



Working group on Tsunamis and Other Hazards Related to Sea-Level Warning and Mitigation Systems (TOWS–WG)

**Inter-ICG Task Team 2
on Disaster Management
and Preparedness**

First Meeting

Seattle, USA

29 November – 1 December 2010

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and Other Hazards Related
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IOC/TOWS-WG/TT2-I/3
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1. PURPOSE OF MEETING

The Task Team 2 on Disaster Management and Preparedness (TT2) had submitted its preliminary report to the TOWS Meeting held on 5–6 May 2010 in Lisbon, Portugal. That report, however, mainly contained main the points which each ICGs had reported to TT2 in relation to disaster management, risk reduction, warning dissemination and emergency response. The report did not include development of action plans related to the TT2 Terms of Reference (Annex I), due to the very limited time for the team to submit its report to the TOWS, after the task team's formation. During the meeting in Lisbon, it was decided, that a task team meeting, and presumably an inter-task team meeting, would be beneficial for the purpose of propelling the functioning of global warning systems for ocean related hazards. An offer was made by the US Government, through NOAA, to host the meeting in Seattle.

Some overarching issues were discussed among Task Team chairs, and these were put to the floor on the first day of the meeting. The Task teams need to discuss and liaise among task teams and working groups from other ICGs for effective information sharing to ensure:

- (i) Warning outputs meet community needs, expectations, and the assessed risks,
- (ii) Proper public & media understanding of different services/products from NTWCs and RTWPs,
- (iii) Capacity enhancements of Member States (NTWCs and DMOs) in using warning products to develop their own tsunami warning chain and decide on evacuation orders, (SOPs)
- (iv) Sea-level monitoring networks meet the requirements of the warning systems.

The meeting was held over three days (29 November–1 December 2010). The first two days were dedicated to the respective task teams to allow in-depth discussions, and a plenary meeting on the third day was arranged to allow interactions and discussions with Task Teams 1 and 3, addressing the critical issues arising.

2. MEMBERS ATTENDING

IOTWS	Irina Rafliana (Indonesia) – Chair
IOTWS	Sam Hettiarachchi (Sri Lanka)
PTWS	David Coetzee (CDEM, NZ)
PTWS	Laura Kong (ITIC)
CARIBE-EWS	Julie Leonard (USA)
NEAMTWS	Russell Artherton (United Kingdom)
Task Team Secretariat:	Bernardo Aliaga (IOC UNESCO)

Stacey Edwards (CARIBE-EWS) had prepared to attend this meeting, but due to illness at the last minute before departure, she could not attend and had to cancel her travel, but continued maintaining communication.

3. MEETING NOTES

3.1 TASK TEAM 2 MEETING, 29–30 NOVEMBER 2010

The combined Task Team meeting and break group followed a plenary introduction and welcoming address from IOC UNESCO and NOAA-PMEL.

The TT2 meeting, with an introduction and agenda setting, chaired by Irina Rafliana, and facilitated by Bernardo Aliaga. All team members agreed the agenda proposed (Annex II), with no additional suggestions. Due to the absence of UN/ISDR representatives, presentation and discussion with this organization did not happen. Nevertheless, the group discussed ways to approach international organizations to address preparedness issues and also seek support through ICGs.

All respective ICGs had already sent their reports to TT2, and forwarded to the TOWS meeting. Nevertheless, the team sensed the need to share and present progresses made by each ICG as represented by the members of the team. This would allow discussion on the strengths and opportunities, as well as burning issues addressed in each region/basin. The team would also think about a further joint monitoring system for community preparedness initiatives, with more systematic approaches. Therefore, each ICG was given time to present updates and issues to be discussed in the meeting.

3.1.1 ICG/CARIBE-EWS Presentation and Discussion by Julie Leonard

The ICG/CARIBE-EWS had pointed out three good examples on preparedness, in Puerto Rico, Nicaragua, and Venezuela. The ICG/CARIBE-EWS put particular concerns in the SOP development in receiving warning and understanding warning products down to the last mile of the system. It is currently developing protocols and SOPs including manuals for four pilot sites. Issues among others are that Meteorological Departments, which are the NTWCs, are not required to serve 24/7. Warning products however, will reach the respective Member States' Tsunami Focal Point (which is the Meteorological Department or CDEMA). The ICG had maintained good communication with the disaster managers in respective countries.

The ICG/CARIBE-EWS had conducted workshops on sharing best practices, including a Tsunami Ready Summit. Nicaragua and Puerto Rico had championed in participatory work developing Tsunami Ready communities, with 9 out of 44 Districts established as a Tsunami Ready Community.

A Caribbean Tsunami Information Center (CTIC) is established, with support from UNDP and the Government of Italy, with some issues on the requested operational costs for sustainability, and Barbados is committing a good amount of resources in terms of office space, support staffs and services. The CARIBE-EWS is elaborating Tsunami Smart programmes, which emphasis self reliance and pro-activeness.

CARIBE-EWS suggest wider ITP (International Training Programme) including real-time conference/internet-based programmes (webinars) to broaden engagement and means of dissemination.

3.1.2 ICG/NEAMTWS Presentation and Discussion by Russell Artherton

The NEAM region is a collection of sub-basins, and it is not feasible to have a single Regional Tsunami Watch Centre for its mostly local tsunami potential. To date, there are no NTWC operating in the NEAMTWS although the France NTWC is expected to be established in 2011.

The involvement by North African countries in NEAMTWS is generally weak and needs to be encouraged.

Operational guidance in NEAMTWS is so far restricted to RTWCs, with an Operational Users Guide now adopted by the ICG. While this Guide includes decision matrices for disaster managers, it is acknowledged that more work is needed on the development of SOPs for NTWCs and disaster management responders. This was particularly the case for those countries in NEAM where existing civil protection organization and provision is relatively weak. The production (by ICG/NEAMTWS WG4) of a draft guidance manual for the benefit of civil protection authorities (disaster management organizations) has been welcomed by the ICG. This manual, reviewed by UN/ISDR, provides guidance for authorities in risk assessment, reduction and management and includes a full description of the structure and operation of the NEAM tsunami warning system from end-to-end. The manual (provided as a document for this meeting) includes case input from Member States across the region.

The NEAMTIC (NEAMTWS Tsunami Information Centre) is to be established in 2011, with support from the European Union.

3.1.3 ICG/PTWS Presentation and Discussion by David Coetzee and Laura Kong

The PTWS Medium-Term Strategy rests on three pillars which are reflected in its working group structure: Risk Assessment and Reduction, Warning Detection, Monitoring and Dissemination, and Awareness and Response. The Awareness and Response working group (WG) includes Public Education, Emergency Management Planning and Response. The WG is circulating a survey to assess current capacities of Member States in awareness and response. The PTWS has also emphasized the development of Tsunami Response Plans and SOPs by Member States as the key to successful response, and through ITIC and its partners, developed training materials on SOPs. PTWS urges consistency in approach.

The WG has had limited response from the Member States to nominate WG members; currently, they are New Zealand, China and Japan. ITIC (International Tsunami Information Center) is a default member.

As the oldest system among the four basins, the PTWS and ITIC has continued to receive requests for training, but ITIC resources have been limited in terms of funding, time and the number of people it can reasonably train in any year. The ITP-Hawaii typically can train a maximum of 15 persons at a time, and uses Hawaii as a working example of an end-to-end system. In contrast, the ITP-International goes to countries where it can reach wider audiences and find relevance to each different localized context. There are requests by the PTWS-SC for ITIC to develop a train-the-trainer programme in order to build regional expertise to better meet the demand. The PTWS seeks funds to meet these requests. A US DHS/FEMA National Disaster Preparedness Training Centre Certified 1-day Tsunami Awareness Course for First Responder was developed by the ITIC in 2010 for the US domestic audience, and has been adapted for international audiences. The next courses by ITIC under US DHS/FEMA will be on Managing Tsunami Risk and Conducting Tsunami Exercises.

