WORLD METEOROLOGICAL ORGANIZATION

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COMMISSION FOR MARITIME METEOROLOGY

ABRIDGED FINAL REPORT

Of The

FIRST SESSION

London, 14th – 29th July, 1952

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E R R A T U M

Page 33, right column, line 7 from the bottom - Substitute : "...at the level of 1250 "for" ...at the level of 1850".

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W. Blow	ITU
E. Chambers	IATA

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G. Swoboda	Secretary General
A. H. Gordon	Technical Officer

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LIST OF DOCUMENTS CONSULTED

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1	-	First provisional agenda with explanatory notes by the President.
2	4	Report of the President CMM.
3	6.1.1	Summary of selected ships' routes.
4	6.6.1 and 6.6.2	Circular letter PMC 48/50 of the President CMM regarding storm warning signals for tropical areas and night (visual) signals.
5	6.5.1 and 6.5.2	Circular letter PMC 51/51 of the President CMM regarding meteorological observations at sea (question raised by Dr. C.F. Brooks).
6	8.2.	Circular letters PMC 39/48 and PMC 39/50 of the President CMM regarding communications problems.
7	8.3.	International Punch Card for maritime purposes.
8	8.4.	Circular letter PMC 44/49 of the President CMM on the recommendations of the Pacific Science Council.
9	6.1.4.	Correspondence regarding ICAO/SAR recommendations (letter CAeM/11 of the President CAeM and letter MCP 2/51 of the President CMM).
10	6.1.5	Working paper on the organization for the regular hemispherical exchange of skeleton bulletins of selected ships' reports.
11	6.1.1	Working paper submitted by the Netherlands regarding the deficiencies of the selected ships' network.
12	8.1.	Working paper for agenda item concerning the time of transmission for radio weather messages to shipping.
13	8.7.	Circular letter PMC 36/50 of the President CMM referring to the use of the word "roll" (Resolution 62 - CD Washington 1947).

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14	8.9.	Circular letter PMC 32/48 of the President CMM containing his report on the work of the Preparatory Committee of Experts on the Co-ordination of Safety at Sea and in the Air, 1948.
15	8.10.	Circular letter PMC 25/47 of the President CMM (with attachments) containing his report on the International Conference on Safety of Life at Sea, London, 1948.
16	6.1.4	Report of the WMO Representative at the third session of the ICAO/SAR Division, Montreal, 1951.
17	8.14. (New Item)	Explanatory note of the President CMM concerning the application of meteorology to the carriage of goods by sea.
18	7.3.	Explanatory memorandum of the Netherlands regarding international co-ordination in maritime climatological work.
19	8.15. (New Item)	Explanatory note of the President CMM on the definition of D_S and v_S.
20	8.16. (New Item)	Explanatory note of the President CMM on the establishment of ocean weather ships in different oceans.
21	8.13 (New Item)	Explanatory note of the President CMM on the value of the International Cloud Atlas for observers at sea.
22	7.3. (New Item)	Working paper submitted by the U.S.A. delegate regarding marine climatological atlases.
23	6.3.1	Circular letter PMC 44/49 of the President CMM concerning the arrangement of maritime broadcasts in Volume IV of Publication No. 9.
24	6.1.1	Recommendation No. 9 ICAO Second Middle East Regional Air Navigation Meeting, Meteorological Committee, 1950.
25	8.2.	Working paper submitted by the Netherlands' Delegation concerning communication problems in connection with the work of selected ships.

CMM 1/ Doc.No.	Agenda Item No.	Title of Document
26	-	First list of working papers.
27	6.2.1	Report of temporary Working Group on Sea Ice concerning International Ice Nomenclature.
28	9.1.	Memorandum submitted by the Delegation for the Netherlands concerning the way radio weather messages from ships at sea are checked at De Bilt.
29	6.5.1	Working paper submitted by the U.K. delegation concerning plans for encouraging investigations at sea into various problems.
30	6.5.2	Working paper submitted by the U.K. delegate concerning various problems relating to the practical difficulties of making observations aboard ships.
31	8.18	Resolution 16 (EC-II) and annexes concerning thunderstorm activity.
32	6.1.1 6.1.3 6.1.5 8.1. 8.3. 8.14. 8.15. 9.1.	Working paper submitted by the U.K. delegate concerning the items in the adjacent column.
33	6.5.1	Working paper submitted by the U.K. delegate showing "controlled" comparisons of sea surface temperatures and engine room in take temperatures.
34	8.3.	Allocation of numbers to countries using punched cards.
35	6.1.3 8.3.	Working paper submitted by the Egyptian Meteorological Department concerning call signs of ships in radio weather messages and concerning the recording of meteorological observations aboard ships at sea.
36	6.1.1 6.1.3 7.2. 8. 8.3. 8.4. 8.6.	Working paper submitted by the New Zealand member concerning each of the agenda items listed in adjacent column.

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37	8.15.	Working paper submitted by the Netherlands delegate concerning a specific definition of D_s and v_s.
38	6.5.1.(a)) 6.5.1 (c)) 6.5.1 (d)) 6.5.1 (e)) 8.17.	Working paper submitted by the U.S. delegate concerning plans for encouraging investigations at sea into various problems and concerning areological observations in merchant ships.
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40		Revised Provisional Agenda.
41	6.6.1 6.6.2	Working paper submitted by the Philippines delegate concerning radio storm warning signals and night visual signals for storm warnings.
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43		Circular letter from President CMM concerning working groups of CMM.
44		Explanations of the items on the revised Agenda with reference to the relevant document numbers.

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45	7.6. 7.7.	Working paper submitted by the French delegate concerning messages from ships about swell and state of sea and concerning the content of meteorological messages for ships on the high seas.
46	-	Second list of documents 7 July, 1952.
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48	6.1.1	Summary of replies to the President's circular letter MCP 4/51 of 17 March, 1952.
49	6.1.1	Table of summaries of the replies to the President's circular letter MCP 4/51 of 8 March, 1952.
50	6.1.1	Summary of replies to the President's circular letter MCP 4/51 of 30 April, 1952.
51	6.1.4 6.1.5 6.5.2 6.6.1 8.2. 8.4. 8.7. 8.8 8.11. 8.14.	Brief comments by the United States delegate on various items on the Agenda.
52	7.1.	Working paper submitted by the Netherlands on sea temperatures in the Mediterranean Sea.
53	6.1.2 8.1. 8.2.	Comments on items of the agenda in the adjacent column by Bermuda.
54	6.5.1	Working paper submitted by Working Group V.
55	6.5.1	Working paper submitted by the United Kingdom giving the results of test of methods of observing sea temperature.

CMM 1/ Doc.No.	Agenda Item No.	Title of Document
56	6.1.1 6.1.2 6.1.3 6.1.4 6.1.5	Report of Working Group I on Items 6, 7, 10, 20 and 27 of the Provisional Agenda.
57	8.16.	Summary of replies to the President's letter MCP 2/51 of 19 May, 1952, regarding information on the operation of ocean weather ships.
58	6.1.2	Working paper submitted by the delegate from India on the map annexed to Resolution No. 37 (CD Washington 1947).
59	6.1.1	Working paper submitted by the delegates for the United States on the lack of reports in certain areas of the North Atlantic.
60	6.5.2	Working paper submitted by the Canadian delegate on various problems concerning practical difficulties about making observations aboard ship.
61	6.1.1	Paper submitted by the delegate for British West African Territories on the lack of reports to the South and West of the West African coast.
62	6.1.2	Working paper submitted by Portugal concerning ship radio messages in the area allocated to Portugal (C.D. Washington, 1947).
63	6.1.1	Working paper submitted by Hong Kong on the definition of a selected ship and a proposal for the compilation of a regular international selected ship list.
64	-	Memorandum on special measurements made on board French weather ships.
65	8.11	Working paper submitted by Working Group No. V on the Maritime Section of IMO, Publication No. 78, Chapter 10.
66	6.2.1	Working paper submitted by Working Group No. II on their work on an International Ice Nomenclature.

CMM 1/ Doc.No..	Agenda Item No..	Title of Document
67	6.1.1 6.1.2 6.1.3 6.1.4 7.3. 8.2. 8.5. 8.6. 8.7. 8.8. 8.12. 8.15. 8.16.	Comments on various agenda items submitted by ICAO.
68	8.5.	Working paper submitted by the Canadian delegate on special investigations in ocean weather ships.
69	6.5.1	Working paper submitted by the Netherlands on the accuracy of observations on board selected ships.
70	9.1.	Working paper submitted by the French Delegation on the subject "Consideration of the general standard of accuracy of observations made in selected ships."
71	8.2.	Working paper submitted by the Netherlands on the subject of various communications problems in connection with the work of selected ships including the cost of transmission.
72	8.17.	Working paper submitted by the French Delegation on the subject of aerological observations by selected ships.
73	6.5.1	Working paper submitted by the French Delegation on the subject of the effect of the ship motion on the readings of a ship anemometer.
74	6.1.2 6.1.3	Supporting paper submitted by the delegate for Portugal concerning ship radio messages in the area allocated to Portugal (Resolution 37, C.D. Washington 1947).
75	8.5.	Working paper submitted by the Norwegian Delegate on studies aboard ocean weather ships.

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76	Various Agenda Items	An extract from a letter received from the Yugoslavian delegate (Captain Cedo Duplancic) concerning various agenda items.
77	6.1.3 7.1. 7.3. 8.16.	An extract from a letter received from the delegate for Israel on various agenda items.
78	-	Third list of working papers.
79	6.1.4	Working paper submitted by the U.K. delegate on a proposal from ICAO re:- (a) the inclusion of D_SV_Sxxx in all radio weather messages from ships. (b) sea and swell reports from a merchant ship to aircraft about to ditch.
80	9.1.	Supporting paper by the Canadian delegate on the consideration of the general standard of accuracy of observations made in delected ships.
81	8.5.	Working paper submitted by the U.K. delegate on general research undertaken aboard British ocean weather ships.
82	6.1.1	Addendum to CMM 1/Doc.49 and CMM 1/Doc.50.
83	8.17.	Summary of replies to the President's circular letter MCP 19/52 of 26 April, 1952.
84	6.3.1	Working paper submitted by the delegate for the Netherlands on the subject of IMO publication 9, Vol. IV.
85	8.2.	An extract from a letter received by Prof. Bergeron, the delegate for Sweden, doncerning Resolution 37 (CD Washington, 1947).
86	6.1.2	Addendum to the chart "Positions of ship which sent wireless weather reports to Meteorological Services on 1 October, 1951".

CMM 1/ Doc.No.	Agenda Item No.	Title of Document
87	6.1.3	Working paper submitted by the delegate for Sweden on the subject of the inclusion of ship call-signs in weather messages.
88	6.5.1 (a) 8.5.	Working paper submitted by the Canadian delegate on work carried out by the Canadian Meteorological Service relative to items in adjacent column.
89		Final Agenda.

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GENERAL SUMMARY OF THE WORK OF THE SESSION

1. The First Session of the Commission for Maritime Meteorology was convened in the building of the Royal Geographical Society, London, at 10.30 a.m. on 14 July, 1952. The President, Cdr. C.E.N. Frankcom, presided and Mr. George Ward, the Under Secretary of State for Air, welcomed the members of the Commission and guests on behalf of the British Government. The address of Mr. Ward and that of the President are recorded in the minutes of the first meeting.

2. The Commission held 13 Plenary Meetings, as a result of which 12 Resolutions and 31 Recommendations were adopted unanimously. In addition, it was recommended that the views of the Commission on certain items on the Agenda should be merely included in the President's Final Report. At the second meeting the President reported upon the activities of the Commission since the last Session, held at Toronto in 1947. This report is recorded in the minutes of the second meeting.

The Commission submitted Resolutions 1 - 12 to the Executive Committee for their information.

The Commission submitted Recommendations 1 - 31 to the Executive Committee for consideration and approval.

3. The list of members, representatives, guests and observers attending the Session is published on page 5. Dr. G. Swoboda, Secretary-General of the WMO, was present at the first four Plenary Meetings. Mr. A.H. Gordon, of the WMO Secretariat, was Technical Secretary for the Session; Mr. C.A.S. Lowndes (U.K.) was Assistant Secretary.

4. At the second meeting Vice-Admiral J.W. Termijtelen (Netherlands) was unanimously elected Vice-President for the Session.

5. Working Groups Nos. II (Ice), III (Technical regulations) and IV (Radio weather messages from whaling ships), which had been previously appointed to carry out investigations prior to the Session, remained in being throughout the Session and continued their work as necessary. The Agenda items previously dealt with by Working Groups Nos. I (Selected Ships), V (Instruments and methods of observation), and VI (General questions about storm warnings) were dealt with during the Session by two newly-formed Committees. These new Committees were:

Committee A: which dealt with all questions concerning the administration and organization of Selected Ships, reports to and from ships at sea, and general questions of a synoptic nature;

Committee B: which dealt with all questions concerning marine meteorological instruments, methods of observation and climatological work over the oceans.

Committee C was formed later to take over a study of some of the work previously undertaken by Working Group II.

6. The Credentials Committee, Nominations Committee, Co-ordination Committee and Drafting Committee were formally appointed and carried out their duties as and when necessaey and convenient.

7. Items on the Agenda were discussed in detail by Committees and Working Groups before being dealt with in Plenary Session.

8. A summarised report of the proceedings, listing the various subjects considered under broad headings, follows:

8.1 The Selected Ship organization.

Resolution 3,
Recommendations 2, 3, 6, 11, 18, 19, 20, 21, 22.

The primary task was to study the existing ocean network and consider the areas where improvements were necessary and practicable. World maps were prepared before the Session, showing the positions of known Selected Ships on stated days and a further map was prepared at the Session from information supplied by Lloyds and the British General Post Office, showing areas of varying shipping density. A composite map built up from the above information is attached to Recommendation 11. It was pointed out at the Session that this map does not necessarily present a complete picture as some of the deficiency is due to communication difficulties;- many ships being fitted for M/F transmission only. The total number of voluntary observing ships has reached the total of 2,385 but, as will be seen from the map, the network of observations in many ocean areas is still very deficient.

There are two major problems:

(a) To encourage all maritime countries to recruit voluntary observing ships;

(b) To endeavour to rationalise their recruitment so that all areas have as good a network as possible.

Recommendations have been made accordingly. It is proposed that a six-monthly list of Selected Ships and their Call Signs be published by the Secretariat. It has been recommended that ships' Call Signs be included in all collective messages, but that there is no need to include the Call Sign in the text of the message. Meteorological Services responsible for the receipt of radio weather messages from shipping in various areas should notify the other nations of their willingness to accept these messages without cost to the ship. In relation to Recommendation 19 about reports from ships in areas where more than one Service is responsible, the delegate from Portugal stated that this recommendation did not entirely satisfy the requirements of his Service but that it provided a compromise. Certain adjustments had been proposed to the areas shown in Maps A and B (Resolution 37, Washington 1947).

Aerological observations from merchant ships are not considered to be practicable at present.

The Commission carefully considered a proposal from New Zealand about the use of tankers as Selected Ships and agreed that these vessels could play a very useful role when on unfrequented routes. It was found, however, that many countries have already recruited tankers as observing ships and it was therefore considered that a specific recommendation on this matter was unnecessary.

8.2. Communication problems in connection with Selected Ships

Resolution 3
Recommendations 4, 5, 6, 29

Considerable study has been devoted to these problems by the Commission since 1947, notably by Admiral Termijtelen, and a memorandum has been prepared. It is suggested that a representative of the Commission for Maritime Meteorology attends the next Administrative Radio Conference of the International Telecommunication Union. The transmission costs of radio weather messages from ships are, in some cases, a major cause for shortage of reports and proposals are made about waiving both ship charges and shore charges on such messages, in view of their bearing on safety of life at sea, as well as on other activities of benefit to the community. It was pointed out at the Session that there were local fiscal difficulties about waiving the shore tolls on such messages.

Action to remedy delays in receipt of radio weather messages is recommended and to ensure that radio bulletins for shipping are issued during the hours of duty of the Radio Operator in "single-operator" ships.

8.3. Technical Regulations

Recommendation 26

The composition of these was a major task and entailed much preliminary work by a Working Group, composed of members from each Region. A detailed document was first prepared, containing all the Resolutions of the International Meteorological Organization concerning maritime meteorology which appeared to have any practical value at present, and this was discussed by correspondence. The Working Group then met in London a few days before the Session and reduced the bulk of the document by deleting all material which appeared to have no specific obligation behind it. This reduced document was then studied by all members and fully discussed in Plenary Sessions before being finalised.

It is recommended that the Secretariat be directed to consider the appropriate method of reproducing those "recommendations" of the International Meteorological Organization which had no place in the Technical Regulations, but have, nevertheless, some continuing practical value.

8.4. Marine observational problems

Resolutions 7, 9, 12
Recommendations 9, 10, 15, 22, 23, 24, 25

Detailed study was given to various instrumental and observational problems and considerable documentation prepared. Ocean weather ships have proved a valuable field for investigations and experiments. Sea and air temperatures, humidity measurements and rainfall observations were among the most difficult and important problems studied. The great potential value of rainfall observations from the oceans was stressed. Working Groups have been set up to further examine the problem - which is still largely unsolved - of how best to make these observations simply and accurately aboard ship. Detailed information for study by the Working Group is contained in various working papers laid before the Session and in the report of the 11th Plenary Session of the Conference. It is considered that continued study and experiment in connection with marine observational problems be carried out in ocean weather ships.

The Commission does not consider that instrumental aids are practicable aboard merchant ships at present for visibility or cloud height observations. Attention is drawn, however, to experiments made aboard ship into instrumental observation of cloud height by the U.S. Weather Bureau.

The question of wave observations was considered and some clarification of instructions concerning these observations is proposed.

The Commission considers that the best way to achieve greater keenness and accuracy among marine observers is by encouragement and some detailed proposals about this are made in a Recommendation. The proposed new Cloud Atlas was considered and the Commission suggests that even if Services did not issue it to their Selected Ships its basic detail should, nevertheless, be incorporated in national instructions.

