WORLD METEOROLOGICAL ORGANIZATION

COMMISSION FOR MARITIME METEOROLOGY

ABRIDGED FINAL REPORT
OF THE
FIFTH SESSION

Kingston, Rhode Island, 19-31 August 1968

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NOTE

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the World Meteorological Organization concerning the legal status of any country or territory or of its authorities, or concerning the delimitation of its frontiers.

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LIST OF PERSONS ATTENDING THE SESSION

1. Officers of the session

K. T. McLeod	president
P. H. Kutschenreuter	vice-president, elected for the duration of the session

2. Representatives of Members of WMO

M. A. Rebolledo	principal delegate	Argentina
L. M. de la Canal	delegate	
H. K. Wolcken	delegate	
R. A. E. Holmes	principal delegate	Australia
J. L. Van Hamme	principal delegate	Belgium
J. M. Dury	delegate	
F. C. Bruzzi	principal delegate	Brazil
K. T. McLeod	principal delegate	Canada
W. T. R. Allen	delegate	
W. E. Markham	delegate	
W. F. Ganong	delegate	
G. H. Washburn	delegate	
J. P. Tully	delegate	
T. Y. Chu	principal delegate	China
H. Thomsen	principal delegate	Denmark
E. Palosuo	principal delegate	Finland
P. Lenoir de la Cochetière	principal delegate	France
J. Romer	delegate	
T. Tournier	delegate	
M. Rodewald	principal delegate	Germany, Federal Republic of
R. Höhn	delegate	
R. R. Nicolaidis	principal delegate	Greece
H. Sigtryggsson	principal delegate	Iceland
S. L. Tierney	principal delegate	Ireland

2. Representatives of Members of WMO (continued)

S. Gadish	principal delegate	Israel
D. Bottari	principal delegate	Italy
L. Ferrandu	delegate	
I. Imai	principal delegate	Japan
J. Masuzawa	delegate	
U. B. Lifiga	principal delegate	Kenya
J. Carmona E.	principal delegate	Mexico
C. Palacio T.	delegate	
B. M. Kamp	principal delegate	Netherlands
W. D. Moens	delegate	
H. Johansen	principal delegate	Norway
T. Rebelo Espírito Santo	principal delegate	Portugal
A. B. Crawford	principal delegate	South Africa
B. Thorslund	principal delegate	Sweden
U. B. Lifiga	principal delegate	Tanzania, United Republic of
S. Vesa-Rajananda	principal delegate	Thailand
Charal Phandhudawi	delegate	
U. B. Lifiga	principal delegate	Uganda
J. Tarbeev	principal delegate	Union of Soviet Socialist Republics
G. M. Tauber	delegate	
C. E. N. Frankcom	principal delegate	United Kingdom of Great Britain and Northern Ireland
G. A. Tunnell	delegate	
J. H. Brazell	delegate	
J. D. Booth	delegate	
P. H. Kutschenreuter	principal delegate	United States of America
M. A. Eaton	delegate	
J. Giraytys	delegate	
J. A. Mirabito	delegate	
M. W. Mull	delegate	
J. J. Schule	delegate	

3. Observers from international organizations

H. Kristjonsson	Food and Agriculture Organization (FAO)
G. F. Hempton	Inter-Governmental Maritime Consultative Organization (IMCO)
E. C. Phillips	International Chamber of Shipping (ICS)
H. Thomsen	International Council for the Exploration of the Sea (ICES)
P. H. Kutschenreuter	International Union of Geodesy and Geophysics (IUGG)
D. L. Harris	Permanent International Association of Navigation Congresses (PIANC)
E. A. Bernard	United Nations Development Programme (UNDP)
P. J. Tully	United Nations Educational, Scientific and Cultural Organization (UNESCO)

4. WMO Secretariat

G. K. Weiss	representative of the Secretary-General
C. R. Dale	permanent secretary of CMM
S. Mizuno	technical assistant for CMM

5. Conference secretariat

G. D. Hughes	conference officer
Miss Suzanne C. Wochos	administrative officer
T. H. Leon	language services officer
Mrs. Marcella Woerheide	deputy language services officer
F. Van Reigersberg	chief interpreter
Mrs. Irene E. Scher	documents officer
Miss Janet M. Michellod	deputy documents officer

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GENERAL SUMMARY OF THE WORK OF THE SESSION

At the kind invitation of the Government of the United States of America, the fifth session of the Commission for Maritime Meteorology was held in Kingston, Rhode Island, from 19 to 31 August 1968. Excellent facilities for the meeting were made available at the University of Rhode Island, including simultaneous interpretation into English, French, Russian and Spanish.

The president of the Commission, Mr. K. T. McLeod, was chairman of the session.

There were 60 persons at the session, including representatives of 29 Members, and observers from eight international organizations. Dr. G. K. Weiss was the representative of the Secretary-General, and the WMO Secretariat was further represented by Mr. C. R. Dale and Mr. S. Mizuno. A complete list of those present is given at the beginning of this report.

1. OPENING OF THE SESSION (Agenda item 1)

The president declared the fifth session of the Commission open at 10.00 a.m. on 19 August 1968. When doing so he paid tribute to missing members who had contributed so generously to the Commission's endeavours during the past years. He noted the many new members who were present and who, he was confident, would greatly assist with the work of the Commission which will be so vital during the coming years. He also read a telegram of welcome from the Vice-President of the United States and expressed the appreciation of the Commission for this thoughtful gesture.

Dr. White, Administrator of the Environmental Science Services Administration and the Permanent Representative of the United States to WMO, welcomed the participants on behalf of the Government of the United States. He then stated that the countries of the world are now at the dawn of an exciting era which could be known as the Ocean Age. There is now a new awareness of the many uses that may be made of the oceans, and success in their utilization will depend to a large extent on welding together the requirements of the meteorologist and oceanographer. This awareness has been particularly recognized by the establishment of the Integrated Global Ocean Station System (IGOSS) by the Intergovernmental Oceanographic Commission and its joint sub-groups with the World Meteorological Organization. IGOSS is in fact a mirror image of the World Weather Watch.

Dr. Werner Baum, President of the University of Rhode Island, welcomed the participants to the University and expressed the hope that the Commission would have a highly successful meeting.

Mr. Davies, Secretary-General of WMO, expressed his sincere gratitude to the United States for hosting the conference. He mentioned the many contributions of the United States to WMO and to the Commission, such as support to the World Weather Watch and the development of a global satellite system which would be of great potential use to most maritime nations. He was particularly glad to see delegates from so many countries in attendance and acknowledged their great support in the marine area. Mr. Davies then referred to the agenda which, although long and heavy, was a very real challenge to the delegates and made reference to certain items in which the Commission could make significant contributions to WWW and further co-operation between the meteorologist and oceanographer. He also expressed the hope for a successful meeting and his sincere thanks for the fine facilities which had been made available at the University of Rhode Island.

Mr. McLeod, the president of CMM, then spoke and stated that the Commission was indeed grateful to the United States for its invitation to hold its fifth session at the University of Rhode Island, a typical American University. He briefly reviewed the history of the Commission which has a long tradition of being composed of a closely-knit group of men who know the problems of the marine environment and are prepared to tackle and solve them. The work of CMM is unique, different from and unmatched by that of any of the other commissions. He stressed the need of merging the efforts of the Commission with those of others and particularly the oceanographic community. The president then indicated that much remains to be done especially with regard to blending the old traditions of the sea and the tendency to cling to the way of the past with the new technology associated with electronic computers, high-speed teleprinters and facsimile, weather satellites and other new technology.

2. ORGANIZATION OF THE SESSION (Agenda item 2)

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

A provisional list of persons present, and the capacities in which they were attending the session, was presented by the representative of the Secretary-General. The list was accepted as the first report on credentials and the Commission decided not to set up a Credentials Committee.

2.2 Adoption of the agenda (Agenda item 2.2)

The provisional agenda was adopted at the first plenary meeting without amendment. The final agenda is reproduced at the beginning of this report, together with a list of relevant documents and numbers of resolutions and recommendations.

2.3 Establishment of committees (Agenda item 2.3)

2.3.1 Working committees

Two working committees were set up to examine in detail the various agenda items:

(a) Committee A to deal with technical and organizational questions. Captain Max Eaton (U.S.A.) was elected chairman of this committee.

(b) Committee B to deal with service and operational problems. Commander C. E. N. Frankcom (United Kingdom) was elected chairman of this committee.

The working committees were assisted by Dr. G. K. Weiss, Mr. C. R. Dale, and Mr. S. Mizuno.

2.3.2 Co-ordination Committee

In accordance with General Regulation 26, a Co-ordination Committee was set up consisting of the president, the vice-president, the chairmen of the two working committees and the representatives of the WMO Secretariat.

2.3.3 Nomination Committee

A Nomination Committee was established consisting of Messrs. U. B. Lifiga (United Republic of Tanzania), J. Tarbeev (U.S.S.R.), M. A. Rebolledo (Argentina), P. H. Kutschenreuter (U.S.A.), R. A. E. Holmes (Australia), and C. E. N. Frankcom (United Kingdom).

2.4 Other organizational questions (Agenda item 2.4)

2.4.1 Since the Commission is without a vice-president, Mr. Paul H. Kutschenreuter was unanimously elected vice-president for the duration of the session.

2.4.2 Under this item the Commission fixed its working time-table for the duration of the session. It also decided that the minutes of the plenary meeting, which it had not been possible to approve during the session, could be approved by the president of the session, Mr. K. T. McLeod, on behalf of the Commission.

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

3.1 The Commission noted with appreciation the report submitted by the president on the activities of CMM since its fourth session.

3.2 There are various matters, the most critical one being codes for use by mariners, which are the responsibility of and are considered by CSM and yet are of very great significance to CMM. The Commission agreed, therefore, that it is of importance that the president of CMM, or a member of the Commission designated by him, should attend the fifth session of CSM.

3.3 In accordance with the request of Fifth Congress for the Commission to consider the desirability of establishing an Advisory Working Group, the Commission considered the merits of such a working group. Since there is a need from time to time for urgent consideration of matters of broad concern to the Commission, such as the UN Resolution 2172 (XXI) - Resources of the Sea, and since such an Advisory Working Group could assist the president in providing an early and representative viewpoint

on such matters and in taking appropriate action, the Commission decided to establish an Advisory Working Group. Resolution 1 (CMM-V) was adopted.

4. REPORTS BY THE CHAIRMEN OF THE WORKING GROUPS AND CMM REPRESENTATIVES PARTICIPATING IN THE WORK OF OTHER TECHNICAL COMMISSIONS (Agenda item 4)

The Commission noted the reports of the various working groups established at its previous session as well as the reports of the CMM representatives participating in the work of other technical commissions. It expressed its profound appreciation of the work carried out by these working groups and CMM representatives. The reports were formally presented to plenary and then studied in detail by the working committees, under the relevant items of the agenda, as indicated below:

4.1 Report by the chairman of the Working Group on the Collection of Ships' Weather Reports and the Provision of Shipping Forecasts

This report was considered under agenda items 5, 12 and 13.

4.2 Report by the chairman of the Working Group on Marine Climatology

This report was considered under agenda item 7.

4.3 Report by the chairman of the Working Group on Sea Ice

This report was considered under agenda items 8, 6 and 15.

4.4 Report by the chairman of the Working Group on Ocean-Atmosphere Interaction

This report was considered under agenda item 10.

4.5 Report by the chairman of the Working Group on Technical Problems

This report was considered under agenda item 11.

4.6 Report by the CMM representative on the CSM Working Group on Data Needs and Codes

This report was considered under agenda item 11.

4.7 Report by the CMM representative on the CSM Working Group on Technical Regulations

This report was considered under agenda item 14.

4.8 Report by the CMM representative on the CCl Working Group on Processing, Exchange and Storage of Climatological Data

This report was considered under agenda item 7.

4.9 Report by the CMM representative on the CCl Working Group on Climatic Atlases

This report was considered under agenda item 7.

5. METEOROLOGICAL INFORMATION REQUIRED IN SUPPORT OF SHIPPING, FISHING OPERATIONS AND OTHER MARINE ACTIVITIES AND PROVISION OF APPROPRIATE SERVICES (Agenda item 5)

5.1 Products requirements for meteorological information

5.1.1 The Commission, within the planning for the World Weather Watch (WWW), attempted to assess the requirements of different user groups for marine meteorological information. Annex V to Resolution 16 (Cg-V), based on WWW Planning Report No. 15, is an account of such an assessment. Using this material, information provided by various international organizations and documents submitted to the session, the session considered the various relevant paragraphs in the Technical Regulations in order to determine what changes, if any, are required at the present time.

5.1.1.1 The Commission first dealt with the weather bulletins for shipping on the high seas and noted that the Technical Regulations give specific instructions covering the content and order of items to be included in Part I (Storm Warnings) but provide only limited information on the content of the remaining mandatory sections, Part II (Synopsis) and Part III (Forecasts). In order to achieve a greater degree of uniformity in information provided to mariners operating in international waters, and in order to ensure the availability of the basic information required by mariners, the Commission felt that the regulatory material relating to Parts II and III should be expanded and made more precise. Accordingly, CMM adopted Recommendation 1 (CMM-V). The Secretary-General is also requested to delete paragraph 13.1.4.3.11, Chapter I, Volume D, WMO Publication No. 9.TP.4.

The Commission noted that in adopting Recommendation 1 (CMM-V) concerning format and content for Parts II and III of Weather Bulletins for Shipping, Chapter 10 of the Technical Regulations would need to be amended. The Commission, in considering the necessary amendments, believed that it would be useful to rearrange the content of Chapter 10 into a more orderly form consistent with the other chapters. In the discussion it was proposed that the title be changed to either "Meteorological services for marine activities" or "Meteorological services for maritime activities". There was also some support for a title "Meteorological services for shipping, fishing and other marine activities". In view of the rapidly expanding international interest in activities in ocean areas, the Commission requested the Executive Committee to examine the question of terminology and indicate the preferred term to be used in WMO publications in the light of present interest in ocean affairs.

5.1.1.2 In considering the content of the additional information to be included in the Technical Regulations, the Commission decided not to include sea surface temperature or mixed layer depth in the weather bulletins. However, it does believe that such information will be of utmost value to the fishing industry during the coming

years. Although the present capability to provide such information is not great, it will gradually become more universal and Members should be encouraged to assist the fishing industry when economically warranted by the provision of such data.

5.1.1.3 In considering the content of the weather bulletin for shipping on the high seas, the Commission acknowledged that it equally applied to coastal operations. However, certain marine activities, such as off-shore drilling, coastal engineering, etc., require certain specialized information which is not included in the bulletin. CMM recognized, however, that the problems involved are most comprehensive and complex and that such forecasts are usually national in character.

5.1.1.4 The Commission examined the adequacy of the list of facsimile charts contained in paragraph 13.3.2, Chapter I, Part A, Volume D, and considered the need for including this information in Technical Regulations. Although the Commission felt that symbolic and written descriptive information in facsimile forecasts for shipping would be of value to the mariner, it finally concluded that the time was not yet appropriate to include this type of information in the "list of facsimile charts". It also concluded that the "list of facsimile charts" should not be included in the Technical Regulations but that it should remain in Volume D. As a result of certain reservations expressed by the representatives of IMCO and ICS regarding the usefulness of the facsimile charts currently available, CMM felt that Members contemplating such broadcasts should be urged to include written or symbolic information which would assist the mariner in the interpretation of the charts. The Commission also noted that IMCO and ICS had expressed concern that an expansion of facsimile facilities might result in a reduction in the availability of conventional radio-telegraphy-telephony weather bulletins and storm warnings for shipping. Although the Commission did not feel a similar concern, it agreed that the concern of IMCO and ICS should be made known to Members.

5.1.1.5 The Commission considered the question of establishing accuracy requirements for certain types of forecasts. It concluded, however, that it was unable to specify the accuracy required for the various elements to be forecast.

5.1.1.6 The adequacy of geographical coverage for shipping forecasts was discussed with reference to two maps from Volume D, WMO Publication No. 9.TP.4, which depicted the areas of responsibility for Members and the area actually covered by weather bulletins for shipping. The Commission noted that Map B was not fully implemented and that the areas not covered were mostly in sparse data areas and in the areas of responsibility of developing countries. Taking into account the lack of weather reports in these areas, the Commission was in agreement that greater emphasis should be placed on the possibility of new techniques and facilities such as satellites, weather buoys and ocean weather stations and on the important potential contribution of the fishing vessels navigating in these areas, particularly in the southern hemisphere, to increase the number of weather reports and consequently to improve the service to be provided by the meteorological services concerned. In connexion with this matter, the Commission was informed by some Members that there were many ships navigating in the areas referred to above which did not transmit weather reports to the nearest convenient coastal radio station. On the other hand, other Members informed the Commission that some coastal radio stations did not make effective reception of ships' weather reports. Further, it was considered that these deficiencies in forecasts for ocean

areas should, if possible, be eliminated, for they represent a safety hazard, and corrective action should be taken through assistance programmes such as VAP, UNDP and bilateral or multilateral programmes if possible. Recommendation 2 (CMM-V) was accordingly adopted.

5.1.1.7 The geographical coverage for facsimile transmission was considered. The Commission noted with appreciation that additional countries are initiating facsimile broadcasts and encouraged others to do likewise.

5.1.1.8 When discussing the time and frequency requirement for weather bulletins and warnings it was noted that the Technical Regulations provided for warnings of tropical cyclones or of storms of hurricane intensity to be broadcast as soon as possible. Most Members stated that they were currently broadcasting storm warnings updated as necessary at frequent times; some at intervals of as little as two or three hours. Also cognizance was taken of a statement of ICS indicating the need for storm warnings at least at six-hour intervals. The Commission strongly felt that storm warnings should be broadcast in accordance with paragraph No. 1612 of the Radio Communications Regulations of ITU and should be repeated every six hours at scheduled times. It was also noted that the "international call (TTT)" in paragraph 10.2.2.1 (a) of the Technical Regulations is a procedural group that was established by ITU. The Commission for Maritime Meteorology considered, therefore, that it should not appear in the Technical Regulations, but that a note should be appended referring to an ITU radio regulation about procedure for transmitting storm warnings. Recommendation 3 (CMM-V) was adopted.

5.1.2 Since Fifth Congress considered that there was a need to ascertain in greater detail the requirements for meteorological products for marine activities, the Commission examined the adequacy of a "List of products which should help shipping and other marine activities in the safe and efficient conduct of their operations", as contained in Resolution 16 (Cg-V). It considered the contents of the list to be useful for shipping and fishing and was pleased to see that many of these items were already included in service provided on an international and national level.

5.1.3 In fulfilling their responsibilities, Members make arrangements for weather information to be broadcast by appropriate radio stations. In this context, the Commission noted that WWW planning was striving to ensure the efficient dissemination of processed information and therefore considered what improvements in the transmission of weather bulletins were required as regards the designation of suitable stations, including the frequency and power used and the scheduling of broadcasts. The Commission concluded that, in a general way, the situation was satisfactory. In certain oceanic areas, however, the provision of weather information was characterized by an exceptional paucity of observations. Also, many small ships operated with no radio operator on board and were fitted only with a radio-telephone. The problem of broadcasts for the Mediterranean region was also pointed out by several representatives. The Commission noted further that radio-telegraph and radio-telephone broadcasts were not always disseminated in English or the MAFOR code in addition to the language of the issuing countries in accordance with paragraph 10.2.3 of the Technical Regulations. Accordingly, the Secretary-General was requested as a matter of urgency to bring this question to the attention of Members concerned and request that remedial action be

taken, keeping the presidents of regional associations and CMM informed as to the progress achieved.

5.1.4 As regards the facsimile transmission of weather charts for reception by ships, the Commission noted that the Eleventh Plenary Assembly of the International Radio Consultative Committee expressed the opinion that WMO should give consideration to standardizing certain provisions of facsimile transmissions specially intended for reception on board ship. In considering this matter it recognized that CMM-IV had already expressed the view that the standards contained in WMO Publication No. 9.TP.4, Volume C, Chapter I, Part V were considered adequate and that this opinion was later supported by CSM-IV. Although the motives of the International Radio Consultative Committee were fully appreciated, the Commission believed that such action on its part would be premature. However, the Secretary-General was requested to make an inquiry among Members to ascertain if their national shipboard users of facsimile products were reasonably satisfied with the world-wide service currently being provided, the results of this inquiry to be referred to the Working Group on Requirements for Marine Meteorological Services. In addition, it was pointed out that mariners would be able to get facsimile equipment much more easily if the equipment were much simpler and cheaper than that currently available. For this purpose, it is desirable that maritime forecasts be broadcast following as simple a standard as possible; for example, a single drum speed, a single index of co-operation and a limited number of radio frequencies. The same views were also largely reflected in the comments of the ICS observer. The Secretary-General was therefore requested to make an inquiry among Members to ascertain the most suitable drum speed(s) and index (indices) of co-operation available on the basis of present WMO standard facsimile specifications.

5.1.5 Notice was taken of the interest displayed by the twentieth session of the Executive Committee on ship routeing and the Commission exchanged ideas and discussed at some length the advantages that may accrue from such activities. It was noted that in addition to the U.S.A., the Netherlands and the U.S.S.R., which were providing weather routeing facilities at the time of CMM-IV, the Federal Republic of Germany, the United Kingdom, and, to a lesser degree, Norway, are now providing this facility. It was made known that the Federal Republic of Germany routed some 180 vessels in 1967 while the U.S.S.R. has routed well over 900 ships. Also 300 U.S.S.R. vessels are equipped with facsimile receivers although the U.S.S.R. representative emphasized that ship routeing should not be linked with the installation of such equipment. The representative of the Federal Republic of Germany was requested that his country promulgate some information on its experience in this field. Also the U.S. representative indicated that some new technical notes had been recently published by his country. The Commission finally concluded that an international discussion on this subject in an appropriate forum in the presence of shipowners and shipmasters would go far in further developing the interest in this matter. The Ship Gear International Exhibition, which is held in London each year, is considered to be such a forum and the Permanent Representative of the United Kingdom may be invited to consider the desirability of organizing such a gathering.

5.1.6 During the discussion on ship routeing, the attention of the Commission was directed to the very great interest of the Environmental Conditions Committee of the 4th International Ships' Structure Congress in this matter. This Committee believed that a great deal more valuable material might be available from the current activities

in this field and had outlined certain information that would be of particular value as follows:

(a) Punched card records of wind speed and wave heights, both as forecasts and as observed from the routed ships, in order that a comparison could be made between the two as well as with other data;

(b) Statistics on the worst (most severe) weather conditions encountered by ships under the guidance of a routeing authority ashore.

Ship routeing agencies may be able to provide supplementary medium-term information on wind speeds and wave height along the ship route. Although such information cannot be correlated with statistics of ship routeing, CMM believed that it might be of interest to the Environmental Conditions Committee. Accordingly, the Commission recommended that those countries (U.S.S.R., Federal Republic of Germany, Netherlands, U.K., U.S.A., and Norway) having an active programme in ship routeing be invited to provide the information to the Environmental Conditions Committee. CMM also believed that information specified in (b) above should be solicited directly from the ships themselves as well as from ship-routeing offices.

5.1.7 The Commission considered that in periods of inclement weather there is a need for continuous timely weather information to assist ships in the approaches to the major ports and in congested areas. The requirement for such information has become more critical during the past few years with the expanded use of larger and faster vessels and the increased congestion in harbour approaches. Further, the increasing use of very-high-frequency communications by marine interests has provided a practical means of meeting such short-distance communications requirements. The Commission considered it highly desirable as well as practical for this type of weather broadcast to be available at the approaches to all major ports as well as other shipping convergence areas. Further, it would be most convenient to the mariner if this service could be provided on the same VHF frequency throughout the world. The Commission accordingly adopted Recommendation 4 (CMM-V).

5.2 The Commission examined a proposed procedure presented by the president for determining and meeting requirements for marine meteorological information. In many cases those needing information do not fully understand the influence of weather and climate or realize the value of meteorological services to their activities. The procedure comprises the following orderly series of steps: meteorological personnel assist those concerned in determining the precise information needed; appropriate services are developed; necessary arrangements are made for development of techniques; research work, new facilities and procedures, and necessary resources; new services or changes to existing services are established as appropriate. The Commission felt that the proposed procedure had considerable merit particularly in view of the new types of activity appearing in ocean areas which need meteorological services.

5.3 Establishment of working groups

The Commission felt that, in addition to the traditional high sea shipping, new or expanded marine activities such as fishing, as well as off-shore mining and drilling, have resulted in an increased demand for service specially designed for the

specific type of operation. In order to meet these demands in an economic manner, considerable attention to the formulation of requirements, in close consultation with a multitude of organizations, is needed. The Commission felt that a detailed study of the requirements of various user groups and a continuing review could best be carried out by a working group. Resolution 2 (CMM-V) was adopted.

5.4 Global tide network

The Commission noted the request of the fourteenth Eastern Pacific Oceanic Conference (EPOC) to encourage the expansion and up-grading of the global tide stations network by installing tide stations at suitable meteorological stations in conjunction with the WWW programme. The Commission felt that the establishment of tide stations was a responsibility of Members and should, therefore, be co-ordinated on a national level.

5.5 The Commission was addressed by the observer from the United Nations Development Programme on the subject of the various types of assistance available to developing nations in the field of meteorology.

It was made clear that maritime meteorology and its applications should be aided; consequently the Commission felt that developing countries should be made aware of the importance of the problems in question and the possibilities of assistance from UNDP. Recommendation 5 (CMM-V) was accordingly adopted.

