WORLD METEOROLOGICAL ORGANIZATION

COMMISSION FOR BASIC SYSTEMS

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OF THE

TENTH SESSION

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NOTE

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CONTENTS

Page

RESOLUTIONS ADOPTED BY THE SESSION

RECOMMENDATIONS ADOPTED BY THE SESSION

Page

GENERAL SUMMARY OF THE WORK OF THE SESSION

1. OPENING OF THE SESSION (agenda item 1)

1.1 The tenth session of the Commission for Basic Systems (CBS) was held in the Geneva International Conference Centre (CICG) from 2 to 13 November 1992. The session was opened at 10.00 a.m. on 2 November by the President of the Commission, Dr A.A. Vasiliev (Russian Federation).

1.2 The Secretary-General, Professor G.O.P. Obasi, welcomed the participants to Geneva and to the tenth session of CBS which was being held on the twenty-fifth anniversary of the approval by Fifth Congress of the first World Weather Watch Programme. Professor Obasi recognized that CBS had the very onerous responsibility of ensuring the development and co-ordinated implementation of the WWW, the basic programme of the Organization and one on which the other programmes depended. He referred to the extremely important developments which had taken place in the past two years regarding the issues of climate change and environmental degradation, including in particular the UN Conference on Environment and Development, in the follow-up of which WMO was playing a very active role. Fundamental to these issues, the Secretary-General stated, were monitoring, analysis, exchange and processing of weather data, which were precisely the responsibilities of CBS. He referred also to the establishment of the Global Climate Observing System which was to be based partly on improved World Weather Watch systems.

1.3 As regards the more traditional items of the session's agenda, the Secretary-General noted the need to continually re-examine, adjust and update the WWW system to meet changing and more demanding requirements. In this regard, he mentioned data management and data quality as two areas in which he hoped advances would continue to be made. He considered that the future of WMO would depend heavily on satellites both as an observational tool and as a means of communication and was pleased to note that they would feature prominently in several items of the session's agenda. Here, he stressed the need to provide ways and means for developing countries to derive full benefits of satellite systems and referred to the transfer of technology as the main theme for the celebration of the World Meteorological Day in 1993. The Secretary-General noted that the session would be discussing the implementation of the new Public Weather Services Programme and congratulated the Commission for its initiative in organizing a technical conference on requirements for meteorological services as expressed by the actual users.

1.4 The Secretary-General recalled the Executive Council's request to CBS to review the concept of basic systems support to programmes other than WWW and to consider any desired changes in its terms of reference in the post-UNCED era. He felt that it was opportune to make a thorough review and assessment of the results of the great efforts that had been devoted to WWW since its inception. There were still many serious deficiencies in the system which were preventing many national Meteorological Services from meeting the ever greater demands placed upon them. He hoped that the Commission would address these issues squarely and propose new initiatives. He made particular reference to the need for greater participation of developing countries in the Commission's work. He considered it necessary to establish an appropriate mechanism to ensure that these countries could contribute more fully to the scientific and technical programmes of WMO and he hoped the session would address this issue and provide appropriate recommendations. He wished the session success in its deliberations.

1.5 The president of the Commission, Dr A.A. Vasiliev, thanked the Secretary-General for the words of welcome and encouragement addressed to the Commission and for his unfailing support to the Commission's activities. The president stated that during the two-year period, since its extraordinary session in London, the Commission and its working bodies had been engaged actively, with the assistance of the Secretariat, in the implementation of the decisions made by Eleventh Congress, by

two Executive Council sessions, as well as by the ninth and extraordinary sessions of CBS. Much had been achieved, but the ever-growing role of meteorology in economic and social activities and in the world-wide concerns with environmental problems had led to new and wider responsibilities for the Commission. The session had a very wide-ranging and comprehensive agenda which would require consideration not only of operational matters but also of the role of the Commission and of the basic systems in support of other WMO and related international programmes. He referred in particular to the follow-up to the UN Conference on Environment and Development and to the consequent need for the Commission to review its own terms of reference. The session would also have to draw up a work programme for the coming years which would focus on the further development and improvement of the basic systems support to a whole range of activities and on the implementation of such important new programmes, as the Public Weather Services Programme, as well as on satellite activities, for which CBS was to be given greater responsibility. The president concluded by expressing his confidence in the combined wisdom, experience and enthusiasm of the Commission members which would ensure a successful and productive session.

1.6 There were 133 participants at the session. These included representatives of 62 Members of WMO, and 10 international organizations. A complete list of participants is given in Appendix A to this report.

2. ORGANIZATION OF THE SESSION (agenda item 2)

2.1 CONSIDERATION OF THE REPORT ON CREDENTIALS (agenda item 2.1)

At the first plenary meeting, the representative of the Secretary-General presented a provisional list of participants for which credentials had been received. Further reports were submitted to the session at ensuing plenary meetings.

2.2 ADOPTION OF THE AGENDA (agenda item 2.2)

The provisional agenda was adopted by the session. The final agenda is reproduced in Appendix B to this report, together with the numbers corresponding to the resolutions and recommendations adopted.

2.3 ESTABLISHMENT OF COMMITTEES (agenda item 2.3)

2.3.1 One working committee was set up to examine in detail the various agenda items. In accordance with proposals made by the president, the following chairmen were appointed for the discussion of individual items:

Mr X. Wu (China), items 6.1 and 6.2;
Mr M. Fischer (France), items 6.3 and 6.6;
Mr P.A. Mwingira (United Republic of Tanzania), items 6.4 and 6.5;
Dr G. Love (Australia), items 6.7 and 7;
Mr R. Sonzini (Argentina), items 8, 10 and 13.

The remaining items would be considered in Plenary or Committee of the Whole, chaired by the president, or, for items 9, 11 and 12, by the former president, Mr J. Neilon (USA).

2.3.2 In accordance with WMO General Regulation 22, a Credentials Committee was established, composed of the principal delegates of Burkina Faso, Japan, Mexico, New Zealand, United Kingdom and Venezuela.

2.3.3 In accordance with WMO General Regulation 24, the Commission established a Nominations Committee and a Co-ordination Committee. The Nomination Committee was composed of the principal delegates of Botswana, Brazil, Canada, Malaysia, Oman, and Sweden. The Co-ordination Committee was composed of the president and vice-president of CBS, the chairmen of the Working Committee and the representative of the Secretary-General. Mr K. Jensen (Denmark) was appointed rapporteur on previous recommendations and resolutions of the Commission.

2.4 OTHER ORGANIZATIONAL QUESTIONS (agenda item 2.4)

Under this agenda item, the Commission agreed that, in accordance with WMO General Regulation 111, minutes would be prepared for plenary discussions on only items 1 and 2 of the

agenda. No minutes would be prepared for the remainder of the session but statements by delegations would be reproduced and distributed as and when requested, in accordance with WMO General Regulation 112. The Commission agreed on the working hours for the duration of the session.

3. REPORT OF THE PRESIDENT OF THE COMMISSION (agenda item 3)

3.1 The Commission noted with appreciation the report of its president, which reviewed the activities of the Commission since its last (extraordinary) session (CBS-Ext.(90)), held in London on September/October 1990. A more detailed analysis of the activities of the Commission was given in the reports of the chairmen of the five working groups and the rapporteurs on the use of quantitative satellite data and on satellite data-retrieval methods. Items in the report requiring action by the Commission were considered under the relevant agenda items. Satisfaction was expressed with the fact that the Commission for Basic Systems, as of 30 June 1992, had 280 members from 117 Members of WMO and that the membership had increased further since then.

3.2 The Commission noted that although there had been no full sessions of the Working Groups on the Global Data-processing System (GDPS), on the Global Observing System (GOS), on the Global Telecommunication System (GTS) and on Data Management (DM), a significant amount of work had been carried out through implementation co-ordination meetings and meetings of sub-groups or expert groups. In all, there had been some thirty meetings related to CBS and/or WWW since October 1990. Follow-up action on most of the decisions of CBS-Ext.(90) was taken or was reviewed by the sixteenth session of the Advisory Working Group which had met in Melbourne (Australia) in November 1991. The various decisions taken by the president, which included the designation of two lead-centres for data quality monitoring, the designation of a number of chairmen of working groups and the approval of several code modifications, were all endorsed by the session.

3.3 As regards the future programme and priorities of the Commission, the session noted and generally endorsed the view that the main challenges facing the Commission were:

(*a*) The greater integration of the WWW through end-to-end data management;

(*b*) The wider introduction of the monitoring of the quality of data and products;

(*c*) The greater application of satellite data and services for remote sensing and telecommunication links;

(*d*) Developing the contribution of the basic systems to climate monitoring and environmental assessment;

(*e*) Ensuring the continued free exchange of WWW data and products between Meteorological Services;

(*f*) The development of Public Weather Services and a greater awareness of how to use them; and

(*g*) Narrowing the gap between developing and developed countries in terms of the installation of facilities and the services and training provided.

3.4 The president expressed his appreciation to all CBS members who had participated in the activities of the Commission and in particular to the vice-president, Dr T. Mohr, and to the former president of CBS, Mr J. Neilon, whose advice and support had been invaluable. He also thanked the chairmen of the working groups and sub-groups, the rapporteurs and other members of the Advisory Working Group, all of who had made substantial contributions to the Commission's work. He expressed his appreciation to the Secretary-General and the staff of the World Weather Watch Department for their unfailing support and co-operation.

4. CONSIDERATION OF THE DECISIONS OF ELEVENTH CONGRESS AND OF THE EXECUTIVE COUNCIL (agenda item 4)

4.1 The session reviewed the various decisions of Eleventh Congress and of the forty-third and forty-fourth sessions of the Executive Council which were of direct relevance to CBS. It was agreed that, for the most part, the follow-up actions to these decisions would either be taken in the normal course of the activities of the Commission and its working groups or would be discussed specifically under other items of the agenda. The main exception to this was the request that the Commission

review its terms of reference, which is discussed in paragraphs 4.12 to 4.15. A brief summary of the session's response to these decisions of Congress and the Executive Council is given below.

WORLD WEATHER WATCH PROGRAMME 1992-1995

4.2 The Commission noted that in adopting the WWW Programme for the current financial period, Congress had placed considerable emphasis on systems support activities with priority being given to:

(*a*) The full implementation and integration of key WWW components and facilities;
(*b*) Improving the efficiency of WWW systems and operations;
(*c*) Introducing new technology and techniques as necessary and appropriate; and
(*d*) The efficient use of available resources in support of (*a*) to (*c*) above;

The Commission urged its working groups to give consideration to the specific activities and/or projects to meet these objectives in their respective areas.

OTHER OBSERVING SYSTEMS

4.3 Noting that Congress had decided that a Global Climate Observing System (GCOS) should be established and that both this system and the proposed Global Ocean Observing System (GOOS) should be based on strengthening existing systems, the Commission requested all of its working groups to keep themselves fully informed of developments in the planning and implementation of these observing systems in order to ensure adequate co-ordination with WWW systems, and to make proposals as to how the basic systems should be strengthened to meet the needs of GCOS and GOOS (GCOS is further discussed under agenda item 7.1).

ENVIRONMENTAL EMERGENCY RESPONSE

4.4 It was agreed that the request of EC-XLIII that CBS keep under review and further develop the operational arrangements for the use of the WWW system in response to environmental emergencies should be acted on by the CBS working groups, and that the regional working groups on WWW be invited to provide appropriate inputs to guidance material on operational, procedural and technical questions of emergency response.

RECOGNITION OF OUTSTANDING SERVICE

4.5 The Commission welcomed the suggestion to recognize formally outstanding and/or exceptionally long service by individuals to the activities of a technical commission and requested the president, with the advice of the Advisory Working Group and in consultation with the Secretary-General, to consider making proposals in this regard.

SATELLITE SERVICE REQUIREMENTS

4.6 The Working Group on Observations was requested to review the list of requirements with a view to its incorporation in the *Guide* and *Manual on the Global Observing System*.

FOLLOW-UP TO THE UN CONFERENCE ON ENVIRONMENT AND DEVELOPMENT

4.7 In light of the results of UNCED, EC-XLIV had adopted Resolution 14 on the Rio Declaration and Agenda 21 and Resolution 15 on the Framework Convention on Climate Change (FCCC). Through these resolutions, an EC Working Group on the Follow-up of UNCED, including Capacity Building was established with the urgent task of reviewing the implications of the results of UNCED for the WMO and national Meteorological and Hydrological Services. The presidents of technical commissions were called upon in both resolutions to ensure that the implications of Agenda 21 and of the FCCC were considered at their meetings.

4.8 A presentation was made on the results of the UN Conference on Environment and Development, including Agenda 21 and the Framework Convention on Climate Change, as well as on Resolutions 14 and 15 (EC-XLIV). The presentation discussed the specific relationship between these activities and those of WMO and the Commission. In this connection, it was recognized that:

(*a*) There was an important role for basic systems in connection with supporting activities in relation to sustainable development efforts; and
(*b*) Significant initiatives had to be taken at the national level in the follow-up to UNCED inasmuch as Agenda 21 (which includes the need for systematic observation and analysis) was essentially a plan of action for national implementation.

4.9 The session also received a brief report on the United Nations Framework Convention on Climate Change by the representative of the Intergovernmental Negotiating Committee's Secretariat. The Commission noted in particular that the Convention, to which there were 157 signatories, provided that States party to the Convention should:

(*a*) Support and further develop, as appropriate, international and intergovernmental programmes and networks or organizations aimed at defining, conducting, assessing and financing research, data collection and systematic observation, taking into account the need to minimize duplication of effort; and

(*b*) Support international and intergovernmental efforts to strengthen systematic observation and national scientific and technical research capacities and capabilities, particularly in developing countries, and to promote access to, and the exchange of, data and analyses thereof obtained from areas beyond national jurisdiction.

4.10 The Commission recognized the implications of both Agenda 21 and the Framework Convention on Climate Change to its work, especially as it applied to strengthening systematic observations and the full and open exchange of data. The Commission also recognized the importance of the role of the national Meteorological and Hydrological Services in implementing the results of UNCED at the local level.

4.11 The Commission decided to appoint a Rapporteur on the Follow-up to UNCED with the urgent task of reviewing Agenda 21 and the Framework Convention on Climate Change in co-operation with the EC Working Group on the Follow-up of UNCED, including Capacity Building in order to identify specific actions which could be taken by CBS and national Meteorological and Hydrological Services in the areas of systematic observations and exchange of data. Resolution 8 was adopted.

TERMS OF REFERENCE OF THE COMMISSION FOR BASIC SYSTEMS

4.12 As a consequence of the decision to transfer the responsibility for satellite matters to CBS, and as part of the follow-up to UNCED, the Executive Council had requested CBS to review the concept of WWW basic systems in support of other WMO as well as non-WMO programmes and that the terms of reference of the Commission be amended accordingly. The session noted with appreciation the president's initiative in informing all CBS members of the EC decision and in inviting them to submit comments and proposals in this regard. Suggestions for amendments to the terms of reference of CBS had been made by a few members, with one submitting a complete proposal for new terms of reference of the Commission and all its working groups.

4.13 The session fully recognized that the basic systems for which CBS was responsible could and should provide support to many programmes other than the WWW. This had already been accepted for a number of years and support was already being provided to such diverse programmes as the World Climate Programme, the Committee on Disarmament, and the IAEA Conventions relating to nuclear accidents, to name but a few. It was also recognized that the basic systems would have to underpin many of the new initiatives, such as the Global Climate Observing System, in the monitoring and study of climate change and the environment and that the system would have to be improved and expanded to meet these challenges. It was agreed that the Commission's terms of reference should be amended accordingly and that corresponding changes be made in the titles and terms of reference of the working groups.

4.14 As regards the longer-term implications of the UNCED process for WMO and CBS, in particular, some Members felt that, in order for adequate support to be provided by the basic systems and for Meteorological Services to fulfil their roles at the national level, it might be necessary to have a fundamental review of how the basic systems were organized and structured, of what the long-term goals and current weaknesses were, and of how the Commission could best meet its responsibilities. Recognizing that this should be part of the long-term planning process, the Commission requested the Advisory Working Group to consider these issues in preparing the Commission's input to the Fourth WMO Long-term Plan.

4.15 The Commission proposed that its terms of reference be revised as given in Recommendation 1 (CBS-X).

5. STATUS OF WWW IMPLEMENTATION AND OPERATION (agenda item 5)

5.1 The Commission received a summary report on the status of implementation of the WWW. It was noted that the sixteenth status report, based upon an enquiry made among Members in mid-1992

and the monitoring exercise of October 1992, was under preparation and would be published before the 1993 session of the Executive Council.

GLOBAL OBSERVING SYSTEM (GOS)

5.2 The Commission noted in particular that:

(a) The percentage of observations carried out in relation to the number of observations required in regional basic synoptic networks was approximately 90 per cent for surface observations and 79 per cent for upper-air observations (radiowind and radiosonde), corresponding to 3 600 surface observations and 725 upper-air observations at each standard observation time. These represented only very small increases over a ten-year period;

(b) In addition to the stations included in the regional basic synoptic networks, the Global Observing System surface-based sub-system also included some 4 500 supplementary stations established to meet national needs, 7 400 voluntary observing ships, some 200 drifting buoys, and more than 600 stations with meteorological radars. Attention was also drawn to the increasing availability of data from sources such as aircraft and automatic stations; and

(c) The space-based sub-system included four polar-orbiting and five geostationary meteorological satellites. These satellite-based systems provided observation (imagery, vertical soundings, etc.) as well as data collection (from data collection platforms) and meteorological information dissemination services.

GLOBAL DATA-PROCESSING SYSTEM (GDPS)

5.3 The Commission noted that:

(a) The three World Meteorological Centres (WMCs) in Melbourne, Moscow and Washington continued to carry out and to disseminate more than 530 analyses and forecasts daily;

(b) More than 2 200 products were prepared daily at the 26 Regional Specialized Meteorological Centres (RSMCs). In addition, a number of other centres (such as the World and Regional Area Forecast Centres) transmitted products over the Global Telecommunication System; and

(c) The three WMCs, 13 RSMCs and a growing number of National Meteorological Centres (NMCs) used computerized numerical weather prediction methods.

GLOBAL TELECOMMUNICATION SYSTEM (GTS)

5.4 The Commission noted that:

(a) All 23 circuits in the main telecommunication network (MTN) were in operation and that 19 of them were telephone-type circuits, operating at a speed of at least 9 600 bit/s;

(b) A total of 219 circuits out of the 267 point-to-point circuits included in the regional meteorological telecommunication networks were in operation (187 satellite/cable/microwave circuits and 32 HF circuits);

(c) The three WMCs, 15 RTHs situated on the MTN, 12 other RTHs and 53 NMCs were automated;

(d) The 20 RTT and 27 radiofacsimile transmissions were made by the RTHs to disseminate observational data and processed information; and

(e) Telecommunication procedures in conformity with standards based on the open systems interconnection (OSI) model, i.e. layer 2 and/or 3, were in operation on 21 GTS circuits, eight of which formed part of the MTN. The X.25 procedures which permitted the exchange of data in binary form (for example, in GRIB or BUFR), were implemented on eight circuits of the MTN.

DATA MANAGEMENT — BINARY REPRESENTATION FORMS

5.5 The Commission recognized that the WWW was now in an open-ended transition period from character-based code forms to binary representation forms. About 30 WWW centres used WMO binary codes for reception of products and/or for internal data handling, whereby the number of

centres using GRIB was much higher than the number of BUFR users. The increasing number of installations of Meteosat meteorological data distribution (MDD) receiving stations, mainly in Africa, handling the MDD broadcast programme which partially used BUFR and GRIB, contributed to the accelerated spread of the WMO binary codes in the meteorological community. This fact had been noted during the last two years. More than two-thirds of the Member countries would need to upgrade their facilities in order to be able to use WMO binary codes. Until this was the case, there was the continuing need to maintain a stream of basic data in character format on the GTS.

ANNUAL GLOBAL MONITORING

5.6 The session was informed that monitoring centres had been invited to present their 1991 annual global monitoring of the operation of the WWW on electronic media in accordance with the formats developed by the Study Group on Operational Matters of the Working Group on the GTS. The Secretariat had received monitoring results presented on floppy disks from 17 centres. Five MTN centres provided results for the global data set and the full monitoring period. The Secretariat could enter the monitoring results into PCs and manipulate the data by using a commercial software package (dBase IV). Much time was saved in entering the data. It was felt that the exchange of monitoring results on electronic media would become an essential method for the adequate and meaningful analyses of the monitoring results.

5.7 A summary of the results of the 1991 annual global monitoring relating to SYNOP reports, Parts A and B of TEMP reports, CLIMAT and CLIMAT TEMP, AIREP and SHIP reports was given in both tables and maps, allowing a comparison between the number of operating stations, the number of reports received and the requirements of both regional basic synoptic networks, and the spacing criteria called for in the Third WMO Long-term Plan. The Commission was informed that there were inconsistencies in the number of AIREP and SHIP reports inserted in the GTS by Members and the number reported at some monitoring centres and exhibited in the summary statistics. The Commission requested that all centres concerned with monitoring these reports should follow the procedures laid down by CBS, thereby allowing for a thorough and systematic analysis of the results and a more satisfactory reporting by the Secretariat.

5.8 The Commission noted with some concern that for each type of report, the numbers actually received at MTN centres were from 10 to 24 per cent less than were made according to Volume A of WMO publication No. 9, *Weather Reporting*. These differences were obviously due to deficiencies in either or both GOS and GTS but any detailed analyses of the deficiencies had not been possible as very few centres had provided information on the suspension of observation programmes or on interruptions in transmissions. The Commission urged Members to provide such information at the time of the monitoring exercise and also to keep the Secretary-General informed of changes in stations and observing programmes in Volume A.

5.9 In complimenting the Secretariat on the improved presentation of the information, the session expressed the hope that this trend would continue through a more in-depth analysis of the data sets and through the use of more graphic displays illustrating the evolution of the system, especially the GOS, over longer periods of time. In this connection, the importance of Members making available metadata, i.e. information on station site and instruments used, was stressed.

6. WWW COMPONENTS AND SUPPORT FUNCTIONS, INCLUDING REPORTS BY THE CHAIRMEN OF WORKING GROUPS AND RAPPORTEURS (agenda item 6)

6.1 GLOBAL DATA-PROCESSING SYSTEM (GDPS) (agenda item 6.1)

REPORT OF THE CHAIRMAN OF THE WORKING GROUP ON THE GLOBAL DATA-PROCESSING SYSTEM

6.1.1 The Commission noted with appreciation the report of the chairman of the CBS Working Group on the Global Data-Processing System, Dr N.F. Veltishchev (Russian Federation). The Commission expressed its satisfaction with the important work carried out by the Working Group through the Expert Meeting of the Working Group on Planning and Implementation of GDPS Centres, held in Geneva on 12–16 November 1990, and the Expert Meeting on Operational Matters of GDPS Centres, held in Geneva on 21–25 October 1991, as well as those activities accomplished by correspondence since CBS-Ext.(90). The topics covered in the report of the chairman and the expert meetings are discussed in detail under the various sub-items of this agenda item.

PLANNING AND IMPLEMENTATION ISSUES OF GDPS CENTRES

6.1.2 The Commission reviewed and endorsed the recommendations of the Working Group on the GDPS on implementation issues of GDPS centres and invited Members and regional associations to address the identified issues as indicated below:

(*a*) Implementation issues at national level:

(i) That efforts be made to define the level of service to be provided by such centres to their communities;

(ii) That efforts be made to explain to decision makers and funding agencies the importance of securing access to already processed data in order to achieve the services referred to above;

(iii) That Members be encouraged to improve the telecommunication and computer infrastructure;

(iv) That some implementation issues be tackled best by ensuring strong commitment of Members who offered to perform RSMC functions. There was also a need for NMCs to initiate and maintain interaction with their associated RSMC so that they could benefit from the RSMC services; and

(v) That the transfer of technology and knowledge be increased through appropriate measures, such as augmented WMO computer-support projects, development and co-ordination of training events addressing specific needs, and the more active exchange of proven meteorological application software.

(*b*) Implementation issues at regional level:

(i) That procedures be established to perform periodic reviews of the capabilities of currently designated RSMCs primarily with a view to assist them to fulfil their role effectively;

(ii) That the criteria developed for RSMC designation for activity specialization be applied when reviewing capabilities of currently designated RSMC centres with geographic specialization; and

(iii) That regional associations be invited to review their need for RSMCs.

(*c*) Implementation issues at global level:

(i) That close co-operation between global and regional centres be promoted in order to ensure that the most efficient use of available GDPS resources occurred;

(ii) That co-operation between centres undertaking global data-processing activities be considered essential and performed on a routine basis; and

(iii) That activities leading to improved products for tropical regions be supported.

DEVELOPMENT OF SPECIFICATIONS OF MINIMUM REQUIREMENTS FOR REAL-TIME DATA-PROCESSING FACILITIES FOR NMCs

6.1.3 The Commission noted the request of Congress to the Executive Council and the Commission for Basic Systems to review implementation strategies for the GDPS and develop, for the benefit and guidance of Members, relevant specifications of minimum requirements for data-processing facilities of an NMC. It noted that the Working Group on the GDPS had identified a range of data-processing functions essential in an NMC under certain circumstances but noted further that the requirements would vary substantially depending upon the Members' national requirements. It reviewed and endorsed the concept of a computer system capable of automating the core functions considered essential in the NMC. The conceptual design identified areas where expert guidance must be sought from other working groups and Commissions for the specifications to be further refined. The guidance on development of specifications are given in Annex I to this report.

6.1.4 The Commission believed that the detailed specification of computerized systems for data-processing and other related functions suitable for use in the NMC was an extremely important activity and therefore requested as a matter of urgency the chairmen of the Working Groups on Data Management and on the Global Telecommunication System to accord priority to the development and provision of more detailed specification of those elements relating to the database, graphics and telecommunications functions.

REQUIREMENTS OF NUMERICAL WEATHER PREDICTION PRODUCTS, THEIR DISTRIBUTION AND THEIR USE

6.1.5 The Commission reviewed trends in numerical weather prediction (NWP), requirements for NWP output products and their availability, and possible new requirements for NWP products at National Meteorological Centres. It endorsed the following recommendations of its Working Group on the Global Data-processing System:

(*a*) The demand for additional NWP products, in particular for grid-point data at higher resolution, should in the first instance be met by the use of GRIB format;

(*b*) The urgent implementation of X.25 protocol in order to facilitate the flow of data between GDPS centres;

(*c*) Where the terrestrial GTS was inadequate, all efforts should be made to develop satellite communication systems for the distribution of NWP products;

(*d*) The NWP output from GDPS centres for use in tropical regions should be improved to meet the needs of NMCs, in particular:

(i) A resolution of at least 2.5 x 2.5 degrees should be achieved;

(ii) Forecasts of precipitation accumulation and vertical velocity should be made available;

(*e*) GDPS centres running global models should, where possible, aim to meet the needs of those RSMCs and NMCs running regional models for the accurate specification of boundary conditions; and

(*f*) RSMCs with regional responsibilities should make all efforts to identify the users of their products and, where possible, meet the requirements for NWP output. This should include bilateral arrangements for the provision of products specially tailored to the needs of an NMC.

VERIFICATION ACTIVITIES

6.1.6 The Commission noted with approval the following recommendations of the Working Group on the Global Data-processing System, which were approved on behalf of the Commission by the president of CBS:

(*a*) It was recommended to modify the list of standard scores to be exchanged as follows:

(i) Anomaly correlation coefficients should replace tendency correlation coefficients. It was felt that the usefulness of exchanging anomaly correlation coefficients would not be adversely affected by the fact that these anomaly correlation coefficients were not based on the same climate fields;

(ii) For verification against wind and temperature observations, a new station list should be added for the tropical area. The European Centre for Medium-Range Weather Forecasts (ECMWF) had made a proposal updating the lists for the areas already defined, following the previously agreed procedure; and

(iii) When screening observations to be taken into account for the calculation of the scores, data differing from the verifying analysis by a certain amount should be rejected. It was considered that a fixed set of limits should be used for that purpose. The UK Meteorological Office and the ECMWF would propose values to be agreed with the other centres participating in the exchange;

(*b*) It was also recommended that centres producing standard scores should be requested to produce an annual summary for insertion in the WWW Progress Report on the GDPS with the following content:

VERIFICATION SUMMARY FOR INCLUSION IN THE ANNUAL WWW PROGRESS REPORT ON THE GDPS

RMS error	Z 500	NH, SH: against analysis
		4 extra tropical standard areas: against observations
RMS vector wind error	W 250	Same areas
RMS vector wind error	W 250	Tropics: against analysis
	W 850	Tropical standard area: against observations

NOTES: 1. Forecast range: 1, 3 and 5 days.
2. All values to be the average of the monthly values over the year.
3. The new list of radio soundings recommended for verification of NWP have been prepared by the ECMWF and forwarded to GDPS centres.

QUALITY CONTROL OF OBSERVATIONAL DATA AND THEIR RECEPTION AT NMCs AND RSMCs

6.1.7 The Commission considered the need to define some terms involved in the general area of quality control and agreed on amendments to the *Manual on the Global Data-processing System* to this effect. It noted that increasing interaction between the quality monitoring programme at the lead centres and the national Meteorological Services would lead to requirements for feedback information from major GDPS data-processing centres to the national observing points. The Commission considered the proposal of its Working Group on the GDPS that the transmission of forecast background information (e.g. fields or vertical profiles) used in NWP operations at observing sites or an NMC would be very useful in quality control. It was felt that further studies, by the Working Group on the GDPS on the implications of this proposal were required.

6.1.8 The session noted that in order to facilitate quality control at the observing site or an NMC, basic PC software for quality control algorithms would be extremely valuable. It was observed that some algorithms employed at major GDPS centres for quality control (e.g. hydrostatic consistency checks for upper-air soundings) could also be used easily by sites equipped with PCs. The Commission recommended that the CBS Software Registry and the related exchange programme be improved and more widely advertised for the purpose of quality assurance.

6.1.9 The session reviewed and updated the procedures and requirements on the quality control of observational data and their reception at GDPS centres and agreed to the addition of procedures and formats for the exchange of monitoring results in Attachment II.15 of the *Manual on the GDPS*, with the understanding that the responsibility for updating this attachment rested with the lead centres. It authorized the president of the Commission to approve changes to this attachment recommended by the lead centres.

6.1.10 The Commission endorsed the view of its Working Group on the GDPS on the concept that quality control information obtained from real-time data-assimilation systems should be incorporated in the quality monitoring and control for data archived in non-real-time and climatological databases. It requested its Working Group on Data Management, in collaboration with the Commission for Climatology, to take into account this concept in developing guidance for database design and development activities.

CO-ORDINATION OF WMC, RSMC AND OTHER MAJOR GDPS CENTRES' OUTPUT PRODUCTS/PROGRAMME FOR REAL-TIME PRODUCTS

6.1.11 The Commission noted that a natural consequence of the trend towards higher resolution numerical weather prediction (NWP) models and their physical sophistication, on both global and regional scales, was the vast amount of information these models could supply. It was seen as a problem encountered by the GDPS to identify the degree of information of use to other centres and to co-ordinate closely between centres in the provision of the increasing requirements for output products. The Commission requested the Working Group on the Global Telecommunication System (GTS) to monitor the flow of GRID and GRIB bulletins in the different segments of the GTS with a view to establishing the degree of overlapping between output products issued by the different GDPS centres. The results of the monitoring should be used by the Working Group on the GDPS together with information on the use of the products received at NMCs to identify bulletins no longer required but still generated and transmitted. The Commission requested the Working Group on Data Processing, in collaboration with the Working Group on Telecommunications, to develop recommendations for minimizing the duplication in output products disseminated through the GTS. This did not preclude the dissemination of similar products for backup purposes.

SUPPORT TO NMCs/RSMCs RUNNING LIMITED AREA MODELS

6.1.12 The Commission agreed that with the growth in the number of limited area models (regional and mesoscale) some kind of co-ordination in the supply of the time-dependent boundary conditions to RSMCs and NMCs (which did not run global or hemispheric models) was needed. Taking into

account the volume of information for limited area models and the variety in geographical locations of their lateral boundaries, the problem of supplying this information could be solved in a more practical way through bilateral agreements between those NMCs and RSMCs running only limited area models and those WMCs, RSMCs and other GDPS centres running global or hemispheric models. The Commission endorsed the view that the experience in this field which already existed in the major GDPS centres, should be transferred to those RSMCs and NMCs requesting such information in order to ensure the uniformity of messages/format for providing lateral boundary conditions.

EXCHANGE OF GRIB PRODUCTS AND INFORMATION ON DATA-PROCESSING ACTIVITIES

6.1.13 The Commission considered and agreed on aspects related to updating the *Manual*, as given in the annex to Recommendation 2 (CBS-X), to reflect the concept of RSMCs with geographical and activity specialization, the current exchange of GRIB products, and the responsibilities of Members for providing information on their real-time data-processing activities.

DATA MANAGEMENT ASPECTS

6.1.14 The Commission noted that the present provisions in the *Manual on the GDPS* as they related to the issues of data processing for non-real-time users (Part III in particular) focused on meeting the needs of data gatherers more than those of users and in some sections advocated the use of standards and techniques no longer in widespread usage. The session felt that the GDPS centres must look to provide a wider group of users with better access to their data. To this end, it supported the principle that the management of databases held in various GDPS centres be more closely integrated through the use of modern database technologies. The session endorsed the concept of a common database for real-time and non-real-time tasks. The Commission, noting that some aspects of Part III had been superseded and that advocated standards and techniques were no longer in widespread usage and did not reflect current practice, approved the proposed changes to Part III of the *Manual*, as given in the annex to Recommendation 2 (CBS-X).

NON-REAL-TIME DATA MANAGEMENT FUNCTIONS OF DATA-PROCESSING CENTRES

6.1.15 The Commission noted that while these functions had not changed in essence, trends in data availability and communications performance were leading to changes. The trends noted included:

(*a*) Greater volumes of data, especially of satellite and other remotely-sensed data;
(*b*) Higher resolution NWP output and a greater use of analysed fields rather than isolated observations;
(*c*) Closer integration with related disciplines such as hydrology and oceanography;
(*d*) A greater role of meteorological services in climate and environmental monitoring, and a broadening of the area for medium-range prediction, long-range outlooks and climate monitoring to provide a global perspective;
(*e*) Requirements for high-resolution data for mesoscale forecasting and modelling; and
(*f*) More asynoptic observations and platforms providing streams of data at high temporal resolution.

6.1.16 The Commission also noted that, in conjunction with these trends, there had been changes in attitudes to data management, including a greater desire:

(*a*) To provide a broader community with access to the data;
(*b*) To use standardized access methods;
(*c*) To record more information about the quality of the data;
(*d*) To be able to inter-compare different types of data sets;
(*e*) To build an audit trail on data so that integrity could be assured; and
(*f*) To build automatically metadata files, that is catalogues providing useful descriptions of the information held in databases.

If the value of non-real-time data sets held by GDPS centres was to be maximized, the focus of these centres must clearly be that of establishing procedures which made the information as accessible and as useful as possible. Emphasizing the functionality of a database aimed at achieving this, and in doing so, it met the needs of the wide community of data users in the most effective way. The Commission invited the Working Group on Data Management to take these matters into account in its work programme.

COLLECTION, STORAGE AND RETRIEVAL OF DATA

6.1.17 The Commission noted the view of the CBS Working Group on the GDPS that the following characteristics were desirable for the storage of data for non-real-time uses within a database structure:

(*a*) There should be a table structure present within the database which provided users with the ability to easily identify the contents of the database (some form of automatic cataloguing system);

(*b*) The database should facilitate the easy inter-comparison of diverse elements contained within it;

(*c*) A given piece of data should be stored in a unique location within the database;

(*d*) The ability to store a wide variety of data with flexibility in adding new types;

(*e*) Easy access from application programs to the stored data;

(*f*) Access should be available via a standard query language. Currently SQL appeared to be the industry standard and should be adopted where possible; and

(*g*) Remote access should be possible for authorized users via systems employing higher level communications protocols (e.g. X.400).

Most of these features suggested that, where possible, the relational database model should be adopted. The Commission invited the Working Groups on Data Management and on the Global Telecommunication System to take into account these views in their work programme.

CLIMATOLOGICAL DATA

6.1.18 The Commission noted that as the relative computing power of different categories of computing platforms increased and as data management systems become more sophisticated, there would be no need to build climatological databases that were separate from the non-real-time databases held in the NMCs. It was felt that through careful consideration of the non-real-time needs within the NMCs as well as of the needs of climatological data, it should be possible to employ a single modern relational database management system for both needs. The Commission requested the Working Group on Data Management in collaboration with the Commission for Climatology (CCl) and the Global Climate Observing System (GCOS) to take into account these views in the design of a database for real-time, non-real-time, and climatological purposes.

6.1.19 The Commission agreed that, where possible, automated quality monitoring systems should be developed which allowed the monitoring of climatological data, including CLIMAT and CLIMAT TEMP messages. The development of these systems should be a co-operative activity between the Working Groups on the Global Data-processing System and on Data Management and relevant bodies of the Commission for Climatology and Marine Meteorology (CMM). The Commission invited these two Commissions in collaboration with CBS, to consider extending the quantity and quality monitoring (including the Lead Centre Programme) currently applied to real-time data transmission to CLIMAT and CLIMAT TEMP messages with a view to increasing the availability of these messages for climate monitoring purposes.

EXCHANGE OF STORED DATA

6.1.20 The Commission reviewed and updated media for exchange, as specified in Part III of the *Manual on the GDPS*, to include computer tape or cartridge for large volumes, floppy disk for smaller data volumes and direct computer-to-computer exchange using higher-level protocols and standard file transfer mechanisms on a bilaterally-agreed basis. The session urged data-processing centres to maintain and publish catalogues of available data and products so as to promote the exchange of stored data. The Commission recognized the need for WMO standards for the exchange of BUFR and GRIB coded data on physical media, and for the exchange of data sets of BUFR and GRIB encoded data records. It requested the Working Group on Data Management to consider defining such standards, in order to replace the current First GARP Global Experiment (FGGE) standard for character codes.

GENERATION AND EXCHANGE BY GDPS CENTRES OF CLIMATE DIAGNOSTIC PRODUCTS AND OTHER NON-REAL-TIME PRODUCTS

LONG-RANGE FORECASTS (BEYOND 10 DAYS) AND OUTLOOK

6.1.21 The Commission was informed that numerical forecasts of periods beyond 10 days were now beginning to be generated at a few centres. It noted that while development of these numerical weather prediction (NWP) techniques was still at a very early stage, the possibility of introducing

operational techniques was now being demonstrated for winter season forecasts by some centres. It was noted that statistical operational seasonal forecasting techniques were well established and were showing improving skill in some tropical areas and especially in those areas affected by the *El Niño*/Southern Oscillation (ENSO). Notwithstanding these developments, it was felt that, at this stage, most benefit of NWP techniques would arise from the exchange of techniques and experience between countries affected by ENSO, and more generally between research groups.

6.1.22 The Commission considered that in order for the provision of longer-range forecasts and outlooks to become an operational feature of the GDPS, after further development of techniques, more thought had to be given to the inclusion of necessary regulations in the *Manual on the GDPS* and to the formats of such products. The Commission approved the proposed updates to Section 5, Part II of the *Manual on the GDPS* with a view to give relative priority to such products (included in updated Attachments II.6, II.8 and II.10).

6.1.23 The Commission endorsed the recommendation of the Working Group on the Global Data-processing System that the list of possible longer-range forecast products needed to be accurately defined by means of the following two approaches:

(*a*) A survey of current research groups, working in the field of longer-range forecasting, requesting an indication as to which parameters were likely to become available with some degree of reliability; and

(*b*) A survey of Members to ascertain likely requirements, and their associated priorities, given the results of (*a*).

Other WMO groups, including the climate community, should also be consulted in this process. A catalogue of the eventual products should be maintained.

CLIMATE DIAGNOSIS

6.1.24 The Commission recognized that most GDPS centres running global assimilation systems had the capability of producing some, or all, of the climate diagnostic products listed in Attachment II.6 of the *Manual on the GDPS*. Such products could therefore be transmitted on the Global Telecomunication System within a few days after their production, on a low priority basis. It recognized the usefulness of exchanging some of these products on a regular basis. The Commission was informed that following a survey by the Working Group on the GDPS on the availability of climate diagnostic products conducted among GDPS centres operating global data assimilation systems and climate centres, the results were being referred to the relevant bodies of the Commission for Climatology and the Working Group on the GTS for consideration.

6.1.25 The Commission adopted consolidated proposals for amendments to the *Manual on the GDPS* as found in Recommendation 2 (CBS-X).

6.1.26 The Commission considered the feasibility of some GDPS centres to begin, in the near future, the exchange of some of the climate diagnosis products identified in Attachment II.6. The Commission requested:

(*a*) The Working Group on the GTS to consider disseminating such products and in particular to provide appropriate bulletin headers for the global exchange of these products, preferably by using the GRIB code; and

(*b*) That upon completion of (*a*) above, and on the recommendation of the Working Group on the GDPS, a few centres should be invited to begin the distribution of the products. The Commission for Climatology was to be kept informed on progress in this area.

GUIDE ON THE GLOBAL DATA-PROCESSING SYSTEM

6.1.27 The Commission recalled that CBS-Ext.(90) had endorsed the proposal of the Working Group on the GDPS that the *Guide on the Global Data-processing System* should be updated in accordance with the table of contents of the proposed revised *Guide*, as given in Annex III to the report of CBS-Ext.(90). The session considered and approved the text developed by the Working Group on the GDPS for the new Chapters 1, 2 and Chapter 3 on methods used in automated processing of data for analysis and prediction; Chapter 4, Section 4.3.1.2.5 on analysis of radar information and Section 4.3.3 on the use of workstations in the forecasting environment; and Chapter 5 on methods of analysis and forecasting in the tropics. It was noted that the current material in Chapter 4 on manual analysis in extra-tropical

latitudes, Chapter 6 on quality control procedures except for the update of geopotential height limit values of the 300 hPa level in Table 17, and Chapter 8 on exchange of personnel, required no changes for the moment, and only minor editorial changes for the RSMC concept were envisaged for Chapter 7. The Commission was informed that following a review of the proposed Chapter 5, there were some suggestions for the restructuring of a few portions of the chapter to incorporate recent developments. It was noted that these were being addressed and would be considered as soon as possible after CBS-X by a panel of major contributors who would finalize the editorial work and consistency of the various chapters. The Commission authorized the president of the Commission to approve any significant updates which might become evident before publication and requested the Secretary-General to arrange for the issuance of a new edition of the *Guide on the GDPS* as soon as possible.

6.1.28 The Commission expressed its sincere thanks for the excellent work carried out by all those who had contributed to updating the new edition of the *Guide*, in particular to the major contributors, Dr N.F. Veltishchev (Russian Federation), Mr D. Katsimardos (Greece), Mr H. Allard (Canada) and Mr K. Prasad (India). It also expressed appreciation for the detailed review work carried out by members of the Working Group on the GDPS and the Secretariat and in particular for the contributions made by Dr P. Julian (USA), Dr P. Francis (UK), Mr T. Hart (Australia) and Mr S. Cheng (Hong Kong).

THE PROVISION OF GUIDANCE ON THE OCCURRENCE OF SEVERE WEATHER

6.1.29 The Commission considered the proposals of the United Kingdom concerning the provision by RSMC Bracknell to other centres, if so requested by the centre concerned, of specialized advisories and bulletins which were more specific to the occurrence of severe weather. The Commission appreciated the proposal of the United Kingdom and agreed that this constituted an encouraging initiative as a contribution to the Public Weather Service Programme of the WMO and the International Decade for Natural Disaster Reduction. It was noted that interpretation of such information which was based on the direct output from NWP models would remain within the competence of the NMC and RSMC in whose area of responsibility the severe conditions were forecast to occur. The Commission agreed that there was the need for a detailed examination of the concept and the methodologies of its implementation. Particular concern was expressed over specific terminology and to the fact that by providing information to centres other than RSMCs, there was a potential to undermine the role of those RSMCs. The Commission agreed that further development of the initiative should be carried out under the guidance of the CBS Working Group on Data Processing.

DESIGNATION OF REGIONAL SPECIALIZED METEOROLOGICAL CENTRES

6.1.30 The Commission agreed that the designation procedures contained in Recommendation 1 (CBS-IX) and as further elaborated by CBS-Ext.(90) in the general summary, paragraphs 5.4, 5.5 and 5.6 should be included in Part I of the *Guide on the GDPS*.

6.1.31 The Commission noted the request of Eleventh Congress that the recommendations of RA I on the designation of Saint-Denis (Réunion) as an RSMC with activity specialization in tropical cyclones be given early consideration. The Commission received with appreciation, and in accordance with the provisions of paragraphs 5.4 and 5.5 of the general summary of the work of the CBS-Ext.(90) session, the formal commitment of France to fulfil the functions of Regional Specialized Meteorological Centre (RSMC) in tropical cyclones for the south-west Indian Ocean. The Commission also received with appreciation the presentation on the capabilities of the Centre. It noted the significant levels of implementation of the operational and scientific capabilities reached by the Centre and the plans to develop further these capabilities. The Commission noted that the Centre was already carrying out the required functions, and agreed that the relevant provisions of the designation procedures had been fulfilled by the Centre and recommended the designation of Saint-Denis (Réunion) as an RSMC on tropical cyclones.

