WORLD METEOROLOGICAL ORGANIZATION

COMMISSION FOR MARINE METEOROLOGY

ABRIDGED FINAL REPORT OF THE EIGHTH SESSION

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NOTE

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C O N T E N T S

Recommendations (continued)

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LIST OF PERSONS ATTENDING THE SESSION

1. Officers of the session

K.P. Vasiliev	president
U.B. Lifiga	vice-president

2. Representatives of Members of WMO

M. Andaloussi	principal delegate	Algeria
A. Guersi	delegate	
L. Zaîm	delegate	
M.A. Rebolledo	principal delegate	Argentina
R.R. Amaturo	delegate	
W. Selesnew	principal delegate	Australia
J.L. van Homme	principal delegate	Belgium
J.M. Dury	alternate	
P.C. Dias Lima	principal delegate	Brazil
J.A.W. McCulloch	principal delegate	Canada
A.H. Campbell	delegate	
W.E. Markham	delegate	
F. Mendoza	principal delegate	Chile
Wang Xianzhao	principal delegate	China
Guo Dexi	delegate	
Yang Huating	delegate	
Lu Jialian	delegate	
Lau Baschu	delegate	
Jin Kui	delegate	
G. Stougaard-Nielsen	principal delegate	Denmark
H.H. Valeur	delegate	
J. Rinne	principal delegate	Finland
J. Laüniainen	delegate	
J. Beydon	principal delegate	France
F. Gérard	delegate	
J.O. Holz	principal delegate	German Democratic
G. Schmager	delegate	Republic

2. Representatives of Members of WMO (continued)

H. Voss	principal delegate	Germany, Federal
L. Hoffman	delegate	Republic of
K. Huber	delegate	
A. Kresling	delegate	
E.W.K. Chu	principal delegate	Hong Kong
H. Sigtryggsson	delegate	Iceland
W.G. Callaghan	principal delegate	Ireland
A. Teitelman	principal delegate	Israel
A. Zancla	principal delegate	Italy
M. Yasui	principal delegate	Japan
A.J. Abandah	principal delegate	Jordan
E.G. Njoroge	principal delegate	Kenya
S.R. Ochieng	delegate	
W.A. Salem	principal delegate	Libyan Arab
I.K. Budaua	delegate	Jamahiriya
T.C. Koh	delegate	Malaysia
E. Lopez Arreola	principal delegate	Mexico
W.D. Moens	principal delegate	Netherlands
C.G. Korevaar	delegate	
L.J. Mahieu	delegate	
E.O. Mkpanam	delegate	Nigeria
Y. Salahu	delegate	
L. Håland	principal delegate	Norway
K. Strand	delegate	
A.S. Al-Harmi	principal delegate	Oman
A.L. Huneidi	delegate/adviser	
C. del Carmen de la Torre	principal delegate	Peru
I.A.P. de Moura	principal delegate	Portugal
I.H. Al-Majed	principal delegate	Qatar
J. Bu-Hadood	delegate	

2. Representatives of Members of WMO (continued)

J.Y. Lee	principal delegate	Republic of Korea
A.M. Henaidi	principal delegate	Saudi Arabia
J.A. Bahanan	delegate	
T. Thompson	principal delegate	Sweden
S. Suwanpong	principal delegate	Thailand
T. Jedidi	principal delegate	Tunisia
B. Himitch	principal delegate	Union of Soviet
K.P. Vasiliev	delegate	Socialist
V.I. Antonov	delegate	Republics
F. Terzeiv	delegate	
V. Konygin	delegate	
V. Komtchatov	delegate	
G.A. White	principal delegate	United Kingdom of
D. Roe	delegate	Great Britain and
R.J. Shearman	delegate	Northern Ireland
U.B. Lifiga	principal delegate	United Republic of Tanzania
R.C. Landis	principal delegate	United States
G.A. Flittner	delegate	of America
J.M. Frosio	delegate	
R.G. Quayle	delegate	
R. Silva	principal delegate	Uruguay
K. Hubschmann	principal delegate	Venezuela

3. Observers from other international organizations

H. Sigtryggson	European Co-operation in the Field of Scientific and Technical Research (COST-43)
Y. Tréglos	Intergovernmental Oceanographic Commission (IOC)
D.P. Kohnke	
E. Nicolaidis	International Maritime Satellite Organization (INMARSAT)
H. Rohde	Permanent International Association of Navigation Congresses (PIANC)

3. Observers from other international organizations (continued)

B. Thompson	Scientific Committee on Oceanic Research (SCOR)

4. Invited experts

G. Goldberg
W. Schlatermund
H.O. Mertins

5. WMO Secretariat

G.K. Weiss	Director, World Weather Watch Department
S. Mizuno	Chief, Ocean Affairs Division
D. Feit	Scientific Officer, Ocean Affairs Division
T. Leyerweerd	Conference Officer

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GENERAL SUMMARY OF THE WORK OF THE SESSION

1. OPENING OF THE SESSION (Agenda item 1)

The eighth session of the Commission for Marine Meteorology was opened by the president of the Commission, Dr. K.P. Vasiliev, at 10 a.m. on 14 September 1981 at the Congress Centrum in Hamburg, Federal Republic of Germany.

1.2 On behalf of the Government of the Federal Republic of Germany, in particular the Federal Ministry of Transport, Mr. Graf, Deputy Director of the Department of Sea Transportation, welcomed all the participants in the session to the Federal Republic of Germany. Mr. Graf stressed, in particular, the importance of marine meteorology, maritime navigation, ocean exploration and exploitation. He referred especially to the economic impact of marine meteorological information on shipping, including ship weather routeing, and emphasized the need for full international cooperation in this important field of the application of meteorology.

1.3 On behalf of the City Council of Hamburg, Senator Steinert extended a warm welcome to the participants to the City of Hamburg. Mr. Steinert mentioned in particular the tradition of Hamburg in respect of marine meteorology. The first marine observatory in the country was installed in Hamburg and in 1875 it became the "Deutsche Seewarte", which made important contributions to meteorology and especially to marine meteorology. He stated that the city was always very much aware of the need for meteorological information and forecasts due to its vulnerability to storm surges. He expressed the hope that the Commission would, through international cooperation, develop the science of meteorology in the area of prediction and early warning of hazardous weather conditions and associated floods. He wished all the participants a pleasant stay in the City of Hamburg.

1.4 On behalf of WMO, Prof. A.C. Wiin-Nielsen, Secretary-General, thanked the Government of the Federal Republic of Germany for hosting the eighth session of the Commission for Marine Meteorology in Hamburg. He expressed his satisfaction at the excellent conference facilities put at the disposal of the session. The Secretary-General recalled the tasks given the Commission by Eighth Congress through the adoption of a policy statement on the further development of marine meteorology and other ocean-related activities. He specifically stressed the importance of the work of the Commission in respect of the application of meteorology to marine interests. The Secretary-General called upon the Commission for Marine Meteorology to make its contribution to the World Weather Watch and the World Climate Programme. He expressed the hope that the Commission would make perceptive decisions, in particular in respect of the observing activities over the ocean, marine data collection, marine climatology and sea ice. In determining its work programme for the coming years, the Secretary-General urged the Commission to keep in mind the contributions marine meteorology could make to socio-economic development, the rational use of ocean resources and environmental protection. He wished the session success in accomplishing its work.

1.5 Dr. E. Lingelbach, president of the Meteorological Service of the Federal Republic of Germany, warmly welcomed the participants and recalled that important international marine meteorological meetings take place in Hamburg at about 25-year intervals. He reminded the Commission that it had held its second session in 1956 in Hamburg. Dr. Lingelbach mentioned particularly the important work in the field of meteorology carried out by the Seewetteramt, and the Meteorological Institute of Hamburg University as well as the German Hydrographic Institute in the field of oceanography. He recalled the contributions which were made by the Seewetteramt to the international marine meteorological and climatological projects of WMO, and to GARP (FGGE, ALPEX). He also stressed the contributions of the Federal Republic of Germany to the World Weather Watch/World Climate Programme and the marine meteorological and climatological activities. Dr Lingelbach wished the session every success.

1.6 In his opening address, Dr. K.P. Vasiliev, president of CMM, gave a short account of the activities of the Commission since its seventh session. He stressed that the Commission carried out its work programme in accordance with the guidelines given by Congress and the Executive Committee. The Commission enjoyed strong support by Members; the number of Members participating actively in the work of the Commission had increased considerably over the last four years. Dr. Vasiliev referred to the need for the Commission to take up the challenge put to it in the following fields: marine meteorological support for ocean exploration, exploitation of mineral and living resources of the ocean, improving marine meteorological services and warnings through the introduction of new scientific knowledge and new technology, the continuation of air/sea interaction studies, contributions to an improved observing and ocean data-collection system. The main tasks of the Commission over the coming years will be to contribute substantially to the World Weather Watch and the World Climate Programme and provide ocean data for medium-range and long-range weather forecasting and research. The president welcomed new CMM Members, in particular China and the German Democratic Republic, who were participating in a CMM session for the first time. The president of CMM felt sure that the Commission would, as usual, carry out its difficult task in a spirit of international co-operation. Finally, he thanked the Government of the Federal Republic of Germany for inviting the Commission to hold its eighth session in Hamburg. He also thanked the Secretary-General and his staff for the support given to the Commission in organizing the session.

2. ORGANIZATION OF THE SESSION (Agenda item 2)

2.1 Consideration of the report on credentials (Agenda item 2.1)

The representative of the Secretary-General presented the first report on credentials and stated that any additional information would be submitted to the session at later plenary meetings. The Commission accepted this report and decided not to set up a Credentials Committee.

2.2 Adoption of the agenda (agenda item 2.2)

The provisional agenda was adopted without amendment at the first plenary

meeting on the understanding that, at any time during the session, additions or alterations could be made. The agenda finally adopted is reproduced at the beginning of the report, together with a list of relevant documents and numbers of resolutions and recommendations.

2.3 Establishment of committees (Agenda item 2.3)

Working Committees

2.3.1 Two working committees were established to deal with specific agenda items:

(a) Committee A: to deal with agenda items 6.1, 7, 8 and 14, and the relevant parts of 4, 9 and 10. Mr. J.A.W. McCulloch (Canada) was elected chairman and Mr. T. Thompson (Sweden) vice-chairman.

(b) Committee B: to deal with agenda items 5 and 6 (excluding 6.1), and the relevant parts of 4, 9 and 10. Dr. H. Voss (Federal Republic of Germany) was elected chairman and Mr. A.M. Henaidi (Saudi Arabia) vice-chairman.

The session decided to deal with agenda items 11 and 12 at a joint session of the two committees chaired by the president of the Commission.

Co-ordination Committee

2.3.2 In accordance with Regulation 27 of the WMO General Regulations, a Co-ordination Committee was established consisting of the president, the vice-president, chairmen of the Working Committees and staff members of the WMO Secretariat.

Nominations Committee

2.3.3 To facilitate the election of officers of the Commission, a Nominations Committee was established consisting of the principal delegates of Argentina, France, Japan, United Republic of Tanzania and the U.S.A.

2.4 Other organizational matters (Agenda item 2.4)

Under this item, the Commission decided on its working hours for the duration of the session. It was agreed that the minutes of plenary sessions, which could not be approved during the session, would be approved later in accordance with Regulation 111 of the WMO General Regulations.

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

3.1 The Commission noted with great satisfaction and appreciation the report of the president of CMM on the activities of the Commission since its seventh session

and thanked the president for his leadership during the inter-sessional period. The report highlighted the main achievements in the field of marine meteorological services, marine climatology, sea-ice services, technical problems, collaboration with other international organizations, including the Integrated Global Ocean Services System (IGOSS), which the Commission was pleased to note. During the general discussion of the presidential report many comments and suggestions were made by delegates. Some of the subjects which were given particular attention by the Commission are described in the following paragraphs.

Training and technical assistance

3.2 The Commission stressed the importance of training efforts in the field of marine meteorology, particularly the holding of training seminars oriented towards specific regional needs and in this relation noted with satisfaction the proposal of the president for convening such training seminars in RA I, II, III and V. With respect to RA IV the special requirements of the Caribbean region should be taken into account. It was also pointed out that training and assistance efforts should not be limited to training seminars but should include other aspects such as fellowships, experts' advice and the provision of equipment. More detailed discussions on this subject are recorded under agenda item 11.

Regional activities

3.3 The Commission was pleased with the development and increase in regional marine meteorological activities and in this regard noted, in particular, the activities in connexion with the Regional Marine Meteorological Programme in the sea areas surrounded by Bahrain, Iran, Iraq, Kuwait, Oman, Qatar and Saudi Arabia, and the marine meteorological activities in the Baltic region. The Commission hoped that this form of regional co-operative initiative would develop further. It requested the Secretary-General to provide the necessary support for such regional co-operative programmes.

Co-ordination with other international organizations

3.4 The Commission noted with satisfaction the excellent working relationship maintained with international organizations, namely the Intergovernmental Maritime Consultative Organization (IMCO) and the International Chamber of Shipping (ICS) with respect to marine meteorological services, the Intergovernmental Oceanographic Commission (IOC) and the Food and Agriculture Organization (FAO) with respect to oceanographic services; however, it regretted that some of these agencies were not present. In this connexion, the representative of IOC stated that his organization will continue to co-operate with CMM on subjects of common interest and hoped that close collaboration would continue to develop.

Future work programme

3.5 The Commission considered the future work programme in the light of the priority programmes of the Organization as defined by Executive Committee XXXIII and adopted the list of major tasks proposed for CMM for 1982-1986 (see Annex I).

3.6 The Commission reviewed its present and planned activities and concluded that a substantial part of its work contributes directly to the WWW and to WCP. In this connexion it was pointed out that the planning and implementation of observing systems, including data collection over the oceans, has been the major activity of the CMM. Marine climatological activities, comprising non-real-time data collection, quality control and archiving carried out under the Marine Climatological Summaries Scheme, including preparation of the marine section of the World Climatic Atlas, constitute an ongoing activity and are an important contribution to the WCP. The Commission's sea-ice activities provide a contribution both to WWW through the real-time component and to WCP through the non-real-time component. The marine meteorological services depend to a large extent on input from WWW, and use the WWW to exchange marine meteorological data between marine meteorological forecast offices. The provision of marine meteorological climatological information to marine interests could be considered as part of support given to the WCAP. Therefore the Commission kept in mind the requirements of WWW and WCP in drawing up its future work programme.

3.7 The Commission discussed its detailed work programme for the period 1982-1986 and agreed to propose a number of major projects which should be carried out by the Commission. For each major project, the goals and the methods of achieving them were indicated in a table which is included as an annex to this report.

3.8 The Commission discussed its terms of reference. It felt that there was no need for a major change, but requested the president of CMM to bring to the attention of STAC and the Executive Committee the wish of CMM to up-date its terms of reference on the occasion of a general review of the terms of reference of all Technical Commissions.

Advisory Working Group

3.9 The Commission felt that there was a need to re-establish the CMM Advisory Working Group. It felt that the CMM Advisory Working Group should play an important role in assisting the president of the Commission in co-ordinating and directing the work of the CMM Working Groups and Rapporteurs, as well as to liaise with IOC and other WMO bodies, in particular other technical commissions and regional associations. The increased involvement of CMM in the WWW, WCP and in programmes relating to the transfer of technology also necessitates a strengthening of the Advisory Working Group. Resolution 1 (CMM-VIII) was adopted.

United Nations Third Conference on the Law of the Sea (UNCLOS)

3.10 The Commission noted the communication from the Chairman of the Third Committee of the Conference, Ambassador A. Yankov, to the Secretary-General of WMO, in which Ambassador Yankov stated that he completely shared the view of Eighth Congress that an adequate marine meteorological data coverage including areas within the exclusive economic zone was indispensable for the issue of timely and accurate storm warnings for the safety of navigation as well as for the protection of life and property in coastal and offshore areas. The Commission was particularly pleased with Ambassador Yankov's statement that, in his view, the relevant provisions of the Informal Composite Negotiating Text (Revision 2) on marine scientific research would not create any difficulties or obstacles to WMO's operational and research activities

over the ocean as these were recognized as routine activities within the terms of reference of WMO and are of common interest to all countries, with an undoubted universal significance.

4. REPORTS BY THE CHAIRMEN OF WORKING GROUPS AND BY RAPPORTEURS (Agenda item 4)

The Commission noted the reports of the chairmen of working groups and rapporteurs and expressed appreciation for their excellent work and for the time and effort spent in carrying out their tasks. These reports were considered in detail under the relevant agenda items.

5. MARINE METEOROLOGICAL SERVICES (Agenda item 5)

5.1 Services for the high seas (Agenda item 5.1)

5.1.1 The Commission noted with appreciation the report of Mr. L. Håland (Norway), chairman of the Working Group on Marine Meteorological Services. It commended the working group for the impressive amount of work carried out in a timely fashion, particularly in relation to the adoption of the Manual on Marine Meteorological Services and the preparation of the revised Guide to Marine Meteorological Services.

Collaboration with IMCO

5.1.2 The Commission was informed of a number of operational matters which have been under joint consideration by IMCO, particularly by its Maritime Safety Committee and the Sub-committee on the Safety of Navigation, namely:

(a) The co-ordination of broadcasts of navigational and meteorological warnings;

(b) Amendment to the International Convention for the Safety of Life at Sea (1974).

With regard to (a) above, the Commission noted that the co-ordination of navigational and meteorological warnings has already been established in some areas and that procedures for such co-ordination have been included in the revised Guide to Marine Meteorological Services. In this connexion, it also noted the following findings of the RA II Rapporteur on the Co-ordination of Broadcasts of Meteorological and Navigational Warnings and Meteorological Support to Maritime Search and Rescue Operations:

- Only important meteorological information should be broadcast together with navigational warnings: e.g. storm and tropical-cyclone warning;

Emphasis should be placed on the necessity of receiving regular meteorological broadcasts in addition to receiving meteorological warnings included in navigational warnings.

Inquiry on marine meteorological services among shipmasters

5.1.3 As a follow-up action in the implementation of Recommendation 6 (CMM-VII) concerning the monitoring of marine meteorological services and following a suggestion of the fourth session of the CMM Advisory Working Group, an inquiry among shipmasters of voluntary observing ships was conducted in August 1978. The main purpose of this inquiry was to obtain from shipmasters opinions on the adequacy of marine meteorological services provided to them to enable national Meteorological Services to take suitable remedial measures where deficiencies are reported by the international marine community. The Commission was pleased to note that the inquiry received an enthusiastic response from shipmasters who greatly welcomed the opportunity to raise the problems they experienced in obtaining the services which they require.

5.1.4 The Commission reviewed the summary of comments of a general nature concerning marine meteorological services which contained a large number of useful suggestions by shipmasters. It felt however that some of the suggestions are of a purely regional nature and may not be appropriate for universal application. The Commission requested the Secretary-General to circulate the summary to all Members of WMO and invite them to take it into account in their programme for the provision of marine meteorological services.

5.1.5 Some discussion took place concerning the suggestion of the standardization of meteorological equipment on board ships, particularly for the purpose of repairs or for providing spares. The Commission was of the opinion that the standardization of various meteorological instruments is not practicable and that PMOs should not be engaged in the repair of instruments. The Commission recommended that Members having a large number of ships participating in the Voluntary Observing Ships' Scheme also maintain a stock of instruments at various foreign PMO offices, thus enabling the PMOs to replace defective instruments upon request or as and when found.

Information on weather routeing services

5.1.6 The Commission was presented with a proposal to include in Volume D the information concerning the availability of weather routeing services throughout the world. This proposal was put forward in view of the considerable progress in numerical weather forecasting and of the desirability of making such services widely known. Following considerable discussion on the subject it was agreed that only those ship routeing services provided by national Meteorological Services should be included in Volume D of WMO Publication No. 9; this information will appear in a separate section of Volume D and provide:

(a) Name of the country;

(b) Name, address, telephone and/or telex number of the national marine meteorological services providing the services.

It was agreed that a note should be inserted to the effect that these services may necessitate certain charges. The Commission requested the Secretary-General to take the necessary action to this end.

Monitoring of marine meteorological services

5.1.7 The Commission recalled that by Recommendation 6 (CMM-VII) it recognized the need for the monitoring of marine meteorological services in particular to identify deficiencies and help to improve the quality of the services. Further, in Part II, paragraph 2.1, Principle 5, of the Manual on Marine Meteorological Services it is stated that "the efficiency and effectiveness of the provision of weather and sea bulletins is monitored by obtaining opinions and reports from marine users". In this connexion, the Commission recognized that a number of Members performed this type of monitoring in one way or another. The Commission further agreed that Members of WMO should transmit to the Secretariat comments, suggestions and complaints by shipmasters about the performance of particular coastal radio stations and the forecast and warning services provided by Members and that the Secretary-General should take appropriate remedial action. Indeed, such information enables the Secretariat to keep abreast of the situation in various parts of the world.

