



JOINT WMO/IOC TECHNICAL COMMISSION FOR
OCEANOGRAPHY AND MARINE METEOROLOGY

JCOMM EXPERT TEAM ON OPERATIONAL OCEAN FORECASTING SYSTEMS FOURTH SESSION

College Park, USA, 25-29 March 2013

FINAL REPORT

**JCOMM EXPERT TEAM ON OPERATIONAL
OCEAN FORECASTING SYSTEMS
FOURTH SESSION**

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JCOMM Meeting Report No. 102

NOTES

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GENERAL SUMMARY OF THE WORK OF THE SESSION

1 OPENING OF THE SESSION

1.1 OPENING

1.1.1 On behalf of Dr Gary Brassington, Chairperson of the Expert Team on Operational Ocean Forecasting Systems (ETOOFS) of the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM), Dr Ming Ji opened the Fourth Session of the ETOOFS at 10:00 Monday 25th March 2013, at the NOAA Centre for Weather and Climate Prediction (NCWCP), Maryland, USA.

1.1.2 Dr Ming Ji, local host and Chairperson of the Services and Forecasting Systems Programme Area (SFSPA) of JCOMM welcomed all experts present.

1.1.3 Dr Gary Brassington recalled the main objective of the session to review decisions and recommendations relevant to ETOOFS at JCOMM-4 Session (May 2012, Yeosu, ROK), particularly the intersessional workplan (2012-2017) of JCOMM.

1.2 TEAM INTRODUCTIONS

1.2.1 Team members and invited experts introduced themselves about background and specialties. List of participants was in Annex II.

1.3 WELCOME SPEECH BY DR WAYNE HIGGINS

1.3.1 Dr Wayne Higgins, acting director of NCEP, welcomed all participants of ETOOFS-4 to the new NOAA Centre for Weather and Climate Prediction (NCWCP). He iterated importance of weather, environment, and climate predictions based on data for national and international benefit to save life and property. Five out of nine centres of NCEP are located now in the Centre, with broad coverage of services for weather/climate predictions. Global ocean forecast system has been operational since 2007, and is capable to track radioactive discharge. There has been years of experience of climate prediction and interactions with ocean community, and both Climate Forecast System (CFS) and Operational Forecast System (OFS) are critical within NCEP. Dr Higgins wished everybody a successful meeting. A guided tour open to the public was then organized by Dr Ming Ji and Dr Hendrik Tolman on Thursday 28th March afternoon.

1.4 ADOPTION OF THE AGENDA

1.4.1 The team adopted the agenda for the session on the basis of the provisional agenda prepared by the Chairperson and the Secretariat (Annex I).

1.5 WORKING ARRANGEMENTS

1.5.1 The team agreed on the working hours and other practical session arrangements. Documentation and the meeting were in English only. Detailed documents and presentations are available online: <http://jcomm.info/etoofs4>.

2. GENERAL BUSINESS

2.1 GUIDANCE FROM JCOMM AND WMO-IOC

Guidance from JCOMM and SCG

2.1.1 Dr Ming Ji, JCOMM Services and Forecasting Systems Programme Area (SFSPA) Coordinator, reported on JCOMM intersessional workplan (2012-2017) and SCG-7 (4-6 March 2013, Tokyo, Japan) decisions relevant to ETOOFS.

2.1.2 The Team noted the priority activities for ETOOFS defined through JCOMM-4 and subsequent discussion at SCG-7 as follows. Details were covered in respective agenda items:

- to complete the first Guide to Operational Ocean Forecasting Systems,
- to develop next generation of performance metrics by coordination with Global Ocean Data Assimilation Experiment (GODAE) OceanView (Agenda 8),
- to develop Ocean Extremes Monitoring System, and to lead coordination in development of capability in Marine Pollution Emergency Response Support Systems (MPERSS) with IAEA and partners, etc.

2.1.3 The Team also noted the JCOMM workplan (2012-2017) for SFSPA, describing planned activities through thirty one “projects”, and emerging requirements from the oceanographic and meteorological communities. Nine projects (See Annex III) will be coordinated by ETOOFS or jointly with other JCOMM Expert Teams (ETs).

- Project#1: Complete guide for operational ocean forecasting system
- Project#2: Observational requirements
- Project#3: Performance monitoring
- Project#4: Ocean extremes monitoring system
- Project#6: Coordination in seasonal climate forecast system
- Project#24: Development of ocean emergency response support capability

Project#25: Develop oceanic radioactive hazard tracking system for enhanced MPERSS

Project#30: Task Team on JCOMM coordination for marine environmental emergency responses

Guidance from IOC

2.1.4 The Team noted that IOC Executive Council at its 45th Session (June 2012, Paris, France) accepted decisions/recommendations of JCOMM-4 Session, and appreciated success of JCOMM all three Programme Areas (including SFSPA), and encouraged further efforts for sustained observations and services.

Guidance from WMO

2.1.5 Dr Boram Lee, WMO Secretariat, reported on the relevant decisions to the work of JCOMM and of the Team, which were made at the 64th Session of the WMO Executive Council (June 2012, Geneva, Switzerland). All the decisions, resolutions, and recommendations of JCOMM-4 were adopted through WMO Resolution 2 (EC-64). [Report of the fourth session of the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology.](#)

2.1.6 The Team took note of WMO's ongoing efforts for, and progress in, the establishment of the Global Framework for Climate Services (GFCS). Recalling that contributing to GFCS implementation for marine and coastal communities should be a high priority for the intersessional period, the Team noted that JCOMM's core mandates directly support the implementation of GFCS; including maritime safety services, marine and coastal emergency responses and risk reduction. The Team agreed to coordinate jointly with other ETs and entities to achieve these.

2.2 CHAIRPERSON REPORT

2.2.1 Dr Gary Brassington reported on activities of himself and the Team after JCOMM fourth session. Activities included ETOOFS team teleconference (24 October 2012) and teleconferences with Co-presidents (29 November 2012), and SCG-7(4- 6 March 2013). Dr Brassington also reported the fourth Session of GODAE OceanView Science Team (GOVST-4, 5-9 November 2012, Rio de Janeiro, Brazil), Joint workshop (co-organized by Dr Brassington) of GOV Working Group for Numerical Experimentation (GOV/WGNE, 19-21 March, 2013, Washington DC, USA).

2.2.2 The Team had a teleconference on 24th October 2012, and preliminarily assigned leaders to projects of ETOOFS. The Chair also had a teleconference on 29th November 2012 with Co-presidents to brief status and work of the Team and received presidency comments for further actions. SCG-7 presented detailed guidance and instructions to the Team, and had been covered by Dr Ming Ji's report (Agenda 2.1) with particular attention to guide writing, coordination for marine environmental emergency responses, contribution to GFCS implementation, and capacity development from the Team.

2.2.3 The GOV/WGNE workshop addressed observations, physical parameterization, modeling initiation and bias, and data assimilation. Evidence was found in the importance of coupled modeling for both short range and medium range forecasting. The coupled model then placed additional requirements on observing system for air-sea parameterization and systematic bias. The Team also noted close connection and coordination with GODAE OceanView in its scientific capacity to address operational ocean forecasting system, and appreciated GOV's progress in numerical experimentation and other activities.

2.3 GOV AND GOVST-4

2.3.1 Dr Eric Dombrowsky, co-chair of GODAE OceanView (GOV), reported on the activities of GOV and GOVST-4. GODAE OceanView is an international forum for operational oceanography scientists. It has a science team, 5 task teams, a patron group, and a project office based in Exeter, UK. Dr Dombrowsky pointed out that ETOOFS has continuous connections with GOV through overlapping membership from its establishment, but there is no formal link between the two. The reason lies in the status differences between the two sides. The team fully recognized complimentary role of GOV in scientific preparedness of Operational Ocean Forecasting Systems (OOFs), and reaffirmed to continue and strengthen coordination in operational oceanography. The team would review workplan and/or strategy of GOV as appropriate to bridge the gap/mismatch between the two parties. (ACTION; led by ET Chair; continuous)

2.3.2 Noting upcoming [scientific symposium and review of GOV](#) (4-8 November, 2013, Washington DC, USA) and considering specific progress in observational requirements, OOFs performance metrics, the team proposed a side meeting after the symposium to consult and update relevant themes, but not necessarily to cover all topics of ETOOFS workplan. The ETOOFS chair acknowledged his invitation to attend and indicated his as yet unconfirmed intention to attend. Members of the team were encouraged to attend the meeting. The Team requested the Secretariat to keep track of the meeting and themes, and proposed feasible side meeting agenda accordingly. The Team also noted the next GOVST meeting will probably held in China first half of 2014.

2.4 GOV-COSS-TT2

2.4.1 Dr Marina Tonani reported on the 2nd meeting of GODAE OceanView Coastal Ocean and Shelf Seas Task Team (GOV-COSS-TT2) held on 4-7 Feb 2013, in Lecce, Italy.

