WORLD METEOROLOGICAL ORGANIZATION

COMMISSION FOR MARINE METEOROLOGY

ABRIDGED FINAL REPORT OF THE SIXTH SESSION

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NOTE

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W O R L D M E T E O R O L O G I C A L O R G A N I Z A T I O N

CMM-VI (WMO - No. 344)

Errata

Page 3 - paragraph 2.3.3, insert "The principal delegate of the United Kingdom" after "The principal delegate of New Zealand"

Page 19 - paragraph 9.2.2.3, 4th line, amend beginning of line to read "observed by radiation methods (whether from ships, aircraft or satellites) and as observed in situ."

Page 51 - Resolution 5 (CMM-VI) DECIDES (e) (ii) 1st line, for "annual analysis" read "manual analysis"

Page 75 - Annex III, Table at foot of page, last line, centre column, delete "26.1 - 30.0"

Page 103 - Recommendation 25 (CMM-V) REQUESTS (1), amend "CMS" to read "CSM".

C O N T E N T S

Recommendations (continued)

LIST OF PERSONS ATTENDING THE SESSION

1. Officers of the session

S. L. Tierney	president	
J. M. Dury	vice-president	

2. Representatives of Members of WMO

M. A. Rebolledo	principal delegate	Argentina
D. R. Nasta	delegate	
D. J. Linforth	principal delegate	Australia
J. L. Van Hamme	principal delegate	Belgium
M. Bechèt	delegate	
J. M. Dury	delegate	
A. da Cunha Silva	principal delegate	Brazil
E. T. Duarte Moraes	delegate	
D. B. A. Mandengue	principal delegate	Cameroon
R. Lee	principal delegate	Canada
L. K. McGlening	delegate	
R. E. Vockeroth	delegate	
F. G. Huidobro	principal delegate	Chile
H. Valeur	principal delegate	Denmark
S. N. Venho	principal delegate	Finland
P. Lenoir de la Cochetière	principal delegate	France
P. Chavy	delegate	
J. Romer	delegate	
T. Tournier	delegate	
R. Höhn	principal delegate	Germany, Federal Republic of
H. O. Mertins	delegate	
Ch. Zaphiropoulos	principal delegate	Greece
E. W. K. Chu	principal delegate	Hong Kong

2. Representatives of Members of WMO (continued)

H. Sigtryggsson	principal delegate	Iceland
G. Abdolali	principal delegate	Iran
K. T. McLeod	delegate	
S. L. Tierney	principal delegate	Ireland
K. Hishida	principal delegate	Japan
M. Taniguchi	delegate	
S. Kawamura	delegate	
S. Fujimoto	delegate	
K. Uchikawa	delegate	
J. Masuzawa	delegate	
K. Agematsu	delegate	
I. Shimizu	delegate	
I. Imai	delegate	
M. Hanzawa	delegate	
M. Abu Gharbieh	principal delegate	Jordan
U. B. Lifiga	principal delegate	Kenya
E. G. Njoroge	delegate	
L. Tang	principal delegate	Khmer Republic
D. Son Chuong	delegate	
R. Ranaivoson	principal delegate	Madagascar
Jorge Martinez Campos	principal delegate	Mexico
W. D. Moens	principal delegate	Netherlands
B. M. Kamp	delegate	
J. A. Hunter	principal delegate	New Zealand
J. M. Babalola	principal delegate	Nigeria
H. Johansen	principal delegate	Norway
A. B. Crawford	principal delegate	South Africa
T. Thompson	principal delegate	Sweden
U. B. Lifiga	principal delegate	Tanzania, United Republic of
E. G. Njoroge	delegate	

2. Representatives of Members of WMO (continued)

S. Suwanpong	principal delegate	Thailand
G. I. Matveychuk	principal delegate	Union of Soviet Socialist Republics
F. S. Terziev	delegate	
G. M. Davydov	delegate	
V. K. Nekrasov	delegate	
J. K. Bannon	principal delegate	United Kingdom of Great Britain and Northern Ireland
G. A. White	delegate	
R. R. Fotheringham	delegate	
P. H. Kutschenreuter	principal delegate	United States of America
J. M. Frosio	delegate	
R. C. Junghans	delegate	
M. W. Mull	delegate	
R. G. Quayle	delegate	
W. H. Quinn	delegate	
N. K. Mulamba	principal delegate	Zaire
Y. Ikoma	delegate	

3. Observer from non-Member country

Rev. Father J. Hennessy, S. J.	The Holy See

4. Observers from other international organizations

E. Abe	International Radio Marine Committee (CIRM)
G. Tomczak	Food and Agriculture Organization of the United Nations (FAO)
T. Maruo	International Chamber of Shipping (ICS)
B. Okamura	Inter-Governmental Maritime Consultative Organization (IMCO)
B. Thompson	Intergovernmental Oceanographic Commission (IOC)
G. Yamamoto	International Union of Geodesy and Geophysics (IUGG)
W. Magistretti	United Nations (UN)
B. Thompson	United Nations Educational, Scientific and Cultural Organization (Unesco)

5. Invited Expert

V. D. Rockney (U.S.A.)	President, Commission for Instruments and Methods of Observation

6. WMO Secretariat

N. L. Veranneman	Representative of the Secretary-General
G. Verploegh	Chief, Ocean Affairs Branch
Miss I. Carter	Technical Officer

AGENDA

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GENERAL SUMMARY OF THE WORK OF THE SESSION

1. OPENING OF THE SESSION (Agenda item 1)

1.1 The president, Mr. S. L. Tierney (Ireland), declared the sixth session of the Commission open at 10.00 a.m. on 9 October 1972. He welcomed all participants to the session and gave the floor to Mr. U. Kagei, Director-General of the United Nations Bureau of the Ministry of Foreign Affairs of Japan.

1.2 Mr. U. Kagei extended a hearty welcome to all participants. He pointed out that Japan was a country strongly influenced by marine meteorological conditions and referred to the serious damage caused by typhoons. He stated that mankind was confronted by the serious problem of environmental pollution which needed a solution and believed that international co-operation in the field of natural science was no less important than in the fields of political and economic problems in order to secure and promote peace in the world. He pointed out the important role that marine meteorology could play in this respect and concluded by hoping that all participants would enjoy their stay in Japan to the fullest extent.

1.3 Dr. D. A. Davies, Secretary-General of the World Meteorological Organization, thanked the Government of Japan for its kind invitation to host the sixth session of the Commission for Marine Meteorology and the WMO Technical Conference on the Means of Acquisition and Communication of Ocean Data which had preceded it, in Tokyo. He thought it appropriate to highlight, in this relation, the consideration being given by the Japanese authorities to the introduction of a meteorological geostationary satellite system which would be of great value, not only to the World Weather Watch (WWW) and the Global Atmospheric Research Programme (GARP), but also very much to marine meteorology, for obvious reasons. He then referred to the informal meeting which the Japan Meteorological Agency was convening to discuss the plans for this system; he expressed his belief that Members represented at CMM-VI would no doubt wish to attend. The Secretary-General pointed out that marine meteorology, well over a century ago, had given the impetus to the convening of the first international meteorological conference in Brussels; ever since, marine meteorology had been of great concern to national Meteorological Services. There was a growing awareness of the oceans as an essential element of the human environment and of the need to use their resources rationally while keeping pollution to a minimum. He expressed the view that it was fortunate that WMO had the Commission for Marine Meteorology as a long-established and smoothly working constituent body, ready to deal with ocean affairs, present and emerging, in so far as they involve WMO. He emphasized that this was well recognized by Sixth Congress in 1971 which urged CMM to devote its primary attention to pursuing a vigorous programme of applications. CMM had before it many items of importance, some reflecting questions of a traditional nature, and others which reflected modern trends and which involved co-operation with other international organizations in programmes such as the Integrated Global Ocean Station System (IGOSS). He encouraged the Commission to plan its future work programme in such a way as to ensure that priority issues would be clearly identified so

that available resources, particularly in expertise, would be utilized in the best possible manner. The Secretary-General extended his best wishes for a successful meeting under the expert guidance of Mr. S. L. Tierney, president of CMM.

1.4 Dr. K. Takahashi, Director-General of the Japan Meteorological Agency, stated that it was a great pleasure and honour to greet all participants in his official capacity as Permanent Representative of Japan with WMO. He pointed out that international co-operation in the field of meteorology started with marine meteorology for the purpose of assisting ocean navigation. In 1973, the World Meteorological Organization would be celebrating the IMO-WMO Centenary, but the history of CMM might be said to date back to the first International Conference on Maritime Meteorology held in Brussels in 1853. Since Sixth Congress, the scope of the Commission had been broadened thereby increasing its importance. Dr. Takahashi stated that it gave him great pleasure to know that the sixth session of CMM was being held in Japan and concluded by hoping that the session would have creative and fruitful discussions.

1.5 The president of CMM, Mr. S. L. Tierney, thanked the previous speakers for their statements and indicated that their comments provided a suitable background for the work of the session. He welcomed the delegations present, as well as representatives of other organizations, and remarked that their presence indicated their keen interest in the status of CMM within the WMO structure. During the coming session, CMM would have to deal with many tasks so as to enable it to give effect to the directive from Sixth Congress that the Commission should embark upon a vigorous programme of the application of meteorology to marine affairs.

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 report on credentials.

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 established, each assigned with specific agenda items; Committee A dealing with agenda items 7, 8, 9, 11 and 17, and Committee B dealing with agenda items 6, 10, 12, 13 and 14. Mr. J. M. Dury (Belgium) was elected chairman of Committee A with Mr. H. Johansen (Norway) as vice-chairman. Mr. M. Mull (U.S.A.) was elected chairman of Committee B.

2.3.2 Co-ordination Committee

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

2.3.3 Nomination Committee

A Nomination Committee was established consisting of:

The principal delegate of Argentina
The principal delegate of Kenya and the United Republic of Tanzania
The principal delegate of New Zealand
The principal delegate of the United States of America
The principal delegate of the Union of Soviet Socialist Republics.

2.4 Other organizational questions (Agenda item 2.4)

Under this item the Commission established its working hours for the duration of the session. It also decided that the minutes of the plenary meetings which it had not been possible to approve during the session, could be approved by the president of the session, 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 fifth session and endorsed the follow-up action taken by the president on questions arising from reports of working groups and rapporteurs.

3.2 The Commission noted with satisfaction that the Advisory Working Group had fulfilled a very useful task in advising the president on the co-ordination of the work between the various working groups of CMM; its advice had been a great help to the president on matters which required action during the intersessional period. The Commission agreed that the Advisory Working Group should be re-established and that its membership should be extended to include the chairmen of all CMM working groups. Resolution 1 (CMM-VI) was adopted.

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

The Commission noted the reports of the various working groups and rapporteurs. It expressed its deep appreciation for the amount of time and effort spent by the experts concerned in dealing with the problems under study and providing the Commission with a clear account of the results obtained and conclusions drawn. The reports were formally presented to plenary and then studied in detail by the working committees under the relevant agenda items.

5. MARINE METEOROLOGY IN RELATION TO WORLD WEATHER WATCH SYSTEMS (Agenda item 5)

5.1 The Commission noted that the 1972-1975 World Weather Watch plan and implementation programme provided for the mobile ship stations to continue as the main source of ocean surface observations and that this plan envisaged a 25 per cent increase in the number of such ships. Furthermore, the Commission was informed that around 1975, one could expect greatly improved telecommunication methods for the collection and transmission of observation data from ocean stations, especially mobile ships. Among these, satellite data collection systems are pre-eminent.

5.2 Most of the subjects discussed under the various items on the agenda act directly or indirectly in support of the implementation of the World Weather Watch plan. The session had entered under this item its conclusions on the following points:

(a) Collection and dissemination of surface, sub-surface and upper-air synoptic observation data from mobile ships; and

(b) Telecommunications intended for meteorological services to marine activities.

5.3 Collection and dissemination of surface, sub-surface and upper-air synoptic observation data from mobile ships

5.3.1 The Commission noted that in order to meet the needs of the WWW and GARP, it was of prime necessity to improve as much as possible the collection of surface and upper-air reports from mobile ships. It considered that the same applied to marine meteorology because of the increasing assistance it has to provide to ocean activities.

5.3.2 In the framework of the present collection and dissemination system (ships; coastal radio stations; GTS), and in view of the recommendations adopted by CMM by correspondence in 1971 and approved by EC-XXIV, the Commission concluded that the existing international procedures were sufficiently sophisticated for the optimum operation of the system. However, the Commission wished to underline again the apparently insuperable difficulties presented by radio watches aborad ships with a single operator, which restrict the duty periods of operators and hence the transmission times to eight hours a day. The Commission considered that the real problems within the purview of WMO were the inadequacies in the implementation of the procedures by Members because of the lack of appropriate means in many cases. The major problems still outstanding are:

(a) The absence or lack of efficiency of coastal radio stations in many collection areas;

(b) The all too frequent shortcomings in data collection at the national levels;

(c) The insufficient re-transmission of ocean observations on the GTS, as a great number of data are not relayed by National Meteorological Centres and Regional Telecommunication Hubs.

With regard to point (a), the Commission adopted Recommendation 1 (CMM-VI).

5.3.3 In the opinion of the Commission the collection of observations at sea would be satisfactorily solved only through the introduction of a satellite system able to carry out an automated collection of data provided by automated observation stations on properly selected mobile ships and buoys. The Commission noted with great interest that EC-XXIV recognized the necessity of co-ordinating the various systems of operational meteorological satellites in view of the importance of the problem of collecting observations from various platforms (particularly from the oceans). It greatly appreciated being informed that, for the need of the WWW and GARP, Members concerned were at present studying the setting up of a "Satellite Data-collection System". It agreed that such a system would also be most useful to marine meteorology and adopted Recommendation 2 (CMM-VI). As far as this work will be co-ordinated by WMO bodies, CMM expressed its wish to collaborate in the study of some aspects, particularly those concerning the subsequent effects on ship equipment. On the other hand, the Commission decided to follow closely the studies carried out by IMCO, ITU and CIRM in order to implement improved maritime mobile services, particularly through the MARSAT project.

5.3.4 The Commission was informed that the telecommunication aspects of the IGOSS BATHY Pilot Project required appropriate and urgent measures by the Commission for Basic Systems and the regional associations. It requested the Secretary-General to bring to the attention of these bodies the interest which CMM has in a general dissemination of bathythermal data for the success of the project. The Commission noted that the regional associations and CBS intend to study very soon the operational implications of the telecommunications.

5.3.5 The Commission realized the increase in the use of R/T on board ships for passing messages from ship to shore. Members were reminded that all meteorological data, whether passed by W/T or R/T, should be routed into the national collecting centres for international exchange in the normal manner.

5.4 Telecommunications intended for meteorological services to marine activities

5.4.1 The Commission recognized that the use of radio telegraphy using the Morse code for broadcasting weather bulletins intended for the high seas is no longer adapted to meet the overall user needs in many cases. Other telecommunication methods such as radio-telephony and radio-facsimile have proved to be efficient. Nevertheless, the Commission agreed that it was premature to try to introduce a world-wide system, based on one or the other of these techniques. But the Members are strongly encouraged to supplement, where appropriate, their traditional systems by more efficient ones. In particular, the Members should consider the introduction, as soon as possible, of radio-facsimile transmissions intended for marine activities, in addition to their

already existing transmission systems. The Commission considered that in the interests of the users, it is desirable to attempt to standardize the drum speed (scan rate) and the index of co-operation in facsimile transmissions intended for marine users. The Commission adopted Recommendation 3 (CMM-VI).

5.4.2 The Commission considered that it was not essential to establish international regulations covering meteorological data transmissions for coastal waters. Appropriate measures fall essentially within the province of the national level. In arriving at this conclusion the Commission was reminded of the specifications of Recommendation 4 (CMM-V) relating to the use of VHF transmissions. It also noted the possibility of broadcasting warnings in plain language via stations broadcasting time signals for mariners on the high seas or in coastal waters, as reported by the U.S.A.

5.4.3 With respect to characteristics of Category A radio transmissions of meteorological bulletins and warnings for the high seas, the Commission considered that it was necessary to specify the general characteristics of these transmissions (types of modulation, frequency bands and maybe power). As the only requirement was to ensure the possibility of satisfactory reception in the whole area to be covered, the Commission was of the view that it was incumbent on the CBS Working Group on the Global Telecommunication System to define these characteristics and to arrange for their inclusion in the appropriate WMO publications.

5.4.4 From the above considerations, it is obvious that the Commission has to follow closely the requirements in respect of the collection and dissemination of observational and processed data. In view of the decisions of Sixth Congress and for purposes of rationalization, the Commission decided not to establish a working group on telecommunications. However, it considered that it was necessary to increase to two the number of CMM experts on the CBS Working Group on the Global Telecommunication System. These two experts should work together closely and, whenever necessary, with the members of CMM through its president.

6. MARINE METEOROLOGICAL SUPPORT SERVICES (Agenda item 6)

6.1 Developments regarding marine meteorological services

6.1.1 The Commission reviewed the present international system of meteorological services to marine activities on the basis of the report of the CMM Working Group on Requirements for Marine Meteorological Services, reproduced in Report No. 4 in the WMO Marine Science Affairs series, and other documents presented to the session. It noted that, at present, weather bulletins and storm warnings constitute the basic element of the international system of responsibilities of Members for marine meteorological forecasts, which is primarily based on considerations concerning safety of navigation.

6.1.2 The Commission noted in this connexion the marked widening of interest in the ocean which has become manifest in recent years. Off-shore mining on the continental shelf or in the deep sea is a spectacular example. Another marked development is the drastic change in the modes of sea transport as the result of the introduction of the container ship, the bigger and more specialized tankers and the

necessity of off-shore loading at various destinations. The Commission further noted that the demands for greater efficiency in maintaining schedules, because of high costs in ports, have resulted in some advanced Meteorological Services being requested to advise ship captains as regards the best route to take in crossing the ocean to avoid, as far as possible, adverse weather and sea conditions. Furthermore, mention was made of fisheries and fishery research having turned to meteorological and oceanographic centres for regular information on sea temperatures at and below the surface. The services that require to be expanded include, inter alia, forecasts regarding icing on ships and installations at sea, marine meteorological information required in the planning and construction of coastal constructions, protection against storm surges, services in relation to the abatement of marine pollution at sea surfaces, forecasts specially required for the operation of new sea vehicles such as hovercraft, and standardization of meteorological services in large ports.

6.1.3 In conclusion, the Commission noted that the weather bulletin for shipping which, apart from climatological advice, used to be the only service given to those working at sea, had been extended by a series of specialized information products originating from newly-created units in meteorological centres staffed by specially trained personnel. In the light of this development, the Commission felt that the time had come to update the relevant WMO publications and the terminology used therein, and, also, to establish within the Commission a new mechanism for the co-ordination at the international level of the various traditional and new marine meteorological services where such co-ordination is required. These actions would also be in line with the desire expressed at Sixth Congress, namely that CMM should give its primary attention to pursuing a vigorous programme of applications.

6.2 Review of relevant WMO publications

6.2.1 The Commission recognized that, as a consequence of decisions taken by Sixth Congress, updating of WMO regulatory publications is now in general progress. In consequence of these decisions and those taken by CMM-V, the president of CMM had initiated a number of actions which resulted in several proposals having been submitted to the session. As had been mentioned by CMM-V, the text of the chapter of the WMO Technical Regulations, entitled "Meteorological services to marine activities", is outdated and should be put in a more orderly form consistent with the other chapters. Furthermore, Sixth Congress requested an overall review of WMO Publication No. 9 of which Volume D contains information for shipping; this review should take into account the need for consistency in the forms in which WMO technical regulatory material is published, i.e. the Technical Regulations, manuals as annexes to Technical Regulations and guides containing recommended practices and further explanatory material.

6.2.2 As a result, the Commission was presented with a draft revised Chapter C.1 of the Technical Regulations, which described in a form consistent with other chapters of that publication the system under which Members have assumed responsibilities for the regular issue of warnings, synopses and forecasts for the high seas and the content of these responsibilities. Furthermore, the text concerning marine meteorological services for coastal areas and off-shore waters was updated. The Commission considered that the draft Technical Regulations constituted a basic step towards reflecting the

expanding services to marine activities. Action taken by the Commission on this draft is recorded under agenda item 14.

6.2.3 According to the new concept, a further explanation and description of the marine meteorological services system should be given in the form of a guide, and the Commission was pleased to note that work on such a guide had already started in implementation of a decision by the Executive Committee. The decisions of the Commission regarding this guide are recorded under agenda item 12.

6.2.4 Up till now, most of the information (regulatory, guidance and operational - e.g. schedule of transmissions) regarding marine meteorological services was contained in Volume D of WMO Publication No. 9. In view of the work done on the revision of Chapter C.1 of the Technical Regulations, and on the new guide, a revision of the layout of Volume D is now possible. The Commission concluded that only information of an operational nature should be retained in Volume D; its detailed conclusions on this matter are recorded under agenda item 12.

