JCOMM EXPERT TEAM ON MARITIME SAFETY SERVICES (ETMSS) SECOND SESSION

Angra dos Reis, Brazil, 24-27 January 2007

FINAL REPORT

JCOMM Meeting Report No. 46

WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

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N O T E

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C O N T E N T S

GENERAL SUMMARY OF THE WORK OF THE SESSION

1. OPENING OF THE SESSION

1.1 Opening

1.1.1 The Second Session of the JCOMM Expert Team on Maritime Safety Services (ETMSS-II) was opened by Mr Henri Savina (France), Chairperson of the ETMSS at 0930 hrs on Wednesday, 24 January 2007, in the Portogalo Suíte Hotel, Angra dos Reis, Brazil.

1.1.2 Mr Savina welcomed the participants to the session and expressed his considerable appreciation to the Brazilian Navy and the Instituto National de Meteorologia do Brazil, the local organizers, Mr Antonio Claudio Vieira and all the staff for the excellent organization and support for hosting the meeting. Mr Savina noted that this was the first meeting of the Team organized outside Europe, and pointed out the importance of such practice to reinforce the contributions of all Issuing Services. He further listed the main issues of the agenda to be discussed during the meeting, to include: the coordination of formats and practices for the International NAVTEX service, information in graphical form, the GMDSS website, feedback from users and provision of tsunami warnings for mariners. He emphasized the need to consider the definition of a Core Membership for the Team and its meeting frequency. Finally, Mr Savina stressed that the success of this meeting depends largely on the contribution of each and every participant. Mr Savina then introduced Vice-Admiral Edison Lawrence Mariath Dantas, Director of Hydrography and Navigation, to address the session.

1.1.3 The Vice-Admiral Lawrence, welcomed the participants to the very beautiful region of Angra dos Reis, Brazil. Vice-Admiral Lawrence recalled that the sea has always been of the utmost importance to humankind, and a source of various and important resources. In particular, he pointed out that since discovery in 1500, Brazil has maintained a close relationship with the sea and its activities, from the earliest exportation of noble wood to the present-day international commercial trades, 95% of which is made by merchant ship sailing off the 8000 km of Brazilian shores. He recalled that the Brazilian Marine Meteorological Service, at the Navy Hydrographic Centre, has assumed the international commitment to be responsible for the preparation of meteorological analysis and forecasts for METAREA V. He also stressed that this meeting would contribute to facilitating the dissemination of information, exchange ideas, discuss goals and consider projects and alliances, in order to contribute to the safety of lives and property of the maritime community. In closing, Vice-Admiral Lawrence assured participants of the full support of his staff and he concluded by wishing all participants a very successful meeting and an enjoyable stay in Brazil.

1.1.4 On behalf of the Secretary-General of the WMO, Mr M. Jarraud, and the Executive Secretary of the IOC, Dr P. Bernal, the Secretariat Representative, Chief of the Ocean Affairs Division, Mr Edgard Cabrera, also welcomed participants to the Second Session of the ETMSS. In doing so, he expressed the very sincere appreciation of both Organizations to the Brazilian Navy and its Director of Hydrography and Navigation Vice-Admiral Lawrence, to the Instituto Nacional de Meteorologia do Brazil for the first arrangements, and especially to the local organizer, Mr Antonio Claudio Vieira and his staff, for providing the excellent facilities as well as for the tremendous organizational effort already put into preparations for the meeting. Mr Cabrera then gave a special welcome and thanks to the representatives of International Organizations, for the support and cooperation which they had shown to the WMO in past years during the development and implementation of the WMO Marine Programme. Further, he stressed that maritime safety services were one of the most important activities within the JCOMM, especially for the WMO. Mr Cabrera supported the remarks of the Chairperson concerning the objectives and importance of the meeting. He assured participants of the full support of the Secretariat, both during the meeting and throughout the implementation of the work programme of the Team, and he concluded by wishing all participants a very successful meeting and an enjoyable stay in Angra dos Reis.

1.1.5 The list of participants in the session is provided in Annex I to this report.

1.2 Adoption of the agenda

1.2.1 The Team adopted its agenda for the session on the basis of the provisional agenda. This Agenda is provided in Annex II to this report.

1.3 Working arrangements

1.3.1 The Team agreed its hours of work and other practical arrangements for the session. The documentation was introduced by the Secretariat, and the participants introduced themselves, to facilitate future interactions throughout the sesssion.

2. Reports

2.1 Report of the Services Programme Area coordinator

2.1.1 The Team noted with interest and appreciation the report of the Services Programme Area (SPA) Coordinator, Dr Craig Donlon. This report covered the structure of the SPA, a brief description of the new Expert Team on Marine Accident Emergency Support (ETMAES), the Terms of Reference (ToR) for the newly appointed Rapporteur for Operational Oceanographic Forecasting Systems (OFS), the Work Plan developed by the Coordinator for the current intersessional period, and concluded with a series of key issues for the Expert Team on Maritime Safety Services (ETMSS) to consider during the remainder of the meeting.

2.1.2 At the Third Session of the Services Coordination Group (SCG-III, Exeter, United Kingdom, 7-10 November 2006), the SPA Coordinator proposed a new structure for the SPA which focuses all current Expert Teams (ETs) on a common theme of Metocean Services in support of Maritime Safety Systems. In addition, noting the importance of pulling through the successes of the Ocean Forecasting systems (such as those within the Global Ocean Data Assimilation Experiment (GODAE) Project) into the JCOMM as GODAE transitions from pilot project to operations and, the increasing role of integrating ocean forecast systems, a new Rapporteur for Operational Oceanographic Forecasting Systems (in particular ocean meso-scale forecasting) has been appointed to facilitate this transition. Dr Adrian Hines (Met Office, United Kingdom) has been appointed as the Rapporteur and is attending the ETMSS meeting respectively.

2.1.3 Dr Donlon introduced the ETMSS to the SPA Work Plan that cuts across all relevant SPA ETs. The agreed Top Level Objectives (TLOs) for the SPA Work Plan which are applicable to all activities of ETMSS and other ETs within the SPA are further detailed in Annex III to this report. An electronic version of the SPA Work Plan has been made available, and can be located at the following web address: http://www.jcomm-services.org Dr. Donlon discussed the role of the SPA within the JCOMM and noted that a key challenge for the programme is the integration of science and standards into operational services supporting maritime safety, emergency response, disaster risk reduction and maritime hazards with full users' support and interaction. The main deliverables from the Work Plan are a series of standard specification documents and services including the following issues:

- A New JCOMM SPA website for general discussion, promotion and information on the activities of the SPA, which can be located at the following address: http://www.jcopmm-services.org;
- A JCOMM Services User Requirement Document (URD);
- Observation Requirements for JCOMM Services including *in situ* and satellite observations;
- *A JCOMM Catalogue of Operational Ocean Products and Services*;
- Standard Data and Metadata Formats for Ocean Products (including satellite, climatology, model, and combined);

- *A Guide to Ocean Product Presentation, Symbology and Nomenclature*.

These documents will be developed by the SPA Coordinator and ET Chairpersons with inputs from Expert Teams themselves rather than by a dedicated Task Team for Ocean Products Development. *The Guide to Ocean Product Presentation, Symbology and Nomenclature* will be presented to the Commission during the JCOMM-III for approval.

2.1.4 The Team noted with appreciation that the SPA is planning an International Maritime Met-Ocean Services Conference (IMMSC 2008) to be held in Exeter, United Kingdom, from 5 to 9 October 2006, with the aim of establishing and agreeing on International Met-Ocean Services requirements, identifying shortcomings of the present systems and reviewing long and short-term solutions. The Conference will bring together private and public maritime application industries, system and service providers, marine scientists and engineers to improve communication and mutual understanding. A Scientific Coordination Group will be established to develop the format and content of the Conference during the next six months. Dr. Donlon requested that the ETMSS provide delegates to represent the Team on the IMMSC Scientific Steering Team **(Action: ETMSS Chairperson and Secretariat)**.

2.1.5 The SPA Coordinator noted the following as key areas for the ETMSS to consider during the discussions:

a) The MSI is a key focus for SPA activities during this intersessional period and that the ETMSS must demonstrate it's successes at the JCOMM-III.

b) To consider the definition of a Core Membership of the ETMSS as a way to provide support to the ET Chairperson and the Secretariat.

c) Sea state products and services to mariners can be improved (e.g., by providing % chance of Rogue Waves). The ETMSS needs to define a clear set of requirements for this type of information for consideration by the ETWS in March 2007.

d) Given the increased activities in the Polar Regions and other areas with seasonal coverage, sea ice information needs better integration into the ETMSS. The ETSI is well advanced in the dissemination of services to mariners in the Arctic Ocean and other ice-covered ocean areas, in terms of development, preparation and graphical products (based on international standards). Therefore, the ETMSS has requested to the ETSI to provide a clear set of recommendations for its consideration.

e) Noting the sustained operation and content of the GMDSS website, the SPA Coordinator suggested that the content of the site should be upgraded and should include easy to access simple Graphical products as requested by the community.

f) As there are differences between the ways by which the Issuing Services generate and report their performance for the monitoring of SafetyNET and NAVTEX dissemination, there is a clear need for standard definitions of the metrics and some overall coordination. Furthermore, it would be useful to publish regular performance statistics on the operational GMDSS website.

g) The SPA Coordinator urged the ETMSS participants to provide to the Secretariat with content on the MSS to be included in the http://www.jcomm-services.org website (especially with regards to images and links to products and services).

h) In accordance to the WMO Regulations (WMO-No. 471: *Guide on Marine Meteorological Services*), and the Terms of Reference of the ETMSS, the Team has the mandated responsibility to manage the MSI in collaboration with the IHO, including those issues related to tsunamis. The SPA Coordinator urged for a clear discussion and production of a clear set of recommendations concerning

dissemination of tsunami advisories.

i) Regarding Capacity Building, the SPA Coordinator requested the ETMSS to develop several lesson scenarios on the MSS using existing tools (e.g., Bilko (http://www.bilko.org) and/or OceanTeacher (http://www.oceanteacher.org)).

2.2 Report of the Chairperson

2.2.1 The Chairperson summarized the main achievements during its previous session, and in particular:

- The formal adoption of common sets of Sub-areas for METAREA 2 and METAREA 3(W). As it is the first step for the coordination of the provision of the MSI on overlapping areas, it was therefore recommended to the concerned Issuing Services to review this matter and to coordinate the work necessary to effect such harmonization, as deemed necessary.

- Definition and formal adoption of complementary guidelines and common abbreviations list for NAVTEX forecasts. This very important first step should be reviewed and updated as required and/or necessary.

- The development of the first version of the GMDSS website, which can be located at the following address: http://weather.gmdss.org.

- Adoption of guidelines for the inclusion of visibility and sea-state information in marine weather forecasts and warnings.

- Preparation and analysis of the last four-yearly basis surveys for the monitoring of Marine Meteorological Services.

- Reinforcement of the cooperation with the IHO/CPRNW.

2.2.2 The Chairperson also stressed that the JCOMM requested the Team to complete the following issues:

- Continue to give the project to improve the GMDSS through the expansion of services to provide products in graphical format via the Inmarsat SafetyNET service its full attention, as the provision of graphics remains a priority activity of the Commission.

- Liaise with the IHO and IMO, to coordinate the use of the common URL *gmdss.org* , registered by the WMO Secretariat for the JCOMM GMDSS website, for the provision of both meteorological and navigational warning information in real-time via the website.

- Facilitate, in cooperation with the IMO, IHO and IOC, the dissemination of appropriate MSI related to tsunamis for both SOLAS and non-SOLAS vessels. For the GMDSS, a proposal for the clarification of responsibilities between the existing and future Regional Tsunami Advisory Centres, National Tsunami Warning Centres, Metarea Issuing Services and Navarea Coordinators should also be prepared.

2.2.3 Additionally, after discussions within the SPA and the IHO/CPRNW, the further mentioned items should be considered:

- The definition of a Core Membership for the Team and the modification of the frequency of the meetings;

- The clarification of the responsibilities and formats for the provision of MSI related to Sea Ice and Icebergs, in cooperation with the ETSI and IHO;

- The improvement of practises and guidelines regarding the provision of sea-state information in MSI, including dangerous and complex seas, in cooperation with the ETWS.

2.2.4 According to a request by the IMO, the Team would also discuss the WMO contributions for the potential new Arctic Metareas. Finally, the Chairperson noted with satisfaction the participation of the SPA Coordinator and OFS Rapporteur, and both Chairpersons of the ETWS and ETSI.

2.3 Report of the Secretariat

2.3.1 The Team recalled that the Second Session of the JCOMM took place in Halifax, Nova Scotia, Canada, in September 2005. Bearing in mind that the best way to activate and motivate the main JCOMM subsidiary bodies is to have them meet early in the intersessional period, to prepare work strategies, address priority issues identified by the JCOMM-II and allocate specific tasks. Thus, a work programme was prepared which allowed for the Management Committee (MAN) and the SPA Coordination Group (SCG) to meet in 2006 to develop a specific Work Plan. In addition to these meetings, the programme includes other subsidiary bodies and related meetings, in particular those of a regular nature (e.g., the present session of the Expert Team on Maritime Safety Services (ETMSS-II)).

2.3.2 The Team noted with appreciation the Summary Reports on the following activities: (i.) the results of the JCOMM-II, (ii.) the Fifth Session of the Management Committee (MAN-V), and (iii.) the Third Session of the SPA Coordination Group (SCG-III). The Team noted that, with regards to the work of the Expert Team on Maritime Safety Services, the Third Session of the SCG had identified specific tasks to be undertaken by the Team that were highlighted in the SPA Coordinator and ETMSS Chairperson reports. The WMO Secretariat Representative, Mr Edgard Cabrera, recalled the overall Work Plan for the JCOMM and highlighted the need of prioritization of these activities and that the JCOMM Implementation Plan should support the WMO Strategic Plan and IOC Medium-term Plan. Mr Cabrera also recalled the role of the JCOMM on ocean-related hazards warning systems and the importance of enhancing collaborations with other WMO Technical Commissions, such as the CBS, CCl and CAS, and partner Organizations, especially with the IMO and IHO.

2.4 Report of SafetyNET and NAVTEX Panels

2.4.1 The Chairperson of the IMO International NAVTEX Coordinating Panel, Mr Steve Godsiff explained the role of the Panel and presented his report. Mr Godsiff explained that there are now, on average, more than six NAVTEX stations broadcasting in each of the 24 time slots and that the number of operational stations continues to grow. In some time slots there are eight or nine stations broadcasting simultaneously. Hence the risk of interference between stations using the same time slot, but in different regions, is increasing. He outlined recent NAVTEX infrastructure developments around the world and, although noting that overall the service is operating satisfactorily, he briefed the Team on the operational issues that the Panel is currently attempting to address. The principal issue of significance to this Team is that of ensuring all relevant information for broadcast is included within the allocated 10 minute time slot for each station. Any over-run raises the possibility of interference with stations programmed to broadcast in the subsequent time slot. Recent initiatives to introduce standardized abbreviations for meteorological information were welcomed by the Panel as a positive step towards reducing transmission times and hence the number and size of over-runs. Another issue for the international service is a desire to achieve consistency of format and units used so as to reduce the risk of users misinterpreting the forecasts and warnings. As an example, wind speeds were quoted where different administrations use different units (e.g., Beaufort, knots, mph, metres /second, etc.).

2.4.2 On behalf of Mr Peter Doherty, the Chairperson of the SafetyNET Panel, Mr Godsiff briefed the Team on the use of SafetyNET coastal warning areas and also raised the requirement for continuity planning in the event that a local disaster affects the ability to broadcast MSI through normal channels. Hurricane Katrina was used as an example; the New Orleans NAVTEX station was destroyed and information for broadcast had to be re-routed through other NAVTEX stations and through SafetyNET.

2.4.3 Mr Godsiff went on to brief the Team regarding the MSI document review that is currently being carried out by a correspondence group that is open to all respective IMO, IHO and WMO Members; he invited participants of this meeting to participate in the group.

2.4.4 Mr Godsiff touched on the issue of the proposed expansion of the WWNWS into the Arctic region, and noted this will be discussed further under Agenda Items 3.1 and 3.2. He also raised the issue of possible amendments to the current structure of the WWNWS in other parts of the world. Specifically, he noted that at the IHO/CPRNW 8, a proposal was included in the report from the NAVAREA XIII Coordinator to consider establishing the Black Sea Region as a Sub-area of NAVAREA III, similar to the current situation whereby the Baltic Sea is administered semi-automously as a Sub-area of NAVAREA I. The NAVAREA III Coordinator was asked to obtain and collect views from all countries affected and report back to the IHO/CPRNW 9 Session. The possible impact on meteorological services also needs to be considered with respect to this proposal. The Team requested the METAREA III Issuing Service and the Chairperson of the ETMSS to be included within the consultation process **(action: METAREA III Issuing Service and ETMSS Chairperson)**. Finally, he brought the attention of the Team to the WWNWS CD, which has been compiled by the Chairperson of IHO/CPRNW, Mr Peter Doherty. The ETMSS participants noted that a copy of this CD had been distributed to each of them during the meeting.

2.5 Reports by Issuing Services

2.5.1 The Team noted with interest the reports from Issuing Services (Argentina, Australia, Brazil, China, France, Greece, India, Japan, Mauritius, New Zealand, Russian Federation, South Africa, United Kingdom and United States) on their experiences, progress and success in implementing the system within their respective METAREAS, in particular on the changes since the First Session of the Expert Team on Maritime Safety Services (ETMSS-I, Lisbon, Portugal, September 2002). These reports also covered, wherever possible, feedback from users as well as experiences with regard to the coverage and implementation of meteorological broadcasts through the International NAVTEX Service. These reports will be published separately in electronic format as a JCOMM Technical Report.

2.5.2 From these reports, as well as the verbal information presented by the representatives of the Issuing Services, the Group noted the following specific points of interest:

- Australia, Brazil, the Russian Federation and New Zealand mentioned that have been supplying the maritime community with weather information broadcasted by HF radio (voice and radio facsimile). They recalled that this service is of considerable value to the mariners and will continue well into the foreseeable future. The USA also provides such services, but the continuation and recapitalization of HF broadcast is under consideration, depending on the feedback from mariners.

- Argentina and South Africa provide warnings on rogue / freak waves.

- Australia, France and the USA provide, or plan to provide, products prepared by automatically generated human voice system. There is potential for having standardized libraries of voice products in different languages.

- Australia, France and the United Kingdom experienced difficulties or necessary adaptations either for VOS data collection or dissemination of MSI caused by either closure or modification of services of the LESs.

- Brazil uses NAVTEX abbreviations on SafetyNET MSI and still provides some information in Iac-fleet format.

- Mauritius and Kenya confirmed that Kenya is technically ready to become a Preparation Service for Sub-area 8/7 of METAREA VIII(S). Mauritius is requested to officially inform the WMO Secretariat regarding this issue **(Action: Mauritius)**.

2.5.3 The Team urged all the Issuing Services to inform the Secretariat of any changes to their transmission schedules for the WMO marine broadcast system for the GMDSS SafetyNET services, as well as to the list of national contact points for the system, if possible well in advance of the implementation of the changes, so that these changes can be reflected in WMO Publication No. 9, Volume D, and also conveyed to users by other various means (ALRS, web site, etc.) **(Action: Issuing Services)**.

2.6 Inmarsat Report

2.6.1 The Team was informed on the overall situation with respect to the Inmarsat C System, Inmarsat C and mini-C mobile terminals as well as some statistical information on the number of Enhanced Group Calling (EGC) SafetyNET messages (navigational, meteorological and search and rescue) per ocean region in all ocean regions and per month in 2006. On average, 600-730 EGC SafetyNET messages of all service types are broadcast in all ocean regions per day, including repeated messages, of which: AOR-E 120 – 160 messages per day; AOR-W 60 – 120 messages per day; IOR 195 – 370 messages per day; and POR 130 – 225 messages per day.

2.6.2 Regarding the quality of Maritime Safety Information (MSI), the Team noted that the Inmarsat Maritime Safety Services department periodically monitors the quality of Maritime Safety Information in the AOR-E, AOR-W satellite regions. The received messages are analyzed, and appropriate recommendations are relayed to the MSI providers if quality related problems are detected.

2.6.3 The Team also noted that Inmarsat had not receive any major complaints in the past twelve months from maritime customers on the quality of the MSI, with the exception of some complaints regarding reception of multi-repeated or unwanted messages. However, reception of these unwanted messages may be due to an improper EGC set up on mobile terminals or position information on the terminal not updated regularly if there is no automatic update from the integrated GPS receiver.

2.7 IMSO Report

2.7.1 On behalf of Mr Andrew Fuller, the WMO Secretariat Representative, Mr Edgard Cabrera, presented the IMSO Report on the analysis and assessment of the performance by Inmarsat Global, Ltd. for the provision of maritime services within the GMDSS. The information contained on this document covers the period from 1 November 2005 to 31 October 2006. It was shown that, during this period, the Inmarsat has continued to provide a sufficient quality of service to meet its obligations under the GMDSS.

2.7.2 The Team noted that the report on the availability of all distress alerting and other GMDSS-related components within the Inmarsat system during the 12-month period from 1 November 2005 to 31 October 2006 represented an acceptably high-level of availability for the core GMDSS services. From November 2005 to April 2006, there were no periods of downtime reported for any GMDSS service. Periods of service non-availability were generally few in number, of short duration and were not significant for GMDSS operations.

2.7.3 The Team also noted that the total number of alerts in each Ocean Region is not significantly different from previous years. The totals include a number of instances when a terminal sent multiple alerts. Inmarsat contacts the vessels concerned with such multiple alerts

and, where the alerts have been false, seeks to assist the vessel to improve its procedures to avoid such occurrences in future. However, many vessels do not respond to these contacts and no further action by Inmarsat is possible.

2.7.4 The programme for the closure of the Inmarsat-E EPIRB service, which was approved by the Maritime Safety Committee (MSC) at its Seventy-Ninth Session, and notified in MSC/Circ.1171, has progressed throughout 2006 under the supervision of the IMSO. On 1 December 2006, there were still approximately 400 EPIRBs which could not be exchanged. These are EPIRBs for which the present owner either cannot be identified or does not respond to Inmarsat's invitation to exchange. It is expected that the final number unaccounted for will be approximately 350. The IMSO believes that every reasonable effort has been made to contact every registered owner of an Inmarsat-E EPIRB, and that Inmarsat has fully fulfilled its obligations under the closure programme agreed upon by the IMO.

2.7.5 The Team noted that during the IMO MSC-82 (Istambul, Turkey, December 2006), a Revision of Resolution A.888(21) was further discussed. An intergovernmental oversight role, similar to the oversight role presently carried out by the IMSO in respect of Inmarsat Ltd., would be needed when other providers of GMDSS satellite services would, in future, be accepted and recognized by the Organization. It was also noted that the decisions made during the MSC-82 are as follows:

- Resolution A.888(21) should be redrafted to reflect the decision on the respective responsibilities of MSC and IMSO. Accordingly, the Committee instructed the COMSAR-XI to finalize the Resolution and submit this decision to the MSC-83 with a view to adoption by 25th Assembly; and

- Any corresponding amendments to SOLAS Chapter IV should be considered and finalized by COMSAR-XI in February 2007. Accordingly, the Committee authorized the WMO Secretariat to circulate the finalized amendments after the COMSAR in accordance with SOLAS Article VIII (i) with a view to adoption by MSC-83.

2.7.6 Due to the importance of this matter and the possible implications for Issuing Services if other providers of GMDSS satellite services would, in future, be accepted and recognized by the IMO, the Team agreed that the JCOMM Cross-cutting *ad hoc* Group on Satellite Data Requirements should review any proposals to update or amend IMO Regulations regarding the dissemination of products and services, in particular the amendments to Resolution A.888(21), with a view to ensuring the Issuing Services can brief national administrations on specific implications for metocean services before changes are endorsed by the IMO.

2.7.7 The Team recalled the Terms of Reference (ToR) of the Cross-cutting *ad hoc* Group on Satellite Data Requirements established by JCOMM-II, and noted that these terms do not cover all SPA satellite requirements, especially regarding communications to assist with maritime support and safety issues. Therefore, the Team recommended that a new satellite rapporteur should be appointed as soon as possible in consultation with the Chairperson of the JCOMM Cross-cutting *ad hoc* Group on Satellite Data Requirements, Dr E. Linstron **(Action: Secretariat, ETMSS chairperson and SPA coordinator)** and a more complete and comprehensive ToR for this new Rapporteur on Satellite Communications for Dissemination of Products and Services be defined. These ToR are provided in detail in Annex IV to this report.

2.8 IMO Report

2.8.1 The Team was informed on the status of the overall activities of the IMO relevant for the work of the Expert Team on Maritime Safety Services (ETMSS). The Team recalled that the during the Seventy-Fourth Session of the Maritime Safety Committee (MSC-74, London, United Kingdom, May to June 2001), recognizing the continuing critical importance of the VOS meteorological reports to the provision of meteorological services to the mariners, including those

under the GMDSS, approved the revised MSC/Circ. 1017 - Participation in the WMO VOS Scheme.

2.8.2 The Team noted that during the past MSC-82 (Istanbul, Turkey, December 2006,), it was recalled that the WMO had provided a long-standing cooperation to mariners and the IMO (MSC/Circ. 1017) to enhance the maritime safety at sea in support of the SOLAS Regulation V/4. It was recognized that the real-time observations provided by the VOS are essential for the provision of weather and ocean forecast services to the mariner, including the Maritime Safety Information (MSI) forecasts and warnings issued by the international NAVTEX and SafetyNET systems.

2.8.3 The MSC-82 also noted that due to security issues in certain regions, some ship owners and masters had concerns regarding availability of VOS ship's positions and identification on public websites not controlled by National Meteorological Services (NMSs). The Team was informed that to achieve progress in this matter, the WMO is organizing a High Level Dialogue Consultative Meeting to be held at the WMO Headquarters, Geneva, Switzerland, from 12 to 13 February 2007 in cooperation with the IMO, ICS, INTERCARGO, INTERTANKO, BIMCO, and other relevant agencies and concerned Members. In addition to the VOS matter, the agreed agenda includes other issues for enhancing the cooperation between the WMO and IMO, and are as follows:

- Revision of MSC/Circ. 1017;
- Maritime Safety Information;
- Marine Pollution Emergency Response Support System;
- Support to Search and Rescue (SAR) Operations;
- Operational Ocean Forecasting System.

2.8.4 The Team agreed that this Dialogue Meeting is of high importance to the work of the ETMSS, especially regarding the Metocean MSI provided in the IMO/IHO/WMO regulations and documentation, and encouraged the Secretariat to pursue any effort to enhance the cooperation between these organizations, especially in the framework of the Maritime Safety Services (**Action: WMO Secretariat)**.

3. Provision of MSI for Polar Regions

3.1 Report of the Chairperson of the joint IMO/IHO/WMO Correspondence Group on MSI Services

3.1.1 The IHO Representative, Mr Steve Godsiff, presented the report on behalf of the Chairperson of the Joint IMO/IHO/WMO Correspondence Group on Arctic MSI Services, prepared by Mr Peter Doherty.,

3.1.2 At the Tenth Session of the IMO COMSAR Sub-Committee (London, United Kingdom, from 6 to 10 March 2006), the increased use of the Arctic region by all elements of the maritime community (commercial, military and scientific) was recognized. It also noted the need for the Arctic Ocean to be respected as the other temperate oceans and navigated with similar concern for the presence of hazards to navigation. Further, it approved the establishment of a Joint IMO/IHO/WMO Correspondence Group (CG) on Arctic MSI Services, to address the expansion of the World-Wide Navigational Warning Service (WWNWS) into the Arctic waters, with associated Terms of Reference, as provided in Annex V to this report.

3.1.3 The Correspondence Group focused on addressing the salient issues identified in the Terms of Reference. The IHO Commission for the Promulgation of Radio Navigational Warnings (CPRNW), which is responsible for the coordination of the World-Wide Navigational Warning Service (WWNWS) (and is also chaired by Mr Peter Doherty), endorsed during it's Eighth Session in September 2006 (Buenos Aires, Argentina), the recommendations of the CG.