Exercises are underpinned as an essential part of preparedness. SOPs should be tested and the post-exercise evaluation/de-brief and resulting corrective action plan should form an essential part of the activity. The PTWS intends to develop guidance on conducting exercises. Consistent methodologies by countries that will participate in the international Wave Exercises is deemed important. Pacific Wave Exercise 2011 will take place in November 2011, and will be lead by a PTWS Task Team that will work and plan in coordination with the other PTWS working groups.

3.1.4 ICG/IOTWS Presentation and Discussion by Irina Rafliana

Post tsunami 2004, Member States were active in developing preparedness initiatives, namely in Seychelles, Bangladesh, Sri Lanka, India, Malaysia, Thailand, Pakistan and Indonesia. It is understandably difficult for Member States to continue prioritizing tsunami hazard to deal with, in regards with its long return period. It needs to consider mainstreaming to larger Disaster Risk Reduction (DRR) framework, such as the UN/ISDR Hyogo Framework of Action which is ratified by most of the Member States. It was suggested by the task team to quote 'tsunami' in its mainstreaming effort.

The Working Group initially included wide scope of work, e.g. governance and community resilience. The ICG restructured the initial working group set ups, which initially consist of six working groups. Now the IOTWS adapt PTWS structure, with Working Group 3 working on Awareness and Response. Interactions were made not only among working groups (Risk Assessment & Reduction, and Warning Dissemination), but also other ICGs particularly with NEAMTWS in relation with the development and training on Indian Ocean Tsunami Risk Assessment Guideline, lead by Working Group Risk Assessment (WG 1). The birth of this guideline is imperative to allow Member States to have complete idea on how to develop policies and preparedness strategy based on risk profile and assessment. A regional training was conducted in Bangkok in 2009. Trial trainings were conducted in two Member States, Sri Lanka and Indonesia in 2010. Indonesia had elaborated and derived a National Tsunami Risk Assessment Guideline, which in 2011 will be implemented by local governments. An assessment tool in measuring preparedness is also available, developed in 2006 by the Indonesian Institute of Science, UNESCO and UN/ISDR. This assessment is incorporated within the risk assessment, particularly when measuring local capacities to come up with the risk formulation and index. It also allows measurement in government capacities and communities' level of self help (resources mobilization capacities).

Indian Ocean Wave Exercise 2009 was conducted as the first ever end-to-end Exercise in the basin, with good number of Member States participating and engage public evacuation drill, such as Tanzania, Pakistan, and Indonesia.

A project of educational materials repositories is made under the coordination of the Jakarta Tsunami Information Centre (JTIC), among Indonesia, Thailand, Philippines and Timor Leste.

Current initiatives, programmes and good practices are intended to be captured in a document produced by the working group on taking preparedness to the last mile. The documentation is lead by Pakistan.

Between 2008 and 2011, the UNESCAP project on Strengthening Tsunami Warning and Emergency Responses: Training Workshops on the Development of Standard Operating Procedures for Indian Ocean and Southeast Asian Countries, UNESCO/IOC conducted two regional workshops for IOTWS and PTWS Southeast Asia countries, and also multi-visit country missions to Pakistan, Myanmar, Vietnam, and the Philippines. The ITIC helped to develop the SOP course materials and within each training, participants took part in a near real-time tsunami table top exercise.

On the 2nd day of the meeting, the team discussed and prepared drafts for six recommended actions (Annex III), each with a designated person(s) in charge. The actions focus on specific issues that the Task team believes will support enhanced disaster management and preparedness, and are a collection of existing initiatives in the four ICGs:

- Stock Take of ICGs Status of Awareness and Response.
Person in Charge: David Coetzee.
- Inter- and Intra-Regional (ICGs) Sharing of Community-based Best Practices (BP).
Persons in Charge: Julie Leonard and Bernardo Aliaga.
- Discussion with ISDR, ECHO, UN Regional Organizations and Other Relevant Donors Including on the Use of CBDRR/CBDRM Platforms.
Persons in Charge: Sam Hettiarachchi and Julie Leonard.
- Development of Basic Standard Operating Procedures on Warning Dissemination and Emergency Response from NTWCs to DMOs.
Persons in Charge: Russell Arthurton and Irina Rafliana.
- Development of Generic Guidelines for Tsunami Wave Exercise.
Persons in Charge: Laura Kong and David Coetzee.
- Tsunami Training and Capacity Building.
Person in Charge: Laura Kong.

3.2 INTER-TASK TEAM MEETING, 1 DECEMBER 2010

At Day 3 of the meeting, all task teams met in plenary. All task teams chairs reported briefly on the outputs of each teams' discussion. TT2 reported on the shared lessons learnt, best practices and gaps, as well as issues among ICGs within their related working groups in awareness and response. TT2 reported the agreed recommendations, to be brought up to each ICG. An inter-task team discussion took place, to address cross-cutting issues, particularly related to the warning system product harmonization which links TT2 with TT3.

Points that were highlighted by Task Team 2 in this plenary meeting were among others:

- The clear line and area of work for TT2 were defined as from the NTWC to the end of the system (community at risk), engaging the Disaster Management Authorities.
- The defined role of TT3 is from the international/regional (RTWP/C) point to NTWC.
- TT3 discussed their area of responsibility and also the need to underpin authorized earthquake monitoring agencies which may make better quality information available.
- The warning services and products discussed within TT3 were that the first bulletin will announce earthquake parameters. This will be sent out to RTWPs. As the time goes; follow-up bulletins will contain threat levels in specific countries. It is the country's decision to request information or warning services to the RTWP/C.
- NTWC is expected to disseminate warning/evacuation order; to evacuate, get out of water or off threat, on alert a need to wait more, or there are no threat for the country/community.
- Countries at national level should decide on the thresholds and criteria for response and evacuation.
- The last bulletin disseminated to Member States/countries to be forwarded as cancellation/all clear through each respective emergency offices.
- The issue may rise when the cancellation status may not be applicable to all countries at the same time.
- TT2 will provide feedback to TT3 on the guiding points on how to make clear such issues, to be part of the proposed matrix produced by TT3.

- The TT2 emphasizes the need to mainstream its tsunami preparedness practices to existing global frameworks and forums, to allow wider audience to support, for example, promoting “Make Our Coastal Community Safe” at the upcoming Global DRR forum under ISDR.
- The TOWS WG task to develop a Compendium Document related to tsunami and other related hazards also underlined the importance of having inputs from all task teams on the agreed terms to be put in the Compendium.

4. RECOMMENDATION

The team recommended key issues to be addressed in a global context in relation to warning dissemination:

- (i) The ICGs are to agree on an overarching concept of operation. The concept should promote the development of national plans for Tsunami Warning and SOPs.
- (ii) Agree that consistent terminologies used by regional watch/warning centres globally, e.g. Warning, Watch, Bulletin, Advisory, Alert.
- (iii) Building on existing good practices, recognizing the existing effective SOPs already developed and evaluated within parts of ICGs, extending these practices more universally throughout ICGs.
- (iv) Develop basic templates for SOPs for all relevant levels, building on the experiences of e.g. PTWS and IOTWS.
- (v) Encourage effective linkages between the respective SOPs within countries.
- (vi) Review and test SOPs through exercises and document the improvement processes.
- (vii) Encourage Member States to review and revise plans based on their exercises.

Thus, the Member States of each ICG hold full responsibility for issuing and responding to the warning.

5. WAY FORWARD

Each person in charge for the proposed activities will continue leading the team with each of the respective ideas and initiatives, and finalizing the terms of references. All members of the task team are expected to share the recommendations with each ICG.

