WORLD METEOROLOGICAL ORGANIZATION

# COMMISSION FOR BASIC SYSTEMS

## ABRIDGED FINAL REPORT

OF THE

# SIXTH SESSION

**Belgrade, 18 March - 4 April 1974**


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Secretariat of the World Meteorological Organization - Geneva - Switzerland
1974

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NOTE

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C O N T E N T S

# LIST OF PERSONS ATTENDING THE SESSION

1. Officers of the session

| | | |
|---|---|---|
| O. Lönnqvist | president | |
| J. Brinkmann | vice-president | |

2. Representatives of Members of WMO

| | | |
|---|---|---|
| M. Belbachir | principal delegate | Algeria |
| R. Damerdji | delegate | |
| M. Kanoun | delegate | |
| Y. Mahammed | delegate | |
| H. N. E. Di Risio | principal delegate | Argentina |
| R. Gnus | delegate | |
| E. R Lichtenstein | delegate | |
| A. H. J. Muffatti | principal delegate | Australia |
| D. E. Handcock | delegate | |
| L. Kletter | principal delegate | Austria |
| B. Knirsch | delegate | |
| M. Hussain | principal delegate | Bangladesh |
| S. M. Rashed Ahmed | delegate | |
| L. Dufour | principal delegate | Belgium |
| G. Doumont | delegate | |
| E. De Dycker | delegate | |
| A. Bogaert | delegate | |
| Y. Morada de Souza | principal delegate | Brazil |
| E. T. Duarte de Moraes | delegate | |
| J. D. Kantchev | principal delegate (until 25.3.74) | Bulgaria |
| S. G. Milouchev | principal delegate (from 26.3.74) | |
| G. L. Pincock | principal delegate | Canada |
| J. G. Potter | delegate | |
| E. M. Elsley | delegate | |

Representatives of Members of WMO (contd.)

| | | |
|---|---|---|
| Lo Chi-Pin | principal delegate | China |
| Juan Tsu-Chun | | |
| Tu Hsing-Yuan | | |
| Lu Chang-Hsi | | |
| Chin Kuei | | |
| J. G. Montoto | principal delegate | Cuba |
| F. Molnár | principal delegate | Czechoslovakia |
| S. Slabý | delegate | |
| E. Carlsen | principal delegate | Denmark |
| P. A. Christensen | delegate | |
| K. A. Khalil | principal delegate | Egypt |
| A. N. Elguindy | delegate | |
| S. N. Venho | principal delegate | Finland |
| T. Peltonen | delegate | |
| D. Söderman | delegate | |
| R. Mittner | principal delegate | France |
| A. Durget | delegate | |
| J. Labrousse | delegate | |
| A. P. Chaussard | delegate | |
| A. Sonnet | delegate | |
| J.-M. Rainer | delegate | |
| E. Peters | principal delegate | German Democratic Republic |
| K. Hartmann | delegate | |
| J. Brinkmann | principal delegate | Germany, Federal Republic of |
| W. Bopp | delegate | |
| S. Mildner | delegate | |
| J. Lieckfeld | delegate | |
| R. Czelnai | principal delegate | Hungary |
| A. Kapovits | delegate | |
| F. H. Sigurdsson | principal delegate | Iceland |
| P. S. Pant | principal delegate | India |
| P. M. Austin Bourke | principal delegate | Ireland |
| R. O. Mathews | delegate | |
| M. Levi | principal delegate | Israel |

Representatives of Members of WMO (contd.)

| | | |
|---|---|---|
| C. Giallombardo | principal delegate | Italy |
| J. Djigbenou | principal delegate | Ivory Coast |
| K. Agematsu | principal delegate | Japan |
| F. B. Kayiwa | principal delegate | Kenya |
| E. Nyoni | delegate | |
| W. Naaman | principal delegate | Lebanon |
| M. A. Issa | principal delegate | Libyan Arab Republic |
| M. A. El Megbari | delegate | |
| S. Jadambaa | principal delegate | Mongolia |
| K. R. Postma | principal delegate | Netherlands |
| H. M. de Jong | delegate | |
| I. S. Kerr | principal delegate | New Zealand |
| J. A. Adejokun | principal delegate | Nigeria |
| A. Moene | principal delegate | Norway |
| O. Haug | delegate | |
| Z. Litynska (Mrs.) | principal delegate | Poland |
| M. T. Ferreira Cabrita | principal delegate | Portugal |
| D. Bacinschi | principal delegate | Romania |
| G. Stana | delegate | |
| F. Jondot | principal delegate | Senegal |
| J. J. Le Roux | principal delegate | South Africa |
| T. A. Bosua | delegate | |
| M. Medina Isabel | principal delegate | Spain |
| F. Meliton Garcia | delegate | |
| O. Lönnqvist | principal delegate | Sweden |
| R. Schäffer (Mrs.) | delegate | |
| L. Moen | delegate | |
| A. Jeannet | principal delegate | Switzerland |
| G. Masri Zada | principal delegate | Syrian Arab Republic |

Representatives of Members of WMO (contd.)

| | | |
|---|---|---|
| F. B. Kayiwa | principal delegate | Tanzania |
| E. Nyoni | delegate | |
| B. Saragganda | principal delegate | Thailand |
| G. Ahialegbedzi | principal delegate | Togo |
| A. Aslan | principal delegate | Turkey |
| F. B. Kayiwa | principal delegate | Uganda |
| E. Nyoni | delegate | |
| B. S. Chuchkalov | principal delegate | Union of Soviet Socialist |
| I. A. Ravdin | delegate | Republics |
| V. V. Bykov | delegate | |
| V. N. Plaksin | delegate | |
| J. K. Bannon | principal delegate | United Kingdom of |
| E. J. Bell | delegate | Great Britain and |
| G. A. Corby | delegate | Northern Ireland |
| S. G. Cornford | delegate | |
| M. H. Freeman | delegate | |
| P. G. Monk | delegate | |
| K. R. Johannessen | principal delegate | United States of America |
| C. Dale | delegate | |
| S. Simplicio | delegate | |
| C. A. Spohn | delegate | |
| E. B. Fawcett | delegate | |
| J. R. Neilon | delegate | |
| G. D. Cartwright | delegate | |
| V. Jurćec (Mrs.) | principal delegate | Yugoslavia |
| V. Dimitrievski | delegate | |
| P. Gburcik | delegate | |
| N. Jevremović | delegate | |
| M. Petrović | delegate | |
| M. Radosavljević | delegate | |
| J. P. Henderson | principal delegate | Zambia |

3. Observers from other international organizations

| | |
|---|---|
| A. S. Bam | United Nations Development Programme (UNDP) |
| U. Rath | International Civil Aviation Organization (ICAO) |
| K. Wood | International Air Transport Association (IATA) |

Observers from other international organizations

| | |
|---|---|
| A. Moritz | European Space Research Organization (ESRO) |
| J. Giraud | Agency for the Safety of Air Navigation in Africa and Madagascar (ASECNA) |

4. Lecturers

G. A. Corby

B. Döös

F. Mesinger

5. WMO Secretariat

| | |
|---|---|
| A. H. Glaser | Representative of the Secretary-General |

G. K. Weiss

H. Bari

F. Pimenta Alves

I. Tölgyesi

A. Vasiliev

J. Peeters

6. Local Secretariat

M. Jovašević

M. Slavnić

S. Otorepec (Mrs.)

P. Lazarević (Mrs.)

# A G E N D A

| Agenda item No. | | Relevant documents | Res. | Rec. |
|---|---|---|---|---|
| 1. | Opening of the session | PINK 1, REV. 1 | | |
| 2. | Organization of the session | PINK 1, REV. 1 | | |
| 2.1 | Consideration of the report on credentials | PINK 1, REV. 1 | | |
| 2.2 | Adoption of the agenda | 1; 2<br>PINK 1, REV. 1 | | |
| 2.3 | Establishment of committees | PINK 1, REV. 1 | | |
| 2.4 | Other organizational questions | PINK 1, REV. 1 | | |
| 3. | Report by the president of the Commission | 16; 44; PINK 29;<br>PINK 29, ADD. 1 | 1, 2, 3,<br>4, 5 | |
| 4. | Co-ordination of data needs for various uses | PINK 6 | | |
| 4.1 | Requirements for observational data | 20; 29; 35;<br>PINK 6 | | |
| 4.2 | Requirements for processed data | 17; 17, ADD. 1;<br>36; PINK 6 | | 1, 2, 3 |
| 5. | General objectives of the WWW plan for the period 1976-1979 | 22; 35; 36; 41;<br>PINK 15;<br>PINK 15, ADD. 1 | | |
| 6. | Observing system (including the GOS part of WWW and the report by the chairman of the Working Group on the GOS) | 6; 6, ADD. 1;<br>6, ADD. 2; 22; 35;<br>PINK 10 | | |
| 6.1 | Data requirements to be met by the GOS | 26; PINK 10 | | |
| 6.2 | Surface-based sub-system | PINK 10 | | |
| 6.3 | Satellite sub-system | PINK 10 | | |

| Agenda item No. | | Relevant documents | Res. | Rec. |
|---|---|---|---|---|
| 6.4 | Optimum mix of observing systems | 46; PINK 10 | | |
| 6.5 | Future development of the GOS | PINK 10 | | |
| 7. | Data-processing system (including the GDPS part of the WWW and the report by the chairman of the Working Group on the GDPS) | 4; 22; 27 | | |
| 7.1 | Organization of the GDPS and functions of WMCs, RMCs and NMCs | 19; 19, ADD. 1; 21; 36; 38; PINK 16 | | 4 |
| 7.2 | Guide on the GDPS (Volumes I and II) | 8; 14; 42; PINK 12; PINK 12, CORR. 1 (French only) | | 5 |
| 7.3 | Tropical synoptic meteorology (including the report by the Rapporteur on Synoptic Meteorology in the Tropics) | 3; 3, ADD. 1; PINK 20 | | |
| 7.4 | Further development of GDPS | 21; PINK 20 | | 6 |
| 8. | Codes (including the Manual on Codes and the report by the chairman of the Working Group on Codes) | 5; 5, ADD. 1; 5, ADD. 2; 5, ADD. 3; 10; 11; 20; 23; 24; 28; 30; 31; 32; 34; 37; 43; 44; 45; PINK 2; PINK 3; PINK 5; PINK 7; PINK 8; PINK 9; PINK 23; PINK 25 | | 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 |
| 9. | Telecommunication system (including the GTS part of WWW and the report by the chairman of the Working Group on the GTS) | 7; 9; 9, ADD. 1; 9, ADD. 2; 9, ADD. 3; 9, ADD. 4; 9, ADD. 5; 9, ADD. 6; 22; 34; 48 | | 17 |
| 9.1 | Organization of the Global Telecommunication System | 41; PINK 13; PINK 28 | | |
| 9.2 | Telecommunications procedures | 9, ADD. 4; 9, ADD. 6; 39; 40; PINK 24, REV. 1 | | |

| Agenda item No. | | Relevant documents | Res. | Rec. |
|---|---|---|---|---|
| 9.3 | Technical problems including introduction of new telecommunication techniques | 33; PINK 26 | | |
| 9.4 | Implementation of the MTC and its branches | 40; PINK 18 | | |
| 9.5 | Manual on the GTS | 9, ADD. 5; 14, CORR. 1; PINK 14; PINK 17; PINK 17, CORR. 1; PINK 19 | | |
| 10. | International Cloud Atlas (including the report by the Rapporteur on Reporting the State of the Sky in the Tropics) | 12; 18; PINK 4 | 6 | 18 |
| 11. | Education and training in the field of CBS | 15; 22, CORR. 1; PINK 22 | | |
| 12. | Review of Technical Regulations | 6, ADD. 2; 25; 26; 35; 42; 47; PINK 21 | | 19 |
| 13. | Nomination of members of working groups and nomination of Rapporteurs | PINK 31 | | |
| 14. | Review of previous resolutions and recommendations of the Commission and relevant Executive Committee resolutions | 13; PINK 30 | 7 | 20, 21, 22 |
| 15. | Scientific lectures and discussions | PINK 32 | | |
| 16. | Election of officers | PINK 11; PINK 11, REV. (Russian only) PINK 27 | | |
| 17. | Date and place of the seventh session | | | |
| 18. | Closure of the session | | | |

# GENERAL SUMMARY OF THE WORK OF THE SESSION

## 1. OPENING OF THE SESSION (Agenda item 1)

1.1 At the invitation of the Federal Executive Council of the Socialist Federal Republic of Yugoslavia, the sixth session of the Commission for Basic Systems (formerly Commission for Synoptic Meteorology) was held in Belgrade from 18 March to 4 April 1974.

1.2 The session was opened by the acting president of the Commission, Dr. O. Lönnqvist at 10.15 a.m. on 18 March 1974.

1.3 Mr. T. Jakovlevski, member of the Federal Executive Council of Yugoslavia in charge of Science and Culture, welcomed the participants. He emphasized the importance of meteorology to the economic development of all countries, and recalled that successful international co-operation in meteorology had been in existence for over 100 years. Mr. Jakovlevski also referred to Yugoslavia's contribution to this international co-operation, and wished the session a fruitful work in its special field, pointing out the need for reducing the gap between technically highly developed and developing countries.

1.4 Mr. M. Šakić, Vice-President of the City Council of Belgrade, expressed his satisfaction that the session was being held in Belgrade. After referring briefly to the activities of the National Meteorological Centre situated in Belgrade and to its international role in synoptic meteorology, Mr. Šakić wished every success to the Commission in its work.

1.5 Dr. K. Langlo, Deputy Secretary-General of WMO, addressed the meeting on behalf of the Secretary-General. Having referred to the significance of sessions of technical commissions in general and of CBS (formerly CSM) in particular, Dr. Langlo expressed the gratitude of the Organization to the Yugoslavian authorities for their active support to WMO's activities and particularly for the excellent arrangements made for the session. Finally, he mentioned some of the most important items of the agenda and expressed his best wishes for the success of the session.

1.6 Dr. D. Radinović, Director of the Federal Hydrometeorological Institute, stated that he felt it was a great privilege to hold the session in his country. After a short review of the major items of the agenda, namely the World Weather Watch plan for 1976-1979 and the details of GOS, GDPS and GTS, Dr. Radinović expressed his satisfaction at the good spirit of co-operation prevailing amongst meteorologists. He thanked, furthermore, the Federal Government and the authorities of the City of Belgrade for hosting the session.

1.7 Dr. O. Lönnqvist, the acting president of the Commission, in his presidential opening address, recalled the five earlier sessions and the former presidents of the Commission. Quoting a saying of the late Professor Bleeker ("Think fast when you work for CSM"), the president pointed out that work at sessions of this

Commission had always to be particularly speedy and precise. Of the many items to be considered at the session, Dr. Lönnqvist called particular attention to the new SYNOP and SHIP codes and to the need for the balanced development of the World Weather Watch, taking into account also the requirements of the Global Atmospheric Research Programme and its First Global Experiment.

1.8 There were 119 participants at the session. Fifty-three Members of WMO and five international organizations were represented. A list of participants is given at the beginning of 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 which was accepted as the first report on credentials. A final report on credentials was submitted to a subsequent plenary meeting and accepted by the Commission. It was consequently decided not to set up a Credentials Committee.

### 2.2 Adoption of the agenda (Agenda item 2.2)

The provisional agenda was adopted at the first plenary meeting without change. The final agenda is reproduced at the beginning of this report, together with an indication of the documents, resolutions and recommendations relating to each item.

### 2.3 Establishement of committees (Agenda item 2.3)

#### 2.3.1 Working committees

Two working committees were set up:

(a) Committee A to deal with agenda items 4, 5, 6, 7 and those parts of items 11 and 12 relating to GOS and GDPS. Dr. J. Brinkmann (Federal Republic of Germany), the acting vice-president of the Commission, was elected chairman of the committee. Mrs. V. Jurčec (Yugoslavia) was elected vice-chairman;

(b) Committee B to consider agenda items 8, 9, 10, 14 and those parts of items 11 and 12 concerning GTS and codes. Mr. R. Mittner (France) was elected chairman of the committee. Mr. I. A. Ravdin (U.S.S.R.) was elected vice-chairman.

#### 2.3.2 Co-ordination Committee

A Co-ordination Committee was established in accordance with Regulation 27 of the WMO General Regulations.

2.3.3 Nomination Committee

A Nomination Committee was set up consisting of the principal delegates of Argentina, Australia, Nigeria, Switzerland, U.S.A. and the U.S.S.R. Mr. K. R. Johannessen (U.S.A.) was elected chairman of this committee.

2.4 Other organizational questions (Agenda item 2.4)

Under this item the Commission agreed on the working hours of the meetings. The president of the session was authorized to approve, on behalf of the Commission, those minutes of plenary meetings which could not be approved during the session.

3. REPORT BY THE PRESIDENT OF THE COMMISSION (Agenda item 3)

3.1 The Commission noted with appreciation the report submitted by the acting president on the activities of the CBS since CSM-V. In this connexion, the Commission recorded its appreciation of the services rendered by Dr. N. G. Leonov during his tenure of the presidency and by Dr. O. Lönnqvist during his term of office as acting president. The discussion on the presidential report is summarized in the following paragraphs and also under relevant technical items of the agenda.

3.2 The Commission reviewed its work programme for the next four years. It took fully into consideration the new terms of reference given to CBS by Sixth Congress in particular as regards the WWW. It also noted the voluminous documentation presented to the session as a result of the need for consideration by the session of the World Weather Watch plan for 1976-1979, the Manuals on Codes and GTS and the Guide on the GDPS. It felt that the increased responsibilities of the Commission, in particular as a co-ordinating body for the World Weather Watch and other operational programmes, required that its working methods be updated in order to ensure that conclusions were reached in a speedy and efficient manner.

3.3 In order to carry out the work programme of the Commission with greater efficiency and also ensure quicker implementation of CBS decisions, the Commission felt that action within the Commission should be taken to:

(a) Speed up the process for formulation and development of recommendations, regulatory and guidance material;

(b) Accelerate the decision-making process, in particular the adoption of recommendations;

(c) Improve the co-ordination within the Commission and also with other WMO bodies, in order to avoid overlapping and duplication of efforts.

3.4 In order to achieve the assigned tasks, the Commission agreed to take the following steps and use the following means:

(a) For the formulation and development of recommendations, regulatory and guidance material:

(i) Re-establishment of working groups and improvement of their working methods;

(ii) Convening of informal planning meetings and technical conferences, as required;

(iii) Improvement of co-ordination through more frequent meetings of the Advisory Working Group, simultaneous or overlapping sessions of CBS working groups, participation of chairmen of CBS working groups in meetings of other CBS working groups;

(iv) Improvement of the information service for members of the Commission by circular letters of the president or other means, such as the WMO bulletin, in order to keep members of the Commission fully informed on the progress made in the work of the Commission and on the implementation of the World Weather Watch;

(b) For the decision-making process and adoption of recommendations by the Commission:

(i) More extensive use of adoption of recommendations by postal ballot, especially on non-controversial matters;

(ii) More extensive use of the authority given to the president of CBS for taking decisions on behalf of the Commission;

(iii) Extraordinary sessions (sessions with limited agenda) of CBS, to deal with matters well prepared by working groups or informal planning meetings.

3.5 However, all the above measures would be effective only if the Members of WMO and members of the Commission were collaborating fully and replying promptly to inquiries and letters. Members would also have to support the activities of CBS to a larger extent, by providing the appropriate expertise and in accepting the carrying out of specific tests and experiments (e.g. coded digital facsimile techniques) when so requested by the Commission.

3.6 In discussing the best way of using the above possibilities, the Commission agreed that the present structure and number of CBS working groups (Working Group on Codes, Working Groups on GOS, GDPS and GTS and the Advisory Working Group) could well be fitted into the above schemes. Therefore, it was agreed to maintain the present scheme of working groups, but to urge them to make more frequent use of the possibilities of appointing rapporteurs and establishing sub-groups within their working groups, in order to deal with specific tasks. In planning sessions of the CBS working groups, it was agreed that items should be well prepared and documented, in particular as regards matters of common interest to more than one working group, and which might best be dealt with in overlapping or simultaneous sessions of the working groups concerned. For projects covering a wider field than that of CBS, it was agreed that the president should request the Executive Committee to authorize the holding of

technical conferences with appropriate participation of experts, as required. Reports of these technical conferences should be submitted to the president of CBS for consideration and for appropriate action.

3.7 In reviewing the specific points to be dealt with by the Commission in the next four years, a list of major tasks was established which is contained in Annex I to this report. It was agreed that this list would be kept up to date by the president of the Commission.

3.8 The Commission felt that in the period 1975-1978 each of the following CBS working groups should have at least one session with a duration of 10 working days:

Working Group on GOS
Working Group on GDPS
Working Group on GTS
Working Group on Codes

In addition to the above, six meetings of sub-groups of CBS working groups should be foreseen in the budget for 1976-1979. Furthermore, there is a need for at least four informal planning meetings and one simultaneous session of at least two working groups which should deal with specific projects covering the fields of more than one CBS working group, such as quality control procedures. As regards the CBS Advisory Working Group, it was felt that in the period 1975-1978 at least three sessions were required to co-ordinate the work programme of the Commission. The Commission also felt that the sequence of meetings must be carefully planned to ensure that business involving more than one group or sub-group was not delayed.

3.9 With regard to the membership of the Advisory Working Group, the Commission felt that this group should be enlarged and be composed of the president and the vice-president of the Commission and six further experts, including the chairmen of the working groups and two members who might represent the interests of tropical and other developing areas. The terms of reference and composition of the Advisory Working Group, and the Working Groups on GOS, GDPS, GTS and Codes are given in Resolutions 1, 2, 3, 4 and 5 (CBS-VI) respectively. Consequently these resolutions were adopted.

3.10 The Commission was also of the opinion that there was a need for an extraordinary session of the Commission in the next financial period with a duration of about 10 working days. It was agreed that the extraordinary session should be held in 1976 with a limited agenda dealing with closely related and operationally urgent matters.

3.11 The Commission recognized that the work programme, as outlined above, could only be carried out if the Secretary-General gave the appropriate technical and administrative support. In this connexion it was stressed that the sessions of the Commission and the working groups should be properly prepared and the documents distributed in time.

3.12 Finally, the Commission invited its president to bring the above work programme to the attention of the Executive Committee and Seventh Congress, in order that appropriate financial provisions could be made.

3.13 The Commission examined its terms of reference to ascertain whether changes were desirable. It was considered that no problems for CBS resulted from changes proposed by CoSAMC-VI to its terms of reference. Several delegates were of the opinion that the CBS terms of reference could be improved, especially as regards the expanded role of CBS in respect of WWW. While no truly substantive changes were proposed, it was agreed that the president of the Commission, in consultation with the Advisory Working Group, should review the terms of reference in time for any recommended changes to be presented to Seventh Congress.

## 4. CO-ORDINATION OF DATA NEEDS FOR VARIOUS USES (Agenda item 4)

### 4.1 Requirements for observational data (Agenda item 4.1)

4.1.1 In accordance with its terms of reference (c), CBS is responsible for "determining and co-ordinating the requirements for observations needed for basic processing, taking into account the requirements for research programmes and applications, as determined by other bodies, Technical Commissions and Regional Associations". The Commission felt that there was a need for a regular procedure for co-ordinating the requirements stated by various bodies. Moreover, it was found desirable to provide advice to the other constituent bodies regarding the form in which these requirements should be stated. The Commission agreed that these matters could best be dealt with by the Working Group on the GDPS in consultation, as necessary, with the Working Groups on the GOS, GTS and Codes. Appropriate provisions were therefore made in the terms of reference of the Working Group on the GDPS (see agenda item 7.1).

4.1.2 The Commission recalled that in Recommendation 6 (CSM-V) it had expressed the meteorological requirements for the synoptic exchanges of aircraft meteorological reports and had recommended that ICAO should take these requirements into consideration when developing a standardized format for AIREP messages. The Commission noted with appreciation that the substance of the above recommendation had been implemented by ICAO and that introduction of the new standard AIREP format had facilitated the use of AIREP for synoptic purposes, in particular for computer processing.

4.1.3 The Commission noted the proposal of CIMO-VI recorded in paragraph 10.2.1 of the general summary of the work of that session concerning the choice of vertical averaging intervals in deriving upper winds. The Commission agreed with the substance of the CIMO proposal, namely that the thickness of the averaging layer should be chosen as a function of the performance of the upper-wind equipment used so that a systematic relationship was achieved between the vector errors in the winds and the vertical layers over which the winds were averaged. It was considered, however, that the Working Group on the GDPS should carry out a careful study of the problem, in particular the suitability of the specific thickness values suggested by CIMO. This study would be in close relation with another study already initiated by the Working Group on GDPS on the revision of the present procedures for reporting significant levels with respect to wind in PILOT and TEMP reports.

4.2 Requirements for processed data (Agenda item 4.2)

4.2.1 On the basis of the report of the second session of the Working Group on the GDPS (Geneva, 1-5 October 1973), the Commission reviewed a number of questions relating to requirements for processed information. These questions are discussed in paragraphs 4.2.2 to 4.2.10 below.

4.2.2 The Commission noted the procedure established for the periodic review of requirements of Members for output products of WMCs and RMCs. In accordance with this procedure, the Secretariat carries out yearly inquiries on these requirements, and makes the results known to the WMCs and RMCs concerned. It was agreed that this arrangement should be continued.

4.2.3 The Commission reviewed the overall lists of output products of WMCs and RMCs which had been laid down by CSM-V in Recommendations 28 and 29 (CSM-V), respectively, approved by Resolution 14 (EC-XXII). The lists were amended by bringing the different output products into a more logical sequence, by improving the terminology and by deleting a few products for which no uniform terminology existed or which did not fall into the competence of RMCs according to the WWW plan. The amended lists are given in Recommendation 1 (CBS-VI) and Recommendation 2 (CBS-VI), which were adopted to replace Recommendations 28 and 29 (CSM-V) respectively. The Commission agreed that the amended overall lists should also be included in Volume I of the Guide on the GDPS.

4.2.4 The Commission recognized that Members might have requirements for special types of products not included in the general lists contained in Recommendation 1 (CBS-VI) and Recommendation 2 (CBS-VI). As an example, some Members expressed requirements for data on boundary conditions for a number of time steps to be used by RMCs/NMCs in their sub-grid-scale numerical analyses and prognoses. It was felt that initially arrangements for exchanging of such data should be made on a bilateral or multilateral basis.

4.2.5 While reviewing the overall lists, the Commission was aware that at the present state of implementation of the World Weather Watch, Members requirements for products must be limited to some extent. Account should be taken of the current and planned output products of WMCs and RMCs, as well as the capacity of affected GTS circuits. The Commission therefore prepared a new set of lists for output products of WMCs and RMCs, called "preference lists", containing products which Members could expect to obtain on a routine basis. These preference lists were included in the Guide on the GDPS with the recommendation that Members be invited to limit their requirement for WMC and RMC output products to those mentioned in the preference lists. However, the Commission felt that the capability of the GTS should considerably increase in the future due to technical improvements and by the replacement of facsimile transmission of WMC/RMC output products by use of the GRID code (see paragraphs 4.2.7 and 4.2.8). Therefore the transmission of some additional products mentioned in the overall lists might become feasible in the future, but the Commission was of the opinion that in each case such additional requirements of Members should be very carefully examined by the regional association concerned.

4.2.6 In addition to the guidelines suggested in paragraph 4.2.5 above, the Commission included in the Guide on the GDPS the following guidelines for Members in stating requirements for processed data in analogue facsimile form:

(a) As regards WMC output products, a Member should require a specific product only from one WMC;

(b) Members should require RMC output products normally from one RMC located in the same region. (Exceptions should be restricted to cases where the area for which a Member has a need to receive RMC output products is not covered by the products from one RMC in the same region);

(c) If there is an urgent need for a Member to receive the same product from more than one RMC or WMC for special operational purposes, these requirements should be limited to surface and 500 mb analyses and prognoses.

4.2.7 The Commission considered that the GRID code for the exchange of processed data which was introduced for international use on 1 January 1974, would make it possible to meet Members' requirements to a larger extent as it became used more generally. On the other hand, the Commission recognized that the introduction of the GRID code should not be detrimental to the work of centres which were not yet in a position to convert the GRID code into pictorial form. Therefore, transmission of certain WMC and RMC output products between WMCs and RMCs in both pictorial and alpha-numerical form would be inevitable for some time. However, the Commission recommended that this transition period should be as short as possible and that during the transition period the dual transmission* of products between WMCs and RMCs should be restricted as far as possible. With respect to the transmission of output products to NMCs, the Commission recognized that many national centres would not have conversion facilities to convert data in GRID code form into pictorial form in the foreseeable future. To provide some guidelines for a minimum dual transmission via the Main Trunk Circuit and its branches, the Commission included a list of products which would require dual transmission in the Guide on the GDPS.

4.2.8 As a result of the decisions of the Commission under paragraphs 4.2.3 to 4.2.7 above, Volume I of the Guide on the GDPS will include four lists relating to output products of WMCs and RMCs, namely:

(a) The overall lists of WMC and RMC output products contained in the annexes to Recommendation 1 (CBS-VI) and Recommendation 2 (CBS-VI);

(b) Lists of WMC and RMC output products to which highest priority should be given for preparation;

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* Dual transmission means that the same product is transmitted in both alpha-numerical and pictorial form over a specific circuit of the GTS.

(c) Lists of WMC and RMC output products with highest priority for transmission by analogue facsimile on the Main Trunk Circuit and its branches*;

(d) A list of output products which are recommended to be transmitted in both alpha-numerical and pictorial forms.

4.2.9 It was emphasized that WMCs and RMCs should ensure that they have the necessary conversion facilities as soon as possible. In this connexion Recommendation 3 (CBS-VI) was adopted. The Commission also pointed out that as soon as an RMC or NMC acquires the necessary conversion facilities, the transmission in pictorial form should be replaced by transmission in alpha-numerical form over as large a part of the transmission path between the issuing and the receiving centres as possible. It was felt, however, that some special output products, which did not lend themselves for transmission in the GRID code form (e.g. surface analyses containing fronts, etc.) would continue to be transmitted in pictorial form or in the IAC code.

4.2.10 The Commission reviewed the "priorities for the transmission of data and products" as contained in paragraph 7 of Volume I of the Guide on the GDPS, and completed them by a general rule stating that the transmission of observational data needed for global-scale analyses and prognoses should have priority over the transmission of processed data.**

4.2.11 It was pointed out that facsimile transmissions could not include all possible parameters on certain upper-air charts. The Commission agreed that it was desirable to establish some priorities concerning the parameters which should be indicated on WMC and RMC products transmitted by facsimile. It requested the Working Group on the GDPS to consider this problem and to suggest appropriate priorities for inclusion in the Guide at a later stage.

## 5. GENERAL OBJECTIVES OF THE WWW PLAN FOR THE PERIOD 1976-1979 (Agenda item 5)

5.1 The Commission noted the request of Sixth Congress that CBS should review the present World Weather Watch plan and make appropriate recommendations to the Executive Committee. While the introductory part of the draft plan for the period 1976-1979 was examined under agenda item 5, the GOS, GDPS and GTS parts were considered under agenda items 6, 7 and 9 respectively.

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* Priorities for the regional exchange of products are laid down by the regional associations concerned.

** Details of the amendments to be made to the draft of Volume I of the Guide on the GDPS (CBS-VI/Doc. 8, Appendix) are given under agenda item 7.2.

5.2 The Commission examined the Introduction of the draft WWW plan for the period 1976-1979 on the basis of a document submitted by the Secretary-General. It felt that a number of amendments had to be made in the proposed text in order to define more clearly the purpose, objectives of the WWW and the goals for the next period. At the same time the introductory part of the plan was considerably shortened. The text of the revised World Weather Watch plan for the period 1976-1979 is included as Annex II to this report.

## 6. OBSERVING SYSTEM (INCLUDING THE GOS PART OF WWW AND THE REPORT BY THE CHAIRMAN OF THE WORKING GROUP ON THE GOS) (Agenda item 6)

The Commission noted with satisfaction the report of the chairman of the CBS Working Group on the Global Observing System, Dr. R. Czelnai, and the excellent work accomplished by this working group since the last session of the Commission and, in particular the GOS part of the draft WWW plan for the period 1976-1979 prepared by the group. Further, the Commission considered that further studies and planning on observational matters should be undertaken to meet, to the maximum extent possible, the requirements of the WWW, GARP, IGOSS and other international programmes presently under consideration, such as the Earthwatch, and agreed to consider the arrangements necessary within the CBS for such studies under agenda item 5.

### 6.1 Data requirements to be met by the GOS (Agenda item 6.1)

6.1.1 The Commission considered a request by RA V to give guidelines for regional associations on the minimum observing programmes of stations to be included in the regional basic synoptic network, together with a proposal submitted by Australia to change WWW specifications for the GOS concerning the recommended observation programmes of stations in the regional basic synoptic network. The Commission was of the opinion that since the relevant Technical Regulations concerning the frequency of synoptic observations were recommended regulations, it was up to regional associations to decide on these matters, it being understood that these decisions would not imply a reduction of the observing programmes required for the global networks in the WWW plan and that they should take into account the requirements stated by other regional associations.

6.1.2 Further, the Commission noted the opinion of a number of members of RA V that no more than one radiosonde observation per day was justified in the tropics. It considered the request of RA V to CBS to decide, on the basis of the results of GATE, MONEX and other experiments, the required frequency of radiosonde observations in the tropics. During the discussion some members from other tropical areas were of the opinion that two radiosonde ascents per day were necessary for weather analysis and forecasting in their areas. Since this matter involves information which has yet to be obtained from the above-mentioned experiments and also consideration of amendments to the Technical Regulations, the Commission invited its president to arrange for the consideration of the matter (see also paragraph 12.6).

6.1.3 Finally, the Commission took into account all the data requirements to be met by the GOS when drawing up the GOS part of the draft WWW plan for the period 1976-1979.

6.2 Surface-based sub-system (Agenda item 6.2)

6.2.1 The Commission reviewed the part of the draft WWW plan for the period 1976-1979 concerning this sub-system of the GOS and agreed to insert radiation measurement stations in the sub-system. Furthermore, the Commission expressed the view that the Secretary-General should expand the paragraph stating the importance of background pollution stations, including the latest developments on this subject, before submitting the plan to the Executive Committee.

6.2.2 The Commission was informed by the representative of ICAO that a requirement still existed for ground-based observations of clear air and convective turbulence, as reflected in Recommendation 8.1/1 (Sixth ANC/Ext. 1969 session of CAeM), and that it was hoped that an operational system for making such observations could be introduced for routine use.

6.3 Satellite sub-system (Agenda item 6.3)

During the last years great progress has been achieved in the observing capabilities of meteorological satellites and in the processing of information obtained by meteorological satellites. Further, it is expected that the improvement in sensors will provide new types of data, increased resolution and accuracy, in particular as regards vertical soundings from satellites. Because of the profound impact of satellite techniques on the further development of the GOS, the Commission, in reviewing this part of the draft WWW plan for the period 1976-1979, noted with satisfaction that it was expanded to incorporate fully the capabilities of existing and planned meteorological satellite systems.

6.4 Optimum mix of observing systems (Agenda item 6.4)

The Commission agreed that to achieve an efficient and economic GOS, the appropriate mix of the various components within the sub-systems, as well as between the surface-based and the space-based sub-systems, was necessary. With this in mind, the relevant paragraphs of the new draft WWW plan were reviewed and consideration was also given to a contribution from the German Democratic Republic concerning the studies required for achieving this objective. It was concluded that the further work required under the GOS section of the plan adequately covered the subject and, therefore, the Commission expressed the view that its president should arrange for such studies to be undertaken.

6.5 Further development of the GOS (Agenda item 6.5)

6.5.1 The Commission considered this subject and expressed the view that the further work required by the GOS part of the draft WWW plan for the period 1976-1979 would provide adequate development of the GOS during this period.

6.5.2 The Commission agreed to recommend the inclusion of the Global Observing System (GOS) part, as amended, in the draft WWW plan for 1976-1979, in accordance with the decisions taken in this respect under agenda item 5.

## 7. DATA-PROCESSING SYSTEM (INCLUDING THE GDPS PART OF THE WWW AND THE REPORT BY THE CHAIRMAN OF THE WORKING GROUP ON THE GDPS) (Agenda item 7)

### 7.1 Organization of the GDPS and functions of WMCs, RMCs and NMCs (Agenda item 7.1)

Report by the chairman of the Working Group on the GDPS

7.1.1 The Commission noted with appreciation the report by the chairman of the Working Group on the GDPS, Mr. E. B. Fawcett,(U.S.A.), which reviewed the very substantial work carried out by the group during the two sessions held since CSM-V and by correspondence. The various proposals contained in the report were considered under the appropriate agenda items.

GDPS part of the draft WWW plan for the period 1976-1979

7.1.2 The Commission reviewed in detail the GDPS part of the draft WWW plan for 1976-1979 presented to the session by the Secretary-General, and proposed a number of minor amendments to it. The amended draft is given in Annex II to this report, while explanatory remarks in connexion with some specific paragraphs of the draft plan are contained in paragraphs 7.1.3 to 7.1.7 below.

7.1.3 On the basis of a proposal submitted by Australia, paragraph 102 of the draft plan was amended to state explicitly that WMC Melbourne prepared products (analyses and forecasts) covering the southern hemisphere only. The purpose of the proposal was to state a realistic expectation of the level of implementation of the output of WMC Melbourne during 1976-1979, so that planning for WWW and other purposes, particularly the First GARP Global Experiment (FGGE), would be on a firm foundation. In this connexion some members pointed out the importance of inter-hemispheric influences, particularly in the monsoon areas. They felt that restricting functions of the WMC Melbourne to the southern hemisphere was artificial and reduced the utility of its products in the monsoon areas.

7.1.4 In connexion with the real-time function of WMC specified in paragraph 103 (c), namely "preparation of alerts of important meteorological phenomena, for example storm warnings based on pertinent information such as satellite data", the Commission felt that the matter required careful study with a view to the co-ordination of the various satellites expected to be in operation by the time of FGGE. The Commission requested its president to call this problem to the attention of the Executive Committee Panel of Experts on Meteorological Satellites.

7.1.5 While agreeing with the formulation of the RMC function in paragraph 107 (b) which requires the "preparation of surface and upper-air meteorological prognoses for specific areas for period up to 72 hours", the Commission recognized that during the next years, prognoses up to 48 hours would represent a more generally attainable requirement for RMCs. It was pointed out, however, that 72-hour prognoses were being prepared in some parts of the world with reasonable success, and that further progress in forecasting techniques for similar periods, in particular for the tropics, was expected to take place within the next few years.

7.1.6 In respect of the storage and retrieval of data discussed in paragraphs 125 to 135 of the draft, the Commission agreed that there was a need for clarifying the respective roles of CBS and CoSAMC regarding data for climatological purposes and for other related applications.

7.1.7 The Commission noted that storage in numerical form was provided for products derived from satellites, such as winds and soundings, but that such storage was not now possible for all original satellite photography, especially for the data from geostationary satellites, because of the volume of data involved. Photographic storage and retrieval is provided for, but this is often at reduced resolution. There is now digital storage of the mapped data acquired from the scanning radiometer of the NOAA satellite of the U.S.A.

