



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

Second Meeting

UNESCO Headquarters, Paris, France
27 March 2009

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

Second Meeting

UNESCO Headquarters, Paris, France
27 March 2009

IOC/TOWS-WG-II/3
Paris, 30 March 2009
Original: English*

* This document contains an executive summary in English, French, Spanish and Russian

TABLE OF CONTENTS

	page
EXECUTIVE SUMMARY	iv
RÉSUMÉ.....	v
RESUMEN DISPOSITIVO	vii
РАБОЧЕЕ РЕЗЮМЕ	ix
1. OPENING AND WELCOME.....	1
1.1 OPENING	1
1.2 ADOPTION OF THE AGENDA	1
1.3 WORKING ARRANGEMENTS.....	1
2. BACKGROUND.....	1
2.1 REVIEW OF ACTIONS, EC DECISIONS.....	1
3. REPORTS FROM RELEVANT BODIES.....	1
3.1 REPORT FROM THE GLOBAL MEETING OF ICGS	1
3.2 REPORT FROM IOC BODIES	2
3.2.1 I-GOOS	2
3.2.2 JCOMM	2
3.2.3 IODE	2
3.2.4 ICAM	3
3.3 OTHER EXTERNAL BODIES	3
3.3.1 WMO	3
3.3.2 ISDR	3
4. REVIEW OF PROGRESS.....	4
4.1 HARMONIZED WORKING GROUPS	4
4.2 IMPLEMENTATION OF GOHWMS FRAMEWORK.....	4
4.3 SEA LEVEL NETWORK.....	4
4.4 COMMON PRACTICES AND PROCEDURES	5
4.5 MATTERS NOT COVERED BY RESOLUTION EC-XLI/6	5
4.5.1 Bathymetry	5
4.5.2 Seismic data	5
4.5.3 Tsunami watch standards	5
4.6 OVERALL COORDINATION	6
4.7 GOVERNANCE AND FUNDING	6
5. REPORT TO THE ASSEMBLY	6

6. OTHER ISSUES 6

6.1 OTHER ISSUES6

6.2 DATE AND PLACE OF THE NEXT MEETING.....6

7. CLOSURE OF MEETING 6

ANNEXES

ANNEX I AGENDA

ANNEX II LIST OF PARTICIPANTS

ANNEX III LIST OF ACRONYMS

EXECUTIVE SUMMARY

The Second Meeting of the Working Group on Tsunamis and Other Hazards Related to Sea-Level Warning and Mitigation Systems (TOWS-WG-II) was held in Paris at UNESCO Headquarters on 27 March 2009, under the co-chairmanship of Dr Neville Smith (IOC Vice-chairman) and Dr François Gerard (I-GOOS Chairman). The meeting reviewed progress with respect to actions and decisions taken by the Governing Bodies through Resolution XXIV-14 and Resolution EC-XLI.6, also in relation to the results of the Global Meeting of the Intergovernmental Coordination Groups for Tsunami Warning Systems (Paris, 24–26 March 2009).

Highlights and recommendations from the meeting are the following:

- TOWS WG-II report on the progress achieved by the ICG Chairpersons in working with the Member States and the TOWS-WG on the development of harmonized working group structures as a foundation for inter-operability, with a view to preparing recommendations for IOC principles, criteria and procedures for ocean-related hazards warning and mitigation systems
- Proposal to establish three inter-ICG Task Teams devoted respectively to sea level, preparedness, and tsunami watch operations, with a view to facilitate coordination of activities, development of common requirements and standards, and sharing of best practices
- Initial Draft Strategy and Plan for the Implementation of the Global Ocean-related Hazards Warning and Mitigation System Framework and of the TOWS-WG Recommendations, to be further elaborated based on the inputs from the ICGs
- Inclusion of requirements on the collection and exchange of real-time sea level data for tsunami warning purposes in the work programmes of JCOMM/GLOSS and JCOMM/DBCP, as well as the possible review of GLOSS terms of reference to reflect the operational requirements of the tsunami warning centres
- Need for ICGs to identify high-priority science issues that can benefit from contributions from IOC programmes and scientific and technical subsidiary bodies in the context of the Programme and Budget for 2010–2011 and developing a whole-of-IOC perspective
- Investigation with the CTBTO Secretariat to conclude an agreement about the provision of i.a. seismic data to TWCs and the coordination of related matters
- Investigation with CTBTO and other seismic networks of the possibilities for improved exchange and standardization of real-time seismic data and coordination of training programs for global seismic monitoring for tsunami warning purposes,
- Facilitation of the exchange, review and adoption of documents and guidelines related to risk assessment methodologies and other standards developed by the ICGs
- Development of a document with definitions and terminology on hazards, disasters, vulnerability and risks drawing on existing documents developed by bodies like UN/ISDR for use by the IOC Secretariat, its Subsidiary Bodies, and its programmes
- Assessment of the IOC Oceanographic Data Exchange Policy as it applies to tsunami warning systems and the monitoring of its implementation to ensure the open, free, and unrestricted sharing of tsunami-relevant observational data needed for timely and effective ocean-related hazard detection, analysis, and warning for coastal communities

- Possible revision of the terms of reference of GEBCO to promote and coordinate the development of high-resolution bathymetric data in coastal areas and digital elevation models

**Groupe de travail sur les systèmes d'alerte aux tsunamis
et aux autres aléas liés au niveau de la mer, et de mitigation (TOWS-WG),
deuxième réunion**

Siège de l'UNESCO, Paris, France
27 mars 2009

RÉSUMÉ

La deuxième réunion du Groupe de travail sur les systèmes d'alerte aux tsunamis et aux autres aléas liés au niveau de la mer, et de mitigation (TOWS-WG-II) s'est tenue à Paris, au Siège de l'UNESCO, le 27 mars 2009, sous la présidence conjointe de M. Neville Smith (Vice-Président de la COI) et de M. François Gérard (Président de l'I-GOOS). Les participants ont passé en revue les progrès réalisés concernant les mesures et décisions adoptées par les organes directeurs dans les résolutions XXIV-14 et EC-XLI.6, compte tenu aussi des résultats de la Réunion mondiale des groupes intergouvernementaux de coordination des systèmes d'alerte aux tsunamis (Paris, 24-26 mars 2009).