Working Group 3 of the ICG/PTWS and Working Group 3 of the ICG/IOTWS welcomes the opportunity to share its resources and experience with those of other regional ICGs in order to meet the objectives of TOWS Task Team 2.

The team proposed to meet to work on particular issue(s) that may not be sufficiently communicated through emails, e.g. developing Tsunami Wave Exercise Guideline. A suggestion of venue and timing is in Jakarta, Indonesia, on the first quarter of 2011. This will benefit the advanced preparations prior 2011 Wave exercises.

6. CLOSING REMARKS

The task team would like to convey gratitude for the hospitality of the US Government and NOAA in hosting the meeting, enabling a productive and stimulating meeting. The team also benefitted from the visit to NOAA PMEL facilities, allowing better understanding of the contribution of NOAA in to the global tsunami and other sea-related hazard warning systems.

ANNEX I

TASK TEAM 2 TERMS OF REFERENCES ON DISASTER MANAGEMENT AND PREPAREDNESS

The Inter-ICG Task Team based on the relevant working groups within the ICGs, shall:

- (i) Facilitate in collaboration with organization such as UN/ISDR, the exchange of experiences and information on preparedness actions, education/awareness raising campaigns and other matters related to disaster management and preparedness.
- (ii) Elaborate proposals for a global or regional tsunami awareness day, possibly connected to the International Day for Disaster Risk Reduction (8 October).
- (iii) Promote preparedness in coastal communities through education and awareness products and campaigns.
- (iv) Replicate preparedness programmes and assessment tools that have been successful in one regional Tsunami Warning and Mitigation System in the others as appropriate.
- (v) Provide a report to the TOWS–WG.

ANNEX II

PROVISIONAL AGENDA

TT2 MEETING – SEATTLE, 29–30 NOVEMBER, AND TOWS TT MEETING, 1 DECEMBER 2010

Day 1, 29 November 2010 09.00am – 16.00pm	
Agenda	Objective
Presentation on TT 2 Report to the TOWS WG	<ul style="list-style-type: none"> To share report provided by TT 2 to the TOWS WG in Lisbon, April 2010, and to gain feedback on this preliminary report from TT 2 members
<p>Updates from TT2 members related to progresses and key issues met within the respective ICG's:</p> <p>ICG-PTWS ICG-IOTWS ICG-NEAMS ICG-CARRIBE</p> <p>TOWS Task Teams and Regional ICG TWS Working Groups and Task Teams is provided at the end of this note. (R. Arthurton, May 2010)</p>	<ul style="list-style-type: none"> To review current differentiated working group settings in each ICG's which affect the scope of work of TT 2 in purpose for harmonization of TWS practices To discuss and update existing tools and terminology related to disaster management including preparedness related to tsunamis and other sea-related hazards To discuss existing and proposed warning chain and dissemination, which also reflect trans-boundaries issues
Review Terms of References, the Scope and Boundaries of 'Disaster Management and Preparedness' within the TOWS context, and its relations to the TT 2 scope of work	<ul style="list-style-type: none"> To review the work which is relevant to the mandate of TT 2 (provide advices and encourage lessons sharing to ICG's) To build common understanding of 'preparedness', 'mitigation' and 'disaster management' related to the TT 2 scope of work To discuss how TT 2 strengthen the link from sciences to practice and decision making in disaster management

Day 2, 30 November 2010	
Agenda	Objective
Discussion on action items for TT 2 prior next TOWS meeting 2011	<ul style="list-style-type: none"> To discuss milestones on TT 2 work prior 2011
Presentation from and discussion with UN ISDR and other related organizations as key partner(s) of TT 2	<ul style="list-style-type: none"> To acquire updates from UN ISDR and (other related organizations if possible) on current status of preparedness on global perspective To discuss collaboration to support the work of TT 2 and preparedness activities through the ICG's
Discussion of cross-cutting issues related to other Task Team of TOWS, to be addressed on Day 3	<ul style="list-style-type: none"> To discuss points to report to the plenary discussion on day 3 To discuss related over-arching issues needs to be addressed to the plenary discussion
Day 3 (Plenary Discussion with Task Team 1 and 3) 1 December 2010 (AM)	

ANNEX III

DRAFT CONCEPT NOTES ON TASK TEAM 2 PROPOSED ACTIVITIES

TOR 1

STOCK-TAKE ON ICG STATUS OF PUBLIC AWARENESS AND NTWC/NDMO RESPONSE Person in Charge: David Coetzee	
BACKGROUND	<p>The respective regional Intergovernmental Coordination Groups (ICGs) have all established an number of specialist working groups, one of which with an 'Awareness and Response' focus (in some cases the focus extends to 'Reduction' and 'Assessment').</p> <p>None of the working groups with an 'Awareness and Response' focus currently possess over a comprehensive view of the status of awareness and response among their Member States. An assessment of current capacity is therefore required within each ICG to inform the focus of the working groups.</p>
RECOMMENDATION	<p>It is recommended that the relevant working group(s) within each ICG conduct a survey of the status of public awareness and response capacity among their Member States in the form of a short questionnaire - to be completed by each member state.</p>
PROPOSED SURVEY FORMAT CONTENT	<ol style="list-style-type: none"> Surveys should comprise two parts: A: Public Awareness Status B: Response Status, with separate parts for: <ul style="list-style-type: none"> National Tsunami Warning Centre (NTWC) National Disaster Management Office (NDMO) Surveys are to be conducted in a 'checkbox' table format to provide for all options in a consistent manner. Besides surveying all methods, types of materials and SOPs used for the respective areas, it must also allow opportunity for Member States to indicate in which areas they require support, or are in a position to offer support. Surveys must be kept short, simple and easy to complete. They can be offered either via an email attachment (MSWord format) or via the web using for instance 'Survey Monkey'. A draft template is attached and can be adjusted or added upon to suit the focus of the particular working group.
EXPECTED RESULT	<p>The working group will collate all returned questionnaires and compile an assessment of the status of awareness and response in the region. The assessment is to be used to develop a work plan for the working group, which is to be presented to and approved by their ICG.</p>

TOR 2

INTER AND INTRA-REGIONAL (ICG) SHARING OF COMMUNITY-BASED EWS BEST PRACTICES (BP)	
<p>Persons in Charge: Julie Leonard and Bernardo Aliaga</p>	
BACKGROUND	<ul style="list-style-type: none"> • There are many examples of community-based EWS from around the world. In order to promote continued implementation in vulnerable communities, i.e. reaching the last mile, BP meetings should be promoted to share experiences. There are a variety of formats which could be used. • ICG-CARIBE-EWS implemented a BP meeting in August 2008 that brought 30 practitioners from 15 countries to share experiences in implementing CB-EWS. This meeting was judged by the practitioners as a successful way to discuss and share approaches to problem identification; methodology and strategy implementation; results achieved; and sustainability and transferability, as well as community participation, gender and media considerations. Participants requested more opportunities to learn from and visit active CB EWS projects. Two opportunities were supported: 1) a visit to Masachapa, Nicaragua, linked to a meeting of the CAWG (PTWS) in November, 2009; 2) TsunamiReady Summit in Mayaguez, PR, where 20 reps from CAM and CAR MS met with TsunamiReady practitioners in Puerto Rico and visited a TR community. . Participation was supported by IOC and other donors. Additionally, presentations on both experiences were made at the ICG-V meeting in Managua, 2010. In the PTWS..., In the IOTWS ...
ACTIVITIES	<p>TT2 recommends to WGs to support a similar activity or activities as part of a CB EWS program to promote the implementation of community-based EWS, i.e., reaching the last mile.</p>
EXPECTED RESULT	<p>X number of “best practices” meetings at regional and/or national level to share experiences in implementing community-based EWS.</p>

