

WORLD METEOROLOGICAL ORGANIZATION

**COMMISSION
FOR MARINE METEOROLOGY**

ABRIDGED FINAL REPORT

OF THE

NINTH SESSION

Geneva, 1-12 October 1984



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LIST OF PERSONS ATTENDING THE SESSION

1. Officers of the session

| | |
|----------------|----------------|
| K. P. Vasiliev | president |
| H. Voss | vice-president |

2. Representatives of Members of WMO

| | | |
|------------------------|--------------------|-------------------|
| M. R. Noune (1-7.X.) | principal delegate | Algeria |
| A. Zehar (8-12.X.) | principal delegate | |
| M. Ouhadda | delegate | |
| M. Bombarda Jr. | principal delegate | Angola |
| M. S. Custodio | delegate | |
| D. J. Linforth | principal delegate | Australia |
| F. Elskens | principal delegate | Belgium |
| C. Funes-Noppen (Miss) | alternate | |
| P. C. Lima | principal delegate | Brazil |
| O. Delev | principal delegate | Bulgaria |
| A. D. J. O'Neill | principal delegate | Canada |
| A. H. Campbell | delegate | |
| Fang Qi | principal delegate | China |
| Guo De Xi | delegate | |
| Yang Huating | delegate | |
| Lu Jialian (Mrs.) | delegate | |
| L. A. Luna | principal delegate | Colombia |
| Ch. Yiangou | principal delegate | Cyprus |
| G. Stougaard Nielsen | principal delegate | Denmark |
| H. H. Valeur | delegate | |
| P. Mälkki | principal delegate | Finland |
| M.-L. Komulainen (Mrs) | delegate | |
| F. Gérard | principal delegate | France |
| C. Billard | delegate | |
| J. O. Holz | principal delegate | German Democratic |
| G. Schmager | delegate | Republic |
| H. Voss | principal delegate | Germany, Federal |
| L. Hoffmann | delegate | Republic of |
| A. Kresling | delegate | |

2. Representatives of Members of WMO (contd.)

| | | |
|----------------------|--------------------|-------------------|
| G. Kassimidis | principal delegate | Greece |
| L. Diallo | principal delegate | Guinea |
| B. Alassane | delegate | |
| Tze-Shan Cheng | principal delegate | Hong Kong |
| M. H. Ghotby | principal delegate | Iran, Islamic |
| M. M. Zakarian | delegate | Republic of |
| L. Burke | principal delegate | Ireland |
| Y. Sekiguchi | principal delegate | Japan |
| S. Ochieng | principal delegate | Kenya |
| M. O. Odido | delegate | |
| M. J. El-Ghadi | principal delegate | Libyan Arab |
| M. H. Ahmed Ghariani | delegate | Jamahiriya |
| S. Ragoonaden | principal delegate | Mauritius |
| V. Montemayor | principal delegate | Mexico |
| A. Belhouji | principal delegate | Morocco |
| W. D. Moens | principal delegate | Netherlands |
| C. G. Korevaar | delegate | |
| L. J. Mahieu | delegate | |
| Y. Salahu | principal delegate | Nigeria |
| E. O. Mkpnam | delegate | |
| J. Guddal | principal delegate | Norway |
| E. Småland | alternate | |
| S. H. Abdul Ali | principal delegate | Oman |
| A. M. Al-Ba-Omar | delegate | |
| A. L. Al-Huneidi | delegate | |
| N. Pantoja (Mrs) | principal delegate | Peru |
| I. H. Al Majed | principal delegate | Qatar |
| Jee-Yong Lee | principal delegate | Republic of Korea |
| A. Jansa | principal delegate | Spain |
| T. Thompson | principal delegate | Sweden |
| T. Jedidi | principal delegate | Tunisia |
| M. Senhan | principal delegate | Turkey |
| E. Apakan | delegate | |

2. Representatives of Members of WMO (contd.)

| | | |
|------------------|--------------------|--|
| V. Savtchenko | principal delegate | Union of Soviet Socialist Republics |
| K. P. Vasiliev | delegate | |
| V. Bakoumov | delegate | |
| V. Loskhilov | delegate | |
| G. V. Mackie | principal delegate | United Kingdom of Great Britain and Northern Ireland |
| J. Marsh | delegate | |
| R. J. Shearman | delegate | |
| U. Lifiga | principal delegate | United Republic of Tanzania |
| P. Wolff | principal delegate | United States of America |
| G. D. Cartwright | delegate | |
| G. Hamilton | delegate | |
| R. Landis | delegate | |

3. Lecturers

J. Guddal
E. Rasmusson
R. J. Shearman
M. Taillade
K. P. Vasiliev

4. Observers from other international organizations

| | |
|-------------------------------------|--|
| Y. Treglos | United Nations Educational, Scientific and Cultural Organization (Unesco) |
| Y. Treglos J. R. Wilson | Intergovernmental Oceanographic Commission (IOC) |
| T. Kvinge | European co-operation in the field of scientific and technical research (COST-43) |
| M. A. Calder | International Chamber of Shipping (ICS) |
| A. H. Ris | International Federation of Shipmasters Associations (IFSMA) |
| J. C. Bell | International Maritime Satellite System Organization (INMARSAT) |
| A. Almoman M. Elmay M. Oreibi | League of Arab States |

4. Observers from other international organizations (contd.)

| | |
|-------------|--|
| J. Howard | Oil Industry International Exploration and |
| G. Verboom | Production Forum (E. and P. Forum) |
| M. Taillade | Service ARGOS (CNES) |
| L. Mesnier | |

5. WMO Secretariat

| | |
|-------------|--|
| G. K. Weiss | Director, World Weather Watch Department; representative of the Secretary-General |
| A. Kabakibo | Director, Languages, Publications and Conferences Department |
| S. Mizuno | Chief, Ocean Affairs Division, World Weather Watch Department |
| P. Dexter | Ocean Affairs Division, World Weather Watch Department |
| G. Tourov | Training Activities Division, Education and Training Department |

GENERAL SUMMARY OF THE WORK OF SESSION

1. OPENING OF THE SESSION (Agenda item 1)

1.1 The ninth session of the Commission for Marine Meteorology was opened by the president of the Commission, Prof. K. P. Vasiliev, at 10h00 on 1 October 1984 at the "Centre international de conférences de Genève" (CICG), Switzerland.

1.2 On behalf of WMO, Dr G. O. P. Obasi, Secretary-General, welcomed delegates to the ninth session of the Commission for Marine Meteorology and to Geneva. In doing so, he indicated particularly that he himself, and all the staff of the Secretariat, were available to assist the delegates in accomplishing their work throughout the session. In reviewing the general Marine Meteorology Programme of WMO, Dr Obasi stressed the importance of the Commission's role in ensuring the successful continuation and development of this Programme. The Secretary-General outlined the factors leading to wide-ranging and fundamental changes in all aspects of marine meteorology, including the tailoring of services to meet a variety of new user requirements. He drew the Commission's attention to the broad policy guidelines provided by Ninth Congress for the work of the Commission. Particularly stressed were new marine services for specific user groups, improvements to the quality and quantity of the services provided, and the significant role to be played by INMARSAT, Service Argos and the geostationary meteorological satellites in the collection of marine data and dissemination of marine products. The Secretary-General commended the development of marine climatologies and the support of the World Climate Programme by the Commission and responsible Members, and urged a continuation of these efforts. In addition, he specially mentioned the co-operative work with IOC in furthering all the basic elements of the IGOSS programme and recommended that this work be continued and expanded. When developing its work programme for the coming years, the Secretary-General reminded the Commission of Ninth Congress's decision that long-term planning should become a fundamental part of the planning process within WMO and requested that the Commission pay particular attention to its contribution to the Second WMO Long-term Plan. Finally, he stressed the role of marine meteorology as a service to all mankind in the proper economic and social development of all countries and the rational use of ocean resources. Dr Obasi concluded by paying a special tribute to Prof. Vasiliev for his work in guiding the Commission so well over the past eight years and wished him every success in the future. He then thanked the Swiss Government for their provision of the excellent facilities of the International Conference Centre for this meeting and wished the session every success in accomplishing its work.

2. ORGANIZATION OF THE SESSION (agenda item 2)

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

At the first plenary meeting the representative of the Secretary-General presented a list of Members whose credentials had been found valid. This list was accepted as the first report on credentials. Reports on credentials were submitted to subsequent plenary meetings and were accepted by the Commission. It was 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 this report, together with a list of resolutions and recommendations and of relevant documents.

2.3 Establishment of committees (agenda item 2.3)

2.3.1 Working Committees

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

- (a) Committee A to deal with agenda items 6.1, 6.2, 6.3, 7 and 8, and the relevant parts of 4, 9, 10 and 16. Mr F. Gérard (France) was elected chairman and Mr R. Shearman (UK) vice-chairman;
- (b) Committee B to deal with agenda items 5, 6.4 and 6.5, and the relevant parts of 4, 9, 10 and 16. Mr R. C. Landis (USA) was elected chairman and Dr V. Savtchenko (USSR) vice-chairman.

The session decided to deal with agenda items 3, 4, 11, 12 and 13 as a Committee of the Whole chaired by the president of the Commission.

2.3.2 Co-ordination Committee

In accordance with Regulation 27 of the WMO General Regulations, a Co-ordination Committee was established consisting of the president, the vice-president, the chairmen of the working committees and the Secretary-General's representative.

2.3.3 Nominations Committee

To facilitate the election of the officers of the Commission, a Nominations Committee was established consisting of the principal delegates of Australia, Brazil, Finland, the United Republic of Tanzania, Japan, and the USA.

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, in accordance with the WMO General Regulations, no minutes of the session would be prepared, but that statements by delegations might be reproduced and distributed as and when requested, in accordance with Regulation 110.

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

3.1 In his report to the Commission, Prof. K. P. Vasiliev, president of CMM, gave a short account of the activities of the Commission since its eighth session. Over the past three years, the Commission membership had grown considerably, indicating an increasing international support for marine meteorology. The eighth session of the Commission had established five working groups and one rapporteur and a variety of assignments had been

carried out, both within WMO and elsewhere, in co-ordination with related organizations, in the areas of marine meteorological services, marine climatology, sea ice, technical problems and marine telecommunications. Prof. Vasiliev outlined the most important tasks for the coming period: the continued support of and improved contributions to the World Weather Watch and World Climate Programmes; the extension of services to marine user groups with the production of advisory material based on the latest scientific and technical information, including advances related to satellites; and active participation in programmes which promoted international co-operation in marine meteorology such as IGOSS and the WMO Wave Programme. The president thanked all members of CMM, particularly the vice-president, the chairmen and members of working groups and the Rapporteur on Marine Telecommunications for conscientiously fulfilling their obligations. He also expressed his appreciation to the Secretary-General and his staff for their valuable contributions and support during the last term. Finally, Prof. Vasiliev praised the co-operation between CMM, other WMO technical commissions and international organizations such as FAO, IMO and IOC which had facilitated the implementation of projects contributing to the advancement of WMO activities.

3.2 The Commission noted with great satisfaction and appreciation the report of the president of CMM and the activities of the Commission since its eighth session and paid a special tribute to the president for his leadership during his eight years in office. 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.

3.3 The Commission was pleased to note that all regional associations had nominated experts to the CMM Working Group on Marine Meteorological Services, recognizing in particular the progress made in marine meteorology in the Arabian Sea, the Gulf of Oman, the Mediterranean Sea and the South-east Pacific (where the "El Niño" phenomenon was especially important). The Commission was also pleased to learn that countries in the Gulf region had been active in implementing marine meteorological developments following the Regional Marine Meteorological Programme Agreement. The Commission hoped that this form of regional co-operation would particularly aid investigations into local marine meteorological features.

3.4 The Commission stressed the importance of changes in marine telecommunications with the introduction of INMARSAT for the collection and dissemination of ships' observational data and forecast products as well as other marine information.

3.5 The Commission emphasized that the excellent working relationships which had been maintained with other international organizations, such as the Intergovernmental Oceanographic Commission (IOC), the Food and Agriculture Organization (FAO), the International Maritime Organization (IMO) and others, had contributed to the successful implementation of operational and scientific programmes relating to the oceans and should be continued. In particular, it was felt that, with the ever-increasing requirement for marine services involving both meteorological and oceanographic elements, coupled with the increasing importance of real-time ocean modelling to medium- to long-range meteorological forecasting, the co-operation between meteorologists and oceanographers should develop even further in the future, both at the national level and through the continued expansion of IGOSS.

3.6 The Commission felt that there was a need to re-establish the CMM Advisory Working Group, which should continue to assist the president of the Commission in the co-ordination and direction of the work of its working groups and rapporteurs and in the continued development of the Marine Meteorology Programme section of the Second WMO Long-term Plan, as well as in furthering co-operation with other WMO bodies, particularly the technical commissions and regional associations, and with other international organizations such as IOC. Resolution 1 (CMM-IX) was adopted.

3.7 The Commission considered the future work programme in the light of the general policy guidance and priority activities outlined by Ninth Congress, bearing in mind the requirements of the Second WMO Long-term Plan, and adopted the list of major tasks proposed for CMM for 1985-1989 (see Annex I).

3.8 The Commission reviewed its present and planned activities and felt that its main tasks continued to be the collection and analysis of marine meteorological data and the provision of marine services, thereby providing a direct contribution to the support and improvement of the WWW and the WCP. Technological advances would ensure that CMM's major concerns remained in the following areas: the expansion of observing systems; the improvement of observing standards and equipment; the utilization of new means of marine data collection, telecommunications and data storage. In addition, the Commission felt that the provision of marine services to an ever-widening range of marine user groups depended to a large extent on input from and the use of WWW to exchange marine meteorological data between marine meteorological forecasting offices.

3.9 The Commission noted with satisfaction the successful completion of technical reports on drifting buoys and ice accretion and the good progress made on the WMO Wave Programme. It agreed that CMM should continue to support both the Wave Programme and the use of experts to produce technical reports on aspects of marine meteorology and associated technology for use in training and advisory programmes internationally. At the same time, it considered that the question of developing standard procedures for the reduction of wind-speed measurements at sea to a given reference level was important to certain users and decided that this problem should be kept under close review.

3.10 The Commission commended the progress made in co-operation with the WCP towards the establishment of marine climatological data banks to include archival material and sea-ice information. It appreciated the efforts made to improve the quality control of data and urged Members to continue co-operating in the extension of this activity.

United Nations Convention on the Law of the Sea

3.11 The Commission noted the decision of Ninth Congress that, in view of a number of aspects of the United Nations Convention on the Law of the Sea, relating to WMO's activities concerning the ocean, the relevant provisions of the Convention should be kept under constant review. This resolution requested the Secretary-General:

- (a) To arrange, in close consultation with the president of CMM, for a continuing review of the implications of the legal

provisions of the Convention on the ocean-related activities of WMO with a view to informing the United Nations and Members of WMO, as appropriate; and

- (b) To take action, as necessary, to ensure that the ocean-related activities of WMO, both operational and scientific, are carried out under the most favourable conditions.

The Commission requested its president to arrange for the undertaking of any studies and action which might be required in this respect, in consultation with the Secretariat.

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

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

5. MARINE METEOROLOGICAL SERVICES (agenda item 5)

Report by the chairman of the Working Group on Marine Meteorological Services

5.1 The Commission considered the report submitted by Mr W. Moens (Netherlands), chairman of the Working Group on Marine Meteorological Services and expressed its appreciation to his working group for the work carried out during the intersessional period. It was evident that the chairman and the members of his working group had had to deal with a number of complex matters within the rather limited time but with a constructive outcome. These efforts were particularly valuable in promoting the implementation of Members' responsibilities as specified in the Manual on Marine Meteorological Services. In this connection the Commission noted the view expressed by Ninth Congress that the full potential of the marine meteorological services programme could not be realized unless Members were able to fulfil their responsibilities as specified in the Manual. It further noted that Congress had appreciated the fact that an increasing number of developing countries were assuming international responsibilities for providing such services and that these countries should be aided through the transfer of knowledge and appropriate assistance programmes.

Seminars on marine meteorological services

5.2 It was recalled that, at its eighth session, the Commission had been of the opinion that regional training seminars or workshops would greatly promote the implementation of marine meteorological activities in developing countries and strongly recommended that regional seminars should be organized. The main purpose of such seminars was to enable meteorologists responsible for marine meteorological services to keep abreast of the evolving requirements of international shipping for weather and related oceanographic information and of methods and techniques currently used for the analysis and forecast of marine meteorological conditions. The Commission was pleased to note that the first such seminar had been held in Bombay, India, in December 1983 for RA II/RA V with much success and that a roving seminar was being organized for RA III/RA IV in 1984 and a seminar for RA I (in English and French separately) in 1985. The Commission expressed its appreciation to

Congress and the Executive Council for providing the necessary financial support for these valuable undertakings, which should, it was urged, be made on a regular basis for the promotion of knowledge and transfer of technology between developed and developing countries.

5.3 The question was raised whether it was preferable to hold a seminar at a given location or to organize roving seminars visiting a few countries. It was explained that roving seminars had been introduced in order, mainly, to economize funds whilst maintaining the total number of participants. The Commission, realizing the advantages and disadvantages of both types of seminar, suggested that the decision in this respect should be made in consultation with the presidents of regional associations concerned and the president of CMM as necessary. However, it expressed its preference for seminars organized at a single location, if circumstances so allowed.

Updating of "Marine services programme to the year 2000"

5.4 The Commission recalled that the Study Group Meeting on the Provision of Marine Meteorological Information to Shipping (Geneva, September 1982) had produced a document entitled "Marine services programme to the year 2000". This document, which had already been circulated to members of CMM, had been submitted to the session in a consolidated form. The Commission placed a high value on this document which reflected, it felt, the evolving trend of requirements of international shipping and other marine user groups and the emphasis upon services being directed towards meeting these requirements. It suggested that the document should be reviewed and updated for the tenth session of the Commission. The Commission recognized that the document had already been considered in formulating the Marine Meteorology Programme part of the Second WMO Long-term Plan and requested that updated versions should also be used for future long-term planning purposes. It referred this matter to the Working Group on Marine Meteorological Services for further study in the light of the comments offered by CMM-IX. The Commission took this occasion to place on record its appreciation to Mr M. Calder, representative of the International Chamber of Shipping, for his valuable contribution in the production of this document.

Distribution of marine meteorological information

5.5 The Commission recalled that, at its eighth session, it had been decided to include information concerning the availability of weather routing services in Volume D of WMO-No. 9. It noted in this connection that the International Maritime Organization (IMO) at its 13th Assembly in November 1983, had adopted a resolution on the provision of weather-routing services to shipping, recommending governments concerned to advise their ships of the availability of weather routing, particularly that published in Volume D of WMO-No. 9. With regard to the inclusion of non-governmental weather routing services in Volume D, the Commission decided to maintain the present practice, i.e. that the national contacts included in Volume D provide, on request, further information on the commercial weather-routing services available in their countries.

5.6 Under this item, the Commission was informed of a study being undertaken by the Working Group on Marine Meteorological Services concerning the standard format of weather forecasts for offshore platforms and, in this connection, it was presented with the standard format used in the North Sea. The Commission considered this as another good example of the expansion of

marine meteorological services and expected similar developments in other regions. It decided to refer this subject to the Working Group on Marine Meteorological Services for further consideration.

Monitoring of marine meteorological services

5.7 By its Recommendation 1 (CMM-VIII) the eighth session of CMM had decided to institute a marine meteorological services monitoring programme and requested the Working Group on Marine Meteorological Services to devise an appropriate method for the implementation of this programme. Consequently, the Study Group Meeting on the Provision of Marine Meteorological Information to Shipping (Geneva, September 1982) had prepared an outline of the monitoring programme including the reporting procedures, content and format of the report. This outline was submitted to the session for consideration. It was concluded that a number of maritime Members already carried out a monitoring programme in one form or another and that these existing programmes should constitute a basis for further development. The Commission adopted the proposed outline with a few amendments, but decided that the design of the format of reporting should be left to individual Meteorological Services. The outline adopted by the Commission in accordance with Recommendation 1 (CMM-VIII) is given in the annex to this paragraph (Annex II). The Commission requested the Secretary-General to promulgate this outline to Members concerned.

5.8 The Commission was presented with a document submitted by the International Federation of Shipmasters' Associations (IFSMA) containing comments and suggestions for the improvement of marine meteorological services. The Commission was pleased to receive such a comprehensive list of suggestions from one of the most important users of marine meteorological products and thanked the representative of IFSMA. The Commission agreed that the IFSMA suggestions could be grouped into the following categories:

- (a) Those problems which might be solved through the implementation of procedures and practices specified in the Manual on Marine Meteorological Services, the Guide to Marine Meteorological Services and other standard procedures;
- (b) Those suggestions which would require further consideration by CMM through the Working Group on Marine Meteorological Services, regional associations and by the Secretariat.

With regard to (a) above, the Commission referred amongst others to the following procedures:

- The need to broadcast warnings, synopses and forecasts in the language of the issuing Member and in English - paragraph 2.2.2.8.1 of the Manual on Marine Meteorological Services;
- The need to adhere to the published schedule of transmissions.

With regard to paragraph (b) above, the Commission requested that these suggestions be considered by the Working Group on Marine Meteorological Services and other WMO bodies as appropriate.