Les points saillants et les recommandations de la réunion sont les suivants :

- Rapport de la deuxième réunion (TOWS-WG-II) sur les progrès réalisés par les Présidents des GIC dans la collaboration avec les États membres et le groupe de travail aux fins de l'harmonisation des structures des groupes de travail, comme fondement de l'interopérabilité, en vue de la formulation de recommandations sur les principes, critères et procédures de la COI en matière de systèmes d'alerte aux aléas liés aux océans et de mitigation.
- Proposition tendant à créer trois équipes spéciales inter-GIC chargées, respectivement, du niveau de la mer, de la préparation, et des opérations de veille aux tsunamis, en vue de faciliter la coordination des activités, l'établissement de prescriptions et de normes communes, et l'échange de bonnes pratiques.
- Projet initial concernant une stratégie et un plan de mise en œuvre du système mondial d'alerte aux aléas liés aux océans et de mitigation ainsi que des recommandations du TOWS-WG, qui sera affiné en fonction des contributions des GIC.
- Prise en considération, dans les plans de travail de la JCOMM/GLOSS et de la JCOMM/DBCP, des exigences en matière de collecte et d'échange de données en temps réel relatives au niveau de la mer à des fins d'alerte aux tsunamis, et éventuel réexamen du mandat du GLOSS afin de tenir compte des besoins opérationnels des centres d'alerte aux tsunamis.
- Nécessité pour les GIC de recenser les questions scientifiques hautement prioritaires qui pourraient bénéficier des contributions des programmes de la COI et des organes subsidiaires scientifiques et techniques dans le cadre du Programme et budget pour 2010-2011, ainsi que d'élaborer une approche axée sur la COI dans son ensemble.
- Examen, avec le secrétariat de l'OTICEN, de la possibilité de conclure un accord sur la fourniture, entre autres, de données sismiques aux centres d'alerte aux tsunamis, et la coordination concernant les questions connexes.
- Examen, avec l'OTICEN et d'autres réseaux sismiques, des possibilités d'améliorer l'échange et la normalisation des données sismiques en temps réel, ainsi que la coordination des programmes de formation à la surveillance sismique mondiale à des fins d'alerte aux tsunamis.

- Facilitation de l'échange, de l'examen et de l'adoption de documents et principes directeurs relatifs aux méthodes d'évaluation des risques et autres normes mises au point par les GIC.
- Élaboration d'un document présentant et précisant au moyen de définitions la terminologie relative aux aléas, aux catastrophes, à la vulnérabilité et aux risques, sur la base de documents existants établis par des organes tels que la SIPC, à l'usage du secrétariat, des organes subsidiaires et des programmes de la COI.
- Évaluation de la politique de la COI en matière d'échange de données, appliquée aux systèmes d'alerte aux tsunamis, et suivi de son application en vue d'assurer le partage ouvert, libre et sans restriction des données d'observation relatives aux tsunamis indispensables nécessaire à la détection et à l'analyse efficace et en temps voulu des aléas liés aux océans, ainsi qu'à l'alerte, au bénéfice des communautés côtières.
- Révision éventuelle du mandat de la GEBCO afin de promouvoir et coordonner la production de données bathymétriques haute résolution dans les zones côtières, ainsi que l'élaboration de modèles numériques d'élévation.

**Segunda reunión del Grupo de Trabajo sobre sistemas de alerta
contra tsunamis y otros peligros relacionados con el nivel del mar
y atenuación de sus efectos (TOWS-WG)**

Sede de la UNESCO, París (Francia)
27 de marzo de 2009

RESUMEN DISPOSITIVO

La segunda reunión del Grupo de Trabajo sobre sistemas de alerta contra tsunamis y otros peligros relacionados con el nivel del mar y atenuación de sus efectos (TOWS-WG-II) se celebró en la Sede de la UNESCO (París) el 27 de marzo de 2009, bajo la copresidencia de los doctores Neville Smith (Vicepresidente de la COI) y François Gérard (Presidente del I-GOOS). En esta reunión se pasó revista a los avances relativos a las medidas y decisiones adoptadas por los órganos rectores en sus resoluciones XXIV-14 y EC-XLI.6 y a las conclusiones de la reunión general de los Grupos Intergubernamentales de Coordinación (ICG) de los sistemas de alerta contra tsunamis (París, 24-26 de marzo de 2009).