Requirements for global exchange of observational data

7.1.8 The Commission reviewed the requirements for observational data for large- and planetary-scale analysis and numerical weather prediction which should be exchanged on the GTS Main Trunk Circuit and its branches. The Commission agreed that BATHY, TESAC, and vertical sounding data should also be included in the global exchanges. Furthermore, it was agreed that there was a requirement for a global distribution of Parts B and D of TEMP and TEMP SHIP reports when the capacity of the MTC and its branches permitted. It was also agreed to amend the criteria for the selection of surface synoptic stations whose reports should be exchanged globally. Finally the Commission drew up, on the basis of the information available at the session, the list of stations from which reports should be included in the bulletins for global exchange. Recognizing the need for keeping up to date the list of stations, it was agreed to authorize the president of CBS to approve changes between sessions of the Commission. Recommendation 4 (CBS-VI) was adopted.

Output products of WMCs and RMCs and their dissemination

7.1.9 The details concerning lists of output products of WMCs and RMCs and the priorities and forms of dissemination of these products were discussed under agenda item 4.2.

Real-time quality control of data

7.1.10 The Commission considered a document submitted by France concerning a standard procedure for national Meteorological Services for the real-time quality control of meteorological data. The Commission agreed with the basic principles of the procedure, namely that:

(a) Consistency in time and the internal consistency of data should be checked at the observing station;

(b) Consistency in space should be checked at the NMC;

(c) Data judged to be erroneous should not be changed by the NMC without first requesting confirmation from the observing station.

It was emphasized, however, that no checking procedure should delay the international transmission of the national data by the NMC; if the checking results in corrected values, these should be transmitted subsequently. The Commission agreed that a study of the standardization of procedures for real-time quality control should be taken up as a matter of urgency by the Working Group on the GDPS, in close collaboration with other working groups concerned. The study should take into account the document submitted by France as well as other relevant studies carried out recently within WMO.

Support by GDPS to FGGE

7.1.11 The Commission recognized that GDPS would have an important role in support of FGGE and regional experiments like MONEX, POLEX, etc., in particular to provide Level III data and to assist in performing quality control and archiving of data for research purposes. In the absence of specifications of the requirement to be met for such experiments, the Commission confined itself to expressing its readiness to assist by elaborating special procedures needed to support such experiments, with the provision that any support to be provided should not be detrimental to the operation of WWW itself.

## 7.2 Guide on the GDPS (Volumes I and II) (Agenda item 7.2)

### 7.2.1 Volume I

7.2.1.1 The Commission noted the draft text of Volume I of the Guide on the GDPS (CBS-VI/Doc. 8), which had been prepared in response to Recommendation 30 (CSM-V) by the Working Group on the GDPS. The Commission expressed its appreciation for the excellent work done by the working group, in particular a group of experts and also by Dr. C. J. E. Schuurmans (Netherlands), who acted as rapporteur for editing the draft. It was pointed out that the draft volume contained a large amount of valuable material on methods and techniques used in meteorological data-processing and on the operational principles of the GDPS, which would be of great use to Members in developing their data-processing activities. It was therefore agreed that Volume I of the Guide should urgently be published in the four official languages of the Organization. The Secretary-General was requested, however, to amend the draft before its publication in the light of the decisions made by the Commission during the session, in particular to bring the text of the draft in line with the proposed WWW plan for 1976-1979 and with the decisions taken under agenda items 4, 7.1, 7.3 and 12. A detailed list of the amendments to be made was drawn up for use by the Secretariat when editing the publication. Recommendation 5 (CBS-VI) was adopted.

7.2.1.2 The Commission recognized that the Guide would have to be kept up to date to reflect the development of data-processing techniques. It therefore authorized the president of CBS to approve amendments to the first edition of the Guide as they became necessary and were developed by the Commission. This decision was also incorporated in Recommendation 5 (CBS-VI).

7.2.1.3 The Commission agreed that the Guide should be completed as soon as possible and should include substantial sections on such subjects as forecasting of tropical storms, storm surges and monsoons, in view of the great practical importance of these phenomena. It was also agreed that the practices and procedures used at National

Meteorological Centres should be described in greater detail in the subsequent editions. A proposal was made that this might be achieved by describing a specific NMC as an example. It was agreed that the work on the Guide on the GDPS should continue with a view to publishing additional material at an early date, in particular those sections mentioned above.

7.2.2 Volume II

7.2.2.1 The Commission considered a proposal to include in Volume II of the Guide on the GDPS a symbol for indicating on surface synoptic charts those locations at which observations were made by automatic weather stations. It was agreed that there was a need for such a standard symbol, and the Commission suggested that the symbol be an equilateral triangle plotted around the station circle. It was accordingly decided that Volume II of the Guide on the GDPS should be amended by inserting the following at the end of paragraph 1.2.2.1:

> "In the case of automatic weather stations, an equilateral triangle is plotted around the station circle so that the apex of the triangle points towards the North Pole (△)."

7.2.2.2 The Commission noted some suggestions concerning amendments to be made to Volume II of the Guide with a view to further standardization of terms employed in weather analysis. It was realized that this problem required a careful study, and the Working Group on the GDPS was requested to examine it as a matter of urgency.

7.2.2.3 With reference to paragraph 1.5.2 of Volume II of the Guide, the Working Group on the GDPS was also entrusted with the task of elaborating proposals for plotting symbols for each code figure of Code Table 0139 - $A_i$ - Accuracy of the fix and repetition rate of atmospherics.

7.3 Tropical synoptic meteorology (including the report by the Rapporteur on Synoptic Meteorology in the Tropics) (Agenda item 7.3)

7.3.1 The Commission noted with appreciation the report of the Rapporteur on Synoptic Meteorology in the Tropics (Dr. P. K. Das, India). The report was based on information received from Members in response to an inquiry on methods of analysis and forecasting in the tropics. It summarized in an excellent manner the present state of development of synoptic meteorology in the tropics, identified the major difficulties hampering progress, and made recommendations for further development. The comments and suggestions of the Commission in connexion with the report are contained in paragraphs 7.3.2 to 7.3.5 below.

7.3.2 The Commission recognized that progress in tropical synoptic meteorology was handicapped by lack of data, in particular upper-air observations made at synoptic stations and by satellites and surface synoptic observations made on board ships. It was pointed out, however, that the implementation by Members of the WWW plan for 1976-1979 should bring about a considerable improvement in the data coverage. In this connexion the importance of the satellite sub-system of the GOS for obtaining vertical profiles of temperature and humidity was emphasized, as well as the derivation of several levels of wind vectors from geostationary satellite pictures. Further, the

implementation of the geostationary satellite part of the satellite sub-system will provide the principal observing tool for monitoring the movement and development of tropical storms.

7.3.3 It was recognized that in those parts of the tropics affected by tropical storms, additional special observing facilities, e.g. weather reconnaissance aircraft and weather radars, were required to improve storm-detection capability. In these areas the present observational programmes on island stations should also be strengthened, and special attention should be given to the setting up of automatic weather stations at strategic locations. The Commission felt that the elaboration of detailed plans for the use of the above-mentioned supplementary facilities could be undertaken by special regional bodies dealing with tropical storm damage-mitigation such as the WMO/ECAFE intergovernmental Typhoon Committee, the WMO/ECAFE Panel on Tropical Cyclones and the RA I Tropical Cyclone Committee.

7.3.4 As regards tropical weather analysis and forecasting methods, the Commission agreed with the conclusion of the rapporteur that Members should be encouraged to adopt more objective techniques, in particular numerical analysis and forecasting techniques. With a view to promoting such development, the Commission requested its Working Group on the GDPS to determine the scope of a possible seminar on numerical weather prediction in the tropics, and to study the feasibility of establishing a computer program bank, from which programs could be made available to Members. The Commission noted in this connexion that following a decision of the Executive Committee, the Secretariat had collected and would distribute to Members within the next few months lists of computer programs used by Members. In order to make the most modern tropical analysis and forecasting techniques widely known to Members, the Commission also suggested that Volume I of the Guide on the GDPS be completed with a detailed description of such techniques (see also paragraph 7.2.1.3). It was agreed that the Secretary-General should invite the Permanent Representative of India to arrange for the preparation of a suitable text for this purpose in consultation with other Members concerned, as appropriate.

7.3.5 The Commission expressed its conviction that the experiments like GATE and MONEX would go a long way towards improving the present analysis and forecasting capability for the tropics. Similarly, the WMO Tropical Cyclone Project should effectively help the countries concerned to reduce loss of life and damage caused by tropical storms. The Commission requested the Secretary-General to distribute the report of the Rapporteur on Synoptic Meteorology in the Tropics to the Members of the above regional bodies.

7.4 Further development of GDPS (Agenda item 7.4)

7.4.1 The main decisions of the Commission regarding the studies required during the period 1976-1979 for the further development of GDPS are incorporated in paragraphs 136 to 141 of the draft WWW plan. In addition to the subjects listed there, the Commission selected the following problem areas which should be intensively studied in the coming years:

(a) Determination of requirements for observational data and meteorological codes;

(b) Determination, in consultation with the Working Group on Codes, of more specific coding procedures to facilitate the automatic processing of data;

(c) Improvement and standarization of methods and procedures for automatic quality control and correction of data during the processing of the data by computer, taking into account the requirements of modern analysis and forecasting methods;

(d) Improvement of techniques and procedures for deriving vertical profiles of temperature and moisture from satellite measurements of radiances.

7.4.2 The Commission was informed that not all aircraft weather reports were received at the processing centres requiring them. It was mentioned that in certain cases selection procedures were applied prior to retransmission and thus only a limited number of air reports were received at processing centres. The Commission felt that all efforts should be continued to improve the reception and increase the number of aircraft weather reports of good quality. Since ICAO was responsible for laying down the procedures for the making and delivery of aircraft reports to regional collecting centres (RTHs), the Commission agreed to request the Secretary-General to bring the above views to the attention of ICAO and also of CAeM. Recommendation 6 (CBS-VI) was adopted.

## 8. CODES INCLUDING THE MANUAL ON CODES AND THE REPORT BY THE CHAIRMAN OF THE WORKING GROUP ON CODES (Agenda item 8)

8.1 The Commission noted with appreciation the work carried out by its Working Group on Codes since CSM-V. The Commission expressed its deep appreciation to the working group and in particular to its chairman Mr. G. Doumont (Belgium) for the achievements in respect to the development of the GRID code, hydrological codes, the SAREP code and other code forms. It also noted the valuable work carried out on the refinement and further development of the new SYNOP and SHIP code forms. It was also noted that the working group carried out numerous studies on code problems referred to it by CSM-V and the president of the Commission.

### 8.2 New SYNOP and SHIP codes

8.2.1 The Commission noted Recommendation 22 (CSM-V), by which the new code forms for SYNOP and SHIP were adopted for international use as from 1 January 1975, subject to modifications and refinements. Since CSM-V, some Members had experienced difficulties in the introduction of the new code forms by 1 January 1975 and, therefore, an Informal Planning Meeting was held which suggested the postponement of the introduction to 1 January 1976 or later, subject to a final date to be recommended at the sixth session of CBS. This suggestion was formally adopted by postal ballot as Recommendation 45 (73-CBS).

8.2.2 Based on the substantial work carried out by the CBS Working Group on Codes, the Secretary-General submitted CBS-VI/Doc. 23, giving detailed specifications for new SYNOP and SHIP codes, which took fully into account the results of the trials

carried out by Members. Before going into the detailed proposals for the various coding specifications of the new SYNOP and SHIP codes, there was a discussion on the final date for introducing them for international use. Taking into consideration the First GARP Global Experiment, which is planned to commence in the second half of 1977, it was felt that possible implementation dates would be either 1 January 1977 or after FGGE. In discussing these dates, the Commission noted that some countries might not be able to implement the new code forms by 1 January 1977. This led to a discussion on whether, in the event of some Members being unable to comply with this implementation date, the use of two different code forms for surface synoptic observations would create considerable difficulties for the processing centres. It was, therefore, decided to put alternative proposals to a vote. These proposals were either to introduce for international use the new code forms for synoptic surface observations on 1 January 1977, or to postpone the introduction to a date after the FGGE. This vote was carried out by a roll call and by a majority decision it was decided not to introduce new code forms for all synoptic surface observations until after the FGGE.

8.2.3 The Commission agreed that the considerable work carried out by the Working Group on Codes in developing the new SYNOP and SHIP code forms should not be lost, and that an updating of these proposed code forms and specifications would be required in the light of the First GARP Global Experiment. The Commission therefore requested the Secretary-General to send CBS-VI/Doc. 23 and other documents relating to the proposed new SYNOP and SHIP codes to all Members of WMO and to the presidents of technical commissions. However, the Commission felt that after FGGE a new approach to the overall code system might be necessary as a result of further technological developments.

8.2.4 As a consequence of the above decision, the Commission reviewed the use of the code forms FM 14.E (SYNOP - Report of synoptic surface observations from land station (AUTOMATIC weather station)) and FM 24.E (SHIP - Report of synoptic surface observations from sea station (AUTOMATIC weather station)). These two code forms were approved by Recommendation 23 (CSM-V) and were introduced for use in the international exchange of reports containing observations of automatic weather stations, as from 1 January 1972. The Commission recognized that these code forms were accepted in anticipation of the introduction of the new SYNOP and SHIP code forms by 1 January 1975. Since FM 14.E and FM 24.E were practically identical to the new code forms, it was felt that a uniform system for reporting the surface synoptic observations would be achieved, if the new code forms were introduced. As they would not now be introduced at an early date, the Commission reviewed the use of the code forms SYNOP FM 14.E and SHIP FM 24.E and noted that these code forms were not very widely used. In many cases Members are distributing internationally on the GTS the observations of automatic weather stations in the code form SYNOP FM 11.E. It was agreed that Members should be encouraged to use the code form FM 11.E for the international distribution of all surface synoptic observations from land stations and the code form FM 21.E, FM 22.E, FM 23.E and FM 26.D for the distribution of all surface synoptic observations from sea stations.

8.2.5 The Commission however was informed that while normally the data from the automatic weather stations were transmitted to the National Meteorological Centre or editing station in special codes, designed for specific observing systems, in some

countries the conversion into international code forms was carried out by computers. Since a reprogramming of the computers might require some time, it was felt that the code forms SYNOP FM 14.E and SHIP FM 24.E should be retained and their use should be reviewed at the next session of CBS. Recommendation 7 (CBS-VI) was adopted.

8.3 Force of surface wind - Beaufort scale

8.3.1 The Commission noted Recommendation 16 (CMM-VI) - The Beaufort scale of wind force - which was approved by Resolution 11 (EC-XXV). This resolution called for introduction of a revised code 1100 F - Force of surface wind, at the same time as the new SHIP code form was introduced. Since CBS-VI agreed not to introduce new code forms for synoptic surface observations until after the FGGE, it was felt that the decision of the Executive Committee concerning the revised code 1100 required reconsideration by EC-XXVI as regards the date for implementation of the above CMM recommendation.

8.3.2 In this connexion the Commission wished to draw the attention of the Executive Committee to the fact that code 1100 was at present inappropriately included in the Manual on Codes, because the code specification F was not mentioned in any of the international codes. Therefore, the Commission agreed that the table under code 1100 was an aid to observation rather than a code and should therefore be removed from the Manual on Codes. Recommendation 8 (CBS-VI) was adopted.

8.3.3 The Commission felt that the table on the Beaufort scale of wind force should be included as an appendix in the Technical Regulations as a guide for observations of the wind speeds in the absence of wind instruments (see paragraphs [A.1.2] 4.7.2 and 4.7.3 of the Technical Regulations) and also as reference material for issuing storm warnings in accordance with Technical Regulations (see paragraphs [C.1] 1.3.1 and 1.4.7.3.2 of the Technical Regulations). Simultaneously, a Beaufort scale of wind force might be included in the WMO Guide on Instruments and Methods of Observations. However, the Commission stressed that a single set of equivalent wind speed over land and sea for the Beaufort scale numbers should be used for all international purposes.

8.4 Amendments to codes FM 39.E - ROCOB and FM 40.E - ROCOB SHIP

8.4.1 The Commission reviewed the present codes FM 39.E - ROCOB and FM 40.E - ROCOB SHIP in the light of the modifications proposed by the Working Group on Codes. It was recognized that these modifications became necessary due to recent developments in rocketsonde techniques. Firstly, several rocketsonde systems obtain data up to about 80-100 km, which is beyond the isobaric levels allowed for in the present code. Secondly, there has been a rapid development of techniques which derive temperature profiles from satellite infra-red radiometers up to 0.01 mb. In order to calibrate and verify the data from these satellite systems by comparing them against rocketsonde data, it is necessary that additional information on the rocketsonde sensor type, correction techniques and reduction procedures be transmitted with the data. It was also noted that real-time surveillance of special atmospheric events (e.g. stratospheric warmings) required complete information regarding the system and the type of sensor used in the rocketsonde observation in order to determine the value of the data obtained. In this connexion it was emphasized that in the proposed code tables there were a number of unassigned code figures which could be used for reporting additional or new sensing equipment and correction techniques.

8.4.2 The Commission agreed that Members be encouraged to submit this information to the Secretariat and authorized the president of CBS to approve amendments to the code tables when necessary. Recommendation 9 (CBS-VI) was adopted.

8.5 Codes for hydrological purposes

The fourth session of the Commission for Hydrology proposed international hydrological codes. These proposed codes were reviewed by the CBS Working Group on Codes and appropriately amended. The president of the Commission for Hydrology agreed with the revision made by the CBS Working Group on Codes. The Commission noted that these code forms followed the general principles for meteorological codes, but mentioned, however, that the systems of international hydrological station identifier numbers were not yet established. It therefore agreed to invite the regional associations to complete the detailed description of the system for international hydrological station identifiers before 1 January 1975, the date on which the HYDRA and HYFOR codes will be introduced for international use. Recommendation 10 (CBS-VI) was adopted.

8.6 Amendments to CLIMAT reports

8.6.1 The Commission noted the difficulties resulting from the fact that the codes FM 71.E, FM 72.E, FM 73, FM 75.D, FM 76.D did not include information on the month and year to which they referred. It was agreed that the existing procedures were no longer adequate because of the increasing frequency of requests for repetition and the wider use of computers for storage, retrieval and processing of the reports. The Commission recognized the need for identification of the month and year within each bulletin of climatological reports. In view of this, Recommendation 11 (CBS-VI) was adopted.

8.6.2 The Commission was informed that CoSAMC-VI recommended that an additional group giving monthly sunshine hours to the nearest hour and proportion of the current climatological normal (CLINO) for the same month should be added to the appropriate section of the code FM 71.E - CLIMAT. The Commission agreed upon this inclusion, and in view of this, Recommendation 12 (CBS-VI) was adopted.

8.7 BATHY and TESAC code forms

8.7.1 The Commission noted that the Joint IOC/WMO group of experts on IGOSS Technical System design and development and Service Requirement (ITECH) proposed to use the $M_jM_j$ in the BATHY and TESAC code forms for identification of the ocean areas where the observations were made. The Commission felt that $M_jM_j$ should not be used for any other purpose than identification of parts of reports. However, the Commission agreed that the requirements stated by ITECH might be met by either:

(a) Replacing the solidus "/" of the GGgg/ group in the BATHY and TESAC code forms by a character for identification of the ocean areas; or

(b) Modifying the GGgg/ group to a GGg// group in the BATHY and TESAC code forms and using the two characters corresponding to the solidi ("//") to identify the ocean and parts thereof.

8.7.2 The Secretary-General was requested to bring the conclusions mentioned above to the attention of the president of CMM, the chairmen of the IOC and the ITECH.

8.8 Amendments to the code forms FM 21.E - SHIP, FM 22.E - SHIP and FM 23.E - SHRED

The Commission noted the requirements stated by CMM-VI for reporting of resultant wave heights and icing in the new SHIP code forms. Since the Commission agreed not to introduce new codes for synoptic surface observations until after FGGE, after discussion it was agreed that the president of CBS be requested to consult with the president of CMM on the need for adjusting the present code forms FM 21.E, FM 22.E and FM 23.E with a view to meeting the most pressing marine requirements.

8.9 Code for reporting synoptic interpretation of cloud data obtained by meteorological satellites

8.9.1 The Commission considered the proposals, and comments on these proposals, made by Members on the draft Recommendation C (73-CBS).

8.9.2 One of the proposals recommended a complete revision of the Code Table 3752 for $S_t$ - Classification of tropical cyclone, on the grounds that the classification referred to in Code Table 3752 was now obsolete as newer techniques for the analysis and forecasting of tropical cyclone intensities from satellite pictures had now been developed (e.g. Dvorak's classification reported in NOAA Technical Memorandum NESS 45, 1973). The procedures for determining a Current Intensity (C.I.) Number from satellite images are explained in the above-mentioned publication which was distributed by the Secretary-General to all Members. The Commission agreed to introduce the change proposed, but observed that the Code Table 3752 should be based on a WMO publication such as the International Cloud Atlas.

8.9.3 At the same time the Commission noted that the procedures to obtain the Current Intensity Number as outlined in the NOAA Technical Memorandum NESS 45 were rather complicated. The Commission requested the Secretary-General to arrange for the preparation of an appropriate document containing a simple straightforward procedure to be used by operational personnel.

8.9.4 Another proposal was to change the $C_m$ code table into a code table with two digits. This proposal, while giving a large amount of details on the cloud forms and systems, would increase unduly the length of SAREP reports which are included in international exchanges. Moreover, Section 2 of the SAREP code is used only to describe major synoptic-scale significant features or cloud masses, while mesoscale or more detailed descriptions may be included in Section 5, their reporting being left to regional decision. The Commission agreed that an expanded $C_m$ code could be developed under Section 5, Regional Codes, if required.

8.9.5 Taking into account the above-mentioned considerations and a number of other proposals, the Commission adopted Recommendation 13 (CBS-VI).

8.10 Allocation of block numbers

The Commission noted that currently block number 50 to 59 were used by China. Since these block number had not yet been allocated to any region, the Commission agreed to allocate them to Region II (Asia), for its use. Recommendation 14 (CBS-VI) was adopted.

8.11 Amendments to coding procedures in Volume I of the Manual on Codes

8.11.1 The Commission noted the result of the inquiry with members of CAeM, which revealed that there was no need to retain the group $90DP_wH_w$ in the codes FM 51.E - TAF, FM 53.E - ARFOR, FM 54.E - ROFOR. In view of this the Commission decided to delete the group from Volume I of the Manual on Codes after the corresponding approval by ICAO. Recommendation 15 (CBS-VI) was adopted.

8.11.2 The Commission considered a number of proposals for amending various coding procedures in Volume I of the Manual on Codes and agreed:

(a) To amend Note 5 to code FM 51.E - TAF to read:

"When the same forecast in a TAF bulletin applies to several aerodromes, a separate forecast shall be issued for each aerodrome concerned. Only one indicator CCCC may prefix each coded forecast";

(b) To delete the last sentence of Remark 2 under Note (9) of METAR FM 15.E, containing the phrase "unconsidered guessing" and the remark in brackets which follows;

(c) To include the following definition of the term "reasonable accuracy" which appears under specification of symbolic letters PPP in the appropriate place in the Manual on Codes:

"For a station situated in a region of normal synoptic network density, the pressure at mean sea-level for a station is considered not to be computed with reasonable accuracy when it introduces a deformation into the analysis of the horizontal pressure field which is purely local and recurring;

For a station in a sparse-data area of the synoptic network, reasonable accuracy will be obtained when the reduction method used has proved to be satisfactory in a region of normal network density and under similar geographical conditions."

(d) To amend notes (1) to (4) under GGgg to read:

"(1) FM 15.E: official time of observation laid down by the meteorological office concerned in accordance with regional decision,

(2) FM 16.E: time of occurrence of the change which justifies the issue of the report,

(3) FM 39.E and FM 40.E: time of firing of the rocket,

(4) FM 63.E and FM 64.E: time of launching of the bathythermograph."

(e) To complete the notes under specification of symbolic letters GG by the following:

"(3) In the case of atmospherics observations, the actual time of observation is the time at which the observation of all specified elements is completed."

(f) To amend Note (1) under GGg to read:

"The time to be reported in FM 41.D is the time ... (other text unchanged) and renumbered as (2) and to add a new Note (1):

(1) The time to be reported in FM 20.E is the time of the last radar exploration which was used to draft the report."

8.12 Editorial revision of the Notes in Volume I of the Manual on Codes

8.12.1 The Commission examined the revised text of the Notes in Volume I of the Manual on Codes prepared by the Secretariat in the light of comments made by Members and the CBS Working Group on Codes. It was agreed that this text constituted an improvement on the existing text and corresponded to the format of the Technical Regulations.

8.12.2 Considering the revised text of Volume I of the Manual on Codes, the Commission amended a number of Regulations and Notes from the editorial point of view. In several places editorial simplifications and clarifications were undertaken. As was proposed by the Working Group on Codes, some of the code forms (PILOT and PILOT SHIP, TEMP and TEMP SHIP, ROCOB and ROCOB SHIP, CLIMAT TEMP and CLIMAT TEMP SHIP) were combined into single code forms without changing the numbering system. The Commission agreed that the consequent changes in Sections A-2, A-3 and A-4 of Volume 1 of the Manual on Codes should be made and requested the Secretary-General to arrange for the preparation of appropriate amendments. Recommendation 16 (CBS-VI) was adopted.

9. TELECOMMUNICATION SYSTEM (INCLUDING THE GTS PART OF WWW AND THE REPORT BY THE CHAIRMAN OF THE WORKING GROUP ON THE GTS) (Agenda item 9)

The Commission noted with appreciation the report by the chairman of the Working Group on the Global Telecommunication System, Dr. C. Giallombardo (Italy). The details of the chairman's report were discussed under the various paragraphs of this agenda item as appropriate. The discussions on this agenda item were mainly based on the report of the sixth session of the CBS Working Group on the GTS which contained the full text of the draft Manual on the GTS, Volume I, Global Aspects.

## 9.1 Organization of the Global Telecommunication System (Agenda item 9.1)

### 9.1.1 The Main Trunk Circuit (see also item 9.4)

9.1.1.1 The Commission was informed of the decisions of the twenty-fifth session of the Executive Committee recorded in Resolution 2 (EC-XXV) concerning the addition of Peking to the list of centres with receiving and transmitting capabilities on the MTC and its branches and the insertion in the WWW plan for the period 1972-1975 of a branch of the MTC Peking-Tokyo. As regards "REQUESTS (1)" of the above-mentioned resolution, the Commission accordingly made the appropriate amendments to the Manual on the GTS, in particular as regards the table and diagram of the responsibilities of centres on the MTC and its branches for the transmission of observational data. As regards "REQUESTS (2)" of Resolution 2 (EC-XXV), calling for a study of the additional circuitry required to bring Peking fully on to the MTC, the Commission agreed to defer action on this matter until further information was available.

### 9.1.2 Radio broadcasts

9.1.2.1 The Commission noted the decisions concerning the necessity of reviewing the present classification and functions of the existing system of radio broadcasts in the light of the WWW plan for the GTS. These decisions are recorded in the general summary of the fifth session of the Commission (paragraph 7.3.2), the Sixth Congress (paragraph 2.6.1.3) and the twenty-fourth session of the Executive Committee (paragraph 3.1.1.2). The Commission discussed the content of each category of broadcast, as well as its intended reception area and operational responsibilities. There was unanimous agreement that two classes of RTT broadcasts should be maintained, namely territorial and regional broadcasts, with some amendments to their present functions. The regional associations should co-ordinate the regional broadcasts in such a way that their contents would include a selection of data exchanged on the MTC to satisfy the Members' requirements.

9.1.2.2 As regards facsimile broadcasts, the Commission noted that the present broadcasts were established according to regional facsimile plans by the WMCs, RMCs and RTHs concerned. The role of the present regional facsimile broadcasts is to disseminate the products of the RMCs in the region, as well as the products of WMCs and other RMCs as required. The Commission therefore agreed that the integration of the facsimile broadcasts into the GTS plan should be confined to one category only, namely regional broadcasts, the contents of which should be decided upon by regional associations concerned and co-ordinated interregionally as necessary in order to meet fully the requirements of Members concerned. However, the limitation in the plan to only one category of facsimile broadcasts does not preclude the establishment of facsimile broadcasts by NMCs to serve purely national purposes.

### 9.1.3 GTS part of the draft WWW plan for 1976-1979

9.1.3.1 The Commission reviewed the GTS part of the draft WWW plan for the period 1976-1979, submitted by the Secretary-General. It was felt desirable not to repeat texts from the Manual on the GTS in the plan. However, the Commission agreed that, for the plan to be consistent, some repetition was unavoidable.

9.1.3.2 The Commission agreed to recommend the inclusion of the GTS part, as amended, in the draft WWW plan for 1976-1979, in accordance with the decisions taken in this respect under agenda item 5.

9.1.4 Overall performance of the GTS

9.1.4.1 The Commission noted a proposal from its Working Group on the Global Telecommunication System for obtaining more efficient and effective systems performance of the GTS. In this connexion it was mentioned that the CBS Working Group on the GTS only met at 4-yearly intervals and was, therefore, unable to perform management functions properly and effectively. The working group, therefore, felt that a special body with adequate regional representation needed to be set up, which could meet at, say, yearly intervals, and whose recommendations could be rapidly processed within WMO. The basis of the terms of reference of this body might be as follows:

(a) Oversee the overall performance of the GTS;

(b) Identify the most serious deficiencies in the implementation of the GTS;

(c) Arrange, if requested, for providing technical advice and assistance to Members.

9.1.4.2 The Commission was informed that the Secretary-General, in compliance with the Executive Committee decisions, had arranged for continuing periodic surveys on the flow of observational data through centres on the Main Trunk Circuit and its branches as well as additional RTHs and NMCs not on the MTC. The results of such surveys are presented to each session of the Executive Committee and published in the yearly Status Report on the Implementation of the World Weather Watch.

9.1.4.3 In this connexion, some delegates felt that a review of the terms of reference of the Commission itself might be required, while other delegates felt that the terms of reference of the CBS Working Group on the GTS, revised at this session, would suffice to cover the objective of the above-mentioned proposal. Furthermore, it was suggested that the three WMCs could arrange to carry out regular checks on the flow of traffic at their centres and exchange such results between themselves.

9.1.4.4 In view of the above, the Commission felt that for the time being the revised terms of reference of the Working Group on the GTS and the machinery proposed under agenda item 3, would permit the working group to review the results of the surveys carried out by the Secretary-General and to formulate recommendations for measures to be taken to overcome the shortcomings noted.

9.1.4.5 Furthermore, the Commission agreed that the matter of the effective monitoring of the overall performance of the GTS should be considered in conjunction with the overall monitoring of the WWW and that this whole matter needed further study by the Commission.

9.2 Telecommunications procedures (Agenda item 9.2)

9.2.1 The Commission reviewed the meteorological telecommunications procedures for the Global Telecommunication System, adopted by the fifth session of the Commission, in particular those concerning the message format, error control and

transmission and relay of pictorial information over circuits operated on a shared data/facsimile transmission basis. In this review it took into consideration the conclusions of the sixth session of the CBS Working Group on the GTS, as well as the procedures adopted by some regional associations which were referred to CBS for consideration and subsequent action for world-wide application as appropriate. The session noted that some points of the GTS procedures needed amendment and/or further clarification in the light of the experience gained by the different centres.

9.2.2 CLLLL

9.2.2.1 The Commission had a discussion on the utilization of the group CLLLL in the starting line of the message format for routine meteorological messages. It recalled its decision, taken at the fifth session of the Commission, that this group would be optional in International Telegraph Alphabet No. 2 and mandatory in International Alphabet No. 5. It noted that some regional associations had decided to make the group mandatory in Alphabet No. 2 in their regional meteorological telecommunication networks. Other regional associations kept the group optional, while encouraging Members to utilize it as far as possible.

9.2.2.2 This group was originally introduced as a means of identification at automated centres. The Commission was informed of the complexity for the operation of the system at some centres due to the lack of unified single procedure between Alphabet No. 2 and Alphabet No. 5. On the other hand, the Commission was informed that some centres would experience difficulties at this stage of implementation of the system if the group CLLLL were made mandatory in Alphabet No. 2. Mention was also made of the overloading of the low-speed circuits (50 bauds) if a new mandatory group was introduced.

9.2.2.3 In view of the above, the Commission agreed to make the use of the group CLLLL mandatory on all segments of the Main Trunk Circuit. Furthermore, it agreed that the group should be used on the main regional circuits and regional circuits as required by the RTHs concerned, in particular in their zone of responsibility for collection of observational data. The Commission urged regional associations to introduce the group CLLLL on their respective regional telecommunication networks as early as practicable to ensure the efficient operation of the Global Telecommunication System as a whole.

9.2.3 Table A - Data designators for alpha-numerical information

9.2.3.1 The Commission considered a new layout and content of Table A, prepared by the Secretariat in accordance with the principles laid down by the Working Group on the GTS. It noted that only two designators AG and FG were allocated for data in gridpoint form. In view of the expected increase in the availability of data in gridpoint form, the type of which could not be defined at present, the Commission agreed that a separate section in Table A under letter "G" should be allocated to gridpoint data. The Commission agreed that the table, as amended, should be included in the Manual on the GTS and authorized the president to approve minor amendments to the table in the light of the developments in the type of data available.

9.2.4 Tables B and C - Geographical designators

9.2.4.1 The Commission noted that Table B - Geographical designators, had been updated regularly by the Secretariat. It considered a proposal by the Working Group on the GTS for a new layout of Table B, with a view to enabling telecommunication centres on the GTS to handle meteorological messages efficiently. The proposal also contained detailed instructions for the proper application of the geographical designators. The Commission agreed to the revised Table B with some minor editorial changes. As regards Table C, the session was of the opinion that the present version needed no amendment.

9.2.5 Table of data designators for information transmitted by analogue facsimile

9.2.5.1 The Commission considered that the data designators for the information transmitted by analogue facsimile should not be included in Table A but should be given in a separate table. It agreed that this table should be included in the appropriate place in the Manual on the GTS.

9.2.6 "ii" and "k"

9.2.6.1 The Commission noted the decision made by its fifth session that "k" should be used in parallel with "ii" and the need for maintaining "k" should be reviewed after experience had been gained in the use of the group CLLLL and in the light of further study of the abbreviated heading. The Commission felt that in view of the present data distribution scheme on the GTS, namely (a) global, (b) regional and interregional, and (c) national and on a bilaterally-agreed basis, the use of "k" for identifying northern and southern hemisphere exchanges was no longer needed and could be dispensed with. Therefore, the Commission agreed upon precise definition and strict procedures for the utilization of "ii" to cover this change in the format of the abbreviated heading. It was further agreed that in both International Alphabets No. 2 and No. 5 the use of "ii" number in the abbreviated heading should be mandatory for all bulletins compiled.

9.2.7 Co-ordination of the designators used in the abbreviated heading and in the text of meteorological messages for various types of data

9.2.7.1 The Commission discussed the methods of identification used in meteorological messages, namely, the catalogue number (CLLLL), the abbreviated heading, and the code form indicator ($M_iM_iM_jM_j$ or a code word). The development of the various identifiers was discussed and the requirement for each was reviewed. As general requirements, the needs of telecommunications and data processing in both automated and manually operated centres were mentioned. More specifically, they serve to identify the following items:

(a) The general type of data contained in a bulletin;

(b) The geographical area from which the data come;

(c) The collecting centre which compiled the bulletin;

(d) The contents of the bulletin (e.g. a specified list of stations);

(e) The time and date of the data;

(f) The code form (and Part when reports can be transmitted in separate Parts).

9.2.7.2 It was agreed that all of the identifiers served more than one of the above purposes but that no one identifier served all of them. It was noted that the interrelation among the three identifiers was not clearly established. It was also mentioned that one or more of the identifiers might be eliminated and the format of the remaining identifiers might be adjusted accordingly to preserve the required identification. In view of these conclusions it was decided that the entire matter of identification needed to be reviewed in more detail before the next session of the Commission by a group composed of experts in telecommunications, data processing, and codes. The group should review the requirements for the various identifiers and their component parts with a view to rationalizing and making more efficient the identification of meteorological data.

9.2.8 Use of MIS and NIL

The Commission considered a proposal to change the present use of MIS and NIL, as well as the recommendation of the sixth session of the Working Group on the GTS to eliminate the indicator MIS. In the light of the information provided that the rules for the use of these terms were interpreted differently by various centres, the Commission concluded that there was no need to use both terms. It was agreed to use NIL as the one term to indicate that a scheduled report was not available for inclusion in a bulletin at its time of transmission. The further clarification was given that a report was considered to be scheduled only if it was listed in WMO Publication No. 9, Volume A, as being taken at a specific time. For example, the surface synoptic report from a station listed in Volume A as taking observations at 0600, 1200 and 1800 GMT is considered a scheduled report at those times but not at 0000 GMT. It was further agreed that for messages containing aerodrome forecasts in the "TAF" code form, NIL should not be used.

9.2.9 Procedures for correction

9.2.9.1 The Commission noted that difficulties were experienced by RTHs, in particular automated centres, in the removal from a routine meteorological message of an error sign and associated redundant characters and also the removal of letter-shift characters (Signal No. 29 in Alphabet No. 2) used for the elimination of errors by over-punching. The Commission stressed that the first approach to overcome this difficulty should be to ensure that all telecommunication centres abided strictly by the procedures for correction of errors. In this connexion the Commission agreed to amend the present procedures to the effect that neither the error sign nor over-punching of errors by use of the ltter-shift character would be used in the starting line and/or in the abbreviated heading of routine meteorological messages.

9.2.9.2 It also agreed that there should be further continued study of the problem, in particular as regards the simplification for automatic working of the use of the letter "E" and "Space" repeated alternately three times to correct information in meteorological messages.

9.2.10 Format and routeing of addressed messages

9.2.10.1 The Commission based its discussions on the conclusions of the sixth session of the Working Group on the GTS. The Commission realized that the number of multi-addressed messages represented a small percentage of the total number of addressed messages and felt it was not necessary that provision for multi-addressed messages should be made in the format to be developed. It was considered when an addressed message had to be sent to more than one addressee, this message would be sent as a single-addressed message and sent separately to each of the addressees. The Commission considered, however, that the repetition of transmission of a series of addressed messages containing the same text to different addressees could be avoided by including the additional addressees in the text of the addressed messages. In view of this, the Commission agreed to a format for single-addressed messages developed by the Working Group on the GTS.

9.2.10.2 As regards the category and definition of the addressed messages and their priority for transmissions, the Commission agreed that the following four categories would suffice:

(a) Service messages;

(b) Request for repetition messages;

(c) Administrative messages;

(d) Data messages (without specification of their contents).

It was felt that service messages would be transmitted for operational purposes only, for example, breakdown of circuits, request for change of frequencies, etc., with (a) and (b) being accorded the higher priority.