6.1.32 Recommendation 3 (CBS-X) on the designation of an RSMC on tropical cyclones was adopted.

6.1.33 The Commission noted the statements of RA IV and of RA VI that there was a requirement for specialized transport/dispersion/deposition model products to be made available to Members in the Regions and the International Atomic Energy Agency in case of a nuclear accident or other environmental emergencies. It noted the recommendation of RA VI that steps be taken leading to the designation of GDPS centres in Moscow, Toulouse and RSMC Bracknell, as RSMCs with activity

specialization on the provision of transport model products. The Commission was informed of the formal commitments of France, the United Kingdom, the United States and Canada that their centres would fulfil the functions of Regional Specialized Meteorological Centres (RSMCs) on the provision of transport model products. The Commission also received with appreciation the presentations on the capabilities of the four centres. It noted the capabilities of the centres to generate and make available operationally, upon request, the required products in the event of an accident, and agreed that the relevant provisions of the designation procedures had been fulfilled by the centres. The Commission therefore recommended the designation of the GDPS centres in Toulouse, Bracknell, Washington and Montreal as Regional Specialized Meteorological Centres (RSMCs) with activity specialization on the provision of transport model products for environmental emergency response.

6.1.34 Recommendation 4 (CBS-X) on the designation of RSMCs on the provision of transport model products for environmental emergency response was adopted.

6.1.35 The Commission recognized that there was the need for the standardization of transport model products and emphasized the need for the exchange of these products between regional centres with a view to monitoring the quality of the products and their further improvement. The Commission supported the proposal of Canada that an international workshop on user requirements for the provision of transport model products be organized. It noted with appreciation that Canada was willing to host such a workshop in collaboration with the WMO Secretariat.

6.2 GLOBAL OBSERVING SYSTEM (GOS) (agenda item 6.2)

REPORT OF THE CHAIRMAN OF THE WORKING GROUP ON THE GLOBAL OBSERVING SYSTEM

6.2.1 The Commission noted with appreciation the report of the chairman of the Working Group on the Global Observing System, Mr F. Zbar (USA). The Commission expressed its gratitude for the very substantial amount of work accomplished by the Working Group, and in particular by the Study Group on the *Manual* and *Guide on the Global Observing System* as well as by the rapporteurs.

6.2.2 The Commission was very appreciative of the efforts being undertaken at the regional level to review the design of the regional basic synoptic networks and urged that these initiatives continue with all due urgency. The Commission noted with appreciation that several Members had increased the number of observational stations in order to achieve horizontal resolution as required by the Third Long-term Plan.

AIRCRAFT METEOROLOGICAL DATA REPORTING SYSTEM

6.2.3 The Commission noted with appreciation the several reports presented on the development of the aircraft meteorological data relay (AMDAR) system. It was pleased to learn of the rapid increase in the data available from a variety of automated systems installed on commercial aircrafts. This increase was due to the implementation of reporting via VHF by both Australian and US registered aircrafts, and geostationary meteorological satellite by aircraft-to-satellite data relay (ASDAR) equipped aircrafts. At the time of the session, some 10 000 reports were being received daily via VHF over North America and adjacent ocean areas, and similar numbers from Australian aircrafts. In addition, eight AMDAR aircrafts were in service, five more were in the process of implementation, and a further 10 were being procured, for a total of 23 systems.

6.2.4 The Commission was informed by the ICAO representative about progress made by the ICAO Automatic Air Reporting (ATAR) Study Group in developing proposals for provisions to be applied in future air reporting. The Commission noted that both the users and providers of the ICAO WAFS, as well as WMO, were represented at the ATAR Study Group.

6.2.5 The Commission took note of the proposals of the ATAR Study Group, which had still to be approved by the ICAO Air Navigation Commission. The group had agreed that the content of manually-produced air reports should be identical to that of the automatic air report. Furthermore the group had identified the parameters and frequency of the reporting required and agreed that, as a minimum, the reporting frequency should be:

(*a*) Every fifteen minutes for aircrafts:
  (i) South of thirty degrees North;
  (ii) Over other data-sparse areas;

(*b*) Every sixty minutes for aircrafts:
  (i) North of thirty degrees North;
  (ii) Flying on organized tracks; and
(*c*) One sounding (i.e. one set of climb-out reports) per airport per hour.

6.2.6 In this regard, the Commission noted that the aeronautical requirements for meteorological information (*inter alia*, wind and temperature) identified by the ATAR Study Group were similar to those of the ICAO Automatic Dependent Surveillance (ADS) Panel. It was noted that the operational implementation of ADS systems over the Pacific, North America, North Atlantic and Europe was envisaged for 1995 with at least 350 aircrafts equipped with ADS avionics by that time.

6.2.7 Recalling the earlier discussions concerning the implementation of the WWW and the large data-sparse areas that were persistent and difficult to eliminate, the Commission believed that the automated reporting from aircrafts offered an excellent opportunity to provide data over many of these data-sparse areas. Note was made of the ability of the aircrafts to report data at both altitude, and during ascent and descent.

6.2.8 The Commission strongly urged that a mix of systems continue to be implemented in the AMDAR programme. It welcomed, for example, the efforts of the Operating Consortium of ASDAR Participants (OCAP) to implement ASDAR on aircrafts flying routes over Africa, the Indian Ocean, and over the South Atlantic.

6.2.9 The Commission was also informed of the efforts being made both to improve the quality of the AMDAR data and to add additional parameters to the reports. The United Kingdom advised that it had been operating a prototype ASDAR monitoring centre and was willing to continue this function on a permanent basis, if desired by the Commission. The Commission welcomed this offer, and agreed that the continuation of such a monitoring activity was important to the success of the AMDAR activities. It also strongly encouraged the initiative of the United States to examine the possibility of indicating humidity measurements in AMDAR reports and welcomed the offer of the OCAP to assist, as appropriate. It requested the chairman of the OCAP to provide regular reports to the CBS Advisory Working Group and to the chairman of the Working Group on the Global Observing System.

AUTOMATED SHIPBOARD AEROLOGICAL PROGRAMME (ASAP)

6.2.10 The report of the chairman of the Working Group on the Global Observing System contained substantial new information on the status of the Automated Shipboard Aerological Programme (ASAP). The Commission was informed that, in large measure due to the impetus of the Composite Observing System for the North Atlantic (COSNA), 13 ASAP systems had been implemented over the North Atlantic. At any one time, from six to eight systems would normally provide two observations per day. Various studies conducted by the Scientific Evaluation Group of the Co-ordinating Group on the COSNA (CGC), had demonstrated the value of the ASAP data to analyses and forecasts. The Commission thanked the participants in the ASAP for their substantial contributions to the implementation of a valuable observing system.

6.2.11 The Commission learned, however, that despite the success of the programme, the number of ASAP systems had significantly decreased, especially during the past year. Canada had, at one time, operated three ASAP systems over the North Pacific, but two systems had been subsequently removed from service. Finland and the United Kingdom also expected to remove their respective single systems on 1 January 1993 and at the end of 1993. The delegate of Finland informed the Commission that the main reasons for the termination of their ASAP activity were the uneven support by Members for the observing systems over the Atlantic, and the need to shift their priorities to give more support for WWW and other facilities in their immediate area. He also indicated a preference towards binding agreements between Governments in case of commonly financed observing systems.

6.2.12 While the Commission understood the need of Members to carefully consider their overall programmes, it believed that the ASAP programme was one of the most important observing systems which provided high quality data over ocean areas. It not only contributed to the WWW, but was also being considered as an important component of the Global Climate Observing System (GCOS).

6.2.13 The Commission was informed that the United States was in the process of developing a project to reconfigure and modernize the ASAP both to make it more suitable to a wider range of ships and to reduce significantly the overall cost. This effort was given the full endorsement of the Commission, which urged other Members to participate in this activity. Information was also

provided to the Commission on the work of the ASAP Co-ordinating Committee (ACC) to widen the distribution of the ASAP. The Commission reiterated its support for the work of the ACC, and asked that the chairman of the ACC keep the chairman of the Working Group on the Global Observing System informed of all progress made.

Composite observing system for the North Atlantic (COSNA)

6.2.14 The Commission was pleased to learn from the chairman of the Co-ordination Group for COSNA that important progress had been made in the development of the Composite Observing System for the North Atlantic.

6.2.15 The Commission noted with appreciation the organizational arrangements which had been agreed by the participants. While on an entirely co-operative basis, these arrangements had led to significant additional contributions to the observing system over the North Atlantic. It was the opinion of the CBS that such direct action by groups of Members directly concerned with the WWW programmes in specific areas was a highly effective way of improving the design and operation of the basic systems. The Commission, therefore, strongly endorsed such initiatives and recommended that Members give consideration to the possibility of organizing similar activities in their areas.

Wind profilers

6.2.16 The Commission was pleased to learn that good progress had been made in the experimental assessment and operational use of wind profilers in a number of countries. In the United States, the demonstration network of 30 wind profilers being installed in the central part of the country was nearing completion. Data from this network was being used semi-operationally in many forecast offices in the central part of the country and at the NMC. Hourly tracking of the location, movement and intensity of upper-atmosphere features had been found to be very useful for short-range numerical forecasts.

6.2.17 The Commission also noted that 13 European countries had collaborated through COST-74 in the development of operational requirements in obtaining frequency allocations, in making technical and budgetary assessments, and in proposing standards for wind profiler systems. Systems had been installed in a number of collaborating countries and about 100 systems were expected in the next 10 years. Wind profilers had also been installed in China and Australia and were under construction in Japan. Work was also underway to provide temperature and humidity measurements through the radio-acoustic sounding system (RASS).

6.2.18 In view of the potentially operational impact of wind profilers for analysis and forecasting, the Commission requested the Working Group on the GOS to continue co-ordinating the status of implementation of wind profilers world-wide. The Commission also requested the WMO Secretariat to make every effort to assist members in securing appropriate frequency allocations for operational wind profilers in areas in which they were being considered for implementation. Further, the Commission urged Members to encourage national commercial ventures to develop and apply further this technology which had great potential for improving upper-air networks.

Automated surface observing systems

6.2.19 The Commission noted that a growing number of Members were planning or were already implementing automated surface observing systems. Due to some technical or financial constraints, some Members still had no plans for fully automated or semi-automated networks. The Commission also noted that methodologies were being developed to utilize other observing systems to complement and provide additional observing information where some elements were no longer observed manually, such as the use of cloud estimates from satellites or the use of radar and lightning detection systems to provide additional information about thunderstorms. It was further noted that new sensors had been introduced and were being developed for use in the automatic weather stations to overcome the difficulties of observing manually quantities such as visibility, present weather and rain. The Commission expressed the view that information regarding the change-over to these automated systems needed continued co-ordination with Members to ensure that knowledge of the observing network was kept up to date, and requested the Working Group on the GOS to keep this matter under review. The Commission noted the information provided by Oman concerning their development of an instrument for observing drifting sand in arid and semi-arid areas.

Quality control procedures for drifting buoy data

6.2.20 The Commission was informed of the new quality control procedures for drifting buoy data on the GTS, which had been developed by the Drifting Buoy Co-operation Panel and its technical co-ordinator in response to a request made by the Executive Council. It noted that the scheme had been in operation on a trial basis since January 1992. It noted with pleasure that this operation had already had a significant, positive impact on the quality of buoy data available on the GTS, with attendant benefits to both operational and non-operational users of these data. The Commission agreed that these procedures might perhaps provide a model for application to other types of operational meteorological or oceanographic data which were inserted onto the GTS through a small number of centres only, and it was noted that the ASAP had already taken steps to implement a bulletin board approach.

6.2.21 The Commission expressed its congratulations and considerable appreciation to the Drifting Buoy Co-operation Panel (DBCP), its technical co-ordinator, to CLS/Service Argos, and to the participating meteorological and oceanographic centres for their efforts in developing, implementing and operating these procedures. It considered that the procedures represented an innovative solution to the problem of operational quality control of buoy data, which contained implications and possible lessons for WWW data management. Finally, the Commission recalled that the technical co-ordinator for the DBCP was supported entirely through voluntary contributions from Panel Member countries, and it therefore urged as many other Members as possible to consider supporting the Panel financially, so that the excellent work of the technical co-ordinator might be continued in the future.

6.2.22 The Commission requested that the Working Group on the Global Observing System prepare an appropriate amendment to the *Guide on the GOS* to include those new procedures for buoy data, and also to examine their possible wider application.

Manual on the Global Observing System

6.2.23 The Commission, at its extraordinary session (1990), recommended that the *Manual on the GOS* should be reviewed by the Study Group on the *Manual* and the *Guide on the GOS* of the Working Group on the Global Observing System in the light of the recommendations concerning new procedures for quality control made by CBS-Ext.(90). The Commission was therefore pleased to note that the Study Group had proposed necessary amendments to Part VI of the *Manual*, which had been endorsed by members of the Working Group on the GOS. Recommendation 5 (CBS-X) was adopted.

Guide on the Global Observing System

6.2.24 The Commission noted with appreciation that following a recommendation by its ninth session, the Study Group had prepared the draft texts for the global atmosphere watch stations (formerly background pollution stations and ozone sounding stations), planetary boundary-layer stations, and tide-gauge stations as well as for the management of automatic weather station networks for inclusion in Part III of the *Guide on the GOS*. The Commission also noted that the draft text for tide-gauge stations had been co-ordinated with the regulations of the Intergovernmental Oceanographic Commission as requested by CBS-IX.

6.2.25 The Commission expressed its appreciation to the RSMC European Centre for Medium-Range Weather Forecasts, as lead centre, for monitoring upper-air data quality for the preparation of a draft text on data quality monitoring and feedback procedures which should be included in the *Guide* in accordance with the recommendation made by CBS-Ext.(90). The Commission noted that the Study Group had reviewed this text and agreed that most of it should be included in Part VII dealing with monitoring of the GOS, while part of the text should be added to Part VI. Noting that the text referred only to procedures for data quality monitoring for upper-air observations, the Commission requested other lead centres to prepare additional texts for other types of observation.

6.2.26 The Commission noted that all proposed additions and amendments to Parts III, VI and VII of the *Guide* had been reviewed and endorsed by members of the Working Group on the GOS by correspondence. The Commission reviewed the text, proposed modifications and approved the inclusion of these sections in the *Guide on the GOS*.

Future work programme of the Working Group on the Global Observing System

6.2.27 The Commission reviewed the proposals made by the chairman of the Working Group on the GOS and concluded that future work programmes of the working group should include, among

others, additional efforts related to the expansion of the GOS to meet observational requirements for climate monitoring and the needs of WMO and related programmes, the improvement of the regional basic synoptic networks in collaboration with regional associations, the close co-ordination with the CBS Working Group on Satellites to ensure a continued advancement of the GOS in a complete and integrated manner, and the advancement of new observing systems.

6.3 GLOBAL TELECOMMUNICATION SYSTEM (GTS) (agenda item 6.3)

REPORT OF THE CHAIRWOMAN OF THE WORKING GROUP ON THE GLOBAL TELECOMMUNICATION SYSTEM

6.3.1 The Commission noted with appreciation the report of the chairwoman of the CBS Working Group on the Global Telecommunication System (GTS), Ms Sylvia Long (United Kingdom), including the work accomplished by the Joint Implementation Co-ordination Meeting on the Main Telecommunication Network/Global Telecommunication System and Data Management, held in Geneva on 22–26 April 1991, and the third session of the CBS Working Group on Telecommunications/Study Group on Operational Matters, held in Geneva on 23–27 March 1992, under the chairmanship of Mr J. Fenix (United States). The topics covered are discussed in detail under the various sub-items below.

ROUTEING OF GTS MESSAGES

6.3.2 The Commission noted that the detailed analyses prepared by the WMO Secretariat of the results of the 1991 annual global monitoring provided by MTN centres on floppy disks revealed discrepancies in the number of bulletins and reports received by MTN centres. The percentage of bulletins and reports missing at each MTN centre ranged from:

(*a*) 8 per cent to 17 per cent for SYNOP reports;
(*b*) 5 per cent to 24 per cent for TEMP reports;
(*c*) 8 per cent to 51 per cent for CLIMAT reports;
(*d*) 12 per cent to 28 per cent for SHIP bulletins and from 2 per cent to 18 per cent for SHIP reports; and
(*e*) 2 per cent to 16 per cent for AIREP bulletins and from 0 per cent to 46 per cent for AIREP reports.

6.3.3 The Commission felt that the main reasons for the discrepancies in the availability of data between centres were the following:

(*a*) The non-compliance to standard and recommended practices and procedures called for in the *Manual on the GTS*;
(*b*) The catalogue of meteorological bulletins was not timely updated;
(*c*) The deficiencies that existed in routeing the meteorological information on the GTS:
  (i) Incorrect routeing directories;
  (ii) Lack of flexibility in the routeing arrangements; and
(*d*) Deficiencies in the operation of GTS centres and circuits.

The Commission also recognized that apparent discrepancies in the availability of data might be due to the existence of limitations or misapplication of monitoring procedures and use.

6.3.4 As for 6.3.3(*a*), the Commission urged GTS centres to review in a comprehensive manner the implementation of standard and recommended practices and procedures called for in the *Manual on the GTS*, in particular those relating to abbreviated headings (e.g. ii = 01–19 for global exchange, mandatory two digits for the ii group) and to the compilation of reports into bulletins.

6.3.5 As for 6.3.3(*b*), the Commission agreed that a comprehensive catalogue of meteorological bulletins for observational data and processed information be established, maintained and updated, and be accessible by GTS centres in quasi-real-time. This catalogue would be an improved version of the *Catalogue of Meteorological Bulletins* (WMO-No. 9) and would be maintained and accessed as a database. The Commission felt that one RTH per WMO Region could undertake the responsibility of maintaining the part of the catalogue related to the meteorological bulletins generated in the Region with the co-operation of other WMO Members in the Region. The Commission invited WMO Members operating RTHs, and in particular MTN centres, to consider whether they could agree to undertake this responsibility. The Commission requested its Working Group on Telecommunications, in co-ordination with the Secretariat, to develop a proposal for the appropriate format and procedures.

The Commission also agreed that the Secretariat should be responsible for establishing, maintaining and co-ordinating the overall database for the catalogue of meteorological bulletins with the assistance of the RTHs concerned.

6.3.6 As for 6.3.3(*c*) (i), the Commission recommended that routeing catalogues of RTHs be exchanged every three months both between RTHs and between RTHs and their associated NMCs, with a copy to the WMO Secretariat, on floppy disks in the format for the presentation of the routeing catalogue given in Annex II to this report. The Commission noted with appreciation that WMC Washington had already implemented this practice, and invited other RTHs to implement it as well.

6.3.7 As for 6.3.3(*c*) (ii), noting that several GTS centres received data on additional circuits not included in the GTS plan, the Commission recommended that, with a view to improving multilateral routeing arrangements, all GTS centres inform the WMO Secretariat on the implementation of additional circuits (used for meteorological data exchange) not included in the GTS plan and that they include in the routeing catalogues the relevant information on the bulletins exchanged on these circuits.

6.3.8 The matters relating to the routeing of processed information had important consequences on the development of the GTS. The Commission felt that a flow diagram for processed information must be developed. The exchange of routeing catalogues recommended above would provide information on the existing arrangements for the exchange of processed information on the GTS and would also assist the GTS centres in defining new arrangements. The Commission agreed that the development of a detailed plan for the efficient routeing of processed information on the GTS required the definition of the volume of processed information issued from source centres and the detailed requirements of WWW centres, and requested the CBS Working Groups on Data Processing and on Data Management to develop and provide these requirements to the Working Group on Telecommunications.

PRESENT STATUS OF THE IMPLEMENTATION OF THE GLOBAL TELECOMMUNICATION SYSTEM

6.3.9 The Commission felt that updated information on the present status and future plans for the implementation of the GTS and additional circuits was of great interest to WMO Members for making the most effective use of the GTS network. The Commission requested the Secretariat to dispatch regularly this information to members of the Working Group on Telecommunications and to WMO Members, and invited them to provide the Secretariat with the necessary updates of this information as soon as available.

STORAGE OF MESSAGES AT GTS CENTRES

6.3.10 The Commission considered requirements placed upon the GTS as regards the retention of GTS for data in message form and agreed that GTS centres should provide for the recovery of data in message form (any data exchanged over the GTS) for a period of 24 hours.

FORMAT OF METEOROLOGICAL MESSAGES

ATTACHMENT II.5 OF THE MANUAL ON THE GLOBAL TELECOMMUNICATION SYSTEM, VOLUME I, PART II

6.3.11 The Commission recalled that the revised Table D, Level designator ii, Attachment II.5 of Volume I, Part II of the *Manual on the GTS*, as adopted by CBS-Ext.(90), could not be implemented in a meaningful way by the WMCs and some RSMCs/RTHs. Considering these difficulties, the President of WMO approved to defer the implementation of Table D, pending its review by CBS.

6.3.12 The Commission noted with appreciation that, after careful review, the new revised Table D (now called D2) had been prepared by the Study Group on Operational Matters of the Working Group on the GTS and an *ad hoc* sub-group. This new proposed table left in place the definitions of most of the levels as currently encoded in the WMO abbreviated heading that were being transmitted on the GTS. Tables A, B1 and C3 of Attachment II-5 were also reviewed with a view to reflect approved changes or additions in abbreviated headings and to accommodate the code changes. With respect to the Table B1 data designators WC and WV allocated for SIGMET messages on tropical cyclone and volcanic ash, respectively, to meet requirements from ICAO, the Commission agreed that they should be implemented immediately. The Commission recommended that the revised tables of Attachment II-5 be included in the *Manual on the GTS*. It also invited its Working Group on Telecommunications to consider a more advanced method (e.g. electronic bulletin board) to provide for the exchange of proposals for changes to the operational tables for abbreviated headers.

6.3.13 The Commission also noted that Table C1 needed to be revised in order to reflect the creation of new countries. The Commission entrusted the Secretariat with this task, in co-ordination with the chairman of the Working Group on Telecommunications, when official notification from the countries concerned was received.

FURTHER DEVELOPMENT OF ABBREVIATED HEADINGS

6.3.14 Possible combinations for the $T_1T_2A_1A_2ii$ of abbreviated headings had an inherent limitation, and present tables for designation of $T_1T_2A_1A_2ii$ were becoming overloaded. However, the Commission was of the opinion that any revision of the abbreviated heading line with extended fields would be extremely difficult to implement in a co-ordinated fashion at RTHs and NMCs. It agreed that the present system of abbreviated headings could accommodate the increasing variety of data and processed information which had to be transmitted over the GTS, if the allocation of abbreviated headings was devoted to providing the necessary information for switching purposes, rather than providing a precise description of the data or product contained in the message.

DETECTION AND ELIMINATION OF DUPLICATED MESSAGES

6.3.15 The Commission reaffirmed the principle that an abbreviated heading line, including the BBB group, should be used only once and should characterize one message. The abbreviated heading line should therefore be sufficient for the detection and deletion of duplicated messages (i.e. the same message transmitted via different routes). However, "false" duplicated messages (i.e. messages with the same abbreviated heading but with differences in content) were still exchanged on the GTS.

6.3.16 The Commission noted with satisfaction that the Study Group on Operational Matters of the Working Group on the GTS was developing standard procedures for the detection and elimination of duplicated messages with a view to facilitate greatly the implementation at all GTS centres.

BBB GROUP

6.3.17 The Commission endorsed the procedure using the BBB group developed for the segmentation of large sets of information into several bulletins needed for the transmission of larger volumes of information and agreed to recommend its inclusion in the *Manual on the GTS*.

ADDRESSED MESSAGES

6.3.18 The Commission noted the definite requirements for a reliable and fast transmission of messages (e.g. service messages, special data messages, request-reply messages, etc.) from an originating centre to a single addressee centre. Such an example was the transmission of marine meteorological messages in the framework of the Global Maritime Distress and Safety System (GMDSS).

6.3.19 The present procedures for addressed messages would necessitate an unacceptable increase in the number of entries in routeing directories in GTS centres and were not suited for automatic switching. As a consequence, most, if not all GTS centres, were actually handling addressed messages manually, and the GTS was not capable of providing an efficient point-to-point transmission service. With a view to keeping entries in routeing directories related to addressed messages to a minimum, abbreviated headings for addressed messages should only contain the following information:

(*a*) Designator(s) for addressed messages and for the proper identification of the type of message (service messages, special data messages, request-reply messages) enabling GTS centres to route them according to levels of priority;

(*b*) Information needed for the appropriate routeing of the message. Indication of the addressee centre enabled intermediate centres to route the message adequately;

(*c*) Complementary information, in particular the location indicator of the originating centre, would be included in the first line of the text of the message.

6.3.20 The Commission endorsed the proposal developed on this basis by its Working Group on the GTS and agreed to recommend that the *Manual on the GTS*, Volume I, Part II, Section 2.4 — Addressed messages — be amended accordingly.

DEVELOPMENT OF REQUEST-REPLY MECHANISMS

6.3.21 There was an urgent requirement for the standardization of request-reply mechanisms. Necessary procedures for the allocation of abbreviated headings and routeing of addressed messages had been agreed upon. The Commission urged the Working Group on Telecommunications to finalize

the procedures for the text requesting GTS messages taking due account of already existing procedures. The development of the text of request-reply messages related to the access to databases was the responsibility of the CBS Working Group on Data Management, in co-ordination with the Working Group on Telecommunications.

EXCHANGE OF SEISMIC DATA OVER THE GTS

6.3.22 The third phase of the full scale experiment on seismic data exchange (GSETT-2) was carried out from 22 April to 9 June 1991. Seven National Seismic Data Centres (Czechoslovakia, Egypt, Germany, Kenya, Peru, Romania and Zambia), in addition to the International Seismic Data Centre in Moscow planned to make use of the GTS during the phase 3 of GSETT-2. The transmission of data from Peru was not succesful. The exchange of data to and from other centres involved RTHs Offenbach, Nairobi, Norrkoping, Sofia and WMC Moscow. During the experiment there were discrepancies in the volume of received and transmitted information at different GTS centres and seismic centres. RTHs and NMCs concerned were considering appropriate improvements in the specific procedures for seismic messages (e.g. numbering in sequence of messages, acknowledgement of addressed messages, and specific monitoring) to improve the exchange of these data over the part of the GTS concerned. The Commission also emphazised that effort should be continued for ensuring the efficient exchange of Level I seismic data over the GTS according to the present arrangements.

EXCHANGE OF CLIMAT AND CLIMAT TEMP REPORTS ON THE GTS

6.3.23 The Commission noted with concern that the availability of CLIMAT and CLIMAT TEMP reports was far from being satisfactory at some WWW centres and that there were major discrepancies in the availability of these reports between MTN centres. The session noted that the lowest level of priority was allocated to climatic data (T_1=C) in Table A, Attachment II-5, Volume I of the Manual on the GTS. The Commission agreed upon the allocation of a higher level of priority (i.e. 3) to climatic data.

6.3.24 The Commission considered the feasibility of a specific climate data monitoring experiment in near-real-time to be carried out in co-ordination with the Commission for Climatology (CCl). It noted that the objective for a demonstration would be as follows:

(*a*) The demonstration should be of a fixed duration (perhaps six months);

(*b*) For each month of the demonstration, each centre should:

(i) Record the number of CLIMAT and CLIMAT TEMP messages received by the tenth day of the month;

(ii) Request retransmission of messages from stations expected but not received by the tenth of the month; and

(iii) Record the number of CLIMAT and CLIMAT TEMP messages received by the last day of the month.

6.3.25 The Commission stressed that, as GTS centres stored messages for a period of 24 hours, it would not be possible in most cases to satisfy requests for retransmission which might relate to data transmitted several days earlier. It recommended that the GDPS centres or other appropriate centres should therefore endeavour to establish and maintain the capability to meet *ad hoc* requests for information that would no longer be available at the GTS centres. It agreed that this matter should be carefully examined by the CBS Working Group on Data Management with the assistance of the Working Groups on Telecommunications and on Data Processing, in particular with a view to defining adequate interfaces between GDPS and GTS components which would be required at WWW centres.

6.3.26 The session felt that specific arrangements should be defined between the centres participating in such a demonstration with a view to sharing the responsibility (at least at the regional and global level) for, on the one hand, collecting the CLIMAT and CLIMAT TEMP reports and, on the other hand, maintaining the relevant databases which would be accessible to groups of participants. The Commission requested its Working Groups on Data Management and on Telecommunications to further study, in co-ordination with the CCl, the requirements for a special climate data monitoring experiment and, as appropriate, to study its feasibility and to develop the operational arrangements required.

DISSEMINATION OF CLIMATIC ANOMALY PRODUCTS OVER THE GTS

6.3.27 The Commission noted the requirement for the dissemination of climatic anomaly products each month over the GTS submitted by the CCl. The data designator T_1T_2=CA was allocated to climatic anomalies in Table B1, Attachment II-5, Volume I of the *Manual on the GTS*. The Commission

recommended that the content of the products in alphanumerical form be presented within bulletins which could be easily exchanged globally over the GTS. The abbreviated headings of the two bulletins inserted by WMC Washington each month into the GTS would be for example CAUS01 KWBC and CAUS02 KWBC.

6.3.28 The Commission felt that the information contained in chart form would be more easily exchanged on the MTN if presented in GRID (later in GRIB) code forms. It was of the opinion that the capability of WWW centres to convert GRID (and GRIB) bulletins into charts be used in this respect for the further dissemination of information in facsimile form onto GTS circuits, and in particular on dissemination systems such as METEOSAT MDD.

MONITORING PROCEDURES AND OTHER DATA MANAGEMENT FUNCTIONS OF THE GTS

ANNUAL GLOBAL MONITORING OF THE OPERATION OF THE WWW

6.3.29 The Secretariat received monitoring results on floppy disks from 15 monitoring centres. Six MTN centres provided results for global data sets over the complete period 1 to 15 October 1991. The Commission noted that the analyses of the 1991 global monitoring results prepared by the Secretariat provided information of major value to the GTS centres to detect deficiencies in the operation of the GTS. It was the first time that such comprehensive information could be submitted, and the exchange of monitoring results on floppy disks revealed its high potential for the analysis of the monitoring results. The standard formats for the presentation of the results of the annual global monitoring on electronic media, which were proposed to Members for the 1992 global monitoring, are included in Annex III to this report.

6.3.30 The Commission recalled that the plan for monitoring the operation of the WWW recommended that WWW centres exchange regularly monitoring information between themselves, in particular between adjacent centres (see paragraph 5, Attachment I-5 to the *Manual on the GTS*). Noting that the presentation of the monitoring results on electronic media greatly facilitated their processing, it invited adjacent centres which provided monitoring results on electronic media, to exchange them regularly.

6.3.31 The Commission felt that one reason for the discrepancies in the availability of data between monitoring centres, was the difference that still existed in monitoring procedures for counting bulletins and reports. The session agreed that the CBS Working Group on Telecommunications should urgently develop a recommended monitoring procedure for counting bulletins and reports. The use of a unified software package for monitoring would be an ideal remedial solution to the deficiencies mentioned above. This solution could be relatively easy to implement at the centres using PCs for the monitoring. Moreover, the use of a PC for monitoring would considerably facilitate the uniform implementation of monitoring activities in all GTS centres. The Working Group on Telecommunications was requested to pursue its study of monitoring software used on PCs and on its transportability to other PCs, with a view to promote the use of computers at WWW centres for the real-time and non-real-time monitoring activities, including the evaluation of the monitoring results exchanged on electronic media.

SPECIFIC MONITORING ON THE EXCHANGE OF BULLETINS

6.3.32 The Commission endorsed the formats for the presentation of the monitoring results on the exchange of bulletins developed by the Study Group on Operational Matters of the Working Group on the GTS included in Annex IV to this report.

GLOBAL AND REGIONAL EXCHANGE LISTS

6.3.33 The Commission recalled that:

(*a*) CBS-IX agreed that the ideal list of stations, from which SYNOP, TEMP, PILOT (radiowind), CLIMAT and CLIMAT TEMP reports should be exchanged globally (so-called ideal global exchange list), should be the lists of stations included in the regional basic synoptic networks (RBSNs);

(*b*) CBS-IX agreed that the list of stations for global exchange (so-called global exchange list) would be established on the basis of the ideal lists taking into account the stations actually in operation (with respect to observation and telecommunication aspects);

(*c*) The new editions of the global exchange list (included in Attachment I-4, Volume I, of the *Manual on the GTS*) were currently prepared on the basis of RBSNs taking into account the stations actually in operation as reported in Volume A of WMO publication No. 9, *Weather Reporting*, and the additional information relating to the telecommunication means as provided by Members. As regards telecommunication means, little information was specifically provided by Members to update this list; and

(*d*) As indicated in paragraph 3.1, Table D, Attachment I-5 of the *Manual on the GTS*, the global exchange list constitutes the global data set to be monitored for the annual global monitoring.

6.3.34 The principle of using, on the one hand, the global exchange list, which is a sub-set of the RBSNs, as a reference data set for the annual global monitoring and, on the other hand, the RBSNs as a reference for the analysis of the monitoring results led to difficulties. The use of the RBSNs as a reference data set for the annual global monitoring would be more consistent. The Commission noted that the proposal to use the RBSNs as a reference data set for SYNOP, TEMP (radiosonde), PILOT (radiowind),CLIMAT and CLIMAT TEMP reports and to amend paragraph 3.1, Table D, Attachment I-5 of the *Manual on the GTS*, accordingly was submitted by the chairman of the CBS Working Group on the GTS to the president of CBS, who endorsed it, with a view to using the RBSNs as a reference data set for the 1992 annual global monitoring.

6.3.35 The Commission fully supported the decision of the president and agreed that the lists of stations for global exchange included in the *Manual on the GTS* be replaced by the lists of stations of the RBSNs. It also requested the Secretariat to provide the list of stations of the RBSNs on electronic media in replacement of the lists of stations for global exchange, preferably in database compatible format.

FUTURE MONITORING ACTIVITIES

6.3.36 The Commission felt it important that the efforts of the monitoring centres should at first aim at improving the implementation of the present monitoring activities before extending it. It invited WWW centres to implement the monitoring procedures given in Attachment I-5 of the *Manual on the GTS*. It urged, particularly, WWW centres to implement the monitoring procedures in such a way that all the replies to the questionnaire included in Format J of Table D be positive (reply: yes). The Commission encouraged WWW centres to provide monitoring results on floppy disks.

REVIEW OF THE *MANUAL ON THE GLOBAL TELECOMMUNICATION SYSTEM*

6.3.37 The Commission for Basic Systems, at its extraordinary session, held in London in 1990, requested that a large-scale revision of the *Manual on the GTS* be undertaken to reflect more adequately the current and future evolution of the GTS. The session examined a proposed structure for the revised *Manual on the GTS*.

6.3.38 In devising the proposed new structure, the following objectives were borne in mind:

(*a*) The *Manual* would continue to be the primary reference to the current GTS and therefore must retain all relevant material in the existing *Manual*;

(*b*) With the emergence of OSI standards, a relationship between the structure of the OSI seven-layer model and the new *Manual* would be appropriate;

(*c*) The *Manual* should cater for new and future technical standards and systems applicable to the GTS, as well as possible new application systems (such as Electronic Messaging, File Transfer Systems, etc.), that might in the future use the GTS in addition to the existing store and forward message handling system; and

(*d*) The *Manual* should be easy to use, having a systematic numbering system and grouping of related topics.

6.3.39 The proposed *Manual* would contain seven parts in Volume I:

Part 1 would cover the purpose of the *Manual*, give an overview of the GTS and describe the *Manual* in the context of WMO regulations and related manuals and publications;

Part 2 would cover the organizational and administrative framework of the GTS and its centres in a hierarchical sequence from global to national. Parts 2.1 to 2.3 would cover not only existing requirements and responsibilities, but would also foreshadow future developments and evolving requirements and responsibilities;

Part 3 would cover technical aspects corresponding generally to the lower layers of the OSI model. Provision was made for new services such as public data networks and integrated services digital network which were likely to be used for parts of the GTS. New text to cover these items would emerge from the work of the Study Group on Communication Techniques and Protocols;

Part 4 would cover application systems corresponding generally to the upper layers of the open systems interconnection (OSI) model. The first edition of the new manual would contain only existing systems. However, as new systems were implemented (for instance a file transfer system), they would appear in Part 4;

Part 5 would cover control and management functions of the GTS, principally monitoring;

Part 6 would provide information on new application systems appropriate for planning the development of the GTS such as file transfer and electronic messaging systems. As and when these were adopted for use on the GTS, the material could be transferred to Part 4;

Part 7 would contain appendices covering details of message headers, monitoring formats and the Global Exchange List;

The proposed *Manual* in Volume II would contain information specific to each Region and the Antarctic, similarly to the present *Manual*, but with the redundancy removed, and dispersed as appropriate in Volume II.

6.3.40 The Commission expressed its general agreement for the proposed structure of the revised *Manual on the GTS*, and made the following comments:

(*a*) Although the inclusion of text of pertinent international standards (International Organization for Standardization, International Telegraph and Telephone Consultative Committee) facilitated reference to these standards, when needed, the session felt that it would more and more overwhelm the *Manual on the GTS*. The session felt that pertinent extracts of applicable international standards could be regrouped in a separate booklet, which the Secretariat could send to Members, upon request;

(*b*) A comprehensive list of acronyms should be included; and

(*c*) Part 4 should include the operational principles for the development of application software packages.

The Commission requested that the development of the revised *Manual on the GTS* be pursued along these guidelines.

COMMUNICATION TECHNIQUES AND PROTOCOLS

6.3.41 The Commission noted with satisfaction that X.25 procedures were installed or planned for the near future on most of the MTN circuits. The X.25 growth showed the potential ability to distribute binary data and products on the GTS and was a key element in achieving a wide area network supporting WWW activities. Logical multiplexing (virtual circuits) provided by the X.25 layer 3 procedures were successfully used at several MTN centres on various circuits for the exchange of different types of information. The Commission was of the opinion that virtual circuits enabled centres to draw full benefit from the total circuit capacity and warmly encouraged MTN centres to set up virtual circuits in replacement of the physical multiplexing carried out by modems (e.g. V29).

6.3.42 The Commission recalled that the Working Group on the GTS approved the implementation strategy for the introduction of the packet-switching mode of operation, which was the following:

(*a*) Packet-switch equipment was used on a point-to-point circuit to ensure multiplexing of several channels on one circuit as different virtual circuits providing for the exchange of different types of information (e.g. digital facsimile, alphanumeric data, etc.);

(*b*) Packet-switch equipment was used in three or more centres linked by GTS circuits to carry out, in addition to the functions described under (*a*):

(i) Direct routeing of information between two centres via other relay centres, without involving their message switching systems;

(ii) Re-routeing of traffic in the case of a circuit or centre failure; and

(*c*) Full use of the packet-switching mode between several GTS centres on the part of the GTS.

6.3.43 The Commission encouraged Members operating MTN centres to give due consideration to the possible introduction of packet-switch equipment which was considered to be very beneficial for the GTS operation, and to carry out pilot experiments on the use of the packet-switching mode according to the implementation strategy described above.

6.3.44 The Commission agreed that the *Manual on the GTS* be amended to reflect its conclusions mentioned above. The Commission adopted Recommendation 6 (CBS-X) proposing amendments to the *Manual on the Global Telecommunication System*, Volume I, Parts I and II.

6.4 WWW DATA MANAGEMENT (DM) (agenda item 6.4)

REPORT OF THE CHAIRMAN OF THE WORKING GROUP ON DATA MANAGEMENT

6.4.1 The Commission received with interest the report of the chairman of the Working Group on Data Management and expressed its special appreciation regarding the progress achieved in data management matters. The Implementation Co-ordination Meetings on Data Management and the Expert Meetings, held since CBS-Ext.(90), were seen as essential events for the further development of the WWW Data Management concept.

6.4.2 The Commission emphasized that, in the most general sense, the objective of WWW Data Management was to develop a well-structured approach to the packaging, exchange and handling of WWW data to meet the needs of all Members. Over a number of years, deficiencies had been identified in the handling of data in the WWW system and particular concern had been expressed that means needed to be developed to meet new requirements, especially in the management of rapidly increasing volumes of data that needed to be exchanged. The goal was to obtain the best advantage from new types of observing systems and the increasingly valuable output of NWP models.

6.4.3 The functions of WWW Data Management related to the identification of the best procedures for the handling of data from the GOS and GDPS sources through the GTS to the users. They included those functions concerned with the forms used for data representation, with information concerning the availability of data, and with the exchange of information on data quality. These functions might be implemented in part, or as a whole, as integral parts of the GOS, GTS or GDPS systems. In the longer term, they might be developed within automated systems providing a bridge between the specialized components.

DATA REPRESENTATION

6.4.4 The WWW was now in an open-ended transition period from character-based code forms to binary representation forms. The Commission recognized the continued need for character codes for some unspecified period, as was stated in its long-term plan. As BUFR and GRIB would not replace the current WMO character-oriented codes in any wholesale manner in the short term because there were simply too many character-oriented communications lines in use, conversion between character-based forms and binary representation forms might be necessary. It could be envisaged for regional centres to take in individual observations from an assortment of observation sites, combine them, convert them to the BUFR format, and pass them on to national or international centres for world-wide distribution. At the same time these regional centres should be encouraged to use their computing infrastructure to decode and display gridded fields transmitted in GRIB code.

6.4.5 Some centres might consider ingesting BUFR messages on the GTS and then reformatting them back into current WMO character-code forms for local transmission on character lines. Before this was undertaken, serious thought should be given to the purposes of such retransmissions. If they were undertaken to supply non-automated centres with "human-readable" information, then there might be more sense in dropping the use of the sometimes complex WMO codes and send instead the information out in a simple tabular form. Eventually, this would eliminate the need for training in human decoding of the WMO codes. Programming to generate tables, for transmission and display, was much simpler than generating the current WMO character codes. If the transmissions were sent to automated centres, then they should switch over to the binary code forms as soon as possible. Of course, there would be an interim period when both binary and character data were flowing on the GTS, but every effort should be made to avoid converting binary data, particularly BUFR encoded messages, back into the character codes.

6.4.6 It was to be hoped that rather than having each centre develop its own computer code for the manipulation of BUFR and GRIB messages, ideally one, or at most a few centres, take on the responsibility for the development and maintenance of such software.

REQUIREMENTS FOR THE DEVELOPMENT OF SPECIFIC WWW DATA MANAGEMENT FUNCTIONS

6.4.7 The CBS-Ext.(90) considered various requirements for WWW Data Management functions and requested the Working Group on Data Management to develop further refinements. The Commission was informed that the Joint Implementation Co-ordination Meeting on the Main Telecommunication Network/Global Telecommunication System and Data Management, held in Geneva in April 1991, the RA III/IV, held in Washington, D.C. in June 1991, the RA VI, held in Reading, UK in October 1991, the Implementation Co-ordination Meetings on WWW Data Management, and the Expert Meeting on Specific WWW Data Management Functions, held in Reading, UK in November 1991, reviewed the original proposal and decided to add substantive elements.

6.4.8 The Commission discussed the revised set of data management requirements and observed that the growing need for the exchange of satellite imagery data was not reflected in the document, especially with respect to the need for special data representation forms and an assessment of its impact on GTS facilities. Furthermore, some requirements, for instance those relating to the GOS, were not clearly stated. Moreover, the Commission felt that the statement of requirements had been superseded to some extent by the documentation regarding the Distributed Databases Concept and the draft *Guide on Data Management*. It was agreed therefore to refer the set of requirements back to the Working Group on Data Management.

CBS SOFTWARE REGISTRY

6.4.9 The Commission reviewed the status of the CBS software exchange. The Secretariat had carried out a new survey in order to update the CBS Software Registry and the new (1992) edition, published earlier this year, contained 194 offered programs (+ 52) and 265 requested programs (+ 65).

6.4.10 Member countries had also been invited to report on experiences gained in this project. The replies received showed that Member countries were very much interested in the continuation of the project and that they wished to receive updated versions of the CBS Software Registry in the future. Furthermore, Member countries reported that, based on the 1990 edition of the Registry, some 50 programs were given away to meet requests.

6.4.11 The CBS Advisory Working Group, at its sixteenth session held in Melbourne in November 1991, noted the lack of data monitoring software "on offer". The Commission, therefore, encouraged Member countries to especially offer software suitable for monitoring data availability and data quality to other Members through this mechanism.

6.4.12 The Commission further recommended that the following aspects should be taken into consideration when software was being reported for publication in the CBS Software Registry. The programs should:

(*a*) Meet well defined, widespread needs;
(*b*) Be modular in nature;
(*c*) Be written to acceptable software standards;
(*d*) Be written in such a fashion as to be "vendor" independent; and
(*e*) Be well written, documented and maintained, and if possible supported by suitable training events to develop user skills.

