WORLD METEOROLOGICAL ORGANIZATION

MANUAL ON MARINE METEOROLOGICAL SERVICES

Volume I

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AMENDMENT

Part I Bis — In pages I bis-9 (Unscheduled Broadcasts, third line), I bis-15 (Note to paragraph 1.3.1) and I bis-17 (Annex *4b,* paragraph 3, C^—Message priority, first line), amend the words "tropical cyclone warnings" to read "urgent warnings (Beaufort force 12 and above)".

PLEASE NOTE THAT THIS PUBLICATION IS GOING TO BE UPDATED BY END OF 2010.

WORLD METEOROLOGICAL ORGANIZATION

MANUAL ON MARINE METEOROLOGICAL SERVICES

VOLUME I

(Annex VI to the WMO Technical Regulations)

GLOBAL ASPECTS

OMM-№ 558

Secretariat of the World Meteorological Organization - Geneva - Switzerland
1990

EDITORIAL NOTE

The following typographical practice has been followed:

Standard meteorological practices and procedures have been printed **in semi-bold roman.**

Recommended meteorological practices and procedures have been printed in light-face roman. *Notes* have been printed in smaller type, light-face roman, preceded by the indication: NOTE.

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INTRODUCTION

General

1. The *Manual on Marine Meteorological Services* is issued in accordance with a decision of Eighth Congress.

2. This *Manual* is designed:

(я) To facilitate co-operation in respect of the international co-ordination of marine meteorological services (MMS);

(b) To specify obligations of Members in the implementation of marine meteorological services;

(c) To ensure uniformity in the practices and procedures employed in achieving (я) and *(b)* above;

(d) To facilitate the development of adequate support from WWW to marine meteorological services.

3. The *Manual* is composed of Volumes I and II, dealing with global aspects and regional aspects respectively. Volume I is composed of four parts which contain the regulatory material dealing essentially with international obligations of Members in providing marine meteorological services for the high seas, coastal and off-shore areas, harbour approaches and ports. Additional obligations, if any, for national marine activities should be met according to local practices and procedures.

4. The regulatory material stems from recommendations of the Commission for Marine Meteorology (CMM) and resolutions of regional associations as wetll as from decisions taken by Congress and the Executive Council.

5. Volume I of the *Manual* - Global Aspects - forms part of the the *Technical Regulations* and is referred to as Annex VI to the *Technical Regulations.*

6. Volume II of the *Manual* - Regional Aspects - does not form part of the *Technical Regulations.*

Types of regulation

7. Volume I of the *Manual* comprises both standard practices and recommended practices and procedures. The definitions of these two types of practice in the *Manual* are as follows.

7.1 The *standard* practices and procedures:

(я) Shall be the practices and procedures which it is necessary that Members follow or implement; and therefore

(b) Shall have the status of requirements in a technical resolution in respect of which Article *9(b)* of the Convention is applicable; and

(c) Shall invariably be distinguished by the use of the term "shall" in the English text, and by suitable equivalent terms in the French, Russian and Spanish texts.

7.2 The *recommended* practices and procedures:

(я) Shall be the practices and procedures which it is desirable that Members follow or implement; and therefore

(b) Shall have the status of recommendations to Members to which Article *9(b)* of the Convention shall not be applied; and

(c) Shall be distinguished by the use of the term "should" in the English text (except where specifically otherwise provided by decision of Congress) and by suitable equivalent terms in the French, Russian and Spanish texts.

8. In accordance with the above definitions, Members shall do their utmost to implement the stan dard practices and procedures. In accordance with Article *9(b)* of the Convention and in conformity with the provision of Regulation 124 of the *General Regulations,* Members shall formally notify the Secretary-General, in writing, of their intention to apply the "standard practices and procedures" of the *Manual,*

except those for which they have lodged specific deviation. Members shall also inform the Secretary-General, at least three months in advance, of any change in the degree of their implementation of a "standard practice or procedure" as previously notified and of the effective date of the change.

9. With regard to recommended practices and procedures, Members are urged to comply with these, but it is not necessary to notify the Secretary-General of non-observance.

10. In order to clarify the status of the various regulatory material, the standard practices and procedures are distinguished from the recommended practices and procedures by a difference in typographical practice, as indicated in the editorial note.

Notes and appendices

11. Certain notes are included in the *Manual* for explanatory purposes. They do not have the status of the annexes to the *Technical Regulations.*

12. Texts which are appended to the *Manual* are called "appendices" and have the same status as the procedures to which they refer.

13. The words "shall" and "should" in the appendices, notes and Volume II have their dictionary meanings and do not have the regulatory character mentioned in paragraph 7 above.

PURPOSE, PRINCIPLES AND ORGANIZATION OF MARINE METEOROLOGICAL SERVICES

1. PURPOSE

The purpose of marine meteorological services (MMS) shall be to make available to marine users at sea or on the coast marine meteorological and related geophysical information which they require, to the extent technically possible.

2. PRINCIPLES

The principles of marine meteorological services are as follows:

Principle 1

Marine meteorological services are provided to satisfy the requirements for information on marine environmental conditions and phenomena, established by national practices and international conventions in relation to marine operations.

Principle 2

Marine meteorological services are designed for the safety of marine operations and to promote, where possible, the efficiency and economy of marine activities.

Principle 3

Marine meteorological services include guidance on the use and interpretation of meteorological and related océanographie information.

Principle 4

Marine meteorological services include assistance to and guidance for marine users in the provision of observational data of a high standard in order to permit an equally high standard of services.

3. ORGANIZATION

3.1 Marine meteorological services shall be so organized as to provide, to the extent possible, shipping, fishing and other marine activities with the meteorological and related océanographie information (warnings, forecasts, charts, expert advice, climatological data) required for the safe conduct and high efficiency of operations, utilizing adequate modes of dissemination, and to perform functions with regard to guidance and training in a coherent manner.

3.2 Marine meteorological services shall comprise the following main components:

(a) Services for the high seas;

(b) Services for coastal and off-shore areas;

(c) Services for main ports and harbour areas;

(d) Training in marine meteorology.

NOTES: (1) In this context, the term "high seas" applies to open ocean or sea areas for which Members have accepted the responsibility for issuing Group A weather and sea bulletins, governed by the procedures under paragraph 2.2 in Part I of this *Manual.*

(2) In this context, the term "coastal and off-shore areas" applies to areas for which Members issue Group B weather and sea bulletins, governed by the procedures under paragraph 2.2 in Part II of this *Manual.*

(3) In this context, the term "main ports and harbour areas" applies to areas for which Members issue port weather and sea bulletins, governed by the procedures under paragraph 2.2 in Part III of this *Manual*

PART I

(Refer also to Part I bis after Appendix I.17, which operates in parallel with Part I until final version on 1 February 1999)

SERVICES FOR THE HIGH SEAS

1. GENERAL

Marine meteorological services for the high seas shall include:

(a) Provision of weather and sea bulletins;

(b) Marine meteorological support for maritime search and rescue;

(c) Provision of information by radio-facsimile;

(d) Marine Climatological Summaries Scheme;

(e) Provision of special marine climatological information;

(f) Provision of marine meteorological information and expert advice.

2. PROVISION OF WEATHER AND SEA BULLETINS

2.1 Principles

The principles for the provision of weather and sea bulletins are as follows:

Principle 1

For the purpose of the regular issue of weather and sea bulletins, the oceans and seas are divided into areas for which Members assume responsibility.

Principle 2

The areas of responsibility together provide complete coverage of oceans and seas by meteorological information contained in weather and sea bulletins for the high seas.

Principle 3

The overlap of areas of responsibility is permissible.

Principle 4

The provision of weather and sea bulletins for areas of responsibility is co-ordinated in accordance with the procedures mentioned hereafter.

Principle 5

The efficiency and effectiveness of the provision of weather and sea bulletins are monitored by obtaining opinions and reports from marine users.

2.2 Procedures

2.2.1 *Areas of responsibility*

2.2.1.1 Areas of responsibility for the issue of weather and sea bulletins for the high seas (called Group A bulletins) shall be as given in Appendix I.1.

NOTE: The areas of responsibility given in Appendix I.1 are reviewed by the Commission for Marine Meteorology to ensure complete area coverage and adequacy of services.

2.2.1.2 Any amendments to the area of responsibility, or proposal for the introduction of new areas of responsibility, shall have the approval of the Executive Council based on a recommendation by the Commission for Marine Meteorology.

2.2.1.2.1 Before drawing up any recommendation on the proposed amendment for submission to the Executive Council, the Commission for Marine Meteorology shall receive the comments of the Members directly concerned with the proposed amendment as well as the comments of the president(s) of the regional association(s) concerned.

NOTE: All correspondence relating to areas of responsibility is addressed to the Secretary-General.

2.2.1.3 Whenever a Member responsible for the issue of weather and sea bulletins for a given area is no longer able to provide this service, the Member should inform the Secretary-General at least six months in advance.

2.2.2 *Issue of weather and sea bulletins for the high seas*

2.2.2:1 Weather and sea bulletins for the high seas shall include, in the order given hereafter:

Part I - Storm warnings;

Part II - Synopsis of major features of the surface weather chart and, to the extent possible, significant characteristics of corresponding sea-surface conditions;

Part III - Forecasts.

2.2.2.2 Weather and sea bulletins for the high seas should, in addition, include the following parts:

Part IV - Analyses and/or prognoses in IAC FLEET code form;

Part V - Selection of reports from sea stations; Part

VI - Selection of reports from land stations.

NOTES: (1) The reports included in Part VI should be for a fixed selection of stations in a fixed order.

(2) Parts IV, V and VI may be issued separately.

2.2.2.3 Major changes in form and content of warnings, synopses and forecasts should be announced at least six months prior to the effective date of the change.

2.2.2.4 Information on broadcast schedules and contents of bulletins shall be conveyed to the WMO Secretariat for inclusion in WMO Publication No. 9, Volume D - Information for shipping.

2.2.2.5 For areas for which more than one Member has assumed responsibility, a common system of indicating forecast areas should be evolved by the Members concerned.

2.2.2.6 The basic meteorological information used for weather and sea bulletins relating to adjacent or overlapping areas of responsibility should be co-ordinated.

2.2.2.7 Weather and sea bulletins shall be issued by radio at least twice daily.

2.2.2.7.1 In fixing the time of broadcast of weather and sea bulletins, Members shall take into consideration the watch-keeping periods of the radio operators in all the areas to which these bulletins apply, as well as the transmission times of weather reports by ships.

2.2.2.7.2 In arranging the times of broadcast of weather and sea bulletins, Members should co-ordinate these with adjacent areas in order to stagger transmission times.

2.2.2.7.3 The transmission of Part I of the weather and sea bulletin shall commence at a scheduled time and be followed immediately by Part II and then Part III.

2.2.2.8 Warnings, synopses and forecasts shall be given in plain language.

2.2.2.8.1 Warnings, synopses and forecasts should be broadcast in the language of the issuing Member and in English.

2.2.2.8.2 Where bulletins are being transmitted by radiotelegraph)' and English cannot be used, the **MAFOR** code form shall be used as a substitute for the forecast in English.

2.2.2.8.3 The language of the synopsis should be as free as possible from technical phraseology.

2.2.2.8.4 The terminology in weather and sea bulletins should be in accordance with the "Multilingual list of terms used in weather and sea bulletins".

NOTE: The "Multilingual list of terms used in weather and sea bulletins" is given in Annex I-2.A of the *Guide to Marine Meteorological Services* (WMO-No. 471) and in Appendix I2 hereto.

2.2.2.9 INDICATION OF WIND

2.2.2.9.1 Wind direction shall be given in points of the compass and not in degrees.

2.2.2.9.2 Wind force should be given in Beaufort notation or wind speed in metres per second or in knots. If metres per second or knots are used, the words "metres per second" or "knots" shall be included in the text of the message.

NOTE: The criteria of the Beaufort notation of wind force are given in Appendix I.3.

2.2.3 *Warnings*

2.2.3.1 Warnings shall be given for gales (Beaufort force 8 or 9) and storms (Beaufort force 10 or over), and for tropical cyclones (hurricanes in the North Atlantic and eastern North Pacific, typhoons in the Western Pacific, cyclones in the Indian Ocean and cyclones of similar nature in other regions).

NOTE: Definition of a tropical cyclone is contained in the *International Meteorological Vocabulary* (WMO-No. 182) and classification of tropical cyclones is left to the Regions concerned.

2.2.3.2 The issue of warnings for near gales (Beaufort force 7) should be an optional service.

2.2.3.3 Warnings for gales, storms and tropical cyclones should have the following content and order of items:

(a) Type of warning;

(b) Date and time of reference in UTC;

(c) Type of disturbance (e.g. low, hurricane, etc.) with a statement of central pressure in hectopascals;

(d) Location of disturbance in terms of latitude and longitude or with reference to well-known landmarks;

(e) Direction and speed of movement of disturbances;

(f) Extent of affected area;

(g) Wind speed or force and direction in the affected areas;

(h) Sea and swell conditions in the affected area;

(i) Other appropriate information such as future positions of disturbances.

2.2.3.3.1 Items (a), *(b)*, *(d)*, (i) and *(g)* listed under 2.2.3.3 shall always be included in the warnings.

2.2.3.4 In addition to indicating the positions of pressure disturbances in terms of latitude and longi tude, or with reference to well-known landmarks, the boundaries of the existing and forecast storm-wind area or areas of high waves should be indicated.

NOTE: The usual practice in warnings is to indicate boundaries with reference to the centre of the pressure disturbance, or to divide the disturbance (low, tropical cyclone) into sectors for which prevailing and forecast conditions are described.

2.2.3.4.1 When warnings are included for more than one pressure disturbance or system, the systems should be described in a descending order of threat.

2.2.3.4.2 Warnings shall be as brief as possible and, at the same time, clear and complete.

2.2.3.5 The time of the last location of each tropical cyclone or extra-tropical storm shall be indicated in the warning.

2.2.3.6 A warning shall be issued immediately the need becomes apparent.

2.2.3.6.1 When no warnings for gales, storms or tropical cyclones are to be issued, that fact shall be positively stated in Part I of each weather and sea bulletin.

2.2.3.6.2 Warnings shall be updated whenever necessary and then issued immediately.

2.2.4 *Synopses*

2.2.4.1 The synopses given in Part II of weather and sea bulletins shall have the following content and order of items:

(a) Date and time of reference in UTC;

(b) Synopsis of major features of the surface weather chart;

(c) Direction and speed of movement of significant pressure systems and tropical disturbances.

2.2.4.1.1 Significant characteristics of corresponding wave conditions (sea and swell) should be included in the synopsis whenever this information is available, as well as characteristics of other sea-surface conditions (drifting ice, currents, etc.) if feasible and significant.

2.2.4.2 Significant low-pressure systems and tropical disturbances which affect or are expected to affect the area within or near to the valid period of the forecast should be described; the central pressure and/or intensity, location, movement and changes of intensity should be given for each system; significant fronts, high-pressure centres, troughs and ridges should be included whenever this helps to clarify the weather situation.

2.2.4.3 Direction and speed of movement of significant pressure systems and tropical disturbances should be indicated in compass points and metres per second or knots respectively.

2.2.4.3.1 Units used for speed of movement of systems shall be indicated.

2.2.5 *Forecasts*

2.2.5.1 The forecasts given in Part III of weather and sea bulletins shall have the following content and order of items:

(a) The valid period of forecast;

(b) Name or designation of forecast area(s);

(c) A description of:

(i) Wind speed or force and direction;

(ii) Visibility when forecast is less than six nautical miles (ten kilometres);

(iii) Ice accretion, where applicable;

(iv) Waves (sea and swell).

2.2.5.1.1 The forecasts should include expected significant changes during the forecast period, significant meteors such as freezing precipitation, snowfall or rainfall, and an outlook for a period beyond that normally covered by the forecast.

2.2.5.2 The valid period shall be indicated either in terms of number of hours from the time of issue of the forecast or in terms of dates and times in UTC of the beginning and end of the period.

2.2.5.3 Visibility should be indicated in nautical miles or kilometres or given in descriptive terms.

2.2.5.3.1 Units used for visibility shall be indicated.

2.2.6 *Analyses and prognoses in* IAC FLEET *code form*

A description of pressure systems and tropical disturbances, fronts, waves and sea-surface temperatures at specified times should be included in the bulletins in the IAC FLEET code form, so as to permit the preparation of contours on surface weather charts.

2.2.7 *Selection of reports from sea stations*

2.2.7.1 When included in weather and sea bulletins for the high seas, reports from ships and other sea stations should be selected to give a reasonable geographical distribution, taking into account the important synoptic features.

2.2.7.2 The information should include the position of ships and other sea stations, time of observation, wind, visibility, atmospheric pressure and, if possible, cloudiness, present and past weather, air and sea-surface temperatures and waves.

2.2.8 ***Selection of reports from land stations***

2.2.8.1 Reports included should be for selected land stations in a fixed order.

2.2.8.2 The reports should include the same elements as those listed in 2.2.7.2 where applicable.

2.2.9 ***Issue of sea-ice information***

Sea-ice terminology shall be in accordance with the *WMO Sea-Ice Nomenclature* (WMO-No. 259).

3. MARINE METEOROLOGICAL SUPPORT FOR MARITIME SEARCH AND RESCUE

3.1 Principles

The principle for marine meteorological support for maritime search and rescue (SAR) is as follows:

Principle

For the purpose of maritime search and rescue (SAR), a meteorological forecast centre may serve more than one Rescue Co-ordination Centre (RCC); likewise, an RCC may make requests for information from more than one meteorological forecast centre depending on the nature of the maritime SAR operation.

3.2 Procedures

3.2.1 Marine meteorological services for maritime **SAR shall be provided in accordance** with **the national overall co-ordination procedures for SAR and taking into account the international recommendations and the requirements in force.**

NOTES: (1) Requirements for SAR services including meteorology are contained in the ICAO Regional Air Navigation Plans.

(2) Additional requirements for maritime SAR services are contained in the IMO *Search and Rescue Manual.*

3.2.1.1 Requests from Rescue Co-ordination Centres (RCCs) shall be dealt with as expeditiously as possible and shall be given highest priority when an SAR operation is in progress.

3.2.1.2 On receiving formal notification from an RCC that a ship or aircraft or survival craft thereof is in distress, every effort shall be made to meet the requirements of the RCC.

3.2.2 Information on the following parameters and phenomena, as may be requested by or be of value **to an RCC, should be provided:**

(a) Atmospheric pressure;

(b) **Surface winds;**

(c) **Sea and swell;**

(d) **Surface visibility;**

(e) Ice accretion;

(f) Sea ice;

(g) **Icebergs;**

(h) Precipitation and cloud cover, including height of cloud base;

(i) Air temperature;

(j) **Humidity;**

(k) Sea-surface temperature;

(l) Surface currents;

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(m) Tidal current deviation;

(ri) Bar conditions;

(o) Surf and breakers;

(p) Storm surge;

(q) Water discolouration.

NOTES: (1) Special weather forecasts covering periods of up to 24 hours and possibly beyond may be required for maritime SAR operations on a continental shelf and slightly beyond. Ships of all sizes, helicopters and fixed-wing aircraft may be involved in these operations.

(2) Medium-range forecasts may he required in the event of SAR operations taking place over large ocean areas where ocean-going ships and fixed-wing aircraft may be involved for considerable periods of time and possibly searching for relatively small objects on the sea surface.

(3) Some of the information to be provided may be the responsibility of more than one authority and should be co-ordinated nationally.

3.2.3 Notification of SAR operations and all subsequent communications between the RCC and the weather forecast centre should be by telephone, telex or other medium designed for rapid transmission or /
reception.

3.2.3.1 When communicating with RCCs or when providing weather forecasts, the terminology should be similar to that used in weather bulletins and warnings to shipping.

3.2.3.2 Л permanent record of all communications should be maintained, showing the times of origin, transmission and reception of the information provided.

3.2.3.3 Weather forecast centres should not attempt to communicate directly, or through coastal radio stations, with ships or aircraft involved in the SAR operation unless specifically requested by the RCC.

3.2.4 Members should encourage ships operating under their national flag, when taking part in any medium- or long-term SAR operation or in the vicinity of a SAR operation but not necessarily participating, to make weather observations at main and intermediate standard times for surface synoptic observations and to transmit them, in the international SHIP code form or plain language, immediately to the appropriate coastal radio station for onward transmission.

4. PROVISION OF INFORMATION BY RADIO-FACSIMILE

4.1 Principles

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The principle for the provision of information by radio-facsimile is as follows:

Principle

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

4.2 Procedures

4.2.1 ***Types of chart***

Radio-facsimile charts likely to be of use to marine users are:

(a)Surface-weather analyses;

(b) Surface-weather prognoses;

(c) Surface wind-field analyses;

(d) Wave analyses;

(e) Wave prognoses;

(f) Sea-surface temperature analyses;

(g) Sea-surface temperature prognoses;

(h) Sea-ice information;

(i) Significant weather depiction;

(j) Upper-air analyses;

(k) Upper-air prognoses.

4.2.2 ***Projections and scales***

Charts intended for radio-facsimile transmission should be prepared with projections and scales prescribed as follows.

4.2.2.1 The following projections should be used as appropriate :

(a) The stereographic projection on a plane cutting the sphere at the standard parallel of latitude 60°;

(b) Lambert's conformal conic projection, the cone cutting the sphere at the standard parallels of latitude 10° and 40° or 30° and 60°;

(c) Mercator's projection true at latitude 22.5°.

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

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

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

4.2.3 ***Preparation of original chart***

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

(a The minimum line thickness should be sufficiently large to ensure clear reproduction;

(b) Lines which are required to be reproduced uniformly should be of uniform width and intensity;

(c) Special marking in heavy print (two or three crosses) of intersections of latitude and longitude lines will facilitate the use of facsimile charts during periods of poor reception;

(d) The minimum separations of detail in letters, figures, symbols, etc. should be sufficient to avoid filling-in of the spaces in the reproduction;

(e) Letters, figures, symbols, etc. should be drawn as simply as possible;

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

4.2.4 ***Legends of charts***

Each chart prepared for facsimile transmission should bear a bold legend including: (a)

Name of issuing Meteorological Forecast Centre in plain language;

(b) Type of chart;

(c) The date and time to which the data refer or, in the case of forecast charts, the time to which the forecast is applicable;

(d) Projection transmitted;

(e) Unit of wind speed;

(f) Special symbols or isopleths.

4.2.5 ***Symbols used on charts***

The symbols used for pictorial representation of observational data, analyses and forecasts are those given in Appendix I.4. While individual countries may use other symbols, particularly for specialized depictions, these should not conflict with those given in Appendix I.4.

4.2.6 ***Model S - surface - charts***

Isobars should be drawn as continuous lines labelled in hectopascals. Centres of high and low pressure, fronts, convergence zones and significant weather phenomena should be marked using symbols from the *Manual on the GDPS* and from Appendix I.4 hereto. Pressure centres on analysis charts should be marked with an open arrow showing the direction of the expected movement of the centre with a figure indicating mean speed of movement in knots.

4.2.7 ***Model W- wave - charts***

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

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

4.2.8 ***Model SST - sea-surface temperature - charts***

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

4.2.9 ***Model SI - sea-ice information - charts***

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

4.2.10 ***Transmission schedules***

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

4.2.11 ***Notification of WMO***

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

5. MARINE CLIMATOLOGICAL SUMMARIES SCHEME

NOTE: The international arrangements regarding the Marine Climatological Summaries Scheme are based on Resolution 35 (Cg-IV), Recommendation 36 (68-CMM), Recommendation 6 (CMM-VI), Recommendation 15 (CMM-VII), Recommendation 35 (79-CMM), Recommendation 6 (CMM-VIII), Recommendation 8 (CMM-VIII), Recommendation 12 (CMM-X) and Recommendation 11 (CMM-XI).

5.1 Principles

The principles of the Marine Climatological Summaries Scheme are as follows:

Principle 1

The oceans and seas are divided into eight areas of responsibility for the purpose of preparing the marine climatological summaries and with a view to continued international co-operation regarding the collection, archiving and exchange of marine data.

Principle 2

Members having assumed responsibility for the respective areas as shown in Appendix I.5 — hereinafter called responsible Members — prepare climatological summaries for their area of responsibility. The preferred method of producing summaries is the chart form. However, Members may prepare, without cost to the World Meteorological Organization, climatological summaries in tabular form for selected representative areas. The tabular form of the summaries is to be used for fixed ship stations. The procedures are specified in paragraph 5.3.

Principle 3

Two responsible Members operate global collecting centres as shown in Appendix I.6. Members operating fixed ship stations or selected, supplementary and auxiliary ship stations make available all surface observations from these stations to both global collecting centres in accordance with the procedures specified in the agreed plan. The cost of this work is borne by the Member operating the ship stations.

Principle 4

Global collecting centres ensure that minimum quality control has been applied to the data, and exchange the data collected with each other, to ensure that both have a complete data set. Global collecting centres ensure that one copy of the global (update) data is sent quarterly to those responsible Members which wish to maintain a global data set — otherwise a data set for their area of responsibility is sent to the remaining responsible Members. The cost of this work is borne by the Members operating the global collecting centres.

Principle S

Responsible Members make available, on request, copies of marine climatological data on magnetic tape in the agreed international exchange format (IMMT). The Member making the request may be asked to bear the cost of copying the data. Other formats may be agreed between the requesting Member and the responsible Member provided that the requesting Member undertakes to bear the additional expenditure involved.

5.2 Areas of responsibility

Each responsible Member shall prepare climatological summaries of observations made after 1960 in accordance with the agreed plan (Appendix I.8), in chart form for its area of responsibility, in tabular form for a number of selected representative areas in its area of responsibility, or in tabular form for a number of fixed ship stations within its area and for fixed ship stations operated solely by the responsible Member in the area of another responsible Member.

5.2.1 *Boundaries of areas of responsibility*

5.2.1.1 The areas of responsibility shall be as given in Appendix I.5.

5.2.1.2 Examination of the boundaries of areas of responsibility with a view to making recommendations for adjustment shall be the responsibility of the Commission for Marine Meteorology (CMM). Such adjustments may become necessary if other Members wish to become responsible Members. Alternatively, existing responsible Members may find that it is necessary to adjust boundaries.

5.2.1.3 Adjustments of boundaries of areas of responsibility should be kept to a minimum.

5.2.2 *Polar and extra-polar regions*

For the purpose of marine climatological summaries, polar regions are defined as extending poleward from latitudes 60°N and 50°S, respectively.

5.2.3 *Selected representative areas*

NOTE: This section applies only if the tabular form of summaries is produced.

5.2.3.1 Each responsible Member shall propose a number of selected representative areas from within its assigned area of responsibility. These areas should be chosen to achieve a good density of data or because of other requirements, such as climatic gradients and related factors.

5.2.3.2 Responsible Members shall submit the list of areas selected to the president of CMM who will ensure that the final choice of the selected representative areas, proposed by the responsible Members, provides a reasonable distribution throughout all areas of responsibility.

5.2.3.3 The indices system, which is given in Appendix I.7 shall be used to code the extent and location of the selected representative areas.

5.2.3.4 The selected representative areas shall remain fixed in their size, shape and position for as many years as possible.

NOTE: The recommended maximum size of a selected area in polar regions is 50 one-degree squares.

5.2.3.5 A map (or maps) showing the distribution of the selected representative areas in each area of responsibility shall be included in the summaries for that area.

5.2.4 *Fixed **ship station area/ocean island stations/moored** buoys **and fixed platforms***

5.2.4.1 The "on station" area should be defined for each fixed station. This area should consist of the smallest number of adjacent one-degree squares, centred on the nominal fixed position, which contain at least 95 per cent of the observations from the fixed station.

5.2.4.2 It should be left to the discretion of the responsible Members to publish data from ocean island stations located in data-sparse areas as supplements to the marine climatological summaries. The island data summaries should not be combined with summaries of ocean data and a warning to this effect must be included in the supplements. Data from ocean island stations should be published in the same form as for fixed ship stations.

5.3 Procedures for preparing marine climatological summaries

5.3.1 *General plan*

The plan for the production of marine climatological summaries is shown in Appendix I.8.

5.3.2 *Layout of marine climatológica! summaries*

5.3.2.1 CHART FORM

The layout of the marine climatological summary in chart form is given in Appendix I.9.

5.3.2.2 TABULAR FORM

The parameters to be included in the tabular form of marine climatological summaries are given in Appendices I.10, III and I.12.

5.3.3 *Period of marine climatological summaries*

5.3.3.1 ANNUAL SUMMARIES

The routine publication of annual summaries ceased in 1981 (Recommendation 6 (CMM-VIII)). However, annual climatological summaries may be published by the responsible Members on an optional basis, preferably in chart form. The processing of data shall be continued so that the original observations will be readily available upon request.

5.3.3.2 DECADAL SUMMARIES

Decadal climatological summaries shall be prepared for the periods 1961-70, 1971-80, 1981-90.

5.4 Minimum number of observations for the preparation of the marine climatological summaries

5.4.1 *General*

All available data shall be used in the preparation of annual and decadal summaries.

5.4.2 ***Annual summaries***

5.4.2.1 The annual mean for any unit area or selected representative area should not be calculated if there are less than 10 observations from the area in any individual month.

5.4.2.2 Statistics for chart areas and frequency tables should not be prepared if there are less than 10 observations from a unit area of a chart or selected representative area or tabulation in any individual month.

5.4.2.3 For tabular summaries, the data should be listed if there are less than 40 observations from a selected representative area in any individual month and those observations have been made on less than 10 different days of the month.

5.4.2.4 For tabular summaries, the data should be summarized if there are less than 40 observations from a selected representative area in any individual month and those observations have been made on 10 or more different days of the month.

5.4.2.5 The data should be summarized in charts or tabulations if there are less than 40 observations from a selected representative area in any individual month.

5.4.3 ***Decadal summaries***

5.4.3.1 Summaries are prepared for decadal periods and not for individual years if there are less than 40 observations from a selected representative area in any individual month.

5.4.3.2 In preparing a climatological summary for a decade or longer period, the summary for each month should be prepared by combining all available observations from that particular months for all years during the period of the summary.

5.4.3.3 It must be clearly stated in the text of the summary when data are summarized, which are known to be irregularly distributed over the 10-year period.

5.5 **Parameters to be included in, and form of, the marine climatological summaries**

5.5.1 ***Fixed ship stations***

Annual and decadal summaries for fixed ship stations shall be produced in tabular form and shall contain the parameters listed in Appendix I.10.

5.5.2 ***Polar and extra-polar regions***

5.5.2.1 ANNUAL SUMMARIES

Data for annual summaries shall be prepared either in a format suitable for publication of charts or alternatively in a format suitable for publication of tables. The type of output required in any individual year is specified in Appendix I.8.

5.5.2.2 DECADAL SUMMARIES

Decadal summaries shall be published either in chart form (preferred) or in tabular form as also indicated in Appendix I.8.

5.5.2.3 CHART FORM

Parameters to be included in the summaries which are produced in chart form are listed in Appendix I.9.

5.5.2.4 TABULAR FORM

Parameters to be included in the summaries are listed In Appendices I.10,I.11 and I.12.

5.5.3 ***Inventory of marine climatological summaries***

During the first quarter of each year, responsible Members shall send a list of marine climatological summaries which have been produced during the previous year to the Secretary-General.