A continuación se enumeran los principales frutos y las recomendaciones de la reunión:

- Elaboración del informe de la segunda reunión del Grupo de Trabajo sobre sistemas de alerta contra tsunamis y otros peligros relacionados con el nivel del mar y atenuación de sus efectos sobre los avances logrados por los Presidentes de los ICG en su cooperación con los Estados Miembros y el TOWS-WG para crear estructuras de trabajo armonizadas que posibiliten la compatibilidad operacional, que servirá para la formulación de recomendaciones sobre los principios, procedimientos y criterios de la COI aplicables a los sistemas de alerta contra los peligros oceánicos y atenuación de sus efectos.
- Propuesta de creación de tres equipos de trabajo comunes a los ICG que se ocuparán de operaciones de observación de, respectivamente, el nivel del mar, el grado de preparación y las operaciones de vigilancia con respecto a los tsunamis, con miras a facilitar la coordinación de las actividades, la elaboración de requisitos y normas comunes y el aprovechamiento compartido de las mejores prácticas.
- Primera versión de la estrategia y plan de aplicación del Marco para un sistema mundial de alerta temprana contra los peligros oceánicos y atenuación de sus efectos y de las recomendaciones del TOWS-WG, que se afinarán en función de las conclusiones de los ICG.
- Incorporación de los requisitos de acopio e intercambio en tiempo real de datos sobre el nivel del mar para fines de alerta contra los tsunamis en los programas de trabajo del Sistema Mundial de Observación del Nivel del Mar (GLOSS) y el Panel de Cooperación sobre Boyas de Acopio de Datos (DBCP) de la Comisión Técnica Mixta sobre Oceanografía y Meteorología Marina (JCOMM), así como la posible revisión del mandato del GLOSS para recoger los requisitos operativos de los Centros de Alerta contra los Tsunamis (TWC).
- Definición, por los ICG, de temas científicos altamente prioritarios que puedan beneficiarse de las contribuciones de los programas de la COI y órganos subsidiarios científicos y técnicos en el marco del Programa y Presupuesto para 2010–2011 y de elaborar una perspectiva común al conjunto de la COI.
- Estudiar con la Secretaría de la Comisión Preparatoria de la Organización del Tratado de Prohibición Completa de los Ensayos Nucleares (CTBTO) cómo llegar a un acuerdo

sobre el suministro de datos sísmicos, entre otros, a los Centros de Alerta contra los Tsunamis (TWC) y sobre la coordinación de asuntos conexos.

- Estudiar con la Secretaría de la CTBTO y otras redes sísmicas las posibilidades de mejorar la normalización y el intercambio de datos sísmicos en tiempo real y la coordinación de programas de formación para una observación sísmica mundial al servicio de las actividades de alerta contra tsunamis.
- Agilización del intercambio, la revisión y la aprobación de documentos y directrices relativos a los métodos de evaluación de riesgos y otras normas elaboradas por los ICG.
- Elaboración de un documento con definiciones y terminología sobre amenazas, desastres, vulnerabilidad y riesgos a partir de los documentos existentes de otros órganos, como la Estrategia Internacional de Reducción de Desastres (EIRD) de las Naciones Unidas, para uso de la Secretaría de la COI, sus órganos subsidiarios y sus programas.
- Evaluación de la Política de Intercambio de Datos Oceanográficos de la COI, que se aplica a los sistemas de alerta contra los tsunamis y al seguimiento de su aplicación a fin de garantizar un intercambio abierto, libre e irrestricto de los datos de observación en materia de tsunamis que se necesitan para realizar oportuna y eficazmente las actividades de detección y análisis de las amenazas oceánicas y de alerta a las comunidades costeras.
- Posible revisión del mandato del Mapa Batimétrico General de los Océanos (GEBCO) para promover y coordinar la obtención de datos batimétricos precisos y de alta definición en las zonas costeras y la elaboración de modelos digitales de elevación.

**Рабочая группа по системам предупреждения и смягчения последствий
цунами и других опасных явлений, связанных с изменением уровня моря
(РГ-СПЦО)**

Второе совещание, Штаб-квартира ЮНЕСКО, Париж, Франция
27 марта 2009 г.

РАБОЧЕЕ РЕЗЮМЕ

Второе совещание Рабочей группы по системам предупреждения и смягчения последствий цунами и других опасных явлений, связанных с изменением уровня моря (РГ-СПЦО-II) состоялось в Париже в Штаб-квартире ЮНЕСКО 27 марта 2009 г. под председательством д-ра Невилла Смита (заместителя Председателя МОК) и д-ра Франсуа Жерара (председателя М-ГСНО). Участники совещания рассмотрели ход осуществления мер и решений, принятых руководящими органами в резолюции XXIV-14 и резолюции ЕС-XLI.6, а также результаты глобального совещания межправительственных координационных групп по системе предупреждения о цунами (Париж, 24-26 марта 2009 г.).

Основные моменты и рекомендации совещания изложены ниже:

- РГ-СПЦО-II сообщает о прогрессе, достигнутом председателями МКГ во взаимодействии с государствами-членами и РГ-СПЦО по разработке согласованных структур Рабочей группы в качестве основы для операционно-совместимых систем с целью подготовки рекомендаций в отношении принципов, критериев и процедур МОК в отношении опасных океанических явлений и систем их предупреждения и смягчения их последствий;
- предложение об учреждении трех целевых групп, являющихся общими для МКГ, деятельность которых будет связана соответственно с уровнем моря, подготовленностью и операциями по слежению за цунами с целью содействия координации деятельности, разработки общих требований и стандартов, а также совместного использования передового опыта;
- первоначальный проект стратегии и плана по реализации рамочного документа по глобальным системам предупреждения и смягчения последствий опасных океанических явлений и осуществления рекомендаций РГ-СПЦО подлежит дальнейшей доработке на основе вкладов МКГ;
- включение потребностей, связанных со сбором и обменом данными об уровне моря в режиме реального времени для целей предупреждения о цунами, в программы работы СКОММ/ГЛОСС и СКОММ/ДБКП, а также возможный пересмотр круга ведения ГЛОСС с тем, чтобы отразить оперативные потребности центров предупреждения о цунами;
- необходимость выявления МКГ высоко приоритетных научных проблем, решению которых может способствовать деятельность, проводимая в рамках программ МОК и ее технических вспомогательных органов в контексте Программы и бюджета на 2010–2011 гг., а также разработки перспективы для всей МОК;
- проведение предварительных переговоров с секретариатом ОДВЗЯИ с целью заключения соглашения о предоставлении сейсмических данных центрам предупреждения о цунами и координации связанных с этим вопросов;