6.3 Establishment of a Working Group on the Marine Meteorological Services System

Having ascertained that the first task, i.e. updating of relevant WMO publications and the terminology used therein, is in full progress, the Commission proceeded with the second task, i.e. consideration of a proper mechanism within the Commission for the co-ordination of marine meteorological services required at the international level. For this purpose the Commission decided to establish a Working Group on the Marine Meteorological Services System and adopted Resolution 2 (CMM-VI).

6.4 Symbols and information on marine facsimile charts

6.4.1 The Commission decided, in particular, that the new Working Group on the Marine Meteorological Services System should arrange for a consultation among marine-user groups concerning their preferences regarding symbols and information appearing on facsimile charts which are directed towards marine interests; tests of the proposed methods of presentation should be prepared by the working group after having made a further review of these proposals and before final approval is sought. Early action on this matter was urged, since standardization will facilitate wider use of facsimile by mariners. The Commission stressed that such symbols should be:

(i) Simple;

(ii) In conformity with recognized meteorological symbols if feasible; and

(iii) Presented in an uncluttered and clear manner, suitable for facsimile broadcast and reception.

6.4.2 In this connexion, the Commission noted with appreciation the work done by the rapporteur of the Working Group on Requirements for Marine Meteorological Services in connexion with symbols for marine facsimile charts. Standardization of

symbols for the routine meteorological charts transmitted by facsimile for marine users was considered an important problem and Recommendation 4 (CMM-VI) was adopted.

6.4.3 The Commission recommended the use, on a trial basis, of methods for presentation of information on special marine charts as described in Annex I. It was recognized that representation of additional parameters may be required to meet specialized needs. If such additional parameters are used, their presentation should be standardized. Examples of such parameters are total cloud amount, which is useful for astronomical navigation, and dew point for cargo protection.

6.4.4 The Commission considered that it would be desirable to indicate the existence of phenomena such as gales, storms and tropical cyclones on facsimile charts intended for marine users.

6.5 User requirements

6.5.1 The Commission considered that the study of user requirements is a continuous one and should have the full attention of the new working group. In this connexion the Commission noted with interest the plan of the Joint IOC/WMO Group of Experts on IGOSS Technical Systems Design and Development and Service Requirements to combine the IGOSS report on User Applications of Oceanographic Products and Services with the CMM report on Requirements for Marine Meteorological Services, and to bring out a comprehensive report on user requirements for environmental information. The Commission expressed the desire to be given an opportunity to review the complete draft of the combined report for detailed comment, before it is published with international status.

6.5.2 Still in relation to this subject, the Commission was informed of increasing demands, addressed to Meteorological Services, for information to be provided on frequency spectra and other characteristics of ocean waves, on a synoptic basis. The Commission considered that, in order to satisfy these demands, more stations on coasts and at sea should be equipped by Members with wave recording instruments (see Recommendation 10 (CMM-VI)). As this was of importance to IGOSS also, the Commission requested its president to bring this matter to the attention of the Joint IOC/WMO Planning Group for IGOSS.

6.5.3 The Commission considered that, as one of the actions to be taken on the studies made by the Working Group on Requirements for Marine Meteorological Services, Members should be encouraged to broaden gradually, to the extent possible, the services they provide to marine interests in the light of those listed as requirements in the report of the working group. In view of this, Recommendation 5 (CMM-VI) was adopted.

6.6 Near-gale warnings

The Commission noted the opinion expressed by Sixth Congress, namely that it may be desirable to make the near-gale warnings of wind of Beaufort force 7 mandatory for all parts of the world. It considered that near-gale warnings were not required for the high seas, although they may be of value in certain waters near coasts.

The Commission, therefore, concluded that near-gale warnings should not be made mandatory for all parts of the world.

7. MARINE CLIMATOLOGY (Agenda item 7)

7.1 Marine Climatological Summaries

The Commission noted the report of the chairman of the Working Group on Marine Climatology and expressed appreciation on the progress made in the last four years. Satisfaction was expressed on the publication by some responsible Members of Marine Climatological Summaries for their areas of responsibility. It is expected that further summaries will be forthcoming in the near future. Some of the areas of responsibility for which 1964 summaries have not yet been published contain polar areas and the tables for these summaries require modification. The Commission approved the detailed proposals for the modifications recommended by the Polar Panel of the Working Group on Marine Climatology and adopted Recommendation 6 (CMM-VI).

7.2 The Historical Sea-surface Temperature Data Project

7.2.1 The Commission appreciated being informed of the background and progress of this project which had been initiated by EC-XVI. The object of the project was to publish a volume giving sea-surface temperatures as far back in time as possible for each month for all oceans. A preliminary survey of data availability covering other parameters such as air temperature, air pressure and wind, showed that four Members, the Federal Republic of Germany, the Netherlands, the United Kingdom and the United States of America, could supply ships' observations over a long period, back to 1860, containing the necessary data. Subsequently, these four Members agreed to participate in the project and pilot studies were carried out by the Federal Republic of Germany and the United States of America to produce sample tables and programme proposals. Experts appointed by the four Members met in Geneva in October 1970 to determine the technical procedures to be used in the implementation of the project, the content and presentation of tables in the final publication and the expected time schedule involved. It was intended that the first set of tables containing monthly averages and other statistical data concerning sea-surface temperature, air temperature and wind should be published in 1974. Of primary importance to marine climatologists is the fact that the period covered by the Historical Sea-surface Temperature Data Project, 1860-1960, immediately precedes the commencement of the Marine Climatological Summaries Project.

7.2.2 In view of this, the Commission considered that the selection of the same representative areas in both projects had considerable advantages. The Commission agreed that the publication of marine data for over a century should go far towards satisfying the needs of scientists for such data to intensify research into climatic changes and, on a shorter term, into seasonal anomalies in conjunction with the problem of general atmospheric circulation. The Commission expressed its appreciation for the work undertaken already by the four Members concerned and its hope for the further successful implementation of the project.

7.3 Homogeneity tests

The Commission showed great interest in the homogeneity tests for marine meteorological data carried out in the United States. The original proposal for such studies had been presented by Dr. V. V. Filippov of the U.S.S.R. to the session of the previous Working Group on Marine Climatology. A preliminary report on the results obtained in the United States was presented to the session. Based on preliminary investigations using actual data over a very long period (more than 75 years) the tests were shown to discriminate with great detail between diverse data sets, particularly for air and sea-surface temperatures. Though investigations are still incomplete, these tests should prove to be quite valuable especially with regard to the Marine Climatological Summaries Project, the marine section of the World Climatic Atlas and the Historical Sea-surface-Temperature Data Project.

7.4 The World Climatic Atlas

7.4.1 The Commission discussed at length the period on which the marine section of the World Climatic Atlas should be based. There was general agreement that, in view of the data availability, the period should start in 1961 as proposed by the working group. The period 1961-1990 was supported by delegates who thought a 30-year period essential. Others were of the opinion that the need for the atlas did not permit such a long delay. The Commission was of the opinion that the homogeneity tests mentioned in paragraph 7.3, and which can also be used for testing homogeneity in time, may have meaningful results which could be taken into account before making the final decision. However, the Commission felt it advisable that Responsible Members should plan for the collection and processing of climatological data from island stations and coastal regions in such a way that there would be no unnecessary delay should the period 1961-1980 be selected.

7.4.2 It was brought to the attention of the Commission that Recommendation 27 (CMM-III) - Inclusion of days of meteorological phenomena in the specifications of the marine section of the World Climatic Atlas - had until now been kept in force. The Commission was of the opinion that the re-established Working Group on Marine Climatology should take the substance of this recommendation into account when providing advice for the preparation of the marine section of the atlas.

7.5 The International Maritime Meteorological Punch-card

7.5.1 The Commission was informed that a complete documentation had been prepared on the original layout of the International Maritime Meteorological Punch-card (IMMPC) and on all subsequent changes both to the layout and in the codes; furthermore, that arrangements had been made for its publication in the revised edition of the Guide to Climatological Practices. This documentation was considered to be very useful and should be updated as necessary.

7.5.2 The new SHIP code form, which will come into force on 1 Janury 1975, will necessitate a major change in the layout of the IMMPC. The Commission considered

that it would be advantageous to use the opportunity to introduce several new requirements for information to be included in the punch-card, such as a responsible-country indicator and a ship number of at least four positions which would be of use for track-checking the data and other purposes. The Commission felt that a completely new layout of the IMMPC would be the best way to ensure the necessary similarity between the punch-card and the log-books, on the one hand, and the new international SHIP code form on the other.

7.6 The Beaufort scale of wind force

The Commission was informed that the use of the new equivalent wind speeds for the steps in the Beaufort wind scale had some effect on the marine climatological summary tables. It agreed with the Working Group on Marine Climatology that, in view of the fact that the decision of EC-XXII (general summary, paragraph 4.9.2) was made at a date when some summaries were in an advanced stage of publication and that ten-year summaries need to be prepared for the decade 1961-1970, the best solution would be to use the old equivalents throughout the summaries for this decade. While, through its Recommendation 16 (CMM-VI), the Commission recommended the introduction of the new equivalents of the Beaufort scale for operational purposes as from the date of introduction of the new SHIP code, it decided that they should be used in the Marine Climatological Summaries for the decade 1971-1980.

7.7 Quality control of data

The Commission noted that four of the nine Responsible Members are practising automatic quality control of their marine climatological data and that three others have computer programmes under development. An exchange of detailed descriptions of the procedures concerned between the Responsible Members had been organized by the Working Group on Marine Climatology. The Commission supported these developments, not only because they prevent an otherwise inevitable duplication of efforts, but also because this procedure leads automatically to a certain similarity between the programmes, which ultimately may result in uniform quality standards of the data collected by Responsible Members.

7.8 Data exchange media

7.8.1 The feasibility of introducing data exchange media other than punch-cards had also been discussed by the working group. The Commission agreed with the conclusions of the working group that:

(a) Magnetic tape should be introduced as a standard medium in addition to punch-cards;

(b) Members preferring to use magnetic tape instead of punch-cards should also accept punched cards from and/or supply punched cards to Members using punch-card equipment;

(c) The obligations of Members (Responsible or not), who prefer the use of punch-cards should not change by the introduction of magnetic tape as an additional medium of exchange;

(d) Members wishing to exchange their observational data on other media than punch-cards or magnetic tape (e.g. as print-outs in case of very small numbers of observations) should arrange for this exchange on a bilateral basis.

7.8.2 At present the following specifications for magnetic tape are acceptable to the Responsible Members wishing to use magnetic tape as a medium of exchange:

Bandwidth:	12.7 mm ($\frac{1}{2}$ inch), 9 track
Density:	800 bits per inch
Recording mode:	EBCDIC (Extended Binary Coded Decimal Interchange Code)
Blocking factor:	10
Card image format	

The Commission considered this set of specifications to be an acceptable basis for initiating the exchange of marine data by tape, but thought it essential that they should be reviewed in the light of experience and/or new developments.

7.9 Exchange of marine meteorological data

7.9.1 The Commission noted that recently there had been some misunderstanding concerning the arrangements for the exchange of marine meteorological data specified in Resolution 35 (Cg-IV). The Commission understood that INVITES (4) of this resolution refers to the collection, punching and exchange of original marine observations. INVITES (6) mentions the arrangements for providing duplicate copies of punch-cards on request on a repayment basis. This, of course, does not preclude reciprocal bilateral exchange agreements and the use of media other than punch-cards.

7.9.2 The Commission noted that, in some instances, very long delays were experienced in providing punched cards to Responsible Members and that, despite the time-table given in Recommendation 7 (CMM-V), a recently conducted inquiry had shown that the exchange of data for the years 1961-1963 had not yet been completed. The Commission urged Members concerned to offer their full support for the timely implementation of the arrangements specified in Resolution 35 (Cg-IV).

7.10 Exchange of sea-surface current data

The Commission considered a proposal from the Netherlands for the international exchange of sea-surface current data from selected ships in view of their eventual inclusion in the marine section of the World Climatic Atlas. The Commission felt that these data should be included and decided that the re-established Working Group on Marine Climatology should make suitable arrangements for the exchange and storage of these data in close co-operation with IOC.

7.11 Exchange of sea-ice observations

The Commission noted the request of the Polar Panel of the Working Group on Marine Climatology for an international exchange of all available sea-ice observations. There was some dissension on the inclusion of plain language reports on sea ice in this exchange. The Commission decided that the re-established Working Group on Marine Climatology should study this problem and the possible inclusion of sea-ice information in the "standard" Part A of the IMMPC.

7.12 Types of data to be stored through the Global Data-processing System

There was some discussion on the types of data to be included in the ultimate storage and retrieval system of the Global Data-processing System (GDPS) in addition to those exchanged via the Global Telecommunication System (GTS) on the basis of a list of data, proposed by Members, technical commissions and other international organizations which was presented to the session. The Commission was of the opinion that this list needed further consolidation and revision. The broad categories of data in which CMM is interested are the following:

Sea-surface currents;

Storm surges and abnormal tides;

Measured wave data;

Sea-ice data;

Pollution data.

The Commission considered that, in this respect, close co-operation with IOC was essential.

7.13 Oceanic water balances

The Commission noted with interest the information supplied regarding the existence and work plan of the joint IOC/WMO panel charged with preparing water balances of the oceans in view of their possible relation to the Marine Climatological Summaries Project. However, as no information had been supplied regarding the period on which calculations would be based, the Commission felt that it was not in a position to make suggestions at this stage.

7.14 Re-establishment of the Working Group on Marine Climatology

The Commission felt that several of the problems mentioned in the preceding paragraphs require further examination by a working group. The Commission noted that the two Responsible Members not represented on the last Working Group on Marine Climatology had nevertheless participated actively in the work of the group. The Commission felt that the re-established Working Group on Marine Climatology should be composed of one expert from each Responsible Member and adopted Resolution 3 (CMM-VI).

8. SEA ICE (Agenda item 8)

8.1 Codes for reporting sea ice

8.1.1 ICEOB and ICEAN codes

The Commission considered the codes which, after their development by the Working Group on Sea Ice, had been revised by a rapporteur in the light of comments received from the CBS Working Group on Codes. The Commission recommended the approval of the ICEAN Code with minor revisions for international use as from 1 January 1975 and adopted Recommendation 7 (CMM-VI). The Commission, noting certain inconsistencies in the ICEOB Code, referred it to the re-established Working Group on Sea Ice to consider the possibility of combining the ICEAN and ICEOB Codes, or failing that, to develop a final form of the ICEOB Code for consideration for approval by correspondence by 1 July 1973.

8.1.2 ICE group appended to SHIP reports

The Commission noted Recommendation 22 (CSM-V) and recommended that the group c_2KD_ire be retained as an optional group in the SHIP code form. At the same time the Commission realized that the specifications of the symbolic letter K were to some extent outdated as pointed out by the second session of the Working Group on Sea Ice and decided that the re-established Working Group on Sea Ice should make suitable proposals for new specifications of this symbolic letter.

8.2 WMO Sea-ice Nomenclature

8.2.1 The Commission noted with satisfaction the publication of the WMO Sea-ice Nomenclature in the English and Russian versions and that the amendments adopted by Recommendation 36 (71-CMM) were incorporated. The Commission also noted that the French text is in preparation and that the Spanish text was under consideration by the Rapporteur on Nomenclature.

8.2.2 A consideration of the "concentration" terms revealed the need to redefine the term pack ice. Further, the Commission also noted that in some areas (e.g. in Greenland and Antarctic waters) ice of land origin may be present in sufficient quantities to require reporting of its concentration.

8.2.3 While being aware of the practical problems resulting from changes in the nomenclature the Commission considered the need to amend the nomenclature to be sufficiently important to warrant its consideration by the re-established Working Group on Sea Ice.

8.3 Illustrated Ice Nomenclature

The Commission noted with satisfaction the publication of the illustrated glossary. The Commission was aware of the wish to replace some of the illustrations

by ones which may more clearly illustrate the terms in question and noted with satisfaction that Members have been invited to submit illustrations to the Secretariat for consideration by the working group.

8.4 Ice symbols

8.4.1 The Commission noted that, since the Working Group on Sea Ice adopted for appraisal the symbology proposed by the U.S.S.R., a considerable amount of editorial work had been done. However, the Commission also noted that several Members were concerned about the legibility of some ice symbols which were lost in facsimile transmission tests, particularly those relating to stages of development. Further, several Members had stressed that ice charts prepared with the draft set of symbols did not depict ice concentration sufficiently clearly to users.

8.4.2 The question was raised whether it might be desirable to use one set of symbols in such areas as the Baltic, Gulf of St. Lawrence, the Great Lakes, etc., and another set in the Arctic and Antarctic. In view of the above considerations, the Commission decided that further evaluation of the symbols and tests of the transmission of charts using these symbols should be undertaken and decided to refer the matter to the re-established Working Group on Sea Ice.

8.4.3 The Commission realized that it is both necessary and desirable for representatives of major users of ice charts to be consulted during the formulation of a final set of WMO ice symbols, but that the lack of an English version of the tables of ice symbols has made it extremely difficult for the Working Group on Sea Ice to consult these users and hence to complete the formulation of a standardized set of WMO ice symbols. The Commission therefore requested the Secretary-General to arrange, at an early date, for the preparation of an English version of the tables, in Russian, of ice symbols which appear in the draft document entitled Ice Symbols for Mapping Purposes, Arctic and Antarctic Research Institute, Leningrad (1971). Recommendation 8 (CMM-VI) was adopted.

8.5 User requirements

8.5.1 The Commission noted with satisfaction the work which had been accomplished by the Working Group on Sea Ice in the preparation of adequate sea-ice nomenclature, codes and symbols for many years. Part of the difficulty in arriving at satisfactory conclusions has been posed by the steady development of sea-ice science. Now that the static, descriptive stage in the development of sea-ice science has been superseded by a dynamic approach to the subject (e.g. AIDJEX, POLEX and equivalent suggestions for Antarctic work), the Commission expected that the remaining problems in the development of ice codes and ice symbols should be resolved before CMM-VII. Once agreement has been reached on these essential tools for the proper international exchange of sea-ice data, attention should be devoted to the assessment of user requirements for sea-ice information. The Commission supported the view held by the working group that this task should be divided into four parts:

(a) Assessment of the types of sea-ice information required for different uses;

(b) Assessment of specific national requirements for sea-ice information;

(c) Assessment of methods of storage and retrieval of sea-ice information;

(d) Assessment of means of improving services to users.

8.5.2 The Commission noted that by preparing the draft table of user requirements for types of sea-ice information, the working group had already gone some way towards the completion of assessment (a) above. Work is also proceeding under the guidance of the Rapporteur on Storage and Retrieval of Sea-ice Information towards the fulfilment of assessment (c) above. The Commission thus considered that a start had been made on a major assessment of user requirements but a great deal remained to be done which might appropriately be put to the re-established working group.

8.6 A guide for sea-ice observing

The Commission recognized the need for the preparation of a text of sea-ice observing methods to be included in the Guide to Meteorological Instrument and Observing Practices (WMO No. 8) and decided to refer this matter to the re-established Working Group on Sea Ice.

8.7 Re-establishment of the Working Group on Sea Ice

8.7.1 The Commission noted with satisfaction the work accomplished by the Working Group on Sea Ice. Since a great variety of questions need continuing study, the Commission decided to re-establish the Working Group on Sea Ice with similar terms of reference and with specific items referred for study to individual experts of the group. Resolution 4 (CMM-VI) was adopted.

8.7.2 The Commission further felt that two sessions of the working group should be held, one not later than December 1973 and one before the end of 1975, the latter one to be held for the purpose of drawing up final conclusions on oustanding items for presentation at CMM-VII.

9. MARINE ENVIRONMENTAL MONITORING INCLUDING OBSERVATIONAL PROCEDURES AND INSTRUMENTATION (Agenda item 9)

9.1 Introduction

9.1.1 The Commission considered this item mainly on the basis of the reports of the chairman of the Working Group of Rapporteurs on Technical Problems and those of the individual rapporteurs. It was recognized that observations from selected ships are now being used for a wide variety of purposes and, consequently, increased attention must be paid to the reliability of observations and the accuracy of instruments. The Commission was gratified to note that the various rapporteurs had devoted great attention to this particular aspect and that their reports contained improved guidance material for the observation of certain parameters. The Commission requested the president of CMM to arrange for the inclusion of this material, in a suitable form,

in the Guide to Meteorological Instrument and Observing Practices. More specific indications are mentioned under the sections of this report dealing with each of the rapporteurs' reports.