Regional part of the Manual on Marine Meteorological Services

5.9 The Commission noted with appreciation that, in accordance with the decision of CMM-VIII, the regional part of the Manual on Marine Meteorological Services had been compiled by the chairman of the Working Group on Marine Meteorological Services and published by the Secretariat in 1983 as Volume II. During the compilation of Volume II, it was noted that a uniform classification for tropical cyclones did not exist. The Commission was also informed that the RA II Rapporteur on Terminology Used in the Classification of Tropical Cyclones had investigated this question with a similar conclusion. The Commission observed that different terminology and classifications of tropical cyclones used in the warnings, could lead to some confusion on the part of recipients. In this connection, the Commission considered it important that national Meteorological Services and Port Meteorological Officers should take every opportunity to advise mariners on local terminology relating to tropical cyclones, in order to minimize misunderstanding and confusion. In view of the fact that the matter had also to be considered by CBS and the regional associations concerned, particularly by the regional tropical cyclone bodies thereof, the Commission requested the Secretary-General to arrange for a study of this question with the participation of all interested parties; it also felt that the involvement of the shipping community in such a study was important.

Future activities

5.10 The Commission agreed that the Working Group on Marine Meteorological Services needed to be re-established to deal with a number of important subjects, including the review of marine user requirements, co-ordination with other related organizations such as FAO, ICS, IFSMA, IHO, IOC and IMO, and the provision of advice on the development of marine meteorological services. Resolution 2 (CMM-IX) was adopted to this end.

6. SYSTEMS AND TECHNIQUES FOR MARINE OBSERVATION 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 Mr R. C. Landis (USA), chairman of the Working Group on Technical Problems. Within this working group the Commission had appointed three rapporteurs:

- (a) Dr G. D. Hamilton (USA) to consider drifting buoys;
- (b) A rapporteur to consider standard procedures for the reduction of wind speed to a given reference level;
- (c) Mr R. G. Jessup (Canada) to consider marine ice-accretion forecasting.

In this connection, the Commission noted the decision by the president of CMM, taken after its eighth session, that the rapporteur's study on standard procedures for reduction of wind speed to a given reference level above the sea surface should not be pursued further. This decision was made because any such procedures and techniques would need to be specific and localized and would therefore be of value to only a few Members.

6.1.2 At the same time, the Commission noted with approval the request by the president of the Commission that the working group should provide guidance on the development of a WMO Wave Programme. It also expressed satisfaction that the activities of the working group, at the request of the president of CMM, had included:

- (a) A review of Chapter 17 of the newly revised WMO Guide to Meteorological Instruments and Observing Practices;
- (b) Consultation with the Secretariat in the selection of a consultant (Dr A. Strong (USA)) for the preparation of a report on intercalibrations of directly measured and remotely sensed marine observations.

The Commission expressed its appreciation to the chairman and rapporteurs for their excellent work and for their reports. It noted that two of the reports (by Dr Hamilton and Dr Strong) had been published in full in the Marine Meteorology and Related Oceanographic Activities series. It suggested that the report by Mr Jessup could also soon be published in the same series (see paragraphs 6.1.3 and 6.1.4 below). The Commission considered the reports and other activities of the working group and its comments and decisions thereon are recorded in the following paragraphs.

6.1.3 Drifting buoys

6.1.3.1 The Commission noted with appreciation the report of Dr G. D. Hamilton (USA), Rapporteur on Drifting Buoys, which had been published as Report No. 11 in the Marine Meteorology and Related Oceanographic Activities series. This report provided an extensive and comprehensive review of drifting buoy operations up to the present, including an analysis of the success of drifting buoys during FGGE. It discussed applications, measurement parameters, telemetry, processing and dissemination; and it examined optimum drifting-buoy networks and operational procedures which, when implemented, would greatly increase marine data coverage and improve global and regional weather analysis and forecasting.

6.1.3.2 The Commission expressed its full agreement with the conclusions of the report, in particular that:

- (a) Drifting buoys had been very effective in improving weather analysis and forecasting in data-sparse marine areas;
- (b) The operational deployment aspects of FGGE could provide much valuable information regarding future buoy-deployment programmes;
- (c) Data-quality evaluation procedures during FGGE could provide useful information for future exercises.

The Commission also noted the detailed and important recommendations made in the report concerning the future development and implementation of drifting-buoy programmes in support of the Marine Meteorology, WWW and WCP Programmes.

6.1.3.3 At the same time, however, the Commission noted that EC-XXXVI had discussed a proposal for international co-operative action for implementing meteorological and oceanographic drifting-buoy programmes and that, by

Resolution 8 (EC-XXXVI) it had approved the joint convening by WMO and IOC of a meeting for the purpose of establishing a consortium for the co-operative implementation of drifting-buoy programmes. The Commission expressed its strong support for this action. It voiced approval for the way in which the proposed consortium was to take note of the very valuable experience concerning drifting buoys gained during FGGE and agreed that the proposed terms of reference for the consortium were comprehensive and covered, at least in general terms, many of the recommendations made by Dr Hamilton in his report (see paragraph 6.1.3.1 above).

6.1.3.4 Noting the plans for the preliminary meeting on drifting buoys (April 1985), the Commission decided to suspend further CMM action on the recommendations contained in the rapporteur's report for the time being. In so doing, however, the Commission stressed its continuing interest in drifting-buoy activities in support of the Marine Meteorology Programme and strongly urged Members to take an active and lively interest in the proposed consortium and in the further implementation of drifting-buoy programmes. It also considered that the valuable experience gained by the COST-43 project in the implementation of, *inter alia*, a North Atlantic drifting-buoy programme was of some significance to the proposed consortium, and urged that COST-43 be invited to participate in this consortium.

6.1.4 Marine ice accretion

6.1.4.1 The Commission noted with appreciation the comprehensive report by the rapporteur Mr R. G. Jessup (Canada) "Forecast techniques for ice accretion on different types of marine structures, including ships, platforms and coastal facilities". It considered that this report made a very valuable contribution to the provision of marine meteorological services in the field of marine ice-accretion forecasting and urged Members concerned to consider its contents carefully in implementing or upgrading such marine forecast services.

6.1.4.2 The Commission considered in detail the recommendations made by the rapporteur for improving the quality of marine ice-accretion predictions and noted that they were divided into three parts:

- (a) Suggestions for rectifying the serious shortage of reliable ice-accretion data for small ships and other types of marine structures;
- (b) Areas where more basic research was required on the physics of ice accretion;
- (c) Suggestions for improvements in the numerical simulation of ice-accretion processes.

6.1.4.3 With regard to the recommendations under (b) and (c), the Commission felt that these were the primary responsibility of individual Members and strongly urged all Members concerned to consider and, if possible, undertake the necessary research and development actions as recommended in the report.

6.1.4.4 With regard to the recommendations under (a), the Commission agreed that it had a clear role to play in improving the quality and quantity

of marine ice-accretion data. It therefore requested the Secretary-General, in consultation with the president of CMM, to:

- (a) Call upon Members affected by the problems of marine ice accretion to initiate training programmes for selected crew members on fishing vessels and operating personnel on other types of marine structures with regard to the observation of marine ice accretion and related parameters;
- (b) Convene an international meeting, in co-operation with IOC, to be attended by leading experts on ice accretion, by marine meteorologists and by oceanographers, for the purpose of setting and reviewing standards for the acquisition and archive of marine ice-accretion data.

The results of these undertakings should be reported to the next session of CMM.

6.1.5 Wind measurements at sea

6.1.5.1 The Commission was pleased to note the results of a survey amongst Members undertaken by the Secretariat, following a recommendation of CMM-VIII, with the aim of determining:

- (a) The availability of instrumental wind measurements at sea from a variety of platforms and the height of instruments;
- (b) Averaging times employed;
- (c) Any height corrections employed;
- (d) Studies undertaken on the interpretation of wind measurements at sea.

These results generally indicated that, while a number of platforms (ships, rigs and buoys) were now equipped with wind-measuring instruments, there was little uniformity with regard to instrument and platform height, averaging time or height corrections.

6.1.5.2 The Commission also noted that EC-XXXVI had agreed with the remarks made by the president of CIMO concerning the difficulty inherent in ensuring homogeneity of wind observations over the oceans from a variety of observing platforms, particularly with regard to the height of observations, and felt that the results of this survey fully supported these remarks.

6.1.5.3 In considering the request by EC-XXXVI that, in collaboration with CIMO and CBS, CMM should keep further developments in the field of wind measurements at sea under close review, the Commission also took note of the decision of its president to discontinue the rapporteur study on standard procedures for reduction of wind speed to a given reference level above the sea for the time being. In view of the difficulties in developing such standard procedures, in compliance with the request of the Executive Council, and considering the continuing importance of the problem, the Commission therefore requested:

- (a) The chairman of the Working Group on Technical Problems to keep this problem under close review, with a view to possibly re-activating an appropriate study at some later date;
- (b) The Secretary-General to continue surveys amongst Members, at appropriate regular intervals, concerning instrumental wind measurements at sea and to convey the results of these surveys to the chairman of the Working Group on Technical Problems and to the Commission.

6.1.6 Intercalibration of surface-based and remotely sensed data

6.1.6.1 The Commission noted with appreciation the valuable report by the rapporteur Dr A. E. Strong (USA) Intercalibrations of Directly Measured and Remotely Sensed Marine Observations, which had been published as Report No. 9 in the Marine Meteorology and Related Oceanographic Activities series. It further noted that this report had recommended, *inter alia*, that a series of intercalibration workshops should be conducted during the 1980s dealing with the intercalibration and standardization of remotely sensed and surface-based ocean data and that the first of these should consider sea-surface temperature.

6.1.6.2 The Commission expressed its full agreement with these recommendations. It considered that remotely sensed ocean data presented enormous potential benefits for the provision of marine meteorological services, for marine climatology, for marine research and for meteorology generally. In this context, the intercalibration workshops recommended by Dr Strong were a necessary and important step in the development of this potential and in the proper utilization of remotely sensed marine data by all Members. It was therefore particularly pleased to note that the first such workshop, on the intercalibration of conventional and remotely sensed sea-surface temperature data, was to take place in Washington, DC in November 1984. It wished the workshop every success and hoped that the papers therefrom would eventually be published by WMO as a report in the Marine Meteorology and Related Oceanographic Activities series, for the optimum benefit to Members.

6.1.6.3 In view of the importance of workshops such as this for the utilization of all remotely sensed marine data, not just sea-surface temperature data - to all aspects of meteorology as mentioned above, the Commission wished to express its further positive support for such activities. Recommendation 1 (CMM-IX) was therefore adopted.

6.1.6.4 At the same time, the Commission was firmly of the opinion that ocean observations from conventional platforms and instrumentation were most important and would continue to be so, both as a general data source and also as "ground-truth" for intercalibration purposes. It therefore urged that the Commission and all interested Members should continue their efforts to improve the accuracy, reliability, homogeneity and geographical coverage of such instruments and platforms, and to further develop the use of ocean data sets combining both conventional and remotely sensed data.

6.1.7 Precipitation measurements at sea

6.1.7.1 The Commission recalled that it had previously been of the opinion that precipitation data over the ocean were very important and that it had requested the Secretary-General to call upon Members to carry out various studies and to report the results to the present session. In reviewing the

results of the Secretariat survey, the Commission expressed disappointment at the poor response to the survey and particularly at the apparent lack of activity with regard to such measurements. At the same time, it noted with appreciation the work currently being undertaken by Japan and others on this problem. The Commission strongly reiterated its belief in the value of such data in the context of the whole range of marine meteorological activities and urged Members to consider and implement studies in this regard wherever possible.

6.1.8 WMO Wave Programme

6.1.8.1 This topic is dealt with in detail under agenda item 6.2.

6.1.9 Future activities

6.1.9.1 The Commission discussed a number of technical problems identified by the rapporteurs and by the chairman of the Working Group on Technical Problems as being in need of further attention in order to make additional improvements to marine meteorological services. In particular, the requirements for, and utilization of, the enormous quantities of satellite-derived marine data which would become available from the new generation of ocean satellites scheduled for launch during the 1980s and 1990s were considered at length. The Commission was in no doubt of the impact of these data on the provision of marine meteorological services (including sea-ice services) especially and was firmly of the opinion that this subject should receive the full attention of the Working Group on Technical Problems during the coming intersessional period.

6.1.9.2 At the same time, however, the Commission felt that ships' observations were currently the major source of marine observational data, and would continue to be for some considerable time. It recognized that the quality of such observations was of great importance and that recent technological advances such as the automation of surface and upper-air shipboard observations and satellite data transmission provided both great potential and great challenges to the Commission. This was therefore clearly also a topic for continuing attention.

6.1.9.3 In view of the increasing requirements in coastal and near-shore regions, in particular the many difficulties inherent in the provision of forecast services for coastal winds, the Commission agreed that assessment and documentation of such techniques were of some importance, especially when assisting developing countries in introducing and expanding the provision of marine meteorological services in their regions.

6.1.9.4 In discussing the recommendation of the chairman of the Working Group on Technical Problems regarding the future of the working group, the Commission agreed fully with him that the concept of conducting specific problem-related studies by rapporteurs during intersessional periods had provided CMM with considerable technical knowledge, which had been particularly important at a time of rapid technological growth. It also agreed that there were many topics, such as those discussed above, which remained to be dealt with by the working group. The Commission therefore decided to re-establish the working group with the terms of reference as given in Resolution 3 (CMM-IX).

6.1.9.5 The Commission discussed briefly the possibility of revising the existing Marine Cloud Album, which is specifically for marine observers and other marine users and consists of relevant pictures from Volume II of the International Cloud Atlas. As Volume II of the International Cloud Atlas had recently been revised and was being prepared for publication, the Commission felt that this was an opportune time to revise also the Marine Cloud Album. It therefore decided to appoint a rapporteur within the Working Group on Technical Problems to accomplish this task, which should be completed within one year and the results reported to the chairman of the working group.

6.2 WMO Wave Programme (agenda item 6.2)

6.2.1 The Commission discussed the subject of the proposed WMO Wave Programme. It noted with great satisfaction the work already undertaken, before, during and after the Meeting of Experts on the Wave Programme and expressed its appreciation to these experts, and to the National Focal Points on the WMO Wave Programme, for their efforts. In particular, it commended Dr P. E. Francis (UK) for his most valuable contribution in formulating the original proposal, which had provided an excellent basis for discussion and for later development into the elements of the proposed Wave Programme.

6.2.2 The Commission considered in some detail the proposed major elements of the WMO Wave Programme, as set out by the meeting of experts in an annex to its final report. It was generally agreed that these elements constituted a sound basis for furthering the diverse requirements of the Wave Programme, and that the recommended actions contained therein should lead to a successful implementation. It was stressed, however, that such implementation was very dependent on the active support of as many Members of WMO as possible, and the Commission therefore strongly urged all Members concerned to respond positively to action undertaken in respect of the Wave Programme.

6.2.3 While generally in agreement with the action indicated in the plan of implementation for the Wave Programme, the Commission was also of the opinion that certain other action should be undertaken within the Programme. In particular it felt that wave hindcast studies were of great value to many users, notably in the context of designing offshore and coastal structures and shore protection, and suggested that action in this regard also be considered in the Programme.

6.2.4 The Commission expressed satisfaction with, and endorsed, the action already undertaken in respect of the Wave Programme as notified by the Secretariat. At the same time, it expressed its appreciation to those experts already engaged on elements of the Programme, and the hope that they would be able to complete their work within the time-scale indicated in the implementation plan. This was particularly the case with the proposed Guide to Wave Analysis and Forecasting, which the Commission felt was of considerable importance to the furtherance of the Wave Programme, and therefore urged that its publication be undertaken as a matter of urgency.

6.2.5 The Commission noted with satisfaction the level of co-operation already existing between WMO and IOC in the implementation of the Wave Programme in such cases as the collection, real-time exploitation and archival of measured wave data, where WMO was co-operating actively with RNODC (Waves) of IOC located at the Institute of Oceanographic Sciences (UK) and the development of certain elements of the Wave Programme, where experts from WMO and

IOC were co-operating and sharing expertise. The Commission urged the appropriate Members to submit inventory forms describing their wave-measurement programmes to RNODC (Waves) under the Programme, and also to subscribe to the Referral System published by RNODC (Waves) wherever appropriate. The Commission also urged that close consultation with relevant user groups should be maintained in the implementation of the Programme. Recommendation 2 (CMM-IX) was adopted.

6.3 Observational data requirements (agenda item 6.3)

6.3.1 The Commission noted with approval that the president of the Commission, on behalf of CMM, had provided a detailed analysis of the satellite data requirements for the WMO Marine Meteorology Programme, which had been used by the Secretariat to produce a consolidated report of the satellite data requirements for all WMO programmes. This report would be considered by the next meeting of the presidents of Technical Commissions (Tashkent, October 1984) with a view to providing a consolidated analysis of satellite data requirements for use by an expert's meeting which would be convened by the EC Panel of Experts on Satellites to assess the technical and economic feasibility of satisfying those specific requirements with available satellite technology between the present and the year 2000. The Commission acknowledged the importance of this work and agreed to keep its own requirements for satellite data under constant review, in order to provide updated information on these requirements to the EC Panel of Experts on Satellites if and when required.

6.3.2 The Commission was also informed of a preliminary cost-analysis study which had been conducted within the context of the Integrated WWW System Study on a possible configuration for a Composite Observing System for the North Atlantic, and which was currently being considered by an Informal Meeting on Observing Systems with Particular Emphasis on the North Atlantic (Reading, October 1984). It noted that this cost analysis, based on an "average" or "realistic" network configuration, had been undertaken as part of more extensive network design studies intended to examine the possible impact on analyses and forecasts of various configurations. The Commission was interested to note that the network configuration used involved a variety of observing systems such as satellites, ocean weather stations, mobile ships, drifting buoys, ASDAR, ASAP and land-based rawinsondes; and that in particular both mobile ships and drifting buoys provided extremely cost-effective means of obtaining required surface meteorological data over the oceans. At the same time, it also noted that all systems, when deployed together in a complementary way, provided in total the most cost-effective way of obtaining both surface and upper-air data over the oceans, as compared, for example, to the existing NAOS network. In this context, the Commission urged Members to continue and increase their efforts to recruit additional voluntary observing ships, particularly those ships which travel on routes which are not now well serviced by the existing voluntary observing fleet. At the same time, Members were urged to contribute wherever possible to the furtherance and expansion of drifting-buoy programmes, and to increase satellite data coverage of the oceans.

6.3.3 The Commission expressed its belief in the value of observing system studies such as this, and its full support for their continued development. It reiterated its willingness to co-operate fully whenever required in this development.

6.4 Requirements for reporting codes (agenda item 6.4)

6.4.1 A Study Group Meeting on the Provision of Marine Meteorological Information to Shipping was held in Geneva in September 1982 and considered the question of the provision of weather and sea bulletins in plain-language and alphanumeric form to marine user groups; the group was of the opinion that there was a diminishing use of the FM 46-IV IAC Fleet Code (Part 4 of the weather and sea bulletins) because of the increased use of radiofacsimile products aboard ships and the decrease in the number of crew members available to transform alphanumeric groups into chart form but that the views of users should be ascertained. The Secretariat had therefore launched an inquiry among Members represented on CMM, requesting them to consult their marine user groups on the use of the FM 46-IV IAC Fleet Code and also Parts 5 and 6 of weather and sea bulletins (selections of reports from sea and land stations respectively).

6.4.2 The Commission studied the summary of the report on this inquiry and agreed that Part 4 (IAC Fleet Code), Part 5 and Part 6 of weather and sea bulletins should be maintained. Paragraph 2.2.2.2 of the Manual on Marine Meteorological Services should thus remain unchanged.

6.4.3 Several members indicated that sea-level information was useful in providing a variety of marine meteorological services and in long-range forecasting, especially when combined with satellite data. The Commission considered a proposal for devising a code form for operational transmission and exchange of hourly sea-level data on a global scale. The Commission expected that the number of stations using the code would increase to about 150 by 1987. The code requirements for this purpose should allow the once-daily transmission over the GTS of hourly sea-level readings at periods of low traffic density. Each message would comprise approximately 1 500 bits. The Commission agreed that the requirements for this code should be transmitted to the CBS Working Group on Codes for consideration.

6.4.4 The Joint IOC/WMO Meeting of Experts on IGOSS Operation and Data Exchange held in Hamburg, from 10 to 14 September 1984, discussed the need for a code to report observations taken along a ship's track. The Commission agreed that, while such measurements were already being taken by research ships and others for sea-surface temperature and salinity, there was likely to be an increased emphasis on them in the future, considering advances in instrumentation and the requirements of users of IGOSS data. It therefore decided that a need existed for a flexible code to facilitate the transmission, processing and exchange of such data. The Commission felt that while it was important to ensure that ships' crews were not overburdened with extra observations, there certainly did appear to be a need for such a code in view of the increasing use of automated sensing equipment on ships and the fact that mainly research ships were involved.

6.5 Marine telecommunication arrangements for data transmission and collection (agenda item 6.5)

INMARSAT

6.5.1 The Commission noted with appreciation the report of Mr P. Kerhervé (France), Rapporteur on Marine Telecommunications. This report was concerned particularly with the development and use of new transmission

facilities (radiotelephone, radiotelex, INMARSAT) rather than with the collection of ships' observations. The advantage of these new facilities was that they enabled ships' observations to be transmitted directly to NMCs which, in the case of INMARSAT, were usually Regional Telecommunication Hubs (RTHs). In the case of both radiotelex and INMARSAT, reports could also be included without manual intervention in the Main Telecommunications Network of the WWW/GTS.

