Intergovernmental Oceanographic Commission
Reports of Governing and Major Subsidiary Bodies

Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWMS)

Thirteenth Session

Bali, Indonesia
28 November–1 December 2022

UNESCO

Intergovernmental Oceanographic Commission
Reports of Governing and Major Subsidiary Bodies

Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWMS)

Thirteenth Session

Bali, Indonesia
28 November–1 December 2022

UNESCO 2023

ICG/IOTWMS-XIII/3
Paris, October 2023
English Only[1]

Participants of the thirteenth session of the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System, Nusa Dua, Bali, Indonesia, 1 December 2022.

[1] The Executive Summary is available in English, French, Spanish and Russian (https://oceanexpert.org/document/32587).

TABLE OF CONTENTS

page

ANNEXES

Executive Summary

The Thirteenth Session of the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWMS-XIII) was held in Bali, Republic of Indonesia, under the Chairpersonship of Professor Dwikorita Karnawati. The session was attended by 54 delegates from 17 Member States in the Indian Ocean region, 4 staff from United Nations agencies (including 3 from UNESCO and 1 from UNESCAP), and an additional 10 observers from 5 Member States (Australia, Germany, Indonesia, Iran and Oman). The adopted meeting agenda is attached as Annex I.

The ICG reviewed the progress made during the intersessional period and considered the reports and recommendations from its Chair, Working Groups and Task Teams, the UNESCO-IOC Secretariat for the ICG/IOTWMS, and the UNESCO-IOC Indian Ocean Tsunami Information Centre (IOTIC). The ICG considered the IOTWMS Medium-term Strategy (2019–2024), IOWave20 Exercise Report, 2018 Capacity Assessment of Tsunami Preparedness in the Indian Ocean (2020), Tsunami Service Provider Service Definition Document (2019), National Tsunami Warning Centre User Guide, and Tsunami Service Provider (TSP) Status Reports from Australia, India and Indonesia. The ICG also received, considered and noted reports of the 13th, 14th and 15th meetings of the UNESCO-IOC Working Group on Tsunami and Other Hazards Related to Sea-Level Warning and Mitigation Systems (TOWS-WG). Central to many of the discussions was the response to the Covid-19 pandemic, the ICG considered two further and important documents: 1) Guidelines for Tsunami Warning Services, Evacuation and Sheltering and 2) Impacts on IOTWMS Monitoring Networks and Tsunami Service Providers. The documentation for the session is available at http://www.UNESCO-IOC.org/iotwms13.

The ICG noted the speech on 23 March 2022 of UN Secretary-General, António Guterres, where he announced the United Nations would spearhead new action to ensure every person on Earth is protected by early warning systems within five years (2017);

The ICG further noted the UN Ocean Decade Tsunami Programme extensive goal to achieve the outcome of 100% of at-risk communities resilient and prepared for tsunamis;

The ICG further noted the efforts of the UNESCO-IOC TOWS-WG to develop a better understanding of the threat from tsunamis generated by non-seismic and complex sources and develop guidance on best practices to monitor and warn for such events;

The ICG further noted the importance of seismic data for timely and accurate determination of tsunami threats by Tsunami Service Providers, and the progress made in bilateral exchange of seismic data among some Member States; and **urged** Member States, especially in the North- West Indian Ocean region, to provide all relevant seismic data in real-time to TSPs and other Member States.

The ICG encouraged Member States to continue reviewing their tsunami warning chains with a view to minimizing the number of steps, and clear authorization of responsibilities amongst stakeholders, especially for near-field tsunami threats.

The ICG encouraged Member States to enhance community preparedness for near-field tsunamis, including for tsunamis generated by non-seismic and complex sources, with emphasis also on self-evacuation based on natural signs.

The ICG encouraged Member States to emphasise to Disaster Management Organisations (DMOs) and Broadcasting Media the role they also play with national Tsunami Warning Centres (NTWCs) in strengthening the national warning chain to ensure optimal community

response, and to stress the importance that all agencies participate in regional tsunami governance and technical forums.

The ICG noted the successful conduct of IOWave20 by Member States, the UNESCO-IOC Tsunami Ready recognition of two villages in India and one village in Indonesia, and the Indian Ocean Tsunami Ready Workshop in Bali, Indonesia 22–26 November 2022, and **encouraged** all Member States to consider implementing the Tsunami Ready Recognition Programme (TRRP) for vulnerable communities leading to UNESCO-IOC recognition.

The ICG noted the successful outcomes of Phase 1, Phases 2a and 2b of the UNESCAP funded project "Strengthening tsunami early warning in the North-West Indian Ocean through regional cooperation", and **further noted** efforts to develop a Phase 2c of the project involving training in inundation and evacuation mapping in support of implementation of the UNESCO-IOC TRRP in the region.

The ICG endorsed the new Terms of Reference of the Indian Ocean Tsunami Information Centre (IOTIC), including addition of the World Tsunami Awareness Day (WTAD) task**.**

The ICG decided to conduct an IOWave exercise in September-October 2023

The ICG decided to continue:

Working Group 1 on Tsunami Risk, Community Awareness and Preparedness

Working Group 2 on Tsunami Detection, Warning and Dissemination

Sub-Regional Working Group for the North-West Indian Ocean.

Task Team on Scientific Tsunami Hazard Assessment of the Makran Subduction Zone

Steering Group

The ICG decided to establish new:

Working Group 3 on Tsunami Ready

Implementation Task Team on IOWAVE23

The ICG decided to establish Tsunami Ready Focal Points (TRFPs) nominated by each Member State to enhance communication, coordination, and implementation of the TRRP or similar initiatives across the Indian Ocean.

The ICG decided to conduct two training workshops on Standard Operating Procedures (SOPs) in the intersessional period, with one to be conducted in the western Indian Ocean region and another in the eastern Indian Ocean, in the first half of 2023 and before IOWAVE23, subject to the availability of funding.

The ICG decided to continue to hold inter-sessional activities as integrated meetings to optimise resources, if available.

The ICG decided to again undertake a full Capacity Assessment of Tsunami Preparedness in the Indian Ocean in 2024 to evaluate progress of the IOTWMS since the Indian Ocean Tsunami of 2004, and also undertake a shorter assessment before each session of the ICG for review by Member States through an online questionnaire to continuously monitor progress after each intersessional period to help guide the work plans of the ICG/IOTWMS.

The ICG decided to extend the Tsunami Service Provider (TSP) services of the IOTWMS to include tsunamis generated by non-seismic and complex sources.

The ICG elected its officers for the next intersessional term commencing at the end of the session, whereby Prof. Dr Dwikorita Karnawati (Indonesia) was elected to continue as Chair, and Dr Yuelong Miao (Australia) and Mr Pattabhi Rama Rao Eluri (India) were elected as Vice-chairs.

The ICG acknowledged with appreciation the contribution and continued support of the Government of Australia for the UNESCO-IOC ICG/IOTWMS Secretariat and the support of the Government of Indonesia for the Indian Ocean Tsunami Information Centre (IOTIC).

The ICG decided to hold its 14th session in late 2024 to coincide with the 20th Commemoration of the Indian Ocean Tsunami of 2004 and **accepted with appreciation** the offer from the Government of the Republic of Indonesia to host it.

The ICG accepted with appreciation the offer from the Sultanate of Oman to host its 15th session in 2026.

The ICG expressed its gratitude to the Republic of Indonesia for the excellent host arrangements for its 13th session.

The ICG adopted Decisions ICG/IOTWMS-XIII.1 as attached in Annex II.

Résumé exécutif

La 13e session du Groupe intergouvernemental de coordination du Système d'alerte aux tsunamis et de mitigation dans l'océan Indien (GIC/IOTWMS-XIII) s'est tenue à Bali (Indonésie), sous la présidence de Mme Dwikorita Karnawati. La session s'est déroulée en présence de 54 délégués de 17 États membres de la région de l'océan Indien, de quatre membres du personnel d'organismes des Nations Unies (dont trois de l'UNESCO et un de la Commission économique et sociale pour l'Asie et le Pacifique – CESAP), et de 10 observateurs de cinq États membres (Allemagne, Australie, Indonésie, Iran et Oman). L'ordre du jour de la réunion figure à l'annexe A.

Le GIC a passé en revue les progrès accomplis pendant l'intersession et a examiné les rapports et recommandations de sa Présidente, de ses groupes de travail et de ses équipes spéciales, ainsi que ceux du Secrétariat de la COI-UNESCO pour le GIC/IOTWMS et du Centre d'information sur les tsunamis dans l'océan Indien (IOTIC). Il a également examiné la Stratégie à moyen terme de l'IOTWMS (2019-2024), le rapport sur l'exercice IOWave20, le rapport d'étape 2018 de l'évaluation des capacités de l'IOTWMS en matière de préparation aux tsunamis dans l'océan Indien (2020), le document de définition des services pour les Prestataires de services relatifs aux tsunamis (2019), le guide de l'utilisateur des centres nationaux d'alerte aux tsunamis, et les rapports d'étape des prestataires de services (TSP) relatifs aux tsunamis d'Australie, d'Inde et d'Indonésie. Le GIC a reçu et examiné les rapports des 13e, 14e et 15e réunions du Groupe de travail de la COI-UNESCO sur les systèmes d'alerte aux tsunamis et autres aléas liés au niveau de la mer, et de mitigation (TOWS-WG), et en a pris note. La réponse à la pandémie de COVID-19 a été au centre de nombreuses discussions. Le GIC a examiné deux autres documents importants : (i) les directives pour les services d'alerte aux tsunamis, l'évacuation et la mise à l'abri ; et (ii) *Impacts on IOTWMS Monitoring Networks and Tsunami Service Providers* (Conséquences pour les réseaux de surveillance et les prestataires de services relatifs aux tsunamis de l'IOTWMS).

Le GIC a pris note du discours prononcé le 23 mars 2022 par le Secrétaire général de l'ONU, António Guterres, dans lequel il a annoncé une nouvelle action à l'initiative des Nations Unies pour faire en sorte que tous les habitants de la planète soient protégés par des systèmes d'alerte précoce d'ici à cinq ans (2027).

Le GIC a également pris note de l'ambitieux objectif du Programme relatif aux tsunamis de la Décennie de l'Océan, qui consiste à assurer la résilience et la préparation aux tsunamis de 100 % des communautés à risque.

Le GIC a pris acte des efforts déployés par le Groupe de travail de la COI sur les systèmes d'alerte aux tsunamis et autres aléas liés au niveau de la mer, et de mitigation (TOWS-WG) pour mieux comprendre la menace que représentent les tsunamis générés par des sources non sismiques et complexes, ainsi que pour élaborer des orientations sur les pratiques exemplaires en matière de surveillance et d'alerte pour de tels événements.

Le GIC a relevé l'importance des données sismiques pour l'identification précise et rapide des risques de tsunami par les prestataires de services relatifs aux tsunamis, ainsi que les progrès accomplis dans l'échange bilatéral de données sismiques entre certains États membres. Il **a demandé instamment** aux États membres, notamment à ceux de la région de l'océan Indien du Nord-Ouest, de communiquer en temps réel toutes les données sismiques pertinentes aux prestataires de services relatifs aux tsunamis et aux autres États membres.

Le GIC a encouragé les États membres à continuer de revoir leur chaîne d'alerte aux tsunamis de façon à réduire le nombre d'étapes, et à répartir clairement les responsabilités entre les parties prenantes, en particulier concernant les risques de tsunamis locaux.

Le GIC a incité les États membres à améliorer la préparation des populations aux tsunamis locaux, y compris les tsunamis générés par des sources non sismiques et complexes, en mettant l'accent sur l'auto-évacuation fondée sur les signes naturels avant-coureurs.

Le GIC a engagé les États membres à mettre en avant auprès des organismes de gestion des catastrophes et des médias le rôle que ceux-ci jouent, avec les centres nationaux d'alerte aux tsunamis (NTWC), pour renforcer la chaîne d'alerte nationale et assurer ainsi une réaction optimale des populations, et à souligner l'importance de la participation de tous les organismes aux forums régionaux techniques et de gouvernance relatifs aux tsunamis.

Le GIC a pris note du bon déroulement de l'exercice IOWave20 réalisé par les États membres, de l'obtention de la certification Tsunami Ready de la COI par deux villages en Inde et neuf villages en Indonésie, ainsi que de la tenue d'un atelier Tsunami Ready pour l'océan Indien à Bali (Indonésie), du 22 au 26 novembre 2022. Il **a engagé** l'ensemble des États membres à envisager de mettre en œuvre le programme de certification Tsunami Ready dans les communautés vulnérables, afin qu'elles reçoivent la certification de la COI-UNESCO.

Le GIC a pris acte des résultats concluants de la phase 1 et des phases 2a et 2b du projet « Renforcer le système d'alerte rapide aux tsunamis dans la région de l'océan Indien du Nord-Ouest par la coopération régionale » financé par la CESAP, ainsi que des efforts destinés à élaborer une phase 2c du projet prévoyant une formation à la cartographie des zones submersibles et des itinéraires d'évacuation à l'appui de la mise en œuvre du programme Tsunami Ready dans la région.

Le GIC a approuvé le nouveau mandat du Centre d'information sur les tsunamis dans l'océan Indien (IOTIC), y compris l'ajout d'une mission relative à la Journée mondiale de sensibilisation aux tsunamis.

Le GIC a décidé d'effectuer un exercice IOWave en septembre-octobre 2023.

Le GIC a décidé de proroger :

- le Groupe de travail 1 sur les risques de tsunami et la sensibilisation et la préparation des communautés ;
- le Groupe de travail 2 sur la détection des tsunamis, l'alerte et la diffusion ;
- le Groupe de travail sous-régional pour l'océan Indien du Nord-Ouest ;
- l'Équipe de travail intersessions sur l'évaluation scientifique du danger de tsunami dans la zone de subduction du Makran ;
- le Comité directeur du GIC/IOTWMS.

Le GIC a décidé de créer :

- un Groupe de travail 3 sur la mise en œuvre du programme de certification Tsunami Ready ;
- une Équipe spéciale sur l'exercice IOWave 23.

Le GIC a décidé de mettre en place des points focaux Tsunami Ready (TRFP) désignés par chaque État membre afin d'améliorer la communication, la coordination et la mise en œuvre du programme Tsunami Ready ou d'initiatives similaires dans la région de l'océan Indien.

Le GIC a décidé d'organiser, pendant la période intersessions, deux ateliers de formation sur les procédures opérationnelles normalisées, dont l'un aura lieu dans la région de l'océan Indien occidental et l'autre dans la région de l'océan Indien oriental, au cours du premier semestre de 2023 et avant la tenue d'IOWave 23, sous réserve de la disponibilité des fonds nécessaires.

Le GIC a décidé de continuer de mener des activités pendant la période intersessions sous la forme de réunions intégrées, afin d'optimiser les ressources, si elles existent.

Le GIC a décidé de réaliser une nouvelle évaluation complète des capacités en matière de préparation aux tsunamis dans l'océan Indien en 2024, en vue d'évaluer les progrès accomplis par l'IOTWMS depuis le tsunami de l'océan Indien de 2004. Avant chacune de ses sessions, il procèdera également à une évaluation plus courte au moyen d'un questionnaire en ligne, qui sera présentée aux États membres pour examen, l'objectif étant d'assurer un suivi continu des progrès après chaque période intersessions pour aider à orienter les plans de travail du GIC/IOTWMS.

Le GIC a décidé d'élargir la gamme des services fournis à l'IOTWMS par les prestataires de services relatifs aux tsunamis (TSP) en incluant les tsunamis générés par des sources non sismiques et complexes.

Le GIC a élu son bureau pour la prochaine période intersessions, à compter de la fin de la session. Mme Dwikorita Karnawati (Indonésie) a été réélue Présidente, et MM. Yuelong Miao (Australie) et Pattabhi Rama Rao Eluri (Inde) ont été élus Vice-Présidents.

Le GIC a pris note avec satisfaction de la contribution et du soutien constant fournis par le Gouvernement australien au Secrétariat de la COI-UNESCO pour le GIC/IOTWMS, ainsi que de l'aide qu'apporte le Gouvernement indonésien au Centre d'information sur les tsunamis dans l'océan Indien (IOTIC).

Le GIC a décidé de tenir sa 14^{e} session à la fin de l'année 2024, de façon qu'elle coïncide avec la commémoration du 20^{e} anniversaire du tsunami dans l'océan Indien de 2004, et **a accepté avec gratitude** la proposition faite par le Gouvernement de l'Indonésie d'accueillir cette session.

Le GIC **a également accepté avec gratitude** la proposition faite par Oman d'accueillir sa 15^{e} session en 2026.

Le GIC **a remercié** le Gouvernement de l'Indonésie de son excellent accueil pour sa 13^{e} session.

Le GIC **a adopté** les décisions ICG/IOTWMS-XIII.1 telles qu'elles figurent à l'annexe II.

Resumen ejecutivo

La 13ª reunión del Grupo Intergubernamental de Coordinación del Sistema de Alerta contra los Tsunamis y Atenuación de sus Efectos en el Océano Índico (ICG/IOTWMS-XIII) se celebró en Bali (Indonesia) bajo la presidencia de la Prof. Dwikorita Karnawati. Asistieron a la reunión 54 delegados de 17 Estados Miembros de la región del océano Índico, cuatro funcionarios de organismos de las Naciones Unidas (tres de ellos de la UNESCO y uno de la CESPAP) y 10 observadores de cinco Estados Miembros (Alemania, Australia, Indonesia, Irán y Omán). El orden del día aprobado de la reunión figura en el anexo A.

El ICG examinó los progresos realizados durante el periodo entre reuniones, y los informes y recomendaciones de su Presidenta, sus grupos de trabajo y sus equipos de trabajo, así como de la Secretaría de la COI/UNESCO para el ICG/IOTWMS y el Centro de Información sobre los Tsunamis en el Océano Índico (IOTIC). El ICG examinó también la Estrategia a Plazo Medio del IOTWMS (2019-2024), el informe sobre el ejercicio IOWave20, la evaluación de la capacidad para la preparación ante los tsunamis en el océano Índico de 2018 (2020), el documento de definición de los servicios de los proveedores de servicios sobre tsunamis (2019), la guía del usuario de los centros nacionales de alerta contra los tsunamis, y los informes de situación de los proveedores de servicios sobre tsunamis de Australia, la India e Indonesia. Asimismo, el ICG recibió y examinó los siguientes informes, de los que tomó nota: los informes de las reuniones 13ª, 14ª y 15ª del Grupo de Trabajo sobre los Sistemas de Alerta contra los Tsunamis y Otros Peligros relacionados con el Nivel del Mar y Atenuación de sus Efectos (TOWS-WG) de la COI/UNESCO. Muchos debates se centraron en la respuesta a la pandemia de COVID-19. Así, el ICG examinó otros dos documentos importantes, a saber, 1) *Guidelines for Tsunami Warning Services, Evacuation and Sheltering during COVID-19* (Directrices para los servicios de alerta contra los tsunamis, la evacuación y el refugio durante la COVID-19) y 2) *Impacts of COVID-19 Pandemic on IOTWMS Monitoring Networks and Tsunami Service Providers* (Repercusiones de la pandemia de COVID-19 para las redes de vigilancia y los proveedores de servicios sobre tsunamis del IOTWMS).

El ICG tomó nota del discurso pronunciado el 23 de marzo de 2022 por el Secretario General de las Naciones Unidas, António Guterres, en el que anunció que las Naciones Unidas encabezarían una nueva acción para garantizar que todos los habitantes del planeta estuvieran protegidos por sistemas de alerta temprana en un plazo de cinco años (2027).

El ICG tomó nota también del ambicioso objetivo del Programa de Tsunamis del Decenio del Océano de las Naciones Unidas de lograr que el 100 % de las comunidades en riesgo estén preparadas y sean resilientes ante los tsunamis.

El ICG tomó nota de los esfuerzos del Grupo de Trabajo sobre los Sistemas de Alerta contra los Tsunamis y Otros Peligros relacionados con el Nivel del Mar y Atenuación de sus Efectos (TOWS-WG) de la COI orientados a comprender mejor la amenaza de los tsunamis generados por fuentes no sísmicas y complejas, así como a formular orientaciones sobre las mejores prácticas en materia de vigilancia y alerta de esos eventos.

El ICG tomó nota también de la importancia de los datos sísmicos para la determinación oportuna y precisa de las amenazas de tsunami por los proveedores de servicios sobre tsunamis, y de los progresos realizados en el intercambio bilateral de datos sísmicos entre determinados Estados Miembros. Asimismo, **instó** a los Estados Miembros, especialmente en la región del océano Índico noroccidental, a proporcionar todos los datos sísmicos pertinentes en tiempo real a los proveedores de servicios sobre tsunamis y a otros Estados Miembros.

El ICG alentó a los Estados Miembros a que siguieran examinando sus cadenas de alerta contra tsunamis con miras a reducir al mínimo el número de etapas, y a que determinaran

claramente las responsabilidades de las partes interesadas, especialmente en lo que respecta a las amenazas de tsunamis locales.

El ICG alentó a los Estados Miembros a mejorar la preparación de las comunidades para los tsunamis locales, incluidos los tsunamis generados por fuentes no sísmicas y complejas, haciendo hincapié igualmente en la autoevacuación basada en las señales de la naturaleza.

El ICG alentó a los Estados Miembros a que hicieran hincapié ante los organismos de gestión de desastres y los medios de difusión en la función que desempeñan, con los centros nacionales de alerta contra los tsunamis (NTWC), en el fortalecimiento de la cadena de alerta nacional para garantizar una respuesta óptima de las comunidades, y a que recalcaran la importancia de que todos los organismos participen en foros regionales sobre gobernanza y aspectos técnicos en materia de tsunamis.

El ICG tomó nota de la ejecución satisfactoria del ejercicio IOWave 20 realizado por los Estados Miembros, de la obtención de la acreditación Tsunami Ready de la COI/UNESCO por parte de dos aldeas en la India y nueve aldeas en Indonesia, y de la organización de un taller sobre Tsunami Ready en el océano Índico en Bali (Indonesia) del 22 al 26 de noviembre de 2022. **Alentó** a todos los Estados Miembros a considerar la posibilidad de aplicar el programa de acreditación Tsunami Ready en las comunidades vulnerables para que reciban la acreditación de la COI/UNESCO.

El ICG tomó nota también de los resultados satisfactorios de la fase 1 y de las fases 2a y 2b del proyecto financiado por la CESPAP “Fortalecimiento de la alerta temprana contra los tsunamis en la región noroccidental del océano Índico mediante la cooperación regional”, así como de los esfuerzos para elaborar una fase 2c del proyecto que abarque una formación en elaboración de mapas de inundación y evacuación que respalde la ejecución del programa Tsunami Ready en la región.

El ICG aprobó el nuevo mandato del Centro de Información sobre los Tsunamis en el Océano Índico (IOTIC), incluida la inclusión de una tarea relativa al Día Mundial de Concienciación sobre los Tsunamis.

El ICG decidió llevar a cabo un ejercicio IOWave en septiembre-octubre de 2023.

El ICG decidió mantener:

- el Grupo de trabajo 1 sobre riesgo de tsunamis y sensibilización y preparación de las comunidades;
- el Grupo de trabajo 2 sobre detección de tsunamis, alerta y difusión;
- el Grupo de trabajo subregional para el océano Índico noroccidental;
- el Equipo de trabajo sobre la evaluación científica del peligro de tsunami en la zona de subducción de Makran;
- el Grupo de Dirección del ICG/IOTWMS.

El ICG decidió establecer:

- un Grupo de trabajo 3 sobre la puesta en marcha de Tsunami Ready;
- un Equipo de trabajo sobre el ejercicio IOWave 23.

El ICG decidió establecer centros de coordinación de Tsunami Ready designados por cada Estado Miembro con miras a mejorar la comunicación, coordinación y aplicación del programa Tsunami Ready u otras iniciativas similares en la región del océano Índico.

El ICG decidió organizar durante el periodo entre reuniones —en el primer semestre de 2023 y antes de que se realice el ejercicio IOWave 23— dos talleres de formación sobre procedimientos normalizados de operaciones, uno de ellos en la región del océano Índico occidental y otro en la del océano Índico oriental, siempre que se disponga de financiación.

El ICG decidió seguir ejecutando actividades entre reuniones como la celebración de reuniones integradas para optimizar los recursos, si se dispone de ellos.

El ICG decidió llevar a cabo de nuevo una evaluación completa de la capacidad en materia de preparación ante los tsunamis en el océano Índico en 2024 a fin de examinar los progresos del IOTWMS desde el tsunami del océano Índico de 2004. Asimismo, antes de cada reunión del ICG efectuará una evaluación más breve mediante un cuestionario en línea, que se someterá al examen de los Estados Miembros, con el objetivo de supervisar continuamente los progresos después de cada periodo entre reuniones, y así ayudar a orientar los planes de trabajo del ICG/IOTWMS.

El ICG decidió ampliar los servicios de los proveedores de servicios sobre tsunamis (TSP) del IOTWMS para incluir los tsunamis generados por fuentes no sísmicas y complejas.

El ICG eligió sus directivos para el próximo periodo entre reuniones que comienza al final de la reunión. La Prof. Dra. Dwikorita Karnawati (Indonesia) fue reelegida Presidenta, y el Dr. Yuelong Miao (Australia) y el Sr. Pattabhi Rama Rao Eluri (India) fueron elegidos Vicepresidentes.

El ICG acogió con satisfacción la contribución y el apoyo constante del Gobierno de Australia a la Secretaría del ICG/IOTWMS de la COI/UNESCO y el apoyo del Gobierno de Indonesia al Centro de Información sobre los Tsunamis en el Océano Índico (IOTIC).

El ICG decidió celebrar su 14ª reunión a finales de 2024, de manera que coincida con la celebración del 20º aniversario del tsunami del océano Índico de 2004, y **aceptó con agradecimiento** la oferta del Gobierno de Indonesia de acogerla.

El ICG aceptó con reconocimiento la propuesta de Omán de acoger su 15ª reunión en 2026.

El ICG agradeció al Gobierno de Indonesia las excelentes disposiciones adoptadas para acoger su 13ª reunión.

El ICG adoptó las Decisiones ICG/IOTWMS-XIII.1 que se adjuntan en el Anexo II.

Рабочее Резюме

Тринадцатая сессия Межправительственной координационной группы по Системе предупреждения о цунами и смягчения их последствий в Индийском океане (МКГ/СПЦСПИО-XIII) прошла на Бали, Индонезия, под председательством профессора Двикориты Карнавати. В работе сессии приняли участие 54 делегата из 17 государств – членов региона Индийского океана, четыре сотрудника учреждений ООН (включая трех сотрудников ЮНЕСКО и одного сотрудника ЭСКАТО ООН), а также 10 наблюдателей из пяти государств-членов (Австралия, Германия, Индонезия, Иран и Оман). Утвержденная повестка дня совещания приводится в приложении А.

МКГ провела обзор достигнутых в межсессионный период результатов и рассмотрела доклады и рекомендации своего председателя, рабочих и целевых групп, Секретариата МОК ЮНЕСКО для МКГ/СПЦСПИО, а также Центра информации о цунами в Индийском океане МОК ЮНЕСКО (ЦИЦИО). МКГ рассмотрела среднесрочную стратегию СПЦСПИО (2019-2024 гг.), доклад об учениях «Волна-20» в Индийском океане, оценку потенциала готовности к цунами в Индийском океане за 2018 г. (2020 г.), документ об определении услуг поставщика данных слежения за цунами (2019 г.), руководство для пользователей национального центра предупреждения о цунами и доклады о ходе работы поставщиков данных слежения за цунами (ПДСЦ) из Австралии, Индии и Индонезии. МКГ также получила, рассмотрела и приняла к сведению доклады 13-го, 14-го и 15-го совещаний рабочей группы МОК ЮНЕСКО по системам предупреждения о цунами и других опасных явлениях, связанных с изменением уровня моря, и смягчения их последствий (РГ-СПЦО). Центральной темой многих дискуссий стали ответные меры в контексте пандемии COVID-19. МКГ рассмотрела два дополнительных важных документа: (1) руководящие принципы деятельности служб предупреждения о цунами, эвакуации и предоставления убежищ; и (2) воздействие на сети мониторинга СПЦСПИО, а также на деятельность поставщиков данных слежения за цунами.

МКГ приняла к сведению выступление Генерального секретаря ООН Антониу Гутерриша от 23 марта 2022 г., в котором он объявил, что Организация Объединенных Наций инициирует принятие новых мер, направленных на то, чтобы через пять лет (к 2027 г.) обеспечить каждому человеку на Земле защиту с помощью систем раннего предупреждения.

МКГ приняла к сведению также масштабную цель Программы по цунами Десятилетия океана ООН по обеспечению устойчивости и готовности к цунами 100% общин, подверженных риску цунами.

МКГ приняла к сведению далее усилия Рабочей группы МОК по системам предупреждения о цунами и других опасных явлениях, связанных с изменением уровня моря, и смягчения их последствий (РГ-СПЦО), по обеспечению более глубокого понимания угрозы цунами несейсмического и комплексного происхождения и разработке руководства по передовой практике мониторинга и предупреждения о таких явлениях.

МКГ подчеркнула также важное значение сейсмических данных для своевременного и точного определения угроз цунами поставщиками данных слежения за цунами, а также достигнутый прогресс в двустороннем обмене сейсмическими данными между рядом государств-членов и **настоятельно призвала** государства-члены, особенно в северо-западной части Индийского океана, предоставлять все соответствующие сейсмические данные в режиме реального времени поставщикам данных слежения за цунами и другим государствам-членам.

МКГ призвала государства-члены продолжать пересмотр их систем предупреждения о цунами с целью сокращения числа этапов и четкого распределения обязанностей между заинтересованными сторонами, особенно в отношении угроз цунами в ближней зоне.

МКГ призвала государства-члены повысить готовность общин к цунами в ближней зоне, включая цунами несейсмического и комплексного происхождения, с особым вниманием к самостоятельной эвакуации на основании сигналов природы.

МКГ призвала государства-члены обратить особое внимание организаций по реагированию на стихийные бедствия и вещательных средств информации на роль, которую они выполняют совместно с национальными центрами предупреждения о цунами (НЦПЦ) в укреплении национальной системы предупреждения в целях обеспечения оптимального реагирования общин и подчеркивать важность участия всех учреждений в региональных руководящих и технических форумах по цунами.

МКГ приняла к сведению информацию об успешном проведении государствами-членами учений «Волна-20» в Индийском океане, сертификации готовности к цунами двух деревень в Индии и девяти деревень в Индонезии в рамках программы МОК ЮНЕСКО, а также о проведении 22-26 ноября 2022 г. на Бали (Индонезия) семинара, посвященного Программе по сертификации готовности к цунами в Индийском океане, и **призвала** все государства-члены рассмотреть вопрос об осуществлении Программы по сертификации готовности к цунами (ПСГЦ) в уязвимых общинах в целях получения сертификата МОК ЮНЕСКО.