TOR 3

<p align="center">DISCUSSION WITH ISDR, ECHO UN REGIONAL ORGANIZATIONS , AND OTHER RELEVANT DONORS, INCLUDING ON THE USE OF CBDRR/CBDRM PLATFORMS</p> <p align="center">Persons in Charge: Sam Hettiarachchi and Julie Leonard</p>	
BACKGROUND	<p>The Hyogo Framework for Action, global DRR campaigns as well as National DRR Platforms are existing means for building bridges between the tsunami EWS and DRR practitioners, in the context of building effective multi-hazard prevention, mitigation and preparedness programs.</p>
ACTIVITIES	<ul style="list-style-type: none"> • Organize a round table on coastal hazards including (emphasizing on) tsunami prevention, mitigation and preparedness at Third Session of the Global Platform for DRR, 8–13 May 2011, Geneva, Switzerland. • Designation of “Tsunami Aware Communities” as part of DRR day. • Campaign on “Make my coastal community safe/resilient”, including public awareness activities, memorials, etc. • Encourage ICGs to promote and MS to actively pursue linkage with national DRR platforms.
EXPECTED RESULT	<ul style="list-style-type: none"> • Creation/inclusion of a program on “make my coastal community safe/resilient”, similar to “one million safe hospitals and safe schools campaign” program and the “making cities safe campaign” (2010–11). • Tsunami and other coastal related hazards are included within HFA reporting process • Incorporation of tsunami awareness into global DRR day.

TOR 4

BASIC FRAMEWORK FOR STANDARD OPERATIONAL PROCEDURES IN TSUNAMI WARNING DISSEMINATION	
<p>Persons in Charge: Russell Arthurton and Irina Rafliana</p>	
DEFINITIONS	<p>A set of written instructions describing a routine or repetitive activity to be followed by an organization. The instructions are stakeholder agreed-upon steps that will be used in coordinating the Who, What, When, Where, and How aspects of the activity.</p> <p>A mechanism for operating effective and reliable coordinated warning systems and disaster management systems. The NTWC SOP must be linked at all levels from international through national to local institutions. It must be simultaneously connected to the corresponding DMO SOP, and vice versa.</p>
BACKGROUND	<ul style="list-style-type: none"> • What and Why? The aim is to provide a basic understanding of the core early warning features of a TWS. These provide an “end-to-end” system of event detection, information processing and messaging which is designed to provide warnings and related information to people at risk in the shortest possible time after a potentially tsunami-generating earthquake. The system depends on the interoperability of its component parts. The management of each part (regional watch centres (providers), national warning centres, disaster management organisations and related emergency agencies) is governed by its specific standard operating procedures so that their operators know precisely what actions are to be taken in an emergency, even if such an emergency is a very rare event. • Who needs them? • For What? <ul style="list-style-type: none"> ○ Current state of development in ICGs ○ Formal and Informal <ul style="list-style-type: none"> ▪ Informal SOP: Users manual in NEAMS ○ Where are the gaps ○ Useful presentation tools <ul style="list-style-type: none"> ▪ Flow charts/templates ○ Basic Principles: <ul style="list-style-type: none"> ▪ Information flow through the system should be pragmatic and depend on specific national and local capacities ○ Basic roles and responsibilities in each part of the TWS <ul style="list-style-type: none"> ▪ RTWP ▪ NTWC ▪ DMO/EOC ▪ Community at Risk
OBJECTIVES	<ul style="list-style-type: none"> • To promote common approach and harmonization in the development of SOPs to the End-to-End Tsunami Warning System to all stages of operations, from detection to dissemination.

	<ul style="list-style-type: none"> • The SOP discussed here include those for real-time emergency operation centres and pre-event activities (Regional Watch Centres/Providers, National Warning Centres, and Disaster Management Offices/Organizations). • SOPs should accommodate specific circumstances of lead to different lead times, resources and capacities available • SOPs should reflect back clearly on how first responders (emergency response officers/DMOs) and communities should be prepared. • SOPs at the local level should clearly reflect what and how community should react and respond to the warning.
RECOMMENDATION	<ul style="list-style-type: none"> • The ICGs are to agree on an overarching concept of operation. The concept should promote the development of national plans for Tsunami Warning and SOPs. • Agree consistent terminologies used by regional watch/warning centres globally. • Warning, Watch, Bulletin, Advisory, Alert. • Building on existing good practices, recognizing the existing effective SOPs already developed and evaluated within parts of ICGs, extend these practices more universally throughout ICGs. • Develop basic templates for SOPs for all relevant levels, building on the experiences of e.g. PTWS and IOTWS. • Encourage effective linkages between the respective SOPs within countries. • Review and test SOPs through exercises and document the improvement processes. Encourage Member States to review and take action plans based on their exercises.

TOR 5

<p>TSUNAMI WAVE EXERCISES GUIDELINE</p> <p>Persons in Charge: Laura Kong & David Coetzee</p>	
<p>BACKGROUND</p>	<p>Regional and national tsunami warning systems in the Pacific and globally must maintain a high level of readiness so as to be able to efficiently and effectively act to provide for the public's safety during fast-onset and rapidly-evolving natural disasters such as tsunamis. To maintain this high state of operational readiness and especially for infrequent events such as tsunamis, tsunami warning centres and emergency agencies must regularly practice their response procedures to ensure that vital communication links work seamlessly, and that agencies and response personnel know the roles that they will need to play during an actual event.</p> <p>The purpose of an exercise is to evaluate the ability of countries and their national and local organizations to respond to a tsunami, whether local or distant. Exercises provide an opportunity for countries to exercise their operational lines of communications, review their tsunami response procedures, and at the same time, promote emergency and tsunami preparedness.</p> <p>Regular regional tsunami exercises have become a permanent fixture of all Intergovernmental Coordination Groups (ICGs). To date, the PTWS has conducted 2 Pacific-wide exercises (2006, 2008) and will conduct its next exercise in the 4th quarter of 2011. The IOTWS conducted an Indian Ocean-wide exercise in the 3rd quarter 2009, and the CARIBE-EWS will conduct an exercise in the 1st quarter of 2011.</p> <p>The preparation, conduct and evaluation of these exercises present significant challenges. The challenges apply to:</p> <ul style="list-style-type: none"> • Resource commitment for exercise planning/preparation • The extensive scope of exercise participation • The absence of consistent and independent evaluation at each participant level • The responsibilities for exercise typically crosses working groups within an ICG and/or within Member States <p>It is also noted that there is no generic and consistent guideline available for ICGs about the development and management of regional tsunami exercises.</p>
<p>RECOMMENDATION</p>	<p>Inter-ICG task team be established to compile a consistent set of guidelines for regional tsunami exercise development, management and evaluation and among others, consider:</p> <ul style="list-style-type: none"> • The focus to be on the exercise of SOPs of NWCs and DMOs • options for sharing of exercise planning, management and evaluation resources across ICGs

EXPECTED RESULT	<ul style="list-style-type: none"> • Generic and consistent guidelines on exercise development, management and evaluation that will apply to both exercise coordinators and exercise players (watch & warning centres as well as disaster management agencies) and that can be used by all ICGs. • A process or system whereby ICGs can support each other in the development, management and evaluation of exercises.
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TSUNAMI TRAINING AND CAPACITY BUILDING	
Person in Charge: Laura Kong	
BACKGROUND	Training classes, workshops, forums, or other mechanisms that bring stakeholders together to increase their knowledge base and improve job skills. For tsunamis, this specifically includes skills to be able to design, implement, and sustain mitigation programs in hazard risk assessment, warning, and awareness and response.
GOALS AND TARGETS	To increase the skills of responsible tsunami stakeholders, and their customers, to respond effectively to tsunamis. This includes the: <ul style="list-style-type: none"> • Provision of background information on the phenomena and its implications, • Technical skills to be proficient at utilizing tools to accomplish their jobs, • Communication skills to be able to convey information to customers (decision-makers to last mile public).
SERVICE PROVIDERS	<p>Training and Outreach has traditionally been conducted by many different organizations (both government and private sector) internationally, nationally, and locally.</p> <p>As part of its mandate and functions under IOC Resolution X-23 (1977), the ITIC assists countries in establishing warning centers and improving tsunami preparedness, and for decades has annually conducted a training program. As an international center, ITIC also works to monitor and improve warning services globally, and serves as an information resource for tsunami events (with WDC-MGG tsunamis), clearinghouse for education and awareness materials, and encourages research that will improve mitigation practices.</p> <p>The ITIC Training Program consists of a Hawaii-based training (ITP-Hawaii) where Hawaii is used as a working example of an end-to-end system of warning, response, and preparedness for both distant and local tsunamis, and an International training (ITP-Intl) where ITIC organizes a regional or country-specific training. The ITP-Hawaii emphasizes small classes where the actual practitioners can answer questions and share real-life experiences. The ITP-Intl allows for international experts to visit a tsunami-prone country to</p>