- предварительное рассмотрение с ОДВЗЯИ и другими сейсмическими сетями возможностей улучшения обмена и стандартизации сейсмических данных в режиме реального времени, а также координации программ подготовки для целей глобального сейсмического мониторинга в интересах предупреждения о цунами;
- содействие обмену, рассмотрению и принятию документов и руководящих указаний, касающихся методологий оценки рисков и других стандартов, разработанных МКГ;
- разработка документа, содержащего почерпнутые из существующих документов, подготовленных такими органами как ООН/МСУОБ, определения и терминологию, используемые применительно к опасностям, бедствиям, уязвимости и рискам для использования Секретариатом МОК, ее вспомогательными органами и программами;
- оценка политики МОК в области обмена океанографическими данными применительно к системам предупреждения о цунами, а также мониторинга ее осуществления с целью обеспечения открытого, бесплатного и неограниченного совместного использования связанных с цунами данных наблюдений, необходимого для своевременного и эффективного обнаружения связанных с океаном опасностей, их анализа и предупреждения прибрежных сообществ;
- возможный пересмотр круга ведения ГЕБКО с целью поощрения и координации составления батиметрических данных высокого разрешения по прибрежным районам, а также цифровых моделей подъема уровня моря.

1. OPENING AND WELCOME

1.1 OPENING

1. Dr Neville Smith, co-chair of the TOWS WG, opened the second meeting at 09:00 of 27 March 2009 by welcoming participants.

1.2 ADOPTION OF THE AGENDA

The Agenda (Annex I) was adopted.

1.3 WORKING ARRANGEMENTS

2. Dr Smith recalled the history and mandate of the TOWS-WG and explained the different roles of members and observers. The list of participants is provided in Annex II.

2. BACKGROUND

2.1 REVIEW OF ACTIONS, EC DECISIONS

3. The chair briefly reviewed the tasks for TOWS-WG defined by Resolutions IOC XXIV-14 and EC-XLI.6 and the 1st Meeting of the WG.

3. REPORTS FROM RELEVANT BODIES

3.1 REPORT FROM THE GLOBAL MEETING OF THE INTERGOVERNMENTAL COORDINATION GROUPS FOR TSUNAMI WARNING SYSTEMS

4. The findings and results of the Global Meeting of the Intergovernmental Coordination Groups for Tsunami Warning Systems (Global ICG TWS Meeting, Paris, 24–26 March 2009) were introduced by the Chair of that meeting, and Chair of the IOC, Capitán Javier Valladares. He noted that for the first time almost all elected “office bearers”, that is chairs of the ICGs and their Workign Groups had met, and emphasized that while some of the recommendations provided by the Global TWS meeting are specific to the regional ICGs, other are of a more global nature and involve governance aspects that require an involvement of the IOC Governing Bodies.
5. The TOWS-WG agreed that a number of specific items raised during the Global ICG TWS Meeting should be considered in more depth, as follows.
6. **Science:** The TOWS-WG noted that common science issues were not highlighted but that bringing such matters to the fore was important. The TOWS-WG agreed to bring this to the attention of the Assembly, with a view to requesting the Executive Secretary to have the ICGs identify high-priority science issues and to developing a whole-of-IOC perspective. Synergy with science requirements elsewhere in IOC is likely to emerge.
7. **National capability:** In discussing the need for National Tsunami Watch Focal Points (TWFP), and the over-arching primacy of national responsibility for warning their communities, it became clear that due to unevenly distributed capacity at an inter- and intra-regional level a number of nations do not have now, and may never have, the capacity to discharge their responsibilities fully. A nominated TWFP does not necessarily equate to a national capacity to respond. The WG agreed that this issue should be brought to the IOC for discussion and advice, perhaps seeking a secondary mechanism that may be activated in such cases.

8. **Terminology and definitions:** The language used in the hazard, disaster, vulnerability and risk communities is rich and varied, and will likely remain so. However, it is also clear the IOC would benefit from agreed definitions and terminology, drawing on similar documents developed by bodies like UN/ISDR. At a minimum it should be used as a reference by the Secretariat, but ideally should be adopted by the Governing Body to guide definitions and terminology use in the Commission. The TOWS-WG will ask the IOC to agree to the development of such a document.
9. **Risk assessment:** The TOWS-WG recommends that the Assembly request the Executive Secretary to facilitate the exchange and review of documents and guidelines related to risk assessment methodologies developed by the ICGs.
10. **Disaster mitigation and preparedness:** the group stressed the importance of the issue as an essential part in an effective end-to-end TWS and the need to cooperate with relevant bodies and NGOs. The members agreed that due to the difference in cultures, national structures and recourses as well as funding possibilities this issue is not covered uniquely or need driven. It was stressed to ensure the involvement of Civil Protection agencies and international coordination groups. The group agreed that the TOWS-WG as an existing body with a global coordinating role in sea level related hazards should ensure the participation of relevant bodies, develop strategies and follow up activities.
11. **National representation and participation:** An insufficient level of participation from countries bordering the ICG/NEAMTWS region was noted, as well as the need to ensure full nomination of TWFPs and TNCs. In this regard, the TOWS-WG recommends another call from the IOC Assembly to Member States.

3.2 REPORT FROM IOC BODIES

3.2.1 I-GOOS

12. Dr François Gérard, chair of I-GOOS and co-chair of the TOWS-WG, briefly focussed on the role and mandate of I-GOOS and stressed that the establishment of regional TWS should be embedded in a broader context of coastal inundation and the Framework for The Global Tsunami and Other Ocean-Related Hazards Early Warning System (GOHWMS).