6.5.2 The Commission was informed that the main problem with the new transmission facilities was that they were still being extended and regulations for their use were still being introduced, so that an exhaustive enquiry would, at this stage, give only an ephemeral picture of the situation. For this reason, the Commission felt that it was most important to keep track of current developments through annual inquiries amongst Members covering:

- (a) The facilities at NMCs for data collection via the new transmission facilities (number of telex lines, degree of automation, etc.);
- (b) The facilities of voluntary observing ships (availability of radiotelex, INMARSAT Ship Earth Stations, etc.);
- (c) Comments by NMCs on the use of these new facilities.

The Commission suggested that these enquiries would be best incorporated in the annual WWW implementation survey.

6.5.3 The Commission discussed the use of the INMARSAT system for the collection of ships' weather reports, for the distribution of meteorological information to shipping, and as a key element in the future global maritime distress and safety system. It was pleased to learn that the INMARSAT system had begun operating on 1 February 1982 and that, as of 14 May 1984, about 10 Coast Earth Stations (CESs) were operational, while about 2 500 ships (including 360 voluntary observing ships) were equipped with Ship Earth Stations (SESs). It also recognized that the system was expanding rapidly, in terms of new CESs becoming operational, of increasing numbers of SESs, of increasing system usage and of new and improved services being offered by INMARSAT to users. It agreed that the impact of INMARSAT on marine meteorological telecommunications would become even more significant in future years, particularly in sea areas such as the Southern Ocean, where the collection of ships' reports by conventional means was especially difficult.

6.5.4 In this connection, the Commission recalled that at its eighth session it had requested the Secretary-General to undertake a study on the utilization of this system covering technical, organizational, administrative and financial aspects, and that it had also prepared the convening in 1983 of an informal planning meeting on this subject. It was, therefore, pleased to note that a number of meetings had subsequently taken place at which INMARSAT matters were considered specifically. These included meetings of CBS and its Working Group on the GTS; Meetings of Experts on the Use of INMARSAT and for the Preparation of Draft Regulatory Material on the Use of INMARSAT for the Collection of Ships' Weather Reports; and WMO/INMARSAT consultative meetings.

6.5.5 The Commission noted with satisfaction various courses of action which had been taken as a result of those meetings and other studies, which included:

- (a) WMO requirements for use of the INMARSAT system had been formulated and transmitted to the INMARSAT organization;
- (b) The proposed amendments to the Manual on the GTS, Part I would be submitted to the eleventh session of the CBS Working Group on the Global Telecommunication System (Geneva, 22 October-2 November 1984) for consideration;
- (c) Members operating CESs had been requested to provide the Secretariat with information concerning the reception by their CESs of ships' weather reports; this information would be included in Volume D of WMO-No. 9;
- (d) A proposed cost-sharing scheme had been formulated by the second Meeting of Experts on the Use of INMARSAT and recommendations were put forward in this connection.

6.5.6 In particular with regard to (d) above, the Commission recognized that certain abnormal situations had arisen and could continue to arise with respect to the collection of ships' weather reports by CESs from ships outside their own Region, which placed unfair burdens on certain Members. It supported the interim cost-sharing scheme which had been formulated by the second Meeting of Experts on the Use of INMARSAT and noted with interest the cost-sharing negotiations initiated between Canada and the USA. It further agreed that the abnormal situation could be substantially alleviated if all Members operating CESs were willing to accept ships' reports transmitted through INMARSAT and also implemented Code 41 (Code 41 is a short code dialling procedure for use with INMARSAT, whereby ships' weather reports are automatically routed by CEDs to relevant National Meteorological Centres). The Commission strongly urged Members concerned to give serious consideration to such action. Several Members also pointed out that the interim regional cost-sharing arrangement was an improvement, but that a basic agreement for the equitable sharing of costs among Members was still needed.

6.5.7 The Commission clearly recognized that the situation concerning the use of INMARSAT was rapidly evolving and required continuing close attention. At the same time, it agreed that both the meetings of experts and the WMO/INMARSAT consultative meetings had provided valuable forums for keeping abreast of new developments, for keeping Members informed of these, and for keeping INMARSAT informed of WMO requirements. It recommended that these meetings should continue on a regular basis, in conjunction with CBS as appropriate, and requested the Secretary-General to make the necessary arrangements in this regard.

6.5.8 The representative of INMARSAT remarked that the co-operation between WMO and INMARSAT was developing in a highly satisfactory manner and noted with appreciation prompt action taken by WMO and its Members concerned to implement the recommendations of the Joint WMO/INMARSAT Consultative Meetings and the Meetings of Experts on the Use of INMARSAT. The Commission expressed its appreciation to the INMARSAT Directorate for their co-operation in meeting meteorological requirements.

Service Argos

6.5.9 The Commission discussed the use of the Argos system for the collection and location of meteorological and oceanographic data from ocean platforms. In particular, it noted with interest that the Guide to Data Collection and Location Services Using Service Argos had been prepared and published as Report No. 10 in the Marine Meteorology and Related Oceanographic Activities series. It expressed its appreciation to the authors of this Guide, Dr G. Hamilton (USA) and Mr R. Rosso (Service Argos), and was pleased to record that the Guide had received wide publicity and distribution and was serving to further the use of the Argos system for the collection and distribution of marine meteorological and oceanographic data, to the ultimate benefit of all Members. The Commission noted in this connection that Ninth Congress had encouraged Members to use modern data-collection systems, such as the Argos system, for the efficient collection of marine data. The Commission also thanked the Service Argos for organizing a highly informative demonstration of the system during the session.

Future global maritime distress and safety system (FGMDSS)

6.5.10 The Commission considered this subject in the light of the information provided by the chairman of the Working Group on Marine Meteorological Services and representatives of ICS and IFSMA. The representative of ICS said that the International Maritime Organization (IMO) had just completed a further series of meetings in preparation for a revision of the section "Safety of Life at Sea Convention (1974)" defining radiocommunication requirements, including radiotelegraph and radiotelephone equipment and the carriage of radio operators. These requirements had to be met by all ships of more than 300 tons sailing internationally. IMO planned to replace these regulations in approximately 1990 by a future global maritime distress and safety system (FGMDSS) based upon automatic signalling techniques and satellite relay of alerting signals to shore-based search and rescue co-ordinated services developed under the Search and Rescue Convention (Hamburg 1979).

6.5.11 The representative of ICS further explained that the equipment and the operational requirements for FGMDSS had been developed from the functions agreed to be essential for the safety of life at sea. Amongst them was that for the dissemination and receipt on board all ships of safety messages including navigational warnings, gale warnings, ice reports, weather forecasts, etc. IMO would require all ships to be equipped to receive NAVTEX direct printing broadcasts of such messages on the medium range (MF) frequency 518 kHz and was encouraging the extension of NAVTEX broadcasting. It was, however, recognized that this single-frequency service could not cover ocean areas and might prove uneconomical in long coastal areas of low ship population. A form of automatic telex-over-radio at high frequencies was proposed for these areas but there was more general support from both governments and shipowners for satellite broadcasts through INMARSAT where their enhanced group call facility had been demonstrated using a low-cost, simple, receive-only ship Earth station to provide a global NAVTEX system. While the carriage requirements for ships were becoming well advanced, the responsibilities of governments were less well defined. The cost of new services should be examined and possible problems in co-ordinating the broadcast of safety information to ocean areas required study. In particular, governments of Members of IMO sought to have only a short and clearly defined period (1990-1994 had been mentioned) when existing and new FGMDSS services would exist side by side.

6.5.12 The Commission realized that the implementation of FGMSS would have a considerable impact on the existing marine telecommunication arrangements for the dissemination of meteorological information. The Commission therefore requested the Secretary-General to follow closely the developments in this field and initiate action in a timely fashion to ensure the smooth transition into a FGMSS-based meteorological information dissemination scheme. The representative of IFSMA stated that the introduction of FGMSS was an opportunity to reconsider the ocean and sea areas of responsibility for the issue of weather and sea bulletins for the high seas, and coastal and offshore areas. Such a reconsideration should take into account the opinions and reports of marine users with respect to the efficiency and effectiveness of the provision of this information.

Future activities

6.5.13 In view of the significant developments in the field of marine telecommunications discussed above and of other activities in the field which required close monitoring, 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 and in the work of the CMM Working Group on Marine Meteorological Services, and to advise other CMM working groups as appropriate. The Commission agreed to appoint a rapporteur for the next intersessional period. Resolution 4 (CMM-IX) was adopted.

7. MARINE CLIMATOLOGY (agenda item 7)

7.1 Contribution of the Commission for Marine Meteorology 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 reviewed its contribution to the World Climate Programme (WCP) and, in particular, the World Climate Data Programme (WCDP). The Commission recalled that:

- (a) It had agreed to participate in and contribute to various components of the WCP within its terms of reference;
- (b) It had agreed that the implementation of the international arrangements for the collection of marine climatological and related data should be strengthened;
- (c) The CMM Working Group on Marine Climatology had been successful in co-ordinating and standardizing the exchange of conventional marine data in the past and that it had kept pace with developments in data processing.

7.1.2 The Commission noted that there were new sources for marine climate data which had arisen as a result of remote-sensing and numerical analysis activities. It recalled that CMM had been made responsible for preparing guidelines for marine data archives and management and that, in this way, the Commission had provided valuable contributions to the WCDP. It reviewed the goals and types of action required by CMM to achieve WCDP objectives in marine data archives.

7.1.3 The Commission noted that numerous advances had been made in microcomputer technology and mass storage of data, with considerable potential for application to marine parts of the WCDP and WCAP and that these advances could be of significant value to Members, both developed and developing. It therefore recommended that the use of this new technology should be encouraged for the production and exchange of marine data products. Recommendation 3 (CMM-IX) was adopted.

7.1.4 In considering the need for the publication of some guidance material on applications of marine climatology, the Commission recalled that Ninth Congress had felt that such applications should be receiving more attention and that the experience of Members already active in the field should be ascertained and documented for the information of all Members. The Commission recognized that, while applications of marine climate data had been practised for many years, these applications had expanded rapidly recently in response both to the availability of quality data and to the requirements for more extensive and detailed planning of marine activities.

7.1.5 The Commission also recognized that many Members at present had both extensive data holdings and developed expertise for presenting these data in ways which were useful for marine data applications. It therefore considered that some form of guidance material which documented this expertise and potential applications of marine climatological data would be extremely useful to many Members and referred the production of such guidance material to the Working Group on Marine Climatology. Recommendation 4 (CMM-IX) was adopted.

7.1.6 The Commission was pleased to note that a final Meeting of Experts on the Historical Sea Surface Temperature (HSST) Data Set Project had recently taken place (Hamburg, Federal Republic of Germany, July 1984), and that this meeting, in finalizing the HSST Data Project, had provided a revised draft of the "User's guide to the HSST data project", which it had recommended for publication as a report in the Marine Meteorology and Related Oceanographic Activities series. The Commission agreed that this project, which had begun in 1964, had resulted in an extremely valuable addition to the totality of marine climatological data, particularly in the context of the WCP. It wished to record its appreciation to all concerned for the considerable amount of work which had gone into the project over the years and agreed that the publication of the user's guide would be a fitting culmination to the project.

7.2 Marine Climatological Summaries Scheme (agenda item 7.2)

7.2.1 The Commission recalled that, at its eighth session (1981), it had recommended (inter alia):

- (a) A new plan for the Marine Climatological Summaries Scheme;
- (b) A regular inventory service for marine climatological data and summaries;
- (c) New formats for data exchange - the international maritime meteorological punch card and tape (IMMPC and IMMT).

It noted with appreciation, therefore, the action so far undertaken and planned with respect to these recommendations by the Working Group on Marine Climatology.

7.2.2 With respect to the Marine Climatological Summaries Scheme, the Commission noted with approval the work so far undertaken by members of the working group in preparing a revised text for the Manual on Marine Meteorological Services and hoped that this revised text would soon be completed and submitted for approval to the Executive Council. It expressed its pleasure that the new data-exchange formats had been included in the revised Guide to Marine Meteorological Services and hoped that these also could be shortly included in the Manual. In emphasizing the importance of the Marine Climatological Summaries Scheme, the Commission strongly urged all Members not already doing so to participate actively in the Scheme, particularly through the submission of data to the appropriate Responsible Members.

7.2.3 In considering the contents of the IMMPC and IMMT formats the Commission felt that a need existed to differentiate between the following two conditions in the formats:

- (a) Past and present weather not observed;
- (b) Past and present weather omitted because of no significant weather to report.

Existing practice meant that present weather summaries could be biased, particularly if the present weather code "02" (omitted (no significant weather to report)) was used in observations from 1982 onwards which contained a blank in the present weather field thus helping to increase the fair-weather bias already intrinsic in marine observations. It felt that inclusion of weather-data indicator (i_x) in the IMMPC/IMMT format would solve this problem and should be implemented as a matter of urgency. Recommendation 5 (CMM-IX) was therefore adopted.

Provision of data to commercial organizations

7.2.4 The Commission considered a document submitted by the United Kingdom regarding the supply of marine climatological data to commercial organizations. This document, and accompanying information paper, explained the problems caused by the lack of uniformity in the charging policies of Members. A possible solution was also tabled by the United Kingdom. During the consideration of this topic, the Commission reaffirmed the principle of the free exchange of climatological data between Members. The Commission stressed that this exchange must be upheld. However the Commission noted that many Members had to provide climatological data to commercial organizations according to the charging policies established by their governments. These charging policies varied from Member to Member and, consequently, created difficulties for many. After considerable discussion, the Commission agreed that due to the complexity of the problem, which was largely governed by national policies and legislation, it could not and should not attempt to formulate an internationally applicable charging policy. Since any such charging policy might also apply to all types of climatological data, the Commission requested the president of CMM to inform the Executive Council of existing difficulties in the application of national charging policies with a view to obtaining further guidance.

7.3 Marine climatological data banks (agenda item 7.3)

7.3.1 In discussing a regular inventory service for marine climatological data and summaries, the Commission noted with satisfaction that the first

set of these inventories was presently available for use by Members and expressed its gratitude to the Responsible Members concerned for their considerable efforts in this regard. At the same time, while recognizing the high costs involved, the Commission reiterated its belief in the value of marine climatological summaries to a variety of users, including the World Climate Programme, and urged Responsible Members to continue with their contributions to this Scheme.

7.3.2 In noting that, to date, the marine climatological data inventory had been prepared by reference only to Responsible Members, the Commission was concerned that this approach had apparently led to discrepancies between the total number of observations archived by maritime Members contributing to the Summaries Scheme and the number of observations appearing in the inventory. The Commission therefore felt that there was a need to undertake an investigation into the problems associated with data listings in the inventory and suggested that the Working Group on Marine Climatology should:

- (a) Investigate possible reasons for the discrepancies;
- (b) Undertake revisions of the inventory, as necessary, in the light of this investigation.

7.3.3 The Commission noted with interest the information provided by the chairman of the Working Group on Marine Climatology concerning the quality control of marine observational data. In particular, it noted that the results of a comparison of quality-control procedures employed by various Members on a test data set showed clearly that the quality-control and correction procedures applied by these Members were far from uniform. The Commission felt that before minimum standards for quality control could be developed which could be performed by the greatest number of Members, it was clearly necessary for some agreement to be reached concerning more uniform procedures generally. It therefore decided to refer this problem to the Working Group on Marine Climatology for further consideration.

7.4 Marine section of the World Climatic Atlas (agenda item 7.4)

7.4.1 The Commission noted the progress made to date towards the preparation of the marine section to the World Climatic Atlas covering the period 1961-1990. At the same time, the Commission felt that there was a serious need to re-examine the requirements for such an atlas. In particular, it considered that the need for the Atlas was diminishing in view of the expanding availability of extensive and comprehensive computer-based climatological data sets and summaries. In addition, problems related to the cost of the production of such an Atlas in view of its likely limited utility, and the atypical nature of the selected 1961-1990 time period were also raised.

7.4.2 On the other hand, the Commission was aware that the Atlas was being produced on the basis of a decision by Congress, and that therefore work on the marine section could not be stopped without further authorization by Congress or the Executive Council. At the same time, the Commission noted that the Commission for Climatology (CCL) was undertaking a similar review of the requirements for the World Climatic Atlas.

7.4.3 In view of these facts, the Commission decided that the president of CMM, as a matter of urgency, should consult with the president of CCI, in order to present the views of CMM concerning the requirements for the marine section of a World Climatic Atlas to the Executive Council and possibly to Tenth Congress.

Future activities

7.4.4 When considering the re-establishment of the Working Group on Marine Climatology, the Commission noted with appreciation the work this group had performed during the intersessional period, under the leadership of Dr L. Hoffmann (Federal Republic of Germany), and the report he had submitted to the session. The Commission recognized that there was a continuing need for technical advice on the exchange and archiving of marine climatological data, co-ordination of marine climatology requirements with the WCP, and technical guidelines and co-ordination in many other important areas. It therefore agreed to re-establish the Working Group on Marine Climatology and Resolution 5 (CMM-IX) was adopted.

8. SEA ICE (agenda item 8)

8.1 The Commission noted with appreciation the report of Dr T. Thompson (Sweden), chairman of the Working Group on Sea Ice and expressed its satisfaction with the work which had been undertaken since CMM-VIII. Although the intersessional period had been only three years, and consequently not all tasks could be completed, the Commission was nevertheless pleased with the results so far achieved.

8.2 The Commission considered amendments and additions to the WMO Sea-ice Nomenclature (WMO-No. 259) proposed by the fourth session of the CMM Working Group on Sea-Ice (Geneva, October 1982). It acknowledged that, although members of the Working Group on Sea Ice had always been carefully selected to cover the widest possible range of ice subjects and geographical areas, it was sometimes necessary to consult other sea-ice experts to ensure that decisions were based on the widest possible international understanding and knowledge. The Commission commended the action taken by the chairman of the group in securing outside expert opinion before submitting the proposed amendments and changes to the WMO Sea-ice Nomenclature for consideration by the session. Recommendation 6 (CMM-IX) was adopted.

8.3 The Commission noted with satisfaction that the working group had reviewed a number of WMO publications with respect to sea ice, including Sea-ice Information Services in the World (WMO-No. 574), Guide to Marine Meteorological Services (WMO-No. 471), and Manual on Marine Meteorological Services (WMO-No. 558), and had suggested amendments or updating as appropriate. It was also pleased to note that some clarification had been made to the International System of Sea-ice Symbols, and that this system was now widely and successfully used.

8.4 The Commission considered with interest the information provided by the chairman of the working group concerning the review it had conducted of existing sea-ice codes and formats. It noted that the ice group in the code FM 13-VII SHIP was regularly omitted at an early stage in transmission over the GTS. Considering that there was a need for receiving ice information over wide geographical areas and that, therefore, this group should be retained for

global exchange, the Commission requested the president of CMM to bring this matter to the attention of the president of CBS. The Commission also noted with interest that a proposal developed by Mr H. Valeur (Denmark) concerning a combined ICEAN/ICEOB code for sea-ice reporting to be used from land, sea and air, was being studied by the working group. It considered that this was potentially a most useful development and encouraged the working group to complete its study. Finally, on the question of codes, the Commission noted with approval that the working group was also making efforts, in co-operation with CBS, towards the development of an appropriate code format for the operational global exchange of digital sea-ice data.

8.5 The potential for remote-sensing techniques in the mapping and surveillance of sea ice is very large, particularly in the use of active microwave techniques because of their independence from cloud and other weather conditions. The Commission reviewed with great interest the development of these techniques and considered that the new active microwave satellites now being planned would have a great impact on sea-ice operational services, research and planning. It therefore urged the Working Group on Sea Ice to maintain a close watch on developments in this area and to continue to review the requirements and specifications for sea-ice parameters which could be obtained from satellites. The working group should also consider ways in which Members could be assisted in planning for the incorporation of remotely-sensed data into their existing services.

8.6 The Commission noted with appreciation that a grid code for the digitizing of sea-ice charts (SIGRID) was being developed, in conformity with the new sea-ice symbology and in support of the WCP. It also noted with interest that a number of countries were preparing to use SIGRID and that some countries were also prepared to participate in a test on the development of a digital sea-ice data bank using SIGRID. It believed that digital sea-ice data would be of value not just in the context of such a data bank for climatological and other purposes, but also for WWW purposes such as real-time or near-real-time applications for medium- and long-range numerical weather prediction. It agreed, however, that for the establishment of such a data bank, some international agreement would have to be reached on a number of factors such as geographical areas, years to be covered, digitizing centres and international data-bank centres, and that close co-operation with the WWW and WCP should be maintained. The Commission also recognized that a problem existed in the digitizing of operational sea-ice charts for near-real-time transmission, in that these charts usually involved a cut-off time when new data could therefore become available. It therefore considered that, while digitized data from such charts could be transmitted for operational purposes, digitized data for the data bank should be obtained only from charts containing all available data, for example at the end of each ice season when all relevant data were available. The Commission finally decided to adopt Recommendation 7 (CMM-IX).

8.7 In view of the many aspects of sea ice which remained to be developed and co-ordinated, particularly in planning for the use of new remotely sensed sea-ice data in marine services, the Commission decided to re-establish the Working Group on Sea Ice, with tasks defined in its terms of reference. Resolution 6 (CMM-IX) was adopted.

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

9.1 The Commission noted with appreciation the work done by the Working Group on Marine Meteorological Services and its Study Group Meeting on the Provision of Marine Meteorological Information to Shipping on standardizing symbols and map specifications for facsimile charts for marine purposes. The Commission felt that the plotting model symbols should also be placed in the Manual. In addition, when examples of radiofacsimile charts were available with the new symbols and map specifications, they might replace existing examples of radiofacsimile charts in the Guide to Marine Meteorological Services. Recommendation 8 (CMM-IX) was adopted. At the same time the Commission recognized that there were still existing or potential problems in the presentation of facsimile charts for marine purposes, for example with respect to the representation of wave periods, or to difficulties of symbolization on computer-drawn charts. It therefore requested the Working Group on Marine Meteorological Services to keep this matter under review.