	<p>engage a much larger and broader set of stakeholders. Since the 2004 Indian Ocean tsunami, the ITIC has conducted more than 60 multi-day trainings around the world.</p> <p>To assist the development of a functional global tsunami warning and mitigation system, the IOC endorses the establishment of Tsunami Information Centers (TIC) in each ICG region to serve as a information resource, and specifically act as a focal point for awareness and the identification of country capacity building activities requirements. To date, Indonesia is served by the Jakarta Tsunami Information Center, and CARIBE-EWS starting in 2011 by the Caribbean Tsunami Information Center, and NEAMTWS by the NEAM Tsunami Information Center. TICs should engage and coordinate and/or collaborate with the relevant regional organizations to meet country needs.</p> <p>The ITP-Hawaii is an example where a TIC (ITIC) works closely with its Regional TWC (PTWC) and its local emergency response and preparedness groups (Hawaii State and County Civil Defense and Pacific Tsunami Museum) to conduct a training focused on practical and real-life sharing on the operational aspects of warning and response. Participants are nominated by their country through IOC Circular Letter, and selection is based on country/regional need and commitment. The training emphasizes stakeholder coordination, and as such, ideally brings simultaneously warning center and the disaster management staff from one country to the same training.</p>
CONTENT	<p>Training curricula have varied in their formats and in their standards for achieving competency. Methods have ranged from high-level briefings for decision-makers to hands-on training to duty and field staff on detection and threat evaluation hardware/software technologies and alert dissemination, and to informal community gatherings to convey and decide on warning, response, and evacuation. Depending on the target audience, appropriate teaching materials and methodologies have been developed and used.</p> <p>In order to support the establishment and strengthening of reliable tsunami early warning systems and an effective end-to-end warning, trainings have focused on the development of tsunami warning and emergency response standard operating procedures (SOPs). These SOPs are considered to be essential for rapid and efficient response.</p> <p>For an effective Tsunami Early Warning and Mitigation System (TEWS) National or Sub-National Tsunami Warning Centres (TWC) need to quickly disseminate consistent and reliable tsunami threat information in an understandable and concise manner. Disaster Management Organizations (DMO), or their Emergency Operations Centres, that are responsible for public safety during natural or man-made disasters, then need to assess the threat to their local populations based on all available information including local knowledge, and when appropriate, disseminate safety information and instructions, and initiate public coastal evacuations. These actions comprise an “End-to-End” TEWS response (monitoring and</p>

	<p>warning, alert dissemination, emergency response, public action).</p> <p>To be successful, Tsunami Warning Centres and Disaster Management Organizations at all levels of government (national, provincial, district and local) require pre-event development of protocol and procedures documents describing their roles, responsibilities, responses, and actions. These responses and actions should be well coordinated and practiced (exercised) within their organizations, in conjunction with external agencies.</p>
RECOMMENDATION	<ul style="list-style-type: none"> • A consistent set of trainings be provided to all regions on the essential components of tsunami early warning. • Further tailoring is done by each ICG. ICGs should survey the training needs of its Member States to identify priorities in topic and/or location. Capacity building may cross-cut across Working Groups/Task Teams and involve a broad set of stakeholders, or be specific to a WG. • Design and implement a framework for regional capacity building modelled after the ITIC ITP-Hawaii and International training programs, and a strategy that will ideally build region-based training centres and expert trainers. Elaborate these in the ICG's Medium Term Strategy. • Coordination amongst service providers, regional organizations, and donors is strongly encouraged Consistency across ICG regions is required.
EXPECTED RESULT	<ul style="list-style-type: none"> • Regionally-specific trainings that involve RTWC and RTICs • Implemented and accountable mitigation programs, including the provision of well-understood coordinated warnings to a prepared population. • Shared best practice protocols that will facilitate the development of a standard approach for all practitioners in a region. • Cadre of regional trainers that is fully knowledgeable and capable to provide a globally consistent approach to tsunami warning and mitigation. • See Activities below.
ACTIVITIES	<ul style="list-style-type: none"> • Study visits of best practices examples (such as ITP-Hawaii) – annual with ICG input on participants. • Regional trainings of nearby countries (annual). • Country trainings specific to the needs of a country (tsunami-prone are highest priority, but upon the interest of each country). • Train-the-trainer trainings to build in-region trainers as knowledge experts on an end-to-end system (at least 1 set of regional trainer/ICG).

In this Series, entitled

Reports of Meetings of Experts and Equivalent Bodies, which was initiated in 1984 and which is published in English only, unless otherwise specified, the reports of the following meetings have already been issued:

1. Third Meeting of the Central Editorial Board for the Geological/Geophysical Atlases of the Atlantic and Pacific Oceans
2. Fourth Meeting of the Central Editorial Board for the Geological/Geophysical Atlases of the Atlantic and Pacific Oceans S. Fourth Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of 'El Niño' (**Also printed in Spanish**)
4. First Session of the IOC-FAO Guiding Group of Experts on the Programme of Ocean Science in Relation to Living Resources
5. First Session of the IOC-UN(OETB) Guiding Group of Experts on the Programme of Ocean Science in Relation to Non-Living Resources
6. First Session of the Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
7. First Session of the Joint CCOP(SOPAC)-IOC Working Group on South Pacific Tectonics and Resources
8. First Session of the IODE Group of Experts on Marine Information Management
9. Tenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies in East Asian Tectonics and Resources
10. Sixth Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
11. First Session of the IOC Consultative Group on Ocean Mapping (**Also printed in French and Spanish**)
12. Joint 100-WMO Meeting for Implementation of IGOSS XBT Ships-of-Opportunity Programmes
13. Second Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
14. Third Session of the Group of Experts on Format Development
15. Eleventh Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of South-East Asian Tectonics and Resources
16. Second Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
17. Seventh Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
18. Second Session of the IOC Group of Experts on Effects of Pollutants
19. Primera Reunión del Comité Editorial de la COI para la Carta Batimétrica Internacional del Mar Caribe y Parte del Océano Pacífico frente a Centroamérica (**Spanish only**)
20. Third Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
21. Twelfth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of South-East Asian Tectonics and Resources
22. Second Session of the IODE Group of Experts on Marine Information Management
23. First Session of the IOC Group of Experts on Marine Geology and Geophysics in the Western Pacific
24. Second Session of the IOC-UN(OETB) Guiding Group of Experts on the Programme of Ocean Science in Relation to Non-Living Resources (**Also printed in French and Spanish**)
25. Third Session of the IOC Group of Experts on Effects of Pollutants
26. Eighth Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
27. Eleventh Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans (**Also printed in French**)
28. Second Session of the IOC-FAO Guiding Group of Experts on the Programme of Ocean Science in Relation to Living Resources
29. First Session of the IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials
30. First Session of the IOCARIBE Group of Experts on Recruitment in Tropical Coastal Demersal Communities (**Also printed in Spanish**)
31. Second IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
32. Thirteenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of East Asia Tectonics and Resources
33. Second Session of the IOC Task Team on the Global Sea-Level Observing System
34. Third Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
35. Fourth Session of the IOC-UNEP-IMO Group of Experts on Effects of Pollutants
36. First Consultative Meeting on RNODCs and Climate Data Services
37. Second Joint IOC-WMO Meeting of Experts on IGOSS-IODE Data Flow
38. Fourth Session of the Joint CCOP/SOPAC-IOC Working Group on South Pacific Tectonics and Resources
39. Fourth Session of the IODE Group of Experts on Technical Aspects of Data Exchange
40. Fourteenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of East Asian Tectonics and Resources
41. Third Session of the IOC Consultative Group on Ocean Mapping
42. Sixth Session of the Joint IOC-WMO-CCPS Working Group on the Investigations of 'El Niño' (**Also printed in Spanish**)
43. First Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean
44. Third Session of the IOC-UN(OALOS) Guiding Group of Experts on the Programme of Ocean Science in Relation to Non-Living Resources
45. Ninth Session of the IOC-UNEP Group of Experts on Methods, Standards and Intercalibration
46. Second Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico
47. Cancelled
48. Twelfth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans
49. Fifteenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies of East Asian Tectonics and Resources
50. Third Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
51. First Session of the IOC Group of Experts on the Global Sea-Level Observing System
52. Fourth Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean
53. First Session of the IOC Editorial Board for the International Chart of the Central Eastern Atlantic (**Also printed in French**)
54. Third Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico (**Also printed in Spanish**)
55. Fifth Session of the IOC-UNEP-IMO Group of Experts on Effects of Pollutants
56. Second Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean
57. First Meeting of the IOC *ad hoc* Group of Experts on Ocean Mapping in the WESTPAC Area
58. Fourth Session of the IOC Consultative Group on Ocean Mapping
59. Second Session of the IOC-WMO/IGOSS Group of Experts on Operations and Technical Applications