3.2.2 JCOMM

13. On behalf of Dr Peter Dexter, the JCOMM co-chair, Mr Rick Bailey provided a view on how both JCOMM and the TOWS-WG can ensure further and intensified collaboration including the future role of the technical sea level related bodies GLOSS and DBCP and the JCOMM Services Programme (including storm surge and wave forecasting).

3.2.3 IODE

14. The TOWS-WG discussed the IOC Oceanographic Data Exchange Policy in the context of global tsunami warning and mitigation system coordination, noting the clarifications within the Mauritius Declaration¹, Resolution XXIII-12², the caveats established in recommendations from

¹ International Meeting to Review the Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States, Port Louis, Mauritius, 10-14 January 2005, Mauritius Declaration, paragraphs 6 and 7.

² Resolution XXIII-12: Recalling its commitment to an open, free and unrestricted sharing of tsunami-relevant real-time observational data in accordance with the UNESCO/IOC Oceanographic Data Exchange Policy and without prejudice to the sovereignty of Member States.

ICG/IOTWS-II³ and ICG/IOTWS-IV⁴ and the results of the Global ICG TWS Meeting. The Global latter described gaps in observational data caused mainly by lack of observation platforms but also by data not being shared by some Member States.

15. The TOWS-WG recommended that the IOC reviews the IOC Oceanographic Data Exchange Policy as it applies to tsunami warning systems and monitors its implementation to ensure the open, free, and unrestricted sharing of tsunami-relevant observational data needed for timely and effective ocean-related hazard detection, analysis, and warning for coastal communities.

3.2.4 ICAM

16. Mr Russell Arthurton, chair of the ICAM Expert Group on Coastal Hazards reported on the status of the ICAM guidelines and stressed that the nomenclature, definitions and thresholds for the various outputs of existing early warning systems differ from one region to another and even within regions. He indicated that this important topic is currently under review amongst the international bodies (including IOC) and other agencies involved.

3.3 OTHER EXTERNAL BODIES

3.3.1 WMO

17. Mr Edgard Cabrera, Chief of the Marine Meteorology and Ocean Affairs Division Ocean of WMO, reported on the recent decisions and actions of the WMO Congress and Executive Council related to tsunami and other ocean-related hazards. He explicitly mentioned GTS as a crucial WMO contribution to the effective exchange and distribution of early warning and related data (including tsunamis). WMO EC (2008) also recognized that many national agencies involved operationally in provision of tsunami warning services were not NMHS, but still required access to the GTS to effectively implement their responsibilities, and therefore urged NMHS to arrange for such access, as a matter of urgency, and requested the WMO Secretariat to encourage, coordinate and facilitate such access, as appropriate. He also mentioned the WMO's role related to EWS for Ocean-related Hazards and the work undertaken by JCOMM on Technical guidelines, such as wind waves and storm surge forecasting.

18. The group recalled that accessibility to GTS data for Member States where the Tsunami Warning Focal Point (TWFP) is not a National Meteorological and Hydrological Service (NMHS), is an issue that has been addressed several times in related meetings and workshops and detailed in the TOWS-WG 1 report, but which has not improved so far. However this was not exposed at the 41st session of the IOC Executive Council. The Working Group agreed to ask the ICGs for specific documentation where an issue has arisen and thus better articulate the real requirement. On the basis of this information, further dialogue will be undertaken between IOC and WMO and a plan of action developed, as appropriate.

3.3.2 ISDR

19. Ms Sandra Amlang from UN/ISDR-PPEW reported on their involvement in tsunami warning and mitigation activities globally. She explicitly mentioned the newly established link with the IOC/ISDR liaison as part of the NEAMTWS Secretariat in Bonn assisting in the implementation of projects within the Indian Ocean TW Consortium initiative. In the following discussion it was agreed to adopt and support the recommendations of the disaster

³ ICG/IOTWS-II/3, passim.

⁴ Recommendation ICG/IOTWS-IV.1.

management and preparedness breakout group of the Global ICG TWS Meeting including to provide a focal point within IOC for interactions with UN/ISDR (see item 4.4. below).

4. REVIEW OF PROGRESS

4.1 HARMONIZED WORKING GROUPS

20. . The chair noted that based on the findings of the TOWS-WG I meeting substantial progress has been made in sharing information based on the current WG structure and cooperation, while from the actual mapping and although the Global ICG TWS meeting advocated the maintenance of the current structure of the WGs of the ICGs, it is evident that there still is opportunity to further harmonize the WG structure.

21. The TOWS Working Group is keeping a “watching brief” at this time. It noted that consideration of ICG working group structures has not been completed by all the ICGs.

22. The TOWS-WG recognizes the need for working groups working on issues specific to a region, but also that in some cases related to standards and technical issues work can be combined among regions. TOWS-WG will seek advice on this subject from the IOC Assembly.

4.2 IMPLEMENTATION OF THE FRAMEWORK FOR THE GLOBAL TSUNAMI AND OTHER OCEAN-RELATED HAZARDS EARLY WARNING SYSTEM (GOHWMS)

23. The Working Group considered the Draft Strategy and Plan 2009–2010 for the regional TEWS's within the Framework for the Global Tsunami and other Ocean-related Hazards Warning and Mitigation System (GOHWMS) and the implementation of TOWS-WG Recommendations (information document IOC/INF-1263). The plan was updated for the actions agreed at the meeting and will be circulated to members of the Working Group for review and comment (by April 30). The document will be provided to the Assembly as an Information Document.