2.4.2 The Team noted that COSS-TT aims to coordinate and support multidisciplinary analysis and forecast in coastal zones and shelf/open ocean exchanges of physical and biogeochemical processes. The Team recognized what was discussed at ETOOFS4 (in integrated coastal observations, establishment of regional alliances, international collaboration) was relevant to observational requirements and other objectives of ETOOFS. In that sense, the Team expressed appreciation and interest to follow progress in COSS-TT, as in other GOV TTs.

2.5 NOMINATION OF VICE-CHAIRPERSON FOR ETOOFS

2.5.1 To ensure succession of the ET leadership, the Team nominated Dr Fraser Davidson (Canada) as vice chairperson for ETOOFS. The Team agreed on the nomination, and procedures will be followed in due manner for consideration and decision of JCOMM Co-presidents.

3. OBSERVATIONAL REQUIREMENTS

3.1 UPDATES OF OBSERVING SYSTEMS

3.1.1 Dr David Legler, Chief of Climate Observation Division, NOAA Climate Prediction Centre (CPC) gave a comprehensive presentation of status of in situ and satellite observing systems in service. The Team noted that GOCS Implementation Plan placed guidance to Observations Programme Area (OPA) implementation goal, prioritizing completion and maintenance of observing system, supporting the United Nations Framework Convention for Climate Change (UNFCCC). The Team also noted non-climate observing requirements will be reviewed in line with the WMO Rolling Review of Requirements.

3.1.2 The Team noted with concerns on the challenges in maintaining Tropical Atmosphere Ocean Array (TAO, currently maintained by Japan and USA), where 21 out of 56 stations do not report in real time, due to inadequacy of services of the arrays, vandalism, and shortfall of funds. The Team appreciated NOAA's TAO internal working group to deal with relevant issues and the international workshop on the Future of the Tropical Pacific Ocean Observing with a view to developing international resourcing strategy and partnership. The Team requested members to communicate with national observing programmes for contributions towards GOOS in the tropical observations.

3.1.3 The Team also noted that the current status of global network for surface drifting buoys didn't meet the designed target that is based on the Global Climate Observing System Implementation Plan (GCOS-92), lacking international contributions from wider range of countries/community. The Team requested members to communicate with national observing programmes within scope of the Working Group for Sea Surface Temperature (SST), to review and include drifting buoys in SoG for surface current verification and applications in dispersion and trajectory modeling.

3.2 TELECONFERENCE FOR OBSERVATIONAL REQUIREMENTS

3.2.1 Dr Gary Corlett, Project Coordinator of Group for High Resolution SST (GHRSSST), presented the progress and status of GHRSSST activities. GHRSSST has provided operational users and science community with SST measured by the satellite constellation, and a framework for SST data sharing, best practices for data processing and a forum for scientific dialogue.

3.2.2 The Team agreed that GHRSSST could contribute to WMO OSCAR in identifying gaps and support planning integrated global observing systems, GHRSSST requirements from OOFs in data assimilation, quality control, product usage and latency, and observing system experiments. In turn, GHRSSST would feedback in short-term (1-2 years) and longer-term (10-20 years). The Team therefore proposed potential GHRSSST and ETOOFS coordination in reviewing OOFs requirements for SST, identifying SST priorities and trade-offs for OOFs, and identifying gaps in SST measurement systems to support OOFs.

3.2.3 In addition, the Team recommended

- replacing reference dataset after loss of Advanced Along-Track Scanning Radiometer (AATSR), e.g. high quality subset of Meteorological Operational satellite programme (MetOp) Advanced Very High Resolution Radiometer (AVHRR),
- redundant capability in microwave SST measurements after loss of Advanced Microwave Scanning Radiometer for Earth Observing System (AMSR-E) (e.g. scanning microwave radiometer on HY-2 series),
- Geostationary SST over Indian Ocean to support future coupled assimilation (e.g. relocate MeteoSat-8),
- Being included in Committee on Earth Observation Satellites (CEOS) and presented to Coordination Group for Meteorological Satellites (CGMS) in summer (8-12 July 2013, Japan).

3.2.4 The Team decided to set up an ad hoc Working Group GHRSSST-ETOOFS-GOV to coordinate offline in reviewing and updating SoG for SST, extending the scope to include sea surface salinity. Suggested members are: Shiro Ishizaki (ETOOFS), Matthew Martin (GOVST/GHRSSST) and Jim Cummings (GOVST/GHRSSST).

3.2.5 It was noted Dr Corlett would visit the ETOOFS chair in Sydney, Australia, 2nd July 2013, when GHRSSST chair and ET Chair would convene a meeting to discuss the recommendations in the GHRSSST presentation. Drs Guimei Liu, Matthew Martin, and Jim Cummings would be contacted to discuss a working group to review the SST requirements for OOFs.

3.2.6 The Team also noted importance to improve coordination across the other two essential observation science teams, Ocean Surface Topography Science Team (OSTST) and Argo Science Team, and recommended to form a working group for each key component of the observation system: sea level. Suggested members are: Gary Brassington/Eric Dombrowsky (ETOOFS/GOVST), Rui Ponte (OSTST), Greg Jacobs (expert), Rosemary Morrow (Surface Water Ocean Topography, SWOT), Pierre-Yves Le Traon, Hendrik Tolman/David Berenger (seasonal), Pierre de Mey (coastal). The Team requested ET Chair and Dr Guimei Liu to approach the co-chairs of the OSTST to discuss the formation of the working group to coordinate the observational requirements for sea level.

3.2.7 The Team also recommended forming an ad hoc task team for *ocean state* of the observation system. Proposed members are: Sudheer Joseph/M. Ravichandran (ETOOFS), Pierre-Yves Le Traon, co-chairs ArgoST. The Team requested ET Chair and Dr Guimei Liu to approach the co-chairs of the ArgoST to discuss the formation of a working group to coordinate the observational requirements.

3.2.8 The Team recognized that joint ad hoc WG's should entrain representatives from ETOOFS, GOVST, ObsST and potentially coastal and seasonal. The primary task is to review the SoG and observational requirements for the WMO/RRR. The secondary task is to prepare recommendations for consideration by the individual teams.

3.3 RRR of WMO

3.3.1 Dr Boram Lee, WMO Secretariat, recalled that Rolling Review of Requirements (RRR) is a process to define and review user requirements of observations for observations, compared with the capabilities of existing and planned observing systems. The Team noted that JCOMM has contributed to RRR through coordination of Mr Ali Mafimbo, by providing requirements for and gap analysis for the area of Ocean Applications, with experts' input from OPA and SFSPA. The Team recalled the discussion during JCOMM-4 (2012), recognizing efforts of ETOOFS and other ETs of SFSPA and need to extend the scope of requirements in WMO RRR and in SoG to cover coastal forecasting and coupled climate forecasting systems, taking into account of development of GFCS. The Team also noted the recommendations made at the 7th meeting of the SFSPA Coordination Group (SCG-7, March 2013), that systematic coordination should be conducted by ETOOFS and ETWCH, in providing input to RRR process with OCG and other groups/organizations.

3.3.2 [Given complexity of essential variables and priority differences, the Team recognized that observational requirements would be reviewed and updated in Working Group style and Points of Contacts \(PoCs\) for different applications would be identified to analyze gaps and update SoG with support of ETs, where feedback for observational requirements should be conducted ahead of revision of SoG for both ocean and climate monitoring.](#)

3.3.3 Recommendations and actions regarding RRR included:

- Dr Guimei Liu contact Dr Candyce Clark (OCG) to identify points of contact (PoCs) in OPA for RRR;
- Dr Guimei Liu participate in OCG meeting (tentatively planned in July 2013) to communicate the role of ETOOFS in observational requirements and to discuss on OPA input to the RRR process;
- Review the WMO Observing Systems Capability Analysis and Review Tool (OSCAR) website for representation of the requirements and review those identified in other application areas for the same variables, in order to ensure propriety and consistency;

- Review and propose update for the GOOS application requirements in OSCAR, in view of including coastal requirements where possible (Hendrik Tolman, Pierre de Mey, and member of COSS-TT);
- Liaise with Mr Ali Mafimbo, Dr Kevin Horsburgh (for ETWCH), GOV and WMO Secretariat to ensure comprehensive and consistent input from JCOMM to RRR process;
- Dr Guimei Liu to attend the Inter Programme Expert Team on Observing System Design and Evolution (IPET-OSDE, planned for July 2014), for discussion with PoCs for other application areas of the RRR process. The Team requested the WMO Secretariat to keep the Team updated on related activities, and to assist related activities.

3.3.4 Dr Gilles Larnicol (in absence) provided a report on GODAE OceanView Observing System Evaluation Task Team (GOV-OSE-TT) for observational requirements. The Team recognized relevance of the work of GOV-OSE-TT and encouraged coordination between OSE-TT and OCG activities, particularly in Observation Impact Statements (OIS). David Legler indicated that his group would use the OIS from GOVST, and would make recommendations to the co-chairs on OIS usage and other relevant feedback. Accordingly, the Team encouraged promoting activities and outcomes of GOV-OSE-TT within JCOMM.