60. Second Session of the IOC Group of Experts on the Global Sea-Level Observing System
61. UNEP-IOC-WMO Meeting of Experts on Long-Term Global Monitoring System of Coastal and Near-Shore Phenomena Related to Climate Change
62. Third Session of the IOC-FAO Group of Experts on the Programme of Ocean Science in Relation to Living Resources
63. Second Session of the IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials
64. Joint Meeting of the Group of Experts on Pollutants and the Group of Experts on Methods, Standards and Inter calibration
65. First Meeting of the Working Group on Oceanographic Co-operation in the ROPME Sea Area
66. Fifth Session of the Editorial Board for the International Bathymetric and its Geological/Geophysical Series
67. Thirteenth Session of the IOC-IHO Joint Guiding Committee for the General Bathymetric Chart of the Oceans **(Also printed in French)**
68. International Meeting of Scientific and Technical Experts on Climate Change and Oceans
69. UNEP-IOC-WMO-IUCN Meeting of Experts on a Long-Term Global Monitoring System
70. Fourth Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
71. ROPME-IOC Meeting of the Steering Committee on Oceanographic Co-operation in the ROPME Sea Area
72. Seventh Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of 'El Niño' **(Spanish only)**
73. Fourth Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico **(Also printed in Spanish)**
74. UNEP-IOC-ASPEI Global Task Team on the Implications of Climate Change on Coral Reefs
75. Third Session of the IODE Group of Experts on Marine Information Management
76. Fifth Session of the IODE Group of Experts on Technical Aspects of Data Exchange
77. ROPME-IOC Meeting of the Steering Committee for the Integrated Project Plan for the Coastal and Marine Environment of the ROPME Sea Area
78. Third Session of the IOC Group of Experts on the Global Sea-level Observing System
79. Third Session of the IOC-IAEA-UNEP Group of Experts on Standards and Reference Materials
80. Fourteenth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans
81. Fifth Joint IOG-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
82. Second Meeting of the UNEP-IOC-ASPEI Global Task Team on the Implications of climate Change on Coral Reefs
83. Seventh Session of the JSC Ocean Observing System Development Panel
84. Fourth Session of the IODE Group of Experts on Marine Information Management
85. Sixth Session of the IOC Editorial Board for the International Bathymetric chart of the Mediterranean and its Geological/Geophysical Series
86. Fourth Session of the Joint IOC-JGOFS Panel on Carbon Dioxide
87. First Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Pacific
88. Eighth Session of the JSC Ocean Observing System Development Panel
89. Ninth Session of the JSC Ocean Observing System Development Panel
90. Sixth Session of the IODE Group of Experts on Technical Aspects of Data Exchange
91. First Session of the IOC-FAO Group of Experts on OSLR for the IOCINCWIO Region
92. Fifth Session of the Joint IOC-JGOFS CO₂ Advisory Panel Meeting
93. Tenth Session of the JSC Ocean Observing System Development Panel
94. First Session of the Joint CMM-IGOSS-IODE Sub-group on Ocean Satellites and Remote Sensing
95. Third Session of the IOC Editorial Board for the International Chart of the Western Indian Ocean
96. Fourth Session of the IOC Group of Experts on the Global Sea Level Observing System
97. Joint Meeting of GEMSI and GEEP Core Groups
98. First Session of the Joint Scientific and Technical Committee for Global Ocean Observing System
99. Second International Meeting of Scientific and Technical Experts on Climate Change and the Oceans
100. First Meeting of the Officers of the Editorial Board for the International Bathymetric Chart of the Western Pacific
101. Fifth Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico
102. Second Session of the Joint Scientific and Technical Committee for Global Ocean Observing System
103. Fifteenth Session of the Joint IOC-IHO Committee for the General Bathymetric Chart of the Oceans
104. Fifth Session of the IOC Consultative Group on Ocean Mapping
105. Fifth Session of the IODE Group of Experts on Marine Information Management
106. IOC-NOAA *Ad hoc* Consultation on Marine Biodiversity
107. Sixth Joint IOC-WMO Meeting for Implementation of IGOSS XBT Ship-of-Opportunity Programmes
108. Third Session of the Health of the Oceans (HOTO) Panel of the Joint Scientific and Technical Committee for GLOSS
109. Second Session of the Strategy Subcommittee (SSC) of the IOC-WMO-UNEP Intergovernmental Committee for the Global Ocean Observing System
110. Third Session of the Joint Scientific and Technical Committee for Global Ocean Observing System
111. First Session of the Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate
112. Sixth Session of the Joint IOC-JGOFS CO₂ Advisory Panel Meeting
113. First Meeting of the IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional - Global Ocean Observing System (NEAR-GOOS)
114. Eighth Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of "El Niño" **(Spanish only)**
115. Second Session of the IOC Editorial Board of the International Bathymetric Chart of the Central Eastern Atlantic **(Also printed in French)**
116. Tenth Session of the Officers Committee for the Joint IOC-IHO General Bathymetric Chart of the Oceans (GEBCO), USA, 1996
117. IOC Group of Experts on the Global Sea Level Observing System (GLOSS), Fifth Session, USA, 1997
118. Joint Scientific Technical Committee for Global Ocean Observing System (J-GOOS), Fourth Session, USA, 1997
119. First Session of the Joint 100-WMO IGOSS Ship-of-Opportunity Programme Implementation Panel, South Africa, 1997
120. Report of Ocean Climate Time-Series Workshop, Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate, USA, 1997
121. IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional Global Ocean Observing System (NEAR-GOOS), Second Session, Thailand, 1997