5.1.8 The Commission considered a proposal by the Secretariat concerning the organization of these monitoring activities in a more systematic fashion on an international basis. The consensus of the Commission was in support of undertaking such monitoring activities. Some delegates, however, expressed concern about the additional workload which could be imposed on the voluntary observing ships. After some discussion, the Commission agreed that an international monitoring programme of marine meteorological services should be initiated and that the matter should be considered further by the Working Group on Marine Meteorological Services with a view to defining an appropriate method of performing such activities. In doing so the Working Group on MMS should keep in mind the following guidelines:

(a) The monitoring activities should be supported by Members;

(b) The monitoring may be extended to include the performance of coastal radio stations;

(c) The method of evaluation should be flexible enough to allow Members to adjust it to their specific needs; the questionnaire to be distributed should have a standard section for entering answers in a simple manner.

Recommendation 1 (CMM-VIII) was adopted.

Provision of information by radio facsimile for marine purposes

5.1.9 The Commission considered a proposal by the chairman of the Working Group on Marine Meteorological Services concerning the standardization of symbols and map specifications for facsimile charts for marine purposes. The Commission was unanimous in agreeing that every effort should be made to achieve this objective and wished to thank in this connexion Mr. W.D. Moens (Netherlands), who drew up a draft

text for inclusion in the Manual on Marine Meteorological Services. It also welcomed the encouraging statement by Captain Goldberg, representing the International Federation of Shipmasters Associations, who stressed the importance of CMM efforts and the need for the introduction of standard symbols at an early date.

5.1.10 The Commission noted that the chairman of the Working Group on Marine Meteorological Services did not have sufficient time for his working group to study Mr. Moens' proposal before its submission to CMM-VIII. It also realized that varying regional requirements may be taken into account and that wider consultation may be required. The Commission therefore agreed that the subject be discussed further by the Working Group on Marine Meteorological Services. In order to assist the working group the Commission requested the Secretary-General to circulate the proposal to Members of WMO and obtain their comments for consideration by the working group. In this connexion, the Commission agreed that Significant Weather Depiction Charts be added and that special projections and scales be permitted for sea-ice charts. The Commission further agreed that, as far as possible, the standard symbols and map specifications given in the Manual on the Global Data-processing System should be followed.

5.2 Services for coastal and offshore areas (Agenda item 5.2)

VHF radio weather broadcast services

5.2.1 The Commission recalled that by Recommendation 3 (CMM-VII) Members were encouraged to study the possibility of providing VHF radio weather broadcast services and considered in this connexion a document submitted by Norway stressing the need for developing this programme further on a regional basis. The discussion then focussed on the difficulty experienced by certain Members in obtaining frequency channels for this purpose; some Members have been more successful than others in this respect but negotiations with national telecommunication administrations are being carried out in certain countries with a promising outcome. The Commission was also informed that an allocation by ITU/WARC of standard designated VHF frequency bands for the dissemination of meteorological information on a global scale as suggested by the seventh session of CMM could not be obtained and that the assignment of such frequencies for this specific purpose should be sought on a national or regional basis.

5.2.2 The Commission was in full agreement that the use of VHF radio broadcasts for disseminating marine meteorological information is highly effective and is of value to marine users in coastal and offshore areas and that this type of service should be introduced or expanded. However, in view of the reasons described in the preceding paragraph, the Commission felt that this programme should be promoted on a national and/or regional basis.

5.3 Services for main ports and harbour areas (Agenda item 5.3)

The Commission felt that many of the discussions and conclusions reached under agenda items 5.1 and 5.2 also related to this item.

5.4 Regional projects related to marine meteorological services (Agenda item 5.4)

5.4.1 The Commission noted that, in general, there are two main stages in the development of marine meteorological services:

(a) Services planned by Members with a view to meeting national as well as international obligations;

(b) Services already established or fully committed to by Members.

The need for assistance in meeting the obligations for the provision of marine meteorological services by Members which are specified in the Manual on Marine Meteorological Services are particularly varied and significant at the level of development referred to in (a) above. These requirements are formulated by regional associations and by Members and cover many aspects of marine meteorological services including planning, organization, technology transfer and daily operational practices. The Commission was of the opinion that such an assistance programme, excluding basic education and training, may be implemented through:

- Expert missions;
- Seminars and workshops;
- Implementation co-ordination meetings.

5.4.2 The Commission voiced strong support for the implementation of the assistance activities referred to above. With regard to expert missions, the Commission felt that national requirements should determine the qualifications of the experts to be selected, e.g. general academic qualifications, fields of specialization and experience in teaching, so that maximum benefit could be derived from the mission by the recipient countries. It felt it would be useful if some of these missions were devoted to questions relating to meteorological instruments and observations aboard voluntary observing ships. If possible these expert missions should also include the provision of equipment. Preliminary studies by regional offices preceding expert missions may also contribute to a clear definition of Members' requirements. With regard to seminars, the Commission fully endorsed the proposal for holding roving seminars on marine meteorological services. It was explained that, at this type of seminar, lectures are repeated in different locations with variations in content to suit regional requirements, as necessary; it saves the expert's time, reduces the cost of seminars and permits on-the-spot training. The Commission stressed that a topic concerning the organization and implementation of an education and training programme in marine meteorology as specified in the Manual on Marine Meteorological Services should always be included. It also suggested that, in addition to seminars, workshops be organized on selected topics and/or techniques for marine meteorological applications. The list of topics for possible inclusion in roving seminars on marine meteorological services is given in the annex to this paragraph (see Annex II).

5.4.3 The Commission agreed that priorities should be defined by the regional associations concerned so that the limited resources available for regional assistance programmes are utilized in the most efficient manner. It therefore suggested that the Secretariat ensures that this subject is considered at sessions of the Regional Associations.

5.5 Requirements for basic WWW facilities and products (Agenda item 5.5)

5.5.1 The seventh session of CMM recognized that the basic needs of marine meteorological services are supplied by the World Weather Watch (WWW) systems, namely the GOS, GTS and GDPS and emphasized that close co-ordination should be maintained with these systems, inter alia, for the provision of output products of marine interest through WMCs and RMCs. In this connexion the Commission was presented with a report on the results of an inquiry on requirements for basic WWW facilities and products (Marine Meteorology and Related Oceanographic Activities, Report No. 6). The report contains many useful suggestions and comments by Members concerning the need for further product support from WMCs, RMCs and NMCs, telecommunication facilities, observational data, etc. The Commission felt that the report warrants further careful study by all concerned, including the Working Group on Marine Meteorological Services and the Commission for Basic Systems, the Joint IOC/WMO Working Committee for IGOSS and Members operating WMCs and RMCs.

5.5.2 The Commission was informed of the Integrated WWW System Study. One of its objectives is to support the implementation of WMO programmes, including the marine meteorological programme, by making available WWW facilities to these programmes. The Commission therefore agreed to develop its requirements through the Working Group on Marine Meteorological Services in consultation with other CMM working groups and rapporteurs. It requested that particular attention be paid to such subjects as:

(a) Mode and facilities for the dissemination of marine meteorological products;

(b) Mode and facilities for data collection from ocean-based observational platforms;

(c) Observational data requirements (see also agenda item 6.2).

Future activities

5.5.3 After consideration of item 5, the Commission identified a number of important subjects to be addressed during the coming inter-sessional period. These include, inter-alia, devising an appropriate method of implementing the marine meteorological services monitoring ship programme as proposed by Recommendation 1 (CMM-VIII) and the development of a section of the Manual on Marine Meteorological Services concerning the standardization of symbols and map specifications for radio facsimile charts used for marine purposes. In addition, due to the continuous increase in user demand for marine meteorological services and information, together with the need to keep under review the requirements of Members for guidance

and assistance in the implementation of their obligations, the Commission decided to re-establish the Working Group on Marine Meteorological Services. Resolution 2 (CMM-VIII) was adopted.

6. MARINE OBSERVATIONS AND DATA COLLECTION (Agenda item 6)

6.1 Marine observing methods and instrumentation (Agenda item 6.1)

6.1.1 The Commission noted with appreciation the report by Dr. L. Baer (U.S.A.), chairman of the Group of Rapporteurs on Technical Problems. Within this group the Commission appointed six rapporteurs to deal with the following subjects:

(a) Automation of observational methods on board ship (Dr. M. Yasui, Japan);

(b) Development of methods for measuring precipitation over the oceans (Dr. G. Olbrück, Federal Republic of Germany);

(c) Guidance on the application of methods for measuring waves and methods for the exchange and archiving of measured wave data (Mr. O.G. Houmb, Norway);

(d) Review of reference height for and averaging time of surface-wind measurements at sea (Dr. F.W. Dobson, Canada);

(e) Intercalibration of surface-based and remotely-sensed data, except sea-surface temperature data, to be used in marine applications (Dr. E.P. McClain, U.S.A.);

(f) Comparison of sea-surface temperature data observed by different methods, including remote sensing (Dr. F.S. Terziev, U.S.S.R.).

The Commission expressed its deep appreciation to the rapporteurs for the excellent work carried out and for their reports. It noted that the reports, except for (c) above, were published in full in the series entitled "Marine Meteorology and Related Oceanographic Activities". In addition to the full reports, which were published in English only, each rapporteur prepared an abbreviated version of his report with detailed conclusions and recommendations and these were reproduced as documents for consideration by the session. The Commission examined the reports of the rapporteurs and recorded its comments and decisions in the paragraphs given below.

6.1.2 Precipitation measurements at sea

6.1.2.1 The Commission noted with gratitude the report by Dr. G. Olbrück (Federal Republic of Germany), Rapporteur on the Development of Methods for Measuring Precipitation over the Oceans. This paper was published as Report No. 1 in the Marine Meteorology and Related Oceanographic Activities series and gives a review of the technical requirements for precipitation measurements, particularly instrumentation.

6.1.2.2 The Commission reiterated the need for precipitation measurements at sea; however it recognized the present difficulties for proper instrumentation of voluntary observing ships. It therefore felt that it would be premature to equip ships participating in the WMO Voluntary Observing Ships' Scheme. However, the Commission strongly urged Members to continue and, if possible, expand precipitation measurements on board research vessels and ocean weather ships.

6.1.2.3 In an endeavour to improve the observations and reporting of precipitation at sea, the Commission felt it essential that ships' officers be made familiar and, if necessary, instructed to report precipitation under "ww" present weather (code table 4677) and "W_1W_2" past weather (code table 4561) of the new common surface code (FM 13-VII SHIP).

6.1.2.4 Furthermore, the Commission agreed that precipitation data from ocean areas were very important and should be archived. Due to the relatively small amount of data, the Commission felt that no special data collection and archiving scheme for precipitation data from ocean areas should be established but requested its Working Group on Marine Climatology to make appropriate arrangements for the archiving of these data within the present marine climatological scheme.

6.1.2.5 The Commission felt that further studies would be required to improve the knowledge of annual and monthly precipitation patterns over the ocean. It agreed to encourage Members to carry out field experiments and investigations, in particular in the following areas:

(a) Coastal precipitation experiments for the accurate analysis of coastal precipitation gradients, including orographic and sea-surface temperature effects;

(b) Radar observation studies to correlate radar with in situ measurements;

(c) Satellite observation studies for the improved estimation of rainfall amounts using multichannel scanning radiometers, particularly in the micro-wave ranges, making use of both annual and short-term means from field experiments;

(d) Studies on the assessment of precipitation over the ocean employing numerical weather-prediction techniques.

The Commission requested the Secretary-General, in consultation with the president of CMM, to call upon Members to carry out the above studies and report the results to the next session of CMM.

6.1.3 Comparison of sea-surface temperature data observed by different methods, including remote sensing

6.1.3.1 The Commission noted with appreciation the report of Dr. F.S. Terziev (U.S.S.R.), Rapporteur on the Comparison of Sea-surface Temperature Data Observed by Different Methods, including Remote Sensing. This report has been published under

the title: Investigation of contemporary methods of sea-surface and sub-surface layer temperatures, in the series Marine Meteorology and Related Oceanographic Activities, Report No. 2. The Commission noted that this report brought sharply into focus the important differences between measurements of water-surface temperatures (WST) and the sub-surface layer temperature (SLT).

6.1.3.2 The Commission noted that CMM-V discussed the concept of sea-surface temperature and gave a number of definitions and explanations for inclusion in the Guide to Meteorological Instrument and Observing Practices. Since then considerable development has taken place with respect to remote-sensing methods, in particular in the fields of airborne radiometry and infra-red sensing by satellites. As these two fields represent different physical characteristics, the Commission felt that inter-comparison of the measurements obtained by the different techniques should be continued with a view to obtaining new high-quality data for operational and research purposes. The Commission agreed in particular to recommend a study to review and, if possible, formulate a generally acceptable glossary of definitions of direct and remotely sensed sea-surface temperature measurements in the light of advances in technology and the results of recent studies on this subject. Recommendation 2 (CMM-VIII) was adopted.

6.1.4 Intercalibration of surface-based and remotely sensed data to be used in marine applications (except sea-surface temperature)

6.1.4.1 The Commission noted with appreciation the report of Dr. E.P. McClain (U.S.A.) on the intercalibration of surface-based and remotely sensed data, except sea-surface temperature data, to be used in marine applications. The Commission noted that the report had been published as Report No. 4 in the Marine Meteorology and Related Oceanographic Activities series. The Commission also noted that the report discussed the types of marine data amenable to remote-sensing methods, the problems of intercalibration of direct and remotely sensed data and some possible field-measurement programmes. The report considered the following parameters amenable, directly or indirectly, to remote-sensing methods, at present or in the near future: surface winds, sea state, sea ice, precipitation, cloud cover, surface currents and sea-surface temperature. The need for co-ordinated field programmes employing research vessels and perhaps buoys was suggested necessary for the development of an appropriate algorithm to obtain the required accuracy for a meaningful intercalibration with satellite measurements.

6.1.4.2 The Commission was informed of tests with over-the-horizon radars for obtaining remotely sensed measurements. It agreed that this new technique should also be investigated as a potential data source for obtaining additional data over the ocean. The observer representing SCOR called the attention of the Commission to a recommendation by a joint meeting of JSC and SCOR-IOC on this topic held on 26-31 January 1981 which completely endorsed the conclusions presented by Dr. McClain. In light of this the Commission stessed the need for continuing collaboration between CMM and SCOR in addition to other appropriate international scientific organizations.

6.1.4.3 The Commission felt that within the Integrated WWW System Study a project to improve remotely sensed measurements of ocean parameters should be carried out

with the participation of satellite and radar experts and the full participation of data users such as meteorological centres, research institutions, SCOR and CCCO. Recommendation 3 (CMM-VIII) was adopted.

6.1.5 Report by the rapporteur on the automation of observational methods on board ship

6.1.5.1 The Commission expressed its satisfaction and gratitude to the rapporteur Dr. M. Yasui (Japan) and noted that his report was published as Report No. 5 in the Marine Meteorology and Related Oceanographic Activities series. The rapporteur, in turn, expressed his appreciation to CMM members for their response to his inquiry regarding developments in the automation of observations on board ship in their respective countries. Two areas were identified for immediate attention. These were the automation of certain portions of the observing procedure as an aid to observers and the automation of communications in order to compensate for the diminishing number of ships with more than one radio officer.

6.1.5.2 The Commission agreed that voluntary observing ships would remain at the core of the Commission's marine surface data programme for the foreseeable future. Hence, as far as is practicable, high priority should be given to automating selected facets of both the observation process and transmission procedures. It was also felt that Members should ensure that ships' officers be made aware of the concept of automated observations at an early stage in their marine training.

6.1.6 Report by the rapporteur on the review of reference height for and averaging time of surface-wind measurements at sea

The Commission noted with appreciation the report by Dr. F.W. Dobson (Canada) published as Report No. 3 in the Marine Meteorology and Related Oceanographic Activities series concerning the review of reference height for and averaging time of surface-wind measurements at sea. The Commission also noted that, while Technical Regulations make specific reference to a ten-metre height for wind measurements for synoptic purposes, it is a practical impossibility to achieve this in the case of ships, buoys and other marine platforms. In the course of further discussion, the Commission reached a number of agreements. These are as follows:

(a) The ten-minute averaging time interval recommended in the report is totally compatible with present standards;

(b) It is desirable to establish a standard height for wind speed, preferably at ten metres;

(c) The information on anemometer exposure on board ships or on platforms is important for the interpretation of wind observations taken at sea;

(d) Members should be encouraged to carry out studies on methods of interpreting measured wind observations made at sea;

(e) There is a need to establish an acceptable international standard procedure for the reduction of measured wind observations at sea to a standard reference level; this question has been referred to the Working Group on Technical Problems for further study. In the meantime, there should be no further attempt to adjust wind values to any reference level aboard ships. Members should be requested to supply the Secretary-General, who will distribute the information, with details of where corrections are currently applied at source to wind measurements made over ocean areas.

Recommendation 4 (CMM-VIII) was adopted.

6.1.7 Wave programme

6.1.7.1 The Commission discussed the subject of a programme on waves. It noted that there are several ongoing activities concerning the observing and forecasting of surface ocean waves. It was also pointed out that certain of these activities require international collaboration. For example, the need for archiving and exchange of measured wave data has been addressed by the IOC Working Committee for International Oceanographic Data Exchange. It has been noted that the Marine Information and Advisory Service of the United Kingdom has been archiving measured wave data, as well as maintaining an inventory.

6.1.7.2 The Commission agreed that it would be useful for the following action to be taken:

(a) Interested Members should identify an expert, acting as a focal point, to define their interests in terms of a specific programme and communicate this to the Secretariat;

(b) IOC should be invited to participate fully in all activities concerning the formulation of an oceanographic wave programme;

(c) The Secretariat should be responsible for selecting an expert to examine the input from all focal points with the goal of preparing a specific programme on waves;

It is expected that the following specific areas will be addressed:

- Wave observation and data collection (e.g. satellite, radar, visual observations);

- Research (e.g. integration of satellite sensing, visual observations, wave measurement);

- Archiving and data exchange (standards for wave data archiving and retrieval);

- Standardization of wave products (e.g. uniform terminology);

- Real-time analysis and forecasting (technique development);

- The development of codes for the reporting and exchange of wave data in real-time.

6.1.7.3 The proposals for the programme should be completed in two years, after which an informal planning meeting consisting of interested Members should be convened.

6.1.8 Future activities

6.1.8.1 The Commission discussed several technical problems identified by the rapporteurs for future studies. The utility of establishing a drifting-buoy programme had been discussed at the preceding WMO Technical Conference and the Commission agreed that CMM should continue to support the development of this programme. The Commission felt that future activities should be focussed specifically on the study of the utilization and requirements for drifting buoys in support of marine meteorological services and designated a rapporteur to undertake such a study. The Commission was not in complete agreement on the need for measuring and reporting surface currents in near real-time, but noted that this matter is under active consideration by the Joint IOC/WMO Working Committee for IGOSS; it is understood that if a clear need is established, the question would then be referred to the WMO Commission for Basic Systems because of the major implications involving code forms and the GTS.

6.1.8.2 The Commission discussed the recommendation of the chairman of the Working Group on Technical Problems regarding the future of the working group. It agreed that there remains a number of subjects, some urgent and others on a continuing basis, to be dealt with by the working group. The Commission therefore decided to re-establish the working group with the terms of reference as in Resolution 3 (CMM-VIII).

Setting of ships' barometers

6.1.8.3 A proposal concerning standardized procedures for setting ships' barometers was considered. This matter will be covered in the revised Guide to Marine Meteorological Services and the Guide to Meteorological Instrument and Observing Practices. The attention of the Commission was drawn to the fact that the standard procedures are not being followed in all cases. Members are reminded of the importance of following the standard procedures.

6.2 Observational data requirements (Agenda item 6.2)

6.2.1 The Commission expressed its appreciation to Dr. G.D. Hamilton (U.S.A.), Rapporteur on the Study of Satellite Data Requirements for Marine Meteorological Services, for his excellent report, which has been published as Report No. 14 in the Marine Science Affairs Report series. The Commission endorsed the conclusions of the rapporteur. It agreed that the requirements stated in Report No. 14 in respect of the satellite data needs for the provision of marine meteorological services should be used in observing system studies carried out under the Integrated WWW

System Study. Therefore the Commission requested the Secretariat to bring the above conclusions to the attention of the CBS and the EC Panel of Experts on Satellites.

6.2.2 The Commission reiterated the statement on observational requirements of the seventh session of CMM. The Commission felt that, in planning the improved GOS, particular attention should be paid to the data-sparse ocean areas. Members should continue and increase their efforts to recruit additional voluntary observing ships, deploy fixed and drifting buoys and increase satellite capabilities and satellite data processing with a view to obtaining improved data coverage over the ocean. The Commission stressed the need for joint efforts by Members in the organization and operation of observing systems providing data from ocean areas.

6.2.3 The Commission expressed the need for giving high priority to observing system studies relating to the ocean areas carried out under the Integrated WWW System Study. The Commission expressed its willingness to co-operate fully in these studies.

6.3 Requirements for reporting codes (Agenda item 6.3)

6.3.1 The Commission noted that the new common surface code will come into force on 1 January 1982. The Commission expressed its satisfaction that the requirements expressed by CMM-VII have largely been satisfied by the new common code. However, it noted some shortcomings in respect of wave reporting in the regulations pertaining to FM 12-VII SYNOP/FM 13-VII SHIP. The Commission invited CBS to review Regulation 12.3.4.3 and proposed the following new text:

> Regulation 12.3.4.3
> Ocean weather stations shall always include swell data when data are available.