6.4.13 In general, the Commission was convinced that this activity contributed significantly to assisting developing and less developed countries in obtaining useful software modules, standardized design ideas and development methodologies, and that, in the longer term, this would help to improve the self-sufficiency of evolving computer centres in these countries. The Commission asked the WMO Secretariat to continue the CBS Software Registry, and the Working Group on Data Management to keep this project under review.

DATA MONITORING

6.4.14 The Commission noted with appreciation that the method of reporting the results of the annual GTS monitoring activities had now been standardized. The widespread adoption of this format, and the standards imposed by the use of DOS-formatted 5.25" or 3.5" floppy disks, would streamline the analysis of the output of these monitoring exercises.

6.4.15 The Commission was pleased that a number of lead centres were now carrying out data quality monitoring. These included:

(*a*) RSMC Bracknell for the monitoring of marine-surface data quality;
(*b*) RSMC ECMWF Reading for the monitoring of upper-air data quality;
(*c*) WMC Washington for the monitoring of aircraft and satellite data quality;
(*d*) RSMC Tokyo for the monitoring of land-surface data quality in Region II; and
(*e*) WMC Melbourne for the monitoring of land-surface data quality in Region V.

6.4.16 The Commission noted with appreciation the reports presented by delegates from Australia and Japan on activities carried out by the lead centres Melbourne and Tokyo for monitoring the quality of land-surface observations in Regions V and II, respectively. The Commission was pleased to learn that after their designation these lead centres had produced comprehensive reports on the quality of sea-level pressure observations on a monthly (Region V) or six-monthly basis (Region II), which had been distributed to Members. The Commission welcomed the offer of these lead centres to provide software and guidance material to those centres which could be designated as lead centres for monitoring the quality of land-surface observations in other WMO Regions.

6.4.17 The Commission learned with appreciation that RSMC Offenbach, Germany volunteered to carry out data quality monitoring as lead centre for land-based surface observations in RA VI as of January 1993. It was also mentioned that RSMC Montreal was seriously considering carrying out data quality monitoring as lead centre for land-based surface observations in RA IV and would make a decision before April 1993. The Commission felt that with the concept of lead centres now well developed there was a pressing need to complete the required global coverage for the quality monitoring of land-based surface observations, and to improve the system for feeding back information gained to the data producers. The feedback of data monitoring results to the data producers was considered to be of prime importance, not only in delayed mode but possibly also in near-real-time.

6.4.18 The non-real-time feedback took the form of exchange of lists of suspect stations, including an indication of the number of gross errors detected, between participating Members, with the list also being forwarded to the WMO Secretariat.

6.4.19 The Commission agreed that the data quality monitoring issues still to be addressed by the Working Groups on the GOS and on Data Management included:

(*a*) Ensuring that this monitoring programme was complete and consistent throughout the WWW;
(*b*) Facilitating further the collection and exchange of monitoring information;
(*c*) Establishing a system for in-depth analysis of the monitoring information; and
(*d*) Disseminating the analyses of monitoring results to the appropriate WMO Department/Division.

6.4.20 The Commission stressed the need for training events and material to prepare the Members, especially the developing ones among them, to become able to benefit fully from the new data management functions and principles. Of special importance in this context were training courses in computer system operating and management, automated data handling and code matters (character as well as binary), visualization techniques, and qualitative and quantitative data monitoring. The Secretary-General was invited to arrange for, and support, such training as a matter of priority. In this context, India kindly offered to sponsor lecturers specialized in computer management and operating from the Indian RMTC, to assist in corresponding WMO training events.

GUIDE ON WWW DATA MANAGEMENT

6.4.21 The CBS-Ext.(90) requested the Working Group on Data Management to develop a *Guide on WWW Data Management* as a matter of urgency. The Commission noted with satisfaction that it had been possible to present a draft version of the *Guide* for consideration already at this session and expressed its special appreciation to all those who had contributed manuscripts to the *Guide*, especially Messrs G. Love (Australia), who had also performed the final editing, W. Brockman, C. Dey, A. Hernhuter, J. Stackpole and F. Zbar (all from the United States), C. Little, A. McIlveen, and R.J. Sowden (retired) (all from the United Kingdom), C.F. Reudink (retired) (Netherlands Antilles), C.Y. Lam (Hong Kong), J.K. Gibson (ECMWF), and D. Schiessl (WMO Secretariat).

6.4.22 Upon reviewing the draft *Guide*, it was noted that it reflected the co-ordinated view of the Data Management experts in WWW and that it was well designed to meet the following objectives:

(*a*) To provide a clear statement of WWW Data Management requirements and how they could best be met in the long term;

(*b*) To provide an information document describing concepts and principles of WWW Data Management;

(*c*) To provide technical information on those data management issues for which clear direction was presently not given by existing WMO statements of specifications, regulations, etc.; and

(*d*) To provide a technical record of certain strategic directions in WWW Data Management.

6.4.23 The Commission requested the Secretary-General to finalize the editorial work, as necessary, and approved the *Guide on WWW Data Management* for publication in English, French, Russian and Spanish as soon as possible. The Commission requested its Working Group on Data Management to keep the *Guide* under review and to develop updates or supplements, as and when necessary.

6.4.24 The Commission decided that this *Guide* should be presented to other technical commissions of WMO with a view to developing jointly one comprehensive WMO *Guide on Data Management*, which should contain all related requirements, concepts and policies of the commissions under the co-ordinating leadership of CBS. It was anticipated that the rapid changes in this specific area might require frequent amendments or updates. It was therefore requested that the *Guide* be published in a loose-leaf form, despite the somewhat higher costs this might entail.

METEOROLOGICAL AND OCEANOGRAPHIC REPORTS THROUGH THE INTERNATIONAL MARITIME SATELLITE SYSTEM (INMARSAT-C)

6.4.25 The Commission was informed that the new INMARSAT-C communications system would become mandatory for all ships as of 1999 and that the implementation phase commenced in 1992. The system had been developed for two-way store and forward telex or data messaging communications from ships via satellite. This system would bring about a number of advantages and improvements in procedures for generating and transmitting ship weather and oceanographic reports with higher reliability of reception at considerably lower message costs to national Meteorological Services.

6.4.26 The Commission was further informed on the intensive co-ordination between INMARSAT and WMO in this matter. It was agreed that the requirements of national Meteorological Services for data reporting through INMARSAT-C were as follows:

(*a*) The procedures should cover the transmission of both meteorological and oceanographic reports;

(*b*) Software for encoding and transmission of the reports from a ship earth station should be as simple as possible to install, operate and modify;

(*c*) No special decoding software should be required at those NMCs receiving the reports from coast earth stations, with the reports being encoded in standard WMO code forms suitable for transmission on the GTS. This implied the use of these code forms throughout the transmission process;

(*d*) Procedures should be applied uniformly, both on ships and at NMCs, to facilitate development, maintenance and distribution of software;

(*e*) As large cost savings as possible; and

(*f*) Immediate installation on ships already equipped with INMARSAT-C terminals.

6.4.27 The Commission was informed that the National Ocean and Atmospheric Administration, USA had developed a PC-based software for implementation on ships for encoding the corresponding marine observations in SHIP, BATHY, TESAC, and TRACKOB. This software would be generally available upon request in early 1993. This software also included quality control functions. The Netherlands, providing a similar software package, reported on difficulties encountered in the telecommunications module of the software which arose from the wide variety of poorly standardized hardware systems for the INMARSAT-C link used on board ships, and voiced a concern about the feasibility of a long-term maintenance of the software through a central source.

6.4.28 The Commission realized that it might not be possible to meet all the requirements to their fullest extent because of technical constraints determined by the characteristics of two different modes of transmission procedures available on the INMARSAT-C service and by the technical

capabilities of some NMCs for collecting the reports. It was, therefore, recommended that the WMO Secretariat pursue the co-operation with INMARSAT with a view to:

(*a*) Implement, as soon as possible, suitable procedures for the transmission of reports in WMO standard formats on the INMARSAT-C messaging channel bearing in mind the already substantial cost savings this would entail;

(*b*) In the short term, arrange for central sources for the development, maintenance and distribution to meteorological services of software for encoding and transmitting meteorological and oceanographic reports in WMO standard forms; and

(*c*) In the medium term, investigate options for obtaining greater savings through the use of the INMARSAT-C signalling channel.

DISTRIBUTED DATABASES (DDBs) CONCEPT

6.4.29 The Commission noted with appreciation that since the principal endorsement by CBS-IX (1988), considerable progress had been achieved in the development of the WWW Distributed Databases concept. The Commission felt that the growing requirements for the routine exchange of basic data were best met through both specific data management functions on the GTS and the necessary upgrade of the transmission capacity of the GTS. In addition to these, there was an increasing demand for the provision and exchange of new data, partially in an *ad hoc* mode.

6.4.30 The WWW was increasingly being called upon to provide support services to other Programmes, for example, the Global Climate Observing System and the Global Ocean Observing System. Furthermore, specific data sets from a vast amount of auxiliary data and reference data were needed at irregular intervals for the support of WWW operations. Both trends solicited the development of a flexible, modern DDB infrastructure. In view of this, the Commission agreed to the principle that the DDBs concept should meet the requirements for the provision of data needed in the WWW system but not routinely exchanged on the GTS, and should support new and emerging needs for data, partially outside of the WWW system and endorsed the concept of the DDBs as given in Annex V to this report. In the light of this, the Commission decided to change the term WWW to WMO in the name of the concept. The Commission accepted that the logical description in the Annex had validity today but envisaged that in due course the existing GTS and the DDBs functions would be subsumed into a comprehensive GTS.

6.4.31 The use of an open-systems architecture and of public data network facilities, whilst providing greater flexibility and a higher level of availability than fixed dedicated circuits of the present closed GTS system, would make the system more vulnerable to unauthorized access than had been the case on the present GTS. It would be necessary to mandate minimum security measures to be implemented by participating Members. In addition to these standard minimum measures, Members might feel the need to implement additional security features. The Commission asked its Working Groups on Data Management and on Telecommunications to take the security aspects into account in their future DDBs-related activities.

6.4.32 The Commission noted that a strategy was emerging for achieving the implementation of the DDBs. In essence, the strategy was meant to identify those elements which must be present in the DDBs and commence to build them — prototypes first, limited implementations between volunteers after this, and finally adoption of the successful techniques and technologies as WMO standards. It was emphasized that, before any resources could be committed, it was important to establish a full understanding of the ultimate requirements of the users and the benefits to be gained.

6.4.33 As a first step, requirements for new databases should be identified and consolidated. Then, prototype DDB systems should be implemented on a trial basis which should provide centres with access to new data and metadata. WMO Members should become involved, as early as possible, in the planning process. A number of Members expressed a strong interest in participating in such trials. To this end, the Commission agreed that a survey be carried out as soon as possible and in the mode proposed by its Working Group on Data Management to collect information on the future requirements and the envisaged role of DDBs centres. The Commission, in particular, welcomed the intent to use the survey also as a means to inform the WWW community and interested users outside of the WWW on the concept and potential services to be provided by the DDBs.

6.4.34 The Commission thought that the information contained in WMO publication No. 9, *Weather Reporting*, Volumes A and C, might be particularly suitable for a DDB trial. In this connection,

Members were once more encouraged to review and update their input in this publication in order to ensure the best possible actuality when the data would move to a database.

CHARACTER CODES

6.4.35 The Commission noted with appreciation the work of the Sub-group on Codes of the Working Group on Data Management and thanked the last two chairmen, Mr C.F. Reudink (Netherlands Antilles) and Dr A. Hernhuter (USA), for their excellent leadership and contributions.

6.4.36 The Commission noted small modifications in order to report wave frequencies in FM 65-IX WAVEOB, to delay reporting of net short wave and direct solar radiation in FM 12-IX Ext. SYNOP, FM 13-IX Ext. SHIP, to include 925 hPa in Code table 1734, to add two new entries for radiosonde systems in Code table 3685 and for amendments to aeronautical codes arising from the final updates to ICAO Annex 3 (*WMO Technical Regulations*, Volume II) for use as from 1 July 1993.

6.4.37 The Commission reaffirmed that changes in character codes should be introduced only if they were absolutely necessary. Implementation dates of modifications to codes should provide sufficient time for the development of the modifications in the corresponding software in all the related meteorological data-acquisition and data-processing systems. The Commission recommended that Members start the development work as soon as the modifications were recommended by CBS.

6.4.38 The Commission recommended that, in order to avoid changes in operational software and systems during holiday periods or week-ends, the implementation date for modifications to existing codes or for new codes, be the first Wednesday following the first of November.

6.4.39 The Commission considered the implementation dates for the modifications recommended to codes, as referred to in paragraphs 6.4.43 through 6.4.48. The Commission, taking into account the time required for development of the corresponding necessary modifications in operational software, recommended 2 November 1994 as the date for implementation of the modifications, with the exception of two pressing changes, which the Commission recommended for 3 November 1993. The two exceptions related to:

(*a*) Reporting of net short wave and direct solar radiation in FM 12-IX Ext. SYNOP and FM 13-IX Ext. SHIP (see paragraph 6.4.44), recommended by CBS-Ext.(90), but which were delayed because of confusion with other data groups; and

(*b*) Reporting of winds derived from water vapour motion in FM 88-VI Ext. SATOB (see paragraph 6.4.47), which replaced the current *ad hoc* practice used to report these winds.

6.4.40 The Commission reviewed the proposal for a flexible character code for reporting sea-level data (SEALEV), which had already been endorsed by the Integrated Global Ocean Services System (IGOSS), and took note of the work done by the Sub-group on Codes on the development of a Flexible Universal Character Code (FLEX). The Commission noted that there was an immediate use of real-time sea-level data by the oceanographic community and also by some meteorological institutions (e.g., for storm surge warning models, ocean/atmosphere models). Sea-level data were also required for climate change monitoring.

6.4.41 Considering the long-term implications of these developments, the Commission recommended:

(*a*) That the requirements for the code SEALEV be fully documented, with particular care being taken to identify those developing countries which would be early users of the code (recipients of data transmitted in SEALEV code);

(*b*) That if the FLEX code proved to be of value, then SEALEV would be subsumed into FLEX;

(*c*) That the possible developments in FLEX be driven by user requirements, including human readability;

(*d*) That a closer working relationship be sought between the Working Group on Data Management and the Intergovernmental Oceanographic Comission/International Oceanographic Data Exchange (IOC/IODE), and mutual participation of experts be encouraged in the co-ordination of issues related to the timing for implementation of changes in GF3 tables of parameters of the IOC/IODE GF3 standard;

(*e*) That the IOC be asked to nominate one or more experts to join the Working Group on Data Management to participate in its deliberations on data representation and codes; and

(*f*) That two centres be identified, which were willing to develop, maintain, document and freely exchange SEALEV, encoders/decoders.

6.4.42 With the conditions listed above, the Commission approved the use of the new code named SEALEV, as described in Annex VI to this report, on an experimental basis as from 1 December 1992. The Commission agreed that the development of a flexible universal character code (FLEX) should continue in accordance with the conditions listed above and requested that there should be a clear linkage between tables developed for FLEX and tables maintained for BUFR.

6.4.43 Noting the requirements expressed by the Commission for Climatology, the Commission for Basic Systems reviewed and agreed the proposed amendments to the CLIMAT code, in order to provide for the transmission of additional climatological data and metadata. These amendments would help those developing countries that did not have the necessary capacity to reconstruct daily and monthly climate information. They would also better support the climate change detection and research work. Recommendation 7 (CBS-X), containing the amendments to FM 71-VI CLIMAT code, was adopted.

6.4.44 The Commission reviewed and agreed on a proposed addition to the SYNOP and SHIP codes to finalize the procedure for reporting net short wave and direct solar radiation. Recommendation 8 (CBS-X), containing the amendments to FM 12-IX Ext. SYNOP and FM 13-IX Ext. SHIP, was adopted.

6.4.45 Noting the proposals made by the Commission for Marine Meteorology for modifications to the SHIP code, the Commission reviewed the proposed modifications and decided to maintain the present method of indicating the position of the ship ($99L_aL_aL_a\ Q_cL_oL_oL_oL_o$), but agreed to the following modifications to the SHIP code:

(*a*) The addition of a group for reporting wet bulb temperature;

(*b*) The mandatory reporting of all present weather, past weather, cloud, and wave groups; and

(*c*) The indication for type of measurement of sea surface temperature.

Recommendation 9 (CBS-X), containing the amendments to FM 13-IX Ext. SHIP, was adopted.

6.4.46 Noting the requirements expressed by the Drifting Buoy Co-operation Panel (DBCP) for modifying the DRIFTER code, the Commission reviewed and agreed on the proposed amendments to the DRIFTER code, to provide for:

(*a*) Changing the name of the code from DRIFTER to BUOY;

(*b*) Addressing the concern of oceanographic researchers regarding confidentiality; and

(*c*) Adding quality control indicators based on the standard IGOSS quality control flags.

Recommendation 10 (CBS-X), containing the FM 18-X BUOY code replacing the FM 18-IX Ext. DRIFTER code, was adopted.

6.4.47 The Commission reviewed and agreed on the proposed amendments to the SATOB code to include winds derived from water vapour motion and to report a more accurate time for observations. Recommendation 11 (CBS-X), containing the amendments to FM 88-VI Ext. SATOB, was adopted.

6.4.48 The Commission reviewed and agreed on proposed amendments to the CLIMAT TEMP code to avoid confusion regarding the reporting of wind in knots or metres/second. Recommendation 12 (CBS-X), containing the amendment to FM 75-VI CLIMAT TEMP and FM 76-VI CLIMAT TEMP SHIP, was adopted.

6.4.49 The Commission noted that the IAEA confirmed in May 1992 that it did not plan to use the RADREP code for accident notification purposes. The Commission noted that while the RADREP code was designed to transmit observed/measured data, the convention notification and information structure format designed by IAEA was developed to transmit not only such data, but also information in text form. The code did not seem to serve the same purpose. Nevertheless, the Commission felt that, for practical reasons, the RADREP code, including Sections 1 and 5, relating to nuclear accident, should remain in the *Manual on Codes*.

6.4.50 The Commission further noted that no requirement had been brought forward by IAEA or other parties for the revision of the current radiological code RADREP. The Commission therefore agreed that the present code form FM 22-IX Ext. RADREP should remain unchanged.

6.4.51 The Commission recognized the growing interrelationships between character codes and binary data representation, the policy to minimize the changes to character codes, and the investigation of suitable flexible codes for new data types. The Commission therefore invited the Working Group on Data Management to consider combining the Sub-group on Data Representation of the Working Group on Data Management and the Sub-group on Codes of the Working Group on Data Management to form a single Sub-group on Data Representation and Codes within the Working Group on Data Management.

6.4.52 The Commission recognized the potential for rapid development in binary representation forms and, therefore, authorized its president, upon recommendation of the chairman of the Working Group on Data Management, to approve on its behalf (without recourse to WMO Regulation 76), during inter-sessional periods, changes to code tables associated with binary representation forms.

6.4.53 The Commission considered the future work programme related to character codes of the Working Group on Data Management beyond CBS-X and it agreed that, among its tasks, the following items would require further study by the Working Group:

(*a*) Development proposals on the SEALEV and FLEX codes, taking into account adjustments and refinements to the codes and reports on the experimental use of SEALEV;

(*b*) Maintenance of existing code forms, keeping in mind that only indispensable modifications should be recommended;

(*c*) Endeavouring to satisfy, if practicable, new coding requirements within a flexible data representation. The objective would be to propose new entries in tables as required, rather than creating new code forms; and

(*d*) Updating the radiological codes, if required, on the basis of expressed WMO policy on emergency environmental matters.

6.5 WMO SATELLITE ACTIVITIES (agenda item 6.5)

REPORT OF THE RAPPORTEURS ON SATELLITE DATA RETRIEVAL METHODS AND ON THE USE OF QUANTITATIVE SATELLITE DATA

6.5.1 The Commission noted with appreciation the depth and quality of the report of the CBS Rapporteurs on Satellite Data Retrieval Methods and on the Use of Quantitative Satellite Data.

6.5.2 Taking into account the various proposals made by the rapporteurs, the Commission agreed that:

(*a*) The earliest possible deployment with international collaboration of improved high spectral resolution sounders on polar and/or geostationary platforms should be encouraged. The goal of common instrumentation should be established;

(*b*) A co-ordinated research and development effort should be undertaken to prepare Advanced TOVS (ATOVS) software that could be shared by the international community for the benefit of all. In particular, the development of software for operational use was strongly supported;

(*c*) Direct read-out services from meteorological satellites were essential and satellite operators were urged to continue these services at present and for the next generation of advanced sounders;

(*d*) There was a growing need for co-ordinated international training programmes regarding the use of satellite data and advantage should be taken of the offer of the International TOVS Working Group to help, where WMO deemed appropriate;

(*e*) TOVS data with a resolution of 500 km no longer satisfied the needs of advanced NWP models, and even less so for other applications. Assimilation studies indicated that TOVS data with a resolution of 250 km or better should be exchanged. Additional information from advanced very high resolution radiometer (AVHRR) data should be transmitted in a form which allowed them to be used in TOVS quality control;

(f) The recent Joint NOAA/EUMETSAT/WMO Workshop on Wind Extraction from Operational Meteorological Satellite Data was effective in providing a forum to help improve wind quality and to assist wind users in their effective application. Further activity of this type (including direct support) was to be strongly encouraged;

(*g*) Improvements in forward radiative transfer models remained crucial and constituted a prerequisite for any significant progress in the use of satellite data in NWP. As a result, increased efforts to develop an improved understanding of the radiative transfer problem were encouraged and validation through airborne experiments, satellite/radiosonde collocations and ground-based measurements were recommended;

(*h*) TOVS data might demonstrate an inherent bias, which was a likely cause of the sometimes disappointing impact on NWP. To ameliorate this, considerable effort was encouraged to affect greater direct use and local tuning of radiances, monitoring of biases, and access to uncorrected RAOB data. In addition, the ongoing process of maintaining quality control of TOVS products by user feedback to the provider of products was to be encouraged;

(*i*) Besides their use in NWP, TOVS data might be used as a tool for the monitoring of synoptic developments and nowcasting. Studies in this field of application were encouraged; and

(*j*) Historical TOVS data were a unique source for climate studies. They were already part of the NOAA/NASA Pathfinder data set and would be available and easily accessible.

EC PANEL OF EXPERTS/CBS WORKING GROUP ON SATELLITES

6.5.3 The Commission considered the report of the chairman of the EC Panel of Experts/CBS Working Group on Satellites, which met in Geneva from 16 to 20 March 1992. It also noted actions which EC-XLIV had taken with regard to recommendations from the tenth session of the Panel/Working Group.

6.5.4 The Commission noted that a short list of satellite data requirements had been prepared based on input from the technical commissions and that the list was being reviewed by the commissions prior to submission to EC-XLV for approval. It noted that the list had been forwarded to the chairmen of the CBS working groups. The Commission agreed with the development of the short list and requested that comments of the chairmen of CBS working groups be incorporated into the list.

6.5.5 The Commission noted that there would be a conversion of APT/WEFAX from analogue to digital transmission format near the end of the decade. The Commission noted that an analysis of a survey of WMO Members showed that the conversion was generally acceptable. However, some WMO Members did have reservations concerning the length of overlap between analogue and digital transmissions.

6.5.6 The Commission noted the terminology for the new digital services, namely low-rate picture transmission (LRPT) to replace the present analogue automatic picture transmission (APT), the low-rate information transmission (LRIT) would replace the present analogue weather facsimile (WEFAX).

6.5.7 The Commission agreed with the importance of a statement of WMO requirements for continuity of the space-based portion of the GOS endorsed by EC-XLIV. It was pleased to learn of the recent Co-ordination of Geostrationary Meteorological Satellites (CGMS) Working Group Meeting on Global Contingency Planning where EUMETSAT, NOAA/NESDIS and Japan had agreed to consider and study contingency planning that could provide continuity of data necessary to WMO Programmes.

6.5.8 The Commission strongly emphasized the importance of satellite data for national Services and cited many examples of specific applications including ozone estimation, tropical cyclone forecasting, and drought monitoring.

6.5.9 The Commission acknowledged the significant progress made in the past year toward the transfer of responsibility from the EC Panel of Experts to the CBS Working Group on Satellites. It believed that the present joint EC/CBS body could complete its tasks by June 1993 and that, at that time, EC-XLV would confirm its earlier decision to transfer the responsibility for satellite matters to CBS. The Commission further felt it important that the CBS Working Group on Satellites meet prior to the next Congress.

6.6 RADIO FREQUENCIES FOR METEOROLOGICAL SERVICES (agenda item 6.6)

6.6.1 The World Administrative Radio Conference (WARC-92) met in Malaga/Torremolinos (Spain) from 3 February to 3 March 1992. The Commission noted its decisions regarding frequency bands for meteorological activities.

6.6.2 On the one hand, WARC-92 allocated world-wide the band 2025–2110 MHz and 2200–2290 MHz to the space research, space operation, and earth exploration-satellite service on a primary basis. However, the co-primary allocation to the mobile service was maintained in the band, and the Conference invited the International Radio Consultative Committee (C.C.I.R.) of ITU to continue the study of provisions to protect the space services from possible harmful interferences. These bands, also called S-bands, were of particular importance for meteorological satellite operations. WARC-92 also

adopted a resolution that the next competent WARC should examine the allocation to the meteorological satellite service in the bands 401–402 MHz and 402–403 MHz with the intent of raising the allocation status to primary. As regards wind-profiler radars, WARC-92 adopted a recommendation that the C.C.I.R. should continue its study as a matter of urgency and that the allocation of appropriate frequencies be included in the agenda of the next competent WARC. In this respect, the C.C.I.R. had established a special task group (TG 8/2) on wind-profiler radars.

6.6.3 On the other hand, WARC-92 decided on the additional allocation of mobile satellite services (MSS) in bands already allocated to the meteorological satellite service on a primary status. The frequency bands concerned were the following:

(*a*) 137–138 MHz, used for APT services:
137–137.025 and 137.175–137.825 were allocated to mobile satellite services for low earth orbiting (LEO) satellite on a primary status. The rest of the band, i.e. 137.025–137.175 and 137.825–138 MHz was allocated to MSS on a secondary status with a view to protecting the meteorological satellite service;

(*b*) 400.15–401 MHz was also allocated to mobile satellite service for LEO satellite on a primary status;

(*c*) 1670–1710 MHz — vital bands for space-to-earth transmissions from geostationary and polar orbiting meteorological satellites:

(i) 1670–1675 MHz, allocated world-wide on a primary status for aeronautical public correspondence (i.e., public telecommunications to passengers of airlines); and

(ii) 1675–1710 MHz had been allocated on a primary status for mobile satellite service (earth-to-space) for the ITU Region 2 (North, Central and South America), provided no constraints were imposed on the development of the meteorologial satellite service. Furthermore, WARC-92 adopted a resolution on studies to be undertaken by C.C.I.R. to examine the operational and technical measures that would facilitate sharing and invited WMO to participate in these studies.

6.6.4 The Commission noted with concern the increasing pressure put on the frequency bands allocated to the meteorological satellite service by the requirements for new public telecommunication services. The sharing of frequency bands between several radio communication services was more and more generalized, and in this regard, the Commission stressed that all frequencies actually used should be properly registered by meteorological services to their national telecommunication administration.

6.6.5 The International Frequency Registration Board (I.F.R.B.) of ITU kept records of frequency assignments notified by national telecommunication administrations in the Master International Frequency Register, which provided the background information required for the co-ordination of new frequency assignments, for the investigation of harmful interferences and for the study of the usage of the radio frequency spectrum with a view to making recommendations for its more effective use. It was therefore of prime importance that all frequencies actually used for meteorological activities, in particular those within bands allocated to meteorological services (i.e. meteorological aids, meteorological satellite services), and characteristics of stations be properly registered. The Commission urged Members to ensure that all the necessary information be provided to their national telecommunication administration, with a view to ensuring that the Master International Frequency Register reflected actual frequency usage.

6.6.6 The Commission was informed of the list of the questions related to meteorological activities adopted by the C.C.I.R. of ITU for the 1990-1994 study period. The list of questions with indication of the responsible C.C.I.R. Study Groups/Working Parties is given in Annex VII to this report. The Commission invited Members to participate actively, as appropriate, in co-ordination with their national telecommunication administrations, in the study of C.C.I.R. questions. Contributions could be submitted to C.C.I.R. either through the national telecommunication administration, which might participate in the work of the C.C.I.R., or through the WMO Secretariat.

6.6.7 The Commission agreed upon the following work programme:

(*a*) That WMO pursue its active participation in relevant ITU meetings, and in particular in C.C.I.R. studies on related questions;

(*b*) That WMO Members be urged to contribute to relevant C.C.I.R. studies, as appropriate, and be invited to keep the relevant CBS working group and the WMO Secretariat informed with a view to facilitating the co-ordination required;

(*c*) That WMO Members be strongly urged to register all meteorological radio-communication stations and frequencies used with their national telecommunication administration with a view to:

(i) Safeguard frequency allocation to meteorological services; and

(ii) Obtain protection against possible harmful interference from other radio-communication services;

(*d*) That studies be carried out to enhance the efficient use of frequency bands allocated to meteorological services (i.e. meteorological aids, and meteorological satellite services) in co-ordination with the Working Group on Satellites and WMO technical commissions concerned, as appropriate; and

(*e*) That the Co-ordination Group for Meteorologial Satellites (CGMS) be invited to consider co-ordinating its activities in these matters with the relevant CBS working group.

6.7 WWW SYSTEMS SUPPORT ACTIVITIES (SSA), INCLUDING THE OPERATIONAL INFORMATION SERVICE (agenda item 6.7)

OPERATIONAL WWW SYSTEMS EVALUATION AFRICA (OWSE-AFRICA)

6.7.1 The Commission received with appreciation the final report on Phase I of the OWSE-AFRICA from Mr E. Mukolwe, chairman of the OWSE-AFRICA Steering Group. It was pleased to learn that Phase I had been completed successfully and that the evaluations for Phase II were in progress. The success of the OWSE-AFRICA was attributed to the enthusiasm of the individuals involved, the ability to co-ordinate existing Voluntary Co-operation Programmes (VCPs), bilateral, and other co-operation projects to focus on the OWSE-AFRICA activities, and the strong support of the Members and organizations participating.

6.7.2 In reviewing the report, the Commission noted that the use of the data collection system/data relay system (DCS/DRS) could increase significantly the availability of observational data at national Centers, and that the national Services were able, with appropriate support, to incorporate the level of technology used in the OWSE-AFRICA into their operational programmes. The Commission further noted, however, that significant data loss still existed over the links between RTHs and NMCs within RA I, and also on the GTS links to centres outside of RA I.

6.7.3 The Commission agreed that Phase I had been successfully completed. It also agreed that the DCP/DRS systems were fully suitable for wide implementation, especially under the field of view of METEOSAT. It recommended, therefore, that Members actively consider the DCP/DRS for implementation at locations where the conventional communication of observational data was particularly difficult.

6.7.4 In making these comments, however, the Commission recognized that the experiences of the OWSE-AFRICA revealed that not all DCP and/or DRS equipment was fully compatible with WWW procedures. In addition, several important considerations for the general implementation of DCP and DRS equipment had also been identified. Additional analysis was required, for example, to develop recommendations on the long-term support required, the monitoring procedures for the effective use of the DCS/DRS, including national or other monitoring, modifications to the general GTS procedures to make efficient use of this new technology, including the procedures for entering the data onto the GTS, and hardware and/or software modifications required to ensure that the equipment met the requirements of both the Members and the WWW system. Accordingly, the Commission agreed that the CBS Working Groups on Telecommunications, on Observations, on Satellites and on Data Management should examine the report of the OWSE-AFRICA in detail, and prepare recommendations for consideration by both the regional associations and CBS-Ext.(94). The Commission also agreed that a final analysis of the results of the OWSE-AFRICA should be prepared, including specific guidelines on the operational use of the DCP/DRS equipment. It requested the chairman of the OWSE-AFRICA Steering Group to work with the participants and the Secretariat to prepare this set of guidelines. It expressed the belief that these guidelines should be prepared as a matter of priority for consideration by RA I Members and donor countries, as appropriate.

6.7.5 The Commission recognized that the OWSE-AFRICA had demonstrated the essential need for some level of centralized long-term support and management. Such support and management was needed to ensure, amongst other things, that the overall system continued to operate, and that failed and/or malfunctioning components were identified and replaced promptly. This support needed to be organized at various levels, and major components needed to be located within RA I. In this regard, the Commission noted the need to reinforce and/or establish the required infrastructure at both the appropriate regional and national levels.

6.7.6 The Commission noted that, at this time, it was difficult for Members in RA I to take full responsibility for the management of the DCP/DRS systems. The main functions which would have to be performed elsewhere included the provision of a central repository of information on the overall system and its components, including equipment and software, the analysis of the performance of the overall system based upon monitoring information, the identification of problems, the organization of the repair and/or replacement activities when this was beyond the means of the individual country, co-ordination of the provision of spares and replacements, and management support.

6.7.7 The Commission agreed that it was essential to continue these activities if systems, such as the DCS/DRS and others of similar or higher levels of technology, were to be integrated into the WWW. In this regard, the Commission believed that the lack of centralized support and management would contribute to perpetuating the technology gap between the developing and developed countries. The Commission believed, therefore, that the development of such support and management was a priority activity which needed to be implemented, and that all possible sources of funding should be sought, including VCP and bilateral programmes. It was the firm conviction of the Commission that some portion of the planned assistance needed to be clearly identified for such support and management at the time the aid project was approved.

6.7.8 Note was taken of the status of Phase II evaluations concerning the Meteorological Data Distribution (MDD). The Commission expressed its appreciation to EUMETSAT for implementing and operating both the MDD and DCS on METEOSAT.

6.7.9 In reviewing the overall work programme for Phase II, the Commission noted that despite the strong support provided to date, additional support was required to meet the objectives of the OWSE-AFRICA. In view of the importance of the OWSE-AFRICA to the further development of the WWW in RA I, the Commission agreed that additional efforts needed to be made to find the resources required.

6.7.10 Note was made by the Commission of the difficulties experienced during the early part of Phase II. It appreciated the strong efforts which had been made by EUMETSAT and relevant Members to resolve the technical difficulties encountered. The Commission agreed, however, that there had not been sufficient time during 1992 to properly evaluate the MDD as a fully operating system. It recommended, therefore, that the period for the operational evaluation of the MDD be extended until 30 June 1993.

6.7.11 The Commission believed that the combination of the DCS/DRS and the MDD offered the potential for major improvement of the exchange of data and products in RA I. The availability of this information was expected to have a profound impact on the ability of many Members in the field of view of METEOSAT to provide improved and/or new meteorological services.

6.7.12 To realize the potential, however, the DCS/DRS and the MDD had to be placed on a fully operational basis. This would require the long-term support of the participants in EUMETSAT, the co-operation of the several Members and organizations providing products and information to the MDD, the assistance of donors to make the facilities and training available to developing countries, and the full support of the Members operating the MDD receiving systems.

6.7.13 The Commission agreed that a strong training component needed to be developed to assist Members with the operation and local support of the MDD system, with making the best use of the information provided through the MDD, and with the development of new capabilities to provide services to their Governments and the general public. It supported the development of a prototype training module, and its evaluation within RA I, with the objective of making such training available at the time of implementation.

6.7.14 In recognition of the need to take action on a number of the recommendations and conclusions from the report on the OWSE-AFRICA, and to provide a firm basis for the full use of the DCS/DRS and MDD capabilities, the Commission adopted Resolution 1 (CBS-X) and Recommendation 13 (CBS-X) on the OWSE-AFRICA.

GUIDELINES FOR THE TECHNICAL CO-OPERATION COMPUTER PROJECTS

6.7.15 The Commission recalled that the objective of the WWW Systems Support Activities (SSA) was to ensure that all Members, particularly developing countries, had at least the minimum necessary equipment and technical know-how to meet national needs and to allow them to fulfil their agreed responsibilities within the WWW system. The WWW/SSA included computer projects for automating key WWW facilities within the territories of developing countries, which were carried out in close co-operation with the Technical Co-operation Programme.

6.7.16 The Commission noted that it was difficult to carry out such projects through a comprehensive systems management approach, which would provide each recipient country with modular, compatible computer systems or sub-systems, because the various sub-systems had different development histories and were very seldom, if ever, donated together or from a single source. This had lead to compatibility problems between the various sub-systems with respect to the exchange of meteorological data, which resulted in an overall loss of performance, great difficulties in maintaining the systems, and a possible lack of confidence in the technical co-operation computer projects.

6.7.17 The Commission felt that a standard interface for the exchange of meteorological data between systems and sub-systems would improve the effectiveness of the technical co-operation computer projects implemented under various operational conditions and would facilitate the maintenance support required. The Commission, therefore, agreed that it was reasonable and practical to adopt the GTS bulletin format which was, in fact, the backbone of the WWW data exchange, as the appropriate standard format for the exchange of data between the computer systems and sub-systems for telecommunication, data handling and data-processing involved in technical co-operation projects.

6.7.18 The Commission also recognized that more sophisticated data structures would have to be developed in the future with a view to meeting requirements for a more efficient data transfer (e.g. file transfer) between advanced telecommunication, data handling and data-processing systems, including workstations for the handling of satellite imagery and related products. The Commission felt that a standardized advanced data exchange interface would greatly facilitate the integration of computer systems and sub-systems, including satellite workstations, at WWW centres. It requested the Working Group on Data Management, in concert with its Working Groups on Telecommunications and on Satellites, to develop a proposal in this respect.

6.7.19 So far, WMO had provided training support for technical co-operation computer projects individually for each project, through experts seconded by a donor country or contracted by the WMO Secretariat, which had not satisfied the need for repetitious training, and had thus not achieved the lasting effect required for the longer-term operation of the received computer system. The Commission felt that an improvement in this area could be expected from the use of computer-based training tools which might be provided in addition to the instructor-based training. These tools could also cover a wider range of related subjects, such as basic computer training, use of operating systems, and more importantly, specific meteorological subjects related to computer applications, as for example use and interpretation techniques of numerical products, forecasting techniques, etc. Donor Members were invited to foster the development of computer-based tutorials together with the development of applications software.

6.7.20 In this context, the Commission recommended that some RMTCs should provide refresher courses for the use of computer systems fielded through technical co-operation projects and apply computer-based training tools and video-taped material, as appropriate. To this end, some RMTCs should be equipped, through technical co-operation projects as required, with the appropriate computer systems and the necessary computer-based tutorials. The delegate from India mentioned the possibility of providing VCP fellowships with respect to general computer applications and to the management of computer systems at the RMTC in India.

6.7.21 The Commission adopted the guidelines for technical co-operation projects providing computer-based systems for the implementation of WWW components and facilities as given in Annex VIII to this report. The Commission recommended that the Secretary-General and donor countries take these guidelines into account, as appropriate, in the development of relevant technical co-operation projects. The Working Groups on Data Management, on Telecommunications, and on Data Processing were requested to consider the inclusion of these guidelines in the respective WWW

guides. The Working Group on Data Management was further requested to develop practical guidelines on planning and management of meteorological computer systems.

7. WWW SUPPORT FOR AND CO-ORDINATION WITH OTHER PROGRAMMES, INCLUDING REGIONAL PROGRAMMES (agenda item 7)

7.1 GLOBAL CLIMATE OBSERVING SYSTEM (GCOS) AND OTHER OBSERVING SYSTEMS (agenda item 7.1)

7.1.1 The Commission was informed of the progress being made in formulating the overall scope and content of the GCOS. It was noted in particular that a task group to address atmospheric issues, which had met just before the CBS session, had proposed as an overall goal that the GCOS evolve into a comprehensive observing system for climate monitoring and prediction. Although still preliminary, the recommendations called for:

(*a*) The maintenance and strengthening of the WWW capability:
  (i) The Global Observing System must retain and increase its observational network, focusing particularly on isolated and/or logistically difficult upper-air stations;
  (ii) Full advantage should be made of moored and drifting buoys, remote automatic stations, profilers, and programmes such as ASAP, ASDAR, or other cost-effective methods;
  (iii) Communications and data management issues must be addressed in the light of the future needs of GCOS;

(*b*) A land-based reference network of high-quality stations selected to provide a spatially-homogeneous array for long-term climatological monitoring and to provide information for satellite retrieval and other future needs; and

(*c*) Full participation of GCOS in the discussion and planning of future space-based observational programmes. It was also recommended that particular attention be given to the need for a full compliment of geostationary satellites, and regretted the lack of useful data from the Indian Ocean sector.

7.1.2 In expressing its appreciation for the presentation, the Commission looked forward to receiving further information as the GCOS evolved, particularly as regarded the specifics of the support that would be required of it. The chairmen of the Working Groups on Observations, on Satellites, and on Data Management were requested to keep themselves informed of further developments in this regard.

7.2 INTERNATIONAL DECADE FOR NATURAL DISASTER REDUCTION (IDNDR) (agenda item 7.2)

7.2.1 The Commission noted that Eleventh Congress had adopted the WMO Plan of Action for the IDNDR and that the Plan well reflected the fact that the WWW system must serve as the basis for improving the capabilities of national Meteorological Services to reduce the adverse effects of meteorological and other environmental disasters. Recalling the views expressed in Recommendation 20 (CBS-Ext.(90)), the Commission reiterated its view that the most important contribution WMO could make to the IDNDR would be to concentrate on the further development and implementation of the existing system. To this effect, the Commission recommended that national Meteorological and Hydrological Services should take steps to establish an adequate climatological meteorological and hydrological database and to promote and stimulate risk assessments using these data.

7.2.2 The Commission stressed the need for strengthening the exchange of information on ongoing activities and plans aimed at mitigating meteorological and hydrological disasters at national, regional and international levels, in the context of the IDNDR.

7.2.3 The Commission was particularly pleased to learn, therefore, that one of the three special projects which were to be implemented in the WMO Plan of Action, and which had been designed to be very cost-effective and to have a significant impact at both the national and international levels, was aimed at substantially upgrading the tropical cyclone warning system in the South-West Indian Ocean Region through the application of meteorological satellite and microcomputer technology and the transfer of scientific knowledge. The project was being implemented by Members of the RA I Tropical Cyclone Committee for the South-West Indian Ocean, in co-operation with WMO, and with

the assistance of the European Development Fund (EDF) for island countries, and the Finnish International Development Agency (FINNIDA) for mainland countries.

7.2.4 It was also noted that a number of other activities being undertaken in the course of implementation of other WMO programmes were directly relevant to natural disaster reduction whether or not they were considered in the context of the IDNDR. The Commission requested the Secretary-General to continue to report to future sessions of CBS on the implementation of the IDNDR Plan of Action of WMO as it related to the WWW.

7.2.5 The Commission was pleased to learn that, in response to a request made by CBS-Ext.(90), the United States would contribute to the programme by preparing a booklet on guidelines for meteorologists in planning for and responding to hydrometeorological disasters. The booklet would be completed in draft form by November 1993 with the intent that it be published as part of WMO's contribution to the IDNDR.

7.3 REGIONAL AND OTHER PROGRAMMES (agenda item 7.3)

REGIONAL PROGRAMMES

7.3.1 The Commission was pleased to note that active consideration was being given within all regional associations to improve the implementation and operational efficiency of the WWW. The Commission fully supported the view expressed by the Working Group on Planning and Implementation of the WWW in Region V that every effort should be made to ensure that the appropriate regional rapporteurs (or chairmen of sub-groups) participate in all relevant CBS working group sessions so that the Region's views might be fully taken into account and that the Region was fully informed of WWW activities and developments.

7.3.2 Appreciation was expressed for the activities of the Drought Monitoring Centres in Region I which were producing very useful products and were potential RSMCs. The Commission therefore noted with some concern that there was considerable uncertainty regarding future financial support for the Centres and urged Members and donor organizations to provide continued support.

ENVIRONMENTAL EMERGENCY RESPONSE

7.3.3 Recalling its mandate to keep under review and to further develop the operational arrangements for the use of the WWW system in response to environmental emergencies, the Commission noted with interest that IAEA had organized an evaluation of the emergency response system in a simulation exercise in January 1992. It was gratifying to learn that the GTS and GDPS components of the system, especially the GDPS Centre in Toulouse (France) had performed well. The Commission agreed to pursue the co-ordination of transport model products and the means of their dissemination, which were provided by the RSMCs for environmental emergency response, in collaboration with the other UN agencies concerned, in order to achieve the necessary level of standardization of the use of the products by non-meteorological agencies.

7.3.4 The Commission was informed by the ICAO representative of a task entitled "Monitoring and provision of warnings to aircraft of radioactive debris and toxic chemical clouds", being undertaken by ICAO in close co-ordination with WMO and IAEA. At present, ICAO was defining the scope of the task, and it was hoped that appropriate provisions could be developed by 1995.

7.3.5 Noting also that an evaluation of the efficiency of the international community in reacting to the Kuwait oil fires had been conducted by an expert group meeting in 1992, the Commission learned with appreciation that WMO's co-ordinating role had greatly facilitated the implementation of the observing programme, rapid communications, data management functions (including the Kuwait Data Archive at NCAR, Boulder, Co., USA), and the availability of atmospheric model products and had provided the first assessment of the potential impact of the plume. Following proposals of the expert group, and a subsequent request of the Executive Council, the session invited the Working Groups on Observations, on Data Processing, on Telecommunications, and on Data Management, as appropriate, to study the report of the expert group and to suggest action which CBS might take in connection with the establishment of a predefined mechanism for the rapid response to environmental emergencies.

