



Intergovernmental Coordination Group for the Tsunami and other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE-EWS)

Tenth Session

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**Intergovernmental Coordination
Group for the Tsunami and other
Coastal Hazards Warning System
for the Caribbean and Adjacent
Regions (ICG/CARIBE-EWS)**

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Executive summary

The 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-X) was held in Philipsburg, Sint Maarten, from 19 to 21 May 2015, hosted by the Government of Sint Maarten. The meeting was attended by 56 participants from 19 Caribbean countries and territories and 4 organizations: Caribbean Tsunami Information Center (CTIC), Puerto Rico Seismic Network ([PRSN](#)), [UNAVCO](#), and the University of the West Indies Seismic Research Centre ([SRC](#));

The ICG recognized the Caribbean Tsunami Information Center (CTIC) essential function in the region and its potential to attract funding for preparedness projects and **acknowledged** the contribution of Barbados to host CTIC, and the continuing efforts of Venezuela and France to realize the support as promised;

The ICG encouraged Member States to have this priority addressed by the Director General during the UNESCO General Conference and **recommended** the U.S. contribution of the Caribbean Tsunami Warning Program ([CTWP](#)) be recognized as a formal component of CTIC; fulfilling parts of the ToR that the CTIC is currently unable to accomplish with its resource constraints;

The ICG recognized the efforts of the Continuously Operating Caribbean GPS Observational Network ([COCONet](#)) and the Trans-boundary, Land and Atmosphere Long-term Observational and Collaborative Network ([TLALOCNet](#)) projects to deploy continuous GPS networks and the installation of three GNSS data centres in the region, and **encouraged** GNSS network operators to contribute continuous data to COCONet and help COCONet to maintain an inventory of the existing continuous real-time GNSS stations in the region;

The ICG endorsed [NASA](#)'s and [NOAA](#)'s exploration of a GNSS-based tsunami early warning capability throughout the Caribbean and Adjacent Regions;

The ICG requested the CTWP to continue producing monthly maps and reports based on current CARIBE-EWS sea-level and seismic stations and available real-time stations in the region, and **acknowledged** the effort of Aruba for offering to host a sea-level data center for the region;

The ICG urged Member States that do not have tsunami evacuation maps to develop a preliminary tsunami evacuation map based on a fixed-height in accordance to the guidelines. It also **recommended** Member States with tsunami inundation maps and no tsunami evacuation maps to continue the efforts underway to keep working towards the development of tsunami evacuation maps;

The ICG decided that Exercise Caribe Wave 16 will have two scenarios, a Northern Hispaniola and a Northern Venezuela event and **further decided** that the exercise takes place on Thursday, 17 March 2016 and commences at 1500 UTC and 1400 UTC for the Hispaniola and Venezuelan scenarios, respectively. The **ICG also recommended** that the Task Team Caribe Wave 16 begin to consider volcanic or landslide tsunami sources as potential scenarios for future exercises;

The ICG acknowledged the scientific and technological advances that have been made since the formation of the CARIBE-EWS to better forecast tsunami impacts in real time and to present forecast information graphically; and **accepted** that the Enhanced Products do not contain alert levels and that Member States will now be fully responsible for tsunami alerts in their own countries and territories according to their Standard Operating Procedures (SOPs);

The ICG agreed with the Pacific Tsunami Warning Center ([PTWC](#)) proposed implementation schedule that begins issuance of the Enhanced Products in parallel with current products on 1 October 2015 and fully transitions to the new products on 1 March 2016, as indicated under Recommendation ICG/CARIBE-EWS-X.5;

The ICG recommended the approval of the guidelines for the Community Performance Based Tsunami Recognition Programme for the Caribbean and Adjacent Regions as outlined in Appendix I of Recommendation ICG/CARIBE-EWS-X.6, for implementation on a pilot basis; it **also recommended** consultation with the US regarding the adoption of the name “Tsunami Ready” with the corresponding French, Spanish and Dutch translations and other relevant languages as the official name for the Community Performance Based Tsunami Recognition Programme for the Caribbean and Adjacent Regions;

The ICG invited Member States and donor agencies to support pilot projects under the Community Performance Based Tsunami Recognition Programme for the Caribbean and Adjacent Regions;

The ICG accepted Nicaragua’s offer to host and develop the Central America Tsunami Advisory Center (CATAC) as a sub-regional Tsunami Service Provider (TSP) under the guidance of the PTWS Regional Working Group for Central America Pacific Coast and within the framework of ICG/PTWS, ICG/CARIBE-EWS and TOWS-WG;

The ICG accepted the offer from Colombia to host the Eleventh Session of ICG/CARIBE-EWS in May 2016 and **acknowledged** the offer of Costa Rica to host the Twelfth Session in 2017.