9.1.2 The reports of the rapporteurs contained, furthermore, useful background information on present developments in the observation of marine parameters. The Commission agreed that appropriate parts of these reports should be published in suitable WMO publications and requested the president of CMM, in consultation with the Secretary-General, to arrange for the selection of suitable material to be published.

9.2 Sea-surface temperature

9.2.1 Comparative study initiated by CMM-IV

9.2.1.1 The Commission noted that the CMM comparative study of sea-surface temperature measurements had come to a satisfactory conclusion. The response by Members to take part in the comparisons had been excellent and over 16 000 observations were obtained. The Commission wished to place on record its appreciation to the participating Members for their valuable contribution and to the U.S. Naval Oceanographic Office for having analysed this wealth of data. The Commission noted with satisfaction the publication of the results of this study as Report No. 5 in the WMO Marine Science Affairs series.

9.2.1.2 The Commission considered in this connexion the conclusions drawn by the Rapporteur on Sea-surface Temperature Measurement on the basis of these and other comparisons. It accepted the conclusion that it is not at present possible to stipulate a standard instrument for sea-surface temperature measurement. Instead, Members should be urged to ensure a high reliability and the greatest possible accuracy of measurement whatever the method used. Guidelines given by the rapporteur in this direction were considered highly useful by the Commission and it fully agreed with the suggestion made by the president of CIMO that a section should be included in the Guide to Meteorological Instrument and Observing Practices, to describe suitable recommended practices. The Commission requested the president of CMM to take appropriate steps in consultation with the Secretary-General, for the development of the recommended practices, taking into account the guidelines referred to above.

9.2.1.3 The Commission noted that its earlier quest for the development of a cheap, reliable, simple and robust instrument for uniform use had resulted in the development of several new types of bucket and trailing instruments. Although realizing that the entire problem is too complex to justify the adoption of a standard instrument, at this time, the Commission wished to encourage continuation of these efforts. In particular, the Commission noted with appreciation the successful work which had been carried out on the development of the new instruments for measuring sea-surface temperatures aboard merchant ships, the thermistor hose and the thermistor bucket, and which were demonstrated both at CMM-VI and, during the previous week, at the WMO Technical Conference on the Means of Acquisition and Communication of Ocean Data. The Commission requested the president of CMM to arrange for descriptions of these new types of instruments and their use to be inserted in the appropriate section of Chapter XVII of the Guide to Meteorological Instrument and Observing Practices.

9.2.1.4 Where the use of buckets and trailing instruments would not seem practical operationally or would not lead to reliable measurements, the Commission felt that remote reading instruments of good quality should be fitted whenever possible, and care should be taken that the sensors are properly exposed, particularly those sited in intakes. Recommendation 9 (CMM-VI) was adopted.

9.2.2 Most representative levels for measuring sea-surface temperature

9.2.2.1 The question whether certain representative levels for measuring sea-surface temperature could be defined was raised at CMM-V and, as a result, the Rapporteur on Sea-surface Temperature Measurement had investigated this matter. Following his reasoning, the Commission accepted the conclusion that the potential complexity of the thermal structure in the near surface layers of the sea at a particular instant does not permit the firm identification of a "representative" level to cover all occasions.

9.2.2.2 It was noted that the above-mentioned report and the conclusions of the Rapporteur indicated that significant thermal gradients can exist in the near surface layers under certain meteorological conditions. Until a standard instrument or measurement level is adopted, it is desirable for research and oceanographic applications to record in ships' meteorological log-books and in the lists of selected and supplementary ships the type of instrument used and the approximate sampling level. However, it did not appear that present operational meteorological requirements and procedures justify the inclusion at this time of this information in ships' meteorological reports.

9.2.2.3 The Commission noted that at the Technical Conference on the Means of Acquisition and Communication of Ocean Data, held in Tokyo the week preceding CMM-VI, the question was raised as to the relationship between sea-surface temperatures as observed in situ. Specifically, should the former be "adjusted" to agree with the latter? The president of CMM was requested to keep this matter under review as it might affect user requirements.

9.2.3 Publication of parts of the report of the rapporteur

The Commission greatly appreciated the thorough studies made by the Rapporteur on Sea-surface Temperature Measurement in carrying out his tasks, and considered that this valuable information would form a welcome addition to the earlier WMO publications on this subject. The Commission therefore requested the president of CMM to arrange, in consultation with the Secretary-General, for the publication of the studies made by the rapporteur on Tasks II and III of his terms of reference.

9.3 Review of trials on the proposed Guide to Reporting Precipitation at Sea

9.3.1 The Commission noted with appreciation the report of the rapporteur. His review of the results of trials completed on the guide proposed in the annex to Recommendation 8 (CMM-IV) was based on reports from Japan, the Netherlands and the United Kingdom. The report also took into account further information supplied by the Federal Republic of Germany and the Netherlands and published material regarding the

relationship between visibility and precipitation. The review confirmed earlier conclusions that radar echoes do not provide a suitable criterion for classifying precipitation. It was also found that there is little point in referring to the degree of instantaneous intensity of precipitation (mm/h) since no international definitions have been laid down and national practices vary.

9.3.2 The rapporteur constructed a table which would assist observers to assess precipitation on a non-instrumental basis. The Commission recognized that this table, showing the most common relation between visibility and precipitation, if not affected by other phenomena, would be of value to observers aboard ships, and recommended that it be included in Chapter XVII of the Guide to Meteorological Instrument and Observing Practices. In using the table it is important to specify that the connexion between visibility and precipitation which is given in the table is mainly valid for precipitation of a continuous type. For showery weather, a wider range of visibility must be expected.

9.3.3 The Commission felt that the descriptions of precipitation for use by shipborne observers proposed by the rapporteur and slightly changed were not in conflict with the existing WMO definitions as contained in Recommendation 41 (CSM-V). It was therefore recommended that these descriptions also be included in the Guide to Meteorological Instrument and Observing Practices. However, as the Commission had no time to study in detail the proposed descriptions at the session, it decided that the new Working Group on Technical Problems should review these descriptions before their inclusion in the guide. The table referred to above and the descriptions of precipitation are contained in Parts A and B of Annex II to this report. As a first step, the Commission requested the president of CMM to bring this table and descriptions to the attention of the president of the Commission for Basic Systems with a view to securing his concurrence for synoptic meteorological purposes with their proposed use as an aid to shipborne observers.

9.4 Precipitation measurement at sea

9.4.1 The conclusions of the rapporteur were studies by the Commission. It was appreciated that the present situation regarding trials and experiments for the optimum installation of raingauges and tests with new models had been expounded with great clarity. The Commission agreed that the importance of continuing research and technical development should again be stressed, particularly with regard to measuring precipitation aboard fixed sea stations.

9.4.2 The Commission noted that regular reports of rainfall amounts from ocean weather stations and also from lightvessels had proved to be of great value in synoptic meteorology and that the series of measurements have now generally become long enough to justify effective use in climatology and in research projects including study of the water balance. As trials have indicated the possibility of sufficiently reliable measurements on board fixed ships, the Commission felt that the making of precipitation measurements should be encouraged wherever possible and, in particular, aboard vessels at fixed stations.

9.4.3 The Commission agreed that a suitable text should be included in the Guide to Meteorological Instrument and Observing Practices to indicate a recommended

practice for measuring precipitation on board ships and at fixed stations and requested the president of CMM to make the necessary arrangements.

9.4.4 The Commission recognized that, apart from the technical problems relating to the measurement of precipitation aboard moving ships, the evaluation of this type of data for synoptic use presents a yet unsolved statistical problem. Nevertheless, the Commission felt that this should not prevent any further research into the development of rainfall measuring techniques aboard moving ships.

9.5 Surface wind measurement at sea

9.5.1 The Commission reviewed the rapporteur's report on ships' problems highlighted during research projects, and also noted the report on investigations on wind structure at sea carried out by Japan in 1969 and prepared in accordance with Recommendation 11 (CMM-V).

9.5.2 Considering the information on the complexity of the wind structure at sea contained in these two reports, and noting the wide range of heights of anemometers currently in use and those proposed, viz. two to three metres on small unmanned buoys, and over 50 metres on large vessels, the Commission decided that a rapporteur should study and report on means of achieving compatibility of measured wind data. The Commission took this decision into account when adopting Resolution 5 (CMM-VI).

9.6 Observation and measurement of ocean waves

9.6.1 The Commission noted with appreciation the valuable work undertaken by the Rapporteur on Observation, Measurement and Forecasting of Waves, and the support he had received from experts selected in a number of maritime countries.

9.6.2 As regards a pictorial guide for the estimation and reporting of wave systems, the Commission noted the conclusion of the rapporteur that in no country a true illustrated guide for observers existed. The existing documents are albums or sets of photographs representing the state of sea for different wind forces of the Beaufort scale. These documents are thus mainly intended for the estimation of wind. The Commission considered that, if a pictorial guide is to assist in the coding of wave reports, it should help the observer in the particular problem of distinguishing between wave systems. The guide should thus depict the differences in appearance between the various stages of the development of wave systems, e.g. rising sea, fully arisen sea, declining sea, swell in various compositions, cross seas, etc. The Commission wished to stress, however, that two-dimensional representation of actual wave conditions, which are three-dimensional and also changing in time, could not serve as an atlas to guide the observer in the same way as, for instance, the cloud atlas, and that the pictorial guide on waves could only have an educational function.

9.6.3 The Commission felt that special photographs would have to be collected to provide the required instructive material. But as it would be difficult to obtain good photographs, other descriptive material such as drawings and paintings might be included. In any case, the photographs and other pictures should be accompanied by a description of the synoptic wave chart showing the particular wave system in relation

to the isobaric pattern over the ocean. The Commission, having agreed on the usefulness of such a guide, decided that an expert should further study this problem and that he should arrange, with the assistance of the Secretariat, for the collection of suitable photographs or other pictorial documents, and the preparation of a guide. The Commission arranged for this task to be carried out by an expert of the Working Group on Technical Problems (see Resolution 5 (CMM-VI)).

9.6.4 The Commission noted with interest the study by the rapporteur of the various uses made of visual wave observations in relation to the uses which can be made of data arising from wave recorders. This study showed that, although it is sometimes difficult to interpret individual wave observations in terms of prevailing wave systems, operational and climatological wave data prepared from those observations shows a remarkable consistency and thus forms a useful source of information for many purposes.

9.6.5 The Commission noted that, in his review of wave reporting practices, the rapporteur considered two alternative reporting procuedures to that at present in use. In one of these procedures, the first group of the wave section of the SHIP report would give the resultant wave height, i.e. an integrated value over all prevailing wave systems. The following code groups would contain, as at present, the parameters of the various wave systems which can be distinguished, e.g. sea and swell. In the second of these procedures, only the resultant wave height along with a mean wave period and predominant wave direction would be reported. It was pointed out that from a wave recorder, only the resultant wave height can be derived for synoptic purposes. The reporting of resultant wave height only would also simplify the work of the visual observer. In order to make a recommendation on the procedure to be followed, the Commission requested the Secretary-General to seek information along the lines indicated by the rapporteur from all Members regarding the use made of wave observations. The Commission also requested its president to inform urgently the president of CBS so as to permit the CBS Working Group on Codes to study the matter at its forthcoming session of the new coding needs resulting from the installation of wave recorders on ships and buoys, and to request the president of CBS to provide coding methods for the procedures outlined above. The Working Group on Technical Problems should consider the information obtained from the Secretary-General and the president of CBS and make a recommendation as to the procedure to be followed. This recommendation should be made as soon as possible and not later than July 1973 (see Resolution 5 (CMM-VI)). The Commission agreed that Members should be encouraged to equip ocean weather ships and research vessels with wave recording instruments. Recommendation 10 (CMM-VI) was adopted.

9.6.6 The increased use of wave recorders will necessitate the establishment of a uniform method for manual analysis of the wave record for synoptic purposes. The Commission noted the information assembled by the rapporteur and decided that the new Working Group on Technical Problems should make a further study of this problem, and recommend a standard method of procedure of analysis of wave records for synoptic records (see Resolution 5 (CMM-VI)).

9.7 Surface current observations

9.7.1 The Commission was informed of the growing need in oceanography for synoptic current observations and the request of the Joint IOC/WMO Planning Group for

IGOSS "that CMM, among others, give the subject immediate attention with the view to arranging for incorporation of current data in oceanic observations at an early date". In the light of improvements in navigational techniques and the strong need for ocean current data, the IOC Group of Experts on Oceanographic Research as it Relates to IGOSS recommended, at its session in September 1972, that observations of ocean currents derived from the ship's set should be provided on a synoptic basis. In particular, the IOC group was of the opinion that current measurements combined with corresponding observations of the surface wind would yield invaluable information on the space-time variability of ocean currents.

9.7.2 The Commission considered that synoptic ocean current observations made on shipping lanes and in coastal passages could also be of great use to national Meteorological Services in the provision of synoptic information to shipping and other marine activities. Ocean current data derived from the ship's set are among the earliest data collected by maritime Members for climatological purposes; however, up till now international co-operation was effected on a bilateral basis. As the Commission had also received requests to co-ordinate the exchange of this type of data for the purposes of storage and processing, it agreed that now the time had come to study the synoptic aspect as well. The study was included under the terms of reference of the new Working Group on Technical Problems. Particularly on this matter, the Commission requested its president to seek advice from an expert designated by IOC on the working group (see Resolution 5 (CMM-VI)).

9.8 Bathythermal observations

9.8.1 The Commission recalled the view expressed at its fifth session, namely 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. As a result of the discussions at that session, an enquiry was conducted among Members to ascertain their use of bathythermal data for meteorological purposes. The response to this inquiry indicated that such uses of bathythermal data covered a broad range of studies and provision of services.

9.8.2 Since CMM-V, some Members have reported that requests to take expendable bathythermograph (XBT) observations by Voluntary Observing Ships have been successfully met. While this is not within the normal responsibilities of voluntary observers, the Commission noted that if Members made special arrangements and provided a minimum amount of training, taking XBT observations was within the capability of the voluntary observer.

9.8.3 The Commission noted that the exchange of bathythermal observations within the framework of IGOSS was currently being carried out by a number of countries participating in the IGOSS BATHY Pilot Project. This project, which has been endorsed by EC-XXIV, is intended to permit, inter alia, the preliminary evaluation of the distribution and density of bathythermal observations and their suitability for describing oceanographic conditions. The Commission further noted that the requirements for bathythermal observations for oceanographic purposes had been determined through IOC inquiries, within the framework of IGOSS. Preliminary results of the IGOSS BATHY Pilot Project, while encouraging, indicate that the amount of bathythermal data is not sufficient to meet the requirements stated by several Members of WMO and IOC. Recommendation 11 (CMM-VI) was therefore adopted.

9.9 International Marine Voice Code

9.9.1 The Commission noted that the attention of its Advisory Working Group had been directed to the fact that a number of countries were developing their own simple code formats for the preparation of reports on weather, sea and ice conditions to shore by ships equipped only with radio-telephony. An inquiry conducted by the president of CMM in November 1970 provided useful information on these national practices and on similar codes developed by various international organizations, such as the IMCO International Code of Signals. The president of CMM had appointed a rapporteur to study the possibility of instituting a simple marine voice code for the transmission of reports in radio-telephony which would be readily intelligible to all recipients and which could easily be re-transmitted.

9.9.2 According to his report to the Commission, the main problem which the rapporteur encountered was that a voice code designed for use irrespective of language would necessarily become complicated and the Commission felt that it would be inadvisable to pursue this idea. It was also noted that the existing ITU code did not meet the requirements. The Commission considered that the new SHIP code form to be introduced in 1975, provided the possibility, by a selection of appropriate groups, to keep the work of the shipboard observer to a minimum while facilitating the international exchange of reports.

9.10 Co-operative scientific investigations

The Commission noted that a number of co-operative scientific investigations are at present being carried out or planned in various ocean areas. Some of these programmes, such as, the GARP Atlantic Tropical Experiment (GATE) and some co-operative investigations co-ordinated by IOC and other international organizations would be greatly assisted if Members of WMO could intensify their observational programmes on Voluntary Observing Ships for given periods, on request from the Secretary-General. It was stressed that for Members to co-operate in this way in these programmes it is essential that they be notified of the details of the co-operation required at least six months in advance. Recommendation 12 (CMM-VI) was adopted.

9.11 List of port meteorological officers

The Commission noted that the list of port meteorological officers which appears in Part C of WMO Publication No. 9, Volume D, is in some instances several years old. It considered that updating of this list would greatly enhance its value for ships' officers and suggested that, for this purpose, Members should be asked to submit to the Secretary-General an updated list of their port meteorological officers along with the annual list of selected, supplementary and auxiliary ships. Arrangements should also be made for the annual reprinting and distribution of the port meteorological officers list. Members should be encouraged to reproduce the lists in sufficient numbers for distribution to all ships co-operating in the WMO Voluntary Observing Ships' scheme. The Commission requested the Secretary-General to make the necessary arrangements.

9.12 Establishment of the Working Group on Technical Problems

As many of the technical problems which were discussed under this agenda item need further study, the Commission established a Working Group on Technical Problems with terms of reference as given in Resolution 15 (CMM-VI). The Commission agreed that some of the tasks of the group could more effectively be undertaken initially by one expert within the group; however, other items need consideration by the entire working group. The Commission therefore decided that the allocation of tasks to specific experts should be left to the chairman of the group.

9.13 IGOSS Pilot Project on Marine Pollution Monitoring

9.13.1 The Commission was appreciative of the fact that the IOC and WMO governing bodies had accepted IGOSS as an IOC initiative to be developed jointly by IOC and WMO. It recognized that IGOSS would benefit not only the oceanographic and meteorological communities, the latter particularly in respect to marine meteorology, but that it would also enable more complete services to be rendered to the rapidly developing ocean-user community through the interplay between the IGOSS services, marine meteorological support services, and the World Weather Watch. The Commission realized that its revised terms of reference, as adopted by Sixth Congress, had underlined the need for increased collaboration between CMM, its working groups and experts, and the joint IOC/WMO bodies involved in IGOSS work.

9.13.2 In respect of marine pollution monitoring, the Commission discussed the implications of the following developments:

(a) The formal recognition by the seventh session of IOC and by Sixth Congress of IGOSS as a basis for the development of an international marine pollution monitoring programme, as far as physical and some chemical variables are concerned;

(b) The subsequent proposal by the Joint IOC/WMO Planning Group for IGOSS, that it develops the plan for the IGOSS Pilot Project on Marine Pollution Monitoring, this proposal having been endorsed by the first session of the IOC Executive Council and falling fully within the spirit of the decision of Sixth Congress;

(c) The consideration by the 1972 United Nations General Assembly of a proposal that IOC, jointly with WMO and, as appropriate, in co-operation with other interested intergovernmental bodies, promote the monitoring of marine pollution, preferably within the framework of IGOSS.

9.13.3 The Commission noted that the recent first session of the joint IOC/WMO Planning Group for IGOSS had called on CMM to provide its assistance in the implementation of the IGOSS Pilot Project on Marine Pollution Monitoring. In addition to the monitoring of certain chemicals for which suitable observation methods are being developed, the project calls for the monitoring of relevant physical parameters such

as wind, state of sea, sea-surface and sub-surface temperatures, precipitation, currents, low-level atmosphere temperature profiles and salinity. That session opened the way for a proposal that the pilot project should be a gradually developing one which should initially concentrate on the monitoring of oil spills and slicks. For this purpose, IOC had called on CMM to examine the possibility of assisting through the system of mobile ship stations in:

(a) The making of visual observations of oil slicks;

(b) The gathering of surface water samples for analysis in appropriate land-based laboratories;

(c) The gathering of samples of precipitation at sea for analysis in land-based laboratories;

it being understood that the above activities would be called for in selected ocean areas.

9.13.4 The reactions of the Commission to this request are contained in Recommendation 13 (CMM-VI). In adopting this recommendation, the Commission realized that, in its work on certain aspects of observation methodology and instrumentation, it would need to call on the co-operation of other WMO bodies. It requested the president of CMM to make the necessary arrangements.

9.13.5 Under this agenda item the Commission also reviewed Resolution 19 (EC-III) entitled Use of Ocean Weather Ships for research purposes. The Commission was of the opinion that studies on marine pollution should be added to the list of subjects mentioned in this resolution on which Members of WMO operating ocean weather stations were requested to carry out investigations, and adopted Recommendation 14 (CMM-VI).

9.13.6 Movement of drifting pollutants with particular reference to oil spills

Following the Torrey Canyon accident, the president of CMM had appointed a CMM rapporteur to report on techniques for forecasting, in support of oil spill combat operations, the movement of oil spills under the combined effect of wind and currents. The Commission noted with interest and appreciation his interim report Environmental Support for Operations to Combat Oil Spills. It suggested that the final report be distributed as background information to Members and interested international organizations concerned with the establishment or development of forecast services for oil spill survey and clean-up operations. It decided to reappoint the rapporteur on the subject with the task of developing the review further. In this relation, it recommended that WMO give consideration to inviting IOC to make appropriate arrangements to co-operate with this rapporteur.