8.5. Weather bulletins and storm warnings for shipping

Resolution 5
Recommendations 13, 27, 31

The present arrangements appear to be generally satisfactory. The Commission considers that some improvement to the detail of radio storm warnings in tropical areas might be effected regionally, in the light of the recommendations made at the Manila Storm Warning Conference (1949). An additional visual storm warning signal for night use is recommended, but it is realised that many Services, having already adopted "private" visual signals, will not necessarily adopt any "international" visual signals, for economic reasons. Provision is made for the inclusion of a "prognosis" in bulletins for shipping, in addition to the Analysis.

It is recommended that the French version of Specifications 5 and 6 of Code 75 in Publication 9 needs amending to read "forte" and "tres forte" instead of "houleuse" and "tres houleuse".

8.6. Synoptic meteorology

Resolutions 4, 6, 8
Recommendations 3, 7, 12

The Commission is opposed to any change in the existing Codes FM 21, 22 and 23 for various practical reasons. A specific definition of the symbols $D_S v_S$ is suggested. The international hours at which observations should be made aboard ship have been clarified. It is recommended that light vessels should be reclassified as "ship" stations instead of "land" stations - with certain modifications. A clarification has been made concerning the reporting of waves by ships to ensure that all distinguishable groups of waves are reported in synoptic messages. A proposal about hemispherical exchange of ships' radio weather messages was investigated.

8.7. Climatology

Resolutions 1, 2, 10
Recommendation 8

The Commission has decided to establish a Working Group to study the application of meteorology to the carriage of goods at sea. It was felt that this was a problem of considerable economic importance and one the study of which might lead to even better co-operation than at present between the shipping industry and meteorologists. Three countries primarily concerned in maritime climatological work (Netherlands, United Kingdom and United States of America), having expressed their willingness in principle to co-operate with regard to collection of data and methods of graphical presentation, the Commission has established a Working Group to examine this problem in detail and report their progress to the President within one year. Although an International Punch Card has been adopted, the Commission does not consider an International Log Book necessary, although the arrangement of log books should broadly follow that of the International Code and Punch Card.

The question of thunderstorms over the oceans was examined in the light of Resolution 16 (EC-II). In addition to that listed in the relevant Resolution of the Commission for Maritime Meteorology, it seems probable that there is available further statistical information about this subject. Concerning a request from Italy and Israel for sea temperature observation in the Mediterranean for statistical purposes, it was found that both Netherlands and the United Kingdom have available considerable data on the question and that these and other countries have additional data also available. It was recommended that both Italy and Israel take action by direct correspondence with the countries above-mentioned and no specific action by the Executive Committee is, therefore, necessary.

8.8. Ice

Recommendations 1, 30

As a result of the studies undertaken by a Working Group of ice experts since 1947, a new International Ice Nomenclature has been drawn up and is recommended for adoption. There is at present considerable difference in the terms used by various countries and the new nomenclature has been prepared as a result of Resolution LXXXII (CMM Toronto, 1947). A new Working Group has been established to consider further action which is necessary as a result of introducing this new nomenclature and to continue investigations into the question of reports of ice from aircraft, which was also instituted at Toronto.

8.9. Radio weather messages from whaling ships

Recommendation 14

The need for every available radio weather message from shipping in the Southern Ocean makes it necessary to endeavour to recruit whaling ships as Selected Ships. Whaling ships are very reluctant to give their position away to their rivals, so some special scheme has to be evolved whereby their position in the weather message could be sent in cypher. The South African Meteorological Service submitted a scheme involving the use of cyphers and volunteered to prepare the cyphers, arrange for their issue to the ships and to collect and re-issue the messages, using a position recypher, for all Southern Ocean countries. Each country would be issued with a copy of the recypher. The names of the ships will be omitted from the collective message. The Commission considers that this plan is the only one likely to succeed. Early action is necessary, as the 1952 whaling season will soon be in operation.

8.10. Ocean weather ships

Recommendation 28

The Commission considered the North Atlantic Ocean Weather Station Agreement and is of the opinion that the meteorological programme of these ships is adequate for maritime purposes. The Commission's view is that the value of the ocean weather stations to world meteorology, both for forecasting at sea and ashore as well as for climatology, is considerable, especially in view of the vessels being "stationary". Although the cost of these ocean stations is, admittedly, high it is considered important that the programme should continue and, if possible, be extended. In accordance with Resolution 42 (EC-II) the question of extending the ocean weather station network to other areas was studied and the Commission has submitted some financial figures. It is suggested that this is a question which merits some joint consultation between interested constituent bodies of the World Meteorological Organization and with the International Civil Aviation Organization. Comment is made about the value of ocean weather ships for research purposes under paragraph 8.4.

8.11 Publications

Resolution 11
Recommendation 16

The Commission does not consider any major amendments necessary to Volume IV of Publication 9, but suggests an alternative to the titles "official" and "unofficial" in bulletins for shipping. Some amendments are proposed to the maritime section of the Guide to Instrumental and Observing Practice of the International Meteorological Organization, in order to simplify and clarify certain aspects of the work aboard voluntary observing ships.

8.12 Miscellaneous

Recommendation 17

The Commission considered a proposal from the International Civil Aviation Organization that the group D_SV_Sapp be included in all radio weather messages from ships - for air/sea rescue purposes. Although desirous of providing all possible assistance in this direction, the Commission points out certain objections to this proposal and suggests joint consultation is desirable between the International Civil Aviation Organization, the International Telecommunication Union, the Inter-Governmental Maritime Consultative Organization and the World Meteorological Organization on this question, as it appears to be more than a meteorological problem.

Consideration was also given to Recommendation 12 of the 3rd SAR meeting of the International Civil Aviation Organization about meteorological reports from merchant ships to an aircraft about to "ditch". Although this matter was not specifically referred to the World Meteorological Organization, the Commission for Maritime Meteorology considers it desirable to draw attention to the fact that reports from a merchant ship (other than a Selected Ship) to a distressed aircraft, giving barometric pressure and a specific cloud height estimation, might be dangerously misleading. It is suggested that a report in more general terms, omitting barometric pressure, would perhaps be preferable. There is evidence that an aneroid barometer reading aboard a non-Selected merchant ship might be as much as 20 mb. in error. It is suggested that the President of the Commission for Maritime Meteorology communicate this viewpoint to the President of the Commission for Aeronautical Meteorology for the information of the International Civil Aviation Organization.

The report of the Preparatory Committee of Experts which sat prior to the International Convention for Safety of Life at Sea (1948) was studied and the Commission expressed satisfaction with the principles of joint consultation between the International Organizations concerned.

The Commission also noted with satisfaction the meteorological provisions contained in the International Convention for Safety of Life at Sea (1948).

With reference to the Recommendations for Research made by the Pacific Science Council in 1949, and their criticisms of the ocean network in that area, the Commission proposes that a letter be sent by the Secretary General of the World Meteorological Organization drawing attention to:

(a) The total of 30,640 meteorological observations known to have been made aboard ships in that area during a month picked at random (July 1949);

(b) The research work which is being carried out by various Meteorological Services aboard ocean weather ships and other ships with a view to improved accuracy of observations at sea.

8.13 Four Working Groups were established for continued study of various problems:

Working Group A (Selected Ship problems in general, questions about issue of radio weather messages to and from shipping and the areas in which such reports should be made).

Working Group B (Problems of observation at sea).

Working Group C (Climatology and applied meteorology, including meteorological aspects of the carriage of goods by sea).

Working Group D (Co-ordination in relation to the preparation of marine climatological atlases).

8.14 It is regrettable that only two countries from the southern hemisphere were represented at the Session. It is suggested for consideration by the Executive Committee that the possibility of arranging at least Regional representation at meetings of Technical Commissions might be considered when such meetings are held at a very considerable distance from some specific Region.

8.15 At the conclusion of the final meeting, Commander Frankcom was re-elected President for a further term of office and Admiral Termijtelen was re-elected Vice-President.

9. The Resolutions and Recommendations adopted at the Session are given on pages 28 to 108.

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LIST OF RESOLUTIONS

Page

Resolutions:

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LIST OF RESOLUTIONS

Res.1 (CMM-I) - THE APPLICATION OF METEOROLOGY TO THE CARRIAGE OF GOODS AT SEA.(*)

The COMMISSION FOR MARITIME METEOROLOGY,

CONSIDERING,

(1) That the carriage and delivery of ships cargoes in good condition is of great importance to every nation, more particularly in these days of world shortages of food and raw materials and of rising costs and damage is often caused to cargoes by weather conditions;

(2) That damage to cargo on board ship due to meteorological conditions may be caused by the cargo taking up moisture available from the air in a ship's hold either by direct absorption (in the case of hygroscopic cargoes) or by condensation onto surfaces of a cargo or its wrappings when the ship encounters lower air temperatures or higher dew points, direct absorption of moisture resulting in mould or taint of the cargo and condensation leading to the same result or else to rusting and damage to cargo;

(3) That up to the present many shipowners have evidently not been aware of the effects of the meteorological factors involved and have relied upon direct ventilation of holds whenever this was considered to be necessary in the opinion of the ship's master;

(4) That in many ships the only information available to the master to assist him in judging when ventilation of the holds would be advisable is that provided by dry and wet bulb thermometers in a screen on the ship's bridge and provision of similar equipment anywhere below decks has been considered worthwhile by only a few shipping companies up to date, in spite of the fact that a knowledge of the difference in humidity between air outside the ship and within the holds concerned, is necessary before a correct decision can be made regarding ventilation;

RESOLVES,

(1) To establish a working group to:

(a) Collect and collate information now available on these problems;
(b) Obtain additional advice on problems of this nature;
(c) Prepare reference material and advice, preferably with pictorial diagrams, which would be made available to National Meteorological Services intending to provide such advice to their own national shipping.

(*) The Executive Committee has noted this Resolution.

(2) That the President of the Commission for Maritime Meteorology should call the attention of Meteorological Services to the importance of inquiries into these problems with their own national shipping.

Res.2 (CMM-I) - STATISTICAL INFORMATION ABOUT THUNDERSTORM ACTIVITY AT SEA.

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 16 (EC-II),

CONSIDERING,

(1) The urgent necessity for drawing up world maps of thunderstorm activity;

(2) That information is now available in published form including;

(a) Virtually a world map of thunderstorm activity contained in the United States Weather Bureau Climatological Atlas of the Oceans;

(b) Monthly maps prepared by the United Kingdom of lightning distribution over ocean areas;

(c) The Köppen-Geiger Handbuch der Klimatologie;

(3) That several countries now have available on punched cards extensive new data on thunder, lightning and thunderstorm incidence, and also on Cumulonimbus clouds;

(4) That additional data in the form outlined in (3) are available from ships and land stations of many countries, which may be transferred to punch cards; and

RESOLVES to invite the attention of the Executive Committee to:

(1) The uneven distribution of the observational network over land and sea, which cannot provide a close or adequate coverage of thunderstorm distribution, particularly over the less travelled areas of the oceans;

(2) The consequent shortcomings in the maps based on available observations which can therefore give only a general indication of the world-wide distribution of thunderstorm; and

(3) The potential value of SFERIC observations and the possibility that such observations can materially assist in making the maps more representative.

Res.3 (CMM-I) - INCLUSION OF SHIPS' CALL SIGNS IN RADIO WEATHER MESSAGES

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 2 (CMM-I),

CONSIDERING,

(1) That the inclusion of call signs in collective messages of ships' reports is desirable in order that users may be in a position to identify the vessels concerned;

(2) That the call sign of each ship originating a meteorological report is known to the coast station receiving the message, as that call sign is used by the ship when initiating the call to the coast station.

(3) That if ships include their call signs in the text of original messages this would involve extra cost;

RECOMMENDS,

(1) That individual Meteorological Services should arrange with their telecommunications services, if possible, for ships' call signs to be included in the preambles of weather messages when the latter are transmitted from the coastal receiving stations to the meteorological centres;

(2) That these call signs be included in all collective messages of ships' reports; and

REQUESTS that the President of the Commission for Maritime Meteorology communicate these recommendations to the President of the Commission for Synoptic Meteorology for consideration.

Res.4 (CMM-I) - OBSERVATION MESSAGES FROM LIGHT SHIPS

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 161, Note (g), (CD Washington 1947),

CONSIDERING that some Members have experienced difficulty in meeting the requirement for use of the SYNOP code by light vessels and that greater flexibility in the use of codes is necessary while maintaining as much uniformity of procedure as possible;

RECOMMENDS,

(1) That light vessels on station should be considered to be in the same category as ships with regard to codes and observing procedures.

The SHIP code form (FM 21, 22 or 23) should be used, with the omission of certain optional groups and the addition of such national and regional supplementary groups as may be required and the inclusion of an optional procedure to provide, if so desired, for replacing the groups $YQL_aL_aL_a$, $L_oL_oL_oGG$ by a station index number in the reports.

(2) That resolution 161, Note (g) (CD Washington 1947) be amended accordingly; and

REQUESTS that the President of the Commission for Maritime Meteorology communicate these recommendations to the President of the Commission for Synoptic Meteorology for consideration.

Res.5 (CMM-I) - INCLUSION OF PROGNOSES IN WEATHER BULLETINS BROADCAST TO SHIPPING

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolutions 45 and 156 (CD Washington 1947).

CONSIDERING that certain Meteorological Services have a requirement for including prognoses in their weather bulletins broadcast to shipping;

RECOMMENDS,

(1) That Resolution 45, (1), Part IV, be amended to read "Part IV-(optional) Analysis and/or prognoses";

(2) That Code FM 62 (IAC Fleet) be extended to include a section for coding prognoses; and

REQUESTS that the President of the Commission for Maritime Meteorology communicate these recommendations to the President of the Commission for Synoptic Meteorology for consideration.

Res.6 (CMM-I) - DEFINITIONS OF SYMBOL LETTERS D_S and v_S

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 161 (CD Washington 1947),

CONSIDERING that existing definitions of symbol letters D_S and v_S require clarification;

RECOMMENDS that the following definitions be adopted:

D_S = Ship's course (true) made good during the 3 hours preceding the time of observation.

v_S = Ship's average speed during the 3 hours preceding the time of observation;

REQUESTS that the President of the Commission for Maritime Meteorology communicate these recommendations to the President of the Commission for Synoptic Meteorology for consideration.

Res.7 (CMM-I) - REDUCED CLOUD ATLAS

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 48 (EC-II),

CONSIDERING,

(1) The value of the Reduced Cloud Atlas to be issued by the World Meteorological Organization as a guide to ships' observers for use in making accurate cloud observations at sea;

(2) That however desirable uniform distribution may be, members have not had an opportunity to decide whether the Reduced Atlas will be adequate for national purposes; and

(3) Cost considerations when distributed in large numbers;

(4) The urgent need for completion of the work;

RECOMMENDS to examine,

(1) The desirability of issuing the Reduced Cloud Atlas in a form suitable for distribution to all ships; simplicity, brevity and careful arrangement for easy reference are essential;

(2) The requirement for including representative pictures of clouds at sea;

(3) The need for including practical hints on estimation of cloud heights (e.g. the use of temperature-dew point table where applicable);

(4) That countries should be permitted to issue modified Reduced Atlases, but in such cases, basic detail of the approved form should not be changed; and

REQUESTS that the President of the Commission for Maritime Meteorology communicate these recommendations to the Chairman of the Committee on Clouds and Hydrometeors for consideration.

Res.8 (CMM-I) - EXCHANGE OF SKELETON BULLETINS OF SHIP REPORTS

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 20 (IMO Paris 1946),

CONSIDERING,

(1) That the terms of reference of the Commission for Maritime Meteorology do not cover the international exchange broadcasts by which skeleton bulletins for this purpose would be exchanged;

(2) That Resolution 20 (IMO Paris 1946) has not been fully implemented;

(3) That meteorological telecommunication channels have been extended in recent years, in particular by the greater use of teletype and radio-teletype;

RECOMMENDS that the plan for international exchange of broadcasts of surface and upper-air data be reviewed, to permit Meteorological Services desirous of preparing weather charts for a hemisphere or the whole world to obtain data with the least possible difficulty; and

REQUESTS that the President of the Commission for Maritime Meteorology communicate these recommendations to the President of the Commission for Synoptic Meteorology for consideration.

Res.9 (CMM-I) - WAVE HEIGHTS IN FEET AND METRES

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 64, paragraph (c), (CD Washington 1947),

CONSIDERING that the present height equivalents in feet and metres can lead to different descriptive terms in weather bulletins for the same wave height,

RECOMMENDS that the equivalent heights in metres of the heights expressed in feet in the paragraph referred to be given to the nearest quarter metre for the plain language specifications "rippled", "smooth", "slight", "moderate" and "rough"; and

REQUESTS that the President of the Commission for Maritime Meteorology communicate these recommendations to the President of the Commission for Synoptic Meteorology for consideration.

Res.10 (CMM-I) - ESTABLISHMENT OF WORKING GROUPS

The COMMISSION FOR MARITIME METEOROLOGY,

RESOLVES,

(1) To establish four working groups with the titles and terms of reference given below;

(2) That the Commission for Climatology be informed of the establishment of Working Group D and be invited to appoint a liaison representative;

(3) That Working Group D should report to the President of the Commission for Maritime Meteorology within one year on its progress towards achievement of its terms of reference.

A. Working Group for the Organization of Synoptic Observations over the Oceans, with terms of reference as follows:

(a) Recruitment and training of observers,

(b) Organization of meteorological networks of observations from ships at sea,

(c) Requirements for the organization of a system of radio weather bulletins and other meteorological information for meeting the needs of shipping and fishermen both on the high seas and in coastal waters, including warnings required for maritime navigation and the safety of life at sea,

(d) Specifications of areas of responsibility, both for the collection of observations from shipping and the issue of radio weather bulletins for shipping,

(e) Meteorological aspects of sea ice, including:

(i) Revision of the text of Code 19 (IMO Pub. No. 9, Fasc. I, p. I-A-4-9: C_2 - Description of kind of ice) to conform with the new nomenclature;

(ii) Examination of the international ice codes as presented in IMO Pub. 9, Fasc. I, Section I-C-1 and recommendations regarding ice observations in coded form from ships;

(iii) Examination of the possibility of reporting sea ice in coded form from an aircraft on ice reconnaissance flight;

(iv) Revision of the text of IMO Publication No. 78, Chapter 10, Paragraph 10.9: Ice.