Résumé exécutif

La 10e session du Groupe intergouvernemental de coordination du Système d'alerte aux tsunamis et autres risques côtiers dans la mer des Caraïbes et les régions adjacentes (GIC/CARIBE-EWS-X) s'est tenue à Philipsburg, Sint Maarten, du 19 au 21 mai 2015, à l'invitation du Gouvernement de Sint Maarten. Elle a réuni 56 participants de 19 pays et territoires des Caraïbes ainsi que quatre organisations : le Centre d'information sur les tsunamis dans les Caraïbes (CTIC), le Réseau sismique de Porto Rico (PRSN), l'UNAVCO et le Centre de recherches sismiques (SRC) de l'Université des Indes occidentales.

Le GIC a souligné le rôle essentiel du Centre d'information sur les tsunamis dans les Caraïbes (CTIC) dans la région ainsi que son aptitude à mobiliser des fonds en faveur de projets de préparation aux catastrophes, et a salué la contribution de la Barbade, qui accueille le CTIC, ainsi que les efforts continus de la France et du Venezuela en vue de concrétiser le soutien annoncé.

Le GIC a encouragé les États membres à faire en sorte que cette priorité soit abordée par la Directrice générale lors de la Conférence générale de l'UNESCO et a recommandé que la contribution des États-Unis que constitue le Programme d'alerte aux tsunamis dans les Caraïbes (CTWP) soit reconnue comme une composante officielle du CTIC, permettant de remplir certaines missions du CTIC que celui-ci n'est pas en mesure de mener à bien actuellement, faute de ressources suffisantes.

Le GIC a salué les efforts accomplis par le Réseau de stations GPS exploité en continu dans les Caraïbes (Continuously Operating Caribbean GPS Observational Network, COCONet) et le Réseau transfrontalier et collaboratif d'observation terrestre et atmosphérique à long terme (Trans-boundary, Land and Atmosphere Long-term Observational and Collaborative Network, TLALOCNet) en vue de déployer des réseaux GPS fonctionnant en continu, ainsi que l'installation de trois centres de données GNSS dans la région, et a encouragé les opérateurs du réseau GNSS à fournir au réseau COCONet des données recueillies en continu et à aider COCONet à tenir l'inventaire des stations GNSS diffusant actuellement en continu et en temps réel dans la région.

Le GIC a approuvé l'étude par la NASA et la NOAA d'un dispositif d'alerte rapide aux tsunamis exploitant le réseau GNSS dans les Caraïbes et les régions adjacentes.

Le GIC a prié le CTWP de continuer à publier chaque mois des cartes et des rapports à partir des données des stations sismiques et d'observation du niveau de la mer existantes du CARIBE-EWS et des stations en temps réel disponibles dans la région, et **a salué** les efforts d'Aruba, qui propose d'accueillir un centre de données relatives au niveau de la mer pour la région.

Le GIC a vivement encouragé les États membres qui ne disposent pas de cartes d'évacuation en cas de tsunami à élaborer une carte préliminaire d'évacuation selon une hauteur fixe, conformément aux lignes directrices. **Il a aussi recommandé** aux États membres dotés de cartes d'inondation par les tsunamis mais ne disposant pas de cartes d'évacuation en cas de tsunami de poursuivre leurs efforts en vue de parvenir à établir ces cartes d'évacuation.

Le GIC a décidé que l'exercice Caribe Wave 16 reposerait sur deux scénarios, l'un se déroulant au nord d'Hispaniola et l'autre au nord du Venezuela. Il a en outre été décidé que l'exercice aurait lieu le jeudi 17 mars 2016 et débiterait à 15:00 UTC pour Hispaniola et à 14:00 UTC pour le Venezuela. **Le GIC a également recommandé** à l'équipe spéciale chargée de superviser l'exercice Caribe Wave 16 de commencer à envisager, en tant

qu'éventuels scénarios pour de futurs exercices, des tsunamis provoqués par une éruption volcanique ou un glissement de terrain.

Le GIC a pris acte des progrès scientifiques et technologiques accomplis depuis la mise en place de CARIBE-EWS et permettant de mieux prévoir les effets des tsunamis en temps réel et de présenter ces informations sous forme de graphiques, et **a accepté** que les produits améliorés ne comportent pas de seuils d'alerte et que les États membres soient désormais les seuls responsables des alertes aux tsunamis dans leurs propres pays et territoires conformément à leurs procédures opérationnelles normalisées (SOP).