9.14 WMO incentive programme for Voluntary Observing Ships

9.14.1 The Commission noted with appreciation the report submitted by the rapporteur and discussed at length the various proposals contained therein. There was general support for the idea that a WMO international award, in addition to national awards, would go far towards maintaining enthusiasm among ships' officers for observ-

ing and transmitting marine meteorological observations. The information on national award schemes provided by the rapporteur showed that it would not be advisable to suggest any changes in national systems, but that the WMO international award should be used by Members in conjunction with their national systems. The Commission therefore recommended the institution of a WMO international award to voluntary meteorological observing ships, for outstanding services to the scientific and operational programmes of the Organization. The names of the ships to be awarded, the dates of the awarding ceremony which should be a combined national and international one and other details of the presentation should be determined by each Member according to national requirements. However, the Commission felt that co-ordination was needed with regard to the number of ships to be awarded by each Member each year, and suggested the following system:

Voluntary Observing Ships recruited by a Member	Maximum number of awards which can be presented annually
24 or less	1
25 to 100	2
101 or more	1 award for each additional 100 ships

9.14.2 The Commission, having thus expressed its ideas of how a WMO international award scheme might best be executed, requested the president of CMM to arrange for a detailed description of the scheme to be prepared if the idea of an international award is approved by the Executive Committee. An example of a certificate which might be presented to ships was available at the session but the Commission recognized that the final choice of a suitable award would rest with the Secretary-General in consultation with the President of WMO. Recommendation 15 (CMM-VI) was adopted.

9.14.3 In addition to the award, the Commission considered a proposal for the distribution by members wishing to do so, of a suitable certificate, carrying the name and emblem of WMO and to be signed by national authorities and an appropriate authority of WMO, to ships as a token of their participation in the WMO Voluntary Observing Ships' scheme. The Commission felt that the presence of such a certificate in the chart room or other suitable place in the ship would indeed have incentive quality in reminding ships' officers of the importance of their meteorological work and the widespread use of their observations. The Commission therefore requested the president of CMM to take appropriate steps, in consultation with the Secretary-General, for the preparation of the required certificate.

10. ACQUISITION AND DISSEMINATION OF MARINE ENVIRONMENTAL DATA (Agenda item 10)

10.1 The report of the chairman of the CMM Working Group on Observation Network at Sea and on Maritime Telecommunications, as well as the nine recommendations adopted by correspondence by the Commission in 1971, as a result of the work of this group, provided the main basis for discussing this point. The Commission noted with interest that EC-XXIV (May 1972) confirmed the approval of these recommendations, thus clarifying the situation concerning international regulations and procedures as related to networks and maritime telecommunications. In particular, the Commission acknowledged

the work accomplished by this group under the very capable leadership of its chairman. In the following paragraphs the Commission restricted its consideration to observing platforms.

10.2 Surface observations

10.2.1 As a first step, the Commission considered the capabilities of the present mobile ship stations for providing meteorological observations at sea. For several decades these ships have constituted the backbone of the synoptic observation system at sea for atmospheric and oceanographic elements required for meteorological purposes. Marine meteorology is especially dependent upon having information dense enough in space and in time, to enable it to provide the services requested from it in support of the safety and/or efficiency of various uses of the ocean. Evidently, the mobile ship stations will continue to play a fundamental role.

10.2.2 Already in 1968, the number of ships recruited exceeded 5 000 and this number is now approaching 7 000. Unfortunately this progressive increase in the number of ships is not necessarily translated into an increase in the number of weather reports, nor is it indeed a better spacial distribution. The reasons for this situation are numerous and well known; among these the most important are:

- Ship automation brings with it a decrease in personnel aboard;
- Meteorological equipment is often inadequate;
- The increasing number of ships plying under a flag of convenience.

Of equal importance are also the following points which affect the availability of observations:

- The restriction in the duty hours of radio operators on board ships;
- The serious deficiencies in the implementation and in the operation of the coastal radio station system, and the deficiencies, in some cases, in the gathering and the re-dissemination of the reports, particularly at the national and regional levels (see section 5).

10.2.3 Some Members wondered whether it might not be more appropriate to recruit fewer ships but to select them according to their greater ability to function as voluntary observing platforms; Meteorological Services would then be in a position to concentrate their efforts on the training of observers and on installing observational equipment on such ships. The Commission considered that this question should be studied further. Such a selection of ships will in any case be necessary when automated observational systems are introduced aboard mobile ships. The unanimous opinion of the Commission (see Recommendation 39 (71-CMM)) was that the gradual introduction of such automated observing systems would very soon become unavoidable, even if the resulting reports had to be routed via coastal radio stations, but particularly when data interrogation systems by satellites were put into operation. In this context, one delegation drew attention to a sort of paradox in the behaviour of meteorologists; during the past few decades, they had persistently claimed that observations carried out by merchant vessels were important, while affording but a minor amount of their resources to the provision of suitable observing equipment to those ships. Such behaviour, if it were to be maintained, would gradually lead to the exhaustion of the

precious source of information constituted by merchant vessels recruited as Voluntary Observing Ships in the framework of WMO. Recalling the discussions on the automation of observations during the Technical Conference organized by CMM jointly with CIMO and with the co-operation of IOC (Tokyo, 2-7 October 1972), the Commission invited the Secretary-General to give high priority to the publication of the lectures, if possible during December 1972 or January 1973. The Commission also agreed that a CMM expert should participate actively in the work of WMO bodies concerned with the automation of surface observations aboard ships, taking into account the work of appropriate IOC groups; it would also be useful for the expert to participate in the work of the Joint IOC/WMO Group of Experts on IGOSS Technical Systems Design and Development and Service Requirements.

10.2.4 In conclusion, the Commission considered that the existing international procedures adopted by WMO were adequate to allow quite a substantial improvement in the scheme. These procedures deal with the recruitment of ships, hours of observation, codes, role of meteorological port liaison officers, incentive programmes, and other matters related to observations at sea. The scheme's efficiency now depends on the extent to which Members have at their disposal the means to implement it further. As regards the developing countries, this aspect of the question received particular attention by the Commission. It was noted that the equipment of mobile ship stations, as essential elements of the WWW, was eligible for support under the Voluntary Assistance Programme (VAP), within the framework of the rules governing the use of this programme.

10.2.5 The Commission supported a proposal aiming at the updating of the chart "Ocean areas where the number of meteorological observations is inadequate" (WMO Pub. No. 9, Vol. D, Chapter I). Such updating should deal only with reports of surface observations at 0000 and at 1200 GMT and not with upper-air observation reports. As certain delegations expressed reservations on the proposed way of completing this work and considered that the results would be profitable only if the updated chart reflected the reports actually received in meteorological centres and took into account observations from island stations, the Commission suggested that the Secretary-General examine the possibility of obtaining, for the execution of this updating, the co-operation of World Meteorological Centres and selected Regional and National Meteorological Centres equipped with meteorological computers.

10.2.6 The Commission considered but did not examine in detail the various possibilities offered by ocean weather ships, by data buoys, and especially by meteorological satellites, knowing that relevant studies are being pursued under other WMO programmes, such as the WWW and GARP and, with respect to data buoys, also by IOC within the framework of IGOSS. It noted, on this occasion, that some of these systems should provide certain meteorological data such as atmospheric vertical temperature profiles and cloud cover, which are not presently provided by automatic stations; therefore, satellites and surface automatic stations can, in certain respects, complement one another. In respect of the ocean weather ships, the Commission wish it to go on record that these ships play, in the present circumstances and for the foreseeable future, an essential role in the provision of surface and upper-air observations for marine meteorological and other environmental purposes.

10.3 Bathythermal observations

The Commission discussed this question under agenda item 9.

10.4 Upper-air observations

10.4.1 The satisfactory trend in the number of ships equipped to make surface observations was unfortunately not followed in the case of mobile ships equipped for upper-air observations. Certain Members were able to slightly increase the number of such ships while others had to keep the numbers unchanged or to reduce it drastically for budgetary reasons. The Commission was of the opinion that this situation was extremely unfortunate. Also here the technical capabilities as well as the existing international rules are quite adequate and the problem is essentially one of means for implementation by Members. In this respect, the Commission noted that this problem, as well as that of assistance to developing countries, was recently the object of an appropriate recommendation (Recommendation 38 (71-CMM)) which was adopted by the Executive Committee.

10.4.2 In view of this situation and of the results of vertical temperature soundings by satellites in infra-red bands, the Commission considered that the upper-air programme by mobile ships might need to be examined from another angle. The purpose of one of the studies undertaken within GARP is to define the areas where the frequency of important cloud systems makes it impossible for the IR system of meteorological satellites to provide vertical soundings in quantities sufficient to meet the requirements. Therefore, it may be advisable to concentrate the efforts on the equipment of mobile ships as upper-air observation stations, on ships navigating mainly in areas of near persistent cloud cover. The Commission felt that CMM should participate, in an appropriate way, in the study of this new approach by the relevant WMO bodies. For this purpose, rather than forming a new working group and for rationalization purposes the Commission asked its president to request the CMM expert on the Working Group on the Global Observing System to participate in this study. This same expert should also be requested to study the new approaches mentioned above under the heading "Surface observations". In order that this expert may better represent the requirement of marine meteorology, the Commission requested that, through the president of CMM and according to the needs, the expert consult the members of CMM and provide them with periodic progress reports. Should developments in these two fields before the next session of CMM necessitate a revision in the international procedures governing the upper-air and surface observations by mobile ships, the Commission requested its president to take the necessary steps within CMM, including the possible re-establishment of a CMM working group.

10.4.3 The Commission recorded the results of its discussions on (i) collection and dissemination of synoptic surface, sub-surface and upper-air synoptic observations from mobile ships and (ii) telecommunications intended for meteorological services to marine activities, under agenda item 5.

11. CODES (Agenda item 11)

11.1 Code forms for use by different categories of sea stations

11.1.1 The Commission noted the new code form SHIP for surface reports from sea stations, which according to Resolution 14 (EC-XXII) will come into effect as from 1 January 1975. It recalled that the general code form had been developed to fulfil

requirements for a large variety of purposes and that it contains a number of figure groups which are "selective" and carry an indicator. It is possible, therefore, to select from the general code form a reduced one for ships which are not required to report all elements, by simply leaving out the figure group corresponding to these elements. The Commission therefore considered the question as to the necessity or desirability to maintain also, after the introduction of the new SHIP code form, reduced or abbreviated code forms for reports from sea stations to be used for special purposes. It concluded that it would no longer be necessary after the introduction of the new SHIP code form to define any abbreviated SHIP code form for uniform international use by certain categories of observing ships; the selection of groups to be reported should be made nationally, taking into account the instructions for such selections in the Manual on Codes.

11.1.2 The Commission arrived at this conclusion on the understanding that the wind group must always be included in reports from ships, regardless of the abbreviated form used. Any ship's meteorological report would therefore contain at least five groups, including the elements date/time, ship's movement/position, the station indicator group and wind. In addition, the Commission confirmed the view expressed in Recommendation 13 (CMM-V), namely that Members be encouraged to make mandatory the observing and reporting of wave conditions on selected ships recruited by them.

11.2 Reports from ships carrying uncertified instruments

Still in relation to the new SHIP code form, the proposal was made that, when a parameter is measured using an uncertified instrument, the tenth digit of the parameter (pressure, air-, sea-, and dew-point temperatures) is not reported and a solidus ("/") is used instead. The proposal, therefore, is to maintain the present procedure used in SHRED (reporting of whole units of air pressure to indicate a ship using uncertified instruments) and to expand the procedure to other parameters. The Commission saw great merit in this proposal and recommended its further consideration by the CBS Working Group on Codes.

11.3 New SHIP code form

11.3.1 The Commission noted that certain Members had informed the Secretary-General, in their comments on the new SYNOP/SHIP code forms, of the difficulties Meteorological Services would have if the date of 1 January 1975 were retained as the date of introduction of the new codes.

11.3.2 Among problems related to marine meteorology were mentioned the preparation and distribution of new log-books and coding instructions which would require a minimum time of two years.

11.3.3 Moreover, the Commission concluded that, in view of the inquiry mentioned in paragraph 9.6.5, it could not, at this stage, establish coding requirements on waves, which may bring out the need to make provision for the reporting of resultant wave measurements.

11.3.4 The Commission, being aware that CBS had been informed in detail of the difficulties through the comments of Members, felt that the marine meteorological aspects of the general problem should receive close attention and requested its president to bring this view to the attention of the president of CBS.

11.4 Code 1100 - Force of surface wind

11.4.1 The Commission considered the report submitted by the president of CMM, which contained an analysis of views expressed by Members on the remaining problems to be solved to enable a general introduction of the CMM-IV scale of equivalent wind speeds of the Beaufort wind scale. Since EC-XXII had approved the CMM-IV scale for use in scientific projects, the remaining problems were concentrated on the introduction of this scale for operational purposes. The Commission was of the opinion that the present situation of only a partial introduction of the new scale should not be allowed to exist for a long time and that a solution must be found. It highly appreciated the efforts of the president of CMM to find, in consultation with the president of CBS, a compromise solution which satisfies both international and national requirements for the use of the Beaufort wind scale.

11.4.2 The Commission recognized the existence of two national requirements of different nature which had to be taken into account. One related to wind estimates made at land stations. The Commission confirmed the earlier view that, since the CMM-IV scale refers only to observations made on board ship, suitable scales for wind observations at stations inland or at the coast should be determined nationally. The other national requirement referred to the use of the Beaufort wind notation in storm warnings and the desirability to maintain existing national criteria for the issue of hurricane warnings. The Commission felt that the solution presented by the president of CMM and which involved a new principle for the equivalent wind speed to be reported for Beaufort force 12, constituted an acceptable compromise between national and international requirements.

11.4.3 With regard to a new table for Code 1100, the Commission agreed with the view which had been expressed by several Members, namely that provision should be made for the reporting, by means of Code 1100, of wind speeds in knots as well as in whole metres per second. This requirement meant that the original CMM-IV scale, which is in tenths of m/sec, had to be converted into a scale of whole units of m/sec. The Commission accepted the solution presented in the report, noting that, as a result, the new scale in whole m/sec would make it somewhat easier for the observer to select an appropriate code figure (wind speed) for reporting. In conclusion, the Commission recognized that the Beaufort scale was, by its very nature, not a linear one and that this fact would always result in certain stepwise irregularities of scales of equivalent wind speeds, whatever the unit of wind speed chosen.

11.4.4 In adopting Recommendation 16 (CMM-VI), the Commission was aware that it had arrived at a workable solution of a very complicated problem, which was acceptable to most delegations. According to the recommendation, the new Code 1100 would only be used for the conversion of visually observed Beaufort wind estimates into wind speeds to be reported. The Commission therefore felt a need to include in WMO regulatory material, the original CMM-IV scale for recommended use in scientific and other

projects. It considered that the best place would be an appendix to Volume I of the WMO Technical Regulations. It therefore requested the Secretary-General to include the text contained in Annex III to this report in the proposals for amendments to the WMO Technical Regulations, for submission to Seventh Congress.

11.4.5 Next, the Commission considered the consequential amendments to WMO Publication No. 9, Volume D. It noted that classifications and specifications of tropical depressions (including tropical cyclones) used by Members in accordance with local requirements are co-ordinated regionally. The Commission therefore saw no point in maintaining in Volume D any general statement regarding these specifications which should hold for all Regions and decided that all references to wind speed equivalents should be deleted in paragraph 13.1.7.1 of Volume D, Part A, Chapter I.

11.4.6 The Commission noted that wind force in Beaufort notation appears in three other international codes and agreed that its president should bring the following suggestions to the attention of the president of CBS for action by the CBS Working Group on Codes:

Code 1144 - F_m: There is no need for a change;

Code 1800 - i: This code is very probably no longer in actual use internationally, and it should be withdrawn;

Code 3940 - T_i: Since wind observations on a weather chart are no longer indicated in Beaufort notation, reference to Beaufort force should be deleted and the code specifications should be expressed in steps of m/sec or knots.

11.4.7 The Commission was informed that the names given in WMO Publication No. 9, Volume D, to the wind descriptive terms in languages other than English needed updating. In this relation, the Commission considered that it would be useful if ships were supplied with the names of wind descriptive terms in the various languages of countries issuing forecasts for shipping and requested the Secretary-General to arrange for such a list.

12. MANUALS, GUIDES, AND TRAINING RELATING TO MARINE METEOROLOGY (Agenda item 12)

12.1 Guide to the Marine Meteorological Services System

12.1.1 The Commission, before considering the table of contents of the proposed Guide to the Marine Meteorological Services System, discussed the objectives of the guide. The Commission came to the conclusion that the proposed guide should, inter alia:

(a) Provide guidance in implementing the Technical Regulations;

(b) Provide guidance on the operations of a marine meteorological service;

(c) Consolidate the material relevant to marine meteorology which is now contained in various WMO publications.

12.1.2 The Commission reviewed the proposed table of contents and came to the conclusion that, in general, the guide when completed would meet the above-mentioned objectives. The Commission felt that distribution of the guide should be considered as a matter of urgency and decided that the completion of the guide should be assigned to a working group (see Resolution 2 (CMM-VI)).

12.1.3 While approving the table of contents of the guide (see Annex IV to this report), the Commission agreed that the completion of the guide should not be hampered by adopting an inflexible format. However, the Commission suggested that the following points should be taken into account in further developing the guide:

(a) Information on weather routeing services for ships should be included;

(b) Other international organizations such as FAO, IMCO, IOC, ICS and other marine bodies should be consulted in determining the requirements for specialized operations;

(c) The Working Groups on Marine Climatology and Sea Ice should be asked to prepare the chapters related to marine climatology, sea-ice and meteorological conditions in cargo compartments;

(d) Some information concerning training of personnel in marine meteorology and relevant subjects, such as physical oceanography, should be included with reference to the WMO Guidelines for the Education and Training of Meteorological Personnel;

(e) The chapter on prediction methods could include topics such as wave prediction methods, ice accretion, tide-level anomalies, etc.;

(f) In dealing with any requirement which will involve the telecommunication systems, the guide should avoid discussing the communication systems as such. If for the proper understanding of a chapter or section a minimum amount of information on telecommunication systems or procedures is necessary the text should be copied from the appropriate WMO publications on meteorological telecommunications.

12.1.4 With the above in mind, the Commission approved, in principle and as a basis for further work, the already drafted chapters of the guide as presented to the session in the pre-session documentation by the president of CMM.

12.2 WMO Publication No. 9, Volume D - Information for shipping

12.2.1 The Commission, after having expressed its opinion that, in view of the new Guide to the Marine Meteorological Services System and the ongoing revision of Chapter C.1 of the Technical Regulations, only information of an operational nature should be retained in Volume D (see paragraph 6.2.4), examined the content of the various parts of this publication and arrived at the following conclusions:

Parts	Content	Suitable form of publication
A	International regulations	
	Chapter I	Guide
	Chapter II, Chapter III	Appendix to Guide
B	List of coastal radio stations	Volume D
C	Port meteorological officers (names and addresses)	"
D	Visual storm warning signals (national)	"
E_i	Multilingual list of terms	Volume D and Guide (optional)
E_{ii}	Equivalents, constants, tables	WMO Publication No. 188
E_{iii}	Universal time system	(Delete)
F	Meteorological broadcast schedules	Volume D

12.2.2 These conclusions are based on the considerations that Chapters II and III of Part A contain very useful background information regarding regulations of the International Convention for Safety of Life at Sea and certain radio regulations concerning the Maritime Mobile Service, both of which should be preserved in the guide. Further, the publication of the International Meteorological Tables (WMO Publication No. 188) makes retention of Part E_{ii} in either Volume D or in the guide superfluous. Finally, it was thought that Part E_{iii} could be deleted as there would probably be very little use for this information, in either Volume D or the guide.

12.2.3 The Commission requested the Secretary-General to take the above views into account when revising WMO Publication No. 9, Volume D.

12.3 Manual on Data Acquisition for IGOSS

12.3.1 The Commission noted from the report of the first session of the Joint IOC/WMO Planning Group for IGOSS that a Manual on Data Acquisition for IGOSS is in preparation. It endorsed in general the principles adopted by that session. The Commission stressed the following points:

(a) The manual should be considered as an international reference document for the preparation of national instructions to shipborne observers, for the observation of oceanographic elements;

(b) It is essential that IOC and WMO produce identical texts, or make cross-references to respective IOC and WMO publications, on material of common interest, utilizing to the fullest extent existing guidelines and expertise.