МКГ приняла к сведению также информацию об успешном завершении фазы 1, а также фазы 2a и 2b финансируемого ЭСКАТО ООН проекта «Усовершенствование системы раннего предупреждения о цунами в северо-западной части Индийского океана на основе регионального сотрудничества» и **приняла к сведению далее** усилия по разработке фазы 2c проекта, включающей обучение составлению карт наводнений и эвакуации в поддержку осуществления ПСГЦ МОК ЮНЕСКО в данном регионе.

МКГ одобрила новый круг ведения Центра информации о цунами в Индийском океане (ЦИЦИО), включая новую функцию по проведению Всемирного дня распространения информации о проблеме цунами.

МКГ постановила провести учения «Волна» в Индийском океане в сентябре-октябре 2023 г.

МКГ постановила продолжить работу:

- рабочей группы 1 по опасности цунами, информированию и обеспечению готовности общин
- рабочей группы 2 по обнаружению цунами, оповещению и распространению информации о них
- субрегиональной рабочей группы по северо-западной части Индийского океана
- целевой группы по научной оценке опасности цунами в Макранской зоне субдукции
- руководящей группы МКГ/СПЦСПИО.

МКГ постановила учредить:

- рабочую группу 3 по осуществлению Программы сертификации готовности к цунами
- целевую группу по проведению учений «Волна-23» в Индийском океане.

МКГ постановила учредить координационные центры Программы сертификации готовности к цунами (КЦГЦ), назначаемые каждым государством-членом в целях более эффективной коммуникации, координации и осуществления ПСГЦ или аналогичных инициатив во всем регионе Индийского океана.

МКГ постановила провести в межсессионный период при наличии финансирования два учебных семинара по стандартным оперативным процедурам (СОП), один в западной части Индийского океана, а другой – в восточной части Индийского океана, в первой половине 2023 г. до начала учений «Волна-23» в Индийском океане.

МКГ постановила и далее по возможности проводить межсессионные мероприятия в формате комплексных совещаний в целях оптимизации ресурсов.

МКГ постановила вновь провести полную оценку потенциала готовности к цунами в Индийском океане в 2024 г. для анализа результатов работы в рамках СПЦСПИО после цунами в Индийском океане в 2004 г., а также проводить более сжатую оценку в формате онлайнового вопросника перед каждой сессией МКГ для дальнейшего рассмотрения государствами-членами в интересах непрерывного мониторинга прогресса после каждого межсессионного периода, что будет служить ориентиром для планов работы МКГ/СПЦСПИО.

МКГ постановила расширить спектр услуг поставщиков данных слежения за цунами СПЦСПИО, распространив их на цунами несейсмического и комплексного происхождения.

МКГ избрала своих должностных лиц на начинающийся после окончания сессии следующий межсессионный период. Проф. д-р Двикорита Карнавати (Индонезия) продолжит выполнять функции председателя, а д-р Юэлун Мяо (Австралия) и г-н Паттабхи Рама Рао Элури (Индия) были избраны заместителями председателя.

МКГ с признательностью отметила вклад и постоянную поддержку секретариата МКГ/СПЦСПИО МОК ЮНЕСКО со стороны правительства Австралии и поддержку, оказываемую правительством Индонезии Центру информации о цунами в Индийском океане (ЦИЦИО).

МКГ постановила провести свою 14-ю сессию в конце 2024 г., приурочив ее к 20-й годовщине цунами 2004 г. в Индийском океане, и **с признательностью приняла предложение** правительства Индонезии о ее проведении на территории этой страны.

МКГ с благодарностью **приняла** предложение правительства Омана провести на его территории 15-ю сессию МКГ в 2026 г.

МКГ выразила благодарность Индонезии за прекрасную организацию ее 13-й сессии.

МКГ приняла Решение ICG/IOTWMS-XIII.1, которое приводится в Приложении II.

1. OPENING CEREMONY

1. The thirteenth session of the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWMS-XIII) was hosted by the Government of Indonesia through the Agency for Meteorology, Climatology and Geophysics (BMKG) at the Courtyard by Marriott Bali in Nusa Dua. The sessional meeting was held from 28 November to 1 December under the Chairship of Prof. Dwikorita Karnawati. The hybrid session was attended by 54 delegates from 17 Member States in the Indian Ocean region (mainly Australia, Bangladesh, Comoros, France, India, Indonesia, Iran, Kenya, Madagascar, Malaysia, Maldives, Myanmar, Oman, Pakistan, Seychelles, Sri Lanka and United Arab Emirates), 1 United Nations agency (UNESCAP, United Nations Economic and Social Commission for Asia and the Pacific), about 10 observers from 5 countries (Australia, Germany, Indonesia, Iran and Oman) and 3 UNESCO representatives.

2. The opening ceremony was conducted under the auspices of BMKG on behalf of the Government of Indonesia with Ms Mila Apriani (Indonesia) as the master of ceremonies. A minute of silence was observed in remembrance of the victims of the West Java earthquake on 24 November 2022. This was followed by a traditional welcoming dance. Opening remarks were provided Dr Itje Chadidjah, Mr Rick Bailey and Prof. Dwikoirita Karnawati. The meeting was officially opened by Dr Suko Prayito Adi (Indonesia), Mr E Pattabhi Rama Rao (India), and Mr Bailey striking the gong.

1.1 OPENING REMARKS

3. Dr Itje Chadidjah, Head of the Indonesian National Commission for UNESCO, welcomed the distinguished delegates and participants to the thirteenth session of the ICG/IOTWMS. He recalled the 2030 Agenda for Sustainable Development and UNESCO-IOC's role in supporting all Member States to undertake science and build capacity. Furthermore, climate change has been identified as a critical issue of our time with coastal communities suffering from sea level rise, ocean acidification and global warming. Additionally, the potential impact of natural hazards, and specifically tsunami, on coastal residents must be addressed for a sustainable future.

4. Mr Rick Bailey, Head of the ICG/IOTWMS Secretariat and on behalf of the Executive Secretary of UNESCO-IOC, addressed the distinguished delegates and participants. He recalled the devastating 2004 Indian Ocean tsunami and subsequent establishment of the ICG/IOTWMS Secretariat with the support of the Government of Australia. Starting in 2005, sea level and seismic observational networks grew and tsunami contacts in the Indian Ocean Member States were established. The Indian Ocean tsunami warning system structure is based on three Tsunami Service Providers (TSPs) of Australia, India and Indonesia making earthquake and tsunami information available to the tsunami warning focal points in each Member State. Since 2015, there has been an increased focus on communities. In 2017, Indian Ocean Tsunami Ready commenced as a pilot programme, which was officially launched as the UNESCO-IOC Tsunami Ready programme in 2021. In conclusion, Mr Bailey thanked the governments of Australia and Indonesia as well as UNESCAP for ICG/IOTWMS programme support. He acknowledged the important role of the TSPs and Indian Ocean Member States who share their observational data. He noted that the 13th sessional meeting would review progress following the ICG/IOTWMS-XII held during 9–12 March 2019 in Kish, Iran and identify areas of future work.

5. Prof. Dwikorita Karanawati, Chair of ICG/IOTWMS, addressed the distinguished delegates and participants. She welcomed all to the 13th session of the ICG/IOTWMS and expressed sincere appreciation for the event arrangements and participation. Recalling the Group of Twenty (G20) Bali summit (15–16 November 2022), Prof. Karnawati expressed the need to continue the momentum to solve global problems. The 2018 Sunda Strait and 2022 Hunga Tonga–Hunga Ha'apai volcano-induced tsunamis have provided insight on the

complexity of non-tectonic tsunamis. Improvement of the detection of non-seismic tsunami events is critical and there are many challenges ahead on this pathway. Key areas for enhancement of Indian Ocean tsunami warning and mitigation include community risk knowledge; tsunami detection, analysis and forecasting; early tsunami warning communication to communities; and overall preparedness and response. Prof. Karnawati expressed the need to provide early warnings with early actions. The development of sustainable community preparedness to achieve zero victims by tsunami can be achieved by implementation of the UNESCO-IOC Tsunami Ready programme. Two Member States, India and Indonesia, have successfully implemented the programme in select coastal communities and the other Indian Ocean Member States must follow with engagement of their governments, stakeholders and communities. In conclusion, Prof. Karnawati wished all partipants a successful meeting.

1.2 ADOPTION OF AGENDA

6. The Head of the ICG/IOTWMS Secretariat, Mr Rick Bailey, reviewed the provisional agenda. He informed the meeting that the agenda was prepared by the Secretariat and Officers taking into account the recommendations of ICG/IOTWMS-XII (Kish, Iran, 9–12 March 2019) and the IOC Rules of Procedure. Mr Bailey opened the floor for comments on the agenda and the ICG approved the agenda without modification (Annex I).

1.3 DESIGNATION OF RAPPORTEURS

7. The Chair requested the group to consider the need to nominate rapporteur(s) for the session. The role of the rapporteur(s) is to review and certify the report prepared by the Secretariat. As a general practice, the host country was requested to propose rapporteurs for the session. Prof. Karnawati proposed Ms Anni Arumsari Fitriany (Day-1), Ms Suci Dewi Anugrah (Day-2), Admiral Musa Julius (Day-3), and Ms Hidayanti (Day-4) who were endorsed by the ICG.

1.4 CONDUCT OF THE SESSION

8. Mr Bailey reviewed the conduct and arrangements of the hybrid sessional meeting including Covid protocols (for the in-person participants) and environmental measures undertaken.

1.5 ESTABLISHMENT OF SESSIONAL COMMITTEES

9. The Chair requested the delegates to consider establishing three (3) statutory sessional committees to facilitate and promote the exchange of viewpoints and advance agreements that might prove time consuming in plenary.

- The Nominations Committee was established to oversee the election of officers and report back to plenary under agenda item 13. Mr Abdullah Alkhadori (Oman) was nominated as the committee Chair with membership from Mr Ramarolahy Rina Adrianasolo (Madagascar) and Ms Veronique Philoe (Seychelles).
- The Recommendations Committee was established to certify that draft recommendations submitted by Member States are consistent in language and fulfil requirements established in the IOC Manual (IOC/INF-785) for presentation under agenda item 16. Mr E Pattabhi Rama Rao (India) was nominated as the committee Chair with membership from Mr Robert Greenwood (Australia), Ms Suci Dewi Anugrah (Indonesia) and Dr Harkunti Rahayu (Indonesia).
- The Programme and Budget Committee was established to produce an estimate of the amount of resources Member States are investing in tsunami warning systems and to estimate needs for 2022–2024, both from UNESCO-IOC regular budget and from other sources, and report back to plenary under agenda item 12.

Dr Yuelong Miao (Australia) was nominated as the committee Chair with membership from Mr Jijjavarapu Padmanabham (India) and Ms Anni Arumsari Fitriany (Indonesia).

10. Mr Bailey announced the nomination deadline for ICG/IOTWMS Officers is at 8:00 UTC on 30 November 2023.

2. REPORT ON INTERSESSIONAL ACTIVITIES

2.1 ICG CHAIRPERSON'S REPORT

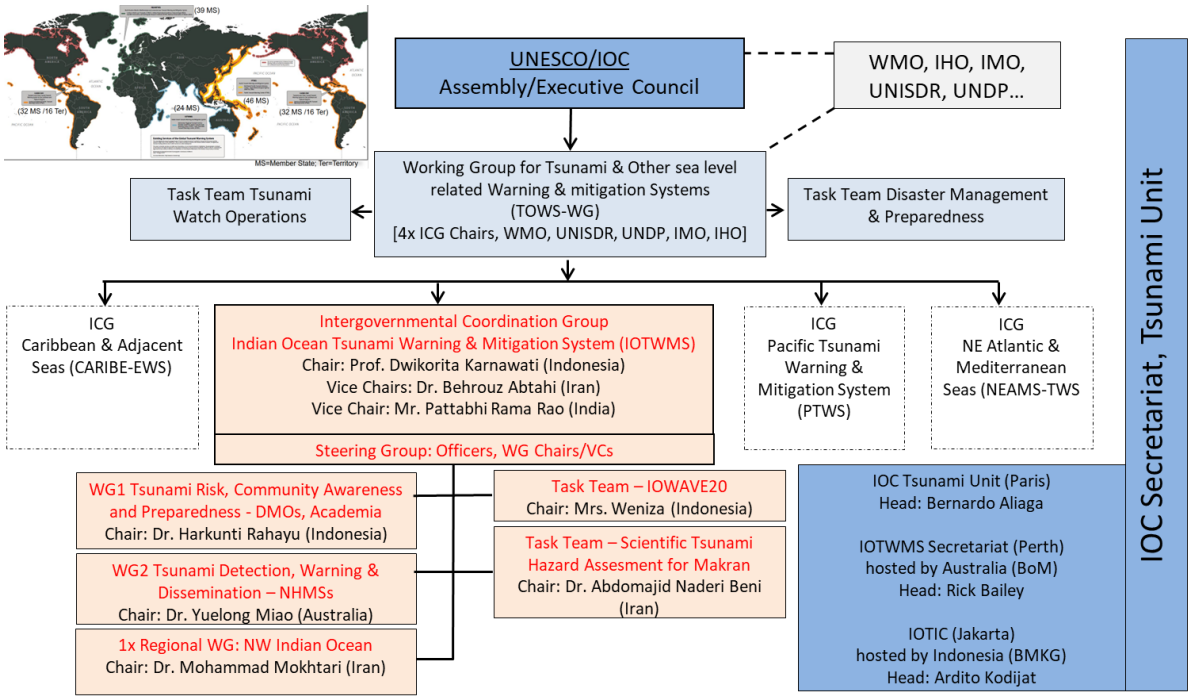
11. Prof. Dwikorita Karnawati, Chair of ICG/IOTWMS, reported on the activities of the ICG during the intersessional period. The presentation of the Chairperson to ICG/IOTWMS-XIII is provided online.

12. The previous sessional meeting, ICG/IOTWMS-XII, was held during 9–12 March 2019 in Kish Island (Iran) where eight (8) Member States attended in-person and there noone participated online. The Intersessional Meeting of the ICG/IOTWMS was held online during 23–24 November 2021 and had over one hundred (100) participants from nineteen (19) Member States including many Disaster Management officials. This thirteenth session of the ICG/IOTWMS held in Bali, Indonesia was attended by over fifty (50) delegates from seventeen (17) Indian Ocean Member States.

13. The ICG/IOTWMS is primarily funded through the Government of Australia and the Indian Ocean Tsunami Informaiton Center (IOTIC) is primarily funded through the Government of Indonesia. Additional funding is provided through the UNESCAP Tsunami Trust Fund and IOC regular programme budget. Many Indian Ocean Member States provide in-kind support including the provision of tsunami service provided by the governments of Australia, India and Indonesia.

14. During the intersessional period, there were 18 meetings of the ICG/IOTWMS and its Working Groups and Task Teams, 12 workshop and webinars, and 25 UNESCAP activities. Prof. Karnawati has supported and represented the ICG/IOTWMS through her participation at 12 key events during the intersessional period.

15. Prof. Karnawati reviewed the governance and structure of the system as show below.



16. The work of IOTIC was reviewed including outreach activities, training courses, and workshops with attention to the UNESCO-IOC Tsunami Ready programme. Going forward, the ICG should continue to leverage from and align with the United Nations (UN) Ocean Decade (2021-2030), the Kyoto Landslide Commitment 2020, Augmenting Tsunami Monitoring Steering Committee, and Joint Task Force for Sensor Monitoring And Reliable Telecommunications (SMART) cables.

17. The key steps in the way forward include: a) Review and implement science and implementation plans; b) Implement outcomes from mult-hazard early warning conferences (i.e., Indonesia, May 2022); c) Expand the number of Tsunami Ready communities and consider critical infrastructure, and d) Utilise lessons learnt from UNESCAP project in the Northwest Indian Ocean region to benefit the entire ocean basin.

2.2 IOC SECRETARIAT REPORT

18. Mr Rick Bailey, Head of ICG/IOTWMS Secretariat, presented the report of the UNESCO-IOC Secretariat, focusing on the governance and structure as well as highlighting undertakings during the intersessional period. The presentation of the Secretariat to ICG/IOTWMS-XIII is provided online.

19. The Secretariat was established in August 2005 and is primarily based in Perth, Australia. The Secretariat is involved in coordination, strategic planning, and maintaining formal databases of key contacts (e.g. Tsunami National Contacts, TNCs; Tsunami Warning Focal Points, TWFPs. The Secretariat works in closely accociate with IOTIC) in the management of key projects. The Head of the Secretariat is theTechnical Secretariat for TOWS-WG Task Team on Tsunami Watch Operations.

20. The Secretariat has supported more than 70 activities during the intersessional period including support for the International Disaster Risk Reduction Day (13 October) and World Tsunami Awareness Day (WTAD, 5 November). The UNESCAP project on Stengthening Tsunami Early Warning in the Nortwest Indian Ocean through Regional cooperation is being successfully implemented through a programmatic approach. Throughout 2023 and 2024, the Secretariat will continue to enhance coordination and communication across all activities of the Indian Ocean Tsunami Warning and Mitigation System.

2.3 TOWS-WG REPORT

21. Mr Rick Bailey briefed on the Working Group for Tsunami and other sea level related Warning and Mitigation System (TOWS-WG) and its Task Teams on Tsunami Watch Operations and Disaster Management and Preparedness (TT-TWO; TT-DMP). The TOWS-WG presentation to ICG/IOTWMS-XIII is provided online.

22. The objective of TOWS-WG is to review and provide guidance on establishing the framework mechanism for a comprehensive, sustained and integrated end-to-end global system covering tsunami and other hazards related to sea level, exploiting existing IOC mechanisms, capacities and capabilities, and facilitating priority projects and programmes, in alignment with the IOC Strategic Plan and IOC Executive Council decisions and in coordination with relevant stakeholders. The Terms of Reference and membership of the Working Group and Task Teams were reviewed.

23. A key topic of the TT-TWO is the review of the operational response to non-seismic and atypical tsunami events whereas the TT-DMP is focused on coordination of the Tsunami Ready Programme. The last meetings were held during February 2022 and the outcomes have been taken forward to the IOC Executive Council held in June 2022.

24. Mr Bailey recalled the 2018 Palu, 2018 Sunda Strait, and 2022 Tonga events and the formation of an ad hoc team on non-seismic tsunamis under TOWS-WG. There are additional ad hoc teams on tsunami generated by volcanos and on meteo-tsunamis. In response to the Tonga event, interim volcano-generated tsunami alert products and procedures were released by the ICG for the Pacific Tsunami Warning and Mitigation System (PTWC) in March 2022.

2.4 UPDATE ON UN OCEAN DECADE

25. Mr Rick Bailey recalled the UN Decade of Ocean Science for Sustainable Development 2021–2030 including the vision for a safe ocean. The UN Ocean Decade Tsunami Programme presentation is available online.

26. The Programme is based on people-centric processes. The UNESCO-IOC has been approved to go forward with preparation of a 10-year research, development, and implementation plan. A goal for new observational and analysis technologies for a low-uncertainty dynamic based capacity including GNSS and SMART cables. Non-seismic and complex sources are not to be forgotten. The UNESCO-IOC Tsunami Ready programme is a fundamental way to get resilient communities. Enhancement of our current activities to achieve these goals will be a focus going forward.

2.5 UN AND NON-UN ORGANIZATIONS

27. Ms Temily Baker of the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) thanked the ICG for the kind invitation to join this meeting. The UNESCAP presentation on developing capacity of countries to be prepared for tsunami threats is available online.

28. Ms Baker is the programme officer for the Tsunami Trust Funded administered by UNESCAP. She argued that the expertise in the rooms represents the most advance people centric disaster warning system in the world. The Asia and Pacific disaster report for 2022 shows that Asia and the Pacific will be most impacted by disaster events. Strengthening early warning systems have been identified as a priority action measure. The work of the ICG/IOTWMS is critical to the strategic pathways.

29. Through the Tsunami Trust Fund, UNESCAP has been involved with tsunami since 2005 and many projects have been dedicated to tsunami preparedness with UNESCO-IOC a

key implementing partner. The project on “Strengthening Tsunami Early Warning in the Northwest Indian Ocean through Regional Cooperation” is currently underway under a programmatic approach with the next phase likely to commence in April 2023.

30. Thailand, Bangladesh, and India were acknowledged and thanked for their contributions to the fund. She briefed on the new disaster vulnerability portal to address economic risk and hotspots with the interfaces on tsunami and earthquakes established. In conclusion, she commended the ICG/IOTWMS for its efforts.

2.6 REPORT OF THE INDIAN OCEAN TSUNAMI INFORMATION CENTER

31. Mr Ardito Kodijat, Head of the Indian Ocean Tsunami Informaiton Center (IOTIC), reported on IOTIC’s activities during the intersessional period. The IOTIC presentation to ICG/IOTWMS-XIII is provided online.

32. IOTIC provides support to the Indian Ocean Member States and their tsunami prone communities in tsunami risk reduction through capacity building in tsunami hazard, awareness, preparedness, education, and mitigation measures. IOTIC is based at UNESCO Jakarta and works in close collaboration with the ICG/IOTWMS Secretariat in Perth.

33. Mr Kodijat noted that the terms-of-reference are in-review by the Steering Group. IOTIC has implemented eight (8) projects, conducted nine (9) Indian Ocean regional workshops, five (5) Indian Ocean Capacity Building Activities and well as supporting the implementation of Exercise IOWave20. Six (6) online lecture series were developed in support of Tsunami Ready and conducted during Covid. Recognition has been given to two villages in India and four villages in Indonesia. The activities contribute to SDD, Sendai Framework and the Ocean Decade.

34. Mr Kodijat futher reported that five (5) educational awareness booklets have been published for communities in Indonesia, a youth video competition was conducted, and a Tsunami Ready boardgame was created. Three (3) modules on Tsunami Ready are under development targeting officials and programme implementors, the community and facilators.

35. The renewal of the partnership agreement between UNESCO-IOC and BMKG covering 2023–2027 has been signed electronically. The IOTIC workplan has been developed for this period.

36. Mr Kodijat commented on challenges and ways forward. Recommendations to the ICG/IOTWMS include:

1. To note the renewal of the Partnership Agreement between UNESCO-IOC and the Government of Indonesia (through BMKG) on the support for IOTIC-BMKG Programme for 2023 to 2027.
2. To approve the renewed IOTIC Term of Reference.
3. To note the role of IOTIC to facilitate, guide, and support Member States in the implementation of UNESCO-IOC Tsunami Ready Recognition Programme.

2.7 UNESCAP NORTHWEST INDIAN OCEAN PROJECT STATUS REPORT

37. Mr Rick Bailey reported on activities of the UNESCAP-funded project on “Strengthening Tsunami Early Warning in the Northwest Indian Ocean through Regional Cooperation” where significant progress has been made throughout the intersessional period. The UNESCAP-funded project presentation is available online.

38. This project supports India, Iran and Pakistan with Oman and United Arab Emirates participating on a self-funded basis. Phase-1 was completed during Covid-19 via hybrid

meetings. Phase-2 is currently underway to finalize the remaining activities of Phase-1, and to conduct a gap analysis and develop of guidance on tsunami inundation mapping and evacuation planning for the region. National coordination mechanisms for evacuation mapping and inundation modelling have been established. The project will develop local capacity in inundation and evacuation maps. Phase-3 will prepare at-risk communities to be Tsunami Ready.

39. Due to travel restrictions during Covid-19, the project has employed in-country and international consultants to facilitate and coordinate important workshops. This has resulted in the national warning chains and standard operating procedures in participating Member States have been further developed and revise for the near-field tsunami threat. Intergovernmental processes have been utilized to further support the project through one ICG/IOTWMS Working Group and two Task Teams. A workshop on Makran Source Zone Science Strengthening Tsunami Warning and Preparedness was held in Abu Dhabi, UAE during 14-16 November 2022 via a hybrid mode.

40. Going forward, a regional cooperation approach including national face-to-face events held concurrently with regional online workshops could be adopted to facilitate capacity development in other areas of the Indian Ocean.

2.8 IOTWMS OVERALL STATUS REPORT

41. Mr Rick Bailey invited the delegates to provide a national report and/or status update.

42. Dr Yuelong Miao from Australia briefed that a multi-hazard framework including tsunamis is under development at the Federal Government level. The Australia Climate Service is investigating the short- and longer-term risks of multi-hazards including tsunami. The enhancement of national coordination at all levels of goverment is gaining momentum. Australia intends to participate in Pacific Wave 2022 (PacWave22), a communication test and regional exercise for the Pacific Island countries to test the new Pacific Tsunami Warning Center (PTWC) interim procedures for volcanic induced tsunami.

43. Dr Miao took the opportunity to engage with Pakistan on bilateral sharing of seismic data, which was received with a positive response.

44. Mr E Pattabhi Rama Rao shared India's National Report to ICG/IOTWMS-XIII. Eightly-one (81) tsunamigenic earthquakes were monitored during the interserssional period. India participated in IOWave20 and the 6-monthly communication tests. The Common Alerting Protocol (CAP) service is implemented in Odisha for multiple disasters including tsunami. There are two communities recognized as Tsunami Ready, who are the first in the Indian Ocean region. The community of Alappad in Kerala State has been identified for future implementation, their tsnunai warning chain has been revised. Tsunami awareness and response activites include involvement with ICG/IOTWMS activities as well as national workshops with a campaign for World Tsunami Awareness Day. Mock drills have been conducted for individual states on a request basis. They plan to develop a standard operating procedure for non-seismic and atypical sources. Further, real-time Global Navigation Satellite System (GNSS) and Strong Motion Accelerograph (SMA) data is being employed for rupture characterization of the tsunamigenic earthquakes.

45. Ms Anni Arumsari Fitriany (Indonesia) congratulated India for their achievements so far. She noted their future plans to work on SOP for atypical tsunami sources. She expressed the benefit of sharing this experience with the other Member States.

46. Dr Karyono gave a briefed on Indonesia’s National Report including the tsunami warning system that is being used by the population and other national developments. The seismograph network is currently at 438 and there are plans to grow to 600. The warning

receiver system has been installed throughout Indonesia. Other plans include to expand the tsunami scenario database, improve bathymetry and topography, use GNSS data for earthquake characterization, and to use accelerometers to enhance hypocenter accuracy.

47. Dr Ali Khoshkhologh reported on activies and progress in Iran. The national tsunami warnin chain and associated standard operating procedures have been updated during national meetings. Iran has plans to implement Tsunami Ready.

48. Mr Ramarolahy Rina Andrianasolo from Madagascar reported on the drills and exercises, training, and workshop in-country. They use SeisComp3 for earthquake monitoring in country in addition to the TSP information.

49. Mr Khalid Alwahaibi of Oman provided a national statement. During the past years they have developed a good framework for tsunami. During 2022, they undertook awareness activities, especially for broadcasting and social media. In the future, they plan to continue to conduct community evacuation and expand the framework to include all stakeholders. The SOP for the Royal Oman Police is being developed as they are critical stakeholder.

50. Mr Ameer Hyder of Pakistan reported that the warning chain and SOPs have been developed for the near-field threat. The bulletins are disseminated in the local language through Short Message Service (SMS), Fax, email and an alarm system is proposed. Pakistan Meteorology Department has their own media center to provide warnings to the communities at-risk. Furthermore, an automatic earthquake and tsunami monitoring software has been installed in Karachi and operator training has been conducted with the help of the United Nations Development Programme (UNDP). Three drills have been conducted in the coastal region and two awareness workshops have been conducted involving the media and stakeholders.

51. Ms Véronique Philoe from **Seychelles** share national activities on tsunami preparedness. The Tsunami National Contact has been changed to Mr Ernesta and the Seychelles Meteorogical Office remains as the 24/7 TWFP. Seychelles participated in Exercise IOWave20 and the associated pre- and post-IOWave20 webinars. Notably, the communication sector was engaged in the Exercise. Seychelles also participated in the Tsunami Ready youth video competition. They are in the process of updating their standard operating producted to reflect recent changes in organisational roles and responsibilities. Seychelles also has plans to implement Tsunami Ready in two communities.

2.9 REVIEW OF ICG/IOTWMS DECISIONS, RECOMMENDATIONS AND ACTIONS

52. Mr Bailey reviewed the decisions and requests arising in Kish, Iran during the ICG/IOWMS-XII during March 2019. He requested the Chairs of the Working Groups to address these in their reporting during Agenda 7.

3. REPORTS ON EARTHQUAKE AND TSUNAMI EVENTS DURING THE INTERSESSIONAL PERIOD

53. Representatives from the TSPs of Australia, India and Indonesia reported on their operational status, developments, and progress since the 12th session of the ICG/IOTWMS (ICG/IOTWMS-XII). They also reported on their performance against the indicators established by the ICG/IOTWMS.

4. IOTWMS TSUNAMI SERVICE PROVIDERS AND MONITORING NETWORKS REPORTS

4.1 STATUS REPORT ON EARTHQUAKE AND SEA LEVEL MONITORING NETWORKS

54. Mr Rick Bailey presented the networks of real-time earthquake and sea level monitoring stations in the Indian Ocean. The network maps should be updated as they are from 2017.

4.2 TSP AUSTRALIA

55. Mr Robert Greenwood provided the TSP Australia presentation. The Joint Australia Tsunami Warning Center (JATWC) is operated by Geoscience Australia and the Bureau of Meteorology. Covid has minimally impacted TSP Australia's operations and has not impacted service delivery. The Bureau of Meteorology has geographical redundancy with interoperable centers in Melbourne and Brisbane.

56. Several earthquakes over magnitude 6.8 occurred during the intersessional period, which JATWC responded to. In instances where Key Performance Indicators (KPIs) were not met it was due to a lack of seismic data. He reviewed the Loyalty Islands event of 10 Feb 2021 and highlighted the importance of local affects on wave heights. Mr Greenwood also recalled the Kermadec Island earthquake on 4 March 2021 and its aftershock where the aftershock information was included within the mainshock warning. He also recalled the South Sandwich Island earthquake on 12 August 2021 where the magnitude was underestimated. Key performance incidcators were broudly met with the exception being for instances with a lack of seismic datea.

57. There was a discussion about the accreditation system. Mr Greenwood elaborateded that the system was reviewed annually to ensure all indicators are satisfactory.

58. The new Deep-ocean Assessment and Reporting of Tsunamis (DART) buoys were discussed noting their ability to be delployed in closer proximity to the sources.

4.3 TSP INDIA

59. Mr Jijjavarapu Padmanabham provided the TSP India presentation. The Coastal Forecast Zones (CFZs) for India have been updated with the addition of 9 CFZs and one modification giving a total of 79 CFZs. A probabilistic tsunami hazard assessment was undertaken as part of the UNESCAP project including the computation of millions of propagation models. Mr Padmanabham showed an example from the Persian Gulf region and the Red Sea.

60. Tsunami awareness and response activities during the intersessional period included Exercise IOWave20 and the 6-montly IOTWMS communication tests, pre- and post-IOWave webinars, and the regional SOP workshop. India commemmorated WTAD by conducting tsunami mock drill in the Tsunami Ready villages.

61. The performance of TSP India was shown including issuing of five threat assessment bulletins with an average time of ~24 minutes. This does not include the South Sandwich Islands event. In the future they plan to adopt a multi-hazard approach for the early warning system to include tsunami, storm surge and other oceanographic disasters. They will utilize GNSS for source charactersiation.