4.3 SEA LEVEL NETWORK

24. 26. The Working Group recommended the creation of a Task Team reporting to TOWS-WG on real-time sea level requirements and progress, based on and in consultation with the existing working groups within the ICGs. The Task Team should:

- Develop requirements for tsunami warning system sea level data, all characteristics of the data stream including networks and network design, for the information of relevant implementation groups;
- Review the provision and availability of sea level data as it pertains to tsunami warning systems and provide advice, as appropriate to GLOSS, DBCP and the ICGs;
- Provide a focal point for sea level issues within the family of ICGs.

25. Further, given the role of GLOSS and DBCP for implementation of sea level networks, the Working Group asks the Assembly to re-affirm the priority attached to the collection and exchange of sea level data for tsunami warning purposes and recommends for JCOMM/GLOSS (for sea-level gauges) and JCOMM/DBCP (for deep ocean tsunameters) to include these requirements in its work programme. To the extent that changes to the terms of reference of GLOSS may be required, the Working Group recommends for IOC in consultation with JCOMM to review the GLOSS and DBCP terms-of-reference to ensure they reflect the operational requirements of the tsunami warning centres.

4.4 COMMON PRACTICES AND PROCEDURES

26. **Disaster management and preparedness:** Subject to decisions of the Assembly with regard to the future of the TOWS-WG, the Working Group recommends the formation of a Task Team to facilitate the exchange of experiences and information on preparedness actions, education/awareness raising campaigns and other matters related to disaster management and preparedness. This Team would in essence be the focal point of IOC programmes when coordinating requirements and priorities for related tsunami actions, such as initiatives with UN/ISDR and WMO. The membership would be drawn from those within the ICGs having such responsibilities, as well as other relevant areas of IOC, and would work principally by correspondence. The initial tasks include:

- promotion of disaster preparedness in coastal communities
- extension of programmes that have been successful in one region to other TWSs
- sharing of risk and hazard assessment tools and products
- potential for enhanced uptake of tsunami material in school curricula
- further consideration of the idea of a tsunami awareness day, possibly connected to the International Day for Disaster Reduction (8 October)

4.5 MATTERS NOT COVERED BY RESOLUTION EC-XLI/6

4.5.1 Bathymetry

27. The TOWS-WG noted the emphasis on bathymetry data in the global meeting and recalled the many previous references, including in the Framework for The Global Tsunami and Other Ocean-Related Hazards Early Warning System (GOHWMS) and from beyond the tsunami community, to the need for high-resolution bathymetric data in coastal areas and digital elevation models. In particular this data is needed for completing the required national risk assessments and in supporting tsunami warning and forecast operations. The TOWS-WG suggests the Assembly give urgent attention to this issue, including through tasking GEBCO in cooperation with IHO, as the IOC has not made any recommendation/resolution on this matter.

4.5.2 Seismic data

28. The TOWS-WG recommends that the Assembly request the Executive Secretary to investigate and conclude a formal agreement with the CTBTO Secretariat for providing CTBTO/IMS data to NTWCs and coordination of training programs for global seismic monitoring, and to continue the coordination efforts for improved exchange and standardisation of real-time seismic data; with other seismic network coordinating bodies such as GEOFON, FDSN, and GSN.

4.5.3 Tsunami watch standards

29. 31. The Working Group recommends the establishment of an inter-ICG Task Team reporting to TOWS-WG, comprised of a representative from each ICG, ideally directly involved with tsunami watch operations. The terms of reference are to:

- Provide a focal point for the ICGs for coordination of tsunami watch operations among the Tsunami Warning Systems;

- Document current and proposed products, working through existing Regional Coordination Groups or their equivalents;
- Review terminology and recommend methods for harmonisation;
- Document responsibilities, coverage, limits and different architecture;
- Develop agreement on uniform standards, procedures and guidelines for tsunami watch operations; and
- Develop guidelines for review of tsunami watch operations.

4.6 OVERALL COORDINATION

30. The group noted that the standardisation of documentation and reporting is progressing and that the Global ICG TWS Meeting was effective. The Working Group concluded that its role was fulfilling an important function. It was also noted that the Global ICG TWS Meeting had been effective in exploring and clarifying a number of important issues for the TOWS WG. The Working Group noted the importance of an effective web site to facilitate coordination and sharing of information between ICGs. ICGs were encouraged to provide feedback to the Executive Secretary on possible areas for improvement.

4.7 GOVERNANCE AND FUNDING

31. Members of the WG noted the importance of being able to properly prepare for meetings, timeline harmonisation and sufficient lead time for document reading and consultation with and within the ICGs.

5. REPORT TO THE ASSEMBLY

32. The recommendations from the meeting will be presented at the 25th session of the IOC Assembly on 22 June 2009. As mentioned, the Draft Strategy and Plan 2009–2010 for harmonizing the implementation of regional TEWS within the GOHWMS framework and implementation of TOWS-WG Recommendations will be presented as an information document to be further elaborated by TOWS-WG in collaboration with the ICGs.
33. Given the different states of development of the respective ICGs in implementing TWSs in their regions and the need for continuing coordination, it will be recommended for the TOWS-WG to continue.

6. OTHER ISSUES

6.1 OTHER ISSUES

34. There were no other issues.

6.2 DATE AND PLACE OF THE NEXT MEETING

35. The date and place of the next meeting will be determined at a later stage, although it would be practical to hold the meeting in April 2010, probably in Paris.