The Commission considered that any text should derive its international status from one organization only, namely the originating organization. Should, for reasons of completeness, the text from IOC manuals need to be reproduced in WMO manuals and vice versa, in these reproduced texts there should be an indication from which publication their international status was derived.

12.3.2 The Commission was informed in this respect that the text in the WMO Guide to Meteorological Instrument and Observing Practices regarding the observation of some meteorological elements was not suitable for ready reproduction in other publications, such as the IGOSS Manual; it concluded that the CMM Working Group on Technical Problems should keep this in mind when reviewing relevant parts of this WMO guide.

12.4 Marine Cloud Album

12.4.1 The Commission noted with appreciation the report of the vice-president who had been designated by the president of CMM to submit a selection of cloud pictures for inclusion in the Marine Cloud Album. The set presented was based on contributions received from the Federal Republic of Germany, Sweden, the United Kingdom and the United States of America and contained photographs, all in colour. The Commission noted that the selection satisfied the criteria set by CMM-V.

12.4.2 The Commission considered that the selection of photographs now presented constituted a real improvement on those in the existing Marine Cloud Album and agreed that the set be reproduced in two forms:

(a) The first, as a Marine Cloud Album (40 photographs) intended for use by marine observers;

(b) The second, as a sheet of cloud photographs consisting largely of the same material (38 photographs).

Symbols and the appropriate code figures, together with cloud height indications, if possible, should be added to the photographs.

12.4.3 The Commission requested the Secretary-General to make the necessary arrangements for the publication of both the revised Marine Cloud Album and the Cloud Sheet.

12.4.4 A proposal was made that the present selection should be extended to include photographs of clouds over tropical waters. The Commission agreed that this addition would be very useful, but that the collection of suitable photographs should not postpone the publication of the selection presently available. The Commission therefore appointed a rapporteur to arrange for the collection of coloured cloud pictures relating to tropical ocean areas with a view to their addition to the Marine Cloud Album at a later stage (see Resolution 6 (CMM-VI)).

12.5 Forms for international synoptic codes

The Commission agreed that it would be useful if port meteorological officers had copies of the national instructions for the use of international codes by marine observers, issued by other countries. These instructions in the appropriate language could then be made available to a ship on request. The Commission agreed that this step would be an important element in the recruitment of Voluntary Observing Ships and requested the Secretary-General to prepare and distribute a list of Members who have available such national instructions and are willing to furnish copies to other Members on request.

12.6 WMO Publication No. 47 - International List of Selected, Supplementary and Auxiliary Ships

12.6.1 The Commission noted that, in order to facilitate the task of a port meteorological officer, the list of supplementary and auxiliary ships should be amended so as to contain the ship names in alphabetical order irrespective of the flag of registry and of the recruiting Member. Furthermore, the list of auxiliary ships should be updated more regularly, so as to contain only names of ships which were recruited during the past year or from which completed log-sheets are received regularly by the recruiting Member. The Commission requested the Secretary-General to take these views of the Commission into account when preparing future annual supplements to WMO Publication No. 47.

12.6.2 In this relation, the Commission felt that certain columns in the international list now seemed superfluous and could probably be deleted. It requested the president of CMM, in consultation with the Secretary-General, to arrange for a definite proposal in this regard.

12.7 Training relating to marine meteorology

12.7.1 Having noted that the Guidelines for the Education and Training of Meteorological Personnel had been completed with an addendum relating to marine meteorology, the Commission learned with interest about the plans to include this addendum in the main text of the guidelines.

12.7.2 In this relation, the representatives from the developing countries stressed the pressing need of their countries for ways and means (including seminars) to train supervisory, operational and technical personnel. The training involved would necessitate not only the establishment of training centres but also the availability of teaching staff at different levels.

12.7.3 Convinced of the importance of developing the specialized branch of marine meteorology, the Commission recognized the need to facilitate assistance to developing countries which have marine interests and which wished to establish or improve their national services in this sphere.

12.7.4 It was recalled that, in its Recommendation 5 (CMM-V), the Commission had drawn attention to the fact that the promotion of marine meteorology in these countries could play an important role in their economic development and that, to this end, requests for assistance could be submitted. It noted that not only the United Nations Development Programme but also the WMO Voluntary Assistance Programme could provide assistance in the training of meteorological personnel in the developing countries.

12.7.5 The Commission welcomed further, with satisfaction, the proposals of the U.S.S.R. and the U.S.A. aimed at sending to the WMO Secretariat, suitable documents for training in the field of marine meteorology, which could supplement the series of lecture notes and other compilations currently being prepared within WMO. Indeed, it was necessary that lecture notes and meteorological problems suitable for the specialized training of Class III and Class IV personnel in marine meteorology and elements of physical oceanography should be prepared. The Secretary-General was requested to follow up this proposal taking into account the need to publish this material in the languages of the Organization used in the developing countries.

12.7.6 It was also recognized that it was particularly urgent to train Class I and concurrently Class II personnel so that, under the direction of personnel of Class I, personnel of Class II would provide the framework of a multi-level training programme.

12.7.7 It is necessary that trainees should have acquired beforehand the maximum general knowledge and experience necessary to profit from the specialized instruction for which a request for assistance has been made. It was recalled that the qualifications of Class I and Class II personnel were described in the Guidelines for the Education and Training of Meteorological Personnel.

12.7.8 Any assistance requested may be provided within the framework of UNDP or VAP. Various types of assistance might be provided, among which may be mentioned:

Fellowships to enable candidates to follow suitable specialized training courses in countries where appropriate instruction is provided;

Training experts;

Courses and training manuals in the WMO official languages used by the countries concerned;

Participation in appropriate research campaigns carried out within the framework of meteorological and oceanographic studies, preferably when the sea area investigated is situated in the neighbourhood of the country of the candidates.

12.7.9 In addition, the Commission expressed its desire to see the training courses in marine meteorology and oceanography expanded in the programmes of schools providing instruction in meteorology, irrespective of whether such schools are sponsored by WMO, as well as in universities.

12.7.10 The Commission also considered it desirable to encourage in every possible way the active participation of meteorologists in marine work, thereby increasing their practical knowledge of the marine environment (e.g. periods of duty on ships or off-shore platforms).

12.7.11 The Commission noted that the Secretary-General was keeping developing countries with marine interests informed of possibilities for assistance in training their personnel for specialization in the field of marine meteorology and oceanography, offered under UNDP and VAP.

12.7.12 The Commission accordingly adopted Recommendations 17 and 18 (CMM-VI).

13. SUPPORT TO MARITIME DEVELOPING COUNTRIES (Agenda item 13)

13.1 The Commission noted with considerable interest that, following Recommendation 5 (CMM-V), Sixth Congress had requested the Secretary-General to take the necessary steps to arrange for assistance to developing countries, inter alia, through advising on ways and means of developing adequate marine meteorological services.

13.2 In the view of the Commission, some of the main problems had been that of securing the necessary trained personnel, equipment, etc., for marine meteorology; the matter of training was discussed in detail under Agenda item 12.

13.3 With respect to the advisory assistance function, the Commission considered that the initiative taken by Congress as a result of Recommendation 5 (CMM-V) was a most useful one and should be followed up energetically, it being understood that countries decide which fields they wish to submit for priority consideration under WMO assistance programmes. The Commission discussed in detail the types and nature of the contemplated expert missions. Its conclusions are contained in Recommendation 19 (CMM-VI).

13.4 The Commission noted the proposals contained in the report submitted by the Rapporteur on the Preparation of Guidance Material on the Organization of Meteorological Activities in the Field of Maritime Meteorology. It also noted that the rapporteur had already proceeded to draft such guidance in the form of information relative to the establishment of a marine meteorological service. In view of the pressing need of developing countries for guidance, it was agreed that consideration should be given to combining such information in a separate form suitable for use by the

countries concerned. For this purpose, it was agreed that the existing draft material should be communicated to the Members represented on CMM for possible revision before being published under a title such as "Suggestions regarding the organization of marine meteorological services". In view of the pressing need for such assistance, the Secretary-General was requested to take early action on this request.

14. TECHNICAL REGULATIONS (Agenda item 14)

14.1 Various proposals for amendments to Volume I of the WMO Technical Regulations were submitted. These can be listed under the following categories:

(a) Proposed amendments to definitions and to Section A, Chapters A.1.1. and A.3.1., submitted by the chairman of the Working Group on Observation Network at Sea and on Maritime Telecommunications;

(b) A proposed revision of Section C, Chapter C.1. submitted by the president of CMM on the basis of studies made by the Working Group on Requirements for Marine Meteorological Services, and

(c) A proposed new Appendix H to Volume I of the Technical Regulations, submitted by the president of CMM in the context of his review of the Beaufort wind scale problem.

14.2 As regards category (a), the Commission had no time during the session to consider in detail these proposals and the comments submitted on them. This was also true with regard to the revision mentioned under (b) above; however, the Commission wished to endorse its earlier view expressed at CMM-V, namely that this Chapter C.1 needed updating as a whole. As recorded under pagraph 11.4.4 the Commission agreed to the content of the proposed Appendix H mentioned under (c) above.

14.3 In view of these considerations, the Commission requested the Secretary-General to arrange without delay for the preparation of a consolidated proposal of the amendments mentioned under (a) and (b) above for review by the Commission by correspondence for submission to Seventh Congress for approval.

15. FUTURE WORK PROGRAMME OF THE COMMISSION (Agenda item 15)

In developing its work programme for the coming intersessional period, as reflected in its resolutions and recommendations, the Commission had very much in mind the modifications in its terms of reference introduced by Sixth Congress. Thus it devoted major attention to promoting the vigorous development of the traditional and new applications of marine meteorology in support of a variety of ocean activities with a growing range of requirements for support services ranging from analyses through forecasts to statistical information on weather and ocean surface conditions. Various technical problems and some of the applied scientific problems associated with the support services will require the continued attention of the Commission. The pre-

sent trend is towards increasing collaboration between marine meteorologists and oceanographers, particularly physical oceanographers; it is expected that this trend will accelerate. The Commission reflected these considerations in its positive response, in line with its revised terms of reference, to requests for supporting IGOSS, its BATHY and Marine Pollution Monitoring Projects. Consequently it felt an increasing participation of CMM experts in joint IOC/WMO bodies dealing with IGOSS is needed. The WMO Voluntary Observing Ships' scheme is likely to remain, for many years to come, a major source of environmental data from the oceans, both for the marine meteorological services system, IGOSS and the World Weather Watch; the further promotion of this Voluntary Observing Ships' scheme by CMM will therefore continue to require very close attention.

16. NOMINATION OF MEMBERS OF WORKING GROUPS AND NOMINATION OF RAPPORTEURS (Agenda item 16)

16.1 In establishing working groups and appointing rapporteurs, the Commission kept in mind the request of EC-XXIII to formulate their terms of reference in accordance with the decisions of Sixth Congress regarding the programmes of the Organization. The Commission established five working groups and appointed one new rapporteur as follows:

Advisory Working Group of CMM
Working Group on the Marine Meteorological Services System
Working Group on Marine Climatology
Working Group on Sea Ice
Working Group on Technical Problems

Rapporteur on the Selection of Cloud Photographs from Tropical Ocean Areas

The decision of the Commission regarding the membership of these working groups and the rapporteur are contained in Resolutions 1 to 6 (CMM-VI).

16.2 In addition, the Commission reappointed Dr. H. O. Mertins to serve as Rapporteur on the Revision of WMO Technical Note No. 72 - The Preparation and Use of Weather Maps by Mariners - and invited him to continue with his task of revising this Technical Note with a view to possibly deleting all references to code forms. The Commission also reappointed Mr. L. Otto to serve as Rapporteur on the Environmental Factors Influencing the Movement of Oil Slicks and invited him to complete the interim report he had submitted to the session.

16.3 Furthermore, the Commission noted the approval given by EC-XXIV for:

(a) The appointment of a Rapporteur on the Meteorological Aspects of Ice Accretion on Superstructures of Ships;

(b) The establishment of a Joint WMO/IMCO Group of Experts on the Weather Routeing of Ships;

and (1) Invited Mr. H. C. Shellard to continue with his studies as Rapporteur on the Meteorological Aspects of Ice Accretion on Ships and Installations at Sea, with terms of reference as given in Annex V to this report;

(2) Invited Mr. H. Kruhl and Mr. Sv. Johansen to continue their studies on the weather routeing of ships, in close association with experts designated by IMCO on this subject, with terms of reference as given in Annex VI to this report.

16.4 The Commission also confirmed the need for the nomination of CMM experts on other WMO groups, i.e.

One on the CBS Working Group on GOS
Two on the CBS Working Group on GTS
One on the CBS Working Group on GDPS
One on the CBS Working Group on Codes

and invited the following experts to serve in this capacity:

GOS: G. Giraytys (U.S.A.)

GTS: T. Tournier (France)
An expert nominated by Japan

GDPS: E. W. K. Chu (Hong Kong; Chairman of the CMM Working Group on Marine Climatology)

Codes: A. B. Crawford (South Africa)

16.5 Assuming that Recommendation 13 (CMM-VI) will be approved by the Executive Committee, the Commission advised the president of CMM to designate the following two CMM experts to work with the Joint IOC/WMO Group of Experts on IGOSS Technical Systems Design and Development and Service Requirements in respect of marine pollution monitoring:

R. C. Junghans (U.S.A.)
An expert nominated by Sweden

17. REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE COMMISSION AND OF RELEVANT EXECUTIVE COMMITTEE RESOLUTIONS (Agenda item 17)

The Commission examined resolutions and recommendations adopted at its previous sessions and still in force. It also examined those Executive Committee resolutions still in force relating to CMM activities. The decisions of the session are incorporated in Resolution 7 (CMM-VI) and Recommendation 20 (CMM-VI).

18. ELECTION OF OFFICERS (Agenda item 18)

By unanimous decision, Mr. J. M. Dury (Belgium) was elected president of the Commission and Dr. K. Hishida vice-president.

19. DATE AND PLACE OF THE SEVENTH SESSION (Agenda item 19)

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

20. SCIENTIFIC LECTURES AND DISCUSSIONS (Agenda item 20)

20.1 The afternoon of Wednesday, 18 October, was devoted to scientific lectures and discussions under the chairmanship of the vice-president of CMM, Mr. J. M. Dury. The following lectures were presented:

		Authors
(1)	Forecasting anomalous water levels for marine and coastal interests	Mr. M. W. Mull (U.S.A.)
(2)	Special forecasts for off-shore drilling and oil rigs in the North Sea and other coastal areas	Mr. R. Ogden (U.K.) (presented by Mr. J. K. Bannon)
(3)	The experience of the Hydro-meteorological Service of the U.S.S.R. in providing services to mariners and fisheries	Dr. F. S. Terziev (U.S.S.R.)
(4)	On the activities of the Japan Meteorological Agency in relation to the prevention of calamities due to storms	Dr. K. Hishida (Japan)

20.2 The Commission requested the Secretary-General to arrange for these lectures to be issued in a suitable series of WMO technical publications.

20.3 In addition to the lectures and discussions, a Japanese film, "Drift-ice puzzle of the frozen sea" by Professor T. Tabata of the Hokkaido University, was shown and was greatly appreciated by those present.

21. CLOSURE OF THE SESSION (Agenda item 21)

21.1 At the conclusion of the technical discussions, reference was made to the fact that the president of the Commission and the representative of the Secretary-General, in order to ensure that CMM-VI could complete its work on time, had been forced to suppress consideration, at the committee level, of the working papers of the two committees. Delegations, whilst agreeing that these measures were necessary in the circumstances, wished to record their hope that arrangements for future sessions would permit avoiding such a situation. They felt that the arrangement whereby only one working committee could meet at a time on account of only one team of interpreters being available made work extremely difficult, not to say impossible, particularly for a Commission dealing with operational matters. This had led to the need to establish numerous ad hoc groups meeting simultaneously; these groups not only had to work virtually without interpretation but moreover they could not all benefit from the assistance of a Secretariat staff member. The representative of the Secretary-General explained that, in making the material arrangements for the session, the Secretary-General had had to work within the limits of the budget and the sum allocated to sessions of technical commissions by the governing bodies. Whilst fully appreciating this point, the meeting concluded that the president should bring the following requirements for future sessions of CMM to the attention of the Executive Committee:

(a) That increased interpretation services should be provided at future sessions; and

(b) That the number of Secretariat staff members attending a CMM session should be increased to permit participation in more of the discussion groups.

21.2 In his closing address the president again thanked the Japan Meteorological Agency for their courtesy in having invited the session to Tokyo. He congratulated the participants on the spirit of co-operation with which they had entered into the work of the session and said that, as a result of their efforts, the activities of CMM would benefit materially. He also thanked all the other officials who took part in the running of the session, including the interpreters and translators. In conclusion he hoped that the incoming president and vice-president would continue to benefit from the support of the Members and that they would find their tasks fulfilling.

The session closed at 2 p.m. on 21 October 1972.

RESOLUTIONS ADOPTED BY THE SESSION

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

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Resolution 1 (CMM-V),

(2) The report of the president of CMM,

CONSIDERING:

(1) The benefit gained by the Commission as a result of the work done by the Advisory Working Group established by CMM-V,

(2) That there is a need for regular contact between the chairmen of the various working groups to ensure adequate co-ordination of work,

DECIDES:

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

(a) To advise the president of the Commission, as necessary, on matters pertaining to the functions of the Commission;

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

(c) To assist the president in the co-ordination of the activities of the working groups established by the Commission;

(d) To take action on urgent matters referred to the Commission which cannot be adequately dealt with by the other working groups or by correspondence;

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

The president of CMM
The vice-president of CMM
The retiring president of CMM
The chairmen of all CMM working groups.

Res. 2 (CMM-VI) - WORKING GROUP ON THE MARINE METEOROLOGICAL SERVICES SYSTEM

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Abridged report of Cg-VI - General summary, paragraph 3.3.2.2, stating that CMM should give its primary attention to pursuing a vigorous programme of applications,

(2) The report of the first session of the Working Group on Requirements for Marine Meteorological Services (November 1970),

CONSIDERING:

(1) That studies and recommendations are required on many questions regarding the Marine Meteorological Services System (MMSS) to meet user requirements,

(2) That changes in user requirements due to expanding marine activities entail a constant review of the global system to meet user requirements,

(3) That there should be co-ordinated development in services provided under the MMSS and those foreseen within the framework of the Integrated Global Ocean Station System (IGOSS),

DECIDES:

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

(a) To make recommendations on, and keep under continuing study, the following items:

(i) Co-ordination of the allocation of areas in the high seas for which Members assume responsibility for marine warnings and forecasts;

(ii) Co-ordination of service products for the high seas, as regards their content, form and time schedules for dissemination, including information in a form suitable for radio-facsimile transmission;

(iii) Statements of requirements for marine meteorological services;

(iv) Promotion of marine meteorological services for local areas;

(b) To complete the preparation of the Guide to the Marine Meteorological Services System and keep the guide under review;

(c) To take action upon matters referred to the working group by the president;

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

P. Lenoir de la Cochetière (France)
L. K. McGlening (Canada)
H. O. Mertins (Federal Republic of Germany)
W. D. Moens (Netherlands)
M. W. Mull (U.S.A.)
A. da Cunha Silva (Brazil)
K. Vassiljev (U.S.S.R.)
An expert to be nominated by Japan
An expert to be nominated by the U.K.;

(3) To select, in accordance with Regulation 31 of the General Regulations, Mr. M. W. Mull as chairman of the working group;

REQUESTS the Secretary-General to invite IOC to designate a member on the group and to invite FAO, IMCO and ICS to be represented on it.

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

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Resolution 3 (CMM-V),

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

CONSIDERING:

(1) That the Marine Climatological Summaries scheme requires continuing attention by the Commission,

(2) That a number of pertinent questions in the field of marine climatology need an early solution,

(3) That some of these questions need to be studied in close collaboration with IOC,

DECIDES:

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

(a) To continue providing technical advice required for the preparation of the Marine Climatological Summaries and the marine section of the World Climatic Atlas;

(b) To propose a new layout of the International Maritime Meteorological Punch-card when required;

(c) To keep under review the chapters in the Guide to Climatological Practices relevant to marine climatology;

(d) To follow closely and stimulate further developments in the field of automatic quality control of marine climatological data;

(e) To study the representativeness of climatological data from selected areas, on the basis of their statistical properties, and to review the results of relevant trial investigations;

(f) To prepare a plan for the international exchange, storage and processing of ships' sea-surface current data for the purpose of inclusion of current data in the marine section of the World Climatic Atlas, taking into account user requirements;

(g) To study the desirability for the exchange and eventual publication of sea-ice observations from ships, both in coded form and plain language, and make appropriate proposals in collaboration with the CMM Working Group on Sea Ice;

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

(i) To advise, as appropriate, IOC in matters dealing with procedures and arrangements for handling the climatological aspects of data collected within the framework of IGOSS;

(2) To give the working group the following composition consisting of an expert nominated by each of the nine Members responsible for the preparation of Marine Climatological Summaries:

E. W. K. Chu (Hong Kong)
W. H. Haggard (U.S.A.)
O. Höflich (Federal Republic of Germany)
C. G. Korevaar (Netherlands)
A. Nakano (Japan)
J. J. Taljaard (South Africa)
An expert to be nominated by India
An expert to be nominated by the U.K.
An expert to be nominated by the U.S.S.R.;

(3) To select, in accordance with Regulation 31 of the General Regulations, Mr. E. W. K. Chu as chairman of the working group.