3.3.5 Given quality of data and possible bias or cherry picking in impact studies, the Team advised to be careful in the study and interpretation of the results, taking into account of users and targeted audiences. The Team recognized it not easy to tell usefulness at present, but recommended a simplified service impact study for observational system.

4. SEASONAL CLIMATE FORECAST SYSTEM

4.1 OBSERVATIONAL REQUIREMENTS

4.1.1 Dr Arun Kumar, representative of WMO Expert Team on Extended and Long-Range Forecasts (ET-ERLF), reported on WMO long-range prediction activities. The Team noted that under WMO Commission of Basic Systems (CBS), there were Global Producing Centres (GPCs) for long range forecasting (LRF), lead centre for long-range forecasts-multimodel ensembles (LC-LRFMME), and global seasonal climate update (GSCU). The World Climate Research Programme/Climate Variability and Predictability (WCRP/CLIVAR) working group on seasonal to interannual predictions (WGSIP) focuses on research, while ET-ERLF on operational forecasting. The Team noted GPCs are WMO recognized centres that have fixed production cycles and time of issuance, provide limited set of mandatory products, verifications, and up-to-date information on methodology and so on.

4.1.2 Noting that seasonal observational requirements have not been updated, the Team decided to include a review of seasonal ocean observation requirements to seek a merger and achieve consistency, by coordination with WCRP-WGSIP liaising with ET-ELRF. PoCs would be Drs Guimei Liu, Oscar Alves, Laura Ferranti, and Magdalena Balmaseda.

4.1.3 Taking note of the workshop, *The Future of the Tropical Pacific Ocean Observing System (organized by Dr NOAA)*, the Team requested the Secretariat to keep

track of the progress and results of this workshop, for possible guidance and update on OSE, and to report to the Team on the results of the event. In addition, the Team requested the WMO Secretariat to contact sub-seasonal to seasonal (S2S), World Weather Research Programme (WWRP) team and to determine its relevance to ETOOFS.

4.2 EXTREME MONITORING AND PERFORMANCE METRICS

4.2.1 Due to nature of ocean extreme monitoring and performance metrics, discussions were overlapping and summarized as combination.

4.2.2 The Team noted that Project#4 aimed to establish the first set of metrics and thresholds to identify ocean extremes for OOFs. Dr Gary Brassington presented potential variables/metrics for the project, including prognostic variables (T, S, Iul, eta), sea level, temperature, salinity, water mass types, transports, potential vorticity/relative vorticity and so on.

4.2.3 The Team noted extremes could be defined by statistics, thresholds, as well as the period of persistence and spatial extent above threshold should be considered. Given most current documents for ocean extremes were about coastal areas, the Team recognized that more efforts should be paid to regional and open seas. Different approaches should be applied by time-space integration, and systematic retrospective anomaly analysis was a possible way considering time, spatial and frequency differences of events. One or two primary ocean/climate indicators in regional and basin scale could be identified as ad hoc experiment and then extend to operational practice.

4.2.4 Actions include:

- ETOOFS-WCRP/CLIVAR-GOV synergy for ocean/climate indicator or extreme definition. (Drs Tony Lee, Ed Harrison, Gary Brassington);
- Interaction with CLIVAR Working Group on Ocean Model Development (WGOMD)-GOV/WGNE (Stephen Griffies, CORE) for potential involvement;

4.2.5 The Team noted there was no ecosystem indicators at present, coastal areas can be first addressed for its socio-economic relevance with a view to extending to larger ecosystem.

5. NATIONAL REPORTS

5.0.1 Round table discussions of national highlights in OOFs were conducted by team members from Drs Gary Brassington (Australia), Frank Bub (USA), Pierre Daniel (France), Guijun Han (National Marine Data and Information Service, China), Shiro Ishizaki (Japan), Sudheer Joseph (India), Guimei Liu (National Marine Environmental Forecasting Centre, China), and Marina Tonani (Italy).

5.0.2 The Team appreciated presentations and progress in individual countries and encouraged further development in OOFs for better services to stakeholders and policy makers in their respective countries.

6. CAPACITY DEVELOPMENT

6.0.1 The Team noted a report by Dr Gary Brassington on the Capacity Development (CD) activities, including the preparations of an Australian Government Overseas Aid Programme (AusAID) funded project in Indian Ocean, and preceding workshop (Fremantle, Australia, 2 October 2012).

6.0.2 The Team also received a presentation by Dr Doug Wilson (USA) on planned in-region training for Caribbean countries in marine forecasting.

6.0.3 The Team noted four major factors should be carefully considered and addressed for CD: 1) status of capabilities and needs/requirements for the Members/Member States, and the region, these can be achieved through inquiry/survey; 2) Curriculum/module should be designed with reference to targeted audience, region, and impact studies; 3) Priority for short term CD activities and long term goals should be formulated and differentiate; 4) Possible resources and conflict/coordination with other organizations/entities.

6.0.4 The Team suggested that relevant CD activities coordinate with established programme or activities, such as those of WMO Education and Training (ETR) and USA's Cooperative Programme for Operational Meteorology, Education and Training (COMET), in order to seek opportunities to develop structured curriculum, which could be widely used and shared for similar activities.

7. MARINE EMERGENCY/POLLUTION RESPONSE

7.0.1 The Team recalled the decision at JCOMM-4 , through Recommendation-4 (JCOMM-4), that JCOMM should develop the implementation strategy and plan for an international coordination framework to support response to marine environmental emergencies, with a focus on the maritime discharge of radioactive hazardous materials.

7.0.2 The Team noted that two projects in the SFSPA intersessional workplan (2012-2017), in response to this request: project #24 to identify and support the technical development of marine environmental emergency response, and project #25 to improve JCOMM's coordinating capabilities for marine environmental emergency response including radioactive hazard (see *Annex III*)

7.1 INTRODUCTION/OVERVIEW OF THE PROJECT

7.1.1 Mr Nick Ashton, Vice-chairperson of SCG, reported on the progress made at SCG-7 in implementing Recommendation 4 (JCOMM-4). An ad hoc task team for the defined period was formed under the guidance of the SCG, led by Mr Ashton, under the Group's guidance. This task team would:

1) firstly, submit a draft proposal for an international framework for responses to marine radioactive material discharge, as well as a JCOMM work plan to accomplish this goal; then,

2) submit a proposal to streamline the global coordination of marine environmental emergency responses, to ensure that existing capabilities within the Marine Pollution Emergency Response Support System for the high seas (MPERSS, including SAR) are not compromised by any reappportionment of resources. The agreed Terms of Reference, as well as the membership were presented in Annex IV of the final report of SCG-7 (see also http://www.jcomm.info/index.php?option=com_oe&task=viewGroupRecord&groupID=280).

7.1.2 The Team noted that ETOOFS and ETMSS would provide major input to the work of this task team, and therefore agreed for the membership of Dr Pierre Daniel and Dr Marina Tonani in this team. During the discussion Drs Daniel and Tonani presented a plan and timelines to implement Project#24, targeting a submission of a proposal for streamlined JCOMM coordination to the WMO congress in 2015. The first draft on a proposed international framework for responses to marine radioactive material discharge would be prepared by November 2013, for consultation with experts during the GODAE OceanView symposium (November 2013, USA), and the final draft would be circulated at least 3 months ahead of WMO congress.

7.1.3 The Team also noted the ongoing preparation by the WMO Secretariat for a survey on the MPERSS status, which include a questionnaire on currently available models/technologies for tracking marine radioactive material. The Team advised that the relevant questions in ongoing and planned surveys should be coordinated and cross-referenced while the ad hoc task team is active to complete the proposal..

7.1.3 The Team made recommendations to the ad hoc task team as follows:

- As the first step, the ad hoc task team should identify which groups (national, regional and international levels) are active in the related areas, in order to comprise them in the consultation and planning process. In doing so, the Team advised to generate a list of people entrained, for example, from the list of participants in the IAEA meeting held in Monaco in 2011. The Team noted with appreciation that Dr Henrick Tolman would provide the latest version of the project proposal of a related activity initiated by IAEA, for consideration by and reference for the team's activity.
- The Team advised that user needs (end and intermediate users) should be identified in drafting such a proposal;
- Given the limited time for the work of the ad hoc task team, the Team advised to review technical capabilities to primarily identify the availabilities (characteristics, inputs, outputs, etc.), taking into account future/extended work for evaluating the performance of each model at a later stage;

- The Team agreed that a meeting of this task team, either fact-to-face or by video-conference, would be useful to progress the work of the ad hoc task team. A proposed time for such a meeting is June/July 2013.