5.6 **Marine climatological data**

5.6.1 ***Collection and exchange of data***

5.6.1.1 Members operating fixed ship stations or selected, supplementary and auxiliary ship stations should transfer ail surface observations from these stations onto magnetic tape. It is recommended that the data be arranged in the

agreed format of the International Maritime Meteorological Tape (IMMT) as described in Appendix I.13. The data should be dispatched to both global collecting centres at three-monthly intervals.

5.6.1.2 The Member originating the data should notify the global collecting centres of the dispatch of the quarterly collection of data. The notification should contain details of the order in which the records are sorted.

5.6.1.3 Members may use the alternative format for maritime meteorological tapes which is given in Appendix I.14. Any alternative format must only be used by mutual agreement between the two Members which are exchanging data.

5.6.1.4 Members should ensure that magnetic tapes are 9-track and written at a density of 1600 or 6250 bpi. The tapes should be unlabelled and written in EBCDIC or ASCII with blocking factor 10.

5.6.1.5 The responsible Member should indicate clearly, in the summary, the extent to which auxiliary ship data have been used.

5.6.2 ***Inventory of marine climatological data***

Global collection centres shall keep an inventory of all marine climatological data received from Members.

5.6.3 ***Quality control of data***

5.6.3.1 All Members should make every effort to apply the minimum quality control procedures in Appendix I.15 before dispatching the data to the global collecting centres. These centres should ensure that this minimum quality control has been applied before making the data available to responsible Members.

5.6.3.2 Quality control of marine data by Members and responsible Members should be continued and improved. Details of national quality control schemes should be made available to responsible Members.

5.6.4 ***Period before 1961***

5.6.4.1 The Historical Sea Surface Temperature Data (HSSTD) project provides for the collection and summarizing of marine climatological data for the period 1861 to 1960. The participants in the HSSTD project have agreed to exchange any additional digitized historical data as they become available.

5.6.4.2 Members having historical data, which are not yet included in the HSSTD project, should send those data to the appropriate participating Member. The data should be converted into the international exchange format (IMMT), or a mutually agreed format, before dispatch to the participating Member. The cost of conversion should be borne by the Member supplying the data.

6. SPECIAL MARINE CLIMATOLOGICAL INFORMATION

6.1 Principles

The principles for collection, storage and processing of special marine climatological information are as follows:

Principle 1

International co-operative arrangements for the collection of special observations from mobile ship stations, i.e. other than those which comprise the Marine Climatological Summaries Scheme, as well as for their storage and eventual processing, include the designation of preferably one international centre suitably equipped for marine data storage and retrieval functions.

Principle 2

In order to ensure the combined use of stored ocean data obtained from special observations at mobile ship stations on the one hand and similar data obtained from measurements at océanographie stations on the other, arrangements for the ultimate archiving of relevant data include the World Data Centres for Oceanography.

6.2 Procedures

6.2.1 ***Reports of freak waves***

NOTES: (1) A freak wave may be defined as a wave of very considerable height ahead of which there is a deep trough. Thus, it is the unusual steepness of the wave which is its outstanding feature and which makes it dangerous to

shipping. Reports so far available suggest that such waves have usually occurred where a strong current flows in the opposite direction to a heavy sea and especially when this occurs near the edge of the continental shelf.

(2) International procedures are based on Recommendation 22 (75-CMM).

6.2.1.1 Members operating fixed ship stations or selected, supplementary and auxiliary ship stations should encourage marine observers to enter in meteorological log-books detailed information on freak waves, including a full description of the phenomenon (indicating height and horizontal distance between crest and trough, if possible), weather conditions, state of the sea and any other factors which may have influenced the state of the sea, as well as any damage sustained by the ship.

NOTE: A layout of a freak-wave report is contained in Annex II-1.B to the *Guide to Marine Meteorological Services* (WMO-No. 471).

6.2.1.2 When received, freak-wave reports should be sent to the Member which has assumed the responsibility for accepting reports from Members on freak waves, for publishing reports of special interest and for analysing the data in due time and publishing the results.

7. PROVISION OF MARINE METEOROLOGICAL INFORMATION AND EXPERT ADVICE

7.1 Principle

7.1.1 The principle for the provision of marine meteorological information and expert advice is as follows:

Principle

One of the important purposes for which marine meteorological data are preserved is their use in special applications in activities such as engineering design studies, planning of marine operations, expertise in insurance claims or official investigations regarding marine accidents, cargo ventilation studies, etc.

7.2 Procedures

7.2.1 The provision of marine meteorological and related océanographic information and expert advice on the use and interpretation of data should be arranged according to national practices.

7.2.2 Marine meteorological data should be preserved by Members in a form which renders these data easily accessible for use in applications requiring expert advice.

7.2.3 Members should assist each other in questions requiring marine meteorological expert advice by providing, as far as possible, the requested information in a convenient form.

7.2.4 Supply of marine meteorological data for special application purposes should be governed by the provisions on exchanges of climatological data contained in Chapter [B.1.]3 of Volume I of the WMO *Technical Regulations* (WMO-No. 49).

APPENDIX I.1

(See paragraph 2.2.1.1)

OCEAN AND SEA AREAS OF RESPONSIBILITY FOR THE ISSUE OF WEATHER AND SEA BULLETINS FOR THE HIGH SEAS (GROUP A)

NOTE: Л map showing the areas of responsibility for the issue of weather and sea bulletins is attached.

REGION I - AFRICA

Country	Area of responsibility
Angola	The area in the South Atlantic enclosed by the Greenwich meridian, 18°S and the African coast Réf.: Rec. 1 (V-RA I), Res. 26 (EC-XXII)
Egypt	The Eastern Mediterranean south of 34°N and east of 20°E. The Red Sea north of 23°N Réf.: Rec. 1 (V-RA I), Res. 26 (EC-XXII)
France	The Western Mediterranean Sea Réf.: Rec. I (V-RA I), Res. 26 (EC-XXII)
France (New Amsterdam Island)	Sea areas south of 30°S and between 60°E and 90°E, overlapping with the areas of Australia and South Africa Réf.: Rcc. 1 (V-RA I), Res. 26 (EC-XXII)
Kenya	Sea areas from 12°N to 11 °S between the African coast and 60°E NOTE: The area from 12"N to 10°N! is an overlapping area between Democratic Yemen and Kenya. Réf.: Rec. 1 (V-RA I), Res. 26 (EC-XXII)
Madagascar	Sea areas from 10°S to 30°S between the African coast and 60°E, and from 5°S to 30"S between 60°E and 70°E Réf.: Rcc. 1 (V-RA I), Res. 26 (EC-XXII)
Mauritius	Sea areas from 10°S to 30°S between 50°E and 60°E, and from the Equator to 30°S between 60°E and 90°E Réf.: Rec. 1 (V-RA I), Res. 26 (EC-XXII), paragraph 3.2.3 of the general summary of EC-XXXIV, Rcc. 1 (VIII-RA V), Res. 2 (EC-XXXV), paragraph 6.3.2G of the general summary of EC-XXXVI
Morocco	North Atlantic waters from 40°N to 25°N cast of 30°W Réf.: Rec. 1 (V-RA I), Res. 26 (EC-XXII)
Mozambique	Sea area in the Mozambique Channel from 12°S to 25°S Réf.: Rcc. 1 (V-RA *I),* Res. 26 (EC-XXII)

REGION I - AFRICA (contd.)

Country	Area of responsibility
Portugal	North Atlantic waters from 44°N to 30°N east of 40°W Réf.: Rec. 1 (V-RA I), Res. 26 (EC-XXII)
Senegal	Sea areas from 25°N to the Equator between 3S°W and the Greenwich meridian Réf.: Rec. 1 (V-RA 1), Res. 26 (EC-XXII) -
South Africa*	The whole ocean area south of the Equator and of the African coast between 20°W and 20°E.Th'c Mozambique Channel south of 15°S and the sea area from 25°S to 30°S between the African coast and 45°E. The whole ocean area south of 30°S and of the African coast between 20°E and 70°E Réf.: Rec. 1 (V-RA I), Res. 26 (EC-XXII)
Spain	North Atlantic waters from 50°N to 20°N east of 3S°W. Mediterranean Sea west of 10°E overlapping with the area of responsibility of France Réf.: Rec. 1 (V-RA 1), Res. 26 (EC-XXII)

REGION II - ASIA

Bangladesh	Sea area in the Bay of Bengal north oflatitude 18°N Réf.: Paragraph 3.2.3 of the general summary of EC-XXX NOTE: This area is an overlapping area between Bangladesh, Burma and India.
Myanmar	Sea area in the Hay of Bengal between the coast and the line 18°N 83°30'E to 18°N 92°E to 10°N 92°E to 10°N 98°30'E NOTES: (1) The area north of 18°N is an overlapping area between Bangladesh, Myanmar and India. (2) The area from 13°30'N to 10°N between 92°E and 94°E is an overlapping area between Myanmar and India. Réf.: Rec. XXXV (CR-II New Delhi 1948), Recs. 20 and 21 (CMM-I), Res. 16 (EC-III), paragraph 34 of the general summary of I-RA II, CMM-Ii/Docs. 30 and 136, paragraph 48 of the general summary of CMM-II, Res. 33 (EC-IX), paragrapli 8.2.3 of the general summary of 1II-RA II, Paragraph 9.1.9 of the general summary of CMM-IV, Rec. 15 (CMM-IV), Res. 14 (EC-XVII), Rec. 2 (IV-RA II), Res.. 3 (EC-XVIII), paragraph 3.2.3 of the general summary of EC-XXX
China	Area enclosed by the following line: 9°N 105°30'E to 9°N 109°E to 5°N 109°E to S°N 110°E to 3°N 110°Eto 3°N 112°30'E, thence along the coast to 7°N 116°30'E to 8°30'N 117°E, thence along the coast to 11°30'N 119°30'E to 12°30'N 120°30'E to 12°30'N 121°E, thence along the coast to 18°N X22°30'E to 18°N 124°E to 21 °N 124°Eto 27°N 132°E to 33°N 132°E, thence along the coast to 3S°N 132°E, to 36°N 129°30'E, thence along the mainland coast to 9°N 105°30'E Réf.: Approval by the President of WMO on behalf of the Executive Committee - WMO circular letter M/MA/MS (PR-2486) of 18 July 1974

* The Government of the Republic of South Africa has been suspended by Resolution 38 (Cg-VII) from exercising its rights and enjoying its privileges as a Member of WMO.

REGION II - ASIA (contd.)

Country	**Area of responsibility**
Egypt	The Red Sea north of 23°N Réf.: CMM-II/Docs. 56 and 136, paragraph 48 of the general summary of CMM-ÍI, Res. 33 (EC-IX), Rec. 15 (CMM-IV), Res. 14 (EC-XV1I)
Hong Kong	Area enclosed by the following line: 33°N 120°30'E to 33°N 124°E to 27°N 124°E to 27°N 132°E to 22°N 124°E to 18°N 124°E to 18° N 120°30'E, thence along coast to 10°N 118°30'Eto 10°N lll°E to 11°30'N 109°E, thence along the mainland coast to 33°N 120°30'E Réf.: Rec. 2 (IV-RA II), Res. 3 (EC-XVIII)
India	Sea areas within the Asian coast and the line 24°N 68°E to 20°N 68°E to 20°N 60°E to 5°N 60°E to 5°N 95°E to 10°N 95°E to 10°N 94°E to 13°30'N 94°E to 13°30'N 92°E to 18°N 92°E to 18°N 94°30'E NOTES: (1) The area in the Arabian Sea north of 20°N and east of 68°E is an overlapping area between India and Pakistan. (2) The area from 10°N to 5°N between 60°E and 95°E is an overlapping area between Sri Lanka and India. (3) The area in the Bay of Bengal north of 18°N is an overlapping area between Bangladesh, Myanmarand India. (4) The area in the Bay of Bengal from 13°30'N to 10°N between 92°E and 94°E is an overlapping area between Myanmar and India. Réf.: Map B of Res. 37 (CD Washington 1947), Rec. XXXV (CR-II New Delhi 1948), Recs. 20 and 21 (CMM-I), Res. 16 (EC-HI), paragraph 34 of the general summary of I-RA II, CMM-I I/Docs. 30 and 136, paragraph 48 of the general summary of CMM-I1, Res. 33 (EC-IX), paragraph 8.2.3 of the general summary of III-RA II, paragraph 9.1.9 of the general summary of CMM-IV, Rec. 15 (CMM-IV), Res. 14 (EC-XVII), Rec. 2 (IV-RA II), Res. 3 (EC-XVIII), paragraph 3.2.3 of the general summary of EC-XXX
Japan	Area enclosed by the following line: 25°N 124°E, to 35°N 124°E to 35°N 127°E, thence along coast to 50°N 140°30'E to 50°N 180° to 25°N 180° to 25°N 124°E Réf.: Rec. 2 (IV-RA II), Res. 3 (EC-XVIII)
Korea	Area enclosed by the following line: 43°N 132°E to 27°N 132°E to 27°N 120°E, thence along coast to 43°N 132°E Réf.: Rec. 2 (IV-RA II), Res. 3 (EC-XVIII)
Pakistan	Persian Gulf, Gulf of Oman and Arabian Sea north of 20°N Réf.: Rec. 2 (IV-RA II), Res. 3 (EC-XVIII), paragraph 3.2.3 of the general summary of EC-XXX
Sri Lanka	Sea areas from 10°N to the Equator between 60°E and 95°E NOTE: The area from 10°N to 5°N between 6()°E and 95"E is an overlapping area between Sri Lanka and India.

REGION II - ASIA (contd.)

Country	Area of responsibility
Sri Lanka (contd.)	Réf.: Map B of Res. 37 (CD Washington 1947), Rec. XXXV (CR-II New Delhi 1948), Recs. 20 and 21 (CMM-I), Res. 16 (EC-HI), paragraph 34 of the general summary of I-RA II, CMM-II/Docs. 30 and 136, paragraph 48 of the general summary of CMM-II, Res. 33 (EC-IX), Rec. 15 (CMM-IV), Res. 14 (EC-XVII), Rec. 2 (IV-RA II), Res. 3 (EX-XVIII), paragraph 3.2.3 of the general summary of EC-XXXIV
Thailand	Area enclosed by the following line: 8°30'N 105°E to 0° 105°E to 0° 104°E along coast to 5°N 9S°E to 10°N 95°E to 10°N 98°30'E along coast to 8°30'N 105°E Réf.: Rec. 2 (IV-RA II), Res. 3 (EC-XVIII)
Union of Soviet Socialist Republics	The Sea of Japan and the other sea areas from 60°N to 40°N between 130°E and 180°, and Bering Sea north of 60°N and west of 170°W. Arctic waters north of USSR territory between 20°E and 170°W Réf.: Map B of Res. 37 (CD Washington 1947), paragraph 38 of the general summary of I-RA II, CMM-II/Docs. 30 and 136, paragraph 48 of the general summary of CMM-II, Res. 33 (EC-IX), Rec. 15 (CMM-IV), Res. 14. (EC-XVII), Rec. 2 (IV-RA II), Res. 3 (EC-XVIII)
Viet Nam	Sea area enclosed by the following line: 1°30'N 104°E to 0°104°E to 0°109°E along coast to 7°N 117°E to 12°N 121°E to 18°N 120°30'Eto 18°N 118°E to 22°N 118°E to 23°30'N 116°30'E, thence along mainland coast to 1°30'N 104°E Réf.: Bec. 2 (IV-RA II), Res. 3 (EC-XVIII)
Yemen	Gulf of Aden and Arabian Sea north of 10°N and west of 60°E. Réf.: Rec. XXXV (CR-II New Dehli 1948), Rec. 20 (CMM-I), Res. 16 (EC-III), Rec. 15 (CMM-IV), Res. 14 (EC-XVII), Rec. 2 (IV-RA II), Res. 3 (EC-XVIII)

REGION HI - SOUTH AMERICA

Argentina	Sea areas south of 33°S between 20°W and 70°W Réf.: Map B of Res. 37 (CD Washington 1947), Rec. IS (CMM-IV), Res. 14 (EC-XVII)
Brazil	Atlantic waters west of 35°W from 3°N to the Equator, and west of 20°W from the Equator to 33°S Réf.: Map B of Res. 37 (CD Washington 1947), Rec. 15 (CMM-IV), Res. 14 (EC-XVII)
Chile	Ocean areas south of 17°S between 120°W and 70°W Réf.: Map B of Res. 37 (CD Washington 1947), Rec. 15 (CMM-IV), Res. 14 (EC-XVII)

General note: Responsibility for meteorological service for shipping in the Caspian Sea and in other similar sea areas is mutually assigned to bordering countries.
Réf.: CMM-II/Doc. 136, paragraph 48 of the general summary of CMM II, Res. 33 (EC-XI), Note on map attached to Rec. 15 (CMM-IV), Res. 14 (EC-XVII)

REGION **III** - SOUTH **AMERICA** (contd.)

Country	Area **of responsibility**
Peru	Pacific Ocean east of 120°W from the Equator to 17°S Réf.: Map B of Res. 37 (CD Washington 1947), Rec. 15 (CMM-IV), Res. 14 (EC-XVII)

REGION IV - NORTH AND CENTRAL AMERICA

Canada	North Atlantic waters west of 35°W north of 25°N, Labrador Sea, Hudson Bay, Davis Strait, Baffin Bay and other Arctic waters off Canadian territory, between the western coast of Greenland and 170°W Réf.: Map B of Res. 37 (CD Washington 1947), Rec. 15 (CMM-IV), Res. 14 (EC-XVII)
United States of America	North Atlantic Ocean between 3°N and 60°N and from the United States east coast to 35°W including the Gulf of Mexico and the Caribbean Sea. Arctic waters north of Alaska between 141°W and 170°W. Sea areas in the Bering Sea east of 170°W, north of 60°N, and east of 180°, south of 60°N. North Pacific Ocean east of 180° and north of the Equator, and the area from 180° to 160°E and from the Equator to 50° N Réf.: Map B of Res. 37 (CD Washington 1947), Rec. 15 (CMM-IV), Res. 14 (EC-XVII), Rec. 2 (IV-RA IV), Res. 2 (EC-XIX)

REGION V - SOUTH-WEST **PACIFIC**

Australia	Sea areas south of 10°S between 90°E and 160°E Réf.: Paragraph 9.2.1 of the general summary of IV-RA V, paragraph 2.3.5.2 of the general summary of EC-XVIII, Rec. 1 (VIII-RA V), Res. 2 (EC-XXXV), paragraph 6.3.20 of the general summary of EC-XXXVI
Fiji	Sea areas from 5°N to 25°S between 160°E and 180° and from the Equator to 25°S between 180" and 120°W Réf.: Paragraph 9.2.1 of the general summary of IV-RA V, paragraph 2.3.5.2 of the general summary of EC-XVIII
France (New Amsterdam Island)	Sea areas south of 30°S and between 60°E and 90°E, overlapping with the areas of Australia and South Africa Réf.: Paragraph 9.2.1 of the general summary of IV-RA V, paragraph 2.3.5.2 of the general summary of EC-XVIII
Guam	Sea areas from 25°N to 5°N between 135°E and 180° Réf.: Paragraph 9.2.1 of the general summary of IV-RA V, paragraph 2.3.5.2 of the general summary of EC-XVIII
Indonesia	Sea areas within 0° 109°E to 0°90°E to 10°S 90°E to 10°S 160°E to 5°N 160°E to5°N119°E Réf.: Paragraph 9.2.1 of the general summary of IV-RA V, paragraph 2.3.5.2 of the general summary of EC-XVIII, Rec. 1 (VIII-RA V), Res. 2 (EC-XXXV)

REGION V - SOUTH-WEST PACIFIC (contd.)

Country	Area of responsibility
New Zealand	Sea area south of 25°S between 160°E and 120°W Réf.: Paragraph 9.2.1 of the general summary of IV-RA V, paragraph 2.3.5.2 of the general summary of EC-XVIII
Philippines	Sea areas within 25°N 135°E to 5°N 135°E to S°N 115°E to 15°N 115°E to 21°N 120°E to 25°N 120°E to 25°N 135°E Réf.: Paragraph 9.2.1 of the general summary of IV-RA V, paragraph 2.3.5.2 of the general summary of EC-XVIII
Singapore	Sea areas from 10°N to the Equator between 95°E and 115°E Réf.: Paragraph 9.2.1 of the general summary of IV-RA V, paragraph 2.3.5.2 of the general summary of EC-XVIII
United States of America	Pacific Ocean north of the Equator and east of 180° Réf.: Paragraph 9.2.1 of the general summary of IV-RA V, paragraph 2.3.5.2 of the general summary of EC-XVIII

REGION VI - EUROPE

France	North Atlantic waters from 50°N to 40°N east of 30°W. The western Mediterranean Sea Réf.: Map B of Res. 37 (CD Washington 1947), Rec. 21 (CMM-I), Res. 16 (EC-Ill), CMM-II/Doc. 136, paragraph 48 of the general summary of CMM-1I, Res. 33 (EC-IX), Rec. IS (CMM-IV), Res. 14 (EC-XVII)
Morocco	North Atlantic waters from 40°N to 25°N east of 30°W Ref.: Map B of Res. 37 (CD Washington 1947), Rec. 15 (CMM-IV), Res. 14 (EC-XVII)
Norway	The North Sea, the Norwegian Sea, the Greenland Sea including areas north of 67°N between 12°W and the Greenland coast. The Barents Sea, northward from coast of Norway and west of the longitude of the border between Norway and the USSR Réf.: Map B of Res. 37 (CD Washington 1947), Rec. 21 (CMM-I), Res. 16 (EC-III), CMM-II/Doc. 136, paragraph 48 of the general summary of CMM-I!, Res. 33 (EC-IX), Rec. 15 (CMM-IV), Res. 14 (EC-XVII)
Portugal	North Atlantic waters from 44°N to 30°N east of 40°W Réf.: Map B of Res. 37 (CD Washington 1947), Rec. 15 (CMM-IV), Res. 14 (EC-XVII)
Spain	North Atlantic waters from 50°N to 20°N east of 35°W. Mediterranean Sea west of 10°E overlapping with the area of responsibility of France Réf.: CMM-II/Docs. 92 and 136, paragraph 48 of the general summary of CMM-1I, Rec. 8 (II-RA I), Res. 33 (EC-IX), Res. 41 (EC-IX), Rec. 15. (CMM-IV), Res. 14 (EC-XVII)
United Kingdom	North Atlantic Ocean north of 35°N, east of 35°W and North Sea Réf.: Map B of Res. 37 (CD Washington 1947), Rec. 15 (CMM-IV), Res. 14 (EC-XVII

REGION VI - EUROPE (contd.)

Country	Area of responsibility
Union of Soviet Socialist Republics	Arctic waters north of USSR territory between 20°E and 170°W Réf.: Map B of Res. 37 (CD Washington 1947), Rec. 15 (CMM-IV), Res. 14 (EC-XVII)

General note: Responsibility for meteorological service for shipping in the North Sea, Baltic Sea, Black Sea and other similar sea areas is mutually assigned to bordering countries. Réf.: CMM-II/Doc. 136, paragraph 48 of the general summary of CMM-ÍI, Res. 33 (EC-IX)

APPENDIX I.2

(See paragraph 2.2.2.8.4)

MULTLINGUAL LIST OF TERMS USED IN WEATHER AND SEA BULLETINS
LISTE MULTILINGUE DES TERMES UTILISES DANS LES BULLETINS DE METEOROLOGIE MARITIME
LISTA MULTILINGUE DE TÉRMINOS UTILIZADOS EN LOS BOLETINES METEOROLOGICOS Y MARINOS

МНОГОЯЗЫЧНЫЙ ПЕРЕЧЕНЬ ТЕРМИНОВ, ИСПОЛЬЗУЕМЫХ В МЕТЕОРОЛОГИЧЕСКИХ И МОРСКИХ БЮЛЛЕТЕНЯХ

ENGLISH	FRANÇAIS	ESPAÑOL	RUSO
Standards of time	**Unités de temps**	**Unidades de tiempo**	**Единица времени**
Co-ordinated Universal Time (UTC)	Tempsuniversel coordonné (UTC)	Tiempo universal coordinado (UTC)	Международное скоординированное время (МСВ)
Zone time	Heure du fuseau	Hora zona	Поясное время
Summer time	Heure d'été	Hora de verano	Летнее время
Local time	Heure locale	Hora local	Местное время
Periods of time	**Périodes de temps**	**Períodos de tiempo**	**Периоды времеии**
Six hours	Six heures	Seis horas	шесть часов
Twelve hours	Douze heures	Doce horas	двенадцать часов
Eighteen hours	Dix-huit heures	Dieciocho horas	восемнадцать часов
Twenty-four hours	Vingt-quatre heures	Veinticuatro horas	двадцать четыре часа
Thirty-six hours	Trente-six heures	Treinta y seis horas	тридцать шесть часов
Forty-eight hours	Quarante-huit heures	Cuarenta y ocho horas	сорок восемь часов
Today	Aujourd'hui	Hoy	сегодня
Tomorrow	Demain	Mañana	завтра
Next few days	Les prochains jours	Los próximos días	следующие несколько дней
Morning	Matin	Mañana	утро
Evening	Soir	Tarde, noche	вечер
Midday	Midi	Mediodía	полдень
Afternoon	Après-midi	Tarde, noche	после полудня
Day	Jour	Día	день
Night	Nuit	Noche	ночь
Sunrise	Lever du soleil	Orto	восход
Sunset	Coucher du soleil	Ocaso	заход
Preliminary terms	**Termes préliminaires**	**Términos preliminares**	**Предварительные термины**
Forecast Further outlook	Prévision Evolution ultérieure probable	Previsión, pronóstico Evolución probable,	Прогноз Вероятная эволюция, дальнейшие перспективы

Preliminary terms (contd.)	**Termes préliminaires** (suite)	**Términos preliminares** (cont.)	**Предварительные термины** (продолж.)
General inference	Situation générale et évolution Situation générale	Perspectivas futuras	Общий вывод
General statement		Situación general	Общее описание положения
Long-range forecast	Prévision à longue échéance	Previsión a largo plazo	Долгосрочный прогноз
Medium-range forecast	Prévision à moyenne échéance	Previsión a medio plazo	Прогноз средней заблаговременности
Short-range forecast	Prévision à courte échéance	Previsión a corto plazo	Краткосрочный прогноз
Synoptic situation	Situation synoptique	Situación sinóptica	Синоптическое положение, синоптическая ситуации
Warning	Avis	Aviso	Предупреждение
Terms of position	**Termes de position**	**Términos de posición**	**Термины положения**
Degrees	Degrés	Grados .	градусы
Latitude	Latitude	Latitud	широта
Longitude	Longitude	Longitud	долгота
Quadrant	Quadrant	Cuadrante	квадрант
Hemisphere	Hémisphère	Hemisferio	полушарие
North	Nord	Norte	север
South	Sud	Sur	юг
East	Est	Este	восток
West	Ouest	Oeste	запад
District	District	Distrito	район
Parallel	Parallèle	Paralelo	параллель
Meridian	Méridien	Meridiano	меридиан
Square	Carré	Cuadrado	квадрат
Bearing	Relèvement	Rumbo	пеленг
Direction	Direction	Dirección	направление
Track	Trajectoire, route	Trayectoria	путь, траектория
Area	Zone	Area, zona	область, район
Line	Ligne	Línea	линия
Storm warnings	**Avis de tempête**	**Avisos de temporales**	**Штормовые предупреждения**
Gale warning	Avis de coup de vent	Aviso de viento duro	штормовое предупреждение
Storm warning	Avis de tempête Avis	Aviso de temporal	штормовое предупреждение
Hurricane warning	d'ouragan Blizzard	Aviso de huracán	предупреждение об урагане
Blizzard		Blizzard, ventisca	близзард
Tropical storms	**Cyclones tropicaux**	**Ciclones tropicales**	**Тропические штормы**
Tropical cyclone	Cyclone tropical	Ciclón tropical	тропический циклон
Hurricane	Ouragan	Huracán	ураган
Tornado	Tornade	Tornado	торнадо
Typhoon	Typhon	Tifón	тайфун
Baguio	Baguio	Baguio	багуйо
Willy-willy	Willy-willy	Willy-willy	вилли-вилли

3

Pressure systems	Systèmes de pression	Sistemas de presión	Барические системы
Area of low pressure	Zone de basses pressions	Area bajas presiones	область пониженного давления
Low	Dépression	Depresión barométrica	циклон
Trough	Creux barométrique	Vaguada	ложбина
Area of high pressure	Zone de hautes pressions	Area de altas presiones	область высокого давления
High	Anticyclone	Anticiclón	антициклон
Ridge (of high pressure)	Dorsale, crête barométrique	Cresta de aita presión	гребень высокого давления
Belt of high pressure	Ceinture de hautes pressions	Cinturón de altas presiones	пояс высокого давления
Belt of low pressure	Ceinture de basses pressions	Cinturón de bajas presiones	пояс низкого давления
Col	Col barométrique	Collado	седловина
Hyperbolic point	Point hyperbolique	Punto hiperbólico	гиперболическая точка
Cyclolysis	Cyclolyse	Ciclolisis	циклозиз
Cyclogenesis	Cyclogenèse	Ciclogcnesis	циклогенез
Anticyclolysis	Anticyclolyse	Anti ciclolisis	аитициклолиз
Anti cyclogenesis	Anticyclogenèse	Anticiclogénesis	а1гциклогенез
Air mass nomenclature	**Nomenclature des masses d'air**	**Nomenclatura de las masas de aire**	Классификация воздушных масс
Air mass Stable air mass Unstable air mass Cold air Arctic air Antarctic air Polar air Warm air Tropical air Subtropical air Equatorial air Maritime air Continental air Winter monsoon Summer monsoon	Masse d'air Masse d'air stable Masse d'air instable Air froid Air arctique Air antarctique Air polaire Air chaud Air tropical Air subtropical Air equatorial Air maritime Air continental Mousson d'hiver Mousson d'été	Masa de aire Masa de aire estable Masa de aire inestable Aire frío Aire ártico Aire antartico Aire polar Aire caliente, aire cálido Aire tropical Aire subtropical Aire ecuatorial Aire marítimo Aire continental Monzón de invierno Monzón de verano	воздушая масса устойчивая масса неустойчивая масса холодная масса арктический воздух антарктический воздух полярный воздух теплый воздух тропический воздух субтропический воздух экваториальный воздух морской воздух континентальный воздух зимний муссон летний муссон
Front nomenclature	**Nomenclature des fronts**	**Nomenclatura de los frentes**	Классификация фронтов
Front	Front	Frente	фронт
Polar front	Front polaire	Fentc polar	полярный фронт холодный
Cold front	Front froid	Frente frío	фронт вторичный холодный
Secondary cold front	Front froid secondaire	Frente frío secundario	фронт теплый фронт
Warm front	Front chaud	Fente caliente	окклюзия окклюзия по
Occlusion	Occlusion	Oclusión	типу холодного фронта
Cold occlusion	Occlusion à caractère de front froid	Oclusión fría	окклюзия по тину теплого фронта
Warm occlusion	Occlusion à caractère de front chaud	Oclusión caliente	