6. MARINE SCIENCE AND ITS APPLICATION (Agenda item 6)

6.1 The adoption of the World Weather Watch plan by Resolution 16 (Cg-V) in 1967 provided an unprecedented opportunity to further advance maritime meteorology. Since the ocean and atmosphere are coupled in a single dynamic system, scientific investigations of vast scope will be required for increased understanding of atmospheric and oceanic environmental processes and their interaction. By Resolution 9 (Cg-V), it was decided that WMO shall endeavour to participate in all meteorological and related aspects of international marine scientific activities.

6.2 The Commission noted that since the Fifth World Meteorological Congress in 1967, a number of very important activities had taken place on an international level relative to UN Resolution 2172 (XXI) - Resources of the Sea. The Commission noted that the Report of the Secretary-General of UN on Marine Science and Technology to the UN General Assembly stated that the marine meteorological component of WMO should be strengthened. Furthermore, the Commission noted the decision of the Executive Committee to establish an EC Panel on Meteorological Aspects of Ocean Affairs, of which the president of CMM is a member.

6.3 The Commission also noted that a particularly important development in marine affairs for WMO was the adoption, by the Inter-governmental Oceanographic Commission of UNESCO, of the concept of an Integrated Global Ocean Station System (IGOSS) and the invitation for the Organization to participate.

6.4 The Commission noted that IGOSS was not merely a system of observing stations, but that it was a complete operational system conceived as the mirror image of the World Weather Watch. Thus, it comprised the same three operational components, i.e. an observational system, a data-processing system, and a telecommunications system; it provided for a two-phase planning based respectively on existing and new technologies. Hence the first meeting of the IOC/IGOSS Working Committee (Paris, April 1968) proposed that both phases of the IGOSS planning and implementation programme be submitted for approval not only to IOC but also to WMO, respectively in 1969 and 1971. In relation to the establishment of IGOSS, the Commission was informed that IOC had proposed a revision of the terms of reference of the joint IOC/WMO Panel of Experts on Co-ordination of Requirements and of the joint IOC/WMO Group of Experts on Telecommunications.

6.5 The Commission noted that IGOSS should be planned and operated in close co-ordination with the World Weather Watch including the Global Atmospheric Research Programme (GARP). The Commission felt that such projects required close co-ordination and co-operation between WMO and IOC and other international organizations concerned. It felt that WMO should take all steps necessary to strengthen its marine meteorological component to ensure that WMO is able to participate in IGOSS and other international groups of similar nature. Furthermore, the Commission felt that appropriate action should be taken by WMO to elaborate concrete plans for marine scientific projects. Accordingly, the Commission adopted Recommendation 6 (CMM-V).

6.6 Specific points relating to an increase in the acquisition of ocean data were discussed under agenda item 11.

6.7 Taking into account the desire of the IGOSS Committee that existing and planned facilities established and operated in accordance with the World Weather Watch plan should be used for the acquisition, transmission and processing (including archiving) of ocean data, the Commission requested its president to arrange that IOC be invited to be represented on all CMM working groups of interest to IOC.

6.8 Within the context of his responsibility as ex-officio member of the EC Panel on Meteorological Aspects of Ocean Affairs, the president of CMM should take action to ensure that CMM played its full role in marine meteorological aspects of ocean affairs.

7. MARINE CLIMATOLOGY (Agenda item 7)

7.1 The Commission considered this item mainly on the basis of the reports of the chairman of the Working Group on Marine Climatology, the representative on the CCl Working Group on Climatic Atlases and the CMM representative on the CCl Working Group on Processing, Exchange and Storage of Climatological Data. Further the Commission noted the approval by the President of WMO of Recommendation 36 (68-CMM) - Supplementing procedures for the preparation of the marine climatological summaries. Certain points were referred to the president of CMM for consideration. Discussions

and conclusions of the Commission on these subjects are summarized in the following paragraphs.

7.2 Publication of marine climatological summaries for the period prior to 1961

7.2.1 The Commission was fully aware of the requirement specified by Resolution 35 (Cg-IV) that the Responsible Members were encouraged to extend the collecting of the marine meteorological observations and the preparing of the climatological summaries to the years before 1961, and as far back in time as possible. While realizing the technical desirability of completing the summaries for the ten years 1951 to 1960, the Commission agreed that there existed practical difficulties such as data scantiness, quality control problems due to non-homogeneous quality of data, different formats of punch-cards used during this period, etc., which would inevitably result in a heavy financial burden on some Members. It was therefore agreed that the preparation of marine climatological summaries prior to 1961 be left to the decision of Responsible Members concerned. It was understood that the period of the marine climatological summaries under Resolution 35 (Cg-IV) started from 1961. It was also recommended that Members be invited to supply, within their resources, marine climatological data prior to 1961 to those Responsible Members who wished to publish the marine climatological summaries for periods prior to 1961. The Commission also felt a need for a more regular exchange of marine climatological data used for the preparation of the marine climatological summaries. Recommendation 7 (CMM-V) was adopted.

7.2.2 The Commission was concerned about the length of time for which the statistics of the marine section of the World Climatic Atlas should be prepared, i.e. either for 20 years from 1961 to 1980 or for 30 years from 1961 to 1990. It therefore requested the president of the Commission to consult the president of the Commission for Climatology on this matter with a view to arriving at a decision on the exact period for which the atlases should be prepared. Provision was also made in the terms of reference of the re-established Working Group on Marine Climatology for further consideration of the problem in the light of the views to be received from the president of the Commission for Climatology (see also Resolution 3 (CMM-V)).

7.3 Supplementary procedures for the marine climatological summary project

The Commission agreed to request the Secretary-General to include the procedures adopted by Recommendation 36 (68-CMM) in an appropriate WMO publication.

7.4 Publication of all or a selection of the original observational data for the selected representative areas

The Commission considered this question in relation to the supplementary procedures adopted by Recommendation 36 (68-CMM). The Commission believed that for those areas covered by an adequate amount of data the publication of all or a selection of the original observational data was not required. Furthermore such publication would result in a considerable cost for Members concerned. The problem would arise only if a sufficient number of observations were not acquired for any representative unit area to calculate the valid monthly mean. The Commission, however, pointed out that in the latter case the criteria given in paragraph 4.12.2 of the said procedures could well be applied. A proposal for the publication of original data

was therefore not supported. This would not, however, prevent any Member from publishing original data it had collected.

7.5 Amendments to the International Maritime Meteorological Punch-Card

The Commission considered a proposal for amending the International Maritime Meteorological Punch-Card. The proposal aims at:

(a) Ensuring consistency between the specifications for columns 64-73 of Part A and those for column 65 of Part B;

(b) Introducing a code for the country to which cards should be sent using column 73;

(c) Making other changes for columns 63 and 65 of Part B.

The Commission, while agreeing that the suggestions made were an improvement to or clarification of the instructions in Appendix F to the Technical Regulations, felt that certain further amendments might be forthcoming from the experience of Members. It therefore decided not to adopt these amendments at this time, but requested the Secretary-General to circulate to Members the proposed amendments inviting them to inform him of any suggestions for further improvement of the International Maritime Meteorological Punch-Card. Results of this inquiry should be transmitted to the president for appropriate action.

7.6 Re-establishment of the Working Group on Marine Climatology

7.6.1 The Commission felt that, in the course of the preparation of marine climatological summaries and ultimately the marine section of the World Climatic Atlas, a number of questions still required continued careful examination by a working group. These are, for instance, continuity of isopleths of land and marine atlases at the junction of land and sea areas, extent of replacing the conventional manual control methods of the marine climatological data by automatic data-processing techniques, and physical-statistical properties of the representativeness of data of representative unit areas, etc. The Commission consequently decided to re-establish a Working Group on Marine Climatology. Resolution 3 (CMM-V) was adopted.

7.6.2 With regard to the representativeness of the data for unit areas mentioned above, the Commission emphasized that it merely contemplated an objective scientific investigation and that conclusions of such an investigation should not result in obligations on the part of any Member responsible for the preparation of marine climatological summaries to alter the distribution or size of selected representative sea areas already established.

7.6.3 For the purpose of studying marine climatological summaries for the Arctic and Antarctic, the Commission requested its president to seek the advice of experts conversant with polar climatology to assist the working group.

8. SEA ICE (Agenda item 8)

8.1 Codes for reporting sea ice

8.1.1 The Commission noted that the Working Group on Sea Ice, as a result of considerable testing, especially in the United States, had devised several improvements to the WMO Spot Ice Code intended mainly for ships and aircraft operating in and over ice-infested waters. This revised version was approved at the first meeting of the Working Group on Sea Ice, with the proviso that the codes should be suitable for the exchange of ice data for scientific, climatological and record (storage) purposes; these codes were not intended for general use aboard voluntary observing ships. At this time the working group solicited the assistance of the WMO Secretariat, which examined the code for consistency with WMO coding practices.

8.1.2 As stated in the report of the first session of the Working Group on Sea Ice (Geneva, 1967), the president of the Commission referred the revised Spot Code to the president of the Commission for Synoptic Meteorology, who in turn referred the code to the chairman of the CSM Working Group on Data Needs and Codes. The chairman of this working group found the code to be acceptable with the exception of one minor procedural change. Since the Commission for Maritime Meteorology found the change to be acceptable, it decided to recommend that the code be accepted, and invited the Commission for Synoptic Meteorology to arrange for final approval. To this end the Commission adopted Recommendation 8 (CMM-V).

8.1.3 Since the Spot Code is most useful for international exchange of scientific and climatological data, the Working Group on Sea Ice at its first meeting in 1967 stated the need for a numerical code for operational and analysis purposes. After examining several possibilities, the Working Group on Sea Ice recommended that an operational and analysis code be devised using the U.S.S.R. code designed for this purpose as a basis. Subsequently Canada suggested a different scheme for encoding analyses of ice charts. The Commission noted these recommendations and referred the matter to a re-established Working Group on Sea Ice.

8.2 WMO Ice Nomenclature

8.2.1 The session noted that Recommendation 35 (68-CMM) (International Ice Nomenclature) was approved by the President of the Organization in accordance with Regulation 9 (5) of the WMO General Regulations. The session was informed that the Secretary-General had already taken steps towards publishing the WMO Sea Ice Nomenclature in the four official languages. However, there were some difficulties in the preparation of the French, Russian and Spanish versions. The session felt that the translations should be made by appropriate sea ice experts. The session requested the Secretary-General to continue his efforts to obtain the support of Members for this undertaking. It noted with appreciation the offer made by the Argentina delegate to solicit the help of Adm. Panzarini for the translation into Spanish. The session hoped that it would be possible to distribute the publication in four languages during 1969.

8.2.2 When reviewing the nomenclature as developed by the CMM Working Group on Sea Ice, the session noted that a meeting of the Baltic Sea Ice Experts (Helsinki,

June 1968) decided to call grey ice (10-15 cm) "thin ice"; grey white ice (15-30 cm) "medium ice"; first-year ice (over 30 cm) "thick ice". This slight modification applied only to ice observations exchanged between Baltic countries. The Commission noted the list of lake and river ice terms prepared by Mr. S. Fremling of the Swedish Meteorological and Hydrological Institute for the draft of the WMO/UNESCO multi-lingual glossary of hydrology. Members undertook to study the list thoroughly and looked forward to receiving the results of correspondence between Dr. Heap, Rapporteur for WMO Sea Ice Nomenclature, and Mr. Fremling, aimed at removing inconsistencies between the two terminologies.

8.3 Illustrated Ice Nomenclature

8.3.1 The session noted that, as a result of Resolution 18 (EC-XIII), the printing of the Illustrated International Ice Nomenclature had been included in the WMO publication programme for 1968/69.

8.3.2 Although final editing of this publication has been delayed by the rather extensive changes in terminology which resulted from the first session of the Working Group on Sea Ice, the Commission hoped that this matter could be pursued actively to an early completion.

8.3.3 It was felt that the production of the Illustrated International Ice Nomenclature should continue to be supervised by the re-established Working Group on Sea Ice. The activities of Mr. J. Fabricius (Denmark) in organizing and pursuing this task were noted, and the Commission extended sincere thanks to him for his efforts. In the re-established working group it was recommended that Mr. Markham (Canada) take over completion of this task as rapporteur.

8.4 Ice symbols

8.4.1 The Commission decided to accept the Russian ice symbols in principle and Dr. Treshnikov (U.S.S.R.), member of the Working Group on Sea Ice, was requested to act as rapporteur in the preparation of a set of symbols on this basis. He was requested to ensure that the symbols be entirely consistent with the WMO Sea Ice Nomenclature.

8.4.2 The Commission hoped the work on these ice symbols would be completed and available for consideration at a proposed meeting of the Working Group on Sea Ice as soon as possible, but not later than 1970.

8.4.3 The Commission, noting the very successful trial broadcasts of ice maps in Russian symbols by the United Kingdom, hoped that, in view of its favourable location, the United Kingdom would undertake further tests with regard to the distribution of ice data by facsimile or otherwise. It was also hoped that countries bordering the Baltic Sea would familiarize themselves with ice symbols used by the U.S.S.R. by receiving ice maps broadcast from the U.S.S.R.

8.5 User requirements

8.5.1 The Commission noted the concern in the report of the Working Group on Sea Ice over the rapidly changing and expanding scope and nature of requirements for sea

ice information in both scientific and operational fields. The Commission agreed with the views of the Working Group that, in its past work on standardizing nomenclature, unifying codes and formulating internationally used symbols, almost exclusive emphasis has been placed on surface shipping and operational needs; little or no attention has been devoted to the needs of the scientist attempting, for example, to acquire data on the global heat balance or to relate ice conditions to fish and marine mammal habits and migrations, nor have the needs been assessed of operators and activities associated with exploiting off-shore oil and other mineral resources. The Commission further noted that, to be more knowledgeable of and responsive to changing user requirements, the working group had begun work in the drafting of a questionnaire designed to identify the users more specifically and to determine more precisely the users' requirements for ice information. The Commission agreed that a fuller study and formal report should be developed prior to its next session and felt that this work should be co-ordinated with the CMM Working Group on Requirements for Marine Meteorological Services.

8.6 Re-establishment of the Working Group on Sea Ice

8.6.1 The Commission noted that, although much useful work had been accomplished by the Working Group on Sea Ice, several questions relating to the international exchange of ice information remained to be answered. Among these were publication of the Illustrated Ice Nomenclature, final agreement on a set of ice symbols, preparation of a numerical code for operational and analysis purposes, and preparation of a text of sea ice observing methods for inclusion in the Guide to Meteorological Instrument and Observing Practices (WMO Publication No. 8.TP.3).

8.6.2 In addition, other problems, such as a review of user requirements for sea ice data, have arisen as a result of the first session of the Working Group on Sea Ice (Geneva 1967). The Commission therefore decided to re-establish the Working Group on Sea Ice with similar terms of reference and with the same system of rapporteurs on individual items. Resolution 4 (CMM-V) was adopted.

8.6.3 The Commission further felt that a session of the working group should be held as soon as possible, but not later than 1970, to draw up final conclusions on outstanding items after adequate preparation on the part of the rapporteurs by correspondence.

9. MARINE METEOROLOGICAL ASPECTS OF THE WORLD WEATHER WATCH (WWW) (Agenda item 9)

9.1 The Commission noted the World Weather Watch plan for the implementation period 1968-1971, which was unanimously adopted by the fifth session of Congress. Furthermore, it noted the request of the Executive Committee that technical commissions should give high priority to activities related to WWW planning.

9.2 The Commission agreed that Planning Reports Nos. 7, 15 and 25, dealing with maritime matters, provided information which had been very useful to the work of the Commission. The decisions of the Commission on the marine aspects of the

Global Observing System (GOS), Global Data Processing System (GDPS), Global Telecommunication System (GTS), the research programme, and education and training, were recorded under the appropriate agenda items.

9.3 In setting up CMM working groups and appointing rapporteurs, the Commission kept the World Weather Watch in mind and formulated their terms of reference accordingly. The Commission felt that the system of working groups and rapporteurs set up by the session would permit CMM to play an active role in the further planning of the World Weather Watch.

9.4 However, the Commission felt that rewording of its terms of reference approved by the fifth session of Congress was needed to ensure that the Commission plays its appropriate role in the rapidly expanding field of marine activities. Recommendation 9 (CMM-V) was adopted.

10. AIR-SEA INTERACTION (Agenda item 10)

10.1 The Commission noted with appreciation the report of the Working Group on Ocean-Atmosphere Interaction. It also noted the work carried out by the IOC Working Group on Ocean-Atmosphere Interaction and in particular the results of the very successful meeting held in Lucerne in September 1967, and that the recommendations made at this meeting were accepted by the fifth session of IOC.

10.2 Ocean-atmosphere interaction is of interest to WMO, IOC, ICSU, IAMAP, IAPSO, SCOR and other international organizations. The Commission noted that the twentieth session of the Executive Committee gave consideration, subject to the concurrence of ICSU, to IOC's joining with WMO and ICSU in a Panel on Ocean-Atmosphere Studies within the framework of the WMO/ICSU Joint Organizing Committee (JOC) for the Global Atmospheric Research Programme (GARP). IOC has accepted this invitation and concurrence of ICSU is expected.

10.3 In the light of the above, the Commission decided not to reconstitute the Working Group on Ocean-Atmosphere Interaction.

10.4 The Commission stressed the importance of ocean-atmosphere interaction studies to its activities and requested the president of CMM, through his role as ex-officio member of the EC Panel on Meteorological Aspects of Ocean Affairs, to follow closely the developments in this field and to take all necessary measures on behalf of the Commission.

10.5 The Commission noted the excellent work done by Mr. K. T. McLeod, president of CMM, as a member on the Joint IOC/WMO Panel of Experts on Co-ordination of Requirements. In view of the Commission's deep interest and responsibility for meeting the requirements for maritime meteorological services and to provide continuity, the Commission felt that the president of CMM, or his designee, should be a member of the above panel.

11. SURFACE AND UPPER-AIR OBSERVATIONS AT SEA (Agenda item 11)

11.1 Sea surface temperature

11.1.1 Comparison of observational methods

The scientific lectures on the subject of observational methods and the excellent and comprehensive summary of observing techniques which was prepared by the Working Group on Technical Problems, particularly through the work of its Panel for the Study of Methods and Instruments for Measuring Sea Surface Temperature, constituted the basis for the discussion of this item. The Commission noted with appreciation the results reported on recent comparison studies by many countries. In this relation it also took note of the statement made by the twentieth session of the Executive Committee on the comparative studies carried out by the panel. In general, the results of working group members and others indicate that the differences, under controlled conditions, between results obtained by the various methods commonly used for measuring sea surface temperature (SST) are of the order of several tenths of a degree C. However, the working group has clearly shown that large differences can occur under certain operational conditions between the various methods, due to many causes.

11.1.2 Development of new instrumentation

The Commission was advised by the Working Group on Technical Problems that insufficient information was at present available by which simple, inexpensive and reliable instruments could be devised for easily measuring SST aboard voluntary ships as was requested in Recommendation 1 (CMM-IV).

11.1.3 Concept of sea surface temperature

The results of the panel's studies were discussed by the Commission. The general view expressed was that sea surface temperature should be defined. It was felt that there often existed differing interpretations of "sea surface temperature", largely depending on methods of observation and synoptic conditions, which might be categorized by (a) "skin temperature", and (b) "near surface mixed layer temperature". The Commission pointed out, however, that the desired sea surface temperature is the temperature representative of conditions in the near surface mixed layer underlying the ocean skin. The Commission recognized that the facilities available in any given ship for measuring the SST are limited and that the observers should state the procedures used (such as bucket, intake, etc.). For these reasons the Commission suggested the following amendments to paragraph 10.8 of the "Guide to Meteorological Instrument and Observing Practices":

(i) 10.8 Sea temperature

Insert a new paragraph 10.8.1:

10.8.1 Temperature to be observed

The temperature to be observed is that temperature of the sea surface representative of the conditions in the near surface mixed

layer underlying the ocean skin.

Renumber present paragraph 10.8.1 to read:

10.8.2 Methods of observation*

(ii) New paragraph 10.8.2, at the end of sub-paragraph (c), amend: (the "skin" method) to read: (the "hull" method).

Renumber following paragraphs accordingly.

The Commission requested the president of CMM to transmit the above amendments to the president of CIMO for inclusion in the Guide.

The Delegate of Ireland did not accept the definition of "sea surface temperature" and suggested that another solution might have been to refer to "sea temperature" throughout, as at present sea surface temperatures are not in fact reported.

11.1.4 Continuing action

The Commission noted that the twentieth session of the Executive Committee expressed its interest in the progress made in the conduct of comparative studies of measuring sea surface temperature and requested that the president of CMM arrange for the Commission to discuss the best way of evaluating the results of the comparisons and the assistance required. The Commission agreed that the work in the comparative studies of sea surface temperature initiated by the panel of the CMM Working Group on Technical Problems should be continued and that the analysis and evaluation of data acquired by members should be completed. The Commission therefore agreed to appoint a rapporteur to direct the continuation of studies and evaluation of results (see Resolution 5 (CMM-V)).

11.1.5 Sea surface temperature indicator

The Commission noted the need to have an indicator in the ship codes to denote the way in which sea surface temperature was measured. It accordingly requested that its president express to the president of CSM the desire of CMM to include such an indicator in the code if and when a major code change is considered.

11.2 Precipitation measurement at sea

11.2.1 The Commission discussed progress made in this field in relation to Recommendation 2 (CMM-IV). Some countries were reporting amounts of precipitation aboard stationary ships as recommended by CMM-IV. Other countries, however, were not doing so because they did not consider that their observational methods were sufficiently developed. In this connexion, the Commission decided to recommend that renewed efforts be made by those concerned to report precipitation amounts on stationary ships because of their value for synoptic and climatological purposes.

11.2.2 As regards studies of precipitation measurements on board mobile ship stations, the Commission noted that little information was available on this topic. It

was felt, however, that some countries might be carrying out investigations with a cheap, robust and reliable gauge to measure precipitation on board some selected ships. It was decided to recommend that those Members who were in a position to do so should install raingauges on a selected number of their mobile ship stations and report precipitation amounts on the understanding, however, that such observations would be mainly of synoptic value. Recommendation 10 (CMM-V) was adopted.

11.3 Wind structure and wind measurement at sea

11.3.1 The Commission reviewed the report of the chairman of the Working Group on Technical Problems and additional information made available to the session. It noted that research in this field was being intensively carried out in many countries. The Commission therefore expressed its hope for the continuation of such research to acquire better knowledge of the wind structure on the near sea surface, with particular reference to vertical distribution of wind speeds and disturbance of wind by the ship. Recommendation 11 (CMM-V) was adopted.

11.3.2 A proposal was made for including the height of the anemometer in a new column No. 15 of the International List of Selected, Supplementary and Auxiliary Ships (WMO Publication No. 47.TP.18). In supporting this proposal, the Commission noted that on account of the continuing increase in the size of ships, the location of anemometers was possibly becoming higher. The Commission decided to request the Secretary-General to take necessary action to this end.

11.3.3 Also under this item were discussed problems related to the equivalent wind speeds for the Beaufort numbers.

11.3.3.1 The Commission noted that subsequent to the decision by the eighteenth session of the Executive Committee on Recommendation 5 (CMM-IV) - Equivalent speeds for the Beaufort numbers, Fifth Congress stated that CMM had been examining the question further. The Commission considered that there existed a number of reasons why a revised scale should be adopted and that the arguments in favour of the existing scale were not based on strictly scientific considerations. Also, other commissions were interested in the question of Beaufort wind speed equivalents. It therefore felt that the problem should now be referred to the Executive Committee for resolution by an EC panel of experts as consideration by CMM had gone on for some 12 years. Recommendation 12 (CMM-V) was adopted.

11.3.3.2 The Commission considered a proposal that intervals in knots for the Beaufort numbers 3 to 5 of the present scale should be amended. In view of Recommendation 12 (CMM-V), it decided that no further action was required at present.

11.4 Sea waves

11.4.1 Observation and measurement of waves

11.4.1.1 Discussion on this subject was focused on the definition of "state of sea" as used in synoptic reports, i.e., whether it refers to a combination of sea waves and swell waves, or merely to sea waves. Despite divergent scientific standpoints among members in the interpretation of terms involved, the Commission agreed to take a con-

structive and practical approach towards achieving a goal to adopt a definition at this session.

11.4.1.2 There seem to exist within WMO confusing instructions on reporting sea conditions. Specifications for sea waves by height are given in paragraph 10.9.3 of the Guide to Meteorological Instrument and Observing Practices, but these specifications are not meant for use in forecasting or the provision of other services for shipping. However, the same values associated with the same subjective definitions as in paragraph 10.9.3 of the guide are found in Code table 3700 for sea state which is used primarily in the forecast code FM 61.D. The Commission noted that many regional practices, as identified in Volume B - Codes, use Code table 3700 as an observing code, and that confusion could exist between Code table 3700 (when used for weather reporting) and paragraph 10.9.3 of the guide. A proposal was made to delete reference to wave heights in Code 3700. Some concern was expressed that the deletion of the wave heights in Code 3700 would result in more subjective interpretations, particularly with respect to the meaning of sea state as used in Code table 3700 of the descriptive terms. The Commission therefore decided to retain the wave height specifications in Code table 3700, but noted that the International Meteorological Vocabulary (WMO-No.182.TP.91) defines the state of sea as "local state of agitation of the sea, due to combined efforts of wind and swell".

11.4.1.3 The Commission decided to request its president to inform the president of CSM that CMM recommends the following changes:

(1) The "state of the sea" as used in Code table 3700 for weather reporting purposes should be defined as: "The state of agitation of the sea resulting from various factors such as wind, swell, currents, angle between swell and wind, etc."