7.2 REVIEW OF AD HOC WORKING GROUP FOR MARINE EMERGENCY/POLLUTION RESPONSE AND STATUS OF CAPABILITY

7.2.1 Dr Hendrik Tolman, reported on NOAA ocean plume and tracer modeling for Fukushima nuclear accident. The work was based on 1/12° global HYCOM, does not simulate coastal contamination sufficiently. Three major products from NOAA/NCEP were highlighted: virtual particle tracking since April 8 2011, pollution estimates from particle tracking combined with atmospheric deposit of radionuclides since April 20 2011, and long term monitoring selected radionuclides using full dispersion modeling.

7.2.2 Dr Masa Kamachi revisited ToR of the ad hoc Task Team on JCOMM coordination for marine environmental emergency responses, and introduced two major activities of Japan in this regard. The Team noted intercomparison of 5 model simulations was conducted, including JAMSTEC, CRIEPI, JAEA, and model results from US and France. Oceanic dispersion of 137Cs from Fukushima nuclear power plant was estimated for March and April 2011. It was found the weak southward current along Fukushima coast led initial transport direction, and mesoscale eddy-like structures and surface-current systems contributed to dispersion in areas beyond the continental shelf. The Team also noted Japan Atomic Energy Agency (JAEA) carried out simulation and validation dispersion of 137Cs to describe its mid- to long-term transition in the ocean, more work had to be done due to unknown source information and coastal processes.

8. PERFORMANCE METRICS

8.0.1 Dr Frank Bub reported process to develop next generation performance metrics: 1) define standards, 2) specify metrics, 3) establish candidate model for comparisons, 4) determine approach and then 5) present comparison.

8.0.2 The Team reaffirmed performance metrics were for best practices and improvement of OOFs, not to single out one OOFs over another. In that sense, the team stressed that common/identical observations, data, and analysis methodologies should be used for the purpose, taking into account of fairness and metrics uncertainties.

8.0.3 Candidate models/centres will be nominated for the task. In determining metrics, key factors like bias, RMSD(E), tolerance will be incorporated, with consideration of model differences in coverage, resolution, and regular analysis intervals.

8.0.4 The Team recommended to narrow down for an achievable starting point. Frank Bub and Alistair Sellar will coordinate and prepare a draft on class 4 data and GOV approach, circulate in ET and aim to present during the GOV symposium Nov 2013.

9. SUMMARY OF PREVIOUS SESSIONS

9.0.1 The Team reviewed and agreed on actions and recommendations for the first three days summarized by the Chairperson and Secretariat, except for writing of Guide to Operational Ocean Forecasting Systems, which was conducted in item 10.

10. GUIDE TO OOFS

10.0.1 Led by Dr Alistair Sellar, the Team devoted the last one and half days to write content for the Guide to Operational Ocean Forecasting Systems. The dynamic document is online in Google drive. The Team agreed on the structure, general contents, and writing assignments of the Guide. The outline details is attached in Annex V.

10.0.2 The Team appreciated contributions of experts, and noted key activities for this project included: establishment of processes for content writers, reviewers, and submissions, descriptions for contents, and submission from member centres. The Team reaffirmed the timeline for the Guide as follows:

- By March 2013: agree on priorities for content, and begin writing
- From April to December 2013: consolidate first draft into form suitable for review
- By end 2014: internal review by ETOOFS and complete a draft
- By end 2015: international review by ocean community worldwide
- 2016: publish as JCOMM publication

11. SUMMARY OF PREVIOUS SESSIONS AND CLOSURE

11.0.1 The Fourth Session of JCOMM Expert Team on Operational Ocean Forecasting Systems was closed at 1300hrs by Dr Gary Brassington. Dr Brassington expressed his appreciation to Dr Ming Ji and NOAA for hosting the meeting, contributions of experts, and support of the secretariat.

AGENDA

(as agreed at ETOOFS-4, 25-29 March 2013, College Park, USA)

- 1 OPENING OF THE SESSION
 - 1.1 Opening
 - 1.2 Team introductions
 - 1.3 Welcome speech by Dr.Wayne Higgins
 - 1.4 Adoption of the Agenda
 - 1.5 Working Arrangements
 - 2 GENERAL BUSINESS
 - 2.1 Guidance and requirements from JCOMM and WMO-IOC
 - 2.2 Chairperson report
 - 2.3 GOVST-4
 - 2.4 GOV-COSS-TT2
 - 2.5 Nomination of Vice-Chairperson for ETOOFS
 - 3 OBSERVATIONAL REQUIREMENTS
 - 3.1 Updates of Observing Systems
 - 3.2 Teleconference for Observational Requirements
 - 3.3 RRR of WMO
 - 4 SEASONAL CLIMATE FORECAST SYSTEM
 - 4.1 Observational requirements
 - 4.2 Extreme monitoring
 - 4.3 Performance metrics for seasonal climate forecast
 - 5 NATIONAL REPORTS
 - 6 CAPACITY DEVELOPMENT
 - 7 MARINE EMERGENCY/POLLUTION RESPONSE
 - 7.1 Introduction/overview of the project (9:00AM)
 - 7.2 Review of ad hoc response and status of capability (10:00AM)
 - 7.3 Discussion and finalise plan (11:00AM)
 - 8 PERFORMANCE METRICS
 - 9 SUMMARY OF PREVIOUS SESSIONS
 - 10 GUIDE TO OPERATIONAL OCEAN FORECAST SYSTEMS
 - 11 CLOSURE
-

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ETOOFS Projects
(Agreed on SCG-7, 3-6 March 2013, Tokyo, Japan)

Project #1: Complete guide for operational ocean forecasting systems

Project Leader(s): Alistair Sellar
Project Team: Frank Bub
Gary Brassington
Guimei Liu

Project Description:

The development of a guide for operational ocean forecasting systems serves many purposes. Promotion of best practice amongst providers, document the products suites and points of contact for access as well as serve as a guide to new providers with an overview of the state of the art systems. The concept of a operational guide is common amongst WMO agencies and has been previously undertaken by the expert team for waves and storm surge. The guide will be coordinated by a lead editor and a team of chapter writers from the ETOOFS team and member institutions and other forecast providers.

- **Expected Outcomes:**
 - Live document (secure)
 - Guide, first draft
- **Key Activities:**
 - Establish process (e.g., content writers, reviewers, submissions)
 - Contents – description of content (Adrian first draft)
 - Submissions from member centres
- **Timeline/milestones:**
 - October 2012: agree process and priorities for content
 - November 2012 - December 2013: chapter writing
 - March 2013 (ETOOFS-4): review structure/list of contents chapter writing
 - 2014: expert review by ETOOFS and consolidation into draft document
 - 2015: international review - distribute access to a team of reviewers followed by an open review inviting the ocean community to comment
 - 2016: publication
- **ETs, Other Organizations and participants:**
 - ETOOFS,
 - National agencies and forecast providers

Project #2: Observational Requirements

Project Leader(s): *Guimei Liu*

Project Team: Sudheer Joseph
Shiro Ishizaki
Gary Brassington

Points of contract: Kevin Horsburgh (ETWCH), link/coordination with Project #10
Ali Mafimbo (JCOMM)
Etienne Charpentier (WMO)

Project Description:

The area of ocean observational requirements is an important component of the [WMO Observing Requirements database](#). User requirements are collated in a comprehensive, systematic and quantitative way to capture observational requirements and eventually meet the needs of ocean forecasting.

Using the Rolling Requirements Review (RRR) process defined by the manual on the Global Observing System, user requirements for observations are compared with the capabilities of present and planned observing systems. The output of this is reviewed by experts in the relevant application and used to prepare a Statement of Guidance (SOG), the main aim of which is to draw attention to the most important gaps between user requirements and observing system capabilities, in the context of the application. The SOG provides an assessment of the adequacy of observations to fulfill requirements and suggests areas of progress towards improved use of satellite and in situ observing systems.

The Expert Team on Operational Ocean Forecasting Systems (ETOOFS) is responsible to: manage and maintain the requirement documents, adhering to relevant Quality Management Systems, for members/member states providing ocean forecasting services; prepare submissions on the requirements (e.g., research, observational and data management) of OOFs Members/Member States to other international groups. The requirements are regularly reviewed by groups of experts and contribute to the JCOMM SPA statement of guidance and the WMO RRR (<http://www.wmo.int/pages/prog/sat/RRR-and-SOG.html>).