9.2.10.3 As regards the routeing system for addressed messages, the Commission felt that the following guidance should be followed for the exchange of addressed messages:

| | Message exchanged between | Circuit to be used |
|---|---|---|
| (a) | Centres on the MTC | MTC |
| (b) | RTHs in the same region | Main regional circuits |
| (c) | NMCs and RTHs in the same region | Regional circuits via the associated RTHs |
| (d) | Centres in different regions not on the MTC | Interregional circuits as available, or MTC |

The Commission was of the opinion that detailed distribution plans for the addressed messages within a region, under normal conditions and in cases of outages, should be worked out by the regional association concerned, based on the above guidance.

9.2.11 Length of meteorological messages

9.2.11.1 The Commission reviewed the length of meteorological messages as given in the present procedures, which state: "The optimum length of messages should be between 200 and 300 groups, observational messages should not exceed 300 groups (i.e. 1800 characters)". The Commission noted that the length of meteorological messages varied considerably and that long meteorological messages raised certain difficulties, such as long transmission time over low-speed channels and disruption of traffic if repetition of such meteorological messages was required. The Commission felt that the absolute maximum message length should be fixed. It was also of the opinion that the maximum length should apply to all types of messages. The Commission realized that a high value for the maximum length might cause difficulties at centres with low capacity computers. However, due to the nature of messages, and bearing in mind future needs for the transmission of meteorological information, the Commission was of the opinion that the maximum length of messages should be approximately twice the optimum length. It was agreed that an optimum message length of 1800 characters and a maximum message length of 3800 characters would be acceptable.

9.2.12 Request for repetition procedures

9.2.12.1 The Commission noted the request made by some regional associations for the necessity of developing precise procedures for requests for repetition of routine alpha-numerical data. The point was also raised that there was a need to specify how a centre should make a request for repetition of facsimile transmissions. The Commission was of the opinion that repetition of facsimile transmissions should follow the same procedures as for requests for repetition of routine alpha-numerical data. Therefore, the Commission developed precise procedures for requests for repetition both for alpha-numerical data and for facsimile transmissions. Since it was not feasible to specify a maximum number of requests to be met in order not to overload the system, the Commission urged Members to make use of these procedures to the minimum extent possible and only in cases where the repetition was really necessary. The Commission agreed that these procedures be included in the Manual on the Global Telecommunication System.

9.2.13 Special procedures for GATE

9.2.13.1 The Commission noted the request of the Joint GARP Organizing Committee (JOC) to study the problems associated with the acquisition of global data during the GARP Atlantic Tropical Experiment (GATE). In particular the Commission was requested "to propose, as a matter of urgency, action which would ensure that GATE stations whose data were missing, garbled or erroneous could be interrogated, and valid messages transmitted within the corresponding 24-hour period". It was pointed out that National Meteorological Centres were responsible for collecting observational data from their own territory, transmitting these data to the associated RTH or WMC, and checking and making corrections in order to ensure that standard telecommunication procedures were applied. It is also the responsibility of each Member to designate an NMC, or other centre as appropriate, to perform meteorological checking of observational data. The Commission, therefore, agreed that the action requested by JOC could best be undertaken by NMCs.

9.2.13.2 The Commission realized, however, that it might not be possible for all NMCs to perform all these functions during GATE. It therefore suggested that one of the three GATE processing centres be entrusted with the responsibility of informing the appropriate NMC when data from any of its GATE stations was missing or erroneous. The notification should be made using the addressed-message format. It was further suggested that each NMC, in addition to whatever action it might be able to take on a national basis to acquire data which were originally missing or erroneous, should institute the following procedure on a trial basis during GATE:

> A few minutes prior to each main synoptic reporting hour, the NMC should transmit to its associated RTH a message containing a list of the identifiers of its stations from which reports have not been received for the previous main synoptic reporting hour. This message would confirm to all recipients that the data from all other stations had been transmitted. If the data from any of the stations should become available later, it should, of course, be transmitted in the appropriate message format.

9.2.14 Error-control procedures in respect of data transmissions

Software system

9.2.14.1 The Commission was informed that some centres had encountered problems in the interpretation of the present error-control procedures (software), in particular as regards the termination of data transmission procedures which appeared to be incomplete. The Commission agreed to a small addition to these procedures with a view to their clarification.

Hardware system

9.2.14.2 The Commission reviewed the error-control procedures for the hardware system in the light of the experience gained in this respect. Some modifications and additions were made to the present text of the procedures with a view to greater clarity for their application.

9.2.15 Data/facsimile (analogue) switching procedures

The Commission reviewed the data/facsimile switching procedures for both the software and hardware systems in the light of the experience gained in this respect. Some modifications and additions were made to the present text of the procedures with a view to greater clarity for their application.

9.2.16 Requirements for relay of facsimile (analogue) transmissions

The Commission reviewed the procedures for the relay of facsimile (analogue) transmissions and agreed that the transmissions should be accomplished by store-and-forward operation or by direct transmission (through-switching) of the signals.

9.2.17 Future study programme on meteorological telecommunication procedures for the GTS

As a result of the above discussions the Commission felt that some points would still require future study in the light of experience gained in the operation of the GTS. These points could be summarized in general terms as follows:

(a) The full correspondence between the CLLLL and the abbreviated heading;

(b) Improvement of the message format of meteorological messages as a whole;

(c) RTD, AMD and COR procedures;

(d) Improvement of the procedures for correction of errors in text of bulletins;

(e) Message format for multi-addressed messages;

(f) Format for the end of an interrupted message;

(g) Improvement of error-control procedures in respect of data transmissions;

(h) Procedures for re-routeing of traffic on the MTC and its branches;

(i) Review of the procedures for store-and-forward data transmission, in particular as regards the queueing principle "first-in", "first-out", and the number of levels of priority required to ensure the distribution of the required information to NMCs within the agreed time limits.

9.3 Technical problems including introduction of new telecommunication techniques (Agenda item 9.3)

9.3.1 The Commission reviewed the technical characteristics and specifications of meteorological transmissions for the Global Telecommunication System, in particular those related to the Main Trunk Circuit and its branches, in the light of the information provided by certain delegates on the operational experience gained so far in the implementation of the present specifications.

9.3.2 Modems for signalling rates of 2400 bits/sec used on the GTS

9.3.2.1 The Commission recalled that the modulation code to be used on the GTS for modems operating at a data-signalling rate of 2400 bits/sec was as defined in CCITT Recommendation V.26, Alternative A. The Commission was informed of difficulties experienced in using this alternative of the modulation code, in that there was a loss of synchronization when a long series of binary zeros were transmitted. In order to overcome this difficulty, some centres had used another coding arrangement which, though not recognized by CCITT, had become known as Alternative A2. The

sixth session of the Working Group on the Global Telecommunication System requested the president of CBS, in consultation with the Secretary-General, to arrange for the acceptance by CCITT of the modulation code Alternative A2. In this connexion, the Commission was further informed that the CCITT Special Study Group A, which dealt with such questions, held its last meeting in January 1974 and an appropriate document to this effect was submitted by WMO to that meeting. The CCITT Special Study Group A agreed that, for the purpose of meteorological data transmission, the A2 coding arrangement was a technically acceptable solution.

9.3.2.2 In view of the above, and taking into consideration that the A2 coding arrangement did not give rise to synchronization difficulties at the centres which use this modulation code, the Commission agreed to the use of the modulation code A or A2 on the GTS as agreed by the related centres. The Commission noted that the CCITT had indicated a preference for modulation code B of the CCITT Recommendation V.26.

9.3.3 Data signalling rates on the MTC

9.3.3.1 The Commission considered the data-signalling rates used at present on the MTC and its branches. It noted that the increasing amount of data needed to be exchanged on the GTS (for example, satellite data, FGGE requirements, etc.) called for the use of data-signalling rates higher than those used at present, on certain parts of the GTS. Therefore, the Commission urged all Members concerned that, where it is possible and desirable, a data-signalling rate of 2400 bits/sec should be used, in particular on the MTC and its branches and preferably also on the main regional circuits.

9.3.3.2 The Commission noted the possibility of introducing higher data-signalling rates on the MTC, for example, 4800 bits/sec, taking into account the increasing volume of traffic expected on the MTC. However, the view was expressed that the introduction of 4800 bits/sec operation on any segment of the MTC would not be possible before 1976 due to budgetary and technical reasons, namely the necessary development of software programming, operational trials, increase of computer capacity, etc. The Commission felt that further study should be made by the Working Group on the GTS regarding operation with the data-signalling rate of 4800 bits/sec or higher on the MTC, bearing in mind that operation on such a higher data-signalling rate could only be implemented about two years after a final decision on this matter was made by CBS.

9.3.4 Coded digital facsimile transmissions

9.3.4.1 The Commission noted with appreciation the work achieved so far on this subject by its Working Group on the GTS. The various codes which have been studied may be divided into two categories depending on the method of coding used. The first includes the code dealt with in Annex IX of the abridged final report of CSM-V, while the second category includes the codes developed by Japan, the Federal Republic of Germany and the U.S.A. These latter codes are very close to each other and are entirely suitable for transmissions on circuits having a low-error rate or an error-detection system; the first which is more complex, is more suitable for circuits which do not have such an error-detection system, and also for radio broadcasts. This

classification is based on the results obtained from tests carried out by several Members, and with reference to the three criteria decided upon by the working group:

(a) Efficiency: of the same order for the four codes;

(b) Complexity: greater for the first code, similar for the three others;

(c) Elimination of errors: very efficient in the case of the first code.

9.3.4.2 The delegate from France pointed out that for several years France had been carrying out limited operation with a transmission on kilometric wavelengths using the code described in Annex IX of the abridged final report of CSM-V, and that, starting in 1976, they would extend such operation.

9.3.4.3 The Commission felt that early implementation of coded digital facsimile transmission on the MTC was particularly desirable for the following reasons:

(a) To expand the digital operation of this part of the GTS;

(b) To facilitate the relay of pictorial information by on-line centres and to make easier the selective distribution on a regional basis;

(c) To increase the capability of the MTC and speed up distribution of processed information.

9.3.4.4 In view of the above, the Commission agreed that the subject of coded digital facsimile transmissions should be studied as an urgent matter by the Working Group on the GTS. The latter group should establish a study group of experts to finalize this study as early as possible. This study group should, in consultation with the Secretary-General, initiate and co-ordinate operational trials between the centres concerned, using the above-mentioned codes. The study group should further study the results of the operational trials with a view to developing the necessary technical documentation to enable a decision to be taken for one unified system to be used on the GTS.

9.3.5 Analogue facsimile transmissions

9.3.5.1 The Commission noted the recommendation made by the Working Group on the GTS for the updating of WMO standards for analogue facsimile. The Commission included the proposed characteristics for analogue facsimile transmission using a drum speed of 240 rpm in Part III of the Manual on the GTS.

9.3.5.2 The Commission agreed that the revision of the analogue facsimile standards, as well as transmission of half-tone graphic documents in case of frequency modulation should continue to be on the study programme of the CBS Working Group on the GTS.

9.4 Implementation of the MTC and its branches (Agenda item 9.4)

9.4.1 The Commission reviewed the present status of implementation and future plans of the segments of the Main Trunk Circuit and its branches, including the

branch of the MTC between Peking and Tokyo. Detailed information as regards the implementation and future plans for each segment of the MTC and its branches was provided by the delegates from the various centres located on the MTC and its branches. The up-to-date information is contained in Annex III to this report. The Commission noted that, in accordance with the approved plans, all segments of the MTC would be operating at 1200/2400 bits/sec, including facsimile transmission capability, by the end of 1974, except for the segments Melbourne-New Delhi and Melbourne-Tokyo.

9.4.2 The Commission noted with concern a proposal from Australia that the WMC Melbourne should have only one major international communications link, that such a link should connect Tokyo and Melbourne and that the Main Trunk Circuit should be reorganized to provide a northern hemisphere closed loop to which Melbourne would be connected by a branch of the Main Trunk Circuit. Australia considered that one 2400 bits/sec link would be adequate to provide to WMC/RMC Melbourne and RMC Darwin all the data which those centres would require during the next few years, including the period of the FGGE and that such a link could also carry without difficulty all the products produced by the WMC/RMC Melbourne, the RMC Darwin and all Region V, and the part of the Antarctic data which the WMC Melbourne would be required to transmit.

9.4.3 The Commission realized that this would be a major change in the concept of the WWW and the configuration of the Main Trunk Circuit and its branches and would cause problems to Members requiring Melbourne WMC products, data from Region V and part of the Antarctic.

9.4.4 The delegate from the U.S.S.R. informed the Commission that the discontinuation of the segment Melbourne-New Delhi from the MTC portion Moscow-New Delhi-Melbourne would lead to considerable difficulties in the activities of the WMC Moscow.

9.4.5 Having regard to the problems of distribution of Region V data and the WMC Melbourne products which would arise should the Melbourne-New Delhi high-speed circuit not be implemented, the Commission urged early and serious reconsideration by Australia of their proposal.

9.4.6 However, because of the urgent nature of the problem, and particularly because Australia had indicated that there was a strong possibility that even the present low-speed circuit between Melbourne and New Delhi might be discontinued, the Commission agreed that there might be an urgent need to revise the GTS plan.

9.4.7 The Commission was of the opinion that a revised plan, which would eliminate the MTC segment New Delhi-Melbourne, would make it necessary to revise the concept of the MTC as adopted by the Fifth Congress. The Commission was, therefore, unable to formulate even the outlines of a revised plan for the MTC and its branches during the session because of the complexity of the problem and the possible repercussions throughout the whole WWW system, and also because of the need for governmental consideration of arrangements needed to implement any revised plan.

9.4.8 The Commission accordingly invited its president to bring this matter to the attention of the forthcoming session of the Executive Committee (EC-XXVI).

9.4.9 The Commission further urged Australia to maintain the Melbourne-New Delhi segment of the MTC at least at the present level (75 baud duplex telegraph) until a solution had been found and implemented. It also requested Australia and Japan to take all the necessary measures to upgrade the segment Tokyo-Melbourne to a telephone-type channel at an early date, and preferably before the commencement of the FGGE scheduled for mid-1977.

9.5 Manual on the GTS (Agenda item 9.5)

9.5.1 The Commission noted with appreciation that the draft text of the Manual on the GTS, Volume I - Global Aspects, was originally prepared by Mr. J. Neilon (U.S.A.) and reviewed by the sixth session of the Working Group on the GTS. This text contained all the regulatory material adopted by the fifth session of the Commission. The Commission reviewed the draft text and amended it, as necessary, in particular to include the conclusions of the Commission recorded under agenda items 9.1, 9.2 and 9.3 above.

9.5.2 The Commission agreed that the Regulatory Material on Regional Aspects would constitute Volume II of the Manual and would include the regional meteorological telecommunication plans as approved by the regional associations concerned.

9.5.3 The Commission recognized that most of the regulatory material contained in the Manual had been published in Chapter I of Publication No. 9, Volume C and was already in force. The Commission was of the opinion that the amendments or additional regulatory material to those already in force at present and which have been included in the Manual at this session should come into force on 15 January 1975. Therefore, the Commission agreed that the Manual on the GTS, Volume I - Global Aspects, should come into force on the same date (15 January 1975), with the understanding that the present Chapter I of Volume C would not be withdrawn before that date.

9.5.4 The Commission adopted Recommendation 17 (CBS-VI).

## 10. INTERNATIONAL CLOUD ATLAS (INCLUDING THE REPORT BY THE RAPPORTEUR ON REPORTING THE STATE OF THE SKY IN THE TROPICS) (Agenda item 10)

10.1 International Cloud Atlas

10.1.1 The Commission recalled Recommendation 41 (CSM-V), approved by Resolution 14 (EC-XXII), in which revised definitions and descriptions of hydrometeors were proposed for inclusion in Volume I of the International Cloud Atlas. The Commission was informed that since the last (1956) edition of Volume I was out of print, it had been decided to prepare a new revised edition, incorporating the amendments contained in Recommendation 41 (CSM-V).

10.1.2 The Commission reviewed the draft text of the new edition, prepared by Mr. A. Durget (France) as consultant, in which those parts having the status of

Technical Regulations were distinguished from the other parts by a different type of print, and in which the numbering system of paragraphs was similar to that followed in the Technical Regulations. It was agreed that, as suggested by the consultant:

(a) The texts appearing in the last edition in Part I, Chapter III, paragraphs 1 to 10 in the sections (8) entitled "Supplementary features and accessory clouds" be given the status of Technical Regulations as a logical consequence of the fact that the relevant section 4 of paragraph 3 in Part I, Chapter II has that status (see also paragraph 12 below);

(b) Part IV - Journal of clouds and meteors - should not be included in the new edition since this part is of no international interest;

(c) The sub-title "Manual on the observation of clouds and other meteors" be added to the present title of the publication.

The Commission also agreed that a corrigendum to the abridged Atlas published in 1956 should be issued to bring the abridged Atlas in line with the new edition of Volume I.

10.1.3 In conclusion, the Commission adopted Recommendation 18 (CBS-VI) requesting the Executive Committee to authorize the publication of the new edition and asking the Secretary-General to arrange for the necessary amendments to be made to the abridged Atlas.

10.2 Report by the Rapporteur on Reporting the State of the Sky in the Tropics

10.2.1 The Commission noted with appreciation the report by the Rapporteur on Reporting the State of the Sky in the Tropics (Mr. R. L. Holle, U.S.A.). It noted with interest that, with the contribution of the rapporteur, a simple code, suitably illustrated by cloud photographs, was devised for reporting the state of the sky in the tropical part of Region IV (North and Central America), and would be used there on an experimental basis for a six-months period in 1974. The Commission considered that there continued to be a need for determining the requirements for reporting the state of the sky in the tropical areas, and felt that the results of the RA IV experiment could be useful to this end. The view was also expressed that photographs of different states of the sky peculiar to tropical areas should be selected for inclusion in the International Cloud Atlas. It was therefore decided to re-appoint the rapporteur to carry out the required studies on the basis of the photographs already collected from Members as well as further photographs to be collected. Resolution 6 (CBS-VI) was adopted.

10.2.2 The Commission invited the president of CBS to request the Secretary-General to assist the rapporteur in collecting suitable photographs from Members and to request the Tropical Experiment Board to co-operate in acquiring high quality photographs of the state of the tropical sky during GATE.

## 11. EDUCATION AND TRAINING IN THE FIELD OF CBS (Agenda item 11)

### 11.1 Training in meteorological data processing

The Commission noted with satisfaction that its Working Group on the Global Data-processing System had appointed a rapporteur (Dr. L. Moen, Sweden) to prepare syllabi for training personnel in meteorological data-processing activities. The syllabi prepared by the rapporteur were studied and amended by the second session of the working group and subsequently approved by the president of the Commission for submission to the Executive Committee Panel of Experts on Meteorological Education and Training. The syllabi will be included in the WMO publication entitled "Guidelines for the education and training of meteorological personnel".

### 11.2 Training in meteorological telecommunications

The Commission was pleased to note that syllabi for training personnel in meteorological telecommunications had been prepared by the chairman of its Working Group on the Global Telecommunication System (Mr. C. Giallombardo, Italy) and that those too had been approved by the president for submission to the Executive Committee Panel of Experts on Meteorological Education and Training. The syllabi will be published in the Guidelines.

### 11.3 Training in synoptic meteorology

The Commission was informed that the twenty-fifth session of the Executive Committee had agreed that a revised edition of the Guidelines should be issued. The revised edition would incorporate new syllabi, currently under preparation, the addendum and any amendments to the syllabi in the present publication. The Commission agreed that the syllabi in synoptic meteorology, which appeared in the present edition of the Guidelines, might require revision and updating and entrusted the Working Group on the GDPS with the study of this matter.

### 11.4 WMO training publications

11.4.1 The Commission was encouraged by the number of training publications which had been issued or were under preparation by the Organization since its last session. These included:

- Compendium of Meteorological Training Facilities
- Compendium of lecture notes in Climatology for Class III meteorological personnel
- Compendium of lecture notes in Climatology for Class IV meteorological personnel

- Compendium of Meteorology for use by Class I and Class II meteorological personnel:

Volume I - Part I - Dynamic Meteorology

Part II - Physical Meteorology

The Commission was particularly interested in the fact that Volume II of the Compendium of Meteorology would contain lecture notes in synoptic meteorology. It expressed the hope that this volume would be issued in the near future. Volume III, the Commission was informed, would be devoted more to the applied meteorological fields.

11.4.2 The Commission noted with appreciation that a sequence of synoptic charts for training purposes had been prepared in the Hydrometeorological Service of the U.S.S.R. This set, which includes some charts covering tropical areas, has proved to be a valuable training aid and is used by several Members. The Commission was of the opinion that similar charts should be prepared on the basis of the more complete data sets to be obtained during GARP experiments such as GATE, MONEX and FGGE, and published for training purposes.

11.5 Requirement for specialized training

11.5.1 A suggestion was made to arrange for specialized training in maritime meteorology. The Commission felt that Members in need of such training facilities should obtain up-to-date information from the Secretary-General on the availability of these facilities.

11.5.2 The Commission noted the proposal of CAS-VI that a symposium of specialists be convened on the topic of interpretation of the broad-scale NWP products in terms of weather for local forecasting purposes. CAS also expressed its support for training seminars and fellowships in this field, in order to raise the level of knowledge in numerical weather prediction. CBS fully supported the proposals of CAS and expressed its hope that these proposals could be implemented soon. The Commission felt that these seminars might be extended in scope to include other objective small-scale weather prediction techniques.

12. REVIEW OF TECHNICAL REGULATIONS (Agenda item 12)

12.1 The Commission examined a number of proposals made by Members and the working groups of the Commission regarding amendments to the Technical Regulations. A summary of these proposals and the conclusions of the Commission on them is given in paragraphs 12.2 to 12.13 below. The order of the summary broadly follows the sequence of the relevant parts of the Technical Regulations.

Definitions

12.2 As requested by Sixth Congress, the Commission reconsidered the definition of "meteorological message" at present appearing in the Technical Regulations, and

proposed to replace it by a new definition drawn up by the Working Group on the GTS and slightly amended at the session. As a consequence of the above proposal, the Commission suggested appropriate editorial changes to Chapter /A.2.3/ - Meteorological codes, of the Technical Regulations where the word "messages" appears with its former connotation. Furthermore, a definition of "meteorological analysis" was drawn up for inclusion in the Technical Regulations, and the definition of the Global Observing System was recommended to be replaced by a new definition based on the WWW plan for the period 1976-1979.

A.1 - The Global Observing System

12.3 It was decided to recommend the replacement of paragraph /A.1.1/ 1.1 concerning the components of the GOS by the more recent formulation as given in paragraph 31 of the draft WWW plan for 1976-1979.

12.4 Australia submitted a proposal to replace paragraphs /A.1.1/ 3.1.7 and /A.1.1/ 3.1.8 regarding the establishment of observing facilities in data-sparse ocean areas by a new paragraph. The reason for the proposal was that the paragraphs /A.1.1/ 3.1.7 and /A.1.1/ 3.1.8 were considered too limited since they called for the establishment of ocean weather stations and fixed automatic marine stations only, while advances in technology now permitted the use of other facilities also, such as drifting buoys, constant level balloons and satellite observing systems, to increase the density of observation in such areas. On the basis of the Australian proposal, the Commission recommended to replace the above-mentioned two paragraphs by a new one which, being less specific, covered more types of facilities but contained an explicit reference to ocean weather stations.

12.5 The Commission felt that, in view of the proposed deletion of Code Table 1100 from the Manual on Codes, the Technical Regulation /A.1.2/ 4.7.2 needed revision. A proposed amended text was therefore included in Recommendation 19 (CBS-VI).

12.6 The Commission considered a suggestion by Australia to amend paragraphs /A.1.3/ 3.1.1 to /A.1.3/ 3.1.2 regarding the frequency of upper-air observations. The purpose of the proposal was to clearly distinguish between upper-wind observations and radiosonde observations so that appropriate recommendations could be made regarding the respective frequencies with which each type of observation should be made and reported. The Commission felt that the Technical Regulations were sufficiently flexible to satisfy Australia and the question of requirements for upper-air observations could be dealt with by the regional associations within the framework of WWW. Considering that the proposed GARP experiments were expected to throw light on the requirements of network densities and frequencies of observations in the tropics, the Commission agreed that the appropriate paragraphs of the Technical Regulations should not be amended before the completion of the study of this matter.

A.2 - The Global Data-processing System

12.7 The Commission recommended amendments to paragraph /A.2.2/ 2.1.1 concerning projections to be used for weather charts, by deleting the references to the areas for which the various projections should be used, since the present text was felt to be unnecessarily restrictive.

12.8 With respect to paragraph [A.2.2] 2.1.2 specifying scales for weather charts, the Commission noted that many Members had made proposals for amendments in response to an inquiry made by the Secretariat at the request of the Working Group on the GDPS. In view of the complexity of the problem and the diversity of the proposals made, the Commission requested the Working Group on the GDPS to study the question, taking into account the comments made by Members, and to report on its conclusions to the president of the Commission in time for submission of a concrete proposal to Seventh Congress (April 1975).

12.9 As regards Chapter [A.2.4] relating to climatological practices, the Commission agreed that a note should be included at the beginning of the chapter, making reference to the Guide on the GDPS. Another proposal agreed upon by the Commission related to paragraph [A.2.4.] 2.1.3 concerning the use of eighty-column punch-cards for the storage of climatological data. This proposal aims at allowing the use of other storage media in the light of technological developments, taking also into account the relevant provisions of the WWW plan.

A.3 - Global Telecommunication System

12.10 With a view to avoiding duplication between the Technical Regulations and the Manual on the GTS, the Commission recommended the replacement of the present Chapter A.3.1 - Meteorological telecommunications - by a new, shorter chapter.

Annexes to Volume I of the Technical Regulations

12.11 A proposal to extend the status of Technical Regulations to specified parts of the International Cloud Atlas is recorded in paragraph 10.1.2 above. In view of this proposal and of the new layout of the revised edition of the Atlas, the part of the table of contents of the Technical Regulations concerning Annex I (International Cloud Atlas) will have to be suitably amended.

Volume III - Operational Hydrology

12.12 The Commission noted the draft for a new chapter entitled "Meteorological Services for Hydrology" that had been developed by CHy in consultation with CBS and CoSAMC for inclusion in the Technical Regulations. The Commission had no comment on the draft.

12.13 The Commission adopted Recommendation 19 (CBS-VI) concerning the proposed amendments to the Technical Regulations. The precise working of all the amendments proposed is given in Annex X to this report.

## 13. NOMINATION OF MEMBERS OF WORKING GROUPS AND NOMINATION OF RAPPORTEURS (Agenda item 13)

13.1 The Commission established five working groups, namely:

- Advisory Working Group

- Working Group on the Global Observing System
- Working Group on the Global Data-processing System
- Working Group on the Global Telecommunication System
- Working Group on Codes

The Commission also appointed a Rapporteur on the State of the Sky in the Tropics, to act until the seventh session of CBS. The chairmen of the working groups, the rapporteur, as well as the members of the Advisory Working Group, were nominated at the session. It was agreed that the members of the other working groups should be nominated by correspondence after the session since all Members of WMO should be invited to nominate experts to serve on these groups.

13.2 Details of the composition and terms of reference of the working groups are given under agenda item 3. Regarding the rapporteur, see agenda item 10.

## 14. REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE COMMISSION AND RELEVANT EXECUTIVE COMMITTEE RESOLUTIONS (Agenda item 14)

14.1 In accordance with current practice, the Commission examined those resolutions and recommendations of CSM/CBS which were adopted prior to its sixth session and were still in force.

14.2 The Commission noted that action on Resolution 7 (CSM-V) - Rapporteur on Training in Synoptic Meteorology had been completed. It expressed its appreciation to the rapporteur (Mr. D. B. A. Mandengue, Cameroon) for the excellent work he had carried out.

14.3 The Commission noted that the substance of Recommendation 12 (CSM-V) - Reporting of Parts B and D of FM 36.D - TEMP SHIP by voluntary observing ships, and Recommendation 26 (CSM-V) - Priority of synoptic time for upper-air observations, had not been included in any Manual or Guide and it was, therefore, necessary to restate these recommendations. Recommendation 20 (CBS-VI) and Recommendation 21 (CBS-VI) were adopted.

14.4 As regards Recommendation 22 (CSM-V) - Code form for synoptic surface observations and Recommendation 45 (73-CBS) - Date of introduction of new code forms for synoptic surface observations, it was decided not to keep these recommendations in force. The decision of the Commission on the introduction of new surface synoptic codes was recorded under agenda item 8.

14.5 The Commission noted that Recommendation 46 (73-CBS) - Code form for the transmission of processed data in digital form and Recommendation 47 (74-CBS) - Sea ice analysis code form, had been approved by the President of WMO on behalf of the Executive Committee, in accordance with Regulation 9 (5) of the General Regulations. The substance of these recommendations will be included in the Manual on Codes. Therefore, these recommendations need not be kept in force.

14.6 In view of the above, the Commission agreed to cancel all recommendations and resolutions adopted by the Commission prior to its sixth session. Resolution 7 (CBS-VI) was adopted.

14.7 The Commission then examined the Executive Committee's resolutions within the field of activity of CBS and agreed that Resolution 14 (EC-XXII), Resolution 15 (EC-XXII), Resolution 2 (EC-XXV) and Resolution 3 (EC-XXV) need no longer be kept in force. Recommendation 22 (CBS-VI) was adopted.

14.8 The Commission also noted that the matters referred to CBS by Resolution 12 (EC-XXIV) and Resolution 11 (EC-XXV) were dealt with under the appropriate agenda items of the sixth session.

## 15. SCIENTIFIC LECTURES AND DISCUSSIONS (Agenda item 15)

15.1 A large part of one day was devoted to the scientific lectures and discussions. The meeting was presided over by Dr. J. Brinkmann, vice-president of CBS. The papers presented were as follows:

- The First GARP Global and related Experiment, by Professor B. R. Döös (Director, Joint Planning Staff)
- The role of the FGGE for analysis and weather forecasting in middle latitudes, by Mr. G. A. Corby (U.K.)
- Design of some experiments with a limited area forecasting model, by Fedor Mesinger and Zavisa I. Janjic (Yugoslavia) (presented by Professor Mesinger)

15.2 The Commission requested the Secretary-General to publish these papers after appropriate consultation with the authors.

## 16. ELECTION OF OFFICERS (Agenda item 16)

Dr. O. Lönnqvist (Sweden) was elected president of CBS and Dr. J. Brinkmann (Federal Republic of Germany) was elected vice-president.

## 17. DATE AND PLACE OF THE SEVENTH SESSION (Agenda item 17)

In the absence of any formal invitation from Members represented at the session, the Commission decided that the date and place of its seventh session should be fixed at a later date and requested its president to make the necessary arrangements in consultation with the Secretary-General.

## 18. CLOSURE OF THE SESSION (Agenda item 18)

18.1 In his closing address the president reviewed the major results of the work which had made the sixth session of CBS successful. He thanked the Yugoslav authorities and in particular Dr. D. Radinović, Permanent Representative of Yugoslavia with WMO, for the excellent facilities provided for the session, and for the warm hospitality extended to the participants. The president also expressed his thanks to WMO and the local secretariat staff who gave support to the work of the session, as well as the chairmen of the working committees and the chairmen and participants of the various ad hoc groups. He thanked all participants for the spirit of friendly co-operation which had characterized the whole session.

18.2 Mr. K. R. Johannessen (U.S.A.) congratulated the president for the excellent manner in which he had presided the session, and assured the president that the Commission would extend full confidence and support to him during his term of office as president of CBS. Mrs. V. Jurčeč thanked all participants for the appreciation shown to the host country for organizing the session. Dr. A. H. Glaser, on behalf of the Secretary-General, congratulated the president on his election as president of CBS. He expressed his gratitude to the Yugoslav hosts and thanked all those who contributed to the success of the session.

18.3 The session was closed at 4 p.m. on 4 April 1974.

## RESOLUTIONS ADOPTED BY THE SESSION

### Res. 1 (CBS-VI) - 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 (CSM-V) - Advisory Working Group of the Commission for Synoptic Meteorology,

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

DECIDES:

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

(a) To advise the president of the Commission, as necessary, in his functions of expressing opinions or taking action on urgent or non-controversial matters;

(b) To assist the president in short- and long-term planning of the work of the Commission and of its working groups;

(c) To assist the president in the co-ordination of the activities of the four major working groups in CBS (GOS, GDPS, GTS and Codes);

(d) To keep under review the work of the Commission;

(2) That the composition of the advisory working group should be as follows:

President of CBS (chairman)

Vice-president of CBS

Chairmen of the CBS Working Groups on GOS, GDPS, GTS and Codes

K. A. Khalil (Egypt)

P. S. Pant (India).

Res. 2 (CBS-VI) - WORKING GROUP ON THE GLOBAL OBSERVING SYSTEM

THE COMMISSION FOR BASIC SYSTEMS,

NOTING Resolution 3 (CSM-V) - Working Group on the Global Observing System,

CONSIDERING that further studies and planning should be undertaken to meet, to the maximum extent possible, the observational requirements of WWW, GARP, AFCS, IGOSS and other international programmes such as the Earthwatch,

DECIDES:

(1) To re-establish the Working Group on the Global Observing System with the following terms of reference:

(a) To follow closely the progress of the implementation of the GOS and, as necessary, to formulate recommendations with a view to improving the performance of the GOS, including ways and means for its monitoring;

(b) To develop a Guide on GOS;

(c) To make studies and recommendations on the following items:

(i) Specifications of observational data requirements for the various networks and scales of meteorological phenomena;

(ii) Design of the future Global Observing System in close relation to the development of four-dimensional data-assimilation techniques;

(iii) More effective utilization of aircraft reports in a mixed observing system;

(iv) Mixture of various observing techniques in the light of new requirements and evaluation of data accuracies and compatibilities;

(v) New observing technology and methods for inclusion in the GOS;

(vi) Problems relating to the initial processing of level I data;

(vii) Relevant aspects of quality-control procedures applied at observing stations;

(d) To consider and, as necessary, make recommendations on observational data requirements for the GOS as put forward by international programmes such as GARP, AFCS, IGOSS and Earth-watch;

(e) To take action on matters referred to the working group by the president;

(2) To give the working group the following composition:

(a) An expert designated by each regional association;

(b) An expert designated by the president of the Commission for Instruments and Methods of Observation;

(c) Experts nominated by Members operating, or planning to operate, significant parts of the Global Observing System, and experts nominated by other Members wishing to participate actively in the work of the group;

(d) Experts who may be designated by presidents of other technical commissions;

(3) To select, in accordance with Regulation 31 of the General Regulations, Dr. R. Czelnai (Hungary) as chairman of the working group.

Res. 3 (CBS-VI) - WORKING GROUP ON THE GLOBAL DATA-PROCESSING SYSTEM

THE COMMISSION FOR BASIC SYSTEMS,

NOTING Resolution 5 (CSM-V) - Working Group on the Global Data-processing System,

CONSIDERING that there is a need for continuation of the Working Group on the Global Data-processing System,

DECIDES:

(1) To re-establish the Working Group on the Global Data-processing System with the following terms of reference:

(a) In order to achieve the most rational and economical GDPS possible, to formulate recommendations on, and to keep under continuous study, the following items, taking into account the views expressed by other technical commissions:

(i) Principles and guidance on methods for the co-ordination and monitoring of technical operational matters of the GDPS;

(ii) Co-ordination of observational data needs of the GDPS, and provision of advice on the formulation of requirements;

(iii) Organization of the GDPS to determine whether changes are desirable and possible;

(iv) All statements of requirements for the products of the GDPS from all users of the system;

(v) Co-ordination of the products of the WMCs and the RMCs and the time schedules for their output, frequency of issue and distribution;

(vi) Transmission priorities of WMC and RMC products on the Main Trunk Circuit and its branches, including priorities for resumption of service after outages;

(vii) Consideration of matters relating to real-time and non-real-time quality control, storage and retrieval of data and products within the GDPS;

(viii) Regular exchange among WMCs, RMCs and NMCs of information on the techniques and procedures used within the GDPS and the results achieved from these techniques;

(b) To keep abreast of scientific and technical developments relating to methods and techniques of meteorological analysis and forecasting for general purposes including the World Weather Watch, to formulate recommendations on implementation of new techniques and/or to bring these developments to the attention of the president of CBS with a view to referring them to other relevant constituent bodies as required;

(c) To identify problems associated with meteorological analysis and forecasting 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 commissions as required;

(d) To prepare additional parts of the Guide on the GDPS and to keep the Guide up to date;

(e) To develop a Manual on the GDPS;

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

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

(h) To act upon matters referred to the working group by the president;

(2) To give the working group the following composition:

(a) An expert designated by each regional association;

(b) An expert to be nominated by each of the Members responsible for the operation of the World Meteorological Centres;

(c) Experts nominated by Members responsible for the operation of Regional Meteorological Centres and other Members wishing to participate actively in the work of the group;

(d) Experts who may be nominated by presidents of other technical commissions;

(3) To select, in accordance with Regulation 31 of the General Regulations, Mr. E. B. Fawcett (U.S.A.) as chairman of the working group.

Res. 4 (CBS-VI) - WORKING GROUP ON THE GLOBAL TELECOMMUNICATION SYSTEM

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Resolution 6 (CSM-V) - Working Group on the Global Telecommunication System,

(2) That the developments in the field of telecommunications are progressing at an accelerated rate, and

CONSIDERING:

(1) That the concept of the World Weather Watch, in the implementation period 1976-1979, will require a series of technical studies,

(2) That changes in meteorological requirements stemming from the World Weather Watch, other WMO programmes and joint programmes between WMO and other organizations, entail a constant review of the world-wide telecommunication system,

DECIDES:

(1) To re-establish the Working Group on the Global Telecommunication System with the following terms of reference:

(a) To study and to formulate recommendations in respect to organizational, technical and procedural aspects of the meteorological telecommunication systems, in particular the

Global Telecommunication System of the World Weather Watch, including the collection of weather reports from ships, as well as the collection and distribution of meteorological information through meteorological satellites;

(b) To keep under constant review developments in telecommunication techniques and equipment and their adaptation to the requirements of an efficient, world-wide system of meteorological telecommunications, in particular the advantages derived from communication space techniques including meteorological satellites, and to formulate appropriate recommendations;

(c) To formulate for meteorological transmissions, proposals on international standardization of operating practices, procedures, equipment and related questions, including format and schedules;

(d) To follow closely the progress of the implementation as well as the operation of the meteorological telecommunication systems and, as necessary, to formulate recommendations with a view to remedying shortcomings and effecting improvements;

(e) To keep in touch with the activities of the Working Groups on Meteorological Telecommunications of regional associations;

(f) To co-ordinate, as necessary, its activities with the work of other working groups of CBS, in respect of meteorological telecommunications;

(g) To keep abreast of the activities of the International Telecommunication Union, the International Civil Aviation Organization, the Inter-Governmental Maritime Consultative Organization and other international organizations concerned, on matters pertaining to meteorological telecommunications;

(h) To establish, as necessary, study groups or panels composed of experts, or appoint rapporteurs, for consideration of special problems of a technical or operational nature;

(i) To undertake any appropriate task in accordance with the directives given by the Commission for Basic Systems, or by its president;

(j) To advise the president of the Commission for Basic Systems on meteorological telecommunication matters as necessary;

(2) To give the following composition to the working group:

(a) The chairmen of the Working Groups on Meteorological Telecommunications of all regional associations;

(b) Experts to be nominated by each of the Members responsible for the operation of World Meteorological Centres and the Regional Telecommunication Hubs on the Main Trunk Circuit and its branches;

(c) Experts nominated by other Members wishing to participate actively in the work of the group;

(d) Experts who may be nominated by presidents of other technical commissions;

(3) To select, in accordance with Regulation 31 of the General Regulations, Mr. I. A. Ravdin (U.S.S.R.) as chairman of the working group.