7.3.6 In this connection, the Working Groups on Telecommunications and on Data Management were also requested to review the recent IAEA publication on *Guidance on International Exchange of Information and Data Following a Major Nuclear Accident or Radiological Emergency* to ensure that, as so

far as the use of the WWW system was concerned, the guidance given was in full conformity with agreed WWW procedures. The Commission recognized the merit of using the GTS as a carrier of radiological data in both routine and emergency situations and agreed that WMO should continue to liaise with IAEA in this regard.

8. PUBLIC WEATHER SERVICES PROGRAMME (PWS) (agenda item 8)

8.1 There was full agreement within the Commission that one of the most important obligations of national Meteorological Services was the provision of services to the general public. It was through these services that the national Services were most visible and were judged not only by the general public but also by national decision-making authorities. There was also recognition that while the major input to PWS came from the basic systems, the Services had applications to a wide range of economic and social activities which would call for co-ordination and consultation between the PWS Programme and other Programmes of WMO.

8.2 The Commission reiterated its full support for the three broad projects that had been identified by CBS-Ext.(90) and approved by Congress, namely: formulation and content of forecasts and warnings; presentation and dissemination techniques, public understanding, public information and education; and exchange and co-ordination of hazardous weather information among neighbouring countries. It expressed strong concern with regard to the very limited funds that had been made available for the Programme and requested the president of the Commission to take every opportunity to press upon the Executive Council and Congress the need for greater resources if the Programme was to succeed.

8.3 The Commission considered how the goals of the Programme might be more clearly identified, particularly as concerned what might be achieved in the coming few years. It was agreed that one of the primary objectives should be the production of a guide on public weather service practices which would be based on the collection and assessment of mechanisms, methods and techniques presently used.

8.4 Pending the publication of such a guide, several Members felt that it would be very useful if arrangements were made for information to be exchanged between Members on the types of services provided and on methods and techniques for their dissemination and verification. It was also suggested that those countries with well-developed Public Weather Services could offer relevant training through staff secondment or workshops to the less developed services.

8.5 Attention was drawn to several important aspects of the Programme, which should be taken into account in its further development and implementation. These included:

(*a*) The effect of social and cultural differences between countries and regions;

(*b*) The differences in capabilities and available facilities from country to country;

(*c*) The need for a broader perspective of what was meant by Public Weather Services and what they could provide (e.g. the Canadian experience of providing information in the form of an ultraviolet radiation index);

(*d*) The crucial importance of public education in the understanding and use of PWS and the scope for relevant information exchanges between Members; and

(*e*) Assessment of the impact of PWS on personal injury and safety of life and economic benefits, even though difficult to do accurately.

8.6 The Commission fully endorsed the suggestion to appoint a rapporteur, to be supported by experts/consultants, for each of the three projects and many Members offered their support in this regard. The president was authorized to appoint these rapporteurs in consultation with the Secretary-General and with supporting Members. The rapporteurs should produce a plan of action for these respective projects which would be considered at an expert meeting in the second half of 1993. Detailed reports on progress made should be submitted to the 1993 session of the Advisory Working Group and to the next extraordinary session of the Commission in 1994.

9. TECHNICAL CONFERENCE ON THE PROVISION OF WEATHER SERVICES: UNDERSTANDING USER REQUIREMENTS (agenda item 9)

9.1 In response to a proposal made by CBS-IX, the Technical Conference on the Provision of Meteorological Services: Understanding User Requirements, was held during CBS-X. The one-day Conference addressed requirements of, and services for, four industries: construction, marine

transport, tourism, and agriculture. The format of the Conference featured a principal address by an industry representative who presented the user requirements, with responses by representatives of two national Meteorological Services who described their capabilities and the services provided to the industry, and an open discussion by attendants and speakers.

9.2 The following experts took part in the formal part of the Conference:

CONSTRUCTION

Principal speaker: Mr B.R. Manning, P.E. President, Southern Bldg., Code Congress Evaluation Service Incorporated International (USA);
Mr Y.K. Chan, Royal Observatory (Hong Kong);
Mr R.J. Shearman, Meteorological Office (UK).

MARINE TRANSPORT

Principal speaker: Capt J.L. Peterson, P & O Containers Ltd. (UK);
Mr X. Wu, State Meteorological Administration (China);
Mr R.A. Sonzini, National Meteorological Service (Argentina).

TOURISM

Principal speaker: Mr G. Linke, Bavarian Tourist Association (Germany);
Mr J.P. Bourdette, Météorologie nationale (France);
Mr M. Kurz, Deutscher Wetterdienst (Germany).

AGRICULTURE

Mr I.K. Essendi, Meteorological Department, (Kenya) (paper prepared by Mr W. Degefu, Project Manager, Drought Monitoring Centre, Nairobi);
Dr U.S. De, Indian Meteorological Department (India).

9.3 An enthusiastic discussion followed each of the presentations, confirming the underlying theme of the Conference that frank discussions between the providers of meteorological services and users of the services were not only necessary but beneficial to both parties.

9.4 The Commission requested the president to consider the possibility of arranging technical conferences at future sessions of the Commission.

10. EDUCATION AND TRAINING RELATED TO CBS ACTIVITIES (agenda item 10)

GENERAL

10.1 The Commission noted with satisfaction the progress achieved, and the assistance provided to its Members, in the field of education and training. It stressed that education and training continued to be of great importance in assisting Members in the training of personnel related to the implementation of the various activities of the Commission.

10.2 The Commission was pleased to note Part II, Volume 6 of WMO publication No. 766, *Education and Training Programme 1992–2001 of the Third WMO Long-term Plan*, as adopted by Eleventh Congress and urged its Members to carry out the roles which were defined for their execution under the various tasks and projects of the plan.

EC PANEL OF EXPERTS ON EDUCATION AND TRAINING

10.3 The Commission noted the views and recommendations of the EC Panel of Experts on Education and Training on the activities of the WMO technical commissions in education and training.

10.4 The Commission recognized and encouraged the need for the active co-ordination and collaboration between the Commission, its working groups, rapporteurs, appropriate bodies in the WMO Secretariat, and the panel in actions directed at achieving the objectives of the Organization's Education and Training Programme. It also recommended that proposals of working groups and rapporteurs which dealt with, or touch upon, training issues be conveyed to the Education and Training Department before consideration by the Commission.

HUMAN RESOURCES DEVELOPMENT

10.5 The Commission emphasized the importance of the Manpower Development Programme, in particular to developing countries, and further stressed the need for a strategic approach to the

implementation of such a Programme. The Commission noted the availability of the results of the global survey of Members' training requirements, which was carried out during 1989. It also urged its Members to use those results to execute the actions indicated under the Manpower Development Programme 61.1 in Table A of Volume 6, Part II, of the *Third WMO Long-term Plan*.

NATIONAL AND REGIONAL TRAINING FACILITIES

10.6 The Commission noted with satisfaction that WMO publication No. 240, *Compendium of Training Facilities for Meteorology and Operational Hydrology*, had been revised and a new loose-leaf edition of the publication was to be issued in the near future. It also noted that the information contained in the publication was computerized and that the database was available on diskette. Members were accordingly urged to take advantage of this publication and to submit new information on their training programmes to the WMO Secretariat to enable the publication to be kept up to date.

10.7 The Commission noted with interest the establishment of the Standing Conference of Heads of Training Institutions of National Meteorological Services and recognized the value of the establishment of the Standing Conference's working groups dealing with the application of up-to-date scientific and technical issues to the education and training processes. The Commission urged its members to make their own inputs and hoped that all Members would benefit from these new activities.

10.8 The Commission noted the information on the activities of the WMO Regional Meteorological Training Centres (RMTCs) and agreed with the need, as stressed by Eleventh Congress, for more emphasis to be placed by RMTCs on regional training requirements for specialized courses on various subject areas. In this connection, members of the Commission were requested to assist RMTCs in organizing courses relevant to the Commission's interest, by using such ways and means as the provision of instructors, relevant training materials, and other technical assistance under various bilateral and multilateral arrangements.

TRAINING COURSES, SEMINARS AND WORKSHOPS

10.9 The Commission noted that, since its last session, WMO had either organized or was a joint organizer/co-sponsor of a number of training events of interest to CBS and, particularly, those for training of instructors and the training in telecommunications and data processing. The Commission also noted the relevant training events which have been approved by EC-XLIII (May 1991) for implementation during the current financial period, subject to the availability of funds. The Commission emphasized the importance of the organization of training events, particularly at RMTCs to multiply the benefit of training provided at the Centres, in such fields as training of trainers, instruments and methods of observation, numerical weather analysis and prediction, meteorological telecommunications, and data handling. Accordingly, the Commission urged its Members to continue to provide financial and other support for the organization and implementation of appropriate training events.

TRAINING MATERIAL

10.10 The Commission noted with satisfaction the training publications that had been prepared, translated and issued by the Organization since the last session. It also noted that they were being used extensively at national and regional training centres. While requesting the Secretary-General to continue the preparation and publication of training materials, the Commission took into account the limited budgetary provisions for the purpose and indicated that "information technologies" should be considered as a priority area. The Commission also urged its Members to provide assistance for these activities as far as possible. The Commission noted with appreciation that Germany had offered a textbook on modern synoptic meteorology for inclusion as a WMO training publication, after translation into a WMO working language.

10.11 The Commission was informed that, since its last session, the stock of materials available in the Training Library had been increased and that the Secretariat was initiating action to function as an exchange forum for audiovisual and computer software training materials. In urging Members to make use of the facilities and holdings of the Training Library in their training programmes, the Commission also drew the attention of Members to their responsibilities, as indicated in Part II, Volume 6 of the *Third WMO Long-term Plan* (WMO-No. 766), to advise on the development of the WMO Training Library's holdings and to make available to the Library relevant textbooks, audiovisual and computer-based training materials.

10.12 Due to the need to update WMO publication No. 258, *Guidelines for Education and Training of Personnel in Meteorology and Operational Hydrology*, the Commission noted that Eleventh Congress (May 1991) requested WMO technical commissions to review and update the relevant training syllabi in the light of recent developments in meteorology. The president was therefore requested to urge the relevant CBS working groups, in accordance with their terms of reference, to make such revisions.

FELLOWSHIP MATTERS

10.13 The Commission noted that, since its last session, the fellowship programme continued to assist Member countries in developing and strengthening trained human resources in their Meteorological Services. Long-term and short-term fellowships had continued to be a very effective way of assisting, where possible, Members with their training requirements. It was noted that the scientific and technical developments in the different applications of meteorology had resulted in an increase in the demand for postgraduate and specialized studies in such areas as numerical weather prediction, telecommunications, and computer applications. With the emphasis on protection of the atmospheric environment and climate change, requirements for training in these fields were expected to increase. The Commission therefore urged Members to arrange for relevant training at all levels to enable such personnel to utilize more effectively the new technologies in these specialized fields and to participate more actively in these disciplines.

10.14 The Commission noted with appreciation that several Members were awarding fellowships under different frameworks in subjects related to the Commission's field of activity and encouraged other Members to provide similar support.

11. LONG-TERM PLANS (agenda item 11)

11.1 The Commission noted that the Third WMO Long-term Plan for the period 1992–2001 had been published at the beginning of 1992 and that the first monitoring and evaluation of progress made in the implementation of the Plan would be carried out by EC-XLVI in 1994. It was noted in particular that the technical commissions, as the principal source of scientific and technical expertise in the WMO system, were expected:

(*a*) To evaluate at their sessions, or at sessions of their advisory working groups, the impacts of activities performed under the Long-term Plan within the area of their responsibilities; and

(*b*) To either at their sessions or through their presidents make comments and suggestions for further development of programme plans in the light of their evaluation.

The Commission felt that for many aspects of the World Weather Watch (WWW) Programme, objective evaluations were already systematically done as reflected, for example, in the biennial Status Reports on Implementation of the WWW. This activity, along with the data quality control monitoring accomplished by major centres, provided a good basis for much of the evaluation.

11.2 The Executive Council had also given broad guidance on future strategies and policies. In particular, it had stressed increased emphasis on sustainable development issues and a more integrated approach to observation and research into the atmosphere, oceans and inland waters. While the possibility of identifying GCOS as a major new programme of WMO between WWW and the World Climate Programme (WCP) had been mentioned, the actual programme structure would be considered again at EC-XLV in 1993.

11.3 The Commission noted with interest, and generally endorsed, the views of the presidents of technical commissions, as expressed at their 1991 meeting, on future WMO activities. It was also agreed that despite many new developments, it would be necessary to maintain many techniques and systems based on traditional practices. The need to provide forecasts and descriptions of weather especially in conditions that pose a threat to life and property would continue to be a requirement. In this connection, it was felt that still greater attention would have to be given to mesoscale meteorological phenomena and relatively short-range forecasting for which developments in science and technology would serve as the driving force.

11.4 With the increased emphasis on climate change and environmental issues, data capture would not only remain fundamental to WMO's activities but would have to be expanded and strengthened through increasingly integrated networks and systems. The Commission felt that this

would lead to an increasing dependence on environmental satellites and that it was of critical importance for adequate planning and investment to be made now in order to ensure that Members' data acquisition needs were met in the future.

11.5 The Commission felt that at the national level, there would be an even greater demand for "value-added services" to meet the needs of various user sectors which were becoming increasingly sophisticated in their applications of meteorological data. In this regard, greater efforts would have to be made to bridge the gap between the services of developing countries and those of the technologically-advanced countries and to fill the gaps in the present WWW basic systems. Trends in economic policy and political regionalization indicated that these aims might best be achieved through the co-operative efforts and joint funding by groups of countries.

11.6 The need for greater integration in the WMO basic systems to support a wide range of programmes, activities and applications would call for much greater co-ordination between technical commissions than is the case at present. Arrangements would have to be made to provide a central focus for, and a synergetic approach to, the work of the technical commissions, which largely functioned independently with a certain amount of duplication of effort. It was suggested that all commissions be invited to reflect on their terms of reference "in the post-UNCED era", just as CBS had done at the present session, and to give particular attention to their needs and contributions to the basic systems.

11.7 Finally, the Commission recognized that a very great co-ordination and management responsibility lay with the Secretariat and that it was the duty of Members to ensure that the Secretariat had the personnel and the tools to adequately carry out these responsibilities.

11.8 The Commission entrusted the Advisory Working Group with the task of pulling these and other ideas together in order to provide a coherent CBS input to the evolving long-term planning process. All members of the Commission were urged to give some thought to these matters and to convey any views they may have to the Secretary-General or to any member of the Advisory Working Group.

12. CBS WORK PROGRAMME; ESTABLISHMENT OF WORKING GROUPS AND RAPPORTEURS (agenda item 12)

12.1 The Commission agreed that its work programme — based on the relevant sections of the Third WMO Long-term Plan, on the decisions of Congress concerning the World Weather Watch Programme, and on the decisions of the Executive Council concerning "the responsibility of CBS to contribute to issues related to data provision, communication and data management across all WMO Programmes" — should be as reflected in the detailed discussions under the various agenda items of its tenth session. To carry out this work programme, and taking into account the revised terms of reference of the Commission as proposed under agenda item 4, the Commission decided to establish an Advisory Working Group, as well as Working Groups on Data Processing, on Observations, on Telecommunications, on Satellites, and on Data Management, and a Rapporteur on the Follow-up to UNCED. Resolutions 2 (CBS-X) to 8 (CBS-X) were adopted.

13. REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE COMMISSION AND RELEVANT EXECUTIVE COUNCIL RESOLUTIONS (agenda item 13)

13.1 In accordance with established practice, the Commission examined those resolutions and recommendations adopted prior to its tenth session which were still in force.

13.2 The Commission noted that the action on all of its previous recommendations had either been completed or their content included in the relevant WMO manuals and decided that they should not be kept in force. As regards Recommendation 1 (CBS-IX) on procedures for the designation of RSMCs, which had been approved by the Executive Council, it was agreed that the substance be included in Part II of the *Manual on GDPS*. Resolution 9 (CBS-X) was adopted.

13.3 The Commission then examined the Executive Council's resolutions within the field of CBS and agreed that Resolutions 1 and 3 (EC-XL) and Resolutions 9, 14 and 15 (EC-XLIII) needed no longer be kept in force. It decided to recommend that Resolution 3 (EC-XXXVI) and Resolution 8 (EC-XLIII) be updated in new resolutions and that Resolutions 1 and 2 (EC-XXXVI), Resolution 5 (EC-XLII) and Resolution 16 (EC-XLIII) be kept in force. Recommendation 14 (CBS-X) was adopted.

14. ELECTION OF OFFICERS (agenda item 14)

14.1 Dr A.A. Vasiliev (Russian Federation) was unanimously elected president of the Commission and Mr S. Mildner (Germany) was unanimously elected vice-president.

15. DATE AND PLACE OF THE NEXT SESSION (agenda item 15)

15.1 The delegate of Finland informed the session that his Government was prepared, in principle, to provide host facilities for the next extraordinary session of the Commission in or near Helsinki in the second half of 1994. He expected that a formal offer would be submitted soon when details of the exact dates and location had been determined. The Commission requested its president, in consultation with the Secretary-General, to make necessary arrangements when the offer was received.

16. CLOSURE OF THE SESSION (agenda item 16)

16.1 In his closing address, the president of the Commission, Dr A.A. Vasiliev, reviewed the work of the tenth session which, he felt, had been highly successful. There had been major accomplishments in the period leading up to the session and a number of very important forward-looking decisions had been taken by the Commission, especially in reviewing its own terms of reference and in reconsidering the concept of basic systems support to a wide variety of programmes. The technical conference held in the middle of the session had also been a major success and had provided very valuable background and stimulus to the discussions.

16.2 The president thanked the participants for their contributions and for the spirit of friendly co-operation in which the deliberations had been conducted, allowing the session to achieve so much in a relatively short time. He thanked all those who had contributed to the smooth running of the session, particularly the chairmen of the committees and members of the *ad hoc* sub-groups, who had worked long and hard. He expressed his appreciation for the services provided by the Secretariat.

16.3 The session of the Commission for Basic Systems closed at 12.00 on Friday, 13 November 1992.

RESOLUTIONS ADOPTED BY THE SESSION

Resolution 1 (CBS-X) — SUPPORT FOR OWSE-AFRICA

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Resolution 3 (EC XXXVI) — Operational World Weather Watch Systems Evaluations (OWSEs),

(2) The Final Report on Phase I of the OWSE-AFRICA, submitted by the chairman of the OWSE-AFRICA Steering Group to CBS-X, and the significant improvements reported in the exchange of observational data at selected stations,

APPRECIATING that Phase I of the OWSE-AFRICA has been completed successfully,

CONSIDERING:

(1) The continuing difficulties with the operation of the GTS in RA I,

(2) The importance of providing an adequate period for the proper evaluation of the MDD,

(3) The need to develop an effective and lasting training programme for the MDD, particularly in the use of the information available through the MDD,

REQUESTS:

(1) The chairman of the OWSE-AFRICA Steering Group to prepare by 31 March 1993 a set of guidelines for the implementation of DCP/DRS systems for consideration by RA I Members;

(2) That mechanisms be developed to effect the co-ordinated purchase of spare parts;

INVITES Members of RA I to proceed with the implementation of DCP/DRS systems, with the assistance of other Members and funding (assistance) programmes, giving due regard to the guidelines provided by the OWSE-AFRICA Steering Group;

RESOLVES:

(1) That the CBS Working Groups on Observations, on Telecommunications, on Satellites, and on Data Management consider the conclusions and recommendations of the OWSE-AFRICA, with the object of preparing specific recommendations on:

(*a*) Improvements to the availability of data, data flow between the RTHs and NMCs within RA I, and between the RTHs Dakar and Nairobi and the RTHs Toulouse and Offenbach, respectively;

(*b*) Procedures for inserting data onto the GTS;

(*c*) Monitoring procedures for both the DCS and the related components of the GTS;

(*d*) Providing a management focus to the support activities for the implementation and use of the DCP/DRS and MDD equipment;

(*e*) Other issues of telecommunications and data management raised by the report of the OWSE-AFRICA evaluations;

(2) That a training programme be developed to support the implementation of the new technologies giving attention to an appropriate mix of conventional and innovative techniques and the needs of the entire staff at the national offices;

(3) That the period of Phase II be extended until 30 June 1993 for the operational evaluation of the MDD system;

REQUESTS the OWSE-AFRICA Steering Group to make the necessary arrangements to extend the period of Phase II, and to complete the evaluation programme;

URGES participants in the OWSE-AFRICA to continue, and where possible to increase, their support for the Phase II evaluation programme.

Resolution 2 (CBS-X) — Advisory working group of the commission for basic systems

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Paragraph 7.13.5 of the general summary of the abridged final report of Fifth Congress,

(2) Resolution 1 (CBS-IX) — Advisory Working Group of the Commission for Basic Systems,

CONSIDERING that a working group is of value in advising the president of the Commission and in assisting him in his duties of co-ordination and planning,

DECIDES:

(1) To establish the Advisory Working Group of CBS with the following terms of reference:

(*a*) To advise the president on all matters related to the work of the Commission;

(*b*) To assist the president in planning and co-ordinating the work of the Commission and its working groups;

(*c*) To review the internal structure and working methods of the Commission;

(*d*) To advise the president on policy matters related to the exchange of data and products;

(*e*) To monitor the implementation of the WWW Programme in relation to the WMO Long-term Plan and advise the president on appropriate actions;

(*f*) To advise the president on matters related to co-operation with other technical commissions and support to other WMO and related programmes;

(*g*) To keep under review the work of the Commission;

(*h*) To assist the president in the co-ordination, guidance and development of the WWW support functions;

(*i*) To keep under review the development and implementation of the Public Weather Services Programme directed towards strengthening that component of national Meteorological Services;

(*j*) To formulate specific plans for the education and training activities in the field of responsibility of CBS;

(2) That the composition of the Advisory Working Group shall be as follows:

President of CBS (chairman)
Vice-president of CBS
Past president of CBS
Chairmen of the CBS Working Groups on Data Processing, on Observations, on Telecommunications, on Data Management, and on Satellites
Mr E.A Mukolwe (Kenya)
Mr P. Ryder (UK)
Mr R.A Sonzini (Argentina)
Mr H. Yang (China)

NOTE: This resolution replaces Resolution 1 (CBS-IX) which is no longer in force.

Resolution 3 (CBS-X) — Working group on data processing

THE COMMISSION FOR BASIC SYSTEMS,

CONSIDERING:

(1) That there is a need for the continuation of the work of the Working Group established by Resolution 2 (CBS-IX),

(2) Recommendation 1 (CBS-X) — Revised Terms of Reference of the Commission for Basic Systems,

DECIDES:

(1) To establish the Working Group on Data Processing with the following terms of reference:

(a) To keep abreast of scientific and technical developments relating to the methods of meteorological analysis and forecasting for general purposes, to consider the implementation of new techniques, and to keep under review organizational and planning aspects of the GDPS;

(b) To provide co-ordination and guidance on the use of modern data-processing techniques for meteorological analysis and forecasting including the processing and interpretation of incoming products by NMCs;

(c) To identify problems associated with meteorological analysis and forecasting at various scales and time ranges requiring study and research and to bring them to the attention of the president of CBS, with a view to referring them to the relevant technical commission, as required;

(d) To co-ordinate observational data requirements of the WWW and Public Weather Services and to provide advice on the formulation of requirements to be met by the Global Observing System;

(e) To review requirements of Members and relevant constituent bodies for WMC and RSMC products;

(f) To co-ordinate the production of analysed and forecast data by WMCs and RSMCs taking account of the requirements of Members for new kinds of products;

(g) To consider the transmission priorities of processed products to meet the requirements of NMCs and other users;

(h) To keep under review and further develop real-time and non-real-time monitoring relating to the GDPS, in co-ordination with the Working Group on Data Management, in order to assist Members in improving their data processing;

(i) To keep under review the established procedures for standardized verification of numerical products and for monitoring the quality of observations, and to develop additional proposals, where necessary, in consultation with the Working Group on Data Management;

(j) To monitor progress on implementation of relevant parts of the WMO Long-term Plan on matters related to the GDPS;

(k) To keep under review and up to date the *Manual on the GDPS*;

(l) To keep under review and up to date relevant training syllabi as required and to suggest training materials and the holding of seminars and symposia;

(m) To establish, as necessary, study groups composed of experts, or to appoint rapporteurs, for consideration of specific problems of a technical or operational nature;

(n) To act upon matters referred to the Working Group by the president of CBS;

(o) To co-ordinate its activities with the work of the Working Group on Data Management and of other working groups of CBS, with a view to the integration of the WWW system conceived as an entity;

(2) That the Working Group on Data Processing shall have the following composition:

(a) The expert designated by each regional association, as rapporteur/co-ordinator with respect to regional aspects of the GDPS;

(b) An expert nominated by each of the Members responsible for the operation of a World Meteorological Centre (WMC);

(c) An expert from one RSMC in each of the WMO Regions, to be nominated by the president of the corresponding regional association;

(d) An expert nominated by the chairman of the CBS Working Group on Data Management;

(e) Experts nominated by other Members or groups of Members, wishing to participate actively in the work of the Working Group;

(f) Experts who may be nominated by presidents of other technical commissions and by international organizations according to the work programme;

(3) To select, in accordance with Regulation 32 of the General Regulations, Mr H. Allard (Canada), as chairman of the Working Group;

(4) To request the chairman to submit a report to the Commission not later than six months before its sessions.

NOTE: This resolution replaces Resolution 2 (CBS-IX) which is no longer in force.

Resolution 4 (CBS-X) — WORKING GROUP ON OBSERVATIONS

THE COMMISSION FOR BASIC SYSTEMS,

CONSIDERING:

(1) That there is a need for the continuation of the work of the Working Group established by Resolution 3 (CBS-IX) — Working Group on the Global Observing System,

(2) Recommendation 1 (CBS-X) — Revised Terms of Reference of the Commission for Basic Systems,

DECIDES:

(1) To establish the Working Group on Observations with the following terms of reference:

(a) To review and advise on the overall comprehensive observational data requirements of the WWW, other WMO programmes, and other international programmes supported by WMO;

(b) To review and advise on the design and implementation of the Global Observing System taking account of:

(i) Established requirements for data;

(ii) The cost, capabilities and performance of observing systems including information received from OWSEs;

(c) To keep under review and further develop real-time and non-real-time monitoring relating to the Global Observing System, in co-ordination with the Working Group on Data Management, in order to assist Members in improving their observing system;

(d) To keep the *Manual* and *Guide on the GOS* under review and to make recommendations for amendments;

(e) To evaluate data requirements of climate monitoring with respect to the overall GOS and to recommend measures to meet those requirements, where possible;

(f) To keep abreast of developments in remote sensing;

(g) To co-ordinate requirements and other matters related to the space-based systems with the Working Group on Satellites;

(h) To co-ordinate with other CBS working groups on radio-frequency utilization matters;

(i) To keep under review matters related to the development and introduction of new observing systems into the GOS;

(j) To monitor progress of the implementation of the WMO Long-term Plan on matters related to the GOS;

(k) To keep up to date relevant training syllabi and to suggest training materials and the holding of seminars and symposia;

(l) To establish necessary study groups composed of experts or to appoint rapporteurs for consideration of specific problems of a technical or operational nature;

(m) To act upon matters referred to the Working Group by the president of CBS;

(*n*) To co-ordinate its activities with the work of the Working Group on Data Management and of other working groups of CBS, with a view to the integration of the WWW system conceived as an entity;

(2) That the Working Group on Observations shall have the following composition:

(*a*) The expert designated by each regional association, as rapporteur/co-ordinator with respect to regional aspects of the GOS;

(*b*) An expert nominated by the chairmen of the CBS Working Groups on Satellites and on Data Management;

(*c*) Experts nominated by other Members, or groups of Members, wishing to participate actively in the work of the Working Group;

(*d*) Experts designated by the presidents of the Commission for Marine Meteorology and the Commission for Instruments and Methods of Observation and of any other technical commission or international organization interested in the work of the Working Group;

(3) To select, in accordance with Regulation 32 of the General Regulations, Mr F.S. Zbar (USA), as chairman of the Working Group;

(4) To request the chairman to submit a report to the Commission not later than six months before its sessions.

NOTE: This resolution replaces Resolution 3 (CBS-IX) which is no longer in force.

Resolution 5 (CBS-X) — WORKING GROUP ON TELECOMMUNCATIONS

THE COMMISSION FOR BASIC SYSTEMS,

CONSIDERING:

(1) That there is a need for the continuation of the work of the Working Group established by Resolution 4 (CBS-IX) — Working Group on the Global Telecommunication System,

(2) Recommendation 1 (CBS-X) — Revised Terms of Reference of the Commission for Basic Systems,

DECIDES:

(1) To establish the Working Group on Telecommunications, with the following terms of reference:

(*a*) To keep abreast of technical developments relating to telecommunications, to consider the implementation of new techniques, and to keep under review the organizational and planning aspects of the GTS, as it relates to the WWW, other WMO Programmes, and other international organizations;

(*b*) To keep under review and make proposals regarding the organization, technical and operational aspects of the entire Global Telecommunication System of the World Weather Watch, including the Main Telecommunication Network, regional and national telecommunication networks, as well as meteorological data collection and distribution systems via meteorological and communications satellites;

(*c*) To keep under review and further develop real-time and non-real-time monitoring procedures relating to the GTS operation, in co-ordination with the Working Group on Data Management, in order to assist Members in improving the operation of their telecommunication systems;

(*d*) To follow closely the progress on the implementation and continued operation of meteorological telecommunication systems and to formulate recommendations with a view to remedying shortcomings and effecting improvements;

(*e*) To keep the regulatory and guidance material under review;

(*f*) To keep under review developments in telecommunication techniques, procedures and equipment, including international standards on data communications, and to formulate for meteorological information exchange

proposals (in binary, alphanumeric, and pictorial form) on the international standardization of operating practices, procedures and equipment;

(*g*) To keep under review allocations of radio frequency bands and assignments of radio frequencies to meteorological activities for operational requirements on telecommunications, instruments, sensors, etc. and research purposes, in co-ordination with the CBS Working Groups on Observations and on Satellites;

(*h*) To monitor progress of the implementation of the WMO Long-term Plan on matters related to the GTS;

(*i*) To co-ordinate its activities with the work of the Working Group on Data Management and of other working groups of CBS, with a view to the integration of the WWW system conceived as an entity;

(*j*) To keep abreast of the activities of the International Telecommunication Union, and in particular, of the C.C.I.R. and I.F.R.B., on frequency matters pertaining to meteorological activities, and to assist the WMO Secretariat in its participation in the C.C.I.R. work, the International Organization for Standardization, the International Civil Aviation Organization, the International Maritime Organization and other international organizations concerned on matters pertaining to telecommunications;

(*k*) To keep up to date relevant training syllabi, as requested, and to suggest training materials and the holding of seminars and symposia;

(*l*) To establish necessary study groups composed of experts, or to appoint rapporteurs, for consideration of specific problems of a technical or operational nature;

(*m*) To act upon matters referred to the Working Group by the president of CBS;

(2) That the Working Group on Telecommunications shall have the following composition:

(*a*) The expert designated by each regional association, as the rapporteur/co-ordinator for regional aspects of the GTS;

(*b*) An expert from one RTH in each of the WMO Regions, to be nominated by the president of the corresponding regional association;

(*c*) An expert designated by the chairman of the CBS Working Group on Data Management;

(*d*) Experts nominated by other Members, or groups of Members, wishing to participate actively in the work of the Working Group;

(*e*) Experts who may be nominated by presidents of other technical commissions and international organizations according to the work programme;

(3) To select, in accordance with Regulation 32 of the General Regulations, Mr M. Fischer (France), as chairman of the Working Group;

(4) To request the chairman to submit a report to the Commission not later than six months before its sessions.

NOTE: This resolution replaces Resolution 4 (CBS-IX) which is no longer in force.

Resolution 6 (CBS-X) — WORKING GROUP ON DATA MANAGEMENT

THE COMMISSION FOR BASIC SYSTEMS,

CONSIDERING:

(1) That full integration of WWW system components, monitoring activities and common, standardized procedures for the handling of data are essential prerequisites for an efficient and flexible operation which will be able to cope with the rapid evolution of requirements and techniques and to ensure that data are available to Members in a timely and convenient fashion,

(2) That modern technology and procedures should be utilized to achieve the maximum benefit from the resources invested in the WWW, and specific attention must be given to

the situation and capabilities of the developing countries when implementing new data management functions,

(3) That, in view of the diversity, complexity and steady evolution of data management requirements, it is necessary to further develop, review and evaluate these aspects through the Working Group on Data Management,

(4) That there is a need for the continuation of the work of the Working Group established by Resolution 5 (CBS-IX) — Working Group on Data Management,

(5) Recommendation 1 (CBS-X) — Revised Terms of Reference of the Commission for Basic Systems,

DECIDES:

(1) To establish a Working Group on Data Management, with the following terms of reference:

(*a*) To keep under review the provision of services of meteorological data management supporting the WWW (GOS, GDPS, GTS) and other related programmes as required in both real-time and non-real time, e.g.:

(i) Co-ordination and orderly monitoring of the generation and flexible exchange of observational data and products;

(ii) Quality control, storage and retrieval of observational data and products;

(iii) Representation forms (meteorological codes and formats) and procedures for syntax conversion (binary, character and graphics) of observational data and products;

(*b*) To develop or adjust appropriate (interfacing) meteorological data-management specifications to:

(i) Provide observational data and products in an efficient manner and convenient to the various application entities;

(ii) Meet new, revised or specialized requirements for WWW facilities and services;

(iii) Ensure that mutually compatible and internally consistent subsets of data emerge from data which are being obtained in different manners on different time and space scales;

(iv) Facilitate the transfer of management and monitoring information (i.e. status of operation) among users of meteorological information and data;

(*c*) To consolidate and co-ordinate statements received from other bodies, Members, regional associations, other technical commissions, and appropriate international organizations on the need for new forms of presentation of meteorological and related data;

(*d*) To keep abreast of the activities of ISO on matters relating to international standards on systems architecture;

(*e*) To monitor progress on the implementation of relevant parts of the WMO Long-term Plan on matters related to data management;

(*f*) To keep up to date relevant training syllabi, as requested, and to suggest training materials and the holding of seminars and symposia;

(*g*) To keep the regulatory and guidance material under review;

(*h*) To establish necessary study groups composed of experts, or to appoint rapporteurs, for consideration of specific problems of a technical or operational nature;

(*i*) To act upon matters referred to the Working Group by the president of CBS;

(*j*) To liaise with the other working groups of CBS with a view to integrating the GDPS, GOS and GTS components into an integrated WWW system;

(2) That the Working Group on Data Management shall have the following composition:

(*a*) The expert designated by each regional association, as rapporteur/co-ordinator, with respect to regional aspects of data management;

(*b*) Experts designated by the chairmen of the CBS Working Groups on Observations, on Data Processing, on Satellites, and on Telecommunications in the light of the issues considered in the work programme;

(*c*) Experts to be nominated by Members, or groups of Members, wishing to participate actively in the work of the Working Group;

(*d*) Experts who may be nominated by presidents of other technical commissions and international organizations according to the work programme;

(3) To select, in accordance with Regulation 32 of the General Regulations, Mr G. Love (Australia), as chairman of the Working Group;

(4) To request the chairman to submit, through the president of the Commission, a report to the Commission not later than six months before its sessions.

NOTE: This resolution replaces Resolution 5 (CBS-IX) which is no longer in force.

Resolution 7 (CBS-X) — WORKING GROUP ON SATELLITES

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Resolution 17 (EC-XLIII) — Executive Council Panel of Experts on Satellites,

(2) The decision of EC-XLIV to establish a CBS Working Group on Satellites, with the same terms of reference and the same composition as the Executive Council Panel,

RECOGNIZING that the CBS Working Group on Satellites will continue to function with the same membership and terms of reference as the Executive Council Panel on Satellites until the Panel is no longer maintained by the Executive Council,

DECIDES:

(1) To establish the CBS Working Group on Satellites with the following terms of reference:

(*a*) To assess the observation, collection, and analysis systems relating to the use of satellites in activities of interest to all WMO Members and to suggest ways and means for improving system capabilities, particularly to Members in developing countries;

(*b*) To collect, collate and keep under review, particularly with regard to their feasibility, the requirements for data, products and services from environmental observation satellites;

(*c*) To assess the status of implementation of the space-based sub-system of the Global Observing System and the adequacy of plans for implementation;

(*d*) To co-ordinate issues and requirements relating to the GOS with the Working Group on Observations;

(*e*) To make recommendations concerning standardization of satellite services and related ground receiving systems;

(*f*) To co-ordinate with the other working groups of CBS on relevant matters, such as the exchange, management and archiving of satellite data and radio-frequency utilization;

(*g*) To represent WMO's interests and convey WMO Members' requirements through appropriate involvement in international satellite groups including the Co-ordination Group for Meteorological Satellites (CGMS) and the Committee on Earth Observation Satellites (CEOS);

(*h*) To keep under review the availability, performance, continuity, and use of environmental observation satellites in WMO Programmes;

(*i*) To keep under review satellite-related education and training requirements and to evaluate the adequacy of existing and planned activities;

(*j*) To identify opportunities and/or problem areas concerning satellite technology and plans for environmental observation satellite operators;

(*k*) To assist in the continuing maintenance of a record of plans for satellite developments and operations in order to assure appropriate consideration of satellite technology in WMO Long-term Plans;

(2) That the Working Group on Satellites shall have the following composition:

(*a*) An expert designated by each of the following Members:

Australia
Brazil
China
France
India
Italy
Japan
Kenya
Russian Federation
United Kingdom
United States

(*b*) An expert nominated by each of the following:

The chairman of the CBS Working Group on Observations
The director of EUMETSAT
The presidents of other technical commissions, as appropriate
The chairman of the JSC
The chairman of the JSTC

(3) That CGMS and CEOS be invited to be represented at meetings of the CBS Working Group on Satellites, as observers;

(4) To select, in accordance with Regulation 32 of the General Regulations, Dr T. Mohr (Germany), as chairman of the Working Group;

AUTHORIZES the president of CBS, in consultation with the President of WMO, to adjust the membership and chairmanship of the Working Group on Satellites, as required;

REQUESTS:

(1) The chairman to submit, through the president of the Commission, a report to the Commission, not later than six months before its sessions;

(2) The Working Group to report annually to the Executive Council, through the president of CBS, under the World Weather Watch Programme;

DECIDES FURTHER that this resolution will take effect on 19 June 1993 consequent to a decision which will be taken by the EC-XLV concerning its Panel of Experts on Satellites.

Resolution 8 (CBS-X) — RAPPORTEUR ON THE FOLLOW-UP TO UNCED

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) The results of the UN Conference on Environment and Development, including the Rio Declaration, Agenda 21, the Statement of Forest Principle, the Convention on Biodiversity, and the Framework Convention on Climate Change,

(2) Resolutions 14 and 15 (EC-XLIV),

CONSIDERING:

(1) That there are long-term implications of the results of the UN Conference on Environment and Development for WMO and for national Meteorological and Hydrological Services,

(2) That there is international recognition of the importance of systematic observations and full and open exchange of data for sustainable development and for detection and prediction of climate change,

(3) The need for CBS to consider the role and support of the WMO basic systems in the follow-up to UNCED and their relationship with other systems,

DECIDES:

(1) To appoint a Rapporteur on the Follow-up to UNCED, to work closely with the Executive Council Working Group on the Follow-up to UNCED, including Capacity Building, and to review Agenda 21 and the Framework Convention on Climate Change in order to identify specific actions which could be taken by CBS and national Meteorological and Hydrological Services in the areas of systematic observations and exchange of data;

(2) To select, in accordance with Regulation 32 of the General Regulations, the vice-president of the Commission as rapporteur;

REQUESTS the rapporteur to prepare a report to the Commission not later than six months before its sessions.

Resolution 9 (CBS-X) — REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE COMMISSION FOR BASIC SYSTEMS

THE COMMISSION FOR BASIC SYSTEMS,

NOTING the action taken on the resolutions and recommendations adopted prior to its tenth session,

DECIDES:

(1) To replace Resolutions 1, 2, 3, 4, 5, and 6 (CBS-IX) with new resolutions;

(2) That all recommendations adopted before its tenth session have been acted upon and have become redundant.

RECOMMENDATIONS ADOPTED BY THE SESSION

Recommendation 1 (CBS-X) — REVISED TERMS OF REFERENCE OF THE COMMISSION FOR BASIC SYSTEMS

THE COMMISSION FOR BASIC SYSTEMS,

NOTING the request of EC-XLIV that CBS review the concept of WWW basic systems in support of all WMO and other related international programmes and recommend any desired changes in its terms of reference or in the organization and presentation of WWW basic system programmes in the post-UNCED era,

STRESSING that WMO's basic systems provide both the common infrastructure and the database to support all WMO Programmes and relevant efforts of international organizations,

RECOGNIZING:

(1) The technological and conceptual advances available for enhancing WMO basic systems to meet requirements in new and effective ways;

(2) The growing global interest in environmental issues and the associated need for improved basic systems;

AFFIRMING that the Commission has an important role to play in further developing and co-ordinating these basic systems, and the competence to do so;

RECOMMENDS that the terms of reference of the Commission for Basic Systems be as given in the Annex to this recommendation.

Annex to Recommendation 1 (CBS-X)

Terms of Reference of the Commission for Basic Systems

The Commission shall be responsible for matters relating to:

(*a*) Co-operation with Members, other technical commissions and relevant bodies in the development and operation of integrated systems for observing, data processing, telecommunications, and data management in response to requirements of all WMO Programmes and opportunities provided by technological developments;

(*b*) The assessment of opportunities for, and the provision of, a common infrastructure to meet the requirements defined by technical commissions and regional associations, as well as by organizations with whom WMO has relations, taking into account new applications of meteorology, hydrology, oceanography, and related environmental sciences;

(*c*) Development and implementation of the Public Weather Services Programme;

(*d*) The processing, storage and retrieval of basic data fo r meteorological and related purposes including, in particular, the organization of the Global Data-processing System (GDPS) of the World Weather Watch;

(*e*) The development and application of systems and techniques to meet user requirements including those of operational weather analysis and forecasting and of services for environmental emergency authorities;

(*f*) Observational systems, facilities and networks (land, sea, air, and space) as decided by Members including, in particular, all technical aspects of the Global Observing System (GOS) of the World Weather Watch;

(*g*) Telecommunication networks, radio-frequency allocation and facilities for operational, research and applications purposes including, in particular,

the organization of the Global Telecommunication Systems (GTS) of the World Weather Watch;

(*h*) The development and application of operational procedures, schedules, and arrangements for the international exchange of observational data and processed information, in particular, through the GTS;

(*i*) The development and application of data management principles and procedures including monitoring and evaluation of the common infrastructure, in particular, of the World Weather Watch.

Recommendation 2 (CBS-X) — AMENDMENTS TO *THE MANUAL ON THE GLOBAL DATA-PROCESSING SYSTEM (GDPS)* — PARTS I, II AND III

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) The report of the CBS Working Group on the GDPS Expert Meeting on Planning and Implementation of the NMCs, WMCs and RSMCs (Geneva, November 1990),

(2) The report of the CBS Working Group on the GDPS Expert Meeting on Operational Matters of WMCs and RSMCs Including Co-ordination of Output Products (Geneva, October 1991),

(3) The *Manual on the Global Data-processing System*,

CONSIDERING:

(1) That there is a need to define some terms involved in the general area of quality control,

(2) That there is a need to specify details of the quality control lead centre monitoring programme,

(3) That there is a need to update procedures and requirements on quality control of observational data and their reception at GDPS centres in both real-time and non-real-time, and procedures and formats for the exchange of monitoring results,

(4) That there is a need to update the *Manual* to reflect the concept of RSMCs with geographical specialization and activity specialization, the current exchange of GRIB products and responsibilities of Members for providing information on their real-time data-processing activities,

(5) That there is a need to update Part II of the *Manual* to include non-real-time functions of GDPS centres and consequently Part III which has been superseded and which advocates standards and techniques no longer in widespread usage and not reflecting current practice, need to be updated,

(6) That there is a need to include in Part I of the *Manual* the procedures approved by the Executive Council for the designation of Regional Specialized Meteorological Centres.

RECOMMENDS that the amendments to the *Manual on the GDPS*, Parts I, II and III, given in the Annex to this recommendation, be adopted for inclusion in the *Manual on the GDPS* as well as relevant parts of the *Manual on the GOS* and *Manual on the GTS*, to take effect from 1 July 1993;

REQUESTS the Secretary-General, to make appropriate changes, as given in the Annex to this recommendation, in the *Manual on the GDPS*;

AUTHORIZES the president of CBS, in consultation with the Secretary-General, to make any consequent purely editorial amendments with respect to the *Manual on the GDPS*.