7. CLOSURE OF MEETING

36. The meeting closed at 17:30 on Friday 27 March 2009.

ANNEX I

AGENDA

1 OPENING AND WELCOME

- 1.1 OPENING
- 1.2 ADOPTION OF AGENDA
- 1.3 WORKING ARRANGEMENTS

2 BACKGROUND

- 2.1 REVIEW OF ACTIONS, EC DECISIONS

3 REPORTS FROM RELEVANT BODIES

- 3.1 REPORT FROM THE GLOBAL MEETING OF THE INTERGOVERNMENTAL COORDINATION GROUPS FOR TSUNAMI WARNING SYSTEMS
- 3.2 REPORT FROM IOC BODIES
 - 3.2.1 I-GOOS
 - 3.2.2 JCOMM
 - 3.2.3 IODE
 - 3.2.4 ICAM
- 3.3 OTHER EXTERNAL BODIES
 - 3.3.1 WMO
 - 3.3.2 ISDR
 - 3.3.3 Other

4 REVIEW OF PROGRESS

- 4.1 HARMONIZED WORKING GROUPS
- 4.2 IMPLEMENTATION OF THE FRAMEWORK FOR THE GLOBAL TSUNAMI AND OTHER OCEAN-RELATED HAZARDS EARLY WARNING SYSTEM (GOHWMS)
- 4.3 SEA LEVEL NETWORK
- 4.4 COMMON PRACTICES AND PROCEDURES
- 4.5 MATTERS NOT COVERED BY RESOLUTION EC-XLI.6
 - 4.5.1 Bathymetry
 - 4.5.2 Seismic data
 - 4.5.3 Tsunami watch standards
- 4.6 OVERALL COORDINATION
- 4.7 GOVERNANCE AND FUNDING

5 REPORT TO THE ASSEMBLY

6 OTHER ISSUES

6.1 OTHER ISSUES

6.2 DATE AND PLACE OF THE NEXT MEETING

7 CLOSURE OF MEETING

ANNEX II

LIST OF PARTICIPANTS

TOWS-WG MEMBERS

Co-chairs

Dr Neville SMITH
Deputy Director
Bureau of Meteorology
Vice-chairman of IOC
Melbourne VIC 3001
Australia
Tel: +61 3 96 69 44 44
Fax: +61 3 96 69 4548
E-mail: n.smith@bom.gov.au

Dr François GERARD
Chair I-GOOS Board
CGPC-S2
Tour Pascal B
92055 La Défense Cédex
France
Tel: +33 1 4081 2388
E-mail: francois.gerard@developpement-durable.gouv.fr

ICG/CARIBE-EWS

Dr Lorna INNIS
Deputy Director
Coastal Zone Management Unit
Bay Street
St. Michael
Barbados
Tel: +246 228-5950
Fax: +246 228-5956
E-mail: linniss@coastal.gov.bb

ICG/IOTWS

Dr Jan SOPAHELUWAKAN
Deputy Chairman for Earth Sciences
Indonesian Institute of Sciences
Jl. Pasir Putih I, Ancol Timur Jakarta 14430
DKI Jakarta
Indonesia
Tel: +62 21-5251850
Fax: + 62 21-5260804
E-mail: jan.sopaheluwakan@lipi.go.id

ICG/NEAMTWS

Prof. Stefano TINTI
Chairman of ICG/NEAMTWS
Bologna University
Viale Berti-Pichat 8
40127 Bologna

Italy

E-mail: stefano.tinti@unibo.it

ICG/PTWS

Mr Yohei HASEGAWA
Senior Coordinator for International
Earthquake and Tsunami Information
Japan Meteorological Agency
1-3-4 Otemachi Chiyoda-ku Tokyo 100-8122
Japan
Tel: +81 (3) 3284 1743
Fax: +81 (3) 3215 2963
E-mail: yhasegawa@met.kishou.go.jp

Ms Filomena NELSON
Principal Disaster Management Officer
Disaster Management Office
Ministry of Natural Resources and
Environment
Apia
Samoa
Tel: +685 20856
Fax: +685 23176
E-mail: filomena.nelson@mnre.gov.ws

JCOMM

Mr Rick BAILEY
Project Director
Bureau of Meteorology
700 Collins Street
Docklands
GPO Box 1289
Melbourne VIC 3001
Australia
Tel: 61 3 9669 4103
Fax: 61 3 9669 4660
E-mail: R.Bailey@bom.gov.au

ICAM Group of Experts on Coastal Hazards

Mr Russell ARTHURTON
Coastal Geoscience
5a Church Lane
Grimston
Melton Mowbray
Leics
LE14 3BY
United Kingdom
Tel: +44-1664-810024
E-mail: r.arthurton@talktalk.net

United States of America

Mr David MCKINNIE
International Tsunami Coordinator
National Oceanic and Atmospheric
Administration
7600 Sand Point Way, NE, B.1
Seattle WA 98115
United States
Tel: +1 206 526 69 50
E-mail: david.mckinnie@noaa.gov

WMO

Mr Edgard CABRERA
Chief, Ocean Affairs Division
World Meteorological Organization
7bis, avenue de la Paix
Case Postale 2300
1211 Geneva
Switzerland
Tel: +41 22 730 82 37
Fax: +41 22 730 81 28
E-mail: ecabrera@wmo.int

ISDR

Dr Sandra AMLANG
Associate Programme Officer
United Nations International Strategy for
Disaster Reduction - Platform for the
Promotion of Early Warning
53113 Bonn
Germany
Tel: +49 228 815 0302
Fax: +49 228 815 0399
E-mail: amlang@un.org

OBSERVERS

Islamic Republic of Iran

Dr Abbas NOBAKHTI
Executive Deputy
Iranian National Center for Oceanography -
Iranian Oceanographic Data Center
No. 9, Etemad Zadeh St.
West Fatemi Ave.
1411813389 Tehran
Iran Islamic Republic of Iran
Tel: +982166913361
Fax: +982166944869
E-mail: a_nobakhti@inco.ac.ir