Note: In studying items 2 and 3 the Working Group should consider the following applications:

(a) Information for navigators seeking to avoid ice,

(b) Information for the guidance of navigators penetrating ice,

(c) Information for statistical purposes.

B. Working Group on Methods of Observation at Sea, with terms of reference as follows:

Promotion of research in maritime meteorology and of investigation of improved methods of observation, including co-ordination of results and circulation of reports, with particular reference to the following:

(a) Measurement of sea surface temperature.

(b) Maritime hygrometry,

(c) Rainfall,

(d) Wind and wind structure,

(e) Ocean waves.

C. Working Group on Applied Meteorology and Climatology, with terms of reference as follows:

(a) All maritime applications of meteorology and climatology, including particularly a plications to carriage of cargo (c.f. Resolution 1 (CMM-I)),

(b) Climatological information for shipping and fishing.

D. Working Group for the study of problems involving international accord in maritime climatology, with terms of reference as follows:

(a) Standardisation of methods of evaluation and presentation of the basic elements of ocean climates, looking to the potential expansion of represented data to meet modern requirements of world commerce and scientific inquiry,

(b) Arrangements whereby data available from ships of nations not preparing to process them can be obtained and used with a suitable division of responsibility of the work involved.

Res.11 (CMM-I) - PROPOSED AMENDMENTS TO IMO PUBLICATION NO. 78

The COMMISSION FOR MARITIME METEOROLOGY

NOTING Resolution 128 (CD Washington 1947),

RECOMMENDS that the proposed amendments to IMO Publication No. 78, entitled "Guide to International Meteorological Instrument and Observing Practice", Chapter 10, as listed below, be made; and

REQUESTS that the President of the Commission for Maritime Meteorology communicate these recommendations to the President of the Commission for Instruments and Methods of Observation for consideration.

10.1.2. (b) For "sling or aspirated psychrometer" read "psychrometer".

(f) Delete "e.g. in large fast liners".

10.2.1. For first sentence of second paragraph read:

"Visual estimates will normally be based upon the appearance of the surface of the sea."

At the end of second paragraph add:

"When the surface of the sea is invisible, (e.g. at night) or when the wind is very light, the force and direction of the true wind cannot be estimated as indicated above. The direction of the relative wind may be estimated, for example, by observations of the funnel smoke; the force of the relative wind must then be measured by anemometer or the judgement and experience of the observer must be used to estimate it in some manner, in order to compute the speed and direction of the true wind."

Third paragraph, first line insert word "counter" before "anemometer".

10.2.2. First paragraph to read:

"Wind direction (i.e. direction from which the wind is blowing) should be reported in tens of degrees from true Borth."

10.3.4. Amend to:

"Provision should be made for the application of the following corrections:

Mercury Barometers
(a) Index error;
(b) Temperature of the instrument;
(c) Latitude (gravity);
(d) Reduction to sea level.

Aneroid Barometers (a) Scale error;
(b) Reduction to sea level;
(c) Temperature (if appropriate tables are provided).

Aneroid barometers should be adequately compensated for temperature. Unless this is the case instruments should be provided with a temperature correction table and means should be provided for measuring the temperature."

10.3.5. Second paragraph, reword first sentence:

"With mercury barometers another source of error is the regular oscillation of the barometer when hanging freely."

Last paragraph, delete the word "probable".

10.4. First paragraph, line 4, delete:

"and not professional meteorologists".

Second paragraph replace by:
"In the absence of instrumental aids the height of cloud base must be estimated. In order to improve their ability to do this, observers should be encouraged to take every opportunity of checking their estimates against known heights, e.g. when a cloud base is seen to intercept a mountainous coast."

10.5.1. Replace first sentence by:

"For all general purposes estimates of visibility are quite satisfactory. Use may be made of visibility meters in special circumstances."

Remainder of paragraph to remain unchanged.

10.5.2. First sentence to read:

"In a large ship it is possible to make use of objects aboard the ship for estimation when the visibility is very low, but it should be recognised that these estimates are likely to be in error since the air may be affected by the ship".

In line 7, for "is made" read may be used as a".

Add new paragraph:

When visibility is not uniform in all directions it should be estimated or measured in the direction of least visibility and a suitable entry made in the log (excluding reduction of visibility due to ship's smoke).

10.5.3. Third sentence to read:

"Unfortunately, however, the smallness of the air sample, the effect of the ship's smoke, and the heating effect of the ship may lead to the measurement being unrepresentative."

Omit last sentence.

Section 10.6. Amend to:

10.6.1. Methods of observation

Temperature and humidity observations should be made by means of a psychrometer with good ventilation. Hygrometers using hygroscopic material are not generally suitable. A single fixed screen is not satisfactory.

10.6.2. Basic requirements

The basic requirements of thermometers for psychrometry at sea are as laid down in Chapters 4 and 5.

Thermometers should read to an accuracy of $0.2^{\circ}F$ or $0.1^{\circ}C$ (CD Washington 1947: 53).

10.6.3. Exposure and management

Psychrometers must be well exposed in a stream of air, fresh from the sea, which has not been in contact with, or passed over, the ship, and should be adequately shielded from radiation and spray.

Sling or aspirated psychrometers exposed on the windward side of the bridge have been found to be satisfactory.

It manually operated psychrometers are used, the thermometers must be read as soon as possible after ventilation has stopped.

For the general management of psychrometers the recommendations of Section 5.2.4. should be followed. Distilled water should be used for the wet bulb thermometer, if possible. If this is not readily available water from the condenser will generally be more suitable than ordinary fresh water.

10.7.1. Reqord (a) as:

"(a) Obtaining a sample of the sea surface water in a suitable receptacle (the 'bucket' method).

Note: A simple canvas bucket is not considered to be a suitable receptacle."

Omit the paragraph:

"Method (b) is ..... intake methods."

Last paragraph, reword to read:

"Sea-water thermometers should be read to an accuracy of 0.2°F or 0.1°C (CD Washington 1947: 53)."

10.7.2. Replace this section by:

"The tolerance for the errors of sea-water thermometers are the same as for ordinary thermometers (see 4.4.2.).

If the 'bucket' method is used, the design of the receptacle should be such as to ensure that heat exchange is reduced to a minimum.

Sea-water thermometers used with the 'bucket' method should have small heat capacity, quick response and be very easy to read."

10.7.3. Delete second sentence of first paragraph.

Line 6, insert new sentence after "of the sample".

"The thermometer should not be withdrawn from the container; however, if the thermometer must be withdrawn, then it should be provided with a cistern with a small heat capacity."

Replace third paragraph by:

"When the condenser intake method is used a note should be made in the log describing the location of the intake thermometer in the engine room, of the depth of the intake below sea level, and of the method used in obtaining a reading (i.e. is the thermometer removed from the well for the purpose of reading?). In ships in which the condenser intake method is used, it is recommended that Maritime Services should seek the permission of shipping companies to install precision thermometers graduated in intervals of 1°F or 1/2°C."

10.8. Ocean Waves

The first paragraph be changed to read:

"The observations should include measurement or estimation of the following characteristics of the wave motion of the sea surface in respect of each distinguishable system of waves:

(a) Height:
(b) Period in seconds:
(c) Direction (from which the waves come) on the scale 01-36 as for wind direction."

The second paragraph be replaced with Annex to Resolution 75, CMM Toronto 1947, preceded by the following statement:

"The following methods of observing wave characteristics of separate wave systems should be used as a guide."

Note: Prior to including Annex to Resolution 75, CMM Toronto, 1947, in this article, the Annex be revised to include the definitions of wave characteristics adopted by the First Session of the Commission for Maritime Meteorology and the substance of Resolutions 63 and 64 (CD Washington 1947), as may be amended.

Res.12 (CMM-I) - VISIBILITY OBSERVATIONS AT SEA

The COMMISSION FOR MARITIME METEOROLOGY,

CONSIDERING,

(1) The difficulties inherent in making accurate observations of visibility at sea;

(2) That the effect of the ship on the air directly above should be taken into account in making visual and instrumental observations under conditions of low visibility in ships;

(3) That visual estimates of visibility are generally satisfactory;

RECOMMENDS that only the decade 90-99 should be used in merchant ships when reporting visibility at sea; and

REQUESTS that the President of the Commission for Maritime Meteorology communicate these recommendations to the President of the Commission for Synoptic Meteorology for consideration.

LIST OF RECOMMENDATIONS

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LIST OF RECOMMENDATIONS

Rec. 1 (CMM-I) - INTERNATIONAL ICE NOMENCLATURE (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Recommendation LXXXII (CMM Toronto 1947),

RECOMMENDS to the Executive Committee:

(1) Adoption of the International Ice Nomenclature given in the Annex to this recommendation:

(2) That the translation of the English text of the International Ice Nomenclature into French, Spanish and Russian be made by the Secretariat of the World Meteorological Organization, the translations be submitted for approval to the Permanent Representatives of the Members for Argentine (Spanish text), France (French text) and USSR (Russian text);

(3) That the International Ice Nomenclature be included in the Meteorological Vocabulary to be prepared by the Commission for Bibliography and Publications.

(*) The Executive Committee has referred this Recommendation to the Presidents of Regional Associations and to the President of the Commission for ~~Instruments and Methods of Observation~~ Synoptic Meteorology.

ANNEX

THE INTERNATIONAL ICE NOMENCLATURE

Ice found at sea may be of three different origins. It may be formed at sea (Sea Ice), on land (Ice of Land Origin) or on rivers and lakes (River-ice and Lake-ice). The present nomenclature gives terms and definitions of ice of the first two mentioned categories only. In the case or river-ice and lake-ice the appropriate sea-ice terms may be used, e.g. "floes of river-ice".

Below is given:

1. A summary of the ice-terms included in the nomenclature, grouped together under headings which will guide the reader as to which terms are available for describing kindred forms of ice;

2. Definitions of the ice-terms arranged in alphabetical order.

Where double terms are used, e.g. Slush/Sludge, either of the two terms may be used.

SUMMARY OF ICE TERMS

1. SEA ICE

1.1 Development and Decay

1.11 New Ice

1.111 Ice crystals/Frazil crystals
1.112 Slush/Sludge
1.113 Pancake ice
1.114 Ice-rind

1.12 Young ice
1.13 Winter-ice
1.14 Old Bay-ice
1.15 Shelf-ice/Barrier-ice
1.16 Polar ice
1.17 Rotten ice
1.18 Brash-ice

1.2 Forms of Fast-Ice

1.21 Fast ice

1.211 Winter fast-ice
1.212 Polar fast-ice

1.22 Icefoot
1.23 Anchor ice/Ground ice

1.3 Pack-Ice/Drift-Ice

1.31 Closeness

1.311 Very close pack-ice/Very close drift-ice
1.312 Close pack-ice/Close drift-ice
1.313 Open pack-ice/Open drift-ice
1.314 Very open pack-ice/Very open drift-ice

1.32 Size of Floes

1.321 Ice-floe/Floe
1.322 Ice-cake
1.323 Bergy-bit (Floeberg*)
1.324 Growler
1.325 Brash-ice

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* To be used only when the sea-ice origin is not in doubt.

1.33 Arrangement

1.331 Ice-limit
1.332 Ice-edge
1.333 Ice-bar
1.334 Bay-Bight
1.335 Tongue
1.336 Ice-field
1.337 Patch
1.338 Belt
1.339 Stream/Strip/String

1.34 Surface features

1.341 Level ice
1.342 Pressure-ice/Screw-ice

1.3421 Rafted ice
1.3422 Hummocked ice
1.3423 Pressure ridge

1.343 Weathered ice
1.344 Melt-water pool
1.345 Submerged icefoot

1.35 Openings in Ice

1.351 Crack

1.3511 Tide-crack

1.352 Lead/Lane

1.3521 Shore Lead

1.353 Pool
1.354 Open water

1.36 Sky and Air Indications

1.361 Water-sky
1.362 Ice-blink
1.363 Frost smoke

2. ICE OF LAND ORIGIN FOUND AT SEA

2.1 Firn-snow/Névé

2.2 Glacier-ice

2.21 Glacier tongue

2.3 Shelf-ice/Barrier-ice

2.4 Iceberg

2.41 Glacier berg
2.42 Tabular berg/Barrier berg

2.5 Bergy-bit

2.6 Growler

2.7 Brash-ice

DEFINITIONS OF ICE TERMS

Anchor ice/Ground ice. Ice found attached or anchored to the bottom, irrespective of nature of its formation.

Barrier berg, see Tabular berg.

Barrier-ice, see Shelf-ice.

Bay/Bight, An inward bed of the ice-edge, formed either by wind or current.

Belt. Long area of pack-ice/drift-ice from a few kilometres to more than 100 kilometres in width.

Bergy-bit. A medium sized piece of ice, generally less than 5 m. above sea level and about the size of a small cottage, mainly originating from glacier-ice, but occasionally a massive piece of sea-ice or disrupted hummocked ice. When the sea-ice origin is not in doubt the term Floeberg may be used.

Bight. See Bay.

Brash-ice. Accumulation of small fragments not more than 2 m. across, the wreckage of other forms of ice.

Close pack-ice/Close drift-ice. Composed of floes mostly in contact, such that navigation is difficult even for specially constructed vessels and ice-breaker assistance may be required. Ice cover 6/8 - 7/8.

Crack. Any fracture or rift in sea-ice not sufficiently wide to be described as a lead/lane. It is usually possible to jump across a crack.

Drift-ice. See Pack-ice.

Fast-ice. Sea-ice which remains fast, generally in the position where originally formed, and which may attain a considerable thickness.

It is found along coasts, where it is attached to the shore, or over shoals, where it may be held in position by islands, grounded icebergs or grounded polar ice. Subdivisions are Winter fast-ice and Polar fast-ice.

Firn-snow/Névé. Snow which has become coarse grained and compact through temperature changes, forming the transition stage to glacier-ice.

Floe. See Ice-floe.

Floeberg. See Bergy-bit.

Frazil crystals. See Ice crystals.

Frost smoke. Fog-like clouds, due to the contact of cold air with relatively warm sea water, which appear over newly-formed leads/lanes and pools or leeward of the ice-edge, and which may persist while slush/sludge and young ice are forming.

Glacier berg. Mass of glacier-ice which has broken away from its parent formation on the coast, and either floats, generally at least 5 m. above sea level, or is stranded on a shoal.

Glacier-ice. Any ice floating on the sea as a berg, which originates from a land glacier.

Glacier tongue. Projecting seaward extension of glacier usually afloat.

Ground-ice. See Anchor ice.

Growler. Smaller piece of ice than a bergy-bit, frequently appearing greenish in colour and barely showing above water. May originate both from sea-ice and from glacier-ice.

Hummocked ice. Ice piled haphazardly one piece over another.

Ice-bar. Ice-edge consisting of floes compacted by sea and swell, and difficult to penetrate.

Iceberg. Large mass of floating or stranded ice, more than 5 m. above sea level, which has broken away either from a glacier or from a shelf-ice/barrier-ice formation. Subdivisions are Glacier berg and Tabular berg/Barrier berg.

Ice-blink. The white or yellowish-white glare on the sky produced by the reflection of considerable areas of sea-ice or land-ice, which may be beyond the range of vision.

Ice-cake. A floe smaller than 10 m. across. One less than 2 m. across may be termed a small cake. (See Brash-ice).

Ice crystals/Frazil crystals. Fine spicules or plates of ice, suspended in water.

Ice-edge. The boundary at any given time between the open sea and sea-ice of any kind, whether floating or fast.

Ice-field. Area of pack-ice/drift-ice, consisting of any size of floe, of such extent that its limits cannot be seen from the crow's nest. When by air observation or otherwise, the full extent of an ice-field is known, the following terms may be used:

Large - over 20 km. across
Medium - 15 - 20 km. across
Small - 10 - 15 km. across

Ice-floe/Floe. A piece of sea-ice, other than fast-ice, large or small, described if possible as "Light" or "Heavy" according to thickness.

Big - over 1000 m. across
Medium - 200 - 1000 m. across
Small - 10 - 200 m. across

Icefoot. Ice step attached to the coast, unmoved by tides and remaining after the fast-ice has moved away. Several varieties of icefoot can be distinguished.

Ice limit. Average position of the ice-edge in any given month or period based on observations over a number of years.

Ice-rind. A thin, elastic, shining crust of ice, formed by the freezing of slush/sludge on a quiet sea surface. Thickness less than 5 cm. It is easily broken by wind or swell, and makes a tinkling noise when passed through by a ship.

Lane. Sea Lead.

Lead/Lane. A navigable passage through pack-ice/drift-ice. A lead/lane may still be so named even if covered by young ice.

Level ice. Ice with a flat surface which has naver been hummocked.

Melt-water pool. A depression on the surface of an ice-floe filled with melt-water, in most cases fresh and drinkable.

Névé. See Firn-snow.

New ice. A general term which included Ice crystals/Frazil crystals, Slush/Sludge, Pancake ice and Ice-rind.

Old bay-ice. Level ice of more than one winter's growth, which has remained unhummocked and also becomes nourished by surface layers of snow. Thickness of ice and snow up to about 2 m. above sea level.

Open pack-ice/Open drift-ice. Floes seldom in contact and with many leads and pools. Ice cover 3/8 - 5/8. Navigation should be comparatively easy for specially constructed vessels and in the lower categories, with ice cover 3/8 or 4/8, even for ordinary vessels.

Open water. A relatively large area of free navigable water in an ice encumbered sea.

Pack-ice/Drift-ice. Term used in a wide sense to include any area of sea-ice, other than fast-ice, no matter what form it takes or how disposed.

Pancake ice. Pieces of newly-formed ice, usually approximately circular, about 30 cm. to 3 m. across, and with raised rims, due to the pieces striking against each other, as the result of wind and swell.

Patch. A collection of pack-ice/drift-ice, less than 10 km. across, the limits of which are visible from the crow's nest.