Annex to Recommendation 2 (CBS-X)

Amendments to the *Manual on the Global Data-processing System*
Part II

Replace paragraphs 2 to 2.1.2.3 by the following:

2. **QUALITY CONTROL OF OBSERVATIONAL DATA AND THEIR RECEPTION AT GDPS CENTRES IN REAL- AND NON-REAL TIME**

2.1 **Quality control of observational data**

2.1.1 ***Definitions***

2.1.1.1 Quality assurance should be taken to mean the procedures that ensure the best possible quality of the data which are used for purposes of the GDPS.

2.1.1.2 Quality control (QC) requires that an operational entity, be it a WMC, RSMC, NMC or observing site, has the ability to select, edit, or otherwise manipulate observations according to its own set of physical or dynamical principles. Furthermore, real-time QC should carry the connotation that such a centre has the ability to feedback, or query, an observation-originating point or responsible staff where appropriate on erroneous or questionable data, or on the lack of an expected report within a time sufficient to retain the synoptic usefulness of the report.

2.1.1.3 Quality monitoring, on the other hand, is the act of aggregating information on the quality of a sample of observations from the point of view of a particular application, e.g. numerical weather prediction. It is important to make a distinction between quality monitoring and delayed-time quality control. The latter needs to be clarified in terms of the actual practices of the centres producing delayed-time products.

2.1.1.4 Quantity monitoring is the act of aggregating information on the numbers of observations available, transmitted, and used by a centre.

2.1.2 ***Responsibility for real-time quality control***

2.1.2.1 The primary responsibility for quality control of all observational (Level II) data should rest with the national Meteorological Service from which the observation originated ensuring that when these observations enter the GTS they are as free from error as possible.

2.1.2.2 For the NMCs not capable of implementing the minimum standards, Members concerned should establish agreements with an appropriate RSMC or NMC to perform the necessary quality control on an interim basis.

NOTE: Minimum standards of quality control for real-time data are given in Attachment II.1.

2.1.2.3 Quality control of observational data needed for real-time uses shall not introduce any significant delay in the onward transmission of the data over the GTS.

2.1.2.4 To detect errors which may escape the national quality control system and errors introduced subsequently, RSMCs, WMCs and other GDPS centres should also carry out appropriate quality monitoring of the observational data they receive.

ATTACHMENT II.1

MINIMUM STANDARDS FOR QUALITY CONTROL OF DATA FOR USE IN THE GDPS (BOTH REAL-TIME AND NON-REAL TIME)

Introduction

1. According to the WWW plan, the Commission for Basic Systems was required to develop minimum standards for the quality control of data in the GDPS. The Plan for Monitoring the Operation of the WWW, developed by CBS (as presently published in the *Manual on the GTS*, WMO-No. 386, Attachment I-5), also includes reference to the fact that minimum standards should be defined in the *Manual on the GDPS*.

Objectives

2. The objectives of the GDPS quality control are:

(*a*) To ensure the best possible quality of the data which are used in the real-time operations of the GDPS;

(*b*) In non-real-time, to protect and improve the quality and integrity of data destined for storage and retrieval within the GDPS;

(*c*) To provide the basis for feedback of information on errors and questionable data to the source of the data.

Basic components

3. The minimum standards for quality control of data apply to all WWW centres: NMCs, RSMCs, WMCs. They include quality control at various stages of processing. They apply both to real-time and non-real-time processing and should lead to various records of quality-control actions.

Aspects of implementation

4. Quality-control standards may be introduced progressively at a GDPS centre using a modular approach. The general priorities for implementation of the minimum standards under the modular concept concern quality control of data, according to:

(*a*) Sources (e.g. stations);
(*b*) Type (e.g. SYNOP, TEMP);
(*c*) Time (e.g. 00 GMT, 12 GMT);
(*d*) Parameters and characteristics (e.g. pressure, wind, temperature, amount of precipitation).

5. WMCs having multiple responsibilities as an RSMC and/or an NMC, and RSMCs also having a responsibility as an NMC, should assume the minimum standards pertinent to all levels at which the centre operates.

6. Table I of this attachment lists the minimum standards for real-time and non-real-time quality control at NMCs, RSMCs and WMCs. Where applicable, regional associations and national Meteorological Services will set up similar quality control standards for data exchanged only at regional or national levels.

Responsibilities

7. General principles for the application and administration of GDPS minimum standards for quality control of data are given in the following paragraphs.

8. The basic responsibilities for implementing minimum standards for quality control of the GDPS rest with Members.

9. An essential part of the quality control plan includes the exchange of information about data deficiencies between GDPS centres and observation points in order to resolve those deficiencies and minimize their recurrence.

10. The frequencies with which information is exchanged in order to improve the quality of data and products should correspond to the frequency with which monitoring reports are exchanged. These are given in the Plan for Monitoring the Operation of the WWW, as given in Attachment II.14, in particular, paragraph 22.

11. The minimum standards specify which data are to be quality controlled and how often. The detailed methods for performing the quality control are left to the Members to develop, but should conform to the minimum standards.* The geographic area (zone) of responsibility for the application of the minimum standards will correspond to that undertaken by each WWW centre for data processing, as laid down in Attachment III.2.

Advanced standards

12. The primary purpose of quality control is to detect data deficiencies and to attempt to correct them in real time. Thus, the WWW centres should perform quality control operations as these are developed and as their technical capabilities allow. Centres which have high-speed computers can apply standards for quality control which are far beyond the minimum standards. These advanced standards should involve more real-time quality control, including correcting or flagging of more reports, parameters and levels than listed in Table I. The WWW Guides give information on methods for more advanced quality control.*

13. It is also the responsibility of automated centres to perform routine maintenance of quality control programmes.

Minimum standards for processed data

14. Minimum standards for quality control of processed data should include:

(*a*) Standards for the presentation of processed data as are given in Attachment II.4 to the *Manual on the GDPS*;
(*b*) Spatial and temporal coherence in the meteorological structure of the product (that is, no impossible or contradictory atmospheric states).

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* Methods for real-time and non-real-time quality control are given in Volume I of the *Guide on the Global Data-processing System*, WMO-No. 305.

Table I

GDPS MINIMUM STANDARDS FOR QUALITY CONTROL OF INCOMING DATA (RECEIVED VIA THE GTS OR OTHER MEANS)

(new text appears in bold)

(1)	*Station list* (2)	*Types of report* (3)	*Times of observations** (4)	*Parameters to be quality-controlled* (5)	*Procedures for quality control* (6)	*Records to be maintained* (7)	*Minimum frequency for performing quality control* (8)
REAL TIME	WMCs RSMCs and NMCs: Global exchange list of RBSNs in Volume A, WMO-No. 9, ***Observing Stations***	SYNOP	00, 06, 12, 18	FM 12: All mandatory groups	*Checking* • Detection of mission data at centres • Adherence to prescribed coding formats • Internal consistency • Time consistency • Space consistency • Physical and climatological limits *Remedial Action* Before further processing, correct or flag erroneous or suspect data *Notification:* Discrepancies and missing data should be made known to the appropriate centre or station NOTE: **It is recognized that notification of not all errors or doubtful data can be done in real time by a processing centre. Thus when it becomes feasible binary data representation should be used to exchange together with observations:** • **Instruments** • **Information on data correction applied** • **Information on quality control**	• Information to identify source of data such as station, aircraft, ship • Type of deficiency (non-receipt, incomplete or incorrect reports, etc.) • Identification of deficient element (whole report, specific group, specific parameter, etc.) • Frequency of occurrence of data deficiencies (according to station type and element)	Preferably with each operational cycle; otherwise, with sufficient frequency to establish representative records
		SHIP	00, 06, 12, 18	FM 13: All mandatory groups			
		PILOT Parts A and B C and D	00, 06, 12, 18	FM 32: Sections 1, 2, 3, 4			
		PILOT SHIP Parts A and B C and D	00, 06, 12, 18	FM 33: Sections 1, 2, 3, 4			
		TEMP Parts A and B C and D	00, 06, 12, 18	FM 35: Sections 1, 2, 3, 4, 5, 6			
		TEMP SHIP Parts A and B C and D	00, 06, 12, 18	FM 36: Sections 1, 2, 3, 4, 5, 6			
		PILOT MOBIL Parts A and B C and D		**FM 34: Sections 1, 2, 3, 4**			
		TEMP MOBIL Parts A and B C and D		**FM 38: Sections 1, 2, 3, 4, 5, 6**			
		SATEM SATOB	Asynoptic	FM 86: Mean temperatures FM 88: Cloud-motion winds			
		Aircraft meteorological observations	Asynoptic	• Time and position • Wind • Temperature • Flight level			
		BUOY	**Asynoptic**	**FM 18: Sections 1, 2**			

(continued)

GDPS MINIMUM STANDARDS FOR QUALITY CONTROL OF INCOMING DATA (RECEIVED VIA THE GTS OR OTHER MEANS) *(contd.)*

(1)	*Station list* (2)	*Types of report* (3)	*Times of observations*• (4)	*Parameters to be quality-controlled* (5)	*Procedures for quality control* (6)	*Records to be maintained* (7)	*Minimum frequency for performing quality control* (8)
		CLIMAT**	Monthly	FM 71: Section 1			
		CLIMAT SHIP**	Monthly	FM 72: Section 1			
		CLIMAT TEMP**	Monthly	FM 75			
		CLIMAT TEMP SHIP**	Monthly	FM 76			
		BUFR	**As defined within the message**	**FM 94: Section 4**			
NON REAL TIME	WMCs RSMCs and NMCs: Global exchange list of RBSNs in Volume A, WMO-No. 9, *Observing Stations*	Same as for real time plus:	Same as for real time plus:	Same as for real time plus:	*Checking* Same as for real time and in addition: • Review of recorded data in comparison with observations taken before and after • Inter-comparison of parameters and calculations • Check of supplementary data • Check of extreme values *Remedial Action* Correct errors and flag data as appropriate *Notification* Refer discrepancies to observing stations or WWW centre as follows: • Once per month from NMCs • Once every three months from RSMCs • Once every six months from WMCs and lead centres.	*Summarize records developed in real time to include:* Same as for real time with all data deficiencies found in real time combined with additional ones found in non-real time	With sufficient frequency to establish representative records
		ROCOB	Asynoptic	FM 39: Sections 1, 2			

• Use observation time nearest to maintain synoptic hours when observation not taken at main synoptic hours.

** Monthly on receipt and prior to initial distribution or use.

NOTES: (1) Any of the observational data types, described in column (3) in terms of their alphanumeric code forms, may also be transmitted in BUFR code. If so, they should be subject to the same minimum standards of quality control as their alphanumeric counterpart. New data (in BUFR) should have quality control standards developed as appropriate.

(2) Lead centres for data quality monitoring are given in WMO-No. 488, *Guide on Global Observing System*, Part VII, paragraph 7.2.2.1.

ATTACHMENT II.2

OBSERVATIONAL DATA REQUIREMENTS OF GDPS CENTRES FOR GLOBAL EXCHANGE

(See also Attachment I-3 of the *Manual on the GTS* (WMO-No. 386) — Principles for the establishment of the exchange programme for observational data on the Main Telecommunication Network). New text appears in bold.

1. **Type of report/data**

The types of message are as follows:

(*a*) TEMP — Parts A, B, C, and D
(*b*) PILOT — Parts A, B, C, and D
(*c*) TEMP SHIP — Parts A, B, C, and D
(*d*) PILOT SHIP — Parts A, B, C, and D
(*e*) TEMP MOBIL — Parts A, B, C, and D
(*f*) PILOT MOBIL — Parts A, B, C, and D
(*g*) SYNOP
(*h*) SHIP
(*i*) Reports from automatic stations on land and at sea
(*j*) **CODAR/AIREP/AMDAR**
(*k*) Selected satellite data, such as cloud images, SATEM, SAREP, SARAD, SATOB
(*l*) **BUOY**
(*m*) CLIMAT, CLIMAT SHIP
(*n*) CLIMAT TEMP, CLIMAT TEMP SHIP
(*o*) **BATHY, TESAC, TRACKOB**
(*p*) **BUFR**

NOTES: (1) **Items (*a*) to (*p*) do not indicate priorities.**

(2) **BUFR can encode any of the above data forms and many more. If BUFR is used to represent any of these data forms, in lieu of the specific alphanumeric code form, the same data requirements apply.**

2. **Frequency of exchanges**

The frequency of exchanges is as follows:

(*a*) TEMP, PILOT, TEMP SHIP, PILOT SHIP, TEMP MOBIL, PILOT MOBIL, as available;
(*b*) **SYNOP, SHIP and reports from automatic stations on land and at sea — 0000, 0600, 1200 and 1800 UTC;**
(*c*) **CODAR/AIREP/AMDAR reports, as available;**
(*d*) Selected satellite data, such as cloud images, SATEM, SAREP, SARAD and SATOB, as available;
(*e*) **BUOY, as available, orbit by orbit;**
(*f*) CLIMAT, CLIMAT SHIP, CLIMAT TEMP and CLIMAT TEMP SHIP — once per month;
(*g*) **BATHY, TESAC and TRACKOB, as available;**
(*h*) **BUFR, as available.**

NOTE to 1 and 2 above: On certain segments of the Main Telecommunication Network and its branches, additional information may be exchanged if necessary and possible, to meet interregional exchange requirements.

3. **Stations/areas from which reports should be included in the bulletins that are to be exchanged**

The lists of stations or areas from which reports should be included in the bulletins that are to be exchanged are established as follows:

(*a*) All stations (on land or at sea) making radiosonde/radiowind observations and reporting by means of TEMP/TEMP SHIP code forms;
(*b*) All stations (on land or at sea) making radiowind observations and reporting by means of PILOT/PILOT SHIP code forms, except those stations from which wind data are included in TEMP/TEMP SHIP reports or which, while not included in the regional basic networks, are located in areas of sufficiently dense network;

(*c*) Stations (on land or at sea) making pilot-balloon observations and reporting by means of PILOT/PILOT SHIP code forms, situated in areas where the upper-air network is not adequate, except those stations from which wind data are included in TEMP/TEMP SHIP reports;

(*d*) All stations included in the regional basic synoptic networks and reporting by means of the SYNOP code form: synoptic surface observation reports from land stations exchanged on the MTN shall include at least Sections 0 and 1 of the SYNOP code form. As an interim measure, Section 3 of the SYNOP code form shall also be included in the global exchange on the MTN;

(*e*) SHIP reports ensuring adequate data coverage, e.g. SHIP reports from locations within 50–100 km of a coastline, could be excluded if the land surface network is adequate. However, all SHIP reports from the southern hemisphere and tropical zones should be included;

(*f*) **CODAR/AIREP/AMDAR reports over ocean areas and data-sparse land areas;**

(*g*) Reports from automatic weather stations in data-sparse areas;

(*h*) **All BUOY data available;**

(*i*) **CLIMAT/CLIMAT TEMP and CLIMAT SHIP/CLIMAT TEMP SHIP reports from the networks of stations recommended by regional associations;**

(*j*) **All BATHY/TESAC and TRACKOB reports, as available;**

(*k*) **All BUFR reports, as available.**

The lists of stations from which reports are to be exchanged globally (global exchange) are given in Attachment I–4 to the *Manual on the GTS* (WMO-No. 386).

ATTACHMENT II.3

TIMES OF RECEIPT OF OBSERVATIONAL DATA

Received data \ *Receiving centre*			*WMC*	*RSMC (RTH)*	*NMC*
Time of receipt of observational data	Global Network	Surface + Upper	H+ 3(6)	H+ 3(6)	H+ 3(6)
	Regional Network	Surface		H+ 2(3)	H+ 2(3)
		Upper		H+ 3(4)	H+ 3(4)
Minimum storage time of observational data for transmission purposes		Surface	H+ 24	H+ 24	
		Upper	H+ 24	H+ 24	

NOTES: (1) This table states times, e.g. H+ 3 (6) hours, within which different categories of data should normally be transmitted to the different centres. H is the time of observation. The first figure is the time necessary for collection of data in regions where telecommunication systems and receiving centres make full use of modern technical equipment; the figure in brackets is applicable where the Global Telecommunication System operates under most difficult conditions.

(2) Time of receipt of observational data is the time at which an adequate amount of data needed for analyses has been received.

Amendments to Part II (continued)

Amend paragraph 5.2.3 to read:

5.2.3 In order to avoid overloading the GTS, Members should limit requests by their NMC for products, taking into account the following considerations:

(*a*) Members should require output products from RSMCs with geographic specialization normally from one RSMC located in the same WMO Region (exceptions shall be restricted to cases where the area, for which a Member needs to receive RSMC output products, is not covered by the products from one RSMC in the same Region);

(*b*) If there is an urgent need for a Member to receive the same product from more than one geographically specialized RSMC or WMC for special operational purposes, these requirements should be limited to a selection of two levels of analyses and prognoses;

(*c*) Members should request processed information from the centres most readily accessible on the GTS.

NOTE: The lists of WMC and RSMC products, to which the highest priority should be given for preparation, are given in Attachments II.8 and II.9.

Add paragraph 5.2.4:

5.2.4 Globally specialized RSMCs should tailor their products to regions to meet regional requirements and, if possible, to limit their size to avoid overloading the GTS.

Amend the following paragraphs to read as follows:

5.3.7 ***Transmission of products in binary, alphanumeric and pictorial form***

5.3.7.1 Until such time as all centres are in a position to convert output products in GRIB and/or GRID code forms into pictorial form, Members should transmit certain of their WMC and RSMC products also in pictorial form in addition to alphanumeric and/or binary form.

5.3.7.2 A list of such products for transmission on the MTN and its branches should provide guidance to Members for triple transmissions.

NOTES: (1) Members are encouraged to transmit processed information in the GRID and/or GRIB code forms.

(2) A minimum list for transmission of products in binary, alphanumerical and pictorial form is given in Attachment II.13.

(3) As Members develop the capability at their RSMCs for transforming these products from GRID and/or GRIB to pictorial form, the pictorial transmission would be discontinued, where appropriate.

5.4 **Responsibilities of Members for providing information on their real-time data-processing activities**

5.4.1 Members shall provide the Secretariat, at stated intervals, with current lists of output products, grid systems available and used at their centre(s) for inclusion in WMO-No. 9, Volume B, *Data Processing.*

5.4.2 Members shall provide the Secretariat annually, at the end of January, with information on equipment in use at the centre, usage of data and products from the GTS, analysis and prediction techniques, real-time quality control and verification procedures and results obtained at their centre(s) for inclusion in an Annual WWW Technical Progress Report on the Global Data-processing System.

5.4.3 Members should provide the Secretariat, at stated intervals, with current information on appropriate routine computer programs used in their centres, which they are willing to make available, or their requirements and requests for software support for inclusion in the WMO Secretariat Software Registry.

ATTACHMENT II.5

TIMES OF AVAILABILITY OF PRODUCTS WITH HIGH OPERATIONAL PRIORITY

	*Short-range 00–72 hours	Medium-range 72–120 hours	Medium-range 120–240 hours
Global model products (digital)	H + 5 (9)	H + 6 (10)	H + 11 (13)
Global model products (graphic)	H + 6 (10)	H + 7 (11)	H + 12 (14)
Regional model products (digital)	H + 4 (5)		
Regional model products (graphic)	H + 5 (6)		

* 00 denotes analyses.

NOTES: (1) This table states, e.g. H+ 5 (9) hours, within which different categories of products should normally be transmitted to the different centres. H is the time of basic observations; the first figure is the time necessary for collection of data, for processing and transmission of products in regions where telecommunication systems, processing and receiving centres make full use of modern technical equipment; the figure in brackets is applicable where the GDPS operates under most difficult conditions.

(2) Charts of high operational priority normally mean surface and 500-hPa analyses and forecasts. High priority may also be given to other products, if based on regional requirements and agreements.

(3) Concerning forecasts, high priority is given to regional forecasts up to one or three days, and to global forecasts up to five days or even more, if these forecasts will have reached an acceptable degree of reliability.

ATTACHMENT II.13

Change the title of the attachment to read:

Minimum product list for transmission in binary, alphanumerical and pictorial form

ATTACHMENT II.15

PROCEDURES AND FORMATS FOR THE EXCHANGE OF MONITORING RESULTS

1. GENERAL REMARKS

1.1 Centres participating in the exchange of monitoring results will implement standard procedures and use agreed formats for communicating the information both to other centres and to the data providers. The following list is incomplete and requires further development in the light of practical experience. Guidance will be given through the initiative of the lead centres in their corresponding fields of responsibility.

1.2 Recognizing the fact that the monthly lists of suspect stations could be misinterpreted if the methods of compilation are not completely understood, they should be circulated only to those centres participating in the monitoring programme. In addition, they should contain a clear explanation of the criteria used and the limitations of the system.

2. UPPER-AIR OBSERVATIONS

2.1 Monthly exchange for upper-air observations should include lists of stations/ships with the following information.

2.1.1 List 1: GEOPOTENTIAL HEIGHT

Month/year
Monitoring centre
Standard of comparison (first-guess/background field)

Selection criteria: FOR 00 AND 12 UTC SEPARATELY, AT LEAST THREE LEVELS WITH 10 OBSERVATIONS DURING THE MONTH AND 100 M WEIGHTED RMS DEPARTURE FROM THE FIELD USED FOR COMPARISON BETWEEN 1 000 hPa AND 50 hPa.

The gross error limits to be used for observed minus reference field are as follows:

Level	Geop
1 000 hPa	100m
925 hPa	100m
850 hPa	100m
700 hPa	100m
500 hPa	150m
400 hPa	175m
300 hPa	200m
250 hPa	225m
200 hPa	250m
150 hPa	275m
100 hPa	300m
70 hPa	375m
50 hPa	400m

Weights to be used at each level are as follows:

Level	Weight
1 000 hPa	3.70
925 hPa	3.55
850 hPa	3.40
700 hPa	2.90
500 hPa	2.20
400 hPa	1.90
300 hPa	1.60
250 hPa	1.50
200 hPa	1.37
150 hPa	1.19
100 hPa	1.00
70 hPa	0.87
50 hPa	0.80

Data to be listed for each selected station/ship should include:

WMO identifier;
Observation time;
Latitude/longitude (for land stations);
Pressure of the level with largest weighted RMS departure;
Number of observations received (including gross errors);
Number of gross errors;
Percentage of observations rejected by the data assimilation;
Mean departure from reference field;
RMS departure from reference field (unweighted).

Gross errors should be excluded from the calculation of the mean and RMS departures. They should not be taken into account in the percentage of rejected data (in neither the numerator nor denominator).

2.1.2 List 2: WIND

Month/year
Monitoring centre
Standard of comparison (first-guess/background field)

Selection criteria: FOR 00 AND 12 UTC SEPARATELY, AT LEAST ONE LEVEL WITH 10 OBSERVATIONS DURING THE MONTH AND 15 M/S RMS VECTOR DEPARTURE FROM THE FIELD USED FOR COMPARISON, BETWEEN 1 000 hPa AND 100 hPa.

The gross error limits to be used are as follows:

Level	Wind
1 000 hPa	35 m s^{-1}
925 hPa	35 m s^{-1}
850 hPa	35 m s^{-1}
700 hPa	40 m s^{-1}
500 hPa	45 m s^{-1}
400 hPa	50 m s^{-1}
300 hPa	60 m s^{-1}
250 hPa	60 m s^{-1}
200 hPa	50 m s^{-1}
150 hPa	50 m s^{-1}
100 hPa	45 m s^{-1}

Data to be listed for each selected station/ship should include:

WMO identifier;
Observation time;
Latitude/longitude (for land stations);
Pressure of the level with largest RMS departure;
Number of observations received (including gross errors);
Number of gross errors;
Percentage of observations rejected by the data assimilation;
Mean departure from reference field for u-component;
Mean departure from reference field for v-component;
RMS vector departure from reference field.

Gross errors should be handled in the same way as for List 1

2.1.3 List 3: WIND DIRECTION

Month/year
Monitoring centre
Standard of comparison (first-guess/background field)

Selection criteria: FOR 00 AND 12 UTC SEPARATELY, AT LEAST FIVE OBSERVATIONS AT EACH STANDARD LEVEL FROM 500 hPa TO 150 hPa, AND, FOR THE AVERAGE OVER THAT LAYER, MEAN DEPARTURE FROM REFERENCE FIELD AT LEAST +/- 10 DEGREES, STANDARD DEVIATION LESS THAN 30 DEGREES, MAXIMUM VERTICAL SPREAD LESS THAN 10 DEGREES.

Same limits for gross errors as above. Data for which the wind speed is less than 5 m/s, either observed or calculated, should also be excluded from the statistics.

Data to be listed for each selected station/ship should include:

WMO identifier;
Observation time;
Latitude/longitude (for land stations);
Minimum number of observations at each level from 500 hPa to 150 hPa (excluding gross errors and data with low wind speed);
Mean departure from reference field for wind direction, averaged over the layer;
Maximum spread of the mean departure at each level around the average;
Standard deviation of the departure from reference field, averaged over the layer.

(To be completed with information from other lead centres)

NOTES: (1) The responsibility for updating this Attachment rests with the lead centres.
(2) Urgent changes to this Attachment recommended by the lead centres shall be approved, on behalf of the Commission for Basic Systems, by the president of the Commission.

Amendments to Part II (continued)

New title: **DATA-PROCESSING ASPECTS**

Modify paragraph 1.3.2 to read:

1.3.2 WMCs should also carry out verification and inter-comparison of products and make results available to all Members concerned, support the inclusion of research results into operational models and their supporting systems and provide training courses on the use of WMC products.

Add paragraph 1.3.3:

1.3.3 The functions of a WMC should also include the following non-real-time activities:

(*a*) Carrying out the development of research in support of large- and planetary-scale analyses and forecasting;
(*b*) Exchanging of technical information with other centres;
(*c*) Providing opportunities for training personnel in data processing;
(*d*) Management of non-real-time data involving:
(i) Collection and quality control of data not available from the GOS in real time, via mail or other means;
(ii) Storage and retrieval of all basic observational data and processed information needed for large- and planetary-scale research and applications;
(iii) Making non-real-time data available to Members or research institutes upon request;
(*e*) Continuously updating and providing, on request catalogues of available products.

Add paragraph 1.4.5:

1.4.5 The functions of an RSMC should also include the following non-real-time activities:

(*a*) Assisting in the management of non-real-time data involving:
(i) Assistance to the WMC in management and maintenance of non-real-time data, in particular by obtaining late and delayed observational data for its area of responsibility;
(ii) Storage and retrieval of basic observational data and processed information needed to discharge the non-real-time responsibilities of the RSMC;
(iii) Making non-real-time data available to Members or research institutes upon request;
(*b*) Development and refinement of new techniques and applications;
(*c*) Carrying out comparative verifications of RSMC products and making results available to all Members concerned;
(*d*) Regular exchange with other centres of information on techniques and procedures used and results achieved;
(*e*) Providing opportunities for training of personnel in manual and automated techniques;
(*f*) Continuously updating and providing, on request, a catalogue of available products.

Add paragraph 1.5.3:

1.5.3 The functions of an NMC should also include the following non-real-time activities:

(*a*) Support, as required, of the appropriate RSMC in managing non-real-time data, including management of its national database;
(*b*) Storage and retrieval (including quality control) of observational data and processed information to meet national and certain international requirements;
(*c*) Research concerning operations to meet national requirements.

Part III

New title: **DATA MANAGEMENT ASPECTS**

Replace the entire Part III as follows:

1. **STORAGE OF DATA**

1.1 Data (observations, analysis and forecast fields) should be organized as much as possible in database structures for easy cataloguing and preparing inventories, in order to facilitate the exchange of data and request-reply processing.

1.2 Where possible, the storage of data for non-real-time users should be within a database structure with the following characteristics:

(*a*) There should be a table structure present within the database which provides users with the ability to identify easily the contents of the database (some form of automatic cataloguing system);
(*b*) The database should facilitate the easy inter-comparison of diverse elements contained within it;
(*c*) The ability to store a wide variety of data with flexibility in adding new types;
(*d*) Easy access from application programs to the stored data.

2. **COLLECTION, ARCHIVING AND RETRIEVAL OF DATA IN THE GDPS**

2.1 **Data to be stored for non-real-time uses**

2.1.1 The following operational data shall be stored within the GDPS:

(*a*) All direct observations or values calculated from these observations by simple methods;
(*b*) Selected derived data which cannot be easily reconstituted from observed data;

(**Replace** paragraph 2.1.1 (*c*) for consistency with change made by CBS-Ext.(90)):

(*c*) Selections of analyses and forecasts including verification results.

2.1.2 The types of material to be stored at WMCs, RSMCs should correspond broadly to those required by investigators of problems on the planetary, large, meso and small scales, respectively.

NOTE: Responsibilities for storage of data at WMCs, RSMCs are given in Attachments III.1 and III.2, respectively. Guidelines for storage and retrieval of satellite data at RSMCs and NMCs are given in Attachment III.4. In meeting these responsibilities, Members should ensure that their centres observe necessary co-ordination with existing archiving systems for marine, aeronautical and satellite data to avoid unnecessary duplication of stored data.

2.1.3 Members should ensure that their NMCs archive and retrieve all data originating from their national observing networks and facilities.

NOTE: Members may wish their NMCs to store additional data of regional, or even global, coverage to satisfy national requirements.

2.2 **National arrangements for storage of climatological data**

2.2.1 Each Member should collect all its climatological records in its appropriate meteorological archives.

2.2.2 Each Member should maintain an up-to-date inventory of the climatological data available in its archives and also of any other climatological data available in its territory.

2.2.3 Each Member should arrange for the transfer of climatological data from its stations to media capable of being processed by automatic methods.

2.3 **Collection of data to be stored**

2.3.1 Where urgency for immediate processing of non-real-time data exists, data collection should be by the GTS, subject to available capacity.

2.3.2 Where such urgency, or sufficient capacity, does not exist, the collection should be the safest most economical means or media available.

2.3.3 Where data are available completely through the GTS, the resulting collection should serve research or non-real-time requirements as well as real-time requirements. Collection of the same data by other methods should, in this case, not be necessary if adequate standards of quality control are achieved for the data collected by the GTS.

3. NON-REAL-TIME QUALITY CONTROL

3.1 Quality control of data to be stored

3.1.1 In addition to the real-time quality control, but prior to their storage for retrieval purposes, all data should be subject to the quality control necessary to ensure a satisfactory standard of accuracy for users.

NOTE: Minimum standards of non-real-time quality control of data to be stored by WWW centres are given in Attachment III.3.

3.1.2 The primary responsibility for non-real-time quality control should rest with Members which operate the centres that store the data. This control should be performed on a routine basis and should begin as soon as possible after the data have been received at the centre.

3.1.3 Prior to placing data in storage, all suspect values and proposed corrections should be appropriately marked for future users of data.

3.1.4 Where possible, Members should employ, and constantly improve, computerized methods used at their centres for re-examination of real-time data to detect and correct errors before storage of data.

4. CLASSIFICATION AND CATALOGUING OF STORED DATA

4.1 Catalogue of stored data

4.1.1 All Members should publish and keep up-to-date catalogues of the data which they store at their centres. A descriptive list of such catalogues should be compiled and disseminated to all Members who request it.

(The old paragraph 4.1.2, which does not reflect current practice, and 4.1.3, which is covered under more general requirements for data collection in Part II, have been deleted).

4.1.2 The WMO Secretariat should serve as an information centre on the availability of stored meteorological and related data.

4.1.3 The classification and cataloguing scheme for WWW data should be made as compatible as possible with methods used by data centres of related disciplines.

5. MEDIA AND FORMATS FOR THE EXCHANGE OF STORED DATA

5.1 Media for exchange

5.1.1 To the extent possible, all data should be stored in digital form on technical carriers. When this is not possible they should be stored in the most convenient form until such time as they can be transferred to technical carriers. The following common standards should be used for purposes of international exchange (and also for national use except when there are important reasons for using other technical carriers). For data stored on magnetic tape, the main requirement is to ensure that magnetic tapes produced on the computers of one country can be read on the computer of another. Member countries should adhere to the following magnetic tape specifications:

(*a*) Tapes are to be 1/2 inch (12.7 mm) wide with maximum reel diameter of 10 1/2 inches (266.7 mm) and a maximum tape length of 2 400 feet (732 m);

(*b*) Tapes should be 9-track, 6 250 or 1 600 or 800 cpi (character per inch), odd parity, unlabelled, and data block size less than 32 000 bytes.

NOTE: Many Member countries now have the capability of higher density magnetic tape devices that allow tapes to be written at recording densities of 1 600, 6 250 cpi, phase encoded. Members are therefore encouraged to explore the exchange of data at these higher densities to achieve greater compaction of data. Also by mutual agreement between the exchanging parties, data may be exchanged on floppy disk, compact disk read only memory (CD-ROM), magnetic cartridges, or through direct computer-to-computer link.

5.1.2 WMCs should provide for the exchange of data in media set forth in paragraph 5.1.1 above. RSMCs and NMCs should provide for the exchange of data on at least one of the standard media set forth in paragraph 5.1.1 above. The desires of the recipient should be considered to the extent possible.

5.1.3 Members operating meteorological satellites should make available, through the WMO Secretariat, information on media and formats used to store data from their satellites.

5.2 **Formats**

5.2.1 Exchange of stored data by physical media should be in the standard formats recommended by WMO. The data records should be based on GRIB (FM 92) and BUFR (FM 94) codes wherever possible.

5.3 **Responsibilities of Members for the exchange of non-real-time data**

5.3.1 Each Member shall be responsible for meeting requests from other Members for non-real-time data stored in its national Service in accordance with the functions laid down in Part II of this *Manual*.

5.3.2 Members should exchange non-real-time data in the standard media given in paragraph 5.1 above and in the standard formats given in paragraph 5.2 above.

NOTE: Each Member should make appropriate financial arrangements with other Members who wish to obtain copies of non-real-time data stored within its national Service.

5.3.3 Each Member shall provide the Secretariat with a summary of the data stored in its national Service, including the media and formats used.

5.4 **Responsibilities of the WMO Secretariat**

5.4.1 The WMO Secretariat shall provide information to Members on the availability of non-real-time data, through the following publications:

(*a*) WMO Publication TD-No. 293, *Catalogue of Climate System Data Sets*;

(*b*) WMO Publication No. 9, Volume B, *Data Processing*.

Delete Attachment III.4 and **re-number** III.5 as III.4.

Amendments to Section 5 of Part II

Amend paragraph 5.1.1 to read (new text in bold):

5.1.1 Processed data (products) required for real-time and **non-real-time** purposes shall reach the national Meteorological Services sufficiently quickly to be of effective use **in its associated time-scale.**

Amend Attachment II.6, paragraph 2 to read:

extended range forecasts
5-, 10-, 15- or 30-day
mean values } Levels and parameters as appropriate and applicable

Amend title in Attachment II.6, paragraph 3 to read:

5-DAY, 15-DAY AND 30-DAY MEAN ANALYSED VALUES

Add in Attachment II.8, paragraph 2, "beyond H + 240" to the entries for surface, 850 hPa, 500 hPa, and 250/200 hPa.

Add in Attachment II.10, paragraph 1, "larger range products (beyond H + 240)"

"Surface"
"850 hPa"
"500 hPa"
"200/250" hPa } Parameters as appropriate

Amendments to Part I

Add a new Attachment I.2 as follows and **re-number** the current Attachment I.2 as I.3:

ATTACHMENT I.2

PROCEDURES FOR BROADENING THE FUNCTIONS OF EXISTING RSMCs AND FOR THE DESIGNATION OF NEW RSMCs

The procedures are as follows:

1. Establishment of a statement of requirements for WWW products and services initiated and endorsed by the WMO constituent body or bodies concerned;
2. Identification of capabilities of relevant existing RSMCs and/or candidate RSMCs, to meet the requirements;
3. Determination in principle whether there is a requirement to:
   (*a*) Broaden the functions of an existing RSMC; and/or
   (*b*) Establish a new RSMC.
4. Formal commitment by a Member or a group of co-operating Members to fulfil the required function(s) of a centre;

   The prospective RSMC should:
   (*a*) Establish a closely defined relationship between the RSMC and the WWW Meteorological Centres as users of RSMC products;
   (*b*) Commit itself to make available a set of products and services designed to meet the given requirements, where appropriate, in terms of specific forecast parameters and formats, the frequency of their issue and targets for timeliness, overall reliability and quality;
   (*c*) Propose method(s) and procedures by which such products and services will be delivered;
   (*d*) Propose method(s) and procedures by which ongoing performance will be assessed (e.g. by verification);
   (*e*) Propose method(s) by which particular WWW Meteorological Centres' changing requirements could be made known and improvements in operational performance introduced by the RSMC; and
   (*f*) Address the question of contingency and back-up arrangements to cover situations where the RSMC may not be able to provide the required services.
5. Demonstration of the capabilities to CBS and the constituent body or bodies referred to under (1);
   - The prospective RSMC should expect to demonstrate its general capabilities of relevance to the service to be offered (such as access to relevant data and processing capability), its ability to meet the above commitment and the suitability of its other proposals.
6. Recommendation by CBS to include in the *Manual on the GDPS*:
   (*a*) The new function(s) of the existing centre; or
   (*b*) The identification and function(s) of the new centre;
7. Acceptance of the CBS recommendation by Congress or the Executive Council.

Recommendation 3 (CBS-X) — DESIGNATION OF A REGIONAL SPECIALIZED METEOROLOGICAL CENTRE (RSMC) ON TROPICAL CYCLONES

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) That Eleventh Congress adopted the Third Long-term Plan which gives priority to the establishment of RSMCs with activity specialization in various areas,

(2) The requirements for specialized WWW products in connection with the Tropical Cyclone Programme as stated in the *Third WMO Long-term Plan* (WMO-No. 761), Part II Volume I, Programme 1.8, paragraphs 224, 225 and 226,

(3) Recommendation 1 (CBS-IX) — Procedure for the designation of Regional Specialized Meteorological Centres (RSMCs) — as amplified by CBS-Ext.(90) general summary, paragraphs 5.4, 5.5 and 5.6,

CONSIDERING that the Meteorological Centre in Saint Denis (Réunion) provides tropical cyclone forecasts and advisory service on an operational basis and has fulfilled the relevant provisions of the designation procedures for new RSMCs,

RECOMMENDS that the Meteorological Centre in Saint Denis (Réunion) be designated as an RSMC with activity specialization in tropical cyclone analysis, tracking, and forecasting with effect from 1 July 1993;

REQUESTS:

(1) The Member operating the designated RSMC to continue to make available its specialized products, as required, to Members concerned on a regional basis and to co-ordinate such activities within the relevant programmes of the Third Long-term Plan, i.e., the Tropical Cyclone Programme and the World Weather Watch Programme;

(2) The Secretary-General to arrange for the inclusion of the newly designated RSMC and the outline of its specialized functions in the *Manual on the GDPS* as soon as the Executive Council has approved this recommendation.

Recommendation 4 (CBS-X) — DESIGNATION OF REGIONAL SPECIALIZED METEOROLOGICAL CENTRES (RSMCs) ON THE PROVISION OF TRANSPORT MODEL PRODUCTS FOR ENVIRONMENTAL EMERGENCY RESPONSE

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) That Eleventh Congress adopted the Third Long-term Plan which gives priority to the establishment of RSMCs with activity specialization in various areas,

(2) The views expressed by EC-XLII that a minimum of two RSMCs be established in each Region for the provision of transport model products,

(3) The requirements stated by RA IV and RA VI for the provision upon request of specialized transport/dispersion/deposition model products to Members in the Regions,

(4) The request of the IAEA to receive transport model products in case of a nuclear accident or emergency,

(5) Recommendation 1 (CBS-IX) — Procedure for the designation of Regional Specialized Meteorological Centres (RSMCs) — as amplified by CBS-Ext.(90) general summary, paragraphs 5.4, 5.5 and 5.6,

CONSIDERING:

(1) The Centres in Toulouse, Bracknell and Montreal have made available to IAEA, upon request, transport model products under an interim arrangement between WMO and IAEA since 1989,

(2) That the GDPS centres in Toulouse, Bracknell, Washington and Montreal can generate and make available transport/dispersion/deposition model products operationally upon request, and have fulfilled the relevant provisions of the designation procedures for new RSMCs and/or broadening the functions(s) of an existing RSMC with geographic specialization to include activity specialization,

RECOMMENDS that the GDPS centres in Toulouse, Bracknell, Washington and Montreal be designated as RSMCs with activity specialization on the provision of transport model products for environmental emergency response to Members in RA IV and RA VI, respectively, upon request with effect from 1 July 1993;

REQUESTS:

(1) Members operating the designated RSMCs to continue to make available their specialized products, as required, to Members concerned on a regional basis and to co-ordinate such activities within the relevant programmes of the Third Long-term Plan, i.e., the World Weather Watch Programme;

(2) The Secretary-General to arrange for the inclusion of the newly designated RSMCs and the outline of their specialized functions in the *Manual on the GDPS* as soon as the Executive Council has approved this recommendation.

Recommendation 5 (CBS-X) — AMENDMENTS TO THE *MANUAL ON THE GLOBAL OBSERVING SYSTEM* — PART VI

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Resolution 2 (Cg-XI) — World Weather Watch Programme for 1992–1995,

(2) Resolution 28 (Cg-XI) — The Third WMO Long-term Plan,

(3) Recommendations on quality control procedures and monitoring data quality endorsed by CBS-Ext.(90),

CONSIDERING that there is a need for further improvement for the real-time quality control at observing sites and collecting centres,

RECOMMENDS that the *Manual on the Global Observing System*, Part VI be amended as indicated in the Annex to this recommendation to take effect on 1 July 1993;

REQUESTS the Secretary-General to make the appropriate changes as given in the Annex to this recommendation, in the *Manual on the Global Observing System*;

AUTHORIZES the president of CBS, in consultation with the Secretary-General, to make any consequent purely editorial amendments as regards the *Manual on the Global Observing System*.

Annex to Recommendation 5 (CBS-X)

Amendments to the *Manual on the Global Observing System* Part VI

Insert the following NOTES after paragraph 3.1 (*d*):

NOTES: (1) In modern, automatic, data-acquisition systems, the high sampling rate of raw signals and the generation of noise may necessitate checking the data just prior to the conversion to Level I data or thereafter. The quality of the reduced data may be improved by filtering and smoothing.

(2) Some meteorological instruments provide "raw" data in excess of what is needed to derive parameters of the state of the atmosphere. Such redundant systems (e.g. special rawinsonde observations) permit the conversion to Level II data through the use of alternative computational procedures. Observation values produced by different conversion formulae will have different standards of accuracy, e.g. upper wind derived from three- or multiple-station solution of a NAVAID system.

(3) In some observational systems, the deduced values may additionally depend on computational procedures used to solve systems of equations that do not have a unique solution, for example, upper-air temperature derived from spectral radiances obtained by remote sensing from satellites. The quality of the reduced data will depend on the method selected to solve the governing equations.

Insert in paragraph 3.1.1, first line under sub-heading after "quality control":

usually by inspection of the observation site and calibration of instruments.

Replace in NOTE (2) to paragraph 3.1.1 "*Guide to Meteorological Instruments and Observing Practices*" by:

Guide to Meteorological Instruments and Methods of Observation.

Add to the NOTES in sub-paragraph 3.1.3.1:

(3) Standard software modules are being developed to support computer-based quality control at observing sites or collecting centres.

Insert a new sub-paragraph 3.1.4.3:

3.1.4.3 Appropriate code forms should be utilized to exchange, together with the observational data:

(i) Information on instruments and observational procedures used;

(ii) Information on data correction applied;

(iii) Information on quality control.

Renumber the old sub-paragraph 3.1.4.3 as 3.1.4.4.

Recommendation 6 (CBS-X) — AMENDMENTS TO THE *MANUAL ON THE GLOBAL TELECOMMUNICATION SYSTEM* — VOLUME I, PARTS I AND II

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Resolution 2 (Cg-XI) — World Weather Watch Programme for 1992–1995,

(2) The World Weather Watch Programme for 1992–2001 — *Third WMO Long-term Plan*, Part II — (WMO-No. 761),

RECOMMENDS the adoption of the amendments to the *Manual on the Global Telecommunication System*, Volume I, Parts I and Part II as given in the Annex to this recommendation, with effect from 3 November 1993;

REQUESTS the Secretary-General to make appropriate amendments, as given in the Annex to this recommendation, to the *Manual on the Global Telecommunication System*, Volume I, Parts I and Part II;

AUTHORIZES the president, in consultation with the Secretary-General, to make any consequent purely editorial amendments as regards Volume I of the *Manual on the Global Telecommunication System*.

Annex to Recommendation 6 (CBS-X)

Amendments to the *Manual on the Global Telecommunication System*, Volume I

Part I

Replace the title of Attachment I-4 by:

Lists of stations comprising the Regional Basic Synoptic Networks

Replace in Attachment I-5, Table D, the text of sub-paragraph (*a*), paragraph 3.1 by:

(*a*) The list of surface stations comprising the Regional Basic Synoptic Networks (RSBNs) for SYNOP and CLIMAT reports; the list of radiowind/radiosonde stations comprising the RBSNs for Parts A and B of TEMP reports and CLIMAT TEMP reports; the lists of radiowind stations comprising the RBSNs for Parts A and B of PILOT reports. The three lists are included in the *Manual on the GTS*, Volume I, Attachment I-4.