Res. 5 (CBS-VI) - WORKING GROUP ON CODES

THE COMMISSION FOR BASIC SYSTEMS,

NOTING Resolution 2 (CSM-V) - Working Group on Codes,

CONSIDERING:

(1) That there is a continuing need for the review of international codes,

(2) That the working programme of the CBS for the coming four years will very probably imply the development of new codes,

DECIDES:

(1) To re-establish the Working Group on Codes with the following terms of reference:

(a) 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 international code forms and tables of specifications;

(b) To develop codes to meet new requirements which have been so established;

(c) To keep under review the existing international codes and to recommend changes to these codes as required;

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

(e) To take action on problems assigned to the working group by the president of CBS;

(f) To initiate a study of a new generation of codes based on the principles of information theory and suited to the automation of data acquisition, transmission and processing;

(g) To co-ordinate its work on the development of new codes and improvement of existing codes with the CBS Working Groups on the GOS, GDPS and GTS;

(2) To give the working group the following composition:

(a) An expert designated by each regional association;

(b) Experts designated by Members wishing to participate actively in the work of the group;

(c) Experts who may be designated by the presidents of the technical commissions;

(3) To select, in accordance with Regulation 31 of the General Regulations, Mr. G. Doumont (Belgium) as chairman of the working group.

Res. 6 (CBS-VI) - RAPPORTEUR ON THE STATE OF THE SKY IN THE TROPICS

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Paragraph 4.2.1 of the general summary of the abridged final report of CSM-V,

(2) The work performed by the Rapporteur on Reporting the State of the Sky in the Tropics in refining and testing a code and sets of cloud photographs for use in the tropical part of Region IV;

CONSIDERING that clouds illustrated in the International Cloud Atlas do not include some states of the sky peculiar to the tropics;

DECIDES:

(1) To appoint a Rapporteur on the State of the Sky in the Tropics with the following terms of reference:

Through co-operation with experts in other regions,

(a) To collect annotated photographs of clouds and state of sky which are widely representative of tropical regions;

(b) To select the most representative photographs of tropical clouds, in particular those not described by existing codes for eventual inclusion in the International Cloud Atlas;

(c) To propose, if possible, a classification of the morphology of the cloud systems observed in the tropical sky;

(d) To prepare, if possible, sets of photographs taken at approximately the same time from satellites and aircraft above the clouds and from the surface;

(e) To investigate to what extent cloud codes adequately describe the state of the sky in the tropics;

(f) To submit a report of his work to the president of CBS no later than 1 July 1977.

(2) To invite Mr. R. L. Holle (U.S.A.) to serve as Rapporteur on the State of the Sky in the Tropics.

Res. 7 (CBS-VI) - REVISION OF THE PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE COMMISSION

THE COMMISSION FOR BASIC SYSTEMS,

NOTING the action taken on the recommendations adopted prior to its sixth session,

CONSIDERING that all the resolutions adopted prior to its sixth session are now obsolete,

DECIDES not to keep in force any of the recommendations or resolutions adopted by the Commission prior to the sixth session.

## RECOMMENDATIONS ADOPTED BY THE SESSION

Rec. 1 (CBS-VI) - OUTPUT PRODUCTS OF WMCs

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Recommendation 28 (CSM-V) - Output products of WMCs, approved by Resolution 14 (EC-XXII),

(2) World Weather Watch plan for 1972-1975, paragraph 133 (a),

CONSIDERING the need for keeping under review the overall list of output products of WMCs,

RECOMMENDS that the list of products given in the annex* to this recommendation be used as a general basis for the establishment and periodic updating of the actual output product programmes of World Meteorological Centres, taking into account both the needs of the recipient Members and the capability of the WMCs and the GTS to meet them.

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* See Annex IV

Rec. 2 (CBS-VI) - OUTPUT PRODUCTS OF RMCs

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Recommendation 29 (CSM-V) - Output products of RMCs, approved by Resolution 14 (EC-XXII),

(2) World Weather Watch plan for 1972-1975, paragraph 133 (a),

CONSIDERING the need for keeping under review the overall list of output products of RMCs,

RECOMMENDS that the list of products given in the annex* to this recommendation be used as a general basis for the establishment and periodic updating of the actual output product programme of Regional Meteorological Centres, taking into account both the needs of the recipient Members and the capability of the RMCs and the GTS to meet them.

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* See Annex V

Rec. 3 (CBS-VI) - CONVERSION OF PRODUCTS IN ALPHA-NUMERIC (GRID CODE) FORM INTO PICTORIAL FORM

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Paragraph 117 of the WWW plan for 1972-1975,

(2) Recommendation 46 (73-CBS) - Code form for the transmission of processed data for grid points for digital form,

(3) Paragraph 3.1.6.1 of the general summary of the abridged report of EC-XXIV,

CONSIDERING:

(1) The need for reducing the time of transmission of processed information on telecommunication circuits, and that this need may be met by the use of the GRID code form instead of the analogue facsimile form,

(2) That many non-computerized NMCs continue to wish to receive output products of WMCs and RMCs in pictorial form,

(3) That it is therefore necessary to have facilities, at appropriate centres, for the conversion of processed data in alpha-numeric form into pictorial form,

(4) That such conversion facilities are in general, most suitably located at World Meteorological Centres and Regional Meteorological Centres,

RECOMMENDS:

(1) That Members operating WMCs/RMCs be invited to equip their respective centres with appropriate facilities for the conversion of processed data in alpha-numeric (GRID code) form into pictorial form for regional distribution, as soon as possible;

(2) That until the conversion facilities become available at all the centres concerned, facsimile and other types of transmissions should be continued as appropriate to meet the requirements of Members.

Rec. 4 (CBS-VI) - REQUIREMENTS FOR GLOBAL EXCHANGE OF OBSERVATIONAL DATA

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Paragraph 4.3.2 of the annex to Recommendation 32 (CSM-V) - Principles for the establishment of the exchange programme for observational data on the Main Trunk Circuit,

(2) Recommendation 33 (CSM-V) - Contents of global exchanges,

(3) Technical Regulations [A.1.1.] 3.1,

CONSIDERING:

(1) That there is a need for a data set for large- and planetary-scale analysis and numerical weather prediction,

(2) That stations in the basic synoptic network are regularly reviewed by regional associations,

(3) That there is a need for immediate updating of the list of stations from which observations are available for global exchange,

(4) That there is a need for exchange on a global basis of data which have become available as a result of developments in satellite techniques,

(5) That the list of stations for global exchange should be reviewed at least at each session of CBS,

RECOMMENDS:

(1) That the observational data requirements for large- and planetary-scale analysis and numerical weather prediction, as laid down in Part A of the annex* to this recommendation, should be used for the establishment of the exchange programmes on the GTS, in particular on the Main Trunk Circuit and its branches;

(2) That the list** of implemented stations as established by the session should be used for the compilation of bulletins for the global exchange on the GTS, in particular on the Main Trunk Circuit and its branches;

AUTHORIZES the president of CBS to update the list of stations in accordance with the procedures laid down in Part B of the annex* taking into account the criteria set forth in paragraph 1.3 of Part A of the annex* to this recommendation;

REQUESTS the Secretary-General to arrange for the inclusion of Part A of the annex* to this recommendation, as well as the list of stations, in the Manual on the GTS.

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* See Annex VI.

** The list of stations is published in the Manual on the GTS.

Rec. 5 (CBS-VI) - PUBLICATION OF VOLUME I OF THE GUIDE ON THE GDPS

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Recommendation 30 (CSM-V) - Publication of a Guide on the Global Data-processing System, approved by Resolution 14 (EC-XXII),

(2) The draft text of Volume I of the Guide on the GDPS as contained in CBS-VI/Doc. 8,

(3) That Volume II of the Guide has been published as WMO Publication No. 305 - Preparation of synoptic weather charts and diagrams,

CONSIDERING:

(1) The urgent need for publication of Volume I of the Guide, which describes in detail the operational methods of the GDPS,

(2) That this volume may require modifications; and that additional material will have to be included later in Volume I of the Guide,

RECOMMENDS that the Secretary-General be requested:

(1) To amend the draft text of Volume I of the Guide in the light of the decisions of the Commission at the sixth session;

(2) To publish the amended text in the four official languages of the Organization as soon as possible;

AUTHORIZES the president of the Commission to approve further changes to the publication as necessary.

Rec. 6 (CBS-VI) - AIRCRAFT WEATHER REPORTS

THE COMMISSION FOR BASIC SYSTEMS,

NOTING Technical Regulations [12.1.] 2.3 and [12.2.] 2.3,

CONSIDERING the increased need for aircraft weather reports for analyses and prognoses,

RECOMMENDS:

(1) That efforts should be continued for making available an increased number of aircraft weather reports to processing centres;

(2) That at all stages of distribution, the elimination of aircraft reports should be kept to a minimum;

(3) That whenever practicable, WMCs and RMCs should apply quality control procedures prior to transmission of aircraft weather reports on the GTS;

REQUESTS the Secretary-General to invite ICAO and CAeM to take action on RECOMMENDS (1) and (2) as appropriate.

Rec. 7 (CBS-VI) - USE OF CODE FORMS FOR THE EXCHANGE OF SYNOPTIC SURFACE OBSERVATIONS ORIGINATING FROM AUTOMATIC WEATHER STATIONS

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Recommendation 23 (CSM-V) recommending the use of the code forms SYNOP FM 14.E and SHIP FM 24.E for international exchange of reports containing observational data obtained by automatic weather stations,

(2) That some Members are using code form FM 11.E for the international distribution of observational data from automatic weather stations,

CONSIDERING:

(1) That in some cases, special codes are used for the transmission of data from automatic weather stations to National Meteorological Centres,

(2) That prior to the distribution of observational data obtained from automatic weather stations transcription into WMO code form takes place,

(3) That a single code form for surface synoptic observation would facilitate the work of processing centres,

RECOMMENDS that preference should be given to the use of code forms FM 11.E, FM 21.E, FM 22.E, FM 23.E and FM 26.D over FM 14.E and FM 24.E for the exchange of reports containing observations of automatic weather stations over the GTS, in particular on the MTC.

Rec. 8 (CBS-VI) - DELETION OF CODE TABLE 1100 - F - FORCE OF SURFACE WIND

THE COMMISSION FOR BASIC SYSTEMS,

NOTING Recommendation 16 (CMM-VI) approved by Resolution 11 (EC-XXV),

CONSIDERING that symbolic letter "F" - Force of surface wind is not used in any international code form,

RECOMMENDS that:

(1) Code table 1100 - "F Force of surface wind" (Beaufort scale of wind) be deleted from Part A-4 of the Manual on Codes, Volume I;

(2) Part A-3 of the Manual on Codes, Volume I, be amended as follows:

(a) Delete all references to F, the specification and associated notes;

(b) Under ff - wind speed - note 1 (b), delete "(Code 1100)";

REQUESTS the Executive Committee to co-ordinate the date for the deletion of the Code Table 1100 and the relevant references from Volume I of the Manual on Codes with the introduction of the Beaufort scale of the wind in an appropriate WMO publication such as the Technical Regulations.

## Rec. 9 (CBS-VI) - MODIFIED CODES ROCOB AND ROCOB SHIP

THE COMMISSION FOR BASIC SYSTEMS,

NOTING a request for modifications to codes FM 39.E ROCOB and FM 40.E ROCOB SHIP,

CONSIDERING that these modifications have become necessary in view of developments in rocketsonde techniques,

RECOMMENDS:

(1) That the modified codes ROCOB and ROCOB SHIP given in the annex* to this recommendation be introduced for international use from 1 January 1975;

(2) That these codes be included in Volume I of the Manual on Codes in replacement of the existing codes FM 39.E ROCOB and FM 40.E ROCOB SHIP;

AUTHORIZES the president of CBS to approve amendments to the appropriate code tables when necessary.

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* See Annex VII.

## Rec. 10 (CBS-VI) - INTERNATIONAL HYDROLOGICAL CODES

THE COMMISSION FOR BASIC SYSTEMS,

NOTING Recommendation 6 (CHy-IV) - International hydrological codes, approved by Resolution 12 (EC-XXIV),

CONSIDERING:

(1) The need for standard international hydrological codes,

(2) That the proposed hydrological codes conform with WMO practices,

RECOMMENDS:

(1) That the codes for reporting hydrological observations from hydrological stations (HYDRA) and hydrological forecasts (HYFOR) given in the annex* to this recommendation be introduced for international use, as from 1 January 1975;

(2) That these codes be included in Volume I of WMO Publication No. 306 - Manual on Codes.

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* See Annex VIII.

Rec. 11 (CBS-VI) - AMENDMENTS TO CODES FM 71.E, FM 72.E, FM 73, FM 75.D and FM 76.D

THE COMMISSION FOR BASIC SYSTEMS,

CONSIDERING:

(1) The increased use of automatic techniques for the collection, distribution and processing of climatological reports,

(2) That the existing codes for the reporting of monthly values do not contain any information about the month and the year to which these data belong and this causes difficulties in the collection and processing of these reports,

RECOMMENDS:

(1) That the group MMJJJ be introduced in codes FM 71.E, FM 72.E, FM 73, FM 75.D and FM 76.D immediately following the words CLIMAT, CLIMAT SHIP, NACLI, CLINP, SPCLI, CLISA, INCLI, CLIMAT TEMP and CLIMAT TEMP SHIP respectively, the specifications of the symbolic letters being as follows:

MM - Month of the year

JJJ - Hundreds, tens and units digits of the year

In the bulletin containing climatological reports, the group MMJJJ should be given only in the first line of the text of the bulletin;

(2) That these code changes be implemented from 1 January 1975;

REQUESTS the Secretary-General to arrange for the necessary amendments to be included in Volume I of the Manual on Codes.

Rec. 12 (CBS-VI) - ADDITION OF MONTHLY SUNSHINE HOURS GROUPS TO CODE FM 71.E - CLIMAT

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Recommendation 3 (CoSAMC-VI) - CLIMAT and CLIMAT TEMP messages,

(2) Paragraph 4.6 of the general summary of the abridged final report of CoSAMC-VI,

CONSIDERING that there is a need for providing for the possibility of reporting of monthly sunshine hours and the proportion of the current climatological normal (CLINO) for the same month,

RECOMMENDS:

(1) That the code FM 71.E - CLIMAT be amended as follows:

(a) To add in Section 1 of the code form after the group $R_1R_1R_1R_1R_d$ an optional group $(S_1S_1S_1k_sk_s)$ and to amend Section 2 as follows:

"Section 2 (NORMAL $\overline{P_oP_oP_oP_o}$ $\overline{PPPP}$ $s_n\overline{TTT}$ $\overline{eeen_rn_r}$ $R_1R_1R_1R_1/$ $(S_1S_1S_1//)$)";

(b) To add new Regulation 71.1.5:

"When monthly total sunshine is not available, the group $(S_1S_1S_1k_sk_s)$ shall be omitted.";

(c) The specifications of the symbolic letters shall be:

$S_1S_1S_1$ = Total sunshine for the month to the nearest hour;

$k_sk_s$ = Total sunshine for the month as a proportion of the climatological normal for the month. The proportion is expressed in fives of per cent;

Note: The value of $k_sk_s$ can be computed as 20 times the ratio of the total sunshine for the month to the climatological normal for the month (to the nearest whole number). For example:

| Ratio observed/normal | $k_sk_s$ |
|---|---|
| 0.72 | 14 |
| 0.73 | 15 |
| 1.72 | 34 |
| 1.73 | 35 |

(2) That these code changes be implemented from 1 January 1975;

REQUESTS the Secretary-General to arrange for the necessary amendments to be included in Volume I of the Manual on Codes.

Rec. 13 (CBS-VI) - CODE FOR REPORTING SYNOPTIC INTERPRETATION OF CLOUD DATA OBTAINED BY METEOROLOGICAL SATELLITES

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Recommendation 20 (CSM-V) - Code form for reporting synoptic interpretation of cloud data obtained by meteorological satellites,

(2) The amendments to the code form given in the annex to Recommendation 20 (CSM-V), which were suggested by the CBS Working Group on Codes,

(3) The further proposals and comments of Members on the code given in the annex to Recommendation 20 (CSM-V),

CONSIDERING:

(1) That comparatively few conventional meteorological observations are available over the large ocean areas, especially in the southern hemisphere,

(2) That there is a need for special messages of tropical cyclone data obtained by meteorological satellites,

(3) That the exchange of information on synoptic features derived from satellite observations should assist forecasting centres in their work,

RECOMMENDS that the code FM 85-VI for reporting synoptic interpretation of cloud data obtained by meteorological satellites (SAREP) given in the annex* to this recommendation, be introduced for international use as from 1 January 1975;

REQUESTS the Secretary-General to arrange for the inclusion of the code in Volume I of the Manual on Codes.

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* See Annex IX.

Rec. 14 (CBS-VI) - ALLOCATION OF BLOCK NUMBERS

THE COMMISSION FOR BASIC SYSTEMS,

NOTING the Manual on Codes, Volume I, Chapter A-5,

CONSIDERING the need to bring the allocation of block numbers up to date in order to meet the existing needs of Region II,

RECOMMENDS that the block numbers (II) 50 to 59 be allocated to Region II (Asia),

REQUESTS the Secretary-General to arrange for the necessary amendments to be included in Volume I of the Manual on Codes (WMO - No. 306).

## Rec. 15 (CBS-VI) - DELETION OF THE GROUP $9ODP_wH_w$ FROM CODES FM 51.E, FM 53.E AND FM 54.E

THE COMMISSION FOR BASIC SYSTEMS,

NOTING the results of an inquiry with members of CAeM concerning the need for retaining the group $9ODP_wH_w$, which indicated that there is no longer any aeronautical requirement to retain this group,

RECOMMENDS:

(1) That the group $9ODP_wH_w$ be deleted from the codes FM 51.E, FM 53.E and FM 54.E;

(2) That the date of implementation of these changes be decided by the Executive Committee in consultation with ICAO;

REQUESTS the Secretary-General to arrange for the necessary amendments to be included in Volume I of the Manual on Codes when appropriate.

## Rec. 16 (CBS-VI) - EDITORIAL REVISION OF THE NOTES IN VOLUME I OF THE MANUAL ON CODES

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Paragraph 5.8.1.9 of the general summary of the abridged report of Cg-III,

(2) Recommendation 24 (CSM-V) - Revision of Notes in Chapter I of Volume B, approved by Resolution 14 (EC-XXII),

(3) The report of the third session of the CBS Working Group on Codes,

CONSIDERING the need for editorial revision of the Notes in Volume I of the Manual on Codes in order to improve the existing text and to align it with the format of Technical Regulations,

RECOMMENDS that the text* revising the Notes in Volume I of the Manual on Codes as adopted by the session should replace the corresponding text now appearing in Section A-1 and some parts of Section A-3 of Volume I of the Manual on Codes;

REQUESTS the Secretary-General to arrange:

(1) For the consequent amendments in Sections A-2, A-3 and A-4 of Volume I of the Manual on Codes to be prepared;

(2) For the publication of the revised text after its approval.

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* The text is included in a new edition of Volume I of the Manual on Codes.

Rec. 17 (CBS-VI) - MANUAL ON THE GLOBAL TELECOMMUNICATION SYSTEM, VOLUME I - GLOBAL ASPECTS

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Recommendation 31 (CSM-V) - WWW Global Telecommunication System Manual,

(2) Agenda item 2.6 of the general summary of the abridged report of Cg-VI,

(3) Resolution 3 (Cg-VI) - World Weather Watch,

(4) Resolution 2 (EC-XXV) - Amendment to the World Weather Watch plan for the period 1972-1975,

RECOMMENDS that the Manual on the Global Telecommunication System - Volume I - Global Aspects - should come into force on 15 January 1975;

REQUESTS the Secretary-General:

(1) To take the necessary steps to publish the Manual on the Global Telecommunication System in its final form*;

(2) To update this Manual by supplements, as required.

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* The Manual on the GTS is published separately.

Rec. 18 (CBS-VI) - PUBLICATION OF A NEW (REVISED) EDITION OF VOLUME I OF THE INTERNATIONAL CLOUD ATLAS

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Recommendation 41 (CSM-V) - Amendments to Volume I of the WMO International Cloud Atlas,

(2) Resolution 14 (EC-XXII) - Report of the fifth session of the Commission for Synoptic Meteorology,

(3) The draft revised text of Volume I of the International Cloud Atlas prepared on the basis of Recommendation 41 (CSM-V),

CONSIDERING:

(1) That the latest (1956) edition of Volume I of the International Cloud Atlas is out of print,

(2) That the Abridged Atlas published in 1956 should be amended in accordance with the revised edition of Volume I of the International Cloud Atlas,

RECOMMENDS:

(1) That the draft revised text of Volume I of the International Cloud Atlas presented to CBS-VI be published, with any necessary editorial amendments, to replace the 1956 edition;

(2) That the Secretary-General be requested to issue an appropriate amendment to the Abridged Atlas to bring it in line with the revised edition of Volume I of the International Cloud Atlas.

Rec. 19 (CBS-VI) - AMENDMENTS TO THE TECHNICAL REGULATIONS

THE COMMISSION FOR BASIC SYSTEMS,

CONSIDERING:

(1) The need for a continuous review of the Technical Regulations, taking into account developments in science and technology,

(2) The proposals made by Members and by the working groups of the Commission for amending the Technical Regulations,

RECOMMENDS to Congress to adopt the amendments to the Technical Regulations contained in the annex* to this recommendation.

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* See Annex X.

Rec. 20 (CBS-VI) - REPORTING OF PARTS B AND D OF FM 36.E - TEMP SHIP BY VOLUNTARY OBSERVING SHIPS

THE COMMISSION FOR BASIC SYSTEMS,

NOTING Recommendation 12 (CSM-V) - Reporting of Parts B and D of FM 36.D - TEMP SHIP by voluntary observing ships,

CONSIDERING:

(1) That Parts A and C are most readily used by meteorological centres for processing,

(2) That information contained in Parts A and C allows a check of the data,

RECOMMENDS that the voluntary observing ships making upper-air observations may exclude Parts B and D of the code form FM 36.E from the transmission of upper-air messages to coastal radio stations when operational difficulties are encountered.

Rec. 21 (CBS-VI) - PRIORITY OF SYNOPTIC TIME FOR UPPER-AIR OBSERVATIONS

THE COMMISSION FOR BASIC SYSTEMS,

NOTING:

(1) Recommendation 26 (CSM-V) - Priority of synoptic time for upper-air observations,

(2) That there is a lack of uniformity of instructions and practices concerning which standard synoptic time has preference when only one upper-air observation per day is made,

CONSIDERING that when upper-air observing stations can only make one observation per day, it is desirable that they all make this observation at the same synoptic time,

RECOMMENDS:

(1) That when only one upper-air observation is made, the choice of the time of the observation, 0000 or 1200 GMT, should be a matter for regional association decision;

(2) That when there are no compelling regional reasons to the contrary, the 0000 GMT observation should be given preference.

Rec. 22 (CBS-VI) - REVISION OF RESOLUTIONS OF THE EXECUTIVE COMMITTEE BASED ON PREVIOUS RECOMMENDATIONS OF THE COMMISSION

THE COMMISSION FOR BASIC SYSTEMS,

NOTING with satisfaction the action taken by the Executive Committee on the previous recommendations of the Commission,

RECOMMENDS that the following Executive Committee resolutions be no longer considered necessary:

Resolution 14 (EC-XXII)
Resolution 15 (EC-XXII)
Resolution 2 (EC-XXV)
Resolution 3 (EC-XXV).

# ANNEX I

Annex to paragraph 3.7 of the general summary

## MAJOR TASKS OF CBS FOR THE PERIOD 1974-1978

| Task description | WWW system involved | | | Codes |
|---|---|---|---|---|
| | GOS | GDPS | GTS | |
| 1. Development of a Manual on the GDPS | | P | | |
| 2. Adjustments to the Guide on the GDPS | | P | | |
| 3. Development of a Guide on the GOS | P | | | |
| 4. Updating and completing of the Manual on Codes | | | | P |
| 5. Adjustments to the Manual on the GTS | | | P | |
| 6. Updating of relevant training syllabi, suggesting training material and holding of seminars and symposia | P | P | P | |
| 7. Guidance material for automation of centres and functions | S | P | P | S |
| 8. Organization of a program bank | S | P | S | S |
| 9. Scheme for collection, storage, and retrieval of data and information and associated procedures | | P | S | S |
| 10. Cataloguing of data and information | | P | | |
| 11. Operational aspects of the reduction of Level I data | P | | | |
| 12. Quality control (real-time and non-real time) | P | P | S | |
| 13. Study on possible future methods for presentation and distribution of processed information, e.g. provision of boundary values to NMCs | | P | P | S |

| Task description | WWW system involved | | | Codes |
|---|---|---|---|---|
| | GOS | GDPS | GTS | |
| 14. Preparation for the introduction of four-dimensional data assimilation techniques for operational work | | P | | |
| 15. Data requirement study | P | P | | |
| 16. Study of the best mix of observing system | P | P | | |
| 17. Distribution and use of new types of satellite data | P | P | S | P |
| 18. Increased use of AIREPS (in co-ordination with CAeM/ICAO) | P | P | S | |
| 19. Study of new observing technology and methods for inclusion in the GOS | P | P | S | S |
| 20. WWW support for FGGE and GARP regional programmes | P | S | P | S |
| 21. WWW support for IGOSS | P | P | S | S |
| 22. WWW support for AFCS | P | P | P | S |
| 23. WWW support for Earthwatch and other international programmes | X | X | X | X |
| 24. Technical characteristics and procedures for data transmission at 4800 bits/sec | | | P | |
| 25. Coded digital facsimile | | | P | |
| 26. Review of marine codes (in consultation with CMM) | | S | | P |
| 27. Review of aeronautical codes (in consultation with CAeM/ICAO) | | | | P |
| 28. Development of a new system of meteorological codes based on principles of information theory and automation of data acquisition, transmission and processing | S | P | P | P |

| Task description | WWW system involved | | | Codes |
|---|---|---|---|---|
| | GOS | GDPS | GTS | |
| 29. Development of codes for exchange of vertical satellite sounding data | P | P | P | P |
| 30. Code requirements studies with respect to automation | P | P | S | P |
| 31. Ways and means of monitoring the performance of the WWW | P | P | P | P |

Note: P : major contribution

S : minor contribution

X : degree of contribution depending on the specific programme

# A N N E X II

**Annex to paragraph 5.2 of the general summary**

## DRAFT WORLD WEATHER WATCH PLAN FOR 1976-1979 (as proposed by CBS-VI)

## INTRODUCTION

### General

1. The World Weather Watch (WWW) is one of the four main programmes of the World Meteorological Organization (WMO). WWW was first established by the Fifth World Meteorological Congress (Geneva, 1967), which approved a plan for the period 1968-1971. The Sixth World Meteorological Congress (Geneva, 1971), approved a revised plan for the period 1972-1975. This present plan, for 1976-1979, was approved by the Seventh World Meteorological Congress (Geneva, 1975). Progress in the implementation of the plans is reviewed annually in the WWW status reports issued by the WMO.

2. While the basic approach of the WWW plan remains unaltered, important additions had to be brought in mainly due to two developments. The first is the rapid technological changes and the second is the growing demand, from several applied fields and programmes of other international organizations, on the facilities created under the WWW plan.

3. Technological change has been rapid in many fields. Chief among these is satellite meteorology, where remarkable progress has culminated in a plan for a global system of geostationary and near-polar orbiting satellites. Continued advances are being made in data-processing techniques.

4. Important developments in applied meteorology have also resulted in suitable adjustments in the WWW plan to provide for closer collaboration with other international organizations. It is very evident that the First GARP Global Experiment (FGGE) and the associated regional experiments (MONEX, POLEX, etc.) will be heavily dependent on WWW for their success.

5. The WWW plan provides for three basic components, a Global Observing System (GOS), a Global Data-processing System (GDPS) and a Global Telecommunications System (GTS), to attain the primary purpose of the WWW. These systems could be useful and effective in meeting the practical needs and problems of the modern world, including those of our environment. WWW must be specified so as to cover the GOS, GDPS and GTS aspects of all users of meteorology.

Purpose and basic concepts of the WWW

6. The World Weather Watch shall be used only for peaceful purposes, due account being taken of the national sovereignty and security of States, in accordance with the provisions of the Charter of the United Nations and the spirit and traditions of the World Meteorological Organization.

7. The primary purpose of the WWW is to make available to each Member, within the limits of the agreed system, meteorological and other related environmental information required in order to enjoy the most efficient and effective meteorological and other related environmental services possible, both as regards to applications and research.

8. A further important purpose of the WWW is to stimulate and facilitate the research work which is necessary to improve the accuracy and extend the useful range of weather and related environmental forecasts and to enable the possibilities and consequences of weather and climate modification to be more accurately assessed.

9. In addition WWW facilities may be used, to the extent feasible, in support of other WMO programmes or international programmes jointly established with WMO in conformity with the policy decisions of the Organization provided that such utilization would not be detrimental to achieving the primary purpose of the WWW.

10. The WWW is an integrated global system but for many purposes it is convenient to consider it from three aspects, namely the global level, the regional level and the national level. General directives for the WWW as a whole will be decided upon by Congress. Following these general directives decisions on organizational and procedural details are left to appropriate bodies of the Organization. Planning at a national level to meet national needs is, of course, a matter for each individual Member to arrange.

11. The objectives of the WWW are to make available to Members the required observational data and processed information. For operational work it is essential that the information is received speedily and in a co-ordinated fashion. For research purposes speed is, in general, not of such vital importance, but the information must be readily accessible in convenient forms.

Essential elements of the WWW

12. The essential elements of the WWW are:

(a) The Global Observing System, consisting of facilities and arrangements for making observations at stations on land and at sea, from aircraft, meteorological satellites and other platforms;

(b) The Global Data-processing System, consisting of meteorological centres with arrangements for the processing of the required observational data (real-time uses)* and for the storage and retrieval of data (non-real-time uses)*;

* Real-time uses are operations in which the information must be received and used or processed within, at most, a few hours after it is generated. Non-real-time uses are those operations which can be carried out over a more extended time period.

(c) The Global Telecommunication System, consisting of telecommunication facilities and arrangements necessary for the rapid and reliable collection and distribution of the required observational data and processed information.

13. This subdivision is largely a matter of convenience and it is emphasized that the various elements are closely inter-dependent and should not be considered as completely separate entities.

14. The WWW is conceived as an evolving system, flexible enough to be adapted to changing conditions. Periodic reviews should be made in order to incorporate the latest technological and scientific developments. New techniques of observation, data processing and telecommunications should be introduced as soon as they have proved to be sufficiently reliable and economical.

Expected benefits of the WWW

15. The further implementation and development of the WWW will enable Members to provide improved meteorological and related environmental services for their respective national economies. Some of the actual and expected benefits of the WWW are described below:

(a) Improvement in short- and medium-range forecasting for general purposes and for many types of special activities, e.g. agriculture, shipping, fishing, transportation, industry, recreation, etc.;

(b) Improvements in extended range forecasts up to one month or more for the benefit of long-term planning of agriculture, water management, etc.;

(c) Improvements in the timeliness and accuracy of warnings against natural disasters caused by meteorological phenomena, particularly tropical cyclones;

(d) Provision of observational data and processed information for several types of applications;

(e) Provision of meteorological and other related environmental information for understanding many aspects of environmental pollution and taking remedial action;

(f) Easier access to stored data and information for all parts of the world for applied as well as basic atmospheric research or related environmental research projects.

Main tasks of the WWW during the period 1976-1979

16. The main tasks of the WWW during the period 1976-1979 are:

(a) Completing the implementation of the WWW plan to bring the GOS, GDPS and GTS in full operation;

(b) Adapting to opportunities provided by technological advances especially space observational systems and data-processing techniques;

(c) Providing increased support needed by other WMO programmes and international programmes established jointly by WMO and other international organizations.

17. In view of the foregoing, provision should be made for the following, under the WWW plan for the period:

(a) Implementation, particularly in Regions I, III and V, of the planned basic networks for surface and upper-air stations which are necessary as a minimum;

(b) Review of the observational networks on the basis of the results of FGGE, AMTEX, MONEX, POLEX and other similar programmes;

(c) Implementation of the meteorological geostationary satellite programmes and improving the sensor capabilities of near-polar orbiting satellites;

(d) Continuing development of four-dimensional data assimilation techniques, in particular for data of vertical soundings from satellites, for use in numerical weather prediction;

(e) Improvement of methods for the presentation of the output products of WMCs and RMCs for dissemination on the GTS;

(f) Elimination, as soon as possible, of the existing inadequacies in the operation of the telecommunication system for the collection and transmission of observational data in Regions I, III and V and in some part of other regions;

(g) Speedier completion of implementation of the GTS Main Trunk Circuit in accordance with actual plans and recommended technical characteristics;

(h) Introduction into the GTS of higher speed data transmission and coded digital facsimile techniques, as well as further improvement of telecommunication procedures.

Relationship between WWW and some of the other international programmes

18. Some of the international programmes that will surely draw upon the facilities created by WWW are the Global Atmospheric Research Programme (GARP), jointly approved by WMO and ICSU, the ICAO Area Forecast System (AFCS), the Integrated Global Ocean Station System (IGOSS), jointly developed by IOC and WMO and the Earthwatch programme of UNEP. Such support should not be detrimental to WWW.

Global Atmospheric Research Programme (GARP)

19. The purpose of GARP, as defined by the WMO-ICSU agreement, is to study those physical processes that are essential for an understanding of:

(a) The transient behaviour of the atmosphere as manifested in the large-scale fluctuations which control changes of the weather. This would lead to

increasing the accuracy of forecasting over periods from one day to several weeks;

(b) The factors that determine the statistical properties of the general circulation of the atmosphere which would lead to a better knowledge of the physical basis of climate.

20. This programme consists of two distinct, but closely interrelated, parts:

(a) The design and testing of a series of numerical models of relevant aspects of the atmosphere's behaviour;

(b) Observational and experimental studies of the atmosphere like GATE, FGGE, MONEX, etc., to provide the data required for testing the above models.

21. The main experiment is scheduled to begin in 1977 and is called the First GARP Global Experiment (FGGE). The experiment will require a truly global coverage of all kinds of meteorological observations, and a special effort of the WWW, over and above its normal functions, will be necessary to provide the required support.

Area Forecast System

22. A close relationship exists between the components of the WWW and the ICAO Area Forecast System. Observational data, provided through the Global Observing System (GOS), and processed information, provided through the Global Data-processing System (GDPS) and transmitted via the Global Telecommunication System (GTS), are essential for the functioning of Area Forecast Centres (AFCs).

Earthwatch

23. One of the major components of the United Nations' Environment Programme (UNEP) action programme is the "Earthwatch", whose primary purpose is to monitor and assess the state of the oceans, the atmosphere, the land and human health in order that rational decisions can be made for the management of the environment. The monitoring of pollutants that affect weather, climate and human health will receive the first priority.

24. In many respects Earthwatch will be similar to the WWW in that it is a global system comprising national facilities, services and research provided by individual Member nations. The monitoring of physical parameters of the atmosphere on a global basis for various environmental purposes has been in existence for many years through the WWW and other WMO programmes. As a result, plans for the implementation of the atmospheric monitoring part of the Earthwatch will inevitably rely heavily upon the WWW.

Integrated Global Ocean Station System (IGOSS)

25. The Integrated Global Ocean Station System (IGOSS) is an Intergovernmental Oceanographic Commission (IOC) programme, jointly developed by IOC and WMO, whose purpose is to provide more extensive and timely information on, and predictions of,

the state of the ocean and to support research on physical and dynamic processes of the ocean. A close co-operation of WWW and IGOSS should provide for development of a comprehensive monitoring system for the ocean-atmosphere environment.

26. The plan for IGOSS is based on a substantial use of parts of GOS such as voluntary ships, buoys, coastal and island stations, ocean station vessels, ice stations and satellite systems. Considerable use will also be made of GTS and GDPS, the latter largely for non-real-time data storage and retrieval.

General principles of WWW implementation

27. The WWW should be implemented according to the following basic principles:

(a) All meteorological activity connected with the implementation of the World Weather Watch on the territories of individual countries should be the responsibility of the countries themselves and should be as far as possible met from national resources;

(b) Implementation of the World Weather Watch on the territory of developing countries should be based on the principle of the utilization of national resources but, where necessary and so requested, assistance may be in part provided by:

(i) The United Nations Development Programme (which should be used to the maximum possible extent);

(ii) Bilateral or multilateral arrangements;

(iii) Contributions in financial form or in the form of equipment or services by Members of WMO; such contributions will constitute the WMO Voluntary Assistance Programme (VAP);

(c) Implementation of the World Weather Watch in regions outside the territories of individual countries (i.e., outer space, oceans, Antarctica) should be based on the principle of voluntary participation of countries which desire and are able to do so, by providing facilities and services, either individually or jointly from their national resources. The possibility of granting assistance from the WMO Voluntary Assistance Programme should, however, not be excluded;

(d) In the implementation of the WWW plan, maximum use should be made of existing facilities and arrangements in the different fields of activity involved. The implementation programme includes the establishment during the period 1976-1979 of the new and improved facilities required by the plan and any necessary further work concerning details relating to these facilities;

(e) No existing component or facility of the WWW should be removed before studies have demonstrated, to the satisfaction of all Members concerned, that the corresponding new component or facility can meet the requirements at least to the same extent as the old.

(f) The development of the three systems, GOS, GDPS, GTS, is an essential feature of the WWW plan. The setting up and operation of the new and improved facilities which are projected require a considerable amount of scientific research, engineering, co-ordination of procedures, standardization of methods and implementation co-ordination.

28. The implementation of the WWW plan will require a significant effort by Members, research and development institutions and WMO bodies. In this connexion, it is necessary to increase the number of trained meteorological personnel, as well as of experts in automatic data-processing, meteorological telecommunications and electronic equipment maintenance employed by meteorological services.

## GLOBAL OBSERVING SYSTEM (GOS)

### Purpose and principles

29. The Global Observing System (GOS) is the co-ordinated system of methods, techniques and facilities for making global observations within the framework of the WWW.

30. The GOS has been established to provide the meteorological and related environmental observations from all parts of the globe that are required by Members for operational and research purposes. It should be flexible and evolutionary in nature so that the mix of specific observational elements can be changed when needed to take advantage of advances in technology and changes in the requirements. However, changes will be made only after sufficient study has been conducted to determine the validity of the new requirements and the representativeness of the data from the new observational systems. Considering the requirements it is useful to define the GOS in three levels - global, regional and national.