1	2	3	4
Front nomenclature	**Nomenclature des**	**Nomenclatura de los**	**Классификация фронтов**
(contd.)	**fronts** (suite)	**frentes** (cont.)	(продолж.)
Upper front	Front en altitude	Frente en altura	верхний фронт
Intertropical front	Front intertropical	Frente intertropical	внутритропический фронт
Frontal wave	Onde frontale	Onda frontal	фронтальная волна
Frontogenesis	Frontogenèse	Frontogénesis	фронтогенез
Frontolysis	Frontolysc	Frontolisis	фроптолиз
Weather	**Temps**	**Tiempo**	Погода
Precipitation	*Précipitation*	*Precipitación*	Осадки
Rain	Pluie	Lluvia	дождь
Freezing rain	Pluie se congelant	Lluvia engelante	переохлажденный дождь
Rain and snow mixed	Pluie et neige mêlées	Lluvia y nieve mezcladas	дождь со снегом
Supercooled rain	Pluie surfondue	Lluvia subfundida	переохлажденный дождь
Snow	Neige	Nieve	снег
Snow pellets	Neige roulée	Nieve granulada	снежная крупа
Snow grains	Neige en grains	Cinarra, gragea	снежные зерна
Drizzle	Bruine	Llovizna .	морось
Hail	Grêle	Granizo	град
Diamond dust	Poudrin de glace	Polvillo de hielo	алмазная пыль
Ice pellets	Granules de glace	Granulos de hielo	ледяной дождь
Small hail	Grésil	Granizo menudo	ледяная крупа
Shower	Averse	Chubasco	ливень
Visibility	*Visibilité*	*Visibilidad*	*Видимость*
Fog	Brouillard	Niebla	туман
Mist	Brume	Neblina	дымка
Haze	Brume sèche	Calima	мгла
Duststorm	Tempête de poussière	Tempestad de polvo	пыльная буря
Sandstorm	Tempête de sable	Tempestad de arena	песчаная буря
Spray	Embruns	Rociones	водяная пыль
Drifting snow	Chasse-neige basse	Ventisca baja	поземок
Blowing snow	Chasse-neige élevée	Ventisca alta	низовая метель
Miscellaneous	*Divers*	*Misceláneos*	*Дополнительные термины*
Cloud	Nuage	Nube	облако
Clearing up	Se dissipant	Despejándo(se)	прояснение
Line squall	Grain en ligne	Turbonada en línea.	линейный шквал
Whirlwind	Tourbillon de vent	Remolino de viento	вихрь
Water-spout	Trombe marine	Tromba marina	смерч
Frost, freezing	Gelée, gel	Helada	мороз, заморозок
Rime	Givre blanc	Cencellada blanca	измормоэь
Glaze	Givre transparent	Cencellada transparente	ледяной налет
Smoke	Fumée	Humo	дым
Thunderstorm	Orage	Tormenta	гроза
Thunder	Tonnerre	Trueno	гром
Lightning	Eclair	Relámpago	молния

1	2	3	4
Wind	**Vent**	**Viento**	Ветер
General terms	*Termes généraux*	*Términos generales*	*Общие термины*
Beaufort scale	Échelle de Beaufort	Escala Beaufort	шкала Бофорта
Calm	Calme	Calma	штиль
Light air	Très légère brise	Ventolina	очень слабый ветер
Light breeze	Légère brise	Flojito (viento), brisa muy débil	слабый ветер
Gentle breeze	Petite brise	Flojo (viento), brisa débil	ветер от слабого до умеренного
Moderate breeze	Jolie brise	Bonancible (viento), brisa moderada	умеренный ветер
Fresh breeze	Bonne brise	Fresquito (viento), brisa fresca	свежий ветер
Strong breeze	Vent frais	Fresco (viento), brisa fuerte	сильный ветер
Near gale	Grand frais	Frescachón, viento fuerte	очень сильный ветер
Gale	Coup de vent	Viento duro	штормовой ветер
Strong gale	Fort coup de vent	Viento muy duro	шторм
Storm	Tempête	Tormenta,tempestad, temporal	сильный шторм - буря
Violent storm	Violente tempête	Temporal duro, borrasca	жестокий шторм
Hurricane	Ouragan	Huracán	ураган
Gust	Rafale	Ráfaga, racha	порыв
Squall	Grain	Turbonada	шквал
Sea breeze	Brise de mer	Brisa de mar	морской бриз
Land breeze	Brise de terre	Brisa de tierra	береговой бриз
Prevailing wind	Vent dominant	Viento dominante	господствующий ветер
Shift of wind	Saute de vent	Salto de viento	поворот ветра
Veering (clockwise change in direction)	Rotation du vent (dans le sens des aiguilles d'une montre)	Cambio de dirección (en el sentido de las agujas del reloj)	менять направление по часовой стрелке
Backing (anticlockwise change in direction)	Rotation du vent (dans le sens contraire des aiguilles d'une montre)	Cambio de dirección en el sentido contrario de las agujas de reloj	менять направление против часовой стрелка
Local names	*Noms locaux*	*Nombres locates*	*Местные названия*
Trade winds (trades)	Alizés	Vientos alisios (alisios)	пассаты
Bora	Bora	Bora	бора
Mistral	Mistral	Mistral	мистраль
Sirocco	Sirocco	Siroco	сирокко
Gregale	Grégal	Gregal	грегаль
Levanter	Levante	Levante	левантии, южный ветер
Norther	Norther	Nortada	северный ветер
Ice*	**Glace***	**Hielo***	Лед*
Bergy bit	Fragment d'iceberg	Tempanito	обломок айсберга
Brash ice concentration	Concentration en brash (sarrasins)	Concentración de escombro de hielo	ледяная каша - сплоченность

* Readers are referred to publication WMO-No. 259 which contains a complete sea-ice nomenclature.

1	2	3	4
Ice (contd.)	Glace (suite)	**Hielo** (cont.)	Лед (продолж.)
Past ice	Banquise côtière	Hielo fijo	припаи
First-year ice	Glace de première année	Hielo del primer año	однолетний лед
Flaw	Brèche de séparation	Grieta	полоса тертого льда
Floe	Floe	Bandcjón	ледяное поле
Frazil	Frasil	Cristales de hielo	ледяные иглы
Grease ice	Sorbet	Hielo grasoso	ледяное сало
Grey ice	Glace grise	Hielo gris	серый лед
Grey-white ice	Glace blanchâtre	Hielo gris blanco	серо-белый лед
Growler	Bourguignon	Gruñón	кусок айсберга
Hummocked ice	Glace hummockée	Hielo amonticulado	торосистый лед
Iceberg	Iceberg	Témpano	айсберг
Ice boundary	Ligne de démarcation de glaces	Frontera del hielo	ледовая граница
Ice edge	Lisière de glace	Borde del hielo	кромка льда
Ice field	Champ des glaces	Campo de hielo	скопление дрейфующего льда
Ice limit	Limite des glaces	limite del hielo	крайняя граница льда
Ice patch	Banc de glace	Manchón de hielo	пятно льда
Ice rind	Glace vitrée	Costra de hielo	склянка
Ice shelf	Plateau de glace	Meseta de hielo	шельфовый ледник
Level ice	Glace plane	Hielo plano	ровный лед
New ice	Nouvelle glace	Hielo nuevo	начальные виды льда
Nilas	Nilas	Nilas	нилас
Pack ice	Banquise	Hielo a la deriva	дрейфующими лед
Pancake ice	Glace en crêpes	Hielo panqueque	блинчатый лед
Polynya	Polynie	Polinia	полынья
Rafted ice	Glace entassée ou Empilée	Hielo sobre escurrido	наслоенный лед
Shore lead	Chenal côtier	Canal costero	прибрежная прогалина
Shuga	Shuga	Shuga	шуга
Slush	Gadoue	Pasta o grumo	снежура
Young ice	Jeune glace	Hielo joven	молодой лед
Miscellaneous nautical terms	**Termes nautiques divers**	**Términos náuticos diversos**	**Разные морские термины**
Sea	Mer	Mar	море
Sea level	Niveau de la mer	Nivel del mar	уровень моря
Horizon	Horizon	Horizonte	горизонт
Tsunamis	Tsunamis	Tsunamis	цунами
Swell	Houle	Mar de fondo	зыбь
Tide	Marée	Marea	морской прилив и отлив
Surge	Lame de fond	Oleada	крутое волнение
Surf	Déferlement	Resaca	прибой
Breakers	Brisants	Rompientes	буруны
Wave	Vague	Ola	волна
Wavelet	Vaguelette	Ola pequeña	небольшая волна

1	2	3	4
General descriptive terms	Termes descriptifs généraux	Términos descriptivos **generales**	Общие описательные термины
Slight	Faible (léger)	Leve	незначительный
Moderate	Modéré	Moderado	умеренный
Violent	Violent	Violento	жестокий
Heavy	Fort (gros)	Fuerte	тяжелый
Strong	Fort	Fuerte	сильный
Dry	Sec	Seco	сухой
Damp	Humide	Húmedo	влажный
In patches	Par plaques, en bancs	En bancos	в кусках, разрывной
Extensive	Etendu	Extenso	обширный, пространный
Low	Bas	Baja	низкий
High	Haut, élevé -	Alta	высокий
Rough	Forte	Duro	бурный
Recurve	Se recourber	Recurvarse	поворачивать
Quickly	Rapidement	Rápidamente	скоро
Slowly	Lentement	Lentamente	медленно
Filling up	Se comblant	Llenándose	заполнение
Increasing	Croissant, augmentant	Aumentando	увеличение
Decreasing	Décroissant, diminuant	Disminuyendo	уменьшение
Breaking up	Se dissolvant	Disipándose	разрушение
Poor	Mauvais	Malo	плохой
Good	Bon	Bueno	хороший
Spreading	S'étend ant	Extendiéndose	распространение
Occasional	Occasionnel	Ocasional	случайный
Continuous	Continu	Continuo	непрерывный, продолжительный
Intermittent	Intermittent De temps à	Intermitente	прерывистый
At times	autre Immédiatement	A veces	иногда, по временам
Immediately		Immedi ata mente	немедленно, непосредственно
	Tôt		
Early	Tard	Temprano	рано
Late	Plus tard, par la suite	Tarde	поздно
Later		Luego, más tarde	позже

APPENDIX I.3

(See paragraph 2.2.2.9.2)

BEAUFORT SCALE OF WIND FORCE

BEAUFORT NUMBER	DESCRIPTIVE TERM	WIND SPEED EQUIVALENTS		SPECIFICATIONS FOR OBSERVATIONS
		metres/sec	knots	On board ship (open sea)
0	Calm	0-0.2	<1	Sea like a mirror
1	Light air	0.3-1.5	1-3	Ripples with the appearance of scales are formed, but without foam crests
2	Light breeze	1.6-3.3	4-6	Small wavelets, still short but more pronounced; crests have a glassy appearance and do not break
3	Gentle breeze	3.4 - 5.4	7-10	Large wavelets; crests begin to break; foam of glassy appearance; perhaps scattered white horses
4	Moderate bieeze	5.5 - 7.9	11-16	Small waves, becoming longer; fairly frequent white horses
5	Fresh breeze	8.0-10.7	17-21	Moderate waves, taking a more pronounced long form; many white horses are formed (chance of some spray)
6	Strong breeze	10.8 -13.8	22-27	Large waves begin to form; the white foam crests are more extensive everywhere (probably some spray)
7	Near gale	13.9-17.1	28-33	Sea heaps up and white foam from breaking waves begins to be blown in streaks along the direction of the wind
8	Gale	17.2 - 20.7	34-40	Moderately high waves of greater length; edges of crests begin to break into the spindrift; the foam is blown in well-marked streaks along the direction of the wind
9	Strong gale	20.8 - 24.4	41-47	High waves; dense streaks of foam along the direction of the wind; crests of waves begin to topple, tumble and roll over; spray may affect visibility
10	Storm	24.5 - 28.4	48-55	Very high waves with long overhanging crests; the resulting foam, in great patches, is blown in dense white streaks along the direction of the wind; on the whole, the surface of the sea takes a white appearance; the tumbling of the sea becomes heavy and shock-like; visibility affected
11	Violent storm	28.5 - 32.6	56-63	Exceptionally high waves (small and medium-sized ships might be for a time lost to view behind the waves); the sea is completely covered with long white patches of foam lying along the direction of the wind; everywhere the edges of the wave crests are blown into front; visibility affected
12	Hurricane	32. 7 and over	64 and over	The air is filled with foam and spray; sea completely white with driving spray; visibility very seriously affected

APPENDIX I.4

(See paragraph 4.2.5)

SYMBOLS AND DEPICTIONS USED ON RADIO-FACSIMILE CHARTS FOR MARINE PURPOSES

1. Typical symbols used for marine meteorological purposes

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

	Cold front at the surface. Warm
	front at the surface Occluded
	front at the surface
	Quasi-stationary front at the surface
	Convergence line
11 ıИ	Inter-tropical convergence zone (ÍTCZ)
	Centre of tropical cyclonic circulation (maximum winds 34-63 knots)
	Centre of tropical cyclonic circulation (maximum winds of 64 knots of more)
	Fog

(b) Additional symbols

	Ice accretion:
	Ice building slowly
	[ce building rapidly

Depiction of lines and systems **on specific charts**

(a) Model S - surface - chart

Continuous lines		Isobars labelled in hectopascals
Crossed line segments		Position of centre of high or low pressure given in hectopascals
		Low pressure
	H	High pressure
f^>	f,f,	Direction of movement of centres and fronts with speed in knots

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

(b) Model W - wave - chart

Continuous lines	Significant wind wave height (sea), or composite wind wave and swell height, where so drawn, labelled in metres
Dashed lines	Significant swell height labelled in metres
MAX	Centre of maximum wave height
M1N	Centre of minimum wave height
	Direction of sea waves
^rv/xr*	Direction of swell waves

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

Continuous lines	Isotherms labelled in degrees Celsius

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

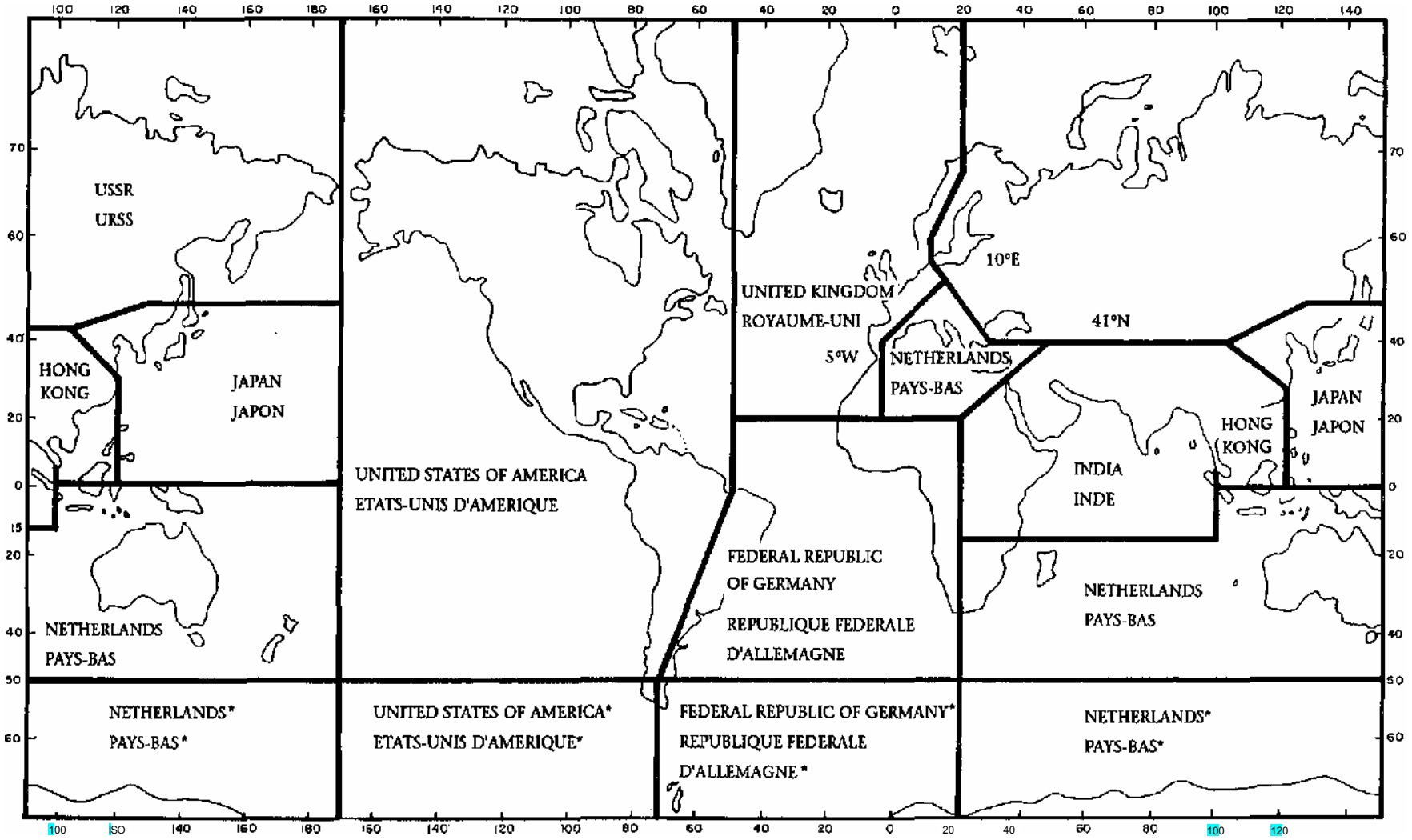
(d) Model SI - sea-ice information-chart.

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

APPENDIX I.5

(See paragraph 5.1)

AREAS OF RESPONSIBILITY AND RESPONSIBLE MEMBERS FOR CLIMATOLOGICAL SUMMARIES



* The USSR is responsible for the compilation of a complete data set and the preparation of the summaries for these sea areas.

APPENDIX I.6

(See paragraph 5.1)

GLOBAL COLLECTING CENTRES FOR MARINE CLIMATOLOGICAL SUMMARIES SCHEME

GCC Germany Deutscher
Wetterdienst Klima und
Umwelt, FE26 P.O. Box 70
04 21 D-22004 Hamburg
GERMANY Tel: +49 40
6690 1444 Fax: +49 40
6690 1499 E-mail:
gcc@dwd.de

GCC United Kingdom
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London Road
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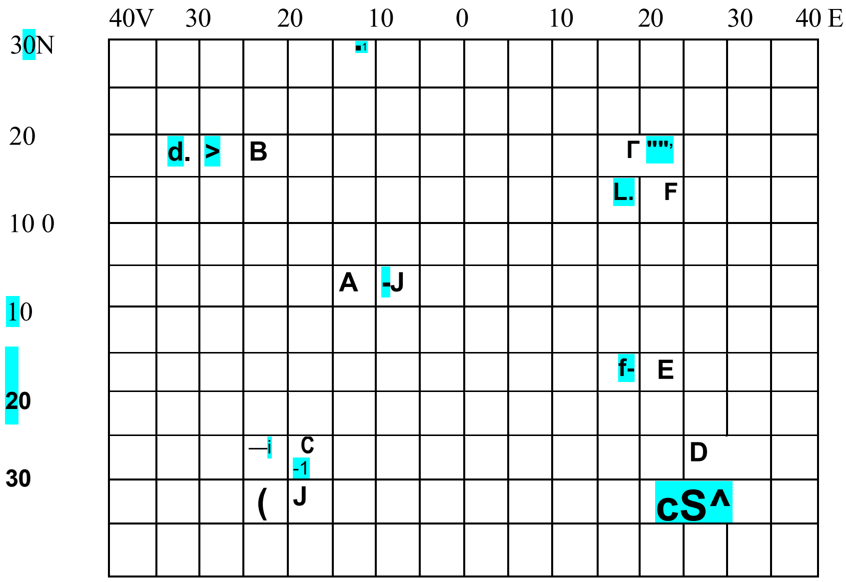
Fax: +44 131 528 7345
E-mail: gcc@metoffice.com

APPENDIX I.7

(See paragraph 5.2.3.3)

AREA INDICES SYSTEM FOR MARINE CLIMATOLOGICAL-SUMMARIES



rea A shall be coded : 00037

" B " " " 01288

" " " " 51281

" " " " 81288

" " " " 80187

" " " " 31149

The following area indices systems shall be used:

(a) A selected representative area shall be indicated with reference to the position in the area of the 1-degree square corner which is nearest (1) to the Equator and (2) to the Greenwich meridian, in that sequence;

(b) A five-figure code shall be used for "area index";

(c) The first figures of the code - QL_aL_0 - shall indicate the 10-degree square in which this 1-degree square is situated, where:

(i) The first figure shall be octant (code 3300);

(ii) The second figure shall be tens of the latitude of the 10-degree square;

(iii) The third figure shall be the tens of the longitude of the 10-degree square.

(d) The fourth and fifth figures of the code shall be the number of the 1-degree square within the 10-degree square as indicated in the above figure.

APPENDIX I.8

(See paragraph 5.3.1)

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

	FIXED STATIONS [a]	REPRESENTATIVE AREA/AREA OF RESPONSIBILITY [b]		
Period	Tables [c]	Tables [c]	Charts M	Isopleths [b] *Ae*
1961-1970 Annual Decadal	X X	X 0?	**0r** 0?	0 0
1971-1980 Annual Decadal	0 X	0 ***os***	***of*** ***os***	0 0
1981-1990 Annual Decadal	0 X	0 0i	0 0?	0 0

KEY: X- Recommended 0
- Optional

NOTES: *a* - Ocean weather stations and other fixed stations *b* - Total area of responsibility c - Summary tables (existing regulations)
d - Numerical data on charts of sea areas (marine climatological summary charts) e - In addition to charts
f - Recommended instead of tables for responsible Members who have not yet published annual summaries *g* - Published in chart or tabular form or both at the option of responsible Members

APPENDIX I.9

(See paragraph 5.3.2.1)

LAYOUT FOR MARINE CLIMATOLOGICAL SUMMARY CHARTS FOR REPRESENTATIVE AREAS

1. General

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

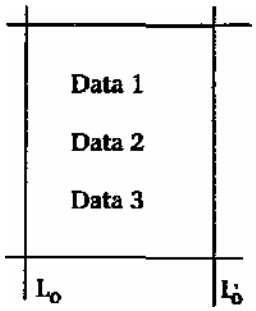
2. Projection

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

3. Unit areas

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

4.



Data 1-3 are specified according to the element summarized

Dimensions of the unit areas

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

5. Specification of elements to be presented on summary charts:

Chart	Data	Element (resolution/unit)
I	1	Mean air temperature (T, 0.1C)
	2	Standard deviation of air temperature[1] (a_T, 0.1°C)
	3	Number of observations of air temperature (N_T)
II		Mean sea-surface temperature (T_w, 0.1°) **grwtO.rC)**

Chart	Data	Element (resolution/unit)
III		Mean dew-point temperature (T^, 0.1°C) o_{Td} (0.1°C) N_{Id}
IV		Mean air-sea temperature difference (T-T_w) (ДТ, 0.1°C) $a_{дт}$(0.1°C)
V		Mean sea-level pressure (P, 0.1 hPa) a_p (0.1 hPa) *P
VI		Median wind speed (f$o, 0.1 m s^{-1}) Standard deviation of wind speed (Of, 0.1 m s^{-1}) Steadiness of wind[2]
VII		Prevailing wind direction[3] Number of wind-speed observations (N_f) Number of measured wind-speed observations
VIII		% of light winds (< 3 m s^{-1}, < Beaufort 2) (0.1%) % of strong winds (£ 11 m s^{-1}, > Beaufort 6) (0.1%) Prevailing direction[3] of strong winds (I°)
IX		% gales (> 17 m s^{-1}, > Beaufort 8) (0.1%) Prevailing direction[3] of gales (I°)
X		Median wave height[4] (H_{50}, 0.5 m) a_H (0.1m) N_H
XI		% waves S 1.5 m (0.1%) %waves£4m(0.1%) %waves£6m(0.1%)
XII		% wave periods[4] £ 6 s (1 s) Prevailing swell direction[3] (1°) Number of swell observations
XIII		% observations with rain or dizzle[5] (0.1%) % observations with other forms of precipitation[6] (0.1%) Number of present weather observations
XIV		% total cloud amount < 2/8 (0.1%) % total cloud amount £ 6/8[7] (0.1%) Number of total cloud observations
XV		% visibility < 1 km (W = 90-93) (0.1%) % visibility I10 km (W = 97-99) (0.1%) Number of visibility observations
XVI		Mean latitude of observations (L^O.I°) Mean longitude of observations (L_0, 0.1°) Total number of observations

Chart	Data	Element (resolution/unit)
XVII		Ola (°JI°) <*Lo(°-[10]> Total number of observations
XVIII		Number of reports of icing % potential moderate or severe superstructure icing[8] (0.1%) Number of observations containing air temperature and wind speed

NOTES: (1) o = $\left| \frac{}{N\text{-}l} \right| y_2 \left|\right.$ where x is the value of an individual observation.

vector average, (2)

Steadiness =

scalar average.

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

(4) Height of sea or swell.

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

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

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

(8) ff >llms-l,TTT <2°C.

6. Production of charts

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

APPENDIX I.10

(See paragraph 5.3.2.2)

PARAMETERS TO BE INCLUDED IN MARINE CLIMATOLOGICAL SUMMARIES FOR FIXED SHIP STATIONS

Table 1 - Mean position of all observations

This table is not included in summaries for fixed ship stations.

Table 2 - Air temperature

(a) Monthly means;

(b) Mean for the year, computed from monthly means;

(c) Extremes with dates and hours of occurrence and 5,25, 50, 75 and 95 percentile values for each month;

(d) Number of observations.

Table 3 - Dew-point temperature

(a) Monthly means;

(b) Mean for the year, computed from monthly means;

(c) Extremes with dates and hours of occurrence and 5,25, 50, 75 and 95 percentile values for each month;

(d) Number of observations.

Table 4 - Sea-surface temperature

(a) Monthly means;

(b) Mean for the year, computed from monthly means;

(c) Extremes with dates and hours of occurrence and 5, 25, 50, 75 and 95 percentile values for each month;

(d) Number of observations.

Table 5 - Air-sea temperature difference

(a) Monthly means;

(b) Mean for the year, computed from monthly means;

(c) Extremes with dates and hours of occurrence and 5, 25, 50, 75 and 95 percentile values for each month;

(d) Number of observations.

Table 6 - Visibility

(a) Precentage frequency for each month for each code figure 90-99 inclusive (WMO code table 4377);

(b) Annual percentage frequency for each code figure 90-99 inclusive;

(c) Number of days for each month and for the year with W = 90-93 and/or W = 4;

(d) Number of observations.

Table 7 - Weather

(я) Number of days for each month with precipitation, i.e. days when one or more of the ww or W code figures (WMO codes tables 4500 and 4677) listed in subsections *(b)* to (e) were reported (excluding ww =17, 98);

(b) Number of days for each month with rain and/or drizzle (ww = 20, 21, 24, 25, 50-67, 80-82; W = 5, 6, 8);

(c) Number of days for each month with snow or snow and rain (ww = 22, 23, 26, 68-79, 83-86; W =7);

(d) Number of days for each month with hail (ww = 27, 87-90);

(e) Number of days for each month with thunderstorms (ww= 17, 29, 91-99; W = 9);

(f) Number of days for each month with;

(i) Gales (Beaufort force > 8);

(ii) Storms (Beaufort force > 10);

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

(g) Number of complete observing days for items (a) to (f);

(h) Total number of days annually for each item *(a)* to (f);

(i) Monthly percentage frequency of occurrence of precipitation at the time of observation (ww = 50-97, 99);

(j) Annual percentage frequency of occurrence of precipitation at the time of observation (ww = 50-97, 99);

(k) Number of observations for items (i) and *(j);*

(l) If measured, monthly and annual amount of precipitation;

(m) Annual percentage frequency of occurrence of each individual ww code figure 50-97, 99.

NOTE; It is recommended that the number of days with precipitation etc. be obtained by making appropriate entries in the log-book at the end of each day, as shown in the following example;

Precipitation V	Rain or drizzle V	Snow or rain and snow	Hail V	Thunder	Fog V	Gale	Storm	Hurricane

In order to facilitate the computation of the monthly and annual totals, these entries can be punched in fixed columns as "I" on a "day-card". If this is done, the sorting of the international maritime punch cards by the various combinations of ww and W is avoided and an accurate total obtained.

Table 8 - Wind direction and speed

(a) Monthly percentage frequencies for the following ranges of speed:

(i) 0 to 4 knots;
(ii) 5 to 9 knots;
(iii) 10 to 14 knots;
■ (iv) 15 to 19 knots;
(v) 20 to 24 knots;
(vi) 25 to 29 knots;
(vii) 30 to 39 knots;
(viii) 40 to 49 knots, etc;

and for directions by sectors of 30°, true north bisecting the first sector;

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

(c) Monthly percentage frequency of occurrence of observations for each range of speed irrespective of direction;

(d) Mean monthly wind speed in knots, derived from all wind-speed observations;

(e) Mean wind speed for the year, computed from monthly means;

(f) Number of observations corresponding to item *(d)*;

(g) Highest wind speed for each month and for the year, with dates and hours of occurrence;

(h) Vector mean wind for each month and its components (W to E and S to N directions taken as positive).

Table 9 - Sea-level pressure

(a) Monthly means for each hour of observation;

(b) Monthly means for all hours of observation;

(c) Mean for the year, computed from monthly means;

(d) Number of observations;

(e) Extremes with dates and hours of occurrence and 5, 25, 50, 75 and 95 percentile values for each month.

Table 10 - Cloud

(a) Monthly mean total amount for each hour of observation;

(b) Monthly mean for all hours of observation;

(c) Monthly mean for all hours of observation in respect of low cloud only (defined as cloud for which h is any code figure (WMO code table 1600) from 0 to 8 inclusive);

(d) Monthly percentage frequency of observations in the following ranges of total cloud amount (all hours of observing combined):

(i) 2 oktas or less;

(ii) 3 to 5 oktas inclusive;

(iii) 6 to 7 oktas;

(iv) 8 oktas;

(e) As item *(d)*, but for low cloud only;

(f) Percentage frequency of height of low cloud for each month, subdivided into ranges corresponding to WMO code table 1600;

(g) Same for the year for items *(a)* to (f) inclusive computed from the monthly means or frequencies;

(h) Number of observations.

Table 11 - Waves

(a) Seasonal tables, with the first-mentioned parameter arranged along the vertical, containing:

(i) Number of observations of any combination of wave height and period irrespective of direction;

(ii) Number of observations of any combination of wave direction and height irrespective of period;

(iii) Number of observations of any combination of wave direction and period irrespective of height;

(iv) Number of observations of any wave height irrespective of period and direction;

(v) Number of observations of any wave period irrespective of height and direction;

(vi) Number of observations of any wave direction irrespective of height and period;

(vii) Total number of observations;

(b) The following seasons shall be used:

(i) December (of the previous year), January, February, March;

(ii) April, May;

(iii) June, July, August, September;

(iv) October, November;

(c) Starting with data for 1971, wave data should be provided in sets of three tables: direction versus height, direction versus period and height versus period, with a line or column "undeter mined" with respect to wave period and direction, respectively;

NOTE: For the period 1961-1970, data are provided as shown in Figure 1.

(d) Only waves with greatest height should be selected. If two waves in the same observation have equal height, the one with the largest period should be selected. If the periods are also equal or undetermined, the direction of the second wave reported should be used;

(e) . In ten-year summaries the tables as indicated under (a) to (c) above should be included on a monthly basis and, in addition, for seasonal tables as shown in Figure 1.