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

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Resolution 4 (CMM-V),

(2) The report of the second session of the Working Group on Sea Ice (Geneva, March 1971),

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

CONSIDERING:

(1) That the assessment of user requirements for sea-ice information, started by the Working Group on Sea Ice at its second session (March 1971), should be further developed along the lines indicated by the working group,

(2) That a number of specific problems relating to sea ice require further study,

DECIDES:

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

(a) To continue with the assessment of user requirements for sea-ice information;

(b) To proceed with the evaluation of the symbols for use on sea-ice maps reviewed by the second session of the working group (1971) and, if desirable, to formulate a recommended standard set of symbols;

(c) To proceed with the preparation of a text of sea-ice observing methods for inclusion in the Guide to Meteorological Instrument and Observing Practices (WMO Publication No. 8);

(d) To advise on sea-ice codes, with particular attention to the specification of symbolic letter K in the SHIP code form and in the ICEAN Code, and to consider the possibility of combining the ICEOB and ICEAN Codes or, failing that, to develop a final form of the ICEOB Code for consideration for approval by correspondence by 1 July 1973;

(e) To consider problems relating to ice of land origin;

(f) To consider possible changes to be introduced in the WMO Sea-ice Nomenclature concerning, e.g., the definitions of the term "pack ice" and the terms for concentrations;

(g) To take such other steps to encourage international co-operation in sea-ice observing, recording and information processing as are deemed advisable by the president of CMM;

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

J. A. Heap (U.K.)
G. Koslowski (Federal Republic of Germany)
B. A. Krutskikh (U.S.S.R.)
W. E. Markham (Canada)
D. R. Nasta (Argentina)
J. J. Schule (U.S.A.)
H. Sigtryggsson (Iceland)
T. Thompson (Sweden)
H. Valeur (Denmark)
An expert to be nominated by Japan;

(3) To select, in accordance with Regulation 31 of the General Regulations, Dr. J. A. Heap as chairman of the working group.

Res. 5 (CMM-VI) - WORKING GROUP ON TECHNICAL PROBLEMS

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Resolution 5 (CMM-V),

(2) The reports of the chairman and the rapporteurs of the Working Group of Rapporteurs on Technical Problems to CMM-VI,

CONSIDERING:

(1) That a number of technical and scientific problems will need to be kept under continuous review and study between sessions of the Commission,

(2) That several of these problems can initially be studied more effectively by a designated expert within the group,

DECIDES:

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

(a) To promote further development of suitable techniques for measuring precipitation on board ship;

(b) To promote study of methods of sea-surface temperature observation using both buckets and remote reading devices;

(c) To review existing methods of observing and measuring ocean currents taking into account information available in IOC;

(d) With regard to wind measurement at sea:

(i) To collect results of studies and investigations into the compatibility of various methods of measuring wind at sea;

(ii) To investigate the need and recommend suitable procedures for the application of reduction factors to wind data measured at different heights above sea-level under different conditions of stability;

(e) With regard to wave measurement and observation:

(i) To recommend, by July 1973, a uniform procedure for the reporting of wave systems on the basis of information provided by Members on the use of visual and measured wave observations, and on advice from the CBS Working Group on Codes regarding the coding aspects of alternative reporting procedures;

(ii) To recommend a uniform method of annual analysis of wave recordings for synoptic purposes compatible with the reporting and coding of visual wave observations;

(iii) To collect, with the assistance of the Secretariat, suitable photographs or other illustrative material for a pictorial guide for the estimation and reporting of wave systems, and prepare a draft of the guide;

(f) To keep under review and study problems regarding automation of measuring techniques on board ship;

(g) To keep under review Chapter XVII of the Guide to Meteorological Instrument and Observing Practices;

(h) To take action on other technical problems assigned to the working group by the president;

(2) To invite the chairman of the working group to consider the allocation of one or more of these tasks to individual experts within the group;

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

J. Giraytys (U.S.A.)
R. Höhn (Federal Republic of Germany)
J. A. Hunter (New Zealand)
J. Romer (France)
F. S. Terziev (U.S.S.R.)
An expert to be nominated by Japan;

(4) To select, in accordance with Regulation 31 of the General Regulations, Mr. J. A. Hunter as chairman of the working group;

REQUESTS the Secretary-General to invite IOC to designate an expert on the group.

Res. 6 (CMM-VI) - RAPPORTEUR ON THE SELECTION OF CLOUD PHOTOGRAPHS FROM TROPICAL OCEAN AREAS

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING the report on the Marine Cloud Album, submitted by the vice-president,

CONSIDERING that the Marine Cloud Album should be expanded to include photographs of clouds characteristic for tropical ocean areas,

DECIDES:

(1) To appoint a Rapporteur on the Selection of Cloud Photographs from Tropical Ocean Areas with the following tasks:

(a) To arrange, with the assistance of the Secretariat, for the collection of suitable photographs;

(b) To report to the president of CMM one year after CMM-VI with appropriate recommendations;

(2) To invite Dr. F. Krügler (Federal Republic of Germany) to serve as Rapporteur on the Selection of Cloud Photographs from Tropical Ocean Areas.

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

THE COMMISSION FOR MARINE METEOROLOGY,

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

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

DECIDES:

(1) To keep in force Recommendations 4 (CMM-V), 25 (CMM-V), 37 and 38 (71-CMM), the texts of which are incorporated in this report;

(2) Not to keep in force Resolutions 1-10 (CMM-V); and

(3) To note with satisfaction the action taken by the competent bodies on its Recommendations 27 (CMM-III), 1 and 4 (CMM-IV), 1-3 (CMM-V), 5-24 (CMM-V), 26-29 (CMM-V), 30-36 (71-CMM) and 39-41 (71-CMM), which are now redundant.

RECOMMENDATIONS ADOPTED BY THE SESSION

Rec. 1 (CMM-VI) - IMPROVEMENT OF THE COASTAL RADIO STATION NETWORK

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING Recommendation 16 (CMM-V) and Recommendations 35 and 41 (71-CMM),

CONSIDERING:

(1) The vast areas of the southern hemisphere and of the tropical areas of the northern hemisphere that lack coastal radio facilities for marine environmental data collection for meteorological purposes,

(2) The ineffectiveness of some coastal radio stations in collection and dissemination of marine data,

(3) That the increasing number of automated vessels and the emphasis on research by Members in the above-mentioned areas bring added urgency to the need for improvement of radio facilities for the collection of ocean data,

(4) That the increased marine data resulting from an improved coastal radio station network will make possible more effective warnings and forecasts for ships on shipping routes through these areas,

(5) That oceanic surface data will be increasingly needed from these areas to complement satellite measurements of sea-surface temperature and atmospheric temperature profiles,

RECOMMENDS:

(1) That the Members do all possible to establish coastal radio stations in areas where this is necessary and to improve the effectiveness of existing stations especially in the eastern South Pacific and the south-eastern North Pacific Oceans, the southern Caribbean Sea, and the western Indian Ocean;

(2) That the Members concerned ensure that coastal radio stations designated for the collection of ships' reports have available the necessary means to render a rapid and fully effective service;

(3) That all Members concerned should monitor the operational effectiveness of their coastal radio stations designated for marine environmental data collection and dissemination to ensure that these stations provide a satisfactory service.

Rec. 2 (CMM-VI) - SATELLITE DATA-COLLECTION SYSTEM

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING that the Members concerned are at present studying the feasibility of setting up a "Satellite Data-collection System" taking into account the requirements of the WWW and GARP,

CONSIDERING that such a system would also be most useful for marine meteorology in its various applications, in view of the numerous shortcomings of the present collection system using coastal radio stations,

WELCOMES very strongly the proposed establishment of a "Satellite Data-collection System";

RECOMMENDS that, in this context, studies should take into consideration the following desirable features:

(1) Co-ordinated geostationary systems with the capability for collecting observational data from fixed and mobile stations including ocean platforms;

(2) Technical compatibility between the different meteorological satellite systems in so far as telecommunications are concerned, including development of a terminal telecommunication package (modulator and accessories, discriminator/decoder, radio transmitter and receiver and antennae) for installation aboard ships, on marine automatic weather stations and on remote islands;

(3) Operational organization (call signs, schedules, system access methods, codes, transmission control, network administration, efficiency checks);

(4) Study of costs and outline of a possible co-operative programme for installation of such terminal telecommunication packages on board ships.

Rec. 3 (CMM-VI) - STANDARDIZATION OF FACSIMILE TRANSMISSION CHARACTERISTICS FOR MARINE USERS

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) That the present standard characteristics adopted by WMO for facsimile transmission leave a choice regarding the drum speed (or scan rate) and the index of co-operation,

(2) The Opinion 24 expressed by the 11th Assembly of the CCIR of the ITU regarding standardization of drum speed and index of co-operation for facsimile transmissions intended for reception on board ships,

CONSIDERING that a greater measure of uniformity in these technical characteristics would work to the benefit of ocean users,

ENCOURAGES members to introduce as soon as possible facsimile broadcasts in support of marine activities to supplement their existing transmission systems;

RECOMMENDS that, for the purpose of facsimile transmission intended for marine activities, Members should be strongly encouraged to adopt, as far as possible, the following technical characteristics selected from amongst the standard characteristics adopted by WMO:

Drum speed (or scan rate): 120 revolutions (or scans) per minute

Index of co-operation: 576

Rec. 4 (CMM-VI) - SYMBOLS FOR MARINE FACSIMILE CHARTS

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) That a number of Members broadcast standard meteorological charts which also serve marine users,

(2) That these charts in many cases employ symbols and practices which are not in conformity with those described in the Technical Regulations, Volume I, Appendix E, and in the Guide on the Global Data-processing System, Vol. II - Preparation of Synoptic Weather Charts and Diagrams (WMO Publication No. 305),

CONSIDERING that the use of different symbols on standard meteorological charts broadcast in various parts of the world makes it difficult for mariners to make effective use of these charts,

RECOMMENDS that Members be reminded that on standard meteorological charts broadcast by facsimile for marine users, the symbols and practices described in the Technical Regulations, Vol. I, Appendix E, and in the Guide on the Global Data-processing System, Vol. II - Preparation of Synoptic Weather Charts and Diagrams (WMO Publication No. 305) should be used.

Rec. 5 (CMM-VI) - PROVISION OF MARINE METEOROLOGICAL INFORMATION TO MARINE INTERESTS

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Abridged report of Cg-VI - General summary, paragraph 3.3.2.2, stating that CMM should give its primary attention to pursuing a vigorous programme of applications,

(2) Report No. 4 of the WMO series of Reports on Marine Science Affairs entitled Requirements for Marine Meteorological Services,

CONSIDERING:

(1) That the study of requirements for marine meteorological services has shown the need for gradually broadening the national programmes for the provision of marine meteorological information,

(2) That such broadening is needed with regard both to the high seas and to coastal areas,

RECOMMENDS:

(1) That Members which have accepted the responsibility for issuing warnings, synopses and forecasts for one or more areas in the high seas, endeavour to provide, to the extent feasible and according to recognized needs, other marine meteorological information for the high seas as listed as a requirement in the report mentioned under NOTING (2);

(2) That the attention of Members be drawn to the requirement that warning services for coastal areas include, in addition to the warnings for gales, storms and tropical cyclones, warnings for marine environmental conditions and phenomena which are known to be of direct danger to navigation or other marine operations, e.g. fog, ice accretion on ships and installations at sea, special wind and/or wave conditions, abnormal water levels due to wind stresses, etc.

Rec. 6 (CMM-VI) - MODIFIED PROCEDURES FOR THE PREPARATION OF MARINE CLIMATOLOGICAL SUMMARIES FOR ARCTIC AND ANTARCTIC REGIONS

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Resolution 35 (Cg-IV),

(2) The report of the first session of the Polar Panel of the CMM Working Group on Marine Climatology,

CONSIDERING that the scarcity of marine meteorological observations in polar regions* and the climatic requirements of these regions necessitate, in certain respects, special procedures for the preparation of meaningful Marine Climatological Summaries,

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* NOTE: For the purpose of this recommendation, polar regions are defined as the regions north of 60°N and south of 50°S.

RECOMMENDS that the modified procedures as shown in the annex* to this recommendation be adopted for the preparation of Marine Climatological Summaries for Arctic and Antarctic regions.

* See Annex VII.

Rec. 7 (CMM-VI) - WMO SEA-ICE ANALYSIS CODE FORM

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Resolution 4 (CMM-V),

(2) Recommendation 8 (CMM-V),

(3) Annex V of the report of the second session of the CMM Working Group on Sea Ice,

CONSIDERING:

(1) That since the development of the ice analysis code (ICEAN) at the second session of the Working Group on Sea Ice, this code has been considered by the CBS Working Group on Codes,

(2) That this code has since been revised by sea-ice coding experts in the light of comments received from the CBS Working Group on Codes,

RECOMMENDS that the code form ICEAN contained in the annex* to this recommendation be approved for introduction for international use as from 1 January 1975.

* See Annex VIII.

Rec. 8 (CMM-VI) - OPERATIONAL TESTS OF THE PROPOSED SET OF ICE SYMBOLS

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Abridged final report of CMM-V - General summary, paragraph 8.4.1,

(2) The report of the CMM Working Group on Sea Ice (Geneva 1971),

CONSIDERING that it is both necessary and desirable for representatives of major users of ice charts to be consulted during the formulation of a final set of WMO ice symbols which satisfactorily meet user requirements,

RECOMMENDS that Members give their full support to the Working Group on Sea Ice in the completion of their task of formulating a final set of WMO ice symbols which satisfactorily meet user requirements, by undertaking operational tests of the use of ice symbols, including facsimile transmissions and by contacting major users of ice information to determine their acceptability.

Rec. 9 (CMM-VI) - SEA-SURFACE TEMPERATURE MEASUREMENT

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) The report of the Rapporteur on Sea-surface Temperature Measurement,

(2) The result of the CMM project of comparative sea-surface temperature measurement, as published in Report No. 5 of the WMO Marine Science Affairs series,

(3) That several Members have succeeded in designing relatively simple and reliable instruments for making sea-surface temperature measurements,

CONSIDERING:

(1) That it is not at present possible to define a standard instrument for sea-surface temperature measurement,

(2) That it is not practicable to define a standard level at which sea-surface temperature observations should be made,

RECOMMENDS:

(1) That Members should be encouraged to continue to search for a reliable, simple and inexpensive method of measuring sea-surface temperature;

(2) That to assist in more effective measurement of sea-surface temperature data, Members should, whenever possible, supply suitable buckets or thermistors or fit accurate, properly sited intake or hull-mounted sensors with remote reading facilities.

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

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

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

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

CONSIDERING:

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

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

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

RECOMMENDS:

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

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

Rec. 11 (CMM-VI) - BATHYTHERMAL OBSERVATIONS ON BOARD VOLUNTARY OBSERVING SHIPS

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Abridged final report of CMM-V - General summary, paragraph 11.7.1.2,

(2) Resolution 11 (Cg-VI) - WMO's participation in the IOC work on IGOSS,

(3) The decision contained in the abridged report of EC-XXIV, General summary, paragraph 5.2.2,

(4) The need expressed by several Members of WMO for bathythermal observations for meteorological purposes such as air-sea interaction studies, local and long-range forecasting, and the provision of services to certain marine activities,

(5) That the Joint IOC/WMO Planning Group for IGOSS as well as other groups working on IGOSS projects have identified extensive requirements for bathythermal observations,

(6) That bathythermal observations are currently being made by all ocean weather stations,

CONSIDERING:

(1) That Members of WMO and IOC which are at present using bathythermal observations operationally within the framework of the IGOSS BATHY Pilot Project could receive more data through the increased participation of Voluntary Observing Ships,

(2) That successful recruitment of Voluntary Observing Ships for the purpose of taking bathythermal observations, especially with expendable bathythermographs, has been demonstrated by some Members,

RECOMMENDS that Members of WMO be encouraged to arrange for bathythermal observations to be taken by appropriate Voluntary Observing Ships.

Rec. 12 (CMM-VI) - INTENSIFIED OBSERVATIONAL PROGRAMMES IN RELATION TO CO-OPERATIVE SCIENTIFIC INVESTIGATIONS

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) That scientific programmes such as the GARP Atlantic Tropical Experiment (GATE) and the First GARP Global Experiment (FGGE) etc. are scheduled to take place in 1974 and subsequent years,

(2) That IOC and other international organizations also co-ordinate co-operative scientific investigations of the oceans,

CONSIDERING that the success of some of these scientific programmes could be enhanced, to a great extent, through observations received from Voluntary Observing Ships,

RECOMMENDS:

(1) That, when invited by the Secretary-General of WMO, Members should make efforts to intensify their observing programmes on voluntary ships within the framework and co-ordination processes of CMM, for given periods and areas relative to the specific investigation programmes;

(2) That the invitation of the Secretary-General of WMO to intensify such programmes on Voluntary Observing Ships be issued to Members in ample time to enable them to take appropriate action.

Rec. 13 (CMM-VI) - MARINE POLLUTION MONITORING

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) The conclusion of WMO (Cg-VI) that there is a need for the Commission to work very closely with IOC and to develop further their joint working arrangements, and Resolution 1 (Cg-VI) specifying in the terms of reference of CMM that the Commission shall be responsible for "assisting in the further implementation of IGOSS and in particular for the purpose of improving and extending services to various marine activities",

(2) That the UN General Assembly, at its present session, has for consideration a recommendation "that the IOC, jointly with the WMO and as appropriate in co-operation with other interested intergovernmental bodies, promote the monitoring of marine pollution, preferably within the framework of IGOSS",

(3) That the Executive Council of the IOC endorsed the planning and implementation of an IGOSS Pilot Project on Marine Pollution Monitoring as initiated by the Joint IOC/WMO Planning Group for IGOSS, and its recommendation that CMM, in its joint working relationships with IOC, include consideration of the marine pollution monitoring programme,

(4) That the IOC Group of Experts on Oceanographic Research as it Relates to IGOSS has recommended that CMM give early consideration to the development of a plan whereby appropriate ships of opportunity would assist in:

(a) Making visual observations of oil slicks,

(b) Gathering surface water samples for analysis in appropriate land-based laboratories,

(c) Gathering samples of precipitation at sea for analysis in land-based laboratories,

it being understood that the above activities would be called for only in selected ocean areas,

(5) That some Members have already undertaken the development of marine pollution monitoring activities,

CONSIDERING:

(1) That ocean weather ships especially and also research vessels could make valuable contributions to this programme,

(2) That uniform observational methods and procedures need to be developed through collaboration between WMO, IOC and other interested international organization and with the full co-operation of Members,

(3) That WMO could assist by arranging for studies concerning precipitation sampling techniques in support of pollution monitoring and that collaborative efforts can be arranged with IOC and other interested organizations in the development of observational and sampling procedures for marine pollution monitoring,

RECOMMENDS:

(1) That Members be invited to intensify their programmes for the development of techniques and procedures for observing or sampling for marine pollution monitoring purposes;

(2) That the president of the Commission be authorized to designate at an early date two experts from CMM to work with the Joint IOC/WMO Group of Experts on IGOSS Technical Systems Design and Development and Service Requirements in respect of marine pollution monitoring. The experts to be selected are to:

(a) Assist in the definition of suitable methodology for visual observation and reporting of oil slicks and other drifting pollutants;

(b) Assist in the determining of suitable precipitation sampling techniques adaptable for shipboard implementation within the WMO Voluntary Observing Ships' scheme;

(3) That Members be encouraged to arrange, when suitable methods for observation and reporting of marine pollution become available, for their ocean weather ships, research vessels and appropriate ships of the Voluntary Observing Ships' scheme to support the IGOSS Pilot Project on Marine Pollution Monitoring.