6.3.2 The Commission noted that Regulations 12.1.3.5 and 12.1.3.6 restrict ships from reporting sea temperatures and waves in abbreviated or reduced forms. This restriction was a carry over from the regulations concerning FM 22-V and FM 23-V. However, the Commission was informed that PMOs continue to observe the practice of instructing voluntary observing ships to include sea temperature and wave information in their reports. Due to the importance of sea temperature and wave data in the provision of marine meteorological services, it is expected that this practice will continue in the future. Therefore the Commission restated its requirements for reporting of sea-surface temperature and wave observation by as many volunatry observing ships as possible. The Commission requested the president of CMM to bring the requirement to the attention of the president of CBS for urgent consideration.

6.3.3 The Commission was informed by delegates and the Secretariat of the action taken for the smooth introduction of the new common surface code on 1 January 1982. The Commission recognized that Members did not anticipate any difficulties in using the new code.

6.4 Marine telecommunication arrangements for data transmission and collection (Agenda item 6.4)

6.4.1 The Commission noted with appreciation the report of Mr. A. Strandli (Norway), Rapporteur on Marine Telecommunications. It expressed particular gratitude

for his report on the possible utilization of the International Maritime Satellite (INMARSAT) system for the collection and dissemination of marine meteorological and oceanographic data and the information which had been sent to all Members of the Commission in 1978.

6.4.2 The Commission discussed at length new telecommunication systems which could be used for the collection of data from ocean areas and for the distribution of meteorological and oceanographic information to ships. The Commission was informed in detail on INMARSAT by a representative of the organization. It noted the great potential of INMARSAT to meet marine meteorological telecommunication requirements. Therefore, the Commission requested the Secretariat to keep in close contact with INMARSAT, IMCO and ITU, with a view to keeping abreast of the development of the system and ensuring that the CMM requirements are brought to the attention of the appropriate bodies. The Commission requested the Secretary-General to prepare, in consultation with the president of CMM, a study on the utilization of INMARSAT for the collection of data from ocean areas and the distribution of marine meteorological and oceanographic information to ships. The study should deal with the technical, organizational, administrative and financial aspects. In particular, the impact of the use of INMARSAT on the present arrangements for the collection and distribution of ships' weather reports on the GTS needs to be investigated to ensure that the ships' weather reports will be rapidly and constantly available at marine forecasting centres. This study should be completed in the second half of 1982 and an informal planning meeting on this subject be convened in 1983.

6.4.3 In connexion with the use of INMARSAT and the ships' radiotelex service, and the ever-increasing cost of transmission of ships' weather reports to coastal radio stations, the Commission noted that questions of cost-sharing, joint financing and other related problems may arise. Since this is a general policy matter, the Commission invited the president of CMM to bring this subject to the attention of the thirty-fourth session of the Executive Committee, with a view to obtaining policy guidance.

6.4.4 The Commission discussed the contributions which the data collection capability of geostationary meteorological satellites (DCP) and the TIROS-N type polar-orbiting satellite (ARGOS) could make to achieve a better ocean data coverage. Therefore it urged Members to study the possibility of making more extensive use of the above data collection capability of meteorological satellites by mobile ships.

6.4.5 The Commission noted that the ITU International Radio Regulations and Instructions for Operation of the International Public Telegram Service would regard a ten-figure group as a single word in the calculation of charges by coastal radio stations operated by PTTs or recognized operating agencies. The Commission felt that this opportunity to reduce expenditure should be taken up and agreed to invite the President of WMO to accept the implementation date of 1 June 1982 of a procedure which would combine five-figure groups comprising messages in FM 13-VII SHIP code into ten-figure groups. This procedure would not require a change in the coding procedures of FM 13-VII SHIP code nor call for a change in the report/message distribution on the GTS. The proposed procedure would require the ship's radio officer to combine five-figure groups of the message into ten-figure groups for transmission to the coastal

radio stations. Upon receipt of the message at the NMC, the ten-figure groups would be converted into standard WMO five-figure group format and distributed on the GTS in accordance with standard GTS procedures. Therefore, the Commission noted that the above ship-to-shore transmission procedures would not call for any change in the WMO Manual on Codes nor in the transmission procedures on the GTS. Recommendation 5 (CMM-VIII) was adopted.

6.4.6 The Commission was informed by the observer from IOC and some of the delegates that it would also be desirable to apply the ship-to-shore transmission procedures mentioned in paragraph 6.4.5 above to BATHY/TESAC reports. The Commission requested the WMO Secretariat, in consultation with the IOC Secretariat, to consult countries participating in IGOSS on the acceptance of the new procedures as of 1 June 1982.

6.4.7 The Commission felt that collaboration between WMO, ITU and IMCO on marine telecommunication matters should be strengthened. The Commission requested the Secretariat to initiate collaboration and keep Members informed of further developments in this field, so that the national telecommunication authorities can be fully briefed on radio frequency band requirements for ocean data transmission and dissemination of meteorological information, particularly in coastal and offshore areas.

6.4.8 The Commission agreed that there was a continuing need for a CMM Rapporteur on Marine Telecommunications who should also participate in the work of the CBS Working Group on the GTS. It agreed to appoint a rapporteur for the next inter-sessional period. Resolution 4 (CMM-VIII) was adopted.

6.4.9 The Commission was also informed of trial TV broadcasts of weather charts to near-coastal shipping. The Commission encouraged such trials and invited Members to inform the Secretary-General of the results. The Secretariat was requested to distribute this information to all the Members of CMM.

7. MARINE CLIMATOLOGY (Agenda item 7)

7.1 Contribution of CMM to the World Climate Programme (Agenda item 7.1)

7.1.1 On the basis of a document submitted by the Secretary-General, the Commission discussed its role within the World Climate Programme. It noted that by decision of Congress the WCP has the following four components:

- World Climate Research Programme (WCRP)
- World Climate Applications Programme (WCAP)
- World Climate Impact Studies Programme (WCIP)
- World Climate Data Programme (WCDP)

The Commission agreed to participate and contribute to the various components within its terms of reference.

7.1.2 With respect to the ocean-related aspects of the WCRP, the Commission was informed by the observer from SCOR of the activities carried out by the WMO/ICSU Joint Scientific Committee (JSC) in close co-operation with the SCOR-IOC Committee on Climatic Changes and the Ocean (CCCO), particularly in respect of the following main activities:

- World Ocean Circulation Experiment
- Cage Experiment (heat-budget study)
- Pilot Ocean Monitoring Study (POMS)

The SCOR observer reported on the status of the feasibility studies carried out on the above main activities, with particular reference to data acquisition systems, in particular satellites.

7.1.3 In respect of data management, the Commission agreed that there should be a minimum duplication of effort in the preparation of mixed data sets combining, for instance, both meteorological and oceonographic observations. In this respect, the observer from IOC recalled that the meeting on Time Series of Ocean Measurement (TSOM) (Tokyo, 11-15 May 1981) came to an agreement whereby, in order to minimize any duplication of effort, existing IODE exchange procedures should be used for the management of TSOM data instead of establishing parallel infrastructures. This agreement has been endorsed by the second session of CCCO (Tokyo, 18-22 May 1981). The observer from IOC stated that this did not imply that the setting up of mixed data sets was of low importance, but it will arise as a second level in non-real-time data management. The Commission concurred with the above principle of data management.

7.1.4 The Commission also noted the activities carried out under the WCAP, in particular in the three high-priority areas, i.e. food production, water resources and energy resources. The Commission indicated its readiness to contribute and participate particularly in the areas of food production and energy resources in respect of services to fishing and the exploration and exploitation of offshore hydrocarbon resources. It invited the president of CMM to follow the development of the WCAP closely.

7.1.5 The Commission discussed in particular its contribution to the WCDP. It felt that the WCDP should make use of the efforts made by the Commission in the field of marine climatology. The Commission also agreed to study any requirement expressed by the WCP for marine meteorological and related data, and its collection, quality control, archiving and processing. The Commission noted that some of these data requirements in support of WCP and, in particular, its WCDP component had already been a topic of discussion during the session on pilot ocean-monitoring studies and related activities at the Tokyo meeting (see paragraph 7.1.3). At that time, special attention was devoted to the meteorological and oceanographic data obtained from energetically active areas of the world's oceans (selected key areas of the

world's oceans important for the study of short-range climatic variability and general circulation of the ocean). The Commission encouraged all Members to promote these studies through participation in POMS as well as attracting voluntary observing ships to these activities.

7.1.6 In respect of the making and collection of ocean observations, the Commission expressed the view that any request for additional ocean observations that is to be made to voluntary observing ships should be channelled through or co-ordinated with the Port Meteorological Officers. This procedure should be followed strictly to avoid the overburdening of ships' officers.

7.1.7 Furthermore, the Commission felt that WCDP should make maximum use of the data collection of IGOSS and oceanographic programmes or projects, e.g. "El Nino", WESTPAC, NORPAX, SECTIONS, RMMP and others.

7.1.8 The Commission agreed that the implementation of the international arrangements for the collection of marine climatological and related data should be strengthened. Therefore it is felt necessary to urge Members to implement fully the provision of Resolution 35 (Cg-IV) in respect of data collection from Members concerned.

7.2 Marine Climatological Summaries Scheme (Agenda item 7.2)

7.2.1 The Commission recalled that the Marine Climatological Summaries Scheme was instituted by Resolution 35 (Cg-IV) in 1963 to meet the emerging needs of various user groups and scientific communities for marine climatological data. Requirements included the request by the International Association of Meteorology and Atmospheric Physics of IUGG that WMO considers the publication of mean monthly sea-surface temperatures and, if possible, also other meteorological elements from representative sea areas. Another important objective of the scheme was to collect data for the eventual preparation of a marine section to the World Climatic Atlas. So far 55 volumes of annual summaries have been published by responsible Members covering the period 1961 to 1972.

7.2.2 In the meantime, the requirements of users - operational, engineering, research - have evolved considerably, data-processing techniques have progressed and magnetic tape has been introduced as a medium for data exchange. Furthermore, budgetary restrictions have become acute in most Meteorological Services, affecting responsible Members who are obliged to allocate large sums to the processing of data, the computation of statistics and the publication of climatological summaries. These developments led to a proposal put before the Commission by the Working Group on Marine Climatology for the production of marine climatological summaries over the period 1961-1990:

(a) All fixed-station summaries, both annual and decadal, be published in tabular form;

(b) For representative areas within the area of responsibility:

(i) Decadal summaries be either in tabular or the proposed chart form at the option of the responsible Member;

(ii) Annual summaries after 1971 be in chart form and before 1971 be in tabular form;

(iii) Isopleths be optional for all summaries.

7.2.3 There was considerable discussion as to the continuing need for the publication of annual summaries in view of their very high cost. The Commission agreed that the routine publication of annual summaries could cease, but that responsible Members should continue the processing of data so that such annual summaries will be readily available upon request. In this regard, the Secretariat was asked to prepare a catalogue of summaries which is now available and identify which summaries responsible Members had committed themselves to prepare. Responsible Members are requested to inform the Secretariat at predetermined regular intervals of the progress being made. The Commission also recommended that decadal summaries be published in either tabular form or in chart form at the option of the responsible Member. In this connexion, it is important that the present data-exchange scheme be maintained and responsible Members should advise the Secretariat when expected data are not received. The chart form proposed by the Working Group on Marine Climatology was approved. The conclusions of the Commission on these subjects are embodied in Recommendations 6 and 7 (CMM-VIII). Recommendation 6 (CMM-VIII) and Recommendation 7 (CMM-VIII) were adopted.

7.3 International Maritime Meteorological Punch Card (IMMPC)/ International Maritime Meteorological Tape (IMMT) (Agenda item 7.3)

7.3.1 The Commission noted that the two major items which received particular attention by the Working Group on Marine Climatology were the revision of the layout of the IMMPC and the design of a new layout for the IMMT, the former as a direct consequence of the introduction of the new common code and the latter in view of the increasing use of magnetic tape as the data-exchange medium. It considered the proposals of the Working Group on Marine Climatology on these two important matters.

IMMPC

7.3.2 The Commission accepted the new punch-card layout as developed by the working group. It contains new elements and features which were added in the light of experience gained by Members since 1961 using the present IMMPC. These are:

(a) An expanded code for the method of sea-surface temperature measurement;

(b) A code to indicate the method of wave observation;

(c) A code to indicate the source of observation;

(d) An expanded code to indicate the type of observation platform;

(e) Ship identifier;

(f) Quality-control indicator;

(g) Elimination of over-punches.

The Commission stressed the need for ships' call signs to be recorded exactly as specified in WMO Publication No. 47 - International List of Selected, Supplementary and Auxiliary Ships. With regard to wave observations made on ocean platforms other than voluntary observing ships, it agreed that the information on methods of wave measurement should be indicated. The Commission requested the Secretariat to consider the possibility of including this information in the list of ODAS stations (e.g. buoys, rigs, towers) to be published in Publication No. 9, Volume A.

IMMT

7.3.3 The working group presented the Commission with two formats for the IMMT: (1) A format having the first 80 characters the same as those in the IMMPC with Q.C. flags appearing at the end of the taped record; and (2) Another format having the Q.C. flags appearing after the last character of each element (thus the format differs from that of the IMMPC in the first 80 characters). The Commission agreed that there was to be one tape format and the first 80 characters (bytes) of the IMMT format be identical to the first 80 columns of the IMMPC format to be used for the international exchange of data, particularly for the Marine Climatological Summaries Scheme. This format would ensure the simplicity of processing and adaptability to differing computer resources. As regards the other format mentioned above, the Commission was of the opinion that this format may be used for national and bilateral exchange of data. Recommendation 8 (CMM-VIII) was adopted.

7.3.4 The Commission agreed that for the transmission of data to responsible Members, a standard specification for magnetic tape may be applied as follows:

- 9 track, 1600 b.p.i., EBCDIC, unlabelled, blocking factor 10.

However, bilateral agreements between Members may establish different specifications that would be more efficient. In any case, all tapes should be fully documented when prepared and all requests for data should contain complete requirements for tape specifications.

7.4 Other marine climatological projects (Agenda item 7.4)

7.4.1 The Commission reviewed the status of other marine climatological projects, such as those relating to historical sea-surface temperature data, the collection of sea-surface current data and the World Climatic Atlas.

Future activities

7.4.2 The Commission recognized the need to develop a Guide for Quality Control Procedures and decided to include this task in the work programme of the Commission during the coming inter-sessional period. The procedures prepared by the Study Group on Marine Climatology (1980) will be appropriate as a basis for this study.

7.4.3 When considering the re-establishment of the Working Group on Marine Climatology, the Commission noted with great appreciation the difficult tasks and excellent work this group has performed under the able leadership of Mr. E.W.K. Chu

(Hong Kong) and the report he submitted to the session. The Commission also recognized that there is a continuing need for technical advice on the exchange and archiving of marine climatological data, co-ordination of marine climatological requirements with the World Climate Programme, and technical guidelines and co-ordination in the preparation of marine climatological summary products, as well as in a number of other important areas. For this reason, the Commission agreed to re-establish the Working Group on Marine Climatology. Resolution 5 (CMM-VIII) was adopted.

8. SEA ICE (Agenda item 8)

8.1 The Commission noted with appreciation the report of Mr. W.E. Markham (Canada), chairman of the Working Group on Sea Ice, and expressed its great satisfaction with the major advances that had been achieved since CMM-VII. Within a number of activities requiring international co-ordination, agreement had been reached which will facilitate the tasks of national sea-ice services in meeting users' requirements both on an operational and scientific level.

8.2 The initiative taken by Canada in inviting a small international group of sea-ice experts to participate in a combined ground-based/airborne experiment to develop a system of sea-ice symbols for international use was greatly appreciated by the Commission. This experiment was followed by national tests and a subsequent meeting in Leningrad led to an agreed system of sea-ice symbols which was later adopted by the president of the Commission (Recommendation 36 (80-CMM)) and approved by EC-XXXIII. The Commission was informed that 11 countries will introduce the symbols into use on their ice charts as of the season 1981/1982. A few minor clarifications of the procedures for the use of the symbols were considered desirable. Recommendation 9 (CMM-VIII) was adopted.

8.3 The WMO Sea-ice Nomenclature (WMO-No. 259) has essentially remained unchanged since it was published in 1970. The Working Group on Sea Ice had identified a number of terms which it would be desirable to modify or add. Other regional groups had presented similar requirements. The Commission referred these to the re-established Working Group on Sea Ice for action. Recommendation 10 (CMM-VIII) was adopted.

8.4 The Commission noted with satisfaction that a Workshop on Remote Sensing of Sea Ice had been convened in 1978. The Workshop reviewed various remote-sensing methods for sea-ice mapping and identified a number of requirements, in particular for all-weather satellite data. In light of the rapid developments taking place within satellite technology, the Commission felt that this field should be kept under constant review by the working group, both with respect to the data itself and to the rapid exchange of data and products.

8.5 Based on information received from Members, a publication entitled "Sea-ice Services of the World" had been prepared by the working group. This publication contains information on operational sea-ice practices of national ice services. The Commission expressed satisfaction at the work being accomplished and at the

same time recognized the need for exchange of information on observational and forecasting methods, in particular with respect to numerical ice-prediction models. Such models are being developed and a few are now operational. The Commission considered it desirable to have information on analysis and forecast models exchanged between the services and possibly included in the above publication. It requested the Working Group on Sea Ice to take action on this matter.

8.6 The Commission recognized the work being carried out to meet special regional requirements, in particular in the Baltic area and in North America, where annual co-ordination meetings are being held. Such regional co-ordination was considered useful and necessary but it should develop along lines compatible with the overall framework of global sea-ice interrelationships.

8.7 Within the field of historical sea-ice data the Commission identified two specific tasks:

(a) The establishment of a catalogue containing information on sea-ice data available within the sea-ice services of the world;

(b) The need for computer-compatible sea-ice data banks which would meet the needs of operational as well as climatological users.

With respect to (a) the Commission instructed the Working Group on Sea Ice to supervise the preparation of a catalogue and, if practicable, make use of the MEDI referral system. With respect to (b) the Commission expressed its satisfaction with the work carried out within the World Climate Programme by Dr. T. Thompson (Sweden) in preparing a proposed tape format for the digitization of historical sea-ice charts. The Commission noted that the digitization of sea-ice charts had already started in some regions mainly to meet the requirements of operational users. The Commission instructed the Working Group on Sea Ice to co-ordinate efforts in establishing computer-compatible sea-ice data banks for operational use. The Working Group on Sea Ice should also maintain close co-operation with the World Climate Programme to ensure that the operational and climatological aspects are co-ordinated as far as possible.

8.8 In view of the many aspects of sea ice that will have to be developed and co-ordinated, the Commission decided to re-establish the Working Group on Sea Ice. The tasks of the working group are defined in its terms of reference. Resolution 6 (CMM-VIII) was adopted.

9. REVIEW OF TECHNICAL REGULATIONS OF INTEREST TO CMM (Agenda item 9)

9.1 The Commission was informed on the status of the Technical Regulations and the Manual on Marine Meteorological Services. It learned that this manual, which originated from the decision of the seventh session of the Commission, was approved by EC-XXXII and has been printed in four languages. The Commission noted with appreciation the efforts of the Working Group on Marine Meteorological Services whose task was completed after much consultation and effort. Many subsequent changes, mainly editorial in nature, have been proposed to the manual. The Commission agreed to accept these changes.

9.2 The Commission also agreed that the manual, which is an annex to the Technical Regulations, Chapter C.1, should be organized in two volumes with the status of Technical Regulations. Volume 1 should contain all decisions on global aspects while Volume 2 should contain all decisions of a regional nature which have been approved by regional associations.

9.3 Recommendation 11 (CMM-VIII) was adopted.

10. GUIDES AND OTHER TECHNICAL PUBLICATIONS (Agenda item 10)

10.1 The Commission recalled that in accordance with Recommendation 25 (CMM-VII) the first edition of the Guide to Marine Meteorological Services was published in 1977. However, in view of the expected publication of the Manual on Marine Meteorological Services, the Working Group on Marine Meteorological Services had been requested to undertake the preparation of a revised Guide in line with the proposed contents of the Manual. Mr. J.M. Dury (Belgium) had been nominated as the Technical Co-ordinator for the drafting and compilation of various contributions by members of the working group as well as by experts from outside the group.

10.2 The Commission was informed that the revised Guide is at the final stage of editing. It therefore wished to thank Mr. Dury and other experts for their valuable contributions. Following the usual practice for the approval of guides, the Commission authorized the president of CMM to approve the revisions to the Guide.

10.3 The Commission was of the opinion that the new report series "Marine Meteorology and Related Oceanographic Activities" is highly useful in expeditiously informing Members of WMO and members of CMM of the results of the work of CMM and referred particularly to the excellent reports of the Rapporteurs on Technical Problems published in this series. Having been informed that Dr. Dobson plans to revise and improve his report (Report No. 3), the Commission proposed that the revised report be published in the WMO Technical Note series or Marine Science Affairs Report series.