3.1.4 The Recommendations are included in the final report of the IHO/CPRNW-8. In particular, it was agreed that, despite limitations with Inmarsat-C coverage, there should not be a northern limit to any NAV/METAREA, and that the CG should investigate further the best way forward for providing full MSI services, including the use of other potential satellite service providers. It was also agreed that an all year rather than seasonal service should be provided.

3.1.5 The boundary limits of the proposed new Arctic NAV/METAREAs have yet to be officially agreed by all relevant Members States and Organizations such as the IMO, IHO and WMO. The draft proposal (provided in the Annex VI to this report), takes into consideration, in particular the Inmarsat satellite footprints, in order to prevent the establishment of areas that would have to promulgate messages under multiple satellite transmissions. Discussions are still taking place, especially between Norway and the Russian Federation regarding some boundaries limits. Nevertheless, the IHO/CPRNW endorsed the selection of Canada (NAVAREAs XVII and XVIII), Norway (NAVAREA XIX) and the Russian Federation (NAVAREAs XX and XXI) as the new Arctic NAVAREA Coordinators.

3.2 Review of the proposals and definition of boundaries and responsibilities for new potential Arctic NAV/METAREAS

3.2.1 The ETMSS Chairperson noted that METAREA Issuing Services still need to be addressed, and the Secretariat informed the Team that, even though discussions on delimitation of NAV/METAREAs are still ongoing, the Norwegian Meteorological Institute have sent an official offer to assume the role and responsibility as Issuing Service for the proposed METAREA XIX. Denmark also informed of its potential interest. The Team urged the Secretariat to further discuss these issues with Norway and Denmark in order to define who will take the responsibility as Issuing Service and Preparatory Service for this METAREA **(Action: Secretariat)**.

3.2.2 The Canadian Representative, Mr Val Swail, presented the Statement from the Permanent Representative of Canada regarding Arctic METAREAs, and was presented as follows:

> '*It is clear that the increased use of the Arctic region by all elements of the maritime community suggests an expansion of the World-Wide Navigational Warning Service into Arctic waters. Canada understands that the procedure of definition of the Arctic METAREAs for GMDSS under the auspices of IMO/IHO/WMO is undergoing change and that many details that are under discussion remain unresolved*
>
> *I am pleased to inform the JCOMM ETMSS of our deep interest in these matters and of our intention for Environment Canada to be the issuing service with responsibility for the proposed GMDSS METAREAs XVII and XVIII. We are currently seeking proper approvals in Canada to that effect.*
>
> *We understand that implementation will likely be one to several years given the shared decision-making of the governing bodies and we look forward to further consultations on technical matters in collaboration with our national and international partners to define and refine its implementation.*'

3.2.3 Based on the previous items, the USA Representative, Mr Timothy Rulon, informed the Team of the potential interest of USA to become a Preparation Service for the proposed METAREAs XVII and possible METAREA XVIII.

3.2.4 The Session noted that the Russian Federation is routinely providing meteorological and ice MSI for SavetyNET within the 17 forecast regions of the Northern Sea Route area of the current Arctic Ocean METAREA (given in Annex VII to this report) and is ready to become the Issuing Service for METAREA XX and XXI. It should be noted that the Russian Federation informed the Team that the question of boundaries shall be clarified before any formal offer. A clear opportunity for reaching an agreement between Norway and the Russian Federation is expected during the next IMO COMSAR in February 2007 (London, United Kingdom). The Chairperson and the IHO

Representative also reminded the Team that the delimitation of these new Arctic NAV/METAREAs is not related to and shall not prejudice the delimitation of any boundaries between States.

3.3 IHO report on provision of MSI related to sea ice

3.3.1 Mr Steve Godsiff presented the IHO Report on provision of the MSI related to sea ice on behalf of Mr Steve Shipman, from the International Hydrographic Bureau. This report contains an excerpt of the IHO S-53 Appendix 1, the joint IMO/IHO/WMO Manual on MSI, regarding 'radio navigational warnings for the world-wide navigational warning service', and 'meteorological warning and forecasts for the high seas'. Mr Godsiff highlighted items related to sea ice information.

3.3.2 The Team noted the information provided and recognized that the MSI, in particular meteorological warnings, should be more clearly defined and included in this publication. The Team recalled that the CPRNW Correspondence Group (CG) established, at the seventh meeting, to review all World-Wide Navigational Warning Service (WWNWS) documentation, and had decided to take a top-down approach and focused initially on the IMO Assembly Resolutions A.705 (17) and A.706 (17). The CPRNW-8 further completed work on reviewing said Resolutions. The Correspondence Group will continue its work with the intention of completing it in time for approval by the CPRNW-9, the IHO and WMO and submission to COMSAR-12. Subsequently the information in these revised resolutions will be cascaded down into the *IMO Publication on Maritime Safety Information*, the *NAVTEX Manual and International SafetyNET Manual* and IHO Publications S-53 and S-53, Appendix 1. The Team urged the WMO Secretariat to consider proposing a Resolution to IMO on Metocean services similar to A.706(17) for navigational warnings, and to discuss these issues during the High Level Dialogue Meeting with the IMO to be held in Geneva, Switzerland, in February 2007 **(Action: Secretariat)**.

3.4 ETSI Report on provision of MSI related to sea ice

3.4.1 The Chairperson of the ETSI, Dr Vasily Smolyanitsky, presented a summary description of MSI related to sea ice and elements for a stronger cooperation between the ETMSS and ETSI, especially in hopes to further develop standards, guidelines and regulations for provision of complex sea ice information in MSI.

3.4.2 The Team noted that the provision of the MSI for ice susceptible waters differs in a number of ways from that for the open water. That includes, but is not restricted to: a list of environmental parameters required to be monitored, formats, timeliness and means of informational products relay to the users. However, many of the standards for common ice products presentation and relay to users (including the GMDSS) have a number of gaps for the Polar Regions (there are chart standards for content but not for dissemination, no standards for ice hazard warning text bulletins and the Inmarsat System has an increasing number of gaps northward of 77-79°).

3.4.3 The specialized Meteorological Services in the Polar Regions, which was evolved initially in support of local marine users, have since developed into a wide range of sea-ice information services designed to meet many user requirements. Bearing in mind that any navigation for the non-icebreaking vessel in the ice infested waters is not only dangerous but in most cases prohibited without the contact and support from the NMHS, the MSI services in the Polar and Sub-polar Regions (both Northern and Southern hemispheres) are timely provided by the twenty-one [by the end of 2006] respective National Ice Services (NIS) and International Ice Patrol (IIP) and are simply referred to as "services".

3.4.4 The Team noted that observational data from coastal stations, icebreakers, drifting buoys, aircraft and satellites are combined by the National Ice Services with diagnostic and prognostic information from ice-ocean coupled numerical models to derive information on ice distribution, compression and divergence, wind and ice drift, ocean current, sea level and sea level oscillations. Sea ice informational products derived in real-time from these data are used operationally to ensure the safety of navigation by all vessels, maximize time and fuel savings of icebreaker lead convoys, determine the most efficient and safest route, and protect life and property associated with human activities on the ice, and include:

- Routine ice charts with various complexity, scale and periodicity (usually 1-7 days), providing tactical and regional recommendations (binary product);

- Sea ice boundary, icebergs propagation boundary with daily periodicity (textual product);

- High-resolution annotated satellite imagery, commonly providing tactical recommendations to the masters (1 hour – 1 day) (binary product);

- Prognostic (usually 1-7 days) ice charts for ice parameters critical for safety and success of navigation (binary product);

- Supplementary synoptic and prognostic (usually 1-7 days) meteorological charts or grids (binary or textual products);

- Textual warnings and forecasts for ice and weather parameters critical for safety and success of navigation;

- Medium and long-term ice and meteorological phenomena forecasts with advance of more than 7 days (commonly based on empirical models) (mostly textual products).

3.4.5 Dr Smolyanitsky recalled the various telecommunication facilities that are used to relay sea ice products (both textual and binary), to the users. He also recalled sea ice guidance material/standards and suggested elements for a common work plan for both Expert Teams. Based on the discussions, the Team agreed to define the Terms of Reference and Membership for a cross-Task Team on provision of MSI for Polar Regions (provided in Annex VIII to this report).

4. Delivery of Tsunami warnings for mariners

4.1 Organization and production of Tsunami Warning Systems

4.1.1 The WMO Secretariat Representative, Ms Alice Soares, presented background information regarding the organization of Tsunami Warning Systems (TWS), in particular regarding functions of Regional Tsunami Warning Centres (RTWC), Regional Tsunami Advisory Centres (RTAC) and National Tsunami Warning Centres (NTWC).

4.1.2 The UNDP Representative, Dr Jane Mocellin, presented the UNDP Strategy on Disaster Risk Reduction and Caribbean initiatives. Based on WMO Publications, Dr Mocellin suggested the following items:

- Revision of all documentation dealing with Maritime Safety Services regarding to new threats of a tsunami disasters. The Publication 'WMO Guide to Marine Meteorological Services' Third Edition WMO-No. 471 needs to have a comprehensive revision in content including in-depth review of current information.

- The Working document "Guidelines for the Provision of MSI related to Tsunamis (Organization, Content and Formats)" needs to be revised accordingly and cross-referenced to other related WMO documents. A methodological scientific-based approach should be followed, which means a Core Expert Group will revise and improve the current version, an outside independent referee reviewer(s) will provide additional key comments; followed by a validation of the product by selected mariners (the target group). Dissemination of the product via media and internet will be the last stage of the product development process.

4.2 Coordination with the IMO, IHO/CPRNW and ICGs

4.2.1 The Team was advised that the IMO/COMSAR and IHO/CPRNW recognized the need to coordinate the provision of MSI related to tsunamis to shipping. The offer made by the IMO through its COMSAR/Circ. 36, to permit TWC to issue their tsunami advices through SafetyNET, was welcomed. However, it was also recognized that a significant amount of preparation and an appropriate demonstration would be required by the responsible centres before operational implementation could be achieved.

4.3 Guidelines for the provision of Tsunamis Warnings for mariners (organization, type, content and formats)

4.3.1 During the discussions, major issues were identified, and it was agreed to set up a Task Team on Tsunami Products for Transmission as MSI, to work urgently on these matters. The Terms of Reference and General Membership of the Task Team have been reproduced and are available in Annex IX to this report. This Task Team will consider only the *pre-tsunami message* (where the mariner is being warned of a potential or imminent tsunami) and not t*he post-tsunami message* (information on damage to navigational aids, seafloor and shoreline changes, etc.). The major issues focused on the need to clarify the responsibilities amongst the various centres or agencies potentially involved, and enhance and adapt existing or proposed tsunami advisories/bulletins (e.g., PTWC, JMA) into the appropriate maritime dissemination channels, in accordance with the WMO Publications Nos. 471 and 558. This is especially important for the GMDSS (SafetyNET and NAVTEX) and the final service must be reconciled with marine users needs. The report presented during the session is provided in Annex X to this report.

5. Coordination with other Expert Teams and Programmes

5.1 Link with the ETWS, especially on extreme waves and storm surges

5.1.1 Recommendations and guidelines for the inclusion of sea-state information in MSI have been agreed upon by the ETMSS-I in September 2002, and approved by the JCOMM-II in October 2005. The *Manual on Marine Meteorological Services* (WMO-No. 558) had been updated in accordance to these Recommendations. The sea-state is now again a mandatory parameter in weather forecasts, and dangerous sea / rogue waves are listed as potential parameters for warnings. The Team agreed on the ToR and General Membership of a Task Team to consider improved baseline sea-state MSI using modern techniques (given in Annex XI to this report).

5.2 Cooperation with Tropical Cyclone Programme on connections between units used in Tropical Cyclone warnings

5.2.1 The Secretariat Representative, Ms Alice Soares, presented a description of the current practices of the five Tropical Cyclone Regional Associations, Panels and Committees in regard to wind averaging periods, and a summary of the final draft of a study, conducted by the WMO Tropical Cyclone Programme (TCP), to provide guidance for converting between different wind averaging periods. The Team noted that this study would be adopted by WMO Tropical Cyclone Programme during 2007, after approval by all respective Tropical Cyclone Regional Associations, Panels and Committees. The Team agreed to wait for a final document to prepare a proposal for the next ETMSS meeting.

6. International coordination of NAVTEX broadcasts

6.1 Guidelines for bulletins broadcast by NAVTEX

6.1.1 Mr Michael Myrsilidis, from Hellenic National Meteorological Services (Greece), presented the work undertaken by the Team since the last meeting, including the first version of the guidelines and abbreviations list that were adopted by the JCOMM-II. These guidelines will be included by the

Secretariat in to the *Manual on Marine Meteorological Services* (WMO-No. 558) and Annex VI to the WMO Technical Regulations.

6.2 Review of common abbreviation list for NAVTEX messages

6.2.1 Mr Myrsilidis gave a short overview of practices and feedback from some NMHSs that already have generally implemented recently, said abbreviations, including those of Canada, France, Greece, Hong-Kong China, France and the United Kingdom.

6.2.2 This achievement is a significant contribution for the reduction of the volume and size of NAVTEX metocean products that may contribute to saturate the network. The estimated saving rates when using abbreviations raise from 15 % (France) to 30-35 % (Greece). All Issuing Services are urged to promote the use of the abbreviations among all the NMHSs issuing products for NAVTEX dissemination **(Action: Issuing Services)**.

6.2.3 The United Kingdom expressed concern, especially for its national NAVTEX service, regarding the reduction of wind directions to only 1 or 2 characters, that could lead to a wrong or misinterpreted information (or to the lack of information) received in case of interference during the reception onboard.

6.2.4 As proposed, the Team agreed to maintain the guidelines and the list of abbreviations unchanged, to have the appropriate time to gather users' feedback. At the same time, as recommended by the JCOMM-II, the Team asked Mr Myrsilidis (Greece) to keep under review both guidelines and list of abbreviations, and to propose amendments as necessary. The Team also urged Mr Myrsilidis and the WMO Secretariat to: (a.) prepare and circulate for revision the survey on users' feedback on the use of Abbreviation in NAVTEX Messages, and (b.) evaluate the possibility to use Abbreviations in National NAVTEX Messages.

6.2.5 Regarding the additional abbreviations used by Canada for the MSI related to sea ice, and noting the deficiency of abbreviations related to icebergs, the ETSI Chairperson suggested that the ETSI Experts should: (i.) review the list of abbreviations regarding sea ice and icebergs, and (ii.) prepare a draft common list in consistency with *WMO Sea-Ice Nomenclature* and *Sea Object Catalogue*, to be provided to Mr Myrsilidis **(Action: ETSI)**.

6.2.6 As the largest metocean messages promulgated via SafetyNET could tie up the terminal for 45 minutes at one time (and then may not allow the transceiver to receive an immediate distress alert), the Team agreed to propose the update of the WMO-No. 558 to allow and promote the use of the common abbreviations prepared for the NAVTEX also for scheduled forecasts by SafetyNET, for endorsement by the JCOMM-III **(Action: Secretariat)**.

6.3 Report on coordination in the Baltic Sea

6.3.1 The representative of Finland, Ms Marja-Leena Komulainen, presented a report regarding the NAVTEX meteorological services for the Baltic Sea region, as well as, more complete criteria for warnings, and a possible way to integrate both the NAVTEX and METEOALARM. The Team noted with appreciation that a system for the international coordination of meteorological broadcasts for the Baltic Sea region through the international NAVTEX Service had been developed. The guidelines for this system were formally approved in 1999 by both Sweden and Finland, and subsequently, these were approved at the WMO Regional Association VI (Europe) in September 2005, for inclusion in Part II of the *Manual on the Marine Meteorological Services* (WMO-No.558).

6.3.2 The Team also noted with appreciation the METEOALARM Project to provide information of meteorological warnings in Europe for 24 hours. The Team also noted that during the first stage of this project (starting the operational phase in March 2007) there were no warnings for sea areas included, but in the near future, it will consider the inclusion of these warning in the system. The Team acknowledged the potential inclusion of marine warnings under this system in the future, but

agreed that more concrete specifications should be considered, and formally requested to be informed on the progress of the project **(Action: Finland)**.

7. Review of WMO regulations and operational information

7.1 Guidelines for sea state description (especially extreme waves and storm surges) and sea ice information on text warnings/bulletins

7.1.1 Based on discussions under Agenda Items 3.3, 3.4 and 5.1, the Team established the Terms of Reference and General Membership for the two Task Teams as presented in Annexes XI and XII to this report.

7.2 Update of Manual on Marine Meteorological Services (WMO-No.558) and Guide to Marine Meteorological Services (WMO-No.471)

7.2.1 The Secretariat Representative, Ms Alice Soares, presented the amendments to the *Manual on Marine Meteorological Services* (WMO-No. 558) and the *Guide to Marine Meteorological Services* (WMO-No. 471) adopted by the JCOMM-II, and Regional Associations I and VI.

7.2.2 Ms Soares informed the ETMSS participants that these Publications will be available on-line in due course, after the formal approval of the WMO Secretary-General.

7.3 Weather Reporting (WMO-No.9), Volume D *Information for Shipping*

7.3.1 The Team recalled that the WMO publishes Weather Reporting (WMO-No. 9), which is the reference publication on the existing facilities and services available on the operation of the World Weather Watch. Volume D - Information for Shipping in this publication includes Meteorological Broadcast Schedules for Shipping and other Marine Activities, Coastal Radio Stations Accepting Ships' Weather Reports and Oceanographic Reports, Specialized Meteorological Services, etc. It noted that the WMO Secretariat has prepared an electronic version of this publication in a different format, providing the information by the METAREA and then by country. This publication was made available in January 2007, and a CD was provided to all participants attending the meeting.

7.3.2 Regarding the difficulties to receive regular NMHSs feedback and updates of this Publication, the WMO Secretariat asked the Issuing Services to help in this process, requesting this information inside their METAREAs **(Action: Issuing Services)**. The WMO Secretariat will also ask WMO Regional Associations Focal Points to facilitate the process in their regions **(Action: WMO Secretariat and Regional Associations Focal Points)**.

8. Information delivery

8.1 Weather information in graphical form for GMDSS

8.1.1 As stated in the 2001 amendments to the SOLAS, Chapter V, weather information in graphical form should be made available for shipping. Despite various actions in past years, the JCOMM-II noted that the project to improve the GMDSS through expansion of services to provide products in graphical format via the Inmarsat SafetyNET service had been underway for several years, but to date had yet to achieve any of the objectives or expectations placed upon it.

8.1.2 The Team noted that the IMO has developed a set of performance standards for the ECDIS, which specifies how an ECDIS must work in order to serve as an adequate replacement for paper charts in SOLAS vessels. This system must display an official Electronic Navigational Chart (ENC) data issued by a National Hydrographic Office and complimented by an updating service. In this regard, vessels must have a type-approved back-up system and official ENCs fulfill the IHO (International Hydrographic Organization) S-57 Standard. The Team also noted the extensive work plan and experience of the ETSI on graphical sea ice information. Based on this

information, the Team agreed on the Terms of Reference for an appointed expert, that could be funded by Swiss Government, and the list of ET Experts to conduct this work (provided in Annex XIII to this report).

8.2 Website

8.2.1 The ETMSS Chairperson presented the first version of the GMDSS website, the JCOMM GMDSS "single official web voice" for end-users worldwide (http://weather.gmdss.org), developed and maintained by France, in accordance to the discussions that took place during the First Session of the ETMSS. It was not envisioned that such a service would replace the standard services, SafetyNET and NAVTEX, but would provide a valuable additional service, as there was no doubt that any additional method of dissemination of safety information was welcomed.

8.2.2 Thanks to the contribution of all Issuing Services, which made the necessary arrangements to route their products on the GTS, this first version provides in real-time all the messages prepared for the SafetyNET dissemination.

8.2.3 The WMO Secretariat has officially registered the web domain named "***gmdss.org***" until January 2011. The tools, design and graphics of this website are tuned and optimized for ships at sea, to minimize the connection time (i.e., the transmission costs) and to take into account the potential low bandwidth telecommunication systems that are the main specific constraints or needs. The contents and "coating" of pages are as light as possible (text or html formats used with very few graphics or images). The useful information is obtained after a minimum number of "clicks" (1 or 2).

8.2.4 Details regarding the operating cycle, bulletins management and hits are provided in Annexes XIV to XVI to this report. **(Action: Issuing Services are requested to carefully check the technical information in Annex XIV to this report (headers, footers, etc.) and also links included on their METAREA pages, and to provide corrections or updates to the ETMSS Chairperson, as appropriate).**

8.2.5 Additionally, both the http: and e-mail access to all the GMDSS bulletins placed on this website (gathered in packages) are also available. The e-mail access is based on the Navimail service system developed for Météo-France (http://www.meteo.fr/marine/navimail). Details on packages, request format for e-mail and http access and hits are provided in Annexes XV and XVI to this report.

8.2.6 This website has now been in operation for more than two years, with significant success. The huge positive feedback received from the SOLAS or non-SOLAS users, demonstrates that the mariners warmly welcome this official website. Some papers promoting the new site have been published in the past few years, for example in the WMO Bulletin. The Team noted with appreciation the results presented by the Chairperson and congratulated Météo-France for the efforts and consideration regarding the preparation of this website. Furthermore, the Team proposed some actions or suggestions to move forward:

- The Team agreed to include as soon as possible the metocean NAVTEX bulletins. The GMDSS Focal Point(s) of each Issuing Service is asked to contact all relevant NMHSs issuing metocean NAVTEX products in order to organize NAVTEX product insertion on the GTS, and to provide the ETMSS Chairperson with the appropriate information, including the GTS headers, in the same tabular form used in Annex XV to this report **(Action: Issuing Services)**.

- As soon as the appropriate direct url addresses will be available on the online version of WMO-No. 9, Volume D, appropriate links should be included in the website to access to the *ad-hoc* information **(Action: WMO Secretariat and ETMSS Chairperson)**.

- As soon as a web-based or a "fill-able" pdf form questionnaire for the MMMS will be made available, the appropriate link(s) should be included on the GMDSS website **(Action: WMO Secretariat, ETMSS Chairperson and SPA Coordinator)**.

- The ETMSS Chairperson will continue, as requested by the JCOMM-II, to liaise with the IHO and IMO, in hopes of coordinating the use of the common URL *gmdss.org* for the provision of both meteorological and navigational warning information in real-time via the Web. The Chairperson will prepare, as requested by the IHO/CPRNW, a detailed working document on the JCOMM GMDSS website to be discussed during its ninth session, planned in Monaco in September 2007 **(Action: ETMSS Chairperson)**.

- Future MSI in graphical or numerical data should be included (when available). Such information will then be made available on "pull mode", in addition or waiting for the implementation of appropriate "push" facilities.

- All NMHSs, in particular Issuing Services, are strongly encouraged to promote this website by all appropriate means. The first suggestion is to include (if not already done), the *ad-hoc* link on the marine section of NMHSs websites. Training courses and articles are also potential ways to make this website more visible to mariners. As suggested by the SCG-III, the promotion could also be made through the IMO and IHO. The Secretariat and ETMSS Chairperson will prepare the *ad-hoc* information document and brochure for this purpose **(Action: WMO Secretariat, ETMSS Chairperson and SPA Coordinator)**.

- The Team also suggested investigating the possibility to develop some graphic functionality, like interactive maps (e.g., showing the METAREA(s) with warning(s) in force). A small *ad hoc* group, including Dr Craig Donlon (SPA Coordinator), Mr Timothy Rulon (USA), Mr M. Rastogi (India), and the OFS Rapporteur, accepted to help the Chairperson on this task.

- Mr Rastogi (India) further suggested making the e-mail access more visible on the website **(Action: ETMSS Chairperson)**.

8.3 User feedback

8.3.1 The Team was informed on the marine meteorological services monitoring programme, with particular emphasis for future gathering of users' feedback. It was noted that the direct interaction with and feedback from users is an essential part of the provision of high quality and valuable marine services. Development of the marine meteorological services (MMS) monitoring programme was initiated by the former Commission for Marine Meteorology (CMM) in 1981. Subsequent sessions of the CMM had reviewed the results of these surveys, and re-iterated their value to WMO Members and endorsed their continuation of support.

8.3.2 The First Session of the JCOMM in 2001, requested the ETMSS to prepare a new survey for distribution by the Secretariat in 2004. Results of this questionnaire were made available at JCOMM-II (Halifax, Canada, September 2005). In response, a total of 308 completed questionnaires by ships' masters were returned directly to the WMO Secretariat, and an additional 209 responses were processed through the Japan Meteorological Agency (JMA).

8.3.3 As a result of the survey analysis presented to the JCOMM-II, it was recognized that there remained considerable improvement with regards both to the quality and content of services, and also their coverage and timeliness in some oceanic regions. In doing so, the Commission noted, in particular:

(a) The reception of the GMDSS information via Inmarsat SafetyNET was judged to be excellent, whereas the reception via NAVTEX was seen to require some improvement.

(b) Although clarity, accuracy and timeliness of warnings were judged to be quite good, there appeared to be a decline in the satisfaction with the overall performance in this area.

(c) For weather bulletins, the areas of clarity, accuracy and timeliness were judged to be quite good, as was the additional area of terminology, but again the results indicated an overall decrease in perceived quality.

(d) The usefulness of the information in graphical form (i.e., facsimile broadcasts at this stage), received the highest positive response of any field reported (94% yes). The agreed consensus among mariners was that facsimile broadcasts as well as other graphic products were extremely useful, and improved delivery systems could obviate most of the criticisms leveled at the current service.

(Action: Issuing Services to take corrective actions in areas of identified weakness. Follow-up by the ETMSS Chairperson and WMO Secretariat)

8.3.4 The Third Session of the Ship Observation Team (SOT-III, Brest, France, 2005) agreed on the value of the Marine Meteorological Services Monitoring Programme questionnaire and the need to continue such monitoring processes, but noted that some ships had difficulties understanding the questionnaire, especially on ships where English was not necessarily the first language, and proposed for consideration of the Team some changes **(Action: Secretariat to translate the questionnaire in all WMO official languages)**.

8.3.5 The new questionnaire, adapted for the SOLAS and non-SOLAS vessels, was discussed and adopted, and will be disseminate at the beginning of 2008 through appropriate channels, after final discussion that will take place during the SOT-IV meeting that will be held in Geneva, Switzerland, from 16-21 April 2007. The filled questionnaires will be gathered by the Secretariat, and the results could be prepared for the JCOMM-III by the Secretariat, with support of an expert of the Team, if required (**Action: Wide distribution and promotion (e.g., JCOMM webpages). Encourage ships' masters to fill several questionnaires for the different METAREAS. Follow-up: WMO Secretariat)**. The Team noted that this questionnaire does not contain sea-state information and use of abbreviations in NAVTEX bulletins. Therefore, the Team asked Mr Michael Myrsilidis and Mr Val Swail to provide their input to the WMO Secretariat by the end of March 2007 to be included in the final version of the questionnaire **(Action: Mr Michael Myrsilidis and Mr Val Swail)**.

8.3.6 The Team also agreed that on the use of online questionnaires (either in a web-based form or in "filling" pdf format) would certainly be revisited, as raised by the Management Committee and the Services Coordination Group during their last sessions in October and November 2006 respectively **(Action: SPA Coordinator to prepare the online questionnaire)**.

9. Review of the ETMSS Work Plan

9.1 Based on previous agenda items, the Team reviewed and revised the Terms of Reference (ToR) for the Task Teams established during the session.

9.2 Noting that the ETMSS has just a Chairperson, and following the SCG-III recommendation, the Team agreed on the ETMSS Core Membership for the current intersessional period, in order to make the identification and management of tasks much easier, and to handle and enhance the necessary role of coordination of all Issuing Services. This Core Membership includes Issuing Services Focal Points, members of the Task Teams established during the session and the chairperson of the IHO/CPRNW.

9.3 Noting that the IMO and IHO Committees and Sub-committees analogous to the ETMSS meet every year, the Team recommended the frequency of the ETMSS meetings should be held every two years. It suggested that the Third Session of the ETMSS might be timed to take place in Geneva, Switzerland, in September or October 2008.

10. Closure of the session

10.1 Adoption of the report

10.1.1 Under this agenda item, the Team reviewed, revised and adopted the report, including actions and recommendations raised from the meeting.