Part II

Replace the whole paragraph 2.4 by the following:

2.4 Addressed messages

2.4.1 *Categories of addressed messages*

2.4.1.1 *Service messages*

Priority: 1

Messages concerning the operation of the system, e.g. breakdown, resumption after breakdown, etc.

2.4.1.2 *Request for GTS messages*

Priority: 2

Messages used for a request for bulletins normally available on the GTS, including request for repetition.

2.4.1.3 *Administrative messages*

Priority: 4

Messages used for communicating between one administration and another. In exceptional circumstances a very urgent administrative message could be transmitted as a service message.

2.4.1.4 *Data messages*

Priority: 2

Messages consisting of meteorological data. These messages may be either replies to requests for GTS messages in the case when the reply is in the form of an addressed message, or replies to requests to databases, or data in accordance with a special agreement.

2.4.1.5 *Request-to-database*

Priority: 2

Messages used for a request for data addressed to a database.

2.4.2 ***Abbreviated headings for addressed messages***

The specifications of the abbreviated headings of addressed messages are the following:

$T_1T_2A_1A_2$ii $C_aC_aC_aC_a$ YYGGgg (BBB)

T_1T_2 = BM, designator for addressed messages in alphanumeric form;

T_1T_2 = BI, designator for addressed messages in binary form;

A_1A_2 = AA, administrative message

BB, service message

RR, request for GTS messages

RQ, request-to-database

DA, data message

ii = 01

$C_aC_aC_aC_a$ = location indicator of the addressed centre

YYGGgg = time of insertion on the GTS.

2.4.3 ***Text of addressed messages***

The first line of the text of an addressed message shall contain the international location indicator of the centre originating the message. The actual content of the addressed message shall start at the second line of the text.

Add at the end of (*a*), paragraph 2.7.1:

(in International Alphabet No. 5, including control characters)

Replace the text of paragraph 2.10.2.2 by:

2.10.2.2 With respect to storage capability to meet requests for messages, WMC and RTHs should store messages they exchange over the GTS for a period of 24 hours.

Include in the text of the example given in Attachment II-4, paragraph 3, the following line:

TTAA 5111/02365 NIL =

Add a new paragraph 5 in Attachment II-4:

5. Examples of presentation of NIL texts:

(*a*) SYNOP bulletin

ZCZC 007

SMRS10 RUMS 220600

NIL

NNNN

(*b*) TEMP bulletin

ZCZC 248

USSN01 ESW1 011200

NIL

NNNN

Replace Tables A, B_1, C_3, and D in Attachment II-5, by the new Tables A, B_1, C_3 and D_2.

In Attachment II-6, examples of addressed messages and request for GTS messages must be reviewed with a view to comply with the above paragraph 2.4.

Add a new paragraph 3 in Attachment II-12, and **renumber** previous paragraphs 3 and 4 as 4 and 5, respectively:

3. The indicator BBB should also be included in the abbreviated headings of bulletins used for the transmission of large sets of information which need to be segmented into several bulletins. The form of the indicator BBB to be used is then Pxx, where xx =

AA for the first bulletin containing the first segment of the set of information;

AB for the second bulletin containing the second segment;

and so on including AX, AY, AZ, BA etc., as required.

TABLE A

Designator T_1 Matrix Table for $T_2A_1A_2ii$ definitions

T_1	Data type	T_2	A_1	A_2	ii	Priority	Max Length
A	Analyses	B1	C1	C1	**	3	3800
B	Addressed message	***	***	***	***	1/2/4*	3800
C	Climatic data	B1	C1	C1	**	3	3800
D	Grid point information (GRID)	B2	C3	C4	D2	3	3800
E	Satellite imagery	B5	C1	C1	**	3	(1)
F	Forecast	B1	C1	C1	**	3	3800
G	Grid point information (GRID)	B2	C3	C4	D2	3	3800
H	Grid point information (GRIB)	B2	C3	C4	D2	3	15,000
I	Binary observation BUFR	B3	C6	C3	**	2	15,000
J	Binary forecast BUFR	B3	C6	C3	**	3	15,000
K	–						
L	–						
M	–						
N	Notices	B1	C1	C1	**	4	3800
O	Oceanographic GRIB	B4	C3	C4	D1	3	15,000
P	Pictorial information (binary)	B2	C3	C4	D2	3	(1)
Q	Pictorial information regional	B2	C3	C5	D2	3	(1)
R	–						
S	Surface data	B1	C1/C2	C1/C2	**	2/4*	3800
T	Satellite data	B1	C3	C4	**	2	3800
U	Upper-air data	B1	C1/C2	C1/C2	**	2	3800
V	National data	(3)	C1	C1	**	(2)	(1)
W	Warnings	B1	C1	C1	**	1	3800
X	GRID regional use	B2	C3	C5	D2	3	3800
Y	GRIB regional use	B2	C3	C5	D2	3	15,000
Z	–						

* Priority level: 1 is allocated to service messages
2 is allocated to data and request messages
4 is allocated to seismologic data (T_1T_2 = SE) or administrative messages.

** See Paragraph 2.3.2.2 for definition and use.

*** See Paragraph 2.4.2 for definition and use.

(1) Size to be defined.

(2) To be determined.

(3) Table B2 or national table.

TABLE B1

Data type designator T_2

(when T_1 = A,C,F,N,S,T,U or W)

Instructions for the proper application of the data type designators

1. The designators specified in this table should be used to the greatest extent possible to indicate the type of data contained within the body of the bulletin.
2. When the table does not contain a suitable designator for the data type, an alphabetic designator which is not assigned in the table should be introduced and the WMO Secretariat notified.
3. This table includes only the FM number and code name for an individual code form. The roman numeral identifying the latest version has been omitted to reduce clutter. In all cases the latest version of a code is implied. Refer to WMO Publication No. 306, *Manual on Codes*, for the complete code name (including the version) of any numbered code. In those few instances where a numbered code does not exist, a reference and the common name is given: e.g. [ICAO] (AIREP). An exaplanatory note may be appended to an individual table if necessary.
4. In the event that no standard format has been established for a particular data type, and where there is a recommended format, that format is given in square brackets under the column labeled Code Form (e.g. [TEXT]). This a character code in free form — International Alphabet No. 2 (Attachment II-1) or International Alphabet No. 5 (Attachment II-2) will be used.

T_1 = A *Analyses*

Designator	Data type	Code Form (*name*)
C	Cyclone	[TEXT]
H	Thickness	[TEXT]
I	Ice	FM 44 (ICEAN)
O	Ozone layer	[TEXT]
R	Radar	[TEXT]
S	Surface	FM 45 (IAC)/FM 46 (IAC FLEET)
T	Satellite cloud	FM 85 (SAREP)
U	Upper air	FM 45 (IAC)
X	Miscellaneous	[TEXT]

T_1 = C *Climatic data*

Designator	Data type	Code Form (*name*)
A	Climatic anomalies	[TEXT]
E	Monthly means (upper air)	FM 76 (CLIMAT TEMP SHIP)
H	Monthly means (surface)	FM 72 (CLIMAT SHIP)
O	Monthly means (ocean areas)	FM 73 (NACLI,CLINP,SPCLI,CLISA,INCLI)
S	Monthly means (surface)	FM 71 (CLIMAT)
U	Monthly means (upper air)	FM 75 (CLIMAT TEMP)

T_1 = F *Forecasts*

Designator	Data type	Code Form (*name*)
A	Aviation area	FM 53 (ARFOR)
B	Upper winds and temperatures	FM 50 (WINTEM)
C	Aerodrome (VT ≤ 12 hours)	FM 51 (TAF)
D	Radiological trajectory dose	FM 57 (RADOF)
E	Extended	[TEXT]
F	Shipping	FM 46 (IAC FLEET)
G	Hydrological	FM 68 (HYFOR)
H	Upper air thickness	[TEXT]
I	Iceberg	[TEXT]
J	Radio warning service (including IUWDS data)	[TEXT]
M	Temperature extremes	[TEXT]
O	Guidance	[TEXT]
P	Public	[TEXT]
Q	Other shipping	[TEXT]
R	Aviation route	FM 54 (ROFOR)
S	Surface	FM 45 (IAC)/FM 46 (IAC FLEET)
T	Aerodrome (VT > 12 hours)	FM 51 (TAF)
U	Upper air	FM 45 (IAC)
W	Winter sports	[TEXT]
X	Miscellaneous	[TEXT]
Z	Shipping area	FM 61 (MAFOR)

T_1 = S *Surface data*

Designator	Data type	Code Form (*name*)
A	Aviation routine reports	FM 15 (METAR)
B	Radar reports (Part A)	FM 20 (RADOB)
C	Radar reports (Part B)	FM 20 (RADOB)

T_1 = S *Surface data (continued)*

Designator	Data type	Code Form (*name*)
D	Radar reports (Parts A & B)	FM 20 (RADOB)
E	Seismic data	• (SEISMIC)
F	Atmospherics reports	(FM 81 (SFAZI)/FM 82 (SFLOC) FM 83 (SFAZU)
G	Radiological data report	FM 22 (RADREP)
I	Intermediate synoptic hour	FM 12 (SYNOP)/FM 13 (SHIP)
M	Main synoptic hour	FM 12 (SYNOP)/FM 13 (SHIP)
N	Non-standard synoptic hour	FM 12 (SYNOP)/FM 13 (SHIP)
O	Oceanographic data	FM 63 (BATHY)/FM 64 (TESAC) FM 65 (WAVEOB)/FM 62 (TRACKOB)
P	Special aviation weather reports	FM 16 (SPECI)
R	Hydrological (river) reports	FM 67 (HYDRA)
S	Drifting bouy reports	FM 18 (BUOY)
T	Sea ice	[TEXT]
U	Snow depth	[TEXT]
V	Lake ice	[TEXT]
X	Miscellaneous	[TEXT]

T_1 = T *Satellite data*

Designator	Data type	Code Form (*name*)
B	Satellite orbit parameters	[TEXT]
C	Satellite cloud interpretations	FM 85 (SAREP)
H	Satellite remote upper-air soundings	FM 86 (SATEM)
R	Clear radiance observations	FM 87 (SARAD)
T	Sea surface temperatures	FM 88 (SATOB)
W	Winds & cloud temperatures	FM 88 (SATOB)
X	Miscellaneous	[TEXT]

T_1 = U *Upper air data*

Designator	Data type	Code Form (*name*)
A	Aircraft reports	ICAO (AIREP)
C	Constant balloon data	(COLBA)
D	Aircraft reports	FM 42 (AMDAR)
E	Upper-level pressure, temperature, humidity and wind (Part D)	FM 35 (TEMP)/FM 36 (TEMP SHIP) FM 38 (TEMP MOBIL)
F	Upper-level pressure, temperature, humidity and wind (Parts C and D) [National and bilateral option]	FM 35 (TEMP)/FM 36 (TEMP SHIP) FM 38 (TEMP MOBIL)
G	Upper-wind (Part B)	FM 32 (PILOT)/FM 33 (PILOT SHIP) FM 34 (PILOT MOBIL)
H	Upper-wind (Part C)	FM 32 (PILOT)/FM 33 (PILOT SHIP) FM 34 (PILOT MOBIL)
I	Upper-wind (Parts A and B) [National and bilateral option]	FM 32 (PILOT)/FM 33 (PILOT SHIP) FM 34 (PILOT MOBIL)
K	Upper-level pressure, temperature, humidity and wind (Part B)	FM 35 (TEMP)/FM 36 (TEMP SHIP) FM 38 (TEMP MOBIL)
L	Upper-level pressure, temperature, humidity and wind (Part C)	FM 35 (TEMP)/FM 36 (TEMP SHIP) FM 38 (TEMP MOBIL)

• The international seismic code is documented in the *Manual on Codes* (WMO-No. 306), Volume I, Attachment I.

T_1 = U *Upper air data (continued)*

Designator	Data type	Code Form (*name*)
M	Upper-level pressure, temperature, humidity and wind (Parts A and B) [National and bilateral option]	FM 35 (TEMP)/FM 36 (TEMP SHIP) FM 38 (TEMP MOBIL)
N	Rocketsonde reports	FM 39 (ROCOB)/FM 40 (ROCOB SHIP)
P	Upper-wind (Part A)	FM 32 (PILOT)/FM 33 (PILOT SHIP) FM 34 (PILOT MOBIL)
Q	Upper-wind (Part D)	FM 32 (PILOT)/FM 33 (PILOT SHIP) FM 34 (PILOT MOBIL)
R	Aircraft report	[NATIONAL*] (RECCO)
S	Upper-level pressure, temperature, humidity and wind (Part A)	FM 35 (TEMP)/FM 36 (TEMP SHIP) FM 38 (TEMP MOBIL)
T	Aircraft report	FM 41 (CODAR)
X	Miscellaneous	[TEXT]
Y	Upper-wind (Parts C and D) [National and bilateral option]	FM 32 (PILOT)/FM 33 (PILOT SHIP) FM 34 (PILOT MOBIL)
Z	Upper-level pressure, temperature, humidity and wind from a sonde released by carrier balloon or aircraft (Parts A, B, C, D)	FM 37 (TEMP DROP)

T_1 = W *Warnings*

Designator	Data type	Code Form (*name*)
C	Tropical cyclone (SIGMET)	[TEXT]
E	Tsunami	[TEXT]
H	Hurricane	[TEXT]
N	Data related to nuclear accident	[TEXT] (IAEA CIS format)
O	Other	[TEXT]
S	SIGMET	[TEXT]
T	Tropical cyclone (Typhoon)	[TEXT]
V	Volcanic ash clouds (SIGMET)	[TEXT]
W	Warnings & weather summary	[TEXT]

T_1 = N *Notices*

Designator	Data type	Code Form (*name*)
N	Nuclear emergency response	[TEXT]
O	METNO/WIFMA	[TEXT]
P	Product generation delay	[TEXT]

TABLE C3

Geographical area designator A_1

(when T_1 = D,G,H,O,P,T,X or Y)

Instructions for the proper application of the data type designator

1. The designator specified in this table should be used to the greatest extent possible to indicate the geographical area of the data contained within the text of the bulletin.
2. Where the geographical area of the data does not correspond exactly with the designator, the designator for the area most approximating that of the data may be used.

* E.g. US national code form for reports from a meteorological reconnaissance flight (RECCO), documented in the *Manual on Codes* (WMO-No. 306), Volume II, Region IV, Part F.

3. When the table does not contain a suitable designator for the geographical area, an alphabetic designator which is not assigned in the table should be introduced and the WMO Secretariat notified.

Designator	Data type
A	0°–90°W northern hemisphere
B	90°W–180° northern hemisphere
C	180°–90°E northern hemisphere
D	90°E–0° northern hemisphere
E	0°–90°W tropical belt
F	90°W–180° tropical belt
G	180°–90°E tropical belt
H	90°E–0° tropical belt
I	0°–90°W southern hemisphere
J	90°W–180° southern hemisphere
K	180°–90°E southern hemisphere
L	90°E–0° southern hemisphere
N	Northern hemisphere
S	Southern hemisphere
T	45°W–180° northern hemisphere
X	Global Area (area not definable)

TABLE D2

Level designator ii

(when T_1 = D,G,H,P,Q,X or Y)

Instructions for the proper application of level designator

1. The designator specified in this table should be used to the greatest extent possible to indicate the level of the data contained within the text of the bulletin.
2. When data at more than one level are contained in the text, the designator for only one of the levels should be used.
3. When the table does not contain a suitable designator for the level, a designator which is not assigned in the table should be used.

Designator	Level
99	1 000 hPa
98	Air properties for the earth's surface
97	Level of the tropopause
96	Level of maximum wind
95	950 hPa
94	Level of 0°C isotherm
93	Not assigned
92	925 hPa
91	Not assigned
90	900 hPa
89	Any parameter reduced to sea level (e.g. MSLP)
88	Ground or water properties for the earth's surface (i.e. snow cover, wave & swell)
87	Not assigned
86	Boundary layer
85–01	Hundred and tens digits of the hectopascal level (e.g. 70 = 700 hPa; 03 = 030 hPa) TO INCLUDE: 81 = 810 hPa = 6 000 ft FL 73 = 730 hPa = 9 000 ft FL 64 = 640 hPa = 12 000 ft FL NOTE: The 810, 730, and 640 hPa levels are being used as geometric heights.
00	Entire atmosphere (e.g. precipitable water)

Recommendation 7 (CBS-X) — PROPOSED AMENDMENTS TO FM 71-VI CLIMAT

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Resolution 5 (CBS-IX) — Working Group on Data Management (DM),

(2) The final report of the CCl Working Group on Climate Data (Geneva, 11–15 November 1991), WMO-TD/No. 488 and its Recommendation 5.1.6,

CONSIDERING:

(1) That there is a need to provide for the transmission of additional climatological parameters,

(2) That it would help developing countries that do not have the necessary capacity to reconstruct daily and monthly climate information,

(3) That it would facilitate climate change detection and research,

RECOMMENDS that the proposed amendments to FM 71-VI CLIMAT, as given in the Annex to this recommendation, be adopted for use as from 2 November 1994;

REQUESTS the Secretary-General, to arrange for the inclusion of the amendments in Volume I of the *Manual on Codes*.

Annex to Recommendation 7 (CBS-X)

Replace FM 71-VI CLIMAT with the following (new text appears in bold):

FM 71-X CLIMAT — Report of monthly values from a land station

CODE FORM:

SECTION 0 CLIMAT MMJJJ

SECTION 1 111 IIiii $1\overline{P_oP_oP_oP_o}$ $2\overline{PPPP}$ $3s_n\overline{TTT}s_ts_ts_t$ $4s_n\overline{T_xT_xT_x}s_n\overline{T_nT_nT_n}$ $5\overline{eee}$ $6R_1R_1R_1R_1R_dn_rn_r$ $7S_1S_1S_1p_sp_sp_s$ $8m_pm_pm_Tm_Tm_{Tx}m_{Tx}$ $9m_em_em_Rm_Rm_Sm_S$

SECTION 2 222 $0Y_bY_bY_cY_c$ $1\overline{P_oP_oP_oP_o}$ $2\overline{PPPP}$ $3s_n\overline{TTT}s_ts_ts_t$ $4s_n\overline{T_xT_xT_x}s_n\overline{T_nT_nT_n}$ $5\overline{eee}$ $6R_1R_1R_1R_1n_rn_r$ $7S_1S_1S_1$ $8y_py_py_Ty_Ty_{Tx}y_{Tx}$ $9y_ey_ey_Ry_Ry_Sy_S$

SECTION 3 333 $0T_{25}T_{25}T_{30}T_{30}$ $1T_{35}T_{35}T_{40}T_{40}$ $2T_{n0}T_{n0}T_{x0}T_{x0}$ $3R_{01}R_{01}R_{05}R_{05}$ $4R_{10}R_{10}R_{50}R_{50}$ $5R_{100}R_{100}R_{150}R_{150}$ $6s_{00}s_{00}s_{01}s_{01}$ $7s_{10}s_{10}s_{50}s_{50}$ $8f_{10}f_{10}f_{20}f_{20}f_{30}f_{30}$ $9V_1V_1V_2V_2V_3V_3$

SECTION 4 444 $0s_nT_{xd}T_{xd}T_{xd}y_xy_x$ $1s_nT_{nd}T_{nd}T_{nd}y_ny_n$ $2s_nT_{ax}T_{ax}T_{ax}y_{ax}y_{ax}$ $3s_nT_{an}T_{an}T_{an}y_{an}y_{an}$ $4R_xR_xR_xR_xy_ry_r$ $5i_wf_xf_xf_xy_{fx}y_{fx}$ $6D_{ts}D_{ts}D_{gr}D_{gr}$ $7i_yG_xG_xG_nG_n$

NOTES:

(1) CLIMAT is the name of the code for reporting monthly values from a land station.

(2) The CLIMAT code form consists of five sections:

Section number	Symbolic figure group	Contents
0	-	Code name and group MMJJJ
1	111	Monthly data of the month referred to in MMJJJ including number of days missing from the records. This section is mandatory.
2	222	Monthly normals corresponding to the month referred to in MMJJJ including number of years missing from the calculation.
3	333	Number of days in the month with parameters beyond certain thresholds during the month referred to in MMJJJ.
4	444	Extreme values during the month referred to in MMJJJ and occurrence of thunderstorms and hail.

REGULATIONS:

71.1

General

71.1.1

When one or several parameters of a group are not available, the missing parameter(s) shall be coded with a set of solidi (/). If all parameters of a group are not available, the group shall be omitted from the report.

71.1.2

When all parameters of a section are missing, except for Section 0 and Section 1, which are mandatory, the section shall be omitted.

71.1.3

The monthly data shall be coded in the code form which is in force during the month to which the data refers (e.g. if the CLIMAT code change is effective on 1 November, the CLIMAT data for October, transmitted in November, will be in the old code form; the first CLIMAT message in the new code form will be for November data, transmitted in December).

71.2

Section 0

71.2.1

The code name CLIMAT and the group MMJJJ shall appear as the prefix to individual reports.

71.2.2

The code name CLIMAT and the group MMJJJ shall be included as the first line of the text of a meteorological bulletin of CLIMAT reports. Individual CLIMAT reports in the bulletin shall contain neither the code name CLIMAT nor the group MMJJJ.

71.3

Section 1

71.3.1

Group $3s_n\overline{TTT}s_ts_ts_t$

This group shall contain both the average air temperature and the standard deviation of the daily values.

71.3.2

Group $6R_1R_1R_1R_1R_dn_rn_r$

If for a particular month the total amount of precipitation is zero, $R_1R_1R_1R_1$ shall be given as 0000 and R_d given by the highest number of quintile which has 0.0 as lower limit (i.e. in months with no rainfall in the 30-year period $R_d = 5$).

71.3.3

Group $7S_1S_1S_1p_sp_sp_s$

This group shall be coded to report the total duration of sunshine in whole hours, and the percentage of the normal that that value represents ($p_sp_sp_s$).

NOTE: If the normal is zero, $p_sp_sp_s$ shall be coded as 3 solidi (///).

71.4

Section 2

71.4.1

Meteorological Services shall submit to the Secretariat, for distribution to the Members, complete normal data of the elements for stations to be included in CLIMAT bulletins. CLIMAT reports for the two months following the submission of such complete normal data to the Secretariat shall include the normals for the months in question, in the form given in Section 2. The same procedure shall be followed when Services consider it necessary to make amendments to previously published normal values.

NOTE: When normal data are included in the bulletins, the number of stations per bulletin may be reduced if necessary.

71.4.2

The normal data reported shall be deduced from observations made over a specific period defined by technical regulations.

NOTE: Section 2 of the code supplies the means to specify the start and finish years, and those years missing from the calculations where it is not possible to supply data for the full recommended period.

71.4.3

Group $3s_n\overline{TTT}s_ts_ts_t$

The standard deviation $s_ts_ts_t$ in this group shall be the normal of the standard deviation of the daily values.

71.4.4

Group $6R_1R_1R_1R_1n_rn_r$

If the normal precipitation for the month is zero, the entire group shall be coded as 6000000.

71.5

Section 3

71.5.1

If the data portion of any group is equal to zero, that group shall be omitted from the report. For example, during one 30-day month the maximum is less than 25°C on 10 days, from 25°C to 29°C on 10 days, and from 30°C to 34°C on 10 days, the first group in Section 3 shall be coded as 02010 and the second group shall not be included in the report.

71.6

Section 4

71.6.1

In groups 0, 1, 2, 3, 4, and 5, if the extreme value occurred on only one day, the day of occurrence shall be coded as the last two digits in the group. If the extreme value occurred on more than one day, 50 shall be added to the first day and that value be coded as the last two digits in the group.

71.6.2

Group $7i_yG_xG_xG_nG_n$

This group shall be included only when a change in practice has occurred, that is when the time of reading of maximum temperature (G_xG_x) or the time of reading of minimum temperature (G_nG_n) has changed.

Replace in Section C (symbolic letters) all references to FM 71-VI by FM 71-X.

Add new symbolic letters:

$D_{gr}D_{gr}$	Number of days in the month with hail (FM 71-X)
$D_{ts}D_{ts}$	Number of days in the month with thunderstorm(s) (FM 71-X)
$f_{10}f_{10}$	Number of days in the month with wind speed equal to or more than 10 metres per second or 20 knots (FM 71-X)
$f_{20}f_{20}$	Number of days in the month with wind speed equal to or more than 20 metres per second or 40 knots (FM 71-X)
$f_{30}f_{30}$	Number of days in the month with wind speed equal to or more than 30 metres per second or 60 knots (FM 71-X)
$f_xf_xf_x$	Highest wind speed in the month in 0.1 metres per second (FM 71-X)
G_nG_n	Principal time of daily reading in UTC (hours) of minimum extreme temperature (FM 71-X)
G_xG_x	Principal time of daily reading in UTC (hours) of maximum extreme temperature (FM 71-X)
i_y	Indicator to specify type of reading. (Code table 1857) (FM 71-X)
m_Rm_R	Number of days missing from the records for precipitation (FM 71-X)

$m_S m_S$ Number of days missing from the records for sunshine duration (FM 71-X)

$m_T m_T$ Number of days missing from the records for air temperature (FM 71-X)

$m_{Tx} m_{Tx}$ Number of days missing from the records for extreme temperature (FM 71-X)

$m_e m_e$ Number of days missing from the records for vapour pressure (FM 71-X)

$m_p m_p$ Number of days missing from the records for pressure (FM 71-X)

$p_s p_s p_s$ Percentage of total sunshine duration relative to the normal (FM 71-X)

$R_{01} R_{01}$ Number of days in the month with precipitation equal to or more than1.0 mm (FM 71-X)

$R_{05} R_{05}$ Number of days in the month with precipitation equal to or more than 5.0 mm (FM 71-X)

$R_{10} R_{10}$ Number of days in the month with precipitation equal to or more than 10.0 mm (FM 71-X)

$R_{50} R_{50}$ Number of days in the month with precipitation equal to or more than 50.0 mm (FM 71-X)

$R_{100} R_{100}$ Number of days in the month with precipitation equal to or more than 100.0 mm (FM 71-X)

$R_{150} R_{150}$ Number of days in the month with precipitation equal to or more than 150.0 mm (FM 71-X)

$R_x R_x R_x R_x$ Highest daily amount of precipitation during the month (0.1 mm) (FM 71-X)

$s_{00} s_{00}$ Number of days in the month with snow depth more than 0 cm (FM 71-X)

$s_{01} s_{01}$ Number of days in the month with snow depth more than 1 cm (FM 71-X)

$s_{10} s_{10}$ Number of days in the month with snow depth more than 10 cm (FM 71-X)

$s_{50} s_{50}$ Number of days in the month with snow depth more than 50 cm (FM 71-X)

$s_t s_t s_t$ Standard deviation of daily values of mean air temperature (FM 71-X)

$T_{no} T_{no}$ Number of days in the month with minimum temperature less than 0°C (FM 71-X)

$T_{xo} T_{xo}$ Number of days in the month with maximum temperature less than 0°C (FM 71-X)

$T_{25} T_{25}$ Number of days in the month with maximum temperature equal to or more than 25°C (FM 71-X)

$T_{30} T_{30}$ Number of days in the month with maximum temperature equal to or more than 30°C (FM 71-X)

$T_{35} T_{35}$ Number of days in the month with maximum temperature equal to or more than 35°C (FM 71-X)

$T_{40} T_{40}$ Number of days in the month with maximum temperature equal to or more than 40°C (FM 71-X)

$T_{an}T_{an}T_{an}$	Lowest temperature of the month (0.1°C) (FM 71-X)
$T_{ax}T_{ax}T_{ax}$	Highest temperature of the month (0.1°C) (FM 71-X)
$\overline{T_nT_nT_n}$	Mean daily minimum temperature of the month (0.1°C) (FM 71-X)
$T_{nd}T_{nd}T_{nd}$	Lowest daily mean temperature of the month (0.1°C) (FM 71-X)
$\overline{T_xT_xT_x}$	Mean daily maximum temperature of the month (0.1°C) (FM 71-X)
$T_{xd}T_{xd}T_{xd}$	Highest daily mean temperature of the month (0.1°C) (FM 71-X)
V_1V_1	Number of days in the month with visibility less than 50 m (FM 71-X)
V_2V_2	Number of days in the month with visibility less than 100 m (FM 71-X)
V_3V_3	Number of days in the month with visibility less than 1 000 m (FM 71-X)
Y_bY_b	Year of beginning of the reference period (FM 71-X)
Y_cY_c	Year of ending of the reference period (FM 71-X)
y_Ry_R	Number of missing years within the reference period from the calculation of normal for precipitation (FM 71-X)
y_Sy_S	Number of missing years within the reference period from the calculation of normal for sunshine duration (FM 71-X)
y_Ty_T	Number of missing years within the reference period from the calculation of normal for mean air temperature (FM 71-X)
$y_{Tx}y_{Tx}$	Number of missing years within the reference period from the calculation of normal for mean extreme temperature (FM 71-X)
$y_{an}y_{an}$	Day of lowest temperature during the month (FM 71-X)
$y_{ax}y_{ax}$	Day of highest temperature during the month (FM 71-X)
y_ey_e	Number of missing years within the reference period from the calculation of vapour pressure normal (FM 71-X)
$y_{fx}y_{fx}$	Day of highest wind speed during the month (FM 71-X)
y_ny_n	Day of lowest daily mean temperature during the month (FM 71-X)
y_py_p	Number of missing years within the reference period from the calculation of pressure normal (FM 71-X)
y_ry_r	Day of highest daily amount of precipitation during the month (FM 71-X)
y_xy_x	Day of highest daily mean temperature during the month (FM 71-X)

Delete k_sk_s and description.

Add Code table 1857:

1857

i_y — Indicator to specify type of reading

Code figure	
0	Not used
1	Maximum/minimum thermometers
2	Automatic Weather Station
3	Thermograph
4–9	Not used

Recommendation 8 (CBS-X) — PROPOSED AMENDMENTS TO FM 12-IX EXT. SYNOP AND FM 13-IX EXT. SHIP

THE COMMISSION FOR BASIC SYSTEMS,

NOTING Resolution 5 (CBS-IX) — Working Group on Data Management (DM),

CONSIDERING that there is a need to finalize the procedure for reporting net short wave and direct solar radiation,

RECOMMENDS that the proposed amendments to FM 12-IX Ext. SYNOP and FM 13-IX Ext. SHIP, as given in the Annex to this recommendation, be adopted for use as from 3 November 1993;

REQUESTS the Secretary-General, to arrange for the inclusion of the amendments in Volume I of the *Manual on Codes.*

Annex to Recommendation 8 (CBS-X)

Amendments to FM 12-IX EXT. SYNOP and FM 13-IX EXT. SHIP

New Code form numbers: FM 12-X SYNOP, FM 13-X SHIP (new text appears in bold)

Amend paragraph 12.4.7.1.1 to read:

12.4.7.1.1

When the group $5j_1j_2j_3j_4$ is used in the form $55j_2j_3j_4$, $553j_3j_4$, **$554j_3j_4$ or $555j_3j_4$** the supplementary group $j_5j_6j_7j_8j_9$ shall be added to report net solar radiation, global solar radiation, diffused solar radiation, long-wave radiation, short-wave radiation, net short-wave radiation or direct solar radiation if data are available. The group shall be repeated as often as necessary.

NOTE: If sunshine duration is not available, the group shall be reported as 55///, 553//, **55407, 55408, 55507 or 55508** whenever the group $j_5j_6j_7j_8j_9$ is required to report radiation data.

Insert new specifications in regulation 12.4.7.1.2 as follows:

(e) 55407
to indicate that the supplementary group 4FFFF, which follows immediately, is used to report net short-wave radiation during the preceding hour, in kJ m^{-2};

(f) 55408
to indicate that the supplementary group 4FFFF, which follows immediately, is used to report direct solar radiation during the preceding hour, in kJ m^{-2};

(g) 55507
to indicate that the supplementary group $5F_{24}F_{24}F_{24}F_{24}$, which follows immediately, is used to report net short-wave radiation during the preceding 24 hours, in J cm^{-2};

(h) 55508
to indicate that the supplementary group $5F_{24}F_{24}F_{24}F_{24}$, which follows immediately, is used to report direct solar radiation during the preceding 24 hours, in J cm^{-2};

Renumber present 12.4.7.1.2 (*e*) through (*h*) as (*i*) through (*l*).

Change NOTE following 12.4.7.4.3 to read:

NOTE: For reporting net short-wave and direct solar radiation during the preceding hour, see 12.4.7.1.2 (*e*) and 12.4.7.1.2 (*f*), respectively.

Change NOTE following 12.4.7.4.4 to read:

NOTE: For reporting net short-wave and direct solar radiation during the preceding 24 hours, see 12.4.7.1.2 (*g*) and 12.4.7.1.2 (*h*), respectively.

Modify code table 2061 to read:

j_1 — $j_5j_6j_7j_8j_9$

2061

j_1 — Supplementary information indicator
$j_2j_3j_4$ — Specifications relating to supplementary information
$j_5j_6j_7j_8j_9$ — Supplementary group which follows $5j_1j_2j_3j_4$

(*a*)

Code figure for	j_1	j_2	j_3	j_4
0 1 2 3	Tens figure of evaporation or evapotranspiration	Units figure of evaporation or evapotranspiration	Tenths figure of evaporation or evapotranspiration	Indicator of type of instrumentation for evaporation measurement or type of crop for which evapotranspiration is reported
4	Temperature change data indicator	Period between the time of observation and the time of temperature change	Sign of temperature change	Amount of temperature change
5	Indicator for sunshine*	Tens figures of duration of sunshine j_2=3 indicates that j_3j_4 reports duration of sunshine in past hour	Units figure of duration of sunshine	Tenths figure of duration of sunshine
	Indicates the following group $5j_5j_6j_7j_8j_9$ reports radiation	j_2=4 indicates the following group $4j_5j_6j_7j_8j_9$ reports radiation during the previous hour. j_2=5 indicates the following group $5j_5j_6j_7j_8j_9$ reports radiation during the preceding 24 hours	j_3=0	j_4=7 indicates the following group reports net short wave radiation. j_4=8 indicates the following group reports direct solar radiation
6	Indicator for data on direction of cloud drift	Direction from which C_L clouds are moving	Direction from which C_M clouds are moving	Direction from which C_H clouds are moving
7	Indicator for data on direction and elevation of cloud	Type of orographic clouds or of clouds with vertical development	Direction in which these clouds are seen	Elevation angle of the top of these clouds
8 9	Indicator for data on surface pressure change (8 - positive or: zero change; 9 - negative change)	Tens figure of surface pressure change	Units figure of surface pressure change	Tenths figure of surface pressure change

* In case of j_1 = 5, see Regulation 12.4.7.4.2.

(*b*)

Code figure for	j_5	j_6	j_7	j_8	j_9
0 1	Sign of net radiation	Thousands figure of net radiation	Hundreds figure of net radiation	Tens figure of net radiation	Units figure of net radiation
2 3 4 5 6 7 8 9	Indicator of type of solar or terrestrial radiation (code figures 0-6 used, 7-9 not used)	Thousands figure of solar or terrestrial radiation	Hundreds figure of solar or terrestrial radiation	Tens figure of solar or terrestrial radiation	Units figure of solar or terrestrial radiation

Recommendation 9 (CBS-X) — PROPOSED AMENDMENTS TO FM 13-IX EXT. SHIP

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Resolution 5 (CBS-IX) — Working Group on Data Management (DM),

(2) The final report of the CMM Sub-group on Marine Climatology, sixth session, (Geneva, 6–10 April 1992) paragraph 7.4,

CONSIDERING that in the SHIP code there is a need to:

(1) Add a group for reporting wet bulb temperature,

(2) Systematically report present, past weather, temperature, clouds and waves,

(3) Indicate the type of measurement of sea surface temperature,

RECOMMENDS that the proposed amendments to FM 13-IX Ext. SHIP, as given in the Annex to this recommendation, be adopted for use as from 2 November 1994;

REQUESTS the Secretary-General, to arrange for the inclusion of the amendments in Volume I of the *Manual on Codes*.

Annex to Recommendation 9 (CBS-X)

Amendments to FM 13-IX EXT. SHIP

New code form number: FM 13-X SHIP

Replace "$0s_nT_wT_wT_w$" in Code Form Section 2, by "$0s_sT_wT_wT_w$"and **add** a new group: "$(8s_wT_bT_bT_b)$".

Replace (*b*) in Regulation 12.1.3.4, by:

(*b*) i_x shall be coded as 1 or 3 as the case may be.

Replace (*b*) in Regulation 12.1.3.5 by:

(*b*) i_x shall be coded as 1 or 3 as the case may be.

Add a NOTE in Regulation 12.2.6.2:

NOTE: All present weather and past weather including phenomena without significance observed at sea shall be reported in the SHIP message.

Add a NOTE in Regulation 12.2.7.1:

NOTE: All cloud observations at sea including no cloud observation shall be reported in the SHIP message.

Delete NOTE under (*a*) in Regulation 12.3.3.4.

Delete regulation 12.3.3.5 and **renumber** 12.3.3.6 as 12.3.3.5.

Renumber regulations 12.3.6 to 12.3.6.8 as 12.3.7 to 12.3.7.8.

Insert new regulation 12.3.6:

12.3.6

Group $8s_wT_bT_bT_b$

12.3.6.1

When the wet bulb is used to derive dew point value in a SHIP report, the group $8s_wT_bT_bT_b$ shall be included to report the wet bulb temperature measurement.

Add the following specifications:

s_s Indicator for the sign and type of measurement of sea surface temperature. (Code table 3850)
(FM 13-X)

s_w Indicator for the sign and type of wet bulb temperature reported. (Code table 3855)
(FM 13-X)

$T_bT_bT_b$ Wet bulb temperature, in tenths of a degree Celsius, its sign being given by s_w.
(FM 13-X)

Add two new code tables:

3850

s_s — Indicator for sign and type of measurement of sea surface temperature

Code figure	Sign	Type of measurement
0	Positive or 0	Intake
1	Negative	Intake
2	Positive or 0	Bucket
3	Negative	Bucket
4	Positive or 0	Hull contact sensor
5	Negative	Hull contact sensor
6	Positive or 0	Other
7	Negative	Other

3855

s_w — Indicator for the sign and type of wet bulb temperature reported

0	Positive or zero measured wet bulb temperature
1	Negative measured wet bulb temperature
2	Iced bulb measured wet bulb temperature
3–4	Not used
5	Positive or zero computed wet bulb temperature
6	Negative computed wet bulb temperature
7	Iced bulb computed wet bulb temperature

Recommendation 10 (CBS-X) — PROPOSED FM 18-X BUOY — REPORT OF A BUOY OBSERVATION TO REPLACE FM 18-IX EXT. DRIFTER

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Resolution 5 (CBS-IX) — Working Group on Data Management (DM),

(2) The requirements expressed by the Drifting Buoy Co-operation Panel (DBCP), seventh session, (Toulouse, 15–18 October 1991) paragraph 6.2,

CONSIDERING:

(1) The importance of these modifications for the scientific community,

(2) The need for:

(*a*) Changing the name of the code to BUOY;

(*b*) Addressing the concern of oceanographic researchers regarding confidentiality,

(*c*) Adding quality control indicators based on the standard IGOSS quality control flags,

RECOMMENDS that the endorsed code, renamed FM 18-X BUOY, as given in the Annex to this recommendation, be adopted to replace the current DRIFTER code for use as from 2 November 1994;

REQUESTS the Secretary-General for the inclusion of the new code and deletion of the DRIFTER code in Volume I of the *Manual on Codes*.

Annex to Recommendation 10 (CBS-X)

FM 18-X BUOY — Report of a buoy observation to replace FM 18-IX EXT. DRIFTER

New code: BUOY (the new features relative to the DRIFTER code appear in bold).

New title: FM 18-X BUOY — Report of a buoy observation

CODE FORM:

SECTION 0 $M_iM_iM_jM_j$ $A_1b_wn_bn_bn_b$ YYMMJ GGgg_iw
$Q_cL_aL_aL_aL_aL_a$
$L_oL_oL_oL_oL_oL_o$ **(6Q_lQ_t//)**

SECTION 1 **111Q_dQ_x** 0ddff 1s_nTTT **2$s_n$$T_dT_dT_d$ (or 29UUU)**
3$P_oP_oP_oP_o$ 4PPPP 5appp

SECTION 2 **222Q_dQ_x** 0$s_n$$T_wT_wT_w$ 1$P_{wa}P_{wa}H_{wa}H_{wa}$
20$P_{wa}P_{wa}P_{wa}$ 21$H_{wa}H_{wa}H_{wa}$

SECTION 3 (333$Q_{d1}Q_{d2}$ (8887k_2 $2z_0z_0z_0z_0$ $3T_0T_0T_0T_0$ $4S_0S_0S_0S_0$
....
$2z_nz_nz_nz_n$ $3T_nT_nT_nT_n$ $4S_nS_nS_nS_n$)
(66$k_6$9k_3 $2z_0z_0z_0z_0$ $d_0d_0c_0c_0c_0$
....
$2z_nz_nz_nz_n$ $d_nd_nc_nc_nc_n$))

SECTION 4 444 (1$Q_PQ_2Q_{TW}Q_4$) (2Q_NQ_L//) { ($Q_cL_aL_aL_aL_aL_a$ $L_oL_oL_oL_oL_oL_o$) or (YYMMJ GGgg/) (7$V_BV_Bd_Bd_B$)
(8$V_iV_iV_iV_i$) (9$i_dZ_dZ_dZ_d$)

NOTES:

(1) **BUOY** is the name of the code for reporting **buoy observations.**

(2) A **BUOY** report, or a bulletin of **BUOY** reports, is identified by the group $M_iM_iM_jM_j$ = ZZXX.

(3) The inclusion of the group $9i_dZ_dZ_dZ_d$ is strongly recommended for buoys which have been deployed with drogues.

(4) The group $9i_dZ_dZ_dZ_d$ should not be used in reports from a buoy on which a drogue has never been installed.

(5) The code form is divided into five sections, the first being mandatory in its entirety and the remainder optional as data are available:

Section	Symbolic figure group	Contents
0	-	Identification, time and position data
1	111	Meteorological and other non-marine data
2	222	Surface marine data
3	333	Temperatures, salinity and current (when available) at selected depths
4	444	Information on engineering and technical parameters, including quality control data

REGULATIONS:

18.1

General

The code name **BUOY** shall not be included in the report.

18.2

Section 0

18.2.1

All groups in Section 0 are mandatory and shall be included in each report, even if no other data are reported. A minimum **BUOY** report shall consist of all groups in Section 0.

18.2.2

Each individual **BUOY** report, even if included in a bulletin of such reports, shall contain as the first group the identification group $M_iM_iM_jM_j$.

18.2.3

Group $A_1b_wn_bn_bn_b$

Only buoy numbers ($n_bn_bn_b$) 001 through 499 are assigned. In the case of a drifting buoy, 500 shall be added to the original $n_bn_bn_b$ number.

NOTES:

(1) A_1b_w normally corresponds to the maritime zone in which the buoy was deployed. The WMO Secretariat allocates to Members, who request and indicate the maritime zone(s) of interest, a block or blocks of serial numbers ($n_bn_bn_b$) to be used by their environmental buoy stations.

(2) The Member concerned registers with the WMO Secretariat the serial numbers actually assigned to individual stations together with their geographical positions of deployment.

(3) The Secretariat informs all concerned of the allocation of serial numbers and registrations made by individual Members.

18.2.4

Groups $Q_cL_aL_aL_aL_a$ $L_oL_oL_oL_oL_o$

Position shall be reported in tenths, hundredths or thousandths of a degree, depending on the capability of the positioning system. **When the position is in tenths of a degree, the groups shall be encoded as $Q_cL_aL_aL_a$// $L_oL_oL_oL_o$//.** When the position is in hundredths of a degree, the groups shall be encoded as $Q_cL_aL_aL_a$/ $L_oL_oL_oL_o$/.

18.2.5

Group **($6Q_lQ_t$//)**

Q_lQ_t are quality control indicators. Q_l applies to position and Q_t to time.

18.3

Section 1

18.3.1

Each of the groups in Section 1 shall be included for all parameters that have been measured, when data are available.

