# JCOMM EXPERT TEAM ON MARINE ACCIDENT EMERGENCY SUPPORT (ETMAES) FIRST SESSION

Angra dos Reis, Brazil, 29-31 January 2007

***FINAL REPORT***

**JCOMM Meeting Report No. 47**

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 First Session of the JCOMM Expert Team on Marine Accident Emergency Support (ETMAES-I) was opened by its Chairperson, Mr Pierre Daniel (France), at 0930 hrs on Monday, 29 January 2007, at the Portogalo Suíte Hotel, Angra dos Reis, Brazil.

1.1.2 Mr Daniel welcomed participants to the session and expressed his considerable appreciation to the Brazilian Navy and the Instituto National de Meteorologia do Brazil, the local organizers, the representative of Brazilian Navy, Mr Antonio Claudio Vieira, and all the staff for the excellent organization and support for hosting the meeting. Mr Daniel noted that this was first meeting of the Expert Team on Marine Accident Emergency Support (ETMAES) and pointed out the importance of such practice to reinforce the contributions of all respective AMOCs. He listed the main issues of the agenda to be discussed during the meeting: products related to specific risks, Harmful Algal Blooms (HABs), Search and Rescue (SAR) operations, operational ocean forecasting systems; coordination with other organizations, such the IMO and IHO; training; the MPERSS website; and feedback from users. Mr Daniel also stressed the need to consider the definition of a core membership for the Team. Finally, he recalled that the success of this meeting would depend on the contribution of each and every participant. Mr Daniel then introduced the Representative of the Brazilian Navy, Commander Antonio Claudio Vieira, to address the session.

1.1.3 Commander Antonio Claudio Vieira, welcomed participants to very beautiful region of Angra dos Reis, on behalf of the Director of Hydrography and Navigation, Vice-Admiral Edison Lawrence Mariath Dantas. Commander Vieira 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 kms of the Brazilian shore. He further 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 emphasized that this meeting would contribute to facilitating the dissemination of information, exchange of ideas, discussion of goals and consideration of projects and alliances, in order to contribute to the safety of lives and property of the maritime community. Commander Vieira assured participants of the full support of Brazilian Navy's staff, and he concluded by wishing all participants a very successful meeting and an enjoyable stay in Angra dos Reis.

1.1.4 On behalf of the Secretary-General of the WMO, Mr Michael Jarraud, and the Executive Secretary of the IOC, Mr Patricio Bernal, the Secretariat Representative, Mr Edgard Cabrera, Chief of the Ocean Affairs Division also welcomed participants to the first session of the ETMAES. In doing so, Mr Cabrera expressed the very sincere appreciation of both Organizations to the Brazilian Navy and to the Instituto Nacional de Meteorologia do Brazil for the initial coordination and arrangements to formalize this venue, and especially to Commander Antonio Claudio Vieira and his staff, for the excellent facilities provided as well as for the tremendous organizational effort that had been put forth for the preparations of the meeting. Mr Cabrera then began by stressing that maritime safety services are one of the most important activities within the JCOMM, especially for the WMO. He recalled that the Expert Team on Marine Accident Emergency Support (ETMAES) was established at the Second Session of the JCOMM and plays an important role in support of the: (i.) Marine Pollution Emergency Support System (MPERSS), and (ii.) Maritime Search and Rescue (SAR) operations. He 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 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 that had been prepared by the Secretariat. 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.

## 2. Reports

### 2.1 Report of the Services Programme Area (SPA) 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 for the newly appointed Rapporteur for Operational Ocean Forecasting Systems (OFS), the work plan developed by the Services Coordination Group (SCG) for the current intersessional period and concluded with a series of key issues for the Expert Team on Marine Accident Emergency Support (ETMAES) 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 attended the ETMAES meeting.

2.1.3 Dr Donlon introduced the ETMAES to the SPA Work Plan, which cuts across all SPA ETs. The agreed Top Level Objectives (TLOs) for the SPA Work Plan, which are applicable to all activities of the ETMAES and other ETs within the SPA are specified in Annex III of this report. An electronic version of the SPA Work Plan is available 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 standards 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 at: http://www.jcomm-services.org;
- A JCOMM Services User Requirement Document (URD);
- Observation Requirements for the 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, combined);
- *A Guide to Ocean Product Presentation, Symbology and Nomenclature*.

These documents will be developed by the SPA Coordinator and the ET Chairpersons with input from the ETs 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 JCOMM-III for approval.

2.1.4 The Team noted with appreciation that the SPA is planning an International Maritime Metocean Services Conference (IMMSC) 2008 (Exeter, United Kingdom, 5-9 October 2008), with the aim of establishing and agreeing upon international MetOcean 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 in upcoming six months. Dr. Donlon requested that the ETMAES provide delegates to represent the Team on the IMMSC Scientific Steering Team **(Action: ETMAES Chairperson and Secretariat)**.

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

a) The MSI is a key focus for SPA activities during this intersessional period, and the ETMAES must demonstrate successes at JCOMM-III.

b) To consider the definition of a Core Membership of the ETMAES as a way to provide support to both the Expert Team Chairperson and the Secretariat.

c) The SPA Work Plan has been developed and a guide to the ETMAES for specific and cross-cutting activities within the JCOMM. The SPA Coordinator urged the ETMAES participants to familiarize themselves with the document in order to develop better collaboration with the other SPA ETs (i.e., ETMSS, ETWS and ETSI), the WMO DPM Program and with the IOC, where appropriate.

d) The ETMAES needs to define a clear set of requirements for sea-state products and services for consideration by the ETWS in March 2007 **(Action: ETMAES Core Membership)**.

e) Given the increased activities in the Polar Regions and other areas with seasonal coverage, sea ice information needs to be better integrated into the ETMAES.

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

g) The technical coordination of high-resolution, re-locatable Model system outputs are at the core of MAES's ability to deliver useful support to MAES activities. There is a need to: (i.) coordinate the operational 365/24/7 network of systems to provide near instantaneous results, (ii.) consider the input forcing data fields required by forecasting systems, proper visualisation of model outputs, and open data exchange, and (iii.) learn from past experiences and share this information with other relevant groups. Data assimilation is essential for accurate forecasts, and the observations are the key to many systems being successful. The ETMAES should coordinate the users' observations requirements for the SAR/MPI/HAB model system, including data assimilation in support of the MAES activities, and pass these to the JCOMM OPA and SPA Coordinators, as necessary and/or as appropriate **(Action: ETMAES Core Membership)**.

h) The SPA Coordinator urged the ETMAES participants to provide the Secretariat content on the MAES to be included in the following website: http://www.jcomm-services.org (especially content, images and links to products and services) **(Action: ETMAES Core Membership)**.

i) In accordance to the WMO Regulations (WMO-No. 471: *Guide on Marine Meteorological Services* and WMO-No. 558: *Manual on Marine Meteorological Services*), and the Terms of Reference of the ETMAES, the Team has the mandated responsibility to coordinate metocean products and services in collaboration with other Organizations, such as the IMO and IHO.

j) Regarding Capacity Building, the SPA Coordinator requested the ETMAES to develop several lesson scenarios on MAES applications using existing tools (e.g., Bilko (http://www.bilko.org) and/or OceanTeacher (http://www.oceanteacher.org)) **(Action: Task Team on Training and Outreach)**.

## 2.2 Report of the Chairperson

2.2.1 The Team noted the report of the Chairperson of the Expert Team on Marine Accident Emergency Support (ETMAES), Mr Pierre Daniel. The Team recalled that the ETMAES was established at the JCOMM-II and plays an important role in the following activities:

(i) In support of the Marine Pollution Emergency Response Support System (MPERSS) by: (a.) monitoring implementation and operations of the MPERSS, and (b.) ensuring coordination and cooperation amongst Area Meteorological and Oceanographic Coordinators (AMOCs) of MPERSS; and

(ii) In support of maritime Search and Rescue (SAR) operations, and in particular for the GMDSS by: (a.) monitoring requirements for meteorological and oceanographic data, information, products and services to support SAR operations worldwide, and (b.) ensuring coordination and cooperation amongst relevant agencies in the provision of meteorological and oceanographic information and support to maritime SAR operations.

2.2.2 Mr Daniel stressed the importance of the contributions by each and every participant for the success of the meeting, as well as to ensure future success of the ETMAES. Mr Daniel was pleased to see an appropriate participation at the meeting, not only AMOCs representatives, but also experts on operational forecast systems, ocean modelling, disasters operations, etc. In order to develop the work of the Expert Team, Mr Daniel proposed the establishment of a Core Team Membership (based on the list of representatives of the AMOCs) that would be discussed during the meeting and endorsed by the Third Session of the JCOMM (JCOMM-III). This will help the development and work of the Team to be executed more effectively by assigning responsibilities of certain actions to respective individuals.

2.2.3 According to recommendations raised from JCOMM-II, Mr Daniel informed the Team of the main priorities of the ETMAES for the current intersessional period. These include guidance materials to be made available through the MAES-MPERSS website at: http://www.maes-mperss.org. However, this website should be much more dynamic, significantly enriched and improved with additional metocean products, with specifications of available models and examples of marine accident emergency support.

2.2.4 The Team noted that other International Organizations have been working on maritime safety information and marine pollution. In order to avoid duplication, Mr Daniel recommended a closer collaboration with the IMO, IHO and EMSA **(Action: Secretariat)**.

2.2.5 In order to develop the work of the Team, Mr Daniel also recommended the organization, during the current intersessional period hold a workshop on MAES with the appropriate industry

involvement and sponsorship.

2.2.6 These issues would be addressed in detail during the meeting in the appropriated agenda items.

## 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, a work programme was prepared which allowed for the Management Committee (MAN) and SPA Coordination Group 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 Marine Accident Emergency Support).

2.3.2 The Team noted with appreciation the summary reports on the following issues: (i.) the results of JCOMM-II, (ii.) the Fifth Session of the Management Committee (MAN-V, Geneva, Switzerland, October 2006), and (iii.) the Third Session of the SPA Coordination Group (SCG-III, Exeter, United Kingdom, November 2006). The Team noted that, with regard to the work of the Expert Team on Marine Accident Emergency Support, the Third Session of the SCG had identified specific tasks to be undertaken by the Team that were highlighted in the SPA Coordinator and ETMAES Chairperson reports. The Secretariat Representative, Mr Edgard Cabrera, recalled the overall work plan for the JCOMM, and highlighted the need to prioritization these activities. 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, and partner Organizations, especially with the IMO and IHO.