Polar fast-ice. Fast-ice formed by the grounding and cementing together of polar ice. By the end of the winter it may reach some tens of kilometres from the coast.

Polar ice. Extremely heavy sea-ice, up to 3m. or more in thickness, or more than one winter's growth. Heavily hummocked, and may ultimately be reduced by weathering to a more or less even surface.

Pool. Any enclosed relatively small area in pack-ice/draft-ice other than a lead/lane.

Pressure-ice/Screw-ice. A general term for ice which has been squeezed together and in places forced upwards. Subdivisions are Rafted ice, Hummocked ice, and Pressure ridge.

Pressure ridge. Ridge or wall of hummocked ice where floes have been pressed against each other.

Rafted ice. Type of pressure-ice/screw-ice formed by one floe overriding another.

Rotten ice. Ice which has become honeycombed in the course of melting and which is in an advanced state of disintegration.

Screw-ice/Barrier-ice. Ice formation over 2 m. above sea level with level surface, which originated from annual accumulations of firn-snow/névé layers on old bay-ice (or on the seaward extansion of a glacier).

Shore lead. A lead between pack-ice/drift-ice and the shore, or between pack-ice/drift-ice and a narrow fringe of fast-ice.

Sludge. See Slush.

Slush/Sludge. An accumulation of ice crystals which remain separate or only slightly frozen together. It forms a thin layer and gives the sea surface a greyish or leaden-tinted colour. With light winds no ripples appear.

String. See Stream.

Strip. See Stream.

Stream/Strip/String. Long narrow area of pack-ice/drift-ice, about 1 km. or less in width, usually composed of small fragments detached from the main mass of ice, and run together under the influence of wind, swell or current.

Submerged icefoot. An underwater ice projection from an iceberg or an ice-floe.

Tabular berg/Barrier berg. A flat-topped berg, showing horizontal firn-snow/névé layers, usually broken off from a shelf-ice/barrier-ice formation.

Tide-crack. The line of junction between an immovable icefoot and fast-ice, the latter being subject to rise and fall of the tide.

Tongue. A projection of the ice-edge up to several kilometres in length, caused by wind or current.

Very close pack-ice/ very close drift-ice. Ice cover practically 8/8 and little if any water present.

Very open pack-ice/very open drift-ice. Water preponderates over ice. Ice cover, 1/8 - 2/8. (Formerly known in Britain as "drift-ice").

Water-sky. Dark streaks on the sky due to the reflection on the clouds of leads/lanes, pools, or open water in the neighbourhood of large areas of sea-ice.

Weathered ice. Hummocked polar ice subjected to weathering which has given the hummocks and pressure ridges a rounded form. If the weathering continues, the surface may become more or less even.

Winter fast-ice. Fast-ice in fjords, gulfs and straits, mainly formed by growth from the shore, but also by commenting of pack-ice/drift-ice. Winter fast-ice rises and falls according to the tide.

Winter-ice. More or less unbroken level ice of not more than one winter's growth, originating from young ice. Thickness from 15 cm. to 2 m. Completely safe for travelling purposes.

Young ice. Newly-formed level ice generally in the transition stage of development from ice-rind, or pancake ice to winter-ice; thickness from 5 cm. to 15 cm., as a rule impassable and unsafe for travel either by men or dogs, or in the case of aircraft for ski or wheel landings.*

(*) Young ice was frequently referred to as "bay-ice" by British whalers in the early 19th century.

Rec.2 (CMM-I) - PUBLICATION OF AN INTERNATIONAL LIST OF SELECTED AND SUPPLEMENTARY SHIPS (*)

The COMMISSION FOR MARITIME METEOROLOGY,

CONSIDERING that an international list of all Selected and Supplementary ships should be published for the benefit of all Meteorological Services,

RECOMMENDS to the Executive Committee,

(1) That each country with a merchant fleet provide the Secretary-General of the World Meteorological Organization at six-monthly intervals with a list of its Selected and Supplementary ships, giving the names of vessels, their radio call letters and, where possible, their usual or seasonal routes; and

(2) That the Secretary-General of the World Meteorological Organization prepare and publish from national lists at six-monthly intervals an international list of all Selected and Supplementary ships to be distributed to all Members.

(*) The Executive Committee has referred this Recommendation to the President of the Commission for Synoptic Meteorology.

Rec.3 (CMM-I) - TIMES OF SHIP OBSERVATIONS (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 25 (CD Copenhagen 1929) and Resolution 18 (I) (IMC Paris 1946),

CONSIDERING that observations made by ships at more frequent intervals than at the four main synoptic times would be desirable although difficulties may be encountered in obtaining and transmitting additional reports under normal circumstances,

RECOMMENDS to the Executive Committee,

(1) That observations taken at the main synoptic times 0000, 0600, 1200 and 1800 GMT daily be considered at the normal observational schedule of Selected and Supplementary ships; and

(2) That when circumstances in ships permit the making of more than four observations a day, the additional observations should be made at one or more of the intermediate synoptic times 0300, 0900, 1500 and 2100 GMT.

These recommendations shall not affect in any way instructions relating to furnishing special observations in ships as contained in Safety of Life at Sea Convention.

(*) The Executive Committee has noted this Recommendation.

Rec.4 (CMM-I) - REPRESENTATION OF THE COMMISSION FOR MARITIME METEOROLOGY AT THE NEXT ORDINARY ADMINISTRATIVE RADIO CONFERENCE OF THE INTERNATIONAL TELECOMMUNICATION UNION (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING the "Final Acts of the International Telecommunications and Radio Conferences, Atlantic City 1947",

CONSIDERING the need to obtain further changes in existing International Radio Regulations to improve the collection and transmission of weather messages to and from ships,

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(*) The Executive Committee has referred this Recommendation to the President of the Commission for Synoptic Meteorology.

RECOMMENDS to the Executive Committee that the Commission for Maritime Meteorology be represented at the next Ordinary Administrative Radio Conference of the International Telecommunication Union, the Member of the Commission for Maritime Meteorology to be guided by the instructions contained in the Annex to this Resolution.

A N N E X

GUIDANCE TO THE REPRESENTATIVE OF THE COMMISSION FOR MARITIME METEOROLOGY TO THE ORDINARY ADMINISTRATIVE RADIO CONFERENCE OF THE INTERNATIONAL TELECOMMUNICATION UNION ON

(1) Facilitating the collection of weather observations from the oceans.

(a) Priority - Radio Regulations

(Atlantic City 1947) Chapt. XV Radiotelegrams art. 38:

Order of priority of Communications in the Mobile Service.

The order of priority of communication in the mobile service is as follows:

1st Distress calls, distress messages and distress traffic.

2nd Communications preceded by the urgency signal.

3rd Communications preceded by the safety signal.

4th Communications relative to radio direction-finding bearings

5th Radiotelegrams relative to the navigation and safe movement of aircraft.

6th Radiotelegrams relative to the navigation, movements and needs of ships, weather observation messages destined for an official meteorological service.

7th Government radiotelegrams for which priority right has been claimed.

8th Service radiotelegrams relating to the working of the radiocommunication service or to radiotelegrams previously transmitted.

9th All other communications.

Prior to the 1947 Atlantic City Convention ships' weather messages were included in Category 9 in the order of priority for transmitting all messages. Since ships' messages are now included in category 6 it appears that this priority for transmission of ship messages is now satisfactory and no further efforts in this connection need be stressed by the CMM representative.

(b) Times of observations for ship reports.

In many cases the times of observations for ship reports fall outside the hours of duty of the Radio Operators. This may have two consequences:

(i) Some of the observations are missed altogether.

(ii) Some of the observations are greatly delayed.

Only ships with a continuous service and ships with 16 hours service in 2 zones, have no difficulties in this respect. The great majority, viz the ships with 8 hours service and the "single operator" ships which generally follow the same watchkeeping schedule, have to take special measures.

A proposal to change the existing watch-keeping schedules solely to benefit meteorological services would be unreasonable.

The only way to meet the above difficulties is to draw the attention of marine observers to Resolution 11 (CD Washington 1947) and to invite them in certain cases to send messages of observations taken during the time that their WT station is closed as soon as the WT service has been resumed.

(c) Radio equipment of the ships and relaying of weather messages.

The number of ocean-going ships fitted only for medium frequency transmission is quickly decreasing. However, ships with less powerful and less modern radio equipment still exist and when they are in mid-ocean they cannot clear their weather messages without retransmission through other ships.

Article 9 of the additional Radio Regulations (Atl. City 1947) states:

1. Stations of the mobile service must, if the sender so requests, serve as intermediaries for the exchange of radiotelegrams originating in or destined for other stations of the mobile service; the number of intermediary stations of the mobile service, is, however, limited to two.

2. .....

3. The transit charge, whether two intermediary stations are concerned or only one, is fixed uniformly at forty gold centimes (0,fr.40) per work pure and simple, without the collection of a minimum charge. When two stations of the mobile service have participated, this charge is divided equally between them.

In Regulation 4, paragraph V of Chapter V of the International Convention on Safety of Life at Sea, 1948, the Contracting Parties undertake to encourage ships that cannot reach the landstation, to have their weather messages relayed by an ocean weather station or some other ship that can reach the landstation.

There seems no doubt that ocean weather stations will offer their intermediary free of cost, but the question of cost in case the messages are retransmitted by other ships needs consideration.

(d) Congestion in busy areas and other difficulties in the delivery of weather messages.

It is difficult to judge how far congestion at certain landstations is a cause of delay or dropping out of weather messages. The right way to get an insight into this question is to request the masters of ships to report all cases when difficulties arise. So far a number of incidental complaints have been received.

Sometimes it appears that radio-operators on board passenger steamers forget that weather messages have priority over private telegrams and new reports, with the result that these messages suffer delay or have been dropped altogether.

The above questions mainly lie on the national level and it seems up to the meteorological services of maritime countries to look into them and to take measures for improvement.

When the failing of landstations of foreign countries is reported the complaints can be brought to the notice of the meteorological services of these countries through the WMO.

(2) Seeking uniform agreement that ship tolls and shore tolls on ships' weather messages be waived.

In article 4, paragraph 2051, Additional Radio Regulations (Atlantic City, 1947) the charges on all meteorological rediotelegrams are reduced by at least 50%.

These charges are:

a) Ship charge.

b) Land station charge.

c) Charge for transmission over the general telecommunication network.

It is most important to ensure that no charges are incurred by the ships for sending weather messages. It is known that the operating companies of certain countries (e.g. U.S.A., Great Britain,

Netherlands) make no ship charges for weather messages sent to shore stations authorised to handle such tranffic. This obviously is a great advantage especially because it avoids complications when the ships make weather reports to foreign stations.

It would be in line with the International Convention on Safety of Life at Sea, 1948, Annex D, Recommendation 15, if other countries could reach the same arrangement. A recommendation to this effect might be issued by the WMO to the various maritime countries.

To a certain extent the same applies to the landstation charge. The owners of the ships must not get a bill for the cost of weather reports. In accordance with Resolution 37, CD Washington, 1947, the meteorological service in whose area a ship is navigating when sending the messages and to whom the message must be addressed, bears the cost incurred.

The question how much the shore station will charge the meteorological service for meteorological messages seems to be in internal affair of the various countries and ought to be settled on the national level.

It goes without saying that all problems would be solved if weather messages could be classified in the category of telegrams of "immediate general interest" which, according to paragraph 2042 of the Additional Radio Regulations,are exempt from all charges. At present the following messages fall within this category:

(a) Distress messages and replies thereto;

(b) Messages originating in mobile stations notigying the presence of icebergs, derelicts and mines, or announcing cyclones and storms;

(c) Messages announcing unexpected phenomena threatening air navigation or the sudden occurrence of obstacles at airports;

(d) Messages originating in mobile stations notifying sudden changes in the position of buoys, the working of lighthouses, devices connected with buoyage, etc.

(e) Service messages relating to the mobile service.

Adoption of the above proposal would solve at the same time the problem of the cost of relaying weather reports from ships by other ships.

(3) Representation of the World Meteorological Organization in regard to frequency requirements for maritime purposes.

Generally speaking it seems that the number and variety of frequencies for maritime purposes shown in the table of frequency

allocations, Radio Regulations, Chapter III, is sufficient. If, however, difficulties should arise which cannot be stttled locally or between neighbouring countries, these difficulties ought to be brought to the notice of the WMO. The Secretariat may, if necessary, invite the CMM representative to submit the matter to the ITU either by correspondence or at the next meeting of that union.

(4) Assisting in telecommunication arrangements for the transmission of weather information and storm warnings to ships at sea.

The CMM representative will give his advice and assistance in all cases when his help is invited in connection with problems of telecommunications.

If necessary he will discuss these problems with the appropriate ITU authority or bring them up for discussion at the next ITU meeting.

Rec.5 (CMM-I) - INTERNATIONAL RADIO REGULATIONS (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 185 (CD Washington 1947) and Resolution 4 (CMM-I),

CONSIDERING that the need for eliminating all charges on ships' weather messages is of great importance for the improvement of the world-wide plan for weather messages to and from ships,

RECOMMENDS to the Executive Committee,

(1) That the World Meteorological Organization request all Members to urge their respective delegations to the next Ordinary Administrative Radio Conference of the International Telecommunication Union to support the following proposals:

(a) Waiving ship charges on all meteorological radiotelegrams,

(b) Waiving land charges on all meteorological radiotelegrams from ships.

(*) The Executive Committee has embodied the substance of this Recommendation in Resolution 22 (EC-III).

Rec.6 (CMM-I) - DELAY IN RECEIPT OF SHIPS' MESSAGES OWING TO TRANSMISSION DIFFICULTIES (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 37, paragraphs 3 (a), (b), (CD Washington 1947),

CONSIDERING,

(1) That Selected and Supplementary ships have experienced difficulties in clearing reports with land stations in certain reporting areas;

(2) The importance of receiving ships' weather messages with the least possible delay in transmission;

RECOMMENDS to the Executive Committee that Meteorological Services of countries whose ships encounter such difficulties repeatedly should communicate promptly with the Meteorological Service concerned giving full particulars as to dates and times and send a copy to the President of the Commission for Maritime Meteorology.

(*) The Executive Committee has referred this Recommendation to the President of the Commission for Maritime Meteorology for appropriate action.

Rec.7 (CMM-I) - SHIP CODES FM 21, FM 22 and FM 23 (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 161 (CD Washington 1947),

CONSIDERING,

(1) That no Member has suggested to the Commission for Maritime Meteorology that changes be made in existing codes for the transmission of weather messages from ships;

(2) That any changes made in ship codes now in use would increase difficulties of shipboard observers as well as seriously disorganize marine climatological work; and

(3) That the present codes have proved satisfactory;

RECOMMENDS to the Executive Committee that the Commission for Synoptic Meteorology be informed that the Commission for Maritime Meteorology would object to any changes in Codes FM 21, FM 22 and FM 23.

(*) The Executive Committee has referred this Recommendation to the President of the Commission for Synoptic Meteorology.

Rec.8 (CMM-I) - INTERNATIONAL PUNCH CARD AND LOGBOOK FOR SHIPS' WEATHER OBSERVATIONS (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 23 (CD Paris 1951),

CONSIDERING,

(1) That the international Punch Card is being brought into general use;

(2) That some uniformity in the logs, for recording marine meteorological observations is desirable so that the information may be readily transferred to punch cards;

RECOMMENDS to the Executive Committee,

(1) That the logs of maritime meteorological observations be in agreement with the international code and the international punch card;

(2) That all Meteorological Services participating in the Selected Ship programme shall require the preparation and submission of a permanent record of weather observations in a suitable form of log;

(3) That an international form of log book is not required.

(*) The Executive Committee has embodied the substance of this Recommendation in Resolution 18 (EC-III)

Rec.9 (CMM-I) - CAPTAIN PETERSEN'S SCALE OF VISIBLE EFFECTS OF THE WIND UPON THE SEA (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 62 (CD Washington 1947),

CONSIDERING that in making wind observations in modern ships, references in Captain Petersen's scale to sounds produced by waves are of little use for observing purposes,

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(*) The Executive Committee has referred this Recommendation to the President of the Commission for Instruments and Methods of Observation.

RECOMMENDS to the Executive Committee,

(1) That under Sea Specification for Beaufort Force 9, the expression "Sea begins to roll" be replaced by "Crests of waves begin to topple, tumble and roll over";

(2) That under Sea Specification for Beaufort Force 10, the expression "Rolling of the sea becomes heavy and shocklike", be replaced by "Tumbling of the sea becomes heavy and shocklike".

Rec.10 (CMM-I) - DEFINITIONS OF LENGTH, HEIGHT, PERIOD AND SPEED OF WAVES (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 63 (CD Washington 1947); and

CONSIDERING that international definitions of length, height, period and speed of waves are required in amplification of this Resolution,

RECOMMENDS that the following definitions be included in Resolution 63 (CD Washington 1947):

Wave length: The horizontal distance between successive crests or troughs. (It is equal to the wave period multiplied by the wave speed).

Wave height: The vertical distance between trough and crest.

Wave period: The time between the passage of two successive wave crests past a fixed point. (It is equal to the wave length divided by the wave speed).

Wave speed: The distance travelled by a wave in a unit of time. (It is equal to the wave length divided by the wave period).

For meteorological purposes the average value of each of the above characteristics is used, as obtained from the larger well formed waves of the wave system being observed.

(*) The Executive Committee has referred this Recommendation to the President of the Commission for Maritime Meteorology for appropriate action through the Secretary-General.