18.3.2
When data are missing for all groups, the entire section shall be omitted from the report.
18.3.3
Group $111Q_dQ_x$
Q_d is a quality control indicator for the section. If all the data group(s) have the same quality control flag value, Q_d shall be coded with that value and Q_x shall be set to 9. If only one data group in the section has a quality control flag other than 1, Q_d shall be coded with that flag and Q_x shall indicate the position of this group within the section. If more than one data group have a quality control flag greater than 1, Q_d shall be set to the greater flag value and Q_x shall be set to 9.
NOTE: **When Q_x shows the position of the data group it should be relative to the group containing Q_x. For example, $Q_x = 1$ refers to the data group immediately following.**
18.4
Section 2
18.4.1
Each of the groups in Section 2 shall be included for all parameters that have been measured, when data are available.
18.4.2
When data are missing for all groups, the entire section shall be omitted from the report.
18.4.3
Group $222Q_dQ_x$
Regulation 18.3.3 shall apply.
18.5
Section 3
18.5.1
General
Section 3 is in two parts. The first part, identified by the indicator group $8887k_2$, shall be used to report temperatures and/or salinity at selected depths. The second part, identified by the indicator group $66k_69k_3$, shall be used to report current at selected depths. **Either or both parts shall be transmitted, depending on the availability of the temperature and/or salinity data for the first part and of current data for the second part.**
18.5.2
Temperatures shall be reported in hundredths of a degree Celsius. When accuracy is limited to tenths of a degree, data shall be encoded using the general form $3T_nT_nT_n/$.
18.5.3
Group $333Q_{d1}Q_{d2}$
$Q_{d1}Q_{d2}$ are two quality control indicators. Q_{d1} is used to indicate the quality of the temperature and salinity profile and Q_{d2} is used to indicate the quality of the current speed and direction profile.
18.6
Section 4
18.6.1
General
Additional groups in this section shall be included as data are available or required.
18.6.2
Group $(1Q_PQ_2Q_{TW}Q_4)$
When Q_P, Q_2, Q_{TW}, and $Q_4 = 0$, the corresponding group shall not be transmitted. Its absence thus indicates a satisfactory general operation.
18.6.3
Group $(2Q_NQ_L//)$
When Q_N and $Q_L = 0$, the corresponding group shall not be transmitted.
Old 18.6.4 deleted (see 18.6.7 hereafter). 18.6.5 and 18.6.6 renumbered as 18.6.4 and 18.6.5 (hereafter).

18.6.4

Group ($Q_cL_aL_aL_aL_aL_a$)

This group shall be transmitted only when $Q_L = 2$ (location over one pass only). It gives the latitude of the second possible solution (symmetrical to the satellite sub-track).

NOTE: Same coding as in Section 0.

18.6.5

Group ($L_oL_oL_oL_oL_oL_o$)

This group shall be transmitted only when $Q_L = 2$ and it gives the longitude of the second possible position, the latitude being indicated by the previous group.

NOTE: Same coding as in Section 0.

18.6.6

***Groups* YYMMJ GGgg/**

The groups YYMMJ GGgg/ give the exact time of the last known position and shall be transmitted only when $Q_L = 1$ together with the following group ($7V_BV_Bd_Bd_B$).

18.6.7

***Group* ($7V_BV_Bd_Bd_B$)**

This group shall be transmitted only when $Q_L = 1$.

Example: At the last location the true direction of the buoy is 47° and its speed is 13 cm s^{-1} — the group is coded 71304.

18.6.8

Group ($8V_iV_iV_iV_i$)

The number of groups $8V_iV_iV_iV_i$ containing information on the engineering status of the buoy shall not exceed three.

NOTES:

(1) The physical equivalent of the value $V_iV_iV_iV_i$ will be different from one buoy to another.

(2) Interpretation of these groups will not be necessary to permit use of the meteorological data.

Add the following specifications:

Q_d	Quality control indicator (Code table 3334) (FM 18-X)
Q_{d1}	Quality control indicator for temperature/salinity profile. (Code table 3334) (FM 18-X)
Q_{d2}	Quality control indicator for current profile. (Code table 3334) (FM 18-X)
Q_l	Quality control indicator for position. (Code table 3334) (FM 18-X)
Q_t	Quality control indicator for time. (Code table 3334) (FM 18-X)
Q_x	Indicator of position of group (see Regulation 18.3.3) (FM 18-X)

Add code table 3334:

3334

Q_d —	Quality control indicator
Q_{d1} —	Quality control indicator for temperature/salinity profile
Q_{d2} —	Quality control indicator for current profile
Q_l —	Quality control indicator for position
Q_t —	Quality control indicator for time
Code figure	
0	Data not checked
1	Data good
2	Data inconsistent
3	Data doubtful
4	Data wrong
5	Data value has been changed
6–9	Not used

NOTE: These flags are the same as the IGOSS quality control flags.

Replace title in code table 2267 by:

k_6 — Method of removing the **velocity and motion of the ship or buoy** from current measurement.

Add NOTE at end of code table 2267:

NOTE: Code figures 0, 1, 2 and 6 are also used for drifting buoys.

Recommendation 11 (CBS-X) — PROPOSED AMENDMENTS TO FM 88-VI EXT. SATOB

THE COMMISSION FOR BASIC SYSTEMS,

NOTING Resolution 5 (CBS-IX) — Working Group on Data Management (DM),

CONSIDERING the need to include winds derived from water vapour motion and to report a more accurate time of observation,

RECOMMENDS that the proposed amendments to FM 88-VI Ext. SATOB, as given in the Annex to this recommendation, be adopted for use as from 3 November 1993;

REQUESTS the Secretary-General to arrange for the inclusion of the amendments in Volume I of the *Manual on Codes*.

Annex to Recommendation 11 (CBS-X)

Amendments to FM 88-VI EXT. SATOB

New code form number: FM 88-X SATOB

Change group YYGGg to YYMMJ GGggw_i, where w_i is method by which winds were determined.

Change NOTE 3 for Sections 2 and 3 to clearly indicate that winds may be included from either cloud motion or water vapour.

Change Regulation 88.3 to "...when data on cloud or water vapour temperature..." and "...winds computed from cloud movement or water vapour motion...".

Change Regulation 88.4 to "...wind computed from cloud movement or water vapour motion are available, while cloud or water vapour temperature...".

Change Regulation 88.9.2 to read "...GGgg...".

Remove FM 88-VI Ext. from specifications of symbolic letters GGg.

Add FM 88-X to specification GGgg and **add** the following to the NOTE:

(5) FM 88-X: time of observation or time of mid-point observation for wind computation.

Add FM 88-X to specification J.

Add FM 88-X to specification MM.

Add w_i to specifications of symbolic letters:

w_i Method by which winds were determined. (Code table 4639) (FM 88-X)

Add code table 4639:

4639

w_i — Method by which winds were determined

Code figure	
0	Not used
1	Wind derived from cloud motion observed in the infrared channel
2	Wind derived from cloud motion observed in the visible channel
3	Wind derived from motion observed in the water vapour channel
4	Wind derived from motion observed in a combination of spectral channels
5–9	Not used

Recommendation 12 (CBS-X) — PROPOSED AMENDMENT TO FM 75-VI CLIMAT TEMP AND FM 76-VI CLIMAT TEMP SHIP

THE COMMISSION FOR BASIC SYSTEMS,

NOTING Resolution 5 (CBS-IX) — Working Group on Data Management (DM),

CONSIDERING the need to avoid confusion regarding the reporting of wind in knots or meters/per second,

RECOMMENDS that the proposed amendment to FM 75-VI CLIMAT TEMP and FM 76-VI CLIMAT TEMP SHIP, as given in the Annex to this recommendation, be adopted for use as from 2 November 1994;

REQUESTS the Secretary-General to arrange for the inclusion of the amendment in Volume I of the *Manual on Codes*.

Annex to Recommendation 12 (CBS-X)

Amendment to FM 75-VI CLIMAT TEMP and FM 76-VI CLIMAT TEMP SHIP

New code form numbers: FM 75-X CLIMAT TEMP and FM 76-X CLIMAT TEMP SHIP

Add a NOTE under specification MM:

NOTE: In FM 75-X and FM 76-X, MM shall be used to indicate the unit of wind speed in addition to indicating the month. When wind speeds are given in knots, 50 shall be added to MM. When the speed is given in metres per second, MM shall not be modified.

Recommendation 13 (CBS-X) — SUPPORT FOR THE OWSE-AFRICA

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Resolution 3 (EC-XXXVI) — Operational World Weather Watch Systems Evaluations (OWSEs),

(2) The abridged final report of the forth-second session of the Executive Council, general summary, paragraphs 3.1.11–3.1.14 concerning the OWSE-AFRICA, especially the recommendation that Members consider the requirements of the OWSE-AFRICA as a matter of urgency,

(3) The final report on Phase-I of the OWSE-AFRICA, submitted by the chairman of the OWSE-AFRICA Steering Group to CBS-X, and the significant improvements reported in the exchange of observational data at selected stations,

EXPRESSES:

(1) Great satisfaction that Phase-I of the OWSE-AFRICA has been completed successfully,

(2) Deep appreciation to the Members and organizations participating in the OWSE-AFRICA for their substantial support through national, bilateral, VCP, and direct contributions;

(3) Its congratulations to the OWSE-AFRICA Steering Group for its leadership,

CONSIDERING:

(1) The substantial benefits to be achieved from the orderly implementation of DCP/DRS and MDD equipment, including the greatly improved information bases to be achieved by the effective use of the DCS/DRS and MDD as a general augmentation of the GTS in RA I,

(2) The critical role of the assistance programmes in the improvement of the capabilities of the developing countries, and the need to ensure that the technologies being implemented in developing countries receive adequate support,

URGES that Members of RA I proceed with the implementation of DCP/DRS systems, with the assistance of other Members and funding (assistance) programmes, giving due regard to the guidelines provided by the OWSE-AFRICA Steering Group;

RECOMMENDS that the Executive Council take special note of the requirements of members in RA I for resources to implement the DCP/DRS systems as a component of the GTS, and to assist in the identification of specific sources of funding;

INVITES the Secretary-General to inform donors and organizations, such as the UNDP, of the importance of the results of the OWSE-AFRICA to the future development of the WWW RA I, and to seek their further assistance in the implementation of the recommendations arising from the OWSE-AFRICA.

Recommendation 14 (CBS-X) — REVIEW OF RESOLUTIONS OF THE EXECUTIVE COUNCIL, BASED ON PREVIOUS RECOMMENDATIONS OF THE COMMISSION FOR BASIC SYSTEMS OR RELATED TO THE WWW

THE COMMISSION FOR BASIC SYSTEMS,

NOTING with satisfaction the action taken by the Executive Council on the previous recommendations of the Commission for Basic Systems or related to the WWW in general,

CONSIDERING that some of the previous Executive Council resolutions are still valid,

RECOMMENDS:

(1) That the following Executive Council resolutions should be kept in force:
Resolutions 1 and 2 (EC-XXXVI), 5 (EC-XLII) and 16 (EC-XLIII);

(2) That the following Executive Council resolutions are partly obsolete and should be replaced by new resolutions:
Resolutions 3 (EC-XXXVI) and 8 (EC-XLIII);

(3) That the following Executive Council resolutions are no longer needed and should not be kept in force:
Resolutions 1 and 3 (EC-XL), 9, 14 and 15 (EC-XLIII).

ANNEX I

ANNEX TO PARAGRAPH 6.1.3 OF THE GENERAL SUMMARY

DEVELOPMENT OF SPECIFICATIONS OF MINIMUM REQUIREMENTS FOR REAL-TIME DATA-PROCESSING FACILITIES AT NMCs

Data-processing capability

1. It is considered that an NMC could require automation to assist in the performance of such functions as:

(*a*) The real-time monitoring of observations with interactive capability for quality control purposes;

(*b*) The preparation and dissemination facilities for worded forecasts;

(*c*) The manipulation of data fields from major centres in order to prepare a range of derived products;

(*d*) The operation of simple statistical models using local observations and imported data;

(*e*) The interactive processing of real-time and climatological fields in support of short- and medium-range forecasting;

(*f*) The preparation of forecast bulletins in an automated or semi-automated fashion using local observations and imported data;

(g) The development of local weather forecasting techniques;

(*h*) The verification of output products;

(*i*) The preparation of high quality, hard copy graphical output; and

(*j*) The archival of a limited set of parameters/fields.

2. It is recognized that implementing all the listed functions in a comprehensive manner would require a relatively powerful computer installation and a highly complex set of software. It is not advocating that all NMCs need to acquire such systems, rather it is expected that any Member automating only the essential functions of their NMC would do so only after a careful analysis of national needs and the preparation of a thorough system design.

3. Following consideration of the list of functions to be performed in an NMC, and noting the need to minimize costs, the Working Group on the GDPS recommended the following features for a system meeting both the data-processing and telecommunications requirements:

(*a*) The system will not have the ability to perform numerical weather prediction *per se* as in WMCs and RSMCs; and

(*b*) The system should have a two microcomputer configuration. The microcomputers should have Unix-based operating systems and be joined by a local area network connection. One of these microcomputers should run a communicating and message switching system, the other an applications and graphics package. This separation does not imply, necessarily, a logical separation (for reasons set out below). The technical advice strongly suggests that the merging of the two general tasks into a single CPU operation would result in an unacceptable level of complexity.

4. It is noted that the proposed output functionality of this NMC data-processing system imposes certain requirements on technical systems selected during its implementation. Requirements were identified in the areas of telecommunications, graphics and display systems, database design, and training and maintenance. While the expertise of the group was not focused on these areas, it was felt important that functionality be specified (where possible) and that, where appropriate, further guidance be sought from the relevant WMO working group or Commission.

5. The telecommunication system's functional requirements should include the collection of observations and grid point bulletins from the GTS (and AFTN), the storage of messages in a database,

the transmission of observations to the GTS and products on national communications circuits, and the capability for bulletin monitoring.

6. The Graphics and Display Service function is to capture numerical products, observations and possibly fax transmission from the database for display by VDU and/or printer hardware.

7. The database is central to the design of an effective automated data-processing system and consists of two components, the telecommunications system database and the applications sub-system database. If possible the database residing in each computer should be controlled by the same database management system (DBMS).

8. The training and maintenance aspect imply that the system cannot be implemented and maintained without ongoing software and hardware maintenance. On site maintenance can only be achieved if operators are thoroughly trained in all aspects of the system. It is therefore recommended that careful attention be paid to the "technology transfer" requirements of the data-processing system.

ANNEX II

ANNEX TO PARAGRAPH 6.3.6 OF THE GENERAL SUMMARY

FORMAT FOR ROUTEING CATALOGUES

1. OBJECTIVE

The objective is to present, in files with fixed-length records, the following information for each group of bulletins identified by the part TTAAii CCCC of the abbreviated heading:

(*a*) Input circuits on which the bulletins are scheduled to be received according to the GTS routeing arrangements as well as to bilateral and/or multilateral arrangements; and

(*b*) Output circuits on which the bulletins are scheduled to be transmitted according to the GTS routeing arrangements and to bilateral and/or multilateral arrangements.

2. PRINCIPLES USED FOR THE DEFINITION OF THE STRUCTURES OF THE FILES

With a view to finding a compromise for limiting the volume of the files when taking into account the differences in the implementation of routeing procedures between automated centres, the following principles are used to define the files and their structures:

(*a*) Taking into account the large number combinations for switching data on output circuits:

Principle 1: To use a one-digit field for each output circuit to indicate if the bulletins are scheduled to be relayed or not.

The sequence of the output circuits will be defined in a primary file called CCCCCIRC containing only one record (see paragraph 3). Consequently, a secondary file called CCCCROUT will include the routeing catalogue by itself (see paragraph 4).

(*b*) Taking into account that:

(i) The number of circuits on which one bulletin is scheduled to be received is relatively low;

(ii) For a source sensitive centre, in case of a bulletin received from different input circuits, one record for each input circuit is required to define the different routeing applied for each output circuit:

Principle 2: To use one record for each input circuit from which the bulletins are scheduled to be received.

3. DEFINITION OF THE PRIMARY FILE CCCCCIRC

3.1 File CCCCCIRC

Name of the file: CCCCCIRC, the four first letters CCCC being the international four-letter location indicator CCCC (see WMO-No. 9, *Catalogue of Meteorological Bulletins*) of the centre and the last four letters the constant sequence CIRC.

Field	Field Name	Type	Width
1	M_CENTRE	Character	4
2	DATE	Numeric	8
3	SOURCESENR	Numeric	1
4	SOURCESENT	Numeric	1
5	DUPLIDELE	Numeric	1
6	NOUT	Numeric	2
7	OUT01	Character	5
.	.	.	.
.	.	.	.

It is possible to have as many additional fields as additional output circuits OUTxx (OUT for output) presented in alphabetical order (nn=NOUT):

(xx+6)	OUTxx	Character	5
.	.	.	.
.	.	.	.
(nn+6)	OUTnn	Character	5
(nn+7)	COMMENTS	Alphanumeric	100

M_CENTRE: International four-letter location indicator CCCC.

DATE: Date of creation or updating of the primary and secondary files:
first four digits: year
next two digits: month
last two digits: day.

SOURCESENR: = 1, if each bulletin is accepted in reception by the centre only if received from preselected circuits;
= 0, if the centre accepts in reception bulletins whatever the circuit(s) on which it receives the bulletins.

SOURCESENT: = 1, if each bulletin is relayed to other GTS centres by the centre only if received from preselected circuits;
= 0, if the centre relays bulletins whatever the circuit(s) on which it receives the bulletins.

DUPLIDELE: = 1, if the centre detects and deletes duplicated bulletins;
= 0, if the centre does not detect and delete duplicated bulletins.

NOUT: Number of output circuits defined in the next fields.

OUTxx: Designator of the output circuit (see paragraph 3.2), xx = 1 to nn = NOUT.

NOTE: Circuits are either GTS circuits or additional circuits (used for meteorological data exchange) not included in the GTS plan.

COMMENTS: This field includes the comments of the centre concerned. It can be used to add information as needed, in particular as regards the use of a designator for a circuit for which no provision is included in paragraph 3.2.

3.2 Designator of circuits

The designators of the output circuits mentioned above and of the input circuits mentioned in paragraph 4 are the following:

(*a*) For a point-to-point circuit: international location indicator CCCC of the adjacent centre;

(*b*) For a point-to-multipoint network: first five letters of the current designator: ANMET, CEMET;

(*c*) For a satellite dissemination system: following current designator: EUMDD for METEOSAT MDD system, EUDRS for METEOSAT DRS system;

(*d*) For an HF broadcast: HCCCC, CCCC being the international location indicator CCCC of the transmitting centre.

NOTE: The notion of circuit has to be used in its broadest meaning. A circuit could be a point-to-point circuit (e.g. a dedicated circuit, a circuit implemented through switched networks like a packet-switched public data network), a point-to-multipoint circuit (e.g. ANMET, CEMET, MDD, DRS), etc.

Any specific designator used for a circuit not matching one of the above categories (*a*) to (*d*) should be defined in the field COMMENTS.

4. Definition of the secondary file CCCCROUT

Name of the file: CCCCROUT, CCCC being the international four-letter location indicator CCCC of the centre and ROUT a constant sequence:

Field	Field Name	Type	Width
1	AHL_TTAAII	Alphanumeric	6
2	AHL_CCCC	Character	4
3	SRIN	Alphanumeric	5
4	STOUT01	Numeric	1
.	.	.	.
.	.	.	.

It is possible to have as many additional fields STOUTxx as additional OUTxx circuits in the same order as given in CCCCCIRC (with nn=NOUT)

(xx+3)	STOUTxx	Numeric	1
.	.	.	.
.	.	.	.
(nn+3)	STOUTnn	Numeric	1

NOTE: When the monitoring results are presented in a database structure (see paragraph 5.2), the sequences of characters "OUTxx" in the names of the fields STOUTxx should be replaced by the designator of the circuit (e.g. STKWBC, STANMET, STEUMDD).

AHL_TTAAII: Part TTAAii of the abbreviated heading.

AHL_CCCC: Part CCCC of the abbreviated heading.

NOTE: Wildcards (so called star or asterisk *, character No. 2/10 of International Alphabet No. 5) could be used in the parts TTAAii CCCC of the abbreviated heading to group the abbreviated headings for which the same routeing is applied when received from the same input circuit. In such a case, it would implicitely be understood that all the abbreviated headings included in the catalogue of meteorological bulletins matching with the use of the wildcards are grouped under this heading, e.g. the heading SM**** KWBC will implicitely group all SYNOP bulletins compiled by KWBC for main standard hours and included in the catalogue of meteorological bulletins.

SRIN: Designator of the input circuit from which the bulletins are routinely scheduled to be received (see paragraph 3.2).

NOTE: The use of five wildcards ***** in the field SRIN would mean that the bulletins are accepted from any input circuits and that the routeing applied for the bulletins received from any circuit (except for those specified in other records) is defined in the next fields STOUTxx of the same record. This practice is not in line with the objective given in 1(*a*) (identification of the input circuit(s) on which the bulletins are scheduled to be received). Therefore, this practice should only be implemented when it is not possible to do otherwise.

STOUTxx: = 1, if the bulletin is scheduled to be transmitted routinely on the circuit defined by the field OUTxx of the primary field CCCCCIRC;
= 0, otherwise.

5. LOGICAL FORMATS

The files should be presented as ASCII files containing:

(*a*) Either a series of consecutive numbers and/or alphabetic characters without separation signals corresponding in number, type and length to the fields in the records of the database;

(*b*) Or a series of consecutive numbers and/or alphabetic characters seperated by a suitable field separator and corresponding in number, type and length to the fields in the records of the database. A suitable field separator would be a comma or a blank. If the fields are separated by commas, the character fields should be surrounded by double quotes.

The end of each record must be marked by one carriage return and one line feed. Blank characters for alphanumeric or character type and zeroes for numeric type must be inserted, as necessary, to ensure that the length of the record is in accordance with the structure of the files given in paragraphs 3 and 4. In this respect, the content of the fields of alphanumeric or character type should be justified on the left and the content of the fields of numeric type should be justified on the right. Examples of a possible record for a file CCCCCIRC and a file CCCCROUT presented without separation signals are, respectively, with CCCC=LAAA:

LAAA19910327001O5EGRR LFPW RUMS EUMDDHLAAA

SMUS01KWBCEGRR 11110

With a view to facilitating the processing of data, centres may define bilateral or multilateral arrangements for the exchange of the primary and secondary files in formats required for specific database software package(s). As an example, the WMO Secretariat would appreciate receiving the files in formats required for dBASE IV software package.

6. PHYSICAL FORMATS

Monitoring results should be handled on 3.5 inch (preferably) or 5.25 inch floppy disks (either single or double density) written by a PC running DOS.

ANNEX III

ANNEX TO PARAGRAPH 6.3.29 OF THE GENERAL SUMMARY

FORMAT FOR THE MONITORING RESULTS OF THE WWW OPERATION ON ELECTRONIC MEDIA

1. INTRODUCTION

The purpose of this annex is to define the structure of the databases used to present the monitoring data collected by centres during annual global monitoring of the operation of the WWW.

The software package used by the WMO Secretariat to process the monitoring results on PC-type workstations is dBASE IV.

2. COMMON FIELDS DEFINED IN DATABASES

M_CENTRE is the location indicator CCCC of the monitoring centre (see WMO-No. 9, *Catalogue of Meteorological Bulletins*).

DISTRIB is a code to indicate the geographical distribution of the bulletin or report. It will contain G for global, R for regional, N for national, D for discontinued, B for bilateral agreements, etc.

DBASE indicates the database used for monitoring and contains T for telecommunications or D for data processing.

QC = QUALITY CONTROL indicates whether the received bulletin or report has been checked for quality: 0 is no quality check. 1 to 9 indicate levels of quality control (to be defined).

STATION_ID Alphanumeric Width 5

This field contains the station identifier which will be IIiii for land stations, call signs for ships and aircrafts, etc. Call signs can be alphabetic as well as numeric so this field should be stored as characters in database files for SHIP and AIREP monitoring results to cater for either format. The maximum length of a ship call sign is nine characters. In order to save space in SYNOP, TEMP and CLIMAT result files, 5 was chosen as the width of the STATION_ID field.

Format H includes the abbreviated heading line of the bulletin, which has been split into four fields for ease of processing the data:

AHL_TTAAII	Alphanumeric	Width 6
AHL_CCCC	Character	Width 4
AHL_YYGGGG	Numeric	Width 6
AHL_BBB	Character	Width 3

These fields correspond to the groups in the abbreviated heading line. For example, AHL_CCCC is the originating centre CCCC, AHL_YYGGGG is the international date/time group, and AHL_BBB is the BBB indicator.

Formats C to G include part of the abbreviated heading line of the bulletin i.e. fields AHL_TTAAII and AHL_CCCC.

Other fields are explained where they occur in the descriptions of the structures of the databases. Most are concerned with the time of receipt of individual observations or with the numbers of bulletins or reports received for a given observation time.

If a field in a record is not relevant for the observation type, it should be left blank. If reports are expected but not received, the field should be given the value 0 (zero). For example, PILOT and TEMP reports are both in the same record for each individual station. If TEMP reports only are expected, all the PILOT fields should contain blanks. If, however, PILOT reports are also expected but not received all the PILOT fields should contain 0.

The '.... TOTAL' fields were included in each record as they are required frequently and they provide a check on other field values.

3. NAMES OF THE DIRECTORIES

Two directories are defined for each monitoring period. The names of the directories should have a width of eight characters:

First charater: G for global annual monitoring, R for regional monitoring
Second character: last digit of the year
Next two characters: month
Next two characters: day of beginning
Last two characters: day of end

For example, G210015 represents the monitoring period from 1 to 15 October 1992.

The files defined in paragraph 4 should be grouped under each directory according to the monitoring period: e.g. the monitoring results of WMC Washington related to SYNOP for the monitoring period from 1 to 15 October 1992 should be included in the file G2100115\KWBCA.

4. **DATABASE STRUCTURES**

(*a*) Format A — SYNOP

File name: CCCCA, CCCC being the location indicator of the monitoring centre.

Field	Field Name	Type	Width
1	M_CENTRE	Character	4
2	DISTRIB	Character	1
3	DBASE_QC	Character	2
4	SCHEDULE	Character	1
5	SCHEDULE	Character	1
6	HH60_00	Numeric	2
7	HH60_06	"	"
8	HH60_12	"	"
9	HH60_18	"	"
10	HH60_TOTAL	"	"
11	HH120_00	"	"
12	HH120_06	"	"
13	HH120_12	"	"
14	HH120_18	"	"
15	HH120_TOT	"	"
16	HH360_00	"	"
17	HH360_06	"	"
18	HH360_12	"	"
19	HH360_18	"	"
20	HH360_TOT	"	"
		Total	43

Field 5, SCHEDULE, is S if data are scheduled to be received and N if data are not scheduled to be received.

Fields 6 to 20 refer to the number of reports received for each observing time (00, 06, 12, 18) within the specified period (HH + 60, 120 or 360 minutes) after the observation time, plus the totals received within the specified period.

(*b*) Format B — TEMP, PILOT

File name: CCCCB, CCCC being the location indicator of the monitoring centre.

Field	Field Name	Type	Width
1	CENTRE	character	4
2	DISTRIB	character	1
3	DBASE_QC	character	2
4	STATION_ID	alphanumeric	5
5	SCHEDULE	character	1
6	PART	character	1
7	THH120_00	numeric	2
8	THH120_06	"	"
9	THH120_12	"	"
10	THH120_18	"	"
11	THH120_TOT	"	"
12	THH720_00	"	"

13	THH720_06	"	"
14	THH720_12	"	"
15	THH720_18	"	"
16	THH720_TOT	"	"
17	PHH120_00	"	"
18	PHH120_06	"	"
19	PHH120_12	"	"
20	PHH120_18	"	"
21	PHH120_TOT	"	"
22	PHH720_00	"	"
23	PHH720_06	"	"
24	PHH720_12	"	"
25	PHH720_18	"	"
26	PHH720_TOT	"	"
		Total	54

Field 6, PART, is A for part A and B for part B of a TEMP or PILOT report.

Fields 7 to 26 refer to the number of reports received within the specified period after observation time plus totals. Fields 7 to 16 are for TEMP reports. Fields 17 to 26 are for PILOT reports. In view of the proportion of stations which report both TEMP and PILOT, it was calculated that space would be saved by incorporating both types of data in the same record although there will be blank fields for stations making only one type of report.

(*c*) Format C — SHIP

File name: CCCCC, the first four C being the location indicator of the monitoring centre.

Field	Field Name	Type	Width
1	M_CENTRE	Character	4
2	DISTRIB	Character	1
3	DBASE_QC	Character	2
4	AHL_TTAAII	Alphanumeric	6
5	AHL_CCCC	Character	4
6	SCHEDULE	"	1
7	WITHIN	Numeric	2
8	BULL00	"	5
9	REPORT00	"	"
10	BULL06	"	"
11	REPORT06	"	"
12	BULL12	"	"
13	REPORT12	"	"
14	BULL18	"	"
15	REPORT18	"	"
16	BULL_TOT	"	"
17	REPORT_TOT	"	"
		Total	70

Fields BULL00,06,12,18 are the total number of SHIP bulletins received within 2 or 12 hours from the originating centre for each standard observation time. Fields REPORT00,06,12,18 are the same data for reports received.

WITHIN indicates the number of hours within which the bulletin is received and will vary between 2 or 12 hours BULL_TOT and REPORT_TOT are the total number of SHIP bulletins and SHIP reports, respectively, received within 2 or 12 hours of all the standard bulletin times.

This database could be restructured if it were decided that individual ships should be monitored. It could then take on Format A structure with STATION_ID as the SHIP call sign.

(*d*) Format D — TEMP SHIP, PILOT SHIP

File name: CCCCD, CCCC being the location indicator of the monitoring centre.

Format D is essentially the same as format C. Field 7, WITHIN, will be 12 or 24 for bulletins received within 12 or 24 hours of the standard bulletin time. An additional field 8, PART, is needed, as

in format B to give the part of the report which has been received. Fields 9 to 17 of format C must then be renumbered 10 to 18.

Total record length for format D is 71.

(*e*) Format E — BUOY

File name: CCCCE, CCCC being the location indicator of the monitoring centre.

Field	Field Name	Type	Width
1	M_CENTRE	Character	4
2	DISTRIB	Character	1
3	DBASE_QC	Character	2
4	AHL_TTAAII	Alphanumeric	6
5	AHL_CCCC	Character	4
6	SCHEDULE	"	1
7	BULL2103	Numeric	5
8	REPORT2103	"	"
9	BULL0309	"	"
10	REPORT0309	"	"
11	BULL0915	"	"
12	REPORT0915	"	"
13	BULL1521	"	"
14	REPORT1521	"	"
15	BULL_TOT	"	"
16	REPORT_TOT	"	"
		Total	68

Field BULL2103 is the number of bulletins compiled between times 2100–0300 UTC and received before 05 UTC. Similarly for the other fields.

(*f*) Format F — AIREP

File name: CCCCF, CCCC being the location indicator of the monitoring centre.

This will have the same fields 1 to 16 as format E.

(*g*) Format G — AMDAR

File name: CCCCG, CCCC being the location indicator of the monitoring centre.

Again, this will have fields identical to format E.

(*h*) Format H — BATHY, TESAC

File name: CCCCH, CCCC being the location indicator of the monitoring centre.

Field	Field Name	Type	Width
1	M_CENTRE	Character	4
2	DISTRIB	Character	1
3	DBASE_QC	Character	2
4	AHL_TTAAII	Alphanumeric	6
5	AHL_CCCC	Character	4
6	AHL_YYGGGG	Numeric	6
7	AHL_BBB	Character	3
8	TIME_REC	Numeric	6
9	TIME_REC	Numeric	2
10	REPORTS	Numeric	2
		Total	36

TIME_REC is the time of receipt of the bulletin in the format YYGGgg.

The field, REPORTS, is the number of reports received with the specified bulletin heading.

(*i*) Format I — CLIMAT, CLIMAT TEMP

File name: CCCCI for CLIMAT reports and CCCCT for CLIMAT TEMP reports, CCCC being the location indicator of the monitoring centre.

Field	Field Name	Type	Width
1	M_CENTRE	Character	4
2	DISTRIB	Character	1
3	DBASE_QC	Character	2
4	STATION_ID	Alphanumeric	5
5	SCHEDULE	Character	1
6	REC_1_TO_5	Numeric	1
7	REC_6_TO15	Numeric	1
		Total	15

Fields 6 and 7 are for reports received from the 1st to the 5th day and from the 6th to the 15th day of the designated monitoring month respectively. Reception of the report is indicated by '1', non reception by '0'.

(*j*) Format J — Questionnaire related to the implementation of monitoring procedures at centres

File name: CCCCJ, CCCC being the location indicator of the monitoring centre.

Field	Field Name	Type	Width
1	AUTO	Character	3
2	BEF_QC	Character	3
3	EXC_GTS	Character	3
4	BLDUP_NC	Character	3
5	BLNIL_C	Character	3
6	BLCOR_C	Character	3
7	RPDUPSA_NC	Character	3
8	RPDUPDA_NC	Character	3
9	RPNIL_NC	Character	3
10	RPCOR_NC	Character	3
11	RPAIREP	Character	3
		Total	33

AUTO: reply yes or no to the question: is the monitoring automated?

BEF_QC: Reply yes or no to the question: is the counting of bulletins and reports performed before quality control?

EXC_GTS: Reply yes or no to the question: are bulletins and reports counted only if received or transmitted on the GTS channels?

BLDUP_NC: Reply yes or no to the question: are duplicated bulletins disregarded?

BLNIL_C: Reply yes or no to the question: are bulletins including only NIL reports counted?

BLCOR_C: Reply yes or no to the question: are bulletins including the indicator COR or CCx counted in addition to bulletins to be corrected?

RPDUPSA_NC: Reply yes or no to the question: are duplicated reports included in bulletins having the same abbreviated heading disregarded?

RPDUPDA_NC: Reply yes or no to the question: are duplicated reports included in bulletins having different abbreviated headings disregarded?

RPNIL_NC: Reply yes or no to the question: are NIL reports disregarded?

RPCOR_NC: Reply yes or no to the question: are reports included in bulletins with the indicator COR or CCx disregarded to avoid double counting of these reports?

RPAIREP: Reply yes or no to the question: are all AIREP/AMDAR reports made at different positions during the flight counted as different reports?

NOTE: The monitoring procedures should be implemented in such a way that all replies to the questionnaire should be yes.

5. SUSPENSION OF OBSERVING PROGRAMMES AND SUSPENSION OF TRANSMISSION ON CIRCUITS

Suspension of observing programmes at observing stations and suspension of transmission on circuits are expected to be monitored in real time. The database format only uses one file to store the information.

(*a*) Format K — Suspension of observing programmes at observing stations

File name: CCCCK, CCCC being the location indicator of the monitoring centre.

Field	Field Name	Type	Width
1	REGION	Character	1
2	CORIGIN	"	4
3	START_DATE	Numeric	8
4	END_DATE	"	8
5	STATION_ID	Alphanumeric	5
6	DETAILS	Character	50
7	SYNOP00	Numeric	2
8	SYNOP06	"	"
9	SYNOP12	"	"
10	SYNOP18	"	"
11	TEMP00	"	"
12	TEMP06	"	"
13	TEMP12	"	"
14	TEMP18	"	"
15	PILOT00	"	"
16	PILOT06	"	"
17	PILOT12	"	"
18	PILOT18	"	"
		Total	102

Fields 1 to 5 have been defined previously. Field 6, DETAILS is a plain language description of the reason for suspension.

The format of the dates in fields 3 and 4 should be as follows:

First four digits: year
Next two digits: month
Next two digits: day

Fields 7 to 18 are the number of reports not made for each observation time e.g. SYNOP00 is the number of missing 00 UTC SYNOP reports.

(*b*) Format L — Suspension of transmission on circuits

File name: CCCCL, CCCC being the location indicator of the monitoring centre.

Field	Field Name	Type	Width
1	REGION	Character	1
2	CENTRE	"	4
3	START_TIME	"	4
4	START_DATE	Numeric	8
5	END_TIME	Character	4
6	END_DATE	Numeric	8
7	CCT_FROM	Alphanumeric	5
8	CCT_TO	"	5
9	REMARKS	"	50
		Total	89

The format of the dates in fields 4 and 6 should be as in above sub-paragraph (*a*).

Fields 7 and 8 are the ends of the circuit. Either of these may be STATION_ID or CCCC. Field 9, REMARKS, is a description of the problem.

One record should correspond to one period of circuit outage. If there are several periods of suspension of transmission on one circuit, then there should be a separate record for each.

6. FORMAT OF RECEIVED DATA

6.1 Logical formats

It is assumed that not all centres will have access to the database program required to format the monitoring data. Therefore two different data formats will be accepted:

(*a*) As files in the exact format required for the dBASE IV software package;

(*b*) As ASCII files containing:

(i) Either a series of consecutive numbers and/or alphabetic characters without separation signals corresponding in number, type and length to the fields in the records of the database;

(ii) Or a series of consecutive numbers and/or alphabetic characters separated by a suitable field separator and corresponding in number, type and length to the fields in the records of the database. A suitable field separator would be a comma or a blank. If the fields are separated by commas, the character fields should be surrounded by double quotes.

In all cases, the end of each record must be marked by one carrriage return and one line feed. Blank characters for alphanumeric or character type and zeroes for numeric type must be inserted as necessary to ensure that the length of the record is in accordance with the structure of the files given in paragraphs 3 and 4. In this respect, the content of the fields of alphanumeric or character type should be justified on the left and the content of the fields of numeric type should be justified on the right.

In the case for data of type (*b*) above a conversion program will be required to produce structured database files.

6.2 **Physical formats**

The data could be transported in machinable form on either magnetic tape or floppy disk. Floppy disk is preferred. Formats for both of these media are discussed.

6.2.1 ***Floppy disk***

Monitoring results can be handled on 3.5 inch (preferably) or 5.25 inch floppy disks (either single or double density) written by a PC running DOS.

6.2.2 ***Magnetic tape***

Tapes would have to be 9-track, IBM written, with a density of 800, 1 600 or 6 250 bits per inch. The higher densities, 1 600 or 6 250, are recommended for efficiency. Some non-IBM mainframes may be restricted to 1 600 bpi by their hardware.

On IBM systems the format of the data on the tape is controlled by the sub-parameters of the DCB parameter. For other mainframes there will be corresponding parameters. The record format is specified by the RECFM sub-parameter. For structured database files this will be a fixed block (RECFM = FB) but for unformatted data the record length and hence the block length could be variable. For database structured files, the logical record length (LRECL) will be equal to the record length of the database. For RECFM = FB the blocksize BLKSIZE, must be less than 32 760 and must be an integer multiple of the record length: i.e. BLKSIZE = nxLRECL where n is an integer. Large values of n give more efficient use of tape because of the reduced number of interblock gaps. Some other manufacturers mainframes will have to write the tape with n=1. For variable record length data LRECL = length of maximum record and must be less than BLKSIZE.

There are more efficient record formats available to IBM compatible machines but these would require different job control language (and possibly special programs) to read the tapes at the ICC.

6.2.3 ***Media independent recommendations***

Records for different databases should not be mixed together in one file, particularly if the file is not in database format. Each file should be blocked according to the database record length if it is in database structured format. It is recommended that there should be accompanying documentation or that the first file on the tape or in the disk directory should describe the format and contents of the rest of the files. In case of problems with reading the tape or floppy disk, it may be useful to know the method which was used to write the data. All magnetic media should be clearly labelled 'DO NOT XRAY' before being transported internationally.

ANNEX IV

ANNEX TO PARAGRAPH 6.3.32 OF THE GENERAL SUMMARY

FORMAT FOR THE MONITORING RESULTS OF THE EXCHANGE OF BULLETINS ON THE GTS

Name of the file: CCCCXXXX, CCCC being the location indicator of the monitoring centre and XXXX a designator for the monitoring provided by the co-ordinator of the monitoring.

Field	Field Name	Type	Width
1	AHL_TTAAII	Alphanumeric	6
2	AHL_CCCC	Character	4
3	AHL_YYGGGG	Numeric	6
4	AHL_BBB	Character	3
5	RECFROM	Character	5
6	RYYGGGG	Numeric	6
7	LENGTH	Numeric	5
8	COR_OPE	Numeric	1
9	DUPLI	Numeric	1
10	TTOUT01	Numeric	6

It is possible to have as many additional fields TTOUTxx as additional OUTxx circuits in the same order as given in the primary file CCCCCIRC (nn=NOUT) (see Note, paragraph 3.1 of Annex II):

(xx+9)	TTOUTxx	Numeric	6
.	.	.	.
.	.	.	.
(nn+9)	TTOUTnn	Numeric	6

When the monitoring results are presented in a database structure like dBASE structure, the sequences of characters "OUTxx" in the names of the fields TTOUTxx should be replaced by the designator of the circuit (see Note, paragraph 3.2 of Annex II), as for example TTKWBC, TTANMET, TTEUMDD.

Fields 1 to 4 identify the bulletins monitored.

RECFROM: Designator of the circuit on which the bulletin was received as given in CCCCCIRC (see Note, paragraph 3.2 of Annex II).

RYYGGGG: Date/time YYGGgg of reception of the bulletin.

LENGTH: Length of the bulletin in octets.

COR_OPE: = 1, if an operator corrected the bulletin at the monitoring centre;
= 0 otherwise.

DUPLI: = 1, if the bulletin was a duplicated bulletin;
= 0 otherwise.

TTOUTxx: Date/time YYGGgg of transmission of the bulletin on the circuit OUTxx given in CCCCCIRC.

The logical and physical formats used should be those specified in paragraphs 5 and 6 of Annex II.

NOTE: References are made to the format for routeing catalogues in Annex II.

ANNEX V

ANNEX TO PARAGRAPH 6.4.30 OF THE GENERAL SUMMARY

CONCEPT AND POTENTIAL FUNCTIONS OF THE WMO DISTRIBUTED DATABASES (DDBs)

THE DISTRIBUTED DATABASES CONCEPT

1. Since its principal endorsement by CBS-IX (1988), the Distributed Databases concept is gradually taking shape. It is clear today that the most efficient provision of the basic data (observations and products) in the WWW should best be supported by an improvement and enhancement of the data management functions within the GTS. These, together with the necessary upgrade of the transmission capacity of the GTS, will lead to improving the routine data distribution to meet the future basic WWW data exchange requirements.

2. Beyond the exchange of the basic data there is also a demand for the provision and exchange of new data to be facilitated by the WWW. On the one hand, the WWW is increasingly being called upon to provide support services to other WMO Programmes, for example, the Global Climate Observing System and the Global Ocean Observing System. On the other hand, a vast amount of auxiliary data and reference data exist of which specific data sets are needed at irregular intervals for the direct support of WWW operations. Both requirements solicit the development of a flexible, modern DDB infrastructure. The DDB concept should meet the requirements for a data handling system for data needed in the WWW system but not routinely exchanged on the GTS, and support new and emerging needs for data, partially outside the WWW system.

3. One way of meeting these needs is to make information available concerning the nature and location of a variety of meteorological and environmental data sets and develop specific purpose databases. Such databases would help centres to better respond to specific tasks within the WWW systems and also to assist centres in tasks that are not necessarily central to the traditional WWW operations. The information should be made known to the meteorological community through the provision of the corresponding metadata (data about data), without necessarily the need to make these data sets themselves available on the same network (e.g. GTS) on which the metadata are obtainable. Depending on the nature of the data requirements, different means of communication and/or telecommunications are possible for sending the requests and replies.

4. The Working Group on the GTS has now proposed a request/reply methodology using a system of addressed messages which will facilitate the *ad hoc* exchange of data using the GTS. In order to provide wider accessability to databases, and to minimize loading of the GTS, it may be necessary to enable non-routine access to DDBs via public networks (e.g. data links over the telephone network, public packet switched data networks or integrated services digital network — a digital telephone network that offers the ability to transmit digital as well as voice data. The use of public networks introduces a "user pays" mechanism, which will also serve to protect the DDBs request/reply system itself from being monopolised by extravagant users. A generic DDB configuration illustrating this concept is given in Figure 1.

5. Should the frequency and importance of obtaining certain data reach a point where it is economically justified and internationally agreed to use the GTS, then the communication links can be upgraded accordingly in a planned manner and such data transfers moved to the GTS.

6. Use of an open-systems architecture and of public data network facilities, whilst providing greater flexibility and a higher level of availability than fixed dedicated circuits of the present closed GTS system, will make the system more vulnerable to unauthorized access than has been the case to date. It will be necessary to mandate minimum security measures to be implemented by participating Members. In addition to these "standard" minimum measures, Members may feel the need to implement additional security features. The implementation of security measures will not be costless.