## 2.4 Reports by AMOCs

2.4.1 The Team noted with interest the reports from AMOCs (Argentina, Australia, Brazil, France, Greece, Kenya, Mauritius, New Zealand, Russian Federation, South Africa, United Kingdom and United States) on their experiences, progress and success and difficulties in implementing the system within their respective MPI areas. These reports will be published separately in electronic form as a JCOMM Technical Report.

2.4.2 From these reports as well as the verbal information presented by the representatives of the AMOCs, the Team noted the following specific points:

a) The Meteorological Services and the corresponding AMOCs generally acts as a support base during a Marine Accident Emergency in support to the various nationals Authorities, which has been given the responsibility to coordinate the safety and security at sea and prevent pollution by ships.

b) In general, the AMOCs currently provide the following meteorological elements:
   i. wind speed and direction;
   ii. air temperatures;
   iii. sea surface temperature;
   iv. wave parameters;
   v. visibility;
   vi. weather parameters (fog and precipitation);
   vii. overall weather conditions.

   However, the Team noted that exist more parameters that could be used.

c) Some AMOCs, which have operational capabilities to run oil spill models, also provide pollutant drift forecasts.

d) Several AMOCs reported on the operational capabilities to run hydrodynamic and oil spill models (Australia, Brazil, France, Greece, Russian Federation and USA) while other AMOCs reported on the need to implement such capabilities (Kenya, Mauritius, New Zealand and South Africa).

e) Few of the AMOCs reported on SAR capabilities (e.g., Australia, Brazil, and France, amongst others). The AMOCs did not report on HABs.

f) A report on the incidents and the exercises conducted were presented during the meeting. Argentina informed on the regional exercise conducted at the regional level with Uruguay and Brazilian Petrobras and the lessons learnt from the exercise.

g) Regarding the identified Needs and Requirements, some commonalities were identified:

i. Endorsement or approval at the national level to the implementation of the MPERSS;
ii. Capacity building in running and understanding the oil spill model appropriately;
iii. Capacity building in remote-sensing for better interpretation of oil slicks;
iv. Hydrodynamic modeling at ports;
v. Human resources to deal with pollution models;
vi. Lack of modeling capabilities (in some AMOCs);
vii. Capacity building in running the model, to monitor and forecast the oil spill trajectory, as it is limited and needs refinement for better outputs;
viii. Adaptation of regional models, based on existing global models;
ix. Cooperation with specialized centres, to become familiar with the development of up-to-date technology; technology transfer and capacity building.

h) Several AMOCs reported on the need for open source codes. The Team strongly supported this request and urged the Task Team on MetOcean Products Development to review the availability of open source codes for the ETMAES applications and provide recommendations on making these codes available **(Action: Task Team on MetOcean Products Development)**.

i) The Russian Federation reported on the preparation of a new national guidance on marine meteorological service. This edition will take into account the statements of the WMO *Guide on Marine Meteorological Services* (WMO-No. 471) and those containing a description of activities on detection and liquidation of accident pollution of marine environment under the MAES.

j) The following AMOCs reported on their capabilities to provide tailored marine forecasts worldwide in support of marine pollution emergencies (Brazil, France, Greece, Kenya, Mauritius, South Africa and USA).

k) It was noted the existing Memorandum of Understanding (MoU) between the Australian Maritime Safety Authority and the Maritime Safety Authority of New Zealand on oil pollution preparedness and response provides the ongoing framework for cooperation during marine pollution emergencies across the boundaries of the MPI Areas X and XIV in the Tasman Sea, and the Pacific Islands Regional Marine Spill Contingency Plan (PACPLAN) which provides the framework for assistance by the four “metropolitan countries” in the region (Australia, France, New Zealand and the USA) in the case of marine pollution emergencies in Pacific Island Countries (PICs).

2.4.3 The Team urged all respective AMOCs to inform the Secretariat of any changes to their list of national contact points for the MPERSS **(Action: AMOCs)**. The Team noted that these reports could be a substantial contribution to the MAES website, and recommended that the Task Team on Website to consider use this information to improve the SPA website and promote the ETMAES activities, in particular SAR capabilities **(Action: Task Team on Website)**.

## 3. Products related to specific risks

### 3.1 Report on Harmful Algal Blooms

3.1.1 The Secretariat Representative, Ms Alice Soares, presented the report on Harmful Algal Bloom (HABs) on behalf of the Coordinator of the IOC Harmful Algal Bloom Programme, Dr Henrik Enevoldsen,. The Team noted that the proliferation of harmful phytoplankton in marine ecosystems can cause massive fish deaths, contaminate seafood with toxins, impact local and regional economies and dramatically affect ecological balance. The Team also noted that there is a widespread interest throughout the world regarding the installation of ocean observation systems to provide the data and knowledge needed to detect and forecast physical, chemical and biological changes in coastal and open-ocean ecosystems. Ms Soares stressed that recent advances in the instrumentation, communications and modeling capabilities have led to the design of prototype real-time observation and prediction systems for coastal ecosystems.

3.1.2 The Team noted that the IOC had published guidelines for the design and implementation of HAB monitoring systems - '*Monitoring and Management Strategies for Harmful Algal Blooms in Coastal Waters'*, that provides a broad review of the many programs, technologies, and policies used worldwide in the monitoring and management of harmful algal blooms in coastal waters. A PDF version of the Table of Contents regarding this information is available at the following web address: http://www.whoi.edu/redtide/Monitoring_Mgt_Report.html. The Team also noted that shortly, the IOC-UNESCO would publish a '*UNESCO Monographs on Oceanographic Methodology*': *Real-time Coastal Observing Systems for Marine Ecosystem Dynamics and Harmful Algal Blooms*: *Theory, Instrumentation and Modelling'*, that offers guidance for developing real-time and near real-time sensing systems for observing and predicting plankton dynamics, including harmful algal blooms, in coastal waters.

3.1.3 Ms Soares stressed that the Scientific Steering Committee for the IOC-SCOR science programme GEOHAB (Global Ecology and Oceanography of Harmful Algal Blooms: www.geohab.info) wishes to address the inclusion of, and approach to, the observation systems for harmful algal events and harmful algal occurrences in regional GOOS components. Clearly, information regarding temperature and velocity is extraordinarily useful for HAB applications, but this information alone is not enough to sustain the information needed for qualified forecasts. The Team noted that models and forecasts can also help by providing earlier and more qualified warnings, so management actions can be timed more appropriately.

3.1.4 The Team noted with interest that the IOC Intergovernmental Panel on Harmful Algal Blooms (IPHAB), during its Eighth Session (Paris, France, from 17 to 20 April 2007), has an agenda to discuss and adopt a more proactive strategy to assist the IOC Member States in making measurements that could help in understanding and forecasting HABs. In this context, the IPHAB has invited the GOOS RAs for a dialogue in this respect, and also welcome a dialogue with the JCOMM on how this process can be accelerated through joint and coordinated action. The Team urged the Secretariat to ensure the participation of an expert from the ETMAES in this meeting to discuss the potential use of operational ocean forecasting systems to the prediction of nuisance and HABs **(Action: Secretariat and OFS Rapporteur)**.

### 3.2 Environmental data needs for planning maritime searches (SAR)

3.2.1 The Secretariat Representative, Ms Alice Soares, presented the report on environmental data needs for planning maritime searches on behalf of the Office of Search and Rescue of US Coast Guard, from Dr Arthur Allen. Ms Soares stressed that meteorological and oceanographic

conditions affect all aspects of a Search and Rescue (SAR) case, from planning where to search to the rescue operation itself. Planning response to complex SAR cases contains the following steps:

1) Pre-Incident Voyage: Often, the only information a SAR planner has is the time and location of the start of the voyage, intended destination and type of craft. This simple information can be combined with environmental data to develop possible scenarios of when the vessel may have met with hazardous sea or flight conditions. Primary data required are sea-state and ice.

2) Drift Trajectories: Drift trajectories are calculated from the earliest possible time of the scenario to the time when search units complete the planned search. Of all the meteorological and oceanographic parameters required for Search and Rescue, 10-meter winds and sea surface currents are the most critical to successfully locating survivors.

3) Search Effort Allocation: The optimal estimation of search effort is determining the most effective search patterns for each search unit, given limited on scene search time. For most common searches, the visibility (primary parameter), wind speed, sea height and cloud ceiling are need for the search area.

4) Search Operations: Safe and effective operations of rescue vessels and aircraft are also dependent on knowing the conditions en route to the search area, the expected conditions at the search area and the transit back to base. For vessels and aircraft, the primary factor for safe operations is sea-state and to lesser extent; wind speed, visibility and precipitation.

5) Account for Previous Search Effort: If the survivors are not located, the process returns to steps 1 or 2 and continues on through step 4, until the survivors are located or the case is suspended. Visibility is primary data requested.

6) Stopping the Case: Survival models are used to help predict the maximum length of time a person can survive in water. The two primary environmental inputs for estimation of survival time in cold water are sea surface air and water temperatures (AST and SST).

3.2.2 A summary of the meteorological and oceanographic parameters needed for planning maritime searches is provided in Annex IV to this report.

3.2.3 The Team noted that in the United Kingdom, for Search Effort Allocation whilst the aviation SAR resource is directed in SAR activities by the United Kingdom Maritime and Coast Guard Agency, the operation of the aircraft is governed by the ICAO/Civil Aviation Regulations or Military Regulations. For Search Operations, in general, in the United Kingdom, conditions would need to be extremely bad for either Aircraft or Marine Search Units not to depart for the search area. The Team also noted that currently in the United Kingdom, the main focus for met ocean input is in Planning the Search Area/Pattern.

3.2.4 Recognizing that the ETMAES should improve its activities in support of SAR operations, the Team recommended that a leader on environment data needs for planning SAR operations should be appointed, and suggested Dr Arthur Allen. The Team urged the Secretariat to officially invite Dr Arthur Allen to work with the Team as a leader on environment data needs for planning SAR operations. If Dr Arthur Allen is not able to accept this post, the Team urged the Secretariat and the ETMAES Chairperson to find and appoint another expert as soon as possible **(Action: Secretariat)**.

3.2.5 The Team noted the substantial information reported, and recommended that the Task Team on Website to consider use this information to improve the SPA website in order to promote

the ETMAES activities and provide an important tool for AMOCs **(Action: Task Team on Website)**.

### 3.3 Report of the current status and potential for use of the operational ocean forecasting systems in MAES applications

3.3.1 The Rapporteur for Ocean Forecasting Systems, Dr Adrian Hines, presented a report on the potential for application of operational ocean modelling systems to MAES applications. Whilst many ocean forecasting systems are in operation, the Rapporteur noted that outputs from the systems are not widely used in MAES applications at the present time.