• **Expected Outcomes:**

- Update SoG document
- Contribute OOFs requirements to CBS/RRR

• **Key Activities:**

- Establish survey document based on SoG and RRR
- Collate submissions from member centres
- Formulating more specific requirements for ocean observations on the basis of improved understanding of data utility
- Responding to the decisions and requests of the WMO Members and IOC Member States
- Contributing to the implementation of the Global Framework for Climate Services (GFCS) for marine and coastal communities

• **Timeline/milestones:**

- *SOG was Updated in March 2012 by the PoC and approved by ET-EGOS-7, May 2012*
- *Provide further update to JCOMM-related part of RRR and SoG (in coordination with Project #10) to IPET-OSDE, July 2014*

• **ETs, Other Organizations and participants:**

- ETOOFS, ETWCH, national agencies, OPA/OCG

Project #3: Performance Monitoring

Project Leader(s): Frank Bub, Gary Brassington

Project Description:

Performance monitoring of the operational ocean forecast systems is a critical element for promotion of best practices and offering guidance on daily performance. The primary goal for this project is to establish a suite of metrics that are performed and published in near real-time. The metrics will take into account both information and practical constraints of resourcing. This project proposes to have each operational centre push a common set of data products to a central server (e.g., USGODAE) from which the metrics will be computed and published online (e.g., <http://www.jcomm.info> or <http://www.jcommops.org>). The ETOOFS will maintain a close relationship with GODAE OceanView task teams to define and assess the operational data products and metrics. The objective for the current intersessional period is to develop next generation metrics for Operational Ocean Forecast Systems.

Expected Outcomes:

- Universally acceptable ocean model monitoring system
- ETOOFS member model-model comparisons
- Improved understanding of members' model skills and weaknesses

Key Activities:

- Agree on and document the process (see outline below)
- Establish data collection and analyses system
- Conduct routine metric comparisons
- Present results

Timeline/milestones:

- TBD

Expert Teams and/or Other Organizations and participants

- ETOOFS
- National agencies and ocean forecast providers
- Data (observation) collection, quality control, distribution will play an essential role

Project #4: Ocean Extremes Monitoring System

Project Leader(s): Gary Brassington

Project Team: Alistair Sellar
Frank Bub

Other contributors:

Points of contract: ETWCH
Ed Harrison

Project Description:

Extreme weather has a clear meaning whereby conditions are above normal and in general pose a risk of harm to people and/or property and/or the environment. The occurrence of large sea states and coastal surge are well known examples of dangerous conditions in the marine environment. Less well identified are extremes in the general ocean state, temperature, salinity and currents and their potential impacts for the environment. This project will aim to establish the scope and methodology for identifying extremes in ocean conditions from OOFs to raise awareness of their occurrence and help facilitate identification of impacts.

Expected Outcomes:

- Establish the first set of metrics and thresholds to identify ocean extremes for OOFs

Key Activities:

- Define the scope of ocean extremes, e.g., physical/spatial/temporal/littoral/coastal/ocean/surface/upper ocean/abyssal
- Define objectives of ocean extremes
- Define the methodology
- Establish first set of metrics

Timeline/milestones:

- March 2013 – Definition of ocean extremes
- 2014 – Establish first metrics and review
- 2015 – Consolidate and document in “the Guide”

Project #6: Coordination in Seasonal Climate Forecast System

Project Leader(s): Guimei Liu

Project Description:

The ocean model and ocean data assimilation components are critical for operational coupled seasonal climate forecast systems (CFS). Expertise in operational ocean modeling and ocean observations reside within the JCOMM community. Ocean model output (forecast guidance) from OOFS aims at lead times of several days, whereas the CFS extends ocean prediction lead times to weeks, month and seasons. Integrated/coordinated ocean model guidance from daily to seasonal time scales would have potential improved service benefits for a broad range of users. The CBS/ET-ELRF (note: it has a new name now) is responsible for operational CFS. This ETOOFS effort is to liaise with the CBS/ET-ELRF to coordinate technical and scientific ocean observing and user requirements for operational ocean models from OOFS and CFS. It will also provide integrates ocean observing requirements from both OOFS and CFS for the RRR updates.

• **Expected Outcomes:**

- Establish (e.g., common datasets, formats, variables, climatology) for ocean model guidance from OOFS and CFS
- Update ocean forecasting service requirements from daily to seasonal time scales
- Coordinated/integrated ocean observing requirements for both OOFS and CFS as input to the RRR process.

• **Key Activities:**

- Liaison with the CBS/ET-ELRF
- Establish common (output) requirements for ocean model guidance from OOFS/CFS
- Coordinate gathering ocean forecasting service requirements from “ocean weather” and climate users
- Coordinate on ocean observing requirements for input to the RRR process
- Articulating requirements for integrated applications of altimeter data from “ocean weather”, waves, and seasonal climate forecast applications.

• **Timeline/milestones:**

- *ET-ELRF meeting: ETOOFS liaison to participate*
- *ETOOFS-4: ET-ELRF rep. to participate*

• **ETs, Other Organizations and participants:**

- ETOOFS, national forecasting centers, ET-ELRF(CBS), ECMWF, OPA

Project #13: Capacity

Development

Project Leader(s): *Boram Lee, Kevin Horsburgh, Vasiliy Smolyanitsky, Gary Brassington*

Project Description:

Capacity Development (CD) remains a core activity at the heart of most JCOMM activities. All individual projects have some capacity development aspects, whether these be high level scientific and technical workshops, hands on training activities, or Guides, Manuals and other guidance and training materials, including online course material.

At its fourth Session of JCOMM in May 2012, it was decided that focused efforts should be made for preparation and management of technical guidance material in conjunction with the regular review and update of the Guides and Manuals (addressed within other SFSPA projects). Also, Specific project related training and capacity development are described under the individual projects, particularly to serve for Members' / Member States' capacity development and technology transfer needs.

Opportunities for training and technology sharing include the joint workshops supported by JCOMM and the Tropical Cyclone Programme (TCP) – to provide hands on training on operational wind wave and storm surge forecasting, and to contribute to the ongoing development of the Storm Surge Watch Scheme (SSWS), as well as joint workshops on sea ice analysis.

• **Expected Outcomes:**

- Support Capacity Development workshops
- Publish and update the Guides on marine meteorology and oceanography, including those on marine meteorological services, ocean forecast systems, waves and storm surge forecasting

• **Key Activities:**

- Support TCP-JCOMM training workshops on wave and surge forecasting
- Support for “Ice Analysts Workshop” on regular scale (1-2 interval)
- Support for sea-ice training documentation and courses including COMET modules and manual for ice experts – ice observers.
- Support METAREA Coordinators and Issuing Services in supporting Maritime Safety Services.

• **Timeline/milestones:**

- 4th JCOMM “Ice Analysts Workshop” (St.Petersburg, Jun/Jul'13)
- 8th JCOMM-TCP Training Workshop on Storm Surge and Wave Forecasting, for East Africa (Nairobi, Nov'12)
- 9th and 10th JCOMM-TCP Training Workshops on Storm Surge and Wave Forecasting (venue and time TBD)

• **ETs, Other Organizations and participants:**

- ETWCH, TCP, ETSI, ETOOFS, COMET

• Implementation of JCOMM-4 decisions (noted by paragraph number of JCOMM-4 report)

- 8.1.11 (training)
- 8.2.3 (continuing JCOMM-TCP workshop series)
- 9.5 (workshop in Africa)
- 9.9 (harmonized training responding to Members'/Member States' needs)
- [need to include other references]

Project #24: Development of Oceanic Emergency Response Support Capability

Project Leader(s): Pierre Daniel, Marina Tonani

Points of contact: Nick Ashton (ET-MSS)
Hendrik Tolman (NOAA)

Project Description:

To enhance the capability of Members/Member States, to include tracking for oceanic releases of radioactive hazard materials. This project specifies the ETOOFS contribution to the Task Team On JCOMM Coordination for Marine Environmental Emergency Responses. This project will review dispersion modeling of radioactive material based on operational ocean forecasting systems in order to identify current best practice. Liaise with ET-MSS and stakeholders to establish the user requirements for dispersion products and services. Compare current best practice relative to the user requirements and make recommendations for closing the performance gap. Contribute the findings to the task team reviewing MPERSS as the coordination for these services.

Expected Outcomes:

- Report on the best practice in dispersion modeling in the global ocean of radioactive material and recommendations for improving the service for any identified gaps between current best practice and user requirements
- Assist the TT & SCG to enhance marine pollution emergency response, with a focus on radioactive material discharge

Key Activities:

- Review the current capabilities of oceanic dispersion modelling and prediction within MPI areas and identify best practices.
- Assist the TT & SCG to liaise with international organisations including IMO,, other, to identify the the requirements for oceanic discharge of radioactive hazards and make recommendations for addressing the gaps in current best practice;
- To assist in coordination to update maes-mperss.org website for dispersion products and services. To assist in updating the contact points for suppliers of ocean data and drift models operators.

Timeline/milestones:

- Mid-2014 Report to the TT and SCG on current capabilities and best practice in dispersion modelling based on operational ocean forecast systems and recommendations for extending dispersion products and services for radioactive materials to address stakeholder requirements.
- Mid-2014 Work with the TT to submit to the SCG a draft proposal for an international framework for responses to marine radioactive material discharge, as well as a JCOMM work plan that describes; 1) requirements and gaps; 2) primary users of such a service; 3) key players and responsible parties in JCOMM coordination/contribution; and, 4) process and timeline to implement the proposed practice
- End-2014 Assist the TT complete MPERSS update for dispersion and other ocean data services

Expert Teams and/or Other Organizations and participants

- ET-OOFS and ET-MSS
- MPERSS Task Team
- AMOCs and supporting services
- National agencies and forecast providers
- GODAE Ocean View Science Team
- IAEA, IMO, IHO

Project #25: Develop oceanic radioactive hazard tracking system for enhanced MPERSS

Project Leaders: Nick Ashton, Henri Savina, Bruce Hackett

Project Description:

The primary objective of Marine Pollution Emergency Response Support Systems (MPERSS) is to have in place a coordinated, global system for the provision of meteorological and oceanographic information for marine pollution emergency response operations outside waters under national jurisdiction. The areas covered have the same geographical distribution as those for the GMDSS, and Area Meteorological and Oceanographic Coordinators (AMOCs) have been identified for all of them.