4.4 TSP INDONESIA

62. Dr Karyono provided the TSP Indonesia presentation including 2022 key performance indicators, developments, and future plans. Since the last ICG, TSP Indonesia has deployed 10 new seismic stations bringing the total to 438 broadband seismometers. The SeisComp earthquake processing system has been upgraded to Version 5 as well as the moment tensor analysis. In October 2022, the tsunami processing system, known as Tsunami Observation and Simulation Terminal (TPAST), was upgraded to include the GNSS displacement functionality. The Indonesia Tsunami Non-Tectonic (INA-TNT) monitoring system has been developed to handle atypical events. They participate in the 6-monthly IOTWMS communication tests. A national consortium has been established to support Indonesia Tsunami Early Warning System (InaTEWS). They continue the contribution of WRS-TSP Indonesia as a real-time system to alert National Tsuanmi Warning Center (NTWCs). Four communities have been recognized as UNESCO-IOC Tsunami Ready communities and three are in progress for the international recognition. BMKG has developed more than 100 tsunami hazards maps for various provinces in Indonesia. In 2022–23 they plan to deploy 83 new seismic stations, strengthen the development of INA-TNT monitoring system for 10 areas.

63. Ms Weniza asked about India's observational monitoring for the inversion computation. India is using the sea level observations from the tide gauge and tsunami buoys in conjunction with GNSS data.

64. Dr Yuelong Miao called attention to the fact of previous TSP bulletins issued on the Global Telecommunication System (GTS). He requests to identify the resource and to raise the issue of "phantom" messages with the World Meteorological Organization (WMO). The event was not isolated and procedures should be rectified to prevent future occurances.

4.5 UPDATE ON TSP SERVICES

65. Mr Robert Greenwood presented proposed changes to the IOTWMS Service Definition, which include:

- Glossary of terms: Added International Hydrographic Organization (IHO)
- Para. 3: Added guidance regarding issuing of NAVAREA products
- Para. 10: added clarification that SL-2 bulletins may be issued for earthquakes less than magnitude 8.0 that have been assessed as causing threat to the IOTWMS CFZs
- Para. 11: Added guidance regarding issuing of service level 2 products for non-seismic and complex source events
- Para. 40: Modified KPI 2 and added explanatory note to KPIs 1,3,4,5,6
- Annexure 3: Added target definitions
- Annexures 5 and 6: changed "Revised" to "Updated" for earthquake magnitude in IOTWMS TSP bulletin templates
- Annexures 5-7: Added new highlighting scheme to indicate sections that would change for non-seismic and complex source events.
- Annexure 7: added a new bulletin category: TSP NAVAREA products with template and examples.
- Moved Annexure 7 to Annexure 8.

66. The proposed "traffic lights" target values for Key Performance Indicator reporting are:

	Service Level 1 EQ Bulletins					Service Level 2 Threat / No Threat Bulletins			General
TSP	KPI 1 ET First EQ Bull Target: 10 mins (% met)	KPI 2 POD EQs GE M6.8 Target: 100%	KPI 3 EQ Mag Target: 0.3 (% met)	KPI 4 EQ Depth Target: 30 km (% met)	KPI 5 EQ Location Target: 30 km (% met)	KPI 6 ET First Threat Bull Target: 20 mins (% met)	KPI 7 POD Tsunami Waves Target: 100%	KPI 8 Tsunami Height Accuracy Target: Factor of 2	KPI 9 False / Incorrect Bulletins Issued Target: 0
Meets Target	<10 min	100%	<0.3	<30 km	<30 km	<20 min	100%	50-200%	0
Near Target	10-15 min	90-100%	0.3-0.45	30-45 km	30-45 km	20-30 min		25-50% or 200-400%	1
Misses Target	>15 min	<90%	>0.45	>45 km	>45 km	>30 min	<100%	>400% or <25%	2+

67. There was a discussion on the maritime bulletins and it was noted that the IOTWMS the first ICG to provide this service.

68. The Tonga response was noted and Australia has shared their SOPs for non-seismic eruptions with their basin. Mr Bailey asked about harmonization of the bulletins across all ICGs. Mr Greenwood noted that the changes have been very minimal so there is nothing controversial.

5. SPECIAL SESSION ON OUTCOMES FROM "INDIAN OCEAN TSUNAMI READY WORKSHOP

5.1 WORKSHOP OUTCOMES

69. Mr Ardito Kodijat reported on the outcomes from the workshop on "Indian Ocean Tsunami Ready" held from 22-26 November at the Sakala Resort Bali in Banjung Tanoa, Bali, Indonesia. Participation included 52 in-person from 11 countries and 14 online participants. There were 26 speaker who either reported on their experience implementing Tsunami Ready and introducing the twelve indicators of the Programme. Communities in India and Indonesia have received the UNESCO-IOC Tsunami Ready recognition. Stakeholder collaboration with the communities is critical to the programme. In this regard we heard from the airport and hotels. Thirteen countries responded to the capacity assessment survey on their ability to implement the indicators of the programme through their national capacity and/or with the support or national technical expertise or broader regional support. Twenty-eight (28) Tsunami Ready videos were shared at the workshop and 27 posters were exhibited. The Tsunami Ready boardgame was played in the evenings. The local junior high school conducted a tsunami evacuation and the workshop participants all participated in the event. A visit the Disaster Management of Bali Office was undertaken where participants were brief on the emergency response procedures.

Recommendations:

1. To note the Indian ocean Tsunami Ready workshop held in 22-26 November 2022 and to acknowledge and appreciate the contribution of UNESCO-IOC IOTIC and ICG/IOTWMS Secretariat, BMKG and UNESCAP to the workshop.
2. For IOTIC-BMKG to continue to organise regional workshops [such as this] as a platform for sharing experiences and lessons on the implementation of UNESCO-IOC Tsunami Ready in the Indian Ocean.

70. The IGC was in support of holding future Tsunami Ready workshop symposiums. The Training Centres in Indonesia and Indonesia could assist in the coordination of such workshops. Furthermore, India and the Seychelles were suggested as potential venues

71. In conclusion, Mr Bailey thanked Mr Kodijat and the teams at IOTIC and BMKG for their support.

5.2 TSUNAMI READY RECOGNITION PROGRAMME OUTLINE

72. Mr Ardito Kodijat outlined the UNESCO-IOC Tsunami Ready Recognition Programme (TRRP). The programme aligns with the 2030 Agenda goals [specifically #11, 14 and 17], the UN Ocean Decade, the Sendai Framework for Disaster Risk Reduction, and World Tsunami Awareness Day. The programme directly contributes to the UN Decade target of 100% of at-risk coastal communities being prepared and resilient to tsunami. The global Tsunami Information Centers are facilitating the program. UNESCO-IOC Manuals and Guides No. 74 address the programme.

73. The Tsunami Ready programme contributes to the end-to-end tsunami warning and mitigation systems. For near-field tsunami, communities must act based on the natural warning signs. In the Indian Ocean region, the programme has been piloted since 2017 and the first communities in India were recognized as tsunami ready in 2019. Today the programme in being implemented in several Member States with 50 around the world received recognition. The programme is a voluntary community-lead to build sustainable tsunami preparedness and awareness through twelve indicators in the areas of assessment (i.e., understanding the hazard and risk), preparedness (i.e., community awareness), and response (i.e., planning and capacity):

1. ASSESS-1: Tsunami hazard zones are mapped and designated.
2. ASSESS-2: The number of people at risk in the tsunami hazard zone is estimated.
3. ASSESS-3: Economic, infrastructural, political, and social resources are identified.

4. PREP-1: Easily understood tsunami evacuation maps are approved.
5. PREP-2: Tsunami information including signage is publically displayed.
6. PREP-3: Outreach and public awareness and education resources are available and distributed.
7. PREP-4: Outreach and educational activities are held at least 3 times a year.
8. PREP-5: A community tsunami exercise is conducted at least every two years.

9. RESP-1: A community tsunami emergency plan is approved.
10. RESP-2: The capacity to manage emergency response operations during a tsunami is in place.
11. RESP-3. Redundant and reliable means to timely receive 24-hour official tsunami alerts are in place.
12. RESP-4: Redundant and reliable means to timely disseminate 24-hour official tsunami alerts to the public are in place.

74. Mr Kodijat explained that the first step is to establish a National Tsunami Ready Board, which could be based on an already established group for response to another disaster such as cylcones.

75. Mr Kodijat presented (4) recommendations for the ICG/IOTWMS to consider.

1. To encourage the Indian Ocean Member States to consider the implementation of UNESCO-IOC Tsunami Ready Recognition Programme to achieve 100% of communities at tsunami risk to be prepared for and resilient to tsunamis by 2030.

2. To encourgage Indian Ocean Member States to establish the National Tsunami Ready Board (NTRB) or to include the function of NTRB in existing committee the country has to start to implement the TRRP.
3. To encourage the Indian Ocean Member States to engage with UNESCO-IOC IOTIC and ICG/IOTWMS Secretariat in the implementation of TRRP.
4. To consider having a Tsuanmi Ready National Contact in each Indian Ocean Member State for easy coordination and stronger collaboration in the implementation of TRRP.

76. Mr Bailey addressed the fourth recommendation noting this would be a new activity for the Secretariat. This was supported by India and Oman.

77. Dr Andi Eka Sakya (Indonesia) suggested that a new Working Group (or sub-Working Group) on Tsunami Ready be formed.

78. Mr Bailey replied that the ICG and IOC needs to facilitate the capacity of Member States to initiate the Tsunami Ready programme.

79. Mr Najaraja Kumar (India) asked if the Tsunami Ready webinars will be held again. Mr Kodijat replied that they will be proposed for 2023. Further, Indonesia (Ani) asked if IOTIC can assist Member States with national training activities and Mr Ardito replied that resources can be difficult to assist individual countries.

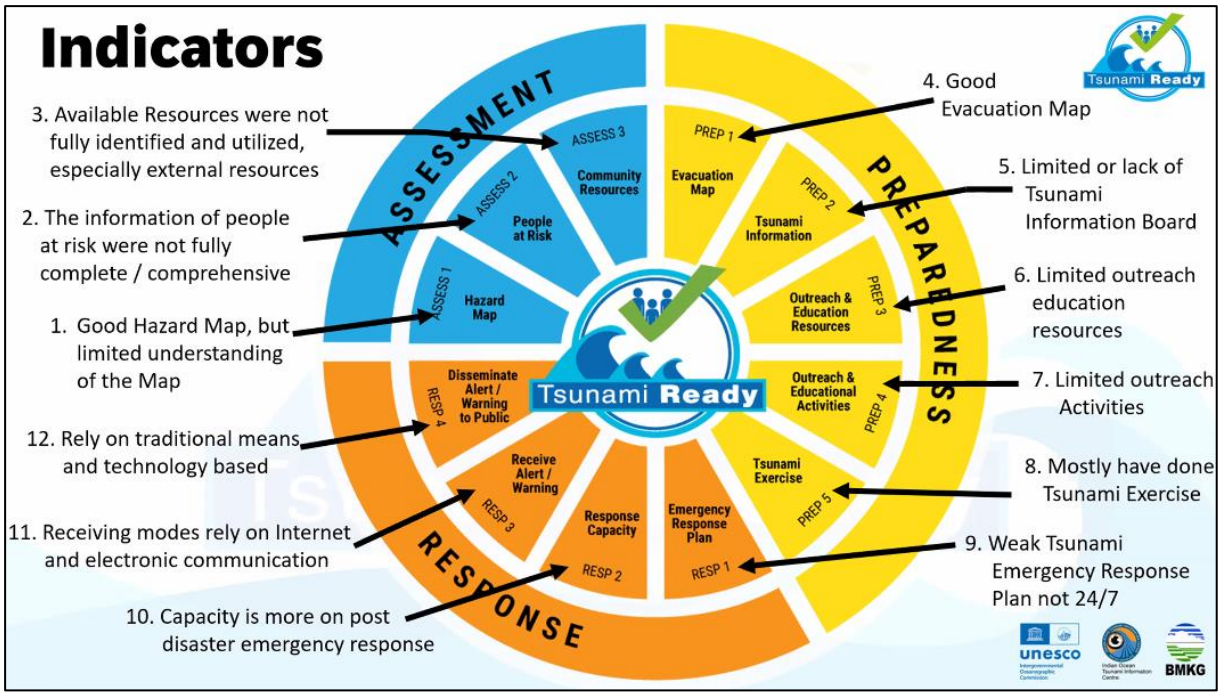
80. Mr E Pattabhi Rama Rao (India) asked if the indicators vary between the different global regions. Mr Kodijat replied that all are using Manuals and Guildes No. 74, however, there may be regional differences in the implementation processs. In the Indian Ocean, we have reviewed the capacity of each member state to formulate a regional approach. However, in the Caribbean much of the Tsunami Work is achieved through aid programmes.

81. Mr Bailey noted that the size of the community can vary, and this will affect the difficulty to implement, and Dr Sakya mentioned the location and remoteness of the community. Mr Rama Rao cited the example of Odisha State who plans large-scale implementation of the programme. Mr Kodijat noted that strategizing with the limited resources and being innovated with implementation is important for the success of the programme.

82. Ms Suci Dewi Anugrah (Indonesia) recalled the successful workshop implemented by IOTIC and suggested a workplan for future Tsunami Ready workshops to enable greater participation and support from countries. Mr Kodijat replied that the funding resources need to be further discussed. The plan going forward is to focus on implementation of the indicators.

5.3 EXAMPLES OF TSUNAMI READY COMMUNTIES

83. Mr Kodijat presented the lessons from Tsunami Ready in Indonesia. Key success factors in implementation include local understanding the programme and its indicators. He emphasized that the programme is primarily focused on capacity building and is not a checklist. The geographical area must be workable such as a village and their must be champions at the village level (i.e., Forum for Disaster Risk Reduction; Disaster Preparedness Unit, or individuals). A strong support network involving multiple stakeholders and collaborators is essential. Building tsunami ready preparedness based on existing programmes such as cyclone preparedness means that the programme increases the existing capacity and does not start from zero. Many indicators of Tsunami Ready can build upon existing initiatives (refer to figure).



84. Existing infrastructure and tourism should be included in the approach.

85. Mr E Pattabhi Rama Rao opened the floor for comments and suggestions.

86. Ms Suci Dewi Anugrah (Indonesia) noted the existing national preparedness programmes and that the Emergency Operation Plan should also consider the preparedness capacity of the community.

87. Mr Bailey noted that the national process for implementation could be shared between countries through a new guide or “cookbook” on best practices. Mr Kodijat replied that this could be achieved through the Tsunami Ready National Contact.

88. Dr Harkunti Rahayu (Indonesia) proposed that if Tsunami Ready was a Working Group then the national contacts could be the members.

89. Dr Rahayu asked about the longer-term plan of the 2030 plan of 100% prepared and resilient communities. Mr Kodijat replied that the in-country contact will help us to understand the status and capacity of their communities and implementation in the Member States.

5.4 TSUNAMI READY TOOLS

90. Mr Ardito Kodijat presented on the Tsunami Ready communication tools including UNESCO-IOC Manuals and Guides (No. 74 and 82) and the logo examples. The tsunami ready viewer (3D goggles) contains information on the communities who have achieved Tsunami Ready recognition. The UNESCO-IOC Tsunami Ready website hosted by International Tsunami Information Center (ITIC) provides information on the programme. There are 21 e-posters related to Tsunami Ready. The Tsunami Ready Board Game is a great introduction to the twelve indicators of the programme. There are 14 short videos that have been released following the process in “Nami” village, which can be translated into local languages. The TR online lecture series (2020) is available. The Ocean Teacher Global Academy has three courses on tsunami ready under development to be available online.

91. Mr Kodijat presented recommendations for the ICG to consider related to Tsunami Ready tools:

1. To encourage Indian Ocean Member States to make use of the Tsunami Ready communication tools to implement TRRP in the country.
2. To encourage the Indian Ocean Member States to collaborate with UNESCO-IOC IOTIC should adaptation be required to be able to effectively use the communination tools.

92. Mr Kodijat confirmed that the new Tsunami Ready communities in Indonesia will be added to the Tsunami Ready viewer.

5.5 RECOGNITION PROCESS

93. Mr Rick Bailey reviewed the Tsunami Ready recognition process including how to receive and renew the UNESCO-IOC recognition. The steps include: a) Read the Tsunami Ready guidelines; b) Establish a National Tsunami Ready Board (NTRB); c) Establish Tsunami Ready local communities; d) Complete the application once the indicators are satisfied; e) NTRB to review application and conduct a site verification visit; and f) UNESCO-IOC recognition process. A four-year renewal procedure is required to sustain recognition.

94. Mr Bailey recalled the story of a landowner providing access to create a shorter evacuation route for the community. He showed the application form, example of Certificate of Recognition, and the recognition signage for the community.

95. Mr E Pattabhi Rama Rao (India) asked about the 4-year renewal process. Mr Kodijat explained that the community should provide regular annual reporting. However, if there is not an annual report provided then further follow-up will be needed for the 4-year renewal. As the programme is new, the process is being refined.

96. Mr Kodijat added that the NTRB issues national recognition prior to the UNESCO-IOC recognition.

97. Ms Suci Dewi Anugrah (Indonesia) asked about the language of the Recognition Signage. It was clarified that in India this has been translated in the local language, however, it is the responsibly of the community to do this as UNESCO-IOC only provides the English version.

98. Ms Anugrah further asked how communities should report on the review of the indicators. Mr Kodijat replied that he will share this with India and Indonesia.

6. TASK TEAM REPORTS

6.1 INDIAN OCEAN WAVE 2020 (IOWAVE20)

99. Ms Weniza, Task Team Chair, reported on the Indian Ocean Wave Exercise held in 2020. There have six Indian Ocean-wide exercises conducted to-date. In IOWave20 there were three scenarios held 1-week apart. An article on Evolution of Ocean Wide Exercises in the Indian Ocean was published. Due to the ongoing Covid pandemic, the scope of the exercise was reduced to be a communication test and virtual exercise (as a minimum). Emphasis was placed on updating organisational SOPs, plans and policies for tsunami warning and emergency response during a pandemic.

100. The exercise objectives were:

1. Validate the dissemination by TSPs of tsunami bulletin notification messages to NTWCs via Tsunami Warning Focal Points (TWFPs) of Indian Ocean countries and reception by NTWCs and TSP messages.

2. Validate the access by NTWCs to the tsunami bulletins and other products on the TSP websites, and the use of that information to produce national warnings.
3. Validate the reporting by NTWCs to the TSPs of their National Tsunami Warning status.

101. The three scenarios were Java, Andaman and Makran trench held on 6, 13 and 20 October respectively. Twenty (20) Indian Ocean Member States reported their participation through the post-exercise evaluation. Six countries including Indonesia, Kenya, Mauritius, Seychelles, Mozambique, and Thailand reported community involvement, but not necessarily evacuation.

102. The Post-IOWave20 Regional Workshop held online during 28–30 September 2020 was attended by 37 participants from 23 Member States. Challenges and gaps included the need for guidelines on: a a) virtual table-top exercises; and b) exercising during a pandemic.

103. Recommendations based on Exercise IOWave20 include:

1. To inform more national leaders in addition to the Tsunami National Contacts.
2. To consider implementation of a technical guide for exercising in a pandemic situation.
3. To consider guidelines for conducting virtual table-top exercise.
4. To encourage countries to conduct regular exercises at least every year between IOWave exercises. The exercises could align with an ICG/IOTWMS communications test.

104. Recommendations for the next Indian Ocean-wide exercise are:

1. As coordinated with the ICG/PTWS through the TOWS-WG Task Team on Disaster Management Preparedness (TT-DMP), the next IOWave exercise will be conducted in 2023 and the next PacWave exercise will be conducted in 2022. This schedule will enable Member States who are members of both ICGs to fully participate in both exercises.
2. The IOWave exercise will use three scenarios which cover all Indian Ocean Member States, to be held will be held one week apart.
3. The next IOWave exercise should be scheduled around the September–October period.
4. IOWave will integrate with the implementation of the UNESCO-IOC Tsunami Ready Programme withing local communities and test or verify the indicators during the exercise.
5. The IOWave technical guide [manual] will include a scenario for a non-techtonic event and include guideline for exercising for such an event.

105. Ms Anni Arumsari Fitriany (Indonesia) commented that tsunamis can occur at anytime and can also be atypical. Therefore, the Task Team should also take these factors into account during exercising planning.

106. Mr Rama Rao (India) agreed that challenges such as multi-hazard (i.e., Tsunami threat during cyclone) should also be accounted for the in future exercises.

107. Dr Rahayu (Indonesia) noted that the pandemic may continue during 2023 so the pandemic situation should also be considered.

108. Ms Suci Dewi Anugrah (Indonesia) mentioned that people with disabilities should also be included.

109. Ms Véronique Philoe (Seychelles) noted the tourism sector involvement during IOWave20. Other sectors are active and will participate in future exercises.

110. Prof. Dwikorita suggested to use a scenario with another hazard (cyclone), atypical tsunami, and a normal scenario.

111. Dr Andi Eka Sakya (Indonesia) recalled the assessment indicator 2 of Tsunami Ready (i.e., the number of people at risk in the tsunami hazard zone is estimated) and suggested to use the IOWave exercise as an opportunity to gather this information.

112. Prof. Dwikorita suggested that there should be a national guideline for vulnerable groups such as those with disabilities. Mr Kodijat recalled that people with disabilities are included in the exercise, but he is not aware of any existing evacuation guidelines for includesiveness. Mr Bailey suggested that this could be an objective of the upcoming exercise.

113. The ICG supported the formation of a new Task Team on Exercise IOWave23.

6.2 TSUNAMI PREPAREDNESS FOR A NEAR-FIELD TSUNAMI HAZARD

114. Ms Sunanda Manneela, a member of the Task Task, presented on the Task Team on Tsunami Preparedness for a Near-Field Tsunami Hazard. This report included a brief history of the formation of the Task Team, the terms-of-reference, membership, activities, and achievements. The Task Team formed during the ICG/IOTWMS-XII following the UNESCAP project and Makran Subduction Zone Hazard Assessment workshop. The Task Team works towards the enhancement of tsunami preparedness for a near-field tsunami hazard including improving end-to-end national warning chains, learning from recent tsunami events. The activities include:

1. Assist Member States threatened by near-field tsunami threat to adapt and integrate their national warning chain standard operating procedures particularly in relation to community preparedness for self-evacuation.
2. Guide the implementation of the UNESCO-IOC Tsunami Ready recognition programme in the ICG/IOTWMS Member States with a near-field tsunami threat.

115. Ms Manneela reviewed the criteria and membership. She recalled there is a similar task team in the PTWS. They prepared a draft on the near-field response, which this Task Team responded to. The achievements aligned with those of the UNESCAP-project such as the harmonization of NTWC products, establishment of national tsunami boards, end-to-end warning chains and SOPs. Challenges include the inclusion of complex sources (non-tectonic); improvement of warning services at NTWC level to provide warnings within 5–10 minutes; SOPs at every level in the warning chain; secondary source disclaimer for effects of secondary landslides. There is also the challenge of the role of the TSPs in the absence of data for characterization of local sources, which highlights the importance of data sharing. She briefed on the types of warnings received by the public including natural, official, and unofficial.

116. Ms Manneela reviewed the criteria and membership. She recalled there is a similar task team in the PTWS. They prepared a draft on the near-field response, which this Task Team responded to. The achievements aligned with those of the UNESCAP-project such as the harmonization of NTWC produces, establishment of national tsunami boards and end-to-end warning chains and standard operating procedures. Challenges include the inclusion of complex sources (non-tectonic); improvement of warning services at NTWC level to provide warnings within 5–10 minutes; SOPs at every level in the warning chain; secondary source disclaimer for effects of secondary landslides. There is also the challenge of the role of the

TSPs in the absence of data for characterization of local sources, which highlights the importance of data sharing. She briefed on the types of warnings received by the public including natural, official, and unofficial.

117. General recommendations for a near-field tsunami hazard, recommendations for Member States, and recommendations for the ICG/IOTWMS were given (Annex 3).

Recommendations to ICG/IOTWMS to address gaps, challenges, and overall future work programme:

1. Task Team to continue its important work in the next inter-sessional period to improve warning chains and increase the number of Tsunami Ready communities in the Indian Ocean.
2. Terms of Reference need to be revised based on the achievements made so far.
3. Guidance on how to account for natural, official, and unofficial warnings in the warning chain.
4. Education and awareness on non-tectonic sources of tsunamis and review standard operating procedures to include such sources.
5. Regular workshops involving media and disaster management organizations to improve their standard operating procedures.
6. Regular end-to-end exercises to evaluate the revised standard operating procedures.
7. Membership to be expanded wherever possible.

118. Mr Bailey thanked Ms Sunanda and the Task Team for the comprehensive report. He noted the wealth of information and recommended a separate standing guideline for the group.

119. Dr Rahayu (Indonesia) expressed the need to include examples from other regions.

120. Mr Rama Rao (India) noted that the specific areas for the Tsunami Ready communities should be in near-field areas.

121. Prof. Dwikorita stressed the importance of recognizing the natural warning signs which is included in the Tsunami Ready programme.

122. Mr Bailey noted that the terms of reference should be updated to include the areas of risk and guidelines on how to do tsunami warning.

123. Mr Abdullah Alkhadori (Oman) noted the short (20 min) tsunami travel time to Oman. He suggested developing key performance incicators for the near-field events. Further he emphasized the importance of self-evacuation for near-field events.

124. Ms Anni Arumsari Fitriany (Indonesia) suggested that this Task Team could consider the multi-hazard events. Further the guidance should also be made based on the challenges.

6.3 SCIENTIFIC TSUNAMI HAZARD ASSESSMENT OF THE MAKRAN SUBDUCTION ZONE

125. Mr Khalifa Al-Ebri (Oman), a member of the Task Team, reported on progress of the Task Team on Scientific Tsunami Hazard Assessment of the Makran Subduction Zone. He shared the Terms of Reference, membership criteria, members, and invited experts. During 14–16 November 2022, a hybrid workshop on Makran Subductoin Zone Science strengthening tsunami warning and preparedness was held in United Arab Emirates.

126. The main achievements of the Task Team include: a) greater understanding of the tsunami hazard in the regionan, including the Arabian Sea, Persian Gulf, and Red Sea; b) Scientists at GFZ, INGV, and INCOIS with the help of the UNESCAP-funded project "Strengthening Tsuanami Warning in the Northwest Indian Ocean through Regional cooperation" has helped to deliver a Probabilistic Tsunami Hazard Assessment (PTHA, V1.0) for the region; c) results from PTHA to be made available through INCOIS, India; d) results from the PTHA indicate that tsunami hazard is possible in the Persian Gulf and Red Sea with amplitudes greater than the 0.5 m threshold for TSPs providing threat advice; and e) some bilaerial exchange of data arrangements have been made (e.g. between Pakistan and Oman) helping to improve access to key seismic and sea level data required for tsunami early warning and hazard assessment.

127. The challenges and gaps noted by the Task Team include: a) PTHA V2.0 required as next stop, to include where possible secondary effects such as splay faulting and submarine landslides; b) More paleo-tsunami work required to verify if the western Makran Subduction Zone is locked and therefore less of a potential tsunami threat to the region; c) Increased bilateral data exchange agreements are required to ensure access to information across the regional required for enhancing and underpinning tsunami early warning and hazard awareness for at-risk coastal communities.

128. The Recommendations to the ICG/IOTWMS to address the gaps and challendges and overall future work programme include:

1. Task Team to continue its important work in the next intersessional period to better help understand the tsunami hazard in the region to help further enhance tsunami early warnings and hazard assessments.
2. Terms of Reference need to be slighty reduced to reflect the achievements made so far.
3. New Chair and Vice-chair need to be appointed.
4. Membership to be expanded wherever possible.

129. Ms Manneela suggested to replicate the PTHA in other regions of the Indian Ocean. Mr Bailey recalled this is included in the Working Group 1 activity to which Dr Rahayu confirmed.

130. The continuation of the Task Team was supported by the ICG with endoresments from Indonesia and Oman.

7. WORKING GROUP REPORTS

131. The Chair invited reports of the three Working Groups of the ICG/IOTWMS.

7.1 SUB-REGIONAL WORKING GROUP FOR THE NORTHWEST INDIAN OCEAN REGION

132. Dr Mohammad Mokhtari, Chair of the Sub-Regional Working Group for the Northwest Indian Ocean (WG-NWIO), reviewed the terms of reference and reported on the activities of the Group in the intersessional period. The WG-NWIO presentation is provided online.

133. Dr Mokhatari gave special thanks to Mr Rick Baily, Ms Temily Baker, Mr Ardito Kodijat and Ms Nora Gale for supporting this importants work. The UNESCAP-funded project on Strengthening tsunami warning in the Northwest Indian Ocean through regional cooperation involves three phases in a programmatic approach. The PTHA simulation models have been a vital output of the project. He reflected on the shallow nature of the Makran subduction zone and the potential for earthquakes of at least M8.3 and possibly as high as M9.2.

134. Other associated projects are seismic bulletin updates, detailed bathymetry and coastal onshore topography, paleo-tsunami, non-seismic data, GNSS, atypical tsunami sources such as mud-volcanos, and earthquake forecasting. He reported on the International Geoscience and Geoparks Programme (IGCP) Project 740 on paleo-tsunami investigations from coring sediments and meteo-tsunami in the Gulf including the 19 March 2017 in the Port of Dayyer, Iran.

135. The challenges are non-seismic events, near-field events, integration of tsunami with other multi-hazard frameworks, timeliness of near-field warnings, optimal network design for data sharing and translation into local languages. The way forward and opportunities include continuation of the UNESCAP project, the paleo-tsunami project, and the engagement of local communities in the Tsunami Ready programme. He suggested to proclaim a tsunami exercise/drill day on 28 November each year on the commemoration of the 1945 tsunami.

136. Mr Bailey noted that there is no explicit recommendation for the Working Group to continue. He noted that the group has been beneficial to the region and their unique situation. He commended the group on their achievements.

137. Mr Bailey asked the delegates if the Working Group should continue. Mr Alkhadori (Oman) expressed full support for continuation of the group. He proposed to add terms of reference addressing the final stage of the warning including self-evacuation, public messages, and media.

138. Ms Anni Arumsari Fitriany (Indonesia) drew attention to the study on landslides and suggested collaboration with the International Consortium on Landslides (ICL).

139. Dr Rahayu noted the uniqueness of the region and supported the continuation of this group. She also expressed a need for other subregional working groups in other areas.

140. The continuation of the Working Group was supported by the ICG.

7.2 WORKING GROUP 1 ON TSUNAMI RISK, COMMUNITY AWARENESS AND PREPAREDNESS

141. Dr Harkunti Rahayu, Chair of Working Group 1 on tsunami risk, community awareness and preparedness (WG-1), presented the Working Group 1 terms of reference, membership, intersessional meetings, and an update on the Group's activities in the intersessional period. The WG-1 presentation is provided online.