### Components

31. The GOS consists of two sub-systems, the surface-based sub-system and the space-based (satellite) sub-system, the former being composed of the regional basic synoptic networks, other observational networks of stations on land and at sea, and aircraft meteorological observations, and the latter of near-polar-orbiting and geostationary meteorological satellites.

### Classification of requirements

32. The requirements of Members for observations may be put into three categories: global, regional and national.

33. Global requirements are for those observations needed to describe meteorological phenomena and processes which occur on the large and planetary scales.

34. Regional requirements are for those observations needed by two or more Members to describe in greater detail the large and planetary scale atmospheric phenomena, as well as to describe the smaller ones on the mesoscale and small scales as may be agreed by regional associations.

35. National requirements, which are defined by each Member, may vary greatly and reflect specialized needs of individual Members.

Observations

36. The GOS provides observational information which falls broadly into two categories: quantitative information derived from instrumental measurements, and qualitative (descriptive) information. Examples of quantitative information which specify the physical state of the atmosphere are instrumental measurements of the atmospheric pressure and humidity, air temperature and wind velocity. Examples of qualitative (descriptive) information are observations of the state of sky, the forms of clouds and the types of precipitation.

Networks of observing stations

37. In close relation to the three levels of requirements for observational data as classified in paragraphs 32, 33, 34 and 35 above, three networks of observing stations are established: global, regional and national networks.

38. The global network is established to satisfy the global requirements which are primarily for quantitative observational data. Detailed composition of the global network is determined and co-ordinated by the Commission for Basic Systems.

39. The regional networks are established to satisfy the regional requirements which are for both quantitative and qualitative observational data. Regional associations are primarily responsible for the determination and co-ordination of the composition of these networks within the general framework established by the Commission for Basic Systems.

40. The national networks are established by Members to satisfy their requirements. Each Member, when implementing its national network, should endeavour to complete the global and regional networks.

Scales of meteorological phenomena

41. The frequency and spacing of the observations should be adjusted to the physical scales of the meteorological phenomena to be described and specified.

42. For the purpose of the planning of the GOS the following classification of scales of meteorological phenomena has proved to be useful:

(a) Small-scale (less than 100 km); for example, thunderstorms, katabatic winds, tornadoes;

(b) Mesoscale (100 - 1000 km); for example, fronts and cloud clusters;

(c) Large-scale (1000 - 5000 km); for example, depressions and anticyclones;

(d) Planetary scale (more than 5000 km); for example, long upper tropospheric waves.

43. At scale (a) most of the observational data for analyses to meet the needs of user groups will be of a specialized nature.

44. Within the GOS plan, therefore, the spacing and frequency of observations required for scales (b), (c) and (d) are given. Scales (b) and (c) can be considered as roughly corresponding to the regional level within the WWW, and (c) and (d) can be combined within the global level.

45. It must be stressed that the above classification is at best a very rough approximation to physical reality. Many phenomena overlap between two of the classes indicated, and there is also dynamic interaction between the phenomena in the different scales.

Observational requirements

46. Theoretically the observing programme should provide data which describe the state of and temporal and spatial changes in the atmosphere. In practice, however, it has not been possible to specify the optimum observational requirements for any of the scales (a) to (d), though to do so for scales (c) and (d) is in fact one of the objectives of GARP. However, minimum data requirements can be specified based upon extensive preparatory studies for FGGE. These are stated in paragraph 51. Practical requirements stated in the WMO Regulations and elsewhere reflect the influence of two factors: (1) the capability of users to apply the data either manually or through numerical models, and (2) the capability of observing systems. Both the methods of application and the observing systems are changing and therefore the practical observational requirements may also be expected to change.

47. Consideration of scales of motion (c) and (d) (large scale and planetary scale) by themselves generally results in different data requirements than that of scale (b) - mesoscale. However, there exists interaction between various scales of motion, which makes such separation often difficult. Large-scale and small-scale requirements are based on the needs for both numerical and manual methods. Requirements for uniform networks have long been important in manual processing of data. Employment of numerical methods in models which cover the globe or significant portions thereof have served to emphasize existing requirements for uniform data networks. Four-dimensional data assimilation techniques used to integrate asynoptic data into the forecast models are being tested. If these results prove useful, the evolving large-scale models will be able to use asynoptic data as well as data collected at standard synoptic hours. With this development, the asynoptic data will have an increasing importance in the future.

48. For the mesoscale there is much more variation geographically in the time and space requirements than for large-scale data. In this respect the use of asynoptic data as well as of synoptic data should be taken into account.

49. The horizontal resolution and frequency requirements regarding observations for the regional networks should be as stated in the WMO Technical Regulations.

50. There are other sources of observations which provide information at positions and at times which are not necessarily fixed - e.g. satellites, aircraft and mobile ships. It is not possible fully to specify on scientific considerations the optimum requirements for the spacing and accuracy of such observations. To obtain information on the basis of which this may be done is one of the objectives of the GARP.

51. Specifications for a global network suitable for providing input to numerical models dealing with atmospheric motions on a large or planetary scale may be taken from the observational requirements set forth for the First GARP Global Experiment. These specifications should be considered as the minimum requirements, and in particular it should be noted that other synoptic requirements may call for more frequent observations. The specifications are set out separately for the middle/high latitudes and for the tropics.

(a) Observational requirements for the global network for mid- and high latitudes

Temperature

| | |
|---|---|
| Horizontal resolution | 500 km |
| Vertical resolution | 4 levels in troposphere |
| | 3 levels in stratosphere |
| Accuracy | $\pm$ 1°C |

Wind

| | |
|---|---|
| Horizontal resolution | 500 km |
| Vertical resolution | 4 levels in troposphere |
| | 3 levels in stratosphere |
| Accuracy | $\pm$ 3 m/sec |

Wind is ranked as lower priority than temperature, since it can be derived satisfactorily from temperature using balance relationships.

Relative humidity

| | |
|---|---|
| Horizontal resolution | 500 km |
| Vertical resolution | 2 degrees of freedom in troposphere(*) |
| Accuracy | ± 30% |

Sea-surface temperature

| | |
|---|---|
| Horizontal resolution | 500 km |
| Accuracy | ± 1°C |

Pressure

| | |
|---|---|
| Horizontal resolution | 500 km |
| Accuracy | ± 0.3% |

(b) Observational requirements for the global network from the tropics

Wind

| | |
|---|---|
| Horizontal resolution | 500 km over land |
| | 1000 km over oceanic areas |
| Vertical resolution | 4 levels in troposphere |
| | 3 levels in stratosphere |
| Accuracy | ± 2 m/sec |

Wind is considered a fundamental parameter in the tropics because it is only weakly coupled to the mass field and cannot be satisfactorily derived from other parameters. Full vertical resolution is a critical requirement in the zone near the Equator.

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(*) Note: The humidity distribution in the vertical should be described by a tropospheric model profile having two independent parameters to be specified by observation.

| | |
|---|---|
| Temperature | |
| Horizontal resolution | same as wind |
| Vertical resolution | 4 levels in troposphere |
| | 3 levels in stratosphere |
| Accuracy | $\pm$ 1°C |
| Relative humidity | |
| Horizontal resolution | same as wind |
| Vertical resolution | 2 degrees of freedom on troposphere(*) |
| Accuracy | $\pm$ 30% |
| Sea-surface temperature | |
| Horizontal resolution | 1000 km |
| Accuracy | $\pm$ 1°C |

(c) Data should be made available twice per day. Observations from conventional upper-air stations and surface stations should be made at the standard synoptic hours of 00 and 12 GMT. If local conditions dictate that observations be made at other times, these observations can be useful for the global network.

52. In implementing the GOS sub-systems, Members should consider that the effectiveness of the observing system is the degree to which the characteristics of the system (including sensors and preliminary data processing) match the data requirements. Since the requirements are a mix of time and space scales, so also will the observing system be a mix of techniques and programmes in order to best meet the full spectrum of requirements. In implementing the Global Observing System, Members should strive to meet the recommendations in paragraphs 49 to 51 (c) as closely as possible within available resources. With regard to the individual sub-systems of GOS, Members should consider the implementation of various sources of observations which offer complementary solutions to meet data requirements.

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(*) Note: The humidity distribution in the vertical should be described by a tropospheric model profile having two independent parameters to be specified by observation.

53. The development and operational use of new techniques of observation introduces a problem of multiple coverage of fixed and variable networks, and of the different quality of independently measured elements and observed phenomena. The combined use of information so obtained will improve the definition of the physical state of the atmosphere. Complete solutions to this problem of mixed systems of observations await further studies of relative accuracies and representativeness.

## Essential elements of the GOS 1976-1979

54. During the period 1976-1979 the GOS will consist of the surface-based sub-system and the space-based sub-system. The surface-based sub-system will continue to constitute the main part of the GOS for the period 1976-1979. Later developments may gradually shift the emphasis in the mix of systems to accommodate improved and new systems but not until relative accuracies and representativeness have been examined and proved.

### Systems for global requirements

55. The global requirements given in paragraph 51 derive primarily from the need to provide input to numerical models dealing with atmospheric motions on large and planetary scales. These requirements emphasize averages over large volumes of the atmosphere and the distribution of the mass and moisture fields. At mid- and high latitudes, a large and increasing part of these requirements will be met during the period by a system of satellites. The surface-based system will continue to play its important role. The two systems, one based on surface and the other on space, will complement each other. Surface observations, radiosonde and aircraft reports will provide geopotential reference and calibration input to the space system. The space system augments the data points provided by the surface-based system to complete the global coverage.

56. In the tropics much more emphasis is placed on the mesoscale convection contribution to the larger scale dynamics and the large-scale wind field. While satellites will contribute greatly to these requirements, considerable input will be required from the surface-based sub-system, particularly upper-wind data from land, aircraft, fixed and mobile ship stations.

### Systems for regional and national requirements

57. It is firmly believed that during the period 1976-1979 the surface-based system will continue to be the main source of information required to meet the regional and national requirements. At the outset, heavy reliance will be placed on the regional networks of synoptic surface and upper-air stations, fixed and mobile ships and aircraft. Information from the space-based sub-system will complement that obtained by the surface-based sub-system to an increasingly significant degree. Decisions regarding additional observations required internationally for specialized purposes should be taken under the relevant WMO programme, in co-operation with other international organizations as appropriate.

## Surface-based sub-system

### Regional basic synoptic networks

58. The regional basic synoptic networks of both surface and upper-air stations will continue to be the main part of the surface-based sub-system. The detailed lists of stations to be established to meet the requirements in paragraphs 46 to 53 have been laid down by regional associations in their decisions relating to the regional basic synoptic networks. Regional associations should continue to examine and revise their regional basic synoptic networks as necessary, taking into account any international requirements for additional mesoscale observations.

59. Considering that these networks are the minimum requirements to permit Members to fulfil their responsibilities within the World Weather Watch and in the application of meteorology, Members should endeavour to complete the implementation of all the surface and upper-air stations of the regional basic synoptic networks. Those upper-air stations which have not yet been established are listed in WMO Publication No. 217 - Basic synoptic networks of observing stations. Special importance is attached to the establishment of stations in areas where the horizontal spacings specified in paragraph 49 are far from being attained. Urgent action should also be taken to complete the observing programme at stations which are already in operation but which do not at present carry out the full programme of observations recommended by the regional associations.

### Automatic weather stations

60. Automatic weather stations capable of meeting some of the requirements for surface observations are available and have proved to be reliable and economic in certain locations on land, and small islands and reefs up to several hundreds of kilometres from the mainland. Such equipment could therefore be used to provide a portion of the surface observations called for in the regional basic synoptic networks, where it would be economical and feasible, particularly at locations where it is not practicable to have a manned station or at manned stations where shortage of trained staff would otherwise preclude round-the-clock operations.

### Fixed sea stations

61. Stationary ship stations and fixed and anchored platforms are required to meet WWW data requirements. Such fixed sea stations provide essential and detailed meteorological and oceanographic data from critical locations or ocean areas, where more economical means are not available. In this role they are primarily part of regional and national scale networks. These fixed sea stations also provide data for the calibration and verification of soundings by remote-sensing from satellites and these observations will be used for analysis of large and planetary scale of motions.

### Research and special purpose vessels

62. Members having research and special purpose vessels should do their utmost to ensure that all such vessels make surface and upper-air meteorological observa-

tions, as well as sub-surface temperature observations down to the thermocline, and transmit this information for further dissemination in accordance with the appropriate WMO procedures. These observations, in particular the upper-wind observations from the tropics, are exceptionally important when such ships ply data-sparse areas.

Mobile ships

63. Considering that there remain needs such as the measurement of wind and atmospheric pressure at sea-level which satellite technology will likely not be able to meet in a foreseeable future, for this and other reasons it is recognized that mobile ships will continue to be one of the main sources of surface observations over the oceans. Aware that there are still vast ocean areas from which very few or no surface meteorological observations are available, Members should endeavour to recruit all ships which may traverse the data-sparse areas. Furthermore, Members should install automatic observing and transmission equipment on mobile ships whenever possible; such action should aid the prompt and accurate transmission of ship reports to meteorological centres. Priority should be given to equipping ships which may pass through the tropics to make upper-wind observations. Efforts should also be made to use such ships to extend the bathythermograph coverage required in the IGOSS plan.

Automatic marine stations

64. Important progress has been made in the development of buoys which could be used as fixed or drifting automatic marine stations but only a few of them have been tested in data-sparse areas. The efforts in this field should be pursued and, as soon as it has been proved that the operation of these buoys is sufficiently reliable and economic in these regions, and that economical means for real-time location of drifting automatic stations can be provided, they should be introduced in the Global Observing System even if they can only measure a small number of basic parameters as, for instance, atmospheric pressure and sea temperature in the regions of persistent cloudiness.

Aircraft

65. Commercial aircraft constitute a valuable source of upper-air data especially over the oceans and sparsely inhabited areas, as has been demonstrated by current practices of meteorological analysis. These data will continue to be important in the mixed observation system for the period of the plan.

Atmospherics detection systems

66. Technical progress now offers the prospect of locating distant thunderstorms by means of automated atmospherics detection systems using very long baselines. Taking into account the obvious advantage of the long-range identification of the location of thunderstorm activity, efforts in this field should be continued and Members are invited to study and implement the necessary networks in the framework of regional associations.

### Weather radars

67. Weather radars constitute one of the best means for observing and studying small and mesoscale cloud-precipitation systems. Weather radar observations provide quantitative and qualitative information which can fruitfully be used in synoptic, aeronautical meteorology and hydrology for early warnings of dangerous weather phenomena and improved quantitative forecasts of specific elements. Members are invited to continue the operation of existing radars or radar networks, to exchange their observations if practicable and to establish or continue the implementation of programmes in this field. The definition of such networks should be considered by regional associations.

### Meteorological rockets

68. Several Members have undertaken to implement programmes for launching meteorological rockets. These rockets will continue to constitute an effective means to measure *in situ* the meteorological parameters above the 10 mb level. Such measurements are indispensable for a better knowledge of the atmosphere at very high levels as well as for the calibration and interpretation of data obtained from satellites. Efforts in this field should be continued.

### Background pollution stations

69. In view of the need for making measurements of pollution concentration, the WMO network of stations to measure the background pollution should be maintained and expanded. Members should continue to endeavour to implement this network and related climatological stations fully during the period 1976-1979.

### Radiation stations

70. In view of the importance of solar radiation in atmospheric processes in influencing the origins of atmospheric motions, Members should establish and operate radiation stations as recommended in the WMO Technical Regulations.

## Space-based sub-system

### System composition

71. Meteorological satellites are divided into two groups, those in near-polar orbits and those in geostationary orbit. With the former it is possible to choose the orbit altitude within a wide range, while with the latter it must be approximately 36 000 km. The near-polar orbiting satellite is able to observe the whole globe twice a day. One polar orbiting satellite, capable of providing two full sets of data daily and kept in continuous operation, is capable of obtaining those data which are currently expected to be provided by the polar orbiting segment of the space-based sub-system. The satellites in geostationary orbit provide near continuous information in an area within a range of about $50^{\circ}$ from the sub-satellite point. Within the latitudinal range of $50^{\circ}$N to $50^{\circ}$S, five geostationary satellites are needed to provide full coverage around the globe. The locations and ranges of coverage are approximately as indicated on the map shown in Attachment I. It is expected that all the five geostationary satellites will be operational by the middle of the period.

72. Both types of satellite are capable of collecting data from fixed and moving platforms. In addition, the geostationary satellites have the ability to disseminate meteorological products to various users.

73. The different capabilities of the near-polar orbiting satellites and geostationary satellites show that both are necessary parts of the space-based subsystem of the GOS.

74. Qualitative information and quantitative data derived from the satellite's radiometric measurements are discussed below. Data collection and dissemination of meteorological information by satellite are covered under the GTS. Meteorological products processed from satellite data available during the period 1976-1979 are covered under the GDPS.

75. Members operating meteorological satellites are encouraged to meet, as far as possible, the accuracy and the time and space resolution of the observational requirements set forth in the present plan.

Information from satellites (1976-1979)

76. The satellites should be equipped to provide with the greatest accuracy possible independently, or in conjunction with surface-based observations, the following quantitative data and qualitative information:

(a) Vertical profiles of temperature and humidity -

Vertical temperature profile radiometers were incorporated into operational satellites in 1972, and the derived soundings have since then been used operationally in numerical weather analysis;

(b) Temperatures of sea, land and cloud top surfaces -

Scanning radiometers, which operate in the infra-red as well as in the visible part of the spectrum provide global coverage of the radiating surface, - land surface, sea surface, or cloud top;

(c) Wind field derived from cloud displacements -

It is generally accepted that the wind field cannot be inferred from pressure and temperature data very near the Equator where the quasi-geostrophic balance breaks down. If direct measurements are not available, cloud motion data will provide the best possible determination of the two-dimensional wind field at the 300 to 200 mb and the 850 mb levels. It is also possible to obtain wind data at middle levels, but to a lesser extent;

(d) Cloud amount, type and height of cloud tops -

Visible and infra-red imagery data obtained from the scanning radiometers can be used to obtain cloud amounts and distribution, height of cloud tops and to some extent cloud types;

(e) Snow and ice cover -

Imagery data from polar orbiters permit snow or ice to be distinguished from cloud cover in most instances. In addition, radiometers on geostationary satellites provide excellent cloud, snow and ice information within their field of view, and by comparing a sequence of pictures the clouds are distinguished from snow or ice in all cases;

(f) Radiance balance data -

Using the measurements from the different radiometer channels the radiance balance in distinct spectral ranges can be computed. From these data the radiation balance of the whole Earth system can be inferred.

Initial data reduction

77. Members operating meteorological satellites are encouraged to assume full responsibility for the conversion of the raw satellite data into meaningful meteorological parameters. These Members are also encouraged to co-ordinate their plans with a view to achieving the optimum efficiency of the WWW satellite sub-system and for making this information available for distribution according to the needs of Members.

Direct read-out

78. All operational meteorological satellites should be equipped to provide direct read-out of the cloud images and, as far as possible, of other real-time data of interest to Members. Members responsible for satellites with this facility are encouraged to ensure the highest possible compatibility between the different systems and to publish details of the technical characteristics of their transmissions as early as possible. This will greatly assist the utilization of direct read-out data. All Members should endeavour to install in their territory at least one direct read-out station for cloud image data.

Experimental satellite data

79. The primary purpose of experimental satellites is the development and testing of new instrumentation and the improvement of existing ones. In addition, these satellites provide information which may be available for operational use. It is expected that the satellite will provide information on:

(a) Improved temperature/humidity vertical profile;

(b) Soil moisture distribution;

(c) Ice definition;

(d) Sea state;

(e) Cloud composition;

(f) Distribution of particulate matter contained in the atmosphere;

(g) Marine pollution.

80. However, in contrast to the operational meteorological satellite systems which provide real-time data on a permanent basis there can be no such guarantee with regard to the experimental satellites.

Satellite data reliability

81. Some caution must also be exercised in planning the use of operational meteorological satellite data as there is always some possibility that the failure of a satellite in orbit could be followed by a launch failure of its replacement satellite; this could result in a reduction of data from operational satellites for a period of some months. The very fine record of success of operational meteorological satellites to date suggests that this probability is low. In the light of the above discussions and in view of the reasons stated in paragraph 55 above, the space-based and surface-based sub-systems should be regarded as being complementary to each other.

Future role of the space-based sub-system in the GOS

82. The time needed to take a new system from the initial requirement to full operational implementation is at least five years. Therefore, there are meteorological satellite systems presently in advanced stages of development from which observational data will be available on a limited basis. Some of these meteorological satellites are undergoing operational tests and are, therefore, in limited deployment while others are of an experimental nature and are used as test beds for the development of future operational sensors. The results obtained from the operational use of the derived data will be reflected in the development of future sensors used on the operational space-based sub-system of the WWW. It is expected that the sensors will provide new types of data, increased resolution and accuracy and would make a major impact on the role of the space-based sub-system within the GOS in the further development of the plan.

Work required for further evolution of the GOS

83. The implementation of the above plans for the GOS will constitute an important step towards the continuous evolution of the system for meeting the stated observational requirements for operational work and research. In the period 1976-1979 and thereafter further studies and planning should be undertaken to meet, to the maximum extent possible, the requirements of WWW, GARP, AFS, IGOSS and other international programmes such as the Earthwatch.

84. Work should continue on specifications of observational data requirements for the various networks and scales of meteorological phenomena with a view to reaching agreement on criteria to be used for an improved Global Observing System. Special attention should be given to the tropics and to air-sea interactions as well as other atmospheric boundary-layer problems.

85. The scientific studies conducted as part of the various international programmes are expected to produce results which, amongst other things, will have a bearing on the design of networks. Therefore, work should be conducted in order to apply these results in the further development of the GOS.

86. Some observing techniques do not lend themselves readily to observations of fixed geographic locations at agreed synoptic hours; in other words they are more suitable for "asynoptic" observations. Studies on the design of the future Global Observing System should be undertaken in close co-ordination with similar studies on the development of four-dimensional data assimilation techniques. High priority should be given to these studies as satellite data are available routinely and form a very important part of the observational information needed to describe the large- and planetary-scale motions.

87. In view of the need for further observations of upper winds in the tropics in order to achieve adequate horizontal and vertical resolution, studies should be conducted of the most economical way of obtaining these observations. These studies should include the observations of new and improved equipment for measuring upper-air winds on board ships, the use of constant-level balloons, dropsondes, satellites, as well as the best use of data from commercial aircraft.

88. To increase the availability and utilization of data from commercial aircraft, studies should be undertaken in the light of advancing technology in the fields of computers, aircraft-based wind sensing devices and satellite data acquisition techniques.

89. Development work on new and improvements to existing automatic surface synoptic stations, fixed and drifting automatic marine stations and simple marine buoys should continue, particularly with a view to increasing the reliability and robustness and reducing the cost of such equipment intended for isolated regions of difficult access.

90. Since in a number of countries arrangements are being made for observing stations on high towers and masts to provide unique data for the study of the structure of the boundary layer of the atmosphere, there is a certain need for an exchange of information on programmes and methods of observation and also on results of research on the use of these data for forecasting.

91. Remote surface-based sensing techniques, for example lasers and acoustic sounders, have been introduced to a limited extent by several Members. Such devices offer the possibility of contributing greatly to the acquisition of the data needed for regional scale and national scale requirements. Efforts should be continued to expand the use of such sensing techniques in the GOS.

92. The increasing use of observational data obtained by the combination of different observational techniques in a mixed system to meet increased data requirements needs careful evaluation of data accuracies and compatibilities, as well as of the initial data reduction procedures. CBS should determine the best mixture of these techniques on the basis of appropriate technical and scientific advice from the WMO technical commissions concerned and other competent bodies.

93. Members should develop techniques to evaluate the performance of the GOS sub-systems which they operate in the light of guidance given by CBS and, as appropriate, CIMO. This should also include reduction of level I data (see paragraph 115) and quality control procedures at the point of observation for maintaining a high level of performance of the GOS.

94. Work should continue on the specification of networks of background air pollution stations including definitions of the observing programmes and networks of stations.

95. On the basis of the above studies, planning work should result in proposals for further improvements to the Global Observing System as a whole in order to obtain the required observations by the most reliable and economic means. These proposals should take into account the needs in related environmental disciplines with a view to working towards a fully integrated environmental observing system.

## GLOBAL DATA-PROCESSING SYSTEM*

### Purpose and principles

96. The purpose of the Global Data-processing System is to make available to all Members processed information which they require. Such information should be provided with a minimum of duplication, be based on the most modern computerized techniques, and be available for both real-time and non-real-time applications.

97. The real-time functions of the system will include:

(i) Pre-processing of data, e.g. quality control, decoding, sorting;

(ii) Analysis of the three-dimensional structure of the atmosphere;

(iii) Prognosis of the three-dimensional structure of the atmosphere, including derivation of specific meteorological parameters (e.g. temperature, precipitation).

98. The non-real-time functions of the system will include:

(i) Collection of observational data, selected derived data and selected analyses and prognoses via telecommunications or other means;

(ii) Quality control to ensure a satisfactory standard of accuracy of stored data;

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* Note: Details of the GDPS will be found in the Guide on the Global Data-processing System.

(iii) Storage and retrieval;

(iv) Classification and cataloguing.

99. The Global Data-processing System (GDPS) is organized as a three-level system, namely a global, regional and national level system. The global and regional levels are served by a system of World Meteorological Centres (WMCs), and Regional Meteorological Centres (RMCs) respectively. At a national level, the Global Data-processing System functions are carried out by National Meteorological Centres (NMCs). The general functions of GDPS centres are:

(i) WMCs are responsible for carrying out data processing of large- and planetary-scale phenomena and making available their products, covering the globe or a large part of it;

(ii) RMCs concentrate on data processing of large-scale and mesoscale phenomena and making available their products (including special purpose forecasts) covering specific areas; and

(iii) NMCs are responsible for satisfying the national data-processing needs of Members and assuring the data-processing functions required. These national data-processing activities may of course be concerned with large-scale analyses and prognoses also.

100. The above functions of the various centres will not affect the status of any international commitments of Members for support to shipping and aviation, nor determine the manner in which Members execute these responsibilities. On the contrary, the results of the implementation of the WWW have shown that the Global Data-processing System aids Members in meeting such international commitments by making better and more varied products available for use.

101. The following sections describe the functions and goals of the WMCs, RMCs and NMCs in the period 1976-1979. Then follows a more detailed specification of the real-time and non-real-time procedures within the GDPS.

World Meteorological Centres (WMCs)

102. The World Meteorological Centres, located in Melbourne, Moscow and Washington should provide global type products primarily describing planetary- and large-scale meteorological phenomena (in the case of Melbourne for the southern hemisphere only). The WMCs are intended to be service centres where products will be available for use by all Members as aids for forecasting and long-range applications.

103. The real-time functions of WMCs are as follows:

(a) Preparation of surface and upper-air meteorological analyses including sea-surface temperature as a rule twice per day for as much of the globe as practicable;

(b) Preparation of surface and upper-air meteorological prognoses, including sea-surface temperature for periods of at least up to four days for as much of the globe as practicable, the frequency of issue depending on the period of validity;

(c) Preparation of alerts of important meteorological phenomena, for example storm warnings based on pertinent information such as satellite data;

(d) Real-time quality control of level II and III data on a global basis for use by the WMC concerned.

104. The non-real-time functions of WMCs are as follows:

(a) Storage and retrieval of basic observational data and processed information needed for large-and planetary-scale research and applications, and making these available to Members on request;

(b) Development and research concerning the operations as well as testing and application of new technology;

(c) Regular exchange with other centres of data and information on techniques and procedures used;

(d) Providing opportunities for training of personnel in data processing.

Goals for the WMCs in 1976-1979

105. During the period 1976-1979, WMCs should:

(a) Complete as necessary their programmes for the preparation and dissemination of output products listed by the Commission for Basic Systems (CBS) taking into account the requirements of Members and the capability of the Global Telecommunication System (GTS);

(b) Complete as necessary data storage and retrieval systems following the general procedures laid down in paragraphs 125 to 135 below and elaborated by the CBS;

(c) Endeavour to increase the accuracy of their analysis and prognosis techniques and extend their prognosis range if possible, by taking full advantage of new and improved data from meteorological satellites and other observing systems as well as improved numerical prediction models which may become available.

Regional Meteorological Centres (RMCs)

106. The Regional Meteorological Centres are:

Algiers, Bracknell, Brasilia, Buenos Aires, Cairo, Dakar, Darwin, Khabarovsk, Melbourne, Miami, Montreal, Moscow, Nairobi, New Delhi, Novosibirsk, Offenbach, Pretoria, Rome, Stockholm, Tashkent, Tokyo, Tunis/Casablanca, Wellington.

These centres should provide regional products with particular attention to large-scale and mesoscale meteorological phenomena. The RMCs should provide products for ready use by Members as aids for providing services to users.

107. The real-time functions of RMCs are as follows:

(a) Preparation of surface and upper-air meteorological analyses up to four times a day for a specific area;

(b) Preparation of surface and upper-air meteorological prognoses for specific areas for periods up to 72 hours, the frequency of issue depending upon the period of validity;

(c) Real-time quality control of level II and III data for use by the RMC concerned, (see paragraph 115 below).

108. The non-real-time functions of RMCs are as follows:

(a) Storage and retrieval of basic observational data and processed information needed to discharge the real-time responsibilities of the RMC and making these available to Members on request;

(b) Development and research into refinement and applications of new data-processing technology and techniques;

(c) Regular exchange with other interested centres of information on techniques and procedures used and of results achieved;

(d) Providing opportunities for training of personnel in manual and automated techniques.

109. To the maximum extent feasible, adjacent RMCs should be prepared to assume each other's functions. This does not necessarily mean that each RMC should be prepared to use the analytical and prognostic models employed by RMCs adjacent to it. Each RMC should, however, be able to issue products covering equivalent geographical areas and to give information generally similar to that contained in the products of adjacent RMCs. Arrangements and procedures for such assumption of functions should be made bilaterally between Members operating adjacent RMCs, but regional associations should monitor these arrangements to ensure that they are compatible with regional requirements.

Goals for RMCs in 1976-1979

110. During the period 1976-1979, RMCs should:

(a) Complete as necessary their programme of the preparation and dissemination of output products as co-ordinated with Members requesting them, based upon the overall list of output products of RMCs and taking into account the capabilities of the GTS;

(b) Implement as necessary their real-time quality control procedures following the general procedures laid down below and in accordance with the guidelines established by CBS;

(c) RMCs which do not yet possess adequate computer capability should endeavour to gain such capability as soon as possible, not only to be able to prepare products required by Members they serve but also to be able to issue, exchange and convert products in the GRID code form into pictorial form for regional and inter-regional distribution as required;

(d) Plan, arrange and implement procedures to assume functions of adjacent RMCs, to ensure that priority RMC products will be available to Members in the event of computer and telecommunication outages;

(e) Implement as necessary their data storage and retrieval functions following the general procedures laid down as described in detail by CBS.

National Meteorological Centres (NMCs)

111. The National Meteorological Centres designated by the Members concerned should be responsible for satisfying the data-processing needs on the national level, assisted as they require by the output products of WMCs and RMCs.

112. The main real-time functions of NMCs are as follows:

(a) Preparation of surface and upper-air analyses and prognoses, as needed to meet national requirements for provision of meteorological services to all users;

(b) Preparation of alerts and warnings of important phenomena, (e.g. occurrences of gales, hailstorms, tropical cyclones) to meet national and international obligations;

(c) Real-time quality control to ensure accuracy of level II data as near as possible to their source.

113. The main non-real-time functions are:

(a) Storage and retrieval of observational data and processed information to meet international and national requirements;

(b) Research concerning the operations to meet national requirements.

Goals for NMCs for 1976-1979

114. During the period 1976-1979 NMCs should:

(a) Take all measures, if not yet done, so as to be adequately manned and equipped to enable them to play their full part in the WWW and also to ensure that the full benefits of the information obtained from WWW are reaped on a national level;

(b) Take action to ensure that applications of meteorology develop to meet the requirements for services for the socio-economic development of the country. For this programme most countries will require computers and other modern devices. (Note: Members may, for their own national purposes, have a need for centralized processing centres with facilities similar to those of an RMC or even a WMC);

(c) Implement an effective and reliable archiving system to ensure the ready retrievability on standard media of all data originating from their national observing networks, following the procedures laid down in the paragraphs 125 to 135 below and in accordance with the corresponding guidelines given by the CBS;

(d) Introduce appropriate quality control procedures for real-time and non-real-time purposes. (Note: Members whose NMCs do not yet have the capability to perform their quality control and archiving responsibilities should arrange with an appropriate RMC or NMC to assume temporarily these functions at least for data which are exchanged internationally over the GTS.)

## PRINCIPLES OF OPERATION OF THE GDPS IN THE PERIOD 1976-1979*

### Real-time service

#### Definition of data levels

115. In discussing the operation of the GDPS it is convenient to use the following classification of data levels, which have been introduced in connexion with the data-processing system for GARP:

Level I : Raw data. These in general are instrument readings or sensor signals that require conversion to the meteorological parameters

* Note: Further details of the procedures described below will be found in the Guide on the Global Data-processing System.

specified in the data requirements. Examples are: telemetry signals from satellite sensors that give such information as radiances, or positions of constant-level balloons, etc.

Level II : Meteorological parameters obtained directly from many kinds of simple instruments, or derived from the level I data (e.g., average winds from subsequent positions of constant-level balloons).

Level III: Initial state parameters. Internally consistent data sets, in gridpoint form obtained from level II data by applying standard initialization procedures.

Both level II and level III data will be available for normal operational use in the GDPS and for special experimental use, such as for FGGE.

Quality control

116. The basic elements of quality control are error detection, error correction and therefore error prevention. The primary responsibility for quality control of all observational (level II) data rests with the national Meteorological Service from which the observation originated. It is of the utmost importance therefore that Members should make adequate provision for quality control of their national meteorological observations with a view to ensuring that at the point where the meteorological observations enter the Global Telecommunication System they will be as free from error as possible. To detect the errors which nevertheless escape the national quality control system, and errors introduced subsequently, RMCs and WMCs should also carry out appropriate quality control of the observational data they receive, in order to ensure high quality in their analyses and prognoses.

117. By meteorological quality control is meant the checking of the meteorological content of observational data. In contrast, telecommunications error-control, which is carried out as an inherent function of the Global Telecommunication System, aims solely at detecting errors introduced during transmission. Quality control of observational data needed for real-time uses should not introduce any delay in the onward transmission of the data over the Global Telecommunication System. This limitation does not of course apply to non-real-time quality control.

118. The minimum standards of real-time quality control to be laid down by the CBS should be implemented at all NMCs, RMCs and WMCs. The NMCs not capable of implementing these standards should establish agreements with an appropriate RMC or NMC to perform the necessary quality control on an interim basis.

Times of receipt of observational data

119. The observational (level II) data required for real-time purposes should reach the national Meteorological Services sufficiently quickly to be used effectively. This calls for a rapid handling of the observational data both by the Global Data-processing System (pre-processing) and the Global Telecommunication

System. Target times for the receipt of observational data have been worked out by the CBS and are included in the Guide on the GDPS. The transmission of observational data should have priority over the transmissions of processed information so as to ensure that these target times are met.

Processing time

120. It is obviously also of importance that processed information (products of WMCs and RMCs) reach Meteorological Services as quickly as possible. GDPS should contribute to this end by the use of improved processing techniques at WMCs and RMCs.

Times of receipt of processed data

121. Target times for the availability of processed information have been worked out by the CBS and are included in the Guide on the GDPS. These are based on the assumption that both manual and automated procedures will continue to be used in the GDPS.

Exchange of products between centres

122. Each NMC, RMC and WMC has the right to state which output products it wishes to receive from other centres. However, as an operating principle, NMCs should limit their requirements, taking into account the capabilities of the Global Telecommunication System. Guidance in this respect has been developed by the CBS and is included in the Guide on the GDPS. Taking into account the provisions of paragraphs 120, 121 and 139:

- Each WMC should make available its output products to meet the expressed needs of other WMCs and of RMCs and NMCs;

- The distribution of output products of each RMC to other RMCs and to NMCs will be arranged to meet the requirements expressed by the recipient.

123. In view of the advantages of alpha-numerical forms (e.g. data in GRID code) over pictorial forms from the point of view of the Global Telecommunication System, and keeping in mind the expressed needs for transmission of observational data and products from WMCs to other WMCs, RMCs and NMCs, the traffic on the Main Trunk Circuit should by the end of the period in principle be restricted to observational data and products in alpha-numeric form.

124. In order to meet the requirements of NMCs for output products in pictorial form, all WMCs/RMCs should have facilities for conversion of products from alpha-numerical to pictorial form for regional transmission. All Members should endeavour to have facilities at their NMCs for receiving Global Data-processing System products in alpha-numeric form and for their conversion to pictorial form as required for internal distribution. Pending the availability of the required conversion capability, facsimile transmissions or transmissions in some other appropriate form from centres originating the products should, however, be maintained.

Non-real-time service

Data to be stored

125. The following data should be stored within the Global Data-processing System:

- All direct observations or values calculated from these observations by simple methods;
- Selected derived data which cannot be easily reconstituted from observed data;
- Selections of analyses and prognoses.

Responsibility of various centres

126. The responsibilities of WMCs, RMCs and NMCs in data storage and retrieval are as set forth in paragraphs 104, 108 and 113. The Commission for Basic Systems should recommend procedures to ensure that all information is stored and readily retrievable and that unnecessary duplication is avoided.

127. Paragraph 126 refers mainly to basic observational data and processed information. Centres at each level should be prepared to store a selection of specialized data. Furthermore, they should be ready to make and store special comprehensive collections of data at the appropriate level gathered over limited periods for research purposes.

128. Further details of the information to be stored at each level in the Global Data-processing System will be laid down as appropriate by the Executive Committee and regional associations on the basis of technical advice by the technical commissions concerned. These details will be published in the Guide on the Global Data-processing System.

Collection of data to be stored

129. Where the urgency for immediate processing exists, data collection will be by meteorological telecommunications, subject to available capacity. Where such urgency, or sufficient capacity, does not exist, collection will be by the safest, most economical means or media which are most useful.

130. Where data are transmitted completely through meteorological telecommunications, the resulting collection should serve research and long-term applications as well as real-time requirements. Collection of the same data by other methods will in this case not be necessary if adequate standards of quality are achieved for the data collected by meteorological telecommunications.

Quality control of data to be stored

131. In addition to the real-time quality control described in paragraphs 116 to 118, 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.

132. Storage centres should strive to use and constantly improve computerized methods for error detection and preliminary correction, nevertheless, some error correction will have to be carried out by specialists in each centre, re-examining suspect values which may have been undetected earlier in the real-time data-processing stages of quality control. As a general principle, prior to placing data in storage, all suspect values and proposed corrections should be appropriately marked for future users of the data.

Media for exchange

133. At present there is no possibility of using a single standard medium for data storage at all centres, thus for exchange of stored data it is necessary that these data be made available on certain standard media. These standard media are punched cards, paper tape and magnetic tape; detailed specifications for these media will be given in the Guide on the Global Data-processing System. It should be noted that only selected satellite photographs are now available in digital form. Film copy will continue to be the basic storage medium for satellite photography.