(2) The note in Code table 3700 on heights should be changed to read: "These values refer to well-developed wind-waves of the open sea. While priority should be given to the descriptive terms, these height values may be used for guidance by the observer when reporting the total state of agitation of the sea resulting from various factors such as wind, swell, currents, angle between swell and wind, etc."

11.4.2 Need for additional wave observations

11.4.2.1 The Commission considered the result of the inquiry conducted by the president of CMM on the need for additional wave observations by ships and coastal stations (CMM-V/Doc. 47). It noted that many countries have made mandatory the reporting of wave observations by voluntary observing ships. Code FM 21.D is generally used.

The Commission was also informed that the optional wave group is included in many of the synoptic reports, even though it is not mandatory. The Commission's attention was further invited to a conclusion of the Joint WMO/IOC Panel of Experts on Co-ordination of Requirements (Paris, July 1968) on basic requirements for observations in ocean areas. It reads: "For IGOSS Phase I, real-time transmission of wave observations is extremely desirable; WMO is requested to consider making it

mandatory." The Commission believed that these facts clearly reflect the increasing requirements for wave observations for a variety of users, particularly for synoptic purposes and that the reporting of wave observations should be made mandatory.

11.4.2.2 The Commission realized that technical difficulties could arise by making the reporting of the wave groups mandatory at this intermediate stage. As an interim measure, therefore, the Commission decided that Members should be urged to encourage their observing ships to make and report wave observations, preferably as mandatory observations on a national basis. Finally the Commission decided that only selected ships should make mandatory wave observations and that CSM should be requested to make wave reporting mandatory in Code FM 21.D at a future major code change.

11.4.2.3 The possibility of making mandatory the reporting of wave observations from coastal stations was discussed. For various reasons, such as location of stations, overloaded telecommunication channels, training of observers, local or regional nature of wave observations, etc., the Commission did not support the mandatory wave observations at coastal stations, but recommended that Members possessing well-situated coastal stations arrange for making and reporting wave observations for regional exchange. Recommendation 13 (CMM-V) was adopted.

11.5 Reporting of ice accretion

The Commission reviewed the results of the investigations carried out by various Members, in particular those conducted by the United Kingdom. It agreed that the shortcoming of the present reporting procedure R_s (Code 3551) was that it did not define the precise rate of ice build-up or break-up. Reporting of more precise rates would considerably increase the value of ice accretion reports for forecasting purposes. The Commission considered that the seven-figure code of ice accretion reasonably overcame such shortcomings and decided to request its adoption. It therefore requested its president to invite the president of CSM to arrange for the amendment of Code R_s (3551), if and when CSM considers any major revision of Codes FM 21.D, FM 22.D and FM 23.D, in accordance with the proposal given in Annex I to this report.

11.6 Trials on proposed Guide to Reporting Precipitation at Sea (Annex to Recommendation 8 (CMM-IV))

11.6.1 The Commission noted with appreciation the work done by many Members and particularly by the Netherlands and the United Kingdom with regard to the proposed Guide to Reporting Precipitation at Sea. The Commission was also informed that the United States had completed trials on this guide on four ocean station vessels but that the results were not yet available.

11.6.2 Preliminary conclusions from studies in the Netherlands and the United Kingdom suggest that the criteria proposed by the guide indicating the effect of precipitation on radars were of little value. The criteria indicating the effect of precipitation on visibility were found to be of some value. It was felt by many observers participating in the trial that the descriptive terms (column 1) to indicate precipitation were of value to them.

11.6.3 The Commission felt that the proposed guide in its present form was not

entirely satisfactory and proposed that a rapporteur should be appointed to study it in the light of trials completed and others pending and to suggest improvements to the guide to the Commission. These recommendations for improvements might be in the form of better descriptive terms for precipitation and, where possible, include visibility criteria. The Commission decided to appoint a rapporteur for this purpose. (See Resolution 5 (CMM-V).)

11.7 Upper-air observations

11.7.1 Radiosonde observations

11.7.1.1 The Commission reviewed reports submitted by several members on the radiosonde observations aboard merchant ships. Many problems associated with accommodation of meteorological personnel, inflation shelters, gas, launching of balloons, etc., are now being solved and it could be said that the practicability of using merchant ships as upper-air observing platforms has been proven. The Commission agreed that the only real problem was telecommunication arrangements for the transmission of upper-air data from ships to coastal radio stations and onward. This aspect is considered under agenda item 12.

11.7.1.2 As a first step towards achieving the expansion of the present and planned marine components of the global observing, telecommunications and data processing systems proposed by Recommendation 6 (CMM-V), the Commission agreed that the observation and reporting of sub-surface sea temperatures using the expendable bathythermograph should be encouraged aboard those merchant ships which carry out upper-air observing programmes. One of the supporting reasons was that these ships carry at least one meteorologist aboard. The Commission was informed that some of those American ships making upper-air observations had been reporting bathythermograph information.

11.7.1.3 The Commission felt an urgent need for devising appropriate international codes, either independent of or additional to the present ship code forms, to report sub-surface sea temperature. It was considered that CSM would be the most appropriate body to deal with the problem together with CMM, and with suitable oceanographic representation. Since events in ocean affairs are developing very rapidly and detailed requirements have not yet formally been established, the Commission believed that further studies would be necessary prior to the adoption of a code for sub-surface data. The Commission therefore requested its president to take necessary action on this matter, as and when required.

11.7.2 Radiowind observations

The Commission noted with appreciation the report of the acting president of CIMO on the development of suitable equipment for radiowind observations aboard ships; the work is now under way in several countries to design simple, low-cost, dependable and reasonably accurate radiowind adjuncts for standard radiosonde systems. While realizing the various difficulties involved, the Commission felt that the development of such equipment would be one of the major contributions to the acquisition of upper-air data over the ocean.

11.8 Automatic weather stations at sea

11.8.1 The Commission reviewed the results of an inquiry on present and planned facilities for the installation and operation of automatic weather stations at sea (CMM-V/Doc. 27). It noted amongst other things that in many countries the operation of automatic weather stations was still at an experimental stage and that further intensive studies were required to prove the technical feasibility of buoy systems. It was felt that studies should be directed particularly towards solving such problems as communication and servicing.

11.8.2 The Commission was informed that certain Members had already installed or were planning to install automatic weather stations in inland waters, i.e. lakes, rivers, etc. It was agreed that the proposed definitions of automatic weather stations for inclusion in the Technical Regulations would also be applicable to such stations. This aspect is considered under agenda item 14.

11.9 Definition of ventilated and unventilated screens

A query was presented to the session regarding the definition of "ventilated" and "not ventilated" screens as given in Columns 6 and 8 of the explanatory notes in the International List of Selected, Supplementary and Auxiliary Ships (WMO - No. 47.TP.18). The Commission was of the opinion that all screens permit a form of ventilation which is either natural or forced and that the present description does not clearly reflect this fact. It therefore decided to request the Secretary-General to amend Columns 6 and 8 of the explanatory notes as follows:

s: screen (natural ventilation)
vs: screen (forced ventilation)
etc.

11.10 Collection of weather radar data recorded by ships

A proposal was made for collecting radar echo photographs of significant weather phenomena, such as hurricane eye, rain bands, etc., to be taken by officers aboard ship. The Commission, while realizing the scientific merit of the proposal, felt that it would create an additional workload for shipboard personnel. The Commission decided that the Working Group on Observation Network at Sea and on Maritime Telecommunications should be requested to investigate this problem.

11.11 Acquiring meteorological and oceanographic observations by satellites

Information was presented to the session on a system to use spacecraft for study of the oceans — sea surface temperature and currents, sea state, sea ice, etc. It was recognized that the use of spacecraft for environmental observations is in its infancy; observations already made from space suggest a considerable potential for the future. The Commission expressed its appreciation for the information provided and hoped that it would soon become operational on a wider basis.

11.12 Storm surge

The attention of the Commission was drawn to a need for organizing a storm surge warning system in that area of RA-I subject to hazards of storm surges. The Commission believed that this was one of the important fields where the Global Data Processing System (WWW) could assist national Meteorological Services. As a first measure towards meeting this need, the Commission decided to request the Secretary-General to provide Members concerned with technical and scientific literature on storm surges — on the theory, observation network, forecasting techniques, etc. For this purpose, the Commission felt that the assistance under the WMO Technical Assistance Programme might be sought from Members having experience with this problem. It also considered desirable that regional associations concerned be invited to study the matter on a regional basis.

11.13 Codes

11.13.1 Uniform procedure for rounding off the decimal figure 5 of air temperature

11.13.1.1 The Commission considered the recommendation of the first (restricted) session of the CSM Working Group on Data Needs and Codes that air temperature should always be rounded off to the nearest whole degree, regardless of the use of the optional group ($1T_wT_wT_wt_T$). The Commission considered that this procedure would increase, rather than decrease, confusion and it therefore did not support the recommendation of the CSM working group. On the contrary, the Commission considered that it would not be necessary to round off the air temperature when the optional group ($1T_wT_wT_wt_T$) was used. Furthermore, it suggested that consideration might be given to making this group mandatory for selected ships using the code form FM 21.D.

11.13.1.2 The Commission considered also that the rounding-off procedure in this case is a synoptic problem, and not a climatological one, because the decimal of the air temperature is recorded in the log sheets of the selected ships. The Commission discussed further the problem of rounding off decimal figure 5, but found it impossible to reach a uniform procedure unanimously.

11.13.1.3 The president of CMM has conducted an inquiry asking members of CMM for their views on the following procedures, outlined in paragraph 5.3.3.2 of the final report of the first session of the CSM working group:

(a) To the nearest even whole number;

(b) To the nearest odd whole number;

(c) Upward, i.e., to the nearest higher whole number (value);

(d) Downward, i.e., to the nearest lower whole number (value);

(e) Upward for positive values and downward for negative values.

11.13.1.4 The majority of the countries who replied preferred method (c). An analysis of the replies is as follows:

5 prefer method (a);

4 prefer method (b);

19 prefer method (c);

2 prefer method (d);

2 prefer method (e).

11.13.1.5 It was pointed out that if the suggestions of the Commission as expressed in paragraph 11.13.1.1 above were accepted, it would not be necessary to have a uniform procedure for rounding off. Nevertheless, the president of CMM was asked to request the president of CSM to arrange for the inclusion of "rounding-off" procedures under national practices of Volume B.

11.13.1.6 The CMM representative on the CSM Working Group on Data Needs and Codes was requested to convey the views of the Commission to the chairman of the said CSM working group. The Commission asked that he also indicate to the CSM working group CMM's desire to review proposed changes to the marine codes before they are adopted and, further, that adequate notice be given to Members, at least one year before changes are implemented.

11.13.2 Abbreviated and special code forms for ship reports

Consideration of this subject was based mainly on the results of the inquiry concerning the actual use of certain ship code forms (CMM-V/Doc. 17) and the report of the CMM representative on the CSM Working Group on Data Needs and Codes (CMM-V/Doc. 40). Much discussion was held on the need for special codes, or at least abbreviated codes, for auxiliary ships, and special weather reports. While realizing the need for simplifying the set of ship codes, the Commission did not consider it ne essary at this time to propose combined codes or suppression of particular codes. In this connexion, the Commission was informed that the CSM Working Group on Data Needs and Codes was considering the requirements formulated by CMM-IV as regards structure of codes and the elements to be included (Annex III of the final report of CMM-IV). It therefore decided merely to supplement the above-mentioned requirements (see Annex II). The CMM representative on the CSM Working Group on Data Needs and Codes was requested to transmit these comments to the chairman of the said CSM Working Group.

11.13.3 CMM representation of the CSM Working Group on Data Needs and Codes

The Commission was convinced that many problems relative to ship codes would arise which should be considered by CSM in close consultation with CMM. It therefore decided that the present representation on the CSM working group by

Mr. A. B. Crawford (South Africa) should be continued.

11.13.4 Marsden squares

The Commission considered a proposal of CSM for changing the numbering system of Marsden squares. While fully agreeing with the merit of the proposal that provision should be made to allocate numbers to those areas north of 80°N and south of 70°S, the Commission could not support the original proposal which would involve the alteration of numbers in the southern hemisphere. It therefore suggested the systematic extension of the present numbering in the southern hemisphere to 90°S, allocation of numbers commencing with 801 to the area north of 80°N. In arriving at this conclusion, the Commission took into account that Marsden squares were used in other disciplines, both for operational and research purposes. It might therefore well be desirable to seek the views of other technical commissions or other bodies concerned before any decision was made on this matter. The president of CMM was requested to inform the president of CSM of the views of the Commission.

11.13.5 Codes for reporting sub-surface sea temperature

Discussions and conclusions of the Commission on this subject are recorded in paragraph 11.7.1.3.

11.13.6 Sea surface temperature indicator

Discussions and conclusions of the Commission on this subject are recorded in paragraph 11.1.5.

11.14 Establishment of a Working Group of Rapporteurs on Technical Problems

After a lengthy discussion, the Commission decided to establish a Working Group of Rapporteurs on Technical Problems. It was felt the studies of specific problems could best be conducted by rapporteurs. The Commission therefore agreed that, for each identified field, one expert should be appointed as rapporteur. Resolution 5 (CMM-V) was adopted.

12. COLLECTION AND DISSEMINATION OF MARINE METEOROLOGICAL OBSERVATIONS INCLUDING METEOROLOGICAL NETWORKS AT SEA (Agenda item 12)

12.1 System for the collection of ships' weather reports - WWW Planning Report No. 25

12.1.1 The Commission considered WWW Planning Report No. 25 and was unanimous in its opinion that the information contained therein was extremely helpful and useful and wished to commend Dr. M. Hanzawa and Mr. T. H. Tournier for a large job very well done. The Commission also recognized however that such a survey places a very heavy workload on Members. It considered, nevertheless, that similar surveys should be carried out periodically, that the information required should be simple and easily obtainable as well as usable, and that the nature of the inquiry should be well

defined. The Commission also felt that such survey might be more beneficially conducted at times on a regional rather than a world-wide basis.

12.1.2 The Commission was concerned that information for the survey was not made available by certain important maritime Members and expressed the hope that a greater response would be forthcoming for any future survey.

12.1.3 The Commission noted that some difficulty had been experienced by ships when calling coastal radio stations and the reason was believed to be the inability of the coastal stations to identify the priority of the calls. Accordingly, it was agreed that Members should be invited to draw the attention of ships to the importance of including "OBS" in their calls to coastal radio stations and that responsible telecommunications administrators should be asked to accept this procedure and ensure that the "OBS" procedure is complied with.

12.1.4 The Commission considered the value of midnight (ship's time) observations transmitted after the resumption of the radio-officer's duty (normally with up to eight hours' delay). While realizing that the meteorological value of any synoptic observation decreases rapidly with time, it was agreed that these reports were still highly useful in some regions, particularly in the southern hemisphere.

12.1.5 The IMCO observer reported that the minimum telecommunications capabilities of vessels were specified by the Safety of Life at Sea Convention and the Radio Regulations. Although many vessels had equipment beyond the minimum requirements, reinforcement of facilities on board ship for the purpose of transmission of weather reports could hardly be supported on an international basis. He further stated that the radio-operator problem could not be solved by shifting the watch periods as the report suggested. The hours of watch were specified by the Radio Regulations and whatever room for interpretation the administrations might have, if any, was not sufficient for this purpose. The Commission also expressed the opinion that the elimination of sparse data areas could not be accomplished entirely by means of voluntary observing ships.

12.1.6 The Commission examined the various tables in the report. For any future survey, it advised the following:

Annex I

(1) A column should be added to show the number of observations prepared but not transmitted (for calculation of the loss of observations aboard ship).

(2) A column should be added to show the number (or percentage) of observations transmitted as CQ messages (broadcast without any specific destination). For statistical purposes, apart from their reception, by nearby ships, CQ messages should be regarded as non-transmitted or lost; CQ messages are, therefore, of very limited use for meteorological purposes.

Annex II

(1) The last two columns showing the mean time of reports averaged for four standard hours do not in all cases give a true indication of the efficiency of each coastal radio station. Circumstances beyond the control of stations may cause delays; for instance, reports which are retarded on account of the watch schedule of officers. For example, there are numerous cases when single-operator ships habitually report, say, the 0000 and 0600 observations when the radio officer comes on watch at 0800 GMT.

(2) Further surveys concerning the time factor should include, if possible, the information regarding the time of file aboard the ship and the time of dispatch to a coastal radio station.

Annex III

Further surveys of this type need only state the time elapsed between the reception of the message at coastal radio stations and its reception at the national collection centres.

Annexes IX and X

The remarks under Annex II (1) above also apply. In other words, much of the apparent delay is primarily due to single-operator problems and the transmission of observations which were made while the operator was off duty.

12.1.7 The outstanding efficiency of Japanese coastal radio stations in the handling of weather reports was noted. This efficiency has probably been achieved because it seems that:

(a) Japanese coastal stations are exceptionally well manned and well equipped.

(b) Japanese ships usually carry two or more radio operators.

(c) Japanese ships usually carry powerful radio transmitters.

12.1.8 The Commission noted that at the present time there were no coastal radio stations in the area contiguous to the Persian Gulf designated to receive weather reports. It was noted that there was presently a large amount of ocean traffic in this area and the weather reports received therefrom normally went to privately owned stations which assumed no responsibility for making these reports further available. The Commission accordingly recommended that the attention of regional associations concerned be drawn to the above information.

12.2 WWW Planning Report 25, Part II

12.2.1 The Commission noted that the procedure contained in paragraph 11.1.2.2 of Volume D, WMO Publication No. 9.TP.4, whereby ship reports must be transmitted to the nearest convenient coastal radio station,was only rarely respected and the probable reason was that this station was not necessarily the best one in the zone of concern from the point of view of rapidity of radio contact. However, the Commission believed that the efficiency of the communications procedures could be enhanced if Members operating voluntary observing ships would consider advising their radio officers as to the more effective radio stations from a meteorological viewpoint in any region in which the ship might be operating.

12.2.2 It was noted that many ships reported to coastal stations not in the region where the ship was navigating and such procedures, except in specified cases, were a deviation from the basic concept of the collection plan as laid down in Volume D. Although there were many different reasons for these deviations, the Commission believed that Members should make every effort to ensure that the plan for the transmission of ships' weather reports to coastal stations was in fact applied. Recommendation 14 (CMM-V) was accordingly adopted.

12.2.3 The Commission considered that the procedures established for single operator ships were still valid but had not yet attained their maximum value. Members should be invited to remind their ships of these procedures and Recommendation 15 (CMM-V) was adopted with this in mind.

12.2.4 Since one factor affecting the efficiency of the ships' report collection plan was the operational conditions at coastal radio stations, the Commission felt that these operational conditions should be subjected to a detailed study in order to bring about improvement in the light of certain deficiencies which were reflected in the study. Accordingly, Recommendation 16 (CMM-V) was adopted.

12.2.5 The Commission discussed in some detail the value of an incentive programme for ships' officers on whose goodwill the WMO voluntary observing scheme depends. It was noted that a number of countries had very effective arrangements for such programmes. It was recommended that the Secretary-General be asked to invite all Members operating selected ships to report their arrangements for such incentives and that these reports be sent to a rapporteur appointed by CMM for the purpose. It was further recommended that this same rapporteur should be instructed to study the feasibility of WMO's sponsoring such activities on an international level. The Commission adopted Recommendation 17 and Resolution 6 (CMM-V).

12.2.6 The Commission was convinced that many new technical developments in the communications field were taking place and that it was imperative that CMM keep pace with these developments in order to ensure that they were utilized at the earliest possible time for the transmission of ships' weather reports. It believed that a study of the problems of telecommunications at sea at a technical conference might help to solve some of them and, as a result, the Commission adopted Recommendation 18 (CMM-V).

12.2.7 The Commission accepted the conclusion in the report that many weather messages were tardy in their arrival at many of the national collection centres. It felt that some of these problems were associated with the facilities available at present at coastal radio stations. Accordingly Recommendation 19 (CMM-V) was adopted.

12.2.8 The Commission noted a table (Annex III) showing the world-wide coverage of ships' reports which were available at the Swedish Meteorological and Hydrological Institute. The coverage was an excellent example of what could be made available and the Commission felt that Members should compare it with their own coverage when evaluating the communications facilities of countries and regions.

12.2.9 The Commission recognized that additional observing ships were needed if the WWW plans and programmes were to be successful to any degree. It felt that the Secretary-General should have all available support in carrying out the wishes of Congress in this regard and accordingly adopted Recommendation 20 (CMM-V).

12.2.10 The Commission was informed that several Members did not have a sufficient number of ships' weather reports to cover their national needs and satisfy their international obligations. The Commission was invited to note the role given, within the framework of the WWW, to the World Meteorological Centres and Regional Meteorological Centres, and the need for these centres to receive the data from the ocean areas quickly and in sufficient number.

Consequently, a certain number of requirements needed to be met:

1. To define the criteria for selection of reports at various stages of transmission.

2. To determine the transmission channels used.

3. To ensure the efficient operation of the telecommunications systems utilized.

As regards selection criteria, it has been established that all ships' weather reports received by coastal stations must, without exception and with the shortest delay possible, reach National Meteorological Centres, Regional Telecommunications Hubs, Regional Meteorological Centres and World Meteorological Centres in conformity with their functions as defined by Fifth Congress, and must, by selective dissemination, if necessary, satisfy all the needs of the associated centres. These needs have been defined by CSM, the regional associations or by bilateral agreements. In the case of regional or sub-regional broadcasts, it has become apparent that they should be organized in such a way that ships' weather reports are grouped, making possible easy access to a sufficiently dense and well-distributed choice of messages to answer the needs of Members making use of these means. Recommendation 21 (CMM-V) was adopted.

As regards verifying the efficient operation of the telecommunications systems utilized, the Commission felt that it was necessary to institute very close control of the transmission of ships' weather reports at various stages of transmission. A study of Planning Report No. 25 shows the need for improvement. Checking

is needed, first of all, at the national collection stage. Members collecting ships' weather reports through their coastal radio stations should check at least once a year to ensure that the collection of reports by coastal stations for the National Meteorological Centre and the relay of these reports to all centres concerned are carried out efficiently, within the time limits set forth by Fifth Congress; that is, that they are in general relayed to all Regional Telecommunications Hubs within two hours from the standard times of observations. Furthermore, regional associations should undertake general surveys concerning the efficiency of dissemination of all available reports; they should then proceed to further survey in consultation with the Secretary-General of the Organization, who should issue the necessary instructions and arrange that the studies be carried out in the most effective manner.

12.3 The Spanish-speaking representatives requested that the Secretary-General arrange that Technical Note No. 72 and the manual on port meteorological officer activities in WMO Publication No. 9.TP.4, Volume D, be translated into Spanish as soon as possible as it would be of great value in their ship-recruiting programme.

12.4 The Commission noted with great interest a proposal submitted by the Federal Republic of Germany for rearranging the schedule of watch-keeping hours for single-operator ships (CMM-V/Doc. 62). Since the above proposal appears very promising with respect to the timely collection of ships' weather reports at coastal radio stations, the Commission decided to request its Working Group on Observation Network at Sea and on Maritime Telecommunications to undertake a thorough study and to report to the president of CMM its findings not later than October 1969. After completion of the Working group's study, the president of the Commission is requested to consult with the president of CSM on the proposal and on the findings of the group with a view to obtaining the views of CSM. In the case of favourable findings by CSM and CMM, the proposal should be circulated to Members for their comments and for appropriate action with their national telecommunications administrations with a view to soliciting their support for adjusting the ITU Radio Regulations.

12.5 Weather reports from whaling and fishing vessels

The Commission noted the increasing number of fishing vessels and the increasing potential for their use as a source of information from sparse-data areas. Although a good number of fishing vessels were currently making weather observations, many of their reports were being lost as a source of information in the immediate area in which the vessels were operating because the reports were transmitted to the home country rather than in accordance with the instructions in WMO Publication No. 9.TP.4, Volume D. The Commission felt that every effort should be made to increase the usefulness of both fishing and whaling vessels and adopted Recommendation 22 (CMM-V). The Commission was then informed that Argentina had in operation in its antarctic meteorological centre on the Orcadas Islands a coastal radio station able to receive messages from whaling and fishing expeditions and any other vessels navigating in that area.

12.6 Research vessels

The Commission viewed with concern the very limited use that is being made of research vessels for obtaining weather observations. It was informed that although

many well-equipped and well-staffed research vessels are continuously at sea, very few transmit weather observations, and even fewer do so in accordance with pertinent regulations. Since even more research vessels are likely to go to sea as a result of the increasing activities in ocean affairs (UN Resolution 2172 (XXI) on the Resources of the Sea, IOC resolutions, etc.), the Commission adopted Recommendation 23 (CMM-V).

12.7 Upper-air programme aboard fishing vessels

The Commission felt that certain large fishing vessels would make ideal platforms for taking upper-air observations on account of their adequate size and the fact that they often remain in one location for a long period. Their availability for this purpose should be investigated in connexion with WWW planning.

12.8 Scheme for acknowledgement of ships' weather messages

In the examination of an Indian proposal to standardize the procedure for acknowledging ships' weather messages by a monthly tally, the Commission felt that this matter could be dealt with only on a national level. If the need arose, correspondence addressed to ships should normally be transmitted through the national Meteorological Service which recruited the ship.