142. Dr Rahayu reported the Probabilistic Tsunami Hazard Assessment (PTHA) for the Indian Ocean has not yet been updated. The intent is to start this work following completion of the Makran PTHA. Guidance on tsunami preparedness for coastal marine private sector and infrastructure has been addressed during the IOTIC workshop on tsunami warning chain to critical infrastructure (2019) and Indonesian work on the design of the new workshop. Next, she shared a learning from the Palu tsunami where the air traffic control collapsed, and a portable one was installed to facilitate the relief efforts. The working group responded to the Covid environment by producing guidelines for tsunami warning services, evacuation and sheltering during the pandemic and followed this up with a survey to determine the new standard. However, the results were predominately based on responses from the National Tsunami Warning Centres with limited responses from the downstream. She also reported on the upstream-downstream interface in tsunami early warning national self-assessment tool, which requires more time for development. Further activities have addressed mainstreaming disaster risk reduction into urban planning and resilience; developing and harmonizing local capacities for tsunami early warning; and improving Covid-19 and pandemic preparedness and responses through the downstream of multi-hazard early warning systems.

143. WG-1 noted and recommended the following:

1. Tsunami Ready Implementation Guidance

   Secretariat with the support of IOTIC and WG-1 Members to develop urgently an online webinar for Tsunami Ready Focal Points on tools and strategies for implementing TR, supporting by a one-page brochure.

2. Tsunami Ready and Critical Infrastructure Guidance

   WG-1 to develop guidance on Tsunami Ready indicators required for critical infrastructure (ports, harbours, airports, power stations, hospitals, etc) to present to ICG and TT-DMP for consideration.

3. Response to COVID 2021 Survey

   Noting the poor responses to the Covid survey in 2021, there is a need to provide a sub-nation case study to next ICG to develop greater awareness of the issues and importance of preparedness to other Member States.

4. Disaster Risk Reduction into Spatial Planning

   Noting spatial planning isn't covered under TRRP, Member States need ensure spatial planning is also taken into consideration at the city, province, and national level with respect to overall preparedness and sustainable resilience.

5. 2018 Capacity Assessment follow up: WG Action Plan

   Recommend WG-1 (and WG-2) develop responses/actions to each recommendation from CATP to present to ICG.

6. Member State Status Report to ICG XIII

   Secretariat to review survey for capacity assessment of tsunami preparedness to develop subset of questions for Member States to respond to help prepare status repot of IOTWMS at each ICG.

7. Next International Journal Special Issue

   Noting the achievement of the two Special Issues of the International Journal of Disaster Resilience in the Built Environment (IJDRBE) published 2020 and 2021, discuss possible topic for next special issue related to warning and mitigation and UN Ocean Decade Tsunami Programme, that can include all ocean basins.

8. Probabalistic Tsunami Hazard Assessment for Indian Ocean

   Noting the new Makran PTHA, suggests updating the Indian Ocean PTHA accordingly.

9. Response to Global Platform for Disaster Risk Reduction 2022 recommendations Bali Agenda for Resilience

   Noting the follow-up action of Global Platform for Disaster Risk Reduction (GPDRR) on 7 of recommendations Bali Agenda for Resilience (BAR). Suggests the importance of achieving the sustainable resilience, learning from Indonesia.

10. Response to UN Ocean Decade Tsunami Programme

    Note and discuss UN Ocean Decade Tsunami Programme definitions: "The ultimate goal of an early warning system is the protection of life, as well as livelihoods. One of the two main goals of the decade is that 100% of communities at risk from tsunamis be prepared and resilient through program like Tsunami Ready or other similar program owned by the Member States".

11. Tsunami Ready Working Group

    Focus on Tsunami Ready implementation, be continuous and involve TR Focal Points, integrate future outcomes from WG1 and WG2 and TOWS-WG as required.

12. WG-1 ToRs and Continuation

    Recommends the addition of a new ToR on Tsunami Ready: Provide advice and guidance (to Tsunami Ready Working Group) on the implementation of the Tsunami Ready Recognition Programme in the Indian Ocean.

13. City/Regional Leader Disaster Risk Reduction Training

    Since Disaster Risk Reduction can be seen as a political commodity, there is need to balance community capacity building. Therefore, a new activity is recommended.

144. Prof. Dwikorita explained the important role of local leaders in the tsunami response and the importance of educating the leaders. Further, she spoke about integration with the crisis centers. Weniza was requested to develop guidelines for the private sector on Tsunami Ready in accordance with ISO standard.

145. Mr Bailey noted that the scope of activities of WG-1 maybe overlapping with WG-2 and we need to ensure that all work is well connected. Moreover, what works in one country may not work in another.

146. Mr Abdullah Alkhadouri (Oman) expressed that the coordination of efforts amongst the working specialists should be considered.

147. Mr Ramarolahy Rina Andrianasolo (Madagascar) supports the idea of a journal for tsunami to help share the work being undertaken.

148. Dr Andi Eka Sayka (Indonesia) thanked the effort of Dr Harkunti and her task team. He noted that recommendations 1 and 2 are related to Tsunami Ready.

149. Mr Abdullah Alkhadouri (Oman) addressed the importance of training the leaders in each Member State. He suggested that one expert trainer can visit each Member State. Mr Bailey suggested that this be included in the Tsunami Ready practice as guidance on capacity development for the leaders. Seychelles agreed with the importance of educating the leaders in Disaster Risk Reduction.

150. Mr Alkhadouri enquired about the Task Teams reporting to the relevant working Groups. Mr Bailey explained that many Task Teams are cross sectorial and report to the Steering Group.

151. The continuation of the Working Group was supported by the ICG with the endorsement of India and Oman.

7.3 WORKING GROUP 2 ON TSUNAMI DETECTION, WARNING AND DISSEMINATION

152. Dr Yuelong Miao, Chair of Working Group 2 on tsunami detection, warning and dissemination, (WG-2), presented the membership, terms of reference, activity timeline and an update on the Group's intersessional activities. The WG-2 presentation is provided online.

153. Dr Miao reported that three meetings of the working group have been help including one in-person and two online. Furthermore, a survey of the Covid impacts of WG-2 activities was conducted and the pandemic was found to have minimal effect on the service. The working Group supported the WTAD Indian Ocean webinar of 10 October 2021 and has contributed to the concept not for the UN Ocean Decade and supported the ad hoc team on tsunamis

generated by volcanos (by completing a survey). Challenges are funding, sustained interest, maintaining the existing monitoring networks, inter-agency cooperation, adoption of the integrated multi-hazard approach, and providing timely and accurate tsunami detection and warning to near-field tsunami, and non-seismic and complex tsunami.

154. Dr Miao referred to the WG-2 recommendations arising in the 2018 Capacity Assessment of Tsunami Preparedness report. The Working Group agrees the following recommendations: 1) Provide support to increase the capacity for analysing real-time seismic and sea-level data for tsunami threat; 2) Provide support to increase the capacity for tsunami modelling to support eneration of threat forecasts; and 3) Increase the frequency of tabletop or similar tsunami warning exercises to review and test SOPs, and reduce the otential for complacency among coutries that have not experienced a recent tsunami event. However, the recommenendation to undertake a further study to examine whether there is a need for so many different software tools to be used to analyse data for tsunami threat or tsunami modelling should not be a priority.

155. The WG-2 recommendations to ICG/IOTWMS XIII are:

1. Approve the draft V5 Service Definition Document.
2. Consider revising the WG-2 workplan of 2019–21 for 2022–24 by:
   - Adding a task to assist the implementation of the Indian Ocean Tsunami Ready Programme.
   - Replacing the task to assist TSPs with the task to assist NTWCs with their impmenting Common Alerting Protocol (CAP), mobile applications and social media for effective dissemination of national tsunami waring information.
   - Adding a tast to develop guideline of best practice to share with NTWCs about how to integrate tsunami into the multi-hazard early warning approach or system for mutual benefits.
3. Discuss whether TSPs should send the actual bulletins directly to NTWCs (not just the notification messages).

156. The final recommendation is carried over from the last ICG meeting and open for discussion. The Working Group recommends the status quo, that is, only sending the notification messages to NTWCs. All Member States agreed and there will be no change to the current procedure.

157. Mr Alkhadouri (Oman) asked about more exercises to “reduce the potential for complacency among countries that have not experienced a recent tsunami”. It was explained that these recommendations were out of the 2018 Capacity Assessment report. The intent is that exercising is beneficial if systems are not frequently used for tsunamis. It was agreed to remove this part of the statement.

158. Mr Rama Rao (India) asked if there have been any comparative studies on the effectiveness of different software tools. Dr Miao replied not to his knowledge.

159. Ms Manneela (India) mentioned that it may be useful to brief Member States on the processes used for the modelling.

160. The continuation of Working Group 2 was supported by the ICG with endorsement from India, Indonesia, and Madagascar.

8. UN OCEAN DECADE TSUNAMI PROGRAMME

161. The UN Ocean Decade (2021–2030) presents a once-in-a-generation opportunity to address gaps in tsunami warning, enhance community preparedness and contribute to "A Safe Ocean". IOC Assembly 31 (Dec. A-31/3.4.1) established the Ocean Decade Tsunami Programme. Its Scientific Committee is currently drafting the research, development, and implementation plan. This will include: a) technological and observational advances to reduce uncertainties; and b) 100% of at-risk communities being prepared and resilient to tsunamis by 2030 (i.e. Tsunami Ready).

8.1 SAFE OCEAN LABORATORY SATELLITE ACTIVITY

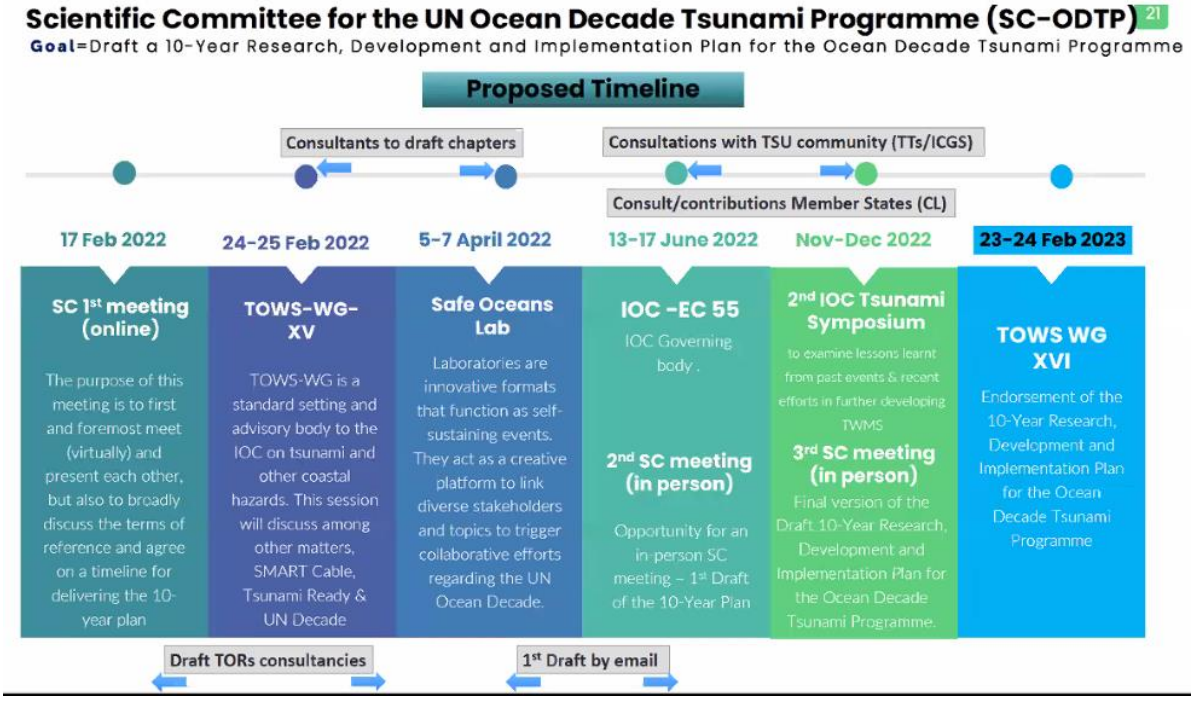
162. Mr Rick Bailey recalled the UN Ocean Decade Tsunami Programme (ODTP) Safe Ocean Laboratory Satellite Activities were launched in 2021 and will continue through 2030. The IOC-UNECO Tsunami Programme has organised and supported two satellite activities during the sessional period including a) 100% of at-risk communities recognised as Tsunami Ready (7 April 2022) and b) Further challenges associated with tsunamis generated by non-seismic and complex sources (6–7 April 2022). Both webinars were attended by around 100 participants.

163. The key recommendations arising from the programme are: a) to identify areas of potential tsunami generation by non-seismic and complex sources in the Indian Ocean, b) to implement recommendations from TOWS-WG with regards to monitoring and warning for tsunamis generated by non-seismic and complex sources, and c) to include tsunami generated by non-seismic and complex sources in community awareness and education programmes.

8.2 DRAFT SCIENCE AND IMPLEMENTATION PLANS

164. Dr Harkunti Rahayu reported on the UN Ocean Decade Tsunami Programme including the terms of reference for the Scientific Committee and the structure and content of the draft science and implementation plan.

165. Dr Rahayu noted the call for actions framework has been developed to address critical gaps in the tsunami warning and mitigation system. The timeline for key activities is provided below.



166. Dr Rahayu recalled that the Tsunami Decade value proposition notes that tsunamigenic processes are complex and difficult to accurately simulate in real-time, which is in-contrast to the detectable nature of the tsunami wavefield.

8.3 IOTWMS STRATEGIC AND IMPLEMENTATION PLANNING

167. Mr Rick Bailey discussed the ICG/IOTWMS strategic and implementation planning including review of national plans and progress in achieving goals of the UN Decade of Ocean Science for Sustainable Development 2021–2030.

168. Mr Bailey noted that a second symposium as a follow-up from the 2018 Paris symposium is proposed for 2023/4. Once the Science Plan is finalized in January or February 2022 it will be shared for feedback, either directly through the Steering Group and/or Member States. The Member State actions associated with the UN Ocean Decade will be reviewed and updated.

169. Mr Alkhadouri (Oman) proposed that each Member State be contacted to provide feedback on the draft science and implementation plan.

170. Mr Rama Rao (India) agreed that it would be good to get feedback from Member States and recognized that the timeframe will be tight.

171. Dr Rahayu (Indonesia) suggested that the global symposium could be held in 2024 in commemoration of two decades since the 2004 Indian Ocean tsunami. This was supported by Mr Kodijat who further noted that early planning is essential to ensure the event does not clash with national activities. Mr Bailey replied that we need to organize the ICG/IOTWMS now to hold in 2024. He further suggested the Steering Group should plan this activity in consultation with the Member States.

172. Dr Yin Myo Min Htwe (Myanmar) noted that they created a risk assessment map of a coastal area of Myanmar. He further supported the global symposium to be held in 2024 and requested to be informed of developments.

173. The strategic pathway will be based on review of the Science Plan. This activity will be conducted post-March 2022 once the Science Plan is completed. The Steering Group will formulate the strategic pathway based on consultation with the Member States.

9. POLICY MATTERS DISCUSSIONS

9.1 TSUNAMI READY IMPLEMENTATION

174. Mr Rick Bailey reported on Tsunami Ready Implementation in the Indian Ocean. He summarized the recommendations arising regarding the implementation of Tsunami Ready. Recalling the UN Secretary General call for “every person on Earth is protected by early warning systems” and UN Ocean Decade Goal by 2030 of 100% at-risk communities resilient and prepared for tsunamis, the recommendations are:

1. Provide guidance on tsunami hazard and risk assessment, including for tsunamis generated by non-seismic and complex sources.
2. Develop guidelines on how to nationally initiate UNESCO-IOC Tsunami Ready Recognition Programme and similar initiatives.
3. Facilitate coordination and sharing of experiences between Member State through the establishment of Tsunami Ready Focal Points (TRFPs).
4. Assist with the sharing and development of community awareness materials, including for tsunamis generated by non-seismic and complex sources.

5. Update Member States on UNESCO-IOC Tsunami Ready Recognition Programme developments and other related initiatives.
6. Identify capacity development and resource needs of Member States for implementing UNESCO-IOC Tsunami Ready Recognition Programme.

175. Dr Rahayu (Indonesia), Dr Yin Myo Min Htwe (Myanmar), and Mr Abdullah Alkhadouri (Oman) expressed support of the recommendations.

176. Prof. Karanwati asked if this guidance was from TOWS-WG and Mr Bailey replied that this guidance is directed to the Indian Ocean Member States.

177. Prof. Karnawati concidered if Tsunami Ready should be considered for its own Working Group or Task Team. Mr Bailey replied that this would be discussed under agenda item 9.5.

178. Mr Kodijat noted that recommendation 6 on capacity development and resource needs should be carried out at the regional level.

9.2 CAPACITY DEVELOPMENT

179. Ms Nora Gale of the ICG/IOTWMS Secretariat reviewed the results of the 2018 Capacity Assessment of Tsunami Preparedness in the Indian Ocean as captured in its Executive Summary. The Capacity Assessment presentation is provided online.

180. The 2018 Capacity Assessment was a follow-up to the 2005 assessment of capacity building requirements in the Indian Ocean following the 2004 Indian Ocean Tsunami. The 2018 assessment provides a new baseline of the status of tsunami preparedness capacity in the region. The assessment addressed the status of: a) policies, plans and guidelines; b) risk assessment and reduction; c) detection, warning and dissemination; and d) public awareness, preparedness and response in Indian Ocean Member States. It identified considerable improvement across all components of the IOTWMS since 2005. It also identified specific gaps and capacity development requirements regional and national levels. Ms Gale reviewed the recommendations of the assessment, noting the endorsement by the working groups.

181. Mr Alkhadouri (Oman) noted a need for general classification of categorization according to the best practice in capacity development, so each Member State knows where it is in relationship to best practice.

182. Mr Bailey presented an overview of Capacity Development Needs by Subregion: eastern Indian Ocean, Island States, Northwest Indian Ocean, and Western Indian Ocean. Public awareness and standard operating procedure were identified as areas where support is required. This assessment can be used to identify the needs in regional areas for further training and capacity development issues. The Secretariat in conjunction with IOTIC will plan trainings utilizing the regional groupings.

183. The ICG recommended that UNESCO-IOC ICG/IOTWMS Secretarial and UNESCO-IOC International Tsunami Information Centre (IOTIC) develop a costed capacity development programme (within available resources) to address the high priority gaps and requirements of Member States identified by the 2018 Capacity Assessment and other surveys for review by the ICG/IOTWMS Steering Group.

184. Mr Kodijat reminded us that we must convince those who are not convinced, and we can use public awareness materials as a tool.

185. Dr Rahayu (Indonesia) noted that much has been done through Tsunami Ready over the last few years, especially in the area of public outreach.

186. Mr Padmanabham (India) noted that it would be great to get updated information. Mr Bailey response that we should collect a target subset of the Information, but the whole assessment was very comprehensive and required a lot of time and resources. This can be done for future ICG meetings.

187. Dr Yin Myo Min Htwe (Myanmar) noted that the policy support is needed in their country.

188. Mr E Pattabhi Rama Rao recalled the establishment of the UNESCO Category 2 training centres in India at INCOIS and Iran at INIOAS. The centres could be utilized for regional capacity building initiatives.

189. Mr Khalid Alwahaibi (Oman) asked if this assessment can be re-conducted every year. Mr Bailey replied that it would be possible to survey a subset of the questions more frequently.

190. Prof. Karnawati expressed the merit of the survey for the Tsunami Ready Programme.

191. Ms Véronique Philoe (Seychelles) suggested to repeat the survey in some capacity every 2–3 years. This will enable Member States to keep up with their undertakings and achievements. Mr Bailey replied that in the future this will be done for each ICG.

192. Dr Harkunti Rahayu (Indonesia) agreed with Mr Bailey that the task was comprehensive and involved.

193. Mr Ameer Hyder (Pakistan) noted that they now have earthquake, detection and warning system. Mr Bailey responded that the results reflect the status in 2018 and do not necessary mean that there is no warning system, but that capacity was needed in this area. Mr Hyder replied that their system was installed in 2008.

9.3 EXPANSION OF THE IOTWMS SERVICES TO INCLUDE WARNING SERVICES FOR TSUANMIS GENERATED BY NON-SEISMIC AND COMPLEX SOURCES

194. Mr Robert Greenwood of TSP Australia explained that the key performance indicators do not currently include tsunamis generated by non-seismic and complex sources. This was a considered decision as there is not enough knowledge on what is possible. Mr Greenwood noted that the existing key performance indicators on timeliness, wave heights, and detection could be used but the target levels would be difficult to set.

195. Mr Bailey expressed that community education in these events is very important. Education programmes on recognition of the natural warning signs is essential.

196. Prof. Karnawati noted the need for a group of experts to think deeper on this.

197. Mr Abdullah Alkhadouri (Oman) suggested this meeting should recommend that national KPIs be instated with a view to work toward harmonization among the Member States.

198. Mr Greenwood suggested that WG-2 could investigate KPIs for non-seismic events. Mr Bailey suggested that WG-1 could also look into associated KPIs.

199. Dr Rahayu (Indonesia) explained that herself and Dr Miao participate in a KPI group for the Pacific region, which could serve as a model for the Indian Ocean region.

200. Mr Bailey explained that the activities of the Working Groups could map to the KPIs as was discussed in previous years.

201. Dr Miao (Australia) is a member to develop the Performance Framework (or globally harmonized KPIs). This activity was initiated in the Pacific and intended for all ocean basins. The measurable outcome is to show year to year improvements [or otherwise] in agreed KPIs covering all aspects on the end-to-end tsunami warning and mitigation system. An online version of the associated questionnaire is being developed with a view to replace the national report.

202. Dr Karyono (Indonesia) noted that more time is required to consider KPIs for non-seismic sources and that target time of 7–10 minutes for dissemination could be considered.

203. Dr Rahayu noted that the last meeting on the UN Ocean Decade Programme looked at the new KPI format for the Performance Framework.

9.4 THINK-TANK ON ISSUES RAISED IN THE MEETING AND NEW IDEAS

204. Mr E Pattabhi Rama Rao (India) noted that the vandalism to tsunami buoys (i.e. DART) continues to be an ongoing issue. He proposed that under the ICG framework, countries could assist each other in buoy retrieval. Prof. Karnawati noted that Indonesia is facing the same issues. She suggested to make a commitment to assist neighboring Member States should their buoys drift into areas governed by other coutries. Mr Bailey suggested that public education in the importance of the tsunami buoys could be undertaken.

9.5 GOVERNANCE AND STRUCTURE OF THE IOTWMS

205. Mr Rick Bailey shared a draft government and structure of the ICG/IOTWMS based on discussions of the recommendations committee. The ‘Phase-A’ structure included new Task Teams on Indian Ocean Tsunami Ready Implementation and National Warning Chain Implementation. Mr Bailey also shared a follow-on ‘Phase-B’ structure such that the two newly proposed Task Teams are combined into a new Working Group on Implementation and Capacity Development. Mr Bailey presented draft ToRs all Working Groups and Task Teams. The identified challenges include the need identify and get commitment of active chairs and vice-chairs for each Working Group and Task Team; the small number of active individuals across the ICG for Working Group and Task Team membership; and potentially transition structure during intersessional period. The meeting reviewed the draft governences.

206. The Chair opened floor for discussion.

207. Mr Greenwood (Australia) asked about scope to extend activities to the Antarctic region. Mr Bailey suggested that this could be incorporated in the existing working groups as territories of the Member States.

208. Mr Rama Rao (India) enquired about continuation of the Task Team on Tsunami Preparedness for a Near-Field Tsunami Hazard. Mr Bailey replied that this could be included in the National Warning Chain Task Team.

209. Mr Padmanabham (India) recalled the Task Team on Tsunami Preparedness for a Near-Field Tsunami Hazard is working on the Northwest Indian Ocean region. Mr Bailey explained that this Task Team was formed in response to the Palu and Sunda Strait tsuanamis in the eastern Indian Ocean [Indonesia], however, they have primarily focused on the Markan region as this is where funding has been available.

210. Mr Ameer Hyder (Pakistan) felt that Working Group 1 should primarily focus on community awareness and preparedness to address this gap.

211. Mr Abdullah Alkhadouri (Oman) noted that new Working Groups should only be formed if there is regional capacity to produce outputs.

212. Ms Fitriany (Indonesia) noted that there should not be overlap between the Working Groups. As an example, she referred to coordination of the IOWave Exercises. Mr Bailey noted that the intent was to coordinate and share ideas at the subregional level, but not coordinate the Exercise.

213. Prof. Karnawati noted the discussions on the two governance models. She noted the expression of many Member States on the need for Tsunami Ready. There was a discussion whether the needs could be accommodated under the existing Working Groups and Task Teams, or if a special group is needed.

214. Dr Suko Prayito Adi (Indonesia) supported a new Working Group specifically on implementation of Tsunami Ready and agreed with the proposed Working Group 3. Mr Bailey further explained that this group contains two main elements: Tsunami Ready and warning chains. 'Phase-B' was also supported by Mr Abdullah Alkhadouri (Oman). However, he suggested to have Tsunami Ready as a separate Task Team under Working Group 1.

215. Dr Harkunti (Indonesia) expressed that 'Phase-B' is better in terms of timing of implementation of the Tsunami Ready as we already have the motivation.

216. Dr Ali Khoshkhologh (Iran) asked about the IOWave Exercise as part of 'Phase-B'. Mr Bailey explained that it has been shown as a separate Task Team. Dr Khoshkhologh then suggested to have a Tsunami Ready Task Team under WG-3.

217. Mr Ramarolahy Rina Andrianasolo (Madagascar) supported the new WG-3.

218. Mr Abdullah Alkhadouri (Oman) suggested to call the Working Group Tsunami Ready and Capacity Development, or alternatively, Capacity Development and Tsunami Ready.

219. Prof. Karnawati expressed the importance of empowering the Member States. Mr Bailey reiterated that the role of the ICG is to enhance the capacity of the Member States.

220. Dr Andi Eka Sakya (Indonesia) referred to the capacity requirements related to preparedness and capacity building. He recalled that guidance on Tsunami Ready could come under WG-1.

221. Mr Bailey explained that WG-3 will be focued on implementation of the UNESCO-IOC Tsunami Ready programme and proposed the Working Group name "Tsunami Ready Implementation". This was supported by the ICG.

222. The ICG agreed on the proposed structure of the Working Groups and Task Teams for the next intersessional period with the terms-of-reference provided in Annex II. The current working groups (i.e., WG-1, WG-2, WG-NWIO) will continue and a new Working Group 3 on Tsunami Ready Implementation would be enstated. The Task Teams on Scientific Tsunami Hazard Assessment of the Makran Subduction Zone would continue, and a new Task Team on Exercise Indian Ocean Wave 2023 would be enstated. The Task Teams on Tsunami Preparedness for a Near-Field Tsunami Hazard and Exercise Indian Ocean Wave 2020 will be discontinued.

223. Prof. Karnawati asked the delegates to comment on the need for a Regional Working Group for the Western Indian Ocean. This was supported by Mr Ramarolahy Rina Andrianasolo (Madagascar) and Ms Véronique Philoe (Seychelles).

224. Ms Philoe (Seychelles) noted the need for a Regional Working Group in the western Indian Ocean region. Seychelles does not have technical capacity and in terms of regional output they could collaborate with other committees.

225. Mr Rama Rao asked about the new Regional Working Groups noting that the Subregional Working Group for the Northwest Indian Ocean was formed based on the risk to the region. He further asked if there is a strong need for new Subregional Working Groups. This concern was also shared by Dr Miao of Australia who expressed the benefit in tactical locations for capacity development workshops but questioned the need for more subregional groups.

226. Mr Bailey replied that targeted training regionally could enable more participation and ease of logistics.

227. There was a discussion on Small Island Developing States (SIDs) and Least Developed Countries (LDCs) and how to address these within the governance structure. Mr Kodijat proposed that an UNESCO-IOC circular letter should be issued to see if they would like to be represented in a new Regional Working Group. Ms Philoe (Seychelles) supported the inclusion of SIDS and LDCs.

228. The ICG decided that an UNESCO-IOC circular letter will be issued to gauge the need for subregional working groups of the Western Indian Ocean, SIDS and LDCs.

229. Prof. Karnawati called for nominations for the working group and task teams including Chair, Vice-Chair(s) and members.

Working Group 1 on Tsunami Risk, Community Awareness and Preparedness

230. The ICG appointed a Chair for Working Group 1 on Tsunami Risk, Community Awareness and Preparedness for the next intersessional period. The Vice-Chair(s) need confirmation.

- WG 1 Chair: Dr Harkunti Pertiwi Rahayu (Indonesia)
- WG 1 Vice-Chair(s) to be confirmed

231. The Chair invited expressions of interest from the floor to join Working Group 1. Australia, India, Indonesia, Iran, Malaysia, and Oman expressed interest in Working Group 1 membership.

Working Group 2 on Tsunami Detection, Warning and Dissemination

232. The ICG appointed a Chair and two Vice-Chairs for Working Group 2 on Tsunami Detection, Warning and Dissemination.

- Chair: Dr Karyono (Indonesia)
- Vice-Chair: Dr Robert Greenwood (Australia)
- Vice-Chair: Mr Jijjavarapu Padmanabham (India)

233. The Chair invited expressions of interest from the floor to join Working Group 2. Australia, India, Indonesia, Malaysia, Oman and Pakistan expressed interest in Working Group 2 membership.

Working Group 3 on Tsunami Ready Implementation

234. The ICG appointed a Chair for the Working Group 3 on Tsunami Ready Implementation. The Vice-Chair needs confirmation.

- Chair: Ms Suci Dewi Anugrah (Indonesia)
- Vice-Chair: *to be confirmed*

235. The Chair invited expressions of interest from the floor to join Working Group 3. Australia, India, Indonesia, Oman, Madagascar, and Seychelles expressed interest in Working Group membership.

Sub-regional Working Group for the Northwest Indian Ocean

236. The ICG appointed a Chair and Vice-Chair for the Sub-regional Working Group for the Northwest Indian Ocean.

- Chair: Dr Mohammad Mokhtari (Iran)
- Vice-Chair: Ms Vijaya Sunanda Maneela

237. The Chair invited expressions of interest from the floor to join the Sub-regional Working Group for the Northwest Indian Ocean. Oman and Pakistan expressed interest in Working Group membership and the WG-1 and WG-2 chairs will participate as invited experts.

Task Team on Scientific Hazard Assessment of the Makran Subduction Zone

238. The Chair and Vice-Chair for the Task Team on Scientific Tsunami Hazard Assessment of the Makran Subduction Zone need confirmation.

239. The Chair invited expressions of interest from the floor to join the Task Team on Scientific Hazard Assessment of the Makran Subduction Zone. India, Indonesia, Oman and Pakistan expressed interest in Task Team membership.