Rec. 14 (CMM-VI) - USE OF OCEAN WEATHER STATIONS FOR RESEARCH PURPOSES

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Resolution 19 (EC-III),

(2) The proposal of the Joint IOC/WMO Planning Group for IGOSS for a Pilot Project on Marine Pollution Monitoring,

(3) That some Members of WMO have already undertaken research activities in the field of marine pollution,

CONSIDERING that further research aboard ocean weather stations into a number of environmental problems, including marine pollution, might produce valuable results,

RECOMMENDS that Members operating ocean weather stations should carry out investigations in the following subjects:

(a) Sea-surface temperatures;

(b) Hygrometry at sea;

(c) Wind structure and wind observations generally at sea;

(d) Rainfall at sea;

(e) Development and testing of wave recorders;

(f) Accumulation of photographs of clouds and states of the sky;

(g) Vertical structure of sea temperature;

(h) Problems of evaporation and radiation;

(i) Meteorological factors affecting radio propagation conditions;

(j) Investigation of condensation nuclei;

(k) Marine pollution.

Rec. 15 (CMM-VI) - WMO INCENTIVE PROGRAMME FOR VOLUNTARY OBSERVING SHIPS

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Resolution 6 (CMM-V) - Rapporteur on an Incentive Programme,

(2) The report of the Rapporteur on an Incentive Programme,

CONSIDERING:

(1) That, for the efficient operation of the WMO Voluntary Observing Ships' scheme, it is essential to maintain the goodwill and enthusiasm of ships' officers for observing, recording and transmitting marine meteorological observations,

(2) That a WMO international award would enhance existing national award schemes and provide increased potential for recruiting ships to fulfil the requirements for the World Weather Watch and other WMO programmes,

(3) That a certificate to be given to ships as a token of their participation in the WMO Voluntary Observing Ships' scheme, for display in a suitable place on board, would form an additional incentive of great value,

RECOMMENDS:

(1) That a WMO international award be instituted, for presentation by the appropriate national authorities, on behalf of WMO, to Voluntary Observing Ships of their choice, recruited by them in recognition of outstanding achievements in the observing, recording and transmission of marine meteorological observations;

(2) That, in addition, a certificate be designed, for signature by appropriate WMO and national authorities, for distribution by Members who wish to do so, to every ship recruited by them as a sign of its participation in the WMO Voluntary Observing Ships' scheme.

Rec. 16 (CMM-VI) - THE BEAUFORT SCALE OF WIND FORCE

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Abridged report of EC-XXII - General summary, paragraph 4.9.2,

(2) Abridged report of Cg-VI - General summary, paragraph 2.3.2,

(3) Marine Science Affairs, Report No. 3 - The Beaufort Scale of Wind Force (1970),

CONSIDERING:

(1) That, in relation to observations made on board ship, a uniform set of equivalent wind speeds to the Beaufort scale wind force should be adopted, for use in scientific projects and operationally,

(2) That the set of equivalent wind speeds adopted by CMM-IV satisfies both national and international requirements if a new principle is applied to the equivalent wind speed to be reported for Beaufort force 12,

RECOMMENDS:

(1) That Code 1100 - Force of surface wind be replaced by a new Code 1100 - Force of surface wind at sea, as indicated in the annex* to this recommendation;

(2) That the new Code 1100 be used exclusively for the purpose of coding wind speeds by shipborne observers;

(3) That the determination and use of Beaufort equivalent wind speeds for observations at coastal stations be left to national decision to satisfy local requirements;

(4) That the new Code 1100 be introduced for international use at the same time as the new SHIP code form mentioned in Resolution 14 (EC-XXII).

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* See Annex IX.

Rec. 17 (CMM-VI) - TRAINING IN MARINE METEOROLOGY

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING Resolution 2 (EC-XXIII),

CONSIDERING:

(1) The existing inadequacies in meteorological education as regards programmes for marine meteorology and oceanography,

(2) The need to encourage contacts between meteorologists specializing in services in support to marine activities and marine users,

RECOMMENDS:

(1) That Members ensure that courses in marine meteorology including elements of physical oceanography are given adequate importance in the meteorological training establishments within their territory;

(2) That Members with maritime interests make arrangements enabling meteorological personnel engaged in training and the provision of services in the marine field to familiarize themselves with the marine environment;

(3) That WMO approach the appropriate bodies, in particular IMCO, with a view to facilitating, by all possible means, participation by meteorologists in marine activities requiring meteorological services.

Rec. 18 (CMM-VI) - ASSISTANCE INTENDED TO ENCOURAGE TRAINING IN MARINE METEOROLOGY IN THE DEVELOPING COUNTRIES

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) The decisions of Sixth Congress concerning the training of meteorological personnel,

(2) The arrangements made by the Organization following the work of the sixth session of the Executive Committee Panel of Experts on Meteorological Education and Training with regard to marine meteorology and physical oceanography,

(3) Resolution 2 (EC-XXIII),

CONSIDERING:

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

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

(3) The possibilities of assistance offered by the United Nations Development Programme and the WMO Voluntary Assistance Programme,

RECOMMENDS that assistance under UNDP or VAP in education and training in marine meteorology and oceanography could give priority attention to the following:

(a) Granting of scholarships for the job training in countries having schools with adequate teaching in the field of marine meteorology and oceanography;

(b) Offering to countries so requesting, the aid of experts to help in organizing and/or training of personnel;

(c) Providing courses and instruction manuals in marine meteorology and oceanography in the WMO official languages used by the nationals in the countries concerned;

(d) Allowing for participation in appropriate research campaigns undertaken within the framework of studies in marine meteorology and oceanography preferably when the sea area investigated is situated in the neighbourhood of the country of the candidates.

Rec. 19 (CMM-VI) - SUPPORT TO MARITIME DEVELOPING COUNTRIES

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Recommendation 5 (CMM-V) - Maritime meteorology and developing nations,

(2) The endorsement of Recommendation 5 (CMM-V) by Sixth Congress, which requested the Secretary-General to take the necessary steps to arrange for assistance to developing countries through advising, inter alia, on ways and means of developing adequate marine meteorological services,

(3) That follow-up action on this Congress decision has already yielded useful results,

CONSIDERING:

(1) That the rapid increase in demands for marine meteorological services resulting from fast-growing ocean activities warrants very active follow-up action on the above decision of Sixth Congress,

(2) That experience has shown that two different types of surveys may be needed, namely short-term exploratory and preparatory surveys and long-term advisory missions,

(3) That the long-term advisory missions should only be organized when the country concerned has a minimum of suitable facilities in operation and staff prepared to specialize in marine meteorology including a counterpart for the adviser,

RECOMMENDS:

(1) That Members in developing parts of the world be advised:

(a) To consider requesting WMO to organize short-term expert surveys (of the order of a few weeks) to assist them in the evaluation of their marine support requirements aimed at developing progressively suitable marine meteorological data acquisition and service systems;

(b) That the experts' reports would be forwarded through the Secretary-General of WMO to the Members concerned to enable them to assess their needs for help under UNDP, WMO and other assistance programmes, with a view to complementing their national efforts in the field of equipment and training for marine meteorological purposes;

(c) To examine the usefulness of following up the first expert mission by a request for a long-term advisory mission aimed at assisting the Members concerned in the organization or further development of their marine meteorological activities;

(2) That Regional Associations concerned be invited to examine the desirability of supporting the above actions, proposed to be taken on a country basis, through requests for similar projects within a regional framework;

(3) That, in view of the growing emphasis being put on the provision of meteorological support services to ocean activities, WMO give due attention to requests by Members for assistance related to the development of their marine meteorology activities.

Rec. 20 (CMM-VI) - REVISION OF RESOLUTIONS OF THE EXECUTIVE COMMITTEE BASED ON PREVIOUS RECOMMENDATIONS OF THE COMMISSION FOR MARINE METEOROLOGY

THE COMMISSION FOR MARINE METEOROLOGY,

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

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

RECOMMENDS:

(1) That, after review of the actions taken on Recommendation 4 (CMM-V) and Recommendation 25 (CMM-V), Resolution 12 (EC-XXI) be no longer considered necessary;

(2) That Resolution 19 (EC-III) be replaced by a new Executive Committee resolution based on Recommendation 14 (CMM-VI); and

(3) That Resolution 15 (EC-XVII) be maintained in force.

ANNEX I

Annex to paragraph 6.4.3 of the general summary

RECOMMENDED METHODS FOR PRESENTATION OF INFORMATION ON SPECIAL MARINE FACSIMILE CHARTS

Sea-surface temperatures

Solid continuous isolines
Intervals to be suitable to geographical areas
Isolines to be clearly labelled

Waves and swell*

On a separate chart
Wave heights in solid lines, each metre from 2-6; every 2 m after 6
Swell heights in broken lines, intervals as for waves
Wave and swell direction indicated by a suitable arrow

Winds

Plot actual wind reports from ships and weather-ships; above 25 knots on the high seas, lower speeds as required for specialized users
Use conventional wind arrows and speed "feathers" as prescribed in WMO publications

Surface analyses and prognoses

In simplified forms
Standardization of isobar intervals is recommended; an interval of 3, 4 or 5 mb

Reduced visibility

3 horizontal lines for visibility below 1 km
2 horizontal lines for visibility 1-2 km

Ice accretion

Areas of possible ice accretion to be indicated by

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* These proposals are for manually prepared charts; computerized charts may require separate methods of presentation.

A N N E X II

Annex to paragraph 9.3.3 of the general summary

Part A

TABLE SHOWING THE MOST COMMON RELATION BETWEEN VISIBILITY AND PRECIPITATION IF NOT AFFECTED BY OTHER PHENOMENA

Visibility Code figure	Drizzle	Rain	Snow
90			
91			(Very heavy)
92	(Very heavy)		Heavy
93	Heavy	(Very heavy)	Moderate
94	Moderate	Heavy	Moderate
95	Moderate	Heavy	Slight
96	Slight	Moderate	Slight
97	(Very slight)	Slight	(Very slight)
98		(Very slight	
99			

NOTES:

1. In using this table the observer should firstly decide upon the form of precipitation. The table should not be used for the coding of visibility, but should only be considered as guidance.

2. In using the table it is important to remember that the connexion between visibility and precipitation which is given in the table is mainly valid for precipitation of a continuous type.

3. For showery weather, one must expect a wider spread of the visibility, as stated above.

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ANNEX II

Part B

DESCRIPTIONS OF PRECIPITATION FOR USE BY SHIPBORNE OBSERVERS

Precipitation occurs either in a more or less uniform manner (intermittent or continuous) or in showers.

All precipitation other than showers must be reported as intermittent or continuous.

Non-showery precipitation usually falls from stratiform clouds (mainly altostratus and nimbostratus); showers falls from large convective clouds (mainly cumulonimbus, rarely cumulus). Drops and solid particles in a shower are generally larger than those occurring in non-showery precipitation.

The drops of precipitation can be supercooled (i.e. the temperature of the drops is below 0°C). On impact with a surface, drops of supercooled rain form a mixture of water and ice having a temperature of 0°C.

Forms of the hydrometeors: (The definitions given below are a shortened version of those given in Chapter II of the new International Cloud Atlas.

(1) Drizzle: Fairly uniform precipitation in the form of very small drops of water. The diameter of the drops is normally less than 0.5 mm. The drops appear almost to float, thus making visible even slight movements of the air. Drizzle falls from a continuous and fairly dense layer of stratiform cloud, usually low, sometimes touching the ground (fog). For coding purposes, drizzle must be classified as "slight", "moderate" or "heavy".

(a) Slight drizzle can readily be detected on the face and on wheel-house windows, but produces very little run-off from deck, roofs, etc;

(b) Moderate drizzle causes windows, decks and superstructures to stream with moisture;

(c) Heavy drizzle as for moderate drizzle and reduces visibility below 1 000 metres.

(2) Rain: Precipitation of drops of water which falls from a cloud, the diameter and concentration of raindrops vary considerably according to the intensity of the precipitation and especially according to its nature (continuous rain, rain showers, storm rain, etc.). Continuous rain usually falls from a more or less uniform layer or layers of thick stratiform cloud. For coding purposes, rain must be classified as "slight", "moderate" or "heavy".

(a) Slight rain may consist of scattered large drops or numerous smaller drops. The rate of accumulation on the deck is small and puddles form very slowly;

(b) Moderate rain: Individual drops are not clearly identifiable. Spray is observable. Puddles form rapidly. Sounds from roofs range from swishing to gentle roar;

(c) Heavy rain: A downpour which makes a roaring noise on awnings and deckheads and forms a misty spray of fine droplets by splashing on deck surfaces.

(3) Snow: Precipitation of ice crystals, singly or agglomerated, which falls from a cloud. The form, size and concentration of snow crystals vary considerably according to the conditions prevailing at the time of the snowfall. The intensity is coded as "slight", "moderate" or "heavy" and is best described by using the connexion between visibility and intensity as shown in the table.

(4) Showers: These are characterized by their abrupt beginning and end, and by the generally rapid and sometimes violent variations in the intensity, of the precipitation. Drops and solid particles falling in a shower are generally larger than those falling in non-showery precipitation. Whether the hydrometeors (rain or snow) occur as showers, or not, depends on the clouds in which they originate. Showers fall from large convection clouds.

(a) Rain and snow showers must be classified for coding purposes with regard to intensity as either "slight", "moderate" or "heavy". The description is the same as for slight, moderate or heavy rain or snow. It must, however, be remembered that the visibility in showery weather shows a much greater variability than for the same category of continuous rain;

(b) Violent showers are exceptionally heavy or torrential rain showers. Such showers occur mostly in tropical regions.

(5) Snow pellets: Precipitation of white and opaque ice particles, which falls from a cloud. These particles are generally conical or rounded. Their diameter may attain five millimetres. These grains having a snowlike structure are brittle and easily crushed, when they fall on a hard surface they bounce and often break up. In most cases, snow pellets fall as showers, often together with snowflakes, normally when temperatures near the surface are close to $0^{\circ}C$. For recording purposes, the intensity of snow pellets, when occurring alone is determined according to the visibility in the same manner as for snow.

(6) Hail: Precipitation of transparent, or partly or completed opaque particles of ice (hailstones), usually spherical, conical or irregular in form and of diameter generally between 5 and 50 millimetres, (smaller particles of similar origin may be classified either small hail or ice pellets) which falls either separately or agglomerated into irregular lumps. Hail always occurs in the form of showers and is often observed during heavy thunderstorms. For coding purposes, hail must be classified as either "slight", "moderate", or "heavy". The intensity is determined by the rate of accumulation of stones as follows:

(a) Slight hail: Few stones falling, no appreciable accumulation on flat surfaces;

(b) Moderate hail: Slow accumulation of stones. Fall sufficient to whiten the decks;

(c) Heavy hail: Rapid accumulation of stones. Rarely experienced in temperate latitudes at sea.

(7) Small hail: Precipitation of translucent ice particles which falls from a cloud. These particles are almost spherical and sometimes have conical tips. Their diameter may attain and even exceed five millimetres. Small hail is an intermediate stage between snow pellets and hailstones. Usually, small hail is not easily crushed and when it falls on a hard surface it bounces with an audible sound on impact. Small hail always occurs in showers. For coding purposes, small hail must be classified as either "slight", "moderate" or "heavy". The intensity is determined by using the accumulation rate as given for hail.

(8) Ice pellets: Precipitation of transparent ice particles which falls from a cloud. These particles are usually spherical or irregular, rarely conical. Their diameter is less than five millimetres. Usually, ice pellets are not easily crushed, when they fall on hard surfaces they generally bounce with an audible sound on impact. Precipitation in the form of ice pellets generally falls from altostratus or nimbostratus. The intensity of ice pellets is determined in the same manner as for hail.

(9) Snow grains: Precipitation of very small opaque white particles of ice. These particles are fairly flat or elongated; their diameter is generally less than one millimetre. When the grains hit a hard surface they do not bounce. They usually fall in small quantities, mostly from stratus or from fog and never in the form of a shower. This precipitation corresponds as it were to drizzle and occurs when the temperature is between 0°C and -10°C approximately. As there is only one code specification which refers to snow grains (ww - 77), it is not necessary to classify intensity.

A N N E X III

Annex to paragraph 11.4.4 of the general summary

PROPOSED APPENDIX H TO VOLUME I OF WMO TECHNICAL REGULATIONS

(See [C.1.] 1.3.1 (g) and [C.1.] 1.4.7.3.2)

Conversion of Beaufort force of the wind into wind speed in metres per second

The following conversion scale has been developed from comparative wind measurements made on board ships in the period from 1874 to 1963 and on the basis of detailed investigations into the statistical properties of wind scales. The origin of the scale and its uses in meteorology and other international conventions are explained in Report No. 3 of the WMO Marine Science Affairs series, entitled The Beaufort Scale of Wind Force. As indicated in paragraph 1.2 of this report, the conversion scale is applicable to visual observations made:

(i) On board moving ships;

(ii) In open sea waters; and

(iii) By experienced observers.

Furthermore the scale corresponds to an equivalent height of anemometer of 15-25 metres.

Beaufort number	Interval of equivalent wind speeds (metres/sec)	Mean equivalent wind speed (metres/sec)
0	0 - 1.3	0.8
1	1.4 - 2.7	2.0
2	2.8 - 4.5	3.6
3	4.6 - 6.6	5.6
4	6.7 - 8.9	7.9
5	9.0 - 11.3	10.2
6	11.4 - 13.8	12.6
7	13.9 - 16.4	15.1
8	16.5 - 19.2	17.8
9	19.3 - 22.4	20.8
10	22.5 - 26.0	24.2
11	26.1 - 30.0	28.0
12	~~26.1 - 30.0~~	33.0*

* Represents a mean value of extreme wind speeds with no upper limit.

NOTE: Appropriate reference to Appendix H should be included in paragraphs [C.1.] 1.3.1 (g) and [C.1.] 1.4.7.3.2.

A N N E X IV

Annex to paragraph 12.1.3 of the general summary

TABLE OF CONTENTS OF THE
GUIDE TO THE MARINE METEOROLOGICAL SERVICES SYSTEM

ANNEX V

Annex to paragraph 16.3 (1) of the general summary

TERMS OF REFERENCE FOR A RAPPORTEUR ON THE METEOROLOGICAL ASPECTS OF ICE ACCRETION ON SHIPS AND INSTALLATIONS AT SEA

In close association with the relevant activities of IMCO:

(1) To review the present state of research into the meteorological aspects of ice accretion, in particular, the relationship between the marine environmental conditions and the formation, development and decay of ice accretion on ships and installations at sea in various waters;

(2) To review the present state of the operational aspects, viz. reporting ice accretion (Code 1751) and forecasts of meteorological conditions liable to cause ice accretion aboard ships;

(3) In the light of (1) and (2) above, to formulate recommendations on action for improvement which could be taken by WMO and possibly on joint action on the part of WMO and IMCO.

ANNEX VI

Annex to paragraph 16.3 (2) of the general summary

TERMS OF REFERENCE FOR CMM EXPERTS ON THE WEATHER ROUTEING OF SHIPS

In close association with experts designated by IMCO:

(a) To review the systems of weather routeing of ships in detail;

(b) To prepare an information pamphlet which would:

(i) Explain the basic concept of the weather routeing of ships together with a summary of the various techniques used in different countries;

(ii) Describe the advantages to be gained from weather routeing services;

(iii) Explain the operational procedures required to apply for and receive the weather routeing service;

(iv) Contain a list of countries from which these services can be obtained together with other relevant information;

(v) Include two separate sections, one containing information of a permanent nature and the other containing information which would require updating, the latter being eventually incorporated in appropriate publications of the organizations concerned.

(c) To consider and recommend measures for widening the application and use of existing weather routeing facilities by merchant ships.

A N N E X VII

Annex to Recommendation 6 (CMM-VI)

DATA TO BE INCLUDED IN MARINE CLIMATOLOGICAL SUMMARIES FOR SELECTED AREAS IN POLAR REGIONS

1. Dry-bulb temperature

   (a) Monthly means;

   (b) Frequency table in 3°C steps based on the intervals 0.0 to 2.9°C (positive values), -0.1 to -3.0°C (negative values), or where and when necessary in 1°C steps based on the intervals 0.0 to 0.9°C (positive values), -0.1 to -1.0°C (negative values);

   (c) Extreme values should be included when 3°C steps are used under (b);

   (d) Standard deviations, if the number of observations is sufficiently large;

   (e) Monthly number of observations.

2. Sea temperature

   (a) Monthly means;

   (b) Frequency table in 1°C steps based on the intervals 0.0 to 0.9°C (positive values), -0.1 to -1.0°C (negative values), e.g. 9.0 to 9.9°C, -1.1 to -2.0°C;

   (c) Monthly number of observations.

3. Air-sea temperature difference

   (a) Monthly means;

   (b) Frequency table in 1°C steps based on the intervals 0.0 to 0.9°C (positive values), -0.1 to -1.0°C (negative values), e.g. 9.0 to 9.9°C, -1.1 to -2.0°C;

   (c) Monthly number of observations.

4. Visibility

(a) Number of observations for each month for each code figure 90-99 (WMO Code No. 4377);

(b) Monthly number of observations.