3.3.2 Dr Hines first began by stressing that the physical ocean and surface wave forecasting systems provide environmental information directly relevant to SAR and counter pollution activities, and secondly that many of the systems used in these activities are designed to ingest gridded NWP data. Dr Hines highlighted that there is therefore potential benefit to the use of gridded ocean forecasting system output, and that there should be no particular technical obstacles in doing so.

3.3.3 The Rapporteur also described a demonstration carried out by Météo-France that used output from four different ocean forecasting systems in drift predictions. The Team noted that resulting predictions showed discrepancies when using the different models, providing an indication of the current limitations of the systems, and highlighting the need for further work to understand the cause of these differences.

3.3.4 The emerging capability in the area of ecosystem modelling was presented. Whilst these systems are currently unable to give robust predictions of the occurrence of a bloom at a particular location, the capability to provide indicators of conditions conducive to blooms was noted. Dr Hines stressed that with appropriate interpretation, this capability could be applied to direct further monitoring and heightens the state of readiness in the case of high risk of a bloom.

3.3.5 Dr Hines further emphasized the need for on-going dialogue and collaboration between the operational oceanography and MAES communities, and identified two particular priorities: (i.), the development of further demonstration cases to identify priorities for development of the forecasting systems, and to build confidence between the communities, and (ii.) the need for the operational oceanography community to provide data to the MAES community on a routine basis. With regard to the latter, Dr Hines noted that a clear endorsement from the ETMAES community would facilitate progress with this within the operational ocean forecasting community.

3.3.6 The Team also noted the report regarding the support for accidental Marine Pollution and Search and Rescue by the Representative of the Norwegian Meteorological Institute (met.no), Mr Bruce Hackett. The Norwegian Meteorological Institute has a national responsibility for weather and ocean forecasting in Norwegian waters. The responsibilities extend to the support of Marine Pollution Response (including oil spill fate and algal bloom forecasting), and to Search and Rescue (SAR) operations. Norway has taken on the role of MSI Coordinator for NAVAREA XIX, and has offered to take the responsibility as Coordinating Issuing Service for the corresponding METAREA XIX, that corresponds to the Arctic waters north of 71° N on MPI Area I.

3.3.7 Mr Hackett highlighted that forecasting the drift of oil and objects, as well as algal blooms, are founded on forcing data from operational models for the atmosphere, ocean circulation and waves. The goal is to apply the best available forcing data for a given area and time span. In this context, the Team was informed that the met.no maintains three drift models to support marine emergency response:

1.) an oil spill fate model (OD3D);
2.) a model for surface drifting objects (LEEWAY); and
3.) a model for ship drift.

3.3.8 Technically speaking, there are strong similarities between the models as well as the services for which they are used. Therefore, the models are implemented in such a way that they share a common user interface and dependence on a common processor for geophysical forcing data. Furthermore, all three models are based on a "particle" representation of the object or substance, so that the main difference lies in the particular characteristics of the particles. The Team also noted that the met.no has cooperated with leading centers of expertise on oil weathering and drift characteristics for floating objects, in an effort to attain state-of-the-art models.

3.3.9 Mr Hackett stressed that, over the past few years, the met.no has recognized the similarities between the three drift models described above. The Team noted that an effort is underway to let them share the same methods for accessing geophysical forcing data. The aim of the forcing processor is to provide a variety of available forcing data sets from met.no and external operational models. The Team also noted that a default list of prioritized sources is maintained and checked for availability when a simulation is requested.

3.3.10 Mr Hackett concluded by informing the Team that specific users can enter their information in web order forms, which are accessed from a common webpage, to set up and run the model. The Team noted with interest that results may be delivered to the users as e-mail attachments or as downloads from the website. In addition, results are stored in an internal format for viewing with met.no's graphical display tool DIANA (see: http://met.no/diana/), that allows the duty meteorologist(s) to immediately view results in combination with other environmental information, in order to provide expert advice to the user. It also facilitates display of the results in a web mapping service client operating on the same website as the order form, thus enabling users with a web browser alone. The Team noted that DIANA is an open source code and re-enforced the recommendation presented in item 2.4.2 (h), by which several AMOCs reported on the need for open source codes. The Team urged the Task Team on MetOcean Products Development to review the availability of open source codes for the ETMAES applications and provide recommendations on making these codes available **(Action: Task Team on MetOcean Products Development)**.

### 3.4 Review Metocean input data requirements, including satellites

3.4.1 The Team recalled that the Second Session of the JCOMM (JCOMM-II) adopted Recommendation 10 (JCOMM-II), Appendix II of the Annex, for the inclusion of a description of metocean input data requirements for marine pollution monitoring and response, which would be included in the WMO *Guide to Marine Meteorological Services* (WMO-No. 471). This Guide also provides a description of metocean input data requirements in support of maritime search and rescue. The Team established a Task Team to review and revise metocean product related contents of the *Manual on Marine Meteorological Services* and the *Guide to Marine Meteorological Services*.

3.4.2 Based on discussions under the previous agenda items, the Team also agreed that the established Task Team should have a broader Terms of Reference to advise on MetOcean Products Development. The Terms of Reference and General Membership of this Task Team are provided in Annex V of this report.

3.4.3 The Team also noted that the recent ETMSS Session established (Annex VI to this report):

- A Task Team on provision of MSI in Polar Regions (PMSI);
- A Task Team to consider improved baseline sea-state MSI using modern techniques;
- A revised Terms of Reference of an Expert, jointly with ET experts, on weather information in graphical form.

3.4.4 The Team was invited to nominate one or more expert(s) to contribute to the work of these small groups. The Representative of USA, Mr David Feit, expressed the interest to participate on the 'Task Team on provision of MSI in Polar Regions' and on the group of ET experts that would support the work of an expert on weather information in graphical form. Brazil also expressed its interest to participate on the 'Task Team to consider improved baseline sea-state MSI using modern techniques'.

## 4. Coordination with other Organizations

### 4.1 IMO Report

4.1.1 The Secretariat Representative, Mr Edgard Cabrera, presented the report on behalf of the IMO. The Team was informed on the roles, responsibilities and activities of the International Maritime Organization (IMO) related to preparedness for, and response to, oil and Hazardous and Noxious Substances (HNS) marine pollution incidents. The Team noted that the IMO plays a key role in ensuring that lives at sea are not put at risk, and that the marine environment is not polluted by shipping, as summarized in the IMO's Mission Statement: *Safe, Secure and Efficient Shipping on Clean Oceans*. This is accomplished by adopting the highest practicable standards of maritime safety and security, and prevention and control of pollution from ships, as well as through consideration of the related legal matters and effective implementation of IMO's instruments with regards to their global and uniform application.

4.1.2 The Team also noted that within its environmental mandate, the IMO has developed and adopted a range of international instruments to address marine pollution arising from international shipping, as well as adopted a range of mandatory and voluntary Guidelines and Codes to provide international standards for the safe transport, storage and handling of harmful substances. The IMO's Marine Environment Division (MED) has Secretariat responsibilities for such instruments and regulations, and regularly reviews and updates these through the Marine Environment Protection Committee.

4.1.3 The Team also noted that the IMO instruments for preparedness, response and cooperation to oil and chemical pollution incidents, is the International Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC Convention, 1990) and it's HNS Protocol of 2000. The IMO, through its Marine Environment Protection Committee, has established the OPRC-HNS Technical Group. This Technical Group is composed of marine oil and chemical spill experts from IMO Member State(s), the shipping, oil and chemical industries, and regional and intergovernmental organizations. The primary objective of the Group is to develop expert resources, tools and guidelines to assist countries in implementing OPRC 90 and the HNS Protocol 2000, and to develop capacity to prepare for and respond to oil and chemical spills in the marine environment.

4.1.4 Mr Cabrera stressed that the movement of marine oil and chemical spills and their ultimate fate in the environment depends strongly on prevailing met ocean conditions, and such information is therefore essential in attempting to predict the trajectory of spills and area of impact. In this context, the Team recognized that the ETMAES plays a significant role in the response of such incidents, and urged the Secretariat to strengthen links and synergize the work of the OPRC-HNS and the ETMAES in the area of marine pollution preparedness for and response to maritime-related accidents **(Action: Secretariat)**. As a starting point, it was suggested that the IMO and WMO exchange the work programmes of the OPRC-HNS Technical Group and the ETMAES, accordingly, with the hopes of determining possible opportunities for collaboration **(Action: Secretariat and ETMAES Chairperson)**.

4.1.5 In addition, the Team was informed that the WMO is organizing a High Level Dialogue Consultative Meeting with IMO to be held at the WMO Headquarters, Geneva, Switzerland, from 12 to 13 February 2007. The Group agreed that this dialogue is of high importance, and encourage the Secretariat to pursue any effort to enhance the cooperation between the organizations especially in the framework of the Marine Accident and Emergency Support activities. It was also endorsed the proposed close cooperation and exchange of information between the OPRC-HNS Technical Group and the ETMAES. A follow up of the activities and meetings of the IMO-MED is required, and an appropriate participation in the relevant meetings and sessions of the IMO Marine Environment Protection Committee, IMO Maritime Safety Committee and appropriate Sub-committees is envisaged **(Action: Secretariat)**.

## 4.2 IHO Report

4.2.1 The IHO Representative, Mr Steve Godsiff, informed the Team regarding IHO Technical Resolution 'IHO Response to Disasters' (Annex VII to this report). This has been put in place since the Indian Ocean Tsunami of 2004, with a view to ensuring an immediate and appropriate response by the IHO Members to any future disasters affecting coastal areas of the world. The goal of this Resolution was to establish procedures and guidelines for Member State(s), regional hydrographic commissions and International Hydrographic Bureau, and to establish the necessary links with other relevant organizations at both national and international levels.

4.2.2 With respect to the principal activities to be addressed by the ETMAES (i.e., the provision of metocean data for pollution, SAR and HAB incidents), Mr Godsiff noted that the IHO input is probably likely to be limited to informing vessels in the area about the incidents through the World-Wide Navigational Warning Service (WWNWS) via the NAVAREA Coordinators with a view to ensuring that vessels on passage in the vicinity keep out of the way of those directly involved with the incident.

4.2.3 Mr Godsiff then introduced the IHO Report which covered current issues associated with the WWNWS, most of which had been discussed at length during the recent ETMSS meeting. He highlighted the point regarding capacity building, and in particular the planned MSI training course which is due to take place in the Caribbean area later this year. This course is designed to enable participants at an operational level to establish the necessary procedures within their respective States to output navigational warning through the WWNWS.

## 4.3 EMSA Report

4.3.1 The Secretariat Representative, Ms Alice Soares, presented a report on behalf of the EMSA. Ms Soares informed the Team that the WMO has invited the EMSA to a meeting for a better mutual understanding of both parties' aims and objectives in the field of marine accident emergency support; and, in addition, to discuss possible links and to explore commonalities.