Le GIC a approuvé le calendrier de mise en œuvre proposé par le Centre d'alerte aux tsunamis dans le Pacifique (PTWC), qui prévoit que la diffusion des produits améliorés parallèlement aux produits actuels débute le 1er octobre 2015 et que la transition vers les nouveaux produits soit entièrement achevée le 1er mars 2016, comme indiqué dans la recommandation ICG/CARIBE-EWS-X.5.

Le GIC a recommandé l'approbation des directives relatives au Programme communautaire de reconnaissance des tsunamis fondée sur la performance pour les Caraïbes et les régions adjacentes, telles qu'énoncées dans l'Appendice I de la recommandation ICG/CARIBE-EWS-X.6, en vue de leur application à titre expérimental. **Il a également recommandé** de consulter les États-Unis concernant l'adoption de l'appellation « Tsunami Ready » – et des traductions correspondantes en français, en espagnol, en néerlandais et dans les autres langues concernées – comme nom officiel du Programme communautaire de reconnaissance des tsunamis fondée sur la performance pour les Caraïbes et les régions adjacentes.

Le GIC a invité les États membres et les organismes donateurs à soutenir les projets pilotes menés au titre du Programme communautaire de reconnaissance des tsunamis fondée sur la performance pour les Caraïbes et les régions adjacentes.

Le GIC a accepté l'offre du Nicaragua, qui a proposé d'accueillir et de mettre en place le Centre consultatif sur les tsunamis en Amérique centrale (CATAC) en tant que Prestataire sous-régional de services relatifs aux tsunamis (TSP), sous la supervision du groupe de travail régional du PTWS pour la côte Pacifique de l'Amérique centrale et dans le cadre du GIC/PTWS, du GIC/CARIBE-EWS et du TOWS-WG.

Le GIC a accepté l'offre de la Colombie d'accueillir la onzième session du GIC/CARIBE-EWS en mai 2016 et a pris acte de la proposition du Costa Rica d'accueillir la douzième session en 2017.

Resumen dispositivo

La 10ª reunión del Grupo Intergubernamental de Coordinación del Sistema de Alerta contra los Tsunamis y otras Amenazas Costeras en el Caribe y Regiones Adyacentes (ICG/CARIBE-EWS-X), cuyo anfitrión fue el Gobierno de Sint Maarten, tuvo lugar en Philipsburg (Sint Maarten) del 19 al 21 de mayo de 2015. A la reunión asistieron 56 participantes de 19 países y territorios del Caribe y 4 organizaciones: el Centro de Información sobre los Tsunamis en el Caribe (CTIC), la Red Sísmica de Puerto Rico ([PRSN](#)), [UNAVCO](#) y el Centro de Investigación Sísmica de la Universidad de las Indias Occidentales ([SRC](#)).

El ICG reconoció la función esencial del Centro de Información sobre los Tsunamis en el Caribe (CTIC) en la región y su potencial para captar financiación para proyectos relacionados con la preparación, y **agradeció** la contribución de Barbados para albergar el CTIC, así como los continuos esfuerzos de Venezuela y Francia para hacer efectivo el apoyo según lo prometido.

El ICG alentó a los Estados Miembros a velar por que la Directora General abordase esta prioridad en la Conferencia General de la UNESCO y **recomendó** que la contribución de los Estados Unidos de América por conducto del Programa de Alerta contra los Tsunamis en el Caribe ([CTWP](#)) se reconociera como un componente oficial del CTIC, que cubría diversos aspectos del mandato del CTIC que este no podía cumplir debido a sus limitaciones de recursos.

El ICG reconoció los esfuerzos llevados a cabo a través de los proyectos de la Red de observación continua por GPS del Caribe ([COCONet](#)) y la Red de colaboración y observación terrestre, atmosférica y transfronteriza a largo plazo ([TLALOCNet](#)) para instalar redes de GPS de funcionamiento continuo y tres centros de datos del GNSS en la región, y **alentó** a los operadores de redes del GNSS a proporcionar datos continuos a COCONet y a ayudar a esta red a llevar un inventario de las estaciones del GNSS de datos continuos y en tiempo real existentes en la región.

El ICG respaldó el estudio de la [NASA](#) y la [NOAA](#) sobre un sistema de alerta temprana contra los tsunamis para el Caribe y sus regiones adyacentes basado en el GNSS.

El ICG pidió al CTWP que siguiera elaborando mapas e informes mensuales a partir de los datos de las estaciones sísmológicas y de medición del nivel del mar de que disponía el CARIBE-EWS y de las estaciones de medición en tiempo real existentes en la región, y **agradeció** el ofrecimiento de Aruba de albergar un centro de datos sobre el nivel del mar para la región.