10.4 With regard to the preparation of guidance material to be published in an appropriate WMO publication series, the Commission proposed the following topics:

(a) Coastal marine meteorology, including special forecast problems connected with marine offshore activities;

(b) Drift calculations of surface objects and marine pollutants using surface wind and current;

(c) Wind wave and swell forecasting for harbour approaches and anchorages;

(d) Forecasting of fog at sea;

(e) Application to offshore areas and high seas of objective forecasting techniques, such as Model Output Statistics, as well as subjective ones;

(f) Use of satellite information for services to marine activities;

(g) Ice and weather conditions affecting navigation.

The Commission requested the Secretariat, in consultation with the president of CMM, to arrange for the preparation of this guidance material with the assistance, as far as possible, of CMM working groups.

10.5 The Commission was informed that the Commission for Instruments and Methods of Observation (CIMO) is now undertaking the complete revision of the Guide to Instrument and Observing Practices including Chapter 17 - Marine observations, and that the president of CMM and the president of CIMO were communicating on the revision of this particular chapter. CIMO contemplates the completion of this chapter by incorporating the relevant decisions of CMM-VIII on marine observing questions. The Commission requested the president of CMM to follow up the matter in consultation with the Secretariat.

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

11.1 The Commission reviewed the WMO Education and Training Programme activities. Special attention was paid to training opportunities using the following basic methods: training seminars, workshops, refresher courses, fellowships, roving seminars and expert missions.

11.2 The Commission agreed that this Education and Training Programme has been very successful and congratulated the Secretariat on the marked progress made in this area since the Commission's last session. It was also noted that there were a number of CMM members present who benefitted greatly from the WMO Education and Training Programme.

11.3 The Commission was made aware that there is a strong desire by many Members to take full advantage of the Education and Training Programme on both a national and regional basis. Particular interest was shown in the area of visual aids for training in marine meteorology. It was also pointed out that in some regions excellent facilities exist for various types of training and that these should be made available on a regional basis. The Commission noted with appreciation the offers made by a number of countries for the use of their training facilities, and invited them to inform the Secretariat of their facilities.

Future activities

11.4 The Commission felt that there should be a wider use of training facilities provided by the WMO Regional Meteorological Training Centres, particularly for the organization of various training courses in marine meteorology. It also agreed that training seminars on meteorological services to marine and coastal activities are highly desirable; such seminars should be organized jointly with IOC and, furthermore, it was desirable for CMM to collaborate with IOC through the IOC Working Group on Training, Education and Mutual Assistance (TEMA).

11.5 The Commission requested that greater use be made of WMO fellowships, particularly short-term fellowships for training personnel in the field of marine meteorology and physical oceanography.

11.6 The Commission was informed of the plan to revise the Guidelines for the education and training of personnel in meteorology and operational hydrology contained in WMO Publication No. 258. It has been pointed out that the guidelines for the syllabi for training of marine meteorological services personnel contained in this publication should be extended considerably in view of the special requirements specified in the Manual on Marine Meteorological Services. A draft of the new guidelines has therefore been reviewed by Captain G. White (U.K.). This draft will be submitted to the next session of the EC Panel on Education and Training scheduled to meet in February 1982.

11.7 The Commission felt that regional training seminars or workshops would greatly promote the implementation of marine meteorological activities in developing countries and it therefore strongly recommended that regional seminars be organized. Specific seminars are recommended for the period 1983-1987 in the following regions: Region I, Regions III/IV, and Regions II/V with the participation of the developing countries in Region VI.

11.8 The Commission has noted, in item 5.4, the strong support for implementing assistance activities in the form of selected expert missions. It also fully endorsed proposals for holding roving seminars on marine meteorological services.

11.9 Recommendation 12 was adopted.

12. RELATIONSHIP WITH JOINT IOC/WMO PROGRAMMES AND PROJECTS (Agenda item 12)

12.1 The Commission was informed of a series of actions taken by the WMO and IOC governing bodies to promote the implementation of IGOSS and co-operation between WMO and IOC; these included the establishment of the Joint IOC/WMO Working Committee for IGOSS, designation by Members of WMO and IOC of a single national representative for IGOSS, the approval of the policy to develop IGOSS on a regional basis and the adoption of the new IGOSS Plan and Implementation Programme 1982-1985. It was also informed that IGOSS has been urged to accelerate its implementation in view of the increasing importance of sub-surface information for long-range weather prediction, operational ocean-based activities and research projects, particularly the World Climate Programme. It is therefore very important that the implementation of IGOSS progresses rapidly, particularly in the area of the IGOSS Observing System, its main element being the BATHY/TESAC Operational Programme. The Commission observed in this connexion that close co-ordination is required between CMM and IOC programmes in the use of common observing platforms, parameters to be observed and exchanged on a real-time basis, code forms to be used, etc. This view was strongly supported by Dr. K. Huber (Federal Republic of Germany), the chairman of the IGOSS Sub-group of Experts on Operations and Technical Applications. It felt that the same should hold good in the field of the IGOSS Data Processing and Services System. It was noted

that such improved relationships could be promoted through closer co-ordination between meteorological and oceanographic services at the national level.

12.2 With regard to the general policy relating to the co-ordination of WMO marine meteorological and related oceanographic activities with IGOSS, the attention of the Commission was drawn to Resolution 7 (EC-XXXIII) adopted by the thirty-third session of the Executive Committee. This resolution urges Members, inter alia,:

(a) To provide support to the collection of data of additional ocean parameters required by the IGOSS Plan, such as BATHY/TESAC data;

(b) To ensure co-ordinated recruitment of voluntary observing ships for CMM as well as IGOSS purposes;

(c) To co-ordinate product preparation and dissemination for certain ocean parameters and phenomena.

The Commission agreed that these points should receive special attention during the coming inter-sessional period, particularly by the Working Group on Marine Meteorological Services.

12.3 The Commission welcomed the statement by the representative of IOC, Mr. Y. Tréglos, who conveyed the total willingness of his organization to continue to co-operate with WMO in matters of common interest.

13. NOMINATION OF MEMBERS OF WORKING GROUPS AND NOMINATION OF RAPPORTEURS

13.1 Five working groups were established and one rapporteur was appointed to carry out the technical work of the Commission during the period 1982-1986. These were:

The Advisory Working Group
The Working Group on Marine Meteorological Services
The Working Group on Technical Problems
The Working Group on Sea Ice
The Working Group on Marine Climatology
Rapporteur on Marine Telecommunications

The membership of the working groups, the rapporteur appointed and the terms of reference for each are contained in Resolutions 1 to 6.

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

14.1 In accordance with current practice, the Commission examined those resolutions and recommendations adopted prior to its eighth session which were still in force. This review also included inter-sessional CMM recommendations adopted by correspondence. It noted that action on most of its previous recommendations had already been taken and completed, or their substance had been incorporated in the Manual on Marine Meteorological Services. Resolution 7 (CMM-VIII) was adopted.

14.2 The Commission also examined the Executive Committee resolutions within the field of the activities of CMM. Recommendation 13 (CMM-VIII) was adopted.

15. ELECTION OF OFFICERS (Agenda item 15)

The Commission elected Dr. K.P. Vasiliev (U.S.S.R.) as president of CMM and Dr. H. Voss (Federal Republic of Germany) as vice-president of CMM.

16. DATE AND PLACE OF THE NINTH SESSION (Agenda item 16)

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

17. CLOSURE OF THE SESSION

17.1 In his closing address, the president of the Commission, Dr. K.P. Vasiliev, reviewed the major results accomplished by the Commission over the past five years and at the eighth session. He expressed his gratitude to the Members, the chairmen of the working groups and rapporteurs for their hard work and co-operative spirit which were of prime importance in achieving the goals set by the Commission. He also expressed his appreciation to the Government of the Federal Republic of Germany for the excellent conference facilities provided and to the conference staff for their support during the session. He thanked especially the WMO Secretariat for the thorough preparation of the eighth session and for their assistance throughout. In concluding he expressed his pleasure at having been afforded the privilege to serve the Commission over the past five years and looked forward to the opportunity to serve again for a further four years.

17.2 Capt. G. White (U.K.), speaking on behalf of the delegates, expressed appreciation to the president for the able manner in which he had conducted the session as well as for his excellent leadership since the last session. Mr. R. Landis (U.S.A.) and Mr. W. Moens (Netherlands) wished to be associated with the earlier statement by Mr. A. Zancla (Italy) who expressed his particular satisfaction at and appreciation of the spirit of co-operation demonstrated throughout the session. Mr. Moens paid special tribute to Mr. M. Dury (Belgium), former president of CMM, for his extensive contribution to CMM during his membership of more than 25 years, making him the most senior CMM delegate. The Commission enthusiastically joined with Mr. Moens in thanking Mr. Dury.

The eighth session of CMM closed at 11 a.m. on 25 September 1981.

RESOLUTIONS ADOPTED BY THE SESSION

Res. 1 (CMM-VIII) - ADVISORY WORKING GROUP OF CMM

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Resolution 1 (CMM-VII),

(2) Resolution 5 (Cg-VIII) - WWW,

(3) Resolution 12 (Cg-VIII) - Marine meteorological and related oceanographic activities in the period 1980-1983,

(4) Resolution 29 (Cg-VIII) - World Climate Programme,

CONSIDERING:

(1) The need of the Commission to promote marine meteorology and related oceanographic programmes and projects,

(2) The contributions of the Commission to the WWW and the WCP,

(3) The need to liaise with IOC and other appropriate international organizations,

(4) The need for continued overall co-ordination of the work programme of the Commission and for advice on matters referred to it from the EC or Congress,

DECIDES:

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

(a) To advise the president in the short- and long-term planning of the future work of the Commission and its working groups;

(b) To advise on the methods of carrying out projects and activities referred to CMM for action by WWW, WCP, IGOSS and other programmes;

(c) To assist the president in the co-ordination of activities of working groups and rapporteurs of CMM;

(d) To advise the president on matters requiring co-ordination with IOC;

(2) That the advisory Working Group will be composed of:

The president of CMM
The vice-president of CMM
The chairman of the Working Group on Marine Meteorological Services
The chairman of the Working Group on Technical Problems
The chairman of the Working Group on Marine Climatology
The chairman of the Working Group on Sea Ice
Mr. A.M. Henaidi (Saudi Arabia)
Mr. M.A. Rebolledo (Argentina)

Res. 2 (CMM-VIII) - WORKING GROUP ON MARINE METEOROLOGICAL SERVICES

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Resolution 2 (CMM-VII) - Working Group on Marine Meteorological Services,

(2) Annex to Resolution 12 (Cg-VIII) - Policy statement on the WMO Programme on Marine Meteorological and Related Oceanographic Activities in 1980-1983, paragraphs 2-6,

(3) The report of the chairman of the Working Group on Marine Meteorological Services,

CONSIDERING:

(1) The continued growth in user demand for marine meteorological services and information and the increasing specialization of marine meteorological products,

(2) The need to keep under review the requirements of Members for guidance and assistance in the implementation of their obligations as specified in the Manual on Marine Meteorological Services,

DECIDES:

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

(a) To keep under review marine user requirements and to make recommendations for relevant marine meteorological services;

(b) To devise an appropriate method of implementing the marine meteorological services monitoring ship programme and to follow its execution, including the performance of coastal radio stations, closely;

(c) To provide advice on the introduction and development of marine meteorological services, in compliance with the requirements of the Manual on Marine Meteorological Services;

(d) To keep under review the contents of the Guide to Marine Meteorological Services, particularly with respect to the need for further guidance material;

(e) To take action upon matters referred to the working group by the president of CMM;

(f) To develop a standard set of symbols and map speficications for radio facsimile charts used for marine purposes;

(2) That the working group will be composed of:

(a) An expert designated by each regional association;

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

(3) To elect, in accordance with WMO General Regulations, Regulation 31, Mr. W.D. Moens (Netherlands) as chairman of the working group;

REQUESTS the Secretary-General to invite IOC, IMCO, ICS, IFSMA and FAO to participate in the work of the group.

Res. 3 (CMM-VIII) - WORKING GROUP ON TECHNICAL PROBLEMS

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING the report of the chairman of the Group of Rapporteurs on Technical Problems,

CONSIDERING that a number of technical questions should be addressed either on a continuing basis or as a matter of urgency,

DECIDES:

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

(a) To undertake technical studies in the following areas:

(i) Drifting buoys (requirements and utilization);

(ii) Standard procedures for the reduction of wind speed to a given reference level above the sea surface;

(iii) Forecast techniques for ice accretion on different types of marine structures, including ships, platforms and coastal facilities;

(b) To consider any matters referred to the working group by the president of CMM;

(2) That the working group will be composed of:

Dr. G.D. Hamilton (U.S.A.) on drifting buoys
Dr. F. Dobson (Canada) on wind-speed reduction methods
Mr. R. G. Jessup (Canada) on ice accretion

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

Res. 4 (CMM-VIII) - RAPPORTEUR ON MARINE TELECOMMUNICATIONS

THE COMMISSION FOR MARINE METEOROLOGY

NOTING the importance of telecommunications for the collection and distribution of marine meteorological data using conventional and space-based communication systems,

CONSIDERING the need for CMM to keep abreast of developments in ship-to-shore communication systems, in particular concerning INMARSAT,

DECIDES:

(1) To appoint a Rapporteur on Marine Telecommunications with the following terms of reference:

(a) To keep abreast of the development of several new marine telecommunication systems and assess their impact on ocean data collection and the distribution of marine meteorological information to ships and other sea platforms;

(b) To assist in monitoring activities, particularly the collection of ships' weather reports and BATHY/TESAC reports;

(c) To maintain a close liaison with CBS, in particular with the CBS Working Group on the Global Telecommunication System;

(2) To elect Mr. P. Kerherve (France) as rapporteur;

REQUESTS the president of CMM to invite the president of CBS to extend an invitation to the rapporteur to participate in the work of the CBS Working Group on the Global Telecommunication System.

Res. 5 (CMM-VIII) - WORKING GROUP ON MARINE CLIMATOLOGY

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Resolution 6 (CMM-VII),

(2) The report of the chairman of the Working Group on Marine Climatology,

CONSIDERING:

(1) That the projects and corresponding tasks of CMM for the inter-sessional period in the field of marine climatology will require action by a working group,

(2) That the Marine Climatological Summaries Scheme requires continued co-ordination among the Members responsible for specific ocean areas,

DECIDES:

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

(a) To co-ordinate marine climatological requirements with the World Climate Programme, with particular emphasis on the World Climate Data Programme and the World Climate Research Programme;

(b) To provide technical advice on the exchange and archiving of marine climatological data;

(c) To provide technical guidance and co-ordinate the preparation of marine climatological summary products, including periodic charts and specifications for the marine section of the World Climatic Atlas, with particular emphasis on selected key areas of the world's oceans important for the study of short-range climatic variability and the general circulation of the oceans;

(d) To keep under review material in WMO regulations, manuals and guides relevant to marine climatology;

(e) To elaborate upon methods of automatic quality control of marine climatological data (based upon detailed specifications of national practices provided by Members) with the goal of publishing recommended minimum standard procedures in appropriate WMO guides;

(f) To keep under review sources of marine climatological data other than ship reports received in manuscript form (e.g. telecommunicated ship reports, buoys, fixed platforms and numerically modelled products), with a view to their eventual inclusion in international exchange and atlas summary products;

(g) To take action on requests referred to the working group by the president of CMM.

(2) That the working group will be composed of:

(a) An expert designated by each Member responsible for an ocean area under the Marine Climatological Summaries Scheme;

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

(3) To elect, in accordance with Regulation 31 of the General Regulations, Dr. L. Hoffmann (Federal Republic of Germany) as chairman of the working group.

Res. 6 (CMM-VIII) - WORKING GROUP ON SEA ICE

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Resolution 7 (CMM-VII) - Working Group on Sea Ice,

(2) The report of the chairman of the Working Group on Sea Ice,

CONSIDERING:

(1) That there is a continuing need for a Working Group on Sea Ice to carry out relevant tasks and projects included in the work programme of the Commission,

(2) That this working group is to be considered as a nucleus of sea-ice experts which will draw on other expertise as necessary,

(3) That the WCP will require support in the field of sea ice,

DECIDES:

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

(a) To review and promote international co-operation in improving the methodology for the acquisition, exchange, processing, storage and dissemination of sea-ice data, including:

(i) Studies of requirements associated with marine meteorological services and the objectives of WCP and other WMO programmes and projects, as well as the development of recommendations in accordance with identified needs;

(ii) Reviews of nomenclature, codes and symbols in accordance with the interests of marine users, WCP and progress in the knowledge of sea ice;

(iii) Methods of predicting sea-ice growth, drift and decay;

(iv) Provision of support to WCP;

(b) To keep under review, in order to facilitate international co-operation, any developments with regard to:

(i) The transmission and processing of remotely sensed data and automated systems for dissemination, storage and retrieval of data;

(ii) Modifications of the specifications for the remote sensing of sea-ice parameters and the resolution desirable;

(c) To examine the steps required to create a computer-compatible sea-ice data bank for both operational and climatic needs, the temporal and spatial requirements involved and the means by which such a programme can be established;

(d) To compile the material needed for a revised edition of the WMO Sea-ice Nomenclature (WMO-No. 259) adding sections on symbols, codes, broadcasts and one on linguistic equivalents, with a view to its publication by December 1983;

(e) To re-examine the need for a catalogue of historical sea-ice data, its content, format and ultimately where Members' holdings should be registered;

(2) To invite the following experts to serve on the working group:

Dr. T. Thompson (Sweden)
Mr. E.D. Faccini (Argentina)
Mr. W.E. Markham (Canada)
Mr. H. Valeur (Denmark)
Mr. M. Akagawa (Japan)
Mr. D. Barnett (U.S.A.)
Dr. V.S. Loshilov (U.S.S.R.)

(3) To elect, in accordance with Regulation 31 of the General Regulations, Dr. T. Thompson as the chairman of the Working Group on Sea Ice.

Res. 7 (CMM-VIII) - REVISION OF THE RESOLUTIONS AND RECOMMENDATIONS OF THE COMMISSION FOR MARINE METEOROLOGY

THE COMMISSION FOR MARINE METEOROLOGY,

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

CONSIDERING that all recommendations adopted prior to its eighth session and still in force have been reconsidered,

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

DECIDES:

(1) To keep in force Recommendations 10 (CMM-VI), 22 (CMM-VII), 29 (CMM-VII), 31 (78-CMM), 32 (78-CMM), 33 (78-CMM), 35 (79-CMM) and 36 (80-CMM), the texts of which are incorporated in this report;

(2) Not to keep in force Resolutions 1-8 (CMM-VII);

(3) To note with satisfaction the action taken by the competent bodies on its Recommendations 25 (CMM-V), 38 (71-CMM), 2 (CMM-VI), 6 (CMM-VI), 12 (CMM-VI), 19 (CMM-VI), 22 (75-CMM), 1-21 (CMM-VII), 23-28 (CMM-VII) and 30 (CMM-VII) which are now redundant.

RECOMMENDATIONS ADOPTED BY THE SESSION

Rec. 1 (CMM-VIII) - MARINE METEOROLOGICAL SERVICES MONITORING PROGRAMME

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Recommendation 6 (CMM-VII) - Monitoring of marine meteorological services,

(2) Manual on Marine Meteorological Services, Part II, paragraph 2.1, Principle 5,

(3) The report of the chairman of the Working Group on Marine Meteorological Services,

CONSIDERING:

(1) The need for routine and continuous monitoring of marine meteorological services to maintain the highest possible standards,

(2) That assistance should be given to Members in the implementation of their obligations in compliance with the Manual on Marine Meteorological Services,

(3) The importance of keeping up-to-date information on the requirements of marine users,

RECOGNIZING the current activities for the monitoring of marine meteorological services effected by Members,

RECOMMENDS:

(1) That a marine meteorological services monitoring programme be instituted;

(2) That the Secretariat in consultation with the president of CMM and the chairman of the Working Group on Marine Meteorological Services, as necessary, assist in the execution of the programme;

REQUESTS the president of CMM to arrange for the Working Group on Marine Meteorological Services to devise an appropriate method for the implementation of the marine meteorological services monitoring programme taking into account the following guidelines:

(a) The monitoring activities should be supported by Members;

(b) The monitoring may be extended and also include the performance of coastal radio stations;

(c) The method of evaluation should be flexible enough to allow Members to adjust it to their specific needs; the questionnaire to be distributed should have a standard section for entering answers in a simple manner.

Rec. 2 (CMM-VIII) - MEASUREMENT OF SEA-SURFACE AND SEA SUB-SURFACE LAYER TEMPERATURES

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Annex to Resolution 12 (Cg-VIII): Policy statement on the WMO Programme on Marine Meteorological and Related Oceanographic Activities in 1980-1983, paragraph 12,

(2) Abridged report of the thirty-second session of the Executive Committee, general summary, paragraph 6.4.2,

(3) Marine Meteorology and Related Oceanographic Activities, Report No. 2 - Investigation of Contemporary Methods of Measuring Sea-Surface and Sub-surface Layer Temperatures,

CONSIDERING:

(1) The need for determination of international principles and procedures for measuring sea-surface and sea sub-surface layer temperatures,

(2) That the comparibility of measurements taken needs to be improved, particularly to support meteorological research, including climatological study programmes,

RECOMMENDS the establishment of a study programme which includes:

(a) The formulation of an agreed terminology and definitions of sea surface temperature data obtained through direct observation and remote-sensing techniques;

(b) The possibility of accepting a single sub-surface layer to which all temperatures are reduced for international use;

REQUESTS the Secretary-General, in consultation with the president of CMM, JSC, IOC and SCOR:

(1) To formulate a detailed study programme;

(2) To invite Members, JSC, IOC and SCOR to participate in the study by providing expert services;

(3) To submit a progress report on this study to Members of CMM before 1 July 1983.