Classification and cataloguing of stored data

134. All centres should publish and keep up-to-date catalogues of the data which they store, and a descriptive list of such catalogues should be compiled and disseminated to all centres. The WMO Secretariat should serve as an information centre on the availability of stored meteorological and related data.

135. The classification and cataloguing scheme for all WWW data developed by the Commission for Basic Systems should be implemented as rapidly as possible. This scheme has to be made as compatible as possible with the methods used by data centres of related disciplines.

Further studies required

136. The implementation of the above plans for the Global Data-processing System will go far towards meeting Members' requirements for processed data for real-time use and for the ready retrievability of data for research and other non-real-time uses. During the period 1976-1979 further work and studies should be conducted on the following lines.

137. The system of WMCs and RMCs should be kept under review by CBS and, as appropriate, by regional associations. Steps should be taken to fill any gaps in the system and to avoid any undesirable redundancy. The possibility of pooling of resources between Members with common interests should be explored, especially as regards the sharing of advanced computer facilities.

138. Research work should continue on the testing and application of new technology:

(a) For modelling the three-dimensional structure of the atmosphere to improve forecasting for all scales of motion;

(b) For studying the impact of new data systems on operational or experimental atmospheric models; and

(c) For four-dimensional assimilation of data from a variety of observation systems into an operational analysis-forecast system.

139. Further efforts should be made, working through the Commission for Basic Systems, to co-ordinate and rationalize WMC and RMC products so that the maximum amount of Members' requirements can be achieved through the exchange of the minimum necessary number of products over the Global Telecommunication System.

140. Continued work is essential for the development of the storage and retrieval service as discussed in paragraphs 125 to 135. Studies are needed in particular to determine the period during which the data should be stored by centres, and to develop or improve standard retrieval formats in which users may expect to obtain the desired data. Classification and cataloguing procedures should also be developed to help all potential users of stored data, and co-operation and co-ordination between the storage and retrieval services of geophysical disciplines involved in the description analysis and prognosis of man's environment. Additionally, CBS should arrange for periodic reviews to ensure that arrangements are adequate to permit all possible World Weather Watch data to be stored in a readily retrievable form.

141. In all the above studies, the desirability of co-ordination and compatibility of data-processing systems in related environmental disciplines should be taken into account.

## GLOBAL TELECOMMUNICATION SYSTEM*

### Purpose and principles

142. The purpose of the Global Telecommunication System (GTS) is primarily to provide the telecommunications facilities and arrangements for the rapid and reliable collection, exchange and distribution of the required observational data, in particular from the Global Observing System, and also of processed information available from the WMCs and RMCs operating within the Global Data-processing System of the WWW to meet the needs of Members for operational and research purposes. The GTS will also give telecommunication support for the implementation of other environmental programmes as decided by the WMO Congress or the Executive Committee.

143. The facilities provided in the Global Telecommunication System and the techniques to be employed on these circuits should be adequate to accommodate the

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* Note: Details of the organization, telecommunication procedures, and technical characteristics and specifications, are given in the Manual on the Global Telecommunication System, Volume I, Global Aspects.

necessary volume of meteorological information and its transmission within the required time limits to meet the needs of Members for operational and research purposes within the WWW, and other programmes as agreed by Congress and/or the Executive Committee.

144. The collection, exchange and transmission schedules and procedures should, for all types of data, be co-ordinated by the Commission for Basic Systems and regional associations as required.

General organization and functions of the GTS

145. The GTS is organized on a global three-level basis, namely:

(a) The Main Trunk Circuit and its branches;

(b) The regional meteorological telecommunication networks; and

(c) The national meteorological telecommunication networks.

146. The GTS is internationally supported by the telecommunication functions of the following centres:

(a) World Meteorological Centres;

(b) Regional Telecommunication Hubs;

(c) Regional Meteorological Centres, as necessary, in accordance with regional agreement; and

(d) National Meteorological Centres.

147. The following paragraphs describe the general organization and functions of the networks and centres mentioned in paragraphs 145 and 146 above.

Main Trunk Circuit and its branches

148. The Main Trunk Circuit and its branches link together the World Meteorological Centres as well as designated Regional Telecommunication Hubs. The centres which are situated on the Main Trunk Circuit and its branches have been specified by Congress. The names of the centres, together with a diagram indicating the routeing of the Main Trunk Circuit and its branches, are given in Part A of Attachment II.

149. The functions of the Main Trunk Circuit and its branches are the following:

(a) Ensuring the rapid and reliable exchange of observational data required for making analyses and prognoses on a global scale;

(b) Ensuring the exchange of processed information between the World Meteorological Centres, including data received from meteorological satellites;

(c) Transmitting additional processed information for the purpose of providing Regional Telecommunication Hubs, Regional Meteorological Centres and National Meteorological Centres with the information produced by the WMCs;

(d) Transmitting, when feasible, other observational data and processed information required for inter-regional exchange.

Regional meteorological telecommunication networks

150. The regional meteorological telecommunication networks consist of an integrated system of circuits which interconnect RTHs, NMCs, and in some regions, WMCs and/or RMCs, and radio broadcasts, in accordance with the meteorological telecommunication plans established by the regional associations. In addition to those centres listed in Part A of Attachment II, regional associations have included in the regional telecommunication plans the RTHs listed in Part B of Attachment II.

151. The principal function of the regional meteorological telecommunication networks is to ensure rapid collection and distribution of observational data and processed information as follows:

(a) Exchange and distribution of observational data within the Region, as required to meet the needs of Members of the Region;

(b) Collection of observational data originating in, or being received by, radio stations located in the Region (e.g. reports from aircraft and ships);

(c) Collection of observational data from NMCs in adjacent Regions, provided that this is found to be of use to the Global Telecommunication System and is agreed upon by the Members concerned and the corresponding regional associations;

(d) Exchange and distribution of processed (conventional and satellite) information as required to meet the needs of Members of the Region;

(e) Interchange of observational data and processed information with other Regions.

National meteorological telecommunication networks

152. The organization of appropriate national telecommunication networks is of great importance to the efficient working of the overall Global Telecommunication System. Therefore the national telecommunication networks should be organized to ensure the rapid and reliable collection and repetition, if necessary, of observational data by the NMCs to meet the WWW requirements.

153. The choice of telecommunication networks and facilities for the collection of meteorological information from stations located within a country or territory is a matter for decision by the Member concerned. The arrangements should comply at least with the WWW requirements as regards maximum tolerable delay and reliability of reception.

Functions of meteorological telecommunication centres

World Meteorological Centres (WMCs)

154. In regard to telecommunications, the World Meteorological Centres are responsible for:

(a) Collecting the observational data originating in their zone of responsibility and transmitting such data in the appropriate form and speed on the Main Trunk Circuit and its branches;

(b) Relaying as internationally agreed, on the Main Trunk Circuit and its branches, in the appropriate form and speed, the meteorological information which they receive from these circuits and/or from RTHs not situated on the Main Trunk Circuit;

(c) Ensuring the selective distribution, in the appropriate form and speed, of meteorological information to the NMCs and to the RTHs not situated on the Main Trunk Circuit which they serve;

(d) Checking and correction in order to maintain standard telecommunication procedures.

Regional Telecommunication Hubs (RTHs)

155. The Regional Telecommunication Hubs are responsible for:

(a) Collecting the observational data originating in their zone of responsibility and transmitting such data in the appropriate form and speed on the Main Trunk Circuit and its branches, either directly or through the appropriate WMC or RTH;

(b) Relaying as internationally agreed, on the Main Trunk Circuit and its branches, in the appropriate form and speed, the meteorological information which they receive from these circuits and/or from RTHs not situated on the Main Trunk Circuit;

(c) Ensuring the selective distribution, in the appropriate form and speed, of meteorological information to the NMCs and to the RTHs not situated on the Main Trunk Circuit which they serve;

(d) Checking and correction in order to maintain standard telecommunication procedures.

Regional Meteorological Centres (RMCs)

156. Regional Meteorological Centres not combined with RTHs perform telecommunication functions as necessary, in accordance with regional agreement.

National Meteorological Centres (NMCs)

157. In regard to telecommunications, the National Meteorological Centres are responsible for:

(a) Collecting observational data from their own territory or that of one or more Members according to bilateral agreements, as well as from aircraft and ships received by centres located within the area of responsibility. This collection should take place as soon as possible and be completed within 15 minutes of the observing station's filing time;

(b) Transmitting such data to the associated Regional Telecommunication Hub and World Meteorological Centre;

(c) Receiving and distributing for its benefit and that of Members who request them, in accordance with bilateral agreements, observational data and processed meteorological information, to meet the requirements of the Members concerned;

(d) Checking and making corrections in order to ensure that standard telecommunication procedures are applied.

158. The efficient performance of the NMC meteorological telecommunication functions is of vital importance to full realization of the benefits of the World Weather Watch. The prompt and complete collection and transmission of national observational data to associated RTHs is essential in order to meet the collection and data-processing goals set out in the plan. In particular suitable priority should be given to ensuring the timely collection of observational data from data-sparse areas and critical island locations.

Engineering principles of the Global Telecommunication System

159. The engineering principles established for the planning of the Global Telecommunication System are as follows:

Principle 1

The Global Telecommunication System is engineered as an integrated network for the collection, exchange and distribution of both processed and unprocessed observational meteorological information on a world-wide basis, with a view to meeting efficiently and effectively, the requirements of all national Meteorological Services and also the requirements of WMCs and RMCs.

Principle 2

The system makes the fullest possible use of cable and landline facilities and other telecommunication means with similar technical and operational characteristics. For medium and high-speed data transmission and also facsimile trans-

mission (in digital and non-digital form) standard telephone-type circuits as well as radio circuits having similar technical characteristics are preferred for operational and financial reasons.

Principle 3

The circuits provided and the techniques employed should be adequate to accommodate the volume of meteorological information and its transmission with the required time limits, to meet the needs of WMCs, RMCs and NMCs.

Principle 4

In planning the circuits and transmission schedules, the volume of traffic to be passed over any one channel is not to exceed 80 per cent of its ultimate capacity. The channels should be engineered to ensure the highest possible reliability.

Principle 5

The system is based mainly on the interconnexion of a number of centres, namely, NMCs, RMCs, RTHs and WMCs. The WMCs, RMCs and RTHs need to be equipped with suitable equipment for selection, switching and editing in order to provide NMCs with the data selected to meet their specified needs.

Principle 6

Provision is envisaged for alternative routeings, where necessary, to ensure the reliability and efficiency of the system, particularly the reliability and efficiency of the Main Trunk Circuit.

Technical characteristics and specifications for the GTS

160. The technical characteristics, specifications of meteorological transmissions and the engineering of WMCs and RTHs on the Main Trunk Circuit and its branches have been developed in detail and are contained in the Manual on the Global Telecommunication System, Volume I, Global Aspects. The Commission for Basic Systems is responsible for reviewing, modifying and updating the information contained in Volume I of the Manual on the Global Telecommunication System, in the light of technological developments and other requirements.

161. Regional meteorological telecommunication networks are developed by regional associations so that they are compatible with the system characteristics (engineering, circuit, transmission) of the Main Trunk Circuit and its branches. Compatibility is essential, particularly to ensure efficient flow of traffic over the Global Telecommunication System. The details of the regional meteorological telecommunication networks are contained in the Manual on the Global Telecommunication System, Volume II, Regional Aspects.

162 National telecommunication networks should be developed so as to ensure efficient flow of traffic over the Global Telecommunication System within the specified time limits.

Basic tasks for further development and improvement of the GTS during the period 1976-1979

163. Every effort should be made by Members concerned, regional associations and CBS for further development and improvement of the GTS during the period 1976-1979, taking into consideration the main tasks indicated in sub-paragraphs 16 (a), 17 (f), 17 (g) and 17 (h), as well as the following specific tasks:

(a) Speeding up the implementation of the regional meteorological telecommunication networks in conformity with the decisions adopted by regional associations, in order to meet fully the requirements for exchange of observational data and processed information on the GTS;

(b) To increase the capacity on certain parts of the GTS, in particular the Main Trunk Circuit and its branches, the main regional circuits, to cope with the increasing amount of traffic and to meet the time limits set for the transmission of data on the GTS. Where necessary operation on low-speed (50-75 bauds) should be replaced by 1200 or 2400 bits/sec. operation. For the same purpose, higher data signalling rates (e.g. 4800 bits/sec.) should be standardized by WMO and should be used on the MTC segments where necessary and feasible;

(c) Reliability of the circuits and centres should be improved by increased use of cable circuits and circuits with similar characteristics (for example, satellite channels) as well as the provision of back-up circuits where feasible for use in case of outages of the main circuits;

(d) Improvement of meteorological telecommunication procedures, including message format, routeing of messages, as well as unification of the error control procedures and the unification of the data facsimile switching procedures;

(e) Increased use of alpha-numeric and digital transmission for processed information by the use of grid-point code and the introduction of coded digital facsimile for the exchange of information not suitable for exchange in alpha-numeric form;

(f) Extension of the role of meteorological satellite systems for the collection of information from automatic platforms and the dissemination of satellite information, and other meteorological information where permitted by the national telecommunication authorities, to a wider range of users;

(g) Implementation and improvement of facilities at WMCs, RTHs and RMCs to ensure selective distribution of observational data and processed information in accordance with the requirements of users.

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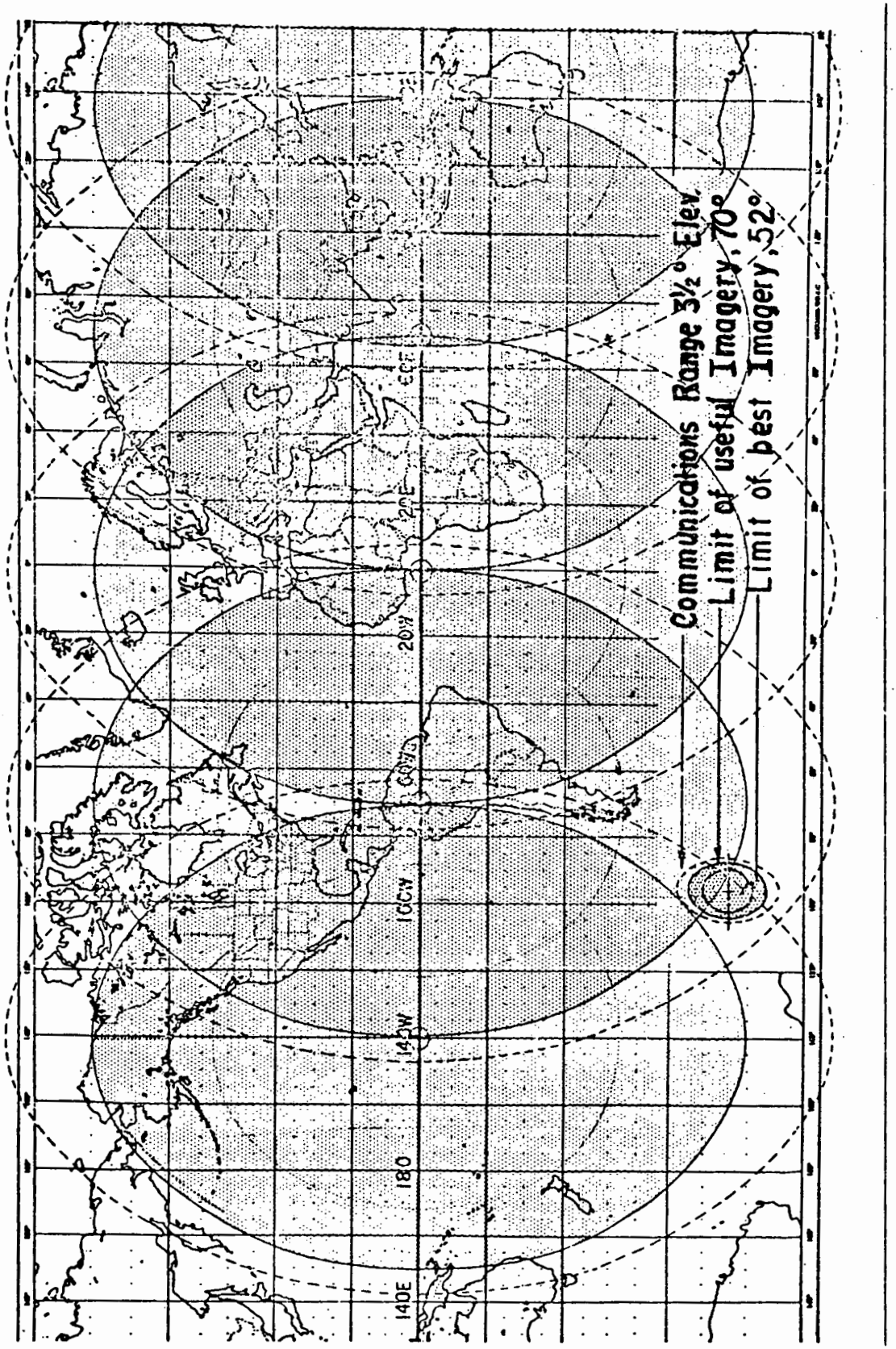
ANNEX II

ATTACHMENT I

MEMBERS' PLANS OF GEOSTATIONARY METEOROLOGICAL SATELLITES



# ATTACHMENT II

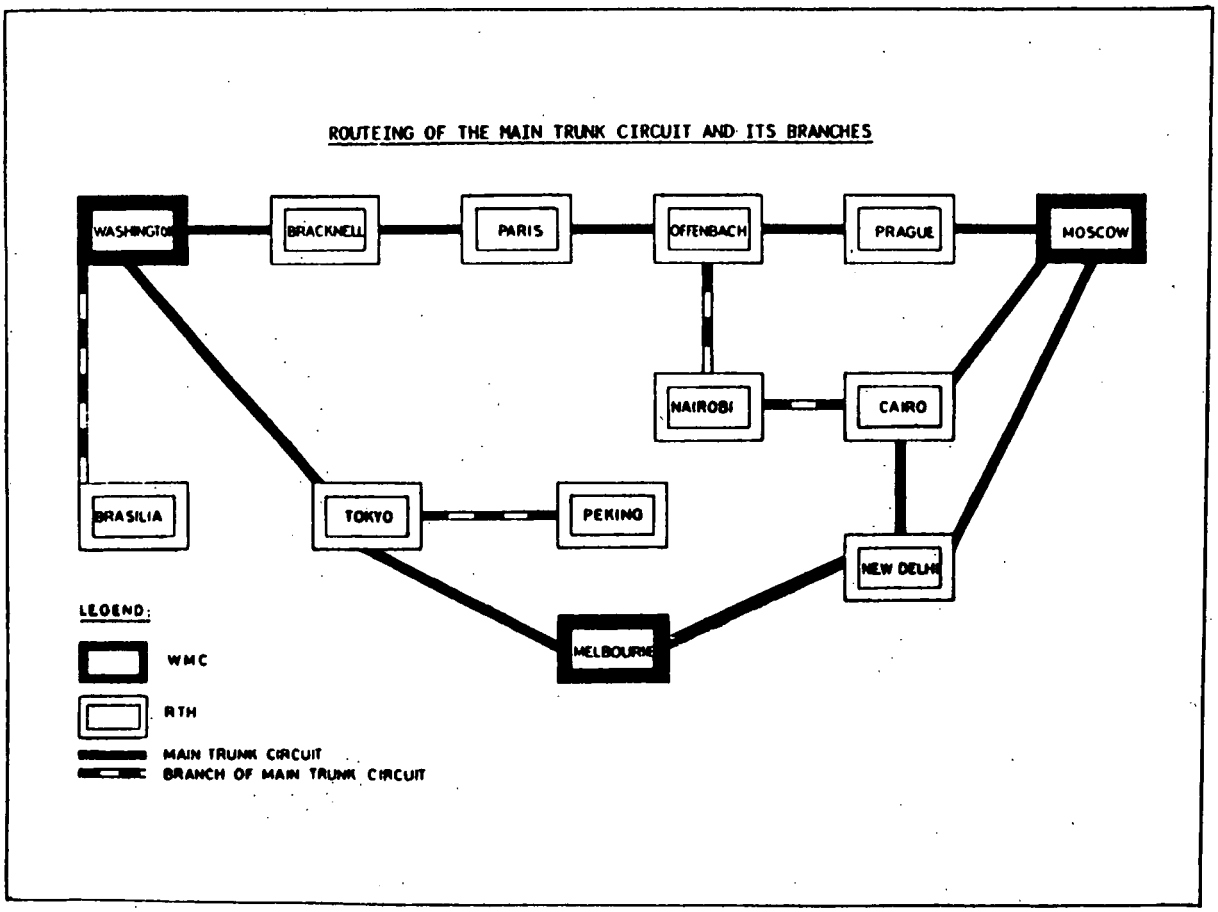
Part A - Centres with receiving and transmitting capabilities on the Main Trunk Circuit and its branches.

(i) World Meteorological Centres

Melbourne Moscow Washington

(ii) Regional Telecommunication Hubs

| | |
|---|---|
| Bracknell | Offenbach |
| Brasilia | Paris |
| Cairo | Peking |
| Nairobi | Prague |
| New Delhi | Tokyo |



Part B - Other Regional Telecommunication Hubs, included by the regional associations in their regional telecommunication plans.

Region I : Algiers, Dakar, Kano, Pretoria, Casablanca*

Region II : Bangkok, Khabarovsk, Novosibirsk, Tashkent, Teheran

Region III: Buenos Aires, Maracay

Region IV : -

Region V : Wellington

Region VI : Rome, Sofia, Stockholm, Vienna

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* Supporting RTH for the RMC Tunis/Casablanca (joint operation)

# A N N E X III

Annex to paragraph 9.4.1 of the general summary

## SUMMARY OF IMPLEMENTATION AND FUTURE PLANS OF THE MAIN TRUNK CIRCUIT AND ITS BRANCHES AS AT APRIL 1974

| Segment | Present operational status | Future plans (Year of implementation) |
|---|---|---|
| Melbourne-New Delhi | Satellite, one 75-baud channel | See general summary agenda item 9.4 |
| New Delhi-Cairo | HF, one 50-baud ARQ channel | HF/ISB, 2 x 50 baud ARQ channels and one FAX channel (1974); HF/ISB, 1 200 bits/sec data channel with special error detection and correction procedure and one FAX channel (1974) |
| New Delhi-Moscow | HF/ISB, 4 x 50-baud ARQ channels and one FAX channel | HF/ISB, 1 200 bits/sec data channel with special error detection and correction procedure and one FAX channel (1974) |
| Cairo-Moscow | HF, one 50-baud ARQ channel | HF/ISB, 1 200 bits/sec data channel with special error detection and correction procedure and one FAX channel (1974) |
| Moscow-Prague | Cable, one 50-baud channel and one FAX channel | 1 200 bits/sec data/FAX channel with hardware error detection and correction procedure (1974) |
| Prague-Offenbach | Cable, one 50-baud channel and one FAX channel | 1 200 bits/sec data/FAX channel with hardware error detection and correction procedure (1974) |

| Segment | Present operational status | Future plans (Year of implementation) |
|---|---|---|
| Offenbach-Paris | 2 400 bits/sec data/FAX channel with software error detection and correction procedure | - |
| Paris-Bracknell | 2 400 bits/sec data/FAX channel with software error detection and correction procedure | - |
| Bracknell-Washington | 2 400 bits/sec data/FAX channel with software error detection and correction procedure | - |
| Washington-Tokyo | 2 400 bits/sec data channel with software error detection and correction procedure | 2 400 bits/sec data/FAX channel with software error detection and correction procedure (1974) |
| Tokyo-Melbourne | Cable, one 75-baud channel | See general summary agenda item 9.4 |
| Nairobi-Cairo | HF/ISB, one 50-baud channel and one FAX channel | HF/ISB, 2 x 50-baud ARQ channels and one FAX channel (1974) |
| Nairobi-Offenbach | HF/ISB, 1 x 50-baud channel and one FAX channel | HF/ISB, 2 x 50-baud ARQ channels and one FAX channel (1975) |
| Brasilia-Washington | HF/ISB, one 50-baud channel | HF/ISB, 2 x 50 baud channels and one FAX channel (1975), and 2 400 bits/sec later |
| Peking- Tokyo | - | 5 x 75-baud channel (1974) to be upgraded later to medium/high speed data transmission |

# A N N E X IV

Annex to Recommendation 1 (CBS-VI)

## OVERALL LIST OF OUTPUT PRODUCTS OF WMCs

I. Analyses

Surface

850 mb
700 mb
500 mb
300 mb
250 mb
200 mb
150 mb
100 mb
70 mb
50 mb
30 mb
20 mb
10 mb

Relative topography, in particular 500/1 000 mb

Jet stream

Tropopause

Nephanalyses

Digitized cloud mosaics*

Mapped radiometric data*

Land and sea-surface temperature*

Snow and ice cover

Storm alerts*

Area coverages: northern hemisphere, southern hemisphere, tropical belt

Times of reference (H): 00 and 12 GMT, as applicable

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* Based on satellite information

II. Prognoses

Surface

850 mb
700 mb
500 mb
300 mb
250 mb
200 mb
150 mb
100 mb
70 mb
50 mb
30 mb
20 mb
10 mb

Relative topography, in particular 500/1 000 mb

Precipitation (quantitative) or vertical motion
30-day mean surface
30-day mean 500 mb

Area coverages: northern hemisphere, southern hemisphere, tropical belt

Times of reference (H): 00 and 12 GMT

Times of validity: H+12, H+24, H+36, H+48, H+72, H+96 and H+120 hours, as far as applicable

III. 5-day, 15-day and 30-day mean values

Surface

500 mb

Relative topography 500/1 000 mb

Sea-surface temperature (preferably anomaly)

Area coverages: northern hemisphere, southern hemisphere, tropical belt

# ANNEX V

Annex to Recommendation 2 (CBS-VI)

## OVERALL LIST OF OUTPUT PRODUCTS OF RMCs

I. Analyses

Surface

850 mb
700 mb
500 mb
400 mb
300 mb
250 mb
200 mb
150 mb
100 mb
70 mb
50 mb
30 mb
20 mb
10 mb

Tropopause and maximum wind or
Tropopause and vertical wind shear

Relative topography, in particular 500/1 000 mb

Stability

Precipitable water

Snow depth

Changes 500 mb, 24 hours

Changes of relative topography 500/1 000 mb, 24 hours

Freezing level

Pressure changes, 3 hours
Pressure changes, 12 and/or 24 hours

Precipitation areas - 6 hours
Precipitation areas - 24 hours

Sferics

Radar echoes

Nephanalyses

Sea-surface temperature

Sea ice

State of sea*

Sea surge*

Thermoclines*

Superstructure icing*

Top of Ekman layer

Transpiration and evaporation estimates*

Water balance assessments involving estimates of soil moisture deficits or soil moisture contents*

Estimates of potential photosynthesis (possible dry matter production)*

Surface air trajectories*

850 mb air trajectories*
700 mb air trajectories*
500 mb air trajectories*

Times of reference (H): 00, 06, 12 and 18 GMT, as applicable

II. Prognoses

NOTE: This list includes products which may also be required by Area Forecast Centres in accordance with requirements determined by ICAO.

Surface

850 mb
700 mb
500 mb
400 mb
300 mb
250 mb
200 mb
150 mb
100 mb

Upper winds and temperatures

Tropopause and maximum wind or
Tropopause and vertical wind shear

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* Subject to confirmation by the technical commissions concerned.

Relative topography 500/1 000 mb

Significant weather

Freezing level

Vorticity

Vertical motion

Precipitation (quantitative)

Maximum and minimum temperatures

State of sea*

Sea surge*

Sea-surface temperature

Thermoclines*

Sea ice

Superstructure icing*

Times of reference (H): 00, 06, 12 and 18 GMT as applicable

Times of validity: H+12, H+18, H+24, H+36, H+48, and H+72 hours, as far as applicable

III. Plotted data

Plotted surface data (3-hourly)

Plotted upper-air data (850, 700, ... 100 mb)

Tabulated winds

Aerological diagrams

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* Subject to confirmation by the technical commissions concerned.

# A N N E X VI

Annex to Recommendation 4 (CBS-VI)

## REQUIREMENTS FOR GLOBAL EXCHANGE OF OBSERVATIONAL DATA

### PART A

Principles for the establishment of the exchange programme for observational data on the Main Trunk Circuit

1. The types of meteorological messages containing observational data to be exchange on the Main Trunk Circuit and its branches, as well as the frequency of the exchanges of these data and the principles followed in the establishment of the list of stations are given below:

1.1 Types of messages

The types of messages are as follows:

(i) TEMP - Parts A and C and Parts B and D when the capacity of the MTC and its branches permits;

(ii) PILOT - Parts A and C;

(iii) TEMP SHIP - Parts A and C and Parts B and D when the capacity of the MTC and its branches permits;

(iv) PILOT SHIP - Parts A and C;

(v) SYNOP;

(vi) SHIP;

(vii) Reports from automatic stations at land and sea;

(viii) CODAR/AIREP;

(ix) Selected satellite data such as cloud images (SAREP), vertical sounding data and winds derived from cloud motion;

(x) CLIMAT, CLIMAT SHIP;

(xi) CLIMAT TEMP, CLIMAT TEMP SHIP;

(xii) BATHY, TESAC.

NOTE: Figures (i) to (xii) do not indicate priorities.

1.2 Frequency of exchanges

The frequency of exchanges is as follows:

(i) TEMP, TEMP SHIP, PILOT, PILOT SHIP - for 0000 and 1200 GMT, and if available, 0600 and/or 1800 GMT;

(ii) SYNOP, SHIP and reports from automatic stations at land and sea - 0000, 0600, 1200 and 1800 GMT;

(iii) CODAR/AIREP reports, as available;

(iv) Selected satellite data: as frequently as possible;

(v) CLIMAT, CLIMAT SHIP, CLIMAT TEMP and CLIMAT TEMP SHIP - once per month;

(vi) BATHY and TESAC, as available.

NOTE: 1.1 and 1.2 above: On certain segments of the Main Trunk Circuit and its branches, additional information may be exchanged if necessary and possible, to meet interregional exchange requirements.

1.3 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:

(i) All stations (on land or at sea) making radiosonde/radiowind observations and reporting by means of TEMP/TEMP SHIP code forms;

(ii) All stations (on land or at sea) making radiowind observations and reporting by means of PILOT/PILOT SHIP code forms, excepting 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;

(iii) 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; but excepting those stations from which wind data are included in TEMP/TEMP SHIP reports;

(iv) Stations selected from the basic synoptic networks making surface observations and reporting by means of the SYNOP code form:

(a) The stations are to form a sufficiently dense network for large- and planetary-scale analysis; i.e. a network with a spacing of 300 km;

(b) The list of stations in (a) above should include all the surface observing stations from the basic synoptic network which are associated with radiosonde/radiowind observing stations (or nearby stations);

(v) SHIP reports ensuring adequate data coverage, for example: SHIP reports from locations within 50-100 km of coastline could be excluded if land surface network is adequate. However, all SHIP reports from the southern hemisphere and tropical zones should be included;

(vi) CODAR / AIREP reports over ocean areas and data-sparse land areas;

(vii) Reports from automatic weather stations in data sparse areas;

(viii) CLIMAT / CLIMAT TEMP and CLIMAT SHIP / CLIMAT TEMP SHIP reports from the networks of stations recommended by regional associations.

*

* *

PART B

Procedure for updating the list of observation stations for global exchanges

It was recognized that certain changes in the list of stations are inevitable from time to time. To provide a simple and effective means of effecting such changes, the procedures given below shall be followed:

1. The president of CBS, at the request of the Member concerned and in consultation with the Secretary-General, shall approve changes in the list of stations for global exchanges without a formal consultation with Members in the following cases:

(a) Inclusion of a new station from the basic synoptic network which becomes operational and that will fill a gap in the distribution of stations for global exchanges or that may be required in the exchange for a specific purpose;

(b) Deletion of an existing station from the list of stations for global exchanges if this does not adversely affect the distribution of stations;

(c) Deletion of stations whose observational programme ceases or for which telecommunication collecting facilities to ensure the timely inclusion of their reports in the exchange become inadequate due to compelling circumstances.

2. The Secretary-General should introduce minor amendments in the list of stations for global exchange which result from the expansion of the observing programme of a station already included in the list, or from a replacement of an existing station by a nearby station when this is adopted by the president of the appropriate regional association.

# A N N E X VII

## Annex to Recommendation 9 (CBS-VI)

## MODIFIED CODES ROCOB AND ROCOB SHIP

FM 39-VI ROCOB - Upper-level temperature, wind and air density report from a land rocketsonde station.

FM 40-VI ROCOB SHIP - Upper-level temperature, wind and air density report from rocketsonde station on ship.

Code form:

| | | | |
|---|---|---|---|
| Section 1 | $M_i M_i M_j M_j$ YYGGg | ( IIiii * | |
| | | ( | |
| | | ( or | |
| | | ( | |
| | | ( 99$L_a L_a L_a$ | $Q_c L_o L_o L_o L_o$ $MMMU_{La} U_{Lo}$** |
| | $a_1 e_T e_T c_T m_r$ | $r_m e_w e_w c_w m_r$ | |
| Section 2 | $HHZ_T TT$ | ddfff | $(9d_p p_1 p_1 p_1)$ |
| | $HHZ_T TT$ | ddfff | $(9d_p p_1 p_1 p_1)$ |
| | ..... | ..... | ..... |
| Section 3 | $(11Z_T T_1 T_1$ | $P_1 P_1 h_1 h_1 h_1$ | $d_1 d_1 f_1 f_1 f_1$ |
| | ..... | ..... | ..... |
| | $11Z_T T_n T_n$ | $P_n P_n h_n h_n h_n$ | $d_n d_n f_n f_n f_n$ |
| | $22Z_T T_1 T_1$ | $P_1 P_1 h_1 h_1 h_1$ | $d_1 d_1 f_1 f_1 f_1$ |
| | ..... | ..... | ..... |
| | $22Z_T T_n T_n$ | $P_n P_n h_n h_n h_n$ | $d_n d_n f_n f_n f_n$ |
| | $33Z_T T_1 T_1$ | $P_1 P_1 h_1 h_1 h$ | $d_1 d_1 f_1 f_1 f_1$ |
| | ..... | ..... | ..... |
| | $33Z_T T_n T_n$ | $P_n P_n h_n h_n h_n$ | $d_n d_n f_n f_n f_n$ |
| | $44Z_T T_1 T_1$ | $P_1 P_1 h_1 h_1 h_1$ | $d_1 d_1 f_1 f_1 f_1$ |
| | ..... | ..... | ..... |

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*/ used in FM 39-VI

**/ used in FM 40-VI

$44Z_TT_nT_n$ $P_nP_nh_nh_nh_n$ $d_nd_nf_nf_nf_n$

$55Z_TT_1T_1$ $P_1P_1h_1h_1h_1$ $d_1d_1f_1f_1f_1$

..... ..... .....

$55Z_TT_nT_n$ $P_nP_nh_nh_nh_n$ $d_nd_nf_nf_nf_n$

$66Z_TT_1T_1$ $P_1P_1h_1h_1h_1$ $d_1d_1f_1f_1f_1$

..... ..... .....

$66Z_TT_nT_n$ $P_nP_nh_nh_nh_n$ $d_nd_nf_nf_nf_n$)

Notes:

1. ROCOB is the name of the code form for an upper-level (for altitudes greater than 20 km) temperature, wind and air density report of a rocketsonde observation from a land station. ROCOB SHIP is the name of the code of a rocketsonde report from a ship.

2. A ROCOB report is identified by $M_iM_iM_jM_j$ = RRXX. A ROCOB SHIP report is identified by $M_iM_iM_jM_j$ = SSXX.

3. The code form is divided into three sections as follows:

| Section number | Contents |
|---|---|
| 1 | Identification data |
| 2 | Data for specified geometric altitudes |
| 3 | Data for isobaric surfaces (optional) |

REGULATIONS:

39.1

General

The code name ROCOB or ROCOB SHIP shall not be included in the report

39.2

Section 1

39.2.1

The land rocketsonde station shall indicate its position by means of the group IIiii. The ship rocketsonde station shall indicate its position by means of the groups $99L_aL_aL_a \quad Q_cL_oL_oL_oL_o \quad MMMU_{La}U_{Lo}$.

39.2.2

Section 1 shall not be transmitted as a separate report.

39.3

Section 2 - Specified geometric altitudes

39.3.1

Mandatory levels

39.3.1.1

Data shall be reported for each 5 km vertical interval, beginning at 20 km, up to the top of the ascent, and for the lowest level of the ascent for which data are available, provided its altitude is higher than 20 km.

39.3.1.2

If data are not available for one or more of the mandatory altitudes specified in Regulation 39.3.1.1, the code groups for those levels shall be inserted in the report in their altitude sequence order with solidi (/, // or ///) reported for the missing elements.

39.3.2

Significant levels

39.3.2.1

All data shall be reported for those non-mandatory levels at which significant changes in speed, direction or temperature occur. The mandatory and significant levels shall be intermixed in the report in ascending order with respect to altitude.

39.3.2.2

The reported significant data shall make it possible to reconstruct the wind and temperature curves between consecutive mandatory levels with sufficient accuracy for practical use.

39.3.2.3

The criteria for significant changes shall be as follows:

(a) A departure of the wind speed of 5 or more metres per second from a linear interpolation between any two consecutive levels selected to be reported;

(b) A departure of the wind direction from a linear interpolation between any two consecutive levels selected to be reported, thus:

60° or more - when the average wind speed for the layer is 8 to 15 metres per second;

30° or more - when the average wind speed for the layer is 16 to 30 metres per second;

20° or more - when the average wind speed for the layer is 31 metres per second or more.

(c) A temperature change of 3°C from a linear interpolation between any two consecutive levels selected to be reported.

Note: To satisfy these criteria, the following method of approximation is recommended:

(i) The bottom level and the top level of the 5 km stratum between two consecutive mandatory levels, constitute the bases lines for determining the significant levels in that stratum. If the wind and temperature criteria are not exceeded, no significant level need be reported. Whenever one of the parameters deviates by more than the limit specified in Regulation 39.3.2.3, the level of greatest deviation becomes a significant level, and data for all three parameters are reported for that level

(ii) The additional significant levels so introduced divide the stratum into several layers. In each separate layer, the deviations from the linearly interpolated values between the base and the top are then considered. The process used in paragraph (i) above is repeated and yields other significant levels. These additional levels in turn modify the layer distribution, and the method is applied again until any level is approximated to the specified criteria values.

39.3.3

Group ddfff

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The thickness of the layer through which wind direction and speed are determined shall be 2 km for both mandatory and significant levels; i.e., 1 km on each side of the altitude reported.

39.3.4

Group $9d_pP_1P_1P_1$

Group $9d_pP_1P_1P_1$ shall be included only when data are available. If temperature data are missing for a stratum of more than 3 km in depth, the $9d_dP_1P_1P_1$ group shall be omitted for the remainder of the ascent.