The project will review the current framework of MPERSS, particularly the role of the AMOCs, their ToRs and their areas of responsibility, in support of any response to radioactive material discharge, marine pollution monitoring and response or marine SAR. This project, together with project#24, may be considered as components of the work of the TT on JCOMM Coordination for Marine Environmental Emergency Responses.

Expected Outcomes:

- Work with the TT to submit the SCG a proposal to streamline the global coordination of marine environmental emergency responses, to ensure existing capabilities within MPERSS (including SAR) are not compromised by any reappointment of resources
- Enhance the visibility and recognition of MPERSS services outside the WMO (e.g., IMO, IAEA);
- In cooperation with the TT and ETOOFS, update user requirements for MPERSS

Key Activities:

- Coordination with TT, SCG, AMOCs, RSMCs on an oceanic radioactive hazmat tracking framework;
- Develop a proposal for the global coordination of marine environmental emergency responses in cooperation with the TT and SCG

Timeline, Major milestones:

- Submit the proposal to SCG; **by end of 2014**

ETs, Other Contributing Organizations:

- TT, ETMSS, ETOOFS, IAEA, IMO, WMO

Project#30 Task Team on JCOMM Coordination for Marine Environmental Emergency Responses

Task Team Leader: Nick Ashton
Task Team Members: Henri Savina (France)
Bruce Hachett (Norway)
Giovanni Coppini (Italy)
Marina Tonani (Italy)
Pierre Daniel (France)
Member of JMA

Project Description:

The Task Team has been established in response to the recommendation (JCOMM-4, May 2012) that JCOMM should take a proactive role in supporting Members/Member States in responding to marine environmental emergencies. This should include supporting responsible centres to extend their technical capabilities, to exchange diagnostic and forecast data, as well as to provide enhanced coordination for services and information provision in a way that meets requirements as defined by the International Atomic Energy Agency (IAEA) and International Maritime Organization (IMO).

Expected Outcomes:

- A draft proposal for an international framework for response to marine radioactive material discharge, as well as a JCOMM work plan that describes: 1) requirements and gaps; 2) primary users of such service; 3) key players and responsible parties in JCOMM coordination/contribution; and, 4) process and timeline to implement the proposed practice;
- Submit to the SCG a proposal to streamline the global coordination of marine environmental emergency responses, to ensure that existing capabilities within the Marine Pollution Emergency Response Support System (MPERSS), including Search and Rescue, are not compromised by any reappointment of resources.

Key Activities:

- Review available technologies for modeling, forecasting, and operational support of radioactive material discharge in marine environments, in view of exploring feasibility of providing enhanced coordination in basin scale;
- Assist the SCG to liaise with international organizations, including IMO, IAEA, and others, on the requirements for the delivery of information in support of response to radioactive material discharge;
- Review the current framework for MPERSS for the high seas, particularly the role of the Area Meteorological and Oceanographic Coordinators (AMOCs) and their applicability, in support of any responses to radioactive material discharge, marine pollution monitoring and response or marine SAR.

Timeline, Major Milestones:

- Draft proposal for an international framework for responses to marine radioactive material discharge; **by mid 2014**;
- Proposal to streamline the global coordination of marine environmental emergency responses; **by end 2014**.

ETs, Other Contributing Organizations:

- ETMSS, ETOOFS, IAEA, IMO, WMO and other UN agencies as appropriate.
-

**TERMS OF REFERENCE
FOR THE AD HOC TASK TEAM ON JCOMM COORDINATION FOR
MARINE ENVIRONMENTAL EMERGENCY RESPONSES**

(Agreed at SCG-7, 4-6 March 2013, Tokyo, Japan)

At the 4th session of the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM-4, May 2012), Members / Member States agreed that JCOMM should take a proactive role in supporting Members / Member States to respond to marine environmental emergencies. This should include supporting responsible centres to extend their technical capabilities, exchange diagnostic and forecast data, as well as provide enhanced coordination for services and information provision in a way that meets requirements as defined by the International Atomic Energy Agency (IAEA) and International Maritime Organization (IMO).

A system that tracks oceanic radioactive plumes using dispersion modelling should leverage the existing framework for tracking atmospheric radioactive hazards in operational NWP centres, operated in conjunction with atmospheric dispersion modelling infrastructures and expertise.

To pursue this objective during the intersessional period (2012 – 2017), the ad hoc Task Team will undertake the following work, and will report directly to the Services and Forecasting Systems Coordination Group (SCG). The Task Team will be active during the defined period to accomplish the tasks described below, mainly through the online correspondence, and in general with no resource implications to JCOMM:

1. Review available technologies for modelling, forecasting, and operational support of radioactive material discharge in marine environments, in view of exploring feasibility of providing enhanced coordination in basin scale; **by mid 2014**;
2. Assist the SCG to liaise with international organizations, including IMO, IAEA and others, on the requirements for the delivery of information in support of radioactive material discharge; **continuous until end 2014**;
3. Submit the SCG a draft proposal for an international framework for responses to marine radioactive material discharge, as well as a JCOMM work plan that describes; 1) requirements and gaps; 2) primary users of such a service; 3) key players and responsible parties in JCOMM coordination/contribution; and, 4) process and timeline to implement the proposed practice; **by mid 2014**;
4. Review the current framework for Marine Pollution Emergency Response Support System for the high seas (MPERSS), particularly the role of the Area Meteorological and Oceanographic Coordinators (AMOCs) and their applicability, in the context of support to any response to radioactive material discharge; marine pollution monitoring and response or marine SAR; **by end 2014**;
5. Submit the SCG a proposal to streamline the global coordination of marine environmental emergency responses, to ensure that existing capabilities within MPERSS (including Search and Rescue) are not compromised by any reapportionment of resources; **by end 2014**.

Team Members:

Nick Ashton (UK) - Leader
Henri Savina (France)
Bruce Hackett (Norway)
Giovanni Coppini (Italy)
Marina Tonari (Italy)
Pierre Daniel (France)
JMA Representative (Japan)

Guide to OOFs: outline

(Prepared by Dr Alistair Sellar, agreed at ETOOFS-4 session)

This outline is likely to become out-of date from time-to-time. It is intended to give an overview of the structure, and the main purpose of each chapter, at-a-glance. For the most up-to-date outline, see the tables of contents in the document for each chapter.

I have added some introductory words to each chapter document to give an overview of what I think we should aim for (level of detail, how general or specific, whether more resources should be gathered). You are the experts, so if you disagree let's discuss it. Each chapter should begin with an introduction, containing some background information, purpose of the chapter, and (if applicable) basic concepts which are relevant to the whole chapter.

It is likely that for some sections we will require information to be provided by all of the OOFs. We can circulate a survey to all OOFs after the meeting. If you wish to add a question to this survey, please add it to the document "ET-OOFS_survey" in the OOS-guide folder.

Schedule for Thursday and Friday:

- Thursday morning:
 - Discussion, agree on structure of chapters to be tackled and finalise who will write what.
 - Decide if some further gathering of resource material is required (see subfolder "Source_material").
 - Introduction to Google docs functionality and checking it works for everyone.
- Thursday afternoon: writing (with discussions as needed)
- Friday first hour:
 - Briefly re-assess the writing plan to see if any changes needed
 - Reviewing structure for new sections - flag up where these are good template for the rest of the chapter.
 - Discuss open questions or propositions (or perhaps we will do this every couple of hours - feel free to raise a discussion at any point)
- Friday remainder: writing (with discussions as needed)
- Friday last hour: assess where we've got to and agree a plan for the next steps
- During the following 2 weeks: Alistair to consolidate output into a coherent draft, circulate to writers, and initiate the plan agreed at the end of the camp.