5. Weather

(a) Monthly number of occasions with rain or drizzle at the time of observation (ww = 50-67, 80-82 (WMO Code No. 4677));

(b) Monthly number of occasions with snow or snow and rain at the time of observation (ww = 68-79, 83-86);

(c) Monthly number of occasions with hail at the time of observation (ww = 87-90);

(d) Monthly number of occasions with current or recent thunderstorms with or without precipitation at the time of observation (ww = 17, 91-99);

(e) Monthly number of observations with:

(i) Gales (Beaufort force 8 or more);

(ii) Storms (Beaufort force 10 or more);

(iii) Hurricane force winds (Beaufort force 12);

at the time of observation;

(f) Monthly number of occasions of precipitation at the time of observation (ww = 50-97, 99);

(g) Monthly number of occasions of visibility less than 1 km;

(h) Monthly number of observations.

6. Wind direction and force

(a) Monthly number of observations for each month for each Beaufort number 0, 1, 2, etc., and for direction by sectors of 30 degrees, true north bisecting the first sector;

(b) Monthly total of observations for each sector irrespective of wind force;

(c) Monthly number of observations for each Beaufort number irrespective of direction;

(d) Monthly number of observations.

7. Pressure

(a) Monthly means and extremes for all hours of observation;

(b) Frequency table in:

4 mb steps, based on the intervals
0.0 to 3.9 mb, e.g. 996.0 to 999.9 mb;

(c) Standard deviations, if the number of observations is sufficiently large;

(d) Monthly number of observations.

8. Cloud

(a) Monthly mean of total cloud amount;

(b) Monthly mean amount for low cloud only (defined as cloud for which h is any code figure from 0 to 8 inclusive (WMO Code No. 1600));

(c) Monthly number of observations in the following ranges of total cloud amount:

(i) 2 oktas or less;

(ii) 3 to 5 oktas inclusive;

(iii) 6 or 7 oktas;

(iv) 8 oktas;

(d) Monthly number of observations.

9. Waves

List of original observations or, where number of observations is sufficient, seasonal tables may be prepared as indicated in paragraph 4.10 of the annex to Recommendation 36 (68-CMM).

10. Period of summaries

Monthly summaries for polar regions shall be prepared for individual years where 40 or more observations per individual month are usually available, at least for the summer months. Otherwise they shall be prepared only for the ten-year periods 1961-70, 1971-80, 1981-90. Usually observations will be available only for the summer months but if in a particular selected area summaries can be prepared for each month of the year then annual summaries should also be included as in the case of non-polar regions.

11. Minimum number of observations

For the preparation of monthly summaries for individual years the same criteria are applicable as indicated in Recommendation 36 (68-CMM).

For the ten-year summaries the following criteria apply:

(a) When 40 or more observations are available from the ten months of the same name the data shall be summarized;

(b) When less than 40 observations are available over the ten months concerned the data shall be examined for time distribution:

(i) If the data represent observations taken on ten or more different days of the month they shall be summarized;

(ii) If the data represent observations taken on less than ten different days of the month, they shall be listed;

(c) When the data are summarized, a cautionary note should be included in an appropriate place in the summary if the distribution of observations over the ten years is very irregular.

12. Maximum size of selected area

The recommended maximum size of a selected area is 20 one-degree squares in latitudes 50° to 60°, 30 one-degree squares in latitudes 60° to 70° and 50 one-degree squares in latitudes greater than 70°.

13. Changes in selected areas

Once selected the areas shall remain fixed in their size, shape and position to cover as many ten-year periods as possible. If a change is unavoidable however, e.g. due to insufficient data, the substituted area shall not overlap the one originally chosen and the data for the original area shall be listed in order to preserve continuity between ten-year periods.

A N N E X VIII

Annex to Recommendation 7 (CMM-VI)

ICE ANALYSIS CODE

FM ..... ICEAN - Ice Analysis Code

Section 1	ICEAN				
	20002	33399	$0Y_cY_cG_cG_c$	$(2Y_sY_sG_sG_s)$	
	75557	33399	$0Y_cY_cG_cG_c$	$(2Y_sY_sG_sG_s)$	$000G_pG_p$
Section 2	44111	$6L_iL_iL_jL_j$	$Q_cL_aL_aL_aL_a$	$L_oL_oL_oL_oL_o$	
	$Q_cL_aL_aL_aL_a$	$L_oL_oL_oL_oL_o$	. . . . .	. . . . .	
	$CF_pC_pS_1C_1$	$(2F_sC_sS_2C_2)$	$(3F_eC_eS_3C_3)$	$(4F_qC_qS_4C_4)$	
	$(5F_uC_uS_5C_5)$	$(6T_1T_2R_eR_h)$	$(7W_tD_wt_EM_s)$	$(8a_iDr_ir_i)$	
	$(9n_Gn_Gn_Bn_B)$				
Section 3	4422K	$Q_cL_aL_aL_aL_a$	$L_oL_oL_oL_oL_o$	$Q_cL_aL_aL_aL_a$	
	$L_oL_oL_oL_oL_o$	. . . . .	. . . . .		
Section 4	4433K	$Q_cL_aL_aL_aL_a$	$L_oL_oL_oL_oL_o$	$Q_cL_aL_aL_aL_a$	
	$L_oL_oL_oL_oL_o$				
	19191				

NOTES:

1. ICEAN is the name of the code form describing actual or predicted ice conditions.

2. An ICEAN message is identified by the word ICEAN.

3. The code form is divided into four sections:

Section number	Symbolic figure group	Contents
1	20002 or 75557	Identification and time groups
2	44111	Description of ice conditions
3	4422	Areas with defined navigability
4	4433	Recommended track

4. General

(i) The name ICEAN shall always appear as the first line of the text of the message.

5. Section 1

(i) The groups in the first line shall be used to begin an ice analysis; the groups in the second line shall be used to begin an ice prognosis;

(ii) The appropriate groups shall be included each time the analysis or prognosis is made up from a different chart. Each such analysis or prognosis shall end with the group 19191;

(iii) When satellite information is used, in addition to conventional data, to prepare the analysis or prognosis, the date and time of this information shall be indicated by means of the optional group $2Y_sY_sG_sG_s$;

(iv) Services which desire to report positions in this message to the nearest half-degree shall use the group $333x_1x_1$ instead of 33399 in which case all position groups shall have the form $L_aL_aL_oL_ok$. The symbolic letters x_1x_1 shall be coded 00 for positions in the northern hemisphere and 11 for positions in the southern hemisphere.

6. Section 2

(i) This section shall be omitted in messages which are intended to contain only information on the navigability of areas or on recommended shipping tracks;

(ii) The group $6L_iL_iL_jL_j$ shall specify the position, relative to the points which follow, of the area of which the ice conditions are described by the groups $CF_pC_pS_1C_1$ ..... $9n_Gn_Gn_Bn_B$ as needed. The specification chosen for L_jL_j may be the same as the one chosen for L_iL_i;

(iii) Section 2 shall be repeated as often as is necessary to describe the ice conditions in the entire area covered by the analysis or prognosis;

(iv) Icebergs present shall be mentioned. Unless sufficient information is given in the group $6L_iL_iL_jL_j$, iceberg reports shall be given by using the group $9n_Gn_Gn_Bn_B$.

7. Section 3

(i) This section shall be omitted when no information on enclosed areas with defined navigability is given;

(ii) The groups $Q_cL_aL_aL_aL_a$, $L_oL_oL_oL_oL_o$ (or $L_aL_aL_oL_ok$, see note (5) (iv)) shall be used to delineate, in a clockwise sequence, an enclosed area;

(iii) The group(s) of the first position shall be repeated;

(iv) If the degree of obstruction to navigation of the enclosed area, indicated by K in the group 4422K, differs in adjoining areas, section 3 shall be repeated as necessary to describe the conditions in the entire region of interest.

8. Section 4

(i) This section shall be omitted when no information on recommended shipping tracks is given;

(ii) The section shall be repeated as often as is necessary to delineate a recommended shipping track, if the degree of obstruction to navigation varies along the track;

(iii) If a track is divided into legs, the dividing position where the change occurs shall be repeated.

Specifications of symbolic code letters

a_i Trend in behaviour of ice. Table 12.

C Total concentration of all ice. Table 2.

C_p Concentration of predominant form. Table 2.

C_s Concentration of secondary form of ice. Table 2.

C_e Concentration of the tertiary form of ice. Table 2.

C_q Concentration of the quaternary form of ice. Table 2.

C_u Concentration of the quintary form of ice. Table 2.

C_1 Concentration of the predominant stage of development of ice. Table 2.

C_2 Concentration of the secondary stage of development of ice. Table 2.

C_3 Concentration of the tertiary stage of development of ice. Table 2.

C_4 Concentration of the quaternary stage of development of ice. Table 2.

C_5 Concentration of the quintary stage of development of ice. Table 2.

D_o True direction toward which ice has drifted in the past 12 hours (WMO Code 0700).

D_W Orientation of water feature given in W_t. Table 7

F_p Predominant form of ice. If two or more forms of ice have the same concentration, selection of the predominant form will be made in a decreasing size sequence. Table 3.

F_s Secondary form of ice. Table 3.

F_e Tertiary form of ice. Table 3.

F_q Quaternary form of ice. Table 3.

F_u Quintary form of ice. Table 3.

G_cG_c Synoptic hour, in GMT, of observation of data from which the chart is prepared.

G_pG_p Number of hours to be added to G_cG_c (chart time) to obtain time to which the prognosis refers.

G_sG_s Hour, in GMT, of observation of satellite date used for the preparation of the chart.

K Effect of the ice on navigation (WMO Code 2100)

$L_aL_aL_aL_a$ Latitude in degrees and minutes.

L_iL_i Type of line or feature being described. Table 13.

L_jL_j Type of line or feature being described. Table 13.

$L_oL_oL_oL_oL_o$ Longitude in degrees and minutes.

M_s Stage of melting. (In case of unequal stages the higher code figure is used). Table 9.

n_Bn_B Number of icebergs within the area described. Table 10.

n_Gn_G Number of growlers and bergy bits within the area described. Table 10.

Q_c Quadrant of the globe. Table 1.

R_e Extent of all ridging. Table 2.

R_h Maximum height of ridging. Table 8.

r_ir_i Distance (nautical miles) travelled by drifting ice in 12 hours.

S_1 Predominant stage of development of ice. If two or more stages of development are of the same concentration, older stages of development will have precedence over the younger stages. Table 4.

S_2 Secondary stage of development of ice. Table 4.

S_3 Tertiary stage of development of ice. Table 4.

S_4 Quaternary stage of development of ice. Table 4.

S_5 Quintary stage of development of ice. Table 4.

T_1 Topography of greatest extent. If two types are equal in extent, the higher code number is used first. Table 5.

T_2 Topography of second greatest extent. Table 5.

t_E Thickness of the predominant form of ice. Snow depth not included. Table 11.

W_t Type of opening in the ice. Table 6.

Y_cY_c Day of the month (GMT) of observation of data from which the chart is prepared.

Y_sY_s Day of the month (GMT) of observation of satellite data used for the preparation of the chart.

CODE TABLES

1. QUADRANT OF THE GLOBE
(Q_c)

	Latitude	Longitude
(1)	North	East
(3)	South	East
(5)	South	West
(7)	North	West

2. CONCENTRATION, SNOW COVER, EXTENT OF RIDGING

(C, C_p, C_l, C_s, C_2, C_e, C_3, C_q, C_4, C_u, C_5, R_e)

(0)	Less than 1/10	(Less than 1/2 okta)
(1)	1/10	(1 okta)
(2)	2-3/10	(2 oktas)
(3)	4/10	(3 oktas)
(4)	5/10	(4 oktas)
(5)	6/10	(5 oktas)
(6)	7-8/10	(6 oktas)
(7)	9/10	(7 oktas)
(8)	10/10	(8 oktas) with openings
(9)	10/10	(8 oktas) without openings

3. FORMS OF ICE
(F_p, F_s, F_e, F_q, F_u)

(0) No ice
(1) Ice of land origin
(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

4. STAGES OF DEVELOPMENT
(S_1, S_2, S_3, S_4, S_5)

(0) No stage of development
(1) New ice
(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

5. 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

6. 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 or more)
(6) Lead, shore lead, flaw lead
(7) Polynya, shore polynya, flaw polynya
(8) Recurring polynya
(9) Water between floes
(/) Undetermined or unknown

7. ORIENTATION
(D_w)

(0) No distinct orientation
(1) Major axis of feature orientated NE-SW
(2) Orientated E-W
(3) Orientated SE-NW
(4) Orientated N-S
(5) Parallels shore to E
(6) Parallels shore to S
(7) Parallels shore to W
(8) Parallels shore to N
(/) Undetermined or unknown

8. MAXIMUM HEIGHT OF RIDGING
(R_h)

(0) Level ice
(1) 1 metre
(2) 2 metres
(3) 3 metres
(4) 4 metres
(5) 5 metres
(6) 6 metres
(7) 7 metres
(8) 8 metres
(9) 9 or more metres
(/) Undetermined or unknown

9. STAGE OF MELTING
(M_s)

(0) No melt
(1) Discoloured ice
(2) Flooded ice
(3) Few puddles
(4) Many puddles
(5) Puddles with few thaw holes
(6) Puddles with many thaw holes
(7) Thaw holes no puddles
(8) Rotten ice
(9) Refreezing/Refrozen puddles
(/) Undetermined or unknown

10. ICE OF LAND ORIGIN
GROWLERS AND BERGY BITS
($n_G n_G$)

ICEBERGS
($n_B n_B$)

(00) None
(01) 1
(02) 2
(03) 3
(04) 4
(05) 5
(06) 6
(07) 7
(08) 8
(09) 9
(0/) Between 1 and 9
(10) 10
(11) 11
(12) 12
(13) 13
(14) 14
(15) 15
(16) 16
(17) 17
(18) 18
(19) 19
(1/) Between 10 and 20
(20) 20
(21) 21-50
(22) 51-100
(23) 101-200
(24) 201-500
(25) More than 500
(//) + Present but not counted

+ Note: The symbol (//) should only be used when counting is impossible due to darkness or poor visibility, or when it is obvious that no counting is required.

11. THICKNESS OF ICE
(t_E)

(0) Less than 5 cm
(1) 5-9 cm
(2) 10-19 cm
(3) 20-29 cm
(4) 30-39 cm
(5) 40-59 cm
(6) 60-89 cm
(7) 90-149 cm
(8) 150-249 cm
(9) 250 cm or more
(/) Undetermined or unknown

12. TREND IN BEHAVIOUR OF ICE
(a_i)

(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

13. TYPE OF LINE OR FEATURE BEING DESCRIBED
(L_iL_i) (L_jL_j)

(00) (Filler)
(01) North-east of following line
(02) East of following line
(03) South-east of following line
(04) South of following line
(05) South-west of following line
(06) West of following line
(07) North-west of following line
(08) North of following line
(09) Within following line
(10) Land
(11) Radar
(12) Satellite
(13) Limits of observation
(14) Limits of analysis
(15) Estimated
(16) Compacted edge

(17) Diffused edge
(18) Area of greater concentration
(19) Area of lesser concentration
(20) (For future use)
(21) Ice edge
(22) Concentration boundary
(23) Fast ice
(24) Lead
(25) Polynya
(26) Belt
(27) Patch
(28) Field
(29) Ridged ice zone
(30) Fracture zone
(31) Iceberg
(32) Scattered icebergs
(33) Group of icebergs
(34) Ice island
(35) (Available for expansion)
(50) Whole visual observed area
(51) Whole visual observed area outside pack ice area.

A N N E X IX

Annex to Recommendation 16 (CMM-VI)

REVISED CODE 1100

F - Force of surface wind at sea

Beaufort number	Descriptive term	Reporting figures metres/sec	Reporting figures knots	Specifications for observing at sea
0	Calm	1 or 0	0 - 2	
1	Light air	2	3 - 5	
2	Light breeze	3 - 4	6 - 8	
3	Gentle breeze	5 - 6	9 - 12	
4	Moderate breeze	7 - 9	13 - 16	
5	Fresh breeze	9 - 11	17 - 21	(as at
6	Strong breeze	12 - 14	22 - 26	present)
7	Near gale	14 - 16	27 - 31	
8	Gale	17 - 19	32 - 37	
9	Strong gale	19 - 22	38 - 43	
10	Storm	23 - 26	44 - 50	
11	Violent storm	26 - 30	51 - 57	
12	Hurricane			
		33	64	

NOTES:

(1) The code is applicable to visual observations made on board ship. The equivalent wind speeds correspond to a reference anemometer height of 20 metres above sea surface.

(2) Zero metres per second or zero knots should only be reported in the rather rare cases of a flat (oily) sea surface.

(3) Where the same reporting figure is given for two consecutive steps of the wind scale, the observer has the possibility to indicate that the wind speed is halfway between these two steps. In the other cases the observer must make a choice between steps of the wind scale when reporting.

(4) For wind force 12, the observer is not expected to distinguish between various wind speeds, as he will not normally be able to do so. He should report Figure 33 (m/sec) or 64 (knots) indicating that the wind has reached Beaufort force 12. The figure of 33 m/sec, or 64 knots, represents a mean value of extreme wind speeds with no upper limit.

(5) If winds of force 12 have been increasing or decreasing noticeably during the last 30 minutes, this fact shall be reported in a plain langauge addition to the ship's report.

(6) This table shall be used for reporting visual observations only; the original equivalent wind speeds to the Beaufort scale are contained in Appendix H to Volume I of the Technical Regulations.

(7) The specifications for observing at sea apply to open, i.e. not wind-sheltered, waters.

RECOMMENDATIONS OF THE COMMISSION FOR MARINE METEOROLOGY

ADOPTED PRIOR TO ITS SIXTH SESSION AND MAINTAINED IN FORCE

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

THE COMMISSION FOR MARINE 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. 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) [CMS] 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. 37 (71-CMM) - SUGGESTED SCHEDULES OF WATCHES OF RADIO OPERATORS ON SHIPS OF THE FOURTH CATEGORY (ITU)

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) Paragraph 12.4 of the general summary of the fifth session of the CMM,

(2) Paragraph 3.6.2 of the report of the first session of the Advisory Working Group of the CMM,

(3) Recommendation 1 (CMM/WGOMT-I),

CONSIDERING:

(1) That the meteorological information from merchant ships constitutes, and will continue to constitute for many years, an essential part of the WWW Global Observing System,

(2) That this information is necessary at the four standard hours of observation 0000, 0600, 1200, and 1800 GMT,

(3) That priority should always be given to the transmission of upper-air observations,

(4) That this information should be transmitted rapidly to National Meteorological Centres for meteorological analyses and for warnings of dangerous phenomena,

OBSERVING:

(1) That the times for transmission from the ship to the coastal station largely depend on the schedules of watches of radio operators on board ship,

(2) That there are a large number of ships of the fourth category on which schedules for working are laid down in national regulations,

(3) That adjusting these regulations so that the schedules coincide with the main hours of observation would bring about a great improvement on the collection of meteorological observations,

RECOMMENDS:

(1) That Members with marine interests be asked to approach their appropriate telecommunication authorities who have drawn up the regulations for the service for operations on board ship on a national basis (Fourth Category), to inform them of the WMO interest in all measures which would bring about an improvement in the transmission of ships' reports, and to request them to be kind enough to look into the possibility of changing the hours of service in such a way that they meet the following requirements:

(a) The schedules of ships of the fourth category include regularly three periods chosen from the four following periods: 0000/0100 - 0600/0700 - 1200/1300 - 1800/1900 GMT;

(b) If upper-air reports are to be transmitted, priority be given wherever possible to the inclusion of the extended periods 0000/0200 and 1200/1400 GMT.

(2) That Members who attempt to obtain changes in this way inform the Secretary-General of WMO on the results obtained and any difficulties encountered.

Rec. 38 (71-CMM) - UPPER-AIR OBSERVATIONS ON BOARD MOBILE SHIPS

THE COMMISSION FOR MARINE METEOROLOGY,

NOTING:

(1) The World Weather Watch plan,

(2) Recommendation 2 (CMM/WGOMT-I),

CONSIDERING:

(1) That it is of utmost importance to increase the number of upper-air observations from ocean areas,

(2) That there is a particular need for more upper-wind observations in the tropics,

(3) That in many cases there are serious financial difficulties which prevent the establishment of upper-air observing stations at sea,

RECOMMENDS that Members be encouraged:

(1) To develop techniques for upper-wind finding from ocean areas, particularly from mobile ships;

(2) To consider the implementation of upper-wind programmes in ships plying in the tropics where wind data are especially useful;

(3) To consider making requests to WMO for assistance under the VAP which, if granted, would result in an increase in the number of upper-air observations over the oceans.

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