12.9 Procedure for the transmission of early morning weather observations

The Commission was made aware that in many areas of the world there were no early morning weather observations transmitted by ships at the proper time, yet it recognized that these observations were significant and of unusual interest. In order that more such observations become available, Recommendation 24 (CMM-V) was adopted.

12.10 Automatic Merchant Vessel Report (AMVER) system

The AMVER system is operated by the U.S. Coast Guard in order to foster safety and nautical assistance on the seas. There are approximately 1800 individual ships carried on plot, mostly in the Atlantic and Pacific Oceans. The meeting was informed that the AMVER system cannot provide meteorological support on a regular basis. However, it might be useful for requesting special selected reports from ships.

12.11 Ship traffic analysis

The Commission noted a project undertaken in the United States which will provide for a means of selecting ships so that observations are obtained from the broadest area with a minimum of redundancy. It considered that the results of such a programme would be very helpful to Members' participation in the Voluntary Observing Ship Scheme in obtaining ocean weather coverage as needed for an effective World Weather Watch programme.

12.12 Upper-air programmes from ships

The Commission considered the problems associated with the transmission of upper-air reports to coastal radio stations based upon the British experimental programme conducted aboard the "Sugar Exporter" on voyages in the North and South Atlantic

and Indian Oceans. As a result, it questioned the need for transmitting the full upper-air report and requested the president of CMM to obtain the view of CSM as a matter of urgency. It also recommended that:

(a) Ships in the upper-air programme be allocated specific coastal radio stations for clearing these reports, taking into account the communications and financial implications involved;

(b) Members which have merchant ships participating in the programme for obtaining upper-air observations be invited to carry out practical comparative experiments aboard such ships for expediting the transmission of upper-air reports to coastal radio stations in Morse, teletype and facsimile mode of transmission.

12.13 The Commission was informed that, in accordance with Recommendation 46 (CSM-IV), the Secretary-General is issuing at weekly intervals advance notifications of changes in Volumes A and C of WMO Publication No. 9.TP.4. These messages, identified by the prefix "METNO", are being distributed through the Global Telecommunications System during low-traffic periods. The Commission felt that it would be very useful if detailed information on the itinerary of ships making upper-air observations could be made known to all Members. Upon receipt of the itinerary, Members are urged to make necessary arrangements for the collection and distribution as will be requested for the use of the upper-air reports from such ships and also for the check on the efficiency of transmission arrangements. Recommendation 25 (CMM-V) was adopted.

12.14 Direct-printing transmission equipment

The Commission was informed that shipping companies are only very slowly introducing direct-printing transmission equipment for use in the maritime mobile service and some time will pass before direct-printing transmission equipment is used to any extent. The Commission felt, however, that in view of the advantages of direct-printing transmission equipment for the speedy and efficient transmission of long messages, Members should be requested to explore the possibility of encouraging its use aboard ships, particularly those selected for taking upper-air observations and on research vessels in so far as the corresponding installations are available at coastal radio stations.

12.15 Allocation of radio frequencies for data from ocean areas

At the request of the president of CIMO, the Commission took note that the following radio frequencies were allocated for telemetry of data from ocean areas (from buoys, automatic stations, etc.):

4162.5	to	4166	kHz
6244.5	to	6248	kHz
8328	to	8331.5	kHz
12479.5	to	12483	kHz
16636.5	to	16640	kHz
22160.5	to	22164	kHz

It also noted that details regarding this matter have been promulgated to Members by the Secretary-General's letter No. 10.018/T/10 of 17 April 1968.

12.16 Improvement of meteorological services

The Commission examined the remarks made by Chile aimed at improving meteorological services by various measures such as the establishment of automatic observing stations in appropriate locations, including islands, the installation of point-to-point telecommunications links, and a standardization of the practices employed by the services involved. The Commission recognized the value of these remarks.

12.17 Establishment of a working group

As new observation techniques are developed and new types of platforms become available, there is a need to incorporate them into the global observation system in the most effective manner. At the same time, it is essential that the maritime component of the Global Observing System using existing techniques and platforms be brought up to the standard required by the WWW plan (see annex to Resolution 16 (Cg-V), paragraphs 22 and 23). It is essential that the regularity and quality of the observational data collected be brought up to and maintained at the highest possible level. Furthermore, it is imperative that the telecommunication arrangements for the collection and distribution of observational data be improved. At the same time, the telecommunication arrangements for the distribution of information to users should be brought to a level adequate to ensure that the agreed operational requirements are met. The Commission decided that it would be appropriate to establish a working group to keep these matters under review and formulate appropriate recommendations. Resolution 7 (CMM-V) was adopted.

12.18 Mobile ships in the Global Observing System

The Commission considered the goals as set forth by the Fifth WMO Congress regarding the substantial increases that will be required in the mobile ship WWW programme for obtaining surface and upper-air observations. Recognizing that ships are tending to become larger and are, as a consequence, becoming fewer in number, the Commission realized that Members will be required to make a supreme effort if the aims of Congress are to be met.

12.19 Recruitment of Greek, Liberian and Panamanian ships

The Commission was informed of steps which had been taken to encourage, through IMCO, shipowners and masters to participate in WMO's Voluntary Observing Ship Scheme and to obtain the direct participation of Greece, Panama and Liberia in the recruitment of ships. CMM was then most gratified by a statement submitted by the Greek delegate which indicated that by law Greek ships over 1600 registered tons will be supplied with meteorological instruments. Since this number will approximate the very large number of 970 ships, Members are invited to take advantage of this favourable situation by recruiting Greek vessels (see also Technical Regulations 2.2.1.5.1 and 2.2.1.5.2). The Commission also noted with satisfaction the action taken by the

Secretary-General and the United States to assist the Liberian and Panamanian authorities in the recruitment of ships and would appreciate follow-up information on this matter as appropriate.

12.20 Utilization of all ships in sparse data areas

In view of the great sparsity of data over much of the oceans, the Commission finally concluded that advantage should be taken of any opportunity to obtain observations from all ships under way in sparse data areas. Attention of Members is therefore invited to the chart showing the ocean areas where the number of meteorological observations is inadequate on page D-A-I-9-E in Part A, Chapter I, Volume D of WMO Publication No. 9.TP.4. Members should be encouraged to bring this map to the attention of all of their ships periodically. In explaining the legend, every effort should be made to persuade the ships' officers to report in the WMO code.

13. MANUALS, GUIDES AND TRAINING RELATING TO MARITIME METEOROLOGY (Agenda item 13)

13.1 Manual for Use by Marine Observers on Board Auxiliary Ships

The Commission noted with gratitude the excellent portfolio prepared by the Netherlands and the large number of copies made available for study. The Commission considered that this portfolio would be very useful as advisory material for countries needing such information, and recommended that it be translated into the official languages so that it will be readily available to all. Before this is done, however, the Commission felt that the portfolio should be studied by a rapporteur and Resolution 8 (CMM-V) was adopted for that purpose.

13.2 Meteorological log-book for auxiliary ships

It was noted that the fourth session of the Commission had requested the Secretary-General to arrange for a copy of a Netherlands log-book to be used as a model and distributed to all Members of CMM. In lieu thereof, the president of CMM considered that it would be useful to distribute the log-books of a few other countries as well as the log-book of the Netherlands. The Commission considered that the action of the Secretary-General in carrying out the wishes of the president in this regard had satisfactorily met the desires of CMM-IV.

13.3 International List of Selected, Supplementary and Auxiliary Ships

The Commission was advised that the Permanent Representative of the Netherlands had made the following two proposals:

(a) To combine all information on auxiliary ships in one consolidated and alphabetic list; and

(b) To supply the Secretariat with the list of auxiliary ships once a year instead of twice, if this meets the requirements of Members.

The Commission, after consideration of the many factors involved, believed that no change should be introduced into the listing of selected, supplementary and auxiliary ships as currently practised. The Commission also considered that there should be no need to supply the Secretariat with the list of auxiliary ships more frequently than once a year.

13.4 Volume D, WMO Publication No. 9.TP.4

The Commission briefly reviewed the contents and presentation of Volume D. Although the Commission feels that an intense study is needed before any major changes are suggested, this cursory review did show that there are disadvantages of having texts of more than one language in one publication. Accordingly, the Commission believes that any future change of Volume D should be planned so that Members can obtain the publication in the one language only.

13.5 Booklet on Radio Facsimile Transmissions of Weather Charts for Ships

The Commission extended sincere thanks to both Mr. Sik and Captain de la Canal whose diligent work made this booklet possible. It critically reviewed the booklet and agreed that its content and presentation were well suited for indicating to both the shipowner and the mariner the many inherent advantages of radio facsimile for the reception of weather information aboard ship.

13.6 In order to achieve the goal established for the booklet, a wide distribution requiring a considerable number of copies would be needed. The Commission therefore recommends that it be reproduced in the four WMO official languages in the most inexpensive form so that copies could be provided free or at a nominal fee. It was visualized that the easiest distribution could be made through making the necessary number of copies available to the WMO maritime Members as well as to selected international organizations such as IMCO, CIRM, ICS, FAO, ITU and IOC. When making the copies available, international organizations as well as Members should be encouraged to obtain further dissemination by the use of trade journals or similar publications. Recommendation 26 (CMM-V) was adopted.

13.7 It was decided that the following charts would be included in the booklet as illustration:

One surface synoptic weather analysis chart;
One surface weather prognostic chart;
One wave forecast chart.

13.8 Preparation of guidance material on the organization of meteorological activities in the field of maritime meteorology

The Commission considered the information presented by the president of CMM on this subject. It reviewed the various publications and material now available and concluded that there was a need for additional guidance information, particularly for developing countries. Since much of the information on the organization in various countries was now available and pertained to developed countries, it might have limited value to developing countries. The Committee therefore decided that,

in order to get a better understanding of the kind of guidance material most desired and to determine the most appropriate way to proceed, a rapporteur should be appointed to investigate this matter further. The Commission adopted Resolution 9 (CMM-V) - Rapporteur on the Preparation of Guidance Material on the Organization of Meteorological Activities in the Field of Maritime Meteorology.

13.9 Booklet "Fishermen and the Weather"

At the fourth session of the Commission, it was agreed that WMO would co-operate with FAO in producing several models for use in preparing national booklets to aid fishermen in understanding the weather. The Commission took note of the booklet "Fishermen and the Weather" which was produced by FAO as a result of this co-operation and expressed the view that the booklet is interesting, informative, and should be useful as an information booklet for fishermen. The Commission further expressed the desire to assist FAO in future similar endeavours should the help of the Commission be needed.

13.10 Marine Cloud Album

13.10.1 Following a decision of the fourth session of the Commission, an inquiry was conducted among Members to obtain more photographs of clouds, particularly those taken at sea. The Commission was shown a set of excellent cloud pictures submitted by the Federal Republic of Germany in response to the above inquiry.

13.10.2 The president proposed the following criteria for judging the suitability of photographs for Marine Cloud Album:

(a) The clouds should appear against a background of the same environment as that of the observer, in this case, the sea;

(b) Some cloud types, particularly those of low clouds, have a different appearance and/or form over the sea as compared to similar clouds over land, and the photographs should reflect this characteristic;

(c) The cloud type for which an illustration is needed should clearly be the dominant feature of the photograph and should show the characteristics described in the International Cloud Atlas;

(d) Other clouds in the photograph should be clearly recognizable as different types.

The Commission accepted these criteria and it added a further point that the photographs should be coloured pictures throughout for the sake of a uniform and more natural presentation.

13.10.3 After having examined the selection of cloud photographs against the criteria as given above, the Commission decided that the majority of types of cloud was well represented by the new pictures. The types of cloud not yet covered with respect to the criteria are the following:

C_L = 1, 7

C_M = 6, 8, 9

C_H = 6, 7

13.10.4 The Commission therefore decided to request the Secretary-General to arrange for obtaining from Members suitable cloud pictures, taking into account the above-mentioned criteria and the types of cloud not yet covered; for this purpose co-operation should be sought from a larger variety of sources, including observers aboard voluntary observing ships. It was also suggested that pictures thus collected should be kept in the Secretariat and be reviewed, at an appropriate time, by a rapporteur appointed by the president of CMM. The president of the Commission was requested to make a decision regarding the publication of a revised edition of the album in light of the report of the rapporteur after consultation with the Secretary-General.

13.11 Specialized meteorological training in the field of maritime meteorology

The Commission noted with appreciation the report submitted by its president on specialized meteorological training. It also noted the action taken by other technical commissions concerning specialized meteorological training. The Commission felt that there was a need for specialized meteorological training in the field of maritime meteorology. It therefore requested the president of CMM to appoint a rapporteur to examine the need for specialized training in the field of maritime meteorology and further requested that he arrange with the president of CSM for this rapporteur to act as a representative of CMM on the CSM Working Group on Qualifications and Training of Meteorological Personnel in the Field of Synoptic Meteorology.

14. TECHNICAL REGULATIONS (Agenda item 14)

14.1 Land and sea automatic weather stations

Congress V specifically requested that the Technical Regulations regarding land and sea automatic weather stations be considered by CSM in consultation with CMM. The proposed text for inclusion in the Technical Regulations as developed by the CSM Working Group on Technical Regulations in consultation with a CMM member was considered by the Commission, which was in general agreement with its contents. The Commission did feel, however, that "air temperature" vice "temperature" was desirable though not essential in the report. Further, CSM is invited to consider under "B. Sea station" the inclusion of:

(a) Fixed platforms off-shore which are manned and unmanned;

(b) Manned floating platform (anchored).

14.2 Collection of meteorological reports from ships

In accordance with a request of Fifth Congress, the Commission considered measures which should be taken in the case where a coastal station designated for the collection of ships' reports discontinues its services. It was agreed that the Member responsible should, if considered necessary, seek relief by other Members using, when necessary, the good offices of the presidents of the regional associations. The Commission also felt that, when seeking such relief, consideration should be given to the necessity of having at least two coastal radio stations in each zone, with proper geographical distribution. Recommendation 27 (CMM-V) was adopted.

14.3 Technical Regulations for transmission of ships' reports

The Commission noted that the World Administrative Radio Conference (Geneva, 1967) amended Section II of the Additional Radio Regulation, "Reduced-rate radio telegrams ARR 2054", so that meteorological radio telegrams must bear the service instruction =OBS= before the address. The Commission considered that, even though this action is the responsibility of ITU, it affects paragraph 6.2.2.10 of the Technical Regulations; Recommendation 28 (CMM-V) was adopted.

15. NOMINATION OF MEMBERS OF WORKING GROUPS AND NOMINATION OF RAPPORTEURS (Agenda item 15)

15.1 The Commission established six working groups and confirmed the need for a number of rapporteurs to carry out the technical programme of the Commission between the fifth and sixth sessions:

Advisory Working Group of CMM
Working Group on Requirements for Marine Meteorological Services
Working Group on Marine Climatology
Working Group on Sea Ice
Working Group of Rapporteurs on Technical Problems
Working Group on Observation Network at Sea and on Maritime Telecommunications

Rapporteur on an Incentive Programme
Rapporteur on the Manual for Use by Marine Observers on Board Auxiliary Ships
Rapporteur on the Preparation of Guidance Material on the Organization of Meteorological Activities in the Field of Maritime Meteorology

The Commission determined the membership of these working groups and appointed the various rapporteurs as indicated in Resolutions 1 to 9 (CMM-V).

16. REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE COMMISSION AND OF RELEVANT EXECUTIVE COMMITTEE RESOLUTIONS (Agenda item 16)

16.1 In accordance with current practice, the Commission examined those resolutions and recommendations of CMM which are still in force. It was agreed that those recommendations of CMM whose substance had been included in WMO Publication No. 9.TP.4, Volume D, need no longer be kept in force. Resolution 10 (CMM-V) was adopted.

16.2 The Commission examined the Executive Committee's resolutions within CMM's field of activity and agreed that Resolutions 19 (EC-III) and 15 (EC-XVII) should be kept in force. Recommendation 29 (CMM-V) was adopted.

17. ELECTION OF OFFICERS (Agenda item 17)

Mr. S. L. Tierney (Ireland) was elected president and Mr. J. M. Dury (Belgium) was elected vice-president of the Commission.

18. DATE AND PLACE OF THE SIXTH SESSION (Agenda item 18)

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

19. SCIENTIFIC LECTURES AND DISCUSSIONS (Agenda item 19)

Two evening meetings were devoted to scientific lectures and discussions under the chairmanship of Dr. M. Rodewald (Federal Republic of Germany). The following lectures were presented:

First session: Evening 21 August 1968

		Author
(1)	Measurement of Sea-Surface Temperature (SST) (some instruments, methods and comparisons)	Mr. A. B. Crawford (South Africa)
(2)	Comparative Sea-Surface Temperature (SST) measurements in the U.S.S.R.	Prof. Dr. G. M. Tauber (U.S.S.R.)
(3)	Collection of Sea-Surface Temperature (SST) data and their utilization for the fisheries in the north-western Pacific Ocean	Dr. I. Imai (Japan)

		Author
(4)	Sea temperature structure and its relation to the United States tuna fisheries in the eastern Pacific Ocean	Dr. G. A. Flittner (U.S.A.)

Second session: Evening 28 August 1968

		Author
(1)	Variations de la température de la mer au voisinage de la surface	M. J. Romer (France)
(2)	The Barbados Oceanographic and Meteorological Experiment (BOMEX)	Mr. F. Ostapoff (U.S.A.)
(3)	Sea-Surface Temperature (SST) patterns in the north-eastern Atlantic	Capt. J. D. Booth (U.K.)
(4)	Numerical synoptic analysis of Sea-Surface Temperature (SST)	Capt. P. M. Wolff (U.S.A.)
(5)	Use of Sea-Surface Temperature (SST) in long-range prediction	Dr. J. Namias (U.S.A.)

20. CLOSURE OF THE SESSION (Agenda item 20)

20.1 In his closing address, the president thanked the delegates for the fine spirit of co-operation that existed during the session and the excellent progress that was made on many significant items. He expressed some regret at having finished his term as president since the duties had often been challenging, mostly interesting, sometimes frustrating, but always rewarding, particularly through the association with a fine group of fellows drawn together for a common purpose — to serve others. He then asked the session to give the new president and vice-president their full support so that they will be able to guide the Commission carefully and well. He also emphasized his concern that, in the years ahead, the Commission should proceed carefully in dealing with the oceanographic community; the meteorologist and oceanographer must co-ordinate and co-operate so that in due course there will be a single system for data collection from the ocean areas as well as perhaps other operational tasks.

Finally, the president thanked the supporting staff for the efficient way in which they carried out their tasks, the University of Rhode Island for its helpful and courteous services, and the host, the United States of America, for, as always, being so hospitable, kind, and thoughtful.

20.2 A number of delegations expressed their sincere thanks to the president of the Commission for his great help and devotion to duties in the period between the fourth and fifth session of the Commission and during the fifth session itself. His

fine and friendly leadership contributed greatly to the accomplishment of the Commission. The speakers also expressed their appreciation to the Committee chairmen, the Conference secretariat and WMO Secretariat for the services rendered during the session.

20.3 The session was closed during the afternoon of Friday 30 August 1968.

RESOLUTIONS ADOPTED BY THE SESSION

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

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING the requests of Congress and the Executive Committee to consider the establishment of an Advisory Working Group of the Commission to advise the president of the Commission and to deal with urgent questions, in particular on international programmes,

CONSIDERING that there is a need to establish a competent expert group to enable the Commission to take prompt action on urgent questions referred to the Commission,

DECIDES:

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

To assist the president of the Commission in:

(a) Providing advice or taking action on urgent matters;

(b) Directing the work of the Commission and in particular the work of the various working groups;

(c) Planning the future work programme of the Commission;

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

President of CMM
Vice-president of CMM
Most recent past president of CMM
Chairman of the Working Group on Requirements for Marine Meteorological Services
Chairman of the Working Group on Observation Network at Sea and on Maritime Telecommunications

Res. 2 (CMM-V) - WORKING GROUP ON REQUIREMENTS FOR MARINE METEOROLOGICAL SERVICES

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING that there has been a great expansion of marine activities in both the national and international fields,

CONSIDERING:

(1) That this expansion of activity makes desirable a complete study of present and future user requirements for marine meteorological services,

(2) That there is a need to keep under review developments related to user requirements which will affect the scope and character of marine service programmes,

DECIDES:

(1) To establish a working group on user and service requirements with the following terms of reference:

(a) To determine the requirements of the various marine interests for marine meteorological information;

(b) To relate requirements to products with particular attention to content, format and schedule;

(c) To keep under review developments relating to user requirements;

(d) To formulate recommendations, as necessary, with regard to WMO plans for the provision of services to marine users;

(e) To establish the general principles concerning marine requirements for national Meteorological Services with respect to processed information from the Global Data Processing System (GDPS) of the WWW;

(f) To carry out any other relevant tasks in marine meteorology which the president of the Commission for Maritime Meteorology may allot to it;

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

M.W. Mull (U.S.A.) (chairman)
T.Y. Chu (Republic of China)
P. Lenoir de la Cochetière (France)
K.T. McLeod (Canada)
An expert to be nominated by Argentina
An expert to be nominated by Brazil
An expert to be nominated by the U.S.S.R.

(3) That the working group should submit an interim report to the president of CMM not later than 30 November 1969;

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

Res. 3 (CMM-V) - WORKING GROUP ON MARINE CLIMATOLOGY

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) Resolution 3 (CMM-IV),

(2) The report of the first session of the Working Group on Marine Climatology (Geneva, May 1967),

(3) Recommendation 36 (68-CMM),

CONSIDERING IN PARTICULAR:

(1) That the Arctic and Antarctic present special problems in the preparation of marine climatological summaries, such as paucity of data and the seasonally changing climatic characteristics,

(2) That further studies are required to determine the statistical representativeness of data provided by these summaries,

DECIDES:

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

(a) To study marine climatological summaries for the Arctic and Antarctic, with the assistance of experts to be selected by the president of CMM, with special emphasis on:

(i) What forms of data are available and what data are required to determine the climates of these special regions;

(ii) (a) To what extent the climatic tables for selected representative areas would be appropriate for climatic representation in these special regions;

(b) If these climatic tables require modifications, what modifications are required;

(iii) A delineation of the boundaries within which modified tables should be employed;

(b) To study physical-statistical properties of the representativeness of data of representative unit areas, using as a criterion of representativeness a quantitative index of the regular deviation of dispersion of observed values;

(c) To continue providing technical advice required for the preparation of the marine climatological summaries and marine section of the World Climatic Atlas including the International Maritime Meteorological Punch-Cards;

(d) To study replacement of the manual control of data by automatic control;

(e) To study feasibility of introducing new data exchange media other than punch-cards;

(f) To study closely with the CCl Working Group on Climatic Atlases the problem of continuity between land and marine atlases;

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

B.M. Kamp (Netherlands) (chairman)
H.J. Bullig (Federal Republic of Germany)
J.G. Cottis (U.K.)
V.V. Filippov (U.S.S.R.)
W.H. Haggard (U.S.A.)
J.J. Taljaard (South Africa)
An expert to be nominated by Argentina
An expert to be nominated by Japan

NOTE: This resolution replaces Resolution 1 (CMM-IV) which need no longer be kept in force.

Res. 4 (CMM-V) - WORKING GROUP ON SEA ICE

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) Resolution 2 (CMM-IV),

(2) Recommendation 35 (68-CMM),

CONSIDERING:

(1) That the Working Group on Sea Ice established by CMM-IV succeeded in accomplishing several tasks of significance,

(2) That several problems, however, still remain unsolved,

(3) That other areas of interest in the field of sea ice have arisen as a result of the first session of the Working Group on Sea Ice (Geneva 1967),

DECIDES:

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

(a) To review progress in the publication of the WMO Sea Ice Nomenclature in the four official languages of WMO with a view to expediting accomplishment of this important task;

(b) To take steps for publishing the Illustrated Ice Nomenclature as a matter of urgency;

(c) To prepare a numerical code for operational and analysis purposes;

(d) To agree upon an international set of ice symbols;

(e) To prepare a text of sea ice observing methods for inclusion in the Guide to Meteorological Instrument and Observing Practices (WMO - No. 8.TP.3);

(f) To examine and define present and future users' requirements for ice data;

(g) To examine means of increasing the quantity and quality of sea ice data available internationally;

(2) To urge the working group to make every effort through exchange of correspondence and use of rapporteurs to reach preliminary agreement so that a working group meeting can, if possible, be convened at Geneva as soon as possible, but not later than 1970, for preparation of final recommendations;

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

G.A. Tunnell (U.K.)	Chairman
J. Heap (U.K.)	Rapporteur on Sea Ice Nomenclature and User Requirements
W.E. Markham (Canada)	Rapporteur on Illustrated Ice Nomenclature
E. Palosuo (Finland)	Rapporteur on Baltic Problems
J.J. Schule, Jr. (U.S.A.)	Rapporteur on Codes and Observing Procedures
A. Treshnikov (U.S.S.R.)	Rapporteur on Symbols

H. Sigtryggsson (Iceland)
G. Koslowski (Federal Republic of Germany)
An expert to be nominated by Argentina
An expert to be nominated by Denmark
An expert to be nominated by France
An expert to be nominated by Japan

Res. 5 (CMM-V) - WORKING GROUP OF RAPPORTEURS ON TECHNICAL PROBLEMS

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 3 (CMM-IV),

CONSIDERING that a number of technical and scientific problems will need to be kept under continuous review and study between the sessions of the Commission,

DECIDES:

(1) To establish a Working Group of Rapporteurs on Technical Problems with the following terms of reference, each rapporteur being fully responsible for the conduct of the specific task allocated to him (details of these tasks are given in the annex to this resolution):*

To keep under constant review and study problems in the fields of:

(i) Sea surface temperature measurement
(ii) Precipitation measurement
(iii) Surface wind measurement
(iv) Observation, measurement and forecasting of waves
(v) Guide to reporting precipitation;

(2) That additional rapporteurs will be appointed by the president of CMM to study other technical problems which may arise;

(3) To invite the following experts to serve as rapporteurs on the working group, under the guidance of the vice-president acting as chairman and co-ordinator:

J.M. Dury (Belgium)	Chairman
J.D. Booth (United Kingdom)	Rapporteur on Sea Surface Temperature Measurement
R. Höhn (Federal Republic of Germany)	Rapporteur on Precipitation Measurement
W.W. Shinners (U.S.A.)	Rapporteur on Surface Wind Measurement
J. Romer (France)	Rapporteur on Observation, Measurement and Forecasting of Waves
H. Johansen (Norway)	Rapporteur on a Guide to Reporting Precipitation

(4) To request the rapporteurs to complete their reports one year prior to CMM-VI.