4.3.2 The Team noted that the European Maritime Safety Agency is tasked to contribute to the enhancement of the overall maritime safety system in the European Community. One of its goals is to reduce the risk of marine pollution, and to assist its Member State(s) in tracing illegal discharges at sea using satellite monitoring. In accordance with the European Directive 2005/35/EC on ship-sourced pollution, the EMSA will provide a sustainable high-performance monitoring system for marine oil spill detection and surveillance in European waters.

4.3.3 The Team noted with interest that the primary service will be available to Members State(s) and the Commission by April 2007, and will consist of oil spill alert information and analysed satellite radar images for the monitoring of illegal discharges and accidental spills of oil from ships. The EMSA products will be delivered to national marine pollution emergency response authorities for the affected waters. These contact points include authorities identified for Marine Pollution Incident Areas I, II, III(a) and III(b) in the MPERSS system. It is envisaged that the primary service will be coupled with new information products emerging from the "Fast Track Marine Core Service"

(MCS) of the Global Monitoring for Environment and Security (GMES) Programme. The GMES programme is jointly led by the European Commission and the European Space Agency. These 'advanced products' are intended to support the decision making process for oil spill response operations, to identify the polluters and to support prosecution by collection of evidence. Therefore, techniques such as oil spill drift modeling in combination with ship traffic data (e.g., AIS and LRIT) will be used to produce this value added products. Noting this, the Team agreed that a close linkage with the EMSA will be of a mutual benefit, in particular as far as concern the potential freely access to radar images for spill detection and other satellite data by the Team. Therefore, the Team urged the Secretariat to convene a meeting between the Secretariat, the ETMAES Chairperson, the SPA Coordinator and EMSA Representatives **(Action: Secretariat)**.

4.3.4 The Team also noted that the EMSA services will not be a source of weather information, but will be a channel for the delivery of information on oil spill location, size and other associated parameters. Information on wind, wave, surface currents and air/sea temperature will also be offered, in the first instance, as part of the primary products to support the interpretation of radar images for spill detection, and in the future, as data inputs to numerical models for spill drift analysis as part of the 'advanced products' suite. The EMSA is still in the stage of implementing its primary service, providing oil spill alert information and analyzed satellite radar images to its Members States.

### 4.4 Other

4.4.1 Under this agenda item, the Team was presented with reports by the representative of the *Cedre*, Dr Claudine Tiercelin, on the 'need for meteorological and oceanographic data in case of marine accidental spills and floating objects lost at sea'; and the CPPS on the 'Plan of Action for the protection of marine environment and coastal areas of the Southeast Pacific'.

4.4.2 Dr Claudine Tiercelin stressed that meteorological and oceanographic conditions affect all aspects of a marine incident involving dangerous goods (oil or chemicals) or objects lost at sea from planning to response. The Team noted that the French operational capacity in oil spill and floating objects drift forecast is based on Météo-France and *Cedre* expertises.

4.4.3 Dr Tiercelin informed the Team that *Cedre*, acting as a technical adviser for the French authorities since 1979, and also providing assistance to the private companies (oil and chemical industries and shipping companies), has been working with Météo-France in the framework of a partnership for several years (a joint effort agreement in effect since 1996). Drift forecasts rely on a pollutant (oil or floating objects) drift model developed by Météo-France (named MOTHY), which includes local area hydrodynamic coastal ocean modelling with tidal and real-time atmospheric forcing from global meteorological models.

4.4.4 The Team noted that the accuracy of the results of the model has been proved both on experiments at sea as well as real cases involving different types of oil (light, intermediate or heavy products) and also on containers (floating or more or less submerged) lost at sea. The Team also noted that the model has been used in the French waters around France (Bay of Biscay, English Channel and the Mediterranean Sea) and also in the Caribbean, Pacific and Indian Ocean overseas territories. During the *Erika* (December 1999) and the *Prestige* (November 2002) spill crisis in the Bay of Biscay, MOTHY was used extensively. The Team noted with interest *Cedre* activities and the potential use of these expertises for the ETMAES training. In this context, the Team recommended the Task Team on Training and Outreach to consider such examples to develop training modules on the MAES **(Action: Task Team on Training and Outreach)**.

4.4.5 Dr Tiercelin concluded by pointing out that *Cedre* and Météo-France have several ongoing national, European and international research projects. Other projects aimed at improving the real-time dissemination of information using an interactive Internet website are ongoing, such as ECUME (a mapping tool for sea emergency, developed by *Cedre*). The Team noted that these projects, using operational data coming from multiple data providers, are characterized by interactions and exchanges with current and future projects.

4.4.6 The Team also noted the report by the CPPS on the 'Plan of Action for the protection of marine environment and coastal areas of the Southeast Pacific', presented by the Secretariat Representative, Mr Edgard Cabrera. The Team noted that this Plan of Action was established in 1981, as a regional mechanism of cooperation to promote, amongst others, the marine environment and coastal areas assessment of the current conditions, including the environmental impact caused by human activities, and to advise the governments in order to face the environment programs adequately. In 1987, the States in the region approved the "Contingency Plan for the Combat of the Contamination by Hydrocarbons in the Southeast Pacific", within the framework of the Agreement of the Regional Cooperation for Combat against the Contamination of the Southeast Pacific by Hydrocarbons and other Substances in Cases of Emergency (1981) and its complementary Protocol (1983). With the cooperation of the IMO, and after consultation regarding said issues, this document was effectively updated in 2004. In 2005, a Memorandum of Cooperation between the CPPS and the Operative Network of Regional Cooperation between Maritime Authorities of South America, Cuba, Mexico and Panama (ROCRAM) was signed, with the purpose to develop joint activities for the protection of the environment by the contamination produced by marine activities. As part of the implementation of this agreement, the CPPS and ROCRAM supported the Regional Course on Preparation, Cooperation and Answer before Oil Spills (OPRC-Level 2, Lima, Peru, September 2006).

4.4.7 The Team was informed that the WMO is supportive of the activities conducted by the CPPS, and that the existing Terms of Reference for the Joint WMO-IOC-CPPS Working Group on investigations related to "El Nino" are under revision in order to strength the cooperation between the respective organizations. The Team agreed that the regional activities are high importance, and encourage the Secretariat to pursue any effort to enhance the cooperation between the regional organizations in special in the framework of the Marine Accident and Emergency Support activities **(Action: WMO Secretariat)**.

## 5. Definition of boundaries and responsibilities for MPI Areas

5.1 The Team recalled that, when the boundaries for the existing MPI Areas were decided upon, marine pollution support and facilities were not envisioned for the Arctic region. The Team noted that at the JCOMM-II Session, it was agreed that:

- Canada would be responsible for Arctic waters north of 67°N over Marine Pollution Incident (MPI) Areas IV, XII and XVI; and

- Norway would be responsible for Arctic waters north of 71°N over Marine Pollution Incident (MPI) Area I.

5.2 However, the Team also noted that the recent ETMSS Session discussed this issue for NAV/METAREAs. The Team also noted that METAREA Issuing Services still need to be addressed and discussions on delimitation of NAV/METAREAs are still ongoing. In this regard, the Team recommended that the MPI Areas should be the same as NAV/METAREAs. The Team also agreed that the ETMAES should wait for a final proposal and definition of boundaries and responsibilities for the new potential Arctic NAV/METAREAs. The Team urged the Secretariat to keep the ETMAES informed on the progress on this issue **(Action: Secretariat)**.

## 6. Review of WMO regulations and operational information

### 6.1 Guidelines for delivery of information

6.1.1 Based on discussions under the Agenda Item 3, the Team established the Terms of Reference and Membership for a Task Team on MetOcean Products Development, as presented in Annex VIII to this report.

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

6.2.1 The Team recalled that the discussions taken under the Agenda Item 3.4 regarding the description of metocean input data requirements for marine pollution monitoring and response. The established Task Team on MetOcean Products Development reviewed and revised the MetOcean product related contents of the *Manual on Marine Meteorological Services* and the *Guide to Marine Meteorological Services* during the session, and the revised version has been reproduced and presented in Annex IX to this report.

### 6.3 Training

6.3.1 The Secretariat Representative, Ms Alice Soares, presented the report on possible alternatives for training within the ETMAES. Ms Soares recalled that during the Third Session of the Services Programme Area (SPA) Coordination Group (SCG-III) agreed that capacity needs to be developed appropriately for each Member in a manner that eventually results a fully functioning suite of met ocean services satisfying national, regional and international needs. The Team noted that the SCG defined four stages of development, for which the capacity building needs are very different:

a) **Stage 0:** Countries/Regions with very little or no services, very limited resources, who do not recognize their needs;

b) **Stage I:** Countries/Regions with little or no services, limited resources, who recognize their needs;

c) **Stage II:** Countries/Regions with some infrastructure, resources and good knowledge of metocean requirements and limitations. These Countries/Regions are capable of implementing SPA systems;

d) **Stage III:** Countries/Regions that have high-level infrastructures, resources and research and development activities. These Countries/Regions are capable of developing the next generation of JCOMM services and products through innovations (e.g., graphic products, ecosystem models, etc.).

6.3.2 The Team recommended that a database identifying capabilities and gaps for each country, should be created in order to identify the stage of each country in regards to the MPERSS implementation, provision of Maritime Safety Information and support of SAR operations **(Action: Secretariat)**.

6.3.3 The Team also noted that for each stage, the most appropriate specialised training and regional cooperative projects would be different. For example, Stage III countries may require advanced training workshops, such as the MARPOLSER 98 Scientific Seminar. The Team was also informed about the objectives and structure of this international seminar and workshop on MPERSS, collectively called MARPOLSER 98. In contrast, it may be more appropriate to develop an initial capacity to use apply metocean products and services provided by other Member in countries that do not yet have operational services in place (Stage 0 and I). In this context, the SCG supported initiatives at all four stages of development, and agreed that should be developed e-learning tools (such as OceanTeacher and/or Bilko lessons) on the activities of each ET, covering the different stages.