9.2 The Commission noted with satisfaction that the Manual on Marine Meteorological Services had now been arranged in two volumes, with Volume I containing decisions on global aspects and Volume II containing decisions of a regional nature which had been approved by regional associations. The new Volume II had been distributed to all Members in December 1983. At the same time, the Commission was informed that there were some inaccuracies and mis-translations in the Spanish section of the multilingual glossary contained in Appendix II.2 of the Manual on Marine Meteorological Services and that these errors were repeated in the text of the Manual. The same problem occurred with the Guide to Marine Meteorological Services. The Commission requested the Secretary-General to take appropriate remedial action, in consultation with Members concerned.

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

10.1 The Commission noted with satisfaction that the revised Guide to Marine Meteorological Services had been published and distributed in 1983. The revised Guide, which contained a wealth of information on national practices and procedures was well received by Members of WMO. It also noted that Volume II (Regional Aspects) of the Manual on Marine Meteorological Services had been compiled and distributed to Members in 1983. Furthermore, owing to its continuing usefulness to marine users, the old Technical Note No. 72 - The Preparation and Use of Weather Maps by Mariners - had been updated and, under the same title, appeared as Report No. 15 in the Marine Science Affairs series.

10.2 The Commission was informed that Mr K.-H. Bock, (Federal Republic of Germany) had been appointed by the president of CMM to serve on the CIMO Working Group on Instruments and Methods of Observation of Surface Data and that he would be given the task of updating Chapter 17 - Marine observations - and Chapter 22 - Automatic meteorological stations. The Commission understood that these chapters would be updated to reflect the evolution in the instrumentation on board ships, particularly automated equipment and new observation techniques. In this connection, the Commission noted that the Guide would be updated chapter by chapter in accordance with a proposed new outline and that the updating should commence towards the end of 1984. In view of the fact that automatic meteorological stations at sea included many and diverse types

of instrument, and that Chapter 22 required expansion, the Commission requested the president of CMM to consult with the president of CIMO on the updating of this chapter, with a view to appointing a suitable expert for this work.

10.3 The Commission noted the four new publications which had been produced in the series Marine Meteorology and Related Oceanographic Activities - Reports Nos. 8-11 - and the four new publications relating to IGOSS published jointly by WMO and IOC. The Commission appreciated that this WMO report series served as an efficient means of distributing information on the work being undertaken or accomplished within CMM and commended the authors for their valuable contributions. It then considered the need for possible new publications, taking into account priorities for guidance material, and proposed that the topics suggested by CMM-VIII, in which suitable publications had not yet been made, were of continuing importance to the Commission and should therefore be considered once more for publication. These topics were:

- (a) Drift calculations of surface objects and marine pollutants;
- (b) Forecasting of fog at sea;
- (c) Application to offshore areas and high seas of both subjective and numerical forecasting techniques and objective forecasting techniques such as model output statistics;
- (e) Ice and weather conditions affecting navigation in areas with ice.

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 the CMM working groups.

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

11.1 The Commission reviewed the WMO Education and Training Programme activities of particular relevance to CMM. It agreed that this Education and Training Programme had been particularly successful and congratulated the Secretariat on its accomplishments during the intersessional period.

11.2 The Commission noted with interest that various national training institutions and the network of WMO Regional Meteorological Training Centres (RMTCs) had contributed significantly to the training of meteorological personnel and that, in particular, course units in marine meteorology and physical oceanography had been included in the curricula of some centres. It was pleased to learn that a two-year M.Sc. programme on oceanography was offered at the RMTC in Manila, Philippines and that this centre, as well as the Nairobi RMTC and other centres, planned to offer future specialized courses on marine meteorology. The Commission warmly supported this development and agreed that higher-level courses in marine meteorology, such as a two-year M.Sc. course including research and applications work, were of considerable value in the training of specialized marine meteorological personnel.

11.3 The Commission was pleased to note that, following the recommendation of the EC Panel of Experts on Education and Training, EC-XXXVI had agreed that well-established RMTCs should embark on new phases of activity concentrating, inter alia, on the following aspects:

- (a) Selecting specific fields of concern to their areas or regions and developing capabilities of high competence in fields which include oceanography and marine meteorology with reference to food (fish) production and alternative energy resources;
- (b) Training users of meteorological information in the utilization of this information and its presentation in various news media.

11.4 While the Commission recognized that the primary objective of the WMO Education and Training Programme was the training of scientific and technical personnel, it also acknowledged the increased importance of including the aspects of education and training of users in this programme. In this connection, the Commission urged Members, particularly those hosting RMTCs, to play a role in the activities connected with the education of the general public on the usefulness of meteorological information.

11.5 In view of the preceding paragraphs, the Commission also voiced its support to the decision of EC-XXXVI to hold the next world-wide Symposium on Education and Training, the theme of which would be on the optimal use of meteorological information and products by all potential users. It therefore invited the president of CMM to consider possibilities for contributing to the Symposium.

11.6 The Commission was highly appreciative of the development work in marine meteorological services being undertaken through the provision of both single-location and roving seminars on marine meteorological services. It strongly urged that this programme of seminars be continued and, if possible, expanded to include at least one such seminar each year in developing countries.

11.7 The Commission was pleased to note, in particular, the success of the Joint RA II/RA V Seminar on Marine Meteorological Services which took place in Bombay, India, in December 1983 and hoped that the RA III/RA IV Roving Seminar planned for November 1984 would meet with similar success. It also noted that a Roving Seminar on Marine Meteorological Services had been planned tentatively to take place in Region I in late 1985. In this case, however, it was felt by delegates of RA I Members attending the session that more could be gained through holding a seminar at a single location for each language group, than from a roving seminar, since a greater number of lecturers could be made available, perhaps for a longer time, thus providing enhanced value for participants. The Commission therefore requested the Secretary-General to examine this possibility also with regard to the planned RA I seminar.

11.8 The Commission strongly supported the training publications and materials presently made available to Members, including those in the WMO Training Library. At the same time, it urged that all such publications should be regularly revised and updated. It also felt that there was presently a lack of suitable equipment in many developing countries which would enable them to make best use of these materials. It therefore urged that more emphasis be given by WMO to meeting the requests of Member countries for such equipment, especially through the WMO VCP.

11.9 In noting the value of suitable meteorological and hydrological glossaries, in the official languages of the Organization, the Commission was also mindful of the problems which might occur through inaccuracies in these glossaries. It was informed in particular that some translation errors were apparent in the Spanish version of some glossaries and other publications and therefore requested the Secretary-General to take appropriate remedial action, in consultation with Members concerned.

11.10 The Commission noted with interest the Executive Council recommendations concerning both the circulation of appropriate scientific review articles as training material and the value of selected bibliographies of textbooks in areas of special interest to the technical commissions. It agreed fully with these recommendations and suggested that they should be taken up by the CMM working groups and a Rapporteur on Education and Training.

11.11 The Commission was highly appreciative of the fellowships which had been awarded by WMO for studies specifically related to marine meteorology and physical oceanography which, it felt, were of great value to Members, particularly in developing their marine meteorological services. In expressing the wish that provision of these fellowships for marine meteorology should be expanded in the future, it also requested that more information be made available to Members on those fellowships already awarded and also on the operation of the IOC Training, Education and Mutual Assistance (TEMA) programme. The Commission was informed of the many bilateral programmes existing in the field of education and training which also provided fellowships for developing countries. It expressed its appreciation to the Members concerned for these programmes and hoped that they would not only continue but also expand if possible.

11.12 The Commission was informed of the growing interaction between the WMO Education and Training Programme and TEMA of IOC. The Commission was convinced that such an interaction would greatly complement each Organization's education and training efforts in marine meteorology and physical oceanography and, indeed, in marine science in general. In this connection, the Commission noted with satisfaction the active participation of WMO in the Unesco/IOC projects in the development of marine science and technology being undertaken in Africa, South America and other regions.

11.13 In considering the future Education and Training Programme in the light of the WMO Long-term Plan (LTP), the Commission expressed its strong support for the main objectives of this programme. At the same time, it felt that education and training were of such importance to developing countries and to the Organization in general, that the Education and Training Programme should assume the highest priority within the overall LTP.

11.14 In considering further the future of education and training activities specifically with respect to CMM, the Commission felt that there was an existing and increasing need to keep both itself in general and those Members concerned, better informed of activities and developments taking place in education and training in the field of marine meteorology. It therefore decided to appoint a Rapporteur on Education and Training, with terms of reference as outlined in Resolution 7 (CMM-IX).

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

12.1 The Commission was informed that IOC fulfilled a function as a joint specialized mechanism within the United Nations system. Besides UNESCO, the UN itself, FAO, IMO and WMO used IOC as an instrument for discharging certain of their responsibilities in the field of marine science. The executive heads of these organizations formed the Inter-secretariat Committee on Scientific Programmes Related to Oceanography (ICSPRO). Following the ICSPRO Agreement, WMO had seconded a scientific officer to the IOC Secretariat and provided other support to the work of IOC. Following this Agreement, co-operation between WMO and IOC covered diverse fields of ocean-related activities which included at present:

- (a) The Integrated Global Ocean Services System (IGOSS);
- (b) The World Climate Programme (WCP), particularly the World Climate Data Programme (WCDP) and the World Climate Research Programme (WCRP);
- (c) The co-operative investigations of the ocean;
- (d) The Long-term and Expanded Programme of Oceanic Exploration and Research (LEPOR); the study of the large-scale ocean/atmosphere interaction processes being one of the important elements of the Programme, as well as the WMO/IOC co-operation in the "El Niño" investigations;
- (e) Training, Education and Mutual Assistance in the Marine Sciences (TEMA).

12.2 The Commission was of the opinion that the co-operation between WMO and IOC and particularly between two ocean-related programmes, i.e. the Marine Meteorology Programme and the joint IOC/WMO IGSS, should be further strengthened in view of:

- (a) The growing requirements of marine user groups for comprehensive marine environmental information;
- (b) The support for the implementation of the World Climate Programme including the projected TOGA programme due to commence in January 1985.

In this connection, the Commission was pleased to note on the one hand that the liaison between the two programmes had been well established and on the other hand that IGSS had made steady progress, particularly in the IGSS Observing System (IOS) and IGSS Data Processing and Services System (IDPSS). With regard to IOS, the Commission noted with interest the establishment of the IGSS Sea-level Pilot Project (ISLPP) in the Pacific Ocean to produce and disseminate monthly charts of mean sea-level variations. It considered that this pilot project was important for climate studies and hoped that as many Members as possible who operated tide-gauge stations would participate.

12.3 The representative of IOC expressed the deep appreciation of his Organization for the support provided by WMO within the general framework of the ICSPRO Agreement. He felt that co-operation between IOC and WMO had been fruitful and that IGOSS could be considered as an excellent example of co-operation in that both Organizations deployed their respective expertise and facilities to achieve a common goal. He supported the view of CMM that products prepared and distributed within the IGOSS framework should not duplicate those prepared under the Marine Meteorology Programme but should complement each other's needs; this concept was moreover advocated by the ICSPRO Agreement which aimed at avoiding duplication and overlapping in the planning and implementation of international co-operative programmes in marine sciences. The representative of IOC expressed his confidence in the successful further development of IGOSS in view of new technological developments such as the increased use of automated systems for ocean data collection and transmission, the Doppler current-profiling system and drifting buoys with new sensors. The Commission thanked the representative of IOC for his enlightening and encouraging statement.

13. WMO LONG-TERM PLAN (agenda item 13)

13.1 In discussing the preparation of the section of both Parts I and II of the Second WMO Long-term Plan (LTP) dealing with the Marine Meteorology Programme, IGOSS and other ocean-related activities, the Commission recognized, in particular, that the timetable recommended by EC-XXXVI for the preparation of the Second LTP required that this session of the Commission should consider closely what its contribution to the LTP might be. It was felt that the Commission should advise particularly on overall policy and strategy matters (i.e. Part I) as well as provide some more concrete suggestions on possible detailed programme objectives for the 1988-1997 period.

13.2 Consequently, the Commission discussed in detail the main long-term objectives of the marine programme for the period, grouped under the major programme elements. It agreed that the main purpose of the programme should be the provision of marine observations and data, the promotion of marine meteorological and oceanographic services generally, together with the application of marine climatological information to both marine service and climatological activities. After due consideration, the Commission endorsed the draft text for Part I of the Second LTP which is given in Annex III.

13.3 In considering the question of detailed programme plans to be included in Part II of the Second LTP, the Commission felt that the preparation of the programme plan should be undertaken by the Secretariat, in close consultation with the president and the Advisory Working Group of the Commission. However, it suggested that a draft outline for Part II should be made along the lines given in the annex to this paragraph with, in particular, the specific long-term objectives included in Section 3 (see Annex IV).

14. SCIENTIFIC LECTURES (agenda item 14)

14.1 Following the suggestion of the fifth session of the CMM Advisory Working Group, scientific lectures of this session were arranged within the main technical part of the agenda. The lectures were intended to serve as introductions to the particular agenda items by giving reviews of the subjects and the problems involved so as to stimulate discussions when the relevant

items were taken up for consideration. Dr H. Voss, in his capacity as vice-president of CMM, was requested to act as organizer of these scientific lectures. The lecture programme elaborated and proposed by Professor Voss was as follows:

- Agenda item 5 - MARINE METEOROLOGICAL SERVICES
Meteorological services for offshore activities
R. J. Shearman (UK)
- Agenda item 6 - SYSTEMS AND TECHNIQUES FOR MARINE OBSERVATION AND DATA COLLECTION
The WMO Wave Programme and its significance to marine meteorological services
J. Guddal (Norway)
 - The Argos system
M. Taillade (Service Argos)
- Agenda item 7 - MARINE CLIMATOLOGY
1982-1983 "El Niño - southern oscillation event"
E. Rasmusson (USA)
- Agenda item 8 - SEA ICE
Sea-ice forecasting
K. P. Vasiliev (USSR)

14.2 The Commission was unanimous in the opinion that all the lectures presented were highly informative and served their purpose of stimulating ensuing discussions. The Commission expressed its deep appreciation to the lecturers for the time and effort they had expended in preparing the lectures and to Dr Voss for organizing the event in such an excellent manner. The Commission suggested that the lectures be published in the Marine Meteorology and Related Oceanographic Activities report series.

14.3 The Commission was pleased to be shown a film demonstrating the operation of the Automated Shipboard Aerological Programme (ASAP), which underlined the potential value of the system for the improvement of data coverage over the open ocean. The Commission was also pleased to receive a seminar entitled "Technical opportunities in ocean remote sensing", which was presented by Mr J. Sherman of the US National Oceanic and Atmospheric Administration Satellite Service.

15. ESTABLISHMENT OF WORKING GROUPS AND NOMINATION OF RAPORTEURS (agenda item 15)

The Commission re-established five working groups and appointed two rapporteurs to carry out the technical work during the intersessional period 1985-1988. These are:

- The Advisory Working Group;
- The Working Group on Marine Climatology;
- The Working Group on Marine Meteorological Services;
- The Working Group on Technical Problems;
- The Working Group on Sea Ice;

- The Rapporteur on Marine Telecommunications;
- The Rapporteur on Education and Training.

The membership of the working groups, the rapporteurs appointed and their terms of reference are contained in Resolutions 1 to 7.

16. REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE COMMISSION AND OF RELEVANT RESOLUTIONS OF THE EXECUTIVE COUNCIL (agenda item 16)

16.1 In accordance with the current practice, the Commission examined those resolutions and recommendations adopted prior to its ninth session and which were still in force. It noted that the action on most of its previous recommendations had already been taken and completed, or their substance incorporated in the Manual on Marine Meteorological Services and the Guide to Marine Meteorological Services as appropriate. Resolution 8 (CMM-IX) was adopted.

16.2 The Commission also examined the Executive Council resolutions within the field of the activities of CMM. Recommendation 9 (CMM-IX) was adopted.

17. ELECTION OF OFFICERS (agenda item 17)

The Commission elected Mr F. Gérard (France) as president of CMM and Mr R. J. Shearman (UK) as vice-president.

18. DATE AND PLACE OF THE TENTH SESSION (agenda item 18)

18.1 In the absence of any formal invitation from delegations at the session, the Commission decided that the date and place of its tenth session should be determined by its president, after consultation with the Secretary-General and in accordance with the provisions of Regulation 180 of the General Regulations.

19. CLOSURE OF THE SESSION (agenda item 19)

19.1 In his closing address, the president of the Commission, Prof. K. P. Vasiliev, reviewed the major results accomplished by the Commission during the past intersessional period and at the ninth session. In so doing, he expressed his gratitude to the vice-president, Dr H. Voss, to the chairmen of the working groups and rapporteurs and to the members of the Commission for the considerable efforts they had expended and for their willingness to co-operate, which factors had contributed so much to the success of the Commission in achieving its goals. He also warmly thanked the staff of the WMO Secretariat for their co-operation and assistance throughout the intersessional period and for their thorough preparation for and assistance during the ninth session. In concluding, Prof. Vasiliev paid a special tribute to all those with whom he had worked so closely and amicably during the eight years of his presidency. He expressed his pleasure at having been able to serve the Commission during a challenging but rewarding time and wished the incoming officers of the Commission every success in their work.

19.2 Dr V. Savtchenko (USSR), speaking on behalf of the delegates, expressed his appreciation to the president of his excellent leadership and guidance throughout his period of office, as well as for the efficient manner in which he had conducted the session. Dr Savtchenko also expressed his thanks to the vice-president, Dr Voss, to all the chairmen of the working groups and the rapporteurs for their great contributions to the work and success of the Commission. Mr W. Moens (Netherlands) paid a special personal contribute to Prof. Vasiliev, as a colleague and friend of long standing in the Commission, for his wise and able guidance of its work during a time of great change and challenge, which had contributed much to its existing high regard, both within WMO and elsewhere. Other delegates who wished to be associated with these remarks included Mr R. C. Landis (USA), Mrs M.-L. Komulainen (Finland), Mr F. Gérard (France), Dr H Voss (Federal Republic of Germany) and Mr Fang Qi (China). On behalf of the Secretary-General of WMO, Dr G. O. P. Obasi, Dr G. K. Weiss thanked Prof. Vasiliev and the delegates for their kind words to the Secretariat and also expressed his appreciation in particular to Prof. Vasiliev and Dr Voss for their contributions to the work of the Commission. The members of the Commission warmly and enthusiastically joined all the speakers in thanking Prof. Vasiliev for his efforts on its behalf.

19.3 Finally, Mr Gérard and other delegates looked forward to the many future challenges facing the Commission, as a result of both technological advances and additional service requirements, with confidence and enthusiasm. Mr G. Verboom (Oil Industry E. and P. Forum), speaking on behalf of a major user group of marine meteorological services, expressed his full support for the work of the Commission and the willingness of the industry to cooperate therein.

19.4 The ninth session of the Commission for Marine Meteorology closed at 11h30 on 12 October 1984.

RESOLUTIONS ADOPTED BY THE SESSION

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

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

- (1) Resolution 1 (CMM-VIII) - Advisory Working Group of CMM,
- (2) Resolution 2 (Cg-IX) - World Weather Watch Plan for 1984-1987,
- (3) Resolution 6 (Cg-IX) - Marine meteorological and related oceanographic activities for the period 1984-1987,
- (4) Resolution 7 (Cg-IX) - Systems and techniques for marine observations and data collection,
- (5) Resolution 8 (Cg-IX) - Integrated Global Ocean Services System,
- (6) Resolution 9 (Cg-IX) - United Nations Conference on the Law of the Sea,
- (7) Resolution 14 (Cg-IX) - 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 co-ordinate 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 Executive Council 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 and other international organizations concerned;
- (2) That the Advisory Working Group will be composed of:
- The president of CMM;
 - The vice-president of CMM;
 - The immediate past-president of CMM;
 - Chairman of CMM Working Group on Marine Meteorological Services;
 - Chairman of CMM Working Group on Marine Climatology;
 - Chairman of CMM Working Group on Sea Ice;
 - Chairman of CMM Working Group on Technical Problems.