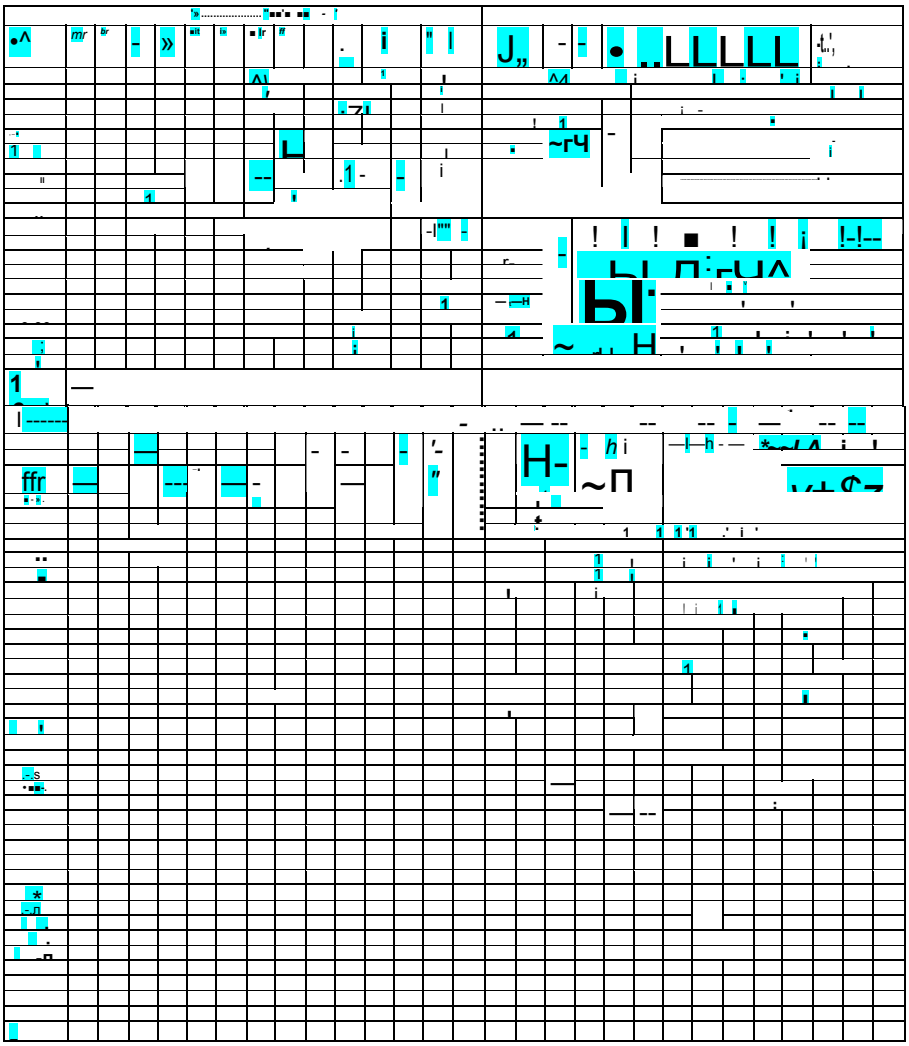


Figure 1 - Monthly percentage frequency of wave directions by specified periods and heights

Legend

X* : Period and direction observed, but not wave height.

X! : Period and height observed, but not wave direction.

X_2 : Direction and height observed, but not wave period. N

N Number of observations.

APPENDIX I.11

(See paragraph 5.3.2.2)

PARAMETERS TO BE INCLUDED IN MARINE CLIMATOLOGICAL SUMMARIES FOR SELECTED REPRESENTATIVE AREAS IN EXTRA-POLAR REGIONS

Table 1 - Mean position of all observations

(a) Monthly mean position of all observations;

(b) Mean position for the year as calculated from the monthly mean positions.

Table 2 - Air temperature

(a) Monthly means;

(b) Mean for the year, computed from monthly means;

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

(d) Monthly and annual total number of observations.

NOTE: The unused higher and lower ranges need not be printed; all intervals between the extreme annual ranges should be retained.

Table 3 - Dew-point temperature

(a) Monthly means;

(b) Mean for the year, computed from monthly means;

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

(d) Monthly and annual total number of observations.

NOTE: See note under Table 2.

Table 4 - Sea-surface temperature

(a) Monthly means;

(b) Mean for the year, computed from monthly means;

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

(d) Monthly and annual total number of observations.

NOTE: See note under Table 2.

Table 5 - Air-sea temperature differences

(a) Monthly means;

(b) Mean for the year, computed from monthly means;

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

(d) Monthly and annual total number of observations.

NOTE: See note under Table 2.

Table 6 - Visibility

(a) Number of observations for each month for each code figure 90-99 (WMO code table 4377);

(b) Total number of observations for the year for each code 90-99;

(c) Monthly and annual total of observations.

Table 7 - Weather

(a) Monthly number of occasions with rain or drizzle at the time of observation (ww = 50-67, 80-82 (WMO code table 4677));

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

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

(d) Monthly number of occasions with thunderstorms at the time of observation (ww = 17, 91-99);

(e) Monthly number of observations with: (i)

Gales (Beaufort force > 8);

(ii) Storms (Beaufort force > 10);

(iii) Hurricane force winds (Beaufort force = 12) at the time of observation;

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

(g) Annual number of occasions for each item (a) to (f);

(h) Monthly and annual total number of observations.

NOTES: (1) A column "VIS < 1 km" (visibility less than 1 km) should be added between the "precipitation" column and the "total number of observations" column.

(2) Responsible Members may include additional non-standard tables for those phenomena which are of importance for particular climatic regions as an appendix to the summary.

Table 8 - Wind direction and force

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

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

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

(d) Mean monthly wind force according to the Beaufort scale, derived from all wind observations;

(e) Mean wind force for the year, computed from monthly means;

(f) Monthly and annual total number of observations.

NOTE: The column "mean force in Beaufort" should be left blank until an appropriate method of representing such a mean is determined.

Table 9 - Sea-level pressure

(a) Monthly means for all hours of observation;

(b) Mean for the year, computed from monthly means;

(c) Frequency table in:

(i) 2-hPa steps between 0° and 30° latitude, based on the intervals 0.0 to 1.9 hPa, e.g. 990.0 to 991.9 hPa;

(ii) 4-hPa steps N of 30°N and S of 30°S, based on the intervals 0.0 to 3.9 hPa, e.g. 996.0 to 999.9 hPa;

(d) Monthly and annual total number of observations.

NOTES: (1) At the bottom of the table, lines should be added showing pressure averages by hour for the 0000, 0600, 1200 and 1800 UTC observations; an account of the number of observations should be included under each list of pressure averages.

(2) See note under Table 2.

Table 10 - Cloud

(a) Monthly mean of total cloud amount;

(b) Monthly mean amount for low cloud only (defined as cloud for which h is any code figure from 0 to 8 inclusive (WMO code table 1600));

(c) Monthly and annual number of observations in the following ranges of total cloud amount: (i) 2 oktas or less;

(ii) 3 to 5 oktas inclusive; (iii) 6 to 7 oktas; (iv) 8 oktas;

(d) Mean for the year for items *(a)* and *(b)*, computed from monthly means;

(e) Monthly and annual total of observations.

NOTE: The table should include the following note: 'Mean low cloud' means amount for low cloud only (defined as cloud for which h is any code figure from 0 to 8 inclusive (WMO code table 1600))".

Table 11 - Waves

Tables as for fixed stations.

APPENDIX I.12

(See paragraph 5.3.2.2)

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

Table 1 - Mean position of all observations

(a) Monthly mean position of all observations;

(b) Mean position for the year as calculated from the monthly mean positions.

Table 2 - Air temperature

(a) Monthly means;

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

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

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

(e) Monthly number of observations.

Table 3 - Dew-point temperature

This table is not included. **Table 4 - Sea-surface temperature**

(a) Monthly means;

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

(c) Monthly number of observations.

Table 5 - Air-sea temperature difference

(a) Monthly means;

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

(c) Monthly number of observations.

Table 6 - Visibility

(a) Number of observations for each month for each code figure 90-99 (WMO code table 4377);

(b) Monthly number of observations.

Table 7 - Weather

(a) Monthly number of occasions with rain or drizzle at the time of observation (ww =50-67, 80-82 (WMO code table 4677));

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

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

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

(e) Monthly number of observations with:

(i) Gales (Beaufort force ≥ 8);

(ii) Storms (Beaufort force ≥ 10);

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

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

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

(h) Monthly number of observations.

Table 8 - Wind direction and force

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

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

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

(d) Monthly number of observations.

Table 9 - Sea-level pressure

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

(b) Fequency table in 4 hPa steps, based on the intervals 0.0 to 3.9 hPa, e.g. 996.0 to 999.9 hPa;

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

(d) Monthly number of observations.

Table 10 - Cloud

(a) Monthly mean of total cloud amount;

(b) Monthly mean amount for low cloud only (defined as cloud for which h is any code figure from 0 to 8 inclusive (WMO code table 1600));

(c) Monthly number of observations in the following ranges of total cloud amount: (i) 2 oktas or less;

(ii) 3 to 5 oktas inclusive;

(iii) 6 to 7 oktas; (iv) 8 oktas;

(d) Monthly number of observations.

Table 11 - Waves

List of original observations or, where number of observations is sufficient, seasonal tables as for fixed ship stations.

APPENDIX I.13

(See paragraph 5.6.1.1)

LAYOUT FOR THE INTERNATIONAL MARITIME METEOROLOGICAL TAPE (IMMT)
[VERSION IMMT-2]

Element number	*Character number*	*Code*	*Element*	*Coding procedure*
		i_T	Format/temperature indicator	3=1MMT format with temperatures in tenths of °C 4=IMMT format with temperatures in halves of °C 5=1MMT format with temperatures in whole °C
2	2-5	AAAA	Year UTC	Four digits
3	6-7	MM	Month UTC	01 -12 January to December
4	8-9	YY	Day UTC	01-31
5	10-11	GG	Time of observation	Nearest whole hour UTC, WMO specifications
6	12	Qc	Ouadrant of the globe	WMO code table 3333
7	13-15	a a a	Latitude	Tenths of degrees, WMO specifications
8	16-19	^o^o^o^o	Longitude	Tenths of degrees
9	20		Cloud height (h) and measuring indicator	0 - h and VV estimated 1 - h measured, W estimated 2 - h and W measured 3 - h estimated, VV measured
10	21	h	Height of clouds	WMO code table 1600
11	22-23	VV	Visibility	WMO code table 4377
12	24	N	Cloud amount	Oktas, WMO code table 2700; show 9 where applicable
13	25-26	dd	True wind direction	Tens of degrees, WMO code table 0877; show 00 or 99 where applicable
14	27	i_w	Indicator for wind speed	WMO code table 1855
15	28-29	ff	Wind speed	Tens and units of knots or metres per second, hundreds omitted; values in excess of 99 knots are to be indicated in units of metres per second and I_w encoded accordingly; the method of estimation or measurement and the units used (knots or metres per second) are indicated in element 14
16	30	s_n	Sign of temperature TTT	Air temperature s_t WMO code table 3845
17	31-33	$T_T T_T T_T$	Air temperature	Tenths of degrees Celsius
18	34		Sign of dew-point temperature	0 - positive or zero measured dew-point temperature 1 - negative measured dew-point temperature 2 - iced measured dew-point temperature 5 - positive or zero computed dew-point temperature 6 - negative computed dew-point temperature 7 - iced computed dew-point temperature
19	35-37	$T_d T_d T_d$	Dew-point temperature	Tenths of degrees Celsius

NOTE: Blanks entered into a record represent missing data

Element Number	*Character Number*	*Code*	*Element*	*Coding procedure*
20	38-41	PPPP	Air pressure	Tenths of hectopascals
21	42-43	WW	Present weather	WMO code table 4677
22	44	W_1	Past weather	WMO code table 4561
23	45	W_2	Past weather	WMO code table 4561
24	46	N_h	Amount of lowest clouds	As reported for C_L or, if no C_L cloud is present, for C_M, in oktas; WMO code table 2700
25	47	C_L	Genus of C_L clouds	WMO code table 0513
26	48	C_M	Genus of C_M clouds	WMO code table 0515
27	49	C_H	Genus of C_H clouds	WMO code table 0509
28	50	s_n	Sign of sea-surface temperature	WMO code table 3845
29	51-53	T T T	Sea surface temperature	Tenth of degrees Celsius
30	54		Indicator for sea-surface temperature measurement	0 - Bucket thermometer 1 - Condenser inlet 2 - Trailing thermistor 3 - Hull contact sensor 4 - "Through hull" sensor 5 - Radiation thermometer 6 - Bait tanks thermometer 7 - Others
31	55		Indicator for wave measurement	Shipborne wave recorder: 0 - Wind sea and swell estimated; 1 - Wind sea and swell measured; 2 - Mixed wave measured, swell estimated; 3 - Other combinations measured and estimated Buoy: 4 - Wind sea and swell measured; 5 - Mixed wave measured, swell estimated; 6 - Other combinations measured and estimated Other measurement system: 7 - Wind sea and swell measured; 8 - Mixed wave measured, swell estimated; 9 - Other combinations measured and estimated
32	56-57	P_WP_W	Period of wind waves or of measured waves	Whole seconds; show 99 where applicable in accordance with Note (3) under specification of P_WP_W in the *Manual on Codes*
33	58-59	H_WH_W	Height of wind waves or of measured waves	Half-metre values. Examples: Calm or less than 1/4m to be encoded 00; 3^T to be encoded 07; 7m to be encoded 14; ll^m to be encoded 23
34	60-61	$d_{wl}d_{wl}$	Direction of predominant swell waves	Tens of degrees, WMO code table 0877; encoded 00 or 99 where applicable. Blanks = No observation of waves attempted
35	62-63	Pwl^wl	Period of predominant swell waves	Whole seconds; encoded 99 where applicable (see under element 32)
36	64-65	$H_{wl}H_{wl}$	Height of predominant swell waves	Half-metre values (see under element 33)
37	*66*	I_s	Ice accretion on ships	WMO code table 1751
38	67-68	E_cE_t	Thickness of ice accretion	In centimetres

Element Number	*Character Number*	*Code*	*Element*	*Coding procedure*	
39	69	R_s	Rate of ice accretion	WMO code table 3551	
40	70		Source of observation	0 - Unknown 1 - Logbook *2* - Telecommunication channels 3 - Publications	National
				4 - Logbook 5 • Telecommunication channels 6 - Publications	International data exchange
	71		Observation platform	0 - unknown 1 • Selected ship 2 - Supplementary ship 3 - Auxiliary ship 4 - Automated station/data buoy 5 - Fixed sea station 6 - Coastal station 7 - Aircraft 8 - Satellite 9 - Others....	
41					
42	72-78		Ship identifier	Ship's call sign or other identifier encoded as follows: 7 characters call sign Columns 72-78 6 characters call sign Columns 72-77 5 characters call sign Columns 72-76 4 characters call sign Columns 72-75 3 characters call sign Columns 72-74	
43	79-80		Country which has recruited the ship	According to numbers assigned by WMO	
44	81		National use		
45	82		Quality control indicator	0 - No quality control (QC) 1 - Manual QC only 2 - Automated QC only (no time-sequence checks) 3 - Automated QC only (inc. time sequence checks) 4 - Manual and automated QC (superficial; no automated time-sequence checks) 5 - Manual and automated QC (superficial; including time-sequence checks) 6 - Manual and automated QC (intensive, including automated time-sequence checks) 7 & 8 - Not used 9 - National system of QC (information to be furnished to WMO)	
46	83	i_w	Weather data indicator	1 - Manual 4 - Automatic	If present and past weather data included Code tables 4677 and 4561 used If present and past weather data included Code tables 4680 and 4531 used
				7 - Automatic	
47	84	i_R	Indicator for inclusion or omission of precipitation data	WMO code table 1819	
48	85-87	RRR	Amount of precipitation which has fallen during the period preceding the time of observation, as indicated by t_R	WMO code table 3590	
49	88		Duration of period of reference for amount of precipitation, ending at the time of the report	WMO code table 4019	

Element Number	*Character Number*	*Code*	*Element*	*Coding procedure*
50			Sign of wet-bulb temperature	0 - positive or zero measured wet-bulb temperature 1 - negative measured wet-bulb temperature 2 - iced measured wet-bulb temperature 5 - positive or zero computed wet-bulb temperature 6 - negative computed wet-bulb temperature 7 - iced computed wet-bulb temperature
51	90-92 93	$T_b T_b$	Wet-bulb temperature	In tenths of degree Celsius, sign given by element 50
52	94-96	a	Characteristic of pressure tendency during the three hours preceding the time of observation	WMO code table 0200
53	*97*	ppp	Amount of pressure tendency at station level during the three hours preceding the time of observation	in tenths of hectopascal
54	**98**	D_s	True direction of resultant displacement of the ship during three hours preceding the time of observation	WMO code table 0700
55		v_s	Ship's average speed made good during the three hours preceding the time of observation	WMO code table 4451
56	99-100	$d_{w2}d_{w2}$	Direction of secondary swell waves	Tens of degrees, WMO code table 0877; encoded 00 or 99 where applicable. Blanks = No observation of waves attempted
57	101-102	P_{w2}	Period of secondary swell waves	Whole seconds; encoded 99 where applicable (see under element 32)
58	103-104	$H_{w2}H_{w2}$	Height of secondary swell waves	Half-metre values (see under element 33)
59	105	C_j	Concentration or arrangement of sea ice	WMO code table 0639
60	106	S_i	Stage of development	WMO code table 3739
61	107	b_j	Ice of land origin	WMO code table 0439
62	108	D_i	True bearing of principal ice edge	WMO code table 0739
63	109	Z_j	Present ice situation and trend of conditions over preceding three hours	WMO code table 5239
64	110		FM 13 code version	0 = previous to FM 24-V 1 = FM 24-V 2 = FM 24-VI Ext. 3 = FM 13-V1I 4 = FM 13-VIII 5 = FM 13-VIII Ext. 6 = FM 13-IX 7 = FM 13-IX Ext. 8 = FM 13-X, etc.
65	111		IMMT version	0 = IMMT version just prior to version number being included 1 =IMMT-1 (previous version) 2 = IMMT-2 (this version) 3 = IMMT-3 (next version), etc.
66	112	Q_j	Quality control indicator for (h)	0 - no quality control (QC) has been performed in this element 1 - QC has been performed; element appears to be correct

Element Number	*Character Number*	*Code*	*Element*	*Coding procedure*
				2 • QC has been performed; element appears to be inconsistent with other elements 3 - QC has been performed; element appears to be doubtful 4 - QC has been performed; element appears to be erroneous 5 - The value has been changed as a result of QC 6 - 8 Reserve 9 - The value of the element missing
67	113	02	QC indicator for (VV)	- idem -
68	114	03	QC indicator for (clouds: elements 12, 24-27)	- idem -
69	115	04	QC indicator for (dd)	- idem -
70	116	05	QC indicator for (ff)	- idem -
71	117	06	QC indicator for (TTT)	- idem -
72	118	07	QC indicator for ($T_dT_dT_d$)	- idem -
73	119	08	QC indicator for (PPPP)	- idem -
74	120	09	QC indicator for (weather: elements 21-23)	- idem -
75	121	010	QC indicator for ($T_wT_wT_wT_w$)	- idem -
76	122	011	QC indicator for (P_wP_w)	- idem -
77	123	012	QC indicator for (H_wH_w)	- idem •
78	124	013	QC indicator for (swell: elements 34-36, 56-58)	- idem -
79	125	014	QC indicator for (i_RRRRt_R)	- idem -
80	126	015	QC indicator for (a)	- idem -
81	127	016	QC indicator for (ppp)	- idem -
82	128	017	QC indicator for (D_s)	- idem -
83	129	018	QC indicator for (v_s)	- idem •
84	130	019	QC indicator for ($T_bT_bT_b$)	- idem -
85	131	020	QC indicator for ships' position	- idem -
87			Minimum quality control (MQC) standards version identification	1 = MQC-I (Original version) 2 = MQC-II (Version 2, May 1996) 3 = MQC-IH (Version 3, May 2000) 4 = MQC-IV (Version 4, June 2001)
		HDG	Ship's heading; the direction to which the bow is pointing, referenced to true North	(000-360); e.g. 360 = North 000 = No movement 090 = East
86	132	COG 021		
	133-135 136-138		Ship's ground course; the direction the vessel actually moves over the fixed Earth and referenced to true North	(000-360); e.g. 360 = North 000 = No movement 090 = East

Element Number	*Character Number*	*Code*	*Element*	*Coding procedure*
89	139-140	SOG	Ship's ground speed; the speed the vessel actually moves over the fixed Earth	(00-99); Round to nearest whole knot
90	141-142	SLL	Maximum height in metres of deck cargo above summer maximum load line	(00-99); Report to nearest whole metre
91	143-145	SLhh	Departure of reference level (summer maximum load line) from actual sea level. Consider the difference positive when the summer maximum load line is above the level of the sea and negative if below the water line	Position 143 (s_L) sign position; 0 = positive or zero, I - negative Positions 144-145 (hh); (00-99) is the difference to the nearest whole metre between the summer maximum load line and the sea level
92	146-148	RWD	Relative wind direction in degrees off the bow	Relative wind direction; e.g. 000 = no apparent relative wind speed (calm conditions on deck). Reported direction for relative wind = 001-360 degrees in a clockwise direction off the bow of the ship. When directly on the bow, RWD = 360
93	149-151	RWS	Relative wind speed reported in units indicated by i_w (knots or m s^{-1})	Reported in either whole knots or whole metres per second (e.g. 010 knots or 005 ms^{-1}). Units established by i_w as indicated in character number 27

NOTES:

(1) Since the relative wind speed can be greater than the true wind speed, e.g., i_w indicates knots and ff - 98, the relative wind speed may be 101 knots; therefore, three positions must be allocated since i_w cannot be adjusted and the relative wind speed converted to metres per second as is done in element 15.

(2) Most of the codes (groups of letters) in the IMMT format with the exception of those added for the VOSClim Project are defined in the *Manual on Codes* (WMO-No. 306) as they basically mirror the code groups used in the FM 1 3-X SHIP code. Because CBS did not agree to expand the FM 13-X SHIP code for the VOSClim Project, the additional observed elements (selected codes) will not appear in the WMO *Manual on Codes*. Therefore an effort was made to select unique codes (groups of letters) not defined in the WMO *Manual on Codes* for the elements added to the IMMT-2 format version modified for the VOSClim Project. This was deliberately done to try and prevent a difference in meaning for a given code group (identical symbolic letters) in the WMO *Manual on Codes* versus that in IMMT.

APPENDIX I.14

(See paragraph 5.6.1.3)

LAYOUT FOR MARITIME METEOROLOGICAL TAPE FOR POSSIBLE USE IN NATIONAL AND BILATERAL DATA EXCHANGE

Element No.	Element	Character No,
1	Format and temperature indicator (Same as Col. 1 of IMMPC) ■Oт)	**1**
2	AA	**2-3**
3	MM	**4-5**
4	YY	**6-7**
S	GG	**8-9**
6	i_w	**10**
7	Q	**11**
8	$L_aL_aL_a$	**12-14**
9	U-oLo	**15-17**
10	Indicator for h and W	**18**
11	h Qi	**19** **20**
12	**W** **0г**	**21-22** **23**
13	**N** **03**	**24**
14	dd 04	**25-26** **27**
15	ff Qs	**28-29** **30**
16	Sn	**31**
17	**TTT** Об	**32-34** **35**
18	Sign of reported wet-bulb or dew-point temperature i	***36***
19	Wet-bulb/dew-point temperature 07	37-39 40
20	**PPPP** 08	41-44 45
21	ww	46-47
22	WT	48
23	W_2 09	49 50
24	N_h	51
2S	**C_L**	52

Element No.	Element	Character No
26	^{c}M	53
27	$\mathbf{c_H}$	54
	$\mathbf{O_3}$	55
28	Sn	56
29	'w'w'w	57-59
	Qio	60
30	Indicator for SST measurement	61
31	Indicator for wave measurement	62
32	■ЛлЛу	63-64
	Qii	65
33	H_wH_w	66-67
	Ql2	68
34	$d_{w1}d_{w1}$	69-70
35	PwlPwl	71-72
36	H_{w1} H^-'	73-74
	Qi3	
37	$\mathbf{I_s}$	75
38	E_sE_s	76-77
39	***K***	78
40	Source of observation	79
41	Observation platform	80
42	Ship identifier	81-87
43	Country which has recruited ship	88-89
44	Quality control indicator	90
45	!<	91
46	National use	92
47	***k***	***93***
48	**RRR**	94-96
	Ql4	97
49	tR	98
50	Sign of computed wet-bulb or dew-point temperature	99
51	Computed wet-bulb or dew-point temperature	100,102
52	a	103
	Ql5	104
S3	ppp	105-107
	Qi6	108
54	D_s	109
	Ql7	110
55.	^{v}s	111
	Ql8	112

cnt No.	Element	Character No.
56	$^{d}w2^{H}w2$	113-114
57	Pw_2Pw2	115-116
58	$Hw2^{H}w2$	117-118
	Ql3	119
59	<H	120
60	s_i	121
61	b_i	122
62	Di	123
63	Z	124

Quality control indicators (Qi to Qi_8) for elements indicated in brackets

Qi(h)	20
02 (W)	23
O_3 (clouds: elements 13, 24-27	55
Q_4(dd)	27
Qs(A)	30
OбOTT)	35
Q7 (wet bulb/dew point)	40
Qs (PPPP)	45
Q_9 (weather: elements 21, 22, 23)	50
QlO ($^{T}w^{T}w^{T}w$)	60
Qii(PwPw)	65
Qi2 (H_WH_W)	68
Q_{13} (swell: elements 34-36, 56-58)	119
$Q_M(i_RRRRt_R)$	97
Qi5 (a)	104
Qió(PPP)	108
Qi7(D_s)	110
Ql8(V_s)	112

Specifications for quality control indicators Qj to Qig

0	No quality control (QC) has been performed on this element
1	QC has been performed; element appears to be correct
2	QC has been performed; element appears to be inconsistent with other element
3	QC has been performed; element appears to be doubtful
4	QC has been performed; element appears to be erroneous
5	The value has been changed as *a* result of QC
6 - 8	Reserve
9	The value of the element is missing

APPENDIX I.15

(See paragraph 5.6.3.1)

MINIMUM QUALITY CONTROL STANDARDS

(VERSION 4, JUNE 2001)

NOTE: See specification for quality control indicators Qj to Q20 at the end of this appendix. Д = space (ASCII 32)

Element	*Error*	*Action*
1	i_T Ф 3-5	Correct manually, otherwise = Д
2	AAAA Ф valid year	Correct manually otherwise reject
3	MM Ф 01-12	Correct manually otherwise reject
4	YY Ф valid day of month	Correct manually otherwise reject
5	G Ф 00-23	Correct manually otherwise reject
6	Q#l,3,5, 7 Q_=A	Correct manually and Q20 = 5, otherwise Q20. = 4 Q20-2
7	$L_aL_aL_a$ Ф 000-900 $L_aL_aL_a$ = ДДД	Correct manually and Q20 = 5, otherwise Q20 = 4 Q_2o = 2 Correct manually and Q_2o = 5, otherwise Q_2o = 4 Q20-2
8	$L_0L_0L_0L_0$ Ф 0000-1800 $L_0L_0L_0L_0$ = ДДДД	$L_aL_aL_a = L_0L_0L_0L_0$ = ДДД(Д) Correct manually otherwise reject

Time sequence checks

	Change in latitude > 0.7°/hr	Correct manually otherwise Q20 = 3
	Change in longitude > 0.7°/hr when latitude 00-39.9	Correct manually otherwise Q_2Q = 3
	Change in longitude > 1.0°/hr when latitude 40-49.9	Correct manually otherwise Q20 = 3
	Change in longitude > 1.47hr when latitude 50-59.9	Correct manually otherwise Q20 = 3
	Change in longitude > 2.07hr when latitude 60-69.9	Correct manually otherwise Q20 = 3
	Change in longitude > 2.7°/hr when latitude 70-79.9	Correct manually otherwise Q20 = 3
9		No checking
10	h Ф 0-9, Д	Correct manually and Qj = 5, otherwise Qj = 4 Ql=9
11	Ь = Д VV Ф 90-99, ДД	Correct manually and Q_2 = 5, otherwise Q_2 = 4 02 = 9
12	УУ=ДД N Ф 0-9, Д, /	Correct manually and Q3 = 5, otherwise Q3 = 4 Correct manually and Q3 = 5, otherwise Q3 = 2
	N<Nh	

Element	*Error*	*Action*
13	dd Φ 00-36, 99	Correct manually and Q4 = 5, otherwise 04 = 4
	dd = ДД, //	
	dd versus ff	
	dd = 00, ff = 00	Correct manually and 04 or Q5 = 5 otherwise
	dd Φ 00, ff = 00	Correct manually and Q4 or 05 = 5 otherwise Q4 = Q5 = 2
14	i_w Φ 0, 1, 3, 4	Correct manually, otherwise Q5 = 4
15	ff > 80 knots ,	Correct manually and Q5 = 5, otherwise Q5 = 3
	ff = AA,//	Qs = 9
16	s_n * 0, 1	Correct manually, otherwise Qg = 4
17	TTT = ДДД, ///	Об = 9
	If-25>TTT>40then	
	when latitude < 45.0	
	TTT<-25	
	TTT>40	
	when latitude > 45.0	
	TTT<-25	Об = 3
	TTT>40	

TTT versus humidity parameters

			manually and Q_i = 5, otherwise Qg = Q_{19} = 2 manually and Qg = Q7 = 5, otherwise C^ = Q_7 = 2
18			manually, otherwise Q_7 =4
19			manually and Q_7 = 5, otherwise Q_7 = Q_{19} = 2 manually and Q_7 = 5, otherwise Q_7 = Qg = 2
20			manually and Qg = 5, otherwise Qa = 3 manually and Qs = 5, otherwise Qg = 4
21			manually and Q_9 = 5, otherwise Q_9 = 4
	TTT < WB (wet bulb)	Correct	
	TTT < DP (dew point)	Correct	
	s_t Φ 0, 1, 2, 5, 6, 7, 9	Correct	
22,23	DP>WB	Correct	
	DP > TTT	Correct	
	WB = DP = ДДД	0.7 = 9	
24-27	930 > PPPP > 1050 hPa	Correct	
	870 > PPPP > 1070 hPa	Correct	
	PPPP = ДДДД	Qs = 9	
	ww = 22-24, 26, 36-39, 48,	Correct	
28			
29			

49, 56, 57, 66-79, 83-88, 93-94 and latitude < 20° ww = ДД, //	$Q_9 = 9$
Wj or W_2 = 7 and latitude <20° W!<W_2 Wj = W_2 = Д, /	Correct manually and Q_9 = 5, otherwise Q_9 = 4 Correct manually and Q_9 = 5, otherwise Q_9 = 2 Q_9 = 9
N = 0 and $N_h C_L C_M C_H$ Ф 0 N = Д and $N_h C_L C_M C_H$ Ф Д N = 9 and not (N_h = 9 and $^{c}L^{c}M^{c}H$ * Л)	Correct manually and Q3 = 5, otherwise Q3 = 2 Correct manually and Q3 = 5, otherwise Q3 = 2 Correct manually and Q3 = 5, otherwise Q3 = 2
N = Д,/ and $N_h C_L C_M C_H$ = Д,/	Cb = 9
s_n Ф 0, 1	Correct manually otherwise Q_{10} = 4
$T_W T_W T_W$ = A,/// if-2.0 > $T_W T_W T_W$ > 37.0 then	Control manually and Q_{10} = 5, otherwise Q_{10} = 4 Control manually and Q_{10} = 5, otherwise Q_{10} = 3
when latitude < 45.0 $T_w T_w T_w$<-2.0 $T_W T_W T_W$>37.0 when latitude ≥ 45.0 $T_W T_W T_M$ < -2.0	Control manually and Q_{10} = 5, otherwise Q_{10} = 3 Control manually and Q_{10} = 5, otherwise Q_{10} = 4