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* See Annex IV.

Res. 6 (CMM-V) - RAPPORTEUR ON AN INCENTIVE PROGRAMME

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING that many countries have active and very successful incentive programmes for their voluntary observing ships,

CONSIDERING:

(1) That the number of ships' weather messages available and transmitted depends on the goodwill of ships' officers,

(2) That an international WMO programme may enhance the national schemes,

DECIDES:

(1) To appoint a Rapporteur on an Incentive Programme with the following tasks:

(a) To develop a plan for an international incentive programme for the voluntary observing ships scheme under the sponsorship of WMO;

(b) To present a report to the president of CMM as soon as practicable and no later than one year after CMM-V;

(2) To invite Mr. W.D. Moens (Netherlands) to act as a Rapporteur on an Incentive Programme.

Res. 7 (CMM-V) - WORKING GROUP ON OBSERVATION NETWORK AT SEA AND ON MARITIME TELECOMMUNICATIONS

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 16 (Cg-V) - WWW Plan,

CONSIDERING:

(1) The need for strengthening the present observing network at sea and the collection system in order to meet the WWW requirements in the period 1968-1971,

(2) The need to apply new techniques of observing and telecommunications to various platforms to ensure adequate data coverage over the oceans, particularly in the sparse areas, with special reference to the southern hemisphere,

DECIDES:

(1) To establish a Working Group on Observation Network at Sea and on Maritime Telecommunications with the following terms of reference:

(a) To keep under constant review developments relating to the observation network at sea and the associated telecommunication arrangements;

(b) To formulate recommendations as necessary with regard to WMO plans for the observation network at sea and the associated telecommunications;

(c) To keep under constant review developments in the field of telecommunications which are related to the provision of services to marine interests;

(d) To formulate recommendations as necessary with regard to maritime telecommunication arrangements needed for provision of services to marine interests;

(e) To carry out any other task of an operational aspect in the field of observation network at sea and of maritime telecommunications as assigned by the president of CMM;

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

T. Tournier (France) (chairman)
A.B. Crawford (South Africa)
C.E.N. Frankcom (United Kingdom)
S. Gadish (Israel)
R. Höhn (Federal Republic of Germany)
W.D. Moens (Netherlands)
An expert to be nominated by Argentina
An expert to be nominated by Japan
An expert to be nominated by the U.S.A.
An expert to be nominated by the U.S.S.R.

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

Res. 8 (CMM-V) - RAPPORTEUR ON THE MANUAL FOR USE BY MARINE OBSERVERS ON BOARD AUXILIARY SHIPS

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING the portfolio "Weather" prepared by the Netherlands,

CONSIDERING:

(1) The usefulness of the portfolio as advisory material for marine observers on board auxiliary ships,

(2) That some rearrangement may be required in order to make the material universally acceptable,

DECIDES:

(1) To appoint a Rapporteur on the Manual for Use by Marine Observers on Board Auxiliary Ships with the following terms of reference:

(a) To prepare the material made available by the Netherlands in a form suitable for use as advisory material on board ships;

(b) To present the prepared material to the president of CMM by January 1969;

(2) To invite Mr. S. Gadish (Israel) to act as Rapporteur on the Manual for Use by Marine Observers on Board Auxiliary Ships.

Res. 9 (CMM-V) - RAPPORTEUR ON THE PREPARATION OF GUIDANCE MATERIAL ON THE ORGANIZATION OF METEOROLOGICAL ACTIVITIES IN THE FIELD OF MARITIME METEOROLOGY

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING paragraph 5.1.11 of the General Summary of EC-XVI,

CONSIDERING:

(1) That information on the organization of meteorological marine services in developed countries may be inappropriate for utilization by developing countries,

(2) That very little, if any, of the required guidance material is available in a convenient form,

(3) That additional study is needed in order to determine how best to proceed to obtain the necessary information,

DECIDES:

(1) To appoint a Rapporteur on the Preparation of Guidance Material on the Organization of Meteorological Activities in the Field of Maritime Meteorology with the following tasks:

(a) To further study the material available and develop a sound plan on how best to proceed to obtain the guidance material;

(b) To report to the president six months after CMM-V with appropriate recommendations;

(2) To invite Mr. K.T. McLeod (Canada) to serve as Rapporteur on the Preparation of Guidance Material on the Organization of Meteorological Activities in the Field of Maritime Meteorology;

INVITES the president to take appropriate action to continue this project on receipt of the study prepared by the rapporteur.

Res. 10 (CMM-V) - REVISION OF THE RESOLUTIONS AND RECOMMENDATIONS OF THE COMMISSION FOR MARITIME METEOROLOGY

THE COMMISSION FOR MARITIME METEOROLOGY,

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

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

DECIDES:

(1) To keep in force Recommendation 27 (CMM-III) and Recommendations 1 and 4 (CMM-IV) and to publish their texts in the report of the fifth session;

(2) Not to keep in force Resolutions 1 to 6 (CMM-IV);

(3) To note with satisfaction the action taken by the competent bodies on its Recommendations 2, 3, 5 to 33 (CMM-IV) and Recommendations 34, 35 and 36 (68-CMM).

RECOMMENDATIONS ADOPTED BY THE SESSION

Rec. 1 (CMM-V) - AMENDMENTS TO TECHNICAL REGULATIONS: FORMAT AND CONTENT FOR PART II (SYNOPSIS) AND PART III (FORECASTS) OF WEATHER BULLETINS FOR SHIPPING

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) That the Technical Regulations give specific instructions covering the content and order of items to be included in Part I (Storm warnings) of the weather bulletins for shipping on the high seas, and

(2) That the Technical Regulations provide only limited information on the content of the remaining mandatory sections, Part II (Synopsis) and Part III (Forecasts),

CONSIDERING:

(1) That there is a need for uniformity in the information provided to mariners operating in international waters,

(2) That there is a need to ensure the availability of certain basic information required by the mariner, and

(3) That there is a need to rearrange the various paragraphs of Chapter 10 of the Technical Regulations in order to provide a more orderly arrangement of subjects,

RECOMMENDS:

(1) That the following paragraphs be added to the Technical Regulations:

10.2.4
Synopsis and forecasts

10.2.4.1
The following content and order of items should be adopted for Part II, Synopsis of meteorological conditions in the forecast area:

10.2.4.1.1
Date and time of reference in GMT

10.2.4.1.2
Type(s) of pressure system with a statement of central pressure, for those systems which affect or are expected to affect the area within

or near to the valid period of the forecast; location of these significant pressure systems in terms of latitude and longitude.

10.2.4.1.3
Direction and speed of movement of significant pressure systems, in compass points and knots or m/s respectively. (Unit used shall be designated.)

10.2.4.1.4
Reference to waves (sea and swell) if feasible and significant.

10.2.4.2
The following content and order of items should be adopted for Part III, Forecasts.

10.2.4.2.1
Valid period of forecast (date(s) and times in GMT).

10.2.4.2.2
Name or designation of forecast area(s).

10.2.4.2.3
A description of the following elements emphasizing expected significant changes in them during the forecast period:

10.2.4.2.3.1
Wind direction (in points of compass).

10.2.4.2.3.2
Wind speed (Beaufort force and, if known, wind speed in knots or in metres per second) as appropriate. If knots or m/s are used, the words "knots" or "m/s" should be included in the text of the messages. Include descriptive items (gale, storm, hurricane), as appropriate.

10.2.4.2.3.3
Visibility (in nautical miles or kilometres). Optional except when the visibility is less than 10 km (6 mi). (Unit used shall be indicated.)

10.2.4.2.3.4
Meteors (optional). To be included if significant, e.g., freezing precipitation, significant snowfall or rainfall, etc.

10.2.4.2.3.5
Waves (sea and swell) (optional). To be included when possible.

10.2.4.2.3.6
Ice accretion conditions. To be included when conditions warrant and risk exists.

10.2.4.2.4
When the synoptic situation permits, an outlook for a period beyond that normally covered by the forecast.

(2) That Chapter 10 of the Technical Regulations be rearranged as follows:

(a) Renumber and rearrange:

TECHNICAL REGULATIONS, CHAPTER 10

Old number	New number
10.2	10.1
10.2.1	10.1.1
10.2.1.1	10.1.1.1
10.2.3	10.1.2
10.2.3.1	10.1.2.1
10.2.3.4	10.1.2.2
10.2.3.5	10.1.2.3
10.2.3.9	10.1.2.4
10.2.3.10	10.1.2.5
10.2.3.3	10.1.2.6
10.2.2	10.1.3
10.2.2.1	10.1.3.1
10.2.2.2	10.1.3.2
10.2.2.4	10.1.3.3
10.2.2.5	10.1.3.4
10.2.3.2	10.1.3.5
	10.1.4
10.2.3.6	10.1.4.1
10.2.3.6.1	10.1.4.1.1
10.2.3.7	10.1.4.2
10.2.3.8	10.1.4.3
10.2.3.11	10.1.4.4
10.2.3.12	10.1.4.5
10.2.4.1	10.1.4.6
10.2.4.1.1	10.1.4.6.1
10.2.4.1.2	10.1.4.6.2
10.2.4.1.3	10.1.4.6.3
10.2.4.1.4	10.1.4.6.4
10.2.4.2	10.1.4.7
10.2.4.2.1	10.1.4.7.1
10.2.4.2.2	10.1.4.7.2
10.2.4.2.3	10.1.4.7.3
10.2.4.2.3.1	10.1.4.7.3.1
10.2.4.2.3.2	10.1.4.7.3.2
10.2.4.2.3.3	10.1.4.7.3.3

Old number	New number
10.2.4.2.3.4	10.1.4.7.3.4
10.2.4.2.3.5	10.1.4.7.3.5
10.2.4.2.3.6	10.1.4.7.3.6
10.2.4.2.4	10.1.4.7.4
10.1	10.2
10.1.1	10.2.1
10.1.1.1	10.2.1.1
10.1.1.2	10.2.1.2
10.1.1.3	10.2.1.3

(b) Reword the following paragraphs (old numbers) to read as follows:

10.1
Meteorological information for coastal waters

10.1.1.1
Members concerned should issue storm warnings, forecasts and other meteorological information for coastal waters, etc.

10.1.1.3
All elements specified for storm warnings for the high seas should be included in warnings broadcast by radiotelephony and radiotelegraphy for coastal waters, etc.

10.2
Meteorological information for the high seas

10.2.3
Weather bulletins

10.2.3.15
The land reports included in weather bulletins should be for a fixed selection of stations in a fixed order.

Rec. 2 (CMM-V) - GEOGRAPHICAL COVERAGE FOR SHIPPING FORECASTS

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) Map B, Areas of responsibility for shipping forecasts, as contained in Volume D, WMO Publication No. 9.TP.4, and

(2) Map showing areas actually covered by weather bulletins for shipping, as contained in the same publication,

CONSIDERING:

(1) That some ships plying in the southern hemisphere are not broadcasting meteorological observations to the nearest coastal radio station or other station in the same zone,

(2) That some coastal radio stations, on the other hand, are not in a position to make effective reception of ship weather reports,

(3) That some of the areas of responsibility for shipping forecasts allocated to one Member are too large to ensure effective service,

(4) That weather bulletins are still not available in many ocean areas, and

(5) That these inadequacies stem from two main causes:

(a) Lack of observational data

(b) Lack of facilities for transmission and reception,

RECOMMENDS:

(1) That Members responsible for selected, supplementary and auxiliary ships plying in sparse areas, particularly in the southern hemisphere, should take the necessary measures to ensure that their weather reports are transmitted to a coastal radio station in accordance with the pertinent provisions contained in Section 13 of Chapter I, Volume D of WMO Publication No. 9.TP.4;

(2) That Members responsible for the areas not covered by shipping weather forecasts take measures to establish the necessary weather services;

(3) That sympathetic consideration should be given to requests for the provision of financial and technical assistance to help the establishment of such services;

(4) That, in the case of a Member not able to fulfill his obligations, the president of the regional association concerned in consultation with the president of CMM and with the agreement of that Member take action as may be appropriate to arrange for the necessary services; and

(5) That the application of new techniques and facilities for obtaining data from sparse areas should be encouraged;

REQUESTS that the Secretary-General, in consultation with the president of the regional association concerned and the president of CMM, take appropriate steps for reviewing the state of implementation of Map B, Areas of responsibility for shipping forecasts (contained in WMO Publication No. 9.TP.4, Volume D), and assist in the formulation of suggestions for improving the area coverage by shipping forecasts in the southern hemisphere.

Rec. 3 (CMM-V) - AMENDMENTS TO TECHNICAL REGULATIONS: STORM WARNINGS

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) Paragraph 10.2.2.1(a) of the Technical Regulations, relating to the international call TTT,

(2) Section 10.2.2 of the Technical Regulations, relating to storm warnings,

(3) Article 36, Section X, of the Radio Regulations of the ITU (Geneva, 1959),

(4) Rule, 4, paragraph b, Chapter V of the International Convention on the Safety of Life at Sea (London, 1960) relating to warnings for ships of gales, storms, and tropical cyclones, and

(5) Number 1612 (Article 44) of the Radio Regulations of the ITU (Geneva, 1959) relating to weather warnings for the mobile shipping service,

CONSIDERING:

(1) That the International Chamber of Shipping as well as other international organizations has expressed the desire that mariners receive storm warnings more rapidly, and

(2) That "international call (TTT)" as contained in paragraph 10.2.2.1(a) of the Technical Regulations is the responsibility of the ITU and reference to it need not be included in the WMO Technical Regulations,

RECOMMENDS:

(1) That paragraph 10.2.2.1 of the WMO Technical Regulations be amended as follows:

(a) Delete paragraph 10.2.2.1(a) "International call (TTT)";

(b) Reletter the paragraphs that follow paragraph 10.2.2.1 (a) as appropriate;

(c) Insert the following note after paragraph 10.2.2.1:

"(j) Storm warnings are safety messages; the transmission procedures are defined in the Radio Regulations.";

(2) That Members issuing weather bulletins for shipping on the high seas make sure that such storm warnings are transmitted as soon as possible after issue and are repeated (updated as necessary) at the end of the first period of silence that

occurs as well as at the end of the first period of silence that occurs where single-operator ships are concerned;

(3) That Members endeavour to have such storm warnings repeated at least every six hours, until the end of the validity period, according to promulgated schedules;

INVITES the Secretary-General of WMO, in co-operation with ITU, IMCO, ICS, and CIRM, to take appropriate steps to have the provision in "RECOMMENDS" (3) above included in the Radio Regulations as a supplement to Number 1612.

Rec. 4 (CMM-V) - PROVISION OF METEOROLOGICAL SERVICES TO MERCHANT SHIPPING AT HARBOUR APPROACHES AND OTHER SHIPPING CONVERGENCE ZONES

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) The increasing congestion in sea lane approaches to the world's major ports as well as in convergence areas such as the Strait of Gibraltar,

(2) The increasing use of larger and faster ships,

CONSIDERING:

(1) That there is a need for continuous weather information on board ships when operating in congested areas,

(2) That there is an increasing use of VHF communication by marine interests to meet the needs of short-distance reliable communication requirements,

RECOMMENDS that Members should study the possibility of providing a continuous VHF weather broadcast in the vicinity of major ports and straits;

REQUESTS the Secretary-General to study in consultation with Members, ITU, and IMCO the possibility of obtaining a single standard world-wide VHF frequency for the dissemination of this information.

Rec. 5 (CMM-V) - MARITIME METEOROLOGY AND DEVELOPING NATIONS

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING the wide interest promoted by the United Nations and by some Member nations in support of oceanography and of the rational exploitation of the resources of the seas,

CONSIDERING:

(1) That full co-operation from developing countries is needed for the success of WWW,

(2) That many developing nations have great responsibilities in maritime meteorology because of their extended coastlines,

(3) That the promotion of maritime meteorology in these countries can play a significant role in their economic development,

RECOMMENDS that the Members concerned endeavour within their own Meteorological Services to promote maritime meteorology as needed to meet their national requirements, by utilizing the various available sources of assistance, particularly the United Nations Development Programme.

Rec. 6 (CMM-V) - PARTICIPATION OF WMO IN THE EXPLORATION OF THE SEA

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) UN General Assembly Resolution 2172 (XXI),

(2) Resolution 9 (Cg-V) - Collaboration with international organizations concerned with marine science and its application,

(3) Resolution 17 (EC-XX) - EC Panel on Meteorological Aspects of Ocean Affairs,

(4) Recommendation 26 (CMM-IV) - Collaboration with the Intergovernmental Oceanographic Commission on studies regarding oceanographic-atmospheric interaction,

(5) Recommendation 23 (CMM-IV) - Collaboration with the Food and Agriculture Organization of the United Nations in the preparation of booklets on fishermen and the weather,

(6) The adoption of the World Weather Watch plan by Resolution 16 (Cg-V), which defines a programme which will bring about large improvements in meteorological services particularly for long- and short-term forecasting for which also an understanding of oceanic processes is necessary,

CONSIDERING:

(1) That the studies of meteorology (especially air-sea interaction), of environmental ocean research and of fisheries science are growing closer to each other in needs and interest as a result of which a number of joint panels with other international organizations, particularly with IOC, have been set up,

(2) That, because of the extensive and long-standing activities and experience of WMO in the field of collection of ocean data and in provision of services to marine users as well as in the participation in research of ocean areas, CMM is immediately ready to play its part in the work of these panels,

WELCOMES the statement in the report on marine science and technology of the Secretary-General of the United Nations to the General Assembly that there is a need to strengthen the marine meteorology component of WMO as well as the ability of the various ocean organizations to interact with WMO and to deal with meteorological aspects of ocean science;

RECOMMENDS:

(1) That the World Meteorological Organization inform the Intergovernmental Oceanographic Commission (IOC) and other international organizations concerned of its willingness to expand as far as possible the present and planned marine components of the global observing, telecommunications and data processing systems;

(2) That the World Meteorological Organization and Intergovernmental Oceanographic Commission continue to devise concrete plans for the furtherance of knowledge of the ocean and take active steps for their implementation;

(3) That WMO should participate in co-ordinated long-term programmes of research projects designed to increase the knowledge of the ocean, such as the International Indian Ocean Expedition, the Co-operative Study of the Kuroshio and Adjacent Regions and the proposed International Decade of Ocean Exploration;

REQUESTS that the Secretary-General:

(1) Notify the Secretary-General of the United Nations of WMO's wish to co-operate in the exploration of the ocean as indicated above;

(2) Give active and full support to the work of the EC Panel on Meteorological Aspects of Ocean Affairs and joint IOC/WMO panels/groups of experts and assist as necessary in the elaboration of concrete joint projects of world-wide and regional nature.

Rec. 7 (CMM-V) - EXCHANGE OF MARINE CLIMATOLOGICAL DATA

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) Resolution 35 (Cg-IV),

(2) The report of the first session of the Working Group on Marine Climatology (Geneva, May 1967),

CONSIDERING:

(1) That the regular receipt of marine climatological data from Members participating in the marine climatological summary project is essential for the preparation of marine climatological summaries by the Responsible Members,

(2) That any delay in receipt of marine climatological data often makes it difficult to make full use of the data in the preparation of the climatological summaries,

(3) That certain Responsible Members plan to prepare marine climatological summaries for periods prior to 1961,

RECOMMENDS:

(1) That Members participating in the marine climatological summary project endeavour to provide the Responsible Members with marine climatological data:

(a) According to the already established time schedule for the data from 1964 onwards;

(b) According to the following minimum time-table for data for the years 1961 to 1963:

(i) Not later than 1969 — data for 1963
(ii) Not later than 1970 — data for 1962
(iii) Not later than 1971 — data for 1961

(2) That Members be invited to supply, within their resources, required data to those Responsible Members who indicated their intention to prepare the summaries for years prior to 1961.

Rec. 8 (CMM-V) - CODE FOR REPORTING SEA ICE

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) Recommendation 28 (CMM-III),

(2) The report of the CMM Working Group on Sea Ice (Geneva, 1967),

CONSIDERING:

(1) That tests have shown the spot ice code developed by the Working Group on Sea Ice at its first meeting (Geneva, 1967) to be superior to the code approved by the third session of CMM for the international exchange of ice data for scientific and climatological purposes,

(2) That the revised code has been examined by the chairman of the CSM Working Group on Data Needs and Codes and proved to be acceptable with minimum revision,

RECOMMENDS:

(1) That the president of CSM be asked to arrange, as a matter of urgency, the approval of the code for reporting of sea ice* annexed to this Recommendation;**

(2) That Members introduce this code better suited for international exchange of ice data for scientific, climatological and record (storage) purposes immediately after its formal approval.

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* NOTE: This "spot ice code" is not intended for general use aboard voluntary observing ships.

** See Annex V.

Rec. 9 (CMM-V) - PROPOSED CHANGES OF THE TERMS OF REFERENCE OF CMM

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) Resolution 16 (Cg-V) — WWW plan,

(2) UN Resolution 2172 — Resources of the Sea,

(3) Resolution 3 (EC-XIX) — Planning studies for the WWW, and

(4) Resolution 4 (Cg-V) — Amendments to the General Regulations of the World Meteorological Organization,

CONSIDERING the great expansion of marine activities in the last few years and the corresponding need to adjust the Commission's terms of reference,

RECOMMENDS that the terms of reference of the Commission for Maritime Meteorology as contained in the General Regulations of the World Meteorological Organization (WMO Publication No. 15.BD.1) — Annex II, paragraph 8, be reworded as indicated in the annex* to this recommendation.

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* See Annex VI.

Rec. 10 (CMM-V) - SYNOPTIC PRECIPITATION MEASUREMENT ABOARD VOLUNTARY OBSERVING SHIPS

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING Recommendation 2 (CMM-IV),

CONSIDERING:

(1) That not all ocean station vessels are reporting precipitation amounts,

(2) That an expanded coverage of such reports would be of value both for synoptic and climatological purposes,

(3) That some countries may have carried out sufficient investigations on precipitation measurements on board mobile stations,

RECOMMENDS:

(1) That those Members operating ocean station vessels who are not reporting precipitation amounts should make renewed efforts to make precipitation measurements;

(2) That those Members who are in a position to do so should install raingauges on a selection of their mobile ship stations to report precipitation amounts;

(3) That these precipitation measurements at sea should be included in the routine weather reports, preferably at 12-hour intervals, using the appropriate $7RRt_rt_r$ group of the SHIP code form.

NOTE: This recommendation supersedes Recommendation 2 (CMM-IV) which need no longer be kept in force.

Rec. 11 (CMM-V) - INVESTIGATIONS ON WIND STRUCTURE AT SEA

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING the report submitted by the CMM Working Group on Technical Problems on the studies carried out on wind structure at sea,

CONSIDERING that the determination of wind structure at sea is of practical importance, in particular for ship design and ship safety, study of wind effects on coastal works, wave forecasting, and for the determination of correction factors for the reduction of wind measurements to a standard height,

RECOMMENDS:

(1) That Members be invited:

(a) To carry out further studies on wind structure at sea, paying special attention to the aspects of particular interest to the Commission for Maritime Meteorology;

(b) To submit the results of their studies to the Secretary-General;

(2) That a report summarizing the information received from Members be circulated in an appropriate form to the members of the Commission.

Rec. 12 (CMM-V) - WIND SPEED EQUIVALENTS OF THE BEAUFORT SCALE

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) The decision of the Eighteenth Session of the Executive Committee on Recommendation 5 (CMM-IV), and

(2) The report of the Fifth Congress that the question of the Beaufort wind speed equivalents was still being considered by CMM,

CONSIDERING:

(1) That reasons exist for the adoption of a revised scale and that the arguments in favour of the existing scale are not based on strictly scientific considerations,

(2) That the matter has been under consideration by CMM for some twelve years, and

(3) That other Commissions are also interested in the question of Beaufort wind speed equivalents,

REQUESTS the Executive Committee to set up, as a matter of urgency, an Executive Committee Panel of Experts to resolve the question of the wind speed equivalents of the Beaufort Scale and to find a solution, preferably within twelve months.

Rec. 13 (CMM-V) - INCREASED REPORTING OF WAVE OBSERVATIONS

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) Results of the inquiry on the need for additional wave observations by ships and coastal stations (CMM-V/Doc. 47),

(2) Conclusion of the Joint WMO/IOC Panel of Experts on Co-ordination of Requirements (Paris, July 1968),

CONSIDERING:

(1) That requirements of a variety of users for wave observations are increasing,

(2) That voluntary observing ships of a large number of countries are reporting wave observations as mandatory in accordance with national instructions,

RECOMMENDS:

(1) That Members be encouraged to make mandatory the observing and reporting of wave conditions on selected ships recruited by that country;

(2) That Members arrange for selected coastal stations to make and report wave observations for regional exchange;

REQUESTS:

The Commission for Synoptic Meteorology to adjust Code FM 21.D at a future major code change to make the wave group mandatory.