39.4

Section 3 - Isobaric Surfaces

39.4.1

Section 3 shall be included only when data are available for any of the isobaric surfaces of 70, 50, 30, 20, 10, 7, 5, 3, 2, 1, $7.10^{-1}$, $5.10^{-1}$, $4.10^{-1}$, $3.10^{-1}$, $2.10^{-1}$, $1.10^{-1}$, $7.10^{-2}$, $5.10^{-2}$, $3.10^{-2}$, $2.10^{-2}$, $1.10^{-2}$, $7.10^{-3}$, $5.10^{-3}$, $3.10^{-3}$, $2.10^{-3}$, $1.10^{-3}$, $7.10^{-4}$, $5.10^{-4}$, $3.10^{-4}$, $2.10^{-4}$, $1.10^{-4}$, $7.10^{-5}$, $5.10^{-5}$, $3.10^{-5}$, $2.10^{-5}$, and $1.10^{-5}$ mb surfaces.

39.4.2

In Section 3, indicator figures 11, 22, 33, 44, 55, and 66 specify the following values for PP and hhh:

Indicator figures 11 shall be used when $P_1P_1$, $P_2P_2$, ...., $P_nP_n$ are reported in whole millibars and $h_1h_1h_1$, $h_2h_2h_2$, ...., $h_nh_nh_n$ in geopotential hectometres.

Indicator figures 22 shall be used when $P_1P_1$, $P_2P_2$, ...., $P_nP_n$ are reported in tenths of a millibar and $h_1h_1h_1$, $h_2h_2h_2$, ...., $h_nh_nh_n$ in geopotential hectometres.

Indicator figures 33 shall be used when $P_1P_1$, $P_2P_2$, ...., $P_nP_n$ are reported in hundredths of a millibar and $h_1h_1h_1$, $h_2h_2h_2$, ...., $h_nh_nh_n$ in geopotential hectometres.

Indicator figures 44 shall be used when $P_1P_1$, $P_2P_2$, ...., $P_nP_n$ are reported in thousandths of a millibar and $h_1h_1h_1$, $h_2h_2h_2$, ...., $h_nh_nh_n$ in geopotential hectometres.

Indicator figures 55 shall be used when $P_1P_1$, $P_2P_2$, ...., $P_nP_n$ are reported in ten-thousandths of a millibar and $h_1h_1h_1$, $h_2h_2h_2$, ...., $h_nh_nh_n$ in geopotential hectometres.

Indicator figures 66 shall be used when $P_1P_1$, $P_2P_2$, ...., $P_nP_n$ are reported in hundred-thousandths of a millibar and $h_1h_1h_1$, $h_2h_2h_2$, ...., $h_nh_nh_n$ in geopotential kilometres.

Modifications to Parts A-2, A-3 and A-4 of Volume I
Manual on Codes (WMO - 306)

The following changes will be required in Parts A-2, A-3 and A-4 of Volume I:

1. Part A-2, a.

1.1 JJJ - Delete the symbolic letters JJJ and the explanation.

2. Part A-3

2.1 Deletion of Symbolic Letters and Specifications

2.1.1 Delete the following symbolic letters and their specifications:

$e_s$, $G_d$, $j_n$

2.1.2 ff - Delete the reference to "FM 39.E and FM 40.E" from the present specifications. Delete (3) under the specification.

2.1.3 GGgg - Delete the reference to "FM 39.E and FM 40.E" from the present specification.

2.1.4 $h_1h_1h_1$, $h_2h_2h_2$, ....., $h_nh_nh_n$ - Delete the present specification for FM 39.E and FM 40.E.

2.1.5 $T_1T_1$, $T_2T_2$, ...., $T_nT_n$, - Delete the present specification for FM 39.E and FM 40.E.

2.2 Changes in Symbolic Letters and Specifications

2.2.1 $d_1d_1$, $d_2d_2$, ...., $d_nd_n$ - Change the present specification for for FM 39.E and FM 40.E to read:

"True direction, in tens of degrees, from which wind is blowing at the specified isobaric surface.

(Code 0877) (FM 39-VI, FM 40-VI)

2.2.2 $f_1f_1$, $f_2f_2$, ...., $f_nf_n$ - Change the symbolic letters and specification for FM 39.E and FM 40.E to read:

$f_1f_1f_1$

$f_2f_2f_2$ Wind speed, in metres per second, at specified isobaric
..... surfaces. (FM 39-VI, FM 40-VI) (see note (4) under YY)
$f_nf_nf_n$

2.2.3 GGg - add the reference to FM 39-VI and FM 40-VI.

2.2.4 HH - Change the present specification for FM 39.E and FM 40.E by replacing the words "to the nearest kilometer" with "in kilometers".

2.2.5 $P_1P_1$, $P_2P_2$, ..., $P_nP_n$ - Delete the reference to FM 39.E and FM 40.E from the specification. Delete the words "and in tenths of a millibar above the 1 millibar surface" from the present specification. (Reason: Surfaces above 1 millibar do not apply to FM 35.E and FM 36.E, also, a new specification has been proposed for $P_1P_1$, etc. for use with FM 39-VI and FM 40-VI.)

2.2.6 $p_1p_1p_1$ - Change the present specification by replacing the words "at the specified level" with "at the altitude given by HH".

2.2.7 TT - In Note (3) under the specification (first sentence) change the word "height" to "altitude".

2.3 Insert the following new symbolic letters and specifications:

2.3.1 $c_T$ = Thermodynamic Correction Technique. (Code table 0659) (FM 39-VI, FM 40-VI)

2.3.2 $c_w$ = Wind Correction Technique. (Code table 0659) (FM 39-VI, FM 40-VI)

2.3.3 $e_Te_T$ = Type of Thermodynamic Sensing Equipment. (Code table 1005) (FM 39-VI, FM 40-VI)

2.3.4 $e_we_w$ = Type of Wind Sensing Equipment. (Code table 1053) (FM 39-VI, FM 40-VI)

2.3.5 fff = Wind speed in metres per second, at the altitude given by HH. (FM 39-VI, FM 40-VI) See note (4) under YY.

2.3.6 $h_1h_1h_1$, $h_2h_2h_2$, ..., $h_nh_nh_n$ = Geopotential of the specified isobaric surfaces, in geopotential hectometres or kilometres. (FM 39-VI, FM 40-VI)

(1) Geopotential of isobaric surfaces at and between 70 and 0.0001 millibar shall be reported in geopotential hectometres and in geopotential kilometres at and above 0.00007 of a millibar.

2.3.7 $P_1P_1$, $P_2P_2$, ..., $P_nP_n$ = Pressure of the specified isobaric surfaces in whole millibars, tenths, hundredths, thousandths, ten-thousandths or hundred-thousandths of a millibar, as specified by the indicator figures 11, 22, 33, 44, 55 or 66. (FM 39-VI, FM 40-VI)

$T_1T_1$

2.3.8 $T_2T_2$ = Temperature to the nearest whole degree Celsius at
.... the specified isobaric surfaces
$T_nT_n$ (FM 39-VI, FM 40-VI)
(1) See Note (3) under TT.

3. Part A-4

3.1 Deletion of Code tables

3.1.1 Delete Code tables 0262, 1051, 1334.

3.2 Changes in Code tables

3.2.1 Code 0877 - For $d_1d_1$, $d_2d_2$ ...., $d_nd_n$ change the first specification to read: True direction, in tens of degrees, from which wind is blowing, at the specified levels.

3.2.2 Add the following footnote to Code table 2649:

Note: Code figure 1 shall be reported if all, or any portion, of the data reduction was manual. Code figure 2 shall be reported only when all the data reduction was by electronic computer.

3.3 New Code Tables

3.3.1 Insert new Code tables 0262, 0659, 1005, 1053.

*

* *

Code table 0262 (revised)

$a_1$ = Reason for no report and ground equipment employed

| Code figure | |
|---|---|
| 0 | Launch not scheduled |
| 1 | Rocket motor failure |
| 2 | Instrument (or) telemetry signal not received |
| 3 | Ground tracking equipment failure |
| 4 | Weather prohibited launch |
| 5 | Range restrictions prohibited launch |
| 6 | Lack of expandables prohibited launch |
| 7 | Radar only employed |
| 8 | Radar and telemetry equipment employed |
| 9 | Telemetry equipment only employed |

Note: When a firing is made but data are not obtained, code figure from 0 through 6 as applicable should be reported.

Code table 0659

$c_T$ = Thermodynamic Correction Technique

$c_w$ = Wind Correction Technique

| Code figure | |
|---|---|
| 0 | No correction applied |
| 1 | U.S. Standard Correction |
| 2 | U.K. Standard Correction |
| 3-9 | Unassigned |

## Code table 1005

$e_T e_T$ - Type of Thermodynamic Sensing Equipment

Code Figure

| | |
|---|---|
| 00 | No thermodynamic sensor |
| | 01-49 sonde |
| 01 | Arcasonde, experimental |
| 02 | Aerasonde 1A, thin film mount, 10 mil (Bt) |
| 03 | WOXIA and WOXJA, experimental |
| 04 | WOXIA, 10 mil (Bt) |
| 05 | WOXJA, 10 mil (Bt) |
| 06 | Walmet, thin film loop mount, 10 mil (Bt) |
| 07 | Sts, experimental (Bt) |
| 08 | Sts, thin film mount, 10 mil (Bt) |
| 09 | Datasonde, experimental (Bt) |
| 10 | Datasonde, thin film loop mount, 10 mil (Bt) |
| 11 | Pulsed sonde, experimental |
| 12-19 | Unassigned |
| 20 | MK-1, MK-2, experimental (Rw) |
| 21 | MK-1 (Rw) |
| 22 | MK-2 (Rw) |
| 23-29 | Unassigned |
| 30 | Echosonde, ES64-B, experimental (Rw) |
| 31 | Echosonde, ES 64-B (Rw) |
| 32-34 | Unassigned |
| 35 | DMN Sonde, thin wire |
| 36 | DMN Sonde, Flat plate |
| 37-44 | Unassigned |
| 45 | U.K. rocketsonde MK-II spiralized coiled 13 $\mu$m resistance wire element |
| 46-49 | Unassigned |
| | 50-54 Sphere |
| 50 | Sphere, experimental |
| 51 | Sphere, inflatable |
| 52-54 | Unassigned |
| | 55-59 Grenade |
| 55 | Grenade, experimental |
| 56 | Grenade |
| 57-59 | Unassigned |
| | 60-64 Density Gage |
| 60 | Density gage, experimental |
| 61-64 | Unassigned |
| | 65-69 Pressure gage |
| 65 | Pressure gage, experimental |
| 66-69 | Unassigned |
| | 70-79 Remote Sensing |
| 70 | Remote Sensing, experimental |
| 71-79 | Unassigned |

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Note: When specifications indicating experimental equipment are reported, plain language remarks explaining the experimental nature of the equipment shall be added at the end of the coded message.

## Code table 1053

$e_w e_w$ - Type of Wind Sensing Equipment

Code Figure

| | |
|---|---|
| 00 | No Wind Sensor |
| | 01-09 Chaff |
| 01 | Chaff, experimental |
| 02 | Chaff, Metalized |
| 03-09 | Unassigned |
| | 10-29 Parachute |
| 10 | Parachute, experimental |
| 11 | Parachute, 0.5m to 3.5m diameter |
| 12 | Parachute, 3.6 to 5.5m diameter |
| 13 | Parachute, greater than 5.5m diameter |
| 14 | Mesh decelerator, experimental |
| 15-29 | Unassigned |
| | 30-49 Starute |
| 30 | Starute, experimental |
| 31 | Starute, 0.5m to 3.5m diameter |
| 32 | Starute, 3.6m to 5.5m diameter |
| 33 | Starite, greater than 5.5m diameter |
| 34-49 | Unassigned |
| | 50-54 Sphere |
| 50 | Sphere, experimental |
| 51 | Sphere, inflatable |
| 52-54 | Unassigned |
| | 55-59 Grenade |
| 55 | Grenade, experimental |
| 56-59 | Unassigned |
| | 60-64 Chemical trail |
| 60 | Chemical Trail, experimental |
| 61-64 | Unassigned |
| | 65-69 Meteor trail |
| 65 | Meteor trail, experimental |
| 66-69 | Unassigned |
| | 70-79 Remote Sensing |
| 70 | Remote Sensing, experimental |
| 71-79 | Unassigned |
| | 80-99 Unassigned |

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Note: When specifications indicating experimental equipment are reported, plain language remarks explaining the experimental nature of the equipment shall be added at the end of the report.

# A N N E X VIII

## Annex to Recommendation 10 (CBS-VI)

## INTERNATIONAL HYDROLOGICAL CODES

FM 67-VI HYDRA - Report of hydrological observations from hydrological station

Code form:

| | | | | | |
|---|---|---|---|---|---|
| SECTION 1 | | $M_iM_iM_jM_j$ | YYGG | $(OOOAC_i)$ | $BBi_Hi_Hi_H$ |
| SECTION 2 | 22 | $XH_sH_sH_sH_s$ | ..... | ..... | (GGgg) |
| SECTION 3 | 33 | $XQQQe_Q$ | ..... | ..... | (GGgg) |
| SECTION 4 | 44 | $t_pRRRR$ | ..... | ..... | |
| SECTION 5 | 55 | $ts_nT_tT_tT_t$ | ..... | ..... | |
| SECTION 6 | 66 | $E_1E_1E_2E_2E_3$ | DDDss | | |

Notes:

1. HYDRA is the name of the code used for reporting of hydrological observations from a hydrological observing station. This code name shall not be included in the report.

2. A HYDRA report, or a bulletin of HYDRA reports is identified by $M_iM_iM_jM_j$ = HHXX

3. The HYDRA code form consists of six sections:

   Section 1: Code name, day and hour of observation, station identification (using one or two groups);

   Section 2: Hydrological data relating to stage;

   Section 3: Hydrological data relating to discharge;

   Section 4: Data relating to precipitation and snow cover;

   Section 5: Data relating to air and water temperature;

   Section 6: Data on the state of ice on the river, lake or reservoir.

Regional associations may decide which of the sections 2, 3, 4, 5 and 6 of the code form are mandatory for the transmission of hydrological data for the international basins in the Region. Otherwise national Services may define such mandatory sections.

4. Use of bracketed groups:

The bracketed groups are optional under certain conditions. They may or may not be included in the report as follows:

($000AC_i$) - The use of this group is optional when the report is destined for national needs. For international exchange the inclusion of this group in the report is mandatory.

(GGgg) - The inclusion of this group is fixed regionally, or nationally when necessary.

REGULATIONS

67.1

General

67.1.1

The identifier groups $M_iM_iM_jM_j$ YYGG ($000AC_i$) shall be included as the first line of the text of the bulletin consisting of HYDRA reports of observations which were made at the same time, in the same Region and country.

67.1.2

Identification of hydrological observing stations:

(a) In an international report the two groups ($000AC_i$) $BBi_Hi_Hi_H$ shall be used for full identification of the hydrological observing station;

(b) In a national report the group ($000AC_i$) may be omitted.

67.1.3

In each individual report whether it is separate or included in a bulletin, the location of the hydrological observing station shall always be defined by the group $BBi_Hi_Hi_H$ in which BB is the international indicator of the basin and $i_Hi_Hi_H$ is the identification number of the station. In addition if the report is intended for international exchange the group $BBi_Hi_Hi_H$ shall be preceded by the group ($000AC_i$) in the first line of the bulletin.

67.1.4

When data for a particular section are not transmitted, the indicator group of the section shall be omitted.

67.2

Sections

67.2.1

Within sections 2, 3, 4 and 5 the groups shall be arranged in order of increasing figures of X, $t_p$ and t.

67.2.2

If the ice condition refers to only one phenomenon, the same code figures shall be used for groups $E_1E_1$ and $E_2E_2$. If the ice condition refers to two phenomena, two different code figures shall be used for groups $E_1E_1$ and $E_2E_2$.

FM 68-VI HYFOR - Hydrological forecast

Code form:

| | | | | | |
|---|---|---|---|---|---|
| SECTION 1 | HYFOR | $(OOOAC_i)$ | $BBi_Hi_Hi_H$ | | |
| SECTION 2 | 22 | $F_HH_{s_1}H_{s_1}H_{s_1}H_{s_1}$ | $F_HH_{s_2}H_{s_2}H_{s_2}H_{s_2}$ | $M_1Y_1Y_1G_1G_1$ | $(M_2Y_2Y_2G_2G_2)$ |
| | | . . . . . | . . . . . | . . . . . | . . . . . |
| SECTION 3 | 33 | $F_HQ_1Q_1Q_1e_Q$ | $F_HQ_2Q_2Q_2e_Q$ | $M_1Y_1Y_1G_1G_1$ | $(M_2Y_2Y_2G_2G_2)$ |
| | | . . . . . | . . . . . | . . . . . | . . . . . |
| SECTION 4 | 66 | $1P_iM_1Y_1Y_1$ | $2P_iM_2Y_2Y_2$ | | |

Notes:

1. HYFOR is the code used for the transmission of hydrological forecasts. This code name is included in the coded forecast.

2. The HYFOR code form consists of four sections:

   Section 1: Code name, station identification (using one or two groups);

   Section 2: Stage forecasts, and date-time of occurrence or date-times of the beginning and the end of the period for which forecasts are valid;

   Section 3: Discharge forecasts, and date-time of occurrence or date-times of the beginning and the end of the period for which forecasts are valid;

   Section 4: Forecasts of ice phenomena and dates of beginning and end of the period for which forecasts are valid.

Regional associations may decide which of the sections 2, 3 and 4 of the code form are mandatory for the transmission of forecasts for international basins under their jurisdiction. Otherwise national Services may define such mandatory sections.

3. Use of bracketed groups:

The bracketed groups are optional under certain conditions. They may or may not be included in the coded forecast as follows:

($000AC_i$) - The use of this group is optional when the forecast is destined for national need. For international exchange the inclusion of this group in the coded forecast is mandatory.

($M_2Y_2Y_2G_2G_2$) - This group is used only when a hydrological forecast applies to a given period.

REGULATIONS:

68.1

General

68.1.1

The identifier groups HYFOR, ($000AC_i$) shall be included as the first line of the text of the bulletin, consisting of HYFOR forecasts established for the hydrological observation station situated in the same Region and country.

68.1.2

Regulation 67.1.2 shall apply.

68.1.3

Regulation 67.1.3 shall apply.

68.1.4

When forecasts for a particular section are not transmitted, the indicator group of the section shall be omitted.

68.2

Sections

68.2.1

In sections 2, 3 and 4 the groups shall be arranged in order of increasing code figures of $F_H$ and $P_i$.

68.2.2

In sections 2 and 3 and for $F_H$ = 8 or 9 one group $M_1Y_1Y_1G_1G_1$ only shall be used to define the date of occurrence of the forecast. For $F_H$ = 1, 2, 3, 4, 5, 6 or 7, two groups $M_1Y_1Y_1G_1G_1$, $M_2Y_2Y_2G_2G_2$ define the beginning and the end of the period for which the forecast is expected to occur.

68.2.3

In sections 2 and 3 the forecast value of the variable (level or discharge) is given by two successive groups beginning with the same code figure of $F_H$.

The first group shall indicate the lower and the second shall indicate the upper limits of the forecast value.

## MEANING OF SYMBOLIC WORDS AND GROUPS

(a) List of symbolic words and letter groups

(Code names and code words)

HYDRA Report of hydrological observations from hydrological station (FM 67-VI)

HYFOR Hydrological forecast (FM 68-VI)

(b) List of symbolic figure groups

22 Data on stage follow
(FM 67-VI, FM 68-VI)

33 Data on river discharges follow
(FM 67-VI, FM 68-VI)

44 Data on precipitation and/or snow cover follow
(FM 67-VI)

55 Data on temperature follow
(FM 67-VI)

66 Data pertaining to ice conditions follow
(FM 67-VI, FM 68-VI)

SPECIFICATIONS OF SYMBOLIC LETTERS

(or groups of letters)

A — Number of the WMO Region in which the hydrological observation station is situated.
(FM 67-VI, FM 68-VI)

BB — International indicator for basin in a given WMO Region (A)
(FM 67-VI, FM 68-VI)

(1) This indicator defines the basin, or group of basins, in which the hydrological observing station is situated. This basin or group of basins may be international or national.

(2) The list of international indicators for basins is given in Vol. ... of Publication No. ... *.

$C_i$ — Indicator of the country for each basin (BB) in which the hydrological observation station is situated.
(FM 67-VI, FM 68-VI)

(1) The list of indicators for countries is given in Vol. ... of Publication No. ... *

DDD — Ice thickness in cm.
(FM 67-VI)

$E_1E_1$, $E_2E_2$ — Ice phenomena on the river, lake or reservoir. (Code 0977)
(FM 67-VI)

$E_3$ — Slush condition under the ice layer. (Code 0964)
(FM 67-VI)

$e_Q$ — Number of zeros after QQQ, $Q_1Q_1Q_1$ or $Q_2Q_2Q_2$ to obtain the discharge in $dm^3/s$.
(FM 67-VI, FM 68-VI)

$F_H$ — Type of forecast given by the four figures which follow and indication of the number of date-time group(s) used. (Code 1109)
(FM 68-VI)

GG — (As in the Manual on Codes, but add "FM 67-VI".)

$G_1G_1$ — Time to the nearest whole hour (GMT) defining the time or the beginning of the period covered by the forecast.
(FM 68-VI)

$G_2G_2$ — Time to the nearest whole hour (GMT) defining the end of the period covered by the forecast.
(FM 68-VI)

* This publication will be issued later.

| | |
|---|---|
| GGgg | (As in Manual on Codes, but add "FM 67-VI" and Note 6 below.)<br>(6) For hydrological observations HYDRA the time to be indicated is the time of occurrence of the observed maximum or observed minimum values of stage or discharges. |
| $H_sH_sH_sH_s$ | Stage in cm, above zero of the gauge for the station. (FM 67-VI)<br>(1) In case of negative stages, 5000 is added to the absolute value measured in cm. |
| $H_{s_1}H_{s_1}H_{s_1}H_{s_1}$ | Lower limit of forecasted stage, in cm, above the zero of gauge for the station. (FM 68-VI)<br>(1) In case of negative stages, 5000 is added to the absolute forecast value in cm. |
| $H_{s_2}H_{s_2}H_{s_2}H_{s_2}$ | Upper limit of forecast stage in cm above the zero of gauge for the station. (FM 68-VI)<br>(1) In case of negative stages, 5000 is added to the absolute forecast value in cm. |
| $i_Hi_Hi_H$ | National hydrological observation station identifier number within a given basin (BB). (FM 67-VI, FM 68-VI)<br>(1) The national station identifier number has a three-figure number allocated by appropriate hydrological services.<br>(2) The list of hydrological observing station identifier numbers of all countries is given in Vol. .... of Publication No. .... * |
| $M_1$ | Indicator of the month when the period covered by the forecast begins. (Code 2562) (FM 68-VI) |
| $M_2$ | Indicator of the month when the period covered by the forecast ends. (Code 2562) (FM 68-VI) |
| $M_iM_i$ | (As in the Manual on Codes, but add "FM 67-VI" and modify Code 2582). |
| $M_JM_J$ | (As in the Manual on Codes, but add "FM 67-VI" and modify Code 2582). |
| $P_i$ | Indicator of the forecast ice phenomenon. (Code 3139) (FM 68-VI) |

* This publication will be issued later.

QQQ — The first three digits of the discharge value in $dm^3/s$. (FM 67-VI),

(1) If the discharge is less than 100 $dm^3/s$, the first Q or QQ should be numbered as 0 or 00, as appropriate.

(2) If the discharge is equal or more than 100 $dm^3/s$, QQQ are the first three rounded digits of the discharge value. The number of remaining digits is indicated by $e_Q$.

$Q_1Q_1Q_1$ — The first three digits of forecast discharge value (lower limit) in $dm^3/s$ (see Notes (1) and (2) under QQQ). (FM 68-VI)

$Q_2Q_2Q_2$ — The first three digits of forecast discharge value (upper limit) in $dm^3/s$ (see Notes (1) and (2) under QQQ). (FM 68-VI)

RRRR — The total amount of precipitation or water equivalent of snow cover on the ground. (Code 3596) (FM 67-VI)

$s_n$ — (As in Manual on Codes, but add "FM 67-VI")

ss — Depth, in cm, of layer of snow on ice. (FM 67-VI)

(1) Depth of snow more than, or equal to, 99 cm is to be coded 99.

$T_tT_tT_t$ — Temperature of the element indicated by t, in tenths of a degree Celsius, its sign being given by $s_n$. (FM 67-VI)

t — Nature of the temperature reading, the value of which is indicated by $s_nT_tT_tT_t$ (Code 4001) (FM 67-VI)

$t_p$ — Period to which measurement of precipitation refers and/or time at which water equivalent of the snow is measured, both coded by RRRR. (Code 4047) (FM 67-VI)

(1) This period or time always ends at the exact hour GG of the measurement.

X — Time of measurement or period of reference and tendency of the element measured, the value of which is indicated by $H_sH_sH_sH_s$ or $QQQe_Q$. (Code 4700)

(FM 67-VI)

(1) This characteristic applies to the measurement of stage or discharge given by the four figures of the group which follow X.

| | |
|---|---|
| YY | (As in the Manual on Codes, but add "FM 67-VI".) |
| $Y_1Y_1$ | Day of the month (GMT) indicating the date or the beginning of the period covered by the forecast (FM 68-VI) |
| $Y_2Y_2$ | Day of the month (GMT) indicating the end of the period covered by the forecast (FM 68-VI) |

## CODE TABLES

### Code 0964

$E_3$ - Slush condition under the ice layer

| Code figure | |
|---|---|
| 0 | No slush |
| 1 | Slush to approximately 1/3 (up to 30%) of the depth of the river |
| 2 | Slush to 1/2 (40-60%) the depth of the river |
| 3 | Slush more than half (70-100%) the depth of the river |

### Code 0977

$E_1E_1$, $E_2E_2$ - Ice phenomena on the river, lake or reservoir.

The first decile (00 to 09) describes the conditions on the river, lake or reservoir prior to transport of ice:

| Code figure | |
|---|---|
| 00 | Water surface free of ice |
| 01 | Ice along banks |
| 02 | Ice crystals |
| 03 | Ice slush |
| 04 | Ice floes from tributaries entering near the river, lake or reservoir station |

The second decile (10 to 19) describes the propagation of slush ice on the water surface of the river, lake or reservoir:

Code figure

10 Floating slush ice covering approximately 1/3 (up to 30%) of the water surface

11 Floating slush ice covering about half (40-60%) of the water surface

12 Floating slush ice covering more than half (70-100%) of the water surface

The third decile (20 to 29) describes the conditions on the river, lake or reservoir when ice is being transported:

20 Floating ice covering 10% of the water surface
21 Floating ice covering 20% of the water surface
22 Floating ice covering 30% of the water surface
23 Floating ice covering 40% of the water surface
24 Floating ice covering 50% of the water surface
25 Floating ice covering 60% of the water surface
26 Floating ice covering 70% of the water surface
27 Floating ice covering 80% of the water surface
28 Floating ice covering 90% of the water surface
29 Floating ice covering 100% of the water surface

The fourth decile (30 to 39) describes the freezing-up of the river, lake or reservoir

30 Water surface frozen at station, free upstream
31 Water surface frozen at station, free downstream
32 Water surface free at station, frozen upstream
33 Water surface free at station, frozen downstream
34 Ice floes near the station, water surface frozen downstream
35 Water surface frozen with breaks
36 Water surface completely frozen over
37 Water surface frozen over, with pile-ups

The fifth decile (40 to 49) describes the state of the river, lake or reservoir when the ice cover is breaking up:

40 Ice melting along the banks
41 Some water on the ice
42 Ice waterlogged
43 Water holes in the ice cover
44 Ice moving
45 Open water in breaks
46 Break-up (first day of movement of ice on the entire water surface)
47 Ice broken artificially

The sixth decile (50 to 59) describes the ice jams on the river, lake or reservoir:

Code figure

50 Ice jam at the station
51 Ice jam below the station
52 Ice jam above the station
53 Scale and position of jam unchanged
54 Jam has frozen solid in the same place
55 Jam has solidified and expanded upstream
56 Jam has solidified and moved downstream
57 Jam is weakening
58 Jam broken up by explosives or other methods
59 Jam broken

The seventh decile (60 to 69) describes the conditions at the mouth of the river when there is no continuous layer of ice:

Code figure

60 Fractured ice
61 Ice piling up against the bank
62 Ice carried towards the bank
63 Band of ice less than 100 m wide fixed to banks
64 Band of ice 100 to 500 m wide fixed to banks
65 Band of ice wider than 500 m fixed to banks

The eighth decile (70 to 79) describes the conditions in the mouth section of the river when ice cover is continuous:

70 Cracks in the ice, mainly across the line of flow
71 Cracks along the flow line
72 Smooth sheet of ice
73 Ice sheet with pile-ups

*

* *

Code 1109

$F_H$ - Type of forecast given by the four figures which follow and indication of the number of date-time groups

| Code figure | Type of forecast | Number of groups used to indicate date-time or period |
|---|---|---|
| 1 | Forecast of maximum stage or discharge | 2 |
| 2 | Forecast of minimum stage or discharge | 2 |
| 3 | Forecast of maximum daily discharge or of maximum daily mean stage | 2 |
| 4 | Forecast of minimum daily discharge or of minimum daily mean stage | 2 |
| 5 | Forecast of average daily stage or discharge | 2 |
| 6 | Forecast of maximum stage or discharge (above flood stage)* | 2 |
| 7 | Forecast of mean stage or mean discharge | 2 |
| 8 | Forecast of stage or discharge | 1 |
| 9 | Forecast of specific stage or discharge (above flood stage)* | 1 |

* For code figures 6 and 9 the flood stage for each station is fixed regionally or otherwise nationally.

Code 2562

$M_1$ - Indicator of the month when the period covered by the forecast begins.

$M_2$ - Indicator of the month when the period covered by the forecast ends.

| Code figure | Month |
|---|---|
| 0 | Current month |
| 1 | First month after the current month |
| 2 | Second month after the current month |
| 3 | Third month after the current month |
| 4 | Fourth month after the current month |
| 5 | Fifth month after the current month |
| 6 | Sixth month after the current month |
| 7 | Seventh month after the current month |
| 8 | Eighth month after the current month |
| 9 | Ninth month after the current month |

Code 2582

Code 2582 should be modified. Add:

(a) For $M_iM_iM_jM_j$: report identifier letters, HHXX signifying HYDRA.

Code 3139

$P_i$ – Indicator of the forecast ice phenomenon.

| Code figure | Phenomenon |
|---|---|
| 1 | Appearance of floating ice |
| 2 | Freeze-up in rivers, lakes or reservoirs |
| 3 | Ice break-up in rivers, lakes or reservoirs |
| 4 | Disappearance of ice |

Code 3596

Under code 3596 (Manual of Codes, Vol. I, page I-A-4-59), add the definition:

RRRR - Total amount of precipitation or water equivalent of snow cover on the ground

Code 4001

t - Nature of the temperature reading, the value of which is indicated by $s_nT_tT_tT_t$

| Code figure | |
|---|---|
| 1 | Air temperature at the time of measurement |
| 2 | Dew-point temperature at the time of measurement |
| 3 | Maximum temperature of air during the preceding 24 hours |
| 4 | Minimum temperature of air during the preceding 24 hours |
| 5 | Water temperature at the time of measurement |

Note: Regional associations may use the code figures 6 to 9 for other specifications.

Code 4047

$t_p$ - Period to which measurement of precipitation refers, and/or time at which water equivalent of snow is measured, the value of which is indicated by RRRR.

| Code figure | |
|---|---|
| 0 | Total precipitation during the 1 hour preceding the observation |
| 1 | Total precipitation during the 2 hours preceding the observation |
| 2 | Total precipitation during the 3 hours preceding the observation |
| 3 | Total precipitation during the 6 hours preceding the observation |
| 4 | Total precipitation during the 12 hours preceding the observation |
| 5 | Total precipitation during the 24 hours preceding the observation |
| 6 | Total precipitation during the 48 hours preceding the observation |
| 7 | Total precipitation during the last 10 days |
| 8 | Total precipitation during the calendar month preceding the observation |
| 9 | Water equivalent of the snow pack at the time of measurement |
| / | Water equivalent of the snow which has fallen during the 24 hours preceding the time of observation. |

Code 4700

X - Time of measurement or period of reference and tendency of the element measured, the value of which is indicated by $H_sH_sH_sH_s$ or $QQQe_Q$

| Code figure | Nature and time or period of measurement | Tendency during the 3 hours preceding the observation |
|---|---|---|
| 0 | Value at time of observation | Stationary |
| 1 | Value at time of observation | Falling |
| 2 | Value at time of observation | Rising |
| 3 | Value at 3 hours before the observation | |
| 4 | Value at 6 hours before the observation | |
| 5 | Value at 12 hours before the observation | |
| 6 | Value at 24 hours before the observation | |
| 7 | Mean value on the preceding day | |
| 8 | Maximum value during preceding 24 hours | |
| 9 | Minimum value during preceding 24 hours | |
| / | Value at time of observation | Unknown |

## Note on a proposed international system of hydrological observing station identification numbers

Within the boundaries of a given WMO Region, the need to transmit hydrological elements relating to an international basin makes it necessary to include three specifications in the identification number of a hydrological observing stations in this basin.

This station identification number should specify without ambiguity:

- The country in which the station is situated (1 figure);
- The number of the basin in which this station is situated (2 figures);
- The national identification number, in this basin, of the station (3 figures).

This general requirement involves using at least six figures in order to specify the international station identification number of a hydrological observing station; the proposed station identification number is therefore of the form $(000AC_i)\ BBi_Hi_Hi_H$.

When the hydrological data contained in the reports are intended solely to meet national needs, the group $BBi_Hi_Hi_H$ only is necessary and sufficient to identify the station.

When the hydrological data contained in the reports are intended for international exchange, the two groups $(000AC_i)\ BBi_Hi_Hi_H$ are mandatory to identify the hydrological observing station.

The allocation of identification numbers will be the responsibility of:

- Regional associations, for $C_i$ and BB;
- Member countries, for $i_Hi_Hi_H$.

The identification number of hydrological observing stations comprises four elements:

(1) A Number of the WMO Region in which the hydrological observing station is situated.

(2) $C_i$ Indicator of the country, for each basin BB, in which the hydrological observing station is situated.

- A list of indicators for countries is given in Volume ... of Publication No. ... (this publication will appear at a later date).

(3) BB International basin indicator, in a given WMO Region A.

- This indicator defines the basin, or group of basins, in which the hydrological observing station is situated. This basin, or group of basins, may be international or national.

- A list of international indicators for basins is given in Volume ... of Publication No. ... (this publication will appear at a later date).

(4) $i_H i_H i_H$ National identification number of a hydrological observing station in a given basin BB.

- This is a three-figure number for identifying the station at the national level, situated in a basin BB, in a country $C_i$.

- This number is allocated nationally by the competent hydrological service.

- A list of national identification numbers of hydrological observing stations in all countries is given in Volume ... of Publication No. ... (this publication will appear at a later date).

Rules for the allocation of identification numbers throughout the world

1. In all cases, BB is defined regionally. Thus a Region may have a maximum of 99 indicators for large basins. The number BB = 00 is not used.

2. The indicator $C_i$, showing the country, is defined regionally. If a country straddles several basins BB it should nevertheless have only one figure for $C_i$ indicating the country.

If a basin BB comprises all or part of the territory of more than ten countries, $C_i$ should be allocated starting with the largest countries, giving joint national numbers to others (the smallest) as has been done for the national meteorological number (block number) 06, i.e II = 06 in Region VI. In the latter very special case, the hundreds figure, allocated to each country with a joint number $C_i$ for the station identification number $i_H i_H i_H$ of their respective hydrological observing stations, should be determined regionally.

Alternatively large river basins composed of more than nine countries may be divided into several sub-basins, each one of which may be allocated a separate BB; thus the number of countries will be less than ten in each BB.

3. The identification numbers $i_H i_H i_H$ are defined nationally. In each country and for a portion of a basin BB, the numbers from $i_H i_H i_H$ = 0 to $i_H i_H i_H$ = 009 may be reserved to designate the identification numbers of hydrological forecast centres. Within a single country and for a portion of a basin BB, the numbers increase from 010 to 099, 100, 199, etc. ... 900 to 999 from west to east and from north to south.

# A N N E X IX

## Annex to Recommendation 13 (CBS-VI)

## CODE FOR REPORTING SYNOPTIC INTERPRETATION OF CLOUD DATA OBTAINED BY METEOROLOGICAL SATELLITES

FM 85-VI SAREP — Report of synoptic interpretation of cloud data obtained by meteorological satellite

Code form:

Part A

| | | | | |
|---|---|---|---|---|
| | $M_iM_iM_jM_j$ | YYGGg | ( IIiii<br>( or<br>( $99L_aL_aL_a$ | $Q_cL_oL_oL_oL_o$ |
| name of cyclone | $n_tn_tL_aL_aL_a$ | $Q_cL_oL_oL_oL_o$ | $A_tS_tW_fa_tt_m$ | $(9d_sd_sf_sf_s)$ |
| | DDDD | | | |

Part B

| | | | | |
|---|---|---|---|---|
| SECTION I | $M_iM_iM_jM_j$ | $YYG_sG_sg_s$ | ( IIiii<br>( or<br>( $99L_aL_aL_a$ | $Q_cL_oL_oL_oL_o$ |
| name of satellite | $QL_aL_aL_oL_o$ | $QL_aL_aL_oL_o$ | . . . . . | . . . . . |
| SECTION 2 | $4S_fS_fC_mW_f$ | $QL_aL_aL_oL_o$ | . . . . . | $(9d_sd_sf_sf_s)$ |
| SECTION 3 | (96/// | /Lddf<br>. . . . . | $QL_aL_aL_oL_o$<br>. . . . . | /Lddf<br>/Lddf | $QL_aL_aL_oL_o$<br>$QL_aL_aL_oL_o$) |
| SECTION 4 | $(97//s_c$ | $QL_aL_aL_oL_o$ | $QL_aL_aL_oL_o$ | . . . . . | etc.) |
| SECTION 5 | 51515 | | | | |
| | DDDD | | | | |

Notes :

1. SAREP is the name of the code form for reporting synoptic interpretation of cloud data obtained by meteorological satellite.

2. A SAREP report from a land station is identified by $M_iM_i$ = CC, a SAREP report from a sea station by $M_iM_i$ = DD.

3. The code form is divided into two Parts:

| PART | Identifier letters ($M_jM_j$) | Contents |
|---|---|---|
| A | AA | Information on tropical cyclone |
| B | BB | Information on significant features |

Each part can be transmitted as a separate message.

4. Part B is divided into 5 sections:

| Section number | Indicator figures or symbolic figure group | Contents |
|---|---|---|
| 1 | - | Identification and position data |
| 2 | 4 | Synoptic interpretation of cloud |
| 3 | 96 | Wind information (optional) |
| 4 | 97 | Ice or snow information (optional) |
| 5 | 51515 | Code groups to be developed regionally |

REGULATIONS

85.1

General

85.1.1

The satellite read out station which originates the report shall indicate its position by means of the group IIiii or the groups $99L_aL_aL_a\ Q_cL_oL_oL_oL_o$

85.1.2

Ship's call sign DDDD shall be included only in SAREP reports from a satellite read out station at sea.