122. First Session of the IOC-IUCN-NOAA *Ad hoc* Consultative Meeting on Large Marine Ecosystems (LME), France, 1997
123. Second Session of the Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC), South Africa, 1997
124. Sixth Session of the IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico, Colombia, 1996 **(also printed in Spanish)**
125. Seventh Session of the IODE Group of Experts on Technical Aspects of Data Exchange, Ireland, 1997
126. IOC-WMO-UNEP-ICSU Coastal Panel of the Global Ocean Observing System (GOOS), First Session, France, 1997
127. Second Session of the IOC-IUCN-NOAA Consultative Meeting on Large Marine Ecosystems (LME), France, 1998
128. Sixth Session of the IOC Consultative Group on Ocean Mapping (CGOM), Monaco, 1997
129. Sixth Session of the Tropical Atmosphere - Ocean Array (TAO) Implementation Panel, United Kingdom, 1997
130. First Session of the IOC-WMO-UNEP-ICSU Steering Committee of the Global Ocean Observing System (GOOS), France, 1998
131. Fourth Session of the Health of the Oceans (HOTO) Panel of the Global Ocean Observing System (GOOS), Singapore, 1997
132. Sixteenth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans (GEBCO), United Kingdom, 1997
133. First Session of the IOC-WMO-UNEP-ICSU-FAO Living Marine Resources Panel of the Global Ocean Observing System (GOOS), France, 1998
134. Fourth Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean (IOC/EB-IBCWIO-IW3), South Africa, 1997
135. Third Session of the Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC), France, 1998
136. Seventh Session of the Joint IOC-JGOFS CO2 Advisory Panel Meeting, Germany, 1997
137. Implementation of Global Ocean Observations for GOOS/GCOS, First Session, Australia, 1998
138. Implementation of Global Ocean Observations for GOOS/GCOS, Second Session, France, 1998
139. Second Session of the IOC-WMO-UNEP-ICSU Coastal Panel of the Global Ocean Observing System (GOOS), Brazil, 1998
140. Third Session of IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional - Global Ocean Observing System (NEAR-GOOS), China, 1998
141. Ninth Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of 'El Niño', Ecuador, 1998 **(Spanish only)**
142. Seventh Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and its Geological/Geophysical Series, Croatia, 1998
143. Seventh Session of the Tropical Atmosphere-Ocean Array (TAO) Implementation Panel, Abidjan, Côte d'Ivoire, 1998
144. Sixth Session of the IODE Group of Experts on Marine Information Management (GEMIM), USA, 1999
145. Second Session of the IOC-WMO-UNEP-ICSU Steering Committee of the Global Ocean Observing System (GOOS), China, 1999
146. Third Session of the IOC-WMO-UNEP-ICSU Coastal Panel of the Global Ocean Observing System (GOOS), Ghana, 1999
147. Fourth Session of the GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC); Fourth Session of the WCRP CLIVAR Upper Ocean Panel (UOP); Special Joint Session of OOPC and UOP, USA, 1999
148. Second Session of the IOC-WMO-UNEP-ICSU-FAO Living Marine Resources Panel of the Global Ocean Observing System (GOOS), France, 1999
149. Eighth Session of the Joint IOC-JGOFS CO2 Advisory Panel Meeting, Japan, 1999
150. Fourth Session of the IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional – Global Ocean Observing System (NEAR-GOOS), Japan, 1999
151. Seventh Session of the IOC Consultative Group on Ocean Mapping (CGOM), Monaco, 1999
152. Sixth Session of the IOC Group of Experts on the Global Sea level Observing System (GLOSS), France, 1999
153. Seventeenth Session of the Joint IOC-IHO Guiding Committee for the General Bathymetric Chart of the Oceans (GEBCO), Canada, 1999
154. Comité Editorial de la COI para la Carta Batimétrica Internacional del Mar Caribe y el Golfo de Mexico (IBCCA), Septima Reunión, Mexico, 1998
IOC Editorial Board for the International Bathymetric Chart of the Caribbean Sea and the Gulf of Mexico (IBCCA), Seventh Session, Mexico, 1998
155. Initial Global Ocean Observing System (GOOS) Commitments Meeting, IOC-WMO-UNEP-ICSU/Impl-III/3, France, 1999
156. First Session of the *ad hoc* Advisory Group for IOCARIBE-GOOS, Venezuela, 1999 **(also printed in Spanish and French)**
157. Fourth Session of the IOC-WMO-UNEP-ICSU Coastal Panel of the Global Ocean Observing System (GOOS), China, 1999
158. Eighth Session of the IOC Editorial Board for the International Bathymetric Chart of the Mediterranean and its Geological/Geophysical Series, Russian Federation, 1999
159. Third Session of the IOC-WMO-UNEP-ICSU-FAO Living Marine Resources Panel of the Global Ocean Observing System (GOOS), Chile, 1999
160. Fourth Session of the IOC-WMO-UNEP-ICSU-FAO Living Marine Resources Panel of the Global Ocean Observing System (GOOS). Hawaii, 2000
161. Eighth Session of the IODE Group of Experts on Technical Aspects of Data Exchange, USA, 2000
162. Third Session of the IOC-IUCN-NOAA Consultative Meeting on Large Marine Ecosystems (LME), France, 2000
163. Fifth Session of the IOC-WMO-UNEP-ICSU Coastal Panel of the Global Ocean Observing System (GOOS), Poland, 2000
164. Third Session of the IOC-WMO-UNEP-ICSU Steering Committee of the Global Ocean Observing System (GOOS), France, 2000
165. Second Session of the *ad hoc* Advisory Group for IOCARIBE-GOOS, Cuba, 2000 **(also printed in Spanish and French)**
166. First Session of the Coastal Ocean Observations Panel, Costa Rica, 2000
167. First GOOS Users' Forum, 2000
168. Seventh Session of the Group of Experts on the Global Sea Level Observing System, Honolulu, 2001
169. First Session of the Advisory Body of Experts on the Law of the Sea (ABE-LOS), France, 2001 **(also printed in French)**
170. Fourth Session of the IOC-WMO-UNEP-ICSU Steering Committee of the Global Ocean Observing System, Chile, 2001
171. First Session of the IOC-SCOR Ocean CO₂ Advisory Panel, France, 2000
172. Fifth Session of the GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC), Norway, 2000 **(electronic copy only)**
173. Third Session of the *ad hoc* Advisory Group for IOCARIBE-GOOS, USA, 2001 **(also printed in Spanish and French)**
174. Second Session of the Coastal Ocean Observations Panel and GOOS Users' Forum, Italy, 2001
175. Second Session of the Black Sea GOOS Workshop, Georgia, 2001
176. Fifth Session of the IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional – Global Ocean Observing System (NEAR-GOOS), Republic of Korea, 2000
177. Second Session of the Advisory Body of Experts on the Law of the Sea (IOC/ABE-LOS), Morocco, 2002 **(also printed in French)**
178. Sixth Session of the Joint GCOS-GOOS-WCRP Ocean Observations Panel for Climate (OOPC), Australia, 2001 **(electronic copy only)**
179. *Cancelled*