10.2 Closure

10.2.1 In closing the meeting, the ETMSS Chairperson, Mr Henri Savina, expressed his appreciation to all participants for their very positive and valuable input to the discussions, to what had been a very successful meeting, and looked forward to working with all participants on the many ongoing action items. Mr Savina offered his sincere appreciation, on behalf of all participants, to the Brazilian Navy, to Commander Antonio Claudio Vieira, local organizer of the meeting, and to all the staff of the Brazilian Navy, especially Lieutenant-Commander Carla Damásio Cordeiro, for hosting the meeting and for providing such excellent facilities, support and hospitality. Further, he expressed his appreciation and a special acknowledgment to Mr Phil Parker for his excellent work in support of the Commission in the previous years. Mr Savina concluded by thanking, on behalf of all participants, the Secretariat, and especially Ms Alice Soares, for the ongoing support.

10.2.2 On behalf of the WMO Secretariat, Mr Edgard Cabrera, expressed his sincere appreciation to the Brazilian Navy for hosting this important meeting for the WMO, and for providing such excellent support and hospitality. Mr Cabrera also thanked all participants for their contributions to the success the meeting.

10.2.3 On behalf of Brazilian Navy, Commander Carlos Augusto Silva, expressed his pleasure at having had the opportunity to host the meeting in Brazil. Commander Silva recognized that this session had brought benefits to both the meeting participants and to the Brazilian Navy. He wished all participants an enjoyable stay in Brazil and a safe journey home.

The SPA Coordinator pointed out the excellent achievements during the session, especially regarding the establishment of a Core Membership for the ETMSS. He expressed his appreciation to have the participation of both Chairpersons of the ETWS and ETSI, SPA Coordinator and OFS Rapporteur, bringing together all Expert Teams Chairpersons to work on a common theme of Maritime Met-ocean Support and Safety Services.

10.2.4 Speaking on behalf of all participants, the WMO Secretariat Representative, Ms Alice Soares, thanked the ETMSS Chairperson for his substantial input and support, both during the meeting and externally.

10.2.5 The Second Session of the JCOMM Expert Team on Maritime Safety Services (ETMSS-II) closed at 11.35 hours on Saturday, 27 January 2007.

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Annex I

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Annex II

AGENDA

1. Opening of the session

1.1. Opening
1.2. Adoption of the agenda
1.3. Working arrangements

2. Reports

2.1 Report of the Services Programme Area coordinator
2.2 Report of the chairperson
2.3 Report of the Secretariat
2.4 Report of SafetyNET and NAVTEX panels
2.5 Reports by Issuing Services
2.6 Inmarsat report
2.7 IMSO report
2.8 IMO report

3. Provision of MSI for Polar Regions

3.1 Report of the Chairperson of the joint IMO/IHO/WMO Correspondence Group on MSI services
3.2 Review of the proposals and definition of boundaries and responsibilities for new potential Arctic NAV/METAREAS
3.3 IHO Report on provision of MSI related to sea ice
3.4 ETSI Report on provision of MSI related to sea ice

4. Delivery of Tsunami warnings for mariners

4.1 Organization and production of Tsunami Warning Systems
4.2 Coordination with the IHO/CPRNW and ICGs
4.3 Guidelines for the provision of Tsunamis Warnings for mariners (organization, type, content, formats)

5. Coordination with other ETs and Programmes

5.1 Link with the ETWS, especially on extreme waves and storm surges
5.2 Cooperation with Tropical Cyclone Programme on connections between units used in TC warnings
5.3 Other

6. International coordination of NAVTEX broadcasts

6.1 Guidelines for bulletins broadcast by the NAVTEX
6.2 Review of common abbreviation list for NAVTEX messages
6.3 Report on coordination in the Baltic Sea

7. Review of WMO regulations and operational information

7.1 Guidelines for sea state description (especially extreme waves and storm surges) and sea ice information on text warnings/bulletins
7.2 Update of *Manual on Marine Meteorological Services* (WMO-No.558) and *Guide to Marine Meteorological Services* (WMO-No.471)
7.3 Weather Reporting (WMO-No.9), Volume D *Information for Shipping*

8. Information delivery

8.1 Weather information in graphical form for the GMDSS
8.2 Website
8.3 User feedback

9. Review of ETMSS work plan

10. Closure of the session
10.1 Adoption of the report
10.2 Closure

Annex III

SPA TOP LEVEL OBJECTIVES (TLOs)

Top Level Objectives (TLOs) for the SPA Work Plan that are applicable to all activities of the ETMSS and other Expert Teams within the SPA:

a) TLO-1: Support to maritime safety, hazard warning and disaster mitigation systems. The objective is to monitor and develop modifications to maritime safety, hazard warning and disaster mitigation systems, as necessary, and to provide assistance to Member(s)/Member State(s) as required. Systems include: the WMO marine broadcast system for the GMDSS, as well as MPERSS; storm surges; tropical cyclones; Tsunami; search and rescue; marine pollution; ice and iceberg warnings; rogue waves and dangerous sea state;

b) TLO-2: The Importance of a User Focused Programme. The Objective is to understand and respond to present and future needs of the maritime service industry and ensure that the services provided to users meet these requirements, including content, delivery timeliness and quality. A key priority for the JCOMM SPA is to provide mechanisms and services that engage the user community in JCOMM discussions, plans and activities and to manage user feedback on all aspects of the JCOMM;

c) TLO-3: Working Effectively with Members/Member States. The Objective is to keep under review and to respond to the requirements of Members/Member States for guidance in the implementation of their duties and obligations with regard to marine services, in particular those specified in the *WMO Manual on Marine Meteorological Services* (WMO-No. 558);

d) TLO-4: Pulling through scientific and technical expertise to operational systems. The Objective is to build on international scientific and technical excellence to better meet the needs of the international maritime service industry by developing the preparation and dissemination of ocean products and services;

e) TLO-5: Communications and 'joining up' the SPA. The Objective is to integrate the internal cross-programme area activities of the JCOMM, with international/regional/global efforts and with that of others to increase efficiency and capability including the relevant programmes of the WMO and IOC (e.g., the DPM, WWW, WCP, GOOS, GCOS), as well as with other organizations such as the IMO, IHO, IMSO and ICS in the provision of marine services and information;

f) TLO-6: Maintaining and monitoring international standards. The Objective is to ensure that the JCOMM SPA acts as a flexible, streamlined organization capable of coordinating international maritime services;

g) TLO-7: Building appropriate capacity within the JCOMM. The Objective is to build appropriate capacity within the JCOMM to make the most of international collaboration (e.g., GOOS, GEO/GEOSS) to share marine meteorological and oceanographic knowledge, infrastructure and services for the benefit of the maritime community.

Annex IV

TERMS OF REFERENCE FOR AN ADDITIONAL RAPPORTEUR ON SATELLITE COMMUNICATIONS FOR DISSEMINATION OF PRODUCTS AND SERVICES

The Rapporteur on Satellite Communications for Dissemination of Products and Services shall:

- Advise the SPA, especially the ETMSS and the ETSI, on the progress of overall satellite communications for dissemination of products and services for SOLAS and non-SOLAS vessels, including Polar Regions;

- Be responsible for collecting and integrating the satellite communications requirements for dissemination of products and services that are essential for the work of the SPA, especially the ETMSS;

- Inform the SPA, especially the ETMSS on the evolution of the IMO regulations regarding the dissemination of products and services, in particular, the amendments to the IMO Resolution A.888(21); and jointly with the SPA, especially the ETMSS, and the WMO Secretariat identify possible consequences for Issuing Services;

- Report the status of issues described in previous items to the SPA Coordination Group (SCG), ETMSS Chairperson and the WMO Secretariat, as appropriate.

The Members of the SCG and ETMSS, as appropriate, will discuss the report by the Rapporteur. After the review by the SCG and the ETMSS, proposals and revisions (if any) will be submitted for approval by JCOMM-III, as appropriate.

Annex V

TERMS OF REFERENCE OF THE JOINT IMO/IHO/WMO CORRESPONDENCE GROUP ON ARCTIC MSI SERVICES

Taking into account resolution A.706 (17), as amended by MSC/Circ.685 and MSC/Circ.750 including the relevant decisions of COMSAR 10, the joint IMO/IHO/WMO Correspondence Group on Arctic MSI Services should give consideration and provide comments on the following:

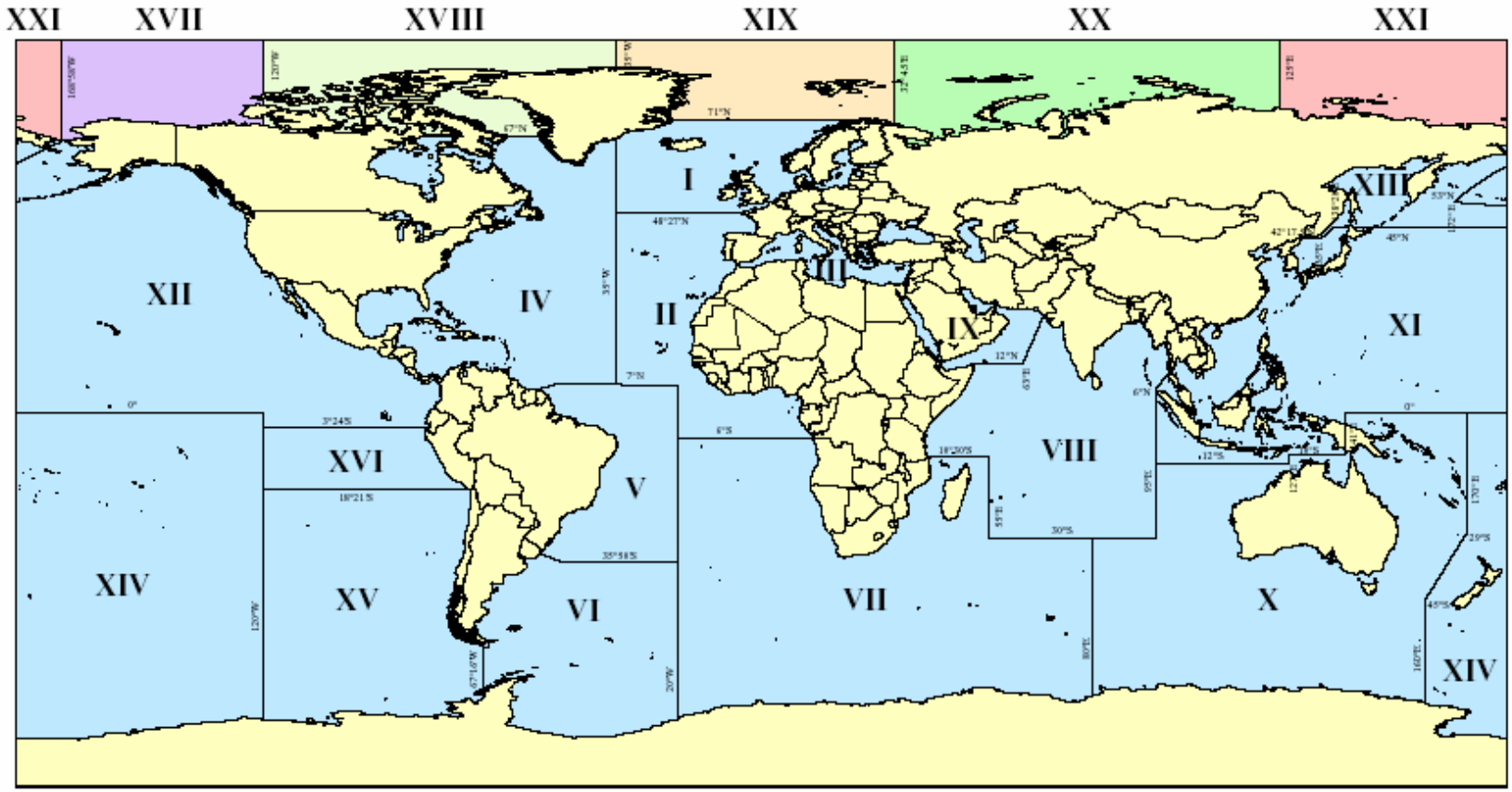
.1 recommend a way forward to deal with the expansion of MSI services, taking account of documents MSC 80/13/2 and COMSAR 10/3 (Russian Federation), COMSAR 10/3/1 (IHO) and observations from other countries in the Arctic regions;

.2 in progressing the matter also consider the following additional salient issues:

a. Should there be a northern limit to any new areas?
b. Can a seasonal service only be provided?
c. Who will act as NAVAREA co-ordinator and METAREA issuing service (do not have to be same country)?
d. Would some of the proposed new NAVAREAs be better established as sub-areas of existing NAVAREAs?
e. How will warnings be transmitted, and can they be monitored as required? Do systems other than Inmarsat (such as HF NBDP, NAVTEX or other satellite service providers) need to be considered?
f. Who will undertake provision of SAR information?
g. How will Inmarsat system definition manual and existing SafetyNET terminals be updated to allow receipt of the new NAVAREAs? Ideally this update needs to be co-ordinated with plans to include new areas in other parts of the world.
h. Will assistance be required from IHO/CPRNW to support new NAVAREA co-ordinators or from JCOMM/ETMSS for METAREA issuing services?
i. How will WWNWS guidance and other relevant documents be updated?

Annex VI

PROPOSED ESTABLISHMENT OF ARCTIC NAVAREAS



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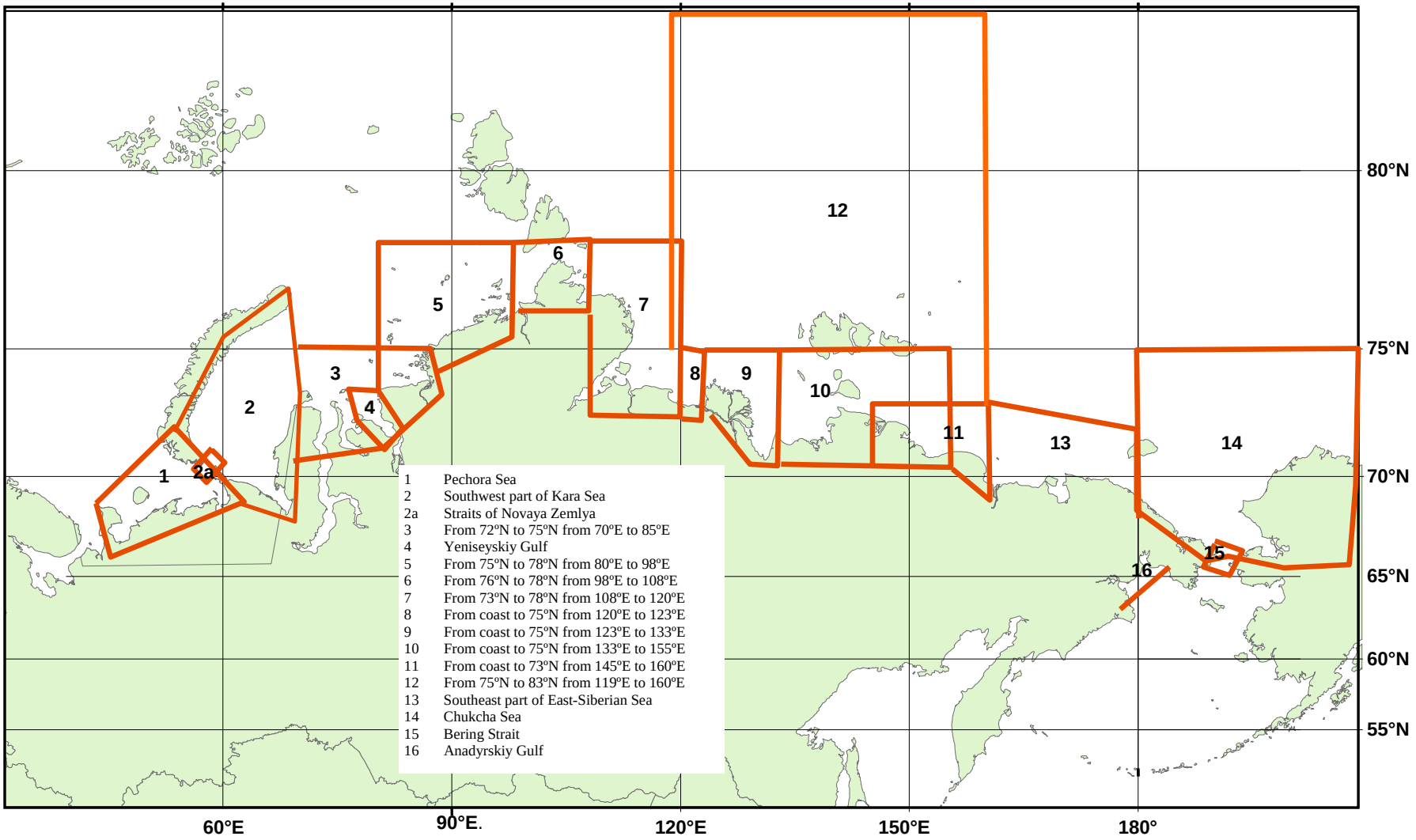
Annex VII

SAFETYNET – ARCTIC OCEAN METAREA

Northern Sea Route Forecast Areas



1	Pechora Sea
2	Southwest part of Kara Sea
2a	Straits of Novaya Zemlya
3	From 72ºN to 75ºN from 70ºE to 85ºE
4	Yeniseyskiy Gulf
5	From 75ºN to 78ºN from 80ºE to 98ºE
6	From 76ºN to 78ºN from 98ºE to 108ºE
7	From 73ºN to 78ºN from 108ºE to 120ºE
8	From coast to 75ºN from 120ºE to 123ºE
9	From coast to 75ºN from 123ºE to 133ºE
10	From coast to 75ºN from 133ºE to 155ºE
11	From coast to 73ºN from 145ºE to 160ºE
12	From 75ºN to 83ºN from 119ºE to 160ºE
13	Southeast part of East-Siberian Sea
14	Chukcha Sea
15	Bering Strait
16	Anadyrskiy Gulf

Annex VIII

TERMS OF REFERENCE OF THE TASK TEAM ON PROVISION OF MSI IN POLAR REGIONS (PMSI)

The TT will provide additional expertise to the ETSI, ETMSS and ETMAES in the following issues:

- Survey user (e.g., shipmasters, ship-owners) requirements on the PMSI, in particular related to sea ice and emergency situations, extend and update existing the ETMSS questionnaires;
- Review standards for presentation and dissemination of the PMSI (both binary and textual) via ground-based and satellite systems;
- Keep under review, in cooperation with the sat rap, existing and prospective satellite and automatic information systems (AIS) for PMSI dissemination including those coordinated by the IALA;
- Review and propose updates to the WMO-No. 558 and WMO-No. 471 publications;
- Keep under review scientific activities related to modelling scenarios of emergency situations, in particular related to the MPERSS;
- Keep under review existing and planned projects/works on standards for coding and presentation of met-ocean information, in particular for sea ice and surface contaminants, within other WMO bodies, including the WMO CBS, IHO and ISO levels;
- Review existing NMS Capacity Building resources related to the provision of PMSI, and provide recommendations on training, as appropriate;
- Submit progressive reports of the stated activities, initiate appropriate actions within the ETMSS, ETMAES and ETSI and the WMO Secretariat, as appropriate.

General Membership:

- ETSI Chairperson (Dr Vasily Smolyanisky, Russian Federation)
- SPA Coordinator (Dr Craig Donlon, United Kingdom)
- ETMSS Chairperson (Mr Henri Savina, France)
- Three Experts from the ETSI (Captain Manuel Hipólito Picasso (Argentina), Two Experts to be appointed during the ETSI-III session)
- Three Experts from the ETMSS (Finland (to be appointed), Canada (to be appointed), additional Expert (to be appointed))
- IHO Representative (to be appointed by Mr Peter Doherty)

Annex IX

TERMS OF REFERENCE AND GENERAL MEMBERSHIP OF THE TASK TEAM ON TSUNAMI PRODUCTS FOR TRANSMISSION AS MSI

The Task Team shall:

1. Prepare a proposal to develop operational guidelines for Tsunami Warnings for mariners, to be reviewed by the appropriate Expert Teams through the relevant International Organizations;

2. Prepare a proposal for the enhancement of the existing formats and contents of Tsunami Products, and/or propose new products if appropriate, for transmission as MSI to ensure the Safety of Mariners;

3. Cooperate with appropriate Committees and/or Sub-committees of the IHO and IMO to prepare updates to relevant operational documentation, and provide this information to the IOC and other bodies for review;

4. Use the opportunity, when feasible, to present the work developed by the TT in ICGs meetings;

5. Work with the IMO and IHO to determine the appropriate operational transmission codes and priorities through the GMDSS for tsunami warning to mariners;

6. Coordinate with the IMO, appropriate recommendations to ship masters in the case of reception of tsunami warnings messages;

The Members of the ETMSS, as appropriate, will discuss the report by the Task Team. After the review by the ETMSS, proposals will be submitted for endorsement by the SCG and approved by the Management Committee (MAN), as appropriate.

General Membership:

- Representative from Australia (Bureau of Meteorology)
- Representative from France (Mr Henri Savina)
- Representative from India (to be appointed)
- Representative from Japan (JMA – to be appointed)
- Representative from Kenya (Ms Stella Aura)
- Representative from Russian Federation (Mr Valery Martyschenko)
- Representative from USA (Mr Timothy Rulon – Chairperson)
- SPA Coordinator (Dr Craig Donlon)
- IHO Representative (to be appointed by Mr Peter Doherty)

Annex X

GUIDELINES FOR THE PROVISION OF MSI RELATED TO TSUNAMIS (ORGANIZATION, CONTENT AND FORMATS)

1. Purpose

1.1 This paper discusses how the JCOMM might best support the provision of tsunami warnings under intergovernmental arrangements. In particular, provision of tsunami warnings to shipping has been the focus of concern by the International Maritime Organization (IMO), which has taken an in-principle and unilateral decision to encourage dissemination of tsunami advices through the GMDSS SafetyNET System. Intervention by the JCOMM has alerted the IMO to the complex and developing intergovernmental arrangements for provision of operational tsunami warnings and the issues which need to be resolved in order to reduce duplication and complexity on the service provision side, and increase effectiveness and utility of future services for the user community. The arrangements that will govern the provision of broadcast tsunami advices by JCOMM Members are the subject of this paper.

2. Background

2.1 Role of the Intergovernmental Oceanographic Commission (IOC)

2.1.1 The IOC (of UNESCO) has been actively involved in promoting an end-to-end tsunami warning system in the Pacific since the inception of the International Coordination Group (ICG) for the Tsunami Warning System in the Pacific (previously ITSU, now PTWS) in 1965. The PTWS was established to provide, on an international basis, timely tsunami warnings to alert the system's participants of the approach of a potentially destructive tsunami. The ICG provides information and guidance, and shares knowledge and experience with the IOC Member State(s) in the respective region(s).

2.1.2 Following the 26 December 2004 undersea earthquake, the subsequent greatest tsunami in living memory and tragic death of hundreds of thousands of people, the IOC took the lead in coordinating activities for immediate action to establish a Tsunami Warning System (TWS) in the Indian Ocean. The immediate response included an interim tsunami advisory information system under the aegis of IOC's International Tsunami Information Center (ITIC) in cooperation with the Pacific Tsunami Warning Center (PTWC) in Hawaii and the Japan Meteorological Agency (JMA), from 1 April 2005.

2.1.3 The IOC also created three additional regional Intergovernmental Coordination Groups (ICGs) as subsidiary bodies of the IOC, which together, with the existing ICG/PTWS and other relevant UN bodies, should form a global working group on tsunamis (and other ocean-related hazards) early-warning systems. The three new ICGs: the Indian Ocean (ICG/IOTWS), the Northeast Atlantic and Mediterranean (ICG/NEAMTWS), and the Caribbean and Adjacent Seas (ICG/CARTWS) have all met and are in the process of implementing plans for the regional TWS.

2.2 Role of WMO

2.2.1 In most countries, National Meteorological and Hydrological Services (NHMS) are involved in national Tsunami Early-Warning Systems (TEWS). As for the PTWS, the WMO contributes and will continue to contribute, especially through the coordination of its Natural Disaster Prevention and Mitigation (DPM) Programme, to the implementation of regional and national TEWS. Among others, we can highlight the contribution of the GTS (dissemination of warnings or advisories and the collection and dissemination of sea level observations) and the definition of a common CREX format for sea level data. For the Indian Ocean basin, the WMO contributed to the national assessments of the countries at risk, which were conducted between May and September 2005, to identify capacity building needs and support requirements for the establishment of an Indian Ocean

Tsunami Warning System (IOTWS), as well as to coordinate the update of GTS Systems in some of the countries involved.

2.3 Role of the JCOMM and ETMSS

2.3.1 JCOMM adopted Recommendation 12 (JCOMM-II), to develop and implement a plan of action to contribute to the implementation and maintenance of marine multi-hazard warning systems for all ocean basins. An expert meeting on this subject was convened in Geneva, Switzerland in February 2006. The meeting adopted an action plan for the JCOMM contributions to Multi-hazard Warning Systems. Among the first set of actions identified as immediately feasible and to be undertaken by the JCOMM within the next two years, one action under the responsibility of the ETMSS addressed tsunamis, viz: ***Cooperate with the IHO and IMO to coordinate the provision of maritime safety information (MSI) related to tsunami warnings.***

2.3.2 The Fifth Session of the Management Committee (MAN-V, Geneva, Switzerland, October 2006) nominated Dr Rodrigo Nuñez and Dr Craig Donlon as the JCOMM Rapporteurs on DPM-related matters. The Committee urged the DPM Rapporteurs to work in conjunction with other JCOMM PA Coordinators in support of Disaster Risk Management (DRM), including a liaison with the DPM Rapporteurs of the CBS and CHy for collaboration and strengthening of linkages for inter-commission activities. For tsunamis, in addition to the upgrade and enhancement of the GLOSS stations, the implementation of the CREX code format for real-time GTS transmission and monitoring of sea level data and the action addressed for the ETMSS was also identified, viz: ***Cooperate with the IMO and IHO in order to address the international organizations' role (IOC, WMO, IHO and IMO) in the provision of Tsunami Maritime Safety Information (TMSI) (warnings and related information).***

2.4 Cooperation with other intergovernmental organizations

2.4.1 The IMO, through a proposal of its Sub-Committee on Radio Communications and Search and Rescue (COMSAR-IX, February 2005), endorsed by its Maritime Safety Committee (MSC), had offered the use of its maritime GMDSS communication facilities, particularly the International SafetyNET System, to distribute warnings from regional centres to both national authorities and vessels at sea (COMSAR/Circ. 36 – see Appendix A). Tsunami warning centres and others wishing to use the International SafetyNET System were invited to register with the IMO International SafetyNET Coordinating Panel to become authorized data providers. To date, none have registered, but some of the regional organizations are still at a very early stage of development.

2.4.2 The COMSAR-X (February 2006) recognized that in respect of the threat to shipping:

- ✓ A tsunami poses a significant risk only to those ships in shallow waters and in port areas;
- ✓ Ships in port are not required to maintain watch on the GMDSS communications equipment; consequently a separate system for promulgating warning messages needs to be established within each port;
- ✓ Tsunami warnings need to be rapidly sent to those ships most at risk.

2.4.3 Hence, the COMSAR was of the opinion that the most important communication links were:

- ✓ *Between Regional and National centres*: new links being established appear to be predominantly by e-mail or through the GTS, however, the use of the SafetyNET System remains an option for the IOC and relevant authorities, if required;

- ✓ *Within nations to coastal regions and ports*: while this is a national issue, the IMO, IHO and WMO can guide and support national authorities through National or Regional Capacity Building programmes;

- ✓ *To both SOLAS and non-SOLAS ships/fishing vessels in shallow coastal waters*: NAVTEX can be used for these warnings, but there may be no stations covering the affected areas, and non-SOLAS ships/fishing vessels may not carry suitable receiving equipment, therefore, other means such as local broadcasts and warnings on maritime VHF channels should be considered.