Rec.11 (CMM-I) - ADEQUACY OF SELECTED SHIP SCHEME (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 37 (CD Washington 1947),

CONSIDERING,

(1) That the total number of Selected and Supplementary ships is inadequate;

(2) That the burden of maintenance of existing Selected and Supplementary ships is unequally distributed between the countries relative to the size and importance of their merchant fleets;

RECOMMENDS to the Executive Committee that each Member be informed of the urgency of recruting further observing ships and be asked to state whether it is able and willing to do this, particularly amongst vessels plying in the areas in which the number of ship reports is inadequate. (See Map Annex)

(*) The Executive Committee has embodied the substance of this Recommendation in Resolution 25 (EC-III)

Rec.12 (CMM-I) - REPORTING WAVES IN SHIPS' WEATHER MESSAGES (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 161 (CD Washington 1947) and Recommendation LXIV (CMM Toronto 1947),

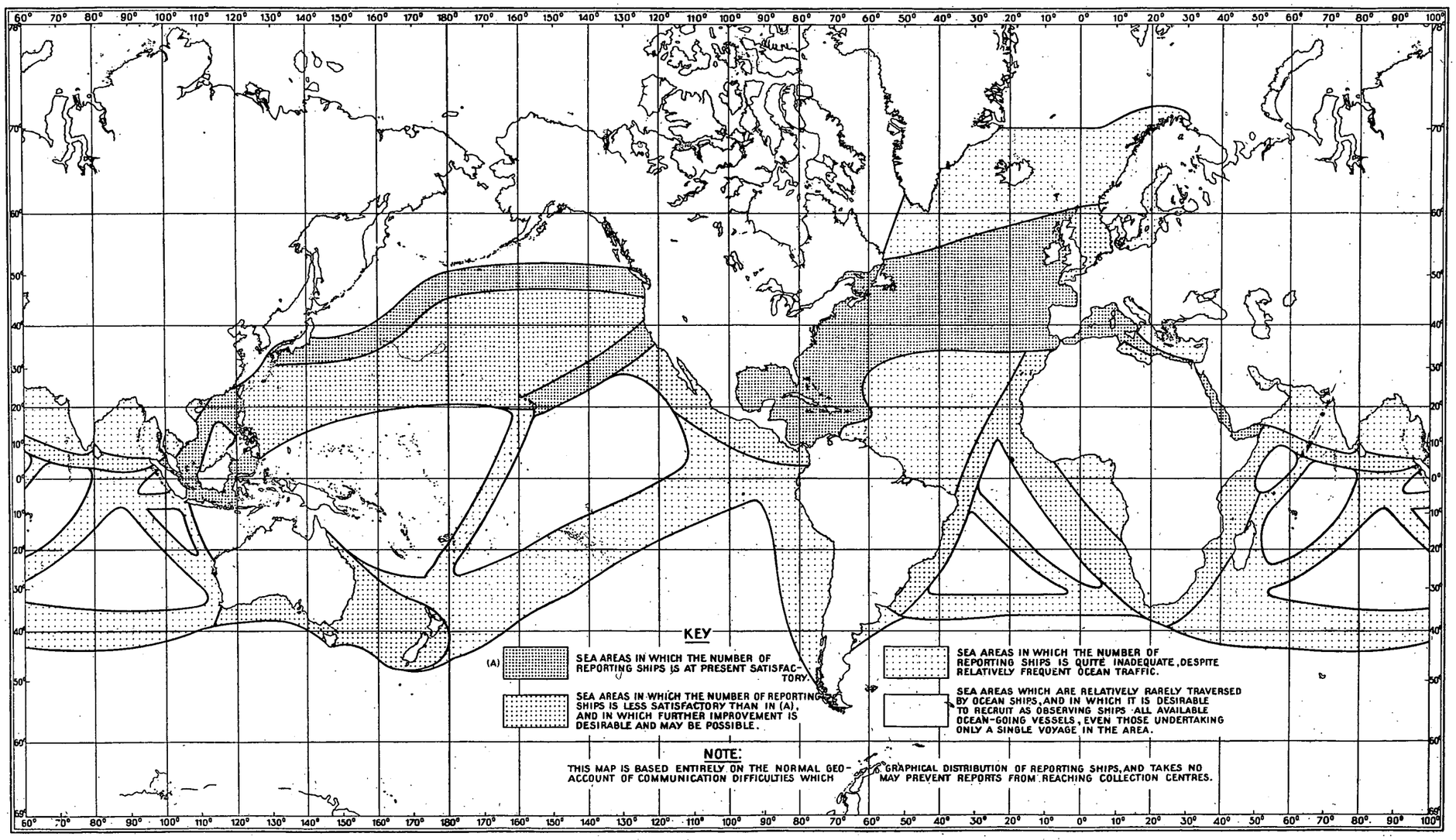
CONSIDERING that existing instructions require clarification in that some meteorological services have instructed their observing ships to include the wave reporting group $1d_w d_w P_w H_w$ once only in a message, even when more than one distinguishable wave system can be observed;

RECOMMENDS to the Executive Committee that appropriate instructions on reporting waves be included in Publication No. 9 Fascicule IV.

(*) The Executive Committee has referred this Recommendation to the President of the Commission for Synoptic Meteorology.

MAP SHOWING DENSITY OF WEATHER REPORTING SHIPS OVER THE OCEANS

Recommendation 11(CMM-I) — Annex



Rec.13 (CMM-I) - VISUAL STORM WARNING SIGNALS (DAY AND NIGHT) (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 43 (CD Washington 1947) and Recommendation 9 of the Conference on Storm Warning Procedures held in Manila in May 1949;

CONSIDERING,

(1) That visual storm signals continue to be of value particularly in certain tropical regions;

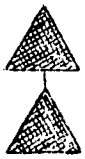
(2) That no major changes in or additions to the existing International Visual Storm Warning Signals would be generally acceptable;

(3) That the specifications of the International Day Signals require clarification;

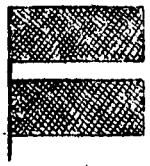
(4) That there is no night signal for the hurricane warning, and the single red light for the "wind from undermined direction" warning is liable to be confused with other lights;

RECOMMENDS to the Executive Committee that the International Visual Storm Warning Signals be amended as follows:

INTERNATIONAL VISUAL STORM SIGNALS

Day	Night	Specification
	White Green	Strong wind (22-33 kts) any direction
	Red Red	Gale (wind 34 kts) and upwards commencing in the NW quadrant
	White White	Gale (wind 34 kts) and upwards commencing in the SW quadrant
	Red White	Gale (wind 34 kts) and upwards commencing in the NE quadrant
	White Red	Gale (wind 34 kts) and upwards commencing in the SE quadrant.

(*) The Executive Committee has embodied the substance of this Recommendation in Resolution 17 (EC-III).

Day	Night	Specification
	No night signal	Wind is expected to veer (clockwise change in direction)
	No night signal	Wind is expected to back (counter-clockwise change in direction)
	Red Green Red	Hurricane (or local synonym) with wind 64 kts and upwards, of any direction; centre of cyclone is expected to pass over or near the station.

Notes:

(1) More than one day signal may be hoisted simultaneously if desired, e.g. to indicate a gale commencing in the SW quadrant and veering.

(2) Additional signals may be used to meet locak requirements, provided their appearance and specifications are distinct from those of the International signals.

(3) Nations with systems of signals already established are not obliged to change them to the International System as indicated in Resolution 43 (2) (CD Washington 1947).

Rec.14 (CMM-I) - WEATHER MESSAGES FROM WHALING SHIPS IN SOUTHERN OCEANS(*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolutions 37 and 50 (CD Washington 1947),

CONSIDERING that the collection of weather messages from whaling ships should be excluded from the provisions of Resolution 37;

(*) The Executive Committee has embodied the substance of this Recommendation in Resolution 24 (EC-III).

RECOMMENDS to the Executive Committee that the following procedure be adopted for the collection and distribution of these weather messages:

(a) Cape Town and Sydney be designated as the two centres for the collection of weather messages from whaling ships; ships to be given complete freedom as to which of the two centres they transmit their reports;

(b) The South African Union Weather Bureau undertake the preparation and duplication of individual cyphers for issue to each of the whaling factory ships operating in the Antarctic, copies of those cyphers to be held by the whaling factory ship and each of the two collecting centres and by no one else;

(c) The two collecting centres each make a daily broadcast of the reports received from whaling factory ships for interception in countries requiring whaling ship reports;

(d) The broadcasts, referred to in (c), exclude the name of the whaling factory ship and the position of the ship be encoded into another cypher to be held only by Meteorological Services requiring the broadcasts and NOT by any of the whaling factory ships;

(e) The preparation and distribution of cyphers for the broadcasts mentioned under (d) be undertaken by the Union Weather Bureau;

(f) In return for the reports from the factory ships, the two collecting authorities should broadcast daily weather bulletins for the express use of the ships in the Southern Ocean, on the lines of the Antarctic Inference broadcast from Cape Town during the whaling seasons of the past few years.

Rec.15 (CMM-I) - PRACTICAL PROBLEMS IN MAKING OBSERVATIONS ABOARD SHIPS (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 57 (CD Washington 1949),

CONSIDERING,

(1) The practical difficulties associated with making weather observations aboard ship;

(*) The Executive Committee has referred this Recommendation to the President of the Commission for Maritime Meteorology for further study.

(2) The procedure now in use in several countries for checking the accuracy of ships' observations;

(3) The practical advantage gained when Meteorological Services give close attention to the training of ships' observers;

(4) The advantages which can result from the active promotion of enthusiasm in weather observing through close co-operation between Meteorological Services and ships' observers;

RECOMMENDS to the Executive Committee,

(1) That the attention of Meteorological Services be drawn to the value of:

(a) The adoption of a system of awards for excellence of service;

(b) Provision of reference material prepared in a popular and interesting style;

(c) Courteous and helpful checking and inspection of observing equipment and techniques;

(d) Preparation of instructions in such a manner as to take into account the practical problems and limitations of observers when making weather observations;

(e) Co-operation between Meteorological Services in locating and correcting recurring errors in weather observations; and

(2) That the World Meteorological Organization design and approve an International Pennant for the use of all ships taking part in the selected ships scheme in order to stimulate international fellowship among weather observing ships.

Rec.16 (CMM-I) - AMENDMENT OF PUBLICATION No. 9 FASCICULE IV (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING the excellent arrangement and comprehensiveness of the contents of Publication No. 9, Fascicule IV, and its recent date,

CONSIDERING that no major changes in the present edition are necessary,

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(*) The Executive Committee has referred this Recommendation to the President of the Commission for Maritime Meteorology for appropriate action through the Secretary-General.

RECOMMENDS to the Executive Committee,

(1) That as individual pages are reprinted, the existing classification by titles of weather bulletins for shipping be replaced by the following classification by letters:

"A" Bulletins for shipping on the high seas issued in any area by that Meteorological Service which is officially responsible for the collection of radio weather messages from shipping in that area.

"B" Bulletins issued by any Meteorological Service for shipping in Coastal areas.

"C" Bulletins issued primarily for Naval Requirements.

"D" Bulletins which are issued for shipping on the high seas in any area by Meteorological Services which have not been officially allocated the responsibility of collecting radio weather messages from shipping in that area.

(2) That a list of bulletins now published in Fascicule III and containing an analysis useful to, although not primarily intended for, shipping be included in Fascicule IV, the list to contain only station names and call signs and references to where details of the broadcasts are to be found in Fascicule III;

(3) That the "Q" code be retained in this publication and Meteorological Services be requested to include the "Q" code in their instructions to voluntary observing ships.

Rec.17 (CMM-I) - INCLUSION OF THE GROUP CONTAINING THE SYMBOLS D_s AND v_s IN METEOROLOGICAL REPORTS FROM SHIPS AT SEA

THE COMMISSION FOR MARITIME METEOROLOGY,

NOTING Recommendation 23 of the Third Session of the Search and Rescue Division of the International Civil Aviation Organization;

CONSIDERING,

(1) That in accordance with definition and to meet meteorological needs, the symbols D_s and v_s refer to the three hours immediately preceding the time of observation and it does not necessarily follow that the course and speed will remain essentially unchanged after the observations, although in many cases this will be so;

(2) That the information regarding the position of ships obtained from meteorological bulletins will be far from complete, being limited to selected and supplementary ships, and to those of the so-called "other ships" which have been specially detailed, to report and even in these categories reports may not be available from some vessels at sea as a consequence of communication difficulties;

(3) That there are possibly other sources apart from ship's meteorological reports, through which the Search and Rescue centres might receive much fuller information regarding the position of ships in the relevant sea areas;

(4) That the extension of groups in weather messages from ships tends to increase transmission costs;

(5) That there were in July 1952 only about 400 ocean-going supplementary and "other" ships to which this optional scheme might apply;

RECOMMENDS that the Commission for Synoptic Meteorology consider this problem in the light of the above remarks; and that

(a) As other than meteorological considerations are involved, the International Civil Aviation Organization be invited to consider the possibility of discussing this subject jointly between representatives of the International Civil Aviation Organization, the Inter-Governmental Maritime Consultative Organization, the International Telecommunication Union and the World Meteorological Organization in line with the suggestions of the Preparatory Committee of Experts on the Co-ordination of Safety at Sea and in the Air (London 1948) in order to achieve the maximum value for Search and Rescue purposes; and

(b) As a temporary arrangement until this problem has been resolved there be no objection to the addition of the optional group "D_8v_3xxx" in radio weather messages transmitted by ships using code forms FM 22 and FM 23 on occasions when specially requested by the Search and Rescue authorities, provided such arrangements are agreed to by the national Meteorological Services concerned.

Rec.18 (CMM-I) - WEATHER MESSAGES FROM SHIPPING IN AREAS FOR WHICH ONLY ONE SERVICE IS RESPONSIBLE (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolutions 37 and 51 (CD Washington 1947),

CONSIDERING,

(1) That the number of weather messages from selected and supplementary ships in nearly all reporting areas is insufficient for

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(*) The Executive Committee has referred this Recommendation to the President of the Commission for Maritime Meteorology for appropriate action through the Secretary-General.

adequate forecasting and storm warning purposes; and

(2) That a number of selected and supplementary ships do not report in certain areas where more ships' reports are required, owing to the fact that the Services responsible for those areas have omitted to request the parent Services of the said ships to instruct them to send in their reports when in those areas;

RECOMMENDS to the Executive Committee,

(1) That all Meteorological Services soleley responsible for areas where more ships' reports are desired, and can be accepted, be invited to inform Services of other countries individually that reports from their selected and supplementary ships are requested when in that area, and that these reports will be accepted without charge to the ships making them, and that if any land charges are involved in handling these reports, the cost will be borne by the Service to whom the messages are addressed;

(2) That the Services of those other countries be invited after having received the above information to instruct their selected and supplementary ships accordingly.

Rec.19 (CMM-I) - REPORTS FROM SHIPS IN AREAS FOR WHICH MORE THAN ONE SERVICE IS RESPONSIBLEa

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolutions 37 and 51 (CD Washington 1947),

CONSIDERING it was necessary to clarify the position of Selected and Supplementary ships in areas where more than one Meteorological Service is responsible for the collection of weather reports from ships;

RECOMMENDS to the Executive Committee,

(1) That in areas where more than one Service is responsible for the collection of ships' reports, ships of any one of these responsible Services shall report to their parent Service;

(2) That when any one of the Services responsible for such an area requires reports from ships whose parent Service is not responsible for the area, the former Service shall request the latter to instruct the Selected and Supplementary ships of its nationality to report to that Service when plying in its allocated area;

(3) That when more than one of the Services responsible for an area require reports from ships whose parent Service is not responsible for the area, the responsible Services concerned shall make mutual arrangements regarding the steps to be taken in this connection, bearing in mind that no ship shall be required to send the same report to more than one collecting centre;

(4) That the Service, the reports of whose Selected and Supplementary ships are required as in (3), will be notified of this fact by the responsible Service, which, according to the arrangements mentioned under (3), is to receive these reports. This notification shall be accompanied by a statement that neither the ships nor the parent Service shall be charged for these reports;

(5) That the parent Service after receiving the notification for action mentioned in (2) or (4) will instruct the selected and supplementary ships of its nationality to act accordingly;

(6) That if local action under (3) among the Services concerned should fail, the question will be submitted to the President of the Commission for Maritime Meteorology for further action.

Rec.20 (CMM-I) - AGREED ADJUSTMENTS TO REPORTING AND FORECASTING AREAS (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 37 (CD Washington 1947), and

CONSIDERING that certain adjustments to the areas shown in Charts A and B have been agreed upon by the Meteorological Services concerned, and approved by Regional Commissions and by the President of the World Meteorological Organization,

RECOMMENDS to the Executive Committee that Charts A and B of Resolution 37 be amended and re-issued to include these adjustments and any future adjustments approved by Regional Associations and the Presidents of the Commission for Maritime Meteorology and the World Meteorological Organization, when the number of changes justifies such action.

Note: Particulars of approved adjustments will be found in the following documents:

(*) The Executive Committee has referred this Recommendation to the President of the Commission for Maritime Meteorology for appropriate action through the Secretary General.

For Chart A.

(1) Recommendation 34 (RC II New Delhi 1948);

(2) General Summary of Session, paragraph 5, (RCV, Wellington, 1948).

(3) Letter of the President of the World Meteorological Organization to the Secretary-General dated 19 February 1952, relating to changes in areas of responsibility assigned to the Philippine Republic and Guam;

For Chart B.

(1) Recommendation 35, (RC II New Delhi, 1948); in this Recommendation, the name SIAM should be amended to THAILAND.

Rec.21 (CMM-I) - PROPOSED ADJUSTMENTS TO REPORTING AND FORECASTING AREAS (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 37 (CD Washington 1947), and

CONSIDERING that certain Meteorological Services desire to make adjustments to the areas shown in Charts A and B, but have not yet obtained the formal consent of those Meteorological Services whose assigned areas are affected in any way by the proposed adjustments,

RECOMMENDS to the Executive Committee that such proposed adjustments to the areas shown in Charts A and B of Resolution 37 (CD Washington, 1947) should be referred to the appropriate Regional Associations in order that agreement may be reached between the Meteorological Services concerned.

Note: The following proposals for adjustments have been brought to the notice of the Commission for Maritime Meteorology;

(*) The Executive Committee has referred this Recommendation to the President of the Commission for Maritime Meteorology for appropriate action through the Secretary-General.