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

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING,

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

(2) Resolution 6 (Cg-IX) - Marine meteorology and related oceanographic activities for the period 1984-1987,

(3) The report of the president of the Commission for Marine Meteorology,

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

CONSIDERING:

(1) The continual growth in user demand for meteorological services and information, the increasing specialization of marine meteorological products and the great changes expected in the methods of transmission of marine meteorological and related oceanographic information with the introduction of INMARSAT Ship Earth Stations,

(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,

(3) The need to participate actively in discussions with IMO and marine user groups in regard to the new telecommunications regulations,

(4) The requirement to improve where possible the WWW system in the areas of marine observations, data collection and processing,

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 including possible amendments to the Guide to and Manual on Marine Meteorological Services;
 - (b) To co-ordinate marine meteorological services with other related organizations such as IMO and IOC (including IGOSS) and ICS, especially with regard to the forthcoming changes in modes of transmission of marine meteorological and related oceanographic information such as the introduction of INMARSAT Ship Earth Stations and the resulting changes in telecommunication regulations (in co-operation with the Rapporteur on Marine Telecommunications);
 - (c) To keep under review the contents of the Guide to Marine Meteorological Services, particularly with respect to the need for further guidance material and the provision of a standard form for forecasts to particular user groups (e.g. offshore platforms);
 - (d) To provide advice on the introduction and development of marine meteorological services, in compliance with the requirements of the Manual on Marine Meteorological Services (including the preparation of an advisory guide for mariners on the use of marine meteorological forecast material by an expert);
 - (e) To take action upon matters 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 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 R. Landis (USA) 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-IX) - WORKING GROUP ON TECHNICAL PROBLEMS

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

- (1) Resolution 3 (CMM-VIII) - Working Group on Technical Problems,
- (2) The report of the president of the Commission for Marine Meteorology,
- (3) The report of the chairman of the Working Group on Technical Problems,

(4) Recommendation 2 (CMM-IX) - WMO Wave Programme,

(5) Recommendation 11 (CMM-III) - Composition of the Marine Cloud Album,

CONSIDERING that there are still many technical problems which require further study in order to continue improvements in the Marine Meteorological Services Programme of WMO,

DECIDES:

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

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

- (i) Preparation of proposals for Chapter 17 of the CIMO Guide to Meteorological Instruments and Methods of Observation, in particular a new section to address wave-measuring instruments to be prepared by an expert;
- (ii) Preparation of a Technical Note on the processing of marine data (control, objective analysis, forecast/calculation);
- (iii) Specification of requirements for ocean parameters from satellites including the preparation of a Technical Note on the use of satellite data in marine meteorological services (in collaboration with the Working Group on Sea-Ice where appropriate);
- (iv) Improvements in the quality and quantity of ships observations;
- (v) Techniques for forecasting coastal winds;
- (vi) Examination of the present Marine Cloud Album in the light of the revised International Cloud Atlas, Volume II, with a view to recommending within one year to the chairman of the working group any appropriate changes to the Album with regard to photographs and/or text;

(b) To continue to provide guidance to and participate in the WMO Wave Programme;

(c) To keep further developments in the field of wind measurements at sea under close review with a view to possible future action;

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

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

- Dr G. Hamilton (USA) on the processing of marine data;
- An expert from France on satellite-derived ocean parameters;
- An expert from Canada on ships' observations;
- An expert from the USSR on coastal winds;
- Mr Ch. Knaack (Federal Republic of Germany) on the Marine Cloud Album;

(3) To select, in accordance with Regulation 31 of the General Regulations, Mr J. Guddal (Norway) as chairman of the working group.

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

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Resolution 4 (CMM-VIII) - Rapporteur on Marine Telecommunications,

(2) The report of the Rapporteur on Marine Telecommunications,

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

CONSIDERING:

(1) The importance of telecommunications for the collection and distribution of marine meteorological data,

(2) The need for CMM to keep abreast of developments in ship-to-shore conventional and space-based communication systems, in particular concerning INMARSAT,

DECIDES:

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

- (a) To keep abreast of the development of new marine telecommunication systems and assess their impact on ocean data collection and the distribution of marine meteorological and oceanographic information to ships and other sea platforms and the resulting changes in telecommunication regulations;
- (b) To assist in monitoring activities, particularly the collection of ships' weather reports and BATHY/TESAC reports, and to encourage the use of improved observing and data-collection systems including automated shipboard observing systems, ASAP and marine satellite communications;
- (c) To participate in the work of the Working Group on Marine Meteorological Services;
- (d) To advise other CMM working groups on matters relating to marine telecommunications, as required;

- (e) To maintain a close liason with CBS, in particular with the CBS Working Group on the Global Telecommunication System;

(2) To elect, in accordance with Regulation 31 of the WMO General Regulations, Mr A. Strandli (Norway) 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-IX) - WORKING GROUP ON MARINE CLIMATOLOGY

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Resolution 5. (CMM-VIII) - Working Group on Marine Climatology,

(2) The report of the president of the Commission for Marine Meteorology,

(3) The report by 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 including methods of automatic quality control of marine climatological data and to recommend minimum standard procedures for inclusion in appropriate WMO guides;
- (c) To keep under review material in WMO regulations, manuals and guides relevant to marine climatology;
- (d) To study the operationally and scientifically useful marine climate data other than ship reports (e.g. remote sensing and numerical analysis activities) which may be archived and exchanged in the future;

- (e) To examine further the proposal for the contents of the marine section of the World Climatic Atlas and develop a detailed plan for the implementation of the marine section of the Atlas taking into account the improved data-analysis system currently available;
 - (f) To prepare for publication a Guide to Applications of Marine Climatology;
 - (g) To investigate problems and advances in the following areas of interest:
 - (i) Discrepancies between the total number of observations archived by maritime Members contributing to the Marine Climatological Summaries Scheme and the number of observations appearing in the inventory;
 - (ii) The use of micro computers and their software for marine climate work, particularly in information storage techniques;
 - (iii) Probable bias in marine observations against extreme conditions;
 - (h) To evaluate the exchange and archiving of data from "El Niño" related experiments such as TOGA, WESTPAC and EPOCS projects and to investigate the preparation of a special "El Niño" data set for use in research projects*;
 - (i) To take action on requests referred to the working group by the president of CMM;
 - (j) To co-ordinate with CCl, as required;
- (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;
 - (c) An expert designated by the president of CCl;
- (3) To elect, in accordance with Regulation 31 of the General Regulations, Mr C. G. Korevaar (Netherlands) as chairman of the working group.

REQUESTS the Secretary-General to invite IOC and other international organizations and programmes concerned to participate in the work of the working group.

* TOGA : Tropical Ocean and Global Atmosphere
WESTPAC: IOC Programme Group for the Western Pacific
EPOCS : Equatorial Pacific Ocean Climate Studies

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

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

- (1) Resolution 6 (CMM-VIII) - Working Group on Sea Ice,
- (2) The report of the president of the Commission for Marine Meteorology,
- (3) The report of the chairman of the Working Group on Sea Ice,
- (4) The report of the chairman of the Working Group on Technical Problems,
- (5) Recommendation 7 (CMM-IX) - Global sea-ice data bank,

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, numerical weather prediction and progress in the knowledge of sea ice;
 - (iii) Methods of predicting sea-ice growth, drift and decay (including the preparation of guidance material on forecasting sea-ice conditions by an expert and the possibility of holding a seminar);
 - (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, in particular in the light of the new active microwave satellites planned for the late 1980s and early 1990s;
 - (ii) Updating of the specifications for the remote sensing of sea-ice parameters (in collaboration with the Working Group on Technical Problems);
- (c) To promote the digitization of historical sea-ice charts and to prepare for the establishment of a global, computer-compatible, sea-ice data bank in close co-operation with the WCP;
- (d) To prepare:
 - (i) An international digital code for operational dissemination of sea-ice information for use in medium- and long-range weather forecasting;
 - (ii) ICEOB/ICEAN codes for the operational collection and exchange of sea-ice observations, as required;
- (e) To investigate the possibilities of preparing guidance material on services to shipping in areas of ice including the preparation by an expert of a guide for navigators;
- (f) To update regularly the INFOCLIMA catalogue relating to sea-ice data and to investigate the inclusion of the same information in publication WMO-No. 574 - Sea-ice Information Services in the World;
- (g) To consider any matters referred to the working group by the president of CMM;

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

- An expert from Argentina;
- An expert from Canada;
- An expert from Denmark;
- An expert from Japan;
- An expert from Sweden;
- An expert from the United States of America;

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

Res. 7 (CMM-IX) - RAPPORTEUR ON EDUCATION AND TRAINING

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

- (1) Resolution 28 (Cg-IX) - Promotion of education and training,
- (2) The abridged final report of EC-XXXIV, paragraph 8 of the general summary,
- (3) The abridged final report of EC-XXXVI, general summary,

CONSIDERING:

- (1) That education and training in the field of marine meteorology and physical oceanography are of great importance to Members in developing and expanding their marine meteorological services to meet their responsibilities under the WMO Marine Meteorology Programme,
- (2) That the Commission and Members need to be kept closely informed of activities in the field of education and training,

DECIDES:

- (1) To appoint a Rapporteur on Education and Training with the following terms of reference:
 - (a) To advise generally on the education and training activities of CMM;
 - (b) To act as the focal point for education and training activities within the Commission;
 - (c) To co-ordinate on CMM activities with the EC Panel of Experts on Education and Training and other bodies, such as the IOC Working Committee for TEMA;
 - (d) To assist the working groups in preparing a bibliography of textbooks on related subjects, for circulation to Members;
 - (e) To take action on matters referred to him by the president of CMM;
- (2) To elect Mr S. Ragoonaden (Mauritius) as the CMM Rapporteur on Education and Training.

Res. 8 (CMM-IX) - 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 ninth session are now obsolete,

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

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

DECIDES:

- (1) Not to keep in force Resolutions 1-7 (CMM-VIII);
 - (2) To keep in force Recommendations 1, 2, 6 and 8 (CMM-VIII);
 - (3) To publish in the final report of the ninth session the texts of the recommendations which were kept in force.
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RECOMMENDATIONS ADOPTED BY THE SESSION

Rec. 1 (CMM-IX) - INTERCALIBRATION OF SURFACE-BASED AND REMOTELY SENSED MARINE DATA

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Recommendation 3 (CMM-VIII) - Intercalibration of surface-based and remotely sensed data,

(2) Marine Meteorology and Related Oceanographic Activities Report No. 9 - Intercalibration of Directly Measured and Remotely Sensed Marine Observations,

FURTHER NOTING:

(1) That a Field Workshop on the Intercalibration of Conventional and Remotely Sensed Sea-surface Temperature Data is to take place in Washington, DC, in November 1984,

(2) That the Integrated WWW System Study includes a project to improve satellite measurement of ocean parameters co-ordinated by the EC Panel of Experts on Satellites,

(3) That the Integrated WWW System Study has arranged for a study of the use of ground-based HF radars in the remote measurement of ocean-surface parameters,

CONSIDERING that intercomparison of marine data obtained by conventional and remote-sensing methods should be expanded and accelerated with the development of procedures to enable a coherent use of combined data for operational and non-operational purposes,

RECOMMENDS that studies and workshops on remotely sensed measurements of ocean parameters using satellite, air- and ground-based sensors be continued and expanded and that these include intercalibration of remotely sensed data with conventional ocean data,

INVITES Members to participate actively in these studies and workshops,

REQUESTS the Secretary-General, in consultation with the president of CMM, and with the co-operation of CIMO, CBS and the EC Panel of Experts on Satellites and IOC, as appropriate, to arrange for such studies and workshops.

Rec. 2 (CMM-IX) - WMO WAVE PROGRAMME

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) The abridged final report of CMM-VIII, paragraph 6.1.7 of the general summary,

(2) The final report of the Meeting of Experts on the WMO Wave Programme,

(3) The activities of IOC relating to the collection and archiving of measured sea waves, particularly through its Responsible National Oceanographic Data Centre (Waves),

CONSIDERING:

(1) That Members are increasingly being required to provide sea-wave analysis and forecast services as part of general marine meteorological services,

(2) That the Marine Meteorology Programme of WMO is required to assist Members in implementing such services,

(3) That the observation, analysis and forecasting of sea waves is a rapidly evolving field, and requires continuing attention by the Commission and Members,

RECOGNIZING that activities currently undertaken by Members in all aspects of sea waves need to be further strengthened and streamlined,

RECOMMENDS that the WMO Wave Programme consisting of elements and a plan of implementation, as detailed in the annex to this recommendation, be implemented;

URGES Members to contribute, wherever possible, to the WMO Wave Programme;

REQUESTS the Secretary-General, in consultation with the president of CMM and in co-operation with IOC and relevant user groups, where appropriate, to assist in the implementation of the programme according to the timetable and priorities indicated in the WMO Wave Programme.

Annex to Recommendation 2

WMO WAVE PROGRAMME - MAJOR ELEMENTS AND PLAN OF IMPLEMENTATION

1. DEVELOPMENT OF CODES FOR REAL-TIME EXCHANGE AND REPORTING OF MARINE SURFACE DATA, INCLUDING DIRECTIONAL WAVE SPECTRA

Recommendations and implementation

1.1 The characteristics of all the possible data sources should be examined, the work done so far should be assessed and the requirements should be developed for new codes for the real-time reporting of surface wind, sea-

surface temperature, sea-level data (i.e. including tides and storm surge), sea-state and spectral wave data. One or more experts should be engaged for this purpose. The manner of condensing spectral data should receive special attention - with the co-operation of an expert on wave data - in order to make real-time exchange feasible. The development of the requirements should be completed by 1985.

1.2 This element of the Wave Programme is seen as being of the highest priority since the exploitation of existing (e.g. buoy and ship-borne wave-recorder) and imminent (e.g. satellites and surface-based radio and microwave systems) sources of much useful data depends on the ability to report and exchange different kinds of such data in real-time. If possible, codes for data from conventional sources should be given immediate attention. Full participation of CBS and the Joint IOC/WMO Working Committee for IGOSS is essential throughout the implementation of this element.

2. IMPROVEMENT OF THE STANDARD OF VISUAL WAVE OBSERVATION

Recommendation and implementation

2.1 It is recommended that there should be a general improvement in the standard of visual wave estimation. This can best be carried out in terms of education and an emphasis on the importance of such observations in terms of the resultant quality of wave analysis and forecast products.

2.2 The training of ships' observers should be intensified and modern visual aids should be made available for such a purpose. Existing training methods rely heavily on written material such as the Guide to Meteorological Instruments and Methods of Observation. This training may be enhanced through the expanded use of visual aids including video tapes and films. It is therefore desirable for WMO, through its Voluntary Co-operation Programme, to obtain or produce a brief correspondence course on wave observation. Such a course could be prepared on video tape and might enjoy wide use aboard voluntary observing ships as well as in training establishments for ships' officers. A suggested completion date for the course is 1986.

2.3 National Meteorological Services, through their Port Meteorological Officers, should stress that accurate wave observations will improve the quality of wave forecasts and thereby benefit marine users.

3. REAL-TIME WAVE ANALYSIS AND FORECASTING

Recommendations and implementation

3.1 Arrangements should be made for the compilation of a catalogue of numerical, deterministic and statistical wave models covering existing operational models for all oceans and seas. In making these arrangements appropriate reference should be made to the catalogue of wave models compiled by the RNODC (Waves) of IOC. The WMO catalogue should be included in the proposed Guide to Wave Analysis and Forecasting and updated regularly. The first catalogue should be completed by the end of 1985.

3.2 Workshops or seminars should be organised on all aspects of operational wave analysis and forecasting techniques with special emphasis on numerical methods. These meetings should deal with wind analyses, boundary-

layer formulation, wave generation, propagation and dissipation and shallow water effects, such as refraction, reflection and shoaling. Discussion of model-performance verification, products and the use of measured wave data should be included. It is expected that each workshop/seminar would be attended by experts from Member countries and that participants would represent a cross-section of both forecasters and modelers. Alternatively, this topic might be included in the lecture programme of seminars on marine meteorological services. It would also be useful to arrange for occasional experts' missions. The establishment of real-time wave-analysis and -forecasting services should be encouraged in those countries where such services are needed and the expertise is not directly available. The implementation of this element is continuous.

3.3 The possibility of amending the WMO GRID code (FM 47-V) to accommodate analysed and forecast wave data with spectral and directional components should be examined. Further, national focal points for the WMO Wave Programme, with the assistance of the members of the CMM Working Group on Marine Meteorological Services as appropriate, should have discussions with major user groups of wave data to determine the preferred formats for chart and grid-point data from numerical wave models. This subject should be reviewed at an appropriate future meeting for possible standardization.

3.4 WMO should work closely with IOC/IODE on the matter of standards and formats for archived wave data. It is expected that IOC will continue as the lead agency regarding archives for measured wave data.

4. GUIDANCE MATERIAL AND ASSISTANCE FOR CO-OPERATIVE WAVE PROGRAMMES

Recommendations

4.1 Guide to Wave Analysis and Forecasting, based largely on the present Handbook on Wave Analysis and Forecasting, should be prepared and published.

4.2 A section on wave-measuring instruments should be added to the Guide to Meteorological Instruments and Methods of Observation.

4.3 Guidance material on wave hindcast techniques and models, and their application to a variety of marine problems should be prepared and distributed.

Implementation

4.4 The following action will be necessary for the implementation of the recommendation:

- (a) A meeting of experts should be convened by 1986 to prepare the Guide to Wave Analysis and Forecasting. The final editing should be done by an expert from this group;
- (b) The following additional material should be incorporated in the handbook:
 - (i) Wind-forcing function;
 - (ii) A summary of the proposed sections of the Guide to Meteorological Instruments and Methods of Observation that deal with wave-measuring instruments (see subparagraph (d) below);

- (iii) A listing of operational wave-analysis and -prediction methods (models);
 - (iv) A bibliography of calibration methods for wave-measuring instruments and quality-control techniques for wind and wave data;
 - (v) A review of archived marine climatological data, wave-model hindcast data, and wave-hindcast models and techniques;
 - (vi) A review of wave statistics, design statistics, e.g. extreme-value estimations;
 - (vii) Wave propagation across continental shelves and numerical ray-propagation models;
 - (viii) Wave-shoaling effects;
- (c) Assistance in the creation of new national wave programmes may be provided through expert missions if needed.
- (d) Preparation of a new section of the Guide to Meteorological Instruments and Methods of Observation that will deal with wave-measuring instruments should be undertaken by an expert.

5. CONSIDERATION OF DEVELOPING TECHNIQUES FOR MEASUREMENT OF WAVES AND SURFACE WIND

Recommendations and implementation

5.1 Implementation of this area of the Wave Programme should contain the following elements:

- (a) WMO and the national focal points should co-ordinate with, and give encouragement to, international and national research projects concerned with new measurement techniques, in order to ensure that the resulting data are both operationally usable and valuable;
- (b) National reviews of known work should be compiled regularly by focal points, perhaps on a yearly basis, giving information on national research projects, their progress and potential; national programmes directed at the exploitation of such new data should also be mentioned; the first review should be completed by 1985;
- (c) Reviews should be made of the national reports, again on a yearly basis, so as to inform all participants of the Wave Programme of the progress in this important area; the first review should be completed by 1986;
- (d) An expert should be engaged to assess the likely impact of data obtained from new techniques, its modes of use (e.g. geographical extent, synoptic and asynoptic timing, fixed and transient location), calibration, and assimilation into the GTS, GDPS, etc.

Implementation of this element ((d)) of the WMO Wave Programme should be carried out in order that Members are adequately prepared for the introduction of new kinds of data when the relevant systems reach an operational basis.

6. EXPLOITATION OF EXISTING TECHNIQUES AND SOURCES OF MEASURED WAVE AND SURFACE-WIND DATA

Recommendation

6.1 There is by now a wealth of practical experience in using automatic wave- and wind-measurement systems in marine environments and also in the associated problems of real-time data relay. These experiences have clearly demonstrated that automatic measuring and real-time relay systems are viable for marine surface data and it is recommended that such systems should be fully exploited.

Implementation

6.2 Efforts should be made to identify governmental and private organizations that deploy instruments to measure surface wind and waves. Data from such sources, if assessed as satisfactory, should be sought and made available to national Meteorological Services for distribution over the GTS. Assistance should be given for the calibration of instruments and quality control of data.

6.3 Oceanographic institutions should be approached through the Permanent Representatives of WMO Members and through relevant IOC channels as appropriate, with a view to their participation in a real-time wave-measuring and -reporting programme.

6.4 The realization of improved networks for surface-wind and wave data using conventional instrumentation is mainly a matter for national implementation. WMO's involvement should, however, include:

- (a) Requesting Members of WMO to submit to the Secretary-General the location of identified wave-recording installations. A summary of this information should subsequently be forwarded to the Responsible National Oceanographic Data Centre for Waves (RNODC(Waves)) of the Intergovernmental Oceanographic Commission, which has the responsibility of identifying all sources of good-quality measured wave data and from time to time publishing catalogues listing the locations. The first summary of information should be available in 1985. A brief form devised by RNODC (Waves) for this purpose should be made available to Members of WMO;
- (b) National implementation which should consist of:
 - (i) Vigorous attempts to gain access to as much data as possible from private, institutional and governmental sources, including help towards the provision of resources for real-time data reporting;

- (ii) Participation in co-ordinated national, regional or international programmes for the installation of conventional surface-wind and wave measuring equipment on suitable marine platforms, using direct or satellite relay communications;
- (iii) Research into the problems of interpretation of surface-wind measurements made on board ships, drilling and production platforms, etc., where height and exposure are non-standard.

7. OBSERVING NETWORK SYSTEM EXPERIMENTS

Recommendations

7.1 It is recommended that the national reviews of known work compiled by national focal points contain a section devoted to experiments on instrumental and model intercomparisons and verifications, a bibliography of published results and a review, if possible, of results not to be published.

7.2 This section of the report should also be forward-looking in announcing planned experiments so that other nations with an interest could pursue participation through bilateral negotiation. The focal points should, in addition, make known nationally the WMO requirements for network experiments so that adjustments could be made to national experiments where economically feasible.

7.3 It is further recommended that the review of the national reports be expanded to include large-scale international experiments which have elements of interest to the WMO Wave Programme. The national focal points could then inform their national agencies participating in the experiments of the sort of assistance they might, if practicable, provide to the WMO Wave Programme.

Implementation

7.4 Implementation of this item in the WMO Wave Programme will coincide with the implementation of the national reviews of known work.