Rec. 3 (CMM-VIII) - INTERCALIBRATION OF SURFACE-BASED AND REMOTELY SENSED DATA

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) The annex to Resolution 12 (Cg-VIII) - Policy statement on marine meteorological and related oceanographic activities for the period 1980-1983,

(2) Marine Meteorology and Related Oceanographic Activities Report No. 4 - Intercalibration of surface-based and remotely sensed data (except sea-surface temperature data) to be used in marine applications,

CONSIDERING:

(1) That the Integrated WWW System Study will include a project to improve satellite measurement of ocean parameters to be co-ordinated by the Executive Committee Panel of Experts on Satellites,

(2) That intercomparison of data obtained by direct as well as remote-sensing methods should be accelerated and procedures should be developed, as guidance, to enable a coherent use of the combined data for operational purposes,

RECOMMENDS that a study project to improve remotely-sensed measurements of ocean parameters using satellites and over-the-horizon radars should be carried out;

INVITES Members to participate actively in the above study project;

REQUESTS the Secretary-General, after consultation with the president of CMM and with the co-operation of CIMO, CBS, the EC Panel of Experts on Satellites and the NAOS Board, to arrange for the above project.

Rec. 4 (CMM-VIII) - WIND MEASUREMENT AT SEA

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Annex to Resolution 12 (Cg-VIII) - Policy statement on the WMO Programme on Marine Meteorological and Related Oceanographic Activities in 1980-1983,

(2) Marine Meteorology and Related Oceanographic Activities Report No. 3 - Review of reference height for and averaging time of surface wind measurements at sea,

CONSIDERING:

(1) That measured wind data from ocean areas are needed for both operational and research purposes, such as weather, wave and storm-surge forecasting and climatological studies,

(2) That one of the main sources of bias in wind data taken aboard ships is the physical position of the ship affecting the observation, particularly with respect to anemometer height and placement,

RECOMMENDS:

(1) That anemometer heights and other relevant information on anemometer exposure on ship or marine platforms be included in relevant WMO publications;

(2) That the recommended averaging time for instrument determinations of wind velocity be 10 minutes;

(3) That all instrument readouts used for reporting wind velocities in WMO codes be averaged automatically (or low-pass filtered) with a time constant consistent with the recommended averaging time;

(4) That Members be requested to supply the Secretary-General with the details for distribution to all interested agencies of corrections that are currently applied at source to wind measurements made over ocean areas;

(5) That Members be encouraged to carry out studies on methods to interpret wind measurements taken at sea;

REQUESTS the Secretary-General:

(1) To arrange for the insertion of the information referred to under RECOMMENDS (1) in relevant WMO publications;

(2) To bring this recommendation to the attention of Members and relevant international organizations;

INVITES the president of CMM, in consultation with the president of CIMO, to arrange for a review of the chapter on marine observation of the Guide to Meteorological Instrument and Observing Practices.

Rec. 5 (CMM-VIII) - TRANSMISSION AND COLLECTION OF SHIPS' WEATHER REPORTS

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING that in accordance with the ITU Telegraph Regulations and CCITT Recommendations, groups of characters or expressions which do not exceed 10 characters are charged as one word;

CONSIDERING:

(1) That combining the five-figure groups comprising messages in FM 13-VII SHIP code into ten-figure groups would result in a reduction in the number of words for the calculation of charges by coastal radio stations operated by PTT or Recognized Operating Agencies,

(2) That there is a need to counteract the increase of groups in the new common code FM 13-VII SHIP and thus the transmission costs,

RECOMMENDS:

(1) The use of ten-figure groups for ship-to-shore transmissions of ships' weather reports in the FM 13-VII code using the Maritime Mobile Service;

(2) That NMC receiving ships' weather reports from coastal radio stations reformat them into five-figure groups prior to insertion into the GTS;

REQUESTS the president of CMM to consult with the president of CBS on this recommendation and hereafter arrange its approval by the President of WMO in accordance with Regulation 9(5) of the WMO General Regulations for implementation of this recommendation as of 1 June 1982.

Rec. 6 (CMM-VIII) - MARINE CLIMATOLOGICAL SUMMARIES SCHEME

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING the final report of the Study Group Meeting on Marine Climatology (Asheville, September 1980),

CONSIDERING:

(1) That ten years' experience in the preparation and publication of the summaries has shown that this service to users has proved useful and should be continued,

(2) That the requirements of users for marine climatological information have evolved considerably,

(3) That modern techniques and facilities for data exchange, processing and storage will permit the change-over from the tabular presentation of the summaries to charted presentation,

BEING CONSCIOUS of the financial burden imposed on the Members responsible for the preparation and publication of marine climatological summaries,

RECOMMENDS:

(1) That the routine publication of the annual summaries cease but the processing of data should continue so that such annual summaries will be readily available upon request; the publication may be continued on an optional basis, preferably in chart form;

(2) That the decadal summaries be published in tabular form or in chart form at the option of the responsible Member;

(3) That the annual and decadal summaries over the period 1961-1990 be prepared and published in accordance with the plan given in the annex (Part A)* to this recommendation;

(4) That the layout for marine climatological summary charts given in the annex (Part B)* to this recommendation be adopted for the preparation of summaries in chart form;

REQUESTS the Secretary-General, in consultation with the president of CMM, to prepare appropriate amendments to the Manual on Marine Meteorological Services, Part II, paragraph 5, for approval by the thirty-fifth session of the Executive Committee.

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* See Annex III

Rec. 7 (CMM-VIII) - REGULAR INVENTORY SERVICE FOR MARINE CLIMATOLOGICAL DATA AND SUMMARIES

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING the requirements of users, including the World Climate Programme, for information concerning the availability of marine climatological data and summaries,

CONSIDERING that a large body of such information remains within the possession of individual Members,

RECOGNIZING that no inventory is maintained routinely on marine climatological data and summaries,

RECOMMENDS that a regular inventory service for marine climatological data and summaries be established;

FURTHER RECOMMENDS:

(1) That Members responsible for the preparation of marine climatological summaries under the Marine Climatological Summaries Scheme submit to the Secretary-General:

(a) By March 1982:

(i) The inventory of marine climatological data forwarded to and received from individual Members under the Scheme from the beginning of the Scheme;

(ii) A list of all marine climatological summaries published by these Members up to and end of 1981;

(b) During the first quarter of each year:

(i) A list of all climatological summaries published by these Members during the previous year;

(ii) A list of all Members who have contributed IMMPC/IMMT during the previous year;

REQUESTS the Secretary-General to arrange for the annual publication and circulation of the results for the information of all Members.

Rec. 8 (CMM-VIII) - INTERNATIONAL MARITIME METEOROLOGICAL PUNCH CARD (IMMPC)/ INTERNATIONAL MARITIME METEOROLOGICAL TAPE (IMMT)

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Recommendation 14 (CBS-VII) - Common code for reporting surface observations from different types of surface stations,

(2) The final report of the Study Group Meeting on Marine Climatology (Asheville, September 1980),

CONSIDERING:

(1) That the layout of the International Maritime Meteorological Punch Card (IMMPC) needs to be revised in accordance with the new common surface code FM 13-VII which will be introduced as of 1 January 1982,

(2) That there is an urgent need for the standardization of the layout of magnetic tape which is used increasingly for the exchange of marine climatological data,

RECOMMENDS:

(1) That the layouts of the International Maritime Meteorological Punch Card (IMMPC) and the International Maritime Meteorological Tape (IMMT) given in the annexes (Parts A and B)* to this recommendation be adopted;

(2) That these layouts be included in the Manual on Marine Meteorological Services;

(3) That for national and bilateral exchange of data, the format given in the annex (Part C)* to this recommendation may be used.

* See Annex IV

Rec. 9 (CMM-VIII) - REVISION OF THE INTERNATIONAL SYSTEM OF SEA-ICE SYMBOLS

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING Recommendation 36 (80-CMM) - International System of Sea-ice Symbols,

CONSIDERING that minor clarification of recommended procedures in the use of symbols are desirable,

RECOMMENDS that amendments given in the annex* to this recommendation be introduced into the International System of Sea-ice Symbols.

* See Annex V

Rec. 10 (CMM-VIII) - REVISION OF THE WMO SEA-ICE NOMENCLATURE

THE COMMISSION FOR MARINE METEOROLOGY

NOTING Recommendation 36 (80-CMM) - International System of Sea-ice Symbols,

CONSIDERING:

(1) That some additions and alterations in the international nomenclature are required, partly as a result of the new sea-ice symbols,

(2) The WMO Sea-ice Nomenclature (WMO-No. 259) has essentially remained unchanged since its publication in 1970,

RECOMMENDS:

(1) That the amendments given in the annex (Part A)* to this recommendation be introduced into the WMO Sea-ice Nomenclature;

(2) That the amendment given in the annex (Part B)* to this recommendation be referred to the Working Group on Sea Ice for later inclusion in the WMO Sea-ice Nomenclature;

(3) That the revised version of the WMO Sea-ice Nomenclature should be implemented by 1 December 1983.

* See Annex VI

Rec. 11 (CMM-VIII) - AMENDMENTS TO THE WMO MANUAL ON MARINE METEOROLOGICAL SERVICES

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) The terms of reference of the Commission, paragraph (e),

(2) Chapter C.1 of the WMO Technical Regulations,

(3) The Manual on Marine Meteorological Services,

(4) The final report of the meeting of the Study Group on Marine Meteorological Services, Geneva, June 1980,

CONSIDERING the need for changes in the Technical Regulations arising out of considerations of the eighth session of the Commission,

RECOMMENDS that amendments to the WMO Manual on Marine Meteorological Services (WMO Technical Regulations, Volume I, Annex VI), as contained in the annex* to this recommendation, be adopted effective 1 July 1982.

INVITES Members to inform the Secretary-General of training facilities available in this connexion for training of marine meteorological personnel;

REQUESTS the Secretary-General:

(1) To circulate to Members information on training opportunities in marine meteorology and physical oceanography;

(2) To assist Members in obtaining fellowships for training in the field of marine meteorology;

(3) To closely co-operate with IOC through the IOC Working Group on Training, Education and Mutual Assistance.

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* See Annex VII

Rec. 12 (CMM-VIII) - EDUCATION AND TRAINING IN THE FIELD OF CMM

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING the policy statement on the WMO Programme on Marine Meteorological and Related Oceanographic Activities in 1980-1983, Eighth World Meteorological Congress, Annex IV,

CONSIDERING:

(1) The need for maritime developing countries to have Meteorological Services responsible for contributing to marine safety and to the efficient exploitation of marine resources,

(2) The need expressed by these countries for qualified personnel in all categories in the field of marine meteorology,

(3) The need for improved training in the physics of the ocean intended for meteorologists,

RECOMMENDS:

(1) The more extensive use of training facilities provided by Regional Training Centres for training in marine meteorology, in particular the organization of special short-term training courses;

(2) The organization of training seminars and symposia on marine meteorological services and physical oceanography, jointly organized by WMO and IOC;

(3) The organization of regional training seminars or workshops on the provision of marine meteorological services to marine interests for:

- Regional Association I (Africa)
- Regional Association II/V (Asia/South-west Pacific), with the participation of developing countries in Regional Association VI (Europe)
- Regional Association III/IV (South America/North and Central America)

(4) The increased availability of short-term fellowships for training in the field of marine meteorology and physical oceanography;

(5) The promotion of courses on physics of the oceans and atmosphere at universities in developing countries.

Rec. 13 (CMM-VIII) - REVISION OF RESOLUTIONS OF THE EXECUTIVE COMMITTEE BASED ON PREVIOUS RECOMMENDATIONS OF THE COMMISSION FOR MARINE METEOROLOGY

THE COMMISSION FOR MARINE METEOROLOGY,

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

CONSIDERING that many of these recommendations have become redundant in the meantime,

RECOMMENDS:

(1) That Resolutions 15 (EC-XXI), 7 (EC-XXIX) and 2 (EC-XXXII) are no longer considered necessary;

(2) That Resolutions 15 (EC-XVII) and 12 (EC-XXV) are maintained in force.

ANNEX I

Annex to paragraph 3.7 of the general summary

FUTURE WORK PROGRAMME OF CMM FOR THE PERIOD 1982-1986

Major projects	Goals	Execution	Target dates
Technology transfer including education and training in marine meteorology and physical oceanography	(a) Promotion of effective participation in, and the implementation of, marine meteorological programmes for developing countries	Members of RA I, RA III/IV, RA II/V and developing countries in RA VI, and Secretariat	Continuous
	(b) Formulation of proposals for assistance in accordance with CMM decisions	President of RA concerned and Secretariat	Continuous
Expansion and improvement of marine meteorological services	(a) Follow-up of the implementation of the services as outlined in the Manual on the MMS	Working Group (WG) on MMS with the assistance of the Secretariat	Continuous
	(b) Monitoring of the operation of the services and formulation of proposals for improvements in the light of stated user requirements and the results of monitoring	Members and WG on MMS with the assistance of the Secretariat	Continuous
	(c) Up-dating of the Manual on MMS	WG on MMS	Continuous

ANNEX I (contd.)

Major projects	Goals	Execution	Target dates
Expansion and improvement of marine meteorological services (contd.)	(d) Preparation of the regional part of the Manual on MMS	WG on MMS (responsible for outline) regional associations (for implementation of the relevant regional chapter)	1982 Continuous
	(e) Up-dating of the Guide to MMS	WG on MMS	Continuous
	(f) Preparation of guidance material on marine meteorological/oceanographic services, including ship routeing for use by Members	President of CMM, through WG on MMS or selected experts with the help of the Secretariat	Continuous
	(g) Monitoring of marine meteorological services	(1) Procedures to be established by WG on MMS	1982/1983
		(2) Members to implement monitoring	Continuous
Marine climatology	(a) Follow-up of the implementation of the Marine Climatological Summaries Scheme (i.e. collection and exchange of data in the IMMPC/IMMT formats, preparation of the summaries by the responsible Members)	Members concerned and Secretariat	Continuous
	(b) Preparation of a guide on the processing of marine climatological data (including quality-control procedures	WG on Marine Climatology	1984

Major projects	Goals	Execution	Target dates
Marine climatology (contd.)	(c) Development of a list of marine climatic charts as a contribution to the World Climatic Atlas	WG on Marine Climatology	1982
	(d) Study of the possibilities for preparation of charts of sea-surface temperature and its anomalies over the northern hemisphere for the period 1950-1980.	WG on Marine Climatology	1983
	(e) Continuation of the collection and archiving of surface current data from ship drift	WG on Marine Climatology	1983
Further development of the ocean/marine observing and data-collection systems	(a) Improvement and expansion of the WMO Voluntary Observing Ship scheme:	Members, WG on MMS and WG on Marine Climatology	Continuous
	(i) Improved quality of observation		Continuous
	(ii) Introduction of new common surface code		1982
	(iii) Automation of observation as far as practicable		Continuous
	(b) Data collection from mobile ships through:	Expert meetings and Rapporteur on Marine Telecommunication	1984

ANNEX I (contd.)

Major projects	Goals	Execution	Target dates
Further development of the ocean/marine observing and data-collection systems (contd.)	(i) INMARSAT for ship-to-shore data transmission (ii) DCP communication with geostationary meteorological satellites (iii) Use of ARGOS facilities connected with TIROS-N type satellites		
	(c) Requirements and utilization of fixed and drifting buoys	WG on Technical Problems	1983
	(d) Intercalibration of direct measured and remotely sensed observations	Study project	1983
	(e) Assistance in the review of the marine observation part of the Guide to Meteorological Instrument and Observing Practices	WG on Technical Problems together with CIMO	1984
	(f) Continuation of studies on the requirement for ocean parameters from satellites in collaboration with the WG on Sea Ice	WG on Technical Problems	1985
	(g) Formulation of the WMO wave programme	Expert meetings, Rapporteur	1984
	(h) Ocean-surface temperature	Expert meetings jointly with JSC, SCOR, and IOC	1984

ANNEX I (contd.)

Major projects	Goals	Execution	Target dates
Further development of the ocean/marine observing and data-collection systems (contd.)	(i) Contribution to the planning of a drifting buoy programme for meteorology and oceanography	Expert meetings jointly with IOC, Rapporteur on Drifting Buoy Programmes	1984
	(j) Review of forecasting methods for ice accretion	Rapporteur, WG on Technical Problems	1984
Sea ice	(a) Operational practice of observation and forecasting of sea ice (Guide)	WG on Sea Ice	1984
	(b) Support services to navigation in ice conditions (proposals for regional procedures)	WG on Sea Ice in collaboration with regional experts or group	1984
	(c) Establishment of a WMO catalogue on historical data of sea ice	WG on Sea Ice with the assistance of Secretariat	Continuous
	(d) Consideration of co-ordination of sea-ice data archive (or sea-ice data banks)	WG on Sea Ice	1984
	(e) Review of Sea-ice Codes	WG on Sea Ice	1984
	(f) Standard exchange, tape format(s) for digital sea-ice data and analysis	WG on Sea Ice	1985
	(g) Up-dating of WMO Sea-ice Nomenclature	WG on Sea Ice	1983

ANNEX I (contd.)

Major projects	Goals	Execution	Target dates
Co-ordination between CMM and IOC activities	(a) Co-ordination between CMM and JWC for IGOSS	President of CMM, CMM Advisory Working Group and chairman of Joint IOC/WMO Working Committee for IGOSS	Continuous
	(b) Co-ordination of preparation and distribution of MMS and IGOSS/IDPSS products	WG on MMS together with the Joint IOC/WMO Working Committee for IGOSS or its subsidary bodies	Continuous
	(c) Co-ordination of the requirements for sub-surface observations required by WMO and IOC programmes	WG on MMS together with the Joint IOC/WMO Working Committee for IGOSS or its subsidiary bodies	Continuous
	(d) Review of the BATHY and TESAC coding requirements in the light of new requirements	WG on MMS together with the Joint IOC/WMO Working Committee for IGOSS	1982
	(e) Preparation of joint WMO/IOC guidance material, e.g. Technical Note or report on "Methods and techniques of forecasting the thermal structure of oceanic waters"	President of CMM/chairman of Joint IOC/WMO Working Committee for IGOSS	1982-1985

ANNEX II

Annex to paragraph 5.4.2 of the general summary

TOPICS FOR POSSIBLE INCLUSION IN ROVING SEMINARS ON MARINE METEOROLOGICAL SERVICES

1. Education and training in marine meteorology
2. Marine weather forecasting applicable to Regions
3. Methods of tropical-cyclone forecasting
4. Telecommunication arrangements in marine meteorology
5. Activities relating to voluntary observing ships
6. Marine meteorological services for coastal and offshore areas including ports
7. Ocean currents in the Regions
8. Wind wave and swell forecasting
9. Sea-surface temperature analysis and applications
10. Marine climatology applicable to the Regions (for example, monsoons)
11. Determination of design parameters for coastal and offshore constructions
12. Seismic waves (Tsunami) and storm surges
13. Ice accretion and sea-ice forecasting
14. Cargo protection
15. Ship routeing
16. Automation of observations

A N N E X III

Annex to Recommendation 6 (CMM-VIII)

PART A

PLAN FOR THE PRODUCTION OF MARINE CLIMATOLOGICAL SUMMARIES OVER THE PERIOD 1961-1990

Period	FIXED STATION[4]	REPRESENTATIVE AREA/AREA OF RESPONSIBILITY[1]		
	Tables[2]	Tables[2]	Charts[1,3]	Isopleths[1,3,5]
1961-1970 Annual	X	X	0[6]	0
Decadal	X	0[7]	0[7]	0
1971-1980 Annual	0	0	0[6]	0
Decadal	X	0[7]	0[7]	0
1981-1990 Annual	0	0	0	0
Decadal	X	0[7]	0[7]	0

Key: X - Recommended
0 - Optional

Notes:
1 - Total area of responsibility
2 - Summary tables (existing regulations)
3 - Numerical data on charts of sea areas (marine climatological summary charts)
4 - Ocean weather stations and other fixed stations
5 - In addition to charts
6 - Recommended instead of tables for responsible Members which have not yet published annual summaries
7 - Published in chart or tabular form or both at the option of responsible Members

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ANNEX III

Annex to Recommendation 6 (CMM-VIII)

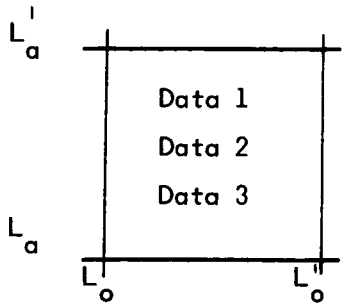
PART B

LAYOUT FOR MARINE CLIMATOLOGICAL SUMMARY CHARTS

1. General. For each area of responsibility charts will be prepared in accordance with the following specifications.

2. Projection. The recommended projection for all areas except the Polar regions is the Mercator projection. For the Polar regions the Polar stereographic projection is recommended. Where charts are produced by typewriter or line-printer systems other projections may be used.