(

Element	*Error*	*Action* Correct manually, make it Д if not
30 31	Indicator Ф 0-7, Д	correctable Correct manually, make it Д if not correctable
32	Indicator Ф 0-9, Д	Qn = 3 Qli = 4 Qll=9
33	20 < P_WP_W < 30 P_WP_W > 30 and Ф 99 P_WP_W = ДЛ, // 35 < H_WH_W < 50 H_WH_W > 50 H_WH_W = ДД, //	Qi2 = 3 Qiz-9
34	d_{wl} d_{wl} Ф 00-36, 99, ДД swell$_1$ = swell$_2$ = A	Correct manually and Q_{13} = 5, otherwise Q_{13} = 4 Qi3 = 9
35	25 < $P_{wl}P_{wl}$ < 30 $P_{wl}P_{wl}$ > 30 and Ф 99	Qi3 = 3 Ql3 = 4
36	35 < $H_{wl}H_{wl}$ < 50 H_wiH_{wl} > 50	Qi3 = 3 Ql3 = 4
37	I_s Ф 1-5, Д	Correct manually, otherwise Д
38	E_SE_S Ф 00-99, ДД	Correct manually, otherwise ДД
39	R_s Ф 0-4, Д	Correct manually, otherwise Д
40	Source Ф 0-6	Correct manually, otherwise Д
41	Platform Ф 0-9	Correct manually, otherwise Д
42	No call sign	Insert manually, mandatory entry
43	No country code	Insert manually
44		No quality control
45	Q*0-6, 9	Correct manually, otherwise Д
46	i_x#l-7	Correct manually, otherwise Д
47	i_R = 0-2 and RRR = 000, ///, ДДД i_R = 3 and RRR Ф000, ///, ДДД i_R = 4 and RRR Ф///, ДДД i_R*0-4	Correct manually, otherwise Q_{14} = 4 Correct manually, otherwise Q_{14} = 2 Correct manually, otherwise Q_{14} = 2 Correct manually, otherwise Q_{14} = 4
48	RRR Ф001-999 and i_R = 1, 2	Correct manually and Q_{14} = 5, otherwise Q_{14} = 2
49	t_R*0-9	Correct manually and Q_{14} = 5, otherwise Q_{14} = 4
50	s_w*0, 1,2,5,6, 7,9	Correct manually, otherwise Q_{19} = 4
51	WB<DP WB = ///, ДДД WB>TTT	Correct manually and Q_{19} = 5, otherwise Q_{19} = Q_7 = 2 Q_{19} = 9 Correct manually and Q_{19} = 5, otherwise Q_{19} = C^ = 2
52	a Ф0-8, Д a = 4 and ppp Ф000 a = 1, 2, 3, 6, 7, 8 and ppp = 0	Correct manually and Q_{15} = 5, otherwise Q_{15} = 4 Correct manually and Q_{15} or Q_{16} - 5, otherwise Qi5-Qi6 = 2 Correct manually and Q_{15} or Q_{16} = 5, otherwise Qi5=Qi6 = 2 Qi5=9
53	a = Д 250 > ppp > 150 ppp > 250 ppp = ДДД	Correct manually and Q_{16} = 5, otherwise Q_{16} = 3 Correct manually and Q_{16} = 5, otherwise Q_{16} = 4 Qi6 = 9
54	D_s Ф 0-9, Д, /	Correct manually and Q_{17} = 5, otherwise Q_{17} = 4 Qi7 = 9

Element	*Error*	
55	V_s Ф 0-9, Д, / V_S = A,/	Легши Correct manually and Q_{18} = 5, otherwise Q_{1S} = 4
56	$d_{w2}d_{w2}$* 00-36, 99	
57	$25<P_{w2}P_{w2}<30$ $^{P}w2^{P}w2$ ^ 30 and * 99	Correct manually and Q_{13} = 5, otherwise Q_{13} = 4 Qi3 = 3 Ql3 = 4
58	$35<H_{w2}H_{w2}<50$ $^{H}w2^{H}w2$ ^ 50	Qn = 3 Qi3 = 4
59	C_i * 0-9, Д, / ,	Correct manually, otherwise Д
60	S_i * 0-9, Д, /	Correct manually, otherwise Д
61	bj 5t 0-9, Д, /	Correct manually, otherwise Д
62	Dj Ф 0-9, Д, /	Correct manually, otherwise Д
63	Zj * 0-9, Д, /	Correct manually, otherwise Д
86	Minimum quality control (MQC) standards version idenification	1 = MQC-I (Original version) 2 = MQC-II (Version 2, May 1996) 3 = MQC-III (Version 3, May 2000) 4 = Present version

Specifications for quality control Indicators Q, to Q_2i>

0	No quality control (QC) has been performed on this element
1	QC has been performed; element appears to be correct
2	QC has been performed; element appears to be inconsistent with other elements
3	QC has been performed; element appears to be doubtful
4	QC has been performed; element appears to be erroneous
5	The value has been changed as a result of QC
6	Reserved for GCC
7	Reserved for GCC
8	Reserve
9	The value of the element is missing

APPENDIX I.16

(see paragraph 5,6.4.3)

HISTORICAL SEA-SURFACE TEMPERATURE (HSST)DATA EXCHANGE FORMAT

									WIND	WIND	AIR	SEA	CD	MSQ
O	LAT	LON	YR	MO	DA	HR	DIRECT	SPD	TEMP	TEMP	AREA			
XXX	XXX	X	XXX	XXXX	XXX	XX	XX	XX	¡XX	iXXX	XXX	XXX	XXXX	

Field	Column	Element *
001	1-3	Card deck number in TDF-11
002	4-6	Marsden 10° square
003	7	Quadrant
004	8-10	Latitude
005	11-14	Longitude
006	15-17	Year (last three digits, i.e. 927 = 1927)
007	18-19	Month
008	20-21	Day
009	22-23	Hour - UTC
010	24-26	Wind direction and indicator
011	27-30	Wind speed and indicator
012	31-33	Air temperature
013	34-36	Sea-surface temperature
014	37-40	Area

* TDF-11 describes elements

Logical rec. = 40
Blocking factor = 100

HSST Data **Set - Extended format for Atlantic and Indian Oceans and Mediterranean Data**

CHARACTER UK/US	NOTATION NL/DI.		RECORD IDENTIFIER
		M D	Historical Marine Data
			Identifies the origin of the lape
			Octant
8	3		Square number
9 10	4 5		Month
11 12 13 14	6 - 7 8 9		Year
IS 16 1? 18 19 20 21 Z2	10 11 12 13 14 15 16 17	Position Unit and	Latitude tenths Longitude Day of month I Iour of day (00-23 UTQ
23 24 25 26	18 19 20 21	+, -	Sea temperature (tenths of °C)
27 28 29 30 31 32 33 34 35 36 37	22 23 24 25 26 27 28 29 30 31 32	+,-■*-, -, e	Air temperature (tenths of °C) e = Ice Wet-bufb temperature (tenths of °C) 000 = calm Wind direction (whole degrees) 990 = variable 999 = missing
38 39 40	33 34 35		Wind speed (tenths of m/s)
41 42 43 44 45	36 37 38 39 40		Barometric pressure (tenths of hPa)
46	41		Total cloud amount (oktas)
47	42		Flags for sea temperature
48	43		Flags for air temperature
49	44		Flags for wind
50 51	45 46	F sus 1 F sus 2	Flags for suspect values

Codes for flag characters

Flags for sea temperatures and state of wet bulb

F sea

0 Sea temperature measured to 0.1°F accuracy
1 Sea temperature measured to 0.1°C accuracy
2 Sea temperature measured to 0.5°F accuracy
3 Sea temperature measured to 0,5°C accuracy
4 Sea temperature measured to 1°F or 1°C accuracy
5)
6) As for codes 0-4, but also the wet bulb is not frozen,
7) even when showing temperature below freezing point 8) 9)

Flags for dry-bulb and wet-bulb temperatures

F air

0 Air temperatures measured to 0.1°F accuracy
1 Air temperatures measured to 0.1°C accuracy
2 Air temperatures measured to 0.5"F accuracy
3 Air temperatures measured to 0.5°C accuracy
4 Air temperatures measured to 1°F or 1°C accuracy 5)
6) As for codes 0-3, but temperatures were measured by an
7) aspirated or whirling psychrometer 8) 9Original units of temperature or accuracy unknown

Flags for wind observations

0	360 point compass	Wind speed measured
1	36 point compass	
2	32 point compass	
3	16 point compass	
4	8 point compass	

5)
6) As for codes 0-4, but wind speed estimated or converted
7) from Beaufort force, or method of observation unknown 8)
9)

Flags for suspect values of sea temperature, air temperature and wind

F sus /

0 No suspect element
+1 Sea temperatures > 97°F (36.1°C)
+2Dry bulb or wet bulb not in range -5°F to 99.9°F (-20.5°C to 37.7°C) or wet bulb > dry bulb
+4 Wind direction 990 (variable) and wind speed > 5 kt

Flags for suspect values of pressure and cloud amount

F sus 2

0 No suspect pressure or cloud amount
+1 Pressure < 940 or > 1050 (pressures < 800 or > 1080 have been rejected)
+2 Cloud amount not reported
+4Additional observation at the same time in the same 1° square, though not identical

The values of F sus 1 and F sus 2 may also be 3, 5, 6 or 7. This means that more than one value is suspect, and the code figures have been added together for the suspect values.

APPENDIX I.17

(See paragraph 6.2.2.4.1)

EXCHANGE FORMAT FOR SEA SURFACE CURRENT DATA OBTAINED FROM SHIP'S SET AND DRIFT

Columns		Item	Code figure	Code definition	Remarks
1-2		Year	00-99	Last two figures of year	Of mid-position
3-4		Month	01-12	January-December	Of mid-position
5-15		Mid-position		Midpoint between "from" and "to" positions	
	5-6	Day	01-31	Day of month	
	7	Octant	0-3, 5, 8	WMO code table 3300	
	8-11	Latitude	0000-9000	Degrees and minutes	
	12-15	Longitude	0000-9959	Degrees and minutes	Without hundreds
16-21		Current			
	16-18	Direction	000-360	Whole degrees, true	000 - no current
	19-21	Rate	000-999	Tenths of knots	
22-37		Position from			
	22-23	Day	01-31	Day of month	
	24-47	Time	0000-2359	Hours and minutes (UTC)	
	28	Octant	0-3, 5-8	WMO code table 3300	
	29-32	Latitude	0000-9000	Degrees and minutes	
	33-36	Longitude	0000-9959	Degrees and minutes	Without hundreds
	37	Method of position fix	0-9	(See page I.17-3)	
38-55		Distance run through water			
38-43		FiiSt part			
	38-40	Course, allowing for leeway	000-360	Whole degrees, true	000 = ship stopped
	41-43	Distance	000-999	Whole nautical miles	
44-49		Second part			

Columns		Item	Code Figure	Code definition	Remarks
	44-46	Course, allowing for leeway	000-360	Whole degrees, true	000 = ship stopped
	47-49	Distance	000-999	Whole nautical miles	
S0-S5		Third part			
	50-52	Course, allowing for leeway	000-360	Whole degrees, true	000 - ship stopped
	53-55	Distance	000-999	Whole nautical miles	
56-71		Position to			
	56-57	Day	01-31	Day of month	
	58-61	Time	0000-2359	Hours and minutes (UTC)	
	62	Octant	0-3, 5-8	WMO code table 3300	
	63-66	Latitude	000-9000	Degrees and minutes	
	67-70	Longitude	0000-9959	Degrees and minutes	Without hundreds
	71	Method of posi-	0-9	(See page 1.17-3)	
		tion fix	0-9	(See page 1.17-3)	
72		Ship's draught	00-99	Country which recruited the ship	As.for IMMPC
73-74		Country	0,1,2	(See page 1.17-3)	
75		Indicator			Concerning columns 76-80
76-80		Ship number			Or call sign, or log-book number

Magnetic tape standards for exchange of sea surface current data obtained from ship's set and drift:

Tape width	1/2 inch
Density	800 bits per inch
Recording mode	EBCDIC
Tracks Tape label	9
Record length	Unlabclled
Record type	80 bytes
Blocking factor	Fixed block
	10

Code specifications for columns 37, 71, 72 and 75 of the sea surface current data exchange format

Column	Item	Specification
37 and **71**	Method of position fix	0 (not allocated) 1 Land fix 2 Running land fix 3 Astro fix (two or more simultaneous bodies) 4 Running solar fix S (Not allocated) 6 Radio fix (D/F) 7 Radar fix 8 Electronic fix (accurate at short range) 9 Electronic fix (accurate at long range)
72	Ship's draught	0 0-4 m 1 5-9 m 2 10-14 m 3 15-19 m 4 20-24 m 5 25-29 m 6 30-34 m 7 35-39 m 8 40-44 m 9 45 m or more
75	Indicator for columns 76-80	0 Ship number **1** Call sign 2 Log-book number

PART I BIS

SERVICES FOR THE HIGH SEAS

1. GENERAL

Marine meteorological services for the high seas shall include:

(a) Provision of warnings and weather and sea bulletins;

(b) Marine meteorological support for maritime search and rescue;

(c) Provision of information by radio facsimile;

(d) Marine climatological summaries scheme;

(e) Provision of special marine climatological information;

(f) Provision of marine meteorological information and expert advice.

2. PROVISION OF WARNINGS AND WEATHER AND SEA BULLETINS (GMDSS APPLICATION)

(The Global Maritime Distress and Safety System (GMDSS) application is compatible with, and required by, the radiocommunication provisions of the 1988 SOLAS amendments via the NAVTEX, International SafetyNET and high frequency Maritime Safety Information (MSI) Services. See Appendix I-1 bis for glossary of terms.)

2.1 Principles

The principles for the preparation and issue of warnings and weather and sea bulletins are as follows:

Principle 1

For the purpose of the preparation and issue of meteorological warnings and the regular preparation and issue of weather and sea bulletins, the oceans and seas are divided into areas for which National Meteorological Services assume responsibility.

Principle 2

The areas of responsibility together provide complete coverage of oceans and seas by meteorological information contained in warnings and weather and sea bulletins for the high seas.

Principle 3

The issue of meteorological warnings and routine weather and sea bulletins for areas not covered by NAVTEX shall be by the International SafetyNET Service for the reception of MSI in compliance with SOLAS, Chapter IV — Radiocommunications.

NOTE: In addition, National Meteorological Services may have to prepare and/or issue warnings and routine forecasts for transmission by a high frequency direct-printing telegraphy maritime safety information service for areas where such a service is provided for ships engaged exclusively on voyages in such areas.

Principle 4

The preparation and issue of warnings and weather and sea bulletins for areas of responsibility are coordinated in accordance with the procedures mentioned in section 2.2.

Principle 5

The efficiency and effectiveness of the provision of warnings and of weather and sea bulletins are monitored by obtaining opinions and reports from marine users.

Principle 6

Maritime safety information broadcasts are monitored by the originating issuing service to ensure the accuracy and integrity of the broadcast.

2.2 Procedures

2.2.1 *Definitions*

2.2.1.1 A preparation service is a National Meteorological Service which has accepted responsibility for the preparation of forecasts and warnings for parts of, or an entire, designated area (Metarea) in the WMO system for the dissemination of meteorological forecasts and warnings to shipping under the GMDSS and for their transfer to the relevant issuing service for broadcast.

2.2.1.2 An issuing service is a National Meteorological Service which has accepted responsibility for ensuring that meteorological forecasts and warnings for shipping are disseminated through the Inmarsat SafetyNET service to the designated area for which the Service has accepted responsibility under the broadcast requirements of the GMDSS. The forecasts and warnings for broadcasts may have been prepared solely by the issuing service, or by another preparation service, or a combination of both, on the basis of negotiations between the services concerned, or otherwise, as appropriate. The issuing service is responsible for composing a complete broadcast bulletin on the basis of information input from the relevant preparation services and for inserting the appropriate enhanced group call (EGC) header, as specified in Appendices I-4 and I-5 of the *Manual on Marine Meteorological Setvices* and Annex *4(b)* of the *International SafetyNET Manual.* Procedures for any modifications by issuing services to information provided by preparation services, and for the choice of appropriate Cj, C_2 and C_3 codes for the broadcast of this information, should be developed by bilateral agreement between the services concerned. The issuing service is also responsible for monitoring the broadcasts of information to its designated area of responsibility.

NOTES: (1) For some Metareas there may be only one preparation service, which will be the same National Meteorological Service as the issuing service (e.g. United Kingdom for area I, Argentina for area VI and Australia for area X).

(2) An appropriate format for the attribution of the origins of the forecast and warning information contained in a broadcast bulletin may be developed on the basis of negotiations among the services concerned.

(3) In situations where appropriate information, data or advice from other designated preparation services for a given Metarea is not available, it is the responsibility of the issuing service for that area to ensure that complete broadcast coverage for the area is maintained.

2.2.2 *Areas of responsibility**

2.2.2.1 Areas of responsibility and the responsible services for the preparation and issue of warnings, weather and sea bulletins through the International SafetyNET service for the high seas shall be as given in Appendix I-2 bis.

NOTES: (1) The areas of responsibility given in Appendix I-2 bis are reviewed by the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology 0COMM) to ensure complete area coverage and adequacy of services.

(2) A broadcast area may be subdivided in the text of the EGC message into subareas to meet the requirements of the National Meteorological Services concerned.

(3) The areas of responsibility defined in Appendix 1-2 bis represent a minimum requirement for issuing and preparation services. Both issuing and preparation services may extend the area of coverage for the preparation and issue of warnings, weather and sea bulletins beyond these areas of responsibility, if they so wish, to meet national requirements. In this case, the area of coverage should be specified in the text of each broadcast.

(4) In the case where there is overlapping of forecast areas between adjacent Metareas, the respective issuing services are strongly encouraged to:

(a) Initiate the redefinition of the subareas used by countries serving adjacent Metareas, in order to conform to the limits of the Metareas;

(b) Coordinate their forecasts and warnings in these overlapping areas;

to ensure as far as possible that non-conflicting information is provided to the user.

2.2.2.2 Any amendments to the area of responsibility, or proposal for the introduction of a change in National Meteorological Services' responsibility for an area, shall have the approval of the Executive Council based on a recommendation by JCOMM.

2.2.2.2.1 Before drawing up any recommendation on the proposed amendment for submission to the Executive Council, JCOMM shall receive the comments of the National Meteorological Services directly concerned with the proposed amendment as well as the comments of the president(s) of the regional association(s) concerned.

All correspondence relating to areas of responsibility is addressed to the Secretary-General.

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2.2.2.3 Whenever a National Meteorological Service responsible for the preparation and/or issue of warnings and weather and sea bulletins for a given area is no longer able to provide this service, the National Meteorological Service should inform the Secretary-General at least six months in advance of the intended termination date.

2.2.3 *Preparation and issue of weather and sea bulletins for the high seas*

2.2.3.1 Weather and sea bulletins for the high seas shall include, in the order given hereafter:

Part I - Warnings;

Part II - Synopsis of major features of the surface weather chart and, to the extent possible, significant characteristics of corresponding sea-surface conditions;

Part III - Forecasts.

2.2.3.2 Weather and sea bulletins for the high seas may, in addition, include the following parts:

Part IV - Analyses and/or prognoses in IAC FLEET code form;

Part V - Selection of reports from sea stations;

Part VI - Selection of reports from land stations.

NOTES: (1) The reports included in Part VI should be for a fixed selection of stations in a fixed order. (2) Parts IV, V and VI may be issued at a separate, scheduled time.

2.2.3.3 Major changes in form and content of warnings, synopses and forecasts should be announced at least six months prior to the effective date of the change.

2.2.3.4 Information on broadcast schedules for routine forecasts and contents of bulletins shall be notified to the WMO Secretariat for inclusion in Weather Reporting (WMO-No. 9), Volume D — Information for shipping.

2.2.3.5 For area(s) for which an issuing service has assumed responsibility, the Service shall select the appropriate land Earth station (LES) to service that area.

NOTES: (1) As there are several LESs which can serve an ocean region and hence an area of broadcast responsibility, issuing services may negotiate directly with the various LES operators to obtain the most favourable tariff (and service) considerations.

(2) In order to ensure reception of unscheduled broadcasts by shipping in an area which is served by more than one satellite and recognizing that National Meteorological Services will not know to which of these satellites the ship's equipment is tuned, the following procedures shall be adopted by issuing services. For unscheduled broadcasts, these shall be issued for broadcast under the SafetyNET service through all Inmarsat ocean region satellites covering the issuing service's area of responsibility. (NOTE: The broadcast requirement for unscheduled broadcasts has been determined by IMO Resolution A.701(17).) For scheduled forecasts, these shall be issued for broadcast over at least a single nominated satellite, in accordance with a pre-arranged schedule, coordinated by WMO.

2.2.3.6 The issuing service shall select the method by which the transfer of information to the LES shall be effected.

NOTE: The transfer of information may be accomplished in several ways. See Appendix I-3 bis for details.

2.2.3.7 Weather and sea bulletins shall be prepared and issued at least twice daily.

2.2.3.7.1 The issue of the weather and sea bulletins shall be at a scheduled time and in the following sequence: Part I to be followed immediately by Part II and then Part III. A schedule of transmission start times for these bulletins has been compiled for all Metareas and the LESs which serve the areas and takes into consideration, inter alia, the existing WMO synoptic times for observations, data analysis and forecast production. Additionally, as these broadcast schedules for the International SafetyNET Service have to be coordinated, under the aegis of WMO, with other Organizations such as IHO, issuing services should not independently change or request WMO to arrange frequent alterations to these coordinated and published schedules (see also paragraph 2.2.3.4).

2.2.3.7.2 All weather and sea bulletins shall be preceded by the word "SECURITE", except urgent warnings (Beaufort force 12 and above), which shall be preceded by "PAN PAN".

2.2.3.7.3 Issuing services must ensure that the correct EGC message addressing formats are adhered to for all warning and forecast messages intended for broadcast by an LES (see Appendix I-4 bis message addressing and Appendix I-5 bis operational guidance).

2.2.3.7.4 **All weather and** sea **bulletins shall include, following** the words **"SECURITE" or "PAN PAN", clear information** on **the** Metarea being addressed **and the** issuing service, e.g.:

SECURITE

Marine weather bulletin for Metarea II issued by Météo-France

2.2.3.8 Warnings, synopses **and forecasts shall be** given **in plain** language.

2.2.3.8.1 Warnings, synopses **and** forecasts **intended for the International** SafetyNET Service **shall be broadcast in English.**

NOTE: Additionally, if a National Meteorological Services wishes to issue warnings and forecasts to meet national obligations under SOLAS, broadcasts may be made in other languages. These broadcasts will be part of a National SafetyNET Service.

2.2.3.8.2 In order to ensure the integrity of the warnings and forecasts being received by mariners, it is essential that issuing services monitor the broadcasts which they originate. Monitoring is especially important in a highly automated system which is dependent on careful adherence to procedure and format. This may be accomplished by the installation of an EGC receive-capability at the issuing service's facility.

NOTE: Each issuing service may use the EGC receiver to check the following:

(a) That the message has been broadcast; *(b)* That the message is received correctly;

(c) That cancellation messages are properly executed;

(d) Any unexplained delay in the message being broadcast.

2.2.3.8.3 The language of the synopsis should be as free as possible from technical phraseology.

2.2.3.8.4 The terminology in weather and sea bulletins should be in accordance with the multilingual list of terms used in weather and sea bulletins, which is given in Annex 2.B of the *Guide to Marine Meteorological Services* (WMO-No. 471) and in Appendix I-2 in the *Manual on Marine Meteorological Services.*

2.2.3.9 Wind direction shall be given in points of the compass and not in degrees.

2.2.3.9.1 Wind force shall be given in Beaufort notation or wind speed in metres per second or in knots. If metres per second or knots are used, the words "metres per second" or "knots" shall be included in the text of the message.

NOTE: The criteria of the Beaufort notation of wind force are given in a Beaufort scale table.

2.2.4 *Warnings*

2.2.4.1 Warnings shall be given for gales (Beaufort force 8 or 9) and storms (Beaufort force 10 or over), and for tropical cyclones (hurricanes in the North Atlantic and eastern North Pacific, typhoons in the Western Pacific, cyclones in the Indian Ocean and cyclones of similar nature in other regions).

NOTES: (1) Warnings to circular areas require a specific address code, C_2 code = 24 (see Appendix I-4 bis).

(2) Warnings may be addressed for reception by shipping in a circular area within the main Metarea (C_2 code = 24), or addressed for reception by shipping within the entire Metarea (C_2 code = 31). This is at the discretion of the issuing services in consultation with the preparation service responsible for the warning. If a circular area address (C_2 code = 24) is chosen, only ships within that area, as defined by the C_3 circular address, will receive the warning.

(3) Definition of a tropical cyclone is contained in the *International Meteorological Vocabulary* (WMO-No. 182) and classification of tropical cyclones is left to the Regions concerned.

2.2.4.2 The issue of warnings for near gales (Beaufort force 7) is optional.

2.2.4.3 Warnings for gales, storms and tropical cyclones should have the following content and order of items: (a) Type of warning;

(b) Date and time of reference in UTC;

(c) Type of disturbance (e.g. low, hurricane, etc.) with a statement of central pressure in hectopascals;

(d) Location of disturbance in terms of latitude and longitude or with reference to well-known landmarks;

(e) Direction and speed of movement of disturbances;

(f) Extent of affected area;

(g) Wind speed or force and direction in the affected areas;

(h) Sea and swell conditions in the affected area;

(i) Other appropriate information such as future positions of disturbances.

2.2.4.3.1 Items (a), *(b)*, *(d)*, (*f*) and *(g)* listed in paragraph 2.2.4.3 shall always be included in the warnings.

2.2.4.4 In addition to indicating the positions of pressure disturbances in terms of latitude and longitude, or with reference to well-known landmarks, the boundaries of the existing and forecast storm-wind area or areas of high waves (including swell) should be indicated.

NOTE: The usual practice in warnings is to indicate boundaries with reference to the centre of the pressure disturbance, or to divide the disturbance (low, tropical cyclone) into sectors for which prevailing and forecast conditions are described.

2.2.4.4.1 When warnings are included for more than one pressure disturbance or system, the systems should be described in descending order of threat.

2.2.4.4.2 Warnings shall be as brief as possible and, at the same time, clear and complete.

2.2.4.5 The time of the last location of each tropical cyclone or extratropical storm shall be indicated in the warning.

2.2.4.6 A warning shall be issued immediately after the need becomes apparent and broadcast immediately on receipt, followed by a repeat after six minutes (repetition code 11), when issued as an unscheduled broadcast.

2.2.4.6.1 When no warnings for gales, storms or tropical cyclones are to be issued, that fact shall be positively stated in Part I of each weather and sea bulletin.

2.2.4.6.2 Warnings shall be updated whenever necessary and then issued immediately.

2.2.4.6.3 Warnings shall remain in force until amended or cancelled.

2.2.4.6.4 Warnings issued as Part I of a scheduled bulletin do not need to be repeated after six minutes.

2.2.4.7 Warnings for other severe conditions such as poor visibility, severe swell, ice accretion, etc., shall also be issued, as necessary.

2.2.5 *Synopses*

2.2.5.1 The synopses given in Part II of weather and sea bulletins shall have the following content and order of items:

(a) Date and time of reference in UTC;

(b) Synopsis of major features of the surface weather chart;

(c) Direction and speed of movement of significant pressure systems and tropical disturbances.

2.2.5.1.1 Significant characteristics of corresponding wave conditions (sea and swell) should be included in the synopsis whenever this information is available, as well as characteristics of other sea-surface conditions (drifting ice, currents, etc.) if feasible and significant.

2.2.5.2 Significant low-pressure systems and tropical disturbances which affect or are expected to affect the area within or near the valid period of the forecast should be described. The central pressure and/or intensity, location, movement and changes of intensity should be given for each system. Significant fronts, high-pressure centres, troughs and ridges should be included whenever this helps to clarify the weather situation.

2.2.5.3 Direction and speed of movement of significant pressure systems and tropical disturbances should be indicated in compass points and metres per second or knots, respectively.

2.2.5.3.1 Units used for speed of movement of systems shall be indicated.

2.2.6 *Forecasts*

2.2.6.1 The forecasts given in Part III of weather and sea bulletins shall have the following content and order of items:

(я) The valid period of forecast;

(b) Name or designation of forecast area(s) within the main MSI area;

(c) A description of:

(i) Wind speed or force and direction;

(ii) Visibility when forecast is less than six nautical miles (10 kilometres);

(iii) Ice accretion, where applicable.

2.2.6.1.1 The forecasts should include expected significant changes during the forecast period, significant meteors such as freezing precipitation, snowfall or rainfall, and an outlook for a period beyond that normally covered by the forecast.

2.2.6.1.2 The forecasts should also include waves (wind sea and/or swell) where possible.

2.2.6.2 The valid period shall be indicated either in terms of number of hours from the time of issue of forecast or in terms of dates and times in UTC of the beginning and end of the period.

2.2.6.3 Visibility shall be indicated in nautical miles or kilometres or given in descriptive terms. 2.2.6.3.1 Units used for visibility shall be indicated.

2.2.7 *Selection of reports from sea stations*

2.2.7.1 When included in weather and sea bulletins for the high seas, reports from ships and other sea stations should be selected to give a reasonable geographical distribution, taking into account the important synoptic features.

2.2.7.2 The information should include the position of ships and other sea stations, time of observation, wind, visibility, atmospheric pressure and, if possible, cloudiness, present and past weather, air and sea-surface temperatures and waves.

2.2.8 *Selection of reports from land stations*

2.2.8.1 Reports included should be for selected land stations in a fixed order.

2.2.8.2 The reports should include the same elements as those listed in paragraph 2.2.7.2, as applicable.

2.2.9 *Issue of sea-ice information*

Sea-ice terminology shall be in accordance with the WMO Sea-Ice Nomenclature (WMO-No. 259).

3. MARINE METEOROLOGICAL SUPPORT FOR MARITIME SEARCH AND RESCUE

3.1 Principles

The principle for marine meteorological support for maritime search and rescue (SAR) is as follows:

Principle For the purpose of maritime search and rescue (SAR), a meteorological forecast centre may serve more than one Rescue Coordination Centre (RCC). Likewise, an RCC may make requests for information from more than one meteorological forecast centre depending on the nature of the maritime SAR operation.

3.2 Procedures

3.2.1 Marine meteorological services for SAR shall be provided in accordance with the national overall coordination procedures for SAR and taking into account the international recommendations and the requirements in force.

NOTES: (1) Requirements for SAR services including meteorology are contained in the ICAO Regional Air Navigation Plans.

(2) Additional requirements for maritime SAR services are contained in the *Joint IMO/CAO Search and Rescue Manual.*

3.2.1.1 Requests from RCCs shall be dealt with as expeditiously as possible and shall be given highest priority when an SAR operation is in progress.