El ICG instó a los Estados Miembros que no disponían de mapas de evacuación en caso de tsunami a elaborar un mapa de evacuación preliminar basado en una altura fija de acuerdo con las directrices. Asimismo, el ICG **recomendó** a los Estados Miembros que disponían de mapas de inundación en caso de tsunami pero no de evacuación que siguieran trabajando para elaborar mapas de evacuación en caso de tsunami.

El ICG decidió que el ejercicio Caribe Wave 16 constara de dos hipótesis, una en el norte de La Española y otra en el norte de Venezuela, y **decidió además** que el ejercicio se llevara a cabo el jueves 17 de marzo de 2016 y comenzara a las 15.00 UTC y a las 14.00 UTC, respectivamente, para las hipótesis de La Española y de Venezuela. El ICG **recomendó también** que el equipo de trabajo sobre el ejercicio Caribe Wave 16 comenzase a contemplar como posibles hipótesis para futuros ejercicios los tsunamis generados por volcanes o corrimientos de tierras.

El ICG expresó su reconocimiento por los avances científicos y tecnológicos logrados desde la creación del CARIBE-EWS para mejorar la previsión de los efectos de los tsunamis en tiempo real y presentar gráficamente la información sobre las previsiones; asimismo, el ICG **aceptó** que los productos mejorados no incluyeran niveles de alerta y que, en lo sucesivo, los Estados Miembros fueran plenamente responsables de las alertas por tsunami en sus propios países y territorios de conformidad con sus procedimientos normalizados de operaciones (SOP).

El ICG mostró su conformidad con el calendario de introducción propuesto por el Centro de Alerta contra los Tsunamis en el Pacífico ([PTWC](#)), según el cual los productos mejorados comenzarían a distribuirse el 1º de octubre de 2015 de forma paralela a los productos existentes y la transición completa a los nuevos productos se produciría el 1º de marzo de 2016, como se indicaba en la recomendación ICG/CARIBE-EWS-X.5.

El ICG recomendó la aprobación de las directrices para el programa de acreditación de la preparación comunitaria frente a los tsunamis del Caribe y sus regiones adyacentes que figuraban en el apéndice I de la recomendación ICG/CARIBE-EWS-X.6, para su aplicación experimental; el ICG **recomendó también** que se consultara con los Estados Unidos de América la adopción del nombre “Tsunami Ready”, con sus correspondientes traducciones al español, el francés, el neerlandés y otros idiomas pertinentes, como nombre oficial de dicho programa.

El ICG invitó a los Estados Miembros y a los organismos donantes a apoyar proyectos piloto en el marco del programa de acreditación de la preparación comunitaria frente a los tsunamis del Caribe y sus regiones adyacentes.

El ICG aceptó el ofrecimiento de Nicaragua de acoger y poner en marcha el Centro de Asesoramiento sobre los Tsunamis de América Central (CATAC) como proveedor subregional de servicios sobre tsunamis, bajo la orientación del Grupo de Trabajo regional del PTWS para la costa del Pacífico de América Central y dentro del marco del ICG/PTWS, el ICG/CARIBE-EWS y el TOWS-WG.

El ICG aceptó el ofrecimiento de Colombia de acoger la 11ª reunión del ICG/CARIBE-EWS en mayo de 2016 y **agradeció** el ofrecimiento de Costa Rica de acoger la 12ª reunión en 2017.

Рабочее резюме

Десятая сессия Межправительственной координационной группы по системе предупреждения о цунами и опасности других бедствий в прибрежных районах Карибского бассейна и прилегающих регионов (МКГ/КАРИБ-СРП-Х) состоялась в Филипсбурге, Синт Маартен, с 19 по 21 мая 2015 г. по приглашению Правительства Синт Маартена. На сессию собралось 56 участников из 19 стран и территорий Карибского бассейна и 4 организаций: Карибского центра информации о цунами (КЦИЦ), Сейсмической сети Пуэрто-Рико ([ССПР](#)), Консорциума [UNAVCO](#) и Центра сейсмических исследований Вест-Индского университета ([ЦСИ](#)).

МКГ отметила важные функции, выполняемые в регионе Карибским центром информации о цунами (КЦИЦ), и его способность привлекать финансирование на проекты по подготовке и **выразила признательность** Барбадосу за размещение КЦИЦ и Венесуэле и Франции за продолжение усилий по оказанию обещанной поддержки.

МКГ призвала государства-члены способствовать учету этого приоритета Генеральным директором в ходе Генеральной конференции ЮНЕСКО и **рекомендовала** признать вклад США в программу оповещения о цунами в Карибском бассейне ([CTWP](#)) в качестве официального компонента КЦИЦ, способствующего выполнению части Круга ведения, которую КЦИЦ в настоящий момент не способен выполнить в связи с ограниченностью его ресурсов.