3. Unit areas. Data will be plotted on unit areas, preferably rectangular, as shown below:



Data 1-3 are specified according to the element summarized

4. Dimensions of the unit areas. The unit areas containing relevant numerical data should, as far as possible, have a uniform size. In data-sparse regions unit areas as large as 5° X 10° may be necessary, otherwise for most parts of the oceans 5° X 5° squares will be suitable. In the vicinity of coasts or in semi-enclosed seas 2° X 2° or even 1° X 1° squares may be appropriate. The selection of unit areas will be undertaken by each responsible Member and will be a compromise between the available number of observations and the expected climatic gradients. The unit areas, once chosen, should be retained in all subsequent annual and decadal charts.

5. Specification of elements to be presented on summary charts

Chart	Data	Element (resolution/unit)
I	1	Mean air temperature ($\overline{T}$, 0.1°C)
	2	Standard deviation of air temperature[1] (σ_T, 0.1°C)
	3	Number of observations of air temperature (N_T)
II	1	Mean sea-surface temperature ($\overline{T}_W$, 0.1°C)
	2	σ_{TW} (0.1°C)
	3	N_{TW}
III	1	Mean dew-point temperature ($\overline{T}_d$, 0.1°C)
	2	σ_{Td} (0.1°C)
	3	N_{Td}
IV	1	Mean air-sea temperature difference ($\overline{T-T}_W$) (ΔT, 0.1°C)
	2	$\sigma_{\Delta T}$ (0.1°C)
	3	$N_{\Delta T}$
V	1	Mean sea-level pressure ($\overline{P}$, 0.1 hPa)
	2	σ_p (0.1 hPa)
	3	N_p
VI	1	Median wind speed (f_{50}, 0.1 m s^{-1})
	2	Standard deviation of wind speed (σ_f, 0.1 m s^{-1})
	3	Steadiness of wind[2]

Chart	Date	Element (resolution/unit)
	1	Prevailing wind direction[3]
VII	2	Number of wind-speed observations (N_f)
	3	Number of measured wind-speed observations
	1	% of light winds ($\leq$ 3 m s^{-1}, $\leq$ Beaufort 2) (0.1%)
VIII	2	% of strong winds ($\geq$11 m s^{-1}, $\geq$ Beaufort 6) (0.1%)
	3	Prevailing direction[3] of strong winds (1°)
	1	% gales ($\geq$ 17 m s^{-1}, $\geq$ Beaufort 8) (0.1%)
IX	2	Prevailing direction[3] of gales (1°)
	3	———
	1	Median wave height[4] (H_{50}, 0.5 m)
X	2	σ_H (0.1 m)
	3	N_H
	1	% waves $\leq$ 1.5m (0.1%)
XI	2	% waves $\geq$ 4m (0.1%)
	3	% waves $\geq$ 6m (0.1%)
	1	% wave periods[4] $\geq$ 6s (1s)
XII	2	Prevailing swell direction[3] (1°)
	3	Number of swell observations

Chart	Date	Element (resolution/unit)
XIII	1	% observations with rain or drizzle[5] (0.1%)
	2	% observations with other forms of precipitation[6] (0.1%)
	3	Number of present weather observations
XIV	1	% Total cloud amount ≤ 2/8 (0.1%)
	2	% Total cloud amount ≤ 6/8 [7](0.1%)
	3	Number of total cloud observations
XV	1	% Visibility < 1 km (VV = 90-93) (0.1%)
	2	% Visibility ≥ 10 km (VV = 97-99) (0.1%)
	3	Number of visibility observations
XVI	1	Mean Latitude of observations ($\bar{L}_a$, 0.1°)
	2	Mean Longitude of observations ($\bar{L}_o$, 0.1°)
	3	Total number of observations
XVII	1	σ_{L_a} (0.1°)
	2	σ_{L_o} (0.1°)
	3	Total number of observations
XVIII	1	Number of reports of icing
	2	% potential moderate or severe superstructure icing[8] (0.1%)
	3	Number of observations containing air temperature and wind speed

Notes

1. $$\sigma = \left[\frac{\sum x^2}{N-1} - \frac{(\sum x)^2}{N(N-1)} \right]^{1/2}$$

   where x is value of an individual observation.

2. Steadiness = $\frac{\text{vector average}}{\text{scalar average}}$

3. A resultant vector mean direction with each speed set equal to 1

4. Height of sea or swell

5. (ww = 50-67, 80-82)

6. (ww = 68-99 except 80-82, 98)

7. N = 6, 7, 8, 9.

8. ff $\geq$ 11 ms^{-1}, TTT $\leq$ 2°C.

6. Monthly and annual charts will be produced as specified above. Mean values and standard deviations are to be computed from the total numbers of observations in all cases (i.e., for the annual charts the annual means and standard deviations will be computed from the sums of the individual observed values). Parameters for decadal charts will be computed in the same manner.

ANNEX IV

Annex to Recommendation 8 (CMM-VIII)

PART A

LAYOUT FOR THE INTERNATIONAL MARITIME METEOROLOGICAL PUNCH CARD (IMMPC) BASED ON THE NEW COMMON CODE: FM 13-VII SHIP

Column	Element	Punching procedures
1	Format and temperature indicator, i_T	0-5
2-3	Year GMT, AA	Last two digits
4-5	Month GMT, MM	01-12 January to December
6-7	Day GMT, YY	01-31
8-9	Time of observation, GG	Nearest whole hour GMT, WMO specifications
10	Indicator for wind speed, i_w	WMO code 1855
11	Octant of the globe, Q	Punched as octant using WMO code 3300; quadrant converted into octant
12-14	Latitude, $L_aL_aL_a$	Tenths of degrees, WMO specifications
15-17	Longitude, $L_oL_oL_o$	Tenths of degrees, WMO specifications
18	Cloud height (h) and visibility (VV) measuring indicator	0 - h and VV estimated 1 - h measured, VV estimated 2 - h and VV measured 3 - h estimated, VV measured
19	Height of clouds, h	WMO code 1600
20-21	Visibility, VV	WMO code 4377; if fog is known to be present, but VV is not reported, column 20 is to be punched 5 and column 21 is to be punched 3

Column	Element	Punching procedures
22	Cloud amount, N	Oktas, WMO code 2700; punch 9 where applicable
23-24	True wind direction, dd	Tens of degrees, WMO code 0877; punch 00 or 99 where applicable
25-26	Wind speed, ff	Tens and units of knots or metres per second, hundreds omitted; values in excess of 99 knots are to be indicated in units of metres per second and i_w encoded accordingly; the method of estimation or measurement and the units used (knots or metres per second) is indicated in column 10
27	Sign of temperature, s_n	WMO code 3845
28-30	Air temperature, TTT	Tenths of degrees Celsius
31	Sign of wet-bulb/dew-point temperature WMO Code 3845	(0-positive) Dew-point (1-negative) temperature 5-positive) Wet-bulb 6-negative) temperature Code figure 7 to be used if ice-bulb temperature is reported
32-34	Wet-bulb or dew-point temperature	Tenths of degrees Celsius
35-38	Air pressure, PPPP	Tenths of hectopascals
39-40	Present weather, ww	WMO code 4677
41-42	Past weather, W_1 and W_2	WMO code 4561
43	Amount of lowest clouds, N_h	As reported for C_L or, if no C_L cloud is present, for C_M, in oktas; WMO code 2700
44	Genus of C_L clouds	WMO code 0513
45	Genus of C_M clouds	WMO code 0515
46	Genus of C_H clouds	WMO code 0509
47	Sign of sea-surface temperature, s_n	WMO code 3845

Column	Element	Punching procedures
48-50	Sea-surface temperature, $T_W T_W T_W$	Tenths of degrees Celsius
51	Indicator for sea-surface temperature (SST) measurement	0 - Bucket thermometer 1 - Condenser inlet 2 - Trailing thermistor 3 - Hull contact sensor 4 - "Through hull" sensor 5 - Radiation thermometer 6 - Bait tanks thermometer 7 - Others
52	Indicator for wave measurement	0 - Wind sea and swell estimated Shipborne Wave Recorder: (1 - Wind sea and swell measured; (2 - Mixed wave measured, swell estimated; (3 - Other combinations of measured and estimated Buoy: (4 - Wind sea and swell measured; (5 - Mixed wave measured, swell estimated; (6 - Other combinations of measured and estimated Other Measurement System: (7 - Wind sea and swell measured; (8 - Mixed wave measured, swell estimated; (9 - Other combinations of measured and estimated
53-54	Period of wind waves or of measured waves, $P_w P_w$	Whole seconds; punch 99 where applicable in accordance with Note (3) under specification of $P_w P_w$ in the Manual on Codes
55-56	Height of wind waves or of measured waves, $H_w H_w$	Half-metre values Examples: Calm or less than 1/4m to be punched 00 3-1/2m to be punched 07 7m to be punched 14 11-1/2m to be punched 23
57-58	Direction of predominant swell waves, $d_{w1} d_{w1}$	Tens of degrees, WMO code 0877; punch 00 or 99 where applicable Blanks = No observation of swell attempted
59-60	Period of predominant swell waves, $P_{w1} P_{w1}$	Whole seconds; punch 99 where applicable (see under columns 53-54)
61-62	Height of predominant swell waves, $H_{w1} H_{w1}$	Half-metre values (see under columns 55-56)

Column	Element	Punching procedures
63	Ice accretion on ships, I_s	WMO code 1751
64-65	Thickness of ice accretion, $E_s E_s$	In centimetres
66	Rate of ice accretion, R_s	WMO code 3551
67	Source of observation on card	0 - Unknown 1 - Logbook) national 2 - Telecommunication channels) national 3 - Publications) national 4 - Logbook) international 5 - Telecommunication channels) international data exchange 6 - Publications) international data exchange
68	Observation platform	0 - Unknown 1 - Selected ship 2 - Supplementary ship 追加 3 - Auxiliary ship 予備船舶 4 - Automated station/data buoy 5 - Fixed sea station 6 - Coastal station 7 - Aircraft 8 - Satellite 9 - Others
69-75	Ship identifier	Ship's call sign or other identifier Call sign positions on punched card 7 characters call sign Col. 69-75 6 " " " " 70-75 5 " " " " 71-75 4 " " " " 72-75
76-77	Country which has recruited ship	According to numbers assigned by WMO
78	Quality control indicator	0 - No quality control (Q.C.) 1 - Manual Q.C. only 2 - Automated Q.C. only (no time-sequence checks) 3 - Automated Q.C. only (including time-sequence checks) 4 - Manual and automated Q.C. (superficial; no automated time-sequence checks) 5 - Manual and automated Q.C. (superficial; including time-sequence checks)

Column	Element	Punching procedures
78	Quality control indicator (contd.)	6 - Manual and automated Q.C. (intensive; including automated time-sequence checks) 7 - Not used 8 - Not used 9 - National system of Q.C. (information to be furnished to WMO)
79-80	Reserved for national use	-

Format and temperature indicator (i_T)

0 = IMMPC format with temperatures in tenths of degrees Celsius
1 = IMMPC format with temperatures in halves of degrees Celsius
2 = IMMPC format with temperatures in whole degrees Celsius
3 = IMMT format with temperatures in tenths of degrees Celsius
4 = IMMT format with temperatures in halves of degrees Celsius
5 = IMMT format with temperatures in whole degrees Celsius

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A N N E X IV

Annex to Recommendation 8 (CMM-VIII)

PART B

LAYOUT FOR THE INTERNATIONAL MARITIME METEOROLOGICAL TAPE (IMMT)
BASED ON THE NEW COMMON CODE: FM 13-VII SHIP

Element No.	Element	Character No.
1	Format and temperature indicator (i_T)	1
2	AA	2-3
3	MM	4-5
4	YY	6-7
5	GG	8-9
6	i_w	10
7	Q	11
8	$L_aL_aL_a$	12-14
9	$L_oL_oL_o$	15-17
10	Indicator for h and VV	18
11	h	19
12	VV	20-21
13	N	22
14	dd	23-24
15	ff	25-26
16	s_n	27
17	TTT	28-30

Element No.	Element	Character No.
18	Sign of reported wet-bulb or dew-point temperature	31
19	Wet-bulb/dew-point temperature	32-34
20	PPPP	35-38
21	ww	39-40
22	W_1	41
23	W_2	42
24	N_h	43
25	C_L	44
26	C_M	45
27	C_H	46
28	s_n	47
29	$T_wT_wT_w$	48-50
30	Indicator for SST measurement	51
31	Indicator for wave measurement	52
32	P_wP_w	53-54
33	H_wH_w	55-56
34	$d_{w1}d_{w1}$	57-58
35	$P_{w1}P_{w1}$	59-60
36	$H_{w1}H_{w1}$	61-62
37	I_s	63
38	E_sE_s	64-65
39	R_s	66
40	Source of observation	67
41	Observation platform	68

Element No.	Element	Character No.
42	Ship identifier	69-75
43	Country which has recruited the ship	76-77
44	Quality control indicator	78
45	National use	79
46	National use	80
47	i_R (降水群の有無)	81
48	RRR (降水量)	82-84
49	t_R (降水時間間隔指示符)	85
50	Sign of computed wet-bulb or dew-point temperature	86
51	Computed wet-bulb or dew-point temperature temperature	87-89
52	a (気圧変化傾向)	90
53	ppp (〃 量)	91-93
54	D_s (船の進行方向)	94
55	v_s (〃 速度)	95
56	$d_{W2}d_{W2}$	96-97
57	$P_{W2}P_{W2}$	98-99
58	$H_{W2}H_{W2}$	100-101
59	c_i (海氷の密接度)	102
60	S_i (〃 発達過程)	103
61	b_i (陸氷)	104
62	D_i (主要な氷の縁の方位)	105
63	z_i (変化状態)	106

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Quality control indicators (Q_1 to Q_{18}) for elements indicated in brackets.

Element No.	Element	Character No.
64	Q_1 (h)	107
65	Q_2 (VV)	108
66	Q_3 (clouds: elements 13; 24-27)	109
67	Q_4 (dd)	110
68	Q_5 (ff)	111
69	Q_6 (TTT)	112
70	Q_7 (wet bulb/dew point	113
71	Q_8 (PPPP)	114
72	Q_9 (weather: elements 21, 22,23)	115
73	Q_{10} ($T_wT_wT_w$)	116
74	Q_{11} (P_wP_w)	117
75	Q_{12} (H_wH_w)	118
76	Q_{13} (swell: elements 34-36, 56-58)	119
77	Q_{14} (i_RRRRt_R)	120
78	Q_{15} (a)	121
79	Q_{16} (ppp)	122
80	Q_{17} (D_s)	123
81	Q_{18} (v_s)	124

Specifications for quality control indicators Q_1 to Q_{18}

0	No quality control (QC) has been performed on this element
1	QC has been performed: element appears to be correct
2	QC has been performed: element appears to be inconsistent with other element
3	QC has been performed: element appears to be doubtful

Specifications for quality control indicators Q_1 to Q_{18} (contd.)

4	QC has been performed: element appears to be erroneous
5	The value has been changed as a result of QC
6	Reserve
7	Reserve
8	Reserve
9	The value of the element is missing

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A N N E X IV

Annex to Recommendation 8 (CMM-VIII)

PART C

LAYOUT FOR A MARITIME METEOROLOGICAL TAPE FOR POSSIBLE USE IN NATIONAL AND BILATERAL DATA EXCHANGE BASED ON THE NEW COMMON CODE: FM 13-VII SHIP

Element No.	Element	Character No.
1	Format and temperature indicator (i_T) (Same as Col. 1 of IMMPC)	1
2	AA	2-3
3	MM	4-5
4	YY	6-7
5	GG	8-9
6	i_w	10
7	Q	11
8	$L_aL_aL_a$	12-14
9	$L_oL_oL_o$	15-17
10	Indicator for h and VV	18
11	h	19
	Q_1	20
12	VV	21-22
	Q_2	23
13	N	24
14	dd	25-26
	Q_4	27

Element No.	Element	Character No.
15	ff	28-29
	Q_5	30
16	s_n	31
17	TTT	32-34
	Q_6	35
18	Sign of reported wet-bulb or dew-point temperature	36
19	Wet-bulb/dew-point temperature	37-39
	Q_7	40
20	PPPP	41-44
	Q_8	45
21	ww	46-47
22	W_1	48
23	W_2	49
	Q_9	50
24	N_h	51
25	C_L	52
26	C_M	53
27	C_H	54
	Q_3	55
28	s_n	56
29	$T_w T_w T_w$	57-59
	Q_{10}	60
30	Indicator for SST measurement	61
31	Indicator for wave measurement	62

Element No.	Element	Character No.
32	P_wP_w	63-64
	Q_{11}	65
33	H_wH_w	66-67
	Q_{12}	68
34	$d_{wl}d_{wl}$	69-70
35	$P_{wl}P_{wl}$	71-72
36	$H_{wl}H_{wl}$	73-74
37	I_s	75
38	E_sE_s	76-77
39	R_s	78
40	Source of observation	79
41	Observation platform	80
42	Ship identifier	81-87
43	Country which has recruited the ship	88-89
44	Quality control indicator	90
45	National use	91
46	National use	92
47	i_R	93
48	RRR	94-96
	Q_{14}	97
49	t_R	98
50	Sign of computed wet-bulb or dew-point temperature	99
51	Computed wet-bulb or dew-point temperature	100-102

Element No.	Element	Character No.
52	a	103
	Q_{15}	104
53	ppp	105-107
	Q_{16}	108
54	D_s	109
	Q_{17}	110
55	v_s	111
	Q_{18}	112
56	$d_{w2}d_{w2}$	113-114
57	$P_{w2}P_{w2}$	115-116
58	$H_{w2}H_{w2}$	117-118
	Q_{13}	119
59	c_i	120
60	S_i	121
61	b_i	122
62	D_i	123
63	z_i	124

Quality control indicators (Q_1 to Q_{18}) for elements indicated in brackets

Q_1 (h)	20
Q_2 (VV)	23
Q_3 (clouds: elements 13; 24-27)	55
Q_4 (dd)	27

Quality control indicators (Q_1 to Q_{18}) for elements indicated in brackets (contd.)

Q_5 (ff)	30
Q_6 (TTT)	35
Q_7 (wet bulb/dew point)	40
Q_8 (PPPP)	45
Q_9 (weather: elements 21, 22, 23)	50
Q_{10} ($T_wT_wT_w$)	60
Q_{11} (P_wP_w)	65
Q_{12} (H_wH_w)	68
Q_{13} (swell: elements 34-36, 56-58)	119
Q_{14} (i_RRRRt_R)	97
Q_{15} (a)	104
Q_{16} (ppp)	108
Q_{17} (D_s)	110
Q_{18} (v_s)	112

Specifications for quality control indicators Q_1 to Q_{18}

0 - No quality control (Q.C.) has been performed on this element

1 - Q.C. has been performed; element appears to be correct

2 - Q.C. has been performed; element appears to be inconsistent with other elements

3 - Q.C. has been performed; element appears to be doubtful

4 - Q.C. has been performed; element appears to be erroneous

5 - The value has been changed as a result of Q.C.

6-8 - Reserve

9 - The value of the element is missing

ANNEX V

Annex to Recommendation 9 (CMM-VIII)

INTERNATIONAL SYSTEM OF SEA-ICE SYMBOLS

1. Add the following note to paragraph 3 at bottom of page 2:

"Note 3: In situations when only two stages of development are present, a dash (-) should be added in place of F_c to separate these situations from those when F_p and F_s are being reported."

2. Add the following note at the end of paragraph 14 - Symbols for the hatching of total concentration of sea ice:

"Note: When scattered stars are used to indicate the presence of new ice, reporting the actual amount of this stage of development as a component of the total concentration is optional."

3. Add to the Table of Ice Symbols related to Stage of Development in Appendix 1, page 2 the symbol x - undetermined or unknown.

4. Delete Note 3 on page 3 of Appendix 1 to Recommendation 36 (80-CMM).

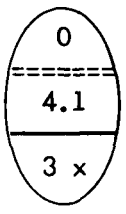
5. Change in Appendix 1, page 4, the table concerning Form of Ice so that symbol 8 reads "Fast ice/growlers or floebergs" and

add

"Notes: 1. The form of new ice is normally not reported when this stage of development occurs as S_a S_b or S_c. The symbol x - undetermined is used.

2. Symbol 8 normally indicates fast ice and is used in conjunction with many stages of development S. However, when ice of land origin (symbol ▲) is reported, the symbol 8 indicates the presence of growlers or floebergs."

6. Add example 8 to Appendix 2, p. 2, to clarify the use of symbol 0 for total concentration.



less than one tenth of ice. Some thick first-year ice in small floes is present and also some new ice but the total concentration is less than one tenth.

A N N E X VI

Annex to Recommendation 10 (CMM-VIII)

PART A

WMO SEA-ICE NOMENCLATURE

Add the following:

4.4.8.1.1 Jammed brash barrier: A strip or narrow belt of new, young or brash ice (usually 100-5000 m wide) formed at the edge of either pack or fast ice or at the shore. It is heavily compacted mostly due to wind action and may extend 2 to 20 m below the surface but does not normally have appreciable topography. Jammed brash barrier may disperse with changing winds but can also consolidate to form a strip of unusually thick ice as compared to the surrounding pack ice.