6.3.4 The Team noted that the IOC/UNESCO Bilko Programme (see: http://www.bilko.org) is a complete system for learning and teaching remote sensing image analysis skills. Its primary goal is to make remote sensing training materials accessible to those without specialist resources at their disposal, as well as to promote good teaching practices by tapping the diverse skills and expertise of an expert community. The Team also noted that Bilko system can be used to demonstrate more than just remote sensing data. Recently a new set of Bilko lessons and

resources were developed that focus on the use of ocean forecast output systems that have proved extremely successful with graduate and post-graduate students. The SPA Coordinator, Dr Craig Donlon, provided background information on the IOC/UNESCO Bilko Programme (http://www.bilko.org), and the Secretariat distributed a CD with Bilko software and tutorial. In this context, the Team noted that GODAE and ESA are developing Bilko lessons (see, e.g., http://earth.esa.int/dragon/oceantraining2007.html) and recommended that links should be established to unite these groups **(Action: Task Team on Training and Outreach)**. The Team also recalled the IODE tools and agreed that these could be considered by the Expert Team. Based on the discussions on possible alternatives for training within the ETMAES, the Team agreed on the Terms of Reference and General Membership of a Task Team on Training and Outreach (provided in Annex X to this report).

## 7. Information delivery

### 7.1 Website

7.1.1 The Team recalled that the first meeting of the *ad hoc* task team on MPERSS approved the proposal of France to develop and host a JCOMM website for MPERSS. Currently, the website includes only basic information, such as what is MPERSS, what is available under MPERSS, AMOC contact points, together with specific examples of MPERSS operations and specifications of available models. The Team noted that in this first version, the information available on the website is based on answers collected from a questionnaire in May 2004. The WMO Secretariat has registered the web domain named "http://www.maes-mperss.org" and has reserved this website until January 2011. This website has now been in operation for more than two years.

7.1.2 The Team recognized that this website should be reviewed both in content and in its structure, periodic updates, engagement with the SPA website (http://www.jcomm-services.org) and other relevant websites. In this regard, the Team agreed on the Terms of Reference and General Membership of a Task Team on Website (provided in Annex XI to this report).

7.1.3 The Team also agreed that following the revision of the content and structure of the website, all respective AMOCs would have direct access to the website in order to keep all relevant information maintained and updated as needed for their own areas and/or to contribute with other content to this website as appropriate **(Action: AMOCs)**.

### 7.2 User feedback

7.2.1 The Team recognized that direct interaction with, and feedback from users, is an essential part of the provision of high quality and valuable marine services. The Team noted that users' feedback was based on answers collected from a questionnaire on MPERSS in May 2004. The Team agreed that the Task Team on Training and Outreach should review and revise this questionnaire **(Action: Task Team on Training and Outreach)**. In addition, the Task Team on Website should consider the development of an online questionnaire either in a web-based format or in "filling" PDF format **(Action: Task Team on Website)**. Such an online questionnaire that should be seen as complementary to the regular "paper" survey that will continue to be disseminated by the JCOMM Secretariat, could allow end-users to provide feedback on a more regular basis. With the appropriate tools, the questionnaires filled online could be stored to be included in the regular delayed-mode survey, but also directly made available in real-time for the AMOCs.

## 8. Review of ETMAES Work Plan

8.1 Based on previous agenda items, the Team reviewed and revised the Terms of Reference for the Task Teams established during the session:

- Task Team on MetOcean Product Development;
- Task Team on Training and Outreach;

- Task Team on Website.

8.2 The Team recommended that the appointed experts for the Task Teams established during the session, and all respective AMOCs should constitute the ETMAES Core Membership. The Team noted that some participants are not able to commit to the work of the Expert Team. Noting this, the Team urged the Secretariat to officially request Members to confirm the nomination of the appointed experts **(Action: Secretariat)**. The Team recommended that two leaders on Marine Pollution and SAR respectively should be appointed with the Terms of Reference similar to that of the Chairperson. The Team suggested Dr Arthur Allen (from USA) to be the leader on environment data needs for planning SAR operations, and urged the Secretariat to officially invite him to commit with the work of the Team **(Action: Secretariat)**. If Dr Arthur Allen is not able to be engaged to this post, the Team urged the Secretariat and the ETMAES Chairperson to find and appoint another expert as soon as possible. The Team also suggest that an expert on Marine Pollution from the Norwegian Meteorological Institute should be appointed, and urged the Secretariat to officially invite the Permanent Representative of Norway with WMO to nominate this expert **(Action: Secretariat)**. Regarding the HABs, and recognizing a different level of development of this area, the Team recommended that the OFS Rapporteur, Dr Adrian Hines, carry out these activities during the current intersessional period **(Action: OFS Rapporteur)**.

8.3 The Team noted that exist overlapping and commonalities between the ETMSS and the ETMAES. It also noted that in other International Organizations, such as the IMO and IHO, these issues are under the responsibility of the Maritime Safety Committees or Sub-committees on Maritime Safety Information and Communications. In this regard, the Team recommended an evaluation of this issue to be reported and reviewed by the SCG-IV, for a final endorsement by the JCOMM-III **(Action: ETMSS and ETMAES Chairpersons and Secretariat)**.

## 9. Closure of the session

### 9.1 Adoption of the report

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

### 9.2 Closure

9.2.1 In closing the meeting, the ETMAES Chairperson, Mr Pierre Daniel, 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 Daniel also expressed his appreciation for having defined three Task Teams, and a general ETMAES Core Membership to help the Team to achieve its objectives. He also 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, for hosting the meeting and for providing such excellent facilities, support and hospitality. Mr Daniel concluded by thanking, on behalf of all participants, the Secretariat for the ongoing support.

9.2.2 On behalf of the Secretariat, Mr Edgard Cabrera, expressed his sincere appreciation and thanks to all participants for their very positive and valuable input and contributions throughout the meeting which no doubt resulted in its overall success. He stressed the efforts to have all the ET Chairpersons, the SPA Coordinator and the OFS Rapporteur together at this meeting. He also thanked the Scientific Officer in charge of the meeting, Ms Alice Soares, for the preparation of the documents and for the meeting itself. Mr Cabrera concluded by expressing his sincere appreciation to the Brazilian Navy and Vice-Admiral Edison Lawrence, for hosting this important meeting for the WMO and for providing such excellent support and hospitality, and especially to Lieutenant-Commander Carla Damásio Cordeiro for the logistical support, as well as to the Instituto National de Meteorologia and Dr António Divino Moura, for the preparatory arrangements.

9.2.3 On behalf of Brazilian Navy, Commander Antonio Claudio Vieira, expressed his pleasure at having had the opportunity to host the meeting in Brazil. Commander Vieira recognized that this event had brought benefits to both meeting participants and to the Brazilian Navy. He wished all participants an enjoyable stay in Brazil and a safe return journey home.

9.2.4 The SPA Coordinator pointed out the excellent achievements during the meeting, especially the establishment of a Core Membership for the ETMAES. He expressed his appreciation to have the participation of Chairpersons of both the ETWS and ETSI, SPA Coordinator and OFS Rapporteur, bringing together all Expert Team Chairpersons to work on a common theme of Maritime MetOcean Support and Safety Services. He concluded by thanking Mr Pierre Daniel for having chaired the meeting.

9.2.5 Speaking on behalf of all participants, Mr Valery Martyshchenko, thanked the ETMAES Chairperson, the Secretariat and the Brazilian Navy for his substantial input and support, both during the meeting and externally.

9.2.6 The First Session of the JCOMM Expert Team on Marine Accident Emergency Support closed at 12.30 hours on Wednesday, 31 January 2007.

**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 SPA Coordinator
2.2 Report of the Chairperson
2.3 Report of the Secretariat
2.4 Reports by AMOCs

**3. Products related to specific risks**

3.1 Report on Harmful Algal Blooms
3.2 Environmental data needs for planning maritime searches (SAR)
3.3 Report of the current status and potential for use of the operational ocean forecasting systems in MAES applications
3.4 Review MetOcean input data requirements, including satellites

**4. Coordination with other Organizations**

4.1 IMO Report
4.2 IHO Report
4.3 EMSA Report
4.4 Other

**5. Definition of boundaries and responsibilities for MPI areas**

**6. Review of WMO regulations and operational information**

6.1 Guidelines for delivery of information
6.2 Update of *Manual on Marine Meteorological Services* (WMO-No. 558) and *Guide to Marine Meteorological Services* (WMO-No. 471)
6.3 Training

**7. Information delivery**

7.1 Website
7.2 User feedback

**8. Review of ETMAES work plan**

**9. Closure of the session**
9.1 Adoption of the report
9.2 Closure

_____

**Annex III**

## SERVICE PROGRAMME AREA TOP LEVEL OBJECTIVES (TLOs)

Top Level Objectives (TLOs) for the Service Programme Area Work Plan, which are applicable to all activities of the ETMSS and other relevant Expert Teams within the SPA include:

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 Members/Member States 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 the 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 local, international, regional and global efforts to increase efficiency and capability including the relevant programmes of the WMO and IOC (e.g., 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**

**Meteorological and Oceanographic Parameters Needed for Planning Maritime Searches**
(**P** primary data required)
(**S** Secondary data required)

| **SAR Steps** | **Environmental Parameters** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Winds | Currents | SST | AST | Waves | Visibility | Cloud cover | Icing |
| Pre-Incident Voyage | | | | | **P** | | | **P** |
| Drift Trajectories | **P** | **P** | | | **S** | | | |
| Search Effort Allocation | **S** | | | | **S** | **P** | **S** | |
| Search Operations | **P** | | **S** | **S** | **P** | **P** | | **P** |
| Account for Previous Searches | **S** | | | | **S** | **P** | **S** | |
| Stopping the Case | **S** | | **P** | **P** | **S** | | | |

**Annex V**

**Terms of Reference for the Task Team on MetOcean Product Development**

- Keep under review and revise metocean product related contents of the *Manual on Marine Meteorological Services* and the *Guide to Marine Meteorological Services*.
- Review users' applications and requirements for metocean products in support of the MAES and advise on the availability of suitable products.
- Coordinate with the Task Team on Website to identify suitable products for inclusion on the ETMAES website, and with Task Team on Training and Outreach to advise on appropriate provision of training in the use of metocean products.
- Keep under review the availability of open source codes for ETMAES applications and provide recommendations on making these codes available.
- Provide advice on metocean model data intercomparisons and product validation, as requested.