2.4.4 The COMSAR and the MSC recognized that further discussion on this subject was not necessary within the IMO, but that options to use the GMDSS communications facilities through either the relevant NAVAREA Coordinators or the METAREA Issuing Services, should remain available to National or Regional centres, if required by the IOC. This offer to the IOC was reiterated through an official letter, as well as during the Executive Council of the IOC in June 2006. It was recognized that the IMO, WMO and IHO should continue to participate in ongoing discussions to ensure that maritime interests are not overlooked.

2.4.5 The need for cooperation between all organizations involved for the provision of MSI related to tsunamis was accepted by the IMO and IHO. During the meeting of the IHO's Committee for the Promulgation of Radio Navigation Warnings in September 2005 (CPRNW7), it was agreed to establish a special joint IMO/IHO/WMO/IOC Working Group to look at all related issues and to make recommendations that affect all interested organizations, to avoid duplication of ongoing or new activities. Additional discussions also took place during the CPRNW8 in September 2006. The ETMSS Chairperson was asked to prepare a proposal covering recommendations to be submitted to the COMSAR as a joint paper by the IMO SafetyNET and NAVTEX Coordinating Panels. Issues to be resolved included in particular:

- A consistent understanding between the IMO, IHO, WMO, and IOC as to the exact role of each organization;

- The characterization of Tsunami Warnings (whether they are navigational warnings or meteorological warnings); and

- Dissemination protocols.

3. Contribution of ETMSS

3.1 Even if tsunamis affect mainly onshore structures and communities, the JCOMM's responsibility is to ensure that maritime interests are not overlooked in the operation of the TWS at either the National and/or Regional levels, keeping in mind the vulnerability of SOLAS and non-SOLAS vessels, in shallow waters and in ports, and the rarity of the phenomenon. According to its Terms of Reference (ToR), the ETMSS shall make the best effort to contribute to and facilitate the dissemination of appropriate MSI related to tsunamis.

3.2 While the decision by the IMO, through its decision (COMSAR/Circular 36) to encourage the rebroadcast of tsunami warnings/advisories via the GMDSS SafetyNET service, is a significant contribution to the public good and for the safety of navigation, more permanent coordination arrangements need to be jointly developed.

3.3 Preparation of a tentative guidance scheme of operational relations and responsibilities between the respective operational centres for the provision of MSI related to tsunamis, both during the building and operational phases of the regional TWS, is the responsibility of the ETMSS. The scheme will be developed in coordination with the IHO and IOC, for consideration by the IMO.

3.4 In addition, specifications for the warning message to be developed (advice type, content, format, priority status, etc.) should also be considered as a common source of metadata on

tsunami advices, which should be used to update both the *Manual on Marine Meteorological Services* (WMO-No. 558) and the *Guide on Marine Meteorological Services* (WMO-No. 471). It would also be useful if they could also be used to update and harmonize the glossary, manuals and practices being developed by the IOC for all its regional TWS.

4. Proposed new tsunami warning service to shipping

4.1 Scope

4.1.1 A complete TWS consists of a real-time quake monitoring capability, a real-time sea level and wave monitoring capability, bathymetric models of coastal areas that can be used for analysis, and a communication system that can be used for the promulgation of warnings. The following discussion only deals with the preparation and dissemination of related MSI to mariners.

4.1.2 It should noted that the JCOMM treats the SafetyNET as a prime means of promulgation of important MSI to a mass audience of interested users (generally vessels covered by SOLAS), rather than as a medium for sharing information between relevant or concerned authorities. It should also be noted, that messages disseminated via the SafetyNET service are transmitted very quickly in real-time, and can be received by anyone with a receiver. There is concern in some countries about such openness of this method, which may result in private individuals receiving a warning prior to the authorities, potentially creating unnecessary and uncontrolled panic. While tsunamis affect both ships at sea and in port, and portside infrastructure, the national authorities have concerns, that given the imprecise nature of tsunami warnings (e.g., exact size of the tsunami, scale of potential damage more generally) an inappropriate response to the warning by another organization responsible for safety of shipping may create panic on land.

4.1.3 Two types of a tsunami warning messages regarding safety of navigation can be considered:

(i) *The pre-tsunami message*: where the mariner is being warned of a potential or imminent tsunami; and

(ii) *The post-tsunami message:* which identifies damage to navigational aids, seafloor and shoreline changes, changes to the positional information of charted wrecks and new surface and subsurface hazards.

4.1.4 The ETMSS should consider only the pre-tsunami warning messages, as the post-tsunami messages are clearly Navigational Warnings and therefore under the coordination of the IHO.

4.2 Responsibilities of designated tsunami centres

4.2.1 Among operational centres potentially involved in the preparation and dissemination of MSI related to tsunamis, the main centres are as follows:

- The Regional Tsunami Advisory Centres (RTAC);
- The National Tsunami Warning Centres (NTWC);
- The Meteorological Issuing Services;
- The NMHS;
- The NAVAREA Coordinators; and
- The National Hydrographic Services.

4.2.2 Some operational centres hold a plurality of activities. For instance, some NMHS have received a mandate to also operate as an NTWC.

4.2.3 The General Terms of Reference of RTAC and NTWC are described in document 4.1.

4.2.4 Discussions at the IOC have made it clear that there are issues of sovereignty associated with promulgating possible disaster warnings within areas of national responsibility, and these may affect decisions on which communication systems are used. Bulletins issued by the RTAC are guidance or advisories for national and local authorities. Its central government or administrative head designates the NTWC, being the authoritative tsunami-warning agency for each country, territory, or administrative area.. This agency has the fundamental responsibility for public safety in a tsunami emergency. The authority for issuing tsunami-warning instructions to the public resides with this agency and not with the RTAC.

4.2.5 That means the responsibility for preparing such warnings, both for SOLAS and non-SOLAS ships (concerning operations in mainly shallow coastal waters and ports), belongs to the national tsunami authority (i.e., the NTWC). Responsibility does not belong to either the RTAC or the Meteorological Issuing Service or NAVAREA Coordinator, which would normally be responsible for issuing other kinds MSI such as bulletins of weather and navigation information. There are grounds for seeking further clarification of these roles, as it is anticipated that as the Regional TWS are implemented and their supporting systems are further developed, automatic derivation of the MSI from products prepared by RTAC will become commonplace. It is also likely, that in order to minimize system decision pathways, especially in the case of a local tsunami, the RTAC may be given the responsibility rather than the NTWC.

4.3 Role of JCOMM

4.3.1 The various responsibilities for issuing and disseminating tsunami advices need to be listed and regularly updated in both International and Regional TWS operational documentation. Information from these documents should be incorporated into the WMO Publication No. 9, Vol. D, thereby providing a description of dissemination arrangements, at least for SOLAS vessels. The information will be updated and maintained by the WMO/JCOMM, with the support of the NTWC, the Issuing Services and the respective ICGs.

4.4 SOLAS and non-SOLAS requirements

4.4.0 For dissemination purposes, it is important to note the difference between the SOLAS and non-SOLAS vessels. As a general statement, according to the nature of the tsunami phenomenon and its rarity, automatic systems shall be designated for the transmission of the warning, from the agency in charge of the preparation to the agencies in charge of the dissemination at sea.

4.4.1 Non-SOLAS

4.4.1.1 For non-SOLAS vessels, the national authorities decide which communication systems will be used to disseminate MSI to ship masters in port and in coastal areas. In general, for the dissemination at sea, the usual channels for dissemination of MSI, which it is presumed are widely known and available onboard ships, will be used. We have also to keep in mind that, according to the IMO Circular 36, SOLAS ships receiving such information through GMDSS channels are requested to retransmit this information to other ships in the area, including non-SOLAS vessels. In such a situation, the more re-transmission of vital information the better. The NTWC has to coordinate with the national agency responsible for the dissemination of the MSI and the port authorities, to implement appropriate emergency plans, including information, education and trials. Additionally, like for other marine natural hazards, bilateral agreements with national or foreign public radio networks may be needed. The JCOMM, through the ETMSS, could help in defining such emergency plans. Cooperation with the ITIC could also be considered, to prepare general materials.

4.4.2 SOLAS

4.4.2.1 NAVTEX

4.4.2.1.1 For SOLAS ships, the communication systems used (outside some polar areas) are International NAVTEX and Inmarsat SafetyNET. For the areas covered by NAVTEX, the tsunami warnings should be disseminated at sea through this facility. The NTWC shall prepare the *ad-hoc* warnings (in English) and make the necessary arrangements with the NAVTEX operator concerned (local authority), if needed through the appropriate NMHS or national hydrographic service, for the broadcast of such information at sea, with the appropriate priority. The METAREA Issuing Services have to ensure that appropriate arrangements are in place to keep the official documentation up to date. Bilateral agreements could be decided, as an interim phase or a permanent arrangement, either for the RTAC, a METAREA Issuing Service or a NAVAREA coordinator to prepare (on behalf of a NTWC), the appropriate NAVTEX messages.

4.4.2.2 SafetyNET

4.4.2.2.1 For the area not covered by NAVTEX, the appropriate information should be made available through SafetyNET. According to the COMSAR/Circ. 36, the RTAC and NTWC may directly issue such warnings on SafetyNET. This would be the best solution, to shorten the process first, but also to better keep under control the information provided for areas under national sovereignty. The METAREA Issuing Services or NAVAREA Coordinators could provide technical support to centres that would decide to use this facility.

4.4.2.2.2 If some NTWC decide against, or are unable to take that option, and disseminate the appropriate information by NAVTEX, they should conclude an appropriate agreement either with the RTAC (if the warning can be derived from RTAC products) or with the METAREA Issuing Service or the NAVAREA Coordinator concerned. All such arrangements should be clearly described in the official documentation.

4.4.2.2.3 From a practical point of view, it could be quite complicated for a METAREA Issuing Service or a NAVAREA Coordinator to deal with different practices for different countries (e.g., keeping operational documentation up-to-date, maintaining appropriate automatic processes, training of operational staff, etc.). It would be easier and more efficient for such warnings to be broadcast via SafetyNET, either by the NTWC or RTAC. This practice should be promoted by the ICGs.

4.4.2.2.4 In some major events, the SafetyNET could be considered the prime medium for promulgating tsunami warnings for all areas concerned. If this is the case, appropriate criteria should be agreed at a regional level so that dissemination could be implemented directly from the RTAC.

4.4.2.2.5 However, in all cases, the METAREA Issuing Services and NAVAREA Coordinators need to receive (in real-time) the warnings of advisories promulgated by the relevant NTWC and RTAC, and have clear procedures and tools to be able to react efficiently according to agreed roles and responsibilities.

4.4.2.2.6 The participation of relevant JCOMM Experts in the ICG Sessions will facilitate the implementation and harmonize practises for the dissemination of MSI within the regional tsunami warning and mitigation systems networks. The opportunity offered by programmed system tests would also be useful for checking dissemination to mariners.

4.4.3 Specifications – type, content, format and priority status

4.4.3.1 There are a number of steps that need to be clearly identified to determine the specifications for the proposed new service. One of these would have been a feasibility analysis, which unfortunately has been pre-empted by the COMSAR Circular 36. Some of the complexities involved are further discussed under Section 5 on this Annex.

4.4.3.2 In order to help agencies in charge of the preparation of tsunami-related MSI, templates of warnings should be included or updated in the JCOMM documents (i.e., *Manual on MMS* No.

558, *Guide on MMS* No. 471) and in the *IHO World-Wide Navigational Warning Service* (WWNWS) guidance documents, as tsunamis are not an everyday occurrence. The IMO documents (such as A.706, NAVTEX and SafetyNET Manuals) should also be updated accordingly. Those templates should be established to ensure that the priority (status) and format are consistent, that the contents of the message meet the requirements of shipping for information about the tsunami hazards, and that the messages are well targeted and plainly understood. The MSI should be easily derived, if possible automatically prepared, from the existing or planned products from the RTAC or NTWC.

4.4.3.3 The MSI prepared for mariners, in the form of tsunami warnings, need to be well targeted and plainly understandable (i.e., they must be clear and concise). In terms of conventional formats for warnings they should contain:

- A header denoting type (TSUNAMI WARNING), origin (preparing agency), date/hour, number of warning;
- Description of Area(s) concerned;
- Type of warning: tsunami observed (seismic and sea level detection) / risk of tsunami (seismic detection only) / test - to be discussed and fixed, at least for SOLAS vessels;
- Information on earthquake: location, date/hour, magnitude;
- Information on (potential) tsunami: intensity, for all areas affected by the MSI, estimated arrival time or travel time;
- General information related to the tsunami: level of uncertainty, information on duration, associated risks (sea level, currents).

4.4.3.4 In addition to information related to the phenomenon itself, some other general information or advices specific to mariners could also be included in the warnings, such as:

- *General advice* (e.g., avoid shallow waters or ports) (depth less than…);
- *Watch or ask* for the information disseminated by the local ports authorities;
- *Disseminate* the information by all means to neighbouring vessels.

4.4.3.5 Draft general sentences could be prepared for SOLAS vessels in coordination with the IHO. It will be up to the agencies responsible for the issuance of MSI to adapt the general format further, as appropriate and/or as needed.

4.4.3.6 In practice, it may not be practicable for lack of timeliness and other considerations for texts to be prepared specifically targeted for the GMDSS. Therefore, it should be incumbent upon the respective TWS's, NAVAREA Coordinators, etc., to ensure that general warnings take shipping interests into account and that the current practices are documented.

4.4.3.7 For the GMDSS, codes to be used for the dissemination of advices via SafetyNET and NAVTEX require clarification. Advice from both Inmarsat and the IMO NAVTEX Co-ordinating Panel would be helpful in that regard.

5. Basis of the JCOMM proposal

5.1 At the outset, it is necessary to precisely determine the purpose of a warning service for shipping in coastal areas. Such a service will be intended to alert ships either in imminent danger in or near ports or coastal sea-lanes, or in potential danger in the near future if they stay on course towards the coast (say up to several hours sailing time). The service should therefore specifically target those very users. For practical purposes, the JCOMM proposal should be based on existing TWS products, which are prepared by the RTAC and NTWC for authorities or the general public. Such products are already available in the Pacific, where the TWS has been operational for decades, and also in the Indian Ocean, through the advisories prepared by the PTWC and JMA as part of the current interim service. However, as discussed below, there may not be a simple or neat mapping of the existing suite of TWS products for JCOMM purposes. In particular, the frequency of updates and the varying degrees of contingency associated with them would seem to introduce a number of significant operational obstacles. For example, congestion on the SafetyNET channels is likely to arise as an issue, if hourly or more frequent updates to bulletins are planned, especially if the bulletins are long and/or complex. Further, the question of how much information about the evolving situation much further a field, and the size of the risk (both probability and size of impact if known), is really necessary or useful to transmit?

5.2 Overviews of the TWS operated by the USA, Japan and Australia, including sample message types, are provided in Appendices B through D.

5.3 The bulletins provided by the PTWC, in particular provide a good starting point and basis for developing a set of message types suitable for adoption for the JCOMM service. Further, additional information on the products prepared by the RTAC can be obtained in the Communications Plans of the Regional TWS (see: http://www.tsunamiwave.info/). The PTWC advices take the form of Warnings, Watches, Advisories, and Information Tsunami Statements, with each different type of message having varying threat levels. Tsunami products transmitted via the GMDSS are the same products transmitted to emergency authorities and the public, to eliminate delays and errors inherent in creating multiple versions of products. There are six basic types of messages as summarized below.

5.4 It should be noted that these definitions are not the definitions currently being used operationally, but are the latest under consideration, based on experience gained from the 15 June 2006 event that the Tsunami Advisory is using as the third highest level of alert, but poses no threat to the local area while the Tsunami Information Statement may actually caution about the possibility of a destructive local tsunami. Work to finalize these definitions is ongoing.

i. ***Tsunami Warning***. Warnings are issued when a potential tsunami with significant inundation is imminent or expected. Warnings alert residents that widespread, dangerous coastal flooding accompanied by powerful currents is possible and may continue for several hours after arrival of the initial wave. Warnings also alert emergency management officials to take action for the entire tsunami hazard zone. Appropriate actions to be taken by local officials may include the evacuation of low-lying coastal areas and the repositioning of ships to deep waters when there is time to safely do so. Warnings may be updated (at least hourly), adjusted geographically, downgraded, or canceled. To provide the earliest possible alert, initial warnings are normally based only on seismic information.

ii. ***Tsunami Watch***. Watches are issued to alert emergency management officials and coastal residents of an event, which may later impact the Watch area. The Watch region may be upgraded to a Warning or Advisory (or canceled), based on updated information and analysis. Therefore, emergency management officials and coastal residents should prepare to take action in case the Watch

is upgraded. Watches are normally issued based on seismic information without confirmation that a destructive tsunami is underway.

iii. ***Tsunami Advisory***. Advisories are issued due to the threat of a potential tsunami, which may produce strong currents dangerous to those in or near the water. Coastal regions historically prone to damage due to strong currents are at the greatest risk. The threat may continue for several hours after the initial wave arrival, but significant widespread inundation is not expected for areas under an Advisory. Appropriate actions to be taken by local officials may include closing beaches and evacuating harbors and marinas, and the repositioning of ships to deep waters when there is time to safely do so. Advisories are normally updated at least hourly to continue the Advisory; expand/contract affected areas, upgrade to a Warning, or cancel the Advisory.

iv. ***Tsunami Information Statement***. Information Statements are issued to inform emergency management officials and coastal residents that an earthquake has occurred. In most cases, Information Statements indicate there is no threat of a destructive tsunami, and they are issued to prevent unnecessary evacuations as the earthquake may have been felt in coastal areas. An Information Statement may, in appropriate situations, caution about the possibility of destructive local tsunamis. Information Statements may be re-issued with additional information, though normally these messages are not updated. However, a Watch, Advisory or Warning may be issued for the area, if necessary, after analysis and/or updated information becomes available.

v. ***Warning Cancellation***. A final text product indicating the end of the damaging tsunami threat. A cancellation is usually issued after an evaluation of sea level data confirms that a destructive tsunami will not impact the warned area.

vi. ***Test*** A test message is issued at unannounced times on approximately a monthly basis to determine delays in disseminating tsunami bulletins, to test the operation of the warning system by requiring a response, and to keep operations staff familiar with the procedures for handling tsunami message traffic.

5.5 Regarding Types i and ii, we can notice especially the ***Pacific-Wide Tsunami Warning Bulletin*** (issued after confirmation of tsunami waves capable of causing a threat in all of the Pacific Basin), ***Regional Expanding Tsunami Warning and Watch Bulletin*** (possibility of a widely destructive tsunami: Tsunami Warning status will encompass regions having less than 3 hours until the estimated time of tsunami arrival. The areas having 3 to 6 hours will be placed in a Watch status.), and ***Regional Fixed Tsunami Warning Bulletin*** (The area placed in Tsunami Warning status encompasses coastal regions within 1000-km of the earthquake epicentre, and does not expand).

5.6 In the context of a JCOMM-coordinated service, messages of Type vi (i.e., Tests) would be useful for evaluation of real-time response and effectiveness. The application of bulletin types i to iii will need careful and close analysis in collaboration with the IMO, IMO, national shipping and port management authorities. A set of minimum requirements needs to be developed to enable the service specifications to be soundly established. This aspect of the project clearly needs further in-depth analysis and consideration. Elements that are likely to be important in determining the nature of the warnings (with the IOC, IMO and IHO) include:

- *Lead-time*: How many hours warning time is sufficient? Probably 4-6 hours for long distance tsunamis, but much less for events having their seismic epicentre closer to shore;

- *Impact including height*: How useful will the warning be if an estimate of impact (height of wave on impact) is not available?

- *Level of threat*: Should the kind of advice conveyed in the Type i bulletin, in the initial phase, constitute a warning?

- *Local variations*: Impact will vary along a coastline depending on geography (embayments, headlands, etc.) and bottom topography. Can a general warning be sufficient with perhaps qualifications for those areas known to be more at risk or to have received larger impacts in the past?

- *Significant tsunami thresholds*: Will it be possible to use a threshold below which warnings will not be required? For example, how will the predicted scale of the event (e.g., major, moderate and minor) affect the issue of warnings? Will all tsunamis be warned even if small impact (e.g., less than 0.5m) is anticipated?

- *Frequency of updates*: May be possible to recommend an optimal update period, but this may be difficult to pin down if the warnings are being updated hourly, or more frequently, by the issuing centres;

- *Overload*: The risk of overloading the SafetyNET System, and on the bridge as messages are received on-board ships, needs to be carefully evaluated, especially given the fairly high rate of initial advices for events, which do not materialise into real and/or significant tsunamis.

6. Conclusion and recommendations

6.1 While the coordination of effort between the JCOMM and the other key intergovernmental organizations on developing the new service is at a relatively early stage, the ETMSS is in a position to scope the shape and direction of future discussions and negotiations. The major issues have been identified in this Annex. Input from the broader community of interests involved with providing the MSI to vessels and the response agencies who will be involved in providing other supporting or emergency services in the case of a significant tsunami event is now required to specify more precisely the operational characteristics of the service. Further involvement of the centres issuing tsunami advice bulletins/warnings will be required to ensure that the service meets the needs of the end-user and can be implemented and operated in the long term without major obstacles or difficulties.

6.2 It is recommended that an ETMSS *ad hoc* Working Group, comprising at least two ETMSS Members, be established to fast-track the warning specification, in collaboration with representatives from the IHO and from the major operational tsunami centres in each of the IOC ICGs, to be identified. The outcomes of these issues are to be submitted through the joint WMO-IOC-IHO-IMO Group that has been addressing the outstanding operational issues, if possible before the end of 2007.

Appendices: 4

Appendix A

IMO-COMSAR/Circ.36 (without annexes)

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IMO

E

Ref. T2-OSS/2.6

COMSAR/Circ.36
18 February 2005

BROADCAST OF WARNINGS FOR TSUNAMIS AND OTHER NATURAL DISASTERS

1 The Sub-Committee on Radiocommunications and Search and Rescue (COMSAR), at its ninth session (7 to 11 February 2005) considered the promulgation of warnings for tsunamis and other natural disasters using the existing International SafetyNET and/or NAVTEX systems and agreed to the following, pending the review of resolution A.706(17) on World-Wide Navigational Warning Service.

2 Tsunami Warning Centres and those who may seek to broadcast warnings as a result of natural disasters (natural disaster warnings) may make use of the existing International SafetyNET system. As a first step each Tsunami Warning Centre and those who may seek to broadcast natural disaster warnings should register with the IMO International SafetyNET Co-ordinating Panel* to obtain a certificate of authorization. A detailed procedure of the steps to be taken following registration is set out in annex 1.

3 NAVAREA and National Co-ordinators in the affected areas, or areas likely to be affected, upon receipt of any tsunami warnings or of any other natural disaster warnings should immediately re-broadcast such warnings using the highest priority and all existing means as appropriate.

4 In the interim and until Tsunami Warning Centres are established and registered, those responsible for issuing tsunami or natural disaster warnings may use the World-Wide Navigational Warning Service (WWNWS) to broadcast such warnings both regionally and locally. This may be achieved by passing the warnings to be broadcasted to the NAVAREA or National Co-ordinators for the affected areas, or areas likely to be affected. The Geographic areas for co-ordinating and promulgating NAVAREA warnings and the contact details of the NAVAREA Co-ordinators under the WWNWS are set out in annexes 2 and 3.

5 NAVAREA and National Co-ordinators in the affected areas or areas likely to be affected should consider tsunami warnings and warnings for other natural disasters as exceptional circumstances and should immediately broadcast such warnings using the highest priority and all existing means as appropriate.

6 Ships, when within affected areas, should consider immediate re-broadcasting of any tsunami warnings and/or any other natural disaster warnings they might receive using all available means (e.g. VHF radio) as appropriate. In addition, ships should consider activating any emergency response procedures and arrangements they deem necessary and to prepare, depending on the circumstances, for the conduct of search and rescue operations. Ships should also consider, in the light of the prevailing circumstances, the need for changes to planned navigational routes.

7 Member Governments are invited to bring this circular and the annexed information to all parties concerned.

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Appendix B

The TWS operated by the USA (with samples of warnings)

The USA currently operates two Tsunami Warning Centers, the PTWC and the WC/ATCW.

The Pacific Tsunami Warning Center (PTWC), located at Ewa Beach, Oahu, Hawaii is a RTAC for the Tsunami Warning System in the Pacific. In this capacity, the PTWC provides information on earthquakes in the Pacific basin to Member States of the IOC/PTWS, as well as to others who may be threatened by tsunamis resulting from these earthquakes. The PTWC is also the NTWC for Hawaii, US possessions, US interests in the Pacific, Puerto Rico and the U.S. Virgin Islands. The PTWC is in the final planning stages to act as an RTAC for the wider Caribbean. On an interim basis, the PTWC also provides advisory information for the Indian Ocean and South China Sea.

The West Coast/Alaska Tsunami Warning Center (WC/ATWC) located in Palmer, Alaska is the NTWC for the U.S. Atlantic, Gulf of Mexico, Alaskan, and Pacific West Coasts, as well as the east and west coasts of Canada.

The information provided by these two centers usually takes the form of Warnings, Watches, Advisories, and Information Tsunami Bulletins/Statements, representing varying threat levels. Tsunami products transmitted via the GMDSS are the same products transmitted to emergency authorities and the public to eliminate delays and errors inherent in creating multiple versions of products.

Broadcast of tsunami Warnings, Watches and Advisories via NAVTEX have been implemented since 1999. As of December 2006, final arrangements by the U.S. are being made to broadcast these via SafetyNET, and are as follows:

SATELLITE	METAREA	WARNING AREA	WMO ID's
None	None	Indian Ocean[2]	WEIO21PHEB WEIO23PHEB
AOR-W,AOE,POR	XII	Pacific, South China Sea[2]	WEPA40PHEB
POR	XII	Hawaii	WEHW40PHEB WEHW50PHEB[1]
AOR-W,AOE	IV	Puerto Rico & VI	WECA42PHEB
AOR-W,POR	XII	AK, Canada, WA, OR, CA	WEPA41PAAQ WEAK51PAAQ[1]
AOR-W,AOE	IV	Canada, East Coast and Gulf	WEXX20PAAQ WEXX30PAAQ[1]
AOR-W,AOE	IV	Caribbean	(Planned)

1. These products are intended for the general public and also contain action statements and general information on the potential impacts of a tsunami. Further public products are in development.
2. Interim service, advisory information only

For links to examples and current products see:

Pacific Tsunami Warning Center (PTWC)
http://www.prh.noaa.gov/pr/ptwc/

West Coast & Alaska Tsunami Warning Center (WC/ATWC)
http://wcatwc.arh.noaa.gov

Tsunami warnings are further distributed by a variety of other means beyond those which are part of the GMDSS, including the: NOAA Weather Radio, U.S. Coast Guard HF/MF/VHF voice broadcasts, U.S. Coast Guard HF SITOR, and the Internet (http, ftp and e-mail). Products are available and in further development to make marine forecasts available using hand-held computers and wireless devices such as cellular phones, which are experiencing explosive growth.

Sample of initial Tsunami Expanding Regional Warning (Pacific Ocean)

TSUNAMI BULLETIN NUMBER 001
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 1542Z 03 MAY 2006

THIS BULLETIN IS FOR ALL AREAS OF THE PACIFIC BASIN EXCEPT
ALASKA - BRITISH COLUMBIA - WASHINGTON - OREGON - CALIFORNIA.

... A TSUNAMI WARNING AND WATCH ARE IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

FIJI / NEW ZEALAND

FOR ALL OTHER PACIFIC AREAS, THIS MESSAGE IS AN ADVISORY ONLY.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 1527Z 03 MAY 2006
COORDINATES - 19.9 SOUTH 174.2 WEST
LOCATION - TONGA ISLANDS
MAGNITUDE - 8.1

EVALUATION

IT IS NOT KNOWN THAT A TSUNAMI WAS GENERATED. THIS WARNING IS BASED ONLY ON THE EARTHQUAKE EVALUATION. AN EARTHQUAKE OF THIS SIZE HAS THE POTENTIAL TO GENERATE A DESTRUCTIVE TSUNAMI THAT CAN STRIKE COASTLINES NEAR THE EPICENTER WITHIN MINUTES AND MORE DISTANT COASTLINES WITHIN HOURS. AUTHORITIES SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS POSSIBILITY. THIS CENTER WILL MONITOR SEA LEVEL DATA FROM GAUGES NEAR THE EARTHQUAKE TO DETERMINE IF A TSUNAMI WAS GENERATED AND ESTIMATE THE SEVERITY OF THE THREAT.