For Chart A:

(1) Proposed by Portugal:

All one or two coastal radio stations in Portuguese West Africa (names to be furnished by Meteorological Service of Porguguese West Africa) to accept ships' weather messages from South Atlantic waters, (limits to be supplied later);

(2) Proposed by Portugal:

Add stations LOURENCO MARQUES, BEIRA and LUMBO in Portuguese East Africa to accept ships' weather messages between Mozambique and Madagascar; (limits to be supplied later);

(3) Proposed by France:

Assign to France a reporting area in the W. Mediterranean (details to be supplied later);

(4) Proposed by India: (7/負の初の項をここに入れ換える)

For Chart B:

(1) Proposed by Norway:

Area assigned to Norway be extended to include (a) Greenland Sea north of Lat. 67°N. and between Long. 12°W. and the Greenland coast. (b) Barents Sea, northward from coast of Norway and between Long. 20°E. and the longitude of the border between Norway and the USSR;

(2) Proposed by Portugal:

Assign to Portuguese W. Africa an area in the South Atlantic (limits to be supplied later);

(3) Proposed by Portugal:

Assign to Portuguese E. Africa an area in the Madagascar Channel (limits to be supplied later);

(4) Proposed by France

Assign to France a forecasting area in the W. Mediterranean (limits to be supplied later);

(5) Proposed by India:

The western limit of the area against India as shown on the right side of the map to end at Long. 60°E. between latitudes 5°S and 12°N as shown on the left side of the same map;

(6) Proposed by India:

The following corrections to be made to achieve uniformity between Map B attached to Resolution 37 (CD Washington 1947) and Map B annexed to Resolution 35 (RC II New Delhi, 1948):

I - (i) Portion between latitudes 12°N and 5°S and longitudes 60°E and 64°E under India to be shown as common area of responsibility of East Africa and India and Ceylon;

(ii) Portion between latitudes 10°N and 12°N and west of longitude 64°E under Aden to be shown as common area of responsibility of East Africa and Aden;

II - Area at present marked against India and Ceylon to be sub-divided as follows:

(i) The area north of latitude 5°N be allotted to India;

(ii) The area south of latitude 10°N be allotted to Ceylon;

(iii) Portion between latitudes 5°N and 10°N be shown as common area of responsibility of Ceylon and India;

(7) Proposed by India:

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Paragraph (a) (i) of Resolution 34 (RC II New Delhi 1948) to be amended to read:

"The inscription on the area formed by combining the areas marked Aden and India should be changed to Aden, India, Pakistan and Ceylon" to bring it in line with the revised Map A annexed to the recommendation in question.

Note: It is suggested that the President of the Commission for Maritime Meteorology should take early action to inform the Presidents of the appropriate Regional Associations of the above proposals.

Rec.22 (CMM-I) - AEROLOGICAL OBSERVATIONS FROM MERCHANT SHIPS (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 41 (CD Washington 1947),

RECOMMENDS to the Executive Committee,

(1) That the investigations undertaken by the United States be noted;

(2) That in view of the need for increased aerological coverage further investigations of this problem should, if practicable, be undertaken by Members;

(3) That the difficulties involved in arranging for aerological observations in merchant ships at the present time make them economically and practically unjestifiable;

(4) That such observations, although useful, being subject to greater observational errors and much less control than those in Ocean Weather Ships be considered as supplementary to the Ocean Weather Ship programme.

(*) The Executive Committee has referred this Recommendation to the President of the Commission for Maritime Meteorology for appropriate action.

Rec.23 (CMM-I) - SPECIAL STUDIES OR OBSERVATIONS WHICH MIGHT USEFULLY BE UNDERTAKEN ABOARD OCEAN WEATHER SHIPS (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolutions 59, 65 and 81 (CD Washington 1947),

CONSIDERING that further research is needed into a number of problems and that such investigations might be best undertaken in Ocean Weather Ships;

RECOMMENDS to the Executive Committee that Members operating Ocean Weather Ships be invited :

(*) The Executive Committee has embodied the substance of this Recommendation in Resolution 19 (EC-III).

(1) To continue investigations relating to:

(a) Sea temperatures

(b) Hygrometry at sea

(c) Wind structure and wind observations generally at sea

(d) Rainfall at sea.

(2) To initiate investigations relating to the following subjects in addition to any other studies which are now being or may be undertaken:

(a) Development and testing of wave recorders

(b) Accumulation of photographs of clouds and states of the sky

(c) Vertical structure of sea temperature

(d) Problems of evaporation and radiation

(e) Meteorological factors affecting radio propagation conditions

(f) Investigation of condensation nuclei.

Rec.24 (CMM-I) - RAINFALL OBSERVATIONS AT SEA (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 59 (CD Washington 1947),

CONSIDERING,

(1) The importance of gaining more complete knowledge of the distribution of rainfall over ocean areas, and the bearing of such knowledge on fundamental meteorological problems;

(2) The great scarcity of data on which the rainfall distribution can be estimated and charted;

(3) The desirability for making maximum use of all means possible, such as ocean weather ships, island stations with representative sites, employing storage type rain gauges as required;

(4) The investigations which have been and are now being undertaken;

(*) The Executive Committee has referred this Recommendation to the President of the Commission for Instruments and Methods of Observation.

RECOMMENDS to the Executive Committee,

(1) That this problem be brought to the attention of Meteorological Services and the other Commissions concerned;

(2) That consideration be given to the provision of assistance, financial or otherwise, through the United Nations Technical Assistance Administration, to countries otherwise unable to undertake the installation of suitable rainfall measuring equipment at representative sites on island possessions;

(3) That countries operating ocean weather ships be asked to undertake, or to complete, investigations on measurement of rainfall.

Rec.25 (CMM-I) - SPECIFICATION FOR HEIGHT OF WAVES (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 64, paragraph (c), (CD Washington 1947),

CONSIDERING,

(1) That the descriptive terms for height of waves recommended therein are not of general application, in that their customary interpretation by users is in terms of the steepness of the waves and not of height only;

(2) The undesirability of introducing more than one set of descriptive terms for height of waves;

RECOMMENDS to the Executive Committee that, in regions where the correspondence between the descriptive terms and the height of waves given in the paragraph referred to is not applicable, the actual height of waves in feet or metres be used when supplying weather information and forecasts for shipping, publications, pilots, etc.

(*) The Executive Committee has referred this Recommendation to the President of the Commission for Maritime Meteorology for appropriate action through the Secretary-General.

Rec.26 (CMM-I) - GENERAL TECHNICAL REGULATIONS IN THE FIELD OF MARITIME METEOROLOGY (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 15 (I) and Resolution 3 (EC-II) of the World Meteorological Organization,

RECOMMENDS to the Executive Committee,

(1) That the Technical Regulations as given in the Annex to this Recommendation (**) be approved for incorporation in the Technical Regulations of the World Meteorological Organization; and

(2) That the Secretary-General of the World Meteorological Organization, in consultation with the President of the Commission for Maritime Meteorology be directed to include such Resolutions of the First Session of the Commission for Maritime Meteorology which are considered to modify these Technical Regulations.

(*) The Executive Committee has referred this Recommendation to the Secretary General for action with the comment that he should read Draft Provisional Technical Regulations for Technical Regulations whenever the term occurs.

(**) The Annex to this Recommendation is published at the end of the Recommendations.

Rec.27(CMM-I) - SPECIAL RADIO STORM WARNING BULLETINS FOR TROPICAL AREAS (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 44 (CD Washington 1947) and Recommendation 1, (Conference on Storm Warning Procedures, Manila, May 1949),

CONSIDERING,

(1) That Recommendation 1 (Manila 1949) has been implemented and proved to be satisfactory for use in storm warning bulletins for ships in western north Pacific waters, including the China seas;

(*) The Executive Committee has referred this Recommendation to the President of the Commission for Maritime Meteorology for appropriate action.

(2) That provisions of Recommendation 1, with slight modifications may be found useful in other parts of the world where tropical cyclones are encountered; and

(3) That Resolution 44 (CD Washington 1947) is considered to be sufficiently flexible to allow the use of more detailed specifications to meet Regional purposes and does not require amendment;

RECOMMENDS to the Executive Committee that the provisions based on Manila Recommendation 1, as given in the Annex to this Recommendation, be brought to the attention of Regional Associations which are concerned with tropical cyclones for consideration.

ANNEX

(Reference IMO Resolution 44 CD Washington 1947)

Suggested content and order of items for storm warning bulletins issued on marine broadcasts by W/T for shipping on the high seas in regions where tropical cyclones may be encountered.

1. International call (TTT)

2. Statement of type of warning

	Corresponding wind	Beaufort force
(Warning	Up to 33 kts.	Up to 7
(Tropical disturbance of unknown origin	Wind speed uncertain	-
Gale Warning	34-47 kts.	8-9
Storm Warning	48-63 kts.	10-11
Hurricane (or local synonym warning)	64 kts. and over	12 and over

(Note: The dual use of the word "Warning" alone will not give rise to misunderstanding, as the text of the bulletin will make it clear).

3. Time of reference GMT in the international six figure date time group.

4. Type of disturbance (low, monson gale, tropical storm, etc.)

Tropical cyclones to be classified as:

(a) Tropical Depressions:	Winds up to 33 kts.
(b) Moderate Tropical Storms:	Winds from 34 to 47 kts.
(c) Severe Tropical Storms:	Winds from 48 to 63 kts.
(d) Hurricanes (or local synonyn):	Winds 64 kts. and over
(e) Tropical disturbance of unknown intensity:	Wind speed uncertain

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5. Location of disturbance:

   (a) Position of storm centre to be given in degrees (and tenths when possible) of latitude and longitude.

   (b) Latitude and longitude to be given in words and not in figures to avoid errors in transmission.

   (c) Information to be given as to the degree of certainty with which the centre is located.

6. Direction and speed of movement of disturbance. Speed of storm centre to be given in knots; direction to the nearest of sixteen points of the compass, or in degrees to the nearest ten.

7. Extent of affected area.

8. Force and direction of wind in various sections of affected area. Wind speeds should be given, if possible, for different distances from the centre in the various sectors of the storm area. Wind speeds to be given in knots; distances in nautical miles.

9. Further indications (if any).

Rec.28(CMM-I) - ESTABLISHMENT OF ADDITIONAL OCEAN WEATHER STATIONS (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 42 (EC-II),

SUBMITS to the Executive Committee the following comments:

Whilst recognizing the technical advantages which would accrue from an extension of the Ocean Weather Ships network, the Commission for Maritime Meteorology does not, for economic reasons, feel that it would be justified in recommending the establishment of further Ocean Weather Ships at present. The Commission for Maritime Meteorology considered this question primarily from the point of view of maritime meteorology and recognized that other factors outside the competence of this commission are involved. The Commission for Maritime Meteorology suggests that the general question of additional Ocean Weather Ships in different areas could best be discussed by Regional Associations in consultation with the Commission for Synoptic Meteorology, the Commission for Aeronautical Meteorology and the International Civil Aviation Organization;

(*) The Executive Committee has referred this Recommendation to the Presidents of Regional Associations and of Technical Commissions likely to be interested.

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Experience of Members who are already operating Ocean Weather Ships is summarized in the Annex to this Recommendation;

Practical advice regarding costs and organization is difficult to give in a generalized form, since it must be related to local conditions. On interpreting the costs as given in the Annex to this Resolution, it should be noted that the duties of the present Ocean Weather Ships cover a number of other fields in addition to meteorology; and

RECOMMENDS that the designation "ocean stations" replace that of "ocean weather ships" and be used in all Publications of the World Meteorological Organization and documents issued hereafter.

A N N E X
MARITIME COMMISSION

CMM-I/Doc.57 19th May, 1952.

My dear Colleague,

Item 8.16 of the Provisional Agenda for the CMM meeting in London is entitled "Establishment of ocean weather ships in different oceans". This Resolution is included as a result of WMO Resolution 42 (EC-2) which reads as follows:

"OCEAN WEATHER SHIPS

THE EXECUTIVE COMMITTEE,

CONSIDERING the interest of the World Meteorological Organization in the establishment of stationary weather ships on the different oceans;

DECIDES to refer the general question of Ocean Weather ships to the Presidents of Regional Associations and to the Presidents of the interested Technical Commissions for study and recommendations."

The supporting note attached to this CMM Resolution reads:

"The Commission should consider from a maritime point of view the desirability of recommending the establishment of ocean weather stations in areas other than those already provided with such ships. They should also give practical advice in a general sense as to the type of vessel which might be suitable in certain oceans, the probable operating cost and other practical problems connected with the operation of weather ships, should the WMO Congress decide that, for the benefit of world meteorology, the establishment of such stations was desirable in certain oceans."

I shall be grateful if you will please let me have at your convenience a short general statement about the experience you have gained in the operation of ocean weather ships, with particular reference to:

(a) Operating costs

(b) Number of ships required to man a station

(c) Type of ship recommended

(d) Number of crew necessary

(e) Meteorological equipment at present used in your own ships.

I have sent similar letters to the Directors of the other Services who are responsible for operating ocean weather ships in the North Atlantic and I hope by this means to be able to supply the Executive Committee with an assessment as to the average operating cost of such vessels and other practical details, in case it should be decided that weather ships are imperative in any other Ocean.

As the CMM Meeting commences on 14th July, I would appreciate the favour of your reply by the end of June at the latest.

I am, my dear Colleague,
Yours sincerely,

(Sgd) C. FRANKCOM

President of the Commission
for Maritime Meteorology

The following letters are replies to date 12th July, 1952, in reply to the President's circular letter MCP2/51 of 19th May, 1952.

UNITED KINGDOM

In regard to your letter reference MCP2/51 respecting the operation and maintenance of Ocean Weather Ships I submit the following statement based on experience gained in operating the four British vessels.

(a) Operating Costs

Four British ships operate from the Base at Greenock for the maintenance of Stations "India" and "Juliet". The ships sail from Greenock to their allotted station conforming to a regular routine, each completed voyage taking 42 days which is made up as follows: 3 days steaming to station, 21 days on

station, 3 days returning to Base, 15 days at Base. The total operating costs for the four ships and maintenance of Base, amounts to approximately £ 230,000 per year.

(b) Number of Ships required to man a station.

The number of ships required to man a station depends of course on the distance they have to steam to and from their station to Base and tottheir endurance. In the case of the British ships, stations "India" and "Juliet" are situated 555 and 502 nautical miles respectively from the Base Port. Four ships are the minimum number required for the service, that is two ships to maintain each station.

(c) Type of ship recommended.

The British ships are corvettes of 1340 tons, Length 205 ft. Beam 33 ft. Moulded Depth 17 ft. 6". Mean Load Draught 14 ft.4". They have a maximum speed of 16 knots, their economical speed is 9 knots and it is only under special circumstances that this economical speed is exceeded. The ships are extremely sea-kindly and stand up well to the very heavy weather that is experienced in the North Atlantic, thereby greatly contributing to low maintenance costs. A disadvantage in regard to them, however, is the amount of oil fuel they are capable of carrying. This strictly limits their field of operation, and for this reason a somewhat larger ship would be preferable for service in the North Atlantic.

(d) Number of Crew necessary

The following crew is the minimum necessary to man the British Ships:

Deck Department	Engine Room Department	Catering Department
Master	Chief Engineer	Chief Steward
3 officers	2 Engineer Officers	1 2nd Steward
1 Boatswain	1 Engineer Asst.8	2 Asst. Stewards
6 Able Seamen	1 Donkeyman	3 boy Stewards
3 Ordinary Seamen	3 Greasers	1 Chief Cook
	4 Firemen	1 Asst. Cook
		1 Galley Boy

Radar & Radio Department	Meteorological Office Staff
1 Radio Officer	1 Meteorological Officer i/c
6 Radio Telegraphists	2 Junior Meteorological Officers
1 Chief Radar Mechanic	4 Meteorological Assistants
2 Radar Mechanics	

Total Crew 53
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(e) Meteorological equipment at present used in British Ships

1 Hand anemometer
3 Barographs (Open scale, oil-damped on antivibration mounting)
1 Barometer-Aneroid
2 Barometers - Marine Mercurial
1 Insulated bucket for taking surface sea-water samples
2 Distant reading psychrometers with recording apparatus
2 Portable screes, fitted with hygrometers
1 Distant reading sea thermograph - the temperature element being mpunted in the condenser intake miscellaneous thermometers
1 Wind vane and 1 cup anemometer - with distant reading direction and speed indicator
1 Assman psychrometer (Electric)
1 Assman psychrometer (Clockwork)
Hydrogen in cylinders, for filling balloons radiosonde
Receiving apparatus, including 2 oscillators, 2 oscilloscopes
1 Control screen for radiosonde
Radar Type 277P, for finding the direction and speed of the upper winds
Radiosondes and radiosonde balloons
Balloons for making cloud height observations and illuminating torches
A plotting table and instruments for radio wind observations
Various books, forms and instructions.

FRANCE

In reply to your letter, reference of which is given above, I have the honour to give you the following particulars relating to the operation of Ocean Station "K" (45°N, 16°W):

(a) Annual expenditure: 317,500,000 francs.

(b) No. of vessels required:

(2 vessels alternating on a continuous basis, the third being normally kept in reserve to replace each of the other two during refits)

(c) Type of vessel recommended:

Twin-screw motor (Diesel) vessel - 1200 - 1500 tons - of maximum stiffness (beam 12 m., draught 4.50 m.) - max. speed 15 knots.

(d) Crew required: 50 men per commissioned vessel.

(e) Meteorological equipment:

1 wind-vane with electric transmission (0° - 360°)
1 anemometer with electric transmission (electromagnetic)

1 slide-rule for computation of true wind
1 (marine) mercury barometer .... "R"
1 aneroid barometer with dial
2 barographs
1 hypsometer .... "R"
1 nephoscope projector (spot-light)
1 marine theodolite
1 telemeter .... "R"
1 SA radar
1 complete radio-sounding outfit
1 screen for max. - min. thermometers and psychrometer .... "R"
1 sling psychrometer
1 submersion thermometer
1 baby thermograph
1 thermograph on condenser circulating system
1 special winch with Nansen bottle for deep level hydrology.

"R" = not intended for ordinary observation work.