Rec. 3 (CMM-IX) - EXPANSION OF MARINE CLIMATOLOGICAL SERVICES

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) The final report of CMM-VIII, general summary, paragraph 7.1 - Contribution of CMM to the World Climate Programme,

(2) Resolution 5 (CMM-VIII) - Terms of reference of the Working Group on Marine Climatology,

(3) The types of action required to achieve World Climate Data Programme objectives as established by Resolution 17 (Cg-IX),

(4) The existence of potentially useful oceanic data products originating from remote-sensing and numerical analysis activities,

(5) Technological advances in mass storage and information and micro-computer technology,

CONSIDERING:

(1) The responsibility of CMM for developing guidelines relating to data management and archives,

(2) The lack of such guidelines for marine data from remote-sensing and numerical analysis activities,

(3) The existence of software in certain Member countries which is useful for providing data services and derived data products for climate research and applications,

(4) The potential usefulness of microcomputer technology and other advances for the development of efficient and inexpensive marine climate data services,

RECOMMENDS:

(1) That a list of marine climate parameters available from remote-sensing and numerical analysis activities be developed with a view to the future archival and exchange of related data for both operational and research purposes;

(2) That guidelines be prepared for the archival and exchange of such data;

(3) That the use of microcomputers and associated software for production and exchange of marine data products be encouraged and advances in emerging information storage technologies be kept under review;

INVITES Members to participate in these activities;

REQUESTS the Secretary-General, in consultation with the presidents of CMM, CBS and CCI, as necessary, to provide support for the promotion of these activities.

Rec. 4 (CMM-IX) - PREPARATION OF A GUIDE TO APPLICATIONS OF MARINE CLIMATOLOGY

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) The abridged final report of Cg-IV, general summary, paragraph 3.1.6.5,

(2) Resolution 35 (Cg-IV) - International arrangements for marine climatological summaries and data collection for the marine section of a World Climatic Atlas,

(3) The report of the president of the CMM,

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

CONSIDERING:

(1) That many Members now have both extensive marine data holdings and developed expertise for presenting these data in ways which are useful for marine data applications,

(2) The need for a publication describing the knowledge and techniques used presently by these Members in providing services for marine climate applications to assist other Members in developing their own programmes,

RECOMMENDS:

(1) That the preparation of a Guide to Applications of Marine Climatology be undertaken;

(2) That the Guide be complementary to and not duplicate the Guide to Climatological Practices but that it should refer to the material available in that Guide and other WMO publications;

(3) That this Guide be published by WMO;

REQUESTS the Secretary General, in consultation with the president of CMM and the president of CCI, as appropriate, to arrange for the preparation of the Guide, in co-ordination with WCAP.

Rec. 5 (CMM-IX) - INTERNATIONAL MARITIME METEOROLOGICAL PUNCH CARD (IMMPC)/
INTERNATIONAL MARITIME METEOROLOGICAL TAPE (IMMT)

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING Recommendation 8 (CMM-VIII) - International maritime meteorological punch card (IMMPC)/international maritime meteorological tape (IMMT),

CONSIDERING:

(1) That the ship synoptic code FM 13-VII was revised in 1982 to include the weather data indicator (i_x),

(2) That the IMMPC/IMMT formats were designed on the assumption that ships and platforms would always observe past and present weather,

(3) That some countries have practised placing a present weather code of "02" (omitted (no significant phenomenon to report)) in those observations from 1982 onward that contain a blank present weather field,

(4) That this practice introduces a fair-weather bias in marine observations,

RECOMMENDS:

(1) The inclusion of weather data indicator (i_x) in the IMMPC/IMMT format for all data observed on or after 1 March 1985,

(2) That the indicator (i_x) should appear in column 79 of Parts A and B and in column 91 of Part C of the approved layouts.

REQUESTS the Secretary-General to bring this recommendation to the attention of all concerned.

Rec. 6 (CMM-IX) - SEA-ICE NOMENCLATURE

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Resolution 6 (CMM-VIII) - Working Group on Sea Ice - by which the Commission decided to re-establish the Working Group on Sea Ice with terms of reference which included, inter alia, the review of the WMO Sea-ice Nomenclature,

(2) The report of the fourth session of the CMM Working Group on Sea Ice,

(3) Recommendation 10 (CMM-VIII) - Revision of the Sea-ice Nomenclature - in which the Commission recommended that a number of sea-ice terms be referred to the Working Group on Sea Ice for inclusion in the WMO Sea-ice Nomenclature,

CONSIDERING:

(1) That some alterations and additions to the Sea-ice Nomenclature are required in the light of experience,

(2) That the subject classification of the WMO Sea-ice Nomenclature requires re-arrangement,

RECOMMENDS:

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

(2) That the subject classification be re-arranged as given in the annex (Part B) to this recommendation and be introduced into the WMO Sea-ice Nomenclature,

REQUESTS the Secretary-General:

(1) To promulgate the amendments to Members by 30 July 1985;

(2) To arrange for the printing of the revised WMO Sea-ice Nomenclature by 30 September 1986.

Annex to Recommendation 6 (CMM-IX)

PART A

AMENDMENTS TO TERMS IN THE WMO SEA-ICE NOMENCLATURE (WMO-No. 259)

CHANGE:

2.5.1 Should read - "Thin first year ice/white ice: First-year ice 30-70 cm thick".

ADD:

2.5.1.1 Thin first year ice/white ice first stage: 30-50 cm thick.

ADD:

2.5.1.2 Thin first-year ice/white ice second stage: 50-70 cm thick.

CHANGE:

4.2 Concentration to read - The ratio expressed in tenths* 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.

* In historical sea-ice data octas have been used by some countries [Editorial note: delete all terms "octas" or fractional eighths in text].

CHANGE:

4.2.6 Open water - Replace sentence starting "There may be ice of land origin" with "No ice of land origin is present".

CHANGE:

4.2.7 Bergy water - Replace lines 2 and 3 with "In which ice of land origin is present in concentrations less than 1/10. There may be sea ice present, although the total concentration of all ice shall not exceed 1/10."

CHANGE:

4.3.4 Floeberg - Last sentence to read: It may typically protrude up to 5 m above sea level.

ADD:

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 typically protrudes up to 2 m above sea level.

CHANGE:

4.3.5 Ice breccia - Ice of different stages of development frozen together.

ADD:

4.4.5.1 Ice isthmus - A narrow connection between two ice areas of very close or compact pack ice. It may be difficult to pass, whilst some- times being part of a recommended route.

CHANGE:

7.4 Delete last two sentences starting with "sometimes".

CHANGE:

8.1 Should read "Sea ice which has not been affected by deformation".

CHANGE:

10.1 Replace "unlike snow" with "unlike ordinary snow".

CHANGE:

12.7 Iceport - Change to two words, i.e. ice port.

Change/Proposed change to Part II

Fracture - ADD:

| | |
|----------------------|------------------------------|
| Crack: | 0 to 1 m wide (7.1.1) |
| Very small fracture: | 1 to 50 m wide (7.1.2) |
| Small fracture: | 50 to 200 m wide (7.1.3) |
| Medium fracture: | 200 to 500 m wide (7.1.4) |
| Large fracture: | more than 500 m wide (7.1.5) |

Proposed new terms

- Area of weakness. A satellite-observed area in which either the ice concentration or the ice thickness is significantly less than that in the surrounding areas. Because the condition is satellite observed, a precise quantitative analysis is not always possible, but navigation conditions are significantly easier than in surrounding areas. (12.7). [Editorial note: appropriate numbering adjustments need to be made.]
- Rubble field. An area of extremely deformed sea ice of unusual thickness formed during the winter by the motion of pack ice against, or around a protruding rock, islet or other obstruction (8.2.3.2).
- Shear ridge. An ice ridge formation which develops when one ice feature is grinding past another. This type of ridge is more linear than those caused by pressure alone (8.2.2.7).
- Shear ridge field. Many shear ridges side by side (8.2.2.7.1).
- Shore ice ride-up. A process by which ice is pushed ashore as a slab (6.5). [Editorial note: Appropriate numbering adjustments need to be made.]
- Shore melt. Open water between the shore and the fast ice, formed by melting and/or as a result of river discharge (9.6).

PART B

AMENDMENTS TO THE SUBJECT CLASSIFICATION OF THE
WMO SEA-ICE NOMENCLATURE (WMO-No. 259)

Part I

- | | | |
|------------|---------------------|---|
| ADD: 1.1.1 | Fast ice | cf 3.1 |
| ADD: 1.1.2 | Drift ice/Pack ice: | Term used in a wide sense to include any area of sea ice other than fast ice no matter what form it takes or how it is dispersed. When concentrations are high, |

i.e. 7/10 or more, drift ice may be replaced by the term pack ice.*

*Previously the term pack ice was used for all ranges of concentration.

[Editorial note: The asterisk phrase should be only in the English and French sections since both Russian and Spanish terms already mean drift ice. In French, pack = banquise, and drift ice = glace dérivante.]

Amend indicated paragraphs as follows:

| <u>Paragraph</u> | <u>Proposed Amendment</u> |
|------------------|--|
| 3.1 | line 6, REPLACE "pack" with "floating" |
| 4. | CHANGE to read: OCCURRENCE OF FLOATING ICE |
| 4.2.1 | line 1, DELETE "PACK", REPLACE "Pack" with "floating" |
| 4.2.1.1 | line 1, DELETE "pack", REPLACE "Pack" with "floating" |
| 4.2.2 | line 1, DELETE "PACK", REPLACE "Pack" with "floating" |
| 4.2.3 | line 1, DELETE "PACK", REPLACE "Pack" with "floating" |
| 4.2.4 | line 1, DELETE "PACK", REPLACE "Pack" with "floating" |
| 4.2.5 | line 1, DELETE "PACK", REPLACE "Pack" with "floating" |
| 4.4.1 | line 1, REPLACE "pack" with "floating" |
| 4.4.1.4 | line 1, REPLACE "pack" with "floating" |
| 4.4.3 | line 1, DELETE "pack" |
| 4.4.5 | line 1, REPLACE "pack" with "floating" |
| 4.4.8.1 | line 3, DELETE "pack" |
| 4.4.8.2 | line 3, DELETE "pack" |
| 4.4.9 | line 2, REPLACE "pack" with "drift" |
| | line 3, REPLACE "pack" with "drift" |
| 4.4.9.1 | line 2, REPLACE "pack" with "drift" |
| 4.4.9.2 | line 2, REPLACE "pack" with "drift" |
| 5. | REPLACE "PACK" with "FLOATING" |
| 5.3 | line 1, DELETE "pack" |
| 6.1 | line 4, after "close" DELETE "pack", after "compact" DELETE "pack" |
| | line 5, DELETE "pack" |

| <u>Paragraph</u> | <u>Proposed Amendment</u> |
|------------------|---|
| 7.1 | line 2, DELETE first word ("pack"), after "compact" DELETE "pack", after "consolidated" DELETE "pack" |
| 7.1.1.2 | line 2, REPLACE "pack" with "drift" |
| | line 3, REPLACE "pack" with "drift" |
| 7.3.1 | line 1, REPLACE "pack" with "drift" |
| | line 2, REPLACE "pack" with "drift" |
| 7.3.2 | line 1, REPLACE "pack" with "drift" |
| 7.4.1 | line 1, REPLACE "pack" with "drift" |
| | line 2, REPLACE "pack" with "drift" |
| 7.4.2 | line 1, REPLACE "pack" with "drift" |
| 8.6.1 | line 3, REPLACE "mobile floating" with "drift" |
| 13.1 | line 1, REPLACE "Pack" with "Drift" |

Part II

(Consequences of above changes to Part II)

ADD: "Drift ice" with above definitions

CHANGE: "Pack ice" to read "Drift ice"

Rec. 7 (CMM-IX) - GLOBAL SEA-ICE DATA BANK

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Resolution 6 (CMM-VIII) - Working Group on Sea Ice,

(2) The report of the chairman of the Working Group on Sea Ice to
CMM-IX;

CONSIDERING:

(1) The need for a global sea-ice data bank in climate research,

(2) The existence of a proposed digitizing format (SIGRID),

(3) The expressed willingness of sea-ice services to participate in
digitizing sea-ice charts,

RECOMMENDS:

(1) That the work towards the establishment of a global sea-ice data
bank be started as soon as possible in close co-operation with the World
Climate Programme,

(2) That in the preparations for establishing the data bank, the
principles given in the annex to this recommendation be followed;

REQUESTS the Secretary-General, in consultation with the president of
CMM and the chairman of the Working Group on Sea Ice, to arrange for the
commencement of this work and for the evaluation of the test material when
available.

Annex to Recommendation 7 (CMM-IX)

GLOBAL SEA-ICE DATA BANK

Principles to be used in the preparations for the
establishment of a global sea ice data bank

1. The format to be used for the collection, storage and retrieval should
be the proposed SIGRID format;

2. The input data should be provided by national sea-ice services and the main source of information will be operational sea-ice charts and satellite data in processed forms.
3. Digitization will be the responsibility of national sea-ice centres. They should, as far as possible, incorporate any additional information received after the operational use of the ice charts. These centres will also be responsible for the quality control of their own data.
4. The digital sea-ice data should be kept within the national services and catalogues should be prepared giving information on the data and how they can be retrieved. These catalogues should be provided to the WMO Secretariat for distribution to WMO Members. This will meet the immediate needs of climate research.
5. Geographical coverage: should be global and in the first stage concentrate on the northern hemisphere. All areas where sea ice occurs for any significant period every year should be included. The data set from each individual ice chart is to be regarded as an independent element.
6. Test year: data from the ice season beginning in the year 1982 should be the test material for the digitizing of sea-ice charts as this was the first year the international system of sea-ice symbols was used by most sea-ice services. The test material provided by the national sea-ice services should be evaluated by a group of experts before the project is continued and the proposed SIGRID format amended as necessary.
7. Years to be covered: following the test year 1982, the digitizing should continue with 1979 - the FGGE year during which a very comprehensive meteorological and oceanographic global data set was compiled. After the digitization and evaluation of the years 1982 and 1979, work should continue with the aim of obtaining a representative climatological period.
8. The global sea-ice data bank After the experience with sea-ice data archiving and merging of data from different sources, the establishment of a global sea-ice data bank should be considered, provided that the necessary resources can be made available. The World Data Centres A and B for Sea Ice and Glaciology should be the location of a sea-ice data bank from which users could retrieve data.

Rec. 8 (CMM-IX) - REVISION OF THE MANUAL ON MARINE METEOROLOGICAL SERVICES,
VOLUME I, PART II

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) The final report of the eighth session of the Commission for Marine Meteorology, general summary, paragraph 5.1.9,

(2) The final report of the Study Group Meeting on the Provision of Marine Meteorological Information to Shipping (Geneva, September 1982),

CONSIDERING:

(1) That, over the past two decades, many Meteorological Services have started to issue marine meteorological information via radiofacsimile in view of the requirements expressed by marine users and shipmasters,

(2) That a vital need exists for standardizing symbols and map specifications for facsimile charts for marine purposes,

RECOMMENDS that the Manual on Marine Meteorological Services, Volume I, PART II, section 4, be revised as indicated in the annex to this recommendation.

Annex to Recommendation 8 (CMM-IX)

REVISED TEXT OF MANUAL ON MARINE METEOROLOGICAL SERVICES,
VOLUME I, PART II, SECTION 4

4. PROVISION OF INFORMATION BY RADIOFACSIMILE

4.1 Principles

4.1.1 The principle for the provision of information by radiofacsimile is as follows:

Principle

Radiofacsimile transmissions have the capability of providing marine users with comprehensive marine environmental information, both in pictorial form and in the form of texts, and thus provide marine users with an efficient service.

4.2 Procedures4.2.1 Types of charts

Radiofacsimile charts likely to be of use to marine users are:

- Surface-weather analyses;
- Surface-weather prognoses;
- Surface wind-field analyses;
- Wave analyses;
- Wave prognoses;
- Sea-surface temperature analyses;
- Sea-surface temperature prognoses;
- Sea-ice information;
- Significant weather depiction;
- Upper-air analyses;
- Upper-air prognoses.

4.2.2 Projections and scales

Charts intended for radiofacsimile transmission should be prepared with projections and scales prescribed as follows:

4.2.2.1 The following projections as appropriate should be used:

- (a) The stereographic projection on a plane cutting the sphere at the standard parallel of latitude 60° ;
- (b) Lambert's conformal conic projection, the cone cutting the sphere at the standard parallels of latitude 10° and 40° or 30° and 60° ;
- (c) Mercator's projection with true-scale standard parallel of latitude $22\text{-}1/2^\circ$.

4.2.2.2 The scales along the standard parallels should be as follows for each charts:

| | | | | | |
|-----|---|---|---|---|------------|
| (a) | Covering the world | - | 1 | : | 40 000 000 |
| | Alternative | - | 1 | : | 60 000 000 |
| (b) | Covering the hemisphere | - | 1 | : | 40 000 000 |
| | Alternatives | - | 1 | : | 30 000 000 |
| | | | 1 | : | 60 000 000 |
| (c) | Covering a large part of a hemisphere or hemispheres | - | 1 | : | 20 000 000 |
| | Alternatives | - | 1 | : | 30 000 000 |
| | | | 1 | : | 40 000 000 |
| (d) | Covering a portion of a continent or an ocean or both | - | 1 | : | 10 000 000 |
| | Alternatives | - | 1 | : | 20 000 000 |
| | | | 1 | : | 15 000 000 |
| | | | 1 | : | 7 500 000 |
| | | | 1 | : | 5 000 000 |

4.2.2.3 The name of the projection, the scale at the standard parallels and the scales for other latitudes should be indicated on every chart.

4.2.3 Preparation of original chart

When preparing charts for facsimile transmission, the following basic considerations in the preparation of the original copy should be followed:

- (a) The minimum line thickness should be sufficiently large to ensure clear reproduction;
- (b) Lines which are required to be reproduced uniformly should be of uniform width and intensity;
- (c) Special marking in heavy print (two or three crosses) of intersections of latitude and longitude lines will facilitate the use of facsimile charts during periods of poor reception;
- (d) The minimum separations of detail in letters, figures, symbols, etc. should be sufficient to avoid filling-in of the spaces in the reproduction;
- (e) Letters, figures, symbols, etc. should be drawn as simply as possible;

(f) Models employed in plotting should be as simple as possible.

4.2.4 Legends of charts

Each chart prepared for facsimile transmissions should bear a bold legend including:

- (a) Name of issuing Meteorological Forecast Centre in plain language;
- (b) Type of chart;
- (c) The date and time to which the data refer or, in the case of forecast charts, the time to which the forecast is applicable;
- (d) Projection transmitted;
- (e) Unit of wind speed;
- (f) Special symbols or isopleths.

4.2.5 Symbols used on charts

The symbols used for pictorial representation of observational data, analyses and forecasts are those given in the attachment. While individual countries may use other symbols, particularly for specialized depictions, these should not conflict with those given in the attachment.

4.2.6 Model S - surface - charts

Isobars should be drawn as continuous lines labelled in hectopascals. Centres of high and low pressure, fronts, convergence zones and significant weather phenomena should be marked using symbols from the Manual on the GDPS and the attachment to this annex. Pressure centres on analysis charts should be marked with an open arrow showing the direction of the expected movement of the centre with a figure indicating mean speed of movement in knots.

4.2.7 Model W - wave - charts

The average values of the wave heights from the larger well-formed waves, thus the significant wave heights, should be drawn as continuous lines labelled in metres. Similarly, swell heights should be drawn as dashed lines. The centres of maximum and minimum wave heights should be marked MAX and MIN respectively. The direction of sea waves should be indicated by solid arrows. The direction of swell waves should be indicated by wavy arrows.

4.2.7.1 In the case where only composite wave heights including both sea waves and swell waves are drawn, they should be depicted in the same way as for sea waves only, i.e. as continuous lines labelled in metres.

4.2.8 Model SST - sea-surface temperature - charts

Sea-surface temperatures should be drawn as solid lines labelled in degrees Celsius, intervals to be suitable to geographical areas.

4.2.9 Model SI - sea-ice information - charts

The international system of sea ice symbols adopted by WMO should be used.

4.2.10 Transmission schedules

Transmission schedules indicating times of transmission, radio frequencies, areas covered, chart projections used and index of co-operation and amendments thereto should be published and made available to marine users as far in advance as possible and by the most expeditious means.

4.2.11 Notification to WMO

The information specified in 4.2.10 shall be notified to the WMO Secretariat for inclusion in WMO-No. 9, Volume D - Information for Shipping.

Attachment to AnnexSYMBOLS AND DEPICTIONS USED ON RADIOFACSIMILE CHARTS FOR MARINE PURPOSES1. Typical symbols used for marine meteorological purposes

(a) Selections from the Manual on the Global Data-processing System (WMO-No. 485)



cold front at the surface



warm front at the surface



occluded front at the surface



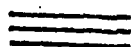
quasi-stationary front at the surface



convergence line



inter-tropical convergence zone (ITCZ)

centre of tropical cyclonic circulation
(maximum winds 34 - 63 knots)centre of tropical cyclonic circulation
(maximum winds of 64 knots or more)

fog

(b) Additional symbols

ice accretion:





ice building slowly





ice building rapidly

2. Depiction of lines and systems on specific charts(a) Model S - surface-chart

| | |
|---|--|
| continuous lines | isobars labelled in hectopascals |
| crossed line segments | position of centre of high or low pressure given in hectopascals |
| *  | low pressure |
| | high pressure |
|  | direction of movement of centres and fronts with speed in knots |

(b) Model W - wave-chart

| | |
|---|---|
| continuous lines | significant wind wave height (sea), or composite wind wave and swell height, where so drawn, labelled in metres |
| dashed lines | significant swell height labelled in metres |
| MAX | centre of maximum wave height |
| MIN | centre of minimum wave height |
|  | direction of sea waves |
|  | direction of swell waves |

(c) Model SST - sea-surface temperature - chart

| | |
|------------------|---------------------------------------|
| continuous lines | isotherms labelled in degrees Celsius |
|------------------|---------------------------------------|

NOTE: Broken lines may be used to avoid confusion with other analysed parameters.