Rec. 14 (CMM-V) - CHECKS TO BE CARRIED OUT FOR A STRICT APPLICATION OF CMM RECOMMENDATIONS CONCERNING THE PLAN FOR THE COLLECTION OF SHIPS' REPORTS

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) Paragraph 7.12.3 of the General Summary of the Abridged Report of the Fifth World Meteorological Congress,

(2) Recommendation 11 (CMM-IV) and Resolution 14 (EC-XVII),

(3) The results of the survey initiated by circular letter No. 13.517/T/MA of 29 June 1967, in particular those in Table I supplying information from meteorological log-books (Planning Report No. 25 — System for the Collection of Ships' Weather Reports),

CONSIDERING:

(1) That the transmission of ships' reports to a coastal radio station not in the region where the ship is navigating constitutes, except in the cases foreseen, a deviation from the basic concepts of the collection plan and is generally speaking detrimental to the efficiency of the system,

(2) That the Secretary-General's survey in Planning Report No. 25 has revealed many such deviations,

(3) That there are many different reasons for these deviations, which can be ascertained only by specific studies by the Members with authority for selected and supplementary ships,

(4) That only these Members can take appropriate measures,

RECOMMENDS:

(1) That all Members with authority for selected and supplementary ships making meteorological observations should endeavour to arrange that transmission instructions are issued in conformity with the pertinent instructions in Volume D, WMO Publication No. 9.TP.4, and that these instructions are in fact applied;

(2) That Members investigate occasions when ships recruited by them are known to have sent weather messages without apparent justification to coastal radio stations outside the regions in which the ships are navigating and explain to the ships' officers the reasons why this procedure is undesirable.

Rec. 15 (CMM-V) - ADDITIONAL PROCEDURES FOR WEATHER MESSAGES FROM SINGLE-OPERATOR SHIPS

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) Paragraph 7.12.3 of the General Summary of the Abridged Report of the Fifth World Meteorological Congress,

(2) Recommendation 12 (CMM-IV),

(3) Resolution 14 (EC-XVII),

(4) The results of the survey initiated by circular letter No. 13.517/T/MA of 29 June 1967 and in particular those in Annexes XV to XIX of Part I, Planning Report No. 25—System for the Collection of Ships' Weather Reports,

CONSIDERING:

(1) That for many years to come single-operator ships will be supplying most of the ships' weather messages available,

(2) That the need for meteorological observations is increased by the demands of WWW,

(3) That proposed technical measures such as the modification of station watch hours, regulated by ITU, or mere selection of additional observing ships would

not bring the desired continuity into the observation network,

(4) That the measures worked out in Recommendation 12 (CMM-IV) constitute a remedy which seems not to have been given wide enough application,

RECOMMENDS that the Members with authority for selected and supplementary ships remind ships' officers of the procedures advocated in paragraph 5.6, Chapter I, Volume D, of WMO Publication No. 9.TP.4 and control their application in all sectors where these measures are warranted.

Rec. 16 (CMM-V) - SHIP-COASTAL RADIO STATION SERVICE

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) Paragraph 7.12.3 of the General Summary of the Abridged Report of the Fifth World Meteorological Congress,

(2) Paragraph 6.2.2.4 of the Technical Regulations,

(3) Recommendation 12 (CMM-IV),

(4) Resolution 14 (EC-XVIII),

(5) The list of coastal radio stations in WMO Publication No. 9.TP.4, Volume D,

(6) The results of the survey initiated by circular letter No. 13.517/T/MA of 29 June 1967 and in particular those in Annexes II and IX of WWW Planning Report No. 25—System for the Collection of Ships' Weather Reports,

CONSIDERING:

(1) That the efficiency of the ships' report collection plan depends, in a considerable measure, on the operational conditions at coastal radio stations,

(2) That these operational conditions should be subjected to detailed study in order to bring about all the desirable improvements, in the light of WWW requirements,

(3) That the list of coastal radio stations should be reviewed in order to retain only those which prove useful,

RECOMMENDS:

(1) That Members having communicated to the WMO Secretariat the names and characteristics of coastal radio stations designated to receive ships' weather messages study the results of the survey of reception conditions, especially Annexes II and IX

(Part I of WWW Planning Report No. 25); seek the real causes of undue delays in reception at coastal radio stations; if necessary, approach the responsible administrations in order to obtain all the requisite improvements, in view of the need for the information to be received as soon as possible and within a maximum delay of 40 minutes, bearing in mind that the message must be at all Regional Telecommunication Hubs within two hours after observation time;

(2) That the presidents of regional associations study closely the list of coastal radio stations for their Region, in the light of the information in the report on the survey of the conditions of ships' report collection, and bring about any review which may be necessary in order to retain only useful coastal radio stations; in particular, a special study should be made of the coastal radio stations for which no information was supplied during the survey and of those with a maximum reception time in excess of 50 minutes from the time the message is filed aboard ship; and that the List of Coastal Radio Stations and WMO Publication No. 9.TP.4 be adjusted as necessary;

(3) That the presidents of regional associations adopt, as a minimum objective after the study recommended above, to have available to ships at least one or two effective coastal radio stations in each of the collection zones shown in Map A of Chapter I, Part A, Volume D, of WMO Publication No. 9.TP.4.

Rec. 17 (CMM-V) - IMPROVEMENT OF VOLUNTARY PARTICIPATION IN METEOROLOGICAL WORK ON BOARD SHIP

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) Paragraph 7.12.3 of the General Summary of the Abridged Report of the Fifth World Meteorological Congress,

(2) Paragraph 2.2.1.5 of the Technical Regulations,

(3) The results of the survey initiated by circular letter No. 13.517/T/MA of 29 June 1967 and in particular those in Annexes XI to XVIII of WWW Planning Report No. 25,

CONSIDERING:

(1) That the number of ships' weather messages is inadequate and that it varies widely from one standard synoptic hour to another, and from one area to another,

(2) That the number of ships' weather messages available and transmitted depends largely on the goodwill of ships' officers,

(3) That the participation of these officers will be all the greater, the better they are informed of the use made of the information obtained, of the aims of WWW and of the importance of the information they supply,

(4) That this participation, based on voluntary co-operation, can be promoted by encouragement,

RECOMMENDS:

(1) That Members recruiting voluntary ships initiate a comprehensive encouragement programme in order to obtain information more regularly and transmitted in the best possible conditions;

(2) That to this end officers making observations and/or transmitting the corresponding messages be better informed of their role in meteorological service and especially in the WWW and that they be encouraged in every way compatible with the possibilities of Members.

Rec. 18 (CMM-V) - THE ARRANGEMENT OF A TECHNICAL CONFERENCE TO STUDY NEW POSSIBILITIES IN MARITIME TELECOMMUNICATIONS

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING paragraphs 2(a) to 12 and 29 of Annex V to Resolution 16 (Cg-V),

CONSIDERING:

(1) That present-day telecommunications cannot fully meet WWW requirements,

(2) That co-ordination between meteorologists and telecommunication engineers should permit serious and fruitful planning,

(3) That the solution of this problem may also solve that of telecommunication for oceanographic data,

RECOMMENDS:

(1) That the problem of telecommunications for the rapid collection of weather observations at sea be studied at a technical conference;

(2) That this conference bring together meteorologists and experts in maritime telecommunications and experts from IOC, ITU, IMCO, ICS, CIRM and other international organizations concerned;

REQUESTS the Secretary-General to arrange the above-mentioned conference in the course of 1969 or as soon as possible thereafter.

Rec. 19 (CMM-V) - OPERATING CONDITIONS AT COASTAL RADIO STATIONS

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) Paragraph 11.3.2 of Part A, Chapter I, Volume D of WMO Publication No. 9.TP.4,

(2) The results of the survey initiated by circular letter No. 13.517/T/MA of 29 June 1967 and in particular Annexes III to V and X of WWW Planning Report No. 25,

CONSIDERING:

(1) That in many cases ships' weather messages arrive unduly late at the national collecting centres,

(2) That all measures must be taken to reduce forwarding times at all stages of transmission,

(3) That rapid relay by the coastal radio station is an essential element in the satisfactory forwarding of ships' weather messages,

(4) That the average time taken for reception at the national collecting centre from the coastal station should not exceed 30 minutes,

RECOMMENDS:

(1) That Members collecting ships' weather messages study carefully the survey results for their national collecting centre;

(2) That these Members pay particular attention to cases where the maximum average reception time at the national collection centre from the coastal station exceeds 30 minutes and endeavour to ascertain whether the associated coastal stations occasion undue delays;

(3) That these Members approach the Administrations responsible for coastal radio stations where transit times are incompatible with the above time, with a view to obtaining improvements in the relay of ships' weather messages.

Rec. 20 (CMM-V) - IMPROVEMENT OF THE METEOROLOGICAL OBSERVATION COVERAGE PATTERN AT SEA

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) Resolution 16 (Cg-V), Annex V, paragraphs 17, 23 and 24,

(2) The results of the survey initiated by circular letter No. 13.517/T/MA of 29 June 1967 and in particular Annex XX to WWW Planning Report No. 25,

(3) That the Secretary-General has taken positive action with regard to the desires of Fifth Congress for establishing weather ships in the southern hemisphere,

CONSIDERING that the selected-ship programme should be substantially increased and, if possible, doubled during the period 1968-1971,

RECOGNIZING:

(1) That this programme will not fill all the gaps in the observational coverage,

(2) That arrangements other than ship selection will be necessary to fill in the maritime coverage pattern,

RECOMMENDS that all the maritime Members be requested to intensify their selected-ship programme, selecting vessels plying in the sparse-data areas shown on the map contained in Publication No. 9.TP.4, Volume D, and entitled "Ocean areas where the number of meteorological observations is inadequate";

REQUESTS the Secretary-General to continue concerned and aggressive measures with a view to establishing ocean weather stations in the southern hemisphere.

Rec. 21 (CMM-V) - REQUIREMENTS FOR TRANSMISSION OF SHIPS' WEATHER MESSAGES

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) Recommendation 11 (CMM-IV), Annex, Part I, paragraph 4,

(2) Recommendation 34 (CSM-IV)-Contents of northern hemisphere exchange,

(3) The results of a survey on the collection of ships' weather reports published in WWW/Planning Report No. 25,

(4) The WWW Plan, Appendix II, paragraph 17 (adopted by Resolution 16 (Cg-V)),

CONSIDERING:

(1) The need for prompt reception of ships' weather reports by meteorological centres responsible for issuing shipping forecasts and warnings and also by NMCs, RMCs, and WMCs which provide output products for assistance of marine weather activities,

(2) The need to define the general needs for reception of ships' weather reports at the centres mentioned above,

RECOMMENDS:

(1) That the following maritime requirements be taken into account when planning the telecommunications arrangements for the collection, exchange and distribution of ships' weather reports:

(a) Collection arrangements

(i) All ships' weather reports received from ships at coastal radio stations should be promptly collected at the appropriate National Meteorological Centre or at a centre with similar function;

(ii) All ships' weather messages received at National Meteorological Centres should be sent without delay to the appropriate Regional Telecommunications Hub;

(b) Exchange arrangements within the Region or between neighbouring Regions

(i) All ships' weather reports from the southern hemisphere and tropical zones should be included in regional and inter-regional exchanges between Regional Telecommunications Hubs and World Meteorological Centres;

(ii) In general, all ships' weather reports from the northern hemisphere should be included in regional and inter-regional exchanges between Regional Telecommunications Hubs and World Meteorological Centres. In order to avoid overloading the telecommunications channels, Regional Telecommunications Hubs should, if necessary and possible, make a selection of ships' weather reports for areas where a close spacing of reports occurs;

(c) Global and hemisphere exchanges

(i) For hemisphere exchanges of ships' weather reports from the northern hemisphere the selection criteria laid down in Recommendation 34 (CSM-IV) should apply;

(ii) All ships' weather reports from the southern hemisphere and tropical zones should be included in global and hemisphere exchanges;

(d) Regional distribution

Regional distribution requirements other than those specified in (a), (b) and (c) above should be determined by regional associations or Members concerned;

(2) That CSM, regional associations and Members should implement the provisions outlined in (1) above with a view to ensuring that centres receive ships' reports needed for their operations;

REQUESTS that the Secretary-General conduct in consultation with the presidents of CSM, CMM and regional associations as appropriate, surveys to determine whether the provisions under "RECOMMENDS" (1) and (2) are fully implemented and to bring the findings to the attention of all concerned.

Rec. 22 (CMM-V) - SHIPS' WEATHER REPORTS FROM WHALING AND FISHING VESSELS

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) Resolution 16 (Cg-V) - World Weather Watch,

(2) WWW Planning Report No. 7 - Meteorological Observations from Mobile and Fixed Ships,

(3) Paragraph 9.2 of the General Summary of the Fourth Session of the Commission for Maritime Meteorology, and

(4) Resolution 10 (EC-XVIII) - Weather reports from whaling, fishing and expedition vessels, provision of forecasts for shipping and transmission of information on ice at sea in the Antarctic,

CONSIDERING:

(1) That there is a lack of meteorological data in areas outside the normal shipping routes,

(2) That there is considerable fishing activity in sparse-data areas for which improvement of weather forecasting service is increasingly required,

(3) That many fishing vessels transmit their weather reports to their home country rather than in accordance with paragraph 11.1.2 of Part A, Chapter I, Volume D of WMO Publication No. 9.TP.4,

(4) That the number of fishing vessels is increasing,

(5) That the whaling fleet could provide very useful data in some areas where no other observation platforms are readily available, and

(6) That there are some good radio stations for the reception of weather reports in the southern hemisphere, including the Antarctic continent,

RECOMMENDS:

(1) That Members be urged to recruit fishing and whaling vessels for obtaining weather observations;

(2) That Members ensure that fishing vessels transmit their weather reports in accordance with paragraph 11.1.2 of Part A, Chapter I, Volume D of WMO Publication No. 9.TP.4.

Rec. 23 (CMM-V) - RESEARCH VESSELS

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) That there are many ocean-going scientific research vessels concerned with fisheries, oceanography and marine research,

(2) That these research vessels make careful meteorological and oceanographic observations as part of their research studies,

(3) That research vessels usually carry competent observers and have adequate radio facilities, and

(4) That research vessels frequently operate in sparse-data areas,

CONSIDERING:

(1) That these observations are infrequently transmitted ashore, and

(2) That most research vessels are usually operated and supported by Members, although some research vessels are operated and supported by international agencies,

RECOMMENDS that Members ensure that research vessels operated by their national authorities make and report weather observations, including upper-air observations, when practicable in accordance with pertinent WMO guidance and instructions,

REQUESTS the Secretary-General to consult with appropriate international organizations and solicit their research vessels to participate in the WMO weather observing ship scheme.

Rec. 24 (CMM-V) - PROCEDURES FOR THE TRANSMISSION OF EARLY MORNING WEATHER OBSERVATIONS

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) Paragraph 5.6.3, Part A, Chapter I, Volume D of WMO Publication No. 9.TP.4,

(2) That in many areas of the world there are few early morning observations from ships transmitted at the proper time,

CONSIDERING:

(1) That an early morning observation is extremely helpful for forecasting purposes,

(2) That this observation may be made available by placing emphasis on the need for certain intermediate observations in particular zones,

RECOMMENDS:

(1) That paragraph 5.6.3, Part A, Chapter I, Volume D, of WMO Publication No. 9.TP.4 be amended to read as follows:

"5.6.3 In certain areas early morning observations are of great value to national weather forecasting centres (see chart attached). Ships sailing in these areas should be encouraged to make an additional early morning observation at the following times:

Area B . . . . . 0300 GMT
Area C . . . . . 2100 GMT
Area E . . . . . 1500 GMT
Area F . . . . . 0900 GMT

NOTE: These observations should be transmitted as soon as the radio officer comes on watch and may be made in reduced form (i.e. FM 23.D) if for some reason the full code form cannot be used."

(2) That the chart attached as an annex* be included as appropriate in the same publication.

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* See Annex VII

Rec. 25 (CMM-V) - COLLECTION OF UPPER-AIR REPORTS FROM MOBILE SHIPS

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) The World Weather Watch plan,

(2) Recommendation 46 (CSM-IV), and

(3) The experience acquired in collecting and distributing upper-air reports from mobile ships,

CONSIDERING:

(1) That there is a need for all upper-air reports from mobile ships to be collected at coastal radio stations with a minimum time delay and promptly distributed to all Members requiring these data;

(2) That co-ordination and monitoring of the collection and distribution of upper-air messages is needed for the programme in order to identify quickly any shortcomings of the system,

RECOMMENDS:

(1) That, when a Member establishes an upper-air programme on board a mobile ship, the Member should send the following information, as appropriate, to the Secretary-General:

(a) Name and call sign of the ship;

(b) Information on the route(s) or area(s) in which the ship will make upper-air observations;

(c) Name(s) of the coast radio station(s) suggested for clearing the reports, if applicable;

(d) Expected dates of departure and arrival at various harbours;

(e) Scheduled observation programme of the ship (surface and upper-air observations, etc.); and

(f) Information on any special radio transmission facilities used for weather messages aboard ship;

(2) That the above information should be included in the METNO messages issued by the Secretary-General to ensure that Members are informed of all details;

(3) That Members with coastal radio stations accepting ships' weather reports should inform the Secretary-General which of them are best suited for the collection of upper-air reports from mobile ships;

(4) That Members having designated a coastal radio station for this purpose should ensure that all upper-air reports from mobile ships, including "delayed" reports up to 24 hours old, received at stations are speedily transmitted to the National Meteorological Centre and from there to the appropriate Regional Telecommunications Hub;

REQUESTS:

(1) CSM and regional associations to arrange for rapid regional and global distribution of upper-air reports from mobile ships;

(2) The Secretary-General to assist in the implementation of this recommendation to the fullest extent.

Rec. 26 (CMM-V) - BOOKLET ON RADIO FACSIMILE TRANSMISSIONS OF WEATHER CHARTS FOR SHIPS

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING the booklet on radio facsimile transmissions of weather charts for ships as prepared by the Working Group on the Collection of Ships' Weather Reports and the Provision of Shipping Forecasts,

CONSIDERING:

(1) That the number of radio facsimile transmissions of weather charts established by meteorological services is steadily increasing,

(2) That ways of encouraging shipowners to install facsimile receivers aboard ships are needed,

(3) That information material on the uses of facsimile would be advantageous,

(4) That the content of the booklet* is well suited for indicating to both shipowners and the mariner the many inherent advantages of radio facsimile for the transmission of weather information,

RECOMMENDS:

(1) That the attached booklet be reproduced in the four official languages;

(2) That distribution be made to the WMO maritime Members and selected international organizations for further promulgation to mariners and shipowners;

* See Annex VIII

(3) That further distribution be encouraged by the use of trade journals and other similar publications.

Rec. 27 (CMM-V) - COLLECTION OF METEOROLOGICAL REPORTS FROM SHIPS

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) Paragraph 7.4.9 of the General Summary of the Abridged Report of the Fifth World Meteorological Congress,

(2) Recommendation 11 (CMM-IV),

CONSIDERING:

(1) That an adequate number of coastal stations in each zone designated for the collection of ships' reports is essential,

(2) That prompt and effective co-operative action will be necessary to ensure the necessary number of stations,

(3) That a Member discontinuing the services of a coastal station should give early notification of his intentions and seek relief by others,

(4) That the regional association is the appropriate WMO body to co-ordinate such action,

RECOMMENDS:

(1) Before a coastal station designated for the collection of ships' reports discontinues its services, the responsible Member should, if possible, inform the president of the regional association concerned, the president of CMM and the Secretary-General of WMO at least six months in advance. In addition, the Member concerned should take any action necessary to ensure that at least two stations which have adequate geographical distribution remain to provide the service in the affected zone. If this action is not within the Member's capability, the help of other Members in the Region should be sought through the good offices of the president of the regional association. Similar action should be taken in consultation with the president of the regional association if any Member or Members in the Region consider that the distribution of coastal radio stations in that Region is inadequate within the above definitions;

(2) That the following sentence be added to paragraph 6.2.2.1 of the Technical Regulations:

> "Changes in the list should be communicated to the Secretariat when known."

Rec. 28 (CMM-V) - CHANGE TO TECHNICAL REGULATIONS (TRANSMISSION OF SHIPS' REPORTS)

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING the amended Section II of the Additional Radio Regulations which come into force on 1 April 1969,

CONSIDERING that the new regulation states that meteorological radio telegrams must bear the service instruction =OBS= at the beginning of the preamble, and the paid service indication =OBS= before the address,

RECOMMENDS that paragraph 6.2.2.10 of the Technical Regulations be modified to read: "Each Member shall arrange in consultation with its Telecommunication Administration that OBS is used in the original call from observing ships to the coastal stations in order to secure the appropriate priority of answer by the coastal station in addition to the inclusion of the present service indicator OBS in the preamble to the message."

Rec. 29 (CMM-V) - REVISION OF RESOLUTIONS OF THE EXECUTIVE COMMITTEE BASED ON PREVIOUS RECOMMENDATIONS OF THE COMMISSION FOR MARITIME METEOROLOGY

THE COMMISSION FOR MARITIME METEOROLOGY,

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

RECOMMENDS:

(1) That Resolution 14 (EC-XVII) be no longer considered necessary;

(2) That the following Executive Committee resolutions be maintained in force: Resolution 19 (EC-III) and Resolution 15 (EC-XVII).

ANNEX I

Annex to paragraph 11.5 of the General Summary

PROPOSED AMENDMENT TO CODE 3551 (R_S) - RATE OF ICE ACCRETION ON SHIPS

(a)

Code figure	Description
0	Ice not building up
1	Ice building up slowly
2	Ice building up moderately quickly
3	Ice building up rapidly
4	Ice melting or breaking up slowly
5	Ice melting or breaking up moderately quickly
6	Ice melting or breaking up rapidly
	("slowly", "moderately quickly" and "rapidly" being described as below)

Description

(i) Slowly - Growth of about 0.6 to 1.2 cm (1/4-1/2 inch) every 12 hours - no necessity for chopping. Deck machinery not frozen up and workable.

(ii) Moderately quickly - About 2.5 cm (1 inch) build-up during 4 hours necessitating chopping. Deck machinery must be kept in motion and ropes and wires constantly moved to prevent freezing.

(iii) Rapidly - Very rapid build-up of ice. Icing conditions may become critical. Chopping is necessary at frequent intervals; at least every two hours on trawlers, trawling comes to a standstill with nets, gear and fish freezing on deck.

(b) Indication of ship direction and speed: When the group commencing with $D_S v_S$ is not reported, this information to be added in plain language to indicate whether ship is heading into or away from the wind.

A N N E X II

Annex to paragraph 11.13.2 of the General Summary

COMMENTS TO BE CONSIDERED IF AND WHEN GENERAL CHANGES TO THE SHIP CODES ARE CONSIDERED

1. General requirements

In addition to the general requirements of the annex to paragraph 6.11.1 of the General Summary of CMM-IV, the following requirements should be considered:

(a) Every effort should be made to avoid lengthening and if possible to reduce the length of the codes used for the transmission of ships' weather reports.

(b) The codes used by observers, in addition to being direct reading, should be as free of artificialities as possible.

(c) Consideration should be given to preparing one basic code for use by all ships. This code would have optional groups for additional data and would be used in place of the one long code (FM 21.D), with its several short versions, each of which may have optional groups.

2. List of artificialities, deficiencies and inconsistencies in the present codes FM 21.D, FM 22.D and FM 23.D

If and when a major code change for ships is considered by CSM, the following artificialities, deficiencies and inconsistencies might be removed, when practicable:

(a) In the present code FM 21.D, the air temperature TT is in the sixth group (PPPTT), while its decimal is in the 13th ($1T_wT_wT_wt_T$). Separation of units and tenths by one or more groups should be avoided. Introduction of a TTT resolves this problem, and also gives the observer the possibility to report, if necessary, rounded-off values with TT/, without the risk of creating any confusion, as referred to in paragraph 11.13.1.1 of the General Summary.

(b) In the present code FM 21.D, 30 is added to GG when the group $D_sv_s$app is not reported. In the present code FM 23.D, however, 30 is added to GG when the group PP/TT is not reported.

(c) In FM 21.D, 60 is added to GG when neither the group $N_hC_LhC_MC_H$ nor $D_sv_s$app is reported.

(d) The period for wind waves is reported with two figures. The period of swell waves is reported with only one, while all swell periods of 14 seconds or longer have to be reported with the same number (4). Furthermore, "no sea", P_wP_w, is reported as 00, while "no swell", P_w, is reported as / (solidus).

(e) Code number 17 for ww takes precedence over the figures 20-49, but not over 18 and 19. This creates a problem when, for instance, the code figures 17, 18 and 25 may all be applicable.

(f) Plain language should be used at the end of the code only. Thus, ICING should be reported after the waves.

(g) When ice is reported, the word ICE is always included in the code (both when plain language or when the group c_2KD_ire is used). When icing is reported, the word ICING is only included when plain language is used, but not when the group $2I_sE_sE_sR_s$ is used.

(h) There is a strong requirement for more sea surface temperature data, yet no provision exists at present for reporting sea surface temperature other than in Code FM 21.D. This might be remedied by the use of an optional group in abbreviated ship codes such as FM 22.D and FM 23.D.