3.2.1.2 On receiving formal notification from an RCC that a ship or aircraft or survival craft thereof is in distress, every effort shall be made to meet the requirements of the RCC.

3.2.2 Information on the following parameters and phenomena, as may be requested by or be of value to an RCC, should be provided:

(a) Atmospheric pressure;

(b) Surface winds;

(c) Sea and swell;

(d) Surface visibility;

(e) Ice accretion;

(f) Sea ice;

(g) Icebergs;

(h) Precipitation and cloud cover, including height of cloud base;

(i) Air temperature;

(j) Humidity;

(k) Sea-surface temperature;

(l) Surface currents;

(m) Tidal current deviation;

(n) Bar conditions;

(o) Surf and breakers;

(p) Storm surge;

(q) Water discolouration.

NOTES: (1) Special weather forecasts covering periods of up to 24 hours and possibly beyond may be required for maritime SAR operations on a continental shelf and slightly beyond. Ships of all sizes, helicopters and fixed-wing aircraft may be involved in these operations.

(2) Medium-range forecasts may be required in the event of SAR operations taking place over large ocean areas where ocean-going ships and fixed-wing aircraft may be involved for considerable periods of time and possibly searching for relatively small objects on the sea surface.

(3) Some of the information to be provided may be the responsibility of more than one authority and should be coordinated nationally.

3.2.3 Notification of SAR operations and all subsequent communications between the RCC and weather forecast centre should be by telephone, telex or other medium designed for rapid transmission or reception.

3.2.3.1 When communicating with RCCs or when providing weather forecasts the terminology should be similar to that used in weather bulletins and warnings to shipping.

3.2.3.2 A permanent record of all communications should be maintained, showing the times of origin, transmission and reception of the information provided.

3.2.3.3 Weather forecast centres should not attempt to communicate directly, or through coastal radio stations, with ships or aircraft involved in the SAR operation unless specifically requested by the RCC.

3.2.3.4 Meteorological Services should encourage ships operating under their national flag, when taking part in any medium- or long-term SAR operation or in the vicinity of a SAR operation but not necessarily participating, to make weather observations at main and intermediate standard times for surface synoptic observations and to transmit them, in the international SHIP code form or plain language, immediately to the appropriate coastal radio station for onward transmission, or through an LES directly to a Meteorological Service.

APPENDIX M BIS

GLOSSARY

In 1973, the International Maritime Organization (IMO) Assembly adopted a recommendation on the development of the maritime distress systems which laid down the IMO policy for improved distress and safety communications at sea based on the most up-to-date techniques. This policy foresaw, as an essential element, the advent of satellite and automatic terrestrial communications. To achieve the former, IMO in 1976 adopted an international convention establishing the Inmarsat organization. The terrestrial element was achieved by the development of the necessary techniques for digital selective calling and direct-printing telegraphy. This was accomplished with the assistance of the International Telecommunication Union's (ITU) International Radio Consultative Committee (CCIR) and the World Administrative Radio Conference (WARC).

In 1983 and 1987 the necessary frequencies were allocated to test and prove the equipment and this facilitated the establishment of the GMDSS. The 1988 GMDSS Conference adopted amendments to the 1974 International Convention for the Safety of Life at Sea (SOLAS) to introduce GMDSS. SafetyNET provides shipping with navigational and meteorological warnings, meteorological forecasts, shore-to-ship alerts and other urgent information in accordance with the requirements of SOLAS 1974. It is suitable for use in all sizes and types of surface craft. SafetyNET is a service of Inmarsat's enhanced group call (EGC) system and was specifically designed for promulgation of maritime safety information (MSI) as part of GMDSS. SafetyNET meets international requirements for broadcasting area, regional or local navigational warnings, meteorological warnings and forecasts and shore-to-ship distress alerts. It is designed with the capacity to provide services within the coverage areas of geostationary maritime communications satellites, that is in sea area A3 of the GMDSS. In addition to providing service to ships operating in sea area A3, it also provides the means of disseminating MSI to coastal waters not covered by NAVTEX. SafetyNET messages can be originated by a registered provider (e.g. a WMO Member) anywhere in the world and broadcast to the appropriate ocean area via an Inmarsat-C land Earth station (LES). Messages are broadcast according to priority, i.e. distress, urgent, safety and routine.

Atlantic Ocean Region (west) (AOR(W)), Atlantic Ocean Region (east) (AOR(E)), Indian Ocean Region (IOR), Pacific Ocean Region (POR): Ocean areas within the footprints (0 elevation) of the Inmarsat satellites located at 55.5°W, 18.5°W, 63°E and 18CTE, respectively.

Land Earth Station (LES): A land station in the Inmarsat satellite communications system which provides interconnection between the satellite and shore systems such as telex and telephone.

Enhanced Group Call (EGC): The system for broadcasting messages via the mobile satellite communications system operated by Inmarsat. EGC is a part of the Inmarsat-C system and currently supports two services: "SafetyNET" and "FleetNET". (FleetNET: A commercial service for the broadcast and automatic receipt of fleet management and general public information by means of direct-printing through Inmarsat's Enhanced Group Call system.)

International NAVTEX Service: The system for the broadcast and automatic reception of maritime safety information by means of narrow-band direct-printing on 518 kHz, using the English language. (NAVTEX receiving capability is part of the mandatory equipment which is required to be carried in certain vessels under the provisions of the revised Chapter IV of the International Convention for the Safety of Life at Sea (SOLAS), 1974).

International SafetyNET Services: The coordinated broadcast and automated reception of Maritime Safety Information via the Inmarsat EGC system using the English language to meet the requirements of the SOLAS Convention.

Maritime Safety Information (MSI): Navigational and meteorological warnings, meteorological forecasts and other urgent safety-related messages broadcast to ships.

National SafetyNET Services: The broadcast and automated reception of Maritime Safety Information via the Inmarsat EGC system using languages as decided by the administration concerned.

Network Coordination Station (NCS): A land station in the Inmarsat mobile satellite communications system which controls channel assignments and other communications functions through a satellite for an entire ocean region.

Registered Provider: An authorized MSI provider which has an agreement with one or more LES for providing SafetyNET broadcast information.

Rescue Coordination Centre (RCC): A unit responsible for promoting efficient organization of search and rescue services for coordinating the conduct of search and rescue operations within a search and rescue region.

SafetyNET: A service for the broadcast and automatic reception of maritime safety information by means of direct-printing through Inmarsat's EGC system.

Scheduled Broadcasts: The regular single transmission of weather and sea bulletins for the high seas, including gale and storm warnings as necessary. Each bulletin broadcasts at least twice daily, in accordance with a pre-arranged and published schedule coordinated by WMO and in the prescribed high seas bulletin format, as described in the *Manual on Marine Meteorological Seivices.* The EGC priority code (C_j) for messages intended for scheduled broadcast is C_2 ~ 1 — Safety, and repetition code (C_4) is C_4 = 01 — Broadcast once only. Scheduled broadcasts should be made within 15 minutes of the published schedule. If this is not possible, a repetition should be used to ensure maximum receipt.

Sea Area A1: An area within the radiotelephone coverage of at least one very high frequency coast station in which continuous digital selective calling (DSC) alerting is available, as may be defined by a SOLAS Contracting Government.

Sea Area A2: An area, excluding sea area A1, within the radiotelephone coverage of at least one medium frequency coast station in which continuous DSC alerting is available, as may be defined by a Contracting Government.

Sea Area A3: An area, excluding sea areas A1 and A2, within the coverage of an Inmarsat geostationary satellite in which continuous alerting is available.

Sea Area A4: An area outside sea areas A1, A2 and A3.

Ship Earth Station (SES): A mobile Earth station in the maritime mobile-satellite service located aboard a ship, or elsewhere.

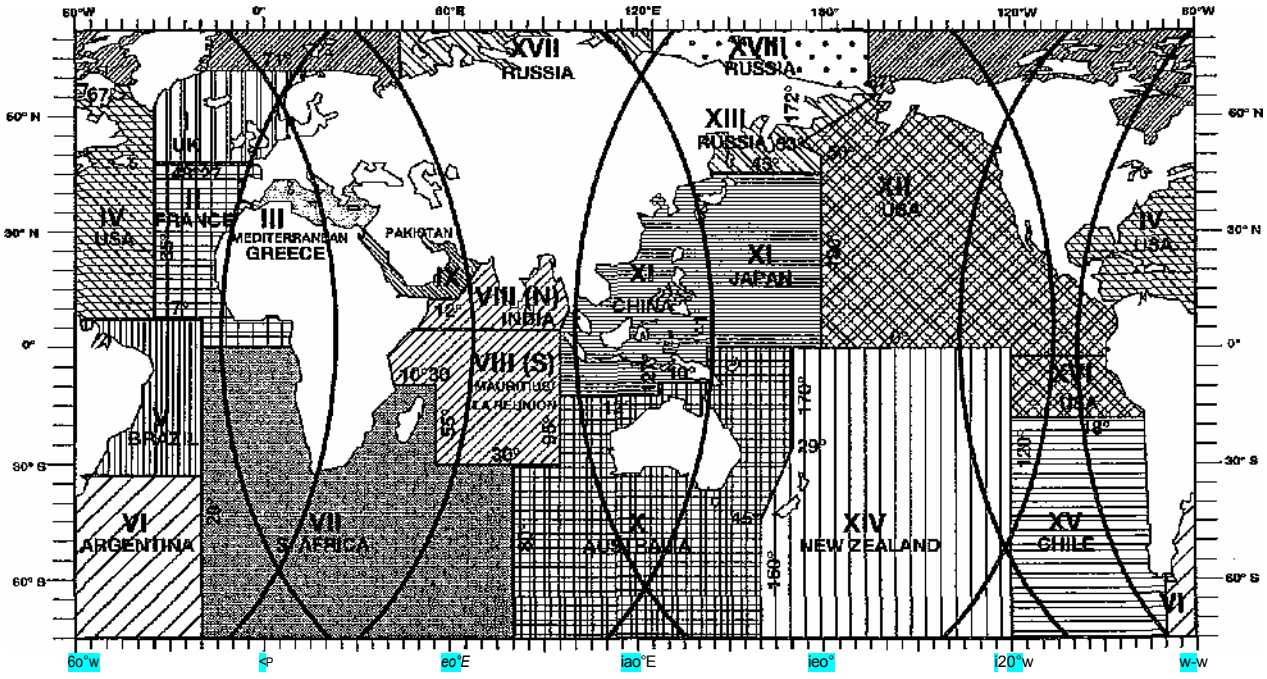
Inmarsat-A: A satellite communications system for transmission of voice, telex, facsimile or data using directional antennae in the Inmarsat satellite system.

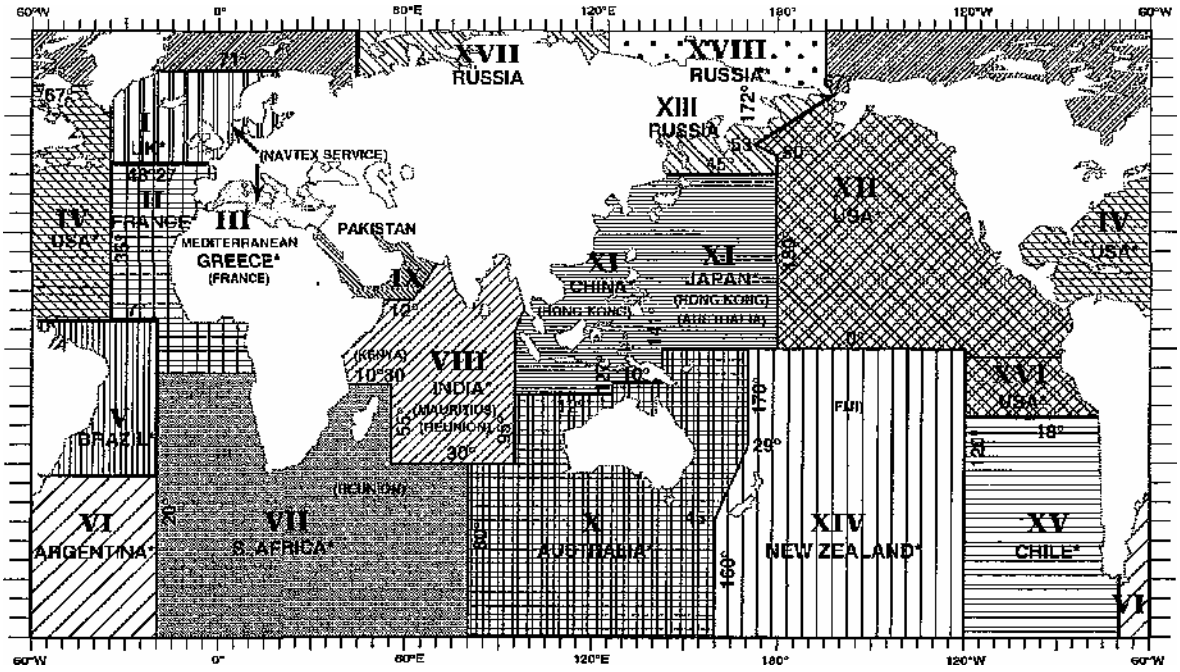
Inmarsat-C: A satellite communications system for telex or data messaging using small terminals and omni-directional antennae in the Inmarsat satellite system.

Unscheduled Broadcasts: The contingent broadcast, with a six-minute repetition, of urgent meteorological information which is intended for immediate delivery to shipping. When such urgent meteorological information comprises or includes tropical cyclone warnings, the EGC priority code (C_j) is C_j = 2 — URGENT and repetition code (C_4) is C_4 = 11 — Repeat six minutes after the initial transmission. All other warnings (e.g. gale and storm) will have C_2 = 1 — SAFETY and C_4 = 11 — Repeat after six minutes.

APPENDIX I-2 BIS

AREAS OF RESPONSIBILITY AND DESIGNATED NATIONAL METEOROLOGICAL SERVICES FOR THE ISSUE OF WARNINGS AND WEATHER AND SEA BULLETINS FOR THE GMDSS





*Denotes a preparation and issuing member { } Denotes a préparation member

AREAS OF RESPONSIBILITY FOR HIGH SEAS (GMDSS)

TABLE 1

METAREA	*Issuing Service*	*Area LES for the issue of scheduled broadcasts (see paragraph 2.2.3.5)*
I	United Kingdom	Goonhilly
II	Fiance	Aussaguel (AOR (E))
		Aussaguel (AOR (W))
III	Greece	Thermopylae (AOR(E))
IV	United States	Southbury (AOR (W))
V	Brazil	Tangua
VI	Argentina	Southbury (AOR (W))
VII-Atlantic Ocean Region	South Africa	Burum (AOR (E))
VII-Indian Ocean Region	South Africa	Burum (IOR)
VIII (N)	India	Aussaguel
VIII (S)	Mauritius/La Réunion*	Aussaguel
IX	Pakistan	Perth
X-Indian Ocean Region	Australia	Perth (IOR)
X-Pacific Ocean Region	Australia	Perth (POR)
XI-Indian Ocean Region	China	Beijing
XI-Pacific Ocean Region	Japan	Yamaguchi
XII-Pacific Ocean Region	United States	Santa Paula (POR)
XII-Atlantic Ocean Region	United States	Southbury (AOR (W))
XIII	Russian Federation	Perth (POR)
XIV	New Zealand	Albany (POR)
XV	Chile	Southbury (AOR (W))
XVI	United States	Southbury (AOR (W))
XVII	Russian Federation	Perth (IOR)
XVIII	Russian Federation	Perth (POR)

Tropical cyclone warnings prepared and issued by RSMC La Réunion are also included in the regular bulletins issued by Mauritus.

Coordinates for GMDSS METAREAs

Area I	The North Atlantic Ocean east of 35°W, from 48°27'N to 71°N including the North Sea and Baltic Sea sub-area.
Area II	Atlantic waters east of 35°W, from 7°N to 48°27'N, and east of 20°W from 7°N to 6°S, including the Strait of Gibraltar.
Area III	The Mediterranean and Black Seas, east of the Strait of Gibraltar.
Area IV	The western part of the North Atlantic Ocean eastwards of the North American coast to 35°W, from 7°N to 67°N, including the Gulf of Mexico and Caribbean Sea.
Area V	Atlantic waters west of 20°W from 35°50'S to 7°N, narrowing in the coastal strips at the extremities to the Uruguay/ Brazil frontier in 3345'*S* and the French Guyana/Brazil frontier in 4°30'N.
Area VI	The South Atlantic and Southern Oceans south of 35°50'S, from 20°W to the longitude of Cape Horn, 67°16'W.
Area VII	The South Atlantic and Southern Oceans south of 6°S from 20°W to the coast of Africa, thence south to the Cape of Good Hope; the South Indian and Southern Oceans south of 10°30'S from the Cape to 55°E, thence south of 30°S to 80°E.
Area VIII (N)	The area of the Indian Ocean enclosed by lines from the Indo-Pakistan frontier in 23°45'N 68°E to 12°N 63°E, thence to Cape Gardafui; the east African coast south to the Equator, thence to 95°E, to 6°N, thence NE'wards to the Myanmar/ Thailand frontier in ION 98°30'E.
Area VIII (S)	The east African coast from the Equator south to 10°30'S, thence to 55°E, to 30°S, to 95°E, to the Equator, to the east African coast.
Area IX	The Red Sea, Gulf of Aden, Arabian Sea and Persian Gulf, north of Area VIII.
Area X	The South Indian and Southern Oceans east of 80°E and south of 30°S to 95°E, to 12°S, to 127°E; thence the Timor Sea, South Pacific and Southern Oceans south of 10°S to 141°E to the Equator, to 170°E, to 29°S, thence SW'wards to 45°S in 160°E, then the 160°E meridian.
Area XI	The Indian Ocean, China Sea and North Pacific Ocean northward of Area X and on the Equator to longitude 180°, eastward of Area VIII and the Asian continent to the North Korea/Russian Federation frontier in 42°30'N 130°E, thence to 135°E, NE'wards to 45°N 138°E, to 45°N 180°.
Area XII	The eastern part of the Pacific Ocean, west of the North and South American coast and east of 120°W, from 3°24'S to the Equator, thence to 180°, to 50°N thence NW'wards to 53°N 172°E, NE'wards following the marine frontier between the United States and Russian Federation waters to 67°N.
Area XIII	Sea areas enclosed north of Area XI and west of Area XII; also all Arctic waters from 170°W westwards to 20°E.
Area XIV	The South Pacific and Southern Oceans south of the Equator, bounded by Area X to the west, the Equator to the north and 120°W to the east.
Area XV	The South Pacific and Southern Oceans south of 18°21'S following the coast of Chile to the longitude of Cape Horn in 67°16'W, and 120°W.
Area XVI	The South Pacific Ocean between 18°21'S and 3°24'S bounded by the coast of Peru and 120°W.
Area XVII	The Arctic Ocean from south-west corner 67°N, 44°E to north-east corner 83°N, 125°E.
Area XVIII	The Arctic Ocean from south-west corner 63°30°N, 125°E to north-east corner 80°N, 165°W.

TABLE 2

METAREA	*Issuing service**	*Preparation service*	*Area LES of issuing service* *(a) For scheduled broadcasts* *(b) For unscheduled broadcasts*	*Remarks*
I	United Kingdom	United Kingdom, Norway	(a) Goonhilly (For AOR (W)) *(b)* Goonhilly (For AOR (W), AOR (E))	1, 3
II	France	France	(a) Aussaguel (For AOR (E)), Aussaguel (For AOR (W)) *(b)* Aussaguel (For AOR (E)), Aussaguel (For AOR (W))	1, 3
III	Greece	Greece, France	(a) Thermopylae (For AOR (E)) *(b)* Thermopylae (For AOR (E) and IOR)	1, 3
IV V	United States Brazil	United States Brazil	(a) Southbury (For AOR (W)) *(b)* Southbury {For AOR (W)), Southbury (For AOR (E))	1, 3
VI	Argentina	Argentina	(a) Tangua (For AOR (E)) *(b)* Tangua(For AOR (W)) Tangua (For AOR (E))	1, 3
VIi-AOR	South Africa	South Africa	(a) Southbury (For AOR (W)) *(b)* Southbury (For AOR (W)),	1, 3
VII-IOR	South Africa	South Africa, La Réunion	(a) Burum (For AOR (E)) *(b)* Burum (For AOR (E) and (W))	1, 3
VIII (N)	India	India	(a) Burum (For IOR) *(b)* Burum (For AOR (E) and IOR)	1, 3
VIII (S)	Mauritius,** La Réunion	Mauritius, La Réunion	(a) Arvi (For IOR) *(b)* Arvi (For IOR)	1, 3
IX	Pakistan	Pakistan	(a) Aussaguel (For IOR) *(b)* Aussaguel (For IOR)	2
X-IOR	Australia	Australia, Mauritius, La Réunion	(a) Perth (For IOR) *(b)* Perth (For IOR)	2
X-POR	Australia	Australia, Fiji, New Zealand	(a) Perth (For IOR) \b) Perth (For IOR and POR) (a) Perth (For POR) (b^ V"^) Perth (For POR and IOR)	2 2
XI-IOR	China	China, Hong Kong	(a) and *ф)* Beijing (For IOR)	1, 3
XI-POR	Japan	Japan, Hong Kong, Australia	(a) and *ф)* Yamaguchi (For POR)	1, 3
XII	United States	United States	(a) Santa Paula (For POR), Southbury (For AOR (W)) *(b)* Southbury (For AOR (W)), Southbury (For AOR (E)), Santa Paula (For POR)	1, 3
XIII	Russian Federation	Russian Federation	(a) and *ф)* Perth (For POR)	3

TABLE 2 *(continued)*

METAREA	*Issuing service"*	*Preparation service*	*Area LES of issuing service* *(a) For scheduled broadcasts* *(b) For unscheduled broadcasts*	*Remarks*
XIV	New Zealand	Fiji New Zealand	(a) Albany (For POR) *(b)* Southbury (For AOR (W)), Albany (For POR)	
XV Chile		Chile United	(a) Southbury (For AOR (W)) (b) Southbury (For AOR (W)),	1,3
XVI	United States	States	(я) Southbury (For AOR (W)) *(b)* Southbury (For AOR (W)), Southbury (For AOR (E)), Santa Paula (For POR)	4
XV11	Russian Federation	Russian Federation	*(a)* and (b) Perth (For IOR) (a)	
XVIII Russian Federation		Russian Federation	and *(b)* Perth (For POR)	

* It is the responsibility of the issuing service to ensure that data are available to provide input for its entire areas of broadcast responsibility and to develop appropriate procedures to rectify any data deficiency.

** Tropical cyclone warnings prepared by RSMC La Réunion are included in the regular bulletins issued by Mauritius.

1 = Full coverage via SafetyNET for areas not covered by NAVTEX.

2 = No NAVTEX coverage.

3 = Partial NAVTEX coverage.

4 = Full coastal coverage via SafetyNET.

APPENDIX I-3 BIS

TRANSFER OF INFORMATION FROM AN ISSUING SERVICE TO A LAND EARTH STATION (LES) PROVIDING Inmarsat-C SERVICES*

The transfer of warnings and forecasts by the issuing service to an LES may be accomplished by:

(1) Telex link from the issuing service directly to the LES;

(2) X.25 packet switching networks;**

(3) A dedicated landline;

(4) The GTS to another National Meteorological Service whose country hosts the relevant LES, thence by either (1) or (2) above by the cooperating National Meteorological Services to the LES;

(5) At Inmarsat-C ship Earth station (SES) direct to the LES. (The approval of the national licensing authority has to be obtained for this method.) Such an approach to message transfer could prove particularly attractive to those issuing services located in countries without a LES, as potential delays and problems in the international terrestrial telecommunications networks could be avoided. It could also serve as an emergency back-up to normal terrestrial communications systems for urgent messages;

(6) Other means, as appropriate, to national requirements and facilities.

Access to the SafetyNET service for the broadcast of meteorological data will be granted only to message originators authorized by WMO and registered with one or more Inmarsat-C LES operators.
Such networks, which operate at transmission speeds higher than telex, may attract lower charges for the land-line portion of the transmission.

APPENDIX I-4 BIS

MESSAGE ADDRESSING

INTRODUCTION

Messages for transmission via the SafetyNET service are received and processed automatically. Because the system is automatic, it depends on accurate preparation of the traffic.

Messages are not reviewed for corruption or accuracy at the LES. Therefore, the originator must take special care to adhere to the specified format as detailed in this appendix. It is for this reason that issuing services shall arrange for monitoring the broadcasts that they originate.

Participating LES transmit SafetyNET messages over an interstation signalling link to the Ocean Region network coordination station (NCS) for transmission over the broadcast channel.

Messages will be queued at the LES according to priority and scheduled for retransmission according to instructions contained in the special address headers (Cj and C_4). Messages with the highest priority will be transmitted first. Shore-to-ship distress alerts will be broadcast first followed by urgency, safety and then routine traffic. The originator of each message will specify in the message parameters the desired number of repetitions and the interval between transmissions.

1. WARNING AND FORECAST ADDRESSING FOR EGC MESSAGES

1.1 Introduction

This appendix describes the methods by which EGC messages are transmitted to LES and subsequently transmitted over the Inmarsat satellite system. The format in which they are transmitted is also described. It is the responsibility of issuing services to ensure that the correct C codes are used, irrespective of the procedures employed for routeing to the LES.

1.2 Routeing of messages to the LES by an issuing service

(see Appendix I.3 bis for methods)

1.3 Addressing of EGC packets

After having gained access to the LES, the issuing service must give EGC packet address information so that the ships in the right areas receive the EGC messages. The EGC packet address information is sent by the issuing service by means of a special message header at the beginning of messages that are required to be transmitted. These message headers will consist of five special codes called C codes. The five codes may be prefixed by additional characters to indicate that the message is an EGC transmission. (A Co code, to identify the ocean region, may be necessary when addressing EGC messages to LES which operate in more than one ocean region.)

The following generalized message header format using C codes shall be adopted by all issuing services. C codes transmitted to the LES are: Ci: C_2: C_3: C_4: C_5, where:

Cj is the priority code - 1 digit

C_2 is the service code - 2 digits

C_3 is the address - up to 12 digits

C_4 is the repetition rate - 2 digits

C_5 is the presentation code - 2 digits

A digit in this context means an alphanumeric character received from the terrestrial network. The meaning of the C codes is explained later in this appendix, but for illustration purposes an example follows:

An incoming (to the LES) EGC "warning" telex would appear as:

1:31:01:11:00 (the C code message header)

SECURITE

MARINE WEATHER WARNING FOR METAREA I ISSUED BY UK MET OFFICE

0245 UTC

STORM WARNING. AT 190600 UTC, LOW 970 57N 20W MOVING NE 15KT. WINDS STORM 10 WITHIN 150 MILES RADIUS OF CENTRE

NNNN

This example is for "SAFETY" priority (C_r = 1) EGC call containing a meteorological warning (C_2 = 31) to Metarea 01, which will be repeated six minutes (C_4 = 11) after the initial transmission. The text of the stoim warning is transmitted in International Alphabet 5 (C_5 = 00).

1.3.1 *Priority codes (C_1)*

Format as received at the LES — 1 digit. The C_a code is used to indicate to the LES the level of priority needed for the message's transmission. The priority number is given in ascending order as follows:

0 ROUTINE "
1 SAFETY Meteorological messages will be
2 URGENCY " either SAFETY (C_2 = 1) or URGENCY
3 DISTRESS J (C_1 = 2)

NOTE: Priority URGENCY (C_1 = 2) to be used for tropical cyclone warnings only. All other meteorological warnings to be classified as SAFETY (C_2 = 1).

1.3.2 *Service codes (C_2)*

Format as received at the LES — two digits. A C_2 code is adopted that will explicitly indicate to the EGC receiver the length of the address it will need to decode during message processing. The service codes allocated for WMO use are described below together with the number of digits in the C_3 code:

(a) 13 - Coastal warnings and forecasts

C_3 code - 4 digits

24 - Meteorological and navigational warnings and search and rescue information to circular areas C_3 code - 10 digits;

(b) 31 - Meteorological and Navarea warnings and meteorological forecasts to pre-defined Metareas

C_3 code - 2 digits

1.3.3 *Addresses (C_3)*

The method that issuing services will use to transmit the EGC packet addresses is given below for each service type described in paragraph 1.3.2 of this appendix.

1.3.3.1 *Service code 13 — Coastal warnings and forecasts*

Coastal warnings and forecasts — C_3 = Xj X_2 to identify the Metarea and Bj B_2 to emulate NAVTEX. Note that B_a codes will be allocated by IMO in accordance with the procedure for allocating NAVTEX transmitter identities laid down in the *IMO NAVTEX Manual* (IMO Publication 951 88.08). B_2 will always be B for warnings and E for forecasts. The Metarea Xj X_2 code and the NAVTEX B_1 and B_2 are sent to the LES as a four-character group, in the order Xj X_2 B_a B_2.

1.3.3.2 *Service code 24 — Meteorological and navigational warnings and search and rescue information to circular areas*

The circular address consists of 10 characters as follows:

D^ $L_a D_3$ D_4 D_5 L_0Mj M_2 M_3, where

Dj D_2 is latitude of centre in degrees with leading zero if required;

L_a is hemisphere N or S;

D_3 D_4 D_5 is longitude of centre in degrees with leading zero, if required;

L_0 is longitude E or W;

M! M_2 M_3 is radius of circle in nautical miles (up to 999);

A circle with a radius of 10 nautical miles is coded as 56N034W010

1.3.3.3 *Service code 31 — Meteorological and Navarea warnings and meteorological forecasts to pre-defined Metareas*
Meteorological and Navarea warnings and meteorological forecasts are addressed to the areas described in Appendix 1-2 bis using the two digits NjN_2 where NjN_2 is the numerical designation of the area.

1.3.4 ***Repetition** codes (C_4)*

Format as received at LES — two digits. The C4 repetition codes are for messages that are required to be repeated at specified intervals until cancelled by the issuing Member and incorporate the needs of MSI providers for the SafetyNET service.

1.3.4.1 *Repetition codes*

A repetition code allows a message to be broadcast once only on receipt (C_4 = 01) or broadcast on receipt and repeated six minutes later (C_4 = 11). Many other types of repetition are possible, but are not relevant to meteorological broadcasts.

1.3.4.2 *Cancel facility*

A cancellation facility for messages transmitted to an LES with repetition codes is necessary. An example of a cancel instruction is as follows:

Cancel messages: message reference number at time; where message reference number is the number given to the message provider by the LES on receipt of the initial message and time is of the form:

DDHHMMZ space MMM space YY e.g. 211430Z FEB 88

If the cancel instruction accompanies a broadcast message it will appear between the NNNN and ++++ characters as follows:

Cj: C_2: C_3: C_4: C_5
SECURITE
"text"
NNNN
CANCEL (message reference number) at (date/time group)
++++

NOTES: (1) Only SECURITE plus "text" is for transmission.

(2) When included with a message for broadcasting, the LES message cancellation instructions will appear between the NNNN and the ■++++ characters. There will only be one instruction to each line, but the facility to provide for more than one line of instructions is desirable.

(3) If the cancellation instruction terminates after the message reference number, i.e. the (time/date) is not included, then the instruction should be executed immediately.

(4) It should also be possible for a cancel instruction to be sent to the LES Store and Forward Unit.

1.3.5 *Presentation codes (C_5)*

The current allocation of presentation codes is as follows PQ173:

0 IA number 5 (IR.V version) odd parity

1 Katakana odd parity

2 Devnagiri odd parity

3 Arabic odd parity

4 Cyrillic odd parity

5 Greek odd parity

6 ITA 2

7 Data

For maritime safety information, C_5 is always 00.