Chapter 1: Organisation of operational ocean forecasting systems (Alistair)

Purpose and scope of the guide

Organisation

Overview list of systems

Obligations on system operators

Accessibility of products

Provision and updating of information

Adherence to standards

Sharing software

Levels of operability

[Chapter 2: Overview of the Ocean Forecast System functions \(Fraser, Marina, Pierre\)](#)

[Introduction](#)

[Inputs](#)

[Observation data - Marina](#)

[Atmospheric forcing](#)

[Monitoring and Quality Control of inputs supply chain](#)

[Data assimilation Fraser](#)

[Ocean Models Marina](#)

[Climatologies](#)

[Numerical Prediction Systems \(Marina/Fraser\)](#)

[Dissemination](#)

[Value-added applications \(Pierre\)](#)

[Oil spill drift monitoring and prediction \(Hackett et al 2009 \)](#)

[Ice shipping route](#)

[Search and rescue](#)

[Fisheries and aquaculture](#)

[Coastal environment and water pollution](#)

[Offshore energy](#)

[Weather forecasting and climate monitoring](#)

[Outreach activities](#)

[Requirements for sustainable operational ocean services](#)

[Research](#)

[Computational resources](#)

[Development/Engineering](#)

[Operations](#)

[Maintenance of product archives](#)

[Accuracy verification and intercomparison](#)

[Monitoring](#)

[Service](#)

[Conclusion Chapter 2](#)

[References Chapter 2](#)

[Chapter 3: Forecasting products \(Pierre\)](#)

[Standard products](#)

[Levels and metadata](#)

[Real time products](#)

[Delayed mode](#)

[Additional optional products](#)

[Real time products](#)

[Delayed mode](#)

[Biochemistry](#)

[Real time products](#)

[Delayed mode](#)

Chapter 4: Data management (Eric)

Data formats

Data exchange

Archiving and data availability

[Chapter 5: Input data for driving and validating ocean forecast systems \(Sudheer, Avichal, Gary, Shiro, Pierre\)](#)

[Introduction](#)

[Observation data](#)

[Argo\(Sudheer - in progress\)](#)

[What is Argo?](#)

[Data Streams and sources:](#)

[Sensor sensitivity:](#)

[Netcdf file types and nomenclature:](#)

[Applications:](#)

[Moored buoys](#)

[Surface in-situ data \(separate into data types? ships, drifters, ...\)](#)

[Drifting buoys for velocity estimation \(DBCP\)](#)

[Satellite SST \(Shiro - in progress\)](#)

[Overview / Basic introduction to the data](#)

[Some technical information \(e.g. on platforms/missions\), references](#)

[Quality control issues specific to this data type \(if any\)](#)

[Data sources / how to obtain](#)

[Useful contacts/websites \(data providers, and possibly contacts for relevant experts within ET-OOFS\)](#)

[Science teams \(e.g. Argo ST, GHRSSST, ...\)](#)

[Satellite altimetry \(Gary - in progress\)](#)

[And so on for other obs types...](#)

[Surface fluxes \(Avichal - in progress\)](#)

[Surface fluxes from NWP systems](#)

[Coupled systems](#)

[Supplemental data](#)

[Boundary forcing](#)

[Bathymetries \(Pierre\)](#)

[Climatologies](#)

Chapter 6: Product quality (Frank, assistance from Alistair)

Quality information

General quality aspects

Standard approaches to system validation

Measures of accuracy (verification)

Consistency with climatology

Realism of physical processes

Other indicators of quality

Appendix A1: Glossary of standard terms (all)

Appendix A2: Freely available software for ocean forecast systems (all)

Ocean models

Ocean data assimilation schemes

Verification tools

Other

Dynamic content - initial list

Some parts of the text will be dynamic, meaning that they need to be updated more frequently than the rest of the guide. These will primarily be technical details of the systems themselves, which evolve rapidly. We should follow the approach adopted by the [storm surge guide](#) (and in future by the [wave guide](#)), which is to record this information in tables both within the published document, and on a live web page. The published document will become out of date as the systems evolve, but will contain a link to the dynamic tables on the web page, which are updated every 2-4 years.

Here is an initial list of the information which is likely to be included in the dynamic content, and where the table would fit in the present structure:

- List of systems: system name, underpinning institute(s), link to system web page. Table in chapter 1.
- Model details: model name, domain coverage, configuration resolutions,
- Data assimilation details: assimilation scheme, platforms assimilated
- Surface / boundary forcing

The organisation of this information may be easier if we have a separate chapter documenting the state of the OOFs. This is the approach taken in the storm surge guide (their chapter 9).

LIST OF ACTIONS

Item	Action	By whom	When/target
2.3.1	Continue and strengthen coordination in operational oceanography with GOVST; review workplan/strategy of GOVST and bridge gap/mismatch between ETOOFS and GOV	Led by ET chair, support by secretariat	continuous
2.3.2 & 2.4.2	Propose and prepare side meeting after GOV symposium 4-6 November 2013 if possible; to consultate, follow and update relevant themes and task teams; encourage members to participate	Led by ET chair, support by secretariat	ASAP
2.5.1	Formalize vice-chair nomination	WMO secretariat	ASAP
3.1.2 & 3.1.3	Communicate national observing programmes for SST, sea level and contribution to GOOS in tropical observations; review and update into SoG	ET members	By end 2014
3.2.2	Review OOFS requirements for SST, identify SST priorities, tradeoffs, and gaps	Overall led by Guimei Liu, Gary Corlett, Secretariat	By end 2014
3.2.4& 3.2.5& 3.2.8	Set up ad hoc WG for GHRSSST-ETOOFS-GOV, Review SoG and prepare recommendations for individual teams	Overall led by Guimei Liu, secretariat support	kickoff contact ASAP By end 2014
3.2.6	Coordinate with OSTST, kickoff contact with OSTST co-chairs	Overall led by Guimei Liu, secretariat support	kickoff contact ASAP By end 2014
3.2.7	Contact ArgoST and form a working group for ocean state of the observation system	Overall led by Guimei Liu, secretariat support	kickoff contact ASAP By end 2014

Item	Action	By whom	When/target
3.3.3	<ul style="list-style-type: none"> • Dr Guimei Liu contact Dr Candyce Clark (OCG) to identify PoCs for RRR; • Dr Guimei Liu participate in OCG meeting to communicate role of ETOOFS in observational requirements; • Review coastal requirements and update GOOS application requirements (Hendrik Tolman, Pierre de Mey, and member of COSS-TT); • Review OSCAR website for representation of the requirements and review other applications for the same variables; • Liaise with Ali Mafimbo to obtain feedback on SoG and observational requirements from RRR of WMO; • Liaise with Ali Mafimbo for RRR (cc, Boram Lee and Etienne Charpentier) to be presented by July 2014 (IPET-OSTE, formerly ET-EGOS), Secretariat to keep update and ensure Dr Guimei Liu's participation of IPET-OSTE meeting; • Liaise with GOV and with ETWCH (Dr Kevin Horsburgh) for observational requirements. 	As indicated	ongoing
4.1.2	Coordinate with WCRP/CLIVAR for observational requirements of seasonal prediction system, liaising with ET-ELRF	Guimei Liu, Oscar Alves, Laura Ferranti, Magdalena Balmaseda	By end 2014
4.1.3	contact sub-seasonal to seasonal (S2S) WWRP/WCRP project team and to determine its relevance to ETOOFS	WMO secretariat	ASAP
4.2.4	<ul style="list-style-type: none"> • ETOOFS-WCRP/CLIVAR-GOV synergy for ocean/climate indicator or extreme definition. (Drs Tony Lee, Ed Harrison, Gary Brassington); • Interaction with WGOMD-GOV/WGNE (Stephen Griffies, CORE) for potential involvement; • Dr Hendrik Tolman volunteered to be a member of project for seasonal forecast system. 	As indicated	As indicated
6.0.4	CD activities coordinate with established programmes or activities, such as WMO Education and Training (ETR) and USA's Cooperative Programme for Operational Meteorology, Education and Training (COMET).	Secretariats	Ongoing

Item	Action	By whom	When/target
7.1.4	<ul style="list-style-type: none"> • Identify which groups should be involved, and identify groups that have not been yet been involved in these activities but have capabilities; • generate a list of people entrained (name can be recovered from the IAEA meeting held in Monaco); • get information from Dr Henrick Tolman (last version of the project) on the IAEA project proposal (needs to know if the project will be financed); • identify user needs (end and intermediate users); • review dispersion modelling: not in term of evaluation (it will take to much time) but in term of what is available (charateristics, inputs, outputs, etc.); • review the WMO survey (mail from Boram); • meet with Mr Nick Ashton June/July 2013. 	As indicated	As indicated
8.0.4	Prepare a draft performance metrics on class 4 data and GOV approach, circulate in ET	Frank Bub, Alistair Sellar	By November 2013
10.0.2	<ul style="list-style-type: none"> • By March 2013: agree on priorities for content, and begin writing • From April to December 2013: consolidate first draft into form suitable for review • By end 2014: internal review by ETOOFS and complete a draft • By end 2015: international review by ocean community worldwide • 2016: publish as JCOMM publication • 	As indicated	As indicated