Membership:

- OFS Rapporteur, Dr Adrian Hines (Leader)
- ETMAES Chairperson, Mr Pierre Daniel
- Representative from Brazil, Dr Emma Giada Matschinske
- Representative from Greece, Dr Petroula Louka
- Representative from Kenya, Ms Stella Aura
- Representative from Norway, Dr Bruce Hackett
- Representative from the United Kingdom, Mr Nick Ashton
- Representative from the United States of America, Mr David Feit
- Representative from the United States of America, Dr Arthur Allen (to be confirmed)
- Representative from the IMO Marine Environment Division (to be appointed)
- Representative from the ETSI (to be appointed at the ETSI-III Session)
- Invited Expert from the ASA, Brazil, Dr Eduardo Yassuda

**Annex VI**

**Terms of Reference of the Task Teams established in the ETMSS-II Session**

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

The Task Team (TT) will provide additional expertise to Expert Team on Sea Ice, Expert Team on Maritime Safety Services and Expert Team on Marine Accident Emergency Support in the following items:

- Survey user (e.g., shipmasters, ship-owners) requirements on PMSI, in particular related to sea ice and emergency situations, extend and update existing ETMSS questionnaires;
- Review standards for presentation and dissemination of PMSI (both binary and textual) via ground-based and satellite systems;
- Keep under review, in cooperation with the Satellite Rapporteur existing and prospective satellite and Automatic Information Systems (AIS) for PMSI dissemination including those coordinated by the IALA;
- Review and propose updates to existing WMO Publication Nos. 558 and 471;
- Keep under review scientific activities related to modelling scenarios of emergency situations, in particular related to the MPERSS;
- Keep under review existing and planned project(s)/work(s) on standards for coding and presentation of met-ocean information, in particular for sea ice and surface contaminants, within other relevant WMO bodies, including the WMO CBS, IHO and ISO levels;
- Review resources related to provision of PMSI existing within the NMS CB, and provide recommendations on training;
- 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)
- SPA Coordinator (Dr Craig Donlon)
- ETMSS Chairperson (Mr Henri Savina)
- Three Experts from the ETSI (Argentina (Captain Manuel Hipólito Picasso), Two Experts to be appointed during the ETSI-III session)
- Three Experts from the ETMSS (Finland (to be appointed), Canada (to be appointed), one additional Expert (to be appointed))
- One expert from the ETMAES (USA (to be appointed))
- IHO Representative (to be appointed by Mr Peter Doherty)

**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 the feedback of the Port Meteorological Officers (PMOs) and other channels used by the respective NMHSs;

2. Review the quality and content of sea-state information provided by 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 the 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 the appropriate authorities;

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

General Membership:

- Representative from Australia (to be appointed)
- Representative from Brazil (Lieutenant-Commander Rodrigo Obino)
- Representative from Mauritius (Mr Mohamudally Beebeejaun – Chairperson)
- Representative from the United Kingdom (Mr Nick Ashton)
- Representative from the United States of America (Mr Timothy Rulon)
- OPS Rapporteur (Dr Adrian Hines)
- Three Experts from the ETWS (to be appointed)

**REVISED TERMS OF REFERENCE OF AN EXPERT ON METOCEAN INFORMATION IN GRAPHICAL FORM**

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

- With the Expert Team on Maritime and Safety Services (ETMSS) and the Services Coordination Group (SCG), specify the need for a basic set of graphical and digital information for MSI;
- Keep under review existing and planned project(s)/work(s) on formats for coding and displaying metocean information on graphical form (especially objects), within the 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 issues;
- Liaise with the WMO Secretariat, IMO, IHO or other agencies/companies to facilitate consistency between the existing or planned WMO Standards and the WMO Information System (WIS);
- Report the status of the project(s) 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 the GMDSS.

The report by the Expert will be reviewed by members of the ETMSS, as appropriate, and be submitted to SCG-IV. After the review by SCG, the proposals will be submitted for approval to 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 the United States of America (Mr Timothy Rulon)
- Representative from the 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 expert from the ETMAES (USA (to be appointed))
- OFS Rapporteur (Dr Adrian Hines)

**Annex VII**

## IHO RESPONSE TO DISASTERS

### 1. Introduction.

In view of the severe hydrographic impact on Safety of Navigation caused by the recent tsunami disaster in the Indian Ocean and the consequent need for support; the International Hydrographic Organization, its Member States and Regional Hydrographic Commissions need to put in place procedures and guidelines such that they will be able to provide an immediate and appropriate response to any future disaster affecting coastal areas of the world. These procedures and guidelines should aim to ensure the immediate assessment of the damage, its affect on National and International shipping and to inform mariners and other interested parties of that damage, particularly with respect to navigational hazards. They should also identify actions required and support needed to recover from the damage. Actions will be coordinated by the IHB, in co-operation with the relevant Regional Hydrographic Commission(s), Member State(s) and other International Organizations, as appropriate.

The intention is to describe the procedures and provide guidance to be followed, at National, Regional and International level within the structure of the IHO; it is not to establish or operate disaster warning systems and services.

### 2. Procedures and Guidelines.

#### a. By Member States.

Each Member State should develop an action plan to be undertaken in the case of a disaster in coastal areas under its jurisdiction. It is very important that each State provides a point of conduct for communication purposes; this should be the Director of the Hydrographic Service or Maritime Safety Agency or other appropriate person familiar with maritime procedures. These plans will contain, as a minimum, the following key elements:

- Assess the extent of damage to the coastal area particularly to ports, harbours, straits, approaches, restricted areas etc.
- Assess, in co-operation with other National Agencies, e.g. Lighthouse Authorities, Port Authorities, the extent of damage to navigational aids.
- Undertake preliminary re-surveys, as soon as possible, starting with the navigationally most sensitive areas in order to evaluate the specific effects on shipping and ensure the continuation of support and supplies through maritime channels and ports, marking new dangers where necessary.
- Promulgate warnings and advice to shipping as appropriate through existing channels (NAVTEX, SafetyNet). Co-operate with the NAVAREA Coordinator and other National co-ordinators so that this information can be made available to the mariners as soon as possible and beyond the area of national jurisdiction.
- Inform the Chairman of the Regional Hydrographic Commission and the IHB of the situation, providing details of the damage, actions taken and indicating what support, if any, is needed.
- Assess and define any new hydrographic / cartographic requirements.
- Provide follow up reports to the Chairman of the Regional Commission and the IHB.

#### b. By Regional Hydrographic Commissions.

The Chairman of the Regional Hydrographic Commission will be responsible for co-ordinating the actions needed within the Region. In order to achieve this the RHC should develop a ‘disaster’ action plan, aimed at supporting States in the area to assess the

hydrographic damage, provide support and co-ordinate actions and efforts. These plans will be focused on the following:

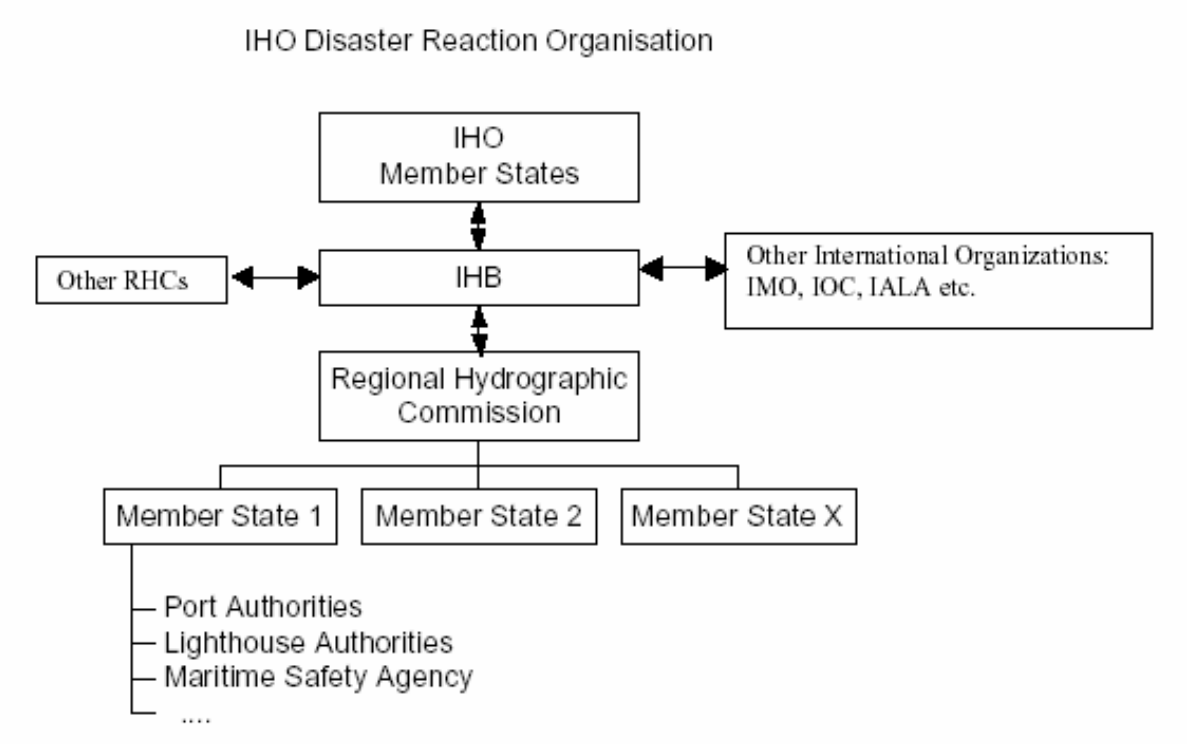
- Communicating, by the quickest means available, with the focal points of the States in the Region, in order to make an initial evaluation of the extent of the damage.
- Deciding whether a Regional technical task team needs to visit States in the area to support the evaluation of the damage and support needed.
- Deciding, based on the information collected, whether an Extraordinary Meeting of the RHC is needed, in order to discuss in detail the problems, evaluate the damage and respond to requests for support.
- Deciding if the Chairman needs to take a co-ordinating role in assessing damage, providing support and broadcasting information to mariners.
- Informing the IHB on the situation, the actions taken and the need, if any, for external support.
- Monitoring the progress of the actions agreed in the area, keeping Member States in the Region and IHB informed accordingly.
- Including this issue as a permanent Agenda item on RHC meetings in order to monitor the readiness of the Commission to respond to disasters and conducting regular table-top exercises to evaluate the procedures.

**c. By the IHB.**

The IHB will co-ordinate the actions required of Member States and Regional Hydrographic Commissions in order to assess damage and will co-operate with other International Organizations as appropriate to co-ordinate any external support required. The IHB will undertake the following tasks:

- Communicate with the Member States and Chairmen of the Regional Hydrographic Commissions in order to collect information relating to the scale of the damage, actions taken, the support needed and the desirability of a regional meeting.
- Participate as appropriate in meetings organized by the RHC or Member States, to determine problems and the actions required to remedy the situation.
- Co-operate with other International Organizations, informing them of matters affecting the safety of navigation, the needs of Member States, actions taken and seeking where appropriate support from these Organizations for the repair of the damage.
- Invite other International Organizations to participate in Regional Meetings, in order to contribute to the discussions and to the required actions.
- Monitor developments and inform Member States on all issues associated with the damage, actions taken and support needed.
- Investigate the willingness of Member States to provide support and co-ordinate the appropriate actions with the affected States in close cooperation with the Chairman of the RHC.
- Participate in discussions at RHC meetings to monitor requirements, develop responses to possible disasters and test the procedures and readiness to respond by table-top exercises.