APPENDIX I-5 BIS

INTERNATIONAL SAFETYNET MANUAL

ANNEX **4** — **Operational guidance**

This annex contains operational guidance for the benefit of Registered Information Providers who are responsible for preparing messages for broadcast via the International SafetyNET Service. Use of the codes given in this annex is mandatory for all messages in the system.

Examples of the various types of messages and message formats are detailed in the subsections of this annex:

(a) Navigational warning services;

(b) Meteorological services;

(c) Search and rescue services;

(d) Chart correction services (to be developed);

(e) Piracy counter-measures broadcast messages.

The broadcast parameters are controlled by the use of 5 "C" codes which are combined into a generalized message header format as follows:

Cf. **C_2: C_3: C_4: C_5**

(Spaces, colons or other delimiters between these fields will be required, depending on the LES addressed).

Each "C" code controls a different broadcast parameter and is assigned a numerical value according to the available options which are fully tabulated in Annex 6.

Because distortion of the header format of a message may prevent its being released, MSI providers must install an Inmarsat SafetyNET receiver and monitor broadcasts of messages which they originate.

ANNEX 4b — Meteorological services

1. The following sets out the arrangements to be used for the broadcast of meteorological forecasts and warnings via SafetyNET for the GMDSS. They are mandatory for broadcasts in the International SafetyNET Service.
2. These guidelines are to be read in conjunction with the WMO *Manual on Marine Meteorological Services* (WMO-No. 558), as revised for the GMDSS.
3. In order to ensure uniformity of the broadcast of meteorological bulletins and warnings globally, the following standard *"C"* codes should be used for meteorological forecasts and warnings issued via SafetyNET for the GMDSS.

   Cj — Message priority

   Always Cj = 2 URGENCY for tropical cyclone warnings only

   Always Cj = 1 SAFETY for forecasts and for warnings other than tropical cyclone warnings

   C_2 — Service code

   Meteorological warnings *(C_2* = 1 or 2) to circular area — C_2 = 24 Meteorological warnings or forecasts (Cj - 1 or 2) to coastal area — C_2 = 13 Meteorological warnings or forecasts to Metarea — C_2 = 31.

   C_3 — Address code

Meteorological warnings *(C_2* = 1 or 2) to circular area (Service code C_2 = 24) C_3 = 10 characters. Address code for circular areas is fully described in Annex 6, paragraph 1.3.3.5, but repeated here for ease of reference. Circular address will consist of 10 numbers as follows:

Dj D_2 L_4D_3 D_4 D_5 b_0K_2 R_2 R_3, where

D_j D_2 L_a (three characters) is latitude of centre in degrees and La whether north (N) or south (S). A leading zero should be used for latitudes less than 10;

D_3 D_4 D_5 Lo (four characters) is longitude of centre in degrees and Lo whether east (E) or west (W) of the prime meridian. A leading zero should be used for longitudes less than 100;

R_j R_2 R_3 (three characters) is radius of circle in nautical miles, up to 999.

Example: A circle centred at latitude 56°N longitude 34°W with radius of 10°NM is coded as 56N034W010

Meteorological warnings (Service code 31) C_3 = the two digits denoting the area of broadcast responsibility (the Metarea) with a leading zero where necessary, e.g. 01, 06, 13,

C_4 — Repetition code

Meteorological warning (category (a) repetition code)

C_4 = 11 On receipt followed by repeat six minutes later. Note a six-minute repeat is used to ensure that the warning is received by the maximum number of ships.

Meteorological forecast (category (a) repetition code) C_4 = 01

Transmit once on receipt C_5 — Presentation code

Always C5 = 00, international alphabet number 5.

Examples:

Meteorological warning (to main broadcast area (Metarea))

1:31:01:11:00

SECURITE

(text) storm warning. At 190600 UTC low 970 57N 20W moving NE 15kts. Wind storm force 10 within 150 miles radius of centre

NNNN.

Tropical cyclone warning (to circular area i.e. only intended to be received by ships within the area of the address)

2:24:20N065W500:ll:00

PAN PAN (text) At 161200 UTC Hurricane Betty located 15 nm north of San Juan, Puerto Rico, moving NW 15 knots with hurricane force winds 75 miles from centre NW and NE quadrants and within 30 miles SW and SE quadrants.

NNNN

Meteorological forecast

1:31:08:01:00

SECURITE

(text) forecast text as *Manual on Marine Meteorological Services*

NNNN

PART II

SERVICES FOR COASTAL AND OFF-SHORE AREAS

1. GENERAL

1.1 Marine meteorological services for coastal and off-shore areas shall include both general and specialized services to meet the requirements of:

- International shipping in harbour approaches and convergence zones;
- Coastal community activities;
- Coastal protection, including coastal engineering works;
- Marine search and rescue (SAR) operations;
- Special transport in coastal areas;
- Fishing;
- Fixed or floating installations at sea;
- Pollution monitoring and clean-up operations;
- Recreational boating.

NOTE: Provision of services relating to océanographie and hydrographie information may be the responsibility of more than one national agency or authority.

1.2 For each of the user applications, a rapid dissemination of information, in particular warnings, should be ensured by means appropriate to the application.

1.3 Services for coastal and off-shore areas should be co-ordinated, wherever possible, with those of neighbouring countries.

1.4 Services provided in accordance with the procedures of Part II of this *Manual* shall not conflict but be co-ordinated nationally and internationally with the services provided for the high seas in accordance with the procedures of Part **I.**

2. GENERAL SERVICES

2.1 Principles

The principles for the provision of general services are as follows:

Principle 1

Services for unspecified general coastal and off-shore activities are those as for the high seas but modified according to local conditions and requirements.

Principle 2

General marine meteorological services for coastal and off-shore areas include the issue of Group B weather and sea bulletins.

2.2 Procedures

2.2.1 *Types of services*

General services for coastal and off-shore areas shall include:

- Issue of coastal weather and sea bulletins;
- Sea-ice bulletins, where appropriate;
- Data information services;
- Climatological services;
- Marine meteorological expert advice.

2.2.2 *Issue of weather and sea bulletins for coastal and off-shore areas*

2.2.2.1 Coastal and off-shore areas for which Members issue weather and sea bulletins (called Group B bulletins) shall be clearly defined.

2.2.2.2 Information on broadcast schedules, the content and forecast areas of Group B weather and sea bulletins shall be conveyed to the WMO Secretariat for inclusion in WMO Publication No. 9, Volume D - Information for shipping.

2.2.2.3 Weather and sea bulletins for coastal and off-shore areas shall include:

(a) Warnings;

(b) Synopses;

(c) Forecasts.

NOTE: Weather and sea bulletins for coastal and off-shore areas may, in addition, include meteorological reports from selected coastal stations, ships and other sea stations.

2.2.2.4 Additional procedures for the issue of weather and sea bulletins for coastal and off-shore areas shall include those specified for bulletins for the high seas as follows:

Announcement of bulletin content Broadcast by radio	2.2.2.3 2.2.2.7 and 2.2.2.7.2 2.2.28
Language and terminology Indication of wind	and subparagraphs 2.2.2.9 and subparagraphs and/or

NOTE: Various modes of radio broadcast are possible: telegraphy, telephony, facsimile public radio; they may be chosen taking into account the needs and capabilities of marine users in the area covered by the bulletin.

2.2.3 *Warnings*

2.2.3.1 When included warnings shall be placed at the beginning of the bulletin.

2.2.3.2 Warnings shall be given for the following phenomena:

(a) Tropical cyclones and associated phenomena;

(b) Gales and storms;

(c) Ice accretion.

2.2.3.2.1 In addition, warnings should be given for:

(d) Restricted visibility (one nautical mile or less);

(e) Unusual and hazardous sea-ice conditions; (f)

Storm-induced water-level changes.

NOTE: Warnings for phenomena (e) and (f) may be the responsibility of more than one national agency or authority.

2.2.3.2.2 Warnings should include, whenever possible, the times when unfavourable weather and sea conditions are expected to begin and end.

2.2.3.3 Additional procedures for the issue of warnings for coastal and off-shore areas shall include those specified for warnings for the high seas as follows:

Warnings for near gales (Beaufort force 7)	: 2.2.3.2
Content of warnings and order of items	: 2.2.3.3
Boundaries of areas of storms or high waves	: 2.2.3.4
Descriptions of more than one system	: 2.2.3.4.1
Brevity and clarity of warnings	: 2.2.3.4.2

Location of tropical cyclones or other storms	: 2.2.3.5
Issue of warnings	: 2.2.3.6
Updating of warnings	: 2.2.3.6.2

2.2.3.4 Members establishing a new visual warning signal should select the appropriate one from the International System of Visual Storm Warning Signals.

NOTE: The international System of Visual Storm Warning Signals is given in Appendix II.I to this *Manual*.

2.2.4 ***Synopses and forecasts***

2.2.4.1 Date and time of reference in UTC shall be added to the synopsis of major features of the surface weather chart.

2.2.4.2 The forecasts should have the following content:

(ta) The valid period of forecast;

(b) Name and designation of forecast area(s);

(c) A description of:

(i) Wind speed or force and direction;

(ii) Visibility when forecast to be less than six nautical miles (10 km);

(iii) Ice accretion, where applicable;

(iv) Sea and swell.

2.2.4.3 Additional procedures for the inclusion of synopses and forecasts in bulletins for coastal and off-shore areas shall include those specified for bulletins for the high seas as follows:

Descriptions of systems and phenomena	2.2.4.2 and 2.2.5.1.1
Indication of movement of systems Indication of	2.2.4.3
valid period Indication of visibility Indication of	2.2.5.2
units	2.2.5.3
	2.2.4.3.1 and 2.2.5.3.1

2.2.5 ***Sea-ice bulletins***

2.2.5.1 Sea-ice bulletins shall be issued during the ice season.

NOTE: The issue of sea-ice bulletins may be the responsibility of more than one national agency or authority.

2.2.5.2 Sea-ice terminology, codes and symbols used in sea-ice bulletins shall not be in conflict with the *WMO Sea-Ice Nomenclature* (WMO-No. 259)

2.2.6 ***Data information services***

Data from observing stations established for the specific purpose of marine meteorological services for coastal and off-shore areas should be preserved and stored in an easily retrievable form.

NOTE: Some stations may be the responsibility of more than one national agency or authority.

2.2.*7* ***Climatological services***

2.2.7.1 The network of climatological stations, established in accordance with Technical Regulations [A.1.I) 3.2.1 and [A.1.1.] 3.2.2 should give a satisfactory representation of the climate characteristics of the coasts as well as of the coastal and off-shore areas for which the Member concerned is providing marine meteorological services.

NOTE: The network may include special observing stations operating over periods of less than ten years.

2.2.7..2 If data from special observing stations are used for marine climatological purposes, an up-to-date directory of these stations should be maintained, giving the following information for each station:

(a) Geographical co-ordinates;

(b) Elevation of station;

(c) A brief description of the local topography;

(d) Category of station and details of observing programme;

(e) Exposure of instruments, including height above ground or above sea level of thermometers, raingauges and anemometers;

(f) Method of measurement of sea parameters, such as water elevation, waves, sea-surface temperatures and currents;

(g) Datum level to which atmospheric pressure data of the station refer;

(h) A station history (dates of beginning of record, changes of site, closure or interruption of records, important changes in the observing programme);

(i) Name of the supervising organization or institution.

2.2.7.3. Climatological statistics prepared for general applications should be made in accordance with the climatological practices specified in the *Technical Regulations,* Chapter [A.2.4.], as appropriate.

2.2.8 ***Marine meteorological expert advice***

The procedures for the provision of marine meteorological expert advice shall be those specified under Part I, paragraph 7.

3. SPECIALIZED SERVICES

3.1 Principles

The principle for the provision of specialized services is as follows:

Principle
Services for specified coastal and off-shore activities are provided in consultation with the user requesting the service.

3.2 Procedures

NOTE: Procedures for services of a purely national nature, distinct from those at the international level, are described in Chapter 4, Part I of the *Guide to Marine Meteorological Services* (WMO-No. 471).

3.2.1 ***Sendees for international shipping in harbour approaches and shipping convergence zones***

3.2.1.1 Services for international shipping in harbour approaches and shipping convergence zones should include the issue of weather and sea bulletins, including local warnings.

3.2.1.2 Warnings, synopses and forecasts shall contain all the elements necessary to ensure the safe navigation of ships through the heavy traffic convergence zones and habour approach channels.

3.2.2 ***Services for coastal community activities***

3.2.2.1 Members should endeavour to provide special warnings of meteorological conditions likely to lead to flooding or other damage to coastal communities.

3.2.2.2 At the request of the appropriate authorites, special information pertaining to the extent and movement of oil spills which may affect activities along coasts should be prepared and supplied to the authority concerned.

3.2.3 ***Services for coastal protection, including coastal engineering works***

The services for coastal protection, including coastal engineering works, should include gale and storm warnings and warnings of high waves, and in addition the provision of meteorological information to assist the prediction of abnormal water levels (storm surges, flooding) due to meteorological and other conditions.

3.2.4 ***Services for maritime search and rescue (SAR) operations***

3.2.4.1 **The procedures for the provision of marine meteorological support to maritime SAR in coastal and off-shore areas shall be as those specified under Part I, paragraph** 3.2.

3.2.4.2 Terminology used should follow that acceptable to the layman.

3.2.5 ***Services for special transport in coastal areas***

Members should endeavour to provide forecasts necessary for safe movement in coastal areas of unusual equipment such as dynamically supported craft, oil drilling rigs or large engineering structures.

3.2.6 ***Services for fishing***

3.2.6.1 In addition to the basic information specified under paragraph 2 above, the specialized services should also include critical wind and wave information and sea-surface temperature data.

3.2.6.2 Fishing vessels should be encouraged to make and record at fixed hours observations of weather and sea conditions and to transmit them expeditiously to local coastal radio stations for onward transmission to meteorological centres.

3.2.7 ***Services for fixed or floating installations at sea***

3.2.7.1 The attention of owners and operators of fixed or floating installations should be drawn to warnings and bulletins which may be available within the area of operation.

3.2.7.2 The cooperation of operators should be sought in connection with obtaining meteorological data from off-shore installations.

3.2.8 ***Services for pollution monitoring and clean-up operations***

3.2.8.1 Specialized services should be provided on a request basis.

3.2.8.2 In coordination with appropriate national authorities, the following information should be provided:

(a) Forecasts of wind;

(b) Analyses and forecasts of state of the sea;

(c) Forecasts of visibility, both vertical and horizontal;

(d) If available, predictions of tide, sea currents and other océanographie information.

3.2.9 ***Services for recreational boating***

3.2.9.1 Special attention should be given to the safety requirements of small pleasure-craft operators when issuing bulletins for their use and for that of recreational boating.

3.2.9.2 The special information intended for recreational boating should be broadcast or displayed as frequently as possible, so as to cover the entire coastal and inland waters where recreational activities are taking place.

NOTE: Suggested methods of communication are given in Chapter 4, Part I of the *Guide to Marine Meteorological Services* (WMO-No. 471).

4. SERVICES FOR COASTAL AREAS USING THE INTERNATIONAL NAVTEX SERVICE

4.1 General

(a) NAVTEX is an international automated direct-printing service for the promulgation of navigational and meteorological warnings, meteorological forecasts and other urgent information to ships. The international NAVTEX service forms part of the Global Maritime Distress and Safety System (GMDSS) developed by the International Maritime Organization (IMO) and, since 1 August 1993, a NAVTEX receiving capability has become part of the mandatory equipment which is required to be carried in certain vessels under the provisions of the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended in 1988;

(b) The International NAVTEX Service is the coordinated broadcast and automatic reception on the frequency 518 kHz of maritime safety information by means of narrow band direct printing telegraphy using the English language;

(c) Responsibility for coordinating the establishment of the global NAVTEX service has been vested by IMO in its Coordinating Panel on NAVTEX (See note);

(d) The operational and technical characteristics of the NAVTEX system are contained in Recommendation ITU-R M.540-2 and in the *NAVTEX Manual* published by the International Maritime Organization (IMO Publication Sales Number IMO-951E).

4.2 Procedures

4.2.1 The time-shared nature of NAVTEX imposes the need for strict discipline in controlling the information flow of the broadcast.

4.2.1.1 Gale warnings are placed at the NAVTEX transmitters by national Meteorological Services. The warnings are broadcast on receipt and at the next routine scheduled transmission only.

4.2.1.2 Forecasts should normally be broadcast twice each day. This service should be carefully coordinated where transmitters are geographically close together. It is important that such forecasts are dedicated to the specific area covered by the NAVTEX transmitter.

4.3 General principles for coordination

Where there is a requirement for coordination of meteorological information via NAVTEX, the following principles should be adopted:

(a) It is assumed that there is an existing exchange using the GTS of weather warnings and some weather forecasts (once or twice daily) for mariners between all national Meteorological Services working in the area;

(b) There should be one national Meteorological Service working as meteorological coordination centre responsible for the provision of weather bulletins for mariners via the NAVTEX system in the area concerned. The selection of the NMS as meteorological coordination centre may be governed by its proximity to the majority of forecasting areas in the region and existing involvement in the provision of NAVTEX services;

(c) The meteorological coordination centre should submit its forecasts and warnings to the NAVTEX station operators for dissemination on a daily operational basis. If necessary, the provision of weather bulletins from other countries could be included for waters not already covered by the coordination centre;

(d) Every national Meteorological Service serving the area concerned should have access to the meteorological coordination centre to deliver by GTS its warnings and forecasts for the areas for which it intends to have responsibility;

(e) The meteorological coordination centre should decide which warning is sent to the NAVTEX operator for dissemination by the system. The criteria for such decisions are based on

warnings with the highest wind speed. In cases of significant difference and serious doubts in warnings, the centre should ask the service which prepared the message in question for additional confirmation (via the GTS link);

(/) The meteorological bulletins and additional warnings which have been sent to the NAVTEX station operators for dissemination should be copied, by the meteorological coordination centre via the GTS, to all national Meteorological Services serving the area.

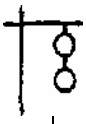
4.4 Coordination arrangements

Specific international coordination arrangements for NAVTEX broadcasts of meteorological information, whenever established, are detailed in the relevant section of Volume II of this *Manual.*

NOTE: The NAVTEX Coordinating Panel can be contacted at the following address: The
Chairman
Coordinating Panel on NAVTEX
International Maritime Organization 4
Albert Embankment LONDON SE1 7SR

APPENDIX II.I

(See paragraph 2.2.3.4) INTERNATIONAL SYSTEM OF VISUAL STORM WARNING SIGNALS

Day Signals	Description **of wind** force	**Night Signals**	Remarks
	Near gale any direction		This signal applies to wind Beaufort force 7 (28-33 kt), (see Note (2) *b)*
	Gale or storm commencing in the NW quadrant		
	Gale or storm commencing in the SW quadrant		The cones apply to wind of Beaufort force 8 (34-40 kt) or more, (see Note (2) *c)*
	Gale or storm commencing in the NE quadrant		
	Gale or storm commencing in the SE quadrant		
	Wind is expected to veer (clockwise change in direction)		
	Wind is expected to back (counter-clockwise change in direction)		Flags may be of any suitable colour
	Hurricane (or local synonym) with wind of Beaufort force 12 (64 kt and above) from any direction		

Legend

O *White* 

Green •

Red

NOTES: (1) More than one day signal may be hoisted simultaneously if desired, e.g.:

(я) To indicate a gale commencing in the SW quadrant and veering (in this case, the original direction is indicated by the cones);

(b) To indicate the direction of an expected near gale (in this case, the ball is hoisted together with the appropriate cones).

(2) Additional signals may be used to meet local requirements:

(a) Provided their appearance and specifications are distinct from those of the international signals;

(b) Or, additionaUy, to force 6 (22-27 kt) if local circumstances, e.g. fishing activities, etc require such a lower limit;

(c) Or, additionally, to force 7 (28-33 kt) if local circumstances necessitate the indication of wind direction.

PART III

SERVICES FOR MAIN PORTS AND HARBOUR AREAS

1. GENERAL

1.1 Marine meteorological services for main ports and harbour areas should meet the requirements of:

- Ships entering or leaving the port;
- Cargo handling, cargo safety and warehousing;
- Loading of barges;
- Dredging and cleaning operations;
- Shipbuilding and other construction work;
- Port engineering projects;
- Ice-breaking services in ports and port entrances;
- Marine pollution-combating operations in the port area;
- Industries, commerce, judicial process and insurance;
- Waterborne recreational activities.

NOTE: Provision of services relating to océanographie and hydrographie information may be the responsibility of more than one national agency or authority.

1.2 **Marine** meteorological services for main ports and harbour areas **shall** preferably be **provided by forecasting** offices located in **port** or by **the** port meteorological officer (PMO) or, if this **is not** possible, by a forecasting office located outside the port.

NOTE: The services provided by the PMO under this section are in addition to those duties listed in [C.1.] 4.2.2 of Volume I of the WMO *Technical Regulations*.

1.3 The information provided should be representative of the environmental conditions in the areas concerned including the fairways and harbour approaches.

1.4 The office or unit(s) designated for the provision of marine meteorological services for main ports and harbour areas should have a rapid and reliable means of communication with port and harbour authorities and other users of the information.

1.5 **The** services provided under the provisions of Part III of this Manual shall not conflict with **the** services provided for **the** coastal and off-shore areas in accordance with the provisions of Part II **and shall be** co-ordinated nationally and internationally.

2. GENERAL SERVICES

2.1 Principles

The principles for the provision of general marine meteorological services for main ports and harbour areas are as follows:

Principle 1

Marine meteorological services for main ports and harbour areas are provided both as general advice and to meet specific demand operations in these areas, in the interests of their safety, efficiency and economy and in support of short- and extended-range planning.

Principle 2

Marine meteorological services for main ports and harbour areas take into account the kind of operations involved and the marine environment of the area. Close consultation with port and harbour authorities and other users of the port and harbour facilities is essential to ascertain the type of information to be included in these services.

Principle 3

Marine meteorological services for main ports and harbour areas are designed to include information on phenomena critical to the safety and efficiency of operations. The criteria for such phenomena are established in consultation with the appropriate port and harbour authorities, also taking into account any criteria established by national practices and international conventions.

Principle 4

Adequate forecasting methods and observational data are the basis for providing effective marine meteorological and, when possible, related océanographie information.

2.2 Procedures

2.2.1 *Types of services*

Marine meteorological services provided for main ports and harbour areas should include the provision of:

(a) Port meteorological officer (PMO) facilities;

(b) Port weather and sea bulletins comprising warnings and, when possible, synopses and forecasts;

(c) Information on actual and climatological conditions, on request;

(d) Marine meteorological advice;

(e) Oral briefing to shipping and other users;

(f) Display of information for the benefit of users and the public.

NOTE: Guidance on PMO facilities is given in Chapter 5, Part I and Chapter 1, Part II of the *Guide to Marine Meteorological Services* (WMO-No. 471).

2.2.2 *Issue of port weather and sea bulletins*

2.2.2.1 **Port weather and sea bulletins shall have the following content and order of items:**

(a) DATE AND LOCAL TIME OF REFERENCE;

***(b)* Name of port and harbour area;**

(c) Warnings, if any.

2.2.2.1.1 In addition to warnings, the port weather and sea bulletins should include: (д) Synopses of

major features of the weather and sea conditions;

(b) Forecasts of marine environmental conditions;

(c) Selected observational data.

NOTE: It may be advantageous to include the local times of high water and low water which are frequently pertinent to local sea conditions in open harbour areas.

2.2.2.2 The format used for warnings for a given port or harbour area should be, as far as possible, on the same lines as that adopted for the high seas, but adjusted to meet local operational requirements taking into account the particular environmental phenomena affecting activities in the area.

NOTE: Examples of formats used for warnings for port and harbour areas, based on national practices, are given in Chapter 5, Part I of the *Guide to Marine Meteorological Services* (WMO-No. 471).

2.2.2.3 The actual environmental information from fixed observing stations should be included in a fixed order.

2.2.2.4 **Port weather and sea bulletins, where provided, shall be issued at least once daily at a fixed** time taking **into account the time of actual operations in the port and harbour area.**

2.2.2.5 Port weather and sea bulletins intended for international use should be provided in the language of the issuing Member and in English.

2.2.2.6 The language used in port weather and sea bulletins should be as free as possible from technical phraseology.

2.2.2.7 The terminology used in port weather and sea bulletins should be in accordance with the "Multilingual list of terms used in weather and sea bulletins".

NOTE: The multilingual list of terms used in weather and sea bulletins is given in Annex 1 -2.A of the *Guide to Marine Meteorological Services* (WMO-No. 471) and in Appendix I.2 to the present *Manual.*

2.2.2.8 **Members providing** marine meteorological services **for main ports and harbour areas shall make available to port and harbour authorities, shipping agents and other users concerned, the rele vant particulars of services provided and transmission details, in addition to furnishing this information to the WMO Secretariat.**

NOTE: The information is included in WMO Publication No. 9, Volume D. The particulars to be furnished include the name of the port, types of services provided, method(s) used for dissemination, times of broadcast and radio frequencies used as well as the address and telephone number of the meteorological office responsible for the provision of services.

2.2.2.9 All changes dealing with the provision of international marine meteorological services for main ports and harbours areas should be conveyed to the WMO Secretariat for inclusion in WMO Publication No. 9, Volume D - Information for shipping, at least six months in advance.

2.2.3 ***Warnings***

2.2.3.1 Warnings shall have the following content and order of items:

(a) **Type of warning;**

(b) **Date and time of issue (local time);**

(c) Extent of the affected area, if appropriate;

(d) **Further indications, if any.**

2.2.3.1.1 Warnings should be clear and as concise as possible.

2.2.3.2 Warnings should be issued for the following elements and phenomena when exceeding critical values:

(a) Wind;

(b) Sea and swell;

(c) Visibility, with special mention of the phenomenon affecting it;

(d) **Heavy precipitation;**

(e) Ice accretion;

(f) **Water-level anomalies** including storm surges; ***(g)***

Harbour seiches; (h) Tsunami.

NOTE: **Warnings for** items *(f), (g)* **and** *(h)* may be the responsibility of more than one national agency or authority.

2.2.3.3 **A warning shall be issued immediately the need becomes apparent.**

2.2.3.4 Warnings should include, whenever possible, the times when unfavourable weather and sea conditions are expected to begin and end.

2.2.3.5 **Warnings shall be updated** as **required** by changes in weather and sea conditions affecting **the port and harbour area.**

2.2.3.6 **Warnings shall be provided to all concerned in the port or harbour area** by **the most rapid communication means available.**

NOTE: Various modes of radio broadcasts are possible: telegraphy, telephony, facsimile and/or public radio; they may be chosen taking into account the needs and capabilities of marine users in the area covered by the bulletin.

2.2.4 *Synopses and forecasts*

2.2.4.1 Synopses and forecasts, if included in the bulletin, shall be given for environmental conditions of importance to the efficient conduct of operations in the port and harbour area.

2.2.4.2 Synopses, when included in the bulletins, shall include data and time of reference (local time) and a description of the meteorological situation and sea conditions which affect, or are likely to affect, the port and harbour area within or close to the valid period of the forecast.

2.2.4.2.1 Synopses shall be as brief as possible.

2.2.4.3 The forecasts shall have the following content and order of items:

(я) The valid period of forecast;

(b) Description of expected state of elements of local importance to port and harbour activities, with indication of expected significant changes, if any.

NOTE: The range of information given may be wide. Examples are given in Chapter 5, Part I of the *Guide to Marine Meteorological Services* (WMO-No. 471).

2.2.4.3.1 The valid period shall be indicated either in terms of number of hours from the time of issue of forecast or in terms of dates and times (local time) of the beginning and end of the period.

2.2.5 *Briefing*

2.2.5.1 In addition to warnings, synopses and forecasts, facilities for oral briefing should be established, if possible.

2.2.5.2 Briefing provided to the recipients should include complete environmental information essential for the planning and execution of daily operations in the port and harbour area as well as for the ships leaving and entering the port.

NOTE: Advice regarding oral briefing is contained in Chapter 5, Part I of the *Guide to Marine Meteorological Services* (WMO-No. 471).

2.2.6 ***Display of information***

2.2.6.1 Arrangements should be made for the regular display of meteorological information in a prominent place on the port premises, for the benefit of the port personnel and ships' officers as well as the public.

2.2.6.2 Normally the display should be in the form of weather charts accompanied by a statement in plain language of the synoptic weather situation and forecast for the next 24 hours; where possible, further outlook beyond 24 hours should also be included.

2.2.6.3 The display of information should, if possible, include important climatological particulars of the port location, which should be of interest to marine users in planning their operations.

2.2.7 *Sea-ice bulletins*

2.2.7.1 Sea-ice bulletins should be issued for main ports and harbour areas concerned, including the fairways, during the ice season.

2.2.7.2 Sea-ice bulletins, when issued for main ports and harbour areas, shall be co-ordinated with

2.2.7.3 Details regarding the content and issue of sea-ice bulletins should be established in consultation with local port and harbour authorities and sea-ice operational services.

2.2.7.4 Sea-ice terminology, codes and symbols used in sea-ice bulletins shall not be in conflict with the *WMO Sea-Ice Nomenclature* (WMO-No. 259).

2.2.8 ***Collection of observational data***

Observations of suitable parameters should be organized at appropriate sites in the port or harbour area in order to obtain the data necessary for the provision of detailed forecast and climatological services as well as information on actual weather and sea conditions.

3. SPECIALIZED SERVICES

3.1 Principles

The principles for the provision of specialized marine meteorological services for main ports and harbour areas are as follows:

Principle 1

Specialized marine meteorological services are provided in support of specified marine activities carried out in main ports and harbour areas, at the request of the operating agencies or authorities concerned and in consultation with them.

Principie 2

Criteria for information to be included in specialized marine meteorological services are established in consultation with the appropriate operating agencies or authorities concerned, also taking into account any criteria established by national practices and international conventions.

3.2 Procedures

3.2.1 *Issue of special bulletins*

3.2.1.1 Special port weather and sea bulletins should be issued for specific marine operations in the port and harbour area, as arranged with the operating agencies or authorities concerned.

3.2.1.2 Special port weather and sea bulletins, when established, should conform, as far as possible, to the procedures specified under paragraph 2.2.2 above.

NOTE: Advice regarding special port weather and sea bulletins is given in Chapter 5, Part I of the *Guide to Marine Meteorological Services* (WMO-No. 471).

3.2.1.3 At the request of appropriate authorities, special information pertaining to the extent and move ment of oil spills which may affect waterborne activities in harbours should be prepared and supplied to the authority concerned.

PART IV

TRAINING IN THE FIELD OF MARINE METEOROLOGY

1. GENERAL

The training programme in the field of marine meteorology shall be addressed to:

(a) Meteorological personnel engaged in observational, forecasting and climatological duties for marine purposes;

(b) Port meteorological officers;

(c) Seafarers whilst at sea and in navigation schools;

(d) Marine observers on board ships.

2. TRAINING OF MARINE METEOROLOGICAL PERSONNEL

2.1 Principles

The principles for training of meteorological personnel in marine meteorology arc as follows:

Principle 1

The training of meteorological personnel constitutes an essential factor in the provision of meteorological services in support of marine activities.