ACRONYMS AND OTHER ABBREVIATIONS

AASTR	Advanced Along-Track Scanning Radiometer
Argo	Array for Real-time Geostrophic Oceanography programme
Argo	Argo Profiling Float Pilot Project
ASAP	As Soon As Possible
ASAP	Automated Shipboard Aerological Programme
AVHRR	Advanced Very High Resolution Radiometer
BATHY	Report of bathythermal observation (FM 63–XI Ext. BATHY)
BOM	Bureau of Meteorology (Australia)
Cal/Val	Calibration/Validation
CARIBE-EWS	Tsunami and other Coastal Hazards Warning System for the Caribbean Sea and Adjacent Regions
CBD	Convention on Biological Diversity
CBS	Commission for Basic Systems (WMO)
CCI	Commission for Climatology (WMO)
CEOS	Committee on Earth Observation Satellites
CGMS	Coordination Group for Meteorological Satellites
CGPS	GPS at Tide Gauges
ChloroGIN	Chlorophyll Ocean Global Integrated Network
CLIVAR	Climate Variability and Predictability programme (WCRP)
CLS	Collecte Localisation Satellites (France)
COMET	Cooperative Programme for Operational Meteorology, Education and Training
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CTBTO	Comprehensive Nuclear-Test-Ban Treaty Organization
DBCP	Data Buoy Cooperation Panel (WMO-IOC)
DM	Data Management
DMPA	Data Management Programme Area (JCOMM)

DMQC	Data Management Quality Control
DRA	Development and Regional Activities
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
EC	Executive Council
EC	European Commission
EC WG WIGOS-WIS	Executive Council working Group on WIGOS and WIS (WMO)
ECMWF	European Centre for Medium-Range Weather Forecasts
ECV	Essential Climate Variables
EEA	European Environment Agency
EEZ	Exclusive Economic Zone
EGOS-IP	Implementation Plan for the Evolution of Global Observing Systems
ENSO	El Niño/Southern Oscillation
EO	Earth Observation
EOS	Earth Observation Summit
EOV	Essential Ocean Variable
EPS	Ensemble Prediction System
ER	Expected Results
ERA	Emergency Response Activities (WMO)
ESA	European Space Agency
ET	Expert Team
ETCCDI	Joint CLIVAR/CCI/JCOMM Expert Team on Climate Detection and Indices
ETDMP	Expert Team on Data Management Practices (JCOMM)
ET-EGOS	CBS Expert Team on the Evolution of the Global Observing System (WMO)
ET-ELRF	Expert Team for Extended Long-Range Forecasting
ETMAES	Expert Team on Marine Accident Emergency Support (JCOMM)
ETMSS	Expert Team on Maritime Safety Services (JCOMM)

ETOOFS	Expert Team on Operational Ocean Forecast System (JCOMM)
ETRP	Education and Training Programme (WMO)
ET-SAT	CBS Expert Team on Satellite Systems (WMO)
ETSI	Expert Team on Sea Ice (JCOMM)
ETWCH	Expert Team on Waves and Coastal Hazards Forecast Systems (formally ETWS)
EUCOS	EUMETNET Composite Observing System
EUMETNET	Network of European Meteorological Services
EUMETSAT	European Organization for the Exploitation of Meteorological Satellites
EuroGOOS	European GOOS
EuroSITES	European integrated network of open ocean multidisciplinary observatories
EVC	Essential Climate Variable
FAO	Food and Agriculture Organization
GCOS	Global Climate Observing System
GCOS-IP	Global Climate Observing System Implementation Plan
GDP	Global Drifter Programme
GDPFS	CBS Global Data Processing and Forecasting System (WMO)
GEF	Global Environment Facility
GEO	Group on Earth Observations
GEOHAB	Marine Geological and Biological Habitat Mapping
GEOSS	Global Earth Observation System of Systems
GFCS	Global Framework for Climate Services
GGODS	Global Open Oceans and Deep Seabed
GHRSSST	GODAE High Resolution SST
GISC	Global Information System Centres (WMO/WIS)
GLOSS	Global Sea-level Observing System
GMDSS	Global Maritime Distress and Safety System (IMO)
GODAE	Global Ocean Data Assimilation Experiment (GOOS)

GOOS	Global Ocean Observing System (IOC-WMO-UNEP-ICSU)
GOS	Global Observing System (WMO)
GOV	GODAE Ocean View
GOVST	GODAE Ocean View Science Team
GPS	Global Positioning System
GRA	GOOS Regional Alliance
GSC	GOOS Steering Committee
GSN	Global Societal Needs
GSOP	CLIVAR's Global Synthesis and Observations Panel
GSSC	GOOS Scientific Steering Committee
GTS	Global Telecommunication System (WMO/WWW)
GUAN	GCOS Upper-Air Network
IAEA	International Atomic Energy Agency
IAEA-MEL	IAEA Marine Environment Laboratories
I-GOOS	The intergovernmental IOC-WMO-UNEP Committee for GOOS
IGOS	Integrated Global Observing Strategy
IGOSS	WMO-IOC Integrated Global Ocean Services System (superseded by JCOMM)
IMO	International Maritime Organization
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IODE	International Oceanographic Data and Information Exchange (IOC)
IOTWS	Indian Ocean Tsunami Warning and Mitigation System (IOC)
IP	Implementation Plan
IPCC	Intergovernmental Panel on Climate Change (WMO, UNEP)
JAMSTEC	Japan Agency for Marine-Earth Science and Technology
JCOMM	Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology
JCOMMOPS	JCOMM in situ Observing Platform Support Centre
JMA	Japan Meteorological Agency

JSTC	Joint Steering Committee
KMA	Korean Meteorological Administration
KORDI	Korea Ocean Research and Development Institute
MAES	Marine Accident Emergency Support
MAN	Management Committee (JCOMM)
METAREA	Meteorological Area
META-T	Water Temperature instrument/platform Metadata Pilot Project (JCOMM)
METOP	Meteorological Operational satellites of the EUMETSAT Polar System (EPS)
MOFS	Met-Ocean Forecasts and Services
MOU	Memorandum of Understanding
MPERSS	Marine Pollution Emergency Response Support System (JCOMM)
MSI	Maritime Safety Information
MSS	Maritime Safety Services
NASA	National Aeronautics and Space Administration
NCEP	NOAA National Center for Environmental Prediction (USA)
NGO	Non-Governmental Organization
NOAA	National Oceanic and Atmospheric Administration (USA)
NODC	IODE National Oceanographic Data Centre (IOC)
NWP	Numerical Weather Prediction
NWS	National Weather Service (USA)
OceanSITES	OCEAN Sustained Interdisciplinary Timeseries Environment observation System
OCG	Observations Coordination Group (JCOMM)
ODS	IODE-JCOMM Ocean Data Standards Pilot Project
OOFS	Operational Ocean Forecasting Systems (JCOMM)
OOPC	Ocean Observations Panel for Climate (GCOS-GOOS-WCRP)
OPA	Observations Programme Area (JCOMM)
OPA-IG	Observations Programme Area Implementation Goals

OPAG	Open Programme Area Group
OSCAR	Ocean Surface Current Analyses – Real-time
OSE	Observing System Experiment
OSSE	Observing System Simulation Experiment
OST	Ocean Surface Topography
OSTM	Ocean Surface Topography Mission (Jason-2)
OSTST	Ocean Surface Topography Science Team
OT	OceanTeacher
PA	Programme Area (JCOMM)
POGO	Partnership for Observation of the Global Oceans
QC	Quality Control
QMF	Quality Management Framework (WMO)
QMS	Quality Management Systems
RA	Regional Association (WMO)
R&D	Research and Development
RMIC	Regional Marine Instrument Centre
RRR	CBS Rolling Review of Requirements (WMO)
SAR	Search and Rescue
SAR	Synthetic Aperture Radar
SCG	Services Coordination Group (JCOMM)
SFSPA	Services and Forecasting Systems Programme Area
SG	Steering Group
SIDS	Small Island Developing State
SL	Sea Level
SLP	Sea Level Pressure
SOA	State Oceanic Administration
SOG	Statements of Guidance
SPA	Services Programme Area (JCOMM)

SSH	Sea surface Height
SSS	Sea Surface Salinity
SST	Sea-Surface Temperature
TAO	Tropical Atmosphere Ocean Array
TAO	Tropical Atmosphere Ocean network of tropical moorings
TOR	Terms of Reference
TT	Task Team
TT-QM	DBCP Task Team on Quality Management (now merged into TT-IBPD)
TTR	Task Team on Resources
TTR	Training-Through-Research
TT-SAT	Task Team on Satellite Data Requirements
UN	United Nations
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
USA	United States of America
WCRP	World Climate Research Programme (WMO/IOC/ICSU)
WESTPAC	West Pacific
WG	Working Group
WGNE	Working Group on Numerical Experimentation
WGSIP	Working Group on Seasonal to Interannual Prediction
WIGOS	WMO Integrated Global Observing Systems
WIGOS-IP	WMO Integrated Global Observing Systems Implementation Plan
WIS	WMO Information System
WMO	World Meteorological Organization (UN)
WOC	World Ocean Council
WOCE	World Ocean Circulation Experiment

WP	Working Paper
WRC	World Radiation Centre
WS	Wind Waves and Storm Surges