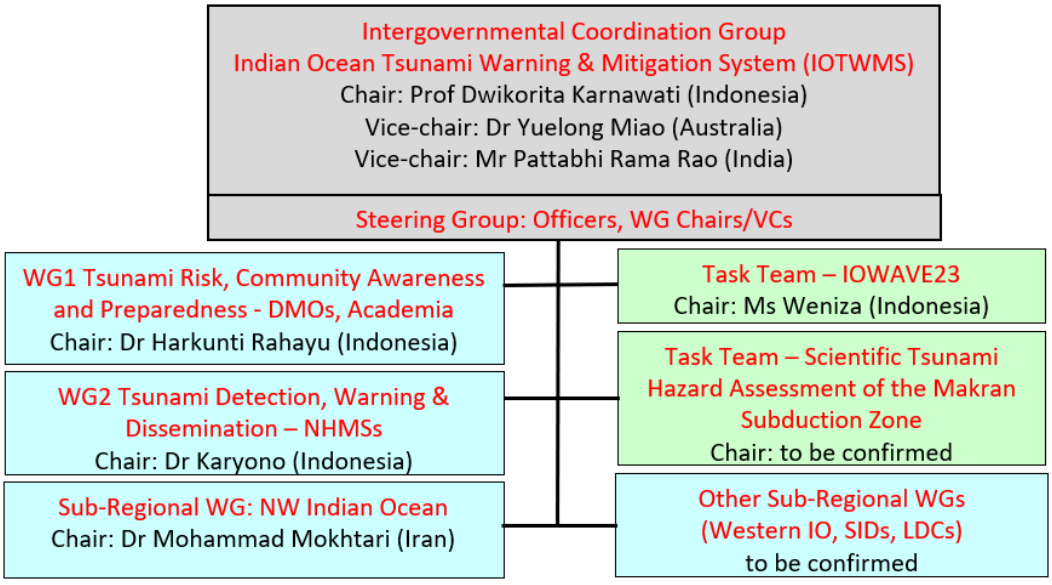
Task Team on Exercise Indian Ocean Wave 2023

240. The ICG appointed a Chair and Vice-Chair for the Task Team on Exercise Indian Ocean Wave 2023 (IOWave23).

- Chair: Mrs Weniza (Indonesia)
- Vice-Chair: Dr Ajay Kumar Bandela (India)

241. The Chair invited expressions of interest from the floor to join the Task Team on IOWave23. Australia, Iran, Madagascar, Oman, Pakistan and Seychelles expressed interest in Task Team membership.

242. The new governance and structure of the ICG/IOTWMS is show in the diagram below.



10. WORLD TSUNAMI AWARENESS DAY

10.1 WTAD 2021 AND 2022 OUTCOMES

243. Mr Ardito Kodijat reported on the outcomes of the 2021 and 2022 World Tsunami Awareness Day (WTAD) held on near 5 November each year. The UNESCO-IOC WTAD events are coordinated globally with specific inputs from each ocean basin. The WTAD addresses the seven global targets of the Sendai Framework for Distaster Risk Reduction.

244. WTAD videos were released through collaboration between UNESCO-IOC and UNDRR. A youtube playlist of the WTAD videos starting from 2020 to today is available online.

245. During 2021 the theme was enhancing international cooperation for developing countries to raise tsunami awareness. In 2021, a Youth video competition was organized for four subregions of the Indian Ocean: Eastern, Small Island States, Northwestern, and Western. Prizes were awarded to the top three videos in each subregion. A webinar on international cooperation, a strategic pathway for the Indian Ocean Tsunami Warning and Mitigation System within the Context of the UN Decade for Ocean science was held on 10 November 2021.

246. During 2022 the theme was to substantially increase the availability and access to multi-hazard warning systems and disaster risk information and assessments to the people by 2030.In 2022 an Indian Ocean Tsunami Ready hybrid workshop was conducted during 22–26 November in Bali, Indonesia. Mr Kodijat reported on national activities for WTAD 2022 in India and Indonesia.

10.2 WTAD 2023

247. The theme of WTAD 2023 has not been confirmed with the United Nations Office for Disaster Risk Reduction (UNDRR), however, a possible return to target A: to reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortalities between 2020–2030 when compared with 2005–2015 has been proposed.

248. Mr Kodijat presented recommendation to the ICG/IOTWMS for consideration:

1. IOTIC to continue to support and assist in the coordination of Indian Ocean WTAD activities with the Member States, UNESCO-IOC and UNDRR
2. To encourage Member States to e more active in commemorating WTAD
3. Member States to inform ICG/IOTWMS Secretariat and IOTIC on plan for WTAD activities (if possible 2 months before 5 November) for better coordination of WTAD in the Indian Ocean.
4. Member States to share the documentation of in country WTAD activities with IOTIC for consolidated information on WTAD in Indian Ocean.

249. Another recommendation for the Steering Group to develop an overall communication plan to share tsunami educational activities of the ICG.

250. Mr Alkhadouri (Oman) suggested that awareness of tsunamis should be done natioanally on a monthy basis and included in an annual communication plan for tsunami hazards (or included within a multi-hazard plan).

251. Ms Anugrah (Indonesia) shared additional information on Indonesian participation in WTAD 2022. This included the Tsunami Fun Drill 2022 by nine communities including some hotels. The success of the experience lead to decision that the Fun Drill will be held annually on 5 November. The video of Tsunami Fun Drill was shown to the meeting participants.

252. Ms Baker reiterated the UNESCAP's support of WTAD will continue during 2023 in the Asia-Pacific region.

253. Mr Bailey noted that 2025 will mark 80-years since the 28 November 1945 tsunami off the coast of [what is now] Pakistan.

254. The recommendations of IOTIC were approved by the ICG with endorsement from India and Seychelles.

11. SESSIONAL REPORTING

255. The Chair requested the three sessional groups established under agenda item 1.5 to report back to the ICG.

256. Dr Harkunti Rahayu (Indonesia) reported that the Recommendations Committee has reviewed the reports of the working groups, task teams, IOTIC, etc. to take the important outcomes forward as recommendations to the ICG as well as strategic implementation plans for the upcoming intersessional period. The decisions have been drafted and will distributed soon for Member States to review.

257. Ms Anni Arumsari Fitriany (Indonesia) reported that the Budget Committee members have met. They reviewed the meeting minutes and have compiled a document (under preparation). This will be presented after lunch.

258. Ms Véronique Philoe (Seychelles) reported that the Elections Committee met a day before. Members are from Oman, Madagascar, and Seychelles. They have compiled and reviewed the applications received by the deadline (08:00 UTC on 30 September 2022) and will make an announcement in Agenda Item 13.

12. PROGRAMME AND BUDGET

259. The Chair requested Mr Rick Bailey, Head of ICG/IOTWMS Secretariat, to introduce this agenda item. Mr Bailey reported that the budget committee has reviewed the programme of activities in terms of their budgetary requirements. Mr Bailey informed the delegates that funding for ICG/IOTWMS activities comprises both regular programme and extra-budgetary funds. He reviewed the proposed activities for the intersessional period noting that not all have funding.

260. The Chair invited ICG to consider the important issue of funding for the long-term sustainability of the ICG/IOTWMS. Member States were invited to make contributions to the IOC Special Account set-up for this purpose.

261. Mr Abdullah Alkhadori (Oman) noted the well-developed plan, and that Oman will do there best to be involved in the future.

262. Dr Suko Prayito Adi noted his Indonesia's support of the budget.

263. There was discussion on the components of the NTWC competency training in initiated by Dr Karyono (Indonesia). A further discussion on the Tsunami Ready programme in terms of development of pilot activities for critical infrastructure was initiated by Dr Rahayu who noted this is endorsed by the TT-DMP of TOWS-WG.

264. There was also a discussion on activities in the budget that are not currently funded. Mr Ameer Hyder (Pakistan) requested that seismic training for National Tsunami Warning Centers be included in the budget. Ms Anugrah (Indonesia) enquired about the conduct of the

IOWave workshops being offline. Mr Bailey replied that if a budget was contributed, they could be held in-person.

265. Mr Jijjavarapu Padmanabham (India) referred to the SOP workshops and suggested to combine events to help save funds. However, Mr Bailey noted it is more economical to get people in regions of the India Ocean to come together in separate events.

266. The budget for 20th Anniversary symposium of the Aceh tsunami was discussed. Indonesia offered a contribution, as did the IOC Secretariat. Prof. Dwikorita explained that the Indonesian support would only be available if the event is held in-country. Dr Rahayu also recalled that TOWS-WG will be conducting a global symposium and suggested they be combined. The ICG decided to continue discussions towards finalisation of the 20th Anniversary symposium plans outside of the sessional meeting.

267. There was a discussion about inclusion of in-kind activites in the budget. Mr Bailey explained that the budget includes activities that are funded out of the IOTWMS programme funds, but not all in-kind activities. Dr Rahayu (Indonesia), Mr Abdullah Alkhadori (Oman) and Ms Fitriany (Indonesia) expressed the need to include more specific in-kind contributions using WG-1 activities as an example. Mr Bailey noted the large quantity of in-kind contributions of Member States and Working Groups with specific mention of the TSPs. Mr Rama Rao (India) explained that the in-kind activity of archiving and providing access to the Northwest Indian Ocean PTHA data is tied to the UNESCAP project and should be remain visible in the budget. Mr Kodijat (IOTIC) suggested having a list for budget and a second list for the programme, which would include specific in-kind activities. Mr Piero Chessa (Australia) expressed support for continuing with the current budgetary reporting approach.

13. ELECTION OF OFFICERS

268. The Secretariat reminded the delegates of the rules and procedures for the election of Officers. The Election of Officers of the ICG/IOTWMS was announced with the IOC Circular Letter 2917 along with the required forms. Open for nominations were the positions of one Chair and two Vice-Chairs. The deadline for nominations was on 30 November at 08:00 UTC.

269. The Chair handed over this part of the session to Ms Véronique Philoe (Seychelles), Member of the Nominations Committee.

270. Nominations were received by the Secretariat before the deadline for all open Officer positions. Each nomination was duly dated, timed, and signed by the Secretariat. The nominations committee duly scrutinized the nomination papers received by the Secretariat. The nominations received were one nomination for Chair and two nominations for Vice-Chair:

- Chair: Prof. Dwikorita Karnawati (Indonesia), seconded by Australia and Oman.
- Vice-Chair: Mr E. Pattabhi Rama Rao (India), seconded by Australia and Oman.
- Vice-Chair: Dr Yuelong Miao (Australia), seconded by India and Indonesia.

271. The Elections Committee recommended that the ICG/IOTWMS elect these Officers for the intersessional period commencing at the closing of this 13th session of the ICG/IOTWMS. The ICG elected the Officers by acclamation and welcomed the elected Chair who will serve her second term.

272. Prof. Dwikorita thanked the ICG for their trust in re-electing her to Chair. She expressed hope in collaboration over the coming sessional period to improve tsunami capacity in the region and to increase Tsunami Ready communities. She thanked the Member States, Secretariat, Working Groups and Task Teams for their ongoing support. She acknowledged

the support of Mr Rama Rao, who will serve his second term as Vice-Chair, and welcomed Dr Miao, who will serve his first term as Vice-Chair.

14. OTHER BUSINESS

273. The Chair asked the delegates to raise any issues not already covered during the meeting.

14.1 UNESCAP

274. Ms Temily Baker thanked BMKG and the Secretariat for the opportunity to attend the ICG/IOTWMS-XIII. She noted the upcoming Asia Pacific Disaster Meeting will preceeded by a three-day regional learning platform, which is potential platform to showcase the IOTWMS. She thinks this would be an incredible opportunity to work together. She proposed a joint session on using single hazard work to promote multi-hazard work and vice versa. It will be held during the 24–25 of July 2023 as a hybrid event.

14.2 AUSTRALIA

275. Mr Piero Chessa (Austraila's Head of Delegation and Tsunami National Contact) expressed appreciation on behalf of himself and Dr Yuelong Miao on the success of the ICG/IOTWMS-XIII. He congratulated Prof. Dwikoritia Karnawati on the renewal of her chairship underpinned by her strong leadership. He expressed sincere gratitude to the Government of Indonesia for hosting the thirteenth session of the ICG/IOTWMS. He drew attention to the importance of the Tsunami Ready Programme. He extended appreciate to Mr Rick Bailey for his management of the Secretariat and his skillful steering of the meeting. In conclusion, Mr Chessa expressed that the sessional meeting has been an enriching and enjoyable experience.

14.3 SYMPOSIUM FOR 20TH ANNIVERSARY OF 2004 INDIAN OCEAN TSUNAMI

276. Prof. Dwikorita Karnawati shared a presentation about the commemoration of the 20th anniversary of the 2004 Aceh tsunami in the Indian Ocean. She proposed a symposium during December 2024 on early warning, early action and safe ocean. The objective of the symposium could be for experts, academia and multi-helix stakeholders to discuss and formulate strategic action for:

1. Strengthening joint efforts in realising the early warning and early action,
2. Accelerating the achievement of 100% of communities at risk of tsunami being prepared for and resilient to tsunamis by 2030, and
3. Realizing the UN Ocean Decade Tsunami Programme and its initiatives towards a safe ocean.

277. Potential topics could include (but are not limited to) non-seismic and complex source tsunami; near-field tsunami; tsunami detection, warning and dissemination; public policy for early warning and early action; tsunami risk, community awareness and preparedness; and capacity development.

278. Dr Rahayu (Indonesia) asked if this could be held in conjunction with the global symposium. She further noted that the national ITB University symposium could be aligned with the event.

279. Mr Rama Rao (India) noted the importance of conducting such a symposium. He noted that holding this event back-to-back with the next ICG could promote further participation.

280. Mr Bailey asked about the audience of the symposium and content balance. He expressed the Secretaraiat's williness to support this event. He suggested that this be discussed further at the upcoming TOWS-WG meeting in February 2023. Prof. Dwikorita confirmed that she intends to present this proposal to the TOWS-WG meeting. In this regard, it needs to be developed further for the meeting.

281. Mr Andrianasolo (Madagascar) suggested a video contest to encourage community tsunami awareness.

15. NEXT SESSIONS

15.1 CONFIRMATION OF DATE AND VENUE FOR ICG/IOTWMS-XIV

282. Mr Bailey reminded the ICG that, at the 12th session of the ICG/IOTWMS, Oman expressed its interest in hosting the 14th session. However, Mr Abdullah Alkhadori (Oman) is not able to confirm at this time and would like to discuss all options.

283. Prof. Karnawati recalled that 2024 will be the year of the commemorative event. Mr Alkhadori (Oman) suggested holding the events together to encourage participation. Dr Rahyau (Indonesia) agreed for the efficiently of traveling.

284. Prof. Karnawati proposed that the location for ICG/IOTWMS-XIV could be in Jakarta followed by the Symposium in Banda Aceh.

15.2 TARGET DATE AND VENUE FOR ICG/IOTWMS-XV

285. The Chair invited expressions from Member States of the ICG to offer the host the 15th session of ICG/IOTWMS (ICG/IOTWMS-XV) in early 2026. The Sultanate of Oman kindly offered to host this event. The Chair thanked the Sultanate of Oman for its generous offer, which was subsequently accepted by the ICG/IOTWMS.

16. ADOPTION OF DECISIONS AND RECOMMENDATIONS

286. Mr Bailey presented the draft recommendations for approval by the ICG. The Chair requested the delegates to adopt the recommendations of the thirteenth session of the ICG/IOTWMS. The recommendations were reviewed by the ICG and adopted with minor changes. A draft was agreed in terms of content, with the Secretariat to make further structural adjustments to improve the layout and readability.

287. The adopted decisions and recommendations are available in Annex II.

17. CLOSING CEREMONY

288. Mr Bailey thanked everyone for an excellent and productive four-day meeting. He recalled by looking at the decision and recommendation the work. He thanked Prof. Karnawati and her team for there support and commitment to the Bali meeting noting the fantastic arrangements. Mr Bailey expressed how great it has been to see those attending in-person. He thanked the online participants for their contributions noting the challenge of time zones. On behalf of the Secretariat, he expressed appreciation for the efforts and contributions of all participants and staff. In conclusion, he wished everyone a safe homeward journey.

289. Prof. Karnawati addressed Mr Bailey, Ms Gale, Mr Rama Rao, Mr Kodijat, the Heads of delegations, and all delegates from the 17 participating countries. She thanked everyone for their energy, passion, and commitments towards solving the challenges in tsunami warning and mitigation. She recalled the importance of UNESCO-IOC Tsunami Ready Programme in the Indian Ocean region through the commitment of the new Working Group 3 on Tsunami

Ready Implementation with support from Working Groups 1 and 2 and the Regional Working Group for the Northwest Indian Ocean. She expects that the working group outputs will enhance capacity in timely and accurate tsunami early warning. The Task Teams on IOWave23 and the Scientific Tsunami Hazard Assessment of the Makran Subduduction Zone are also thanked for their work and commitment. The challenge remains and we must work harder under a limited budget to maximise our outputs. By working together, she believes we can face all problems. During the upcoming intersessional period, we will have many opportunities to engage online and in-person. Prof. Karnawati thanked all participants for their work and passion. She thanked the organizers and apologized for any limitations. In conclusion, she wished everyone happiness and congratuations.

290. In response, Mr Alkhadori (Oman) thanked the Government of Indonesia, and specifically BMKG, for the successful hosting of the event. He also thanked the Secretariat for the exceptional support over the last four-days and all participants for their contributions. In conclusion, he expressed a hope to see everyone again soon.

ANNEX I

AGENDA

INTERGOVERMENTAL OCEANOGRAPHIC COMMISSION of UNESCO
Intergovernmental Coordination Group for the Indian Ocean
Tsunami Warning and Mitigation System

13th Meeting, Bali, Indonesia, 28 Nov.–1 Dec. 2022

1. OPENING CEREMONY

1.1 WELCOME SPEECHES

1.2 ADOPTION OF AGENDA

1.3 DESIGNATION OF RAPPORTEUR

1.4 CONDUCT OF THE SESSION

1.5 ESTABLISHMENT OF SESSIONAL COMMITTEES

2. REPORTS ON INTERSESSIONAL ACTIVITIES

2.1 ICG CHAIRPERSON'S REPORT

2.2 IOC SECRETARIAT REPORT

2.3 TOWS-WG REPORT

2.4 UPDATE ON UN OCEAN DECADE

2.5 UN AND NON-UN ORGANISATIONS

2.6 REPORT OF THE INDIAN OCEAN TSUNAMI INFORMATION CENTRE (IOTIC)

2.7 UNESCAP NWIO PROJECT STATUS REPORT

2.8 IOTWMS OVERALL STATUS REPORT

2.9 REVIEW OF ICG/IOTWMS DECISIONS, RECOMMENDATIONS AND ACTIONS

3. REPORTS ON EARTHQUAKE AND TSUNAMI EVENTS DURING INTER-SESSIONAL PERIOD

4. IOTWMS TSUNAMI SERVICE PROVIDER & MONITORING NETWORKS REPORTS

4.1 STATUS REPORT ON EARTHQUAKE & SEA LEVEL MONITORING NETWORKS

4.2 TSP AUSTRALIA

4.3 TSP INDIA

4.4 TSP INDONESIA

4.5 UPDATE TO TSP SERVICES

5. SPECIAL SESSION ON "OUTCOMES FROM TSUNAMI READY INDIAN OCEAN COUNTRIES SYMPOSIUM"

5.1 SYMPOSIUM OUTCOMES

5.2 TSUNAMI READY RECOGNITION PROGRAMME OUTLINE

5.3 EXAMPLES OF TSUNAMI READY COMMUNITIES

5.4 TSUNAMI READY TOOLS

- ONLINE TRAINING COURSE
- ANIMATIONS
- TSUNAMI READY BOARDGAME

5.5 CERTIFICATION PROCESS

6. TASK TEAM REPORTS

6.1 INDIAN OCEAN WAVE

6.2 TSUNAMI PREPAREDNESS FOR A NEAR TSUNAMI HAZARD

6.3 SCIENTIFIC HAZARD ASSESSMENT OF THE MAKRAN SUBDUCTION ZONE

7. WORKING GROUP REPORTS

7.1 SUB-REGIONAL WORKING GROUP FOR THE NORTH-WEST INDIAN OCEAN

7.2 WORKING GROUP 1: TSUNAMI RISK, COMMUNITY AWARENESS & PREPAREDNESS

7.3 WORKING GROUP 2: TSUNAMI DETECTION, WARNING & DISSEMINATION

8. UN OCEAN DECADE TSUNAMI PROGRAMME

8.1 SAFE OCEAN LABORATORY SATELLITE ACTIVITIES

8.2 DRAFT SCIENCE & IMPLEMENTATION PLANS

8.3 IOTWMS STRATEGIC & IMPLEMENTATION PLANNING, INCLUDING ACHIEVING GOALS OF THE UN DECADE OF OCEAN SCIENCE FOR SUSTAINABLE DEVELOPMENT 2021–2030

9. POLICY MATTERS

9.1 TSUNAMI READY IMPLEMENTATION

9.2 CAPACITY DEVELOPMENT

9.3 EXPANSION OF IOTWMS SERVICES TO INCLUDE WARNING SERVICES FOR TSUNAMIS GENERATED BY NON-SEISMIC AND COMPLEX SOURCES

9.4 THINK TANK ON ISSUES RAISED IN THE MEETING AND NEW IDEAS

9.5 GOVERNANCE AND STRUCTURE OF THE ICG/IOTWMS

10. WORLD TSUNAMI AWARENESS DAY

10.1 WTAD 2021 & 2022 OUTCOMES

10.2 WTAD 2023

11. SESSIONAL REPORTING

11.1 SESSIONAL COMMITTEES MEET TO DISCUSS AND FINALISE REPORTS

11.2 SECRETARIAT DRAFT DECISIONS AND RECOMMENDATIONS

12. PROGRAMME AND BUDGET

13. ELECTION OF OFFICERS

14. OTHER BUSINESS

15. NEXT SESSION

15.1 CONFIRMATION OF DATE AND VENUE FOR ICG/IOTWMS-XIV

15.2 TARGET DATE AND VENUE ICG/IOTWMS-XV

16. ADOPTION OF DECISIONS AND RECOMMENDATIONS

17. CLOSE OF MEETING

ANNEX II

ADOPTED DECISIONS AND RECOMMENDATIONS

Decision ICG/IOTWMS-XIII.1

The Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWMS),

Having met for its 13th Session from 28 November – 1 December in Bali, Republic of Indonesia;

Recalling Resolution XXIII-12 that established the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWMS);

Acknowledging with appreciation the contribution and continued support of the Government of Australia for the UNESCO-IOC ICG/IOTWMS Secretariat Office since 2005 and the support of the Government of Republic of Indonesia for the UNESCO-IOC Indian Ocean Tsunami Information Centre (IOTIC) for the 5-year period starting 2017 – 2022 and agreement under negotiation to extend a further 5-years until 2027;

Acknowledging with appreciation the support from UNESCAP Trust Fund for Tsunami, Disaster and Climate Preparedness for the UNESCO-IOC project on “Strengthening tsunami early warning in the North-West Indian Ocean through regional cooperation”;

Having reviewed the progress made in the implementation of the IOTWMS since the 12th Session of the ICG/IOTWMS (9–12 March 2019, Kish Island, Islamic Republic of Iran);

Having considered the reports of:

1. ICG/IOTWMS Chair
2. IOC Secretariat
3. IOTIC
4. 14th and 15th Meetings of the ICG/IOTWMS Steering Group
5. 13th and 14th Meetings of the TOWS-WG
6. TSP Australia
7. TSP India
8. TSP Indonesia
9. IOWave20 Exercise
10. 2018 Capacity Assessment of Tsunami Preparedness in the Indian Ocean (published 2020)
11. Task Team on Scientific Tsunami Hazard Assessment of the Makran Subduction Zone
12. Task Team on Tsunami Preparedness for a Near-Field Tsunami Hazard
13. Working Group 1 on Tsunami Risk, Community Awareness, and Preparedness
14. Working Group 2 on Tsunami Detection, Warning and Dissemination
15. Sub-regional Working Group for the North-West Indian Ocean
16. Working Group 2 TSP Service Definition Document update (V5 draft)

17. Working Group 2 NTWC User Guide
18. IOTWMS Medium Term Strategy (2019-2024)
19. Tsunami Ready Recognition Programme (TRRP)(published 2022)

Noting with appreciation the Member State reports provided by Australia, India, Indonesia, Madagascar, Oman, Pakistan, and the Seychelles;

Noting with appreciation the outcomes of the Working Group on Tsunamis and Other Hazards related to Sea-Level Warning and Mitigation Systems (TOWS-WG) in guiding the activities of the ICG and its Working Groups and Task Teams;

Recognizing the progress towards establishing National Tsunami Warning Centres (NTWCs) in all countries around the Indian Ocean since the Indian Ocean Tsunami of 26 December 2004;

Reaffirming that the IOTWMS is a coordinated network of national systems and capacities, and is part of a global network of early-warning systems for all ocean-related hazards;

Reaffirming further that each Member State has the responsibility to issue warnings within its respective territories;

Recalling the *Mauritius Declaration* adopted at the intergovernmental coordination meeting held at Grand Baie, 14–16 April 2005 to openly share and exchange tsunami-relevant real-time observational data in accordance with the UNESCO-IOC Oceanographic Data Exchange Policy;

Considering the outcomes of the 3rd UN World Conference on Disaster Risk Reduction (13–18 March 2015, Sendai, Japan), the Sendai Framework for Disaster Risk Reduction 2015–2030 (A/CONF.224/CRP.1);

Considering the WMO International Network for Multi Hazard Early Warning Systems (IN-MHEWS) initiative;

Taking into account the Summary Statement of the International Conference to commemorate the 10th anniversary of the Indian Ocean Tsunami: 'The Indian Ocean Tsunami Warning and Mitigation System 10 years after the Indian Ocean Tsunami: Achievements, Challenges, Remaining Gaps and Policy Perspectives' (24-25 November 2014, Jakarta, Indonesia; *IOC/BRO/2015/2*);

Noting the Summary Statement of the symposium 'Advances in Tsunami Warning to Enhance Community Responses' (12–14 February 2018, Paris, France) that identified the current status of operational tsunami warnings and community resilience and future avenues for improvement (*IOC/BRO/2015/2*);

Noting the decision by the UN General Assembly, as part of the Omnibus Resolution for Oceans and the law of the sea (A/RES/72/73), to "proclaim the United Nations Decade of Ocean Science for Sustainable Development for the 10-year period beginning on 1 January 2021;

Noting on 23 March 2022, UN Secretary-General, António Guterres, announced the United Nations would spearhead new action to ensure every person on Earth is protected by early warning systems within five years (2017);

Noting the follow-up action of Global Platform for Disaster Risk Reduction (GPDRR) in Bali, May 2022, with regards seven of the recommendations from Bali Agenda for Resilience (BAR),

and **recognising** the importance of achieving the *sustainable resilience*, learning from Indonesia:

1. Sustainable resilience is locally led, built on local context and strongly supported by the State
2. Sustainable resilience can only be achieved when collaborations with passions take place among the “Pentahelix” Stakeholders (Government, community, business enterprise, academia and media)
3. Sustainable resilience will thrive upon the availability of adequate, predictable, and decentralized financing
4. Sustainable resilience will only be meaningful when everyone is involved, everyone has a role, and no one left behind
5. Sustainable resilience will progress exponentially when innovations and technology are backed by global resources a developed with local context,

Recalling IOC Resolution XXVI-6 on Data Buoy Vandalism: Impact and Responses, IOC Resolution XXVI-7 on Global Coordination of Early Warning and Mitigation Systems for Tsunamis and Other Sea-Level Related Hazards;

Acknowledging the contributions of seismic data through the CTBTO;

Reaffirming that participation in ICG activities should be self-funded by the Member States;

Encouraging Member States to promptly inform the Secretariat of all changes to the TNC/TWFP/NTWC contacts through official channels;

Noting the continued diminishing engagement by some Member States in the activities of the ICG/IOTWMS and **urging** all Member States to participate more actively;

Encouraging Member States to make voluntary contributions to the IOC Special Account set up for the ICG/IOTWMS to support activities identified in the Budget and Programme to underpin successful implementation of the IOTWMS and capacity development for Member States;

Noting with appreciation the efforts of Tsunami Service Provider (TSP)-India, TSP-Indonesia and TSP-Australia, including the issuing of public bulletins over the IOC Public Email List server and the GTS;

Noting the importance of the national status of tsunami warnings to be available on the TSP public websites and **urging** Member State National Tsunami Warning Centres to ensure national tsunami warning status is reported back to the TSPs in a timely manner via the agreed web reporting protocols during tsunami events, tests and exercises;

Noting that the IOC Executive Council #55, 13-17 June 2022, **instructs** all ICGs as part of their work plans to:

1. Encourage sea-level network operators to undertake regular and routine calibration of their sea-level monitoring instrumentation, following recommendations of IOC Manuals & Guides No #3 and No. 14 (Volumes I-V),
2. Routinely monitor the status of seismic and sea level related observing networks to identify and better help rectify gaps in coverage and free and open data exchange,

3. TSPs and National Tsunami Warning Centres (NTWCs) to identify all coastal areas or near-shore faults that could generate large earthquakes and submarine landslides and be prepared to issue warnings as appropriate,

Noting the importance of clarifying the earthquake and tsunami potential of the Makran Subduction Zone;

Encouraging Member States to continue to acquire new datasets such as the Global Navigation Satellite System (GNSS), seismic, paleo-tsunami and other geological data to enhance tsunami hazard assessment and the timeliness and accuracy of tsunami warnings in the North-West Indian Ocean;

Noting the importance of seismic data for timely and accurate determination of tsunami threats by TSPs, and the progress made in bilateral exchange of seismic data among some Member States;

Urging Member States, especially in the North-West Indian Ocean region, to provide all relevant seismic data in real-time to TSPs and other Member States;

Encouraging Member States to collect high-resolution coastal bathymetry and topography data to improve characterisation of tsunami and other coastal hazards and risks and promote sharing of this data to the extent possible;

Noting with concern the continued instances of tsunami buoy vandalism in the IOTWMS region, and **encouraging** Member States to promptly inform the UNESCO-IOC Secretariat such occurrences of tsunami buoy vandalism to facilitate incorporation in the Global Vandalism Report of the Data Buoy Cooperation Panel (DBCP);

Encouraging Member States to consider contributing any education or outreach materials related to data buoy vandalism to the DBCP for inclusion in a tool kit of regionally relevant materials to counter vandalism;

Noting the successful outcomes of Phase 1, Phases 2a and 2b of the UNESCAP funded project “Strengthening tsunami early warning in the North-West Indian Ocean through regional cooperation”, in particular:

1. A better understanding of the science of the Makran Source Zone
2. Development of a Probabilistic Tsunami Hazard Assessment (PTHA) to guide risk assessment and community awareness and support inundation modelling,
3. Strengthening of national tsunami warning chains and underpinning Standard Operating Procedures (SOPs),
4. Completion of a capacity gap analysis for Member States in inundation modelling and evacuation planning,

Further noting efforts to develop a Phase 2c of the NWIO UNESCAP project involving training in inundation and evacuation mapping in support of implementation of the UNESCO-IOC TRRP in the region;

Noting the role of IOTIC to facilitate, guide, and support Member States in the implementation of the UNESCO-IOC TRRP in coordination with the UNESCO-IOC Secretariat for the ICG/IOTWMS;

Recognizing the outcomes of the 2018 Capacity Assessment of Tsunami Preparedness in the Indian Ocean (published 2020);

Noting with appreciation the work of the former work of the Task Team on Capacity Assessment of Tsunami Preparedness and the comprehensive nature and value of the assessment;

Noting the value of basin-wide tsunami exercises and drills and the successful conduct by Member States of Exercise IOWave20, despite the Covid pandemic;

Recognizing the valuable recommendations from the IOTWMS-IOTIC Post-IOWave20 Webinar,11 - 12 November 2020, on Lessons Learnt during Exercise Indian Ocean Wave 2020;

Encouraging Member States to conduct further exercises and drills at the national level involving communities at least once per year;

Noting the piloting of the TRRP by India and Indonesia;

Encouraging all Member States to implement the TRRP in vulnerable communities with UNESCO-IOC recognition to meet the UN Ocean Decade Tsunami Programme goal of 100% at-risk communities resilient and prepared for tsunamis.