**3. IHO Disaster Reaction Organization**



**Annex VIII**

**REVISED METOCEAN INPUT DATA REQUIREMENTS
FOR MARINE ACCICENT EMERGENCY MONITORING AND RESPONSE**

**Basic principles:**

- Nowcast, forecast (short and medium-term), and short-term archive weather, oceanographic and sea-ice information should be made available for the incident site.
- Regional models should be used to ensure coverage of the MPERSS areas.
- Optimal use should be made of the combination of *in situ* and remotely-sensed observations together with numerical models (preferably with data assimilation where available).
- Priority focus should be on the high-risk areas of coastline, shipping routes, ports, navigation hazards or regions that are known as major problem areas for shipping or oil production/exploration platforms.
- Fast communication of met-ocean data and numerical model outputs is essential for the MPEROAs across the MPERSS regions.
- Effective electronic data communications methods should be established for the MPEROAs.
- The data must be in a form that meets user requirements in quality, accuracy and presentation needs as specified by the ETMAES.
- Spill models should be ground-truthed using observations to ensure the accuracy and performance and to assist in the refinement of algorithms.
- Procedures should be in place for an NMS to provide the required information as quickly as possible when a request is received.
- Routine weather, oceanographic and sea-ice bulletins should be provided in addition to the response to a request for more specific advice.

**Activities requiring environmental information**

The particular activities that require environmental information input for specific applications are:

**A. Vessel and crew safety and support:**

To ensure safety of life and reduce the potential of further pollution following an incident, metocean information will be required for:

- A1: Crew safety and evacuation;
- A2: Drifting of a vessel;
- A3: Salvage operations;
- A4: Cargo removal and lightering.

**B. Pollution at sea (including oil, chemicals and cargo containers)**

This can be addressed through spill and drift trajectory modeling using either fixed or dynamic metocean data. The trajectory models to be used vary in complexity, cost and depending upon the geographic area of need, with different input data requirements (e.g., open sea (primarily influenced by ocean currents and winds) or near shore (influence of tidal conditions and winds). Knowledge of the chemical, physical and biological properties of the pollutant from the beginning of the incident is essential for prediction of the outcome. The extent of weathering of the pollutant at sea affects the choice of response procedures to be used to combat the spill. The primary function in response to these incidents is to determine:

- B1: 3-dimensional movement direction and speed;
- B2: 3-dimensional spreading and dispersion of the pollutant;
- B3: Weathering of the pollutant;

- B4: Stranding of the pollutant.

**C. Support for Marine Pollution Emergency Response Operation Authorities (MPEROAs)**

MPEROAs will require both the archived and real-time met-ocean information to support the planning and carrying out of field operations in response to incidents. The activities to be supported include:

- C1: Planning (scenario development);
- C2: Logistics/equipment (limitations of use under certain sea-states);
- C3: Recording of response actions and decision support information.

**D. SAR Operations**

Response to SAR cases may involve some or all of the following activities requiring support:

- D1: Planning based on pre-incident voyage;
- D2: Prediction of drift trajectories;
- D3: Search effort allocation;
- D4: Search operations;
- D5: Account for previous search effort;
- D6: Decision to stop the case.

**E. Preparedness for, and response to algae blooms**

Preparedness for response to the occurrence of algae blooms depends on the provision of indicators of the risk of blooms. The response to algae blooms also depend on knowledge of ocean transport and the evolution of the bloom itself. Operations carried out in response to (a) bloom(s) may include relocating aquaculture and restricting access to bathing waters. The activities that require metocean data inputs are as follows:

- E1: Identification of conditions conducive to blooms;
- E2: Direction of further monitoring;
- E3: Determine spreading and landfall of the bloom;
- E4: Operations in response to the bloom.

**Metocean parameter requirements**

Table 1 contains details of the Metocean data requirements for each of the tasks that are required to be undertaken in response to incidents. It should be noted that requirements for sea-ice and iceberg information are only applicable for operations in ice infested waters.

Requirements for data latency and updating frequency, together with temporal and spatial sampling requirements will depend upon the nature and location of a particular incident.

Table 2 provides details of sources typically used to meet particular data requirements. This table is not intended to provide an exhaustive list. Field data sources refer to observed data other than that measured by satellite. Optimal use should be made of the combination of data from the different sources. *[Advice required from a HAB expert to complete Table 2]*

| Response activity | | Environmental information requirement |
|---|---|---|
| **A. Vessel safety and support** | A1: Crew safety and evacuation | Sea-state<br>Surface winds<br>Visibility |
| | A2: Drifting of the vessel | Surface winds<br>Surface and near-surface currents<br>Sea-state<br>Sea-ice<br>Bathymetry / shoreline |
| | A3: Salvage operations | Surface winds<br>Sea-state<br>Sea-ice<br>Lightning<br>Surface and near-surface currents<br>Visibility<br>Bathymetry / shoreline |
| | A4: Cargo removal and lightering | Surface winds<br>Sea-state<br>Sea-ice<br>Lightning<br>Visibility<br>Bathymetry / shoreline |
| **B. Pollution at sea** | B1: Movement direction and speed | Surface winds<br>3-D ocean currents<br>Sea-state<br>Sea-ice<br>Ocean density |
| | B2: Spreading of the pollutant | Surface winds<br>3D ocean currents<br>Sea-state<br>Sea-ice<br>Ocean density<br>Bathymetry / shoreline |
| | B3: Weathering of the pollutant | Sea-state<br>Precipitation<br>Air temperature<br>Sea temperature<br>Ocean density |
| | B4: Stranding of the pollutant | 3D ocean currents<br>Bathymetry / shoreline |
| **C. Support for MPEROAs** | C1: Planning (scenario development) | Surface winds<br>Sea-state<br>Surface / tidal currents<br>Sea-ice<br>Bathymetry / shoreline |
| | C2: Logistics / equipment (limitations of use under certain sea states) | Sea-state<br>Sea-ice<br>Surface winds |
| | C3: Recording of response actions and decision support information for cost recovery. | Data as used in the response as appropriate |

| | | |
|---|---|---|
| **D. SAR Operations** | D1: Planning based on pre-incident voyage | Sea-state<br>Ice accretion<br>Sea-ice |
| | D2: Prediction of drift trajectories | Surface winds<br>Surface currents<br>Sea-state<br>Bathymetry / shoreline<br>Sea-ice |
| | D3: Search effort allocation | Surface and upper air winds<br>Sea-state<br>Sea-ice<br>Visibility<br>Cloud cover |
| | D4: Search operations | Surface winds<br>Sea-state<br>Visibility<br>Sea-surface temperature<br>Surface-air temperature<br>Sea-ice |
| | D5: Account for previous search effort | Surface winds<br>Sea-state<br>Visibility<br>Cloud cover<br>Sea-ice |
| | D6: Decision to stop the case | Surface winds<br>Sea-state<br>Sea-surface temperature<br>Surface-air temperature<br>Sea-ice |
| **E. Preparedness for, and response to algae blooms** | E1: Identification of conditions conducive to blooms | *[Advice required from a HAB expert]* |
| | E2: Direction of further monitoring | *[Advice required from a HAB expert]* |
| | E3: Determine spreading and landfall of the bloom | *[Advice required from a HAB expert]* |
| | E4: Operations in response to the bloom | *[Advice required from a HAB expert]* |

**Table 1: Metocean data requirements**

| Parameter | Field data sources | Satellite data sources | Numerical model and analysis data sources |
|---|---|---|---|
| Sea-state | Wave buoys.<br>Ship observations.<br>Oil platforms.<br>Coastal HF radar. | Satellite altimetry (wave height data).<br>Synthetic Aperture Radar data. | Wave model analysis and forecast systems. |
| Surface-wind | Moored buoys.<br>Drifting buoys.<br>Ship observations.<br>Oil platforms. | Scatterometer data.<br>Satellite altimetry. | NWP analysis and forecast systems. |
| Surface and sub-surface currents | Drifting buoys.<br>Moored buoys.<br>Current profilers.<br>Coastal HF radar. | Satellite altimetry (surface only). | Ocean analysis and forecasting systems.<br>Surface current analysis systems. |
| Lightning | Lightning detection systems. | Satellite-based detection. | |
| Visibility | Ship observations.<br>Coastal Stations. | | NWP analysis and forecast systems. |
| Sea ice | Ship observations.<br>Coastal stations.<br>Ice mass balance buoys. | AMSR / SSM/I / AVHRR satellite data.<br>Satellite altimetry.<br>Synthetic Aperture Radar data.<br>Scatterometer data. | Ice chart.<br>Coupled ocean - sea-ice - atmosphere analysis and forecast systems. |
| Precipitation | Ship observations.<br>Coastal stations.<br>Oil platforms.<br>Weather radar. | | NWP analysis and forecast systems. |
| Air temperature | Ship observations.<br>Coastal stations.<br>Oil platforms.<br>Moored buoys (surface only)<br>Drifting buoys (surface only) | | NWP analysis and forecast systems. |
| Ocean temperature and density | Argo floats.<br>Ship observations.<br>Moored buoys.<br>Drifting buoys. | | Ocean analysis and forecast systems. |
| Ice accretion | Ship observations. | | NWP analysis and forecast systems. |
| Cloud cover | Ship observations.<br>Coastal stations. | Passive radiometry satellite data.<br>Geostationary satellite data. | NWP analysis and forecast systems. |

| | | | |
|---|---|---|---|
| | Oil platforms. | | |
| Sea-surface temperature | Argo floats.<br>Ship observations.<br>Moored buoys.<br>Drifting buoys. | Infrared satellite data.<br>Microwave satellite data. | SST analysis systems.<br>Ocean analysis and forecast systems. |
| Surface-air temperature | Ship observations.<br>Moored buoys.<br>Drifting buoys. | | NWP analysis and forecast systems. |
| Bathymetry / shoreline | Aerial photographs. | Satellite imagery. | Bathymetric chart data.<br>Gridded bathymetric datasets. |

**Table 2: Sources of Metocean data**

## 2.3 Meteorological services in support of maritime search and rescue

### 2.3.1 *Maritime search and rescue*

Under the GMDSS, Rescue Coordination Centres (RCCs) are responsible for coordinating search and rescue of ships in distress in each SAR region (links to IMO COMSAR to review issues). The success of a search and rescue operations depend to a large extent on the meteorological and oceanographic information available to the RCC. Survivors may be aboard an open small boat which will drift with the wind, waves, tides and currents and search areas may be extensive if the position of the survival craft is not known with any degree of accuracy. Also, it may be extremely difficult to see a small craft in conditions of poor visibility. The use made of meteorological and oceanographic information by a RCC is shown in the relevant extracts from the IMO Search and Rescue Manual, reproduced in Annex 2.F of this Chapter.