HOLLAND

In reply to your above letter here follows a short general statement regarding the experience gained in the operation of weather ships in the Netherlands:

(a) The yearly operating costs per ship amount to about 2 million guilders (roughly £ 200,000) inclusive writing-off for depreciation of ship and equipment and loss of interest. To my regret it is not yet possible at this stage to give the exact figures of the costs during the period the Netherlands have been taking part in the OWS scheme.

(b) It is difficult to give a concrete answer to the question how many ships are required to man a station. Among other things this will depend on the type of ship, the distance of the station from the home port, etc.

Apart from extraordinary circumstances each ship yearly will need about 2-3 months for maintenance and repair. This would mean that at least 3 ships are needed to man 2 stations.

(c) The type of ship to be recommended depends on the ocean area where the ship is to be used. For the Atlantic, frigates and corvettes have proved their usefulness. On the other hand in the Indian Ocean good experiences were gained with a tanker of 3000 gross r. tons. This ship was equipped at Djakarta in 1949 as a temporary weather ship and stayed at sea for almost three months at a stretch.

(d) The number of the crew will depend on the type of ship. In the Netherlands weatherships the Meteorological staff consists of 7 (2 radiosondes) or 10 (4 radiosondes) observers, whilst the radio service requires 11 operators.

(e) In principle the Netherlands weatherships have been equipped according to the instruction of "Ocean Station Vessel Manual" (ICAO Doc. 6926-AN/856). A list of instruments these weatherships carry has been enclosed.

Meteorological equipment of the Netherlands Weatherships.

The equipment is to be divided into three parts:

A. Equipment for surface observations.

B. Equipment for upper air pressure, temperature and humidity observations.

C. Equipment for upper wind observations.

SPECIFICATIONS

A. Equipment for surface observations

Wind-direction measuring equipment
Windspeed measuring equipment
Measuring equipment for plotting true winds
Marine mercurial barometer
Ventilated psychrometer type Assmann
Psychrometer type dry and wet bulb
Precision aneroid barometer
Barograph
Sea surface temperature thermometer
Cloud searchlight

B. Equipment for upper air pressure, temperature and humidity observations

Radio sonde type Mark II
Receiver and frequency measuring equipment
Muirhead RC oscillator
Muirhead tuning fork 1000 c/s oscillator
Oscillograph
Ships screen for testing radiosonde readings
Balloon inflation room
Hydrogen store.

C. Equipment for upper wind observations

Ceiling balloon equipment
Radar wind finding equipment type S.A.
Marine theodolite.

Supplementary equipment

Anemometer
Marine mercurial barometer
Aneroid barometer
Psychrometer type dry and wet bulb
Barograph
Sea surface temperature thermometer
Radio sonde receiver

CANADA

PACIFIC OCEAN WEATHER STATION "P"

General

The Department of Transport operates ships which maintain ocean weather station "P" with two active vessels, the "St. Catherines" and "Stonetown" and one standby vessel the "St. Stephen". To date the "St. Stephen" has not been called upon to do active duty as the other two vessels have been able to maintain a regular schedule of six weeks on station with each ship leaving port in time to take over in order that the "on station" time will not exceed six weeks. The station has been in operation on this schedule since December 1950 and operations so far achieved have been better than estimated by the Department

Operating Costs

The operating costs for the fiscal year April 1st, 1951, to March 31st, 1952, are listed as follows:

C.G.S. "Stonetown"	- $ 279,997
C.G.S. "St. Catherines"	- $ 242,875
C.G.S. "St. Stephen"	- $ 36,140
Total	- $ 559,012

Number of Ships required

Past experience would indicate that a minimum of three ships are required to man a station, whereas in the case of the Pacific weather station "P" an average travelling time of six days is required per patrol. A schedule of six week patrols requires each vessel to

be out to sea for forty-nine days and in the case of two active cessels manning the station, such a schedule places a severe strain on both the ships and operating crews. It is therefore considered that shorter patrols would be more satisfactory in the long run, although less economical from the standpoint of operating costs.

Type of Ships Recommended

Of the ships which were available for conversion to weather station duty, the frigates were considered preferable for economy, speed and facilities for carrying out the meteorological programme. Corvettes were considered to be too small to maintain long patrols and larger ships were considered to be less economical to operate than frigates.

Ships that are designed to offer a clear after-deck for releasing the large upper air balloons and the installation of suitable balloon inflation shelters, are definitely preferable, as the upper air observations are most essential to the meteorological progeamme of ocean weather stations. The ships should also be capable of carrying a stabilized radar set of sufficient accuracy to track the targets used for upper wind observations.

Number of Crew Neccessary

The following complements of the Pacific Weather Ships are listed as follows:

C.G.S. "Stonetown"

Total ships' crew	-	42
Meteorological Personal	-	5
Wireless Personal	-	9
Total	-	56

C.G.S. "St. Catherines"

Total ship's crew	-	41
Meteorological Personal	-	5
Wireless personal	-	9
Total	-	55

C.G.S. "St. Stephen"

Standby Crew	-	10

The above complements for each of the active ships "St. Catherines" and "Stonetown" are minimum requirements.

Meteorological equipment

The following equipment is carried on each of the two weather ships. It will be noted that duplicate wind equipment and radiosonde ground receiving sets are installed on each vessel to minimize disruptions in the meteorological programme as much as possible.

Equipment for surface weather observations

MSC Type U-2 Wind Equipment, 2 sets complete
New Marine Barometer, # 775
Wallac & Tiernan Aneroid Barometer, Model 126
MSC Barograph, # 40/35
Taylor Temperature Recorded, # 76JM3640
Raingauges, 2 units, with measuring graduates
Mercury thermometers and slings

Equipment for upper air observations

MSC Radiosonde Receptors, 2 sets	Hydrogen supply, inflating nozzles, etc.
MSC Radiosonde instruments, exhaustable	Winds aloft graphing board and utensils,
Balloons	Radar reflector targets.

U. S. A.

(b) The number of vessels required to maintain 5-2/3 U.S. ocean stations in the Atlantic is 14 ships.

With reference to point (e) which relates to meteorological equipment aboard U.S. ocean stations, I believe the following will be of interest to the MC:

1 set wind equipment including repeaters	$ 1000.00	
2 Sea water thermometers	25.00	each
1 Marine type Barograph, open scale	185.00	
1 Precision Aneroid Barometer	375.00	
Radiosondes, 72 MC	15.00	each
500 - gram balloon	2.20	each
100 - gram balloon	.42	each
Radar target (2 used for each observation)	.45	each
Radiosonde battery	2.00	
Indidentals for each radiosonde observation	1.50	
1 Baseline check box for radiosonde calibration	128.00	
1 Battery text box	22.00	
1 Barograph Cabinet	30.00	
1 Winds aloft calculator (to obtain horizontal distance)	8.80	

2 Radiosonde equipment (usually 2 sets installed on each ship)	$ 1600.00 each
2 Helium regulators	14.00 each
1 Marine theodolite	1000.00
1 Pibal timer	45.00
3 Psychrometers, sling type	12.00 each
1 set inflation weights	15.00
1 DRT (dead reckoning tracer) Part of the ship's equipment but is used in connection with taking rawin observations.	

In addition to the ship's regular complement, the U.S. Weather Bureau assigns four observer-technicians to each patrol. Occasionally, an additional observer is detailed to a patrol for training purposes as required.

NORWAY

In answer to your letter of 19th May, 1952, to the Director, Det Norske Meteorologiske Institutt, I have the honour to inform you about our experience regarding Ocean Weather Station "M" as follows*

(a) The operating costs are about Kr 55.000 a year. This is the running expense and does not include depreciation.

(b) When the distance from homeport to station is not more than about 800 km., it is possible and most convenient to man a station with 2 ships.

(c) Type of ships depends on the distance from homeport and the ships' capacity for carrying fuel. For station "M" we are very well satisfied with our corvettes.

(d) We have a crew of 43 on each ship. Of these 7 are meteorologists.

(e) Meteorological equipment is the same as when U.K. participated in the station "M" and as far as I remember the same as is used in the British Weather Ships.

Rec.29 (CMM-I) - TRANSMISSION SCHEDULES FOR SHIPS ONLY EMPLOYING ONE RADIO OPERATOR (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution 45 (CD Washington 1927), and

CONSIDERING that many merchant ships employ only one radio operator;

RECOMMENDS to the Executive Committee that in the Content of Resolution 45 (CD Washington 1947) the following sentence be added in paragraph 4:

"Transmission schedules of bulletins should be arranged whenever practicable to fall within the hours of duty of the radio operator in single operator ships".

(*) The Executive Committee has embodied the substance of this Recommendation in Resolution 20 (EC-III).

Rec.30(CMM-I) - REPORTING LANDING CONDITIONS FOR AN AIRCRAFT ON ICE OR BETWEEN ICE FLOES IN CODED FORM(*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING Resolution LXXXIII (CMM Toronto 1947),

RECOMMENDS to the Executive Committee that the first part of Resolution LXXXIII (CMM Toronto 1947), i.e. "examination of the possibility of reporting landing conditions for an aircraft on ice or between ice floes in coded form" is beyond the terms of reference of the Commission for Maritime Meteorology as specified by the 1st Congress of the World Meteorological Organization in Paris 1951.

(*) The Executive Committee has referred this Recommendation to the President of the Commission for Maritime Meteorology for appropriate action.

Rec.31 (CMM-I) - DEFINITION OF CONFUSED SEA (*)

The COMMISSION FOR MARITIME METEOROLOGY,

NOTING that no provision is made in Resolution 64 (CD Washington 1947) for describing a confused sea,

RECOMMENDS to the Executive Committee that the following paragraphs be added at the end of the content of Resolution 64 (CD Washington 1927):

"When the state of the sea surface is so confused that none of the above descriptive terms can be considered appropriate, the term "confused" should be used".

(*) The Executive Committee has embodied the substance of this Recommendation in Resolution 21 (EC-III).

TECHNICAL REGULATIONS - PART 1

MARITIME COMMISSION

STATIONS OF METEOROLOGICAL OBSERVATIONS

* 5.0. Marine Meteorological Stations

5.1. Classification of Marine Stations

5.1.1. Marine Stations are divided into the following categories:

(a) Selected Ships
(b) Supplementary ships
(c) Other voluntary observing ships
(d) Ocean station vessels
(e) Ships undertaking scientific expeditions
(f) Automatic stations on buoys
(g) Light ships

* 5.1.2. The regulations appertaining to land stations shall, as far as possible, also apply to marine stations but with certain stated modifications to conform to the different circumstances prevailing at sea.

5.2. Establishment of a world plan for ships' reports.

CD Washington 1947: 37

5.2.1. A world-wide plan for weather reports from ships, which provides for the transmission by radio of ships' weather reports to collection centres and for prompt transmission to Meteorological Services needing these reports is established as shown on Map A Annex.(*)

CD Washington 1947: 37

5.2.2. Changes of sea areas can be approved by the President of the WMO at the request of the Directors of Meteorological Services primarily concerned with the boundaries of their areas, after concurrence by the President of the Commission for Maritime Meteorology in consulation as necessary with the President of the Regional Association concerned, such changes to become effective after not less than six months notice to Members of WMO.

CD Washington 1947: 37

5.2.3. Meteorological Services of maritime countries shall inform their voluntary observing ships regarding the reporting procedures in all oceans and the radiostations to which the reports should be sent in each

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* Not based on any specific Resolution or Recommendation.

(*) Not reproduced here.

area; they shall make suitable arrangements in their area for retransmission of the collection of reports without delay for the benefit of other Services; established centres of collections shall promptly retransmit the synoptic reports so received from ships, in such form as may be agreed upon.

CD Washington 1947: 37

5.2.4. As a general rule a voluntary reporting ship should not be asked to send the same observation to more than one collection centre and indivudual ships should not be asked to use more than one form of coded message.

CD Washington 1947: 37

5.2.5. Whenever the ships' weather reports received at designated collecting stations are deficient or whenever the transmission of collectives is deficient or unduly delayed the Meteorological Services responsible for the collections shall first take local or regional action in an endeavour to correct the deficiency. If such action is not effective the Meteorological Service concerned shall notify the Secretariat of the WMO, which will inform the President of the Commission for Maritime Meteorology who in turn will take whatever action is practicable to make good the deficiency in consultation with the Directors of the Services concerned and if necessary with the President of the WMO.

CD Washington 1947: 38

5.3. Recruitment of voluntary observing ships

5.3.1. Recruitment of voluntary observing ships shall be the responsibility of Meteorological Services of maritime countries.

CD Washington 1947: 38

5.3.2. To ensure that an adequate number of voluntary observing ships is available to cover all ocean areas, each such Service should recruit as many of its own ships as possible for this purpose, under the following headings:

(a) "Selected ships", supplied with full sets of certified instruments and closely supervised for maintaining a high degree of accuracy in their weather reporting service, which will be requested by the parent National Service to report in the standard form of message for reports from ships, at least at the main synoptic times whenever practicable, and also as required by the International Convention for Safety of Life at Sea.

(b) "Supplementary ships", supplied with modified sets of certified instruments, which will be requested to report in areas where shipping is relatively sparse, or as instructed by the parent National Service, using an abridged form of message for reports from ships at least at the main synoptic times whenever practicable or more frequently as required when storm conditions threaten or prevail, and also, as required by the International Convention for Safety of Life at Sea.

(c) "Other ships", not supplied with certified instruments, which will be requested to report in areas where shipping is relatively sparse, or as instructed by the parent National Service, or on request and especially when storm conditions threaten or prevail, or as required by the International Convention for Safety of Life at Sea, using a special abridged form of message for reports from ships or in plain language if use of code is impracticable. These vessels will, be encouraged to make their reports at the main synoptic times, but reports at other times if more convenient to themselves will be acceptable, the time being reported in the message to the nearest hour G.M.T. with preference for the standard intermediate hours of 0300, 0900, 1500 and 2100 G.M.T.

CD Washington 1947: 36

5.4 Collection of additional information from ocean areas

5.4.1. In ocean areas where reports are sparse Meteorological Services should consider the practicability of improving the ocean networks in those areas by the following means:

(a) Expanding their selected ships' programme

(b) Increasing coverage in areas infrequently travelled, by enlisting: -
  (i) Supplementary ships
  (ii) Other vessels

(c) Establishing any or all of the following:

  (i) Ocean station vessels
  (ii) Automatic stations where possible
  (iii) Aircraft reconnaissance
  (iv) Routine observations from trans-oceanic aircraft
  (v) Sferics and radar networks
  (vi) Observations of wave characteristics from networks of automatic wave recorders and other suitable instruments, including microseismic observation networks

(vii) Co-operation of scientific espeditions
(viii) Reports from light ships or lighthouses on isolated islands.

CD Washington 1947: 58

5.5. Liaison officers at ports

5.5.1. Meteorological Services of maritime States should establish and maintain close liaison with their merchant marine schools (navigation schools) to ensure that adequate attention is given to meteorology in the training curricula. It is considered to be desirable that the examinations for certificates of competency of ship's officers should include test papers in marine meteorology, and that the syllabus should include:

(a) Observational techniques;

(b) The drawing and interpretation of weather maps as applied to sea navigation.

CD Washington 1947: 46

5.5.2. Direct liaison with voluntary observers aboard ships should be encouraged in every way, and especially by inviting ships' officers to visit Meteorological Offices, by sending instructors to sea in ships, and through the work of port meteorological officers.

" 5.5.3. The Services of maritime states, should, if practicable, appoint meteorological liaison officers at their main ports.

" 5.5.4. These officers should, if possible, have marine experience and their duties shall be:

(a) To recruit, instruct and maintain contact with voluntary observers on board ships of the State concerned and maintain and inspect instruments in accordance with standard international meteorological practise;

(b) To assist, upon request of the Master of any ship regardless of the ship's State of registry, in checking of instruments, providing information regarding storm warnings, forecast messages, etc. and advise on meteorological problems as requested;

CD Copenhagen 1929: 33

(c) Although requests and complaints concerning the ships and mariners of the various countries should be made through national administrative channels, that is, through the intermediary of the Meteorological Service of the country to which the ships and personnel belong, liaison officers of any country may offer their services, in special

circumstances, to ships of any nationality and may use their discretion in seeking the co-operation of such ships for furnishing weather reports when in the waters which have a meteorological significance to the country concerned, subject to the approval of the owners or local agents and permission of the ship's master, so long as the basic instructions for meteorological reports from the ship are not modified by such action.

* 5.7. Ocean Station vessels

* 5.7.1. Those Meteorological Services whose countries are engaged in the operation of ocean station vessels, should, as far as possible, maintain a programme of meteorological observations on such ships equivalent to that of land observatories, including upper air soundings to the highese practicable levels.

5.7.2. Insofar as is practicable, investigations into various fields of marine meteorology and oceanography should be carried out aboard ocean station vessels, by encouraging scientific interests to add specialists for their particular projects of investigations.

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* Not based on any specific Resolution or Recommendation.

MARITIME COMMISSION

METEOROLOGICAL OBSERVATIONS

Part 1 - Surface observations

5.10. Surface observations on shipboards

* 5.10.1. The regulations appertaining to surface observations at land stations shall, as far as possible, also apply to marine observations but with certain stated modifications to conform to the different circumstances prevailing at sea.

5.11. Elements to be observed aboard ships of different categories

CD Washington 1947: 161

5.11.1. The following elements should, as far as the ship's duties and the safety of the ship permits, be observed regularly aboard selected ships except that any or all of the non-instrumental observations (xii) to (xiv) inclusive may be omitted when circumstances justify it. Observations (xv) to (xix) should only be made when ice is in sight. Ocean station vessels should make observations of all elements below and those in 5.11.2.

(a) Instrumental observations

(i) Barometric pressure
(ii) Dry bulb temperature
(iii) Three hour change in barometric pressure
(iv) Barometric characteristic
(v) Sea temperature
(vi) Wet bulb temperature

(b) Visual observations

(i) Total amount of cloud
(ii) Height of base of cloud
(iii) Amount of cloud whose height is reported in (ii)
(iv) Type of cloud C_L
(v) Type of cloud C_M
(vi) Type of cloud C_H
(vii) Wind direction
(viii) Wind speed
(ix) Visibility

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* Not based on any specific Resolution or Recommendation

(x) Present weather
(xi) Past weather
(xii) Direction of waves
(xiii) Period of waves
(xiv) Mean maximum height of waves
(xv) Kind of ice
(xvi) Effect of ice on navigation
(xvii) Bearing of ice limit
(xviii) Distance of ice limit from ship
(xix) Orientation of ice limit.