Recognizing the Palu and Sunda Strait tsunami events as being very complex from an early warning perspective and the current technical limitations of producing timely and accurate forecasts for tsunamis from near-field non-seismic and complex sources (e.g. aerial landslides, submarine landslides, volcanoes) and the value of in situ observations;

Further noting the efforts of the UNESCO-IOC TOWS-WG to develop a better understanding of the threat from tsunamis generated by non-seismic and complex sources and develop guidance on best practices to monitor and warn for such events;

Recognizing tsunamis generated by non-seismic and complex sources are often near-field threats where natural warnings signs are important to understand to facilitate effective community responses;

Encouraging all Member States to continue reviewing their national tsunami warning chains with a view to minimizing the number of steps and ensuring clear authorization of responsibilities amongst stakeholders, especially for near-field tsunami threats;

Encouraging Member States to emphasise to Disaster Management Organisations (DMOs) the role they play in strengthening the national warning chain to ensure optimal community response, and stress the importance that all agencies participate in regional tsunami governance and technical forums;

Encouraging Member States to enhance community preparedness for near-field tsunamis, with emphasis on self-evacuation based on natural signs, including tsunamis generated by non-seismic and complex source;

Encouraging NTWCs and DMOs to continue to develop and routinely review Standard Operating Procedures (SOPs) and provide copies to the UNESCO-IOC Secretariat for the ICG/IOTWMS;

Encouraging the continued involvement of national and international broadcast media in warning dissemination, SOP training activities, workshops, and exercises;

Noting with appreciation the successful outcomes of the Indian Ocean Tsunami Ready Workshop, 22 – 26 November 2022, in Bali, Indonesia, organised by UNESCO-IOC IOTIC,

BMKG and UNESCO-IOC Secretariat, and **further noting** with funding provided by BMKG with support of the Government of Republic of Indonesia, ICG/IOTWMS Secretariat with support of the Government of Australia, and UNESCAP:

1. Training on the 12 Tsunami Ready indicators and processes for recognition
2. Promotion of Tsunami Ready communication tools;
3. Shared experiences of villages that have already, or are about to receive Tsunami Ready recognition
4. Field trip to a Tsunami Ready recognised village, Tanjung Benoa.

Noting spatial planning for Disaster Risk Reduction (DRR) isn't covered under TRRP;

Urging Member States to ensure DRR based spatial planning is also taken into consideration at the city, province, and national level with respect to overall preparedness and sustainable resilience**;**

Urging Member States to consider nominating new participants to training activities and workshops to ensure that more in-country experts are trained and available to handle tsunami warning operations and emergency response to the tsunami threat;

Noting the establishment of the UN Ocean Decade Tsunami Programme (ODTP) and its two primary goals:

1. Improved accuracy and timelines of the tsunami warnings through enhance and new observing systems
2. 100% of at-risk Communities resilient and prepared for the tsunami threat

Noting the UN Secretary General's call that "every person on Earth is protected by early warning systems" and the UN Ocean Decade Goal by 2030 of 100% of at-risk communities resilient and prepared for tsunamis, **recognizes** the need to:

1. Provide guidance on tsunami hazard and risk assessment, including for tsunamis generated by non-seismic and complex sources
2. Develop guidelines on how to nationally initiate UNESCO-IOC TRRP and similar initiatives
3. Facilitate coordination and sharing of experiences between Member States through the establishment of Tsunami Ready Focal Points (TRFPs)
4. Assist with the sharing and development of community awareness materials, including for tsunamis generated by non-seismic and complex sources
5. Update Member States on UNESCO-IOC TRRP developments and other related initiatives
6. Identify capacity development and resource needs of Member States for implementing UNESCO-IOC TRRP

Noting the extensive task to achieve the outcome 100% of at-risk communities resilient and prepared for tsunamis, **further recognizing** the roles of the ICG/IOTWMS and its work plans are to support the capacity development of Member States to help them achieve this, depending on their risk assessment and national priorities;

Noting the success of Regional Working Group for North-West Indian Ocean in regional cooperation of Member States facing similar risks, resources and capacity;

Noting the establishment of the Science Committee of the UN ODTP, involving representatives of the ICG/IOTWMS and its efforts to develop a Draft Science Plan for review by each ICG in order to consider scope, objectives and identification and confirmation of Member States future commitments to supporting implementation of the plan;

Noting the future plans of the UN ODTP to hold a 2nd Symposium to follow on from the 1st Symposium "Advances in Tsunami Warning to Enhance Community Responses" (12–14 February 2018, Paris, France);

Noting the ICG/IOTWMS has plans to organise a symposium in 2024 to commemorate the 20th Anniversary of the Indian Ocean Tsunami of 2004;

Noting the annual success of the World Tsunami Awareness Day (WTAD) held on 5 November with the support of UNDRR and UNESCO-IOC in developing community awareness;

Urging Member States to advise UNESCO-IOC IOTIC and UNESCO-IOC ICG/IOTWMS Secretariat of their plans two months before the WTAD event each year, so that a more coordinated and targeted approach ca be developed to further maximise outcomes.

Recognising the value of involvement of youth groups, such as U-INSPIRE, in aiding the capacity development of Member States and in support of engagement of communities in the TRRP.

Decides to:

1. Include the instructions from IOC Executive Council #55, 13-17 June 2022, and the recommendations from TOWS-WG XII, XIV and XV in the work plans of the ICG for the next inter-sessional period;
2. Extend the TSP services to include tsunamis generated by non-seismic and complex sources;
3. Adopt V5.0 of the IOTWMS Service Definition Document prepared by Working Group 2;
4. Continue with TSPs only sending notifications to the NTWCs of Member State to update on the availability of TSP bulletins on the registered user web sites;
5. Establish Tsunami Ready Focal Points (TRFPs) in each Member State to enhance communication, coordination, and implementation of the TRRP or similar initiatives across the Indian Ocean;
6. Undertake a full Capacity Assessment of Tsunami Preparedness in the Indian Ocean again in 2024 to evaluate progress of the IOTWMS since Indian Ocean Tsunami of 2004;
7. Undertake a shorter assessment before each session of the ICG for review by Member States through an online questionnaire to continuously monitor progress after each intersessional period and guide the work plans of the ICG/IOTWMS;
8. Organise a symposium in 2024 to commemorate the 20th Anniversary of the Indian Ocean Tsunami of 2004;
9. Continue existing Working Group 1 with modified Terms of Reference as attached in Annex 1, with Chair Dr Harkunti Pertiwi Rahayu (Indonesia) and a Vice-chair to be confirmed by Circular Letter;

10. Continue existing Working Group 2 with modified Terms of Reference as attached in Annex 2, with Chair Dr Karyono (Indonesia) and two Vice-chairs: Mr Robert Greenwood (Australia) an Mr. Padmanabham Jijjavarapu (India);
11. Continue existing Sub-Regional Working Group for the North-West Indian Ocean with modified Terms of Reference as attached in Annex 3, with Chair Dr Mohammad Mokhtari (Iran) and Vice-chair Ms Vijaya Sunanda Maneela (India);
12. Continue the Steering Group with Terms of Reference as attached in Annex 4, with TSP Representatives and NTWC Representative to be confirmed;
13. Establish a new Working Group 3 with Terms of Reference as attached in Annex 5, with Chair Ms Suci Dewi Anugrah (Indonesia) and Vice-Chair from Seychelles (to be confirmed);
14. Continue intersessional Task Team on Scientific Tsunami Hazard Assessment of the Makran Subduction Zone, reporting to the Sub-Regional Working Group for the North-West Indian Ocean with modified Terms of Reference as attached in Annex 6, and with Chair and Vice-chair to be confirmed by Circular Letter;
15. Establish a new intersessional Task Team on Exercise Indian Ocean Wave 23 (IOWave23) reporting to the new Working Group 3 with Terms of Reference as attached in Annex 7, and with Chair Ms Weniza (Indonesia) and Vice-chair Mr Ajay Kumar Bandela (India);
16. Endorse the new Terms of Reference of the Indian Ocean Tsunami Information Centre (IOTIC), including addition of the World Tsunami Awareness Day (WTAD) task, as attached in Annex 8;
17. Continue to hold inter-sessional activities as integrated meetings to optimize resources if available;
18. Dissolve the IOWave20 Task Team;
19. Dissolve the Task Team on Tsunami Preparedness for a Near-field Tsunami Hazard.

Requests Working Group 1 to:

1. Address the recommendations of the 2018 Capacity Assessment of Tsunami Preparedness in the Indian Ocean;
2. Follow up the recommendations contained in the IOWave20 Exercise Report;
3. Update the Probabilistic Tsunami Hazard Assessment (PTHA) for the whole Indian Ocean in collaboration with relevant experts from the Member States, based on recent PTHA developed for the North-West Indian Ocean under the UNESCAP funded project “Strengthening Tsunami Early warning in the North-West Indian Ocean Through Regional Cooperation”;
4. Develop community education materials in collaboration with IOTIC on the natural warnings signs for tsunamis generated by non-seismic and complex sources;
5. Develop guidance on Tsunami Ready indicators required for critical infrastructure (ports, harbours, airports, power stations, hospitals, etc.) to present to ICG and TOWS-WG Task Team Disaster Management & Preparedness (TT DMP) for consideration in the further development of the TRRP;
6. Noting the poor responses to the COVID-19 survey in 2021, provide a sub-nation case study to the 14th Session of the ICG to develop greater awareness of the issues and importance of preparedness to other Member States;

7. Noting the achievement of two Special Issues of IJDRBE published in 2020 and 2021, discuss a possible topic for the next special issue related to warning and mitigation and UN ODTP that can include all ocean basins;
8. Noting the UN ODTP definition “The goal of an early warning system is the protection of life, as well as livelihoods”, and further noting one of the two main goals of the UN Ocean Decade is that 100% of communities at risk from tsunamis be prepared and resilient through programmes like Tsunami Ready or other similar programmes implemented by the Member States”. Working Group 1 needs to discuss the following issues:
    a) What is Community?
    b) How many Communities are at Risk from Tsunami?
    c) Are public awareness and educational activities conducted?
    d) Are public awareness and response tested and exercised?
    e) Institutionalizing Tsunami Awareness and Response?

Requests Working Group 2 to:

1. Address the recommendations of the 2018 Capacity Assessment of Tsunami Preparedness in the Indian Ocean;
2. Follow up the recommendations contained in the IOWave20 Exercise Report;
3. Investigate methods of detection and threat assessment of non-seismic and complex source tsunami events, including volcanoes and landslide events;
4. Explore possible new tsunami-detection technologies such as pressure sensors attached to undersea communications cables;
5. Extend the TSP services to include tsunamis generated by non-seismic and complex sources;
6. Adopt the updated IOTWMS TSP Service Definition Document (Version 5) and request the TSPs to conform to it;
7. Implement further the TOWS-WG request on TSP messages for the maritime community;
8. Assist the implementation of the UNESCO-IOC TRRP;
9. Replace the task to assist TSPs with the task to assist NTWCs with their implementing CAP, mobile applications, and social media for effective dissemination of national tsunami warning information;
10. Develop guideline of best practice to share with NTWCs about how to integrate tsunami into the multi-hazard early warning approach or system for mutual benefits;
11. Include an additional one-day session on Tsunami Warning Centre and Seismic Network Operations as part of all future Standard Operating Procedure (SOP) training;

Requests new Working Group 3 to:

1. Address the recommendations of the 2018 Capacity Assessment of Tsunami Preparedness in the Indian Ocean;
2. Follow up the recommendations contained in the IOWave20 Exercise Report;

3. Provide guidance on tsunami hazard and risk assessment, including for tsunamis generated by non-seismic and complex sources in collaboration with Working Group 1;
4. Develop guidelines on how to nationally initiate UNESCO-IOC TRRP and similar initiatives;
5. Facilitate coordination and sharing of experiences between Member States on implementation of UNESCO-IOC TRRP through the Member State Tsunami Ready Focal Points (TRFPs);
6. Assist Working Group 1 and IOTIC with the sharing and development of community awareness materials, including for tsunamis generated by non-seismic and complex sources;
7. Collaborate with IOTIC to update Member States on UNESCO-IOC TRRP developments and other related initiatives;
8. Collaborate with IOTIC and Secretariat for ICG/IOTWMS to identify capacity development and resource needs of Member States for implementing UNESCO-IOC TRRP;
9. Support UNESCO-IOC Secretariat for the ICG/IOTWMS and UNESCO-IOC IOTIC conduct two training workshops on Standard Operating Procedures, including national warning chain development, in the intersessional period in first half of 2023 and before IOWAVE23, subject to the availability of funding, with one to be conducted in the western region of the Indian Ocean and the other to be conducted in the eastern region of the Indian Ocean.

Requests Regional Working Group for North-West Indian Ocean to:

1. Address the recommendations of the 2018 Capacity Assessment of Tsunami Preparedness in the Indian Ocean;
2. Follow up the recommendations contained in the IOWave20 Exercise Report;
3. Support further strengthening of tsunami warning chains, improvement of SOPs of DMOs and Broadcast Media, and timelines in passing the information between multiple stakeholders;
4. Include complex sources in national tsunami early warnings;
5. Utilise proposed UNESCAP project Phase 2c to develop hazard, inundation and evacuation maps for agreed pilot areas in pathway towards Tsunami Read recognition;
6. Employ unified tsunami modelling approach developed by UNESCAP project;
7. Encourage all Member States to participate at full level (from issuing warnings to the evacuation of the public in selected regions, at least in tsunami-ready pilot areas) in upcoming drills (IOWave Exercise).

Requests Task Team Scientific Tsunami Hazard Assessment of the Makran Subduction Zone to:

1. Address the recommendations of the 2018 Capacity Assessment of Tsunami Preparedness in the Indian Ocean;
2. Support making output from Probabilistic Tsunami Hazard Assessment (PTHA) V1.0 for NWIO region available to all Member States;
3. Begin work on PTHA V2.0 to include tsunami generated from other sources;

4. Explore the possibility of using GNSS and HF Radar data for enhancing national operational tsunami early warning systems;
5. Support more paleo-tsunami studies to help better understand the seismicity of the region, particularly the western Makran Trench;
6. Study the potential consequences of tsunamis generated by mud volcanoes and splay faults, as the near-source regions are becoming industrial hubs due to rapid development in the region;
7. Identify the optimal networks and improve regional data-sharing through bilateral and multilateral arrangements, while also sharing data with TSPs.

Requests new Task Team IOWAVE23 to:

1. Address the recommendations of the 2018 Capacity Assessment of Tsunami Preparedness in the Indian Ocean;
2. Conduct Indian Ocean Wave Exercise (IOWave23) in 2023 noting suggestions from the post-IOWave20 lessons learnt workshop, including an increased focus on participation of Local Disaster Management Offices (LDMO) down to community level and exercising communities recognised or planning to be recognised under the TRRP or similar initiatives;
3. Explore mechanisms where resources are available for participation of international observers with expertise in tsunami warning in countries conducting community evacuations and implementing TRRP and similar initiatives during future IOWave exercises;
4. Conduct IOWAVE23 in Sept/Oct 2023, with three scenarios run one week apart and not on consecutive days, with at least one scenario with major tsunami impacts;
5. Include near-field tsunami scenarios, with scenarios for tsunami generated by non-seismic and complex sources;
6. Support pre- and post-IOWAVE workshops to facilitate planning, conduct, and review of Exercise. exercises in pandemic situation.
7. Encourage Member States to test/verify the UNESCO-IOC Tsunami Ready Indicators during the Exercise;
8. Develop guidelines and manual for conducting virtual table-top exercises.

Requests UNESCO-IOC Secretariat for the ICG/IOTWMS**:**

1. Follow up the recommendations contained in the IOWave20 Exercise Report;
2. In collaboration with UNESCO-IOC IOTIC, follow up the recommendations of the 2018 Capacity Assessment of Tsunami Preparedness in the Indian Ocean, including share a summary table of Member States needs based on the assessment (and other more recent surveys) for Member State to review and provide feedback;
3. Review the previous Member State Survey for Capacity Assessment to develop a subset of questions for Member States to respond to in order to help prepare a status report of the IOTWMS at each ICG session;
4. Through a Circular Letter seek nominations from each Member State for a Tsunami Ready Focal Point (TRFP) to facilitate coordination and implementation of the TRRP and similar initiatives;

5. Survey Member States via Circular Letter, especially considering African States, SIDS and LDCs as high priority, to ascertain if other regional or sub-groups need to be established to facilitate capacity development and regional cooperation;
6. Consult with WMO on GTS issues with public notification of TSP bulletins to avoid relay of older notifications.

Requests the UNESCO-IOC IOTIC to:

1. Follow up the recommendations contained in the IOWave20 Exercise Report;
2. In collaboration with UNESCO-IOC Secretariat for ICG/IOTWMS, follow up the recommendations of the 2018 Capacity Assessment of Tsunami Preparedness in the Indian Ocean;
3. In consultation with the UNESCO-IOC ICG/IOTWMS Secretariat, create a capacity development work plan for the intersessional period, where appropriate utilising the International Training Centre for Operational Oceanography (ITCOocean) operated by INCOIS in India, and the BMKG Training Center in Indonesia that serves as an OTGA Specialized Training Center (STC Indonesia), and STC ITIC in Hawaii;
4. In consultation with the UNESCO-IOC ICG/IOTWMS Secretariat create use the summary table of Member States capacity development requirements presented by UNESCO-IOC Secretariat to ICG/IOTWMS XIII to develop a capacity building work plan focusing on those areas most required by Member States, such as SOP training and community awareness.
5. In consultation with the UNESCO-IOC ICG/IOTWMS Secretariat and new Working Group 3 “Tsunami Ready Implementation”, continue to organize regional workshops such as the Indian Ocean Tsunami Ready Workshop in Nov 2022 as platforms for sharing experience and lessons learnt on the implementation of UNESCO-IOC TRRP in the Indian Ocean.
6. In consultation with the UNESCO-IOC ICG/IOTWMS Secretariat, Working Group 1 and new Working Group 3, develop urgently an online webinar for TRFPs on tools and strategies for implementing Tsunami Ready, supported by a one-page brochure.

Requests UNESCO-IOC TOWS-WG to:

1. Complete and harmonise the KPI Framework for the global tsunami warning and mitigation system to facilitate monitoring and reporting of implementation of the IOTWMS and progress towards Member State goal of 100% of at-risk communities resilient and prepared for tsunamis;
2. Expand the TRRP to also include preparedness with respect to critical infrastructure;
3. Hold the 2nd Symposium in 2024 to coincide with the 20th Commemoration of the Indian Ocean Tsunami of 2004, taking care not to conflict with individual Member State commemorations;
4. Hold the 2nd Symposium together with the planned ICG/IOTWMS symposium in 2024 as one global symposium.

Requests Chair of ICG/IOTWMS to:

1. Discuss at the next TOWS-WG meeting the option of holding the 2nd TOWS-WG Symposium with the ICG/IOTWMS symposium in 2024 to mark the 20th Commemoration of the Indian Ocean Tsunami of 2004 as one global symposium.

Requests the UNESCO-IOC Executive Secretary to:

1. Prepare the Executive Summary Report of the 13th Session of the ICG/IOTWMS within 30 days.

Elects Professor Dwikorita Karnawati as ICG/IOTWMS Chair with Mr E. Pattabhi Rao and Dr Yuelong Miao as Vice-chairs for the next intersessional term commencing at the end of the session;

Expresses its gratitude to the Government of the Republic of Indonesia for kindly hosting the 13th Session of the ICG/IOTWMS in Bali;

Accepts with appreciation the kind offer of the Government of the Republic of Indonesia to host the 14th Session of the ICG/IOTWMS in 2024;

Accepts with appreciation the kind offer of the Sultanate of Oman to host the 15th Session of the ICG/IOTWMS in 2026.

Financial Implications: Extrabudgetary only

Annex 1 to Decision ICG/IOTWMS-XIII.1

Working Group 1
Tsunami Risk, Community Awareness and Preparedness

Terms-of-Reference

Liaise with other working group(s) and task team(s) within the ICG/IOTWMS and with working groups from the other ocean basins through the TOWS-WG to:

1. Assist, develop and strengthen the overall capacity and capability of Member States in tsunami risk assessment and mitigation, community awareness and preparedness, including for tsunamis generated by non-seismic and complex sources.
2. Encourage Member States to mainstream tsunami Disaster Risk Reduction into sustainable development to help achieve resilient communities in the region.
3. Provide advice on any future development of UNESCO-IOC Tsunami Ready Recognition Programme.
4. Support implementation of IOWave Exercises.
5. Identify areas of priority for action following assessments, exercises, and real tsunami events.
6. Provide advice on user requirements and utility of tsunami warning products and services.
7. Provide advice to the UNESCO-IOC Indian Ocean Tsunami Information Centre (IOTIC) on educational, awareness and preparedness materials.
8. Promote collaboration among academia, research institutions and disaster management offices to encourage multidisciplinary and multi sectoral interaction in ensuring tsunami risk knowledge are streamlined to risk reduction strategies.

Activities may include:

1. Monitor, assess and routinely report to the Steering Group and ICG on the status of Tsunami Risk Assessments, Community Awareness and Preparedness in each Member State.
2. Seek resources and coordinate projects to develop guidelines and build capacity in Member States.
3. Support the organsation of workshops and symposiums for training and capability development.
4. Contribute to the conduct of regular exercises of the IOTWMS.
5. Encourage Member States to integrate tsunami risk assessment, community awareness and preparedness within national disaster risk reduction programmes for multi-hazards.
6. Stimulate and share information on best-practices between Member States.
7. Assist with development and application of guidelines on hazard, vulnerability and risk assessment and mitigation, exercises, and post-event surveys.
8. Work closely with Working Group 3 “Tsunami Ready Implementation”, UNESCO-IOC IOTIC, and UNESCO-IOC Secretariat for the ICG/IOTWMS to help develop the capacity of Member States across the Indian Ocean to implement the UNESCO-IOC TRRP or similar initiatives.
9. Work closely with Working Group 2 "Tsunami Detection, Warning and Dissemination" and Working Group 3 “Tsunami Ready Implementation”, UNESCO-IOC IOTIC and UNESCO-IOC Secretariat for OICG/IOTWMS to help develop effective national

tsunami warning chains, warning products, services, Standing Operating Procedures, and warning chains.

10. Under the direction of the Steering Group, assist with national assessments of the IOTWMS performance after each exercise and real tsunami event.

The Working Group will be composed of members nominated by Member States with expertise in disaster management, an invited IOTIC representative, and other invited observers as required, with a chairperson and two vice-chairpersons to be elected by the ICG.

Annex 2 to Decision ICG/IOTWMS-XIII.1

Working Group 2
Tsunami Detection, Warning and Dissemination

Terms-of-Reference

Liaise with other working group(s) and task team(s) within the ICG/IOTWMS and with working groups from the other ocean basins through the TOWS-WG to:

1. Coordinate and strengthen the operational implementation of tsunami detection, warning and dissemination, including for tsunamis generated by non-seismic and complex sources.
2. Support the Tsunami Service Providers (TSPs) delivery of interoperable regional tsunami threat information products to Member States.
3. Support Member States in the development of their national tsunami warning capabilities.
4. Monitor the performance of key observational, warning and communication system components.
5. Support implementation of IOWave Exercises.
6. Identify areas of priority for action following assessments, communications tests, exercises, and real tsunami events.
7. Provide advice on further development of UNESCO-IOC TRRP.
8. Provide advice to the Indian Ocean Tsunami Information Centre (IOTIC) on educational materials about the warning systems and services.
9. In collaboration with UNESCO-IOC IOTIC and UNESCO-IOC Secretariat for ICG/IOTWMS, help strengthen the capacity and capability of Member States.

Activities may include:

1. Help coordinate and facilitate the development and operational implementation of tsunami detection, warning and dissemination systems and procedures within Multi-Hazard Early Warning System (MHEWS) frameworks and systems.
2. Monitor, assess and routinely report to the Steering Group and ICG on the performance of Tsunami Service Providers (TSPs), observational seismic and sea level monitoring networks, communication systems and procedures.
3. Consult with Working Group 1 “Tsunami Risk, Community Awareness and Preparedness” on the requirements and suitability of threat information and warning products.
4. Work closely with Working Group 1 "Tsunami Risk, Community Awareness and Preparedness", Working Group 3 “Tsunami Ready Implementation”, UNESCO-IOC IOTIC and UNESCO-IOC Secretariat for ICG/IOTWMS, to help develop the capacity of Member States across the Indian Ocean to implement the UNESCO-IOC Tsunami Ready Recognition Programme (TRRP) or similar initiatives.

5. Work closely with Working Group 1 "Tsunami Risk, Community Awareness and Preparedness", Working Group 3 “Tsunami Ready Implementation”, UNESCO-IOC IOTIC and UNESCO-IOC Secretariat for ICG/IOTWMS, to develop effective national tsunami warning chains, warning products, services, Standing Operating Procedures, and warning chains.
6. Monitor existing international and national arrangements and provision of real-time data required for tsunami monitoring and warning with regards to seismic, GNSS, sea level and other kinds of measurements and data exchange.
7. Undertake studies to determine warning requirements for seismic and sea level data.
8. Facilitate the ongoing development and benchmarking of tsunami modelling, forecast and verification systems.
9. Contribute to the conduct of regular exercises and communication tests of the IOTWMS.
10. In collaboration with Working Group 1 " Tsunami Risk, Community Awareness and Preparedness ", Working Group 3 “Tsunami Ready Implementation”, UNESCO-IOC IOTIC and UNESCO-IOC Secretariat for ICG/IOTWMS, help to develop, coordinate, and implement training and capacity building programmes for NTWCs, DMOs and Broadcast Media in the Tsunami Warning Services.
11. Develop and maintain relevant documentation, such as the IOTWMS Service Definition and IOTWMS NTWC Users Guide.

The Working Group will be composed of members nominated by Member States, Member State representatives for each ICG-designated TSP, at least two representatives of non-TSP National Tsunami Warning Centres, and invited observers, with a chairperson and one or two vice-chairpersons to be elected by the ICG.

Annex 3 to Decision ICG/IOTWMS-XIII.1

Regional Working Group
North-West Indian Ocean

Terms-of-Reference

Liaise with other working group(s) and task team(s) within the ICG/IOTWMS and with working groups from the other ocean basins through the TOWS-WG to:

1. In collaboration with UNESCO-IOC IOTIC and UNESCO-IOC Secretariat for the ICG/IOTWMS, evaluate capabilities and identify capacity building requirements of Member States in the region for providing end-to-end tsunami warning and mitigation services within the framework of the ICG/IOTWMS and within a multi-hazard framework
2. In collaboration Working Group 1 "Tsunami Risk, Community Awareness and Preparedness", promote and facilitate tsunami hazard and risk assessments and research in the region, including for tsunamis generated by non-seismic and complex sources.
3. In collaboration with Working Group 3 “Tsunami Ready Implementation”, support implementation of UNESCO-IOC TRRP or similar activities across the region to help make at-risk communities resilient and prepared for tsunamis
4. In collaboration with Working Group 3 “Tsunami Ready Implementation”, facilitate sharing of experiences between Member State Tsunami Ready Focal Points (TRFPs) on Tsunami Ready implementation
5. Facilitate cooperation in the establishment and upgrading of seismic, sea level and GNSS stations and networks and communication systems in the region

6. Facilitate the timely sharing of tsunami-related data and information in the region
7. Establish and maintain procedures for National Tsunami Warning Centres (NTWCs) across the region to exchange information on national tsunami warnings, observations, and impacts during events.
8. Support the implementation of IOWAVE Exercises and other similar drills across the region and encourage all Member States to participate at full level (from issuing warnings to the evacuation of the public in selected regions, at least in tsunami-ready pilot regions).

The Group will be composed of members representing NTWC and Tsunami Ready Focal Point from each of the Member States of India, Iran, Oman, Pakistan, United Arab Emirates, and Yemen in the North-West Indian Ocean region and invited observers, with a chairperson and vice-chairperson to be elected.

Annex 4 to Decision ICG/IOTWMS-XIII.1

Steering Group

Terms-of-Reference

Coordinate and integrate the work of ICG/IOTWMS in the inter-sessional periods, as implemented through the ICG's various Working Groups and Task Teams to:

1. Oversee the execution of the Decisions and Recommendations of the ICG.
2. Monitor the overall performance of the IOTWMS.
3. Identify areas of priority for action following assessments, communications tests, exercises, and real tsunami events.
4. Ensure the IOTWMS is implemented in line with the guidance of the TOWS-WG for the harmonisation of global tsunami warning and mitigation systems.
5. Identify and assess resource requirements to support implementation of the IOTWMS.

Activities may include

1. Promote and enhance the institutionalisation of tsunami early warning systems, their implementation, exercises, and maintenance.
2. Develop and maintain the Medium-term Strategy and Outreach Plan.
3. Identify funding priorities for the ICG/IOTWMS Work Plans, including development of Programme and Budget for subsequent inter-sessional period for review by the ICG.
4. Oversee the planning and implementation of ocean wide tsunami exercises and drills.
5. Oversee performance assessment of IOTWMS for real tsunami events, with assistance of UNESCO-IOC IOTIC and ICG/IOTWMS Secretariat through post-event questionnaires to be completed by Member States, for finalisation and distribution within two months after the event.
6. Contribute to the work of the TOWS-WG to coordinate the most effective global implementation and harmonisation of tsunami warning and mitigation systems.

Membership of the Steering Group includes the ICG Chair and Vice Chairs, Chairs and Vice Chairs of the Working Groups, Member State representatives from each TSP and two other NTWCs. Invited observers include a representative from IOTIC, immediate past Chair of the ICG for one term, and other invited observers as required. The Chair of ICG/IOTWMS is the

Chair of the Steering Group. The Steering Group will primarily work offline by correspondence, but will meet in person at least once a year if resources are available.