Principle 2

International co-operation in the field of education and training in marine meteorology is achieved through assistance in the form of short- and long-term fellowships, on-the-job training, assignment of experts to countries to help in training of personnel, training courses and instruction manuals, regional training seminars and by publication of suitable compendia of lecture notes and other guidance material specially intended for marine purposes.

2.2 Procedures

2.2.1 The programme of training in marine meteorology shall apply to all the classes of meteoro logical personnel (Classes I, II, III and IV) engaged in marine meteorological activities and shall be carried out, if necessary, by special training centres equipped for the purpose.

NOTE: Guidance on classification of meteorological personnel and curricula for their training is contained in *Guidelines for the Education and Training of Personnel in Meteorology and Operational Hydrology* (Third Edition) (WMO-No. 258).

2.2.2 Members should ensure that centres equipped for the training of marine meteorological personnel are manned by qualified and experienced specialists.

2.2.3 Members should make arrangements enabling meteorological personnel engaged in training and in the provision of services in marine meteorology to familiarize themselves with the marine environment.

NOTE: Specific arrangements include the organization of familiarization sea voyages and familiarization visits to those countries where well-established marine meteorological services are provided.

2.2.4 Members should, in addition to standard textbooks and their own lecture notes, take into account the internationally accepted syllabuses for marine meteorological training personnel and the special compendia of lecture notes issued by the World Meteorological Organization intended for different classes of meteorological personnel.

2.2.5 Members should pay full attention to the use of films and audio-visual aids for marine meteorological training purposes.

2.2.6 Members should endeavour to introduce marine meteorology and related physical oceanography as one of the subjects to be taught in the regular courses on meteorology given by universities in their country.

3. METEOROLOGICAL TRAINING OF PORT METEOROLOGICAL OFFICERS

3.1 Principles

The principles for the meteorological training of port meteorological officers (PMOs) are as follows:

Principle 1

The meteorological training of a PMO is aimed at keeping up to date his knowledge of the principles and organization of meteorological forecasting for the marine environment, the use of marine meteorological instruments and methods of observing on board ship, the use of codes and meteorological log-books as well as the procedures for recording and transmitting observations.

Principle 2

The training programme of a PMO includes arrangements for keeping the PMO continuously informed of the latest issues of relevant publications, magazines and other material available nationally and internationally for meteorological observing tasks.

3.2. Procedures

3.2.1 Regular courses for the training of port meteorological officers in their duties should be provided nationally.

NOTES: (1) Visits to one or more ports with well-established PMO services may be considered as part of the training course.

(2) The duties of port meteorological officers are described in Chapter 1, Part II of the *Guide to Marine Meteorological Services* (WMO-No. 471).

3.2.2 Information regarding the main objectives and organization of international scientific co-operative investigations and experiments which include the use of voluntary observing ships should be part of the updated training of port meteorological officers.

4. METEOROLOGICAL TRAINING OF SEAFARERS

4.1 Principles

The principles for the meteorological training of seafarers are as follows:

Principle 1

The training of non-professional seafarers, such as those on pleasure boats, in the language and terminology used in warnings and bulletins contributes considerably to the safety of their navigation.

Principle 2

Assistance in the training of seafarers in meteorological observations and transmission of meteorological reports, and in the use and correct interpretation of marine meteorological information is an integral part of meteorological services in enhancing the safety and efficiency of ship operations.

4.2 Procedures

4.2.1 Members should give every assistance to navigation schools to ensure that courses in basic marine meteorology meet the relevant requirements of the International Convention on Standards of Training, Certification and Watch-keeping for Seafarers, 1978. This is to ensure that seafarers are compe tent to make meteorological observations and to transmit them, as well as to understand the warnings, synopses and forecasts provided for their use.

NOTE: Applicable requirements from the International Convention on Standards of Training, Certification and Watch-keeping for Seafarers administered by IMO are reproduced in Chapter 2, Part II of the *Guide to Marine Meteorological Services* (WMO-No. 471).

4.2.2 Members should arrange for the provision of suitable guidance material to shipmasters and navigation schools, in the light of standard textbooks and special publications issued by the World Meteorological Organization, on the use and interpretation of weather charts.

4.2.3 Members should encourage the inclusion of a reasonable level of practical meteorological knowledge and its application to navigation in statutory syllabuses for examinations of ships' officers,

having due regard to established international standards and recommendations with respect to the training and certification of seafarers.

5. METEOROLOGICAL BRIEFING OF MARINE OBSERVERS

5.1 Principles

The principle for the meteorological briefing of marine observers is as follows:

Principle

The making, recording and transmitting by radio of routine marine meteorological observations are voluntary additions to the official duties of merchant ships' officers and continuous briefing on these meteorological tasks is an important area of responsibility of national Meteorological Services.

5.2 Procédures

Members should arrange, through port meteorological officers as appropriate, adequate briefing of marine observers on board ships in making accurate observations, in recording them in meteorological log-books and, in addition, in transmitting them in accordance with the standing procedures contained in the WMO *Manual on the Global Telecommunication System* (WMO-No. 386).

WORLD METEOROLOGICAL ORGANIZATION

MANUAL ON MARINE METEOROLOGICAL SERVICES

VOLUME II

REGIONAL ASPECTS

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CONTENTS

INTRODUCTION

1. The material contained in Volume II does not form part of the WMO *Technical Regulations* and is applicable only to the Members of the regional associations concerned. The words "shall"[1] and "should" as used in this volume have their dictionary meanings and do not have the regulatory character mentioned in the introduction to Volume I and in the introduction to the WMO *Technical Regulations.*

2. Volume II is divided into sections corresponding to the six Regions of the World Meteorological Organization, namely:

Region I	Africa
Region II	Asia
Region III	South America
Region IV	North and Central America
Region V	South-West Pacific
Region VI	Europe

1. REGION I - AFRICA

1.1 Regional practice concerning storm warnings

1.1.1 The provisions applicable to storm warnings issued in regions where tropical cyclones may be encountered are given in the Appendix.

1.1.2 The contents of the warnings in Region I (Africa) and the order in which the items are given are as shown in the Appendix, with the additions and explanations given below.

(a) Under item (a) Warnings for near gale (Beaufort force 7) will also be issued;

(b) Under item *(b)* International six-figure date-time group will be used;

NOTE: Information concerning the origin of the warning such as map time or data from satellite to be given.

(c) Under item (c) the following terminology will be used:

	Corresponding wind speed (Beaufort scale)
Weak tropical disturbance	up to 7
Moderate tropical depression	8-9
Severe tropical depression	10 -11
Intense tropica! cyclone	12 or over
Tropical disturbance of unknown intensity	unknown

(d) Under item *{d)* the information will be given in the following way:

(i) Positions of centre of disturbance to be given in degrees (and tenths where possible);

(ii) Latitude and longitude to be given in words, not figures;

(iii) The degree of uncertainty of the position of the centre to be given by the radius, expressed in nautical miles, of the circle in which the centre is located;

(e) Under item (e) the speed of movement of centre to be given in knots, direction to the nearest of sixteen points of the compass or in degrees to the nearest ten, given in words;

(f) Under items (f) and *(h)* the information is to be given if possible for different distances from the centre in the various sectors (distances in nautical miles);

(g) Under item *(h)* wind speeds are to be given in knots, distances in nautical miles;

(h) Under item *(h)* further movement or development is to be given only when they can be forecast with reasonable confidence.

1.1.3 The classification of weather disturbances adopted for use in the South-West Indian Ocean area of RA I is as follows.

Classification	Corresponding DVORAK T Number	Corresponding maximum wind speed (knots)	Corresponding international hurricane scale number
Zone of disturbed weather			
Tropical disturbance			
Tropical depression	1 to 2	IS to 33	
Moderate tropical depression/storm	2 to 3	34 to 47	
Severe tropical depression/storm	3 to 4	48to63	
Tropical cyclone	4 to S	64 to 90	1 to 2
Intense tropical cyclone	5 to 6	90 to 115	2.5 to 3.5
Very intense tropical cyclone	6	115	3.5
Extra-tropical depression			

1.2 Tropical Cyclone Operational Plan for the South-West Indian Ocean

The arrangements for tropical cyclone warnings for the South-West Indian Ocean, formulated under the regional component of the WMO Tropical Cyclone Programme and approved by Regional Association I (Resolution 14 (VIII-RA I)), are contained in the "Tropical Cyclone Operational Plan for the South-West Indian Ocean", published separately.

2. REGION II - ASIA

2.1 Regional practice concerning storm warnings

2.1.1 The provisions applicable to storm warnings issued in regions where tropical storms may be encountered are given in the Appendix.

2.1.2 Maritime countries in Region II (Asia) that are affected by tropical storms should issue storm warnings with the contents and order of items given in the Appendix, with the following reservation:

Under (c) (ii), the term "tropical storm" is used instead of "moderate tropical storm".

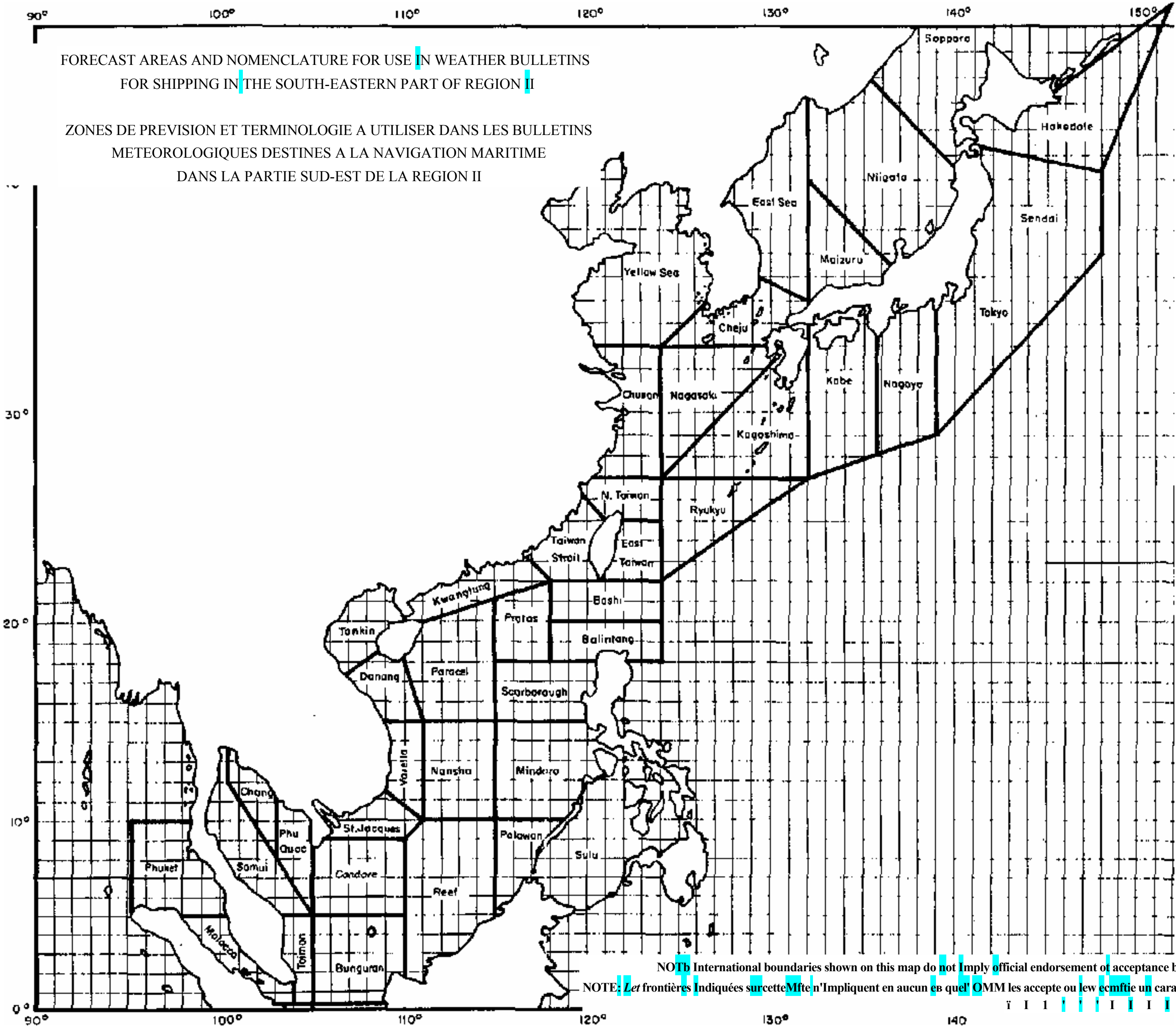
Réf.: General summary of the work of I-RA II, paragraph 36.

2.2 Forecast areas and nomenclature for use in weather bulletins for shipping in the south-eastern part of Region II

Regional Association II has decided that the nomenclature given in the map reproduced on page II-2 should be used by Members issuing weather and sea bulletins which refer to the areas shown thereon (Resolution 17 (IV-RA II)).

FORECAST AREAS AND NOMENCLATURE FOR USE IN WEATHER BULLETINS
FOR SHIPPING IN THE SOUTH-EASTERN PART OF REGION II

ZONES DE PREVISION ET TERMINOLOGIE A UTILISER DANS LES BULLETINS
METEOROLOGIQUES DESTINES A LA NAVIGATION MARITIME
DANS LA PARTIE SUD-EST DE LA REGION II



NOTE: International boundaries shown on this map do not imply official endorsement or acceptance by the WMO.

NOTE: Les frontières indiquées sur cette carte n'impliquent en aucune façon que l'OMM les accepte ou leur confère un caractère officiel.

3. REGION III - SOUTH AMERICA

The provisions applicable to storm warnings issued in regions where tropical cyclones may be encountered are given in the Appendix. There is at present no information regarding regional practice in respect of Region III (South America) appropriate for inclusion in this section.

4. REGION IV - NORTH AND CENTRAL AMERICA

4.1 Regional practice concerning storm warnings

4.1.1 The provisions applicable to storm warnings issued in regions where tropical cyclones may be encountered are given in the Appendix.

4.1.2. The following terminology is used in Region IV:

Tropical cyclone: A non-frontal cyclone of synoptic scale, developing over tropical or subtropical waters and having a definite organized circulation.

Hurricane: A warm-core tropical cyclone in which maximum average surface wind (1 minute mean) is 64 knots or greater.

Tropical storm: A well-organized warm-core tropical cyclone in which the maximum average surface wind (1 minute mean) is in the range of 34-63 knots inclusive.

Tropical depression: A tropical cyclone in which the maximum average surface wind (1 minute mean) is 33 knots or less.

Ref.: Resolution 27 (78-RA IV)

4.1.3 Marine tropical cyclone advisories are prepared only by the United States hurricane centres. They are prepared for all tropical depressions, tropical storms or hurricanes within a centre's area of responsibility. Advisories will cease when tropical cyclones drop below depression stage or have gone inland and winds over the water have dropped below gale force. All marine advisories on tropical storms and hurricanes will contain 12- and 24-hour forecast periods only.

(From information contained in *World Weather Watch - Regional Association IV (North and South America) Hurricane Operational Plan* (WMO-No. 524)).

4.2 Hurricane Operational Plan

The arrangements for tropical cyclone warnings, formulated under the regional component of the WMO Tropical Cyclone Programme and approved by Regional Association IV (Resolution 27 (78-RA IV)), are contained in the *RA IV Hurricane Operational Plan.*

5. REGION V – SOUTH-WEST PACIFIC

5.1 Regional practice concerning storm warnings

5.1.1 The provisions applicable to storm warnings issued in regions where tropical cyclones may be encountered are given in the Appendix.

5.1.2 The contents of storm warnings and the order of items as given in the Appendix will be used throughout Region V (South-West Pacific) but any Member may use for item (c) Type of disturbance, the specifications most appropriate to its local requirements.

5.1.3 All depressions, storms and typhoons originating within or entering the Philippine area of responsibility are identified in the tropical cyclone bulletins issued by the Philippine Weather Bureau by Filipino feminine nicknames ending in the letters "ng". (Notification of the Permanent Representative of the Philippines).

6. REGION VI - EUROPE

6.1 Co-ordinated common system for the designation of marine forecast areas in the Baltic Sea

6.1.1 Considering that the designation of common forecast areas in the Baltic Sea will enhance the co-ordination of marine meteorological support to various marine activities, Regional Association VI has adopted the co-ordinated common system of marine forecast areas as described below (Resolution 21 (VIII-RA VI)).

6.1.2 The basis for the uniform system is a three-level division of the forecast areas: main areas, sub-areas, local areas.

6.1.3 Main areas are described by their geographical names and numbers, as presented on the map reproduced on page VI-3.

6.1.4 Sub-areas within the main area are described, in general, according to the "point of compass" (e.g. eastern part, southern part, etc.). Exceptions are the sub-areas of 4 and 12, for which the use of geographical names is recommended, i.e. 4 W - Sea of Aaland, 4 E - Archipelago Sea, 12 W - The Belts, 12 E - The Sound.

6.1.5 Local areas are distinguished by their local names, e.g. Bight of Hanoe, Gulf of Gdansk, etc.

(a) Names of the main forecast areas:

(1) Bay of Bothnia
(2) The Quark
(3) Sea of Bothnia
(4) Sea of Aaland and Archipelago
(5) Gulf of Finland
(6) Gulf of Riga
(7) Northern Baltic
(8) Central Baltic
(9) South-Eastern Baltic
(10) Southern Baltic
(11) Western Baltic
(12) The Belts and the Sound
(13) Kattegat
(14) Skagerrak
(15) Lake Vaenern

(b) Boundaries between main forecast areas:

Between area 1 and 2	Ratan - Stubben
Between area 2 and 3	Jarnasudde - Halsögrund
Between area 3 and 4	Parallel 60°30'N
Between area 4 and 7	Parallel 59°50'N
Between area 5 and 6	Parallel 59°00'N
Between area 5 and 7	Meridian 23°00'E
Between area 7 and 8	Parallel 58°20'N
Between area 6 and 8	Meridian 22°00'E
Between area 8 and 9	Parallel S6°30'N
Between area 9 and 10	Meridian 17°00'E
Between area 10 and 11	Falsterbo - Arkona
Between area 11 and 12	Falsterbo - Stevns, Kappel Kirke - Kelsner - Vejsnaes nakke - Gammel Pol
Between area 12 and 13	Sjaellands Odde - Hjelm/Gaasehage, Kullen - Gilbjerghoved
Between areal3 and 14	Skagen - Pater Noster
Between area 14 and North Sea	Hanstholm - Lindesnes

NOTES: (1) For practical reasons, when exchanging the forecasts between the meteorological services, the number of the area can be used instead of the whole name . However, when issuing the forecast for the marine user, the number, if used, should always be used together with the name of the respective area.

(2) When subdiving a main area into sub-areas the number, if used, and the name of the main area should always be mentioned first.

(3) When deciding on the names of the main areas in the various national languages, great care should be taken to assure the best possible correspondence between these and the English names.

(4) The numbers identifying forecast areas, when used for telecommunication purposes, should be prefaced by the letter II.

(5) The date of implementaxation of the co-ordinated common system described above is 1 August 1984.

6.2 Co-ordinated common system for the designation of marine forecast areas in the North Sea

6.2.1 Considering that designation of common forecast areas in the North Sea will facilitate the co-ordination of marine meteorological support to various marine activities, Regional Association VI has adopted the co-ordi nated common system of marine forecast areas as described below (Resolution 22 (VIII-RA VI)).

6.2.2 ' The basis for.the uniform system is a two-level division of the forecast areas: main areas and sub-areas.

6.2.3 Main areas are described by the geographical names and numbers, as presented on the map on page VI-5.

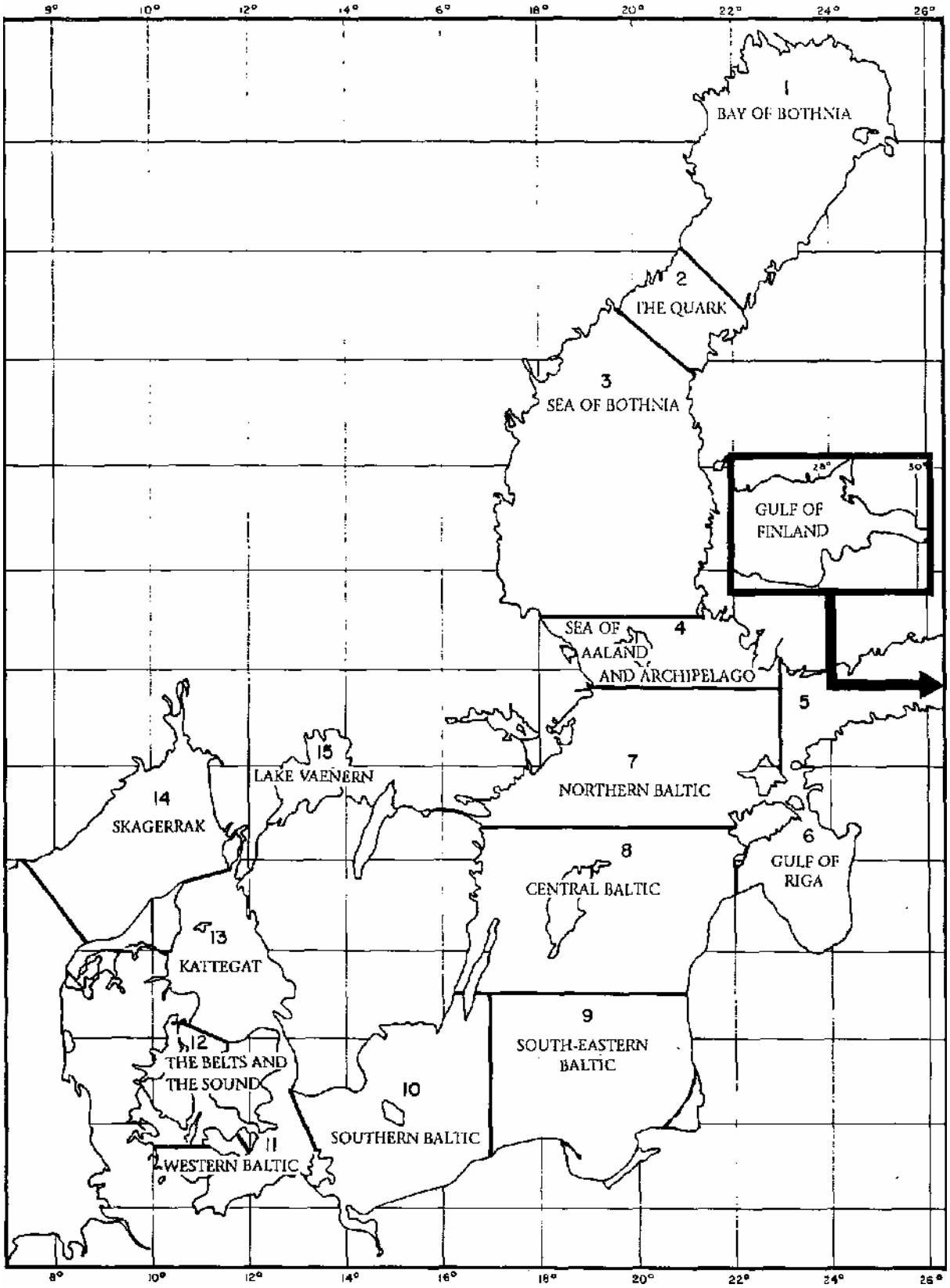
6.2.4 Sub-areas within a main area can, if the meteorological situation necessitates, be described according to the points of the compass, e.g. North Viking - East German Bight - West Humber, etc.

(я) Names and numbers of the main forecast areas:

N1 Viking Northern
N2 Utsire
N3 Southern Utsire
N4 Forties
N5 Cromarty
N6 Forth
N7 Tyne
N8 Dogger
N9 Fisher
N10 German Bight
N11 Humber
N12 Thames
N13 Dover

(p) Boundaries between main forecast areas:

Between area N1 and N2 Meridian of 4°E
Between area N1 and N3 Meridian of 4°E
Between area N1 and N4 Parallel of 58°30'N
Between area N2 and N3 Parallel of 59°N
Between area N3 and N4 Meridian of 4°E
Between area N3 and N9 Parallel of 57°45'N
Between area N4 and NS Meridian of 1°W
Between area N4 and N6 Meridian 1°W
Between area N4 and N9 Meridian of 4°E
Between area N5 and N6 Parallel of 57°N
Between area N6 and N7 Line from 57°N 1°W to 55°40'N 1°50'W
Between area N7 and N8 Line from 57°N 1°W to 54°1S'N 00°45'E
Between area N7 and N11 Parallel of S4n5'N
Between area N8 and N10 Meridian of 4°E
Between area N9 and N14 Line from Lindesnes to Hanstholm
Between area N9 and N10 Parallel of 56°N



Main marine forecast areas of the Baltic Sea

(b) Boundaries between main forecast areas: (contd.)

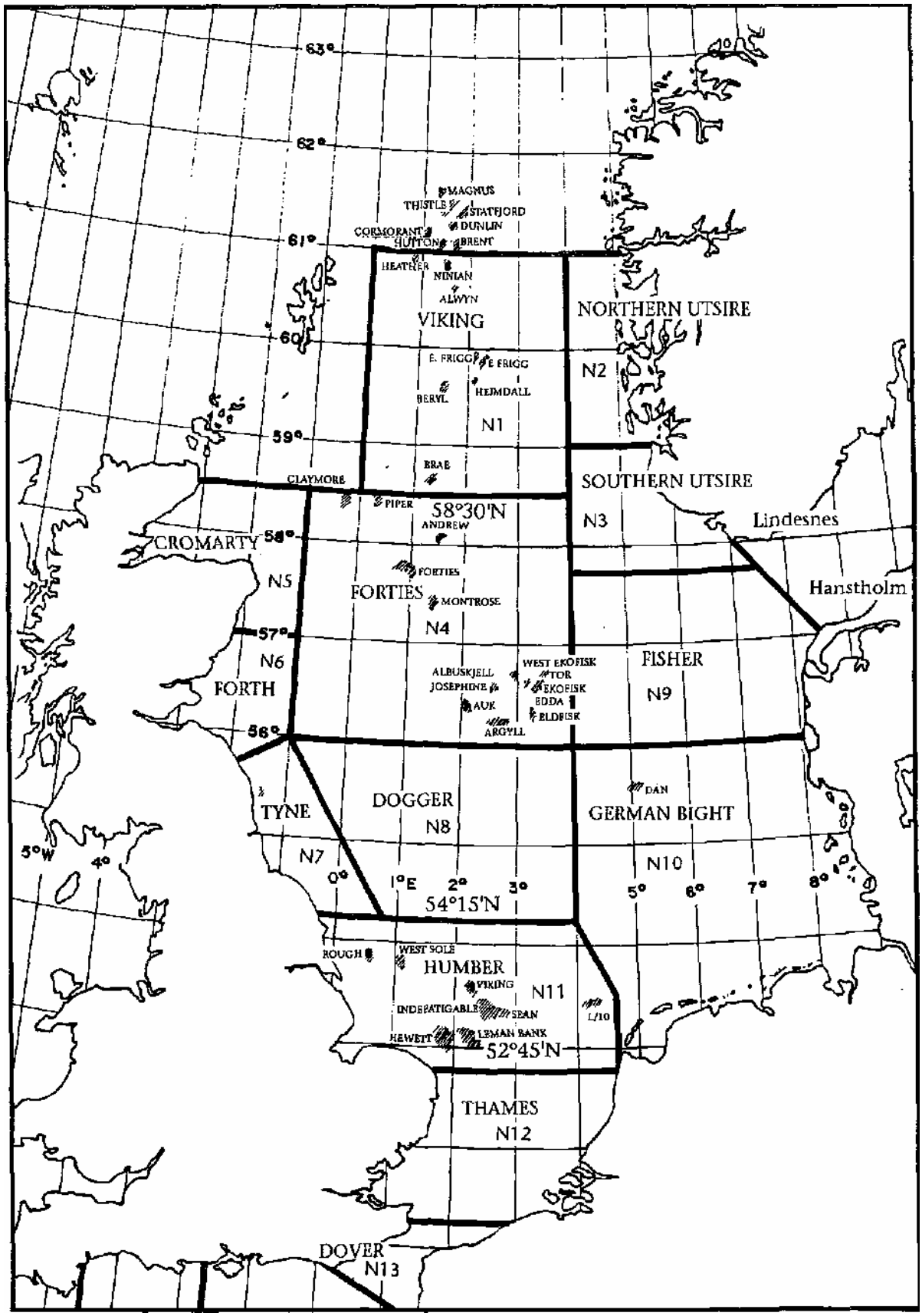
Between area N10 and N11 Line from 54°15'N 4°E to 53°35'N 4°40'E thence meridian of 4°40'E
Between area N11 and N12 Parallel of 52° 45'N
Between area N12 and N13 Parallel of 51°15'N
Between area N13 and ... Line from 50°45'N 0°15'E to 50°15'N 1°30'E

NOTES: (1) For practical reasons, when exchanging forecasts between the Meteorological Services, the number of the area instead of the whole name can be used. When issuing the forecast for the marine user, the number, if used, should always be used together with the name of the respective area.

(2) When deciding on the names of the main areas in the various national languages, great care should be taken to assure the best possible correspondence between these and the English names.

(3) The numbers indentlfying forecast areas, when used for telecommunication purposes, should be prefaced by the letter N.

(4) The date of Implementation of the co-ordinated common system described above is 1 August 1984.



Main marine forecast areas of the North Sea

APPENDIX

PROVISIONS APPLICABLE TO STORM WARNINGS ISSUED IN REGIONS WHERE TROPICAL CYCLONES MAY BE ENCOUNTERED

The content and order of items for a storm warning issued by radio for the high seas in regions where tropical cyclones may be encountered are as follows:

(a) Type of warning:

	Co/responding wind speed {Beaufort scale)	*in knots*
Gale warning	8 or 9	34-47
Storm warnng	10 or over	48 or more
Hurricane (or local synonym) warning	12	64 and over
Tropical disturbance of unknown intensity	uncertain	

NOTE: Near-gale warnings of wind of Beaufort force 7 (28-33 knots) may he issued as an optional form of warning.

(b) Date of time of reference in UTC;

(c) Type of disturbance (e.g. low, hurricane, etc.) with a statement of central pressure of deep lows in hectopascals:

Tropicals cyclones are classified as:

(i) Tropical depression	Winds up to 34 knots
(ii) Moderate tropical storm	Winds 34-47 knots
(iii Severe tropical storm	Winds 48-63 knots
(iv) Hurricane (or local synonym)	Winds 64 knots and over
(v) Tropical disturbance of unknown intensity	Wind speed uncertain

NOTE: Definition of a tropical cyclone is contained in the *International Meteorological Vocabulary* (WMO-No. 182) and the classification of tropical cyclones is left to the Regions concerned.

(d) Location of disturbance to be given in terms of latitude and longitude;

(e) Direction and speed of movement of disturbance. Direction is to be given in points of the compass and speed in metres per second or knots (units used shall be indicated);

(f) Extent of affected area;

(g) Wind speed and direction:

(i) Wind speeds should be given, if possible, for different distances from the centre in the various sectors of the storm area;

(ii) Wind direction shall be given in points of the compass and not in degrees;

(iii) Wind speeds should be given in Beaufort force notation and, if known, in metres per second or in knots. If metres per second or knots are used, the "metres per second" or "knots" should be included in the text of the message;

(h) Sea and swell conditions in affected area;

(i) Further indications, if any.