ESTIMATED INITIAL TSUNAMI WAVE ARRIVAL TIMES. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. THE TIME BETWEEN SUCCESSIVE TSUNAMI WAVES CAN BE FIVE MINUTES TO ONE HOUR.

LOCATION		COORDINATES	ARRIVAL TIME
FIJI	SUVA	18.1S 178.4E	1713Z 03 MAY
NEW ZEALAND	GISBORNE	38.1S 176.4E	1821Z 03 MAY
	EAST CAPE	36.2S 175.1E	1854Z 03 MAY
	LYTTELTON	43.6S 172.7E	2005Z 03 MAY
	NEW PLYMOUTH	39.1S 174.1E	2027Z 03 MAY
	DUNEDIN	45.9S 170.5E	2040Z 03 MAY
	MILFORD SOUND	44.6S 167.9E	2108Z 03 MAY
	WESTPORT	41.8S 171.6E	2108Z 03 MAY
	BLUFF	46.6S 168.3E	2154Z 03 MAY

BULLETINS WILL BE ISSUED HOURLY OR SOONER IF CONDITIONS WARRANT.
THE TSUNAMI WARNING AND WATCH WILL REMAIN IN EFFECT UNTIL FURTHER NOTICE.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE BULLETINS FOR ALASKA - BRITISH COLUMBIA - WASHINGTON - OREGON - CALIFORNIA.

Sample of the following Tsunami Fixed Regional Warning (Pacific Ocean)

TSUNAMI BULLETIN NUMBER 002
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 1631Z 03 MAY 2006

THIS BULLETIN IS FOR ALL AREAS OF THE PACIFIC BASIN EXCEPT
ALASKA - BRITISH COLUMBIA - WASHINGTON - OREGON - CALIFORNIA.

... A TSUNAMI WARNING IS IN EFFECT ...

A TSUNAMI WARNING IS IN EFFECT FOR

TONGA / NIUE / AMERICAN SAMOA / SAMOA / WALLIS-FUTUNA / FIJI

FOR ALL OTHER PACIFIC AREAS, THIS MESSAGE IS AN ADVISORY ONLY.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 1527Z 03 MAY 2006
COORDINATES - 19.9 SOUTH 174.2 WEST
LOCATION - TONGA ISLANDS
MAGNITUDE - 7.8

EVALUATION

IT IS NOT KNOWN THAT A TSUNAMI WAS GENERATED. THIS WARNING IS BASED ONLY ON THE EARTHQUAKE EVALUATION. AN EARTHQUAKE OF THIS SIZE HAS THE POTENTIAL TO GENERATE A DESTRUCTIVE TSUNAMI THAT CAN STRIKE COASTLINES IN THE REGION NEAR THE EPICENTER WITHIN MINUTES TO HOURS. AUTHORITIES IN THE REGION SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THIS POSSIBILITY. THIS CENTER WILL CONTINUE TO MONITOR SEA LEVEL GAUGES NEAREST THE REGION AND REPORT IF ANY TSUNAMI WAVE ACTIVITY IS OBSERVED. THE WARNING WILL NOT EXPAND TO OTHER AREAS OF THE PACIFIC UNLESS ADDITIONAL DATA ARE RECEIVED TO WARRANT SUCH AN EXPANSION.

ESTIMATED INITIAL TSUNAMI WAVE ARRIVAL TIMES. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. THE TIME BETWEEN SUCCESSIVE TSUNAMI WAVES CAN BE FIVE MINUTES TO ONE HOUR.

LOCATION		COORDINATES	ARRIVAL TIME
TONGA	NUKUALOFA	21.0S 175.2W	1551Z 03 MAY
NIUE	NIUE IS.	19.0S 170.0W	1557Z 03 MAY
AMERICAN SAMOA	PAGO PAGO	14.3S 170.7W	1620Z 03 MAY
SAMOA	APIA	13.8S 171.8W	1622Z 03 MAY
WALLIS-FUTUNA	WALLIS IS.	13.2S 176.2W	1643Z 03 MAY
FIJI	SUVA	18.5S 178.5E	1704Z 03 MAY

BULLETINS WILL BE ISSUED HOURLY OR SOONER IF CONDITIONS WARRANT.
THE TSUNAMI WARNING WILL REMAIN IN EFFECT UNTIL FURTHER NOTICE.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE BULLETINS
FOR ALASKA - BRITISH COLUMBIA - WASHINGTON - OREGON - CALIFORNIA.

Sample of the cancellation of the Tsunami Fixed Regional Warning (Pacific Ocean)

TSUNAMI BULLETIN NUMBER 003
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 1736Z 03 MAY 2006

THIS BULLETIN IS FOR ALL AREAS OF THE PACIFIC BASIN EXCEPT
ALASKA - BRITISH COLUMBIA - WASHINGTON - OREGON - CALIFORNIA.

... TSUNAMI WARNING CANCELLATION ...

THE TSUNAMI WARNING IS CANCELLED FOR ALL COASTAL AREAS AND ISLANDS IN THE PACIFIC OUTSIDE OF ALASKA - BRITISH COLOMBIA - WASHINGTON - OREGON - CALIFORNIA. THOSE AREAS SHOULD REFER TO MESSAGES FROM THE WEST COAST AND ALASKA TSUNAMI WARNING CENTER.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 1527Z 03 MAY 2006
COORDINATES - 19.9 SOUTH 174.2 WEST
LOCATION - TONGA ISLANDS
MAGNITUDE - 7.8

MEASUREMENTS OR REPORTS OF TSUNAMI WAVE ACTIVITY

GAUGE LOCATION	LAT	LON	TIME	AMPL	PER
PAGO PAGO	14.3S	170.7W	1636Z	0.15M	24MIN
NIUE	19.1S	169.9W	1603Z	0.21M	10MIN

TIME - TIME OF THE MEASUREMENT
AMPL - AMPLITUDE IN METERS FROM MIDDLE TO CREST OR MIDDLE
TO TROUGH OR HALF OF THE CREST TO TROUGH
PER - PERIOD OF TIME FROM ONE WAVE CREST TO THE NEXT

EVALUATION

SEA LEVEL READINGS INDICATE A TSUNAMI WAS GENERATED. IT MAY HAVE BEEN DESTRUCTIVE ALONG COASTS NEAR THE EARTHQUAKE EPICENTER. FOR THOSE AREAS - WHEN NO MAJOR WAVES ARE OBSERVED FOR TWO HOURS AFTER THE ESTIMATED TIME OF ARRIVAL OR DAMAGING WAVES HAVE NOT OCURRED FOR AT LEAST TWO HOURS THEN LOCAL AUTHORITIES CAN ASSUME THE THREAT IS PASSED. DANGER TO BOATS AND COASTAL STRUCTURES CAN CONTINUE FOR SEVERAL HOURS DUE TO RAPID CURRENTS. AS LOCAL CONDITIONS CAN CAUSE A WIDE VARIATION IN TSUNAMI WAVE ACTION THE ALL CLEAR DETERMINATION MUST BE MADE BY LOCAL AUTHORITIES

NO TSUNAMI THREAT EXISTS FOR OTHER COASTAL AREAS IN THE PACIFIC ALTHOUGH SOME OTHER AREAS MAY EXPERIENCE SMALL SEA LEVEL CHANGES.
THE TSUNAMI WARNING IS CANCELLED.

THIS WILL BE THE FINAL BULLETIN ISSUED FOR THIS EVENT UNLESS ADDITIONAL INFORMATION BECOMES AVAILABLE.

THE WEST COAST/ALASKA TSUNAMI WARNING CENTER WILL ISSUE BULLETINS FOR ALASKA - BRITISH COLUMBIA - WASHINGTON - OREGON - CALIFORNIA.

Sample of local Tsunami Watch Bulletin (Indian Ocean – Advisory)

TSUNAMI BULLETIN NUMBER 001
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 0836Z 17 JUL 2006

THIS BULLETIN IS FOR ALL AREAS OF THE INDIAN OCEAN.

... A LOCAL TSUNAMI WATCH IS IN EFFECT ...

A TSUNAMI WATCH IS IN EFFECT FOR

AUSTRALIA / INDONESIA

FOR OTHER AREAS OF THE INDIAN OCEAN REGION, THIS MESSAGE IS AN ADVISORY ONLY.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS

ORIGIN TIME - 0819Z 17 JUL 2006
COORDINATES - 9.3 SOUTH 107.3 EAST
LOCATION - SOUTH OF JAWA INDONESIA
MAGNITUDE - 7.2

EVALUATION

A DESTRUCTIVE WIDESPREAD TSUNAMI THREAT DOES NOT EXIST BASED ON HISTORICAL EARTHQUAKE AND TSUNAMI DATA.

HOWEVER - THERE IS THE POSSIBILITY OF A LOCAL TSUNAMI THAT COULD AFFECT COASTS LOCATED USUALLY NO MORE THAN A HUNDRED KILOMETERS FROM THE EARTHQUAKE EPICENTER. AUTHORITIES FOR THE REGION NEAR THE EPICENTER SHOULD BE AWARE OF THIS POSSIBILITY.
AREAS FURTHER FROM THE EPICENTER COULD EXPERIENCE SMALL SEA LEVEL CHANGES AND STRONG OR UNUSUAL COASTAL CURRENTS.

DUE TO ONLY LIMITED SEA LEVEL DATA FROM THE REGION IT IS NOT POSSIBLE FOR THIS CENTER TO RAPIDLY CONFIRM NOR EVALUATE THE STRENGTH OF A TSUNAMI IF ONE HAS BEEN GENERATED.

ESTIMATED INITIAL TSUNAMI WAVE ARRIVAL TIMES. ACTUAL ARRIVAL TIMES
MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. THE TIME
BETWEEN SUCCESSIVE TSUNAMI WAVES CAN BE FIVE MINUTES TO ONE HOUR.

LOCATION		COORDINATES	ARRIVAL TIME
AUSTRALIA	CHRISTMAS IS	10.4S 105.4E	0836Z 17 JUL
INDONESIA	CILACAP	7.8S 108.9E	0900Z 17 JUL

THIS WILL BE THE ONLY BULLETIN ISSUED BY THE PACIFIC TSUNAMI WARNING CENTER FOR THIS EVENT UNLESS ADDITIONAL INFORMATION BECOMES AVAILABLE.

THE JAPAN METEOROLOGICAL AGENCY MAY ISSUE ADDITIONAL INFORMATION FOR THIS EVENT.

Sample of Ocean-Wide Tsunami Watch Bulletin (Indian Ocean – Advisory)

TSUNAMI BULLETIN NUMBER 001
PACIFIC TSUNAMI WARNING CENTER/NOAA/NWS
ISSUED AT 0149Z 11 APR 2005
THIS BULLETIN IS FOR ALL AREAS OF THE INDIAN OCEAN.

... AN INDIAN-OCEAN-WIDE TSUNAMI WATCH IS IN EFFECT ...

A TSUNAMI WATCH IS IN EFFECT FOR
INDONESIA / INDIA / AUSTRALIA / THAILAND / SRI LANKA / MYANMAR / MALDIVES / UNITED KINGDOM / MALAYSIA / BANGLADESH / MAURITIUS / SEYCHELLES / REUNION / OMAN / SOMALIA / MADAGASCAR / PAKISTAN / IRAN / YEMEN / COMORES / KENYA / MOZAMBIQUE / TANZANIA / CROZET ISLANDS / KERGUELEN ISLANDS / SOUTH AFRICA / SINGAPORE

FOR OTHER AREAS OF THE INDIAN OCEAN REGION, THIS MESSAGE IS AN ADVISORY ONLY.

AN EARTHQUAKE HAS OCCURRED WITH THESE PRELIMINARY PARAMETERS
ORIGIN TIME - 0100Z 11 APR 2005
COORDINATES - 1.3 NORTH 97.5 EAST
LOCATION - NORTHERN SUMATERA INDONESIA
MAGNITUDE - 8.2

EVALUATION
EARTHQUAKES OF THIS SIZE HAVE THE POTENTIAL TO GENERATE A WIDESPREAD DESTRUCTIVE TSUNAMI THAT CAN AFFECT COASTLINES ACROSS THE ENTIRE INDIAN OCEAN BASIN. HOWEVER - IT IS NOT KNOWN THAT A TSUNAMI WAS GENERATED. THIS WATCH IS BASED ONLY ON THE EARTHQUAKE EVALUATION. AUTHORITIES IN THE REGION SHOULD TAKE APPROPRIATE ACTION IN RESPONSE TO THE POSSIBILITY OF A WIDESPREAD DESTRUCTIVE TSUNAMI. DUE TO ONLY LIMITED SEA LEVEL DATA FROM THE REGION IT IS NOT POSSIBLE FOR THIS CENTER TO RAPIDLY CONFIRM NOR EVALUATE THE STRENGTH OF A TSUNAMI IF ONE HAS BEEN GENERATED. ESTIMATED INITIAL TSUNAMI WAVE ARRIVAL TIMES. ACTUAL ARRIVAL TIMES MAY DIFFER AND THE INITIAL WAVE MAY NOT BE THE LARGEST. THE TIME BETWEEN SUCCESSIVE TSUNAMI WAVES CAN BE FIVE MINUTES TO ONE HOUR.

LOCATION		COORDINATES	ARRIVAL TIME
INDONESIA	SIMEULUE	2.5N 96.0E	0134Z 11 APR
	SIBERUT	1.5S 98.7E	0144Z 11 APR
	PADANG	0.9S 100.1E	0214Z 11 APR
	BANDA ACEH	5.5N 95.1E	0223Z 11 APR
	BENGKULU	3.9S 102.0E	0238Z 11 APR
	BANDAR LAMPUNG	6.0S 105.5E	0338Z 11 APR
	CILACAP	7.8S 108.9E	0351Z 11 APR
	BALI	9.0S 115.5E	0433Z 11 APR
	BELAWAN	3.8N 98.8E	0544Z 11 APR
	KUPANG	10.0S 123.4E	0549Z 11 APR
INDIA	GREAT NICOBAR	7.1N 93.6E	0236Z 11 APR
	LITTLE ANDAMAN	10.7N 92.3E	0314Z 11 APR
	PORT BLAIR	11.9N 92.7E	0338Z 11 APR
	NORTH ANDAMAN	13.3N 92.6E	0343Z 11 APR
	CHENNAI	13.4N 80.4E	0432Z 11 APR
	KAKINADA	17.2N 82.7E	0456Z 11 APR
	TRIVANDRUM	8.0N 77.0E	0508Z 11 APR
	BALESHWAR	21.6N 87.3E	0604Z 11 APR
	MANGALORE	13.3N 74.4E	0641Z 11 APR
	BOMBAY	18.8N 72.6E	0908Z 11 APR
	GULF OF KUTCH	22.7N 68.9E	0917Z 11 APR
AUSTRALIA	COCOS ISLAND	12.1S 96.7E	0304Z 11 APR
	CHRISTMAS IS	10.4S 105.4E	0311Z 11 APR
	NORTH WEST CAPE	21.5S 113.9E	0520Z 11 APR
	CAPE INSPIRATIO	25.9S 113.0E	0616Z 11 APR
	CAPE LEVEQUE	16.1S 122.6E	0637Z 11 APR
	PERTH	32.0S 115.3E	0638Z 11 APR
	AUGUSTA	34.3S 114.7E	0644Z 11 APR
	GERALDTOWN	28.6S 114.3E	0648Z 11 APR
	ESPERANCE	34.0S 121.8E	0824Z 11 APR
	KINGSTON SOUTH	37.0S 139.4E	0957Z 11 APR

	EUCLA MOTEL	31.8S 128.9E	1006Z 11 APR
	DARWIN	12.1S 130.7E	1017Z 11 APR
	HEARD ISLAND	54.0S 73.5E	1031Z 11 APR
	HOBART	43.3S 147.6E	1059Z 11 APR
THAILAND	PHUKET	8.0N 98.2E	0350Z 11 APR
	KO PHRA THONG	9.1N 98.2E	0425Z 11 APR
	KO TARUTAO	6.6N 99.6E	0504Z 11 APR
SRI LANKA	DONDRA HEAD	6.0N 81.0E	0351Z 11 APR
	TRINCOMALEE	8.7N 81.3E	0352Z 11 APR
	COLOMBO	7.0N 79.5E	0415Z 11 APR
	JAFFNA	9.9N 80.0E	0508Z 11 APR
MYANMAR	PYINKAYAING	16.0N 94.0E	0417Z 11 APR
	CHEDUBA ISLAND	18.9N 93.4E	0456Z 11 APR
	SITTWE	20.0N 92.9E	0523Z 11 APR
	MERGUI	12.8N 98.4E	0543Z 11 APR
	YANGON	16.0N 96.5E	0559Z 11 APR
MALDIVES	GAN	0.6S 73.2E	0447Z 11 APR
	MALE	4.2N 73.6E	0458Z 11 APR
	MINICOV	8.3N 73.0E	0522Z 11 APR
UK	DIEGO GARCIA	7.3S 72.4E	0459Z 11 APR
MALAYSIA	GEORGETOWN	5.4N 100.1E	0547Z 11 APR
	PORT DICKSON	2.5N 101.7E	0925Z 11 APR
BANGLADESH	CHITTAGONG	22.7N 91.2E	0711Z 11 APR
MAURITIUS	PORT LOUIS	20.0S 57.3E	0746Z 11 APR
SEYCHELLES	VICTORIA	4.5S 55.6E	0806Z 11 APR
REUNION	ST DENIS	20.8S 55.2E	0809Z 11 APR
OMAN	DUQM	19.7N 57.8E	0830Z 11 APR
	SALALAH	17.0N 54.5E	0831Z 11 APR
	MUSCAT	23.9N 58.6E	0850Z 11 APR
SOMALIA	HILALAYA	6.5N 49.5E	0838Z 11 APR
	CAPE GUARO	11.9N 51.4E	0848Z 11 APR
	MOGADISHU	2.0N 45.5E	0903Z 11 APR
	KAAMBOONI	1.5S 41.9E	0928Z 11 APR
MADAGASCAR	ANTSIRANANA	12.1S 49.5E	0842Z 11 APR
	TOAMASINA	17.8S 49.6E	0850Z 11 APR
	MANAKARA	22.0S 48.5E	0901Z 11 APR
	MAHAJANGA	15.4S 46.2E	0947Z 11 APR
	CAP STE MARIE	25.8S 45.2E	0957Z 11 APR
	TOLIARA	23.4S 43.6E	1026Z 11 APR
PAKISTAN	GWADAR	25.1N 62.4E	0845Z 11 APR
	KARACHI	24.7N 66.9E	0937Z 11 APR
IRAN	GAVATER	25.0N 61.3E	0852Z 11 APR
YEMEN	AL MUKALLA	14.5N 49.5E	0913Z 11 APR
	ADEN	13.0N 45.5E	1003Z 11 APR
COMORES	MORONI	11.6S 43.3E	0943Z 11 APR
KENYA	MOMBASA	4.0S 40.0E	0957Z 11 APR
MOZAMBIQUE	CABO DELGADO	10.5S 41.0E	0959Z 11 APR
	ANGOCHE	15.5S 41.0E	1017Z 11 APR
	QUELIMANE	18.0S 37.1E	1149Z 11 APR
	MAPUTO	25.9S 32.8E	1201Z 11 APR
	BEIRA	19.9S 35.1E	1238Z 11 APR
TANZANIA	LINDI	9.8S 39.9E	1007Z 11 APR
	DAR ES SALAAM	6.7S 39.4E	1007Z 11 APR
CROZET ISL.	CROZET ISLANDS	46.4S 51.8E	1013Z 11 APR
KERGUELEN IS.	PORT AUX FRANCA	49.0S 69.5E	1052Z 11 APR
SOUTH AFRICA	PRINCE EDWARD I	46.6S 37.6E	1149Z 11 APR
	DURBAN	29.8S 31.2E	1157Z 11 APR
	PORT ELIZABETH	33.9S 25.8E	1242Z 11 APR
	CAPE TOWN	34.1S 18.0E	1359Z 11 APR
SINGAPORE	SINGAPORE	1.2N 103.8E	1502Z 11 APR

THIS WILL BE THE ONLY BULLETIN ISSUED BY THE PACIFIC TSUNAMI WARNING CENTER FOR THIS EVENT UNLESS ADDITIONAL INFORMATION

Sample of Initial Public Tsunami Warning (Atlantic Ocean)

WEXX30 PAAQ 172109
TSUATE

BULLETIN
PUBLIC TSUNAMI MESSAGE NUMBER 1
NWS WEST COAST/ALASKA TSUNAMI WARNING CENTER PALMER AK
409 PM EST FRI FEB 17 2006

...THIS MESSAGE IS FOR TEST PURPOSES TO SHOW AN EXAMPLE
WEXX30 MESSAGE...

...A TEST TSUNAMI WARNING IS IN EFFECT WHICH INCLUDES THE
FLORIDA - GEORGIA - SOUTH CAROLINA AND NORTH CAROLINA
COASTAL AREAS FROM FLAGLER BEACH FLORIDA TO DUCK NORTH CAROLINA...

A TSUNAMI WARNING MEANS... ALL COASTAL RESIDENTS IN THE WARNING AREA WHO ARE NEAR THE BEACH OR IN LOW-LYING REGIONS SHOULD MOVE IMMEDIATELY INLAND TO HIGHER GROUND AND AWAY FROM ALL HARBORS AND INLETS INCLUDING THOSE SHELTERED DIRECTLY FROM THE SEA. THOSE FEELING THE EARTH SHAKE... SEEING UNUSUAL WAVE ACTION... OR THE WATER LEVEL RISING OR RECEDING MAY HAVE ONLY A FEW MINUTES BEFORE THE TSUNAMI ARRIVAL AND SHOULD EVACUATE IMMEDIATELY. HOMES AND SMALL BUILDINGS ARE NOT DESIGNED TO WITHSTAND TSUNAMI IMPACTS. DO NOT STAY IN THESE STRUCTURES.

ALL RESIDENTS WITHIN THE WARNED AREA SHOULD BE ALERT FOR INSTRUCTIONS BROADCAST FROM THEIR LOCAL CIVIL AUTHORITIES. THIS TSUNAMI WARNING IS BASED SOLELY ON EARTHQUAKE INFORMATION - THE TSUNAMI HAS NOT YET BEEN CONFIRMED.

AT 350 PM EASTERN STANDARD TIME ON FEBRUARY 17 AN EARTHQUAKE WITH PRELIMINARY MAGNITUDE 7.2 OCCURRED 100 MILES SOUTH OF MYRTLE BEACH SOUTH CAROLINA.
THIS EARTHQUAKE MAY HAVE GENERATED A TSUNAMI. IF A TSUNAMI HAS BEEN GENERATED THE WAVES WILL FIRST REACH SOUTH SANTEE RIVER SOUTH CAROLINA AT 537 PM EST ON FEBRUARY 17. ESTIMATED TSUNAMI ARRIVAL TIMES AND MAPS ALONG WITH SAFETY RULES AND OTHER INFORMATION CAN BE FOUND ON THE WEB SITE WCATWC.ARH.NOAA.GOV.

TSUNAMIS CAN BE DANGEROUS WAVES THAT ARE NOT SURVIVABLE. WAVE HEIGHTS ARE AMPLIFIED BY IRREGULAR SHORELINE AND ARE DIFFICULT TO PREDICT. TSUNAMIS OFTEN APPEAR AS A STRONG SURGE AND MAY BE PRECEDED BY A RECEDING WATER LEVEL. MARINERS IN WATER DEEPER THAN 600 FEET SHOULD NOT BE AFFECTED BY A TSUNAMI. WAVE HEIGHTS WILL INCREASE RAPIDLY AS WATER SHALLOWS. TSUNAMIS ARE A SERIES OF OCEAN WAVES WHICH CAN BE DANGEROUS FOR SEVERAL HOURS AFTER THE INITIAL WAVE ARRIVAL. DO NOT RETURN TO EVACUATED AREAS UNTIL AN ALL CLEAR IS GIVEN BY LOCAL CIVIL AUTHORITIES.

ADDITIONAL MESSAGES WILL BE ISSUED HALF-HOURLY OR SOONER IF CONDITIONS WARRANT. THE TSUNAMI WARNING WILL REMAIN IN EFFECT UNTIL FURTHER NOTICE. FOR FURTHER INFORMATION STAY TUNED TO NOAA WEATHER RADIO... YOUR LOCAL TV OR RADIO STATIONS... OR SEE THE WEB SITE WCATWC.ARH.NOAA.GOV.

THIS IS A TEST MESSAGE. DO NOT TAKE ACTION BASED ON THIS MESSAGE.
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Appendix C

The TWS Operated by Japan (with Samples of Warnings)

The Japan Meteorological Agency (JMA) is responsible for issuance of tsunami warning/advisory and tsunami information to the relevant organizations in Japan. The JMA also provides the Northwest Pacific Tsunami Advisory (NWPTA) to countries around the Northwest Pacific as reference and supplement to the tsunami bulletins issued by the Pacific Tsunami Warning Center (PTWC) of the USA, so that the recipient countries take appropriate actions against threat of tsunami. Moreover, the JMA will provide Tsunami Watch Information (TWI) to countries in the Indian Ocean region on an interim basis until tsunami warning system becomes fully operational in the region.

1.) Tsunami forecast bulletins of the JMA for domestic use are different from those of the PTWC. The JMA's tsunami forecast bulletins are divided amongst three categories: Tsunami Warning, Tsunami Advisory, and Tsunami Information. The JMA issues tsunami warnings and/or advisories for the coastal regions of the country where threat of tsunami exists. Such coastal regions are set beforehand by splitting the Japanese coast into 66 blocks. Whether the JMA issues tsunami warning and/or advisory or not depends on estimated maximum tsunami height. Tsunami height is estimated from the earthquake parameters including: latitude, longitude, depth and magnitude derived from the analysis of the seismic observation data, and tsunami simulation database, which were calculated in advance.

Tsunami information is issued as supplementary information of tsunami warning and/or advisory, in which estimated arrival time and height of tsunami at coasts are described in detail. When tsunamis are actually observed at tide gauges, observed arrival time and tsunami of tsunamis are described accordingly. Tsunami warning and/or advisory are cancelled, upgraded or downgraded based on tsunami observations. Categories of tsunami forecast bulletins are shown in Table 1.

Table 1- Categories of tsunami forecast bulletin

Tsunami Forecast Bulletin		Value of Tsunami Height Described in Messages
Tsunami Warning	Major Tsunami	"3m", "4m", "6m", "8m", "over 10m"
	Tsunami	"1m", "2m"
Tsunami Advisory	Tsunami Attention	"0.5m"
Tsunami Information on - Estimated arrival time and height of tsunami for each coastal region - Estimated time of high tide with tsunami arrival time at coasts - Observed arrival time and height of tsunami		

(Tsunami height is measured from the ordinary tide levels)

2) The NWPTA contains seismic source parameters (e.g., origin time, latitude, longitude and magnitude) and tsunamigenic potential based on the source parameters. Moreover, the NWPTA contains estimated tsunami arrival time and height at forecast points located around the Northwest Pacific by tsunami numerical simulation.

3) The TWI for the Indian Ocean contains seismic source parameters (e.g., origin time, latitude, longitude and magnitude) and tsunamigenic potential based on the source parameters. In addition, it contains estimated travel time of tsunami at forecast points located around the Indian Ocean.

The JMA provides domestic tsunami warning and/or advisories for the NAVTEX as information for ships for the purpose of mitigation of tsunami disasters. The JMA is considering provision of tsunami warning, advisory and information to SafetyNET and having discussion with relevant authorities. Provision of the NWPTA and the Indian Ocean TWI for SafetyNET is also being discussed.