Japan

Ms Suzuka SAKASHITA
Permanent Delegation of Japan to UNESCO
Paris
France
E-mail: dl.japan@unesco.org

Kenya

Dr Charles NGUNJIRI
Assistant Director, Kenya Meteorological
Department
Kenya Meteorological Department
Nairobi
P.O. Box 30259-00100GPO
Kenya
Tel: +254-020-3867880
Fax: +254(0)20 3876955/3877373
E-mail: mainangunjiri@yahoo.com

Malaysia

Mr Mohd Rosaidi CHE ABAS
Director of Geophysics and Tsunami
Division
Malaysian Meteorological Department
Jalan Sultan
46667 Petaling Jaya
Selangor
Malaysia
Tel: 603-79678000
Fax: 603-79550964
E-mail: rosaidi@met.gov.my

The Netherlands

Ms Julie DE GRAAF
Dutch Delegation to UNESCO
Paris
France
E-mail: julie-de.graaf@minbuza.nl

IOC CHAIRMAN

Capitán Javier VALLADARES
Chairman, Intergovernmental
Oceanographic Commission (IOC)
Dirección de Relaciones Internacionales
Ministerio de Ciencia, Tecnología e
Innovación Productiva
Av. Córdoba 831 Piso 4°
(C1054AAH) Buenos Aires
Argentina

IOC SECRETARIAT

Mr Thorkild AARUP
GLOSS Technical Secretary
1 rue Miollis
75732 Paris cedex 15
France
Tel: +33 1 45 68 40 19
Fax: +33 1 45 68 58 12
E-mail: t.aarup@unesco.org

Mr Stefano BELFIORE
Secretariat to ICG/NEAMTWS
Intergovernmental Oceanographic
Commission of UNESCO
UN Campus - Hermann Ehlers Str. 10
D-53113 Bonn, Germany
Tel.: +49 228 815 0307
Fax: +49 228 815 0399
E-mail: s.belfiore@unesco.org

Mr Tony ELLIOTT
Head of ICG/IOTWS Secretariat,
IOC Perth Regional Programme Office
c/o Bureau of Meteorology
PO Box 1370, West Perth
1100 Hay Street
Perth WA 6872
Australia
Tel: +61 8 9226 0191
Fax: +61 8 9263 2211
E-mail: t.elliott@unesco.org

Mr. Peter KOLTERMANN
Head of Section, Tsunami Unit
Intergovernmental Oceanographic
Commission of UNESCO
1 rue Miollis
75732 Paris cedex 15
France
Tel: +33 1 45 68 40 15
Fax: +33 1 45 68 58 10
E-mail: p.koltermann@unesco.org

Ms Boram LEE
Programme Specialist
Intergovernmental Oceanographic
Commission of UNESCO
1 rue Miollis
75732 Paris cedex 15
France
Tel: +33 1 45 68 39 88
Fax: +33 1 45 68 58 12
E-mail: b.lee@unesco.org

Mrs Belén MARTÍN MÍGUEZ
Programme Specialist
Intergovernmental Oceanographic
Commission UNESCO
1, rue Miollis
F-75732 Paris Cedex 15
Tel: +33 1 45.68.39.90
Fax: +33 1 45.68.58.12
E-mail: b.martin-miguez@unesco.org

Mr Ulrich WOLF
Head of Secretariat to ICG/NEAMTWS
Intergovernmental Oceanographic
Commission of UNESCO
UN Campus - Hermann Ehlers Str. 10
D-53113 Bonn, Germany
Tel.: +49 228 815 0303
Fax: +49 228 815 0399
E-mail: u.wolf@unesco.org

ANNEX III

LIST OF ACRONYMS

CARIBE-EWS	Tsunami and other Coastal Hazards Warning System for the Caribbean and Adjacent Regions
CTBTO	Comprehensive Test Ban Treaty Organisation
DBCP	Data Buoy Cooperation Panel
DRR	WMO Disaster Risk Reduction
GEBCO	General Bathymetric Chart of the Oceans
GLOSS	Global Sea-Level Observing System
GOOS	Global Ocean Observing System
GOWHMS	ad hoc Working Group for Global Tsunami and Other Ocean-related Hazards Early Warning System
GTS	Global Telecommunication System
ICAM	Integrated Coastal Area Management Programme
ICG	Intergovernmental Coordination Group
I-GOOS	Intergovernmental IOC-WMO-UNEP Committee for GOOS
IHO	International Hydrographic Office
IODE	IOC International Oceanographic Data and Information Exchange
IOTWS	Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System
ISDR	Un International Strategy for Disaster Reduction
JCOMM	WMO-IOC Joint Technical Commission for Oceanography and Marine Meteorology
NEAMTWS	Tsunami Early Warning and Mitigation System in the North-Eastern Atlantic, the Mediterranean and Connected Seas
NGO	Nongovernmental organization
NMHS	WMO National Meteorological and Hydrological Service
NTWC	National Tsunami Warning Center
NTWFP	National Tsunami Warning Focal Point
PPEW	Platform for the Promotion of Early Warning
PTWS	Pacific Tsunami Warning and Mitigation System (formerly ITSU)
RTWC	Regional Tsunami Warning Centre
ToR	Terms of reference
TCU	Tsunami Coordination Unit
TOWS-WG	Working Group on Tsunamis and Other Hazards Related to Sea-Level Warning and Mitigation Systems

TWFP	Tsunami Warning Focal Point
TWS	Tsunami Warning System
WG	Working Group
WMO	World Meteorological Organization

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 C02 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)**