(d) Model SI - sea ice information - chart

The international system of sea ice symbols adopted by WMO should be used.

* The appropriate letter from the alphabet of the issuing country may be used, provided that the chart contains explicitly the correspondence to the appropriate English letters.

Rec. 9 (CMM-IX) - REVISION OF RESOLUTIONS OF THE EXECUTIVE COUNCIL BASED ON
PREVIOUS RECOMMENDATIONS OF THE COMMISSION FOR MARINE
METEOROLOGY

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING with satisfaction the action taken by the Executive Council 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 Resolution 9 (EC-XXXIV) no longer be considered necessary;
 - (2) That Resolutions 15 (EC-XXI) and 12 (EC-XXV) be kept in force.
-

A N N E X I

Annex to paragraph 3.7 of the general summary

FUTURE WORK PROGRAMME OF CMM FOR THE PERIOD 1985-1989

| MAJOR PROJECTS | GOALS | EXECUTION | TARGET DATES |
|---|--|---|--------------|
| Development and improvement of marine meteorological services | (a) Monitoring of marine user requirements and to make recommendations for relevant marine meteorological services (MMS) including updating the Guide to and Manual on Marine Meteorological Services; | Working Group (WG) on MMS with the assistance of the Secretariat | Continuous |
| | (b) Monitoring of MMS and the issue of regulatory material to facilitate this process; | WG on MMS; Secretariat. Members to implement monitoring | Continuous |
| | (c) Co-ordination of MMS with projects of other related organizations such as: (i) IMO (navigational warnings and search and rescue operations); (ii) IOC (oceanographic services, IGOSS); (iii) INMARSAT; | WG on MMS; Rapporteur on Marine Telecommunications, Secretariat | Continuous |
| | (d) Preparation of guidance material on marine meteorological/oceanographic services, including the preparation of a publication for marine users on what a mariner should know about weather maps and the state of the sea; | WG on MMS; WMO expert; Secretariat | 1988 |
| | (e) Revision and updating of document "Marine services programme to the year 2000", in consultation with appropriate user groups. | WG on MMS; user groups, (e.g. ICS, IFSMA, IMO, etc.); Secretariat | 1987 |

ANNEX I (continued)

| MAJOR PROJECTS | GOALS | EXECUTION | TARGET DATES |
|----------------|---|--|---|
| Sea ice | <p>(a) Continued promotion of international co-operation in improving the methodology for the acquisition, exchange, processing, storage and dissemination of sea-ice data and products;</p> <p>(b) Specification of requirements and promotion of international co-operation in the development and use of remote sensing for sea-ice, with special attention to microwave techniques;</p> <p>(c) Study of user requirements and recommendation of service changes as appropriate including suitable formats;</p> <p>(d) Provision of support for WCP and WNW;</p> <p>(e) Preparation of guidance material on methods of predicting sea-ice growth, drift and decay;</p> <p>(f) Preparations for the establishment of a global (computer compatible) sea-ice data bank to include historical sea-ice chart data;</p> <p>(g) Preparation and publication of an international code for operational exchange of ice information and proposals for the organization of such an exchange;</p> <p>(h) Publication of the revised WMO Sea-ice Nomenclature;</p> | <p>WG on Sea Ice</p> <p>WG on Sea Ice</p> <p>WG on Sea Ice with assistance from Secretariat</p> <p>WG on Sea Ice with assistance from Secretariat</p> <p>WG on Sea Ice, WMO expert</p> <p>WG on Sea Ice, in co-operation with CCI and in co-ordination with the WCP</p> <p>WG on Sea Ice</p> <p>WG on Sea Ice; Secretariat</p> | <p>Continuous</p> <p>Continuous</p> <p>Continuous</p> <p>Continuous</p> <p>1988</p> <p>1986 initially, then continuous</p> <p>1985, 1986</p> <p>30 September 1986</p> |

ANNEX I (continued)

| MAJOR PROJECTS | GOALS | EXECUTION | TARGET DATES |
|---------------------|---|--|--------------|
| Sea ice (continued) | (i) Preparation and publication of guidance material on services to shipping in areas of ice including a guide for navigators; | WG on Sea Ice; WMO expert; Secretariat | 1988 |
| | (j) Regular updating of the INFOCLIMA Catalogue relating to sea ice and investigating the inclusion of this information in the publication WMO-No. 574 - Sea-ice Information Services in the World. | WG on Sea Ice with the assistance of Secretariat | Continuous |
| Marine climatology | (a) Co-ordination of marine climatological requirements with the WCP and provision of technical advice on the exchange and archival of such data; | WG on Marine Climatology | Continuous |
| | (b) Reviewing material in WMO Regulations, manuals and guides relevant to marine climatology including the recommendation of minimum standards for automatic quality control; | WG on Marine Climatology | Continuous. |
| | (c) Preparation and publication of a Guide to Applications of Marine Climatology; | WG on Marine Climatology, with the assistance of the Secretariat | 1986 |
| | (d) Operational and scientific study of useful marine data, e.g. from remote-sensing and numerical-analysis activities with a view to future archival and exchange; | WG on Marine Climatology | Continuous |
| | (e) Examination of the proposal for the marine section of the World Climatic Atlas and preparation of the section taking account of the improved data analysis system currently available; | WG on Marine Climatology, president of CMM in consultation with president of CCI | 1987 |

ANNEX I (continued)

| MAJOR PROJECTS | GOALS | EXECUTION | TARGET DATES |
|--|--|--|--------------|
| Marine climatology (continued) | (f) Investigation of problems and advances related to marine data collection and exchange; | WG on Marine Climatology | Continuous |
| | (g) Review of the implementation of the Marine Climatological Summaries Scheme. | WG on Marine Climatology | Continuous |
| | (h) Evaluation of marine climatological data exchange for special projects in particular the possibilities of an "El Niño" data set; | WG on Marine Climatology | Continuous |
| Further development of observing data-collection and forecasting systems | (a) Improvement and expansion of the WMO Voluntary Observing Ships' scheme: (i) Improved quality of observation; (ii) Automation of observation as far as practicable; | Members; WG on MMS; WG on Marine Climatology | Continuous |
| | (b) Data collection from mobile ships through maintaining marine communication systems, especially automated shipboard observing systems, ASAP and marine satellite communications (including INMARSAT); | Expert meetings and Rapporteur on Marine Telecommunications in co-operation with WG on MMS | Continuous |
| | (c) Preparation of a Technical Note on the Forecasting of Coastal Winds; | WMO expert; WG on Technical Problems | 1988 |
| | (d) Preparation of a Technical Note on the Processing of Marine Data (control, objective analysis, forecast/calculation); | WG on Technical Problems | 1988 |
| | (e) Preparation of a Technical Note on the Use of Satellite Data in Marine Meteorological Services; | WG on Technical Problems | 1988 |

ANNEX I (continued)

| MAJOR PROJECTS | GOALS | EXECUTION | TARGET DATES |
|---|--|---|-----------------------------------|
| Further development of observing, data-collection and forecasting systems (continued) | (f) Specification of requirements for ocean parameters, including geographical coverage, to be obtained from satellites and the promotion of international co-operation for the development and use of remote sensing; | WG on Technical Problems in collaboration with WG on Sea Ice | 1988 |
| | (g) Guide to Meteorological Instrument and Observing Practices; (i) Further review of Chapter 17 with a view to the inclusion of a section on wave-measuring instruments; (ii) Expansion of Chapter 22; | CMM experts; WG on Technical Problems, together with CIMO and the WMO Wave Programme | 1986 |
| | (h) Preparation of a Technical Note on Automated Wave-measuring Systems; | WG on Technical Problems, together with CIMO and the WMO Wave Programme | 1988 |
| | (i) Studies on definition of marine data density requirements including observing network studies; | All WG's, in co-operation with ISS | 1989 |
| | Technology transfer including education and training in marine meteorology and physical oceanography | (a) Improvement in expertise in marine meteorology and physical oceanography amongst Members; | WMO experts; Secretariat; Members |
| (b) Promotion of effective participation in, and implementation of, marine meteorological programmes by developing countries through training seminars, experts' missions, fellowships, provision of equipment, etc.; | | Members of RA I, RA III/IV, RA II/V and developing countries in RA VI; Secretariat | Continuous |
| (c) Formulation of proposals for assistance in accordance with CMM decisions; | | Presidents of RAs concerned and Secretariat | Continuous |

ANNEX I (continued)

| MAJOR PROJECTS | GOALS | EXECUTION | TARGET DATES |
|--|--|--|------------------------|
| WMO Wave Programme | (a) Development of code requirements for the real-time reporting of ocean data; | WMO experts in co-operation with CBS, IGOSS, COST-43 | 1984, then continues |
| | (b) Improvement in the accuracy of visual wave estimates including the production of a training guide; | WMO experts; Members | 1986 |
| | (c) Monitoring techniques for wave analysis and forecasting, including the preparation of a catalogue on numerical wave models in use, an examination of user analysis/forecast output requirements and the preparation of a revised Guide to Wave Analysis and Forecasting; | WMO experts; Secretariat; Members; RNODC (Waves) of IOC | End of 1985 |
| | (d) Conducting seminars/workshops on wave analysis and forecasting; | WMO experts; Secretariat (in conjunction with other MMS) | Continuous as required |
| | (e) Monitoring new techniques for wave measurement and intercomparison and verification experiments for numerical wave models; studying the impact of new data on wave analysis and forecasting; | WG on Technical Problems; WMO expert; Secretariat | Continuous |
| | (f) Promotion of the exploitation of existing data through the RNODC (Waves) Data Referral System (IOC); | WMO experts in co-operation with IODE | Continuous |
| Co-ordination between CMM and IOC activities | (a) Co-ordination between CMM and Joint IOC/WMO Working Committee for IGOSS (JWC for IGOSS); | President of CMM; CMM Advisory Working Group and chairman of JWC for IGOSS | Continuous |
| | (b) Co-ordination of preparation and distribution of MMS and IGOSS/IDPSS products; | WG on MMS, together with JWC for IGOSS or its subsidiary bodies | Continuous |

ANNEX I (continued)

| MAJOR PROJECTS | GOALS | EXECUTION | TARGET DATES |
|--|--|---|---|
| Co-ordination between CMM and IOC activities (continued) | <p>(c) Co-ordination of the requirements for sub surface observations required by WMO and IOC programmes;</p> <p>(d) Preparation of joint WMO/IOC guidance material;</p> <p>(e) Study of the possibility of preparing a Climatic Atlas of the World Ocean.</p> | <p>WG on MMS, together with JWC for IGOS or its subsidiary bodies</p> <p>President of CMM and chairman JWC for IGOS</p> <p>WG on Marine Climatology, together with the WC for IODE or its subsidiary bodies</p> | <p>Continuous</p> <p>Continuous</p> <p>1988</p> |

A N N E X I I

Annex to paragraph 5.7 of the general summary

OUTLINE OF A MARINE METEOROLOGICAL SERVICES MONITORING PROGRAMME

I. OBJECTIVE

The objective of the programme is to monitor the efficiency and effectiveness of the provision of weather and sea bulletins by obtaining opinions and reports from marine users.

II. METHOD

The method of operating this programme is by arranging for regular information, preferably in a standardized form, concerning the marine meteorological services received during ships' operational activities. The number of ships to be assigned should be decided at the discretion of Members.

III. REPORTING PROCEDURES

The information should be submitted by ships to the national Meteorological Services which have either recruited them, or are the national Meteorological Services of their flag country, or have specifically requested such information.

IV. CONTENT AND FORMAT OF REPORT

1. The information to be submitted may include the following elements:

- (a) Storm and gale warnings:
 - clarity
 - quality of information
 - timeliness
- (b) Weather bulletins:
 - clarity
 - quality of information
 - timeliness
 - compliance with procedure
 - terminology
 - languages
 - area coverage and identification
- (c) Facsimile:
 - maintaining schedules
 - quality of information
 - readability
 - symbology
 - quality of reception
- (d) Coastal radio stations/
Coast Earth Stations:
 - establishing contact with receiving station
 - delays with OBS messages
 - five- or ten-figure groups

(e) Other shortcomings (the following information should accompany any fault reported):

- date;
- time;
- position of ship;
- radio frequency and station call sign;

(f) Suggested improvements.

2. The monitoring questionnaire to be distributed should have a standard section for entering answers in a simple manner.
3. Port Meteorological Officers should be encouraged to receive verbal reports from any ship calling at their ports for subsequent transmission to the national Meteorological Service.

V. FOLLOW-UP PROCEDURE

The relevant comments should be submitted by the national Meteorological Services to the WMO Secretariat for appropriate follow-up action including compilation and distribution of the data. These comments should also be brought to the attention of the presidents of the regional associations concerned.

A N N E X III

Annex to paragraph 13.2 of the general summary

OUTLINE OF THE SECOND LONG-TERM PLAN, THE MARINE METEOROLOGY PROGRAMME, IGOSS AND OTHER OCEAN-RELATED ACTIVITIES

PART I - OVERALL POLICY AND STRATEGY (1988-1997)

Introduction

1. The main purpose of the Marine Meteorology Programme, IGOSS and other ocean-related activities is the promotion and required international co-ordination of marine observing systems, of marine meteorological and oceanographic services for the high seas, coastal and port areas, together with the application of marine climatological information including that for the World Climate Programme (WCP) and for planning marine activities. The fundamental goals of the Programme are the promotion of maritime safety, the furthering of basic economic ocean-related activities and the provision of relevant information to these ends. The programme also includes the continued development and expansion of a comprehensive and integrated marine environmental monitoring service including sea-ice services, information exchange on marine technology and services, the further development of an operational ocean-data collection exchange system and other activities within the Joint WMO/IOC Integrated Global Ocean Services System (IGOSS).

2. This WMO programme comprises eight major elements:

- (a) Marine meteorological services;
- (b) Oceanographic services;
- (c) Marine climatological and related ocean-data base;
- (d) Systems for marine and ocean observations and data collection;
- (e) Information exchange on marine technology and services;
- (f) Development of techniques for marine observation and forecasting;
- (g) Implementation support activities;
- (h) Education and training activities.

3. While these elements are closely linked and often interconnected (in particular marine meteorological and oceanographic services are becoming more closely integrated), their division is nevertheless appropriate for planning purposes. The Marine Meteorology Programme, IGOSS and other ocean-related activities constitute an identifiable and coherent applications programme stemming from the very origins of meteorology and whose interests cover the whole range of meteorological activities. It is closely co-ordinated with the WWW and the WCP. Following Congress's directives on the institutional support for the programme, it functions at the global level through CMM and at the

regional level through the regional associations and other regional groupings where appropriate. Similarly, oceanographic services are provided through IGOSS which is planned and co-ordinated by the Joint IOC/WMO Working Committee for IGOSS and is supported by Members of WMO and Member States of IOC. At the national, and to a certain extent regional level, planning is carried out by individual Members.

Main long-term objectives of the Programme

4. The main long-term objectives of the Marine Meteorology Programme, IGOSS and other ocean-related activities may be identified under the major programme elements. They are:

- (a) Marine meteorological services: to promote improvements in marine meteorological and sea-ice services to meet the evolving needs of international and national user groups, to keep pace with rapid developments in remote-sensing and marine telecommunications, including techniques for information processing and dissemination, and to promote the further development of other specialized services;
 - (b) Oceanographic services: to promote and co-ordinate, through IGOSS, a global operational ocean analysis and service system;
 - (c) Marine climatological and related ocean data base: to pursue the collection, storage and retrieval of global marine climatological data sets, in particular with respect to the WCP and the provision of marine services;
 - (d) Systems for marine and ocean observations and data collection: to improve and expand ocean-surface and upper-air observations and data coverage, particularly through the promotion of ocean-buoy programmes, the WMO Voluntary Observing Ships (VOS) Scheme, and the application of remote-sensing techniques to ocean observations;
 - (e) Information exchange on marine technology and services: to continue the publication of guidance material for both operational and non-operational marine meteorological and ocean applications;
 - (f) Development of techniques for marine observations and forecasting: to promote and co-ordinate the development and application of special marine observing, analysis and forecasting techniques;
 - (g) Implementation support activities: to further international co-operative activities for the development and expansion of national marine meteorological and oceanographic services;
 - (h) Education and training activities: to promote specialized education and training in marine meteorology and physical oceanography, including user education.
-

A N N E X I V

Annex to paragraph 13.3 of the general summary

OUTLINE OF THE SECOND LONG-TERM PLAN

THE MARINE METEOROLOGICAL PROGRAMME, IGOSS AND OTHER OCEAN-RELATED ACTIVITIES

PART II - PROGRAMME PLANS

1. Introduction

- (a) General background
 - Nature of marine meteorology;
 - Scope of marine meteorology;
 - Concept of synoptic oceanography;
- (b) Marine meteorology and IGOSS programmes
 - Basic purpose, scope of the programme and basic functions (MMS, marine and ocean climate, marine and ocean observing systems, oceanographic services);
- (c) Current status
 - Development of MMS, marine climate, marine observations, oceanographic services, problems especially of adequacy of marine observations, new requirements for tailored services;
- (d) Long-term objectives
 - As in Part I;
- (e) Substructure
 - As in Part I;
- (f) Responsible bodies
 - Cg, EC, CMM, IGOSS/WC, RAs, Members.

2. Major developments

- (a) Major needs and future requirements
 - Evolution of international shipping on high seas, in coastal waters, ports and harbours;
 - Fisheries;
 - Specialized service requirements;
 - Marine climate requirements including WCP;
 - Comprehensive (distributed) marine data base;
 - Economics, especially cost of energy and effects on shipping; possible development of power/sail vessels and requirements for weather routing; automation of ships;
 - Further developments in coastal environment, requirements for marine climatologies;
 - Observations and services in support of the WWW.

- (b) Scientific and technological advances
 - In-situ techniques for observation and data collection;
 - Remote-sensing techniques for marine data;
 - Satellite capability and capacity to provide remotely sensed marine data;
 - Continued development of ocean-buoy technology for marine data;
 - Marine telecommunications;
 - Widespread use of coupled ocean/atmosphere models (including wave models);
 - Nowcasting services for ports, coastal zone;
 - Long-, medium- and short-range weather forecasting including that relating to sea ice forecasting;
- (c) Existing or potential planning influences
 - Development of ocean services (IGOSS);
 - Rationalization of meteorological and ocean services at the national and international levels;
 - A very large increase in the quantity and quality of satellite-sensed marine data;
 - Ocean-buoy co-ordination;
 - Specialized ocean-data centres;
 - Interagency projects (FGMDSS, SAR, etc.);
 - Further development of two-tiered structure of marine services: general and simple; specific and complex.

3. Specific objectives for the decade

The specific objectives for the decade 1988-1997 of the Marine Meteorology Programme, IGOSS and other ocean-related activities may again be identified under the major programme elements. They are:

Marine meteorological services

- (a) To promote improvements in marine meteorological services to meet the evolving needs of international shipping and the changing ship-route patterns;
- (b) To promote services in keeping with developments in the exploitation of living and mineral resources in the ocean;
- (c) To promote the development and application of ships' weather-routing services;
- (d) To promote marine services in line with increasing coastal marine activities;

- (e) To promote the development of marine services for ports and harbours, including nowcasting services;
- (f) To keep pace with the rapid developments in marine telecommunications, especially satellite communications, for the efficient dissemination of marine service products to the user community and to promote their application;
- (g) To promote the further development and support of specialized marine forecast and information services, including sea ice and tropical cyclones.

Oceanographic services

- (a) To improve the oceanic coverage for sub-surface data collection (priority being given to temperature) through:
 - (i) Increased submission of BATHY, TESAC and other data into the GTS by research ships within IGOSS;
 - (ii) Further recruitment of VOS/ships-of-opportunity;
 - (iii) Increased submission of data from moored and drifting buoys;
- (b) To encourage the real-time application of ocean data, e.g. to the study of short-term climate variability, for fisheries and marine pollution control;
- (c) To promote and co-ordinate the operational contribution of IGOSS to a comprehensive ocean observing system;
- (d) To continue the ocean basin scale regional development of the IDPSS, including the co-ordinated provision of ocean services by establishing appropriate Specialized Oceanographic Centres (SOCs);
- (e) To develop, as necessary, appropriate code forms for individual ocean parameters for the exchange of ocean data and products;
- (f) To promote the exchange of operational ocean-service products over the GTS.

Marine climatological and related ocean data base

- (a) To pursue and expand the collection, storage and retrieval of the global marine and ocean climatological data sets, including data from remote-sensing technology, in particular global data sets with respect to support for the WCP and to the application of marine meteorological/climatological information to the provision of marine and ocean services;
- (b) To ensure the development and introduction of efficient and uniform quality-control procedures for the collection and processing of marine climatological data;

- (c) To further the development of a sea-ice observational/climatological data set for real-time/non-real-time purposes, including data from remote-sensing technologies;
- (d) To develop the marine section of the World Climatic Atlas.

Systems for marine and ocean observations and data collection

- (a) To improve ocean data coverage, in support of both the WWW and marine meteorological services, by employing additional marine observing platforms, particularly by promoting and co-ordinating the establishment and operation of fixed- and drifting-buoy programmes;
- (b) To encourage the use of improved observing and data-collection systems in the WMO Voluntary Observing Ships' (VOS) Scheme, including automated surface and upper-air shipboard observing systems and marine satellite communications;
- (c) To encourage the continued expansion of the VOS Scheme;
- (d) To promote the development of a composite ocean observing system;
- (e) To encourage the application of remote-sensing techniques in marine observations.