180. Second Session of the IOC-SCOR Ocean CO₂ Advisory Panel, Honolulu, Hawaii, U.S.A, 2002 (*electronic copy only*)
181. IOC Workshop on the Establishment of SEAGOOS in the Wider Southeast Asian Region, Seoul, Republic of Korea, 2001 (SEAGOOS preparatory workshop) (*electronic copy only*)
182. First Session of the IODE Steering Group for the Resource Kit, USA, 19–21 March 2001
183. Fourth Session of the IOC-IUCN-NOAA Consultative Meeting on Large Marine Ecosystems (LMEs), France, 2002
184. Seventh Session of the IODE Group of Experts on Marine Information Management (GEMIM), France, 2002 (*electronic copy only*)
185. Sixth Session of IOC/WESTPAC Coordinating Committee for the North-East Asian Regional - Global Ocean Observing System (NEAR-GOOS), Republic of Korea, 2001 (*electronic copy only*)
186. First Session of the Global Ocean Observing System (GOOS) Capacity Building Panel, Switzerland, 2002 (*electronic copy only*)
187. Fourth Session of the ad hoc Advisory Group for IOCARIBE-GOOS, 2002, Mexico (*also printed in French and Spanish*)
188. Fifth Session of the IOC Editorial Board for the International Bathymetric Chart of the Western Indian Ocean (IBCWIO), Mauritius, 2000
189. Third session of the Editorial Board for the International Bathymetric Chart of the Western Pacific, China, 2000
190. Third Session of the Coastal Ocean Observations Panel and GOOS Users' Forum, Vietnam, 2002
191. Eighth Session of the IOC Consultative Group on Ocean Mapping, Russian Federation, 2001
192. Third Session of the Advisory Body of Experts on the Law of the Sea (IOC/ABE-LOS), Lisbon, 2003 (*also printed in French*)
193. Extraordinary Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of 'El Niño', Chile, 1999 (*Spanish only; electronic copy only*)
194. Fifth Session of the IOC-WMO-UNEP-ICSU Steering Committee of the Global Ocean Observing System, France, 2002
195. Sixth Session of the IOC-WMO-UNEP-ICSU Steering Committee of the Global Ocean Observing System, South Africa, 2003
196. Fourth Session of the Coastal Ocean Observations Panel, South Africa, 2002 (*electronic copy only*)
197. First Session of the JCOMM/IODE Expert Team On Data Management Practices, Belgium, 2003 (*also JCOMM Meeting Report No. 25*)
198. Fifth Session of the IOC-IUCN-NOAA Consultative Meeting on Large Marine Ecosystems (LMEs), Paris, 2003
199. Ninth Session of the IOC Consultative Group on Ocean Mapping, Monaco, 2003 (*Recommendations in English, French, Russian and Spanish included*)
200. Eighth Session of the IOC Group of Experts on the Global Sea level Observing System (GLOSS), France, 2003 (*electronic copy only*)
201. Fourth Session of the Advisory Body of Experts on the Law of the Sea (IOC/ABE-LOS), Greece, 2004 (*also printed in French*)
202. Sixth Session of the IOC-IUCN-NOAA Consultative Meeting on Large Marine Ecosystems (LMEs), Paris, 2004 (*electronic copy only*)
203. Fifth Session of the Advisory Body of Experts on the Law of the Sea (IOC/ABE-LOS), Argentina, 2005 (*also printed in French*)
204. Ninth Session of the IOC Group of Experts on the Global Sea level Observing System (GLOSS), France, 2005 (*electronic copy only*)
205. Eighth Session of the IOC/WESTPAC Co-ordinating Committee for the North-East Asian Regional – Global Ocean Observing System (NEAR-GOOS), China, 2003 (*electronic copy only*)
206. Sixth Meeting of the Advisory Body of Experts on the Law of the Sea (IOC/ABE-LOS), Spain, 2006 (*also printed in French*)
207. Third Session of the Regional Forum of the Global Ocean Observing System, South Africa, 2006 (*electronic copy only*)
208. Seventh Session of the IOC-UNEP-IUCN-NOAA Consultative Meeting on Large Marine Ecosystems (LMEs), Paris, 2005 (*electronic copy only*)
209. Eighth Session of the IOC-UNEP-IUCN-NOAA Consultative Meeting on Large Marine Ecosystems (LMEs), Paris, 2006 (*electronic copy only*)
210. Seventh Meeting of the IOC Advisory Body of Experts on the Law of the Sea (IOC/ABE-LOS), Gabon, 2007 (*bilingual English/French*)
211. First Meeting of the IOC Working Group on the Future of IOC, Paris, 2008 (*Executive Summary in English, French, Russian and Spanish included*)
212. First meeting of the Working Group on Tsunamis and Other Hazards Related to Sea-Level Warning and Mitigation Systems (TOWS-WG), Paris, 3–4 April 2008 (*Executive Summary in English, French, Russian and Spanish included*)
213. First Session of the Panel for Integrated Coastal Observation (PICO-I), Paris, 10–11 April 2008 (*electronic copy only*)
214. Tenth Session of the IOC Group of Experts on the Global Sea level Observing System (GLOSS), Paris, 6–8 June 2007 (*electronic copy only*)
215. Eighth Meeting of the IOC Advisory Body of Experts on the Law of the Sea (IOC/ABE-LOS), Paris, 21–25 April 2008 (*bilingual English/French*)
216. Fourth Session of the Global Ocean Observing System (GOOS) Regional Alliances Forum (GRF), Guayaquil, Ecuador, 25–27 November 2008 (*electronic copy only*)
217. Second Session of the Working Group on Tsunamis and Other Hazards Related to Sea-Level Warning and Mitigation Systems (TOWS-WG), Paris, 27 March 2009 (*Executive Summary in English, French, Russian and Spanish included*)
218. Ninth Meeting of the IOC Advisory Body of Experts on the Law of the Sea (IOC/ABE-LOS), Paris, 30 March–3 April 2009 (*bilingual English/French*)
219. First Session of the IOC-SCOR International Ocean Carbon Coordination Project (IOCCP) Scientific Steering Group (also IOCCP Reports, 3), Broomfield, Colorado, U.S.A., 1 October 2005 (*electronic copy only*)
220. Second Session of the IOC-SCOR International Ocean Carbon Coordination Project (IOCCP) Scientific Steering Group (also IOCCP Reports, 6), Paris, France, 20 April 2007 (*electronic copy only*)
221. Third Session of the IOC-SCOR International Ocean Carbon Coordination Project (IOCCP) Scientific Steering Group (also IOCCP Reports, 10), Villefranche-sur-mer, France, 3–4 October 2008 (*electronic copy only*)
222. Fourth Session of the IOC-SCOR International Ocean Carbon Coordination Project (IOCCP) Scientific Steering Group (also IOCCP Reports, 15), Jena, Germany, 14 September 2009 (*electronic copy only*)
223. First Meeting of the joint IOC-ICES Study Group on Nutrient Standards (SGONS) (also IOCCP Reports, 20), Paris, France, 23–24 March 2010 (*Executive Summary in E, F, R, S included*)
224. Third Session of the Working Group on Tsunamis and Other Hazards Related to Sea-Level Warning and Mitigation Systems (TOWS-WG), Lisbon, Portugal, 5–6 May 2010 (*Executive Summary in English, French, Russian and Spanish included*)
225. Eleventh Session of the IOC Group of Experts on the Global Sea level Observing System (GLOSS), Paris, 13–15 May 2009 (*electronic copy only*)
226. Second Session of the Panel for Integrated Coastal Observation (PICO-II), Paris, 24–26 February 2009 (*electronic copy only*)
227. First meeting of the Task Team on Seismic Data Exchange in the South West Pacific of the ICG/PTWS Regional Working Group for the Southwest Pacific, Port Vila, Vanuatu, 19–20 October 2009 (*electronic copy only*)
228. Fourth Session of the Working Group on Tsunamis and Other Hazards Related to Sea-Level Warning and Mitigation Systems (TOWS-WG), Paris, France, 20–21 March 2011 (*Executive Summary in English, French, Russian and Spanish included*)
229. Second Session of the IODE Steering Group for Ocean Teacher (SG-OT), Miami, Florida, 11–15 April 2011
230. First Meeting of the Inter-ICG Task Team 1 on Sea Level Monitoring for Tsunami (Working Group on Tsunamis and Other Hazards Related to Sea-Level Warning and Mitigation Systems (TOWS-WG), Seattle, USA, 29 November–1 December 2010

231. First Meeting of the Inter-ICG Task Team 2 on Disaster Management and Preparedness (Working Group on Tsunamis and Other Hazards Related to Sea-Level Warning and Mitigation Systems (TOWS-WG), Seattle, USA, 29 November–1 December 2010