МКГ отметила усилия проектов Непрерывно действующей сети наблюдений GPS в Карибском бассейне ([COCONet](#)) и Трансграничной сети долгосрочных наземных и атмосферных наблюдений и сотрудничества ([TLALOCNet](#)) по размещению непрерывно действующих сетей GPS и трех центров данных ГНСС в регионе и **призвала** операторов сетей ГНСС предоставлять на постоянной основе данные в COCONet и содействовать COCONet в поддержании реестра существующих непрерывно действующих в режиме реального времени станций ГНСС в регионе.

МКГ одобрила изучение силами [НАСА](#) и [НОАА](#) возможностей раннего предупреждения о цунами на основе ГНСС в Карибском и прилегающих регионах.

МКГ предложила ПОЦК продолжать работу по подготовке ежемесячных карт и докладов на основе данных действующих станций наблюдения за уровнем моря и сейсмичностью КАРИБ-СРП и действующих в режиме реального времени станций в регионе и **отметила** предложение Арубы по размещению регионального центра данных по уровню моря.

МКГ призвала государства-члены, которые еще не имеют маршрутов эвакуации при цунами, подготовить предварительные маршруты эвакуации при цунами на основе зафиксированной высоты уровня моря в соответствии с руководящими принципами. Она также **рекомендовала** государствам-членам, имеющим карты наводнения при цунами и не имеющим маршрутов эвакуации при цунами, продолжить ведущуюся работу по подготовке маршрутов эвакуации при цунами.

МКГ постановила, что учения «Карибская Волна-16» будут проводиться по двум сценариям с цунами на севере Гаити и на севере Венесуэлы, и **также постановила**, что учения пройдут во вторник 17 марта 2016 г. и начнутся в 15.00 ВКВ и 14.00 ВКВ для сценариев на Гаити и в Венесуэле соответственно. **МКГ также рекомендовала** целевой группе по учениям «Карибская Волна-16» приступить к рассмотрению вулканических или оползневых источников цунами в качестве основы для возможных сценариев будущих учений.

МКГ отметила научные и технологические достижения с момента создания КАРИБ-СРП, позволяющие лучше прогнозировать последствия цунами в реальном времени и предоставлять информацию о прогнозировании в графическом формате, и **согласилась** с тем, что усовершенствованные продукты не будут включать уровня угрозы и что отныне государства-члены будут нести полную ответственность за оповещения об угрозе цунами в своих странах и территориях в соответствии с их стандартными оперативными процедурами (СОП).

МКГ согласилась с предлагаемым Центром предупреждения о цунами в Тихом океане ([ЦПЦТО](#)) графиком внедрения, согласно которому использование усовершенствованных продуктов начнется 1 октября 2015 г. параллельно с действующими продуктами с полным переходом на новые продукты к 1 марта 2016 г. в соответствии с рекомендацией ICG/CARIBE-EWS-X.5.

МКГ рекомендовала утвердить руководящие принципы Программы сертификации готовности общин к цунами на основе показателей эффективности для Карибского бассейна и прилегающих регионов в соответствии с приложением I к рекомендации ICG/CARIBE-EWS-X.6 для осуществления на экспериментальной основе и **также рекомендовала** провести консультации с США относительно утверждения названия «Готов к цунами» с соответствующим переводом на французский, испанский, голландский и другие актуальные языки в качестве официального названия Программы сертификации готовности общин к цунами на основе показателей эффективности для Карибского бассейна и прилегающих регионов.

МКГ предложила государствам-членам и донорским учреждениям оказать поддержку осуществлению пилотных проектов в рамках Программы сертификации готовности общин к цунами на основе показателей эффективности для Карибского бассейна и прилегающих регионов.

МКГ приняла предложение Никарагуа создать и разместить у себя Региональный консультативный центр по цунами для Центральной Америки (САТАС) в качестве субрегионального провайдера услуг по цунами (ПУЦ) под руководством Региональной рабочей группы по системе оповещения о цунами и смягчению их последствий для Тихоокеанского побережья Центральной Америки и в рамках МКГ/СПЦТО, МКГ/КАРИБ-СРП и РГ-СПЦО.

МКГ приняла предложение Колумбии принять у себя одиннадцатую сессию МКГ/КАРИБ-СРП в мае 2016 г. и **приняла к сведению** предложение Коста-Рики принять у себя двенадцатую сессию в 2017 г.