Annex 5 to Decision ICG/IOTWMS-XIII.1

Working Group 3
Tsunami Ready Implementation

Terms-of-Reference

Liaise with other working group(s) and task team(s) within the ICG/IOTWMS and with working groups from the other ocean basins through the TOWS-WG to:

1. Monitor and evaluate the implementation Tsunami Ready Recognition Programme, National Warning Chains, and related activities to deliver tsunami resilient and prepared communities for the Indian Ocean
2. Provide guidance on tsunami hazard and risk assessment, including for tsunamis generated by non-seismic and complex sources.
3. Provide guidance to Member States on reviewing and enhancing national tsunami warning chains.
4. Provide guidance on how to nationally initiate UNESCO-IOC Tsunami Ready Recognition Programme (TRRP) and similar initiatives
5. Facilitate sharing of experiences between Member State Tsunami Ready Focal Points (TRFPs)
6. Update Member States on UNESCO-IOC TRRP developments and other related initiatives
7. Develop exercise tools and coordinate implementation of IOWAVE Exercises and other drills as required
8. In collaboration with UNESCO-IOC IOTIC and UNESCO-IOC Secretariat for ICG/IOTWMS, identify capacity development and resource needs of Member States to implement TRRP, national tsunami warning chains, and related activities
9. Assist with training programmes of Member States implemented by UNESCO-IOC IOTIC and coordinated by UNESCO-IOC ICG/IOTWMS Secretariat to facilitate enhanced national tsunami warning chains and at-risk communities becoming resilient and prepared for tsunamis
10. Provide an annual report on Tsunami Ready implementation to the Steering Group

Members: WG1 and WG2 and RWG-NWIO chairs, WG2 and WG1 tsunami warning chain relevant experts, ICG/IOTWMS TRRP and exercise experts, Member State Tsunami Ready Focal Points (TRFP), invited experts, IOTIC, Secretariat.

Annex 6 to Decision ICG/IOTWMS-XIII.1

Task Team on Scientific Tsunami Hazard Assessment of the Makran Subduction Zone

Terms-of-Reference

Under the direction of the Regional Working Group North-West Indian Ocean:

1. Draft an agreement document for real-time exchange between Member States of seismic/sea-level/GNSS data in the Makran Subduction Zone (MSZ)

2. Specify optimal number and configuration of seismic/sea-level/GNSS and other observing networks needed for real-time tsunami warning in the MSZ
3. Investigate and report on the credible maximum earthquake magnitude in the Makran Subduction Zone and define a strategy to develop a unified hazard map
4. Investigate and report on the seismicity of the Makran Subduction Zone.
5. Review and report on the status of research into modelling of secondary non-seismic effects tsunamis in Makran for potential use in the IOTWMS

The Task Team will report to the RWG North-West Indian Ocean. Members of the Task Team will include WG-NWIO Member States (India, Iran, Oman, Pakistan, United Arab Emirates, Yemen), representatives of the 3 TSPs (Australia, India, Indonesia), and invited experts from international institutions involved in research of MSZ (GFZ, GTM, etc.)

Annex 7 to Decision ICG/IOTWMS-XIII.1

Task Team on IOWave23

Terms-of-Reference

Under the direction of Working Group 3 “Tsunami Ready Implementation”:

1. Plan and coordinate the next IOWave Exercise (IOWave23), taking on-board suggestions from the post-IOWave20 lessons learnt workshop, including an increased focus on involving Local Disaster Management Offices (LDMOs) down to community level and implementation of IOTR.
2. Prepare the IOWAVE23 Exercise Manual in accordance with the Guideline on "How to Plan. Conduct and Evaluate Tsunami Exercises" (IOC Manuals and Guides No. 58) at least 6 months in advance of the exercise.
3. Prepare the Exercise Report for ICG/IOTWMS-XIV.

The Task Team will report to Working Group 3and work in collaboration with Working Group 1, Working Group 2 and IOTIC, and be composed of members nominated by Member States and representatives from TSPs, with a chairperson and vice-chairperson.

Annex 8 to Decision ICG/IOTWMS-XIII.1

Indian Ocean Tsunami Information Centre

Terms-of-Reference

Goal of IOTIC

The overall goal of IOTIC is to support the UNESCO-IOC ICG/IOTWMS Member States in tsunami risk reduction for Indian Ocean at-risk communities through capacity building in tsunami hazard, awareness, preparedness, education, and mitigation measures.

Objectives

- Strengthening the Indian Ocean (national and regional) tsunami disaster risk reduction and emergency response capacity for an effective tsunami early warning system,

- Supporting preparedness against tsunamis of at-risk communities, especially through the implementation of UNESCO-IOC Tsunami Ready Recognition Programme (TRRP).
- Providing resources in tsunami risk reduction, educational, awareness, and preparedness for the Indian Ocean region.

Terms-of-Reference

1. Help reduce the overall tsunami risk across the Indian Ocean by working closely and in coordination with the UNESCO-IOC ICG/IOTWMS, it's Steering Group, Working Groups, Task Teams, UNESCO-IOC ICG/IOTWMS Secretariat, and the TOWS-WG Task Team on Disaster Management & Preparedness (TT DMP) to:
    a. Contribute to the development of global guidelines in tsunami risk reduction and their implementation in the Indian Ocean.
    b. Maintain close familiarity of the operations and needs of the Indian Ocean Tsunami Warning and Mitigation System and work closely with the Tsunami Service Providers (TSPs), National Tsunami Warning Centres (NTWCs), and Disaster Management Organisations (DMOs) to assist, as needed, with the socialization, promotion, and capacity building required for an effective tsunami emergency response.
    c. In coordination with the UNESCO-IOC ICG/IOTWMS Secretariat and as needed, support the ICG/IOTWMS and it's Working Groups and Task Teams to conduct training programmes, workshops, and seminars.
    d. In collaboration with the UNESCO-IOC ICG/IOTWMS Secretariat develop project proposals and assist with project implementation in support of the ICG/IOTWMS programmes and activities in the Indian Ocean Region.
    e. Manage tsunami post-event performance surveys and compilation of reports in close collaboration with the UNESCO-IOC ICG/IOTWMS Secretariat under the overall direction of the ICG/IOTWMS Steering Group, assisted by the International Tsunami Information Center (ITIC), UNESCO-IOC Tsunami Unit, and teams of experts nominated by the UNESC)-IOC ICG/IOTWMS Steering Group as required

2. Help Member States of the UNESCO-IOC ICG/IOTWMS reduce their tsunami risk by:
    a. Serving as the focal point under the guidance of the UNESCO-IOC ICG/IOTWMS to guide, facilitate, and process the implementation of the UNESCO/IOC Tsunami Ready Recognition Programme (TRRP) in the Indian Ocean.
    b. Serving as the focal point under the guidance of the ICG/IOTWMS, in coordination with the UNESCO-IOC Secretariat, to guide, facilitate, support, and coordinate the activities of the World Tsunami Awareness Day (WTAD) in the Indian Ocean.
    c. Assisting national stakeholders in the overall improvement of tsunami preparedness and effective tsunami emergency response through tsunami risk assessment, warning guidance and emergency response, education and awareness, tsunami mitigation, and the implementation of national initiatives to reach certification against the UNESCO-IOC Tsunami Ready indicators.
    d. Serving as an information resource providing for the development, publication, and distribution of resource materials on tsunami hazard, awareness, preparedness, and education for the Indian Ocean.
    e. Serving as a technical resource and help foster research and its application to strengthen technical and institutional aspects of tsunami preparedness and tsunami emergency response to prevent loss of life and minimize damage to property.

3. Coordinate activities and exchange materials, resources, and information with other Tsunami Information Centres (TICs) of the other ocean basins (Caribbean Tsunami Information Centre (CTIC), International Information Centre (ITIC), and North-East Atlantic

and Mediterranean Seas Tsunami Information Centre (NEAMTIC)) to ensure global consistency and potential use of derived products across all regions.

4. Share information on programmes, activities, and events, as well as information on tsunami education, awareness, and preparedness resources by managing and maintaining the IOTIC Website and social media channels as platforms for information exchange

Governance

The IOTIC is an UNESCO-IOC entity operating under the overall authority of the Executive Secretary of UNESCO-IOC. The day-to-day management is performed by the UNESCO-IOC National Programme Officer stationed in Jakarta under the supervision of the Director of the UNESCO Office Jakarta and the Head of the UNESCO-IOC Tsunami Unit in Paris. The operational and implementation of programmes and activities of IOTIC is in close coordination with the UNESCO-IOC ICG/IOTWMS Secretariat in Perth. The IOTIC reports to each session of the UNESCO-IOC ICG/IOTWMS and to the inter-sessional meetings of the UNESCO-IOC ICG/IOTWMS Steering Group. IOTIC's activities and work plans are guided by and coordinated with the overall needs and requirements of the UNESCO-IOC ICG/IOTWMS, it's Working Groups and Task Teams.

ANNEX III

RECOMMENDATAIONS FOR A NEAR-FIELD TSUNAMI

Thirteenth Session of the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System
(ICG/IOTWMS-XIII)

ICG/IOTWMS Task Team on
Tsunami Preparedness for a Near-Field Tsunami Hazard

Bali, Indonesia, 29 November 2022

General Recommendations

- Self-evacuation is the key to surviving local tsunamis, where we are left with very short time to respond.
  - People must be made aware of natural warning signs so that they can self evacuate.
  - Robust standard operating procedures with clear instructions on when to evacuation, where to, and when it is safe to return.
  - Evacuation maps showing safe and effective routes and clear signage are essential in hazard zones.
  - Improving knowledge of past events, which are powerful lessons.

- Pulbic awareness and preparedness
  - Have effective, comprehensive, and continuing public education programmes.
  - Regular exercises
  - Undertake debriefings and post-event public response analysis.

- Simple warning chains
  - Official warning systems must have simple warning chains.
  - Official warnings should be designed to reinforce natural warnings and strengthen self-evacuation. Research show that people are more likely to act upon information if it comes from multiple sources.
  - Target releasing warning quickly (within 10 minutes). The best practice is to issue withing 5 to 10 minutes for a local-source tsunami based on the best information available at the time.
  - First warning to be conservative considering the error bar. Sometimes it may be the only only the public will receive due to subsequent communication and power outages.
  - Regular warning updates to convey new information.
  - All Clear / Cancellation: Because warnings need to be early and conservative, the chance of false alarms is high. Having procedures to quickly step back from the warning state are important but doing so too early has caused issues in the past.
  - People must know not to wait for an official warning before evacuation.

Recommendations to Member States:

- Ensure participation of high-level representatives at regional meetings to discuss and reflect on national strategies for tsunami early warning, warning chain, and community preparedness in the context of near-field tsunamis.

- Set-up National Working Groups (if not convened yet) to discuss and revise national strategies for tsunami early warning, warning chains, and capacity building.

- Adapt related standard operating procedures with end-to-end perspective, including specific arrangements and standard operating procedures for media publication.

- Assign members from the National Working Groups to assist with regional standard operating procedures workshops and assure feedback into the national standard operating procedures.

- Establish working relations with relevant public media regarding tsunami warning dissemination and promote the participation of selected representative in the regional media workshops.

- Organize a working process between National Working Grous and media representatives to agree on roles and responsibilities, arrangements, and procedures for warning dissemination by the media on a high priority basis.

- Provision of necessary human and financial resources to run the agreed arrangements and procedurs.

ANNEX IV

LIST OF PARTICIPANTS

ICG/IOTWMS OFFICERS

Prof. Dwikorita KARNAWATI
Chair of ICG/IOTWMS
Director General of BMKG
Agency for Meteorology Climatology and Geophysics (BMKG)
P.O. Box 3540 Jkt.
DKI Jakarta 10720
Indonesia
Email: dwiko@bmkg.go.id

Mr E Pattabhi RAMA RAO
Vice-Chair of ICG/IOTWMS
Scientist-F
Indian National Centre for Ocean Information Services
"Ocean Valley", Pragathi Nagar (BO), Nizampet (SO)
Hyderabad Telangana 500 090
India
Email: pattabhi@incois.gov.in

Heads of Delegation

AUSTRALIA

Mr Piero CHESSA
Group Executive
Bureau of Meteorology
700 Collins Street, Docklands
Melbourne VIC 3001
Australia
Email: piero.chessa@bom.gov.au

BANGLADESH

Mr Md Momenul Islam
Meteorologist
Seismic Observatory and Research Center
Bangladesh Meteorological Department
Agargaon, Dhaka 1207
Bangladesh
Email: momenulislam799@hotmail.com

COMOROS

Mr Ahmed Youssouf
Director
National Agency of Civil Aviation and Meteorology
Route d'Itsambouni
Moroni
Comoros
Email: ayoussouf3@gmail.com

FRANCE

Ms Patricia Salerno
Head of Weather Forecasting Department
Météo-France - Interregional Direction for Indian Ocean
50 Boulevard du Chaudron
97490 Sainte-Clotilde
Réunion
Email: patricia.salerno@meteo.fr

INDIA

Mr E Pattabhi RAMA RAO
Vice-Chair of ICG/IOTWMS
Scientist-F
Indian National Centre for Ocean Information Services
"Ocean Valley", Pragathi Nagar (BO), Nizampet (SO)
Hyderabad Telangana 500 090
India
Email: pattabhi@incois.gov.in

INDONESIA

Dr Suko Prayitno ADI
Deputy Director General for Geophysics
Agency for Meteorology Climatology and Geophysics (BMKG)
P.O. Box 3540 Jkt.
DKI Jakarta 10720
Indonesia
Email: sukoprayito1963@gmail.com

ISLAMIC REPUBLIC OF IRAN

Dr Mortaza TAVAKOLI
Director
Iranian National Institute for Oceanography and Atmospheric Science
No.3 Etemad Zadeh St.
Tehran 014155-4781

Islamic Republic of Iran
Email: inioas@inio.ac.ir

KENYA

Dr Phillip SAGERO
Principal Meteorologist
Oceanography & Marine Services
Kenya Meteorological Department
Dagorretti Corner, Ngong' Road
Nairobi 00100
Kenya
Email: phsagero@gmail.com

MADAGASCAR

Prof. Solofoarisoa RAKOTONIAINA
Director
Institute and Observatory of Geophysics in Antananarivo (IOGA)
P.O. Box 3843
101 Antananarivo
Madagascar
Email: solofoarisoa@gmail.com

MALAYSIA

Ms Azahani Abd AZIZ
Director of Technical Weather and Geophysics Division
Malaysian Meteorological Department
Jalan Sultan
Petaling Jaya Selangor 46667
Malaysia
Email: azahani@met.gov.my

MALDIVES

Mr Umar Moosa Fikry
Deputy Chief Executive
National Disaster Management Authority
G.Rihijehi Koshi, Ameenee Magu
Male'
Republic of Maldives
Email: umar.fikry@ndma.gov.mv

MYANMAR

Dr Kyaw Moe Oo
Department of Meteorology and Hydrology
No. 50, Kaba-Aye Pagoda Road
Mayangone Township
Nay Pyi Taw
Myanmar
Email: kyawmoeoo39@gmail.com

OMAN

Mr Abdullah ALKHADOURI
Acting Director General of Meteorology
Directorate General of Meteorology & Air Navigation
P.O. Box 1
Muscat
Oman
Email: a.alkhadouri@met.gov.om

PAKISTAN

Mr Ameer HYDER
National Seismic Monitoring and Tsunami Early Warning Centre
Pakistan Meteorological Department
Karachi
Pakistan
Email: free2hyder@yahoo.com

SEYCHELLES

Mr Robert ERNESTA
Director General
Disaster Risk Management Division
P.O Box 445
Victoria, Mahe
Seychelles
Email: robert.ernesta@drmd.gov.sc

SRI LANKA

Maj Gen Sudantha RANASINGHE
Director General
Disaster Management Centre
3rd, 4th Floor, 120/2 Vidya Mawatha
Colombo 00700
Sri Lanka
Email: dg@dmc.gov.lk

UNITED ARAB EMIRATES

Mr Khalifa ALEBRI
Head Of Tsunami Early Warning Center
National Center of Meteorology
19th Street
Al Shawamekh
United Arab Emirates
Email: kalebri@ncms.ae

Delegates of ICG/IOTWMS Member States

AUSTRALIA

Dr Gareth DAVIES
Vice-Chair of ICG/IOTWMS WG-1
Tsunami Scientist
Geoscience Australia
Cnr Jerrabomberra Ave and Hindmarsh Drive
Symonston
Canberra ACT 2609
Australia
Email: gareth.davies@ga.gov.au

Dr Robert GREENWOOD
Technical Lead Tsunami
Bureau of Meteorology
700 Collins Street, Docklands
Melbourne VIC 3001
Australia
Email: robert.greenwood@bom.gov.au

Dr Yuelong MIAO
Alternate Head of Delegation
Chair of ICG/IOTWMS WG-2
Co-Director of Joint Australian Tsunami Warning Centre
Bureau of Meteorology
700 Collins Street, Docklands
Melbourne VIC 3001
Australia
Email: yuelong.miao@bom.gov.au

Ms Adrienne MOSELEY
Co-Director of Joint Australian Tsunami Warning Centre
Director of National Earthquake Alerts Centre
Geoscience Australia
Cnr Jerrabomberra Ave and Hindmarsh Drive
Symonston
Canberra ACT 2609
Australia
Email: adrienne.moseley@ga.gov.au

BANGLADESH

Mr Md Rubyet Kabir
Meteorologist
Bangladesh Meteorological Department
Agargaon, Dhaka 1207
Bangladesh
Email: nobel74@gmail.com

COMOROS

Ms An-Inaya Bintie ABDOURAZAKOU
Technician
National Agency of Civil Aviation and Meteorology
Route d'Itsambouni
Moroni
Comoros
Email: masoibrah1@yahoo.fr

Mr Saifou-Dine ALIANI TOIHA
Alternate Head of Delegation
Head of Forecasting Department
National Agency of Civil Aviation and Meteorology
Route d'Itsambouni
Moroni
Comoros
Email: alianitoiha@yahoo.fr

INDIA

Dr Srinivasa Kumar TUMMALA
Director
Indian National Centre for Ocean Information Services
"Ocean Valley", Pragathi Nagar (BO),
Nizampet (SO)
Hyderabad Telangana 500 090
India
Email: srinivas@incois.gov.in

Mr Ajay Kumar BANDELA
Indian National Centre for Ocean Information Services
"Ocean Valley", Pragathi Nagar (BO),
Nizampet (SO)
Hyderabad Telangana 500 090
India
Email: ajay@incois.gov.in

Mr TNC KARTHIK
Indian National Centre for Ocean Information Services
"Ocean Valley", Pragathi Nagar (BO),
Nizampet (SO)
Hyderabad Telangana 500 090
India
Email: karthik.tnc@incois.gov.in

Mr M Nagaraja KUMAR
Indian National Centre for Ocean Information Services
"Ocean Valley", Pragathi Nagar (BO), Nizampet (SO)
Hyderabad Telangana 500 090
India
Email: raja@incois.gov.in

Ms V Sunanda MANNEELA
Vice-Chair of ICG/IOTWMS WG-NWIO
Indian National Centre for Ocean Information Services
"Ocean Valley", Pragathi Nagar (BO), Nizampet (SO)
Hyderabad Telangana 500 090
India
Email: sunanda@incois.gov.in

Dr TM Balakrishnan NAIR
Indian National Centre for Ocean Information Services
"Ocean Valley", Pragathi Nagar (BO), Nizampet (SO)
Hyderabad Telangana 500 090
India
Email: bala@incois.gov.in

Dr Dipankar SAIKIA
Indian National Centre for Ocean Information Services
"Ocean Valley", Pragathi Nagar (BO), Nizampet (SO)
Hyderabad Telangana 500 090
India
Email: dipankar.s@incois.gov.in

Dr K Siva SRINIVAS
Indian National Centre for Ocean Information Services
"Ocean Valley", Pragathi Nagar (BO), Nizampet (SO)
Hyderabad Telangana 500 090
India
Email: sivasrinivas.k@incois.gov.in

INDONESIA

Ms Neng ALIYA
International Cooperation
Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG)
Jl. Angkasa 1 No.2
DKI Jakarta 10610
Indonesia
Email: neng.alia@bmkg.go.id

Ms Suci Dewi ANUGRAH
Sub Coordinator of Earthquake Mitigation
Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG)
Jl. Angkasa 1 No.2
DKI Jakarta 10610
Indonesia
Email: suci.dewi.sda@gmail.com

Dr DARYONO
Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG)
Jl. Angkasa 1 No.2
DKI Jakarta 10610
Indonesia
Email: daryonobmkg@gmail.com

Mr Yedi DERMADI
Earthquake and Tsunami Warning Center
Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG)
Jl. Angkasa 1 No.2
DKI Jakarta 10610
Indonesia
Email: ydermadi@yahoo.com

Ms Anni Arumsari FITRIANY
Coordinator for Cooperation Affairs
Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG)
Jl. Ankara 1 No.2
DKI Jakarta 10610
Indonesia
Email: anni.arumsari@bmkg.go.id

MrIndra GUNAWAN
Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG)
Jl. Angkasa 1 No.2
DKI Jakarta 10610
Indonesia
Email: indra.gunawan@bmkg.go.id

Ms HIDAYANTI
Sub Coordinator of Tsunami Mitigation
Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG)
Jl. Angkasa 1 No.2
DKI Jakarta 10610
Indonesia
Email: yanti.0918@gmail.com

Ms Tri HANDAYANI
Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG)
Jl. Angkasa 1 No.2
DKI Jakarta 10610
Indonesia
Email: okkechayank@gmail.com

Admiral Musa JULIUS
Earthquake and Tsunami Mitigation Division Staff
Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG)
Jl. Angkasa 1 No.2
DKI Jakarta 10610
Indonesia
Email: admiralmusajulius@yahoo.com

Dr KARYONO
Vice-Chair of ICG/IOTWMS WG-2
Agency for Meteorology Climatology and Geophysics (BMKG)
P.O. Box 3540 Jkt.
DKI Jakarta 10720
Indonesia
Email: karyonosu@gmail.com

Cahyo NUGROHO
Head of Tsunami Mitigation Sub Division
Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG)
Jl. Angkasa 1 No.2
DKI Jakarta 10610
Indonesia
Email: cahyo.nugroho@bmkg.go.id

Dr Sugeng PRIBADI
Agency for Meteorology Climatology and Geophysics (BMKG)
P.O. Box 3540 Jkt.
DKI Jakarta 10720
Indonesia
Email: sugengphd52@gmail.com

Dr Harkunti RAHAYU
Chair of ICG/IOTWMS WG-1
Bandung Institute of Technology
Campus
Jl. Ganesha no. 10
Bandung West Java 40132
Indonesia
Email: harkunti@gmail.com

Ms Evi RUMONDANG
Agency for Meteorology Climatology and Geophysics (BMKG)
P.O. Box 3540 Jkt.
DKI Jakarta 10720
Indonesia

Dr Andi Eka SAKYA
INDONESIA
Email: andi.eka.sakya@gmail.com

Mr Urip SETIYONO
Head of Data Observation & Quality of Earthquake and Tsunami Division
Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG)
Jl. Angkasa 1 No.2
DKI Jakarta 10610
Indonesia
Email: usetiyono08@gmail.com

Mr Rahmat TRIYONO
Head of Earthquake and Tsunami Centre
Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG)
Jl. Angkasa 1 No.2
DKI Jakarta 10610
Indonesia
Email: rahmat.triyono@gmail.com

Arief TYASTAMA
Agency for Meteorology Climatology and Geophysics (BMKG)
P.O. Box 3540 Jkt.
DKI Jakarta 10720
Indonesia

Mrs WENIZA
Chair of ICG/IOTWMS TT-IOWave20
Vice-Chair of ICG/IOTWMS TT-Near-Field
Head of Tsunami Mitigation Sub Division
The Agency for Meteorology, Climatology and Geophysics, Indonesia
Head Office
Jl. Angkasa 1 No.2
Kemayoran
Jakarta Pusat Jakarta 10720
Indonesia
Email: weniza@bmkg.go.id

ISLAMIC REPUBLIC OF IRAN

Ms Fahimeh FOROUGHI
Head International Cooperation Office
Iranian National Institute for Oceanography and Atmospheric Science

No.3 Etemad Zadeh St.
Tehran 014155-4781
Islamic Republic of Iran
Email: fahimeh.foroughi@gmail.com

Dr Ali KHOSHKHOLGH
Vice-Chair of ICG/IOTWMS TT-IOWave20
Head Iranian National Center for Ocean Hazards
Iranian National Institute for Oceanography and Atmospheric Science
No.3 Etemad Zadeh St.
Tehran 014155-4781
Islamic Republic of Iran
Email: tahakhoshkholgh@gmail.com

KENYA

Mr Phillip OKELLO
Alternate Head of Delegation
Kenya Meteorological Department
Dagorretti Corner, Ngong' Road
Nairobi 00100
Kenya
Email: koderaphillps@yahoo.com

MADAGASCAR

Mr Ramarolahy Rina ANDRIANASOLO
NTWC Staff
Institute and Observatory of Geophysics in Antananarivo (IOGA)
P.O. Box 3843
101 Antananarivo
Madagascar
Email: rinaranamana@gmail.com

MALAYSIA

Mr Zaidi Zainal ABIDIN
Principal Assistant Director of National Weather and Geophysics Operation Center
Malaysian Meteorological Department
Jalan Sultan
Petaling Jaya Selangor 46667
Malaysia
Email: zaidi@met.gov.my

MALDIVES

Ms SAFEENAZ
National Disaster Management Authority
G. Rihijehi Koshi, Ameenee Magu
Male'
Republic of Maldives
Email: safeenaz.hassan@ndma.gov.mv

MYANMAR

Dr Yin Myo Min Htwe
Deputy Director
Department of Meteorology and Hydrology
No. 50, Kaba-Aye Pagoda Road
Mayangone Township
Nay Pyi Taw
Myanmar
Email: jianyou.wu007@gmail.com

OMAN

Mr Khalid ALWAHAIBI
Acting Director of Forecasting & EWS
Directorate General of Meteorology & Air Navigation
P.O. Box 1
Muscat
Sultanate of Oman
Email: k.alwahaibi@met.gov.om

SEYCHELLES

Ms Véronique PHILOE
Senior Disaster Management Officer
Disaster Risk Management Division
P.O Box 445
Victoria, Mahe
Seychelles
Email: Veronique.Philoe@drmd.gov.sc

SRI LANKA

Mr Sunil JAYAWEERA
Director (Preparedness)
Disaster Management Centre
3rd, 4th Floor, 120/2 Vidya Mawatha
Colombo 00700
Sri Lanka
Email: suniljayaweera@dmc.gov.lk

Brig Anil PERERA
Disaster Management Centre
3rd, 4th Floor, 120/2 Vidya Mawatha
Colombo 00700
Sri Lanka
Email: direoc@dmc.gov.lk

UNITED ARAB EMIRATED

Dr Badr ALAMERI
Seismologist
National Center of Meteorology
19th Street
Al Shawamekh
United Arab Emirates
Email: BAlameri@ncms.ae

Dr Ali MEGAHED
Senior Seismic Engineer
National Center of Meteorology
19th Street
Al Shawamekh
United Arab Emirates
Email: amegahed@ncms.ae

Delegates of UN Organisations

United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)

Ms Temily BAKER
Programme Management Officer
Disaster Risk Reduction Section (DRS)
Information and Communications Technology and Disaster Risk Reduction Division (IDD)
United Nations Economic and Social Commission for Asia and the Pacific
United Nations Building, Rajadamnern Nok Avenue
Bangkok 10200
Thailand
Email: temily.baker@un.org

Observers

AUSTRALIA

Ms Sarah Crowley
Manager Marine and Antarctic and Environmental Prediction Services
Bureau of Meteorology
700 Collins Street, Docklands
Melbourne VIC 3001
Australia
Email: sarah.crowley@bom.gov.au

GERMANY

Mr Harald SPAHN
Consulting Services & Training
Disaster Risk Reduction
Dwaspadd 15
26689 Apen
Germany
Email: harald.spahn@web.de

INDONESIA

Mr. Tribowo KRISWINARSO
Agency for Meteorology Climatology and Geophysics (BMKG)
P.O. Box 3540 Jkt.
DKI Jakarta 10720
Indonesia
Email: tribowokriswinarso@gmail.com

ISLAMIC REPUBLIC OF IRAN

Dr Mohammad MOKHTARI
Chair of ICG/IOTWMS WG-NWIO
Director of National Center for Earthquake Prediction
Seismotectonics
International Institute of Seismology and Earthquake Engineering
P.O. Box: 19537-14453
Tehran
Islamic Republic of Iran
Email: m_7_mokhtari@yahoo.com

OMAN

Mr Said AL-HARTHY
Directorate General of Meteorology & Air Navigation
P.O. Box 1
Muscat
Sultanate of Oman
Email: s.alharthy@met.gov.om

IOC Secretariat

Mr Rick BAILEY
Head of ICG/IOTWMS Secretariat
UNESCO-IOC Perth Regional Programme Office
WA 6872 PO Box 1370, West Perth
Australia
Email: r.bailey@unesco.org

Ms Nora GALE
Assistant Programme Specialist
ICG/IOTWMS Secretariat
UNESCO-IOC Perth Regional Programme Office
WA 6872 PO Box 1370, West Perth
Australia
Email: n.gale@unesco.org

Mr Ardito M. KODIJAT
Head of the Indian Ocean Tsunami Information Centre
UNESCO Office Jakarta
Jl. Galuh II no 5
Kebayoran Baru
Jakarta Selatan DKI 12110
Indonesia
Email: a.kodijat@unesco.org

ANNEX V

LIST OF ACRONYMS

BMKG	Indonesian Agency for Meteorology, Climatology and Geophysics
CAP	Common Alerting Protocol
CFZ	Coastal Forecast Zone
COVID	Coronavirus Disease
CTBTO	Comprehensive Nuclear Test-Ban Treaty Organization
DART	Deep-ocean Assessment and Reporting of Tsunamis
DBCP	Data Buoy Cooperation Panel
G20	Group of Twenty
GNSS	Global Navigation Satellite System
GPDRR	Global Platform for Disaster Risk Reduction
GTS	Global Telecommunication System
ICG	Intergovernmental Coordination Group
ICL	International Consortium on Landslides
IGCP	International Geoscience and Geoparks Programme
IHO	International Hydrographic Organization
IJDRBE	International Journal of Disaster Resilience in the Built Environment
InaTEWS	Indonesia Tsunami Early Warning System
INA-TNT	Indonesia Tsunami Non-Tectonic
INCOIS	Indian National Centre for Ocean Information Services
IN-MHEWS	International Network for Multi Hazard Early Warning Systems
IOC	Intergovernmental Oceanographic Commission of UNESCO
IOTIC	Indian Ocean Tsunami Information Centre
IOTWMS	Indian Ocean Tsunami Warning and Mitigation System
IOTWMS-XII	12th session of the ICG/IOTWMS
IOTWMS-XIII	13th session of the ICG/IOTWMS