Change the following:

4.4.2 ICE MASSIF: A variable accumulation of close or very close pack ice covering hundreds of square kilometres which is found in the same region every summer.

4.2 Concentration: The ratio expressed in tenths or octas describing the amount of the sea surface covered by ice as a fraction of the whole area being considered. Total concentration includes all stages of development that are present, partial concentration may refer to the amount of a particular stage or of a particular form of ice and represents only a part of the total.

7.1.1 CRACK: Any fracture of fast ice, consolidated ice or a single floe which may have been followed by separation ranging from a few centimetres to 1 m.

7.1.2 VERY SMALL FRACTURE: 1 to 50 m wide.

Insertions

2.5.1 THIN FIRST YEAR ICE/WHITE ICE: "May be sub-divided into first stage (2.5.1a) 30-50 cm and second stage (2.5.1b) 50-70 cm thick".

2.6 Old ice: Following "at least one summer's melt" insert "typical thickness up to 3 m or more".

2.6.1 SECOND YEAR ICE: Following "only one summer's melt" insert "Typical thickness up to 2.5 m and sometimes more" delete "and less dense".

Minor clarifications

4.3.4 FLOEBERG: Change last sentence to "It may protrude up to 5 m above sea-level.

10.4.2 ICEBERG: Insert "protruding" after "varying shape,".

10.4.3 ICE ISLAND: Insert "protruding" after "pieces of floating ice".

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ANNEX VI

Annex to Recommendation 10 (CMM-VIII)

PART B

SEA-ICE TERMS FOR FUTURE STUDY

The following terms are proposed for future study by the working group:

4.3.4.1 Floebit: A relatively small piece of sea ice, normally not more than 10 m across, composed of a hummock(s) or part of a ridge(s) frozen together and separated from any surroundings. It may protrude up to 2 m above sea-level.

4.3.5 Ice breccia: Ice pieces of different stages of development frozen together.

4.4.5.1 Ice isthmus: A strip connecting two ice areas of very close or compact pack ice. The strip is difficult to pass, yet sometimes being part of a recommended route.

5.3 Shearing: (The Russian definition is not in full agreement with the English and should be aligned).

9.5.1 Shore melt: Open water between the shore and the fast ice, formed by melting and/or due to river discharge.

A N N E X VII

Annex to Recommendation 11 (CMM-VIII)

PROPOSED AMENDMENTS TO WMO TECHNICAL REGULATIONS, VOLUME I, ANNEX VI, MANUAL ON MARINE METEOROLOGICAL SERVICES

I. Proposed by Members

Paragraph	Proposed amendment
II.2.2.1.2	Add sub-paragraph II.2.2.1.2.1 as follows: "Before drawing up any recommendation on the proposed amendment to the Executive Committee, the Commission for Marine Meteorology shall receive the comments of the Members directly concerned with the proposed amendment as well as the comments of the president(s) of regional association(s) concerned".
II.2.2.4.1.1	Delete the NOTE.
II.3.2.3.1	Delete the words "Either by telephone or telex".
II.4.1.1	Replace "the mariner" by "marine users".
II.4.2.1	idem.
II.4.2.5	Replace "Shipping" by "marine users".
III.2.2.3.2	Transfer "(c) Restricted visibility (1 nautical mile or less)" to paragraph III.2.2.3.2.1.
III.2.2.7.2(f) and III.3.2.6.1	Amend to read: "Sea-surface temperature".
II.5	Amend NOTE to read: "...Rec. 6 (CMM-VI), Rec. 15 (CMM-VII) and Rec. 35 (79-CMM)".
II.5.2.4.3.2	Amend NOTE to read: "...given in Annex I-3.B to the Guide ...".
II.6.2.1.1	Amend NOTE to read: "...contained in Annex II-1.B to the Guide ...".
II.6.2.2.1	Amend third line to read: "...given in Annex II-1.C to the Guide ...".
II.6.2.2.6.1	Amend NOTE (3) to read: "...given in Annex I-3.C to the Guide ...".

Paragraph	Proposed amendment
III.1.1	Add NOTE as follows: "NOTE: Provision of services relating to oceanographic and hydrographic information may be the responsibility of more than one national agency or authority.
III.2.2.3.4	Amend to read: "Members establishing a new visual warning signal should select the appropriate one from the International System of Visual Storm Signals".
III.2.2.3.4	Amend the NOTE to read: "The International System of Visual Storm Signals is given in Appendix III.1".
II.	Proposed by the Study Group on MMS and consequential to changes in other publications
Paragraph	Proposed amendment
I.1.1	Add after "they require" the words "to the extent technically possible".
II.2.2.2.7.3	Add after "Part II" the words "and then Part III".
II.2.2.2.8.4	Delete in second line "as given in Appendix II.2".
	Add NOTE to read as follows: "NOTE: The multilingual list of terms used in weather and sea bulletins is given in Annex I-2.A of the Guide to MMS (WMO-No. 471)".
II.2.2.3.3.1	Insert "d" after "b".
II.2.2.3.4.1	Amend the last words as: "...descending order of threat".
II.2.2.4.3.1	Delete the words "direction and".
III.3.2	PROCEDURES Amend NOTE to read; "...described in Part I, Chapter 4 of the Guide..."
III.3.2.2	Number the existing paragraph as sub-paragraph 3.2.2.1 and Add new sub-paragraph 3.2.2.2 as follows: "At the request of the appropriate authorities, special information pertaining to the extent and movement of oil spills which may affect activities along coasts should be prepared and supplied to the authority concerned".
III.3.2.9.2	Amend NOTE same as III.3.2 above
IV.2.1.1 Principle 2	Amend second sentence to read "Close consultation with port and harbour authorities and other users of the port and harbour facilities is essential to ascertain the type of information to be included in these services".
IV.2.2.1.1	Amend NOTE to read: "...given in Part I, Chapter 5 and Part II, Chapter 1 of the Guide..."

Paragraph	Proposed amendment
IV.2.2.2.2	Amend NOTE to read: "...given in Part I, Chapter 5 to the Guide...".
IV.2.2.2.3	Amend "platforms" to "stations".
IV.2.2.2.7	Amend according to II.2.2.2.8.4.
IV.2.2.3.2	Amend text to read: "Warnings should be issued for the following elements and phenomena when exceeding critical values: (a) wind; (b) sea and swell etc.".
IV.2.2.3.2	Amend (c) to read as follows: "(c) Visibility, with special mention of the phenomenon affecting it;".
IV.2.2.3.5	Delete the paragraph, and renumber 2.2.3.6 and 2.2.3.7 accordingly.
IV.2.2.4.3	Amend NOTE same as IV.2.2.2.2.
IV.2.2.5.2	Amend NOTE same as IV.2.2.2.2.
IV.2.2.6.1	Delete in third line "the passengers and".
IV.3.2.1.2	Amend NOTE same as IV.2.2.2.2.
IV.3.2.1.3	Add new paragraph as follows: "At the request of appropriate authorities, special information pertaining to the extent and movement of oil spills which may affect waterborne activities in harbours should be prepared and supplied to the authority concerned".
V.3.2.1	Amend NOTE (2) to read: "...described in Part II, Chapter 1 of the Guide...".
V.4.1.1	Amend "Principle 2" to read as follows: "Assistance to the training of seafarers in meteorological observation and transmission of meteorological reports, and in the use and correct interpretation of marine meteorological information is an integral part of meteorological services in enhancing the safety and efficiency of ship operations".
V.4.2.1	Amend the text as follows: (i) Third line, insert full stop after "1978". (ii) Rest of the sentence, amend as: "This is to ensure that seafarers would be competent to make meteorological observations and transmit them as well as understand the warnings, synopses and forecasts provided for their use".
V.4.2.1	Amend NOTE to read as follows: "Applicable requirements from the International Convention on Standards of Training and Certification of Watch-keeping for Seafarers administered by IMCO are reproduced in Part II, Chapter 2 of the Guide to MMS".
V.4.2.3	Amend "respecting" to "with respect to".

RECOMMENDATIONS OF THE COMMISSION FOR MARINE METEOROLOGY ADOPTED PRIOR TO ITS EIGHTH SESSION AND MAINTAINED IN FORCE

Rec. 10 (CMM-VI) - MEASUREMENT OF OCEAN WAVES

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) The report of the Rapporteur on Observation, Measurement and Forecasting of Waves,

(2) Recommendation 13 (CMM-V) - Increased reporting of wave observations,

CONSIDERING:

(1) That the many uses of ocean wave observations could be made more effective by an improvement of the accuracy of wave height observations,

(2) That a wave recorder gives a more reliable observation of resultant wave height than a visual observation,

(3) That the wave recorders which are now being developed might be used on board stationary and research ships,

RECOMMENDS:

(1) That Members be encouraged to continue their efforts in developing reliable wave recording instruments for use on board ships;

(2) That Members be encouraged to equip ocean weather ships and research vessels with wave recorders to assist ships' officers in making ocean wave reports.

Rec. 22 (CMM-VII) - WMO CATALOGUE OF HISTORICAL SEA-ICE INFORMATION

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING the report of the chairman of the Working Group on Sea Ice to CMM-VII,

CONSIDERING:

(1) That there is a vast amount of historical sea-ice information available in the various national sea-ice services,

(2) That an inventory of this information will be of great use in broad-scale scientific studies, such as climatic change and numerical modelling,

RECOMMENDS that a Catalogue of Historical Sea-ice Information be prepared and published by WMO on the basis of information obtained from National Sea-ice Services, using the Marine Environmental Data Information (MEDI) Referral System, along the lines as indicated in the annex to this recommendation.

Annex

WMO CATALOGUE OF HISTORICAL SEA-ICE INFORMATION

General layout of the catalogue:

Main headings

Satellite data

Aircraft observed data

Ship observed data

Composite charts

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Rec. 29 (CMM-VII) - MARINE ENVIRONMENTAL DATA INFORMATION (MEDI) REFERRAL SYSTEM

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Resolution IX-30 of the Ninth IOC Assembly inviting, amongst others, WMO to participate in the MEDI Referral System,

(2) Resolution 7 (EC-XXVIII) in which the Executive Committee agreed in principle that WMO participate in the MEDI Referral System subject to further technical studies by CMM and CBS.

CONSIDERING that the MEDI Referral System will constitute an efficient medium for research and exchange of desired marine environmental data on a world-wide scale,

RECOMMENDS that Members of WMO should participate in the MEDI Referral System by registering their marine data holdings with the IOC Secretariat;

REQUESTS the Secretary-General to follow the development of the MEDI and inform Members of WMO as appropriate.

Rec. 30 (CMM-VII) - REVISION OF RESOLUTIONS OF THE EXECUTIVE COMMITTEE BASED ON PREVIOUS RECOMMENDATIONS OF THE COMMISSION FOR MARINE METEOROLOGY

THE COMMISSION FOR MARINE METEOROLOGY,

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

CONSIDERING that many of these recommendations have become redundant in the meantime,

RECOMMENDS:

(1) That Resolutions 19 (EC-III) and 11 (EC-XXV) be no longer considered necessary;

(2) That Resolutions 15 (EC-XVII), 15 (EC-XXI), 12 (EC-XXV) and 14 (EC-XXV) be maintained in force.

Rec. 31 (78-CMM) - QUALITY CONTROL OF MARINE METEOROLOGICAL DATA

THE COMMISSION FOR MARINE METEOROLOGY

NOTING Section 7.4 of the Guide to Marine Meteorological Services (WMO Publication No. 471),

CONSIDERING:

(1) That marine meteorological data should be subject to the quality control necessary to ensure a satisfactory standard of accuracy for users,

(2) That the preparation of marine climatological summaries should be based on quality-controlled data,

(3) That automation of quality control is highly desirable for Members with an automatic computing capability,

RECOMMENDS:

(1) That, so far as possible, Members co-operating in data exchange for the Marine Climatological Summaries Scheme should:

(a) Scrutinize log-books prior to punching or keying to tape;

(b) Assure legality of coding for all elements;

(c) Assure internal consistency among elements within individual observations;

(d) Perform time series consistency checks which can be achieved, for example, by scrutiny of listed observations in time sequence order (as they appear in log-books);

(e) Review extremes;

(f) Review observations with respect to other data reported in the geographic vicinity at the same synoptic time;

(2) That particular care be taken in extreme value checks so as to avoid deleting genuine extreme values;

(3) That, whenever possible, these quality control procedures be performed with the assistance of automatic computers;

FURTHER RECOMMENDS that close collaboration should be maintained between CMM and CBS with regard to the development of quality control procedures for meteorological data.

Rec. 32 (78-CMM) - COASTAL MARINE CLIMATOLOGY

THE COMMISSION FOR MARINE METEOROLOGY

NOTING:

(1) General summary, paragraph 7.6.4 of the final abridged report of CMM-VII,

(2) Resolution 6 (CMM-VII),

CONSIDERING:

(1) That an urgent need exists to gain more knowledge of the climatology of coastal zones and off-shore waters which is essential for scientific purposes as well as for the planning of marine operations in these areas,

(2) That there is a general paucity of observational data from coastal and off-shore areas,

RECOMMENDS that Members concerned establish networks of marine meteorological observing stations in coastal and off-shore waters, if such a network is not already available, in order to build up statistical information necessary for studies of coastal marine climates.

Rec. 33 (78-CMM) - MARINE METEOROLOGICAL SERVICES ASSISTING IN THE PREVENTION OF MARINE POLLUTION INCIDENTS AND IN THE REDUCTION OF SEVERE CONSEQUENCES WHEN THEY OCCUR

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) The catastrophic consequences for coastal communities which oil spills at sea have had and are still expected to have,

(2) That at some harbour approaches in the world marine environmental information and forecasts are being used as an essential input in operations guiding the safe navigation of large oil tankers,

CONSIDERING:

(1) That marine environmental conditions are of utmost importance in relation to safe navigation of oil tankers in coastal and off-shore areas,

(2) That specialized marine meteorological services are needed to assist in marine operations designed to safeguard oil exploitation and transportation at sea,

(3) That in cases of severe marine pollution incidents, national meteorological services should be ready to respond expeditiously and adequately to requests for assistance, in view of catastrophic consequences which such incidents may have,

RECOMMENDS:

(1) That maritime Members, taking into account the relevant specifications of the Guide to Marine Meteorological Services (WMO-No. 471), establish as an urgent measure centres or groups of expertise which can expeditiously provide appropriate marine environmental information and forecasts:

(a) As an input in the national planning of measures to prevent marine pollution incidents;

(b) As an input in operations, where established, which are designed to guide the navigation of oil tankers or to assist other marine activities recognized to constitute a potential source of severe marine pollution;

(c) As an effective response to emergency requests when marine pollution incidents happen;

(2) That Members co-ordinate internationally, where possible, their marine meteorological services provided to bodies responsible for combatting marine pollution;

(3) That Members concerned submit to the Secretary-General of WMO information, for inclusion in an appropriate WMO publication, on their marine meteorological services provided to bodies responsible for combatting marine pollution, and update that information as necessary.

Rec. 35 (79-CMM) - MARINE CLIMATOLOGICAL SUMMARIES FOR THE OCEAN AREAS SOUTH OF LATITUDE 50°S

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Resolution 35 (Cg-IV),

(2) Recommendation 16 (CMM-VII) and the decisions of the Executive Committee on this recommendation contained in Resolution 7 (EC-XXIX).

(3) General summary, paragraph 3.2.5 (EC-XXX), containing a review of comments by Members signatory to the Antarctic Treaty on the arrangements proposed by Recommendation 16 (CMM-VII),

CONSIDERING:

(1) That in the spirit of Resolution 35 (Cg-IV) the same co-ordinating procedures between Members should be maintained for the ocean area south of latitude 50°S as are valid for all other ocean areas,

(2) That several Members have expressed interest in the collection and processing of marine climatological data from this ocean area,

(3) That studies of suitable ways of the preparation and publication of marine climatological information for this ocean area should start with the shortest possible delay,

RECOMMENDS:

(1) That the Federal Republic of Germany, Netherlands, U.S.A. and U.S.S.R. be invited to share responsibility for the collection and preparation of decadal summaries of marine climatological data from the ocean south of 50°S and starting with the year 1961;

(2) That the Federal Republic of Germany, Netherlands and U.S.A. be invited:

(i) To undertake initial collection of the data as follows:

(a) Federal Republic of Germany: data from the ocean area from meridian 70°W eastward to meridian 20°E;

(b) Netherlands: data from the ocean area from meridian 20°E eastward to meridian 170°W;

(c) United States of America: data from the ocean area from meridian 170°W eastward to meridian 70°W;

(ii) To forward regularly a copy of all collected data relating to ocean area south of 50°S to the U.S.S.R., for compilation of a complete data set;

(3) That the U.S.S.R. be invited to prepare summaries for the area south of 50 degrees south in accordance with the specifications for polar regions contained in the Guide to Marine Meteorological Services, WMO-No. 471, Section 7.2.5 and Annex 7-F;

(4) That Members be invited to submit all IMMPC data not already transmitted for the areas indicated in RECOMMENDS (2) above to the Federal Republic of Germany, Netherlands and U.S.A. respectively;

(5) That the Secretary-General arrange for all such data already collected in accordance with Resolution 35 (Cg-IV) for the areas indicated in RECOMMENDS (2) above to be transmitted to the Federal Republic of Germany, Netherlands and U.S.A. respectively.

Rec. 36 (80-CMM) - INTERNATIONAL SYSTEM OF SEA-ICE SYMBOLS*

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) General Summary, paragraph 8.2, of the Abridged Final Report of CMM-VII, in which a strong requirement for the development of uniform sea-ice symbols was expressed,

(2) The efforts made by the Working Group on Sea Ice to obtain agreement between national sea-ice information Services on an international sea-ice symbology system,

CONSIDERING:

(1) That the international system of sea-ice symbols contained in the annex to this recommendation appears to meet the requirements for inclusion of the various details on sea-ice charts,

*This recommendation was considered by the Executive Committee at its 33rd session. The Executive Committee approved the recommendation and requested the Secretary-General to include the International System of Sea-ice Symbols in WMO-No. 259 - WMO Sea-ice Nomenclature, as well as in WMO-No. 471 - Guide to Marine Meteorological Services (see Resolution 4 (EC-XXXIII)).

(2) That the use of this international system also enables the development of a uniform system of digitized sea-ice information for international exchange by magnetic tape,

RECOMMENDS:

(1) That the international system of sea-ice symbols contained in the annex to this recommendation be generally used by sea-ice information Services as from 1 October 1981;

(2) That the international symbology system be included in WMO Publication No. 259 - WMO Sea-ice Nomenclature, as well as in the Guide to Marine Meteorological Services;

REQUESTS the Chairman of the Working Group on Sea Ice, in accordance with paragraph (e) of the terms of reference of the Working Group, to undertake the necessary studies for the development of a uniform system of digitized sea-ice information for international exchange.

*

* *

Annex to Recommendation 36 (80-CMM)

INTERNATIONAL SYSTEM OF SEA-ICE SYMBOLS

1. Use

The international system of sea-ice symbols is intended for use on synoptic and prognostic ice charts which are issued by national ice centres, either by radio facsimile or by mail, primarily to serve operational marine activities. Charts transmitted by ice-observing units to users should also follow the international system. Additional symbols determined on the basis of regional or national requirements may be added, provided that they do not overlap or contradict the international system.

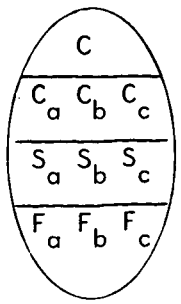
2. Main elements

The system encompasses ice elements and features which can be grouped under the following headings:

(i) Concentration (C)
(ii) Stage of development (S)
(iii) Form of ice (F)
(iv) Dynamic processes
(v) Water openings
(vi) Topography
(vii) Ice thickness
(viii) Stage of melting
(ix) Surface features
(x) Ice of land origin
(xi) Limits
(xii) Strips and patches

3. Main symbol

The basic data concerning concentration, stage of development (with amounts of up to three age classes) and form of ice are contained in a simple oval form (the egg; see Appendix 2 for examples).



C - Total concentration of ice in the area, reported in tenths (see code table in Appendix 1).

Note: Ranges of concentration may be reported; see example in Appendix 2.

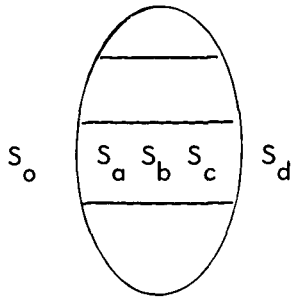
C_a C_b C_c - Partial concentration of thickest (C_a), second thickest (C_b) and third thickest (C_c) ice, in tenths.

Note: Less than 1/10 is not reported. 10/10 of one stage of development is reported by C, S_a and F_a or C S_a F_p F_s.

$S_a\ S_b\ S_c$ - Stage of development of thickest (S_a), second thickest (S_b) and third thickest (S_c) ice of which the concentrations are reported by C_a, C_b, C_c respectively (see code table and symbols in Appendix 1).