Information exchange on marine technology and services

- (a) To continue the development, updating and publication of guidance and technical material such as marine meteorological guides, manuals, handbooks and reports;
- (b) To continue the development and updating of operational manuals (e.g. WMO-No. 9, Volume D) for marine meteorology and related oceanographic activities;

Development of techniques for marine observations and forecasting

- (a) To promote and co-ordinate the development and application of special marine analysis and forecasting, taking account of the requirements of user groups and availability of data;
- (b) To further the development of new techniques for in situ observations;
- (c) To encourage the development and application of remote-sensing techniques as significant contributors to marine observing systems and marine services;
- (d) To encourage activities relating to the intercomparison and combined use of remotely sensed and in situ ocean data.

Implementation support activities

- (a) To further international co-operative activities in support of the development of marine meteorological services;
- (b) To encourage the use of the WMO Voluntary Co-operation Programme and other co-operative programmes, for this purpose.

Education and training activities

- (a) To promote the transfer of information and techniques through the convening of and support for training seminars, workshops, technical conferences, etc;
- (b) To encourage the development of specialized training in marine meteorology and physical oceanography in meteorological training institutes and universities;
- (c) To promote the application of marine meteorological and climatological information, including the education and training of users in the utilization of this information.

4. Plans and implementation schedule

Based on and expanded from Annex I to this report, "Future work programme of CMM for the period 1985-1989" to be completed by the Secretariat, in close consultation with the president of CMM and the CMM Advisory Working Group.

RECOMMENDATIONS OF THE COMMISSION FOR MARINE METEOROLOGICAL
ADOPTED PRIOR TO ITS NINTH SESSION AND MAINTAINED IN FORCE

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 Temperature,

CONSIDERING:

- (1) The need for determination of international principles and procedures for sea-surface and sea sub-surface layer temperatures,
- (2) That the comparability 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. 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.

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

*

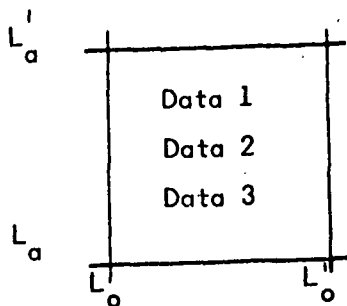
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PART B

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 $5^\circ \times 10^\circ$ may be necessary, otherwise for most parts of the oceans $5^\circ \times 5^\circ$ squares will be suitable. In the vicinity of coasts or in semi-enclosed seas $2^\circ \times 2^\circ$ or even $1^\circ \times 1^\circ$ 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 (\bar{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 (\bar{T}_W , 0.1°C) |
| | 2 | σ_{TW} (0.1°C) |
| | 3 | N_{TW} |

| <u>Chart</u> | <u>Data</u> | <u>Element (resolution/unit)</u> |
|--------------|-------------|---|
| III | 1 | Mean dew-point temperature (\bar{T}_d , 0.1°C) |
| | 2 | σ_{T_d} (0.1°C) |
| | 3 | N_{T_d} |
| IV | 1 | Mean air-sea temperature difference ($\bar{T}-\bar{T}_w$) (ΔT , 0.1°C) |
| | 2 | $\sigma_{\Delta T}$ (0.1°C) |
| | 3 | $N_{\Delta T}$ |
| V | 1 | Mean sea-level pressure (\bar{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 |
| VII | 1 | Prevailing wind direction ³ |
| | 2 | Number of wind-speed observations (N_f) |
| | 3 | Number of measured wind-speed observations |
| VIII | 1 | % of light winds (≤ 3 m s ⁻¹ , \leq Beaufort 2) (0.1%) |
| | 2 | % of strong winds (≥ 11 m s ⁻¹ , \geq Beaufort 6) (0.1%) |
| | 3 | Prevailing direction ³ of strong winds (1°) |
| IX | 1 | % gales (≥ 17 m s ⁻¹ , \geq Beaufort 8) (0.1%) |
| | 2 | Prevailing direction ³ of gales (1°) |
| | 3 | _____ |

| <u>Chart</u> | <u>Data</u> | <u>Element (resolution/unit)</u> |
|--------------|-------------|--|
| X | 1 | Median wave height ⁴ (H_{50} , 0.5 m) |
| | 2 | σ_H (0.1 m) |
| | 3 | N_H |
| XI | 1 | % waves $\leq 1.5m$ (0.1%) |
| | 2 | % waves $\geq 4m$ (0.1%) |
| | 3 | % waves $\geq 6m$ (0.1%) |
| XII | 1 | % wave periods ⁴ $\geq 6s$ (1s) |
| | 2 | Prevailing swell direction ³ (1°) |
| | 3 | Number of swell observations |
| 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 $\leq 2/8$ (0.1%) |
| | 2 | % Total cloud amount $\leq 6/8$ 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}_O , 0.1°) |
| | 2 | Mean Longitude of observations (\bar{L}_O , 0.1°) |
| | 3 | Total number of observations |

| <u>Chart</u> | <u>Data</u> | <u>Element (resolution/unit)</u> |
|--------------|-------------|---|
| XVII | 1 | σ_{L_o} (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 <u>and</u> wind speed |

Notes

1.
$$\sigma = \frac{x^2}{N-1} - \frac{(\sum x)^2}{N(N-1)} \quad 1/2$$

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

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.

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.

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

| <u>Column</u> | <u>Element</u> | <u>Punching procedures</u> |
|---------------|---|--|
| 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 |

| <u>Column</u> | <u>Element</u> | <u>Punching procedures</u> |
|---------------|--|---|
| 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, $L_{\alpha} L_{\alpha} L_{\alpha}$ | Tenths of degrees, WMO specifications |
| 15-17 | Longitude, $L_{\circ} L_{\circ} L_{\circ}$ | 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 |
| 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 temperature (1-negative) temperature (5-positive) Wet-bulb temperature (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 |

| <u>Column</u> | <u>Element</u> | <u>Punching procedures</u> | | | | | | | | |
|--------------------------|---|--|--|---|-------------------------|---|------|---|--------------------------|---|
| 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 , L 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 | | | | | | | | |
| 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 | <table border="0"> <tr> <td></td> <td>0 - <u>Wind sea and swell estimated</u></td> </tr> <tr> <td>Shipborne Wave Recorder</td> <td>(1 - Wind sea and swell measured 2 - Mixed wave measured, swell estimated 3 - Other combinations of measured and estimated)</td> </tr> <tr> <td>Buoy</td> <td>(4 - Wind sea and swell measured 5 - Mixed wave measured, swell estimated 6 - Other combinations of measured and estimated)</td> </tr> <tr> <td>Other Measurement System</td> <td>(7 - Wind sea and swell measured 8 - Mixed wave measured, swell estimated 9 - Other combinations of measured and estimated)</td> </tr> </table> | | 0 - <u>Wind sea and swell estimated</u> | 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) |
| | 0 - <u>Wind sea and swell estimated</u> | | | | | | | | | |
| 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_P $W W$ | Whole seconds; punch 99 where applicable in accordance with Note (3) under specification of P_P in the Manual on Codes $W W$ | | | | | | | | |

| <u>Column</u> | <u>Element</u> | <u>Punching procedures</u> |
|---------------|---|--|
| 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, $d_{wl} d_{wl}$ | 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, $P_{wl} P_{wl}$ | Whole seconds; punch 99 where applicable (see under columns 53-54) |
| 61-62 | Height of predominant swell waves, $H_{wl} H_{wl}$ | Half-metre values (see under columns 55-56) |
| 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) 2 - Telecommunication) national channels) 3 - Publications) 4 - Logbook) international 5 - Telecommunication) data exchange channels) 6 - Publications) |
| 68 | Observation platform | 0 - Unknown 1 - Selected ship 2 - Supplementary ship 3 - Auxiliary ship 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 <u>Call sign positions on punched card</u> 7 characters call sign Col. 69-75 6 " " " " 70-75 5 " " " " 71-75 4 " " " " 72-75 |

| <u>Column</u> | <u>Element</u> | <u>Punching procedures</u> |
|---------------|------------------------------------|---|
| 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) |
| 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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PART B

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

| <u>Element No.</u> | <u>Element</u> | <u>Character No.</u> |
|--------------------|--|----------------------|
| 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 | $L L L$ $o o o$ | 12-14 |
| 9 | $L L L$ $o o o$ | 15-17 |
| 10 | Indicator for h and W | 18 |
| 11 | h | 19 |
| 12 | W | 20-21 |
| 13 | N | 22 |
| 14 | dd | 23-24 |
| 15 | ff | 25-26 |
| 16 | s_n | 27 |
| 17 | TTT | 28-30 |
| 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 |

| <u>Element No.</u> | <u>Element</u> | <u>Character No.</u> |
|--------------------|--------------------------------------|----------------------|
| 24 | N_h | 43 |
| 25 | C_L | 44 |
| 26 | C_M | 45 |
| 27 | C_H | 46 |
| 28 | s_n | 47 |
| 29 | T_{www} | 48-50 |
| 30 | Indicator for SST measurement | 51 |
| 31 | Indicator for wave measurement | 52 |
| 32 | P_{ww} | 53-54 |
| 33 | H_{ww} | 55-56 |
| 34 | $d_{wl} d_{wl}$ | 57-58 |
| 35 | $P_{wl} P_{wl}$ | 59-60 |
| 36 | $H_{wl} H_{wl}$ | 61-62 |
| 37 | I_s | 63 |
| 38 | E_{ss} | 64-65 |
| 39 | R_s | 66 |
| 40 | Source of observation | 67 |
| 41 | Observation platform | 68 |
| 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 | 81 |
| 48 | RRR | 82-84 |
| 49 | t_R | 85 |

| <u>Element No.</u> | <u>Element</u> | <u>Character No.</u> |
|---|---|----------------------|
| 50 | Sign of computed wet-bulb or dew-point temperature | 86 |
| 51 | Computed wet-bulb or dew-point temperature | 87-89 |
| 52 | a | 90 |
| 53 | ppp | 91-93 |
| 54 | D _s | 94 |
| 55 | v _s | 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 | 102 |
| 60 | S _i | 103 |
| 61 | b _i | 104 |
| 62 | D _i | 105 |
| 63 | z _i | 106 |
| Quality control indicators (Q ₁ to Q ₁₈) for elements indicated in brackets. | | |
| 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 _w T _w T _w) | 116 |
| 74 | Q ₁₁ (P _w P _w) | 117 |

| <u>Element No.</u> | <u>Element</u> | <u>Character No.</u> |
|--------------------|---|----------------------|
| 75 | Q_{12} (H_{ww}) | 118 |
| 76 | Q_{13} (swell: elements 34-36, 56-58) | 119 |
| 77 | Q_{14} ($i_R^{RRRt_R}$) | 120 |
| 78 | Q_{15} (α) | 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
- 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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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

| <u>Element No.</u> | <u>Element</u> | <u>Character No.</u> |
|--------------------|---|----------------------|
| 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 | $L_o L_o L_o$ | 12-14 |
| 9 | $L_o L_o L_o$ | 15-17 |
| 10 | Indicator for h and W | 18 |
| 11 | h | 19 |
| | Q_1 | 20 |
| 12 | W | 21-22 |
| | Q_2 | 23 |
| 13 | N | 24 |
| 14 | dd | 25-26 |
| | Q_4 | 27 |
| 15 | ff | 28-29 |
| | Q_5 | 30 |
| 16 | s_n | 31 |
| 17 | TTT | 32-34 |
| | Q_6 | 35 |

| <u>Element No.</u> | <u>Element</u> | <u>Character No.</u> |
|--------------------|--|----------------------|
| 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 |
| 32 | P _w P _w | 63-64 |
| | Q ₁₁ | 65 |
| 33 | H _w H _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 |

| <u>Element No.</u> | <u>Element</u> | <u>Character No.</u> |
|--------------------|--|----------------------|
| 37 | I_s | 75 |
| 38 | $E_s E_s$ | 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 |
| 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 | $d_{w2}^d d_{w2}$ | 113-114 |

| <u>Element No.</u> | <u>Element</u> | <u>Character No.</u> |
|--------------------|-----------------|----------------------|
| 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 |
| 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_{RRRt_R}) | 97 |
| Q_{15} (α) | 104 |

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

| | |
|--------------------|-----|
| 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
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LIST OF DOCUMENTS

I. "DOC" series

| Doc. No. | Title | Agenda item | Submitted by |
|----------|--|-------------|---------------------------|
| 1 | Provisional agenda | 2.2 | |
| 2 | Explanatory memorandum relating to the provisional agenda | 2.2 | |
| 3 | Requirements for reporting codes | 6.4 | Secretary-General |
| 4 | Sea ice | 8 | Secretary-General |
| 5 | Review of Technical Regulations of interest to CMM - The Manual on Marine Meteorological Services | 9 | Secretary-General |
| 6 | Guides and other technical publications | 10 | Secretary-General |
| 7 | Systems and techniques for marine observation and data collection - WMO Wave Programme | 6.2 | Secretary-General |
| 8 | Reports by the chairmen of working groups and by rapporteurs - Report by the chairman of the Working Group on Technical Problems | 4 | Chairman of working group |
| | ADD.1 | | |
| 9 | Reports by the chairmen of working groups and by rapporteurs - Report by the chairman of the Working Group on Marine Climatology | 4 | Chairman of working group |
| 10 | Marine climatology - Marine section of the World Climatic Atlas | 7.4 | Secretary-General |

| Doc. No. | Title | Agenda item | Submitted by |
|----------|--|-------------|----------------------------------|
| 11 | Contribution of CMM to the World Climate Programme | 7.1 | Secretary-General |
| 12 | Report by the president of the Commission | 3 | President of CMM |
| 13 | Reports by the chairmen of working groups and by rapporteurs - Report by the chairman of the Working Group on Sea Ice | 4 and 8 | Chairman of working group |
| 14 | Reports by the chairmen of working groups and by rapporteurs - Report by the chairman of the Working Group on Marine Meteorological Services | 4 and 5 | Chairman of working group |
| 15 | Distribution of marine meteorological information - Monitoring of marine meteorological services | 5 | Secretary-General |
| 16 | Marine Climatological Summaries Scheme - Marine climatological data bank | 7.2 and 7.3 | Secretary-General |
| 17 | Scientific lectures | 14 | Secretary-General |
| | ADD.1 | | |
| 18 | Reports by the chairmen of working groups and by rapporteurs - Distribution of marine meteorological information - Dissemination of meteorological information in the FGMDSS | 4 and 5 | Chairman of Working Group on MMS |
| 19 | Marine telecommunication arrangements for data transmission and collection - INMARSAT | 6.5 | Secretary-General |
| 20 | Reports by the chairmen of working groups and by rapporteurs - Report by the Rapporteur on Marine Telecommunications | 4 and 6.5 | Rapporteur |

| Doc. No. | Title | Agenda item | Submitted by |
|----------|---|-------------|----------------------------------|
| 21 | Marine climatology - Quality control of marine observations | 4 and 7 | Chairman of Working Group on MMS |
| 22 | Review of previous resolutions and recommendations of the Commission and of relevant Executive Council resolutions | 16 | Secretary-General |
| 23 | Marine climatology - Guide to Applications of Marine Climatology | 7 | Secretary-General |
| 24 | Marine Climatological Summaries Scheme - Provision of data for commercial meteorological organizations | 7.2 | United Kingdom |
| 25 | Relationship with joint WMO/IOC programmes and projects | 12 | Secretary-General |
| 26 | Marine observing methods and instrumentation | 6.1 | Secretary-General |
| 27 | WMO Long-term Plan | 13 | Secretary-General |
| 28 | Marine meteorological services | 5 | Secretary-General |
| 29 | Education and training in the field of CMM | 11 | Secretary-General |
| 30 | Marine climatology - International maritime meteorological punch card (IMMPC)/International maritime meteorological tape (IMMT) | 4 and 7 | Secretary-General |

II. "PINK" series

| Doc. No. | Title | Agenda item | Submitted by |
|----------|--|---------------|---------------------------------|
| 1 | Report to plenary on items 1, 2, 3 and 4 - Opening of the session - Organization of the session - Report by the president of the Commission - Reports by the chairmen of working groups and by rapporteurs | 1, 2, 3, 4 | President of the Commission |
| 2 | Report to plenary on item 14 - Scientific lectures | 14 | President of the Commission |
| 3 | Report to plenary on item 7 - Marine climatology | 7 | Chairman, Committee A |
| 4 | Report to plenary on item 5 - Marine meteorological services | 5 | Chairman, Committee B |
| 5 | Report to plenary on item 9 - Review of Technical Regulations of interest to CMM | 9 | Chairman, Committee B |
| 6 | Report to plenary on item 13 - WMO Long-term Plan | 13 | Chairman, Committee B |
| 7 | Report to plenary on items 6.1, 6.2 and 6.3 - Marine observing methods and instrumentation - WMO Wave Programme - Observational data requirements | 6.1, 6.2, 6.3 | Chairman, Committee A |
| 8 | Report to plenary on items 6.4 and 6.5 - Requirements for reporting codes - Marine telecommunication arrangements for data transmission and collection | 6.4, 6.5 | Chairman, Committee B |
| 9 | Report to plenary on item 10 - Guides and other technical publications | 10 | Chairman, Committee B |
| 10 | Report to plenary on item 15 - Establishment of working groups and nomination of rapporteurs | 15 | President of the Commission |
| 11 | Report to plenary on item 17 - Election of officers | 17 | Chairman, Nominations Committee |

| Doc. No. | Title | Agenda item | Submitted by |
|-------------|---|----------------|--------------------------|
| 12 | Report to Plenary on item 16 - Review of previous resolutions and recommendations of the Commission and of relevant resolutions of the Executive Council | 16 | Chairman, Committee A |
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| 15 | Report to plenary on item 12 - Relationship with joint WMO/IOC programmes and projects | 12 | Chairman, Committee B |

LIST OF ABBREVIATIONS AND ACRONYMS

| | |
|---------------|--|
| ASAP | Automated Shipboard Aerological Programme |
| ASDAR | Aircraft to Satellite Data Relay |
| BATHY | Bathy thermograph report |
| CBS | Commission for Basic Systems |
| CCCC | Committee on Climate Changes and the Ocean |
| CCI | Commission for Climatology |
| CES | Coast Earth Station |
| CIMO | Commission for Instruments and Methods of Observation |
| CNES | Centre National d'Etudes Spatiales |
| COST-43 | European Co-operation in the Field of Scientific and Technical Research |
| DCP | Data-collection platform |
| E and P Forum | Oil Industry International Exploration and Production Forum |
| EPOCS | Equatorial Pacific Ocean Climate Studies |
| FAO | Food and Agriculture Organization |
| FGGE | First GARP Global Experiment |
| FGMDSS | Future global maritime distress and safety system |
| GARP | Global Atmospheric Research Project |
| GDPS | Global Data-processing System |
| GOS | Global Observing System |
| GTS | Global Telecommunication System |
| HSST | Historical sea-surface temperature |
| ICS | International Chamber of Shipping |
| ICSPRO | Inter-Secretariat Committee on Scientific Programmes Related to Oceanography |
| ICSU | International Council of Scientific Unions |
| IDOE | International Decade of Ocean Exploration |
| IDPSS | IGOSS Data Processing and Services System |
| IFSMA | International Federation of Shipmasters' Associations |
| IGOSS | Integrated Global Ocean Services System |
| IHO | International Hydrographic Organization |
| IMMPC | International Maritime Meteorological Punch Card |
| IMMT | International Maritime Meteorological Tape |
| IMO | International Maritime Organization |
| INMARSAT | International Maritime Satellite Organization |
| IOC | Intergovernmental Oceanographic Commission |
| IODE | International Oceanographic Data Exchange (IOC) |
| IOS | IGOSS Observing System |
| ISLPP | IGOSS Sea Level Pilot Project |
| ITU | International Telecommunication Union |
| JSC | Joint Scientific Committee |
| JWC | Joint IOC/WMO Working Committee (for IGOSS) |
| LEPOR | Long-term and Expanded Programme of Ocean Exploration and Research |
| LTP | Long-term Plan |
| MMS | Marine meteorological services |
| NAOS | North Atlantic Ocean Stations |
| NMC | National Meteorological Centre |
| ODAS | Ocean Data Acquisition System |
| RMC | Regional Meteorological Centre |
| RMMP | Regional Marine Meteorological Programme |

| | |
|---------|--|
| RMTC | Regional Meteorological Training Centre |
| RNODC | Responsible National Oceanographic Data Centre |
| RTH | Regional Telecommunication Hub |
| SAR | Search and rescue |
| SCOR | Scientific Committee on Ocean Research |
| SES | Ship Earth Station |
| SOC | Specialized Oceanographic Centre |
| TEMA | Training, education and mutual assistance in the marine sciences (IOC) |
| TESAC | Temperature, salinity, current message |
| TOGA | Tropical Ocean Global Atmosphere |
| VCP | Voluntary Co-operation Programme |
| VOS | Voluntary Observing Ship |
| WCAP | World Climate Applications Programme |
| WCDP | World Climate Data Programme |
| WCIP | World Climate Impact Studies Programme |
| WCP | World Climate Programme |
| WCRP | World Climate Research Programme |
| WESTPAC | Western Pacific (IOC) |
| WMC | World Meteorological Centre |
| WWW | World Weather Watch |