1. WELCOME AND OPENING

- 1 The 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-X) was held in Philipsburg, Sint Maarten, from 19 to 21 May 2015, hosted by the Government of Sint Maarten.
- 2 The Session was opened on Tuesday, 19 May 2015, under the Chairmanship of Ms Christa von Hillebrandt-Andrade (USA), Chair of the ICG/CARIBE-EWS.
- 3 Ms Christa von Hillebrandt-Andrade, Chair of the ICG/CARIBE-EWS, highlighted that in 10 years of development there are significant advances in the CARIBE-EWS. The observational backbone of the Warning System has been implemented reducing to minutes the detection time of earthquakes and tsunamis and protocols at the national and local level have been strengthened and exercised with tens of thousands of people participating yearly in the regional tsunami exercise Caribe Wave.
- 4 She explained that a *Tsunami Public Awareness and Education Strategy for the Caribbean and Adjacent Regions* ([IOC/2013/TS/107 Rev.](#)) has also been developed and two institutions in support of these efforts have been established in the region, the Caribbean Tsunami Warning Program ([CTWP](#)) in Puerto Rico and the Caribbean Tsunami Information Center (CTIC) in Barbados. She highlighted that while in the Caribbean tsunamis are no longer “El Peligro Olvidado” (the “Forgotten Danger”), the devastation in the Indian Ocean, Japan and Chile reminded us all of the power of these waves and the need to be ready, and therefore she make a call to each of the participating Members States and organizations to actively participate in the discussions on how can we best protect our residents, visitors and economies from these infrequent but deadly waves that will, one day, strike again our shores.
- 5 Along the same lines, she recalled that the Governments adopted recently the [Sendai Framework for Disaster Risk Reduction 2015-2030](#) at the Third World Conference on Disaster Risk Reduction (WCDRR) hosted by the Government of Japan in Sendai from 14 to 18 March 2015. The Sendai Framework reiterated Governments’ commitment to disaster risk reduction and the building of resilience therefore it is important that the Caribbean Tsunami and other Coastal Hazard Warning System is aligned and contributes to the outcome and goals of the framework.
- 6 She thanked the Government of Sint Marten for kindly hosting the Tenth session of the ICG/CARIBE-EWS and providing such an appropriate backdrop on why a tsunami warning system in the Caribbean is so important: Beautiful beaches and warm waters that attract thousands of residents and visitors year round and for whose lives and livelihoods we are responsible.
- 7 Mr Vladimir Ryabinin, Executive Secretary of the Intergovernmental Oceanographic Commission (IOC) of UNESCO, sent a pre-recorded video message to the meeting. In his message, Mr Ryabinin expressed that, in its first 2 months as Executive Secretary of IOC, he noted how enthusiastic the tsunami community is in doing the very important job of protecting millions of people on the coasts of the world ocean. In the Caribbean, after 10 years of hard work a very effective and reliable observational system is in place and a tsunami recognition programme for communities is under development, which is especially important in the Caribbean where the warning time is very little in some locations.
- 8 He noted that the Caribbean system will be also putting in place new enhanced products as it has been the case in the Pacific system and noted that the Caribbean has excelled on public awareness and preparedness activities with its annual Caribe Wave

exercises that mobilize hundreds of thousands of people, making more and more citizens aware about this hazard in the region.

9 Mr Ryabinin reported that at the Third United Nations World Conference on Disaster Risk Reduction, countries from all around the world underscored the increasingly important role of Multi-Hazard Early Warning Systems and noted that the CARIBE-EWS definition of a Tsunami and Other Coastal Hazards Early Warning System meet this change in paradigm and perhaps is an open door for re-engage work with governments to make sure that this system is sustained into the future. He also indicated that it is important that the current trends in the domain of disaster risk reduction are taken into account in planning of the further development of tsunami warning systems because this may help to sustain the tsunami warning systems as part of major national and international developments.

10 He deeply thanked the Government of Sint Maarten and the Kingdom of Netherlands for hosting the Tenth session of the ICG/CARIBE-EWS.

11 Honourable Prime Minister of Sint Maarten, Mr Marcel Gumbs, expressed that as a young country susceptible to natural disasters, the Government of Sint Maarten values the opportunity provided by the hosting of the Tenth session of the ICG/CARIBE-EWS to learn the issues, best practices, trends and developments related to tsunami risk reduction. He complimented UNESCO for its continued efforts and dedication in helping countries to build capacities and capabilities to minimize the risk brought about by disasters such as tsunamis.