5.11.2. The observation of the following additional observations shall be optional for selected ships:

(i) Amount of significant cloud
(ii) Type of significant cloud
(iii) Height of significant cloud

5.11.3. The following elements should be observed regularly by supplementary ships:

(a) Instrumental observations

(i) Barometric pressure
(ii) Dry bulb temperature

(b) Visual observations

(i) Total amount of cloud
(ii) Height of base of cloud
(iii) Amount of cloud whose height is reported in (ii)
(iv) Type of cloud C_L
(v) Type of cloud C_M
(vi) Type of cloud C_H
(vii) Wind direction
(viii) Wind speed
(ix) Visibility
(x) Present weather
(xi) Past weather
(xii) Ice (plain language)

5.11.4. The following elements should be observed aboard other voluntary observing ships:

(i) Total amount of cloud
(ii) Wind direction
(iii) Wind force
(iv) Visibility
(v) Present weather
(vi) Past weather
(vii) Ice (plain language)

CD Washington 1947: 205

5.11.5. Any reports concerning special phenomena which would justify inclusion in voluntary observing ships' weather messagesshall be sent in plain language.

CMI De Bilt 1933: 2

5.11.6. When describing whirlwinds and similar phenomena the direction of rotation shall be given always as if seen from aboce.

5.12. Hours of observation

CMI Paris 1947: 17,18

5.12.1. Ships' observations for synoptic purposes shall be made and reported at the main synoptic times throughout the world according to G.M.T., not by local or zone time, and shall be taken, whenever possible at 0000,0600, 1200 and 1800 G.M.T. Intermediate and special observations should be taken on the hour preferably at 0300, 0900, 1500 and 2100 G.M.T.

5.12.2. Every effort should be made to secure the observations within a tolerance of 10 minutes before or after the synoptic hour.

5.12.3. The pressure observation should, whenever possible, be taken as closely as possible to the synoptic hour and the other observations immediately before or after it. Air and sea temperatures should be obtained in as close sequence as possible and sea temperature observations should be made by the engine room at the time of observation if sea temperature is obtained from the intake reading.

CD Washington 1947: 112

5.12.4. Where operational difficulties on board ship make it impracticable to observe at the times prescribed, the synoptic observations should be taken as near as possible to the recommended synoptic hours, with the actual hour of the observation recorded. Meteorological Services should draw the attention of their voluntary marine observers to the provisions of this rule with specific advice on the meteorological advantages of exercising this latitude to permit, for example:

(a) The taking of observations that would otherwise be missed (e.g., observers preoccupied by essential ship duties;

(b) The immediate transmission of a report that would otherwise be greatly delayed by being taken just after the W/T operator had gone off watch on a single operator ship.

* 5.12.5. Voluntary observers at sea should be encouraged to record their observations at each of the four principal synoptic hours even though one or more of the recorded observations may not be transmitted.

* 5.12.6. When sudden and dangerous weather developments are encountered by ships at sea, they should make special observations and reports as soon as possible and without regard to these standard hours of observation, in accordance with the Convention for Safety of Life at Sea.

5.13. Instruments

CD Washington 1947: 52

5.13.1. Maritime Meteorological Services shall, as far as practicable, supply their selected merchant ships with equipment that is reliable, accurate and adapted as fully as possible to the practical considerations attending the work of shipboard weather observers and maintain an inspection programme and in so doing shall take full account of the equipment required, specifications and standards set forth in the approved "Guide to International Meteorological Instruments and Observing Practice".

5.14. Recording and preservation of observations

CMM Toronto 1947 LXXXV

5.14.1. Marine observations shall be recorded in a ship's meteorological log-book, or equivalent record, which should be collected by Maritime Meteorological Services and which should contain columns for all elements of the synoptic code. The form of the log-book should be basically international, although providing columns for inserting all original data of observations and columns for observations of special national interest.

5.15. Methods of observations

* 5.15.1. Methods of observations on shipboard should conform to the requirements laid down in the approved "Guide to International Meteorological Instrument and Observing Practice". Special attention is drawn to the limits of accuracy desirable in instrumental readings as laid down in that publication. The following points are stated for particular emphasis with respect to the special conditions for weather observations from ships at sea.

* Not based on any specific Resolution or Recommendation.

* 5.15.1.1. Clouds. Visual observations of cloud at sea should as far as practicable conform to the requirements and specifications of the International Cloud Atlas.

CD Washington 1947: 47

5.15.1.2. Barometric pressure. Each Service should take precautions to ensure checking of ships' barometers, every three months if possinle (especially aneroid barometers) against standard barometers on shore. Observing personnel should be impressed with the necessity of making reductions of atmospheric pressure readings to sea level using standard reduction tables or the Gold Slide if fitted. Ships supplied with barographs should be instructed to compare these instruments with a mercury barometer once every three months if possible.

CD Washington 1947: 138

5.15.1.3. Dry and wet bulb temperatures. Maritime services shall take full account of the limitations and inadequacies of temperature readings from dry and wet bulb thermometers exposed in a single fixed screen and should as a minimum standard for thermometers effect the installation of well ventilated double screens preferably portable so as to secure air temperature readings from the weather side of the bridge, but all services should as rapidly as possible replace fixed screens with suitably designed sling psychrometers or aspirated thermometers, at least in the selected ship list. Ships' Masters and other officers should, in general, be led to understand the practical importance of accurate dew point determinations because of the bearing on problems of hold ventilation as a means of reducing moisture damage to cargoes in the holds.

CMM Toronto 1947 XXXVII

5.15.1.4. Sea temperature. The temperature of the sea surface should be measured by either of the following:

(a) Obtaining a sample of the surface water in a suitable receptacle (the "bucket" method).

(b) Reading the temperature of the condenser intake water (the condenser intake method).

The method used for sea surface temperature obser vation should be clearly indicated in the ship's weather log or equivalent reporting forms.

* Not based on any specific Resolution or Recommendation.

CD Washington 1947: 62

5.15.1.5. Wind. Aboard voluntary observing ships, visual observations of wind force should be made by reference to the Beaufort Scale in conjunction with Captain Petersen's Criterion Tables, and the wind direction by observing the motion of sea waves (i.e. wind driven waves and not swell waves raised by the wind in a distant area). Wind speed in radio weather messages from ships shall be reported in knots; if it has been observed by the Beaufort scale the appropriate WMO tables shall be used.

CD Washington 1947: 63

5.15.1.6. Waves. The following definitions shall apply:

Sea: The waves being raised by the wind blowing in the immediate neighbourhood of the place of observation at the time of observation.

Swell: A system of waves not being raised locally.

Breaker: The collapse of a whole wave resulting from its running into very shallow water - (depth of the order of twice the wave height).

Surf: The broken water between the shore line and the outermost line of breakers.

The expression "Breaking Seas" must be taken to mean the partial collapse of the crest of a wave caused by:

(a) Action of the wind;

(b) Steepening of waves due to their encountering a contrary current or tidal stream;

(c) Steepening of waves due to their running into shore water not shallow enough to cause a breaker.

Wave length: The horizontal distance between successive crests or troughs. (It is equal to the wave period multiplied by the wave speed).

Wave height: The vertical distance between trough and crest.

Wave period: The time between the passage of two successive wave crests past any given point. (It is equal to the wave length divided by the wave speed).

Wave speed: The distance travelled by the wave in a unit of time. (It is equal to the wave length divided by the wave period.)

For meteorological purposes the average value of each of the above characteristics is used, as obtained from the groups of larger waves of each wave system.

In making observations at sea, observers should attempt to observe and record each separate wave system, should such separate systems be clearly distinguishable, according to Publication 78.

The characteristics of waves to be observed are:

(a) Direction from which the waves come.

(b) Period to the nearest second.

(c) Mean maximum height.

6. Ice

CMM I London 1952 Rec. I

6.1. The ice nomenclature, the terms and definitions of which are contained in Recommendation I Annex to CMM-I shall apply.

CD Washington 1947: 78

6.2. Reporting ships from which icebergs are visible should add, in plain language, to their synoptic weather report the number of iceberg seen at the synoptic hour, (e.g. "3 bergs").

6.3. Reporting of sea ice in connection with the synoptic weather report is not to supersede the reporting of sea ice and icebergs according to the International Convention for the Safety of Life at Sea.

7. Checking of ships reports

CD Washington 1947: 57

7.1. Services responsible for collecting reports should examine them in conjunction with synoptic charts, in order to detect indications of significant recurring errors in reports from individual ships and bring them to the attention of the Meteorological Services of the country of registry for action. These checks should be made over periods of several days with sufficient frequency at first to reduce the errors in ships' reports, and later to prevent an undue number of errors developing.

Part 2 - Upper air observations

5. Upper air obsercations on shipboard

The regulations appertaining to upper air observations at land stations shall also apply to upper air observations at marine stations having regard to the different circumstances prevailing at sea.

* Not based on any specific Resolution or Recommendation.

GENERAL TECHNICAL REGULATIONS - PART III

TECHNICAL REGULATIONS AND RECOMMENDATIONS

MARITIME COMMISSION

METEOROLOGICAL CODES

* 4. Codes for transmission of marine weather reports and information

General. The appropriate forms of messages, symbols and specifications established by WMO Regulations shall be used for the reporting and transmissions by radio of surface and upper air observations by ships at sea, and for the transmission of weather reports and analyses to ships at sea.

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* Not based on any specific Resolution or Recommendation.

MARITIME COMMISSION

METEOROLOGICAL TELECOMMUNICATIONS

6. Weather messages for shipping

6.1. General

CD Washington 1947: 37

6.1.1. Collecting Services should transmit marine weather information and forecasts to shipping in their allotted areas. (See Map B Annex) (*)

CD Washington 1947: 43

6.1.2. Visual storm warnings and broadcasts of storm warnings and weather information for coastal shipping by R/T and low power W/T are primarily domestic matters and therefore the details of such warnings and bulletins should be established by the individual services with adherence as far as practicable to the international system for visual signals, details of which are contained in IMO publication No. 9 Fascicule IV. To obtain the maximum possible degree of uniformity, the following practices are suggested:

" 6.1.2.1. All elements specified for storm warnings to shipping on the high seas should be included in domestic warnings broadcast by R/T and W/T, the order and wording being determined by the issuing Service to suit its individual requirements. All storm warnings should be broadcast in the language of the issuing country and in English.

6.2. Content of marine broadcasts

CD Washington 1947: 45

6.2.1. Radio weather bulletins for shipping on the high seas shall consist of the following parts in the order listed:

Part I Storm warnings

Part II Synopsis of weather conditions in the forecast area

Part III Forecasts

Part IV (optional) Analysis

Part V (optional) A selection of ship reports

(*) Not reproduced here.

Part VI (optional) A selection of land reports

Part VII (optional) Additional ship reports

Part VIII (optional) Additional land reports

Part IX (optional) Upper air reports

Part X (optional) Aircraft reports.

CD Washington 1947: 45 — 6.2.2. Storm warnings shall be in plain language and as brief as possible consistent with clarity and completeness. When there are no storms in the forecast area, that fact shall be positively indicated in each bulletin.

CD Washington 1947: 45 — 6.2.3. Synopsis of weather conditions in the forecast area shall be in plain language and all positions and areas shall be given in plain language and the language of the synopsis should be as free as possible from technical phraseology. (Wind directions to be given in points of compass and not in degrees).

CD Washington 1947: 45 — 6.2.4. Forecasts shall be in plain language and all positions should be given, and areas delineated, in terms of latitude and longitude or with reference to well-known landmarks. Forecasts need only refer to areas of significant weather occurring in the forecast area of responsibility.

CD Washington 1947: 45 — 6.2.5. Analyses shall be encoded in the appropriate form established by WMO regulations and shall include essential isobars, and should include fronts and indications of future development when possible.

CD Washington 1947: 45 — 6.2.6. A selection of ship reports from the area for which the analysis is made may be included.

CD Washington 1947: 45 — 6.2.7. A selection of land reports may be included particularly from coastal areas adjacent to the area for which the analysis is made.

CD Washington 1947: 45 — 6.2.8. The remaining parts of the bulletin, when included, will be such as to enable those ships which carry meteorological staffs, to draw reasonably complete maps.

CD Washington 1947: 45 — 6.2.9. Reference to sea and swell should be made in Parts II and III as necessary (as specified in WMO Pub. 78).

CD Utrecht 1923: 29

6.3. Marine broadcast schedules

In fixing the time of issue of marine meteorological bulletins for the use of ships at sea the different Services should take into consideration the time of watchkeeping of the wireless operators in all the areas to which such bulletins apply.

CD Washington 1947: 45

6.3.1. The time of commencement of Part I shall be scheduled and be followed immediately by Parts II and III in that order.

CD Washington 1947: 45

6.3.2. The remaining parts may follow Parts I, II and III as convenient, and the optional parts IV - X inclusive, can be transmitted in any convenient order.

CD Washington 1947: 45

6.3.3. Weather bulletins should be issued not less than twice daily.

CD Washington 1947: 45

6.3.4. The first warning concerning a storm of hurricane intensity should be broadcast immediately on receipt, regardless of existing schedules.

CD Washington 1947: 45

6.4. In order to avoid confusion, major changes in the list of weather bulletins for shipping should be announced well in advance of the effective date of change. The index numbers of stations and the order in which they appear in the bulletin should be preserved as far as possible.

CD Washington 1947: 45

6.5. Parts I, II and III should be broadcast in the language of the issuing country and in English.

CD Washington 1947: 44

6.6. The following content and order of items should be adopted for all storm warnings issued on marine broadcasts by W/T for shipping on the high seas.

(a) International call (TTT)

(b) Type of warning

English	French	Spanich	Corresponding Wind Beaufort
Gale warning	Avis de coup de vent	Aviso de viento duro	Force 8-9
Storm warning	Avis de tempête	Aviso de temporal	Force 10-11
Hurricane warning or local synonym	Avis d'ouragan	Aviso de Huracan	Force 12

(c) Time of reference G.M.T.

(d) Type of disturbance (e.g. low, hurricane, etc.)

(d.1) Statement of central pressure of deep lows in mb.

(e) Location of disturbance in terms of latitude and longitude.

(f) Direction and speed of movement of disturbance.

(g) Extent of affected area (including reference to sea and swell).

(h) Force and direction of wind in various sections of affected area, wind direction to be given in points of the compass not in degrees.

(i) Further indications (Forecast).

Example of storm warning

TTT Storm warning (b) at 0000 4 August (c) a deep low (d) central pressure 980 millibars (4.1) was located at 45 north 27 west (e) moving north east at 30 kmots (f) accompanied by winds of force 8 and very rough sea and heavy swell over an area extending 400 miles from the centre and force 10 to 11 with very high sea in the northeast quadrant for a distance of 200 miles from the centre (g) and (h). This storm centre is expected to retard and turn northward with little decrease in winds during the next 24 hours (i).

MARITIME COMMISSION

METEOROLOGICAL TELECOMMUNICATIONS

9.1. Collection of reports

CD Washington 1947: 66

9.1.1. Countries requiring radio weather messages from ships shall inform the Secretary-General of the WMO and provide a list of radio stations with their call signs and wave lengths authorized to accept such reports from ships, and whether fitted with short, medium or long wave. Confirmation shall be given to the Secretary-General that no charge will be made to the ship for the receipt of such a message.

9.1.2. The Secretariat shall advise the President of CMM, and transmit such information to all Maritime Services.

CD Copenhagen 1929: 29

9.1.3. Ships shall be encouraged to exchange weather messages for the benefit of each other when in areas where shipping is sparse or where there is no regular bulletin for shipping.

CD Copenhagen 1929: 30

9.1.4. Radio weather messages from ships other than those selected for voluntary meteorological duties should, upon request, be transmitted from ship to ship and also from ship to a coastal station, in principle free of charge. Such messages may be sent in plain language or in the appropriate meteorological code in ship's use.

CD Copenhagen 1929: 27

9.1.5. Weather messages shall be transmitted to a coastal station as soon as possible after the time of observation and to secure the appropriate priority of answer by the coast station ships should include the abbreviation OBS in their call to the coast station. Special attention should be drawn to the fact that such messages take a traffic priority immediately below the traffic concerned with safe navigation, in the International Telecommunications Convention (Atlantic City, 1947).

* 9.1.6. In view of the importance to ships and to shore installations, of receiving every possible assistance in covering sparesely reported ocean areas (especially in those regions where storms develop rapidly) every effort should be made to have ships relay weather messages when communication conditions are difficult as a means of informing each other and also the responsible meteorological services of the areas concerned. (See International Convention for Safety of Life at Sea).

* Not based on any specific Resolution or Recommendation.

MARITIME COMMISSION

CLIMATOLOGICAL AND STATISTICAL SERVICES

4.1. Exchange of marine records

* 4.1.1. The meteorological services engaged with the collection of marine weather records should provide means for the ready exchange of data in agreed form according to mutual agreement between the services concerned.

CD Paris 1951: 23 4.1.2. When marine observations are recorded on punched cards the type of card used should be in the standard form for international punched cards for marine weather observations.

CD Washington 1947: 71 4.1.3. Monthly mean values of meteorological elements derived from the observations made by ocean station vessels on prescribed stations should be prepared by the respective operating meteorological services for dissemination in CLIMAT broadcasts.

6.1. Marine meteorological charts

CD Washington 1947: 28 6.1.1. Every maritime chart for meteorological purposes should have printed on its face the name of the projection and the scale at the standard parallels $22\frac{1}{2}^{\circ}$, 30° or 60° (both 30° and 60° in the case of the conic projection in the northern hemisphere and 10° and 40° in the southern hemisphere), and the scales or conversion factors for different latitudes.

CMM Toronto 1947: LIV 6.1.2. The Mercator's projection should be freely employed for the benefit of the users of maritime climatological atlases.

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* Not based on any specific Resolution or Recommendation.