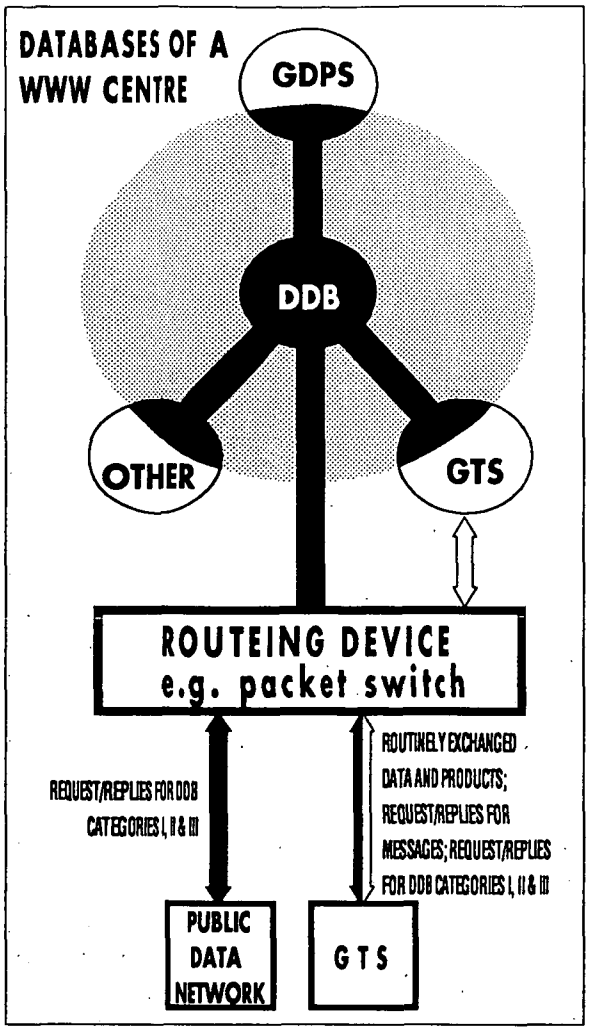

Figure 1 — Generic configuration of a DDB centre

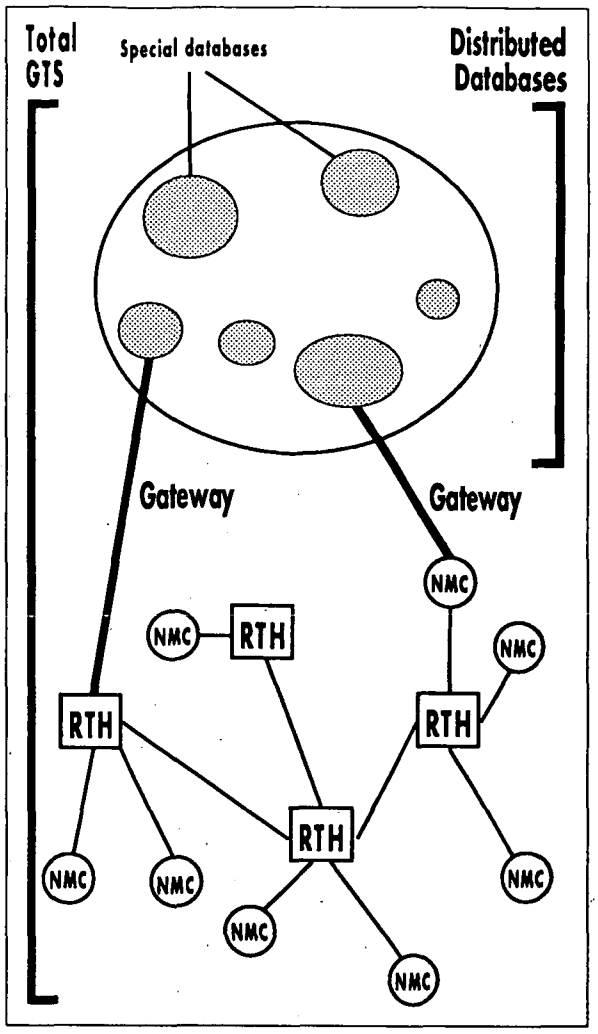

Figure 2 — Possible structure of the GTS incorporating distributed databases (DDBs)

AN IMPLEMENTATION MODEL OF THE DDBs ON THE GTS

7. Figure 2 provides a logical view of the structure of the GTS incorporating the DDBs. This logical description has the following features:

(*a*) An upper DDBs plane, in which all databases are logically interconnected;
(*b*) On the upper plane there is any-node-to-any-node connectivity, with bulk data transfer arrangements in place, but whose operation would not diminish the efficiency of the basic GTS;
(*c*) The upper plane could possibly be a "managed network";
(*d*) Standardization of upper plane database structures (possibly using the relational model);
(*e*) There is a gateway between the DDBs and RTH and NMC;
(*f*) A lower layer which is the basic GTS; and
(*g*) The basic GTS continues to store and forward essential observational data and meteorological products between adjacent nodes, with improved communications, automation of routeing tables, and implementation of the new request/reply mechanism.

8. The need for a catalogue system in any new database is fundamental. Such a catalogue system will allow those participating databases to know what data is held in other databases. A database catalogue contains metadata. For a catalogue to be useful there must be ways of browsing a database's catalogue from a remote system.

9. Modern, relational databases use a series of tables which contain an in-built system for defining the relationships between tables. This table structure lends itself to building a catalogue, or table of metadata, to meet the DDBs requirements. Furthermore, modern database systems are available which can handle "binary large objects" and are, therefore, potentially suitable for WMO DDBs applications, particularly, if in the longer term, the DDBs are to provide back-up facilities for major centres.

THE IMPLEMENTATION STRATGEGY

10. A strategy is emerging for achieving the implementation of the DDBs. In essence, the strategy is to identify those elements which must be present in the DDBs and commence to build them — prototypes first, limited implementations between willing volunteers after this, and finally after consideration by CBS, adoption of the successful techniques and technologies as WMO standards. Application of a strategy such as this requires careful selection of the first demonstration implementations.

POSSIBLE PROTOTYPE DDBs

11. It is generally assumed that any specific DDB consists of data and/or metadata residing at a specific location responsible for this data and of the pertinent mechanisms for accessing and retrieving the data from outside this specific DDB location. The first prototypes will ideally use similar database management systems and employ the same access methods via the same type of communication system. In the development of these prototypes it would seem desirable, if possible, to use the new request/reply mechanism. This will require assistance from the Working Groups on Data Processing and on Telecommunications to define the interface between the GDPS databases.

12. Possible prototype DDBs can be grouped into the following three categories:

Category I Data and/or metadata germane to routine WWW operations. Requests should be possible for the metadata, the data itself, or both, and could be responded to via the GTS or other communication or telecommunication means, as appropriate.

Category II Auxiliary data and related metadata needed for supporting specific tasks within the WWW system and beyond. This type of data, and corresponding metadata may reside in or outside of a WWW centre. Requests should be possible for the metadata, the data itself, or both, and could be responded to via the GTS or other means, as appropriate.

Category III Metadata (only) describing data that exist in WWW centres or in other centres which are of importance to the meteorological community in general. Requests should be made mainly outside of the GTS (i.e. using non-GTS means). The exchange of the metadata should also not use the GTS, but other means including, for example, common mail services.

13. The following table contains examples of data sets and/or metadata which would typically fit into the DDBs concept. Some of these sets are already in existence in a suitable form, while others will have to be generated or adapted.

Examples of data sets to be considered for *ad hoc* exchange using DDBs

Category	Data set
I	WWW data and/or metadata relating to: - Catalogues on data and products existing at centres - WMO Publication No. 9, *Weather Reporting*, Vols. A, B and C - Information on the operational status of centres - Metadata relating to numerical products, e.g. skill scores - International and national BUFR and GRIB tables - Information on changes to forecast models
II	Auxiliary data sets: - Hydrological - Climatological - Agro-meteorological - Oceanographic information, observations, products - Reference data, e.g. information on droughts, locusts
III	Metadata relating to: - Climate data sets - Environmental data sets - Image data of earth observing satellites - TOGA data sets - Long-term re-analysis data - Information on available meteorological application software - Experimental data sets (e.g. FGGE, GARP/GATE, Wetnet, AMEX)

14. Any DDB constructed should have the potential to serve both the WWW operations and users outside of the WWW system, in a similar way as the basic systems themselves provide basic services to other WMO Programmes. Users in meteorological centres would benefit from gaining access to information of the types listed in the table in a near-real-time mode, which could be provided in DDBs through their centres' communications system, and which would not be conveniently available through other means. Centres participating in the DDBs services would have to dedicate resources towards the implementation of such services, for example the creation/adaptation of locally maintained data sets, access mechanisms to data sets residing outside, and equipment and services that enable local users to access the data sets. Before any resources could be committed, it is important to establish a full understanding of the ultimate requirements of the users and the benefits to be gained.

THE NEXT STEPS FORWARD

15. As a first step, requirements for new databases should be identified and consolidated. Then, prototype DDB systems should be implemented which should provide centres with access to new data and metadata. WMO Members should become involved, as early as possible, in the planning process. To this end, the Expert Meeting on Specific WWW Data Management Functions (Reading, UK, November 1991) requested the WMO Secretariat to organize a survey to collect information on the future requirements and the envisaged role of DDBs centres. For reason of practicality, the distribution of the questionnaire will have to be restricted. It is to be aimed at experts on GOS, GTS and GDPS, at experts on both WWW and WCP data management, as well as at experts on satellites, and will be carried out among the members of the corresponding CBS working groups (including the EC Panel of Experts/CBS Working Group on Satellites) and the CCl Working Group on Climate Data.

16. The survey is intended to enable the CBS Working Group on Data Management to achieve the following objectives:

(*a*) Inform the WWW community and interested users outside of the WWW system on the concept and potential services to be provided by the DDBs;

(*b*) Collect information on the requirements and priorities of users, with respect to:
  (i) Types of real data sets;
  (ii) Types of metadata;
  (iii) Preferred mechanisms for access;
  (iv) Preferred mechanisms for obtaining the data;
  (v) Time delay of replies, depending on the data types;
  (vi) Preferred data representation forms for queries as well as answers;

(*c*) Collect information on whether and to what extent (or for what type of data) centres may consider operating DDBs; and

(*d*) Collect information on whether WWW centres would consider providing one or more links to data sets residing outside of the WWW.

ANNEX VI

ANNEX TO PARAGRAPH 6.4.42 OF THE GENERAL SUMMARY

NEW CODE SEALEV

Add new code FORM:

SEALEV — Sea Level Reporting Code
CODE FORM:

SECTION 0	SEALEV
SECTION 1	GGS1 (General data descriptors)
SECTION 2	GGS2 (Data described in Section 1)
SECTION 3	GGS3 (Sea level descriptors)
SECTION 4	GGS4 (Sea level data)
SECTION 5	GGS5 (End of message indicator)

NOTES: (1) SEALEV is the name of a flexible character code for the exchange of data from a sea level reporting station. The flexibility of the code reflects the variations in the data observed and formats from diverse automated sea level observation platforms.

(2) The primary purpose of a sea level observing station is to observe and report values of sea level relative to a fixed datum plane. Other data required to locate the platform in both time and space (e.g. time of observations and platform identification) may also be included.

(3) The individual data descriptors in Section 1 and Section 3 are the GF3 parameter descriptors listed in IOC Manuals and Guides 17, *A General Formatting System for Geo-referenced Data*, Volume 2 (*Technical Description of the GF3 Format and Code Tables*). The GF3 parameter descriptors used in this code are also described in Section G of this Manual.

(4) The code form is divided into six sections:

Section number	Symbolic group	Contents
0	---	Code identifier
1	GGS1	Descriptors for data other than sea level data
2	GGS2	Data described in Section 1
3	GGS3	Descriptors for sea level data
4	GGS4	Sea level data
5	GGS5	End of message indicator

REGULATIONS:

14.1

General

14.1.1

The code name SEALEV shall be included as the first line of the report.

14.1.2

Each section shall begin on a new line. The first group in each section shall begin with the number one. Subsequent groups shall be numbered sequentially with the integer value of the relative location of the group within that section.

14.1.3

Data descriptors

Data descriptors shall be either individual data descriptors or common sequence descriptors.

NOTE: Individual data descriptors and common sequence descriptors are listed in Section G.

14.1.3.1

Individual data descriptors shall be a four-character alphanumeric identical to (or derived from) the IOC GF3 parameter code.

14.1.3.2

Individual data descriptors shall be paired within each group. If the last data descriptor group includes only one individual data descriptor, that group shall end with four solidi (////).

14.1.3.3
In order to reduce the number of descriptor groups, individual data descriptors shall be replaced by common sequence descriptors wherever possible. The common sequence descriptors shall be of the general form CSEQnnnn, where the four letters CSEQ uniquely identify the group as a common sequence indicator and nnnn is a four-digit number.
14.1.4
Occurrence indicators
14.1.4.1
The general form of occurrence indicator shall be Neeerrr//, where N is the sequential group indicator described in Regulation 14.1.2, eee is a three-digit number which indicates the number of elements to be repreated, and rrr is a three-digit number which indicates the number of repetitions. The two solidi at the end of the group are unique to the occurrence indicator and serve to distinguish it from other groups.
14.1.4.2
The occurrence indicator shall be followed by a number of individual data descriptors, or the equivalent common sequence descriptor(s), equal to the number of elements included.
14.2
Section 0
Section 0 shall consist only of the code identifier SEALEV.
14.3
Section 1
14.3.1
This section, and each succeeding section, shall begin on a new line. This section and each succeeding section shall begin with a group of the general form GGSn, where n is the number of the section.
14.3.2
At a minimum, Section 1 shall include individual data descriptors for the platform identifier, date or day of the year, and the time of the observation (or the equivalent common sequence descriptor(s)), in that order.
14.3.3
Indicators for other data not associated with sea level values, such as radio transmission information or battery voltages, shall be included in Section 1.
NOTE: Interpretation of these additional groups will not be necessary to permit use of sea level data.
14.4
Section 2
14.4.1
Section 2 shall contain data described in Section 1, in the order given in Section 1.
14.4.2
Data shall be reported in nine-character groups, where the first character is the integer value of the position of the group.
14.4.3
If there is insufficient data to fill completely the final group in Section 2, that group shall end with a sufficient number of solidi to bring the total number of characters in that group to nine.
14.5
Section 3
14.5.1
Section 3 shall contain individual data descriptors and/or common sequence indicators, and occurrence indicators to describe the values of sea level reported in Section 4.
14.6
Section 4
14.6.1
Section 4 shall contain data described in Section 3, in the order given in Section 1.
14.6.2
Data shall be reported in nine-character groups, where the first character is the integer value of the position of the group.

14.6.3
If there is insufficient data to completely fill the final group for any set of levels for a given reference level, that group shall end with a sufficient number of solidi to bring the total number of characters in that group to nine.
14.7
Section 5
Section 5 shall consist only of the end of message indicator.

ADDITION OF NEW SECTION G

For the purpose of listing the descriptors included in the sea level code, it is suggested to introduce a new Section G in Volume I, Part A of the *Manual on Codes*, listing SEALEV data descriptors (both individual and common sequences descriptors). This will be originally a small section with only the sea level descriptors, but as work on a flexible format based on GF3 table data continues, it would get much larger. A format similar to the BUFR tables should be used: indicators, descriptors, scale, and reference value. For the most part these may be copied directly from the GF3 tables. The descriptors should be limited, at this time, to those which will actually be used in SEALEV. It is suggested to divide this new section into three parts: Part A for individual data descriptors, Part B for common sequence indicators (equivalent to BUFR Table D), and Part C for table reference.

Add to Contents:

G — Sea level code descriptors 1-G-1

Add to Introduction, under Part A:

Section G contains the list of individual data descriptors, common sequence descriptors, and code tables unique to those descriptors used in SEALEV.

Add a new Section G:

G — DATA DESCRIPTORS FOR SEALEV

(*a*) Individual data descriptors

Desc.	Parameter	Unit	Ref.	Width
BATV	Battery voltage	0.1 volt	0	4
DATE	Date (2-digit month, 2-digit day)	-------	-	4
DAYS	Day of year (Jan. 1 = 1)	-------	1	4
HHMM	Hour and minute of transmission (UTC)	-------	0	4
ITYP	Type of sea level gauge	Table	1	4
REFS	Gauge reference level	0.01 m	0 (msl)	4
RTE1	Radio transmission information, part 1	()	()	4
RTE2	Radio transmission information, part 2	()	()	4
SAMA	Averaging time*	min.	()	4
SAMI	Sampling interval**	min.	()	4
SECS	Seconds of transmission time	-------	0	4
SLEV	Sea level values	0.01 m	0	4
SLPT	Platform identifier	-------	-	8
YEAR	Year	-------	0	4

(It is envisaged to replace REFS, the actual reference level(s), with something like REFL, a derived reference level for a 10-meter block of sea level values. REFL would be a value in whole meters, with the option of being a negative number (with reference to mean sea level) if required. It would be repeated as necessary.)

* Length of time over which an individual observation is averaged.

** Time between successive samples.

(*b*) Common sequence descriptors

Desc. Descriptors

CSEQ0001
These will be derived later. As one example, there should be a comon sequence descriptor which includes the basic positioning data:

SLPT + (DATE or DAYS) + HHMM +SECS

(*c*) Descriptor code tables

(As this time, only one code table is defined, the one listing the types of gauges. That table, and any others that come up as the code is being developed, will be included later.)

ANNEX VII

ANNEX TO PARAGRAPH 6.6.6 OF THE GENERAL SUMMARY

QUESTIONS RELATED TO METEOROLOGICAL ACTIVITIES ASSIGNED TO STUDY GROUPS OF THE INTERNATIONAL RADIO CONSULTATIVE COMMITTEE (C.C.I.R.) OF ITU FOR THE 1990–1994 STUDY PERIOD

1. **Study Group 7 — Science Services**
   - Working Party 7C
     - Q.138/7: Radiocommunication systems for earth exploration including meteorological satellites.
     - Q 140/7: Sensors used by earth exploration including meteorological satellites.
     - Q 141/7: Radiocommunication systems for meteorological satellites.
     - Q 144/7: Radiocommunication systems for meteorological aids service.
2. **Study Group 8 — Mobile, radiodetermination and amateur services**
   - Task Group 8/2
     - Q 102/8: Suitable frequency bands for the operation of wind profilers radars.
3. **Study Group 12 — Inter-service sharing and compatibility**
   - Task Group 12/3
     - Q.3/12: Sharing between the earth exploration-satellite service or the meteorological-satellite service, on the one hand, and other space services or meteorological aids service, on the other.

ANNEX VIII

ANNEX TO PARAGRAPH 6.7.21 OF THE GENERAL SUMMARY

GUIDELINES FOR TECHNICAL CO-OPERATION PROJECTS PROVIDING COMPUTER-BASED SYSTEMS FOR THE IMPLEMENTATION OF WWW COMPONENTS AND FACILITIES

Computer-based system or sub-systems, which are planned to be installed in developing countries for the implementation of WWW components and facilities through Technical Co-operation Projects, should be designed in compliance with the following guidelines regarding data exchange and training support:

(*a*) The computer system interfaces should comply with ISO/CCITT standards;

(*b*) GTS bulletins should be the standard format for data exchange between computer systems or sub-systems for telecommunication, data handling and data-processing functions;

(*c*) The software should be written in a modular way with a view to simplifying the software maintenance to be carried out in the field;

(*d*) The data handling should comprise functions for WMO binary representation forms, or should be designed in such a way that the software modules necessary for this purpose can be easily incorporated at a later date when required;

(*e*) Computer-based systems should include appropriate user manuals and guides which may be accompanied by computer-based training packages (tutorials) with a view to assisting the user in operating and applying the system; and

(*f*) Training courses should be organized at centres equipped with the appropriate systems for users of computer systems installed under Technical Co-operation Projects. In this context, the role of the RMTCs for conducting refresher courses for computer users should be strengthened.

APPENDIX A

LIST OF PERSONS ATTENDING THE SESSION

1. **Officers of the Session**

A.A. Vasiliev	President
T. Mohr	Vice-president

2. **Representatives of WMO Members**

Member	*Name*	*Capacity*
Algeria	A. Kerbachi	Principal Delegate
Argentina	R.A. Sonzini	Principal Delegate
Australia	D.J. Gauntlett	Principal Delegate
	G. Love	Alternate
Austria	H. Gmoser	Principal Delegate
Belarus	I. Pokoumeiko	Principal Delegate
	V. Galka	Delegate
Belgium	E. De Dycker	Principal Delegate
	Cl. de Ridder	Delegate
Botswana	D.F. Molotsi	Principal Delegate
	M.K. Matlhaga (Ms.)	Delegate
Brazil	J.M. Rezende	Delegate
Bulgaria	V. Andreev	Principal Delegate
Burkina Faso	T.F. Nikiema	Principal Delegate
	A.J. Garane	Delegate
Canada	R.J. Mills	Principal Delegate
	H. Allard	Delegate
	J.G. Cote	Delegate
China	Wu Xianwei	Principal Delegate
	Li Zechun	Delegate
	Shi Peiliang	Delegate
Congo	A. Lebvoua	Principal Delegate
	D. Evouya	Alternate
Croatia	V. Jurcec (Mrs.)	Principal Delegate
	I. Cacic	Delegate
Czechos-	I. Zahumensky	Principal Delegate
lovakia	E. Cervena (Mrs.)	Delegate
Denmark	K. Jensen	Principal Delegate
Ecuador	M. Guerrero	Principal Delegate
Egypt	M. Bekhiet	Principal Delegate
	A. Said-Ahmed	Delegate
	A.M. Rebba	Delegate

2. **Representatives of WMO Members** (contd.)

Member	*Name*	*Capacity*
Estonia	P. Karing	Principal Delegate
Finland	J.T. Riissanen	Principal Delegate
	M. Alestalo	Delegate
France	J.P. Bourdette	Principal Delegate
	M. Fisher	Delegate
	G. Le Goff	Delegate
Gambia	M. Sahor	Principal Delegate
Germany	T. Mohr	Principal Delegate
	S. Mildner	Alternate
	M.R. Engels	Delegate
	M. Kurz	Delegate
	B. Barg	Delegate
	D. Fickel	Delegate
Ghana	J.B. Dankwa	Principal Delegate
	G.A. Wilson	Delegate
Greece	D. Arsenis	Principal Delegate
	N. Prezerakos	Delegate
Hong Kong	Yuk-Kwan Chan	Principal Delegate
Hungary	K. Vissy	Principal Delegate
Iceland	M. Einarsson	Principal Delegate
India	U.S. De	Principal Delegate
Iran, Islamic Republic of	B. Diamati	Principal Delegate
Ireland	J.J. Logue	Principal Delegate
Islamic State of Afghanistan	M. Es'haq	Principal Delegate
	O. Abidy	Delegate
	A.Q. Qadeer	Delegate
Israel	S. Rahamim	Principal Delegate
Italy	R. Sorani	Principal Delegate
	P. Serpi	Delegate
Japan	K. Kato	Principal Delegate
	K. Shida	Delegate
Kenya	E.A. Mukolwe	Principal Delegate
	I.K. Essendi	Alternate
Malaysia	P. Markandan	Principal Delegate

2. **Representatives of WMO Members** (contd.)

Member	*Name*	*Capacity*
Mauritius	M. Lee Man Yan	Principal Delegate
Mexico	J.R. Lorenzo Franco	Principal Delegate
	L.L. Hernández	Delegate
Netherlands	H. Daan	Principal Delegate
	S. Smith	Delegate
New Zealand	M.W. Pointer	Principal Delegate
Nigeria	J.O. Adekoya	Principal Delegate
Norway	K. Björheim	Principal Delegate
Oman	A.R. Al-Harmi	Principal Delegate
	N. S. Al-Riyami	Delegate
Poland	R. Klejnowski	Principal Delegate
	R. Krassowski	Delegate
	W. Drozdowicz	Delegate
	E. Klejnowska (Mrs.)	Delegate
	T. Klinski	Delegate
Portugal	M.I. Barros Ferreira (Mrs.)	Delegate
	A. Botao	Delegate
Republic of Korea	Yong-Hwang Yoon	Principal Delegate
	Soon-kab Chung	Delegate
Romania	M. Ioana	Principal Delegate
	G. Balut	Delegate
	I. Barca	Delegate
	G. Istode	Delegate
Russian Federation	A.A. Vasiliev	Principal Delegate
	V. Bondarenko	Delegate
	E.P. Dapkounas	Delegate
	V. Matsarski	Delegate
Senegal	S. Diallo	Principal Delegate
	M. Yattara	Delegate
Slovenia	M. Jürgele	Principal Delegate
Spain	C. Martínez (Mrs.)	Principal Delegate
	J. Irigaray (Mrs.)	Delegate
Sweden	K. Gerdin	Principal Delegate
Switzerland	P. Rauh	Principal Delegate
Syrian Arab Republic	S. Jabbour	Principal Delegate
Tunisia	A. Ben Jemaa	Principal Delegate
Turkey	A. Sarikaya	Principal Delegate
	A. Kilic	Delegate
United Kingdom	P. Ryder	Principal Delegate
	R.J. Adams	Delegate

2. **Representatives of WMO Members** (contd.)

Member	*Name*	*Capacity*
United Kingdom	P.S. Cherng	Delegate
	P.E. Francis	Delegate
	S. Long (Mrs.)	Delegate
	R.J. Shearman	Delegate
United Rep. of Tanzania	P.A. Mwingira	Principal Delegate
	G.R. Shayo	Delegate
United States of America	B. Landis	Principal Delegate
	J. Fenix	Delegate
	J.R. Neilon	Delegate
	P.K. Rao	Delegate
	J.D. Stackpole	Delegate
	J. Weiss	Delegate
	F.S. Zbar	Delegate
Yugoslavia	M. Jovasevic	Principal Delegate
Zimbabwe	J. Bwaila	Principal Delegate

3. **Representatives of International Organizations**

Organization	*Name*
International Civil Aviation Organization (ICAO)	O.M. Turpeinen
International Telecommunication Union (ITU)	H.J. Meyerhoff A. Nalbandian
Agency for Air Safety in Africa and Madagascar (ASECNA)	P. Allah-Rabaye
European Centre for Medium-Range Weather-Forecasts (ECMWF)	J.K. Gibson M. Jarraud
European Organization for the Exploitation of Meteorological Satellites (EUMETSAT)	G. Bridge
Intergovernmental Negotiating Committee for a Framework Convention on Climate Change (INC/FCCC)	C. Schlosser (Mrs.)
Intergovernmental Oceano-graphic Commission (IOC)	I. Tréglos
International Commission on Irrigation and Drainage (ICID)	M. Soutter
International Federation of Red Cross and Red Crescent Societies (IFRC)	J-P. Lucot
World Federation of United Nations Associations (WFUNA)	M. Weydert

4. **Technical Conference on the Provision of Weather Services: Understanding User Requirements**

Organization	*Name*
Southern Building Code Congress Evaluation Service Inc. International (USA)	B.R. Manning
P & O Containers Ltd (UK)	J.L. Peterson
Bavarian Tourist Association (Germany)	G. Linke

5. **WMO Secretariat**

Capacity	*Name*
Director, WWW Department	J.L. Rasmussen
Director, Basic Systems, WWW Department	D. Schiessl

APPENDIX B

AGENDA

	Agenda item	*Relevant documents*	*Resolutions and recommendations adopted*
1.	OPENING OF THE SESSION	PINK 1	
2.	ORGANIZATION OF THE SESSION	PINK 1	
2.1	Consideration of the report on credentials	PINK 1	
2.2	Adoption of the agenda	1; 2; PINK 1	
2.3	Establishment of committees	PINK 1	
2.4	Other organizational questions	PINK 1	
3.	REPORT OF THE PRESIDENT OF THE COMMISSION	25; 40; PINK 3	
4.	CONSIDERATION OF THE DECISIONS OF ELEVENTH CONGRESS AND OF THE EXECUTIVE COUNCIL	7; 7, ADD. 1; 37; PINK 16; PINK 24	Res. 8 Rec. 1
5.	STATUS OF WWW IMPLEMENTATION AND OPERATION	22; PINK 7	
6.	WWW COMPONENTS AND SUPPORT FUNCTIONS, INCLUDING REPORTS BY THE CHAIRMEN OF WORKING GROUPS AND RAPPORTEURS		
6.1	Global Data-processing System (GDPS)	5; 5, CORR. 1; 18, 19; 21; 27; 27, ADD. 1; 28; 29; 38; 39; 41; PINK 9; PINK 12; PINK 17; PINK 18	Rec. 2,3,4
6.2	Global Observing System (GOS)	3; 15; 23; PINK 8	Rec. 5
6.3	Global Telecommunication System (GTS)	26; PINK 27	Rec. 6
6.4	WWW Data Management (DM)	6; 8; 9; 10; 20; 30; 31; 36; PINK 13; PINK 15; PINK 28	Rec. 7,8, 9,10,11, 12
6.5	WMO satellite activities	13; 14; PINK 2	

	Agenda item	*Relevant documents*	*Resolutions and recommendations adopted*
6.6	Radio frequencies for meteorological services	32; PINK 26	
6.7	WWW Systems Support Activities (SSA), including the Operational Information Service	24; 34; PINK 10; PINK 19	Res. 1 Rec. 13
7.	WWW SUPPORT FOR AND CO-ORDINATION WITH OTHER PROGRAMMES, INCLUDING REGIONAL PROGRAMMES		
7.1	Global Climate Observing System (GCOS) and other observing systems	PINK 5	
7.2	International Decade for Natural Disaster Reduction (IDNDR)	12; PINK 4	
7.3	Regional and other programmes	33; PINK 6	
8.	PUBLIC WEATHER SERVICES PROGRAMME (PWS)	35; PINK 21	
9.	TECHNICAL CONFERENCE ON THE PROVISION OF WEATHER SERVICES: UNDERSTANDING USER REQUIREMENTS	PINK 14	
10.	EDUCATION AND TRAINING RELATED TO CBS ACTIVITIES	16; PINK 22	
11.	LONG-TERM PLANS	11; PINK 25	
12.	CBS WORK PROGRAMME; ESTABLISHMENT OF WORKING GROUPS AND RAPPORTEURS	17; PINK 29	Res. 2,3,4, 5,6,7,8
13.	REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE COMMISSION AND RELEVANT EXECUTIVE COUNCIL RESOLUTIONS	4; PINK 23	Res. 9 Rec. 14
14.	ELECTION OF OFFICERS	PINK 11; PINK 20	
15.	DATE AND PLACE OF THE NEXT SESSION		
16.	CLOSURE OF THE SESSION		

APPENDIX C

LIST OF DOCUMENTS

Doc. No.	*Title*	*Agenda item*	*Submitted by*
	I. "Doc" series		
1	Provisional agenda	2.2	—
2	Explanatory memorandum relating to the draft provisional agenda	2.2	—
3	Global Observing System (GOS) *Manual* and *Guide on the Global Observing System*	6.2	Secretary-General
4	Review of previous resolutions and recommendations of the Commission and relevant Executive Council resolutions	13	Secretary-General
5	WWW components and support functions, including reports by the chairmen of working groups and rapporteurs Global Data-processing System (GDPS) CORR. 1	6.1	Secretary-General
6	WWW Data Management (DM) Meteorological and oceanographic reports through INMARSAT-C	6.4	Secretary-General
7	Consideration of the decisions of Eleventh Congress and of the Executive Council ADD. 1	4	Secretary-General
8	WWW Data Management (DM) Requirements for the development of specific WWW Data Management functions	6.4	Secretary-General
9	WWW Data Management (DM) Distributed Databases Concept (DDBs)	6.4	Secretary-General
10	WWW Data Management (DM) Report of the chairman of the CBS Working Group on Data Management	6.4	Chairman of the Working Group
11	Long-term Plans	11	Secretary-General
12	International Decade for Natural Disaster Reduction (IDNDR)	7.2	Secretary-General
13	WMO satellite activities Report of the rapporteurs on Satellite Data Retrieval Methods and Use of Quantitative Satellite Data	6.5	Rapporteurs

Doc. No.	*Title*	*Agenda item*	*Submitted by*
14	WMO satellite activities Report of the chairman of the EC Panel of Experts/CBS Working Group on Satellites	6.5	Chairman of the Working Group
15	Global Observing System (GOS) Operational quality control procedures for drifting buoy data on the GTS	6.2	Secretary-General
16	Education and training related to CBS activities	10	Secretary-General
17	CBS work programme; establishment of working groups and rapporteurs CBS Working Group on Satellites	12	Secretary-General
18	Global Data-processing System (GDPS) Designation of St.-Denis, Réunion, as an RSMC with activity specialization in tropical cyclones for the south-west Indian Ocean ADD. 1	6.1	France
19	Global Data-processing System (GDPS) Designation of the operational GDPS Centre Bracknell as an RSMC with activity specialization in the provision of transport model products	6.1	United Kingdom
20	WWW Data Management (DM) *Guide on WWW Data Management*	6.4	Secretary-General
21	Global Data-processing System (GDPS) Designation of the GDPS centre in Toulouse as an RSMC with activity specialization in the provision of transport model products	6.1	France
22	Status of WWW implementation and operation	5	Secretary-General
23	Global Observing System (GOS) Report of the chairman of the Working Group on the Global Observing System	6.2	Chairman of the Working Group
24	WWW Systems Support Activities (SSA), including the Operational Information Service Report on the results and conclusions from the OWSE-AFRICA	6.7	Chairman of the OWSE-AFRICA Steering Group
25	Report of the president of the Commission	3	President of CBS
26	Global Telecommunication System (GTS)	6.3	Chairman of the Working Group
27	Global Data-processing System (GDPS) Updates to the *Guide on the GDPS* ADD. 1	6.1	Secretary-General

Doc. No.	*Title*	*Agenda item*	*Submitted by*
28	WWW components and support functions, including reports by the chairmen of working groups and rapporteurs	6.1	Dr. N.F. Veltishchev Chairman,WG/GDPS
	Global Data-Processing System (GDPS)		
	Report of the chairman of the Working Group on the Global Data-processing System		
29	Global Data-processing System (GDPS)	6.1	Secretary-General
	Designation of regional specialized meteorological centres (RSMCs) with activity specialization		
30	WWW Data Management (DM)	6.4	Secretary-General
	Character codes		
31	WWW Data Management (DM)	6.4	Secretary-General
32	Radio frequencies for meteorological services	6.6	Secretary-General
33	Regional and other programmes	7.3	Secretary-General
34	WWW Systems Support Activities (SSA), including the Operational Information Service	6.7	Secretary-General
	Guidelines for the Technical Co-operation Computer Projects		
35	WWW Public Weather Services Programme	8	Secretary-General
36	WWW Data Management (DM)	6.4	Chairmen of the Working Groups
	Proposal for a flexible universal character code (FLEX)		
37	Consideration of the decisions of Eleventh Congress and of the Executive Council	4	Secretary-General
	Follow-up to the UN Conference on Environment and Development		
38	Global Data-processing System (GDPS)	6.1	United Kingdom
	The provision of guidance on the occurrence of severe weather		
39	Global Data-processing System (GDPS)	6.1	United States
	A regional specialized meteorological centre for emergency response to atmospheric pollution incidents		
40	Report of the president of the Commission	3	United States
	Terms of reference for the Commission and its working groups		
41	Global Data-processing System (GDPS)	6.1	Canada
	Designation of the GDPS centre in Montreal as a regional specialized meteorological centre with activity specialization in the provision of transport model products		

Doc. No.	*Title*	*Agenda item*	*Submitted by*
	II. "PINK" series		
1	Opening of the session	1	President of CBS
	Organization of the session	2	
2	WMO satellite activities	6.5	Chairman, Working Committee
3	Report of the president of the Commission	3	President of CBS
4	International Decade for Natural Disaster Reduction (IDNDR)	7.2	Chairman, Working Committee
5	GCOS and other observing systems	7.1	Chairman, Working Committee
6	Regional and other programmes	7.3	Chairman, Working Committee
7	Status of WWW implementation and operation	5	President of CBS
8	Global Observing System (GOS)	6.2	Chairman, Working Committee
9	Global Data-processing System (GDPS)	6.1	Chairman, Working Committee
10	WWW Systems Support Activities (SSA), including the Operational Information Service	6.7	Chairman, Working Committee
11	Election of Officers	14	Chairman, Nominations Committee
12	Global Data-processing System (GDPS)	6.1	Chairman, Working Committee
13	WWW Data Management (DM)	6.4	Chairman, Working Committee
	Provision of guidance on the occurrence of severe weather		
	Procedure for the designation of Regional Specialized Meteorological Centres		
14	Technical Conference on the Provision of Weather Services: Understanding User Requirements	9	Chairman, Working Committee
15	WWW Data Management (DM)	6.4	Chairman, Working Committee
	Distributed Databases Concept (DDBs)		
16	Consideration of the decisions of Eleventh Congress and of the Executive Council	4	President of CBS
17	Global Data-processing System (GDPS)	6.1	Chairman, Working Committee
	Guide on the Global Data-processing System		
18	Global Data-processing System (GDPS)	6.1	Chairman, Working Committee
	Designation of new RSMCs with activity specialization		

Doc. No.	*Title*	*Agenda item*	*Submitted by*
19	WWW Systems Support Activities (SSA), including the Operational Information Service	6.7	Chairman, Working Committee
20	Election of Officers	14	Chairman, Nominations Committee
21	Public Weather Services Programme	8	Chairman, Working Committee
22	Education and training related to CBS activities	10	Chairman, Working Committee
23	Review of previous resolutions and recommendations of the Commission and relevant Executive Council resolutions	13	Rapporteur
24	Consideration of the decisions of Eleventh Congress and of the Executive Council	4	President of CBS
	Terms of reference of CBS		
25	Long-term Plans	11	Chairman, Working Committee
26	Radio frequencies for meteorological services	6.6	Chairman, Working Committee
27	Global Telecommunication System (GTS)	6.3	Chairman, Working Committee
28	WWW Data Management (DM)	6.4	Chairman, Working Committee
	Character codes		
29	CBS work programme; establishment of working groups and rapporteurs	12	President of CBS

WORLD METEOROLOGICAL ORGANIZATION

Supplement to WMO-No. 784

Abridged final report of the

tenth session of the Commission for Basic Systems

Decisions taken by the Executive Council

at its forty-fifth session (1993)

on the abridged final report

of the tenth session of the Commission for Basic Systems

This document should be considered as a guide to the status of the decisions adopted at the tenth session of the Commission for Basic Systems.

A. DECISIONS RECORDED IN THE GENERAL SUMMARY OF THE WORK OF EC-XLV

3.1 WWW BASIC SYSTEMS AND SUPPORT FUNCTIONS; THE REPORT OF THE PRESIDENT OF CBS AND THE REPORT OF THE TENTH SESSION OF THE COMMISSION (agenda item 3.1)

3.1.1 The Executive Council noted with appreciation the report of the president of the Commission for Basic Systems on the activities of the Commission since EC-XLIV. The main event had been the tenth session of CBS held in Geneva from 2 to 13 November 1992. The Council was pleased to note that this had been a successful and productive session.

3.1.2 The Council noted with appreciation the inter-sessional accomplishments of the Commission especially as regards the substantial revisions and additions to the various *Manuals* and *Guides* for which CBS was responsible. It was noted in particular that a new *Guide on Data Management* had been prepared and the Council agreed that this be added to the list of mandatory publications. The establishment of the CBS Working Group on Satellites and the first steps in the development and implementation of the new Public Weather Services Programme were also appreciated (see items 3.4 and 6.1, respectively). The Council complimented the CBS Advisory Working Group on its initiative in holding a one-day technical conference on user requirements in association with CBS-X.

3.1.3 In noting the report of the tenth session of the Commission, the Council expressed its particular appreciation for the Commission's response to its request that CBS review its terms of reference in the light of the need of almost all WMO Programmes, as well as some other non-WMO international Programmes, for support from the basic systems of observations, telecommunications and data processing. The Council carefully considered the revised terms of reference as proposed by CBS-X, taking into account comments made by other constituent bodies, and decided that they be recommended for approval by Congress. In so doing, the Council recognized that, as the basic systems were already supporting a number of programmes outside WWW, the change in the terms of reference of the Commission was largely a question of emphasis. It felt, therefore, that the Commission could continue to operate on the basis of its existing terms of reference, but keeping in mind its wider responsibilities as already indicated by the Council. It was agreed that the new terms of reference of CBS, which constituted an amendment to the general regulations, did not need to be submitted to Members for a vote by correspondence, but should be submitted to Twelfth Congress at which time the views of all other technical commissions on their respective terms of reference would be known.

3.1.4 The Council further noted with appreciation that the Commission had appointed its vice-president as a Rapporteur on the Follow-up to UNCED with the task of reviewing Agenda 21 and the Framework Convention on Climate Change in order to identify the specific actions which could be taken by CBS and by National Meteorological Services.

3.1.5 Finally, as regarded environmental emergency response, the Council expressed its satisfaction that four centres, Bracknell, Montreal, Toulouse, and Washington, had undertaken to fulfil the functions of RSMCs with activity specialization on the provision of transport model products and that CBS had recommended that they be so designated. The Council especially welcomed the planned international Workshop on User Requirements for the Provision of Transport Model Products, which would be organized by WMO in collaboration with the IAEA and other international agencies and which would address issues such as the international standardization of these products and their dissemination, as well as user requirements and guidance required by different user groups.

3.1.6 The decisions of the Executive Council on the recommendations of CBS-X are recorded in Resolution 4 (EC-XLV). In view of the concerns expressed on possible implementation difficulties of the amendments to FM 71-VI CLIMAT (Recommendation 7 (CBS-X)), the Council agreed to review at its next session the implementation date of 2 November 1994, if these concerns still existed. At the same time, in light of the importance of this amendment to the work on climate change and climate variability, the Council encouraged Members to proceed toward implementation as a matter of some urgency.

B. RESOLUTION

Resolution 4 (EC-XLV) — REPORT OF THE TENTH SESSION OF THE COMMISSION FOR BASIC SYSTEMS

THE EXECUTIVE COUNCIL,

HAVING CONSIDERED the abridged final report of the tenth session of the Commission for Basic Systems,

EXPRESSES ITS APPRECIATION for the actions taken by the Commission especially in response to the Council's request to review the terms of reference of CBS and to consider its role in the follow-up to UNCED,

DECIDES:

(1) To note the report;

(2) To note Resolutions 1 to 9 (CBS-X);

(3) To take action on each of the recommendations as follows:

Recommendation 1 (CBS-X) — REVISED TERMS OF REFERENCE OF THE COMMISSION FOR BASIC SYSTEMS

(*a*) Notes and supports this recommendation which constitutes a proposal to amend the General Regulations of WMO;

(*b*) Requests the Secretary-General, in accordance with Regulation 2 (*c*) (ii) of the General Regulations of WMO, to submit the proposal to Twelfth Congress for consideration and approval.

Recommendation 2 (CBS-X) — AMENDMENTS TO THE *MANUAL ON THE GLOBAL DATA-PROCESSING SYSTEM* — PARTS I, II AND III

Recommendation 5 (CBS-X) — AMENDMENTS TO THE *MANUAL ON THE GLOBAL OBSERVING SYSTEM* — PART VI

Recommendation 6 (CBS-X) — AMENDMENTS TO THE *GLOBAL TELECOMMUNICATION SYSTEM* — VOLUME I, PARTS I AND II

(*a*) Approves Recommendations 2 and 5 (CBS-X) for implementation as from 1 July 1993 and Recommendation 6 (CBS-X) for implementation as from 3 November 1993;

(*b*) Requests the Secretary-General to incorporate the amendments and additions to the *Manuals on the Global Data-processing System, on the Global Observing System* and *on the Global Telecommunication System*, as appropriate;

(*c*) Authorizes the Secretary-General in consultation with the president of CBS to make any consequential editorial amendments to these *Manuals*.

Recommendation 3 (CBS-X) — DESIGNATION OF A REGIONAL SPECIALIZED METEOROLOGICAL CENTRE (RSMC) ON TROPICAL CYCLONES

Recommendation 4 (CBS-X) — DESIGNATION OF REGIONAL SPECIALIZED METEOROLOGICAL CENTRES (RSMCs) ON THE PROVISION OF TRANSPORT MODEL PRODUCTS FOR ENVIRONMENTAL EMERGENCY RESPONSE

(*a*) Approves these recommendations designating five RSMCs with activity specializations with effect from 1 July 1993;

(*b*) Requests the Secretary-General to arrange for the inclusion of the newly designated RSMCs with an outline of their specialized functions to be included in the *Manual on the Global Data-processing System*.

Recommendation 7 (CBS-X) — AMENDMENTS TO FM 71-VI CLIMAT

Recommendation 8 (CBS-X) — AMENDMENTS TO FM 12-IX EXT. SYNOP AND FM 13-IX EXT. SHIP

Recommendation 9 (CBS-X) — AMENDMENTS TO FM 13-IX EXT. SHIP

Recommendation 10 (CBS-X) — FM 18-X BUOY — REPORT OF A BUOY OBSERVATION TO REPLACE FM 18-IX EXT. DRIFTER

Recommendation 11 (CBS-X) — AMENDMENTS TO FM 88-VI EXT. SATOB

Recommendation 12 (CBS-X) — AMENDMENTS TO FM 75-VI CLIMAT TEMP AND FM 76-VI CLIMAT TEMP SHIP

(*a*) Approves Recommendations 8 and 11 (CBS-X) for implementation with effect from 3 November 1993;
(*b*) Approves Recommendations 7, 9, 10, and 12 (CBS-X) for implementation from 2 November 1994;
(*c*) Requests the Secretary-General to arrange for the inclusion of the amendments in Volume I of the *Manual on Codes*.

Recommendation 13 (CBS-X) — SUPPORT FOR THE OWSE-AFRICA

(*a*) Encourages Members of RA I to proceed with the implementation of DCP/DRS systems;
(*b*) Urges donor Members and funding organizations to support the implementation of the recommendations arising from the OWSE-AFRICA;
(*c*) Requests the Secretary-General, in consultation with Members concerned in RA I, to prepare appropriate technical co-operation projects and to seek the support of donors.

Recommendation 14 (CBX-X) — REVIEW OF RESOLUTIONS OF THE EXECUTIVE COUNCIL, BASED ON PREVIOUS RECOMMENDATIONS OF THE COMMISSION FOR BASIC SYSTEMS OR RELATED TO THE WWW

(Action on this recommendation was taken during consideration of item 18)