3. Summary of code changes proposed at CMM-V (if and when major code changes are considered necessary)

(a) The reporting of waves should be mandatory for selected ships. (See paragraph 11.4.2.2 of the General Summary.)

(b) Provision should be made for the inclusion of an indicator to report the method used in measuring the temperature of the sea surface. (See paragraph 11.1.5 of the General Summary.)

(c) Seven digits should be provided in the reporting of ice accretion in place of the current five-digit code as shown in Code table 3551. (See paragraph 11.5 of the General Summary.)

ANNEX III

Annex to paragraph 12.2.8 of the General Summary

NUMBER OF SHIP REPORTS AVAILABLE AT THE SWEDISH METEOROLOGICAL AND HYDROLOGICAL INSTITUTE

Date & Time	*Total*	*Arctic Sea*	*Baltic*	*Northern Sea Skagerack Kattegat*	*Mediter. Sea*	*Black Sea*	*North Atlantic incl. Norwegian Sea. Caribbean Sea and Gulf of Mexico*	*South Atlantic*	*Indian Ocean*	*Pacific*
1967										
1 Sept.										
00 GMT	453	7	2	12	4	0	229	0	0	199
06 GMT	244	20	1	12	13	1	80	0	0	117
12 GMT	414	20	2	12	17	1	204	7	15	136
18 GMT	322	18	0	13	15	0	170	0	0	106
3 Sept.										
00 GMT	347	11	0	12	3	0	132	2	1	186
06 GMT	297	12	1	12	8	0	127	0	0	137
12 GMT	450	9	1	16	7	0	259	10	13	135
18 GMT	460	23	3	27	5	0	306	0	1	95
7 Sept.										
00 GMT	279	7	0	9	5	0	154	0	0	104
06 GMT	229	5	1	17	8	0	98	0	0	100
12 GMT	451	13	2	28	13	2	277	3	1	112
18 GMT	407	22	0	22	8	0	330	0	0	25
9 Sept.										
00 GMT	308	6	0	14	7	0	202	0	0	79
06 GMT	204	15	0	21	9	0	114	0	0	45
12 GMT	369	20	1	24	17	1	255	5	13	33
18 GMT	286	11	2	22	10	0	164	0	1	76

SHIP reports delayed more than 6 hours are not included.

ANNEX IV

Annex to Resolution 5 (CMM-V)

SPECIFIC TASKS FOR THE RAPPORTEUR ON SEA SURFACE TEMPERATURE MEASUREMENT

1. To continue and intensify the campaign for comparative sea surface temperature measurements by means of the various available instruments (thermometers designed for intake, buckets of various types, radiometers on board ships, aircraft, or satellites, etc.), recommending a reference against which comparison can be made.

2. To make a report on the precise measurements of the thermal structure near the surface for the purpose of determining the most representative levels.

3. To make recommendations based on the evolution of comparison tests for a standard instrument that would be simple and inexpensive and which could be used on all types of vessel.

4. To study the feasibility of establishing a network of bathythermic measurements down to the level of the thermocline.

*

* *

SPECIFIC TASKS FOR THE RAPPORTEUR ON PRECIPITATION MEASUREMENT

1. To report on existing methods and procedures for measuring precipitation amounts on board stationary or mobile ships.

2. To determine whether a simple, inexpensive and robust type of instrument exists or could be developed which would give representative measurements of precipitation amounts on board either stationary or mobile ships.

*

* *

SPECIFIC TASKS FOR THE RAPPORTEUR
ON SURFACE WIND MEASUREMENT

1. To give special attention to:

(a) Collecting the results of studies and investigations into the comparability of various methods of measuring wind at sea. Specifically, the rapporteur should consider:

(i) The results obtained by comparing data from various instruments including efforts to compare measurements from fixed or semi-fixed platforms (towers, drilling platforms, buoys, etc.) with instruments on board ships;

(ii) Efforts made to relate estimates of wind direction and speed at sea to measured values of these parameters;

(iii) Studies relating observations of wind direction and speed at sea to similar observations at coastal stations;

(b) Studies investigating the physical structure of wind at sea in the lowest layers (up to about 30 metres). Particularly, the rapporteur should prepare, as a minimum, a report for CMM-VI on the studies then in existence and on probable future developments.

2. To prepare analyses of the above-mentioned matters with the view to:

(a) Recommending additional studies which Members could take either singly or jointly to resolve deficiencies in methods of measuring surface wind at sea;

(b) Suggesting criteria Members might use in designing surface wind equipment for use at sea;

(c) Suggesting tentative guides to be used for installing and operating wind measuring systems on board ships.

3. To prepare a summary of the relative capabilities of the various wind-measuring techniques, recommendations for further studies and instrument development, and, if possible, criteria and guides for Members to consider when designing and using wind instruments on ships.

*

* *

SPECIFIC TASKS FOR THE RAPPORTEUR ON OBSERVATION, MEASUREMENT AND FORECASTING OF WAVES

1. To investigate the production of an illustrated guide for estimating and reporting state of sea.

2. To review the instructions given to observers in the Guide to Meteorological Instrument and Observing Practices.

3. To investigate the reporting of waves measured by ships fitted with wave recorders.

4. To keep under review the research into sea wave spectra including instrument development, with a view to improving the observation and measurement of waves for synoptic purposes.

5. To keep under review the methods of wave forecasting.

*

* *

SPECIFIC TASKS FOR THE RAPPORTEUR ON A GUIDE TO REPORTING PRECIPITATION

1. To review the results of trials completed on the proposed Guide to Reporting Precipitation and trials pending, with special reference to visibility criteria; and

2. To recommend an improved version of the proposed guide, or, if this proves impractical, to make any other suggestions for assisting the observers aboard ship in observing precipitation at sea.

ANNEX V

Annex to Recommendation 8 (CMM-V)

SPOT ICE CODE

AERIAL		99$L_aL_aL_a$	$Q_cL_oL_oL_oL_o$	YYGG9	Vgghh	$CF_PC_PS_1C_1$	
SHIP	SPICE	99$L_aL_aL_a$	$Q_cL_oL_oL_oL_o$	YYGGO	$CF_PC_PS_1C_1$	$Vt_Es_sD_bL_e$	
SHORE		IIiii	YYGG/	$T_WT_W{}^E{}_t{}^D{}_E{}^a{}_E$	$CF_PC_PS_1C_1$	$Vt_Es_sD_bL_e$	
AERIAL SHIP SHORE	$2F_sC_sS_2C_2$	$3F_eC_eS_3C_3$	$4F_qC_qS_4C_4$	$5F_uC_uS_5C_5$	$6T_1T_2R_eR_h$	$7W_tD_WE_em_s$	
AERIAL SHIP SHORE	$9n_Gn_Gn_Bn_B$	888nn	$i_zd_zd_zs_zs_z$	$OD_zL_zL_ze_z$	$C_zF_{Pz}C_{Pz}S_{1z}C_{1z}$		

NOTES:

(1) The symbols 9, 0, and / are used as the fifth figure of the group YYGG- to indicate that it is a spot ice report from, respectively, an aircraft, a ship, or a coastal station.

(2) When no ice is observed, the group immediately following the date-time group in the ship or shore report, or the visibility-time-altitude group in the aerial report, shall be coded /////, if observation was impossible due to darkness, fog, etc., and 00000 if no ice is present. If ice is observed outside the spot, report it using optional groups.

(3) When ice is observed, the reporting of the first five groups is mandatory. Groups with indicator figures 2 to 7 inclusive and 9 shall be included only if the related phenomena are present and observed.

(4) Section with indicator group 888nn
This section contains information on ice conditions outside the spot. Its use is optional. Depending upon the feature which is being reported (code i_z), the section takes one of the following forms:

(i) i_z = 0, 1, or 2

888nn $i_z d_z d_z s_z s_z$ $/d_z d_z s_z s_z$ $/d_z d_z s_z s_z$ ... $C_z F_{Pz} C_{Pz} S_{lz} C_{lz}$

The group $/d_z d_z s_z s_z$ indicating the bearing and distance of the observed feature may be repeated as often as is necessary to delineate an edge or a boundary.

(ii) i_z = 3 to 7 inclusive

888nn $i_z d_z d_z s_z s_z$ $OD_z L_z L_z e_z$ $C_z F_{Pz} C_{Pz} S_{lz} C_{lz}$

(iii) i_z = 8, 9

888nn $i_z d_z d_z s_z s_z$ $OD_z L_z L_z e_z$

It may be necessary to report several ice or water features outside the spot. In this case the entire set of groups related to each of the respective features should be reported, the first feature being indicated by the group 88811, the second by 88822, etc.

*

* *

MEANING OF SYMBOLS

a_E Trend in behavior of ice near shore (shore stations only). Use table 21.

C Total concentration of all ice within the spot. Use table 3A.

C_p Concentration of predominant form within the spot. Use table 3.

C_s Concentration of secondary form of ice within the spot. Use table 3.

C_e Concentration of the tertiary form of ice within the spot. Use table 3.

C_q Concentration of the quaternary form of ice within the spot. Use table 3.

C_u Concentration of the quintary form of ice within the spot. Use table 3.

C_z Total concentration in feature described in i_z. Use table 3A. If i_z is coded 0–7, $C_zF_{Pz}C_{Pz}S_{1z}C_{1z}$ must be reported. If i_z is 8 or 9, they are not reported.

C_{Pz} Concentration of predominant form of ice in feature described by i_z. Use table 3.

C_1 Concentration of the predominant stage of development within the spot. Use table 3.

C_2 Concentration of the secondary stage of development of ice within the spot. Use table 3.

C_3 Concentration of the tertiary stage of development within the spot. Use table 3.

C_4 Concentration of the quaternary stage of development within the spot. Use table 3.

C_5 Concentration of the quintary stage of development within the spot. Use table 3.

C_{1z} Concentration of predominant stage of development in feature described by i_z. Use table 3.

D_E Ice drift near shore (shore stations only). Use table 20.

D_W Orientation of water feature reported in W_t. Use table 10.

D_b Direction into which water sky or ice blink is observed (ship or shore observation only). Use table 18.

D_z Orientation of the ice or water feature indicated by i_z. Use table 10.

d_zd_z True bearing to ice or water feature in tens of of degrees. If distance (S_zS_z) is greater than 99 kilometers, add 50 to bearing.

E_e Extent of fast ice; report this element if the horizontal visibility permits. Use table 11.

E_t Type of fast ice (shore stations only). Use table 19.

e_z Width of the ice or water feature indicated by i_z. Use table 15.

F_p Predominant form of ice within the spot. Use table 4. If two or more forms of ice have the same concentration, selection of the predominant form will be made in a decreasing size sequence.

F_s Secondary form of ice within the spot. Use table 4.

F_e Tertiary form of ice within the spot. Use table 4.

F_q Quaternary form of ice within the spot. Use table 4.

F_u Quintary form of ice within the spot. Use table 4.

F_{Pz} Predominant form of ice in feature described by i_z. Use table 4.

GG Hour of the day in Greenwich Mean Time.

gg Time in minutes (aerial observation only).

hh Altitude, in steps of 30 meters (aerial observation only).

II International block number in which station is located (shore station only).

iii The international index number (shore station only).

i_z Indicator for ice or water features outside the spot. Code table 14.
(1) If i_z is 3–9 it must be followed by $0D_zL_zL_ze_z$
(2) If i_z is 0–7 it must be followed by $C_zF_{Pz}C_{Pz}S_{1z}C_{1z}$

$L_aL_aL_a$ Latitude in degrees and tenths.

L_e Width of shore lead, if the horizontal visibility permits (ship or shore observation only). Use table 11.

$L_oL_oL_oL_o$ Longitude in degrees and tenths.

L_zL_z Length of the ice or water feature in kilometers. Code 99 refers to 99 or more kilometers.

m_s Stage of melting. Record the predominant type of melting observed using table 12.

n_Bn_B Number of icebergs within the limits of visibility. Use table 13.

n_Gn_G Number of growlers and bergy bits within the limits of visibility. Use table 13.

nn Number used to differentiate several ice and/or water features. The first feature is indicated by the group 88811, the second by 88822, etc.

Q_c Quadrant of the globe. Record the quadrant of the globe in which the observer is located (ship station only). Use table 1.

R_e Extent of all ridging. Use table 7.

R_h Maximum height of ridging. Use table 8.

S_1 Predominant stage of development of ice within the spot. If two or more stages of development are of the same concentration, older stages of development will have precedence over the younger stages. Use table 5.

S_2 Secondary stage of development of ice within the spot. Use table 5.

S_3 Tertiary stage of development within the spot. Use table 5.

S_4 Quaternary stage of development within the spot. Use table 5.

S_5 Quintary stage of development within the spot. Use table 5.

S_{1z} Predominant stage of development in feature described by i_z. Use table 5.

s Depth of snow cover on the ice (ship or shore observation only). Use table 17.

S_zS_z Distance to the ice or water feature in kilometers.

T_WT_W Water temperature in whole degrees Celsius. Add 50 for temperature below 0°C (shore stations only).

T_1 Primary type of topography. Report topography of greatest extent. Use table 6. If two types are equal in extent, report higher code number first.

T_2 Secondary type of topography. Report topography of second greatest extent. Use table 6.

t_E Thickness of ice. If ice of varying thickness, report thickness of the predominant form of ice. Do not include snow depth (ship or shore observation only). Use table 16.

V Visibility (horizontal). When the visibility is irregular or spotty, report the average visibility over the spot. Use table 2.

W_t Type of opening in the ice. If the ice concentration is greater than 80 percent, report the presence of the largest type opening within the spot. If less than 80 percent concentration, continue to report the largest type openings other than polynyas or pools. Use table 9.

YY Day of the month.

*

* *

TABLES

(1)

QUADRANT OF THE GLOBE
(Qc)

	Latitude	Longitude
1)	North	East
3)	South	East
5)	South	West
7)	North	West

(2)

VISIBILITY
(V)

0) <50m
1) 50 — 200m
2) 200 — 500m
3) 500 — 1,000m
4) 1 — 2km
5) 2 — 4km
6) 4 — 10km
7) 10 — 20km
8) 20 — 50km
9) 50 or more km

(3)

CONCENTRATION
(C_P, C_1, C_s, C_2, C_e, C_3, C_q, C_4, C_u, C_5, C_{Pz}, C_{1z})

0) <½ okta
1) 1 okta
2) 2 oktas
3) 3 oktas
4) 4 oktas
5) 5 oktas
6) 6 oktas
7) 7 oktas
8) 8 oktas with openings
9) 8 oktas without openings
/) Undetermined

(3A)

CONCENTRATION
(C, C_z)

0) No ice
1) 1 okta
2) 2 oktas
3) 3 oktas
4) 4 oktas
5) 5 oktas
6) 6 oktas
7) 7 oktas
8) 8 oktas with openings
9) 8 oktas without openings
/) Undetermined

(4)

FORMS OF ICE
(F_P, F_s, F_e, F_q, F_u, F_{Pz})

0) No form of ice
1) New ice, nilas
2) Pancake ice
3) Brash ice, small ice cakes, ice cakes
4) Small ice floes
5) Medium ice floes
6) Big ice floes
7) Vast ice floes
8) Giant ice floes
9) Fast ice
/) Undetermined or unknown

(5)

STAGES OF DEVELOPMENT
(S_1, S_2, S_3, S_4, S_5, S_{1z})

0) No stage of development
1) Frazil ice, grease ice, slush, shuga
2) Ice rind, dark nilas, light nilas
3) Gray ice
4) Gray-white ice
5) Thin first-year ice
6) Medium first-year ice
7) Thick first-year ice
8) Second-year ice
9) Multi-year ice
/) Undetermined or unknown

(6)

TOPOGRAPHY
(T_1, T_2)

0) Level ice
1) Rafted ice
2) Finger-rafted ice
3) Hummocks
4) New ridges
5) Weathered ridges
6) Very weathered ridges
7) Aged ridges
8) Consolidated ridges
9) Standing floe
/) Undetermined or unknown

(7)

EXTENT OF RIDGING
(R_e)

0) No ridging
1) 1/10—2/10
2) 3/10
3) 4/10
4) 5/10
5) 6/10
6) 7/10
7) 8/10
8) 9/10
9) 10/10
/) Undetermined or unknown

(8)

MAXIMUM HEIGHT OF RIDGING
(R_h)

0) 0—1 meter
1) 2 meters
2) 3 meters
3) 4 meters
4) 5 meters
5) 6 meters
6) 7 meters
7) 8 meters
8) 9 meters
9) 10 or more meters
/) Undetermined or unknown

(9)

TYPE OF OPENING IN THE ICE
(W_t)

0) No openings
1) Crack
2) Very small fracture (0-50m)
3) Small fracture (50-200m)
4) Medium fracture (200-500m)
5) Large fracture (>500m)
6) Lead, flaw lead
7) Polynya, shore polynya, flaw polynya
8) Recurring polynya
9) Open water
/) Undetermined or unknown

(10)

ORIENTATION
(D_W) (D_z)

0) No distinct orientation
1) Major axis of feature oriented N-S
2) Oriented NE-SW
3) Oriented E-W
4) Oriented SE-NW
5) Parallels shore to N
6) Parallels shore to E
7) Parallels shore to S
8) Parallels shore to W
/) Undetermined or unknown

(11)

EXTENT OF FAST ICE
(E_e)
WIDTH OF SHORE LEAD
(L_e)

0) Not present
1) <100m
2) 100 — 1km
3) 1 — 2km
4) 2 — 5km
5) 5 — 10km
6) 10 — 30km
7) 30 — 50km
8) 50 — 100km
9) 100 or more km
/) Undetermined or unknown

(12)

STAGE OF MELTING
(m_s)

0) No melting
1) Few puddles
2) Many puddles
3) Many puddles with few thawing holes
4) Many puddles with many thawing holes
5) Thawing holes without puddles
6) Dried ice
7) Rotten ice
8) Flooded ice
9) Brash ice formed by melting
/) Undetermined or unknown

(13)
ICE OF LAND ORIGIN GROWLERS AND BERGY BITS
$(n_G n_G)$
ICE BERGS
$(n_B n_B)$

00)	None	13)	13
01)	1	14)	14
02)	2	15)	15
03)	3	16)	16
04)	4	17)	17
05)	5	18)	18
06)	6	19)	19
07)	7	20)	20
08)	8	21)	21—50
09)	9	22)	51—100
10)	10	23)	101—200
11)	11	24)	201—500
12)	12	25)	500

(14)
INDICATOR FOR ICE WATER FEATURE
(i_z)

0) Ice edge
1) Concentration boundary
2) Fast ice edge, fast ice boundary
3) Lead
4) Polynya
5) Belt
6) Patch
7) Field
8) Ridge zone
9) Fracture zone
/) Not reported

(15)
WIDTH
(e_z)

0) <50m
1) 50 — 100m
2) 100 — 200m
3) 200 — 500m
4) 500 — 1,000m
5) 1 — 2km
6) 2 — 5km
7) 5 — 10km
8) 10 — 50km
9) 50 or more km
/) Undetermined or unknown

(16)
THICKNESS OF ICE
(t_E)

0) <5cm
1) 5 — 10cm
2) 10 — 20cm
3) 20 — 30cm
4) 30 — 40cm
5) 40 — 60cm
6) 60 — 90cm
7) 90 — 150cm
8) 1.5 — 2.5 meters
9) ≧2.5 meters
/) Undetermined or unknown

(17)
DEPTH OF SNOW
(s)

0) Bare ice or trace
1) < 2cm
2) 2 — 5cm
3) 5 — 10cm
4) 10 — 15cm
5) 15 — 25cm
6) 25 — 50cm
7) 50 — 100cm
8) 100 — 200cm
9) 200 or more cm
/) Undetermined or unknown

(18)
WATER SKY OR ICE BLINK
(D_b)

0) Not present
1) Ice Blink to N
2) Ice Blink to E
3) Ice Blink to S
4) Ice Blink to W
5) Water Sky to N
6) Water Sky to E
7) Water Sky to S
8) Water Sky to W
9) Frost smoke
/) Undetermined or unknown

(19)
TYPE OF FAST ICE
(E_t)

0) No fast ice
1) Young coastal ice
2) Young fast ice
3) First-year fast ice
4) Second-year fast ice
5) Multi-year fast ice
6) Ice foot
7) Grounded ice
8) Stranded ice
9) Grounded hummock
/) Undetermined or unknown

(20)
ICE DRIFT NEAR SHORE
(D_E)

0) No ice drift
1) Ice drift to N
2) Ice drift to NE
3) Ice drift to E
4) Ice drift to SE
5) Ice drift to S
6) Ice drift to SW
7) Ice drift to W
8) Ice drift to NW
9) All ice motionless
/) Undetermined or unknown

(21)
TREND IN BEHAVIOR OF ICE NEAR SHORE
(a_E)

0) No change
1) Ice situation improving (for navigation)
2) Ice situation worsening (for navigation)
3) Ice breaking up
4) Ice opening or drifting away
5) Ice increasing
6) Ice freezing together
7) Ice drifting in
8) Ice under pressure
9) Ice hummocking or screwing
/) Undetermined or unknown

A N N E X VI

Annex to Recommendation 9 (CMM-V)

REWORDING OF TERMS OF REFERENCE OF CMM GIVEN IN ANNEX II OF THE GENERAL REGULATIONS

(8) Commission for Maritime Meteorology (CMM)

(a)(b (c) unchanged;

(d) Applying knowledge in all branches of meteorology to maritime activities;

(e) Formulating the special requirements for observations made at sea;

(f) unchanged;

(g) Organizing networks of observations from ships and other platforms at sea;

(h) Formulating requirements for the organization of a system of weather bulletins and other meteorological information to meet the needs of shippping, fishing and other marine activities both on the high seas and in coastal waters, including warnings required for maritime navigation and the safety of life at sea;

(i) Establishing plans for the allocation of areas of responsibility, both for the collection of observations from ocean areas and the issue of weather bulletins and other meteorological information;

(j) Preparing maritime climatological information, to meet the needs of maritime activities;

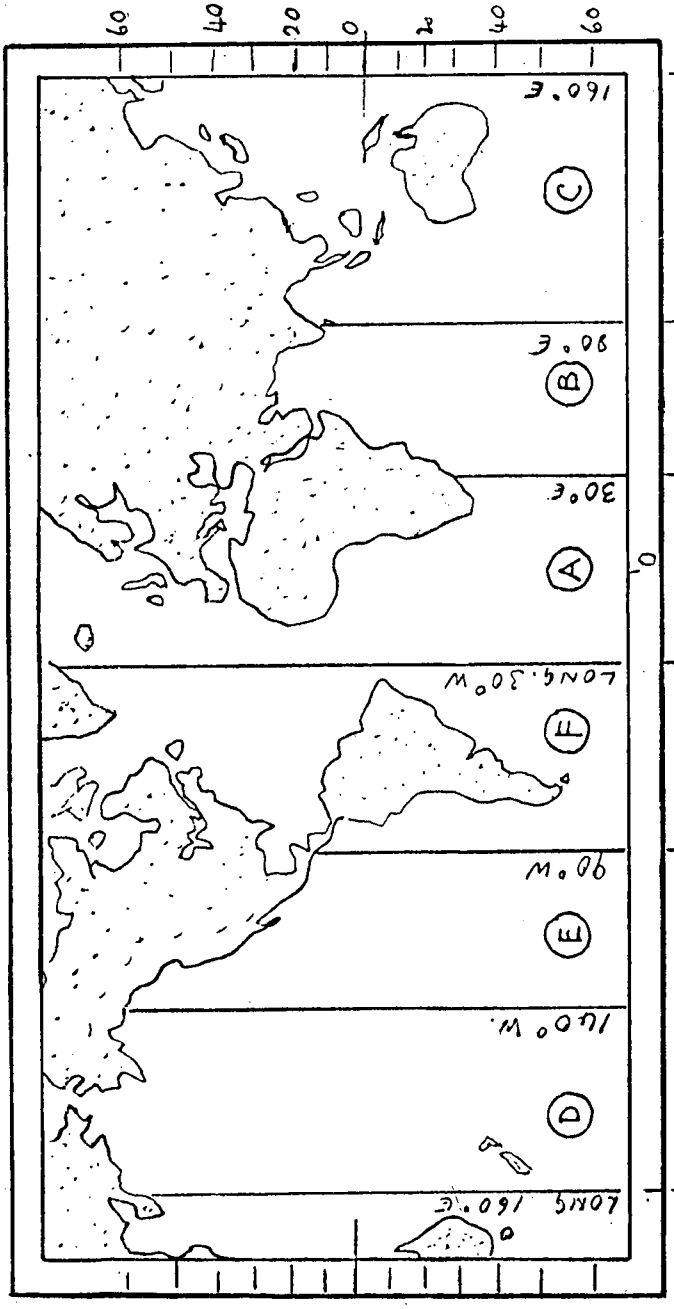
(k) unchanged;

(l) unchanged.

ANNEX VII

Annex to Recommendation 24 (CMM-V)

CHART TO SHOW THE INTERNATIONAL RADIO WATCHKEEPING AREAS AND THE ADDITIONAL EARLY MORNING WEATHER OBSERVATIONS REQUIRED IN AREAS B, C, E AND F



Weather observations required:-	0000,0600 1200,1800	0000,0600 1200,1500 1800	0000,0600 0900,1200 1800	0000,0600 1200,1800	0000,0300 0600,1200 1800	0000,0600 1200,1800 2100	GMT

ANNEX VIII

Annex to Recommendation 26 (CMM-V)

REVISED FINAL DRAFT OF A BOOKLET ON RADIO FACSIMILE TRANSMISSIONS OF WEATHER CHARTS FOR SHIPS

Preface

Within the past few years, the number of radio facsimile transmissions of weather charts established by Meteorological Services has steadily increased. Additional facsimile broadcast station facilities are being planned. Ships at sea receiving radio facsimile surface weather and wave charts for ocean areas have used them to much advantage.