Examples of Tsunami Bulletins by Japan Meteorological Agency

1. Examples of NAVTEX broadcast based on domestic tsunami forecast

(1.) Tsunami Warning and Advisory issued for NAVTEX (Emergent)

WEJP64 RJTD 151129
(STX)
FOR OTARU NAVTEX AREA
EMERGENCY TSUNAMI WARNING
TSUNAMI EXPECTED
OKHOTSK SEA COAST OF HOKKAIDO
EMERGENCY TSUNAMI ADVISORY
TSUNAMI ATTENTION
WESTERN PART OF PACIFIC COAST OF
HOKKAIDO
NORTHERN PART OF JAPAN SEA COAST OF
HOKKAIDO
PACIFIC COAST OF AOMORI PREF.
ISSUED FROM JMA AT 151129 UTC=
(ETX)

(2.) Tsunami Warning and Advisory issued for NAVTEX (Scheduled)

WEJP84 RJTD 151129
(STX)
FOR OTARU NAVTEX AREA
FOLLOWING WARNING IS VALID NOW
TSUNAMI EXPECTED
OKHOTSK SEA COAST OF HOKKAIDO
FOLLOWING ADVISORY IS VALID NOW
TSUNAMI ATTENTION
WESTERN PART OF PACIFIC COAST OF
HOKKAIDO
NORTHERN PART OF JAPAN SEA COAST OF
HOKKAIDO
PACIFIC COAST OF AOMORI PREF.
ISSUED FROM JMA AT 151129 UTC=
(ETX)

(3.) Cancellation of Tsunami Advisory issued for NAVTEX (Emergent)

WEJP74 RJTD 151532
(STX)
FOR OTARU NAVTEX AREA
TSUNAMI ATTENTION CLEARED UP
OKHOTSK SEA COAST OF HOKKAIDO
NORTHERN PART OF JAPAN SEA COAST OF
HOKKAIDO
151430 UTC TSUNAMI ADVISORY ISSUED FROM
JMA HAS BEEN CLEARED UP FOR THE COASTS
ABOVE AT 151532 UTC=
(ETX)

(4.) Cancellation of Tsunami Advisory issued for NAVTEX (Scheduled)

WEJP84 RJTD 151630
(STX)
FOR OTARU NAVTEX AREA
ALL CLEARED=
(ETX)

2. Examples of Tsunami Information for domestic use

(1.) Estimated arrival times and heights of tsunami

ISSUED AT 0457 JST 26 SEP 2003

ESTIMATED TSUNAMI ARRIVAL TIME AND HEIGHT

<MAJOR TSUNAMI>
CENTRAL PART OF PACIFIC COAST OF HOKKAIDO AT 0500 3m

<TSUNAMI>
EASTERN PART OF PACIFIC COAST OF HOKKAIDO AT 0500 1m

<TSUNAMI ATTENTION>
WESTERN PART OF PACIFIC COAST OF HOKKAIDO AT 0520 0.5m
JAPAN SEA COAST OF AOMORI PREF. AT 0550 0.5m
PACIFIC COAST OF AOMORI PREF. AT 0510 0.5m
IWATE PREF. AT 0510 0.5m
MIYAGI PREF. AT 0530 0.5m
FUKUSHIMA PREF. AT 0600 0.5m

EARTHQUAKE INFORMATION
OCCURRED AT 0450 JST 26 SEP 2003
REGION NAME TOKACHI
LATITUDE 41.7N
LONGITUDE 144.2E
DEPTH 60KM
MAGNITUDE 7.8

(2) Observed arrival times and heights of tsunami

ISSUED AT 1833 JST 26 SEP 2003

TSUNAMI OBSERVATIONS AS OF 1830 JST

AT SOME PARTS OF THE COASTS, TSUNAMIS MAY BE HIGHER THAN THOSE OBSERVED AT THE OBSERVATION SITES.

KUSHIRO	INITIAL TSUNAMI	AT 0506	(+)	1.0M
	MAXIMUM TSUNAMI	AT 0903		1.2M
HANASAKI	INITIAL TSUNAMI	AT 0527	(+)	0.9M
	MAXIMUM TSUNAMI	AT 0540		0.9M
URAKAWA	INITIAL TSUNAMI	AT 0507	(+)	0.2M
	MAXIMUM TSUNAMI	AT 0624		1.3M
MURORAN	INITIAL TSUNAMI	AT 0526	(-)	0.1M
	MAXIMUM TSUNAMI	AT 0726		0.3M
HAKODATE	INITIAL TSUNAMI	AT 0605	(+)	0.3M
	MAXIMUM TSUNAMI	AT 0818		0.8M
HACHINOHE	INITIAL TSUNAMI	AT 0544	(+)	0.6M
	MAXIMUM TSUNAMI	AT 0817		1.0M

SEKINEHAMA	INITIAL TSUNAMI	AT 0539	(+)	0.4M
	MAXIMUM TSUNAMI	AT 0747		0.5M
MIYAKO	INITIAL TSUNAMI	AT 0534	(+)	0.6M
	MAXIMUM TSUNAMI	AT 0544		0.6M
OFUNATO	INITIAL TSUNAMI	AT 0544	(+)	0.2M
	MAXIMUM TSUNAMI	AT 0549		0.2M
KAMAISHI	INITIAL TSUNAMI	AT 0540	(+)	0.4M
	MAXIMUM TSUNAMI	AT 0747		0.5M
AYUKAWA	INITIAL TSUNAMI	AT 0559	(+)	0.2M
	MAXIMUM TSUNAMI	AT 0900		0.3M

……
(following lines are omitted)

3-1. Example of Northwest Pacific Tsunami Advisory (NWPTA)

TSUNAMI BULLETIN NUMBER 001
ISSUED BY NWPTAC (JMA)
ISSUED AT 0436Z 13 JAN 2007

HYPOCENTRAL PARAMETERS
ORIGIN TIME:0424Z 13 JAN 2007
PRELIMINARY EPICENTER:LAT46.1NORTH LON154.2EAST
EAST OF KURIL ISLANDS, RUSSIA
JAPAN - KURIL ISLANDS - KAMCHATKA PENINSULA
MAG:8.3(MW)

EVALUATION
THERE IS A POSSIBILITY OF A DESTRUCTIVE OCEAN-WIDE TSUNAMI

THIS BULLETIN IS FOR
EAST COASTS OF KAMCHATKA PENINSULA
KURIL ISLANDS
EAST COASTS OF PHILIPPINES
NORTH COASTS OF IRIAN JAYA
NORTH COASTS OF PAPUA NEW GUINEA
MARIANA ISLANDS
MICRONESIA
MARSHALL ISLANDS
NORTH COASTS OF SOLOMON ISLANDS
SOLOMON SEA

ESTIMATED TSUNAMI ARRIVAL TIME AND ESTIMATED TSUNAMI WAVE AMPLITUDE
EAST COASTS OF KAMCHATKA PENINSULA

LOCATION	COORDINATES	ARRIVAL TIME	AMPL
UST_KAMCHATSK	56.1N 162.6E	0608Z 13 JAN	0.5M
PETROPAVLOVSK_K	53.2N 159.6E	0534Z 13 JAN	0.5M

KURIL ISLANDS

LOCATION	COORDINATES	ARRIVAL TIME	AMPL
SEVERO_KURILSK	50.8N 156.1E	0509Z 13 JAN	1M
URUP_IS.	46.1N 150.5E	0443Z 13 JAN	OVER10M

EAST COASTS OF PHILIPPINES

LOCATION	COORDINATES	ARRIVAL TIME	AMPL
LEGASPI	13.2N 123.8E	1003Z 13 JAN	0.5M
LAOANG	12.6N 125.0E	0957Z 13 JAN	0.5M
MADRID	09.2N 126.0E	1010Z 13 JAN	1M

NORTH COASTS OF IRIAN JAYA

LOCATION	COORDINATES	ARRIVAL TIME	AMPL
SORONG	00.8S 131.1E	1141Z 13 JAN	0.5M
WARSA	00.6S 135.8E	1116Z 13 JAN	1M
JAYAPURA	02.4S 140.8E	1124Z 13 JAN	1M

NORTH COASTS OF PAPUA NEW GUINEA

LOCATION	COORDINATES	ARRIVAL TIME	AMPL
VANIMO	02.6S 141.3E	1120Z 13 JAN	1M
WEWAK	03.5S 143.7E	1132Z 13 JAN	1M
KAVIENG	02.5S 150.7E	1057Z 13 JAN	0.5M
KIETA	06.1S 155.6E	1149Z 13 JAN	2M

MARIANA ISLANDS

LOCATION	COORDINATES	ARRIVAL TIME	AMPL
GUAM	13.4N 144.7E	0851Z 13 JAN	1M
SAIPAN	15.3N 145.8E	0831Z 13 JAN	1M

MICRONESIA

LOCATION	COORDINATES	ARRIVAL TIME	AMPL
CHUUK_IS.	07.4N 151.8E	0925Z 13 JAN	1M
POHNPEI_IS.	07.0N 158.2E	0927Z 13 JAN	1M
KOSRAE_IS.	05.5N 163.0E	0954Z 13 JAN	1M

MARSHALL ISLANDS

LOCATION	COORDINATES	ARRIVAL TIME	AMPL
ENIWETOK	11.4N 162.3E	0902Z 13 JAN	1M

NORTH COASTS OF SOLOMON ISLANDS

LOCATION	COORDINATES	ARRIVAL TIME	AMPL
PANGGOE	06.9S 157.2E	1203Z 13 JAN	1M
AUKI	08.8S 160.6E	1226Z 13 JAN	0.5M
KIRAKIRA	10.4S 161.9E	0908Z 13 JAN	0.5M

SOLOMON SEA

LOCATION	COORDINATES	ARRIVAL TIME	AMPL
HONIARA	09.3S 160.0E	1253Z 13 JAN	1M

AMPL - AMPLITUDE IN METERS FROM MIDDLE TO CREST

HOWEVER AT SOME COASTS, PARTICULARLY THOSE NEAR THE EPICENTER, HIGHER TSUNAMIS MAY ARRIVE EARLIER THAN OUR ESTIMATION AT THE NEARBY FORECAST POINTS

AUTHORITIES SHOULD BE AWARE OF THIS POSSIBILITY

FURTHERMORE THE EVALUATION OF TSUNAMIGENIC POTENTIAL AND ESTIMATED ARRIVAL TIME OF TSUNAMIS MAY BE DIFFERENT FROM THOSE OF PTWC DUE TO DIFFERENCES IN THE ESTIMATED EARTHQUAKE PARAMETERS AUTHORITIES SHOULD USE THE EARLIEST ARRIVAL TIMES FOR GREATEST SAFETY

THIS WILL BE THE FINAL BULLETIN UNLESS THERE ARE CHANGES ABOUT THE POTENTIAL OF TSUNAMI GENERATION BY RE-EVALUATION OF THE EARTHQUAKE OR THERE ARE REPORTS ON TSUNAMI OBSERVATIONS

3-2. Example of Northwest Pacific Tsunami Advisory (NWPTA) including tsunami observations

TSUNAMI BULLETIN NUMBER 004
ISSUED BY NWPTAC (JMA)
ISSUED AT 1158Z 13 JAN 2007

HYPOCENTRAL PARAMETERS

ORIGIN TIME:0424Z 13 JAN 2007
PRELIMINARY EPICENTER: LAT46.9NORTH LON155.1EAST
EAST OF KURIL ISLANDS, RUSSIA
JAPAN - KURIL ISLANDS - KAMCHATKA PENINSULA
MAG:8.2(MW)

EVALUATION
THERE IS A POSSIBILITY OF A DESTRUCTIVE OCEAN-WIDE TSUNAMI

THIS BULLETIN IS FOR
EAST COASTS OF KAMCHATKA PENINSULA
KURIL ISLANDS
EAST COASTS OF PHILIPPINES
NORTH COASTS OF IRIAN JAYA
NORTH COASTS OF PAPUA NEW GUINEA
NORTH COASTS OF SOLOMON ISLANDS
MARIANA ISLANDS
MICRONESIA
MARSHALL ISLANDS
SOLOMON SEA

(Intermediate portion is omitted.)

MEASUREMENTS OR REPORTS ON TSUNAMI (REVISION)
LOCATION COORDINATES ARRIVAL TIME AMPL
MIDWAY IS. 28.2N 177.4W
MAXIMUM TSUNAMI WAVE 0911Z 13 JAN 0.2M
WAKE IS. 16.3N 166.6E
MAXIMUM TSUNAMI WAVE 0848Z 13 JAN 0.1M
CHICHIJIMA 27.1N 142.2E
MAXIMUM TSUNAMI WAVE 0738Z 13 JAN 0.4M
MIYAKO 39.6N 142.0E
MAXIMUM TSUNAMI WAVE 0633Z 13 JAN 0.1M
MAXIMUM TSUNAMI WAVE -- HALF OF AMPLITUDE FROM THE TROUGH
TO THE CREST

THIS WILL BE THE FINAL BULLETIN UNLESS THERE ARE CHANGES ABOUT THE
POTENTIAL OF TSUNAMI GENERATION BY RE-EVALUATION OF THE EARTHQUAKE
OR THERE ARE REPORTS ON TSUNAMI OBSERVATIONS

4-1. Example of Tsunami Watch Information (TWI) for the Indian Ocean (IO)

TSUNAMI BULLETIN NUMBER 001
ISSUED BY THE JAPAN METEOROLOGICAL AGENCY (JMA)
ISSUED AT 0846 17 JUL 2006 (UTC)

... A LOCAL TSUNAMI WATCH IS IN EFFECT ...

1.EARTHQUAKE INFORMATION
ORIGIN TIME : 0819 17 JUL 2006 (UTC)
COORDINATES : 9.3 SOUTH 107.3 EAST
LOCATION : SOUTH OF JAWA, INDONESIA
MAGNITUDE : 7.2

2.EVALUATION
THERE IS A POSSIBILITY OF A DESTRUCTIVE LOCAL TSUNAMI
IN THE INDIAN OCEAN.

3.ESTIMATED TSUNAMI TRAVEL TIME
ONE HOUR OR LESS
INDONESIA:
INDIAN OCEAN COAST OF SUMATRA
INDIAN OCEAN COAST OF JAWA
SOUTH COASTS OF LESSER SUNDA ISLANDS
AUSTRALIA:
COCOS ISLANDS

*TSUNAMI TRAVEL TIME IS ESTIMATED ONLY FROM EARTHQUAKE DATA
AND INDICATES THE TIME LAPSE BETWEEN ORIGIN TIME AND TSUNAMI
ARRIVAL TIME.

*THIS WILL BE THE FINAL INFORMATION UNLESS THERE ARE CHANGES
ABOUT THE POTENTIAL OF TSUNAMI GENERATION AND ESTIMATED TSUNAMI
TRAVEL TIME BY RE-EVALUATION OF THE EARTHQUAKE OR THERE ARE
REPORTS ON TSUNAMI OBSERVATIONS.

4-2. Example of Tsunami Watch Information (TWI) for the Indian Ocean (IO) including tsunami observations

TSUNAMI BULLETIN NUMBER 004
ISSUED BY THE JAPAN METEOROLOGICAL AGENCY (JMA)
ISSUED AT 1850 17 JUL 2006 (UTC)

... A LOCAL TSUNAMI WATCH IS IN EFFECT ...

1.EARTHQUAKE INFORMATION
ORIGIN TIME : 0819 17 JUL 2006 (UTC)
COORDINATES : 9.3 SOUTH 107.3 EAST
LOCATION : SOUTH OF JAWA, INDONESIA
MAGNITUDE : 7.2

2.EVALUATION
THERE IS A POSSIBILITY OF A DESTRUCTIVE LOCAL TSUNAMI
IN THE INDIAN OCEAN.

3.ESTIMATED TSUNAMI TRAVEL TIME
ONE HOUR OR LESS
INDONESIA:
INDIAN OCEAN COAST OF SUMATRA
INDIAN OCEAN COAST OF JAWA
SOUTH COASTS OF LESSER SUNDA ISLANDS
AUSTRALIA:
COCOS ISLANDS

4.OBSERVASIONS ON MAXIMUM TSUNAMI WAVE

LOCATION	COORDINATES	ARRIVAL TIME	AMPL
BENOA	8.8S 115.2E	1044Z 17 JUL	0.2M
RODORIGUES	19.7S 63.4E	1750Z 17 JUL	0.4M

AMPL -- AMPLITUDE IN METERS OF HALF OF THE CREST TO TROUGH

*TSUNAMI TRAVEL TIME IS ESTIMATED ONLY FROM EARTHQUAKE DATA

AND INDICATES THE TIME LAPSE BETWEEN ORIGIN TIME AND TSUNAMI ARRIVAL TIME.

*THIS WILL BE THE FINAL INFORMATION UNLESS THERE ARE CHANGES ABOUT THE POTENTIAL OF TSUNAMI GENERATION AND ESTIMATED TSUNAMI TRAVEL TIME BY RE-EVALUATION OF THE EARTHQUAKE OR THERE ARE REPORTS ON TSUNAMI OBSERVATIONS.

Appendix D

The TWS operated by Australia (with samples of warnings)

The Australian Tsunami Warning System (ATWS)

Australia is currently developing the Australian Tsunami Warning System (ATWS) through a four year project, funded by the Australian Government, which will conclude in June 2009. This is a joint project between the Bureau of Meteorology, Geoscience Australia (GA) and Emergency Management Australia (EMA).

As of Thursday, 7 December 2006, the Bureau of Meteorology began interpreting intelligence received from the PTWC and JMA to provide rapid advice on relevance and likely impact on Australian coasts. The Bureau of Meteorology forwards these Australian-specific tsunami bulletins to the National Emergency Services agencies and the media for action. Three categories of bulletins have been introduced for operational use, and are described below.

Future Development

With Australian Government funding for $68.9 million over four years (ending 2009), the Bureau of Meteorology (Bureau), Geoscience Australia (GA) and Emergency Management Australia (EMA) are charged with the responsibility of establishing a more comprehensive operational tsunami warning system for Australia (the ATWS). This four year project will also support the international development of tsunami warning capability in the Indian and Pacific Oceans. This will include the installation of enhanced seismic and sea level monitoring networks, data analysis and communication tools, computer modeling systems to help better determine the time, size and locations of potential impacts.

As part of the ATWS Project, a joint Bureau and GA Australian Tsunami Warning Centre (AusTWC) will be established by mid-2007.

Types of Bulletins

1) *"No Threat"* bulletin
An undersea earthquake has been detected but has not generated a tsunami OR may have generated a tsunami which has no potential to impact on Australia (or its islands and territories), based on advice received from the PTWC or JMA. No further bulletins will be issued unless the situation changes.

2) "*Potential Threat"* bulletin
An undersea earthquake has been detected and a tsunami may have been generated with potential to impact Australia (or its islands and territories), based on advice received from the PTWC or JMA.

If a *"Potential Threat"* bulletin is issued and subsequent information confirms the threat, **'Regional Warnings'** (including action statements) will then be issued by the Bureau of Meteorology's seven State and Territory Offices in the regions that may be affected.

3) *"Cancellation"* bulletin
Canceling a previous *"Potential Threat"* bulletin. A *"Cancellation"* bulletin may be released to inform that the threat has ended and that a tsunami has not impacted on Australia's coast, or that the impact of a tsunami on the Australian coast has ended.

Examples of Australian Tsunami Bulletins

1. No Threat to Australia

Australian Government Bureau of Meteorology
National Meteorological and Oceanographic Centre

TSUNAMI BULLETIN

Issued at:
5:00pm EDT on Tuesday 28 November 2006
4:00pm EST on Tuesday 28 November 2006
4:30pm CDT on Tuesday 28 November 2006
3:30pm CST on Tuesday 28 November 2006
2:00pm WST on Tuesday 28 November 2006

NO TSUNAMI THREAT TO AUSTRALIAN MAINLAND OR ISLANDS

The Pacific Tsunami Warning Centre (PTWC) in Hawaii has detected an undersea earthquake near Samoa and has issued a Tsunami Bulletin.

The earthquake has also been detected by Geoscience Australia.

Based on the magnitude and location of this earthquake there is no tsunami threat to the Australian mainland or islands.

No further bulletins will be issued for this event unless the threat level changes.

The earthquake occurred at 06:22 UTC at Latitude 16.6 South, Longitude 172.0 West, with magnitude 6.9.

UTC Time Zone conversion:
EDT = UTC + 11 hours
EST = UTC + 10 hours
CDT = UTC + 10.5 hours
CST = UTC + 9.5 hours
WST = UTC + 8 hours

This bulletin is also available through TV and Radio broadcasts and the Bureau's website at: www.bom.gov.au/tsunami/

2. Potential Threat to Australian coast or islands

Australian Government, Bureau of Meteorology
National Meteorological and Oceanographic Centre

TOP PRIORITY FOR IMMEDIATE BROADCAST

TSUNAMI BULLETIN

Issued at:
6:55pm EST on Monday 17 July 2006
6:25pm CST on Monday 17 July 2006
4:55pm WST on Monday 17 July 2006

TSUNAMI THREAT TO CHRISTMAS AND COCOS ISLANDS AND THE WA COAST FROM CARNARVON TO EXMOUTH.

The Pacific Tsunami Warning Centre (PTWC) in Hawaii has detected an undersea earthquake south of Java and has issued a Tsunami Bulletin.

The earthquake has also been detected by Geoscience Australia.

Based on the magnitude and location of this earthquake, tsunami could start affecting these locations at the following local times:

CHRISTMAS ISLAND from 3:35pm Monday
COCOS ISLAND from 4:15pm Monday
CORAL BAY (WA) from 7:00pm Monday

The Bureau is seeking confirmation that tsunami have been generated. Tsunami Warnings will be issued, if necessary, by the Regional Offices of the Bureau in affected States. People in coastal areas in threatened regions should move out of the water and away from low lying foreshore areas, and should then listen for further advice from state emergency service authorities.

The earthquake occurred at 0819 UTC 17 July 2006 at Latitude 9.3 South, Longitude 107.3 East, with magnitude 7.7.

UTC Time Zone conversion:

EDT = UTC + 11 hours

EST = UTC + 10 hours

CDT = UTC + 10.5 hours

CST = UTC + 9.5 hours

WST = UTC + 8 hours

This bulletin is also available through TV and Radio broadcasts and the Bureau's website at: http://www.bom.gov.au/tsunami/

Annex XI

TERMS OF REFERENCE AND GENERAL MEMBERSHIP OF THE TASK TEAM TO CONSIDER IMPROVED BASELINE SEA STATE MSI USING MODERN TECHNIQUES

The Task Team shall:

1. Survey of the main marine users of sea state information based on feedback of Port Meteorological Officers (PMOs) and other channels used by the NMHSs;

2. Review the quality and content of sea-state information provided by the MSI services (e.g., what are the differences in representativeness (hourly/daily, instantaneous/time average));

3. Develop definitions and generic product specifications for Crossing seas, Rogue waves, steep/short seas, and other sea-state parameters as suggested by user community (ref. to (1.));

4. Integrate negative surge (low water level) information into the guidelines for warnings/bulletins with existing MSI;

5. Review the mandate to improve basic MSI with appropriate authorities;

6. Update the VOS questionnaire to include feedback on sea-state information.

General Membership:

- Representative from Australia (to be appointed)
- Representative from Mauritius (Mr Mohamudally Beebeejaun – Chairperson)
- Representative from the United Kingdom (Mr Nick Ashton)
- Representative from the USA (Mr Timothy Rulon)
- OPS Rapporteur (Dr Adrian Hines)
- Three Experts from the ETWS (to be appointed)

Annex XII

REVISED TERMS OF REFERENCE OF AN EXPERT ON WEATHER INFORMATION IN GRAPHICAL FORM

The Expert, jointly with ET Experts (membership), shall:

- With the ETMSS and SCG, specify the need for a basic set of graphical and digital information for MSI;
- Keep under review existing and planned projects/works on formats for coding and displaying met ocean information on graphical form (especially objects), within the respective WMO bodies, including the CBS, at both the international and regional levels;
- Keep under review existing and planned project(s)/work(s) on navigational system(s) for marine users, including formats, developed or approved by the IMO or IHO (i.e., Marine Information Objects (MIOs)), in particular the work undertaken by the HGMIO and other agencies/companies, especially for meteorology and oceanography aspects;
- Liaise with the WMO Secretariat, IMO, IHO or other agencies/companies to facilitate consistency between the existing or planned WMO standards and WMO Information System (WIS);
- Report the status of the project to the ETMSS Chairperson, SCG and the WMO Secretariat, as appropriate;
- Prepare a first version of a detailed report to the SCG-IV, planned for the beginning of 2009, as well as a final version to the JCOMM-III, including proposals on the formats contents and symbology and dissemination, to be used in future, including within GMDSS

The report by the Expert will be reviewed by the Members of the ETMSS, as appropriate, and be submitted to the SCG-IV. After the review by the SCG, the proposals will be submitted for approval to the JCOMM-III, if appropriate.

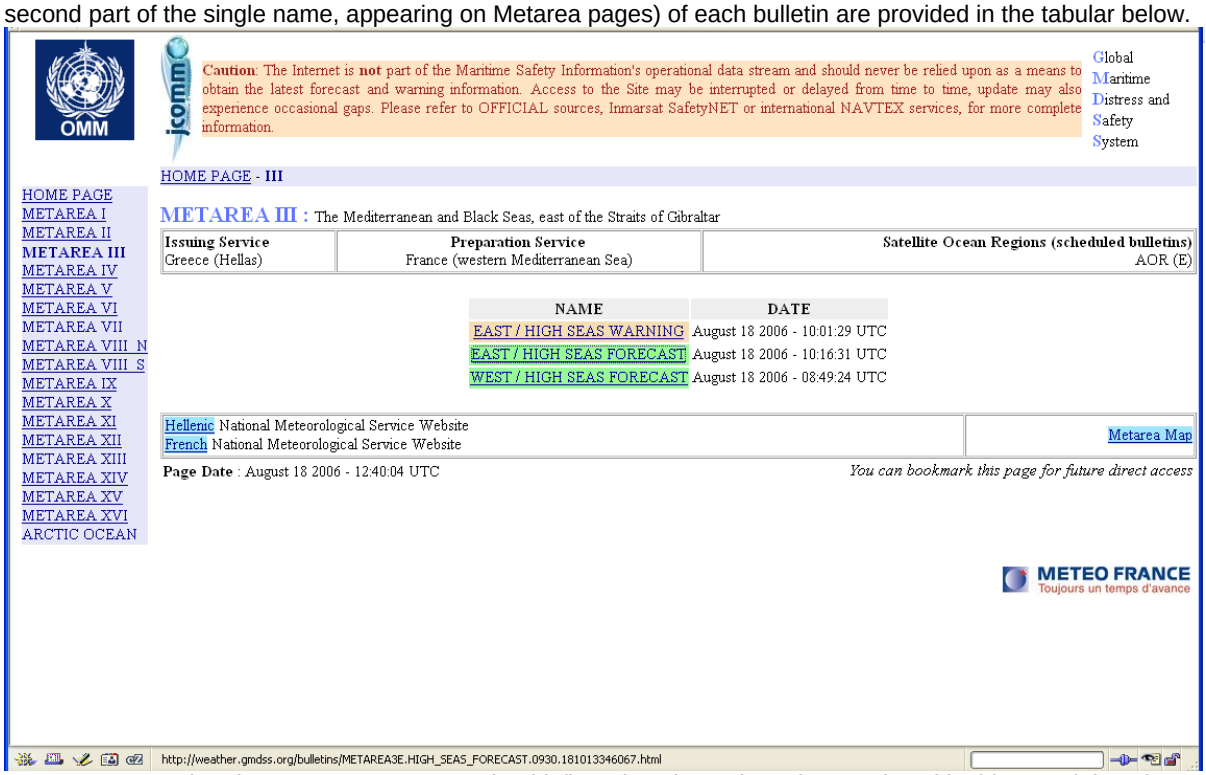
General Membership:

- Representative from Argentina (Commander Negri)
- Representative from Australia (to be appointed)
- Representative from France (Mr Henri Savina)
- Representative from the United Kingdom (Mr Nick Ashton)
- Representative from USA (Mr Timothy Rulon)
- Representative from Russian Federation (Mr Valery Martyschenko)
- Two Experts from the ETSI (to be appointed during the ETSI-III session)
- One or more Expert(s) from the ETWS (to be appointed during the ETWS-II session)
- One or more Expert(s) from the ETMAES (to be appointed during the ETMAES-I session)
- OFS Rapporteur (Dr Adrian Hines)

Annex XIII

GMDSS WEBSITE – OPERATING CYCLE AND BULLETINS MANAGEMENT

The current principle of the website is to create frequently (every 5 minutes) each METAREA page containing the updated list of the bulletins available and to associate each new bulletin a single name (which it preserves as much as the bulletin is available – for example *METAREA3E.HIGH_SEAS_FORECAST.0930.181013346067.html*). This single name cannot be used to automatically receive the bulletin, as the third part of it (*0930.181013346067*) is different for each bulletin. Retention, management and apparent name (the second part of the single name, appearing on Metarea pages) of each bulletin are provided in the tabular below.