12 He indicated that the threat of a tsunami to the Caribbean causes great concern for the Government of Sint Maarten, which adds to the vulnerability to climate related events such as storms and hurricanes that are forecasted days in advance. However, tsunami related events generated by the movement of the faults of the earth's crust can occur at moments notice and, depending on the location of the tsunami, very little time is given for evacuation. This small window of opportunity for preparation and mobilization makes us realize the importance of an inclusive and effective approach when it comes to an early warning system for the islands in the region. When we speak of tsunami risk reduction, we must be cognizant that we are only as strong as the weakest link, and therefore it is important for all islands in the region to be equally prepared and capable of managing a tsunami event.

13 Prime Minister Gumbs indicated that when it comes to risk reduction, cooperation is the key and for this reason he was happy to learn of the joint regional approach the ICG/CARIBE-EWS has taken to address the challenges and adopt the strategies for risk reduction. With this in mind, he wished the participants much success and expressed that he looks forward to reading the outcome document listing the decisions and recommendations. As a final note he called upon participants to take some time out to enjoy Sint Maarten.

14 Mr Marcel Gumbs wished the Delegates the very best for the conference, thanked them for coming to Phillipsburg, Sint Maarten, and declared the session open.

15 The addresses of Ms Christa von Hillebrandt-Andrade, Mr Vladimir Ryabinin and the Honourable Prime Minister of Sint Maarten, Mr Marcel Gumbs, are included in full under ANNEX III.

2. ORGANIZATION OF THE SESSION

2.1. ADOPTION OF AGENDA

16 The Chairperson informed the Plenary that the agenda was prepared by the Secretariat and the Chair taking into account the Recommendations and instructions given at

ICG/CARIBE-EWS-VIII, as well as the relevant parts of the IOC Rules of Procedure (IOC/INF-1166)

17 She reported that on request of Nicaragua an agenda item 6.5 on Central America
Tsunami Warning Center (CATAC) has been added to the provisional agenda.

18 The AGENDA was approved as presented.

2.2. DESIGNATION OF THE RAPPORTEUR

19 The Chairperson requested Delegates to propose candidates for rapporteur of the
meeting. As customary, the meeting was requested to choose one rapporteur for each of the
three languages of the meeting: English, French and Spanish.

20 Mr Stephen Hall (U.K.) volunteered for English, France proposed Mr Dennis Lopez for
French, and Costa Rica proposed Ms Natalia Zamora for Spanish.

21 The ICG **approved** the proposals and **thanked** UK, France and Costa Rica for
providing rapporteurs.

2.3. CONDUCT OF THE SESSION, TIMETABLE AND DOCUMENTATION

22 The Chairperson, Ms Christa von Hillebrandt-Andrade, noted that interpretation was
available in English, French, and Spanish. She informed the Plenary that, in order to facilitate
the proceedings of the meeting, a timetable had been prepared by the Secretariat in
coordination with the Chair and the local organizing committee. At this point, she offered the
floor to the local host to provide logistic details about the welcome reception, lunch, and the
logistics for working groups, Plenary and Secretariat. Mr Paul Maartens, on behalf of the host
organizing committee, provided detailed logistic information.

23 Ms Hillebrandt requested the Secretariat to introduce the documentation for the
meeting. On behalf of the Secretariat, Mr Aliaga explained that due to financial constraints
the documentation is available only in English and posted to the meeting website. Only the
provisional agenda, provisional timetable, and provisional list of participants had been
printed. Mr Aliaga asked Delegates to check the participants' provisional list and confirm
details to the Secretariat.

24 In order to smooth the work of the session and facilitate the generation of
recommendations and agreements, the Plenary decided to set up the following
intrasessional Working Groups and Committees to address some of the major issues
addressed at the meeting:

- Enhanced PTWC Products and Monitoring and Detection Systems (includes Tsunami Services Model). Co-Chairs Mr Chip McCreery (USA) and Mr Jean Marie Saurel (France)
- CaribeWave 16. Chair: Ms Elizabeth Vanacore (PRSN)
- Tsunami Recognition Programme. Chair: Ms Alison Brome
- Recommendations Committee. Chair: Mr Milton Puentes

25 The Chair requested Working Groups to produce a recommendation for approval by
the Intergovernmental Coordination Group (ICG) or re-draft the ones presented by the
intersessional Working Groups, as needed.

26 Ms Hillebrandt suggested that while in Plenary the time used to reporting be reduced as much as possible to concentrate on the exchange of views and decisions on policy matters. The Plenary decided that national reports be delivered without PowerPoint presentations, and instead be provided to the Secretariat for posting to the meeting website.