85.2

PART A

85.2.1

For the reporting of the interpretation of cloud mass which is recognized as pertaining to a tropical cyclone, Part A shall be used.

85.2.2

The time of the picture of the cyclone(s) shall be encoded by the group YYGGg.

85.2.3

Whenever available the name of the cyclone shall be included.

85.2.4

Tropical cyclones shall be numbered by successive numerals $n_t n_t$. The station originating SAREP reports shall maintain the number assigned to the cyclone as long as it exists or can be identified.

85.2.5

The position of the centre of the cloud mass or the tropical cyclone, or the eye of the cyclone as appropriate, shall be reported by means of the groups $n_t n_t L_a L_a L_a \; Q_c L_o L_o L_o$.

85.2.6

The movement of the centre of the tropical cyclone, when known, shall be included in the report by means of the group $9 d_s d_s f_s f_s$.

85.2.7

When two or more cyclones are detected on the same photograph and thereby given the same time, the groups $n_t n_t L_a L_a L_a \; Q_c L_o L_o L_o$ $A_t S_t W_f a_t t_m \; (9 d_s d_s f_s f_s)$ shall be repeated for each cyclone, preceded by the name whenever it is known.

85.3

Part B

85.3.1

Section 1 - Identification and position data

85.3.1.1

The name of the satellite on which the SAREP report is based shall be included in Section 1.

85.3.1.2

The groups $QL_aL_aL_oL_o$ shall be used to delineate, in clockwise sequence, the analyzed area.

85.3.1.3

The first position group shall be repeated.

85.3.2

Section 2 - Synoptic interpretation of cloud

85.3.2.1

Code groups beginning with the indicator figure 4 shall be used for a description of the synoptic interpretation of significant features.

85.3.2.2

The groups $QL_aL_aL_oL_o$ shall be used to delineate the significant features $S_fS_f$, except when $S_fS_f$ is coded as 99. In this case, the position groups shall refer to the cloud pattern indicated by $C_m$.

85.3.2.3

For delineating areas in Section 2, the same rules shall be followed as indicated under Section 1. When it is used in conjunction with $W_f$, the position group may refer to a nearly circular cloud mass or cloud band. In the case of a nearly circular cloud mass, the position group refers to the centre of the mass. In the case of a cloud band, the position groups refer to a line centrally located along the length of the band.

85.3.2.4

The movement of the system under consideration, when known, shall be included in the report by means of the group $9d_sd_sf_sf_s$.

85.3.2.5

Section 2 shall be used only to describe major synoptic scale significant features or cloud masses. Mesoscale or more detailed descriptions shall be included in section 5, their reporting being left to regional decision.

85.3.3

Section 3 - Wind information derived from the movement of cloud elements

85.3.3.1

Section 3 shall only be used by centres or stations having highly trained staff and computer facilities.

85.3.4

Section 4 - Snow or ice information

85.3.4.1

Section 4 shall be included only once a week or when major changes in snow cover or ice extension are observed, provided snow or ice information is available.

85.3.4.2

For delineating areas in section 4, the same rules shall be followed as indicated under section 1.

85.3.5

Section 5 - Code groups to be developed regionally

85.3.5.1

Detailed or mesoscale description of cloud information which is required to be reported, shall be included in section 5.

*

* *

## SPECIFICATIONS OF SYMBOLIC LETTERS

| | |
|---|---|
| $A_t$ | Accuracy of determination of the geographical position of the tropical cyclone (Code table 0152) |
| $a_t$ | Apparent 24-hour change in intensity of the tropical cyclone (Code table 0252) |
| $C_m$ | Major cloud configuration (Code table 0544) |
| $d_s d_s$ | True direction in tens of degrees, towards which the tropical cyclone or system is moving (Code table 0877, Volume I, Manual on Codes) |
| f | Wind speed derived from movement of cloud elements (Code table 1200) |
| $f_s f_s$ | True speed, in knots, of tropical cyclone or other system |
| GGg | Actual time of observation in hours and tens of minutes GMT (1) In the case of satellite observations, see Regulation 85.2.2 |
| $G_s G_s g_s$ | Mid-time (in hours and tens of minutes GMT) of the scanning period required to obtain the satellite picture used for the analysis. |
| L | Estimated level of wind data (Code table 2300) |
| $L_a L_a$ | Latitude in whole degrees |
| $L_o L_o$ | Longitude in whole degrees, omitting the hundreds digit |
| $n_t n_t$ | Identification number of tropical cyclone, from 01 to 99 |
| Q | Octant of the globe (Code table 3300, Volume I, Manual on Codes) |
| $S_t$ | Intensity of tropical cyclone (Code table 3752) |
| $S_f S_f$ | Synoptic interpretation of significant features (Code table 3780) |
| $s_c$ | Nature of snow or ice interpreted from satellite information (Code table 3833) |
| $t_m$ | Time interval over which the movement of the tropical cyclone has been calculated (Code table 4044) |
| $W_f$ | Mean width or mean diameter of the feature specified by $S_f S_f$ or mean diameter of the overcast cloud of the tropical cyclone (Code table 4536) |

## CODE TABLES

### Code table 0152

$A_t$ - Accuracy of the determination of the geographical position of the tropical cyclone

Code figure

0 - cyclone centre within 10 km of the transmitted position
1 - " " " 20 km " " " "
2 - " " " 50 km " " " "
3 - " " " 100 km " " " "
4 - " " " 200 km " " " "
5 - " " " 300 km " " " "
/ - undetermined

### Code table 0252

$a_t$ - Apparent 24-hour change in intensity of tropical cyclone

Code figure

0 - much apparent weakening
1 - apparent weakening
2 - no apparent change
3 - apparent intensification
4 - apparent strong intensification
5 - )
6 - )
7 - ) not used
8 - )
9 - not observed previously
/ - undetermined

## Code table 0544

$C_m$ - Major cloud configuration

Code figure

0 - low stratus or fog
1 - stratiform
2 - stratocumuliform - closed cells
3 - cirriform
4 - cumuliform and stratiform
5 - cumuliform
6 - open cells - not associated with cumulonimbus
7 - open cells - cumulus and cumulonimbus
8 - cumulonimbus (may be associated with other cloud types)
9 - multi-layered
/ - undetermined

## Code table 1200

f - Wind speed

Code figure

0 - 0 to 9 m/s
1 - 10 to 19 m/s
2 - 20 to 29 m/s
3 - 30 to 39 m/s
4 - 40 to 49 m/s
5 - 50 to 59 m/s
6 - 60 to 69 m/s
7 - 70 to 79 m/s
8 - 80 to 89 m/s
9 - $\geqslant$ 90 m/s
/ - undetermined

## Code table 2300

L - Estimated level of wind data

Code figure

0 - not used

1 - not used

2 - low-cloud level

3 - not used

4 - not used

5 - middle-cloud level

6 - not used

7 - not used

8 - high-cloud level

9 - not used

## Code table 3752

$S_t$ - Classification of the tropical cyclone

| Code figure | Current Intensity (CI Number) * | Max. sustained wind speed (knots) | Max. sustained wind speed (m/sec.) |
|---|---|---|---|
| 1 | 1,5 | 25 | 13 |
| 2 | 2 | 30 | 15 |
| 3 | 3 | 40 | 20 |
| 4 | 4 | 60 | 30 |
| 5 | 5 | 85 | 43 |
| 6 | 6 | 110 | 56 |
| 7 | 7 | 135 | 68 |
| 8 | 8 | 170 | 86 |
| 9 | Becoming extra-tropical | | |
| 0 | Decaying | | |
| / | Undetermined | | |

Note

The procedures for determining the Current Intensity (CI) Number from satellite imagery are explained in WMO Publication ....

Secretariat Note

In the absence of the above Publication, Memorandum NESS 45, which was distributed by the Secretary-General to all Members by circular letter W/SY/CO of 18 June 1973 may be used.

## Code table 3780

$S_fS_f$ - Synoptic interpretation of significant features

Code figure

00 - low level ridge
01 - upper level ridge, sharp
02 - upper level ridge, medium
03 - upper level ridge, broad
10 - quasi-stationary front, broken cloud pattern
11 - quasi-stationary front, continuous cloud mass
12 - cold front, broken cloud pattern
13 - cold front, continuous cloud mass
14 - warm front, broken cloud pattern
15 - warm front, continuous cloud mass
16 - occluded front
17 - squall-line
18 - non-frontal extra-tropical cloud band
20 - widening area in frontal cloud band
21 - well-developed frontal wave
22 - initial vortex associated with a front
23 - vortex occluding, cold air intrusion
24 - mature vortex, fully occluded
25 - decaying vortex
26 - clouds forming due to waves forming to the lee of mountain ranges or other obstacles
27 - clouds due to eddies to the lee of islands or isolated obstacles
28 - clear area due to orographic föhn processes
29 - orographic cloud system
30 - positive vorticity advection maximum enhanced Cu or Cb
31 - positive vorticity advection maximum, (solid) cloud mass
32 - vorticity maximum, comma shape, without clear area downstream
33 - vorticity maximum, comma shape with clear area downstream
34 - cut-off vortex

35 - secondary vorticity centre, spiraling Cu or Cb without cirrus plumes

36 - secondary vorticity centre, spiraling Cu or Cb, with cirrus plumes

40 - low level trough

41 - upper level trough, determined through cold-frontal cloud mass

42 - upper level trough, associated with major cloud mass

43 - upper level trough, preceded by crescent cloud formation

44 - upper level trough, determined by cirrus plumes

50 - jet stream, determined by cirrus shadow or edge

51 - same as 50, with transversal streaks

52 - jet stream, determined through cirrus streaks

53 - same as 52, with transversal streaks

54 - jet stream, determined from a change in the cloud texture

55 - jet stream, determined from a change in the cellular cloud pattern

60 - area of isolated Cb, Ci-plumes extend less than 1° latitude from the source

61 - same as 60, Ci-plumes extend more than 1° latitude from the source

62 - area of Cb clusters, Ci-plumes extend less than 1° latitude from the source

63 - same as 62, Ci-plumes extend more than 1° latitude from the source

70 - intertropical convergence zone (ITCZ) without specification of characteristics

71 - ITCZ as uniformly bright band of cumulonimbus with cirrus cover

72 - ITCZ as an accumulation of cumulonimbus

73 - ITCZ as banks of cumuliform clouds gathering along the axis of convergence lying along the direction of the trade winds

74 - bank of tropical clouds without cumulonimbus (Cb)

75 - bank of tropical clouds with Cb

76 - tropical wave

77 - wind shear line

88 - area of windespread sand- or duststorm

89 - area of widespread smoke

90 - ridge

91 - frontal cloud band

92 - frontal wave

93 - vortex

94 - convergence zone (including ITCZ)

95 - jet stream

96 - positive vorticity advection maximum (comma formation, enhanced convection, etc.)

97 - trough

98 - major cloud system

99 - synoptic interpretation of significant features is undetermined

Notes

(1) Code figure 90 to 99 may be used when more detailed synoptic interpretation is not possible.

(2) In case of $S_fS_f$ 88, 89 or 98 the position groups in Section 2 delineate a major cloud system, an area of widespread sand- or duststorm or an area of smoke.

## Code table 3833

$s_c$ - Nature of snow or ice interpreted from satellite information

Code figure

0 - } snow cover ( partial
1 - } ( continuous

2 - shore ice

3 - snow covered ice

4 - shelf ice

5 - } sea ice ( compact
6 - } ( broken
7 - } ( scattered

8 - channel in sea ice

9 - iceberg(s)

/ - nature of snow or ice undetermined

## Code table 4044

$t_m$ - Time interval over which the movement of the tropical cyclone has been calculated

Code figure

0 - less than 1 hour

1 - 1 to less than 2 hours

2 - 2 to less than 3 hours

3 - 3 to less than 6 hours

4 - 6 to less than 9 hours

5 - 9 to less than 12 hours

6 - 12 to less than 15 hours

7 - 15 to less than 18 hours

8 - 18 to less than 21 hours

9 - 21 to less than 30 hours

/ - movement group is not included

## Code table 4536

$W_f$ - Mean width or mean diameter of the feature specified by $S_fS_f$ or mean diameter of the overcast cloud of the tropical cyclone

Code figure

0 - < 1° of latitude

1 - 1° to less than 2° of latitude

2 - 2° " " " 3° " "

3 - 3° " " " 4° " "

4 - 4° " " " 5° " "

5 - 5° " " " 6° " "

6 - 6° " " " 7° " "

7 - 7° " " " 8° " "

8 - 8° " " " 9° " "

9 - > 9° of latitude

/ - undetermined

ANNEX X

Annex to Recommendation 19 (CBS-VI)

PROPOSED AMENDMENTS TO THE TECHNICAL REGULATIONS

1. Under "Definitions" replace the term "Forecast" by "Meteorological forecast (Forecast)", the definition of the term remaining unchanged.

2. Replace the definition of "Global Observing System (GOS)" by the following text: "The Global Observing System (GOS) is the co-ordinated system of methods, techniques and facilities for making global observations within the framework of the World Weather Watch."

3. Insert the following term and definition: "Meteorological analysis (Analysis). A statement of analysed meteorological conditions for a specified geographical area."

4. Replace the definition of "Meteorological message" by the following: "A message comprising a single meteorological bulletin, preceded by a starting line and followed by end of message signals."

5. Replace the text of paragraph [A.1.1.] 1.1 by the following: "The Global Observing System shall consist of two sub-systems: the surface-based sub-system and the space-based (satellite) sub-system, the former being composed of the regional basic synoptic networks, other observational networks of stations on land and at sea, and aircraft meteorological observations, and the latter of near-polar orbiting and geostationary meteorological satellites."

6. (a) Amend paragraph [A.1.1.] 3.1.7 to read: "Members should establish, either individually or jointly, ocean weather stations or other suitable observational facilities in ocean areas where there are large gaps in the world network of surface and upper-air synoptic stations."

   (b) Delete paragraph [A.1.1.] 3.1.8 and the relevant Note.

   (c) Renumber paragraph [A.1.1.] 3.1.9 to [A.1.1.] 3.1.8.

7. Amend paragraph [A.1.2.] 4.7.2 to read: "In the absence of an anemometer, the wind speed shall be estimated by reference to the Beaufort scale, where possible."

8. In paragraph [A.2.2.] 2.1.1 delete the words "for the polar areas", "for middle latitudes" and "for equatorial areas" at the end of sub-paragraphs (a), (b) and (c), respectively.

9. Amend the text of paragraph [A.2.3.] 1.1.1 to read: "Meteorological information exchanged for international purposes shall be in the appropriate international code forms, specified in the Manual on Codes (Publication No. 306) (Annex II), with the exception of those types of information specifically excluded by these Technical Regulations.

NOTE: Meteorological information exclusively for exchange between one Member and another may be in other forms by bilateral agreement."

10. In paragraphs [A.2.3.] 1.2.2 and [A.2.3.] 1.3.1, replace the word "messages" by "code forms".

11. Add at the end of the Note in paragraph [A.2.4.] 1.1 the following: "and in Volume I of the Guide on the Global Data-processing System."

12. Replace the text of paragraph [A.2.4.] 2.1.3 by the following: "Each Member should arrange for the transfer of climatological records from its stations to media capable of being processed by automatic methods."

13. Replace present Chapter A.3.1 - Meteorological telecommunications - by the following:

"Chapter A.3.1

Meteorological Telecommunications

NOTE: Information relating to point-to-point circuits and radio broadcasts, particularly transmission programmes, notified by Members, is given in Publication No. 9, Volume C.

(A.3.1.) 1

GENERAL

(A.3.1.) 1.1

Organization of the Global Telecommunication System

(A.3.1.) 1.1.1

The Global Telecommunication System shall be organized on three levels:

(a) The Main Trunk Circuit and its branches;

(b) Regional telecommunication networks;

(c) National telecommunication networks.

(A.3.1.) 1.1.2

The Global Telecommunication System shall be established and operated in accordance with standard procedures and recommended practices set out in the Manual on the Global Telecommunication System (Annex III).

(A.3.1) 1.2

Telecommunication functions of centres

(A.3.1.) 1.2.1

World Meteorological Centres, Regional Telecommunication Hubs (and Regional Meteorological Centres in specified cases) and National Meteorological Centres shall ensure that the Global Telecommunication System functions efficiently.

(A.3.1.) 1.3

Engineering principles of the Global Telecommunication System

(A.3.1.) 1.3.1

The basic engineering principles adopted for the Global Telecommunication System shall provide for the integration of global, regional and national telecommunication systems to ensure transmission of the required meteorological information within the specified acceptable time delays.

(A.3.1.) 2

RESPONSIBILITIES OF MEMBERS IN THE FIELD OF METEOROLOGICAL TELECOMMUNICATIONS

(A.3.1.) 2.1

General responsibilities

(A.3.1.) 2.1.1

Members having accepted responsibility in the field of meteorological telecommunications shall ensure that all appropriate measures are taken for the installation and good functioning of their WMCs, RTHs, RMCs and NMCs in relation to their needs and the role which they have accepted in accordance with interregional and regional agreements and those between the Members concerned.

(A.3.1.) 2.1.2

Members shall ensure that their national collecting system for meteorological reports allows not only national but also international needs to be met.

(A.3.1.) 2.1.3

Members making meteorological transmissions shall provide the Secretariat with details of the contents and schedules of their transmission programmes."

14. Amend table of contents as regards Annex I to read: "International Cloud Atlas, Volume I, Part I; Part II: paragraphs II.1.1, II.1.4, II.1.5, II.2.3, sub-paragraphs 1, 2, 3 and 4 of each paragraph from II.3.1 to II.3.10, paragraphs II.8.2 and II.8.4; Part III: paragraph III.1 and the definitions (in italics) of paragraph III.2 (not attached)."

LIST OF DOCUMENTS

## I. "DOC" series

| Doc. No. | Title | Agenda item | Submitted by |
|---|---|---|---|
| 1 | Provisional agenda | 2.2 | - |
| 2 | Explanatory memorandum relating to the provisional agenda | 2.2 | - |
| 3 | Data-processing system including GDPS part of WWW<br><br>Tropical synoptic meteorology<br><br>Report of the Rapporteur on Synoptic Meteorology in the Tropics<br><br>ADD. 1 | 7.3 | Rapporteur |
| 4 | Data-processing system<br><br>Report by the chairman of the Working Group on the GDPS | 7 | Chairman, working group |
| 5 | Codes<br><br>ADD. 1<br>ADD. 2<br>ADD. 3 | 8 | Secretary-General |
| 6 | Observing system<br><br>Report by the chairman of the Working Group on GOS<br><br>ADD. 1<br>ADD. 2 | 6 | Chairman, working group |
| 7 | Telecommunication system<br><br>Report of the chairman of the Working Group on the Global Telecommunication System | 9 | Chairman, working group |

| Doc. No. | Title | Agenda item | Submitted by |
|---|---|---|---|
| 8 | Guide on the GDPS<br><br>Preparation, approval and publication of Volume I of the Guide on the GDPS | 7.2 | Secretary-General |
| 9 | Telecommunication system<br><br>Review and follow-up of the decisions of the sixth session of the CBS Working Group on the GTS<br><br>ADD. 1<br>ADD. 2<br>ADD. 3<br>ADD. 4<br>ADD. 5<br>ADD. 6 | 9 | Secretary-General |
| 10 | Codes<br><br>Editorial revision of the notes in Volume I of the Manual on Codes | 8 | Secretary-General |
| 11 | Codes<br><br>Report of the chairman of the Working Group on Codes | 8 | Chairman, working group |
| 12 | International Cloud Atlas<br><br>Report by the Rapporteur on Reporting the State of the Sky in the Tropics | 10 | Rapporteur |
| 13 | Review of previous resolutions and recommendations of the Commission and relevant Executive Committee resolutions | 14 | Secretary-General |
| 14 | Guide on the GDPS (Volumes I and II)<br><br>Review of Volume II of the Guide on the GDPS | 7.2 | Secretary-General |
| 15 | Education and training in the field of CBS | 11 | Secretary-General |
| 16 | Report of the president of the Commission | 3 | Acting president of CBS |

| Doc. No. | Title | Agenda item | Submitted by |
|---|---|---|---|
| 17 | Co-ordination of data needs for various uses<br><br>Requirements for processed data<br><br>ADD. 1 | 4.2 | Secretary-General |
| 18 | International Cloud Atlas | 10 | Secretary-General |
| 19 | Data-processing system<br><br>Organization of GDPS and functions of WMCs, RMCs and NMCs. Review of the requirements for global exchange of observational data, including the list of stations for global exchange<br><br>ADD. 1 | 7.1 | Secretary-General |
| 20 | Request for review of requirements with regard to the criteria for significant wind levels for international exchange in PILOT and TEMP | 4.1, 8 | Sweden |
| 21 | Organization of the GDPS and functions of WMCs, RMCs and NMCs<br><br>Further development of the GDPS | 7.1, 7.4 | Secretary-General |
| 22 | General objectives of the WWW plan for the period 1976 to 1979<br><br>Observing system (including the GOS part of WWW and the report by the chairman of the Working Group on the GOS)<br><br>Data-processing system (including the GDPS part of WWW and the report by the chairman of the Working Group on the GDPS)<br><br>Telecommunication system (including the GTS part of WWW and the report by the chairman of the Working Group on the GTS) | 5, 6, 7, 9 | Secretary-General |

| Doc. No. | Title | Agenda item | Submitted by |
|---|---|---|---|
| 23 | Codes<br><br>Codes for reporting synoptic surface observations (SYNOP and SHIP) | 8 | Secretary-General |
| 24 | Codes<br><br>Proposal for the improved identification of CLIMAT messages | 8 | United Kingdom of Great Britain and Northern Ireland |
| 25 | Review of Technical Regulations | 12 | Secretary-General |
| 26 | Data requirements to be met by the GOS<br><br>Observing programme of stations included in the regional basic synoptic networks | 6.1, 12 | Secretary-General |
| 27 | Global-data processing system | 7 | France |
| 28 | Codes<br><br>Proposal for modification of the SHIP code (FM 24.E), Part I | 8 | United Kingdom of Great Britain and Northern Ireland |
| 29 | Requirements for observational data<br><br>Vertical averaging intervals for deriving upper winds | 4.1 | Secretary-General |
| 30 | Codes<br><br>Proposal for addition of monthly sunshine hours to CLIMAT messages | 8 | United Kingdom of Great Britain and Northern Ireland |
| 31 | Codes<br><br>Editorial revision of the notes in Volume I of the Manual on Codes | 8 | France |
| 32 | Codes<br><br>Code for reporting synoptic surface observations (SYNOP) | 8 | United Kingdom of Great Britain and Northern Ireland |

| Doc. No. | Title | Agenda item | Submitted by |
|---|---|---|---|
| 33 | Telecommunication system<br><br>Technical problems including introduction of new telecommunication techniques | 9.3 | France |
| 34 | Codes<br><br>Telecommunication system<br><br>Implementation aspects of the new SYNOP and SHIP codes | 8, 9 | Secretary-General |
| 35 | Proposal to change WWW specifications for the GOS | 4.1, 5, 6, 12 | Australia |
| 36 | Programmes of output of Melbourne WMC, Melbourne RMC, and Darwin RMC/AFC | 4.2, 5, 7.1 | Australia |
| 37 | Codes<br><br>FM - 24V SHIP: Report of synoptic observation from sea station | 8 | South Africa |
| 38 | List of stations from which reports should be included for the global exchange | 7.1 | U.S.S.R. |
| 39 | Telecommunication system<br><br>Addition to telecommunication procedures | 9.2 | U.S.S.R. |
| 40 | Telecommunication system<br><br>Conversion of facsimile (analogue) transmissions on the MTC | 9.2, 9.4 | U.S.S.R. |
| 41 | Proposal to re-organize the Global Telecommunication System | 5, 9.1 | Australia |
| 42 | Guide on the GDPS (Volume II)<br><br>Technical Regulations<br><br>Symbols for present weather and past weather | 7.2, 12 | France |

| Doc. No. | Title | Agenda item | Submitted by |
|---|---|---|---|
| 43 | Codes<br><br>Code for reporting synoptic interpretation of cloud data obtained by meteorological satellites | 8 | German Democratic Republic |
| 44 | Proposal to defer introduction of new SYNOP and SHIP code forms | 3, 8 | Australia |
| 45 | Codes<br><br>Further development of the aeronautical meteorological codes | 8 | ICAO |
| 46 | Observing System<br><br>Optimum mix of observing system | 6.4 | German Democratic Republic |
| 47 | Review of Technical Regulations | 12 | Australia |
| 48 | Telecommunication system | 9 | Secretary-General |
| | II. "PINK" series | | |
| 1 | Opening of the session<br><br>Organization of the session<br><br>REV. 1 | 1, 2 | President of the session |
| 2 | Codes | 8 | Chairman, Committee B |
| 3 | Codes | 8 | Chairman, Committee B |
| 4 | International Cloud Atlas (including the report by the Rapporteur on Reporting the State of the Sky in the Tropics) | 10 | Chairman, Committee B |
| 5 | Codes | 8 | Chairman, Committee B |
| 6 | Co-ordination of data needs for various uses | 4 | Chairman, Committee A |
| 7 | Codes | 8 | Chairman, Committee B |
| 8 | Codes | 8 | Chairman, Committee B |

| Doc. No. | Title | Agenda item | Submitted by |
|---|---|---|---|
| 9 | Codes | 8 | Chairman, Committee B |
| 10 | Observing system (including the GOS part of WWW and the report by the chairman of the Working Group on the GOS) | 6 | Chairman, Committee A |
| 11 | Election of officers<br>REV. 1 (Russian only) | 16 | Chairman of the Committee |
| 12 | Guide on the GDPS (Volumes I and II)<br>CORR. (French only) | 7.2 | Chairman, Committee A |
| 13 | Telecommunication system (including the GTS part of WWW and the report by the chairman of the Working Group on the GTS) | 9 | Chairman, Committee B |
| 14 | Telecommunication system (including the GTS part of WWW and the report by the chairman of the Working Group on the GTS)<br>CORR. 1 | 9.5 | Chairman, Committee B |
| 15 | General objectives of the WWW plan for the period 1976 to 1979<br>ADD. 1 | 5 | Chairman, Committee A |
| 16 | Organization of the GDPS and functions of WMCs, RMCs and NMCs | 7.1 | Chairman, Committee A |
| 17 | Telecommunication system<br>Manual on GTS<br>CORR. 1 | 9.5 | Chairman, Committee B |
| 18 | Telecommunication system<br>Implementation of the MTC and its branches | 9.4 | Chairman, Committee B |
| 19 | Telecommunication system<br>Manual on GTS | 9.5 | Chairman, Committee B |

| Doc. No. | Title | Agenda item | Submitted by |
|---|---|---|---|
| 20 | Tropical synoptic meteorology (including the report by the Rapporteur on Synoptic Meteorology in the Tropics). Further development of the GTS | 7.3, 7.4 | Chairman, Committee A |
| 21 | Review of Technical Regulations | 12 | Chairman, Committee A |
| 22 | Education and training in the field of CBS | 11 | Chairman, Committee A |
| | CORR. 1 | | |
| 23 | Editorial revision of the notes in Volume I of the Manual on Codes | 8 | Chairman, Committee B |
| 24 | Telecommunication procedures | 9.2 | Chairman, Committee B |
| | REV. 1 | | |
| 25 | Editorial revision of the notes in Volume I of the Manual on Codes (SYNOP and SHIP code forms) | 8 | Chairman, Committee B |
| 26 | Telecommunication system | 9.3 | Chairman, Committee B |
| | Technical problems including introduction of new telecommunication techniques | | |
| 27 | Election of officers | 16 | - |
| 28 | Organization of the Global Telecommunication System | 9.1 | Chairman, Committee B |
| 29 | Report by the president of the Commission | 3 | Chairman, Committee A |
| | ADD. 1 | | |
| 30 | Review of previous resolutions and recommendations of the Commission and relevant Executive Committee resolutions | 14 | - |
| 31 | Nomination of members of working groups and nomination of rapporteurs | 13 | Chairman, ad hoc group |
| 32 | Scientific lectures and discussions | 15 | Vice-president of the session |

W O R L D  M E T E O R O L O G I C A L  O R G A N I Z A T I O N

Supplement to WMO Publication No. 381

# Abridged Final Report of

# the Sixth Session of the Commission for Basic Systems

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# Decisions of the Executive Committee

# on the Abridged Final Report

# of the Sixth Session of the Commission for Basic Systems

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This document should be considered as a guide to the status of the decisions adopted at the sixth session of the Commission for Basic Systems.

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## A. DECISIONS RECORDED IN THE GENERAL SUMMARY OF THE WORK OF EC-XXVI

(Relevant extracts)

### 3.1.3 WWW plan for 1976-1979

3.1.3.1 In Resolution 3 (Cg-VI), the Executive Committee was requested to submit a report to the Seventh Congress containing proposals for the continuation and further development of the World Weather Watch in the seventh financial period. To assist the Executive Committee in the preparation of this report, the Commission for Basic Systems had considered, in accordance with the directive of Sixth Congress recorded in paragraph 3.1.3.16 of the general summary of Cg-VI, the need for revisions of the WWW plan for 1972-1975 to be made by Seventh Congress. In this connexion a revised WWW plan had been prepared at the sixth session of CBS for the period 1976-1979, on the basis of a first draft prepared by the Secretary-General, and was submitted to the Executive Committee.

3.1.3.2 The Executive Committee noted with appreciation the work carried out by CBS in preparing the revised plan, and considered that the draft plan for 1976-1979 submitted by CBS constituted a sound basis for the development of WWW in the next financial period. The Committee, however, made some amendments to the draft plan; these are referred to in paragraphs 3.1.3.3 and 3.1.3.4 below.

3.1.3.3 The sixth session of CBS referred to the Executive Committee a proposal from Australia that the WMC Melbourne should have only one major international communications link, that such a link should connect Tokyo and Melbourne and that the Main Trunk Circuit should be reorganized to provide a northern hemisphere closed loop to which Melbourne would be connected by a branch of the Main Trunk Circuit. While the Committee shared the concern of CBS at this proposal which involves a major change in the WWW plan affecting the telecommunication links between the northern and southern hemispheres, it recognized that the proposal had been made on the basis of a realistic consideration of the restricted functions of the WMC Melbourne. The Executive Committee therefore proposed to Congress that the routeing of the Main Trunk Circuit and its branches be amended as given in Attachment II to the draft WWW plan for 1976-1979 by deleting the MTC segment Melbourne-New Delhi. In making this proposal to Congress, the Executive Committee emphasized the need for the early upgrading of the Tokyo-Melbourne segment to high-speed data and facsimile transmissions. The Executive Committee also felt that there is a need for maintaining a

low-speed back-up channel Melbourne-New Delhi at least for the exchange of observational data. Furthermore, the Committee invited the president of CBS to study the routeing of the MTC as a consequence of the deletion of the Melbourne-New Delhi segment of the MTC and report his findings to Seventh Congress.

3.1.3.4 Some other minor amendments were also made to make the plan more adapted to present circumstances and expected future developments.

3.1.3.5 The Secretary-General was requested to submit the amended draft plan on behalf of the Executive Committee to Seventh Congress for adoption. The amended draft plan is reproduced in the Annex* to this report. In this connexion, the Committee also requested the Secretary-General to submit appropriate background documentation to Seventh Congress on the implementation of the WWW plan for 1972-1975, including details of the regional meteorological telecommunication networks and their state of implementation.

3.1.4 Report of the president of CBS and consideration of the report of the sixth session of CBS

3.1.4.1 The Executive Committee noted with appreciation the report of the president of CBS. It also noted the report of the sixth session of CBS and recorded its decisions on the recommendations developed at this session in Resolution 3 (EC-XXVI).

3.1.4.2 The Executive Committee noted with approval the detailed work programme of CBS for the period 1974-1978 as drawn up at CBS-VI, and expressed its appreciation to the Commission for this clear form of presentation of its main tasks. The relevant budgetary provisions for 1975 were made under agenda item 7. As regards the implementation of the work programme during the seventh financial period of WMO, the Executive Committee noted that the appropriate financial provisions would have to be made by Seventh Congress (see also agenda item 7.2).

3.1.4.3 The Executive Committee supported the proposal of the president of CBS for holding in 1974 consecutively a session of the Advisory Working Group of CBS and a meeting of an ad hoc group of experts for elaborating codes for the exchange of meteorological satellite data. This latter meeting was recommended by the Executive Committee Panel of Experts on Meteorological Satellites, with a view to reaching an agreement on such codes at least nine months before

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*Annex not attached.

FGGE (see paragraph 3.2 below). The Committee requested the President of WMO to authorize, after consultation with the Secretary-General, the use of necessary funds for holding these meetings.

3.1.4.4 The Executive Committee noted the decision of CBS not to recommend the introduction of new surface synoptic codes until after the First GARP Global Experiment. It requested the Secretary-General to inform all concerned accordingly.

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## B. RESOLUTION

### Resolution 3 (EC-XXVI)

### REPORT OF THE SIXTH SESSION OF THE COMMISSION FOR BASIC SYSTEMS

THE EXECUTIVE COMMITTEE,

HAVING CONSIDERED the abridged report of the sixth session of the Commission for Basic Systems,

DECIDES:

(1) To note the report;

(2) To note Resolutions 1 to 7 (CBS-VI);

(3) To take action on the recommendations as follows:

Recommendation 1 (CBS-VI) - Output products of WMCs

Recommendation 2 (CBS-VI) - Output products of RMCs

Recommendation 3 (CBS-VI) - Conversion of products in alpha-numeric (GRID code) form into pictorial form

Recommendation 7 (CBS-VI) - Use of code forms for the exchange of synoptic surface observations originating from automatic weather stations

Recommendation 20 (CBS-VI) - Reporting of Parts B and D of FM 36-E - TEMP SHIP by voluntary observing ships

Recommendation 21 (CBS-VI) - Priority of synoptic time for upper-air observations

(a) Approves these recommendations;

(b) Requests the Secretary-General to bring them to the attention of all concerned.

Recommendation 4 (CBS-VI) - Requirements for global exchange of observational data

(a) Approves this recommendation;

(b) Requests the Secretary-General to include the substance of this recommendation in the Manual on GTS.

Recommendation 5 (CBS-VI) - Publication of Volume I of the Guide on the GDPS

(a) Approves this recommendation;

(b) Requests the Secretary-General;

(i) To arrange in consultation with the president of CBS for the completion of the text of the volume in the light of the decisions of CBS-VI;

(ii) To publish the volume in the four official languages of the Organization as soon as possible.

Recommendation 6 (CBS-VI) - Aircraft weather reports

(a) Approves this recommendation;

(b) Requests the Secretary-General:

(i) To invite ICAO and CAeM to take action on RECOMMENDS (1) and (2) as appropriate;

(ii) To bring the recommendation to the attention of all concerned.

Recommendation 8 (CBS-VI) - Deletion of Code Table 1100 - F - Force of surface wind

(a) Approves this recommendation and stresses that only one single Beaufort Scale of wind force at sea and on land should be used;

(b) Invites the presidents of CIMO and CMM to arrange for the inclusion of the Beaufort scale of wind in the Guide to Meteorological Instrument and Observing Practices and other appropriate WMO publications;

(c) Requests the Secretary-General:

(i) To include in his consolidated report to Seventh Congress on the revision of the Technical Regulations the recommendation of CBS that the code table on the Beaufort scale of wind force appearing in Volume I of the Manual on Codes be transferred to the Technical Regulations as an appendix (see also general summary of CMM-VI, paragraph 11.4.4);

(ii) To take the action mentioned under RECOMMENDS, subject to approval by Cg-VII of the proposed amendment to the Technical Regulations described in (i) above, and with effect from the same date at which the relevant amendment to the Technical Regulations comes into force,

Recommendation 9 (CBS-VI) - Modified codes ROCOB and ROCOB SHIP

Recommendation 10 (CBS-VI)- International hydrological codes

Recommendation 11 (CBS-VI) - Amendment to Codes FM 71.E, FM 72.E, FM 73, FM 75.D and FM 76.D

Recommendation 12 (CBS-VI) - Addition of monthly sunshine hours groups to Code FM 71.E - CLIMAT

Recommendation 13 (CBS-VI) - Code for reporting synoptic interpretation of cloud data obtained by meteorological satellites

(a) Approves these recommendations;

(b) Decides that the above code forms and amendments to codes come into force on 1 January 1975;

(c) Authorizes the president of CBS to approve, in consultation with the Secretary-General, minor changes to the new and revised codes as required;

(d) Requests the Secretary-General to publish and distribute, before 1 July 1974, the new code decisions.

Recommendation 14 (CBS-VI) - Allocation of block numbers

Endorses the president's approval of this recommendation in accordance with Regulation 9(5) of the General Regulations.

Recommendation 15 (CBS-VI) - Deletion of the group 9ODP $H_w H_w$ from codes FM 51.E, FM 53.E and FM 54.E

(a) Approves this recommendation;

(b) Requests the Secretary-General:

(i) To consult ICAO on the date of implementation of this recommendation;

(ii) To publish and distribute the necessary amendments to Volume I of the Manual on Codes with effect from the date agreed with ICAO.

Recommendation 16 (CBS-VI) - Editorial revision of the Notes in Volume I of the Manual on Codes

(a) Approves this recommendation;

(b) Decides that the new Manual on Codes comes into force on 1 January 1975;

(c) Requests the Secretary-General to publish a revised edition of Volume I of the Manual on Codes in accordance with this recommendation, as soon as possible.

Recommendation 17 (CBS-VI) - Manual on the Global Telecommunication System - Volume I - Global Aspects

(a) Approves this recommendation;

(b) Authorizes the president of CBS to approve minor amendments to the Manual on GTS as required;

(c) Requests the Secretary-General:

(i) To publish the Manual as soon as possible;

(ii) To issue supplements to the publication as required, in consultation with the president of CBS.

Recommendation 18 (CBS-VI) - Publication of a new (revised) edition of Volume I of the International Cloud Atlas

(a) Approves this recommendation;

(b) Requests the Secretary-General:

(i) To publish a new edition of Volume I of the International Cloud Atlas in accordance with this recommendation;

(ii) To publish an appropriate amendment to the Abridged Atlas to bring it in line with the new edition of Volume I of the International Cloud Atlas.

Recommendation 19 (CBS-VI) - Amendments to the Technical Regulations

(a) Notes this recommendation;

(b) Requests the Secretary-General to incorporate the proposed amendments in his consolidated report to Seventh Congress on the revision of the Technical Regulations.

Recommendation 22 (CBS-VI) - Revision of resolutions of the Executive Committee based on previous recommendations of the Commission

(Action on this recommendation was taken by the Executive Committee under agenda item 9.7)

REQUESTS the Secretary-General to bring the above decisions to the attention of all concerned.

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NOTE: This resolution replaces Resolution 14 (EC-XXII), which is no longer in force.