### *2.3.2 Marine meteorological supporting services*

The procedures which should be followed when providing marine meteorological and oceanographic services to maritime search and rescue operations are described in Volume I, Part I, Paragraph 3.2 of the *Manual on Marine Meteorological Services.*

In an emergency situation, meteorological and oceanographic information will be required quickly, and procedures should be in place for an NMS to provide the required information to an RCC as quickly as possible when a request is received. This requires the RCC to be kept informed of the addresses of relevant forecasting centres and the available means of communication. It is also recommended that there is agreement between the respective NMS(s) and the RCC(s) on the standard format of the information that is required as this would save time when a request is initiated. The parameters required are described in detail in [*refer to Annex here*]. Alongside the general meteorological forecasts, specific metocean data requirements can be summarized as follows:

- Sea-state;
- Icing;
- Surface winds;
- Surface / tidal currents;
- Visibility;
- Cloud cover;
- Sea-surface temperature;
- Surface-air temperature;
- Atmospheric pressure; and
- Sea ice.

It is a useful practice to supply the RCC with routine weather and sea bulletins, so that in an emergency, the RCC has at least a general forecast of the weather and oceanographic conditions in the area while waiting for the response to a request for more specific advice. On many occasions, when the weather is benign, the routine bulletins will be sufficient for RCC purposes.

**Annex IX**

## Terms of Reference for the Task Team on Training and Outreach

- Provide advice on the availability of training resources; prepare an inventory of existing training resources and provide advice on the target users (Stages);
- Link to the Task Team on MetOcean Product Development;
- Provide recommendations for the content and form of technical, scientific and users (e.g., maritime authorities) workshops;
- Identify opportunities to use existing training material and/or develop new material for use as e-learning tools (such as OceanTeacher and/or Bilko lesson);
- Identify suitable information and provide material on the website, as appropriate and or/as necessary
- Link to the Task Team on the Website to identify contents to be included in the MAES website.

Membership:

- Representative from the *Cedre*, Dr Claudine Tiercelin (Leader)
- Representative from Brazil, Rodrigo Obino
- Representative from Kenya, Ms Stella Aura
- Representative from Mauritius, Mr Mohamudally Beebeejaun
- Representative from Norway, Dr Bruce Hackett
- Representative from South Africa, Mr Tshepho Ngobeni
- Representative from the United Kingdom, Dr Adrien Hines
- Representative from the United States of America, Mr David Feit

**Annex X**

## Terms of Reference for the Task Team on the Website

1. To review and revise the existing MPERSS website;
2. To provide guidance on the content, as appropriate;
3. Implement a new MPERSS experiment under the SPA, prepare a parallel of the existing MPERSS on the JCOMM services website;
4. Develop a template for providing information on the website;
5. Advice the AMOCS on the provision of their information for the website;
6. Moderate the MPERSS website and the JCOMM Services website;
7. Provide guidelines on outreach material which can be made available on the website;
8. To develop a facility for wide-ranging feedback;
9. Link to the Task Team on Training and Outreach to identify contents to be included in the MAES website.

Membership:

- Representative from France, Mr Pierre Daniel (Leader)
- Representatives from Brazil, Commander Augusto Silva and Lieutenant-Commander Carla Cordeiro
- Representative from Mauritius, Mr Mohamudally Beebeejaun
- Representative from the United Kingdom, Mr Nick Ashton
- Invited Expert from the ASA, Dr Eduard Yassuda

**Annex XI**

## LIST OF ACTIONS

| Para | Action | By whom | When/target |
|---|---|---|---|
| MAES-I 2.4.2 j) | To develop lesson scenarios on MAES applications using existing tools (Bilko and/or OceanTeacher) | TT on Training and Outreach | JCOMM-III |
| MAES-I 2.2.4 | To establish a close collaboration with the IMO, IHO and EMSA | Secretariat | ASAP |
| MAES-I 2.4.2 h) and 3.3.10 | To review the availability of Open Source codes for the ETMAES applications and promote the use of these codes | TT on MetOcean Products Development | ASAP/Continuing |
| MAES-I 2.4.3 | To inform the Secretariat of any changes to their list of contact points for the MPERSS | AMOCs | Continuing |
| MAES-I 2.4.3 | To improve the SPA website by including MPERSS information and promote ETMAES activities, in particular SAR capabilities in the SPA website | TT on Website | ASAP |
| MAES-I 3.1.4 | To discuss the potential use of Operational Ocean Forecasting Systems to the prediction of nuisance and HABs at the IPHAB | Secretariat and OFS Rapporteur | April 2007 |
| MAES-I 3.2.4 | To nominate a leader on SAR operations | Secretariat and ETMAES Chairperson | ASAP |
| MAES-I 4.1.4 | To strengthen relationships and synergize the work of the OPRC-HNS and ETMAES in the area of marine pollution preparedness for and response to maritime-related accidents | Secretariat | Ongoing |
| MAES-I 4.1.4 | To exchange the OPRC-HNS Work Plan and the ETMAES in the hope to determine possible opportunities for collaboration | Secretariat and ETMAES Chairperson | ASAP |
| MAES-I 4.1.5 | To ensure that participation in relevant meetings and sessions of the IMO Marine Environment Protection Committee, IMO Maritime Safety Committee and appropriate Sub-Committees are met | Secretariat | Continuing |
| MAES-I 4.3.3 | To convene a meeting between the Secretariat, the ETMAES Chairperson, SPA Coordinator and EMSA Representatives | Secretariat | ASAP |
| MAES-I 4.4.4 | To consider *Cedre* activities to develop training modules on the MAES | TT on Training and Outreach | Ongoing |
| MAES-I 4.4.7 | To enhance the cooperation with regional organizations especially in the framework of the MAES activities | Secretariat | Ongoing |
| MAES-I 5.2 | To keep the ETMAES informed on the progress of the definition of Arctic NAV/METAREAs | Secretariat | Ongoing |
| MAES-I 6.3.2 | To create a database, identifying capabilities and gaps for each country, on the MPERSS, implementation, provision of MSI and support of SAR operations | Secretariat | 2007 |
| MAES-I 6.3.4 | To establish links with the GODAE and ESA on Bilko lessons | TT on Training and Outreach | ASAP |

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|---|---|---|---|
| MAES-I 7.1.3 | To maintain and update relevant information for each respective AMOC and/or contribute with other content to the SPA website | AMOCs | Continuing |
| MAES-I 7.2.1 | To review and revise the questionnaire on MPERSS | TT on Training and Outreach | ASAP |
| MAES-I 7.2.1 | To create an online questionnaire on the MPERSS based on the revised version | TT on Website | ASAP |
| MAES-I 8.2 | To evaluate the possibility to merge the ETMSS and ETMAES | Secretariat, ETMSS and ETMAES Chairpersons | Proposal for revision by SCG-IV/Final endorsement by the JCOMM-III |
| MAES-I 8.3 | To officially request Members to confirm the nomination of the appointed experts during the session | Secretariat | ASAP |

**Annex XII**

## ACRONYMS AND OTHER ABBREVIATIONS

| | |
|---|---|
| AIS | Automatic Identification System |
| AMOC | Area Meteorological and Oceanographic Coordinator |
| AST | Air Surface Temperature |
| CB | Capacity Building |
| CBS | Commission for Basic Systems (WMO) |
| CPPS | Permanent Commission of South Pacific |
| DPM | Disaster Prevention and Mitigation (WMO) |
| ECUME | Etude Cartographique des Urgences. en MEr |
| EMSA | European Maritime Safety Agency |
| ESA | European Space Agency |
| ET | Expert Team |
| ETMAES | Expert Team on Marine Accident Emergency Support |
| ETMSS | Expert Team on Maritime Safety Services |
| ETSI | Expert Team on Sea Ice |
| ETWS | Expert Team on Wind Waves and Storm Surges |
| GCOS | Global Climate Observing System |
| GEO | Group on Earth Observation |
| GEOHAB | Global Ecology and Oceanography of Harmful Algal Blooms |
| GEOSS | Global Earth Observation System of Systems |
| GMDSS | Global Maritime Distress and Safety System |
| GMES | Global Monitoring for Environment and Security |
| GODAE | Global Ocean Data Assimilation Experiment |
| GOOS | Global Ocean Observing System |
| HAB | Harmful Algal Blooms |
| HNS | Hazardous and Noxious Substances |
| ICAO | International Civil Aviation Organization |
| ICS | International Chamber of Shipping |
| IHO | International Hydrographic Organization |
| IMMSC | International Maritime Metocean Services Conference |
| IMO | International Maritime Organization |
| IMSO | International Mobile Satellite Organization |
| IOC | Intergovernmental Oceanographic Commission |
| IODE | International Oceanographic Data and Information Exchange (IOC) |
| ISO | International Standards Organization |
| IPHAB | Intergovernmental Panel on Harmful Algal Blooms |
| JCOMM | Joint WMO/IOC Technical Commission for Oceanography and marine Meteorology |
| LRIT | Long-range Identification and Tracking Systems |
| MAES | Marine Accident Emergency Support |
| MCS | Fast Track Marine Core Service |
| MED | IMO Marine Environment Division |
| MIO | Marine Information Objects |
| MOTHY | Modèle Océanique de Transport d'HYdrocarbures |
| MPERSS | Marine Pollution Emergency Support System |
| MPI | Marine Pollution Incident |
| MSI | Maritime Safety Information |
| NMHS | National Meteorological and Hydrological Service |
| NMS | National Meteorological Service |
| OFS | Operational Ocean Forecasting System |
| OPA | Observations Programme Area |
| OPRC | International Convention on Oil Pollution Preparedness, Response and Cooperation |
| PACPLAN | Pacific Islands Regional Marine Spill Contingency Plan |
| PMSI | Polar Maritime Safety Information |
| RA | Regional Alliances |

| | |
|---|---|
| ROCRAM | Operative Network of Regional Cooperation between Maritime Authorities of South America, Cuba, Mexico and Panama |
| SAR | Search and Rescue |
| SCG | Services Coordination Group |
| SCOR | Scientific Committee on Oceanic Research |
| SPA | Services Programme Area |
| SST | Sea Surface Temperature |
| TLO | Top Level Objectives |
| TT | Task Team |
| VOS | Voluntary Observing Ship |
| WCP | World Climate Programme (WMO) |
| WIS | WMO Information System |
| WMO | World Meteorological Organization |
| WWNWS | World-Wide Navigational Warning Service |
| WWW | World Weather Watch (WMO) |