The customer must ensure that the Metarea page posted at his/her place is per hour (+ - 5mn) and in this case it has the most recent information available (use the "reload" button). This is in order to avoid the problems related to the possible presence of Proxy (master cache) and activation by default of the cache of the navigators. Thus, it is essential that customers consulting the website pass initially by the Metarea page to ensure to have the last bulletins available.

Additional solutions to recover the bulletins automatically are available through the Navimail service or by http (only packages - and not single bulletins - are available) see Annex 2. Users are also able to receive the single bulletins by passing a preliminary analysis of the Metarea page to recover the lines containing the name of the bulletins (the chains: "bulletins /").

Annex XIV

GMDSS WEBSITE – BULLETINS MANAGEMENT

HEADER	METAREA	NAME ON THE WEB SITE	RETENTION (in hours)	MANAGEMENT	COMMENTS
FQNT21.EGRR	1	HIGH_SEAS_FORECAST	27	REPLACE	
WONT54.EGRR	1	HIGH_SEAS_WARNING	15	REPLACE	
FPUK71.EGRR	1	OFF_SHORE_FORECAST	27	REPLACE	
WOUK50.EGRR	1	OFF_SHORE_WARNING	9	ALL	Name completed with order number (1,2,3...)
FQNT50.LFPW	2	HIGH_SEAS_FORECAST	27	REPLACE	
FQNT52.LFPW	2	HIGH_SEAS_FORECAST	27	REPLACE	
WONT50.LFPW	2	HIGH_SEAS_WARNING	15	REPLACE	
FQME22.LGAT	3E	HIGH_SEAS_FORECAST	27	REPLACE	
WWME22.LGAT	3E	HIGH_SEAS_WARNING	15	REPLACE	
FQMQXX.LFPW	3W	HIGH_SEAS_FORECAST	27	REPLACE	
WOMQ50.LFPW	3W	HIGH_SEAS_WARNING	15	REPLACE	
FZNT01.KWBC	4	HIGH_SEAS_FORECAST	15	REPLACE	
WTNT21.KNHC	4	HURRICANE_ADVISORY	9	REPLACE	Name completed with "1"
WTNT22.KNHC	4	HURRICANE_ADVISORY	9	REPLACE	Name completed with "2"
WTNT23.KNHC	4	HURRICANE_ADVISORY	9	REPLACE	Name completed with "3"
WTNT24.KNHC	4	HURRICANE_ADVISORY	9	REPLACE	Name completed with "4"
WTNT25.KNHC	4	HURRICANE_ADVISORY	9	REPLACE	Name completed with "5"
FQST02.SBBR	5	HIGH_SEAS_FORECAST	27	REPLACE	
WWST02.SBBR	5	HIGH_SEAS_WARNING	15	REPLACE	
WWST02.SABM	6	HIGH_SEAS_FORECAST_NORTH_60S	27	REPLACE	
WWAA02.SAWB	6	HIGH_SEAS_FORECAST_SOUTH_60S	27	REPLACE	
FQZA31.FAPR	7	HIGH_SEAS_FORECAST	27	REPLACE	
WTIO22.FMEE	7	TROPICAL_CYCLONE_WARNING	9	ALL	Name completed with order number (1,2,3...)
WTIO24.FMEE	7	TROPICAL_CYCLONE_WARNING	9	ALL	Name completed with order number (1,2,3...)
FQIN01.DEMS	8N	HIGH_SEAS_FORECAST	27	REPLACE	
WTIN01.DEMS	8N	HIGH_SEAS_WARNING	15	REPLACE	
FQIO25.FIMP	8S	HIGH_SEAS_FORECAST	27	REPLACE	
FQIO26.FIMP	8S	HIGH_SEAS_FORECAST	27	REPLACE	
WTIO20.FMEE	8S	TROPICAL_CYCLONE_WARNING	9	ALL	Name completed with order number (1,2,3...)
WTIO22.FMEE	8S	TROPICAL_CYCLONE_WARNING	9	ALL	Name completed with order number (1,2,3...)
WWPK20.OPKC	9	HIGH_SEAS_FORECAST	27	REPLACE	
FQAU20.ABRF	10	HIGH_SEAS_FORECAST_NORTH-EASTERN-AREA	27	REPLACE	
FQAU21.ADRM	10	HIGH_SEAS_FORECAST_NORTHERN-AREA	27	REPLACE	
FQAU22.AMRF	10	HIGH_SEAS_FORECAST_SOUTH-EASTERN-AREA	27	REPLACE	
FQAU23.APRF	10	HIGH_SEAS_FORECAST_WESTERN-AREA	27	REPLACE	
WTAU01.ABRF	10	TROPICAL_CYCLONE_GALE_WARNING_BRISBANE	9	REPLACE	Name completed with "01"
WTAU02.ABRF	10	TROPICAL_CYCLONE_GALE_WARNING_BRISBANE	9	REPLACE	Name completed with "02"
WTAU03.ADRM	10	TROPICAL_CYCLONE_WARNING_DARWIN	9	REPLACE	Name completed with "03"

WTAU04.ADRM	10	TROPICAL_CYCLONE_WARNING_DARWIN	9	REPLACE	Name completed with "04"
WTAU05.APRF	10	TROPICAL_CYCLONE_WARNING_PERTH	9	REPLACE	Name completed with "05"
WTAU06.APRF	10	TROPICAL_CYCLONE_WARNING_PERTH	9	REPLACE	Name completed with "06"
WTAU07.APRF	10	TROPICAL_CYCLONE_WARNING_PERTH	9	REPLACE	Name completed with "07"
WTAU10.ADRM	10	TROPICAL_CYCLONE_WARNING_DARWIN	9	REPLACE	Name completed with "10"
WTAU11.ADRM	10	TROPICAL_CYCLONE_WARNING_DARWIN	9	REPLACE	Name completed with "11"
WTAU12.ADRM	10	TROPICAL_CYCLONE_WARNING_DARWIN	9	REPLACE	Name completed with "12"
WTAU13.ADRM	10	TROPICAL_CYCLONE_WARNING_DARWIN	9	REPLACE	Name completed with "13"
WOAU01.ABRF	10	WARNING_BRISBANE	9	REPLACE	Name completed with "01"
WOAU02.ABRF	10	WARNING_BRISBANE	9	REPLACE	Name completed with "02"
WOAU03.ADRM	10	WARNING_DARWIN	9	REPLACE	Name completed with "03"
WOAU04.ADRM	10	WARNING_DARWIN	9	REPLACE	Name completed with "04"
WOAU05.APRF	10	WARNING_PERTH	9	REPLACE	Name completed with "05"
WOAU06.APRF	10	WARNING_PERTH	9	REPLACE	Name completed with "06"
WOAU07.APRF	10	WARNING_PERTH	9	REPLACE	Name completed with "07"
WOAU08.APRF	10	WARNING_PERTH	9	REPLACE	Name completed with "08"
WOAU09.ASRF	10	WARNING_SYDNEY	9	REPLACE	Name completed with "09"
WOAU10.ASRF	10	WARNING_SYDNEY	9	REPLACE	Name completed with "10"
WOAU11.APRM	10	WARNING_ADELAIDE	9	REPLACE	Name completed with "11"
WOAU12.AMRF	10	WARNING_MELBOURNE	9	REPLACE	Name completed with "12"
WHAU01.ABRF	10	SEVERE_TROPICAL_CYCLONE_WARNING_BRISBANE	9	REPLACE	Name completed with "01"
WHAU02.ABRF	10	SEVERE_TROPICAL_CYCLONE_WARNING_BRISBANE	9	REPLACE	Name completed with "02"
WTNG01.AYPY	10	TROPICAL_CYCLONE_WARNING_PORT_MORESBY	9	REPLACE	Name completed with "01"
WTNG02.AYPY	10	TROPICAL_CYCLONE_WARNING_PORT_MORESBY	9	REPLACE	Name completed with "02"
WHNG01.AYPY	10	SEVERE_TROPICAL_CYCLONE_WARNING_PORT_MORESBY	9	REPLACE	
WONG01.AYPY	10	WARNING_PORT_MORESBY	9	REPLACE	Name completed with "01"
WONG02.AYPY	10	WARNING_PORT_MORESBY	9	REPLACE	Name completed with "02"
WWCI50.BABJ	11	HIGH_SEAS_FORECAST_CHINA	27	REPLACE	
WWHK82.VHHH	11	HIGH_SEAS_FORECAST_HONG_KONG_CHINA	27	REPLACE	
WWJP25.RJTD	11	HIGH_SEAS_FORECAST_JAPAN	27	REPLACE	
FQAU21.ADRM	11	HIGH_SEAS_FORECAST_NORTHERN-AREA_AUSTRALIA	27	REPLACE	
WWJP26.RJTD	11	HIGH_SEAS_WARNING_JAPAN	9	REPLACE	
WTJP21.RJTD	11	TYPHOON_WARNING_JAPAN	9	REPLACE	Name completed with "1"
WTJP22.RJTD	11	TYPHOON_WARNING_JAPAN	9	REPLACE	Name completed with "2"
WTJP23.RJTD	11	TYPHOON_WARNING_JAPAN	9	REPLACE	Name completed with "3"
WTJP24.RJTD	11	TYPHOON_WARNING_JAPAN	9	REPLACE	Name completed with "4"
WTJP25.RJTD	11	TYPHOON_WARNING_JAPAN	9	REPLACE	Name completed with "5"
WTJP26.RJTD	11	TYPHOON_WARNING_JAPAN	9	REPLACE	Name completed with "6"
WTJP31.RJTD	11	TYPHOON_WARNING_JAPAN	9	REPLACE	Name completed with "1"
WTJP32.RJTD	11	TYPHOON_WARNING_JAPAN	9	REPLACE	Name completed with "2"
WTJP33.RJTD	11	TYPHOON_WARNING_JAPAN	9	REPLACE	Name completed with "3"
WTJP34.RJTD	11	TYPHOON_WARNING_JAPAN	9	REPLACE	Name completed with "4"
WTJP35.RJTD	11	TYPHOON_WARNING_JAPAN	9	REPLACE	Name completed with "5"
WTJP36.RJTD	11	TYPHOON_WARNING_JAPAN	9	REPLACE	Name completed with "6"
WTAU03.ADRM	11	TROPICAL_CYCLONE_WARNING_DARWIN	9	REPLACE	Name completed with "03"
WTAU04.ADRM	11	TROPICAL_CYCLONE_WARNING_DARWIN	9	REPLACE	Name completed with "04"

WTAU10.ADRM	11	TROPICAL_CYCLONE_WARNING_DARWIN	9	REPLACE	Name completed with "10"
WTAU11.ADRM	11	TROPICAL_CYCLONE_WARNING_DARWIN	9	REPLACE	Name completed with "11"
WTAU12.ADRM	11	TROPICAL_CYCLONE_WARNING_DARWIN	9	REPLACE	Name completed with "12"
WTAU13.ADRM	11	TROPICAL_CYCLONE_WARNING_DARWIN	9	REPLACE	Name completed with "13"
WOAU03.ADRM	11	WARNING_DARWIN	9	REPLACE	Name completed with "03"
WOAU04.ADRM	11	WARNING_DARWIN	9	REPLACE	Name completed with "04"
FZPN02.KWBC	12	HIGH_SEAS_FORECAST	15	REPLACE	
WTPZ21.KNHC	12	HURRICANE_ADVISORY_EAST_140W	9	REPLACE	Name completed with "1"
WTPZ22.KNHC	12	HURRICANE_ADVISORY_EAST_140W	9	REPLACE	Name completed with "2"
WTPZ23.KNHC	12	HURRICANE_ADVISORY_EAST_140W	9	REPLACE	Name completed with "3"
WTPZ24.KNHC	12	HURRICANE_ADVISORY_EAST_140W	9	REPLACE	Name completed with "4"
WTPZ25.KNHC	12	HURRICANE_ADVISORY_EAST_140W	9	REPLACE	Name completed with "5"
WTPA21.PHFO	12	HURRICANE_ADVISORY_WEST_140W	9	REPLACE	Name completed with "6"
WTPA22.PHFO	12	HURRICANE_ADVISORY_WEST_140W	9	REPLACE	Name completed with "7"
WTPA23.PHFO	12	HURRICANE_ADVISORY_WEST_140W	9	REPLACE	Name completed with "8"
WTPA24.PHFO	12	HURRICANE_ADVISORY_WEST_140W	9	REPLACE	Name completed with "9"
WTPA25.PHFO	12	HURRICANE_ADVISORY_WEST_140W	9	REPLACE	Name completed with "10"
FQRA01.RUVV	13	HIGH_SEAS_FORECAST	27	REPLACE	
WORA01.RUVV	13	HIGH_SEAS_WARNING	15	REPLACE	
FQRS01.RUSP	ARCTIC_OCEAN	HIGH_SEAS_FORECAST	27	REPLACE	
WORS01.RUSP	ARCTIC_OCEAN	HIGH_SEAS_WARNING	15	REPLACE	
FQPS01.NFFN	14	HIGH_SEAS_FORECAST_AREA_ISLANDS	27	REPLACE	
FQPS43.NZKL	14	HIGH_SEAS_FORECAST_AREA_SUBTROPIC	27	REPLACE	
FQPS44.NZKL	14	HIGH_SEAS_FORECAST_AREA_FORTIES	27	REPLACE	
FQPS45.NZKL	14	HIGH_SEAS_FORECAST_AREA_PACIFIC	27	REPLACE	
WOPS01.NFFN	14	GALE_STORM_WARNING_NORTH_25S	15	REPLACE	
WHPS01.NFFN	14	HURRICANE_WARNING_NORTH_25S	15	REPLACE	
WWNZ40.NZKL	14	GALE_STORM_WARNING_SOUTH_25S	15	REPLACE	
WTNZ41.NZKL	14	TROPICAL_CYCLONE_WARNING_SOUTH_25S	15	REPLACE	
FZPS02.SCSC	15	HIGH_SEAS_FORECAST_COASTAL	15	REPLACE	
FZPS04.SCSC	15	HIGH_SEAS_FORECAST	15	REPLACE	
FZAA02.SCSC	15	HIGH_SEAS_FORECAST_ANTARCTIC	15	REPLACE	
FZPN04.KWHC	16	HIGH_SEAS_FORECAST	15	REPLACE	

E-MAIL REQUEST FORMAT AND HTTP ACCESS

E-Mail request format

All SafetyNET products available on the JCOMM GMDSS website (http://weather.gmdss.org) and are also available by e-mail via **Navimail,** and thus accessible free of charge on simple email request. One simply has to send the request by e-mail and the bulletins will be received directly into the requester's e-mail box.

Météo-France provides a user friendly interface (PC compatible) to help one compose the e-mail request. This interface can be downloaded free via the Web on the English page of Navimail. To complete and download the interface, first choose "first download", or use directly http://www.meteo.fr/meteonet/services/navimail/installation_en.html, then chose "other" in the upper part if you are interested only by bulletins and images. One can also download the full Maxsea package if interested which is also located in the GRIB products.

It should be noted that the use of this interface is not mandatory. One can directly send his/her e-mail request to the following address: **navimail@meteo.fr** (optional subject), using the specific format described below indicated below.

Single bulletins are not directly available by e-mail. For e-mail requests, all of the GMDSS SafetyNET messages of the same Metarea are generally included in the same package (warning(s) first, then scheduled bulletin in force). Mariners do not need to know if there is a warning in force: he/she will receive all the meteorological MSI in force for the respective Metarea (or the part of the Metarea) he/she asked for. All packages are updated in real-time (depending of course of the GTS reception in Toulouse, France). The complete list of packages is available below:

gmdss_metarea1_inmarsat	(North Part of North Atlantic Ocean (High Seas))
gmdss_metarea1_offshore	(Northeast Part of North Atlantic Ocean (Offshore))
gmdss_metarea2_inmarsat	(East Part of North Atlantic Ocean)
gmdss_metarea3-w_inmarsat	(East Mediterranean Sea)
gmdss_metarea3-e_inmarsat	(West Mediterranean Sea)
gmdss_metarea4_inmarsat	(West Part of North Atlantic Ocean)
gmdss_metarea5_inmarsat	(North Part of South Atlantic Ocean)
gmdss_metarea6_n-60_inmarsat	(South Atlantic Ocean North of 60S)
gmdss_metarea6_s-60_inmarsat	(South Atlantic Ocean South of 60S)
gmdss_metarea7_inmarsat	(SE Atlantic Ocean + extreme SW of Indian Ocean)
gmdss_metarea8-n_inmarsat	(North Indian Ocean)
gmdss_metarea8-s_inmarsat	(Southwest of Indian ocean)
gmdss_metarea9_inmarsat	(Red Sea, Gulf of Aden, Arabian Sea, Persian Gulf)
gmdss_metarea10-ne_inmarsat	(Northeast of Australia (Pacific ocean))
gmdss_metarea10-n_inmarsat	(North of Australia)
gmdss_metarea10-w_inmarsat	(Southeast of Indian ocean)
gmdss_metarea10-se_inmarsat	(Southeast of Australia (Pacific ocean))
gmdss_metarea11-ior_inmarsat	(West part of the North Pacific Ocean (China))
gmdss_metarea11-por_inmarsat	(West part of the North Pacific Ocean (Japan))
gmdss_metarea11-s-equator_inmarsat	(West part of the Pacific Ocean, south equator)
gmdss_metarea12_inmarsat	(East part of the North Pacific Ocean)
gmdss_metarea13_inmarsat	(Northwest of Pacific Nord and part of Arctic waters)
gmdss_arctic_ocean	(from SW corner 67N, 44E to NE corner 80N, 165W)
gmdss_metarea14-south_inmarsat	(South Pacific south of 25S)
gmdss_metarea14-tropics_inmarsat	(South Pacific north of 25S)
gmdss_metarea15_inmarsat	(Southeast Pacific)
gmdss_metarea16_inmarsat	(Southeast Pacific between 18S and 3S)

To obtain one or more of these packages, simply send an email to the following address: **navimail@meteo.fr** (optional subject) and the body will contain, between two compulsory beacons, one or several names of these packages. Within a few seconds or minutes later you will receive back an email containing the requested information.

Example 1:

@mto@reqt@bull@
gmdss_metarea3-e_inmarsat
@mto@reqt@fin@

Example 2:

@mto@reqt@bull@
gmdss_metarea3-w_inmarsat
gmdss_metarea3-e_inmarsat
@mto@reqt@fin@

If you wish to receive one or several messages directly in the body of the answer (no attached details) it is necessary to add in the list, anywhere, between the 2 beacons, the line "noattach"

Example 3:

@mto@reqt@bull@
gmdss_metarea3-e_inmarsat
noattach
@mto@reqt@fin@

Http access

Similar for e-mail requests, single bulletins are not directly accessible by http through a unique address. For http access, the same packages prepared for e-mail that gather all the GMDSS SafetyNET messages of one METAREA (or a part of it) (warning(s) first, then scheduled bulletin in force), are available. Mariners do not need to know if there is a warning in force: he/she will ask all the meteorological MSI in force for the METAREA (or the part of the METAREA). All packages are updated in real-time (depending of course of the GTS reception in Toulouse, France). The complete list of links is available below:

http://weather.gmdss.org/navimail/GMDSS_METAREA1_INMARSAT
http://weather.gmdss.org/navimail/GMDSS_METAREA1_OFFSHORE
http://weather.gmdss.org/navimail/GMDSS_METAREA2_INMARSAT
http://weather.gmdss.org/navimail/GMDSS_METAREA3-W_INMARSAT
http://weather.gmdss.org/navimail/GMDSS_METAREA3-E_INMARSAT
http://weather.gmdss.org/navimail/GMDSS_METAREA4_INMARSAT
http://weather.gmdss.org/navimail/GMDSS_METAREA5_INMARSAT
http://weather.gmdss.org/navimail/GMDSS_METAREA6_N-60_INMARSAT
http://weather.gmdss.org/navimail/GMDSS_METAREA6_S-60_INMARSAT
http://weather.gmdss.org/navimail/GMDSS_METAREA7_INMARSAT
http://weather.gmdss.org/navimail/GMDSS_METAREA8-N_INMARSAT
http://weather.gmdss.org/navimail/GMDSS_METAREA8-S_INMARSAT
http://weather.gmdss.org/navimail/GMDSS_METAREA9_INMARSAT
http://weather.gmdss.org/navimail/GMDSS_METAREA10-NE_INMARSAT
http://weather.gmdss.org/navimail/GMDSS_METAREA10-N_INMARSAT
http://weather.gmdss.org/navimail/GMDSS_METAREA10-W_INMARSAT
http://weather.gmdss.org/navimail/GMDSS_METAREA10-SE_INMARSAT
http://weather.gmdss.org/navimail/GMDSS_METAREA11-IOR_INMARSAT
http://weather.gmdss.org/navimail/GMDSS_METAREA11-POR_INMARSAT
http://weather.gmdss.org/navimail/GMDSS_METAREA11-S-EQUATOR_INMARSAT
http://weather.gmdss.org/navimail/GMDSS_METAREA12_INMARSAT
http://weather.gmdss.org/navimail/GMDSS_METAREA13_INMARSAT
http://weather.gmdss.org/navimail/GMDSS_ARCTIC_OCEAN
http://weather.gmdss.org/navimail/GMDSS_METAREA14-SOUTH_INMARSAT
http://weather.gmdss.org/navimail/GMDSS_METAREA14-TROPICS_INMARSAT
http://weather.gmdss.org/navimail/GMDSS_METAREA15_INMARSAT
http://weather.gmdss.org/navimail/GMDSS_METAREA16_INMARSAT

Annex XV

GMDSS WEB SITE – STATISTICS

Year 2004 - Website hits

	Jan-2004	Feb-2004	Mar-2004	Apr-2004	May-2004	Jun-2004	Jul-2004	Aug-2004	Sept-2004	Oct-2004	Nov-2004	Dec-2004
Visits		2 057	2 329	2 319	2 485	2 942	3 379	3 618	7 104	5 856	5 553	4 671
Visitors		1 788	1 973	1 979	2 097	2 482	2 964	3 132	6 266	5 159	4 953	4 013
Visited pages		8 067	7 693	8 262	8 163	10 085	11 756	13 367	16 532	14 582	15 084	13 079
Homepage		2 150	2 038	2 186	2 009	2 488	3 084	3 419	3 109	2 804	2 985	2 559
Metareas pages		4 719	4 609	5 016	5 107	6 219	7 024	8 298	11 448	10 240	10 592	8 962
General information pages		1 198	1 046	1 060	1 047	1 378	1 648	1 650	1 975	1 538	1 507	1 558
Metareas chart		638	628	494	559	763	895	819	1 321	846	833	861
Transmission schedule		130	118	136	120	161	197	201	161	135	145	136
List of NAVTEX abbreviations		0	0	0	0	0	0	0	0	0	0	0
Metarea I		539	626	559	576	829	1 037	1 064	814	786	772	783
Metarea II		519	461	665	592	685	1 085	1 232	881	849	832	800
Metarea III		699	740	904	1 093	1 276	1 570	1 869	1 623	1 540	1 481	1 433
Metarea IV		281	233	294	246	384	368	523	4 781	3 202	3 003	1 916
Metarea V		305	416	490	357	310	423	636	591	529	757	349
Metarea VI		592	493	560	490	491	631	656	519	589	741	654
Metarea VII		316	192	185	188	218	219	278	251	293	386	402
Metarea VIII N		95	113	118	217	331	183	262	241	317	365	383
Metarea VIII S		259	316	264	268	316	212	259	255	308	348	448
Metarea IX		127	146	106	125	168	136	249	249	207	221	202
Metarea X		145	165	156	112	169	193	165	208	265	306	283
Metarea XI		128	117	144	136	246	203	251	205	530	389	281
Metarea XII		112	90	96	119	102	120	148	129	170	161	186
Metarea XIII		111	77	73	94	99	81	130	108	115	153	135
Metarea XIV		147	108	106	102	123	115	152	139	148	153	205
Metarea XV		132	112	132	175	210	184	144	139	139	181	201
Metarea XVI		103	116	79	103	128	125	140	143	125	178	134
Arctic Ocean		109	88	85	114	134	139	140	172	128	165	167

STATISTICS

Year 2005 - Web site hits

	Jan-2005	Feb-2005	Mar-2005	Apr-2005	May-2005	Jun-2005	Jul-2005	Aug-2005	Sept-2005	Oct-2005	Nov-2005	Dec-2005
Visits	5 020	4 388	5 417	6 125	6 807	7 656	11 651	9 039	9 414	9 800	7 686	6 218
Visitors	4 460	3 687	4 755	5 179	5 822	6 467	9 855	7 598	8 200	8 318	6 436	5 290
Visited pages	14 614	14 119	15 331	21 078	21 742	21 606	27 148	23 599	21 396	21 976	19 287	16 101
Homepage	2 795	3 225	2 915	3 667	3 423	3 316	3 586	3 816	3 477	3 845	3 543	2 903
Metareas pages	10 222	8 956	10 680	15 711	16 484	16 809	21 574	18 058	16 004	16 094	14 013	11 864
General information pages	1 597	1 938	1 736	1 700	1 835	1 481	1 988	1 725	1 915	2 037	1 731	1 334
Metareas chart	884	967	904	966	1 110	872	1 423	1 068	1 234	1 325	911	777
Transmission schedule	159	205	192	182	179	163	151	147	144	160	163	99
List of NAVTEX abbreviations	0	0	0	0	0	0	0	0	0	0	0	0
Metarea I	957	798	919	1 398	1 452	1 381	1 407	1 486	1 194	1 065	1 001	834
Metarea II	843	877	1 161	1 561	1 843	1 524	1 349	1 545	1 320	1 502	1 560	1 175
Metarea III	1 794	2 193	2 220	2 861	2 628	2 323	2 626	3 004	2 462	2 713	2 557	2 432
Metarea IV	1 962	582	1 583	2 268	3 171	4 419	8 984	5 342	5 861	5 810	3 904	2 579
Metarea V	636	520	584	822	815	795	857	747	510	610	588	560
Metarea VI	948	821	783	876	829	742	790	651	508	513	485	508
Metarea VII	339	355	394	567	540	564	552	519	383	337	330	415
Metarea VIII N	340	327	361	550	512	525	641	548	594	691	638	570
Metarea VIII S	376	361	426	648	566	621	556	531	526	498	526	508
Metarea IX	273	367	476	565	527	538	568	534	432	321	385	326
Metarea X	274	226	295	531	512	537	427	419	326	337	312	233
Metarea XI	276	234	260	462	442	452	494	463	350	294	339	317
Metarea XII	188	232	213	450	461	487	402	370	273	303	254	198
Metarea XIII	168	163	148	356	387	361	355	366	233	169	183	163
Metarea XIV	206	284	229	478	482	438	398	438	310	223	216	182
Metarea XV	286	267	245	485	491	379	406	394	246	236	302	433
Metarea XVI	180	199	179	424	423	377	408	386	262	206	187	180
Arctic Ocean	176	150	204	409	403	346	354	317	214	266	246	221