IOTWMS-XIV	14th session of the ICG/IOTWMS
IOTWMS-XV	15th session of the ICG/IOTWMS
IOWave	Indian Ocean Wave
IOWave20	Indian Ocean Wave 2020
IOWave23	Indian Ocean Wave 2023
ITCOocean	International Training Centre for Operational Oceanography
ITIC	International Tsunami Information Center
JATWC	Joint Australia Tsunami Warning Center
KPI	Key Performance Indicator
LDC	Least Developed Country
LDMO	Local Disaster Mangement Office
NAVAREA	Navigational Area
NTRB	National Tsunami Ready Board
NTWC	National Tsuanmi Warning Center
ODTP	[UN] Ocean Decade Tsunami Programme
PacWave22	Pacific Wave 2022 [Exercise]
PTHA	Probabilistic Tsunami Hazard Assessment
PTWS	Pacific Tsunami Warning Center
SIDS	Small Island Developing State
SMA	Strong Motion Accelerograph
SMART	Sensor Monitoring And Reliable Telecommunications
SMS	Short Message Service
SOP	Standard Operating Procedure
STC	Specialized Training Centre
TNC	Tsunami National Contact
ToR	Terms of Reference
TOWS-WG	Working Group on Tsunami and Other Hazards Related to Sea-Level Warning and Mitigation Systems (UNESCO-IOC)

TPAST	Tsunami Observation and Simulation Terminal
TRFP	Tsunami Ready Focal Point
TRRP	Tsunami Ready Recognition Programme
TSP	Tsunami Service Provider
TT-DMP	[TOWS-WG] Task Team on Disaster Management Preparedness
TT-TWO	[TOWS-WG] Task Team on Tsunami Watch Operations
TWFP	Tsunami Warning Focal Point
UN	United Nations
UNDP	United Nations Development Programme
UNDRR	United Nations Office for Disaster Risk Reduction
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNESCO	United Nations Educational, Scientific and Cultural Organization
WG-1	[ICG/IOTWMS] Working Group 1 on Tsunami Risk, Community Awareness and Preparedness
WG-2	[ICG/IOTWMS] Working Group 2 on Tsunami Detection, Warning and Dissemination
WG-NWIO	[ICG/IOTWMS] Sub-regional Working Group form the Northwest Indian Ocean
WMO	World Meteorological Organization
WTAD	World Tsunami Awareness Day

In this Series *Languages*

Reports of Governing and Major Subsidiary Bodies, which was initiated at the beginning of 1984, the reports of the following meetings have already been issued:

1.	Eleventh Session of the Working Committee on international Oceanographic Data Exchange	E, F, S, R
2.	Seventeenth Session of the Executive Council	E , F, S, R,Ar
3.	Fourth Session of the Working Committee for Training, Education and Mutual Assistance	E, F, S, R
4.	Fifth Session of the Working Committee for the Global Investigation of Pollution in the Marine Environment	E, F, S, R
5.	First Session of the IOC Sub-Commission for the Caribbean and Adjacent Regions	E, F, S
6.	Third Session of the *ad hoc* Task team to Study the Implications, for the Commission, of the UN Convention on the Law of the Sea and the New Ocean Regime	E, F, S, R
7.	First Session of the Programme Group on Ocean Processes and Climate	E, F, S, R
8.	Eighteenth Session of the Executive Council	E, F, S, R, Ar
9.	Thirteenth Session of the Assembly	E, F, S, R, Ar
10.	Tenth Session of the International Co-ordination Group for the Tsunami Warning System in the Pacific	
11.	Nineteenth Session of the Executive Council, Paris, 1986	E, F, S, R, Ar
12.	Sixth Session of the IOC Scientific Committee for the Global Investigation of Pollution in the Marine Environment	E, F, S
13.	Twelfth Session of the IOC Working Committee on International Oceanographic Data Exchange	E, F, S, R
14.	Second Session of the IOC Sub-Commission for the Caribbean and Adjacent Regions, Havana, 1986	E, F, S
15.	First Session of the IOC Regional Committee for the Central Eastern Atlantic, Praia, 1987	E, F, S
16.	Second Session of the IOC Programme Group on Ocean Processes and Climate	E, F, S
17.	Twentieth Session of the Executive Council, Paris, 1987	E, F, S, R, Ar
18.	Fourteenth Session of the Assembly, Paris, 1987	E, F, S, R, Ar
19.	Fifth Session of the IOC Regional Committee for the Southern Ocean	E, F, S, R
20.	Eleventh Session of the International Co-ordination Group for the Tsunami Warning System in the Pacific, Beijing, 1987	E, F, S, R
21.	Second Session of the IOC Regional Committee for the Co-operative Investigation in the North and Central Western Indian Ocean, Arusha, 1987	E, F
22.	Fourth Session of the IOC Regional Committee for the Western Pacific, Bangkok, 1987	E only
23.	Twenty-first Session of the Executive Council, Paris, 1988	E, F, S, R
24.	Twenty-second Session of the Executive Council, Paris, 1989	E, F, S, R
25.	Fifteenth Session of the Assembly, Paris, 1989	E, F, S, R
26.	Third Session of the IOC Committee on Ocean Processes and Climate, Paris, 1989	E, F, S, R
27.	Twelfth Session of the International Co-ordination Group for the Tsunami Warning System in the Pacific, Novosibirski, 1989	E, F, S, R
28.	Third Session of the Sub-Commission for the Caribbean and Adjacent Regions, Caracas, 1989	E, S
29.	First Session of the IOC Sub-Commission for the Western Pacific, Hangzhou, 1990	E only
30.	Fifth Session of the IOC Regional Committee for the Western Pacific, Hangzhou, 1990	E only
31.	Twenty-third Session of the Executive Council, Paris, 1990	E, F, S, R
32.	Thirteenth Session of the IOC Committee on International Oceanographic Data and Information Exchange, New York, 1990	E only
33.	Seventh Session of the IOC Committee for the Global Investigation of Pollution in the Marine Environment, Paris, 1991	E, F, S, R
34.	Fifth Session of the IOC Committee for Training, Education and Mutual Assistance in Marine Sciences, Paris, 1991	E, F, S, R
35.	Fourth Session of the IOC Committee on Ocean Processes and Climate, Paris, 1991	E, F, S, R
36.	Twenty-fourth Session of the Executive Council, Paris, 1991	E, F, S, R
37.	Sixteenth Session of the Assembly, Paris, 1991	E, F, S, R, Ar
38.	Thirteenth Session of the International Co-ordination Group for the Tsunami Warning System in the Pacific, Baja California, 1991	E, F, S, R
39.	Second Session of the IOC-WMO Intergovernmental WOCE Panel, Paris, 1992	E only
40.	Twenty-fifth Session of the Executive Council, Paris, 1992	E, F, S, R
41.	Fifth Session of the IOC Committee on Ocean Processes and Climate, Paris, 1992	E, F, S, R
42.	Second Session of the IOC Regional Committee for the Central Eastern Atlantic, Lagos, 1990	E, F
43.	First Session of the Joint IOC-UNEP Intergovernmental Panel for the Global Investigation of Pollution in the Marine Environment, Paris, 1992	E, F, S, R
44.	First Session of the IOC-FAO Intergovernmental Panel on Harmful Algal Blooms, Paris, 1992	E, F, S
45.	Fourteenth Session of the IOC Committee on International Oceanographic Data and Information Exchange, Paris, 1992	E, F, S, R
46.	Third Session of the IOC Regional Committee for the Co-operative Investigation in the North and Central Western Indian Ocean, Vascoas, 1992	E, F
47.	Second Session of the IOC Sub-Commission for the Western Pacific, Bangkok, 1993	E only
48.	Fourth Session of the IOC Sub-Cornmission for the Caribbean and Adjacent Regions, Veracruz, 1992	E, S
49.	Third Session of the IOC Regional Committee for the Central Eastern Atlantic, Dakar, 1993	E, F
50.	First Session of the IOC Committee for the Global Ocean Observing System, Paris, 1993	E, F, S, R
51.	Twenty-sixth Session of the Executive Council, Paris, 1993	E, F, S, R
52.	Seventeenth Session of the Assembly, Paris, 1993	E, F, S, R
53.	Fourteenth Session of the International Co-ordination Group for the Tsunami Warning System in the Pacific, Tokyo, 1993	E, F, S, R
54.	Second Session of the IOC-FAO Intergovernmental Panel on Harmful Algal Blooms, Paris, 1993	E, F, S
55.	Twenty-seventh Session of the Executive Council, Paris, 1994	E, F, S, R
56.	First Planning Session of the IOC-WMO-UNEP Committee for the Global Ocean Observing System, Melbourne, 1994	E, F, S, R
57.	Eighth Session of the IOC-UNEP-IMO Committee for the Global Investigation of Pollution in the Marine Environment, San José, Costa Rica, 1994	E, F, S
58.	Twenty-eighth Session of the Executive Council, Paris, 1995	E, F, S, R
59.	Eighteenth Session of the Assembly, Paris, 1995	E, F, S, R
60.	Second Session of the IOC-WMO-UNEP Committee for the Global Ocean Observing System, Paris, 1995	E, F, S, R

61.	Third Session of the IOC-WMO Intergovernmental WOCE Panel, Paris, 1995	E only
62.	Fifteenth Session of the International Co-ordination Group for the Tsunami Warning System in the Pacific, Papetee, 1995	E, F, S, R
63.	Third Session of the IOC-FAO Intergovernmental Panel on Harmful Algal Blooms, Paris, 1995	E, F, S
64.	Fifteenth Session of the IOC Committee on International Oceanographic Data and Information Exchange	E, F, S, R
65.	Second Planning Session of the IOC-WMO-UNEP Committee for the Global Ocean Observing System, Paris, 1995	E only
66.	Third Session of the IOC Sub-Commission for the Western Pacific, Tokyo, 1996	E only
67.	Fifth Session of the IOC Sub-Commission for the Caribbean and Adjacent Regions, Christ Church, 1995	E, S
68.	Intergovernmental Meeting on the IOC Black Sea Regional Programme in Marine Sciences and Services	E, R
69.	Fourth Session of the IOC Regional Committee for the Central Eastern Atlantic, Las Palmas, 1995	E, F, S
70.	Twenty-ninth Session of the Executive Council, Paris, 1996	E, F, S, R
71.	Sixth Session for the IOC Regional Committee for the Southern Ocean and the First Southern Ocean Forum, Bremerhaven, 1996	E, F, S,
72.	IOC Black Sea Regional Committee, First Session, Varna, 1996	E, R
73.	IOC Regional Committee for the Co-operative Investigation in the North and Central Western Indian Ocean, Fourth Session, Mombasa, 1997	E, F
74.	Nineteenth Session of the Assembly, Paris, 1997	E, F, S, R
75.	Third Session of the IOC-WMO-UNEP Committee for the Global Ocean Observing System, Paris, 1997	E, F, S, R
76.	Thirtieth Session of the Executive Council, Paris, 1997	E, F, S, R
77.	Second Session of the IOC Regional Committee for the Central Indian Ocean, Goa, 1996	E only
78.	Sixteenth Session of the International Co-ordination Group for the Tsunami Warning System in the Pacific, Lima, 1997	E, F, S, R
79.	Thirty-first Session of the Executive Council, Paris, 1998	E, F, S, R
80.	Thirty-second Session of the Executive Council, Paris, 1999	E, F, S, R
81.	Second Session of the IOC Black Sea Regional Committee, Istanbul, 1999	E only
82.	Twentieth Session of the Assembly, Paris, 1999	E, F, S, R
83.	Fourth Session of the IOC-WMO-UNEP Committee for the Global Ocean Observing System, Paris, 1999	E, F, S, R
84.	Seventeenth Session of the International Coordination Group for the Tsunami Warning System in the Pacific, Seoul, 1999	E, F, S, R
85.	Fourth Session of the IOC Sub-Commission for the Western Pacific, Seoul, 1999	E only
86.	Thirty-third Session of the Executive Council, Paris, 2000	E, F, S, R
87.	Thirty-fourth Session of the Executive Council, Paris, 2001	E, F, S, R
88.	Extraordinary Session of the Executive Council, Paris, 2001	E, F, S, R
89.	Sixth Session of the IOC Sub-Commission for the Caribbean and Adjacent Regions, San José, 1999	E only
90.	Twenty-first Session of the Assembly, Paris, 2001	E, F, S, R
91.	Thirty-fifth Session of the Executive Council, Paris, 2002	E, F, S, R
92.	Sixteenth Session of the IOC Committee on International Oceanographic Data and Information Exchange, Lisbon, 2000	E, F, S, R
93.	Eighteenth Session of the International Coordination Group for the Tsunami Warning System in the Pacific, Cartagena, 2001	E, F, S, R
94.	Fifth Session of the IOC-WMO-UNEP Committee for the Global Ocean Observing System, Paris, 2001	E, F, S, R
95.	Seventh Session of the IOC Sub-commission for the Caribbean and Adjacent Regions (IOCARIBE), Mexico, 2002	E, S
96.	Fifth Session of the IOC Sub-Commission for the Western Pacific, Australia, 2002	E only
97.	Thirty-sixth Session of the Executive Council, Paris, 2003	E, F, S, R
98.	Twenty-second Session of the Assembly, Paris, 2003	E, F, S, R
99.	Fifth Session of the IOC Regional Committee for the Co-operative Investigation in the North and Central Western Indian Ocean, Kenya, 2002 (* Executive Summary available separately in E, F, S & R)	E*
100.	Sixth Session of the IOC Intergovernmental Panel on Harmful Algal Blooms, St. Petersburg (USA), 2002 (* Executive Summary available separately in E, F, S & R)	E*
101.	Seventeenth Session of the IOC Committee on International Oceanographic Data and Information Exchange, Paris, 2003 (* Executive Summary available separately in E, F, S & R)	E*
102.	Sixth Session of the IOC-WMO-UNEP Committee for the Global Ocean Observing System, Paris, 2003 (* Executive Summary available separately in E, F, S & R)	E*
103.	Nineteenth Session of the International Coordination Group for the Tsunami Warning System in the Pacific, Wellington, New Zealand, 2003 (* Executive Summary available separately in E, F, S & R)	E*
104.	Third Session of the IOC Regional Committee for the Central Indian Ocean, Tehran, Islamic Republic of Iran, 21-23 February 2000	E only
105.	Thirty-seventh Session of the Executive Council, Paris, 2004	E, F, S, R
106.	Seventh Session of the IOC-WMO-UNEP Committee for the Global Ocean Observing System, Paris, 2005 (* Executive Summary available separately in E, F, S & R); and Extraordinary Session, Paris, 20 June 2005	E*
107.	First Session of the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWS), Perth, Australia, 3–5 August 2005	E only
108.	Twentieth Session of the Intergovernmental Coordination Group for the Tsunami Warning System in the Pacific, Viña del Mar, Chile, 3–7 October 2005 (* Executive Summary available separately in E, F, S & R)	E*
109.	Twenty-Third Session of the Assembly, Paris, 21–30 June 2005	E, F, S, R
110.	First Session of the Intergovernmental Coordination Group for the Tsunami Early Warning and Mitigation System in the North Eastern Atlantic, the Mediterranean and Connected Seas (ICG/NEAMTWS), Rome, Italy, 21–22 November 2005	E only
111.	Eighth Session of the IOC Sub-commission for the Caribbean and Adjacent Regions (IOCARIBE), Recife, Brazil, 14–17 April 2004 (* Executive Summary available separately in E, F, S & R)	E*
112.	First Session of the Intergovernmental Coordination Group for the Tsunami and other Coastal Hazards Warning System for the Caribbean Sea and Adjacent Regions (ICG/CARIBE-EWS), Bridgetown, Barbados, 10–12 January 2006	E only
113.	Ninth Session of the IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE), Cartagena de Indias, Colombia, 19–22 April 2006 (* Executive Summary available separately in E, F, S & R)	E S*

114.	Second Session of the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWS), Hyderabad, India, 14–16 December 2005	E only
115.	Second Session of the WMO-IOC Joint Technical Commission for Oceanography and Marine Meteorology, Halifax, Canada, 19–27 September 2005 (Abridged final report with resolutions and recommendations)	E, F, R, S
116.	Sixth Session of the IOC Regional Committee for the Western Indian Ocean (IOCWIO), Maputo, Mozambique, 2–4 November 2005 (* Executive Summary available separately in E, F, S & R)	E*
117.	Fourth Session of the IOC Regional Committee for the Central Indian Ocean, Colombo, Sri Lanka 8–10 December 2005 (* Executive Summary available separately in E, F, S & R)	E*
118.	Thirty-eighth Session of the Executive Council, Paris, 20 June 2005 (Electronic copy only)	E, F, R, S
119.	Thirty-ninth Session of the Executive Council, Paris, 21–28 June 2006	E, F, R, S
120.	Third Session of the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWS), Bali, Indonesia, 31 July–2 August 2006 (*Executive Summary available separately in E,F,S & R)	E*
121.	Second Session of the Intergovernmental Coordination Group for the Tsunami Early Warning and Mitigation System in the North Eastern Atlantic, the Mediterranean and Connected Seas (ICG/NEAMTWS), Nice, France, 22–24 May 2006	E only
122.	Seventh Session of the IOC Intergovernmental Panel on Harmful Algal Blooms, Paris, France, 16–18 March 2005 (* Executive Summary available separately in E, F, S & R)	E*
123.	Fourth Session of the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWS-IV), Mombasa, Kenya, 30 February-2 March 2007 (* Executive Summary available separately in E, F, S & R)	E*
124.	Nineteenth Session of the IOC Committee on International Oceanographic Data and Information Exchange, Trieste, Italy, 12–16 March 2007 (* Executive Summary available separately in E, F, S & R)	E*
125.	Third Session of the Intergovernmental Coordination Group for the Tsunami Early Warning and Mitigation System in the North Eastern Atlantic, the Mediterranean and Connected Seas, Bonn, Germany, 7–9 February 2007 (* Executive Summary available separately in E, F, S & R)	E*
126.	Second Session of the Intergovernmental Coordination Group for the Tsunami and other Coastal Hazards Warning System for the Caribbean Sea and Adjacent Regions, Cumaná, Venezuela, 15–19 January 2007 (* Executive Summary available separately in E, F, S & R)	E*
127.	Twenty-first Session of the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System, Melbourne, Australia, 3–5 May 2006 (* Executive Summary available separately in E, F, S & R)	E*
128.	Twenty-fourth Session of the Assembly, Paris, 19–28 June 2007	E, F, S, R
129.	Fourth Session of the Intergovernmental Coordination Group for the Tsunami Early Warning and Mitigation System in the North Eastern Atlantic, the Mediterranean and Connected Seas, Lisbon, Portugal, 21–23 November 2007 (* Executive Summary available separately in E, F, S & R)	E*
130.	Twenty-second Session of the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System, Guayaquil, Ecuador, 17–21 September 2007 (* Executive Summary available in E, F, S & R included)	E*
131.	Forty-first Session of the Executive Council, Paris, 24 June–1 July 2008	E, F, R, S
132.	Third Session of the Intergovernmental Coordination Group for the Tsunami and other Coastal Hazards Warning System for the Caribbean Sea and Adjacent Regions, Panama City, Panama, 12–14 March 2008 (* Executive Summary available separately in E, F, S & R)	E*
133.	Eighth Session of the IOC Intergovernmental Panel on Harmful Algal Blooms, Paris, France, 17–20 April 2007 (* Executive Summary available separately in E, F, S & R)	E*
134.	Twenty-third Session of the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System, Apia, Samoa, 16–18 February 2009 (*Executive Summary available separately in E, F, S & R)	E*
135.	Twentieth Session of the IOC Committee on International Oceanographic Data and Information Exchange, Beijing, China, 4–8 May 2009 (*Executive Summary available separately in E, F, S & R)	E*
136.	Tenth Session of the IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE), Puerto La Cruz, Bolivarian Republic of Venezuela, 22–25 October 2008 (*Executive Summary available separately in E, F, S & R)	E, S*
137.	Seventh Session of the IOC Sub-Commission for the Western Pacific (WESTPAC-VII), Sabah, Malaysia, 26–29 May 2008 (*Executive Summary available separately in E, F, S & R)	E*
138.	Ninth Session of the IOC-WMO-UNEP Committee for the Global Ocean Observing System, Paris, France, 10–12 June 2009 (* Executive Summary available separately in E, F, S & R);	E*
139.	Fifth Session of the Intergovernmental Coordination Group for the Tsunami Early Warning and Mitigation System in the North Eastern Atlantic, the Mediterranean and Connected Seas, Athens, Greece, 3–5 November 2008 (* Executive Summary available separately in E, F, S & R)	E*
140.	Fourth Session of the Intergovernmental Coordination Group for the Tsunami and other Coastal Hazards Warning System for the Caribbean Sea and Adjacent Regions, Fort-de-France, Martinique, France, 2–4 June 2009 (* Executive Summary available separately in E, F, S & R)	E*
141.	Twenty-fifth Session of the Assembly, Paris, 16–25 June 2009	E, F, R, S
142.	Third Session of the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology, Marrakesh, Morocco, 4–11 November 2009	E, F, R, S
143.	Ninth Session of the IOC Intergovernmental Panel on Harmful Algal Blooms, Paris, France, 22–24 April 2009 (* Executive Summary available separately in E, F, S & R)	E*
144.	Fifth Session of the Intergovernmental Coordination Group for the Tsunami and other Coastal Hazards Warning System for the Caribbean Sea and Adjacent Regions, Managua, Nicaragua, 15–17 March 2010 (* Executive Summary available in E, F, S & R)	E*
145.	Sixth Session of the IOC Regional Committee for the Central and Eastern Atlantic Ocean, Accra, Ghana, 28–30 March 2010 (* Executive Summary available in E, F, S & R)	E*
146.	Forty-second Session of the Executive Council; Paris, 15, 19 & 20 June 2009	E, F, R, S
147.	Forty-third Session of the Executive Council; Paris, 8–16 June 2010	E, F, R, S
148.	Sixth Session of the Intergovernmental Coordination Group for the Tsunami Early Warning and Mitigation System in the North Eastern Atlantic, the Mediterranean and Connected Seas, Istanbul, Turkey, 11–13 November 2009 (* Executive Summary available separately in Ar, E, F, S & R)	E*
149.	Seventh Session of the Intergovernmental Coordination Group for the Tsunami Early Warning and Mitigation System in the North Eastern Atlantic, the Mediterranean and Connected Seas, Paris, France, 23–25 November 2010 (* Executive Summary available separately in Ar, E, F, S & R)	E*
150.	Sixth Session of the Intergovernmental Coordination Group for the Tsunami and other Coastal Hazards Warning System for the Caribbean Sea and Adjacent Regions, Santo Domingo, Dominican Republic, 26–29 April 2011 (* Executive Summary available in E, F, S & R)	E*

151.	Twenty-fourth Session of the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System, Beijing, China, 24–27 May 2011 (*Executive Summary in E, F, S & R included)	E*
152.	Twenty-first Session of the IOC Committee on International Oceanographic Data and Information Exchange, Liège, Belgium, 23–26 March 2011 (*Executive Summary available separately in E, F, S & R)	E*
153.	Eighth Session of the IOC Sub-Commission for the Western Pacific (WESTPAC-VIII), Bali, Indonesia, 10–13 May 2010 (*Executive Summary available separately in E, F, S & R)	E*
154.	Tenth IOC Intergovernmental Panel on Harmful Algal Blooms, Paris, France, 12–14 April 2011 (* Executive Summary available separately in E, F, S & R)	E*
155.	Forty-fifth Session of the Executive Council, Paris, 26–28 June 2012 (* Decisions available in E, F, S & R)	E*
156.	Seventh Session of the Intergovernmental Coordination Group for the Tsunami and other Coastal Hazards Warning System for the Caribbean Sea and Adjacent Regions, Willemstad, Curacao, 2–4 April 2012 (*Executive Summary available in E, F, S & R)	E*
157.	Eleventh Session of the IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE), Miami, USA, 17–20 May 2011 (*Executive Summary available separately in E & S)	E, S*
158.	Eight Session of the Intergovernmental Coordination Group for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE EWS-VIII), Trinidad & Tobago, 29 April–1 May 2013 (*Executive Summary available in E, F, S & R)	E*
159.	Twenty-seventh Session of the Assembly, Paris, 26 June–5 July 2013 and Forty-sixth Session of the Executive Council, Paris, 25 June 2013	E, F, R, S
160.	Twenty-fifth Session of the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS), Vladivostok, Russian Federation, 9–11 September 2013 (*Executive Summary in E, F & R)	E*
161.	Ninth Session of the Intergovernmental Coordination Group for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions, US Virgin Islands, 13-15 May 2014 (*Executive Summary available in E, F, S & R)	E*
162.	Forty-seventh Session of the Executive Council, Paris, 1–4 July 2014 (* Decisions available in E, F, S & R)	E*
163.	Ninth Session of the IOC Sub-Commission of the Western Pacific (WESTPAC-IX), Busan, Republic of Korea, 9–12 May 2012	E
164.	Eleventh Session of the Intergovernmental Coordination Group for the Tsunami Early Warning and Mitigation System in the North Eastern Atlantic, the Mediterranean and Connected Seas, 12–14 November 2014, Nicosia, Cyprus (*Executive Summary available in E, F, S & R)	E*
165.	Twenty-sixth Session of the Intergovernmental Coordination Group for the for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS-XXVI), Hawaii, USA, 22–24 April 2015 (*Executive Summary available in E, F, S & R)	E*
166.	Tenth Session of the Intergovernmental Coordination Group for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE-EWS), Philipsburg, Sint Maarten, Kingdom of the Netherlands, 19–21 May 2015 (*Executive Summary available in E, F, S & R)	E*
167.	Tenth Session of the IOC Sub-Commission of the Western Pacific (WESTPAC-X), Phuket, Thailand, 12–15 May 2015	E
168.	Twenty-eighth Session of the Assembly, Paris, 18–25 June 2015	
169.	Twelfth 12th Session of the Intergovernmental Coordination Group for the Tsunami Early Warning and Mitigation System in the North-eastern Atlantic, the Mediterranean and Connected Seas (ICG/NEAMTWS-XII), Dublin, Ireland, 16-18 November 2015 (*Executive Summary available in E, F, S & R)	E*
170.	Eleventh Session of the Intergovernmental Coordination Group for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE EWS-XI), Cartagena, Colombia, 5-7 April 2016 (*Executive Summary available in E, F, S & R)	E*
171.	Tenth Session of the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWS), Muscat, Oman, 24–26 March 2015	E*
172.	Forty-ninth Session of the Executive Council, Paris, 7–10 June 2016 (* Decisions available in E, F, S & R)	E*
173.	Thirteenth Session of the Intergovernmental Coordination Group for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions, Bucharest, Romania, 26–28 September 2016 (*Executive Summary available in E, F, S & R)	E*
174.	Twenty-seventh Session of the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS-XXVII), Tahiti, France, 28-31 March 2017 (*Executive Summary available in E, F, S & R)	E*
175.	Twelfth Session of the Intergovernmental Coordination Group for the Tsunami and other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE-EWS), Puntarenas, Costa Rica, 10–12 May 2017 (*Executive Summary available in E, F, S & R)	E*
176.	Eleventh Session of the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWMS), Putrajaya, Malaysia, 18–20 April 2017 (*Executive Summary available in E, F, S & R)	E*
177.	Fourteenth Session of the Intergovernmental Coordination Group for the Tsunami Early Warning and Mitigation System in the North-eastern Atlantic, the Mediterranean and connected seas (ICG/NEAMTWS), Lisbon, Portugal, 21–23 November 2017 (*Executive Summary available in E, F, S & R)	E*
178.	Twenty-ninth Session of the Assembly, Paris, 21–29 June 2017 and Fiftieth Session of the Executive Council, Paris, 20 June 2017 (*Executive Summary available in E, F, S & R)	E*
179.	Thirteenth Session of the Intergovernmental Coordination Group for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE EWS-XIII), Curaçao, 23–27 April 2018 (*Executive Summary available in E, F, S & R)	E*
180.	Twenty-fifth Session of the IOC Committee on International Oceanographic Data and Information Exchange, Tokyo, 2019 (* Executive Summary available separately in E, F, S & R)	E*
181.	Fifteenth Session of the Intergovernmental Coordination Group for the Tsunami Early Warning and Mitigation System in the North-Eastern Atlantic, the Mediterranean and Connected Seas (ICG/NEAMTWS), Paris, France, 26–28 November 2018 (*Executive Summary available in E, F, S & R)	E*
182.	Twelfth Session of the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWMS), Kish, Islamic Republic of Iran, 9–12 March 2019 (*Executive Summary available in E, F, S, R)	E*
183.	Twenty-eighth Session of the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS-XXVIII), Montelimar, Nicaragua, 2–5 April 2019 (*Executive Summary available in E, F, S & R)	E*
184.	Fourteenth session of the Intergovernmental Coordination Group for the Tsunami and other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE-EWS-XIV/3), Punta Leona, Costa Rica, 8–11 April 2019 (*Executive Summary available in E, F, S & R)	E*
185.	Fifth Session of the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWS-V/3), Putrajaya, Malaysia, 8–10 April 2008	E

186.	Sixth Session of the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWS-VI/3), Hyderabad, India, 7–9 April 2009	E
187.	Eighth Session of the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWS-VIII/3), Melbourne, Australia, 3–6 May 2011	E
188.	Fifty-first Session of the Executive Council, Paris, 3–6 July 2018 (* Decisions available in E, F, S & R)	E*
189.	Sixteenth Session of the Intergovernmental Coordination Group for the Tsunami Early Warning and Mitigation System in the North-Eastern Atlantic, the Mediterranean and Connected Seas (ICG/NEAMTWS), Cannes, France, 2-4 December 2019 (* Executive Summary available in E, F, S & R)	E*
190.	Fifteenth Session of the Intergovernmental Coordination Group for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE EWS-XV), 27–29 April 2021 (online) (* Executive Summary available in E, F, S & R)	E*
191.	Twenty-ninth Session of the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS-XXIX), Online,1–2 and 7–8 December 2021 (*Executive Summary available in E, F, S & R)	E*
192.	Thirtieth Session of the IOC Assembly, Paris, 26 June–4 July 2019 and Fifty-second session of the IOC Executive Council, Paris, 25 June 2019 (*Summary report available in E, F, S & R)	E*
193.	Fifty-third Session of the Executive Council, Online, 3–9 February 2021 (* Decisions available in E, F, S & R)	E*
194.	Thirty-first Session of the IOC Assembly, Online, 14–25 June-2021	E F S R
195.	Tenth Session of the International Co-ordinating Group for the Tsunami Warning System in the Pacific, Sidney, Canada, 1–3 August 1985	E
196.	Inter-Sessional Meeting of the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWMS), online, 23–24 November 2021	E
197.	Twenty-ninth Session of the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS), 1–2 & 7–8 December 2021 (online)	E*
198.	Sixteenth Session of the Intergovernmental Coordination Group for the Tsunami and other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE-EWS), San José, Costa Rica, 25–28 April 2023	E (summary in F & S)
199.	Summary Report of the Eighteenth Session of the Intergovernmental Coordination Group for the Tsunami Early Warning and Mitigation System in the North-eastern Atlantic, the Mediterranean and Connected Seas (ICG/NEAMTWS-XVIII), 6–8 February 2024, UNESCO Headquarters, Paris	E (summary in F & S)
200.	Summary Report of the Thirteenth Session of the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWMS), 28 November–1 December 2022, Bali, Indonesia	E (summary in F & S)