Notes:

(1) If more than one class of stage of development remains after the selection of S_a and S_b, S_c should indicate the class having the greatest concentration of the remaining classes (see also Note (2)).



(2) Reporting of S_a, S_b and S_c should generally be restricted to a maximum of three significant classes. In exceptional cases, further classes can be reported as follows:

with S_o - stage of development of ice thicker than S_a but having a concentration of less than 1/10;

S_d - stage of development of any other remaining class.

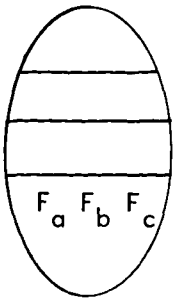
(3) No concentrations are reported for S_o and S_d.

Form of ice (F) - Two variants are possible according to the ice conditions observed:

First variant

$F_a\ F_b\ F_c$ - form of ice (floe size) corresponding to S_a, S_b and S_c respectively (see code table in Appendix 1).

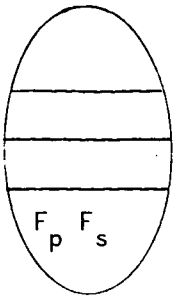
Notes:



(1) Absence of information on any one of these forms of ice should be reported with an "x" at the corresponding position.

(2) When icebergs are present in sufficient numbers to have a concentration figure, this situation can be reported with $F_a = 9$, the appropriate symbol for S_a and the corresponding partial concentration C_a^a (see example in Appendix 2).

Second variant



F_p F_s - Predominant (F_p) and secondary (F_s) floe size, reported independently from S_a, S_b and S_c (see code table in Appendix 1).

Note: If only predominant floe size (form of ice) is reported, only the symbol for F_p shall be reported (see examples in Appendix 2).

4. Symbols for dynamic processes

Compacting

Diverging

Shearing

Drift

Supplementary procedures (optional):

Compacting: ⟶ (degree) ⟵

degree: 1 - Slight compacting
2 - Considerable compacting
3 - Strong compacting

Drift: (in tenths of knots) ⟶ (e.g. 15 = 1.5 knots)

5. Symbols for water openings

Crack (symbol indicating presence of cracks in the area)

Crack (symbol for a crack at a specific location)

Lead or

Frozen lead (the orientation of the crosslines may be varied to distinguish them from other hatching lines)

Supplementary procedures (optional)

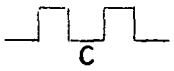
Lead (width) (width of lead in metres or kilometres, e.g. 100-300 m)

6. Symbols for topography features

Ridges/hummocks f $\frac{\blacktriangle\blacktriangle}{C}$ $\bar{h}/h_x$

Concentration (areal coverage) C in tenths
Frequency f in number per nautical mile (f is an alternative for C)
Mean height $\bar{h}$ and maximum height h_x are expressed in decimetres.

Note: The data for C or f, $\bar{h}$ and h_x are added where known.

Rafting 

Concentration C as above to be added where known.

Windrow 

7. Symbol for ice thickness

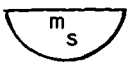
Thickness measured $\boxed{t_E}$ (t_E in centimetres)

Thickness estimated $\boxed{t_E}$ (example: $\boxed{35}$)

When more than one measurement has been taken, both mean and maximum thickness are reported as shown:

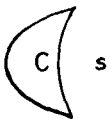
$\boxed{30/40_x}$

8. Symbol for stage of melting

Stage of melting 

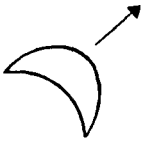
(see code table for m_s in Appendix 1).

9. Symbol for surface features

Snow cover: 

C - concentration (areal coverage) in tenths
s - snow depth, according to WMO Code 3800

The orientation of the symbol will show the direction of sastrugi, as follows:



10. Symbols for ice of land origin

	Growler and/or bergy bit	
	Iceberg (size unspecified)	
	Iceberg, small	
	Iceberg, medium	
n = number from WMO Code 2877	Iceberg, large	
	Iceberg, very large	
(Triangular symbol as at right)	Tabular berg indicated by adding a horizontal line through any of the above, e.g.	
YY day of month sighted	Ice island	
	Radar target (suspected berg)	
Ice of sea origin:	Floeberg	

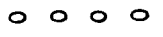
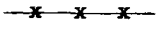
Note: The right-hand column of symbols may be used when many bergs are present but actual numbers are not known.

Specification of icebergs (as established by the International Ice Patrol Service):

Size	Height (m)	Length (m)
Growler & bergy bit	up to 5	less than 15
Iceberg, small	6-15	16-60
Iceberg, medium	16-45	61-122
Iceberg, large	46-75	123-213
Iceberg, very large	over 75	more than 213

Note: Sizes refer to the above-water portion only. If height and length of a berg fall into different size classifications, use the larger size. Dimensions (in kilometres) of a tabular berg or ice island may be indicated beneath the symbol.

11. Symbols for limits

Undercast	
Limit of visual observations	
Limit of radar observations	
Ice edge by radar	

Observed edge or boundary (Visual or satellite) ————————

Estimated edge or boundary – – – – – – –

12. Symbol for strips and patches

Strips and patches ∾ C

C - concentration in tenths of ice within the area of strips and patches (Optional addition).

The symbol ∾ C is placed within the main "oval" symbol in the section reserved for "Form of ice" (see example in Appendix 2).

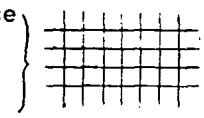
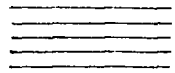
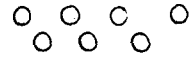
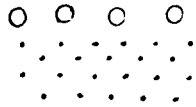
13. Supplementary procedures for indicating total concentration

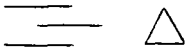
In order to facilitate readability of the chart, ice-covered areas may be hatched according to total ice concentration. Hatching may be applied to all areas of ice concentration or only to some of them. Whenever hatching is applied, the hatching symbols as shown below shall be used. No international rules are given for the spacing or thickness of the hatching lines: the thickness may be the same throughout all hatched areas, or may vary in the sense that thickest lines are used for areas of thicker ice.

14. Symbols for the hatching of total concentration of sea ice

Fast ice  or  With national variation of hatching to show stage of development

Concentration

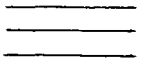
10/10	Consolidated pack ice compact	
9-10/10	Very close pack ice	
7-9/10	Close pack ice	
4-6/10	Open pack ice	 (Line spacing is twice that of close pack ice)
1-3/10	Very open pack ice	
<1/10	Open water	
0	Ice free	

Bergy water 

Presence of new ice  (symbols may be scattered)

15. Additional symbols for regional use

Symbol adopted for use in the Baltic Sea area:

Level ice  (Line spacing is twice that of close pack ice)

ANNEX I, APPENDIX 1

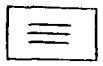
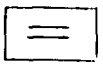
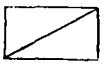
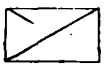
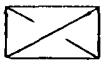
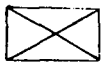
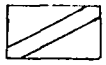
TABLES OF ICE SYMBOLS

Total concentration of ice (C)

Concentration	Symbol
Ice free	0
Less than one tenth	1
1/10	2
2/10	3
3/10	4
4/10	5
5/10	6
6/10	7
7/10	8
8/10	9
9/10	9+
More than 9/10 less than 10/10	10
10/10	

Stage of development and thickness

(S_o S_a S_b S_c S_d)

Numerical classification in International Glossary	Element	Thickness	Symbol	Alternative symbol
	No stage of development	-	0	
2.1	New ice	-	1	
2.2	Nilas; ice rind	<10 cm	2	
2.4	Young ice	10-30 cm	3	
2.4.1	Gray ice	10-15 cm	4	
2.4.2	Gray-white ice	15-30 cm	5	
2.5	First-year ice	30-200 cm	6	
2.5.1	Thin first-year ice	30-70 cm	7	
2.5.1a	Thin first-year ice, first stage	30-50 cm	8	
2.5.1b	Thin first-year ice, second stage	50-70 cm	9	
2.5.2	Medium first-year ice	70-120 cm	1.	
2.5.3	Thick first-year ice	>120 cm	4.	
2.6	Old ice		7.	
2.6.1	Second-year ice		8.	
2.6.2	Multi-year ice		9.	
10.4	Ice of land origin		▲.	▲

Notes:

(1) Use of symbols (figures):

On the horizontal line giving S_o S_a S_b S_c S_d only one dot (•) is to be placed to indicate the distinction between classes of any ice having a thickness over 70 cm (symbols 1. to 9.) from classes with thickness below 70 cm (symbols 1-9).

Examples:

S_a = 2.5.2)
S_b = 2.5.1)
S_c = 2.4)

Symbol: 1·7 3

S_a = 2.6)
S_b = 2.5.3)
S_c = 2.5)

Symbol: 7 4·6

S_o = 2.6)
S_a = 2.5.3)
S_b = 2.5.1)
S_c = 2.4)

Symbol: 7 4·7 3

S_a = 2.5.1a)
S_b = 2.4.2)
S_c = 2.1)

Symbol: 8 5 1

S_o = 2.5.2)
S_a = 2.5.1a)
S_b = 2.4.2)
S_c = 2.1)

Symbol: 1• 8 5 1

(2) The dot-symbol which indicates a distinction between classes of stage of development should be placed midway between the top and the bottom of the figures.

(3) Thickness figures for old ice, second-year ice and multi-year ice will be included in this table pending appropriate revision of the International Sea-ice Nomenclature. The separation of thin first-year ice into first and second stages (2.5.1a and b) will also be addressed at the same time.

Form of ice

(F_a F_b F_c F_p F_s)

Element	Symbol
Pancake ice	0
Small ice cake; brash ice	1
Ice cake	2
Small floe	3
Medium floe	4
Big floe	5
Vast floe	6
Giant floe	7
Growlers or floebergs	8
Ice bergs	9
Undertermined or unknown	x (for F_a F_b F_c only)

Stage of melting

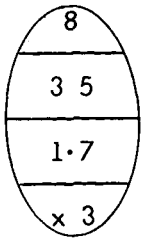
(m_s)

Element	Symbol
No melt	0
Few puddles	1
Many puddles	2
Flooded ice	3
Few thawholes	4
Many thawholes	5
Dried ice	6
Rotten ice	7
Few frozen puddles	8
All puddles frozen	9

ANNEX I, APPENDIX 2

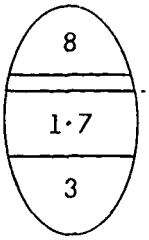
EXAMPLES OF THE USE OF THE "OVAL" SYMBOL

Example 1



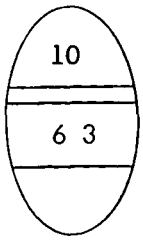
8 tenths of ice; 3 tenths of medium and 5 tenths of thin first-year ice; floe size of medium first-year ice is not known; the floe size of thin first-year ice is small floe.

Example 2



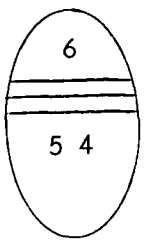
8 tenths of ice; medium and thin first-year ice of which the partial concentrations are not given; predominant floe size is small floe.

Example 3



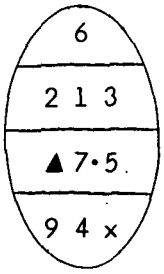
10 tenths of ice; first-year and young ice of which the partial concentrations are not given; no information on form of ice (this example applies particularly to satellite data).

Example 4



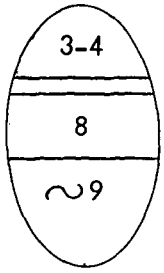
6 tenths of ice in big and medium floes; stages of development not given and therefore there are no partial concentrations.

Example 5



6 tenths of ice; 2 tenths concentration of ice bergs, one tenth of old ice and 3 tenths of gray-white ice; the floe size of old ice is medium floe.

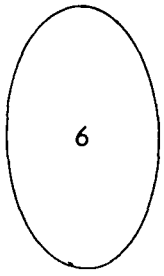
Example 6



3 to 4 tenths of ice; all thin first-year ice of 30-50 cm thickness; in strips and patches where the concentration is 9 tenths.

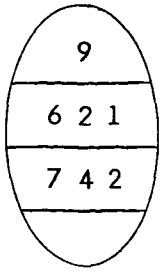
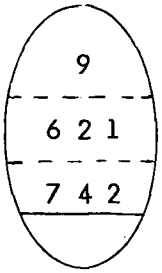
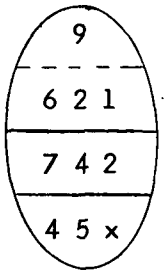
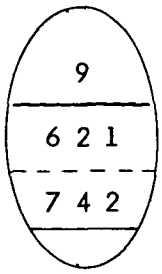
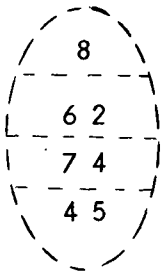
(With one stage of development, indication of partial concentration is not needed).

Example 7



6 tenths of ice; no other details given.

In general, throughout the symbology solid lines are used for observed data and dashed lines for estimates. For indicating estimates in the "oval", see following examples.

Known data	Estimated data	Missing data	Symbol
Concentration, partial concentrations and stage of development		Floe size	
Concentration	Partial concentrations and stage of development	Floe size	
Concentration, stage of development and floe size	Partial concentrations		
Concentration and partial concentration	Stage of development	Floe size	
	All data		

LIST OF DOCUMENTS

I. "DOC" series

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1	Provisional agenda	2.2	
2	Explanatory memorandum relating to the provisional agenda	2.2	
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4	Marine climatological summaries scheme ADD. 1	7.2	Secretary-General
5	International Maritime Meteorological Punch Card (IMMPC)/International Maritime Meteorological Tape (IMMT) Add.1	7.3	Secretary-General
6	Review of Technical Regulations of interest to CMM	9	Secretary-General
7	Report by the Rapporteur on Marine Telecommunications	4, 6.4	Rapporteur
8	Report by the chairman of the CMM Working Group on Marine Climatology	4, 7	Chairman of the working group
9	Report by the Rapporteur on the Study of Satellite Data Requirements for Marine Meteorological Services	4, 6.2	Rapporteur
10	Education and training in the field of CMM	11	Secretary-General

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12	Contribution of CMM to the World Climate Programme	7.1	Secretary-General
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14	Services for the high seas Marine Meteorological Services monitoring-ship programme	5.1	Secretary-General
15	Services for the high seas Provision of information by radio facsimile for marine purposes	5.1, 9	Chairman of the Working Group on Marine Meteorological Services
16	Report by the Rapporteur on the Development of Methods for Measuring Precipitation over the Oceans	4, 6.1	Chairman of the Group of Rapporteurs on Technical Problems
17	Report by the chairman of the Working Group on Marine Meteorological Services	4, 5	Chairman of the working group
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18	Report by the chairman of the Working Group on Sea Ice	4, 8	Chairman of the working group
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19	Report by the Rapporteur on Comparison of Sea-surface Temperature Data Observed by Different Methods, including Remote Sensing	4, 6.1	Chairman of the Group of Rapporteurs on Technical Problems
20	Report by the president of the Commission	3	President of CMM
21	Regional projects related to marine meteorological services	5.4	Secretary-General
22	Report by the chairman of the Group of Rapporteurs on Technical Problems	4, 6.1	Chairman of the group of rapporteurs

Doc. No.	Title	Agenda item	Submitted by
23	Marine Climatological Summaries Scheme	7.2	Netherlands
24	Report by the Rapporteur on the Intercalibration of Surface-based and Remotely sensed Data, except Sea-surface Temperature Data, to be used in Marine Applications	4, 6.1	Chairman of the Group of Rapporteurs on Technical Problems
25	Report by the Rapporteur on the Automation of Observational Methods on board Ship	4, 6.1	Chairman of the Group of Rapporteurs on Technical Problems
26	Marine observing methods and instrumentation Programme on waves	6.1	Chairman of the Group of Rapporteurs on Technical Problems
27	Requirements for reporting codes ADD.1	6.3	Secretary-General
28	Requirements for basic WWW facilities and products	5.5, 6.2	Secretary-General
29	Relationship with joint IOC/WMO programmes and projects	12	Secretary-General
30	Services for coastal and offshore areas A VHF radio weather broadcast service transmitting marine meteorological information for recreational boating and other small craft	5.2	Norway
31	Report by the Rapporteur on the Review of Reference Height for and Averaging Time of Surface-wind Measurement at Sea	4, 6.1	Chairman of the Group of Rapporteurs on Technical Problems
32	Marine meteorological services Results of an inquiry on marine meteorological services among shipmasters	5	Secretary-General

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33	Marine meteorological services Information on weather-routeing services	5	Federal Republic of Germany
34	Marine telecommunication arrangements for data transmission and collection ADD.1	4, 6.3, 6.4	United Kingdom
35	Marine observations and data collection - Report of the WMO Technical Conference on the Automation of Marine Observations and Data Collection	6	Secretary-General
	II. "PINK" series		
1	Report to plenary on items 3 and 4 - Report by the President of the Commission - Reports by the chairmen of working groups and by rapporteurs	3, 4	President of the Commission
2	Report to plenary on items 1 and 2 - Opening of the session - Organization of the session	1, 2	President of the Commission
3	Report to plenary on item 11 - Education and training in the field of CMM	11	President of the Commission
4	Report to plenary on item 12 - Relationship with Joing IOC/WMO programmes and projects	12	President of the Commission
5	Report to plenary on item 10 - Guides and other technical publications	10	President of the Commission
6	Report to plenary on item 9 - Review of Technical Regulations of interest to CMM	9	President of the Commission

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7	Report of Committee A to plenary on item 6.1 - Marine observing methods and instrumentation	6.1	Chairman, Committee A
8	Report of Committee B to plenary on item 5.1 - Services for the high seas	5.1	Chairman, Committee B
9	Report to plenary on item 3 - Report by the President of the Commission	3	President of the Commission
10	Report of Committee B to plenary on items 6.2 and 6.3 - Observational data requirements - Requirements for reporting codes	6.2 and 6.3	Chairman, Committee B
11	Report of Committee B to plenary on items 6.4 - Marine telecommunication arrangements for data transmission and collection	6.4	Chairman, Committee B
12	Report of the Nominations Committee to plenary on item 15 - Election of officers	15	Chairman, Nominations Committee
13	Report of Committee A to plenary on item 7.1 - Contribution of CMM to the World Climate Programme	7.1	Chairman, Committee A
14	Report of Committee A to plenary on item 7.3 - International Maritime Meteorological Punch Card (IMMPC)/ International Maritime Meteorological Tape (IMMT)	7.3	Chairman, Committee A
15	Report of Committee B to plenary on items 5.2, 5.3, 5.4 and 5.5 - Services for coastal and offshore areas - Services for main ports and harbour areas	5.2, 5.3, 5.4, 5.5	Chairman, Committee B

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	- Regional projects related to Marine Meteorological services - Requirements for basic WWW facilities and products		
16	Report of Committee B to plenary on item 5.5 - Requirements for basic WWW facilities and products	5.5	Chairman, Committee B
17	Report of Committee A to plenary on item 7.2 - Marine Climatological Summaries Scheme	7.2	Chairman, Committee A
18	Report of Committee A to plenary on item 7.4 - Other marine climatological projects	7.4	Chairman, Committee A
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20	Report of Committee A to plenary on item 8 - Sea ice	8	Chairman, Committee A

LIST OF ABBREVIATIONS

ALPEX	Alpine Experiment
BATHY	Bathy Thermograph Report
CBS	Commission on Basic Systems
CCCO	Committee on Climate Changes and the Ocean
CIMO	Commission on Instruments and Methods of Observation
DCP	Data Collection Platform
FAO	Food and Agriculture Organization
FGGE	First GARP Global Experiment
GARP	Global Atmospheric Research Project
GDPS	Global Data-processing System
GOS	Global Observing System
GTS	Global Telecommunication System
ICS	International Chamber of Shipping
ICSU	International Council of Scientific Unions
IDOE	International Decade of Ocean Exploration
IFSMA	International Federation of Shipmasters Associations
IGOSS	Integrated Global Ocean Services System
IMCO	Inter-Governmental Maritime Consultative Organization
INMARSAT	International Maritime Satellite consortium
IOC	Intergovernmental Oceanographic Commission
IODE	IOC Working Committee on International Oceanographic Data Exchange
ITU	International Telecommunications Union
JSC	Joint Scientific Committee
NMC	National Meteorological Centre
NORPAX	North Pacific Experiment
ODAS	Ocean Data Acquisition System
POMS	Pilot Ocean Monitoring Study
RMC	Regional Meteorological Centre
RMMP	Regional Marine Meteorological Programme
SCOR	Scientific Committee on Ocean Research
SECTIONS	U.S.S.R. Project for Oceanographic Monitoring Studies
STAC	Scientific and Technical Advisory Committee
TESAC	Temperature, Salinity, Current Message
WARC	World Administrative Radio Conference
WCAP	World Climate Applications Programme
WCDP	World Climate Data Programme
WCIP	World Climate Impact Studies Programme
WCRP	World Climate Research Programme
WESTPAC	IOC Working Group for the Western Pacific
WMC	World Meteorological Centre
WWW	World Weather Watch