STATISTICS

Year 2006 - Web site hits

	Jan-2006	Feb-2006	Mar-2006	Apr-2006	May-2006	Jun-2006	Jul-2006	Aug-2006	Sept-2006	Oct-2006	Nov-2006	Dec-2006
Visits	7 084	6 679	7 526	6 733	7 576	8 294	9 205	12 089	11 135	11 072		
Visitors	6 090	5 673	6 366	5 742	6 515	7 127	7 831	10 114	9 431	9 367		
Visited pages	18 202	18 168	19 553	17 794	19 819	19 951	21 191	27 190	25 119	27 664		
Homepage	3 336	3 638	4 064	3 472	3 736	3 510	3 442	4 775	4 570	4 961		
Metareas pages	13 521	13 130	13 870	12 783	14 372	14 850	16 321	20 632	18 629	20 381		
General information pages	1 345	1 400	1 619	1 539	1 711	1 591	1 428	1 783	1 920	2 322		
Metareas chart	694	733	853	807	958	946	835	1 025	1 132	1 227		
Transmission schedule	132	126	148	122	154	142	104	181	188	212		
List of NAVTEX abbreviations	0	0	0	0	0	0	0	0	0	131		
Metarea I	892	1 050	1 005	979	1 341	1 323	1 120	1 577	1 578	1 646		
Metarea II	1 523	1 423	1 478	1 776	2 041	1 562	1 361	1 782	2 003	2 334		
Metarea III	2 542	2 378	2 710	2 630	2 984	2 837	3 157	3 999	3 117	3 942		
Metarea IV	3 504	2 670	2 728	2 421	2 873	4 282	4 740	6 812	6 129	5 488		
Metarea V	579	626	638	581	508	537	619	587	532	772		
Metarea VI	608	571	523	439	430	424	475	561	509	644		
Metarea VII	386	473	414	362	326	374	474	591	475	534		
Metarea VIII N	424	443	508	587	649	505	710	785	840	635		
Metarea VIII S	466	530	591	432	407	443	443	514	471	570		
Metarea IX	434	552	491	536	434	399	544	522	489	600		
Metarea X	400	369	407	325	267	281	310	369	322	397		
Metarea XI	371	523	660	483	545	498	755	849	671	674		
Metarea XII	280	361	320	262	303	263	299	373	312	418		
Metarea XIII	190	190	227	168	233	194	215	249	207	298		
Metarea XIV	241	323	331	259	304	255	381	288	271	508		
Metarea XV	301	289	333	222	263	234	246	263	276	358		
Metarea XVI	195	178	248	182	215	204	266	281	212	315		
Arctic Ocean	185	181	258	139	249	235	206	230	215	248		

STATISTICS

Year 2005 – E-Mail requests (packages)

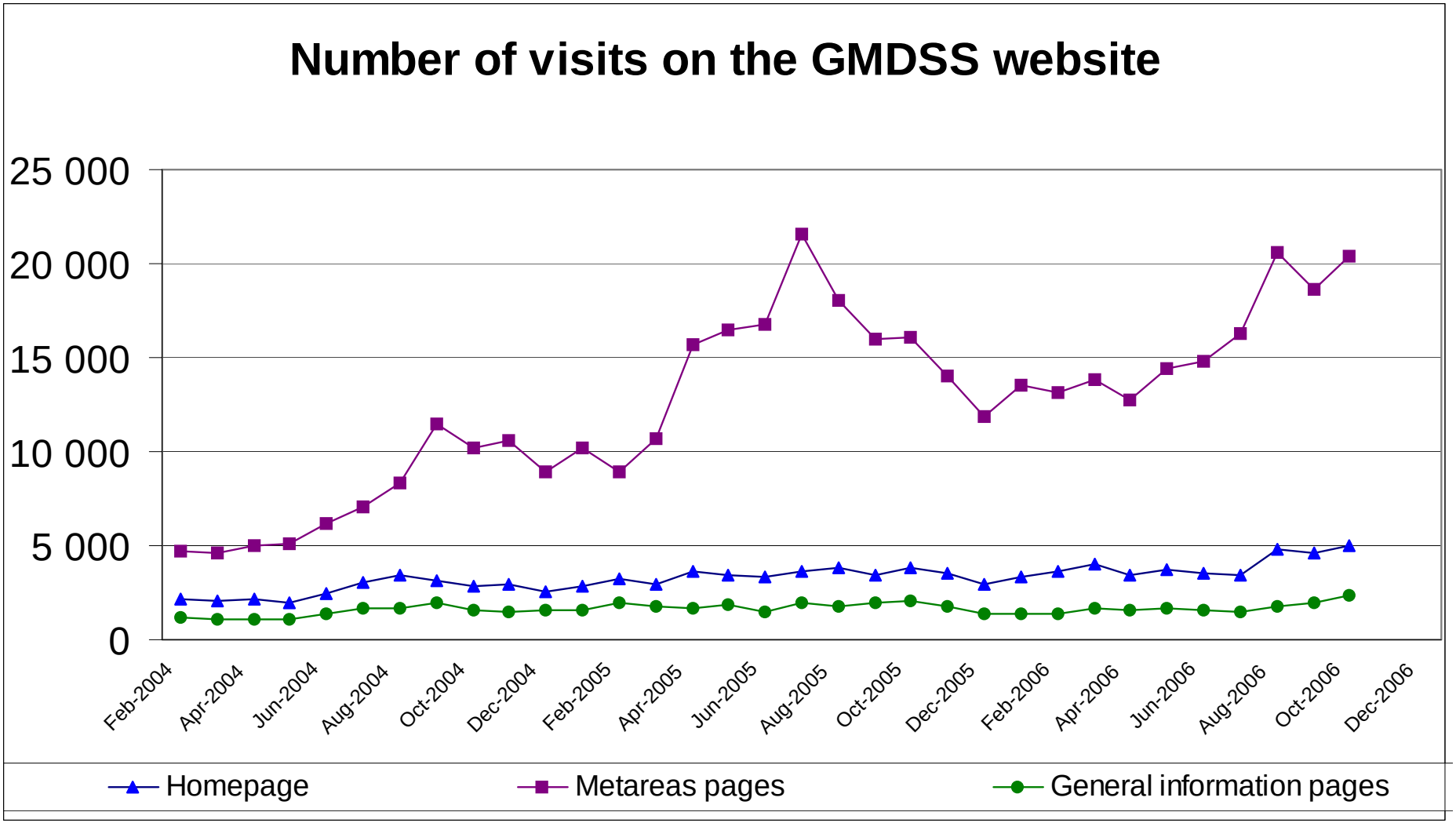
	Jan-2005	Feb-2005	Mar-2005	Apr-2005	May-2005	Jun-2005	Jul-2005	Aug-2005	Sept-2005	Oct-2005	Nov-2005	Dec-2005
GMDSS_METAREA1_INMARSAT	10	6	4	6	8	6	11	136	1208	500	475	442
GMDSS_METAREA1_OFFSHORE	10	3	3	5	9	5	8	137	1198	498	476	444
GMDSS_METAREA2_INMARSAT	11	9	6	6	11	34	18	147	1205	514	529	438
GMDSS_METAREA3-E_INMARSAT	32	37	40	43	39	82	95	181	1250	560	530	470
GMDSS_METAREA3-W_INMARSAT	5	3	15	52	53	48	46	180	1217	530	501	453
GMDSS_METAREA4_INMARSAT	6	4	6	4	17	9	3	132	1198	504	510	434
GMDSS_METAREA5_INMARSAT	0	1	4	0	1	17	2	134	1197	495	453	422
GMDSS_METAREA6_N-60_INMARSAT	0	1	2	0	0	5	1	130	1197	493	480	423
GMDSS_METAREA6_S-60_INMARSAT	1	0	2	0	0	5	1	130	1197	392	473	426
GMDSS_METAREA7_INMARSAT	59	55	67	60	66	72	82	193	1266	574	535	481
GMDSS_METAREA8-N_INMARSAT	0	2	0	0	0	5	2	130	1197	496	472	420
GMDSS_METAREA8-S_INMARSAT	59	55	60	60	62	66	75	201	1268	560	533	476
GMDSS_METAREA9_INMARSAT	3	1	0	3	0	3	1	130	1173	464	428	332
GMDSS_METAREA10-NE_INMARSAT	0	2	0	1	15	23	8	131	1197	496	474	422
GMDSS_METAREA10-N_INMARSAT	0	1	0	1	0	4	9	131	1197	496	472	422
GMDSS_METAREA10-SE_INMARSAT	0	0	0	1	0	4	0	130	1197	495	472	420
GMDSS_METAREA10-W_INMARSAT	0	1	3	2	2	3	2	133	1199	496	472	419
GMDSS_METAREA11-IOR_INMARSAT	0	0	0	2	0	3	0	130	1197	496	472	419
GMDSS_METAREA11-POR_INMARSAT	0	0	0	1	0	6	0	131	1197	496	472	419
GMDSS_METAREA11-S-EQUATOR_INMARSAT	5	0	0	0	6	5	1	131	1197	495	472	419
GMDSS_METAREA12_INMARSAT	0	0	0	0	0	4	0	130	1200	496	472	419
GMDSS_METAREA13_INMARSAT	0	0	0	0	0	0	0	0	0	174	0	0
GMDSS_METAREA14-SOUTH_INMARSAT	1	1	2	1	1	6	3	135	1200	495	472	426
GMDSS_METAREA14-TROPICS_INMARSAT	0	1	2	4	4	8	4	149	1200	495	477	423
GMDSS_METAREA15_INMARSAT	2	0	1	3	0	5	0	130	1197	494	472	418
GMDSS_METAREA16_INMARSAT	0	0	0	2	0	4	1	131	1202	495	472	425
GMDSS_ARCTIC_OCEAN	0	0	0	0	0	0	0	0	0	0	0	0
Total of requests	204	183	217	257	294	432	373	3553	30151	12699	12066	10712

STATISTICS

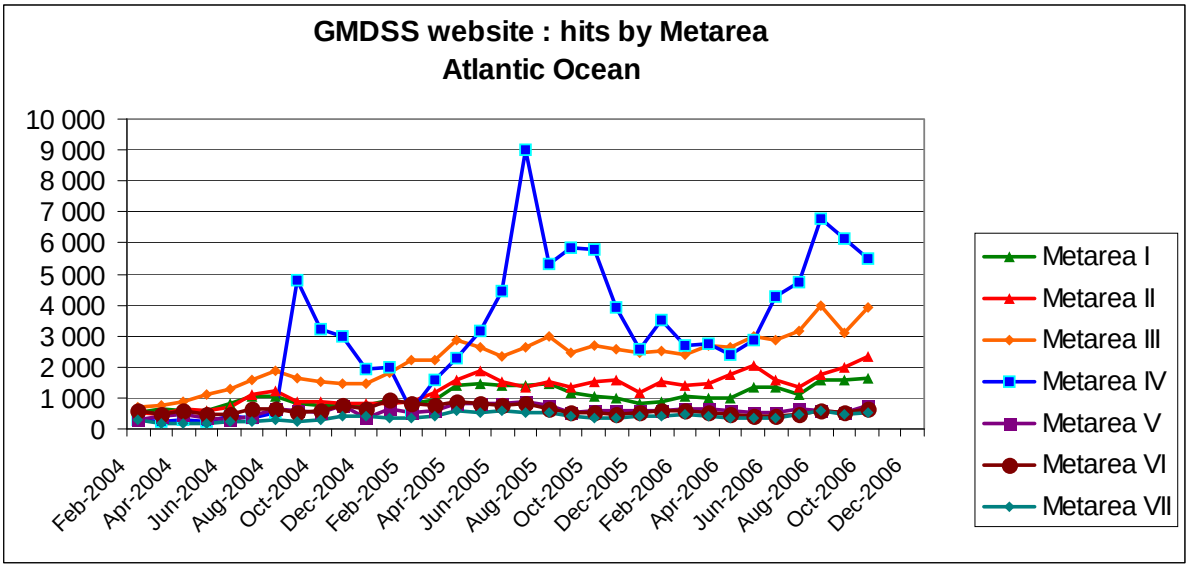
Year 2006 – E-Mail requests (packages)

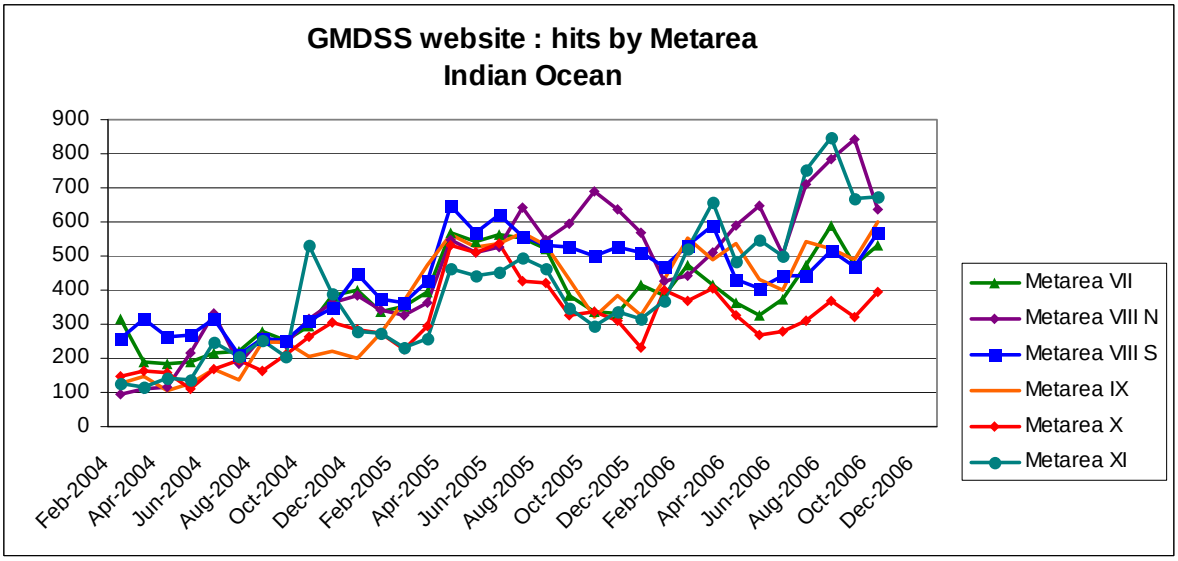
	Jan-2006	Feb-2006	Mar-2006	Apr-2006	May-2006	Jun-2006	Jul-2006	Aug-2006	Sept-2006	Oct-2006	Nov-2006	Dec-2006
GMDSS_METAREA1_INMARSAT	430	438	477	399	485	375	141	395	451	450		
GMDSS_METAREA1_OFFSHORE	427	435	474	401	487	368	145	398	456	452		
GMDSS_METAREA2_INMARSAT	438	439	477	413	511	415	139	438	480	527		
GMDSS_METAREA3-E_INMARSAT	474	482	516	454	565	421	250	434	498	501		
GMDSS_METAREA3-W_INMARSAT	450	451	482	430	501	380	184	403	468	471		
GMDSS_METAREA4_INMARSAT	431	444	497	411	488	372	198	489	486	450		
GMDSS_METAREA5_INMARSAT	423	435	473	398	482	351	132	394	453	449		
GMDSS_METAREA6_N-60_INMARSAT	425	434	471	397	485	361	130	401	468	454		
GMDSS_METAREA6_S-60_INMARSAT	425	433	471	397	485	357	131	392	450	450		
GMDSS_METAREA7_INMARSAT	486	491	563	486	550	451	218	487	539	539		
GMDSS_METAREA8-N_INMARSAT	423	389	462	397	440	364	134	429	470	449		
GMDSS_METAREA8-S_INMARSAT	484	491	593	489	549	453	231	524	568	539		
GMDSS_METAREA9_INMARSAT	348	396	464	325	411	344	121	359	386	398		
GMDSS_METAREA10-NE_INMARSAT	423	439	471	397	482	364	130	393	450	450		
GMDSS_METAREA10-N_INMARSAT	423	433	471	398	482	364	130	392	450	449		
GMDSS_METAREA10-SE_INMARSAT	423	434	471	396	482	365	130	393	450	450		
GMDSS_METAREA10-W_INMARSAT	423	433	473	397	482	364	130	392	450	449		
GMDSS_METAREA11-IOR_INMARSAT	423	433	471	396	482	365	134	398	460	453		
GMDSS_METAREA11-POR_INMARSAT	423	433	471	397	482	365	130	392	450	449		
GMDSS_METAREA11-S-EQUATOR_INMARSAT	423	438	475	397	483	365	131	392	450	453		
GMDSS_METAREA12_INMARSAT	423	433	471	398	484	364	130	392	453	468		
GMDSS_METAREA13_INMARSAT	0	0	0	0	0	0	0	0	169	49		
GMDSS_METAREA14-SOUTH_INMARSAT	423	433	476	400	488	365	130	392	453	449		
GMDSS_METAREA14-TROPICS_INMARSAT	425	437	470	400	487	379	156	406	451	463		
GMDSS_METAREA15_INMARSAT	343	98	475	400	481	332	126	393	443	449		
GMDSS_METAREA16_INMARSAT	423	434	477	399	490	369	130	393	456	456		
GMDSS_ARCTIC_OCEAN	0	0	0	0	0	0	0	0	0	0		
Total of requests	10662	10636	12092	10172	12244	9373	3741	10271	11758	11616		

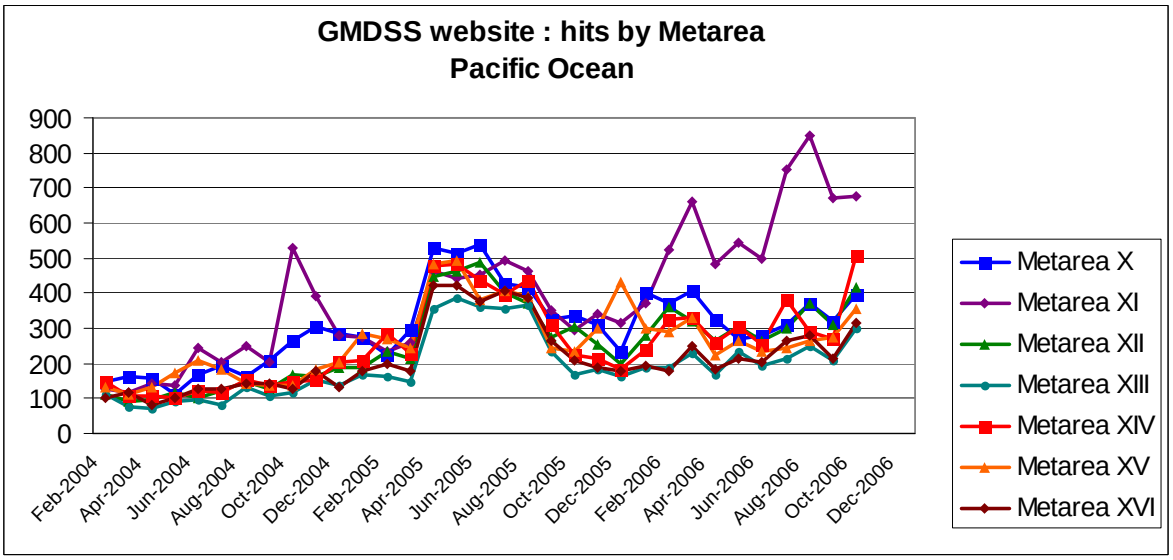
STATISTICS – GMDSS WEB SITE HITS



STATISTICS / GMDSS WEB SITE HITS







Annex XVI

LIST OF ACTIONS

Para	Action	By whom	When/target
MSS-II 2.1.4	To provide delegates to represent the Team on the IMMSC Scientific Steering Team	ETMSS participants	Mid-2007
MSS-II 2.4.4	To include METAREA III Issuing Service within the consultation process about consider establishing the Black Sea Region as a Sub-area of NAVAREA III	METAREA III Issuing Service and ETMSS Chairperson	ASAP
MSS-II 2.5.2	To formally inform the Secretariat that Kenya is technically ready to become a Preparatory Service for Sub-area 8/7 of METAREA VIII(S)	Mauritius	ASAP
MSS-II 2.5.3	To inform the Secretariat of any changes to the transmission schedules for the WMO marine broadcast system for the GMDSS SafetyNET services, as well as to the list of national contact points for the system	All Issuing Services	Continuing
MSS-II 2.7.7	To appoint a new Rapporteur on Satellite Communications for Dissemination of Products and Services, in consultation with Dr. E. Lindstrom	Secretariat, ETMSS Chairperson and SPA Coordinator	ASAP
MSS-II 2.8.5	To enhance the cooperation with the IMO and IHO, especially in the framework of the Maritime Safety Services	Secretariat	February 2007
MSS-II 3.2.1	To discuss with Norway and Denmark in order to define who will take the responsibility as Issuing Service and Preparatory Service for METAREA XIX	Secretariat	ASAP
MSS-II 3.3.2	To consider proposing a Resolution to the IMO on Metocean services similar to A.706(17) for navigational warnings and to discuss these issues during the High-Level Dialogue Meeting with the IMO	Secretariat	ASAP
MSS-II 6.2.2	To promote the use of abbreviations among all the NMHSs issuing products for NAVTEX dissemination	Issuing Services	Continuing
MSS-II 6.2.5	(i.) To review the list of abbreviations regarding sea ice and icebergs, and (ii.) To prepare a draft common list in consistency with *WMO Sea-Ice Nomenclature* and *Sea Object Catalogue*, to be provided to Mr M. Myrsilidis	ETSI Experts	March 2007
MSS-II 6.2.6	To allow and promote the use of the common abbreviations prepared for NAVTEX also for scheduled forecasts by SafetyNET, for endorsement by JCOMM-III	Secretariat	JCOMM-III
MSS-II 6.3.2	To inform the ETMSS on the progress of the METEOALARM project	Finland	Continuing
MSS-II 7.3.2	To request countries in each METAREA to regularly update the information contained in WMO Pub. No. 9, Volume D	Issuing Services	Continuing
MSS-II 7.3.2	To request countries in each Regional Association to regularly update the information contained in WMO Pub. No. 9, Volume D	Secretariat and Regional Associations Focal Points	Continuing
MSS-II 8.2.4	To carefully check the technical information in the Annex XIV and provide corrections or updates to the ETMSS Chairperson	Issuing Services	ASAP

MSS-II 8.2.6	To contact all NMHSs issuing metocean NAVTEX products in order to organize NAVTEX products insertion on the GTS, and to provide the ETMSS Chairperson with the appropriate information, including the GTS headers, in the same tabular form used in Annex XV	Issuing Services	ASAP
MSS-II 8.2.6	To provide the appropriate direct url addresses of the online version of WMO Pub. No. 9, Volume D, to include the appropriate links in the GMDSS website to access to the *ad-hoc* information	Secretariat and ETMSS Chairperson	ASAP
MSS-II 8.2.6	To make available the web-based or a "fill-able" pdf form questionnaire for MMMS, and include the appropriate link(s) on the GMDSS website	Secretariat, ETMSS Chairperson and SPA Coordinator	ASAP
MSS-II 8.2.6	To prepare a detailed working document on the JCOMM GMDSS website to be discussed during its ninth session of the IHO/CPRNW, planned in Monaco in September 2007	ETMSS Chairperson	September 2007
MSS-II 8.2.6	To prepare the *ad-hoc* information document and brochure to promote the GMDSS website	Secretariat, ETMSS Chairperson and SPA Coordinator	2007
MSS-II 8.2.6	To investigate the possibility to develop some graphic functionalities, like interactive maps (e.g., showing the Metarea(s) with warning(s) in force)	ETMSS Chairperson, SPA Coordinator, USA and India representatives and OFS Rapporteur	2007
MSS-II 8.2.6	To make the e-mail access more visible on the website	ETMSS Chairperson	ASAP
MSS-II 8.3.3	To take corrective actions in areas of identified weakness in the survey	Issuing Services, Secretariat and ETMSS Chairperson	Continuing
MSS-II 8.3.4	To translate the questionnaire in all WMO official languages	Secretariat	Mid-2007
MSS-II 8.3.5	To widely distribute and promote the JCOMM web pages and to encourage ships masters to fill in several questionnaires for the different METAREAS	Secretariat	2007
MSS-II 8.3.5	To provide the ETWS input on sea state information and use of abbreviations in NAVTEX bulletins to the WMO Secretariat by the end of March 2007 to be included in the final version of the questionnaire	Mr Michael Myrsilidis and Mr Val Swail	March 2007
MSS-II 8.3.6	To prepare the on-line questionnaire on users' feedback	SPA Coordinator	Mid-2007

Annex XVII

ACRONYMS AND OTHER ABBREVIATIONS

AIS	Automatic Information System
ALRS	Admiralty List of Radio Signals
ATWS	Australian Tsunami Warning System
AusTWC	Australian Tsunami Warning Centre
CARTWS	Caribbean and Adjecent Seas Tsunami Warning System
CAS	Commission for Atmospheric Sciences (WMO)
CB	Capacity Building
CBS	Commission for Basic Systems (WMO)
CCl	Commission for Climatology (WMO)
CG	Correspondence Group
CHy	Commission for Hydrology
CMM	Commission for Marine Meteorology (WMO)
COMSAR	Sub-Committee on Radiocommunications and Search and Rescue (IMO)
CPRNW	IHO Commission on the Promulgation of Radio Navigational Warnings
DPM	Disaster Prevention and Mitigation (WMO)
DRM	Disaster Risk Management
ECDIS	Electronic Chart Display Information System
EGC	Enhanced Group Calling
EMA	Emergency Management Australia
ENC	Electronic Navigational Chart
ET	Expert Team
ETMAES	Expert Team on Marine Accident Emergency Support (JCOMM)
ETMSS	Expert Team on Maritime Safety Services (JCOMM)
ETSI	Expert Team on Sea Ice (JCOMM)
ETWS	Expert Team on Wind Waves and Storm Surges (JCOMM)
GA	Geoscience Australia
GEO	Group on Earth Observation
GEOSS	Global Earth Observation System of Systems
GCOS	Global Climate Observing System
GLOSS	Global Sea-level Observing System
GMDSS	Global Maritime Distress and Safety System
GODAE	Global Ocean Data Assimilation Experiment
GOOS	Global Ocean Observing System
GPS	Global Positioning System
GTS	Global Telecommunication System (WWW)
HF	High Frequency
HGMIO	Harmonizing Group on Marine Information Objects
IALA	International Association of Lighthouse Authorities
ICG	International Coordination Group
ICS	International Chamber of Shipping
IHO	International Hydrographic Organization
IIP	International Ice Portal
IMMSC	International Maritime Met-ocean Services Conference
IMO	International Maritime Organization
IMSO	International Mobile Satellite Organization
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IOTWS	Indian Ocean Tsunami Warning and Mitigation System
ISO	International Standards Organization
ITIC	International Tsunami Information Center (IOC)
ITSU	International Coordination Group for the Tsunami Warning System in the Pacific
JMA	Japan Meteorological Agency
JCOMM	Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology
LES	Land Earth Station (Inmarsat)

MIO	Marine Information Objects
MMS	Marine Meteorological Services
MSC	Maritime Safety Committee (IMO)
MSI	Maritime Safety Information
NAVTEX	International system for reception of marine safety information
NBDP	Narrow Band Direct Printing
NEAMTWS	Northeast Atlantic and Mediterranean Tsunami Warning System
NIS	National Ice Services
NMHS	National Meteorological and Hydrological Service
NMS	National Meteorological Service
NOAA	National Oceanic and Atmospheric Administration (USA)
NTWC	National Tsunami Warning Centre
NWPTA	Northwest Pacific Tsunami Advisory
OFS	Operational Ocean Forecasting Systems
PMSI	Polar Maritime Safety Information
PTWC	Pacific Tsunami Warning System
RTAC	Regional Tsunami Advisory Centre
RTWC	Regional Tsunami Warning Centre
SAR	Search and Rescue
SCG	Services Programme Area Coordination Group (JCOMM)
SOLAS	International Convention for the Safety of Life at Sea
SOT	Ship Observations Team (OPA)
SPA	Services Programme Area
TEWS	Tsunami Early-Warning System
TLO	Top Level Objectives
TMSI	Tsunami Maritime Safety Information
TOR	Terms of Reference
TWI	Tsunami Watch Information
TWS	Tsunami Warning Systems
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
URD	User Requirement Document
URL	Uniform Resource Locator
VOS	Voluntary Observing Ship
WCP	World Climate Programme
WMO	World Meteorological Organization
WWNWS	World-Wide Navigational Warning Service (IHO/IMO)
WWW	World Weather Watch (WMO)