The purpose of this booklet is to encourage more ships to make use of this means of pictorial communication by installing radio facsimile receivers aboard and — to attain that objective — to point out its advantages and describe briefly how weather and wave charts can be used on board to minimize weather damage, increase personal safety and possibly also to lessen travel time en route — thus saving on fuel and labour cost — or to improve efficiency in special sea tasks such as scientific endeavours, high sea fisheries, etc. It also includes a general reference regarding ships already equipped with radio facsimile recorders, lists the more common radio facsimile transmissions provided by the Meteorological Services and explains in non-technical terms how radio facsimile communication works.

Hourly costs for ship operations are enormous nowadays. On long voyages, commercial or for other purposes — military, fishing, scientific, etc. — with a continuous sequence of analysed and forecast weather and wave charts recorded on board by a facsimile receiver, together with warnings received from regular shipping bulletin broadcasts, the probability of savings in time spent at sea is doubtless enhanced. For a ship sailing directly between two given geographical points, savings from a few hours to sometimes 24 hours and more can be made. On shorter routes, savings will be less and sometimes non-existent. However, due to the present limitations of knowledge on the weather behaviour and other related variable factors, savings in ships' transit time should be evaluated over a reasonable period of operations, not on a single voyage. No doubt those savings will offset the cost of installing radio facsimile equipment aboard. Furthermore, whatever the length and purpose of a particular voyage, there will always exist other very important potential "savings" difficult to evaluate monetarily, such as comfort and safety of crew and passengers' comfort or even safety, as well as damage to vessel equipment, cargo, etc., which can be obtained if very stormy areas are avoided. These aspects, involved in what we can call "safe navigation", are implied as a primary purpose of facsimile transmission of weather information for shipping by Regulation 4 (b) (ii), Chapter V of the International Convention for Safety of Life at Sea (London, 1960).

This booklet has been prepared by the Commission for Maritime Meteorology of the World Meteorological Organization. Obviously, it cannot include details about the various commercial types of facsimile apparatus so potential users are advised to make inquiries from the Meteorological Service of their country. If more shipping and fishing companies are encouraged to install radio facsimile equipment aboard their vessels after reading this booklet, the Commission's efforts will be well rewarded.

I. INTRODUCTION

To the man on the bridge, a look at the weather ahead is always helpful. For almost half a century, weather offices as well as ships at sea have had to plot and analyse their own weather charts from reports included in radio weather transmissions; a time-consuming task not always rewarding on ships because of deficient or incomplete reception of data. With the more recent establishment of a system of radio facsimile broadcasts of weather charts by several Meteorological Services, this task has not only been eliminated at most weather offices and aboard ships that have been equipped with facsimile recorders, but the amount of weather and sea information thus available has increased considerably; this is especially aboard ships, where serious limitations normally exist in trained personnel for meteorological work. Weather charts received by this means of communication give ships' officers a "bird's-eye view" of weather and related sea conditions over an entire ocean, or a large portion of it, as well as weather situations on the adjoining continents. They also receive forecast positions of weather systems 24 hours or more in advance, depending on the normal availability of observations. The adoption of facsimile receivers functioning automatically should be especially valuable aboard automated ships where the number of staff is appreciably reduced.

There are indications that future facsimile broadcasts of meteorological information for maritime use are expected to contain fully processed information represented both graphically and in written form in order to facilitate its use. Further, there would be considerable advantage in having facsimile transmission of supplementary information related to safety and navigation.

II. SHIPS EQUIPPED WITH RADIO FACSIMILE RECORDERS

Many merchant and other vessels have taken advantage of this means of communication for obtaining analysed and forecast weather charts for operational use at sea by installing radio facsimile receivers aboard. According to a survey made by the World Meteorological Organization (WMO), the number of vessels equipped in early 1968 for receiving radio facsimile transmissions is shown below.

List showing the number of ships fitted with facsimile receivers*

Type of ship				
Merchant	Fishing	Research	Others	Total
854	412	34	25	1 325

By the end of 1968 (information provided at CMM-V), this figure had increased to nearly 3 000 vessels.

As a result, these vessels have available, promptly after they are completed ashore, the weather and sea charts indicated in the following paragraphs.

* Naval ships have not been included in this survey.

III. INFORMATION TRANSMITTED BY RADIO FACSIMILE TRANSMISSIONS

For several years now, a number of Meteorological Services throughout the world have been providing daily radio facsimile transmissions of weather charts. Figure 1* shows ocean areas covered by radio facsimile weather analyses and forecast charts of interest to ships and Appendix 1* includes a small selection of fax transmissions, areas, type of charts and schedules, from WMO Publication No. 9.TP.4, Volume D, Part F, entitled "Information for shipping". Additional details of radio facsimile stations, including frequencies and scales used, can be obtained from that publication and from the ITU List of Radiodetermination and Special Service Stations. Radio facsimile transmissions contain actual and forecast weather charts for the surface and upper levels, but not all are provided for the use of maritime navigation purposes. The following list contains some of those weather and sea charts of use to ships:

1. Surface weather analysis : Shows weather patterns based on synoptic surface observations normally made a few hours before reception time on board.

2. Surface weather prognosis : Indicates future weather patterns given on a 24-hour forecast basis. In some regions, this outlook may extend to 36.

3. Extended surface prognosis : Indicates forecast positions of pressure systems and fronts at the surface for the next two to five days.

4. Wave analysis : Shows characteristics of sea waves, specially height contours - i.e. lines connecting point of equal wave height - and direction of movement, based on synoptic wave observations made normally a few hours before reception time on board and/or on calculations derived from the wind or wave field.

5. Wave prognosis : Gives forecast position of wave systems normally on a 24-hour basis.

6. Sea temperature : Shows surface temperature analysis and forecast contours based on mean values for a given period, normally a week, ten days or a month. Some transmissions include also sea-temperature anomalies.

* Not reproduced herein.

7. 500-millibar charts : Show 500-mb height contours as an indication of the pressure and wind fields at the 5.5 km (18 000 feet) level approximately. Available in actual and also prognostic patterns; up to 72 hours for some regions. With experience, information on the movement and development of surface weather systems may be derived from these 500 mb charts.

8. Sea ice : Shows sea-ice areas with their known characteristics as well as positions of icebergs.

9. Satellite weather pictures : Show cloud cover, position of disturbances and tropical cyclones.

In addition, special purpose charts, mostly for research tions, are available in some much more restricted regions. They contain environmental information such as sea temperature at different depths, salinity, currents, thermocline depth, etc.

Not all the charts listed above are broadcast within each ocean area covered by radio fax transmissions, neither does a given type of chart contain exactly the same information everywhere because of differences in work methods and because the information given on the charts sometimes depends on the amount of data available at the forecast centres. In Appendix II* of this booklet, some samples of the charts listed above are included.

At its 4th session (1964) the Commission for Maritime Meteorology considered the question of facsimile weather charts for transmission to ships. It recommended that Members (1) indicate on the analysis and forecast charts the areas of winds of 34 knots (Beaufort 8) or more, (2) show by symbol and figures the direction and speed of pressure centres on analysed charts and that (3) all transmitted charts include their type of projection and scale. The Commission also proposed that Members operating radio facsimile broadcasts adhere strictly to published chart transmission schedules and also arrange schedules in so far as practicable, in order that charts of interest to ships are transmitted successively.

A full explanation on how radio facsimile transmissions of weather charts work is beyond the scope of this booklet. However, it is hoped that the following explanation will be helpful in gaining some understanding.

IV. RADIO FACSIMILE COMMUNICATION AND HOW IT WORKS

Facsimile transmission is used for sending pictures, charts, diagrams and texts by either landline or radio channels from one point to several others. This type of transmission is possible because the strength of an electric current can be varied by light. Any change in current caused by light at the transmitting station will be reproduced at the receiving stations. In a facsimile transmitter, the weather chart or other material to be transmitted is wrapped around a cylindrical drum which may rotate at speeds of 60,

* Not reproduced herein.

90 or 120 revolutions per minute. As the drum rotates, a small ray of light, about one-fourth millimeter in diameter (0.07 inch), shines on the chart while moving slowly parallel to the axis of the drum. The effect is that the light beam scans the drum about four times for every millimeter of chart length. For weather charts having few or widely spaced lines, the transmitter can be adjusted so that the light passes over the chart only twice for every millimeter of chart length.

This ray of light is then reflected back to a photoelectric cell which changes the light waves into an electrical current. When the light passes over dark areas or lines on a weather chart, less light is reflected and the photoelectric cell sends out a weaker current; while passing over white areas of the chart, the cell sends out a stronger current. These weaker and stronger currents are then reversed electronically in the transmitter so that the stronger current will reproduce black on the station's facsimile recorders and the weaker current white. This arrangement allows the recorder to reproduce an exact positive copy of the original material transmitted.

Ships' officers, when listening to a voice broadcast from a regular amplitude modulated (AM) broadcast station have experienced, no doubt, the fading of the radio signals which was caused by static and other atmospheric disturbances. This is especially true when the receiver was some distance from the broadcasting station. As a result of this phenomenon, for long-distance communication, the AM signal output of the facsimile transmitter must be converted to a frequency-modulated (FM) type of signal, usually referred to as an essentially static-free transmission. Otherwise, only portions of the chart or none at all could be received during periods of interference. A radio facsimile transmitter employs a converter to change the AM signal to the FM type of signal for transmitting the charts or other material to ships.

V. RADIO FACSIMILE EQUIPMENT ABOARD SHIPS

On ships, the equipment consists of a radio receiver, an FM to AM signal converter and facsimile recorder. Only a small amount of space will be required in the chart room or radio office for installation of this equipment. In planning for an installation aboard ship, consideration should be given to the ship's usual route or routes, the radio facsimile stations which would be received and the number of frequencies used by these stations to assure reliable reception of transmitted weather charts along the ship's routes. Determination of these points will give an idea of the capability of the radio receiver with respect to the number of receiving channels required. Only a simple wire aerial is needed.

In ships' recorders, the received FM signal is converted back to an AM signal and then is passed to the recording head. Most facsimile recorders employ chemically treated or coated paper for recording weather charts or diagrams. The signal from the recording head passes through the paper,

by means of a stylus * with the stronger currents producing lines, shaded or dark areas, and weaker currents resulting in the white areas on the weather charts.

After a little training, ships' navigating officers will find that operation of the radio facsimile recorder soon becomes routine as with other electronic navigational gear aboard. Radio officers, with their knowledge of electronics, would normally be capable of servicing the equipment, such as replacing parts and making adjustments as required.

For standardization purposes, the WMO specified three speeds for weather chart transmissions: 60, 90 and 120 rpm and 2 scanning densities, namely 2 or 4 lines per mm. When the transmitter is operating with 2 scanning lines per mm for example, at a rate equal to a speed of 60 rpm, it takes 20 minutes to transmit and receive a weather chart area approximately 48 cm by 30 cm (19 in by 12 in); 90 rpm, 15 minutes; 120 rpm, 10 minutes. The WMO has also developed technical specifications for weather chart facsimile transmitters and recorders. For those interested in additional information concerning this equipment, the specifications will be found in Appendix III** of this booklet.

VI. ADVANTAGES OF HAVING RADIO FACSIMILE EQUIPMENT ABOARD AND USE OF WAVE AND WEATHER CHARTS

As stated in the preface, special circumstances exist which may have an important bearing on safety and comfort at sea, as well as on the economy of ships' operations, depending on whether ship-masters have or do not have access to the meteorological information shown on facsimile chart transmissions.

Every mariner will generally be interested in avoiding bad-weather areas, not so much for reasons of comfort - although this aspect may deserve special interest aboard passenger liners - as for the safety of the ship, crew, passenger and cargo. Strong winds and heavy seas may endanger lives entrusted to his skill - crew and passengers - and lead to higher operating costs due to higher fuel consumption and lessening profit, or losses, due to longer stays at sea, damage to superstructure and cargo, losses of or damage to instruments, engines, etc.

Benefits from the operation of a radio facsimile receiver aboard a ship begin with its basic capability of furnishing sea and weather information

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* One type of recorder employs a pen which marks the lines or darker areas in ink when the pen is activated by the stronger current.

** Not reproduced herein.

regularly and continuously. Anyone with brief instructions can switch on the equipment which can be kept in operation without being attended. Captains may, therefore, have a regular succession of charts at their disposal with a minimum delay after their preparation by the meteorologist ashore. These charts will furnish them with an overall and objective outlook of the weather situation and its tendency in the oceanic areas of interest to the ship. Such outlook may be supplemented, in certain regions, with the wave condition charts and/or forecast charts for weather and sea.

Obviously, this will not be possible when using radiotelegraph morse channels only, because the time consumed aboard listening to meteorological broadcast and decoding, plotting and analysing the information so obtained is usually too long when related to manpower available. Furthermore, charts received by facsimile channels are not only more numerous and diversified than those which can be prepared aboard ships with limited selection of weather bulletins, but are also more reliable. When radio transmissions are affected by strong interference and noises, it may still be possible to reconstruct the portion of a chart affected by radio disturbances.

Selection and use of weather and wave charts recorded on board is a function of several factors, such as the ship itself, her mission — commercial, scientific, military — and existing circumstances. The avoidance of bad weather areas may not always be convenient or possible. With a fast-moving storm, it may be better to endure bad but not damaging weather for a few hours at slower speeds instead of altering course which may add miles to the voyage. This is even more true when the forecast charts indicate that a longer period of strong winds and high waves may be avoided later in the voyage. Finally, captains may want, in addition, to consult a Meteorological Service forecaster by using high seas radiotelephone or by radiotelegraph. But, if they do so, having first had access to the pictorial and general outlook which only facsimile maps can provide adequately, they should normally have a better basis to ask for advice and to interpret it.

Of course, the higher the level of meteorological knowledge of a master, the greater will be the profit that will result from the use of a facsimile map. It should normally be expected that the average modern captain would have acquired a good experience and meteorological background which would enable him to make better command decisions when having access to the more extensive and better analysed amount of information presented by the facsimile charts. * This is a very important point even for ships being routed from

* If the meteorological knowledge of the captain and his officers is lower than is necessary to interpret, and profit by, the weather charts, their almost continuous contact with the facsimile charts and the direct association of these with actual weather conditions will enormously facilitate the task of improving their training. This is an important advantage which may be gained by the use of radio facsimile on board. Reading of WMO Technical Note No. 72 — The Preparation and Use of Weather Maps by Mariners — is recommended. (Note issued by the WMO Secretariat, 41 Avenue Giuseppe-Motta, P.O. Box No. 1, 1211 Geneva 20, Switzerland.)

land since the captain has the final responsibility and not the forecast centre. When saying this, it is not meant that advice from shore should be disregarded when receiving facsimile charts aboard, but that a master on some occasions may have to consider other operational factors in arriving at a decision which may be unknown to the routeing authority ashore.

In the following paragraphs, a few examples of the use which can be made of the charts listed in Chapter III are given:

1. Cargo and passenger ships : Merchant ships are normally operated on rather tight schedules due to the nature of their voyages and to their high hourly cost of operation. This makes it easy to understand the importance of adopting every known measure to avoid or lessen delays due to very bad weather areas along their routes.

Undoubtedly, the first measure should be to study the weather situation and its forecast before leaving port and to select the most convenient route, adopting, if necessary, other circumstantial decisions such as departing a few hours later or earlier than scheduled.

As explained before, a facsimile recording set on board will, as a general rule, considerably help the efforts of captains to obtain the most clear and complete outlook of weather and wave synopses and prognoses; and this should apply even when ships are in harbour where port meteorological officer services are available since, with the set of charts thus at hand, the P M O advice should be more objective and comprehensive and its evaluation by the captain enhanced.

Sea ice distribution charts (8) can be very useful if the selected route takes the ship through areas where icebergs and large sea ice fields may be found.

Once the ship is on her selected route, it may be discovered that weather systems move and intensify more slowly or more rapidly than forecast. This does not happen frequently but, as knowledge about atmosphere circulation is still limited, it sometimes occurs. Therefore, captains should not relay blindly on what they are advised in port or by radio channels. On the countrary, they must follow very closely the atmospheric behaviour and be ready to introduce the necessary adjustment to their courses in order to avoid the full brunt of any extensive areas of very strong winds and heavy seas. No doubt captains' decisions will be made more easily when based on an important and continuous flow of facsimile charts than when relying on the less complete information received by the common radiotelegraph channels.

Having thus a continuous flow of charts, captains of ships fitted with facsimile will be in possession of more detailed information than that given

in the radio weather bulletins which are necessarily rather brief. They will therefore be able to follow closely the atmospheric conditions and be more ready to interpret the forecasts they receive and make any necessary adjustments to the course and speed of their ships.

Facsimile receivers on board passenger ships, especially liners on long cruises, may render an additional advantage by giving passengers graphical and continuous information about the weather. These details, if conveniently handled by the captain, should add favourably to the many others used to keep them entertained, since normally it should be expected that weather behaviour will be psychologically considered as a very interesting matter by passengers anxious to enjoy the voyage.

The following is an example furnished by a shipping company showing the importance of the decisions a captain is able to adopt when having a complete and objective knowledge of the weather, as only a radio facsimile receiver can normally furnish him:

> A SHIP OF THE "SUGAR LINE LIMITED" WAS SAILING FROM MALTA, IN THE MEDITERRANEAN SEA, TO SYDNEY, NOVA SCOTIA, DURING THE WINTER SEASON. BEING CONTINUOUSLY UP TO DATE ABOUT THE GENERAL WEATHER SITUATION THROUGH THE RADIO FACSIMILE SET INSTALLED ON BOARD, THE CAPTAIN WAS ABLE TO SEE THAT A DEEP LOW IN THE NORTH ATLANTIC WAS COMING ACROSS, STRONG HEAD WINDS AND HEAVY SEAS THREATENING THE SHIP IF SHE FOLLOWED THE SOUTH ROUTE, NORMAL FOR THAT SEASON, WHICH WOULD MAKE THE SHIP PASS SOUTH OF THE FORECAST TRAJECTORY FOR THE LOW CENTRE. IT WAS THEN DECIDED TO FOLLOW A GREAT CIRCLE ROUTE, TO THE NORTH, BECAUSE WHILST THE SHIP WOULD STILL EXPERIENCE FAIRLY STRONG WINDS THEY WOULD BLOW ASTERN OF HER AND, IN ANY CASE, THAT ROUTE WAS THE SHORTEST ONE. AS A RESULT, IT WAS ESTIMATED THAT THIS SHIP SAVED OVER 24 HOURS COMPARED WITH THE TIME THAT SHE WAS EXPECTED TO TAKE ON THE ALTERNATIVE ROUTE.

2. Fishing vessels: The foregoing advantages offered by radio facsimile receiver installed on board for safe and economic operation of ships, as moving floating platforms, are similarly applicable to fishing vessels. Besides, there are advantages for the logistic and safe conduct of specific fishing activities to be obtained through an intelligent analysis and use of the information gathered when receiving common facsimile weather and sea charts, i.e. (a) to seek shelter or to delay departure in order to avoid a long period of forecast adverse weather and wave conditions under which no fishing activities could be undertaken; (b) to endure at sea - when advantageous and possible - a forecast spell of bad weather when favourable conditions for fishing are expected to follow; (c) to reduce the area to be explored for fish schools knowing the sea-temperature pattern; (d) to select areas of good visibility when catching whales, etc.; (e) to receive other information of help in deciding fishing strategy such as fleet deployment and catch results of other ships; (f) weather routeing of fishing vessels.

Fishing vessels are not generally operated on fixed schedules. Their profitability naturally increases in direct ratio to the speed with which their holds are filled and unloaded, and the ship is ready to start all over

again. From experience, it is known that fluctuations on fish abundance and distribution are closely related to variations in certain oceanographic parameters which - in turn - are largely affected by weather variations. Thus, it normally should be very useful to fishermen to have timely access to synoptic or near synoptic zonal information on those parameters, as well as to the weather prognosis for the same region and its surroundings. Undoubtedly, the skipper of a fishing vessel equipped with a radio facsimile receiver will usually have a better and more objective knowledge of the sea and weather conditions and their trend than if no such facility were on board.*

Availability of biological and oceanographical information needed to meet specific fishery requirements, especially that which may help fishermen not to wast much time searching for fish concentrations, is still a very difficult problem to solve due to the well-known scarcity of observations in many ocean areas. Nevertheless, in certain limited regions where fishing and other vessels are numerous and contribute to the observational programme, an experimental special facsimile service for fishing activities has been set up. An example was given by the pilot project "on the rapid utilization of synoptic oceanographic observations" undertaken over the North Sea and adjacent sea areas - January/March 1966 - under the sponsorship of the International Council for the Exploration of the Sea (ICES). Another example is the large-scale project to forecast fishing and oceanographic conditions which is in progress in the waters adjacent to Japan, where about 400 fishing vessels are already equipped with facsimile sets which are used also for receiving from intelligence centrals on shore grid charts giving processed information about fishing results by area, time and species in relation to fishing effort. Meeting the increasing requirements of the fishing industry for environmental data could be greatly facilitated by the use of radio facsimile information.

3. Ships on scientific or other relevant operations: Ships on scientific or other special missions may have to accomplish them under certain meteorological conditions, with less emphasis on the duration of the campaign, at least within certain limits. Charts listed in Chapter III should be useful to them, as to any other type of ship, for safe and economic operation, but also should be of great help in the planning and execution of their specific tasks, such as those of scientific observations and experiments, which require that a given span of good weather - or of some special weather condition - be available in order to carry them out thoroughly. Even if professional meteorologists are on board these ships, radio facsimile equipment will be of great help since much more information will normally be available than through other communications channels.

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* Fishing skippers are not only advised to read the WMO publication previously referred to (Chapter VI), but also FAO Fisheries Circular No. 16 - Fishermen and the Weather, by K. Terada, Biology Branch, Fisheries Division FAO.

RECOMMENDATIONS OF THE COMMISSION FOR MARITIME METEOROLOGY
ADOPTED PRIOR TO ITS FIFTH SESSION AND MAINTAINED IN FORCE

Rec. 27 (CMM-III) - INCLUSION OF DAYS OF METEOROLOGICAL PHENOMENA IN THE SPECIFICATIONS OF THE MARINE SECTION OF THE WORLD CLIMATIC ATLAS

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 32 (Cg-III),

CONSIDERING:

(1) That in 1956 the World Meteorological Organization published the "World distribution of thunderstorm days" (Publ. No. 21.TP.21, 1956) to meet the requirements of the International Telecommunication Union, but that this publication (dealing with a climatic element) was not a detailed climatological study of thunderstorm activity,

(2) That the Responsible Members* should include thunderstorm frequency and number of days of other meteorological phenomena in the marine section of the World Climatic Atlas,

(3) That land climatological data for certain elements are usually expressed in terms of the number of days of their occurrence, whereas marine climatological data for the same elements from mobile ship stations are expressed in terms of percentage frequency of occurrence of the element,

RECOMMENDS:

(1) That Members be invited to investigate the statistical relations between percentage frequency of occurrence of selected meteorological elements and number of days of the same elements, firstly at the locations of ocean weather stations, and secondly on the basis of data from mobile ship stations, in so far as available, by studying consecutive observations covering periods of one day for fixed, limited, oceanic areas,

(2) That Members be invited to compare the results of these investigations for several varied geographic locations, for the same elements, to determine whether the relationships established in selected geographic locations are applicable in other locations,

(3) That these comparisons be submitted for consideration by the fourth session of the Commission for Maritime Meteorology.

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* See Recommendation 22 (CMM-III) in WMO Publication No. 101.RP.41.

Rec. 1 (CMM-IV) - MEASUREMENTS OF SEA SURFACE TEMPERATURE

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING Recommendation 8 (CMM-III),

CONSIDERING:

(1) That it has not been possible, up to now, to develop a uniform method of obtaining sea surface temperatures to the required accuracy which can be used economically and easily on merchant ships,

(2) That certain doubts have been expressed with respect to the absolute reliability, under certain conditions, of measurements obtained from condenser intake thermometers,

RECOMMENDS:

(1) That Members carrying out further studies on measurement of sea surface temperature:

(a) Devote particular attention:

(i) To making comparative measurements of temperature obtained from condenser intake thermometers using, amongst others, recording devices;

(ii) To developing a simple, cheap and reliable instrument for measuring sea surface temperature which could easily be used aboard voluntary observing ships;

(b) Keep the Secretary-General informed of the results obtained in these matters;

(2) That the Secretary-General be requested to send a circular letter to Members, drafted in consultation with the president of the Commission for Maritime Meteorology, inviting Members to make a special effort to improve the measurements of sea surface temperature at mobile ship stations.

Rec. 4 (CMM-IV) - MEASUREMENT OF WIND AT SEA

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING:

(1) Resolution 4 (CMM-III),

(2) The relevant part of the report of the CMM Working Group on Technical Problems,

CONSIDERING:

(1) That, for meteorological purposes, wind estimates at sea are not in all circumstances reliable enough, particularly in higher ranges of wind speeds and sometimes also at night,

(2) That there is a need for more precise wind data in these higher wind speeds,

RECOMMENDS that Members:

(1) Be urged to continue efforts to develop and install suitable fixed wind measuring equipment in ships and to educate seamen in its use;

(2) Be invited to keep the Secretary-General informed of developments.

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