27 The timetable was approved as is presented.

3. REPORT ON INTERSESSIONAL ACTIVITIES

3.1. IOC EXECUTIVE SECRETARY'S REPORT

28 The Technical Secretary for ICG/CARIBE-EWS, Mr Bernardo Aliaga, presented the report of the Executive Secretary of the Intergovernmental Oceanographic Commission (IOC), recalling that in his main message to the Delegates he emphasized the importance of the [Sendai Framework for Disaster Risk Reduction 2015-2030](#) and highlighted the link with the sustainability of the ICGs through the call for increasing the availability of and access to multi-hazard early warning systems. He reported that Mr Ryabinin attended the Tenth session of the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWS-X) held in Muscat, Oman, from 24 to 26 March 2015 and the Third World Conference on Disaster Risk Reduction ([WCDRR](#)) held in Sendai, Japan, from 14 to 18 March 2015; however due to the overlapping with discussions at Headquarters on budgetary matters he could not attend neither the Twenty-sixth session of the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS-XXVI) held in Honolulu, United States, from 22 to 24 April 2015 nor the 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-X) held in Philipsburg, Sint Maarten, from 19 to 21 May 2015. However, the good news is that for the next biennium IOC may enjoy a slight increase on its regular budget including for the Tsunami Programme.

29 Ms Hillebrandt-Andrade indicated that she met Mr Ryabinin at the Third World Conference on Disaster Risk Reduction and noted his interest in the Tsunami Programme; she also noted his interest in the Caribbean system that would need more efforts in the coming years after an initial emphasis in the Indian Ocean.

30 The **ICG noted** the report of the Executive Secretary.

3.2. CHAIR'S REPORT

31 The Chairperson of ICG/CARIBE-EWS, Ms Christa von Hillebrandt-Andrade, reported that the intersessional 2014-2015 period was extremely busy as the ICG continued to strengthen and promote the Tsunami and other Coastal Hazards Warning System for the Caribbean and Adjacent Regions. She indicated that between the two sessions she sought to provide guidance and support to all focus areas of the CARIBE-EWS on Monitoring and Detection, Tsunami Hazard, Communications and Preparedness, Readiness and Resilience in coordination with Secretariat, CTIC, Officers and Member States.

32 She explained that she represented the ICG/CARIBE-EWS at several intergovernmental, international and national meetings and activities, like the 47th Session of IOC Executive Council ([IOC/EC-XLVII](#)) held in Paris, France, from 1 to 4 July 2014, the 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 ([ICG/NEAMTWS-XI](#)) held in Nicosia, Cyprus, from 12 to 14 November 2014, the [ASTARTE](#) (Assessment, STrategy And Risk Reduction for Tsunamis in Europe) project annual meeting held in Siracusa, Italy, from 16 to 18 October 2014, the Seventh

session of the Working Group on Tsunamis and Other Hazards Related to Sea-Level Warning and Mitigation Systems ([IOC/TOWS-WG-VII/3](#)), held in Paris, France, the 12 and 13 February 2014; and [International Tsunami Symposium 2015](#) “ Making the Pacific Ready for Tsunami Threat” to commemorate the 50th Anniversary of the PTWS held in Hawaii, United States, the 20 and 21 April 2015. She also participated in the meeting of the ICG/CARIBE-EWS [Task Team on Tsunami Services Model](#) held in Cartagena de Indias, Colombia, the 4 and 5 December 2014, the [Fourth Training Course for Operators of Sea Level Stations in the Caribbean and Adjacent Regions](#) held in Mayagüez, United States, from 3 to 7 November 2014, and the Task Team Meeting of the [ICG/CARIBE-EWS Tsunami Recognition Programme](#) held in Mayaguez, Puerto Rico, the 8 and 9 April 2015.

33 She visited several Member States and Territories to see first-hand their operations and especially recognized the support and hospitality of the governments of US Virgin Islands, Dominican Republic, Colombia, Mexico, Aruba, Saint Kitts and Nevis, Nicaragua, Anguilla and the IOC Tsunami Unit in Paris, France, for the corresponding invitations and their hospitality and support. She expressed that it has been very gratifying to see the commitment of the colleagues and institutions in the strengthening of the tsunami warning system.

34 As part of the preparation and follow-up to Exercise CaribeWave/Lantex 15 ([IOC/2014/TS/118 Vol.1](#)), she had the opportunity to also speak with many of the Tsunami Warning Focal Points (TWFPs) and Tsunami National Contacts (TNCs) and appreciated these exchanges. She highlighted that the CARIBE-EWS is the ICG which has the highest percentage of Member States with designated Tsunami National Contacts and Tsunami Warning Focal Points (47/48 for a 98%). All of the Member States, however, did participate in Exercise Caribe Wave/Lantex 15 marking the first time that the ICG/CARIBE-EWS or any other ICG has 100% participation of its Member States and territories for a wide-basin tsunami exercise, which is something for all to be proud. She reported that contact was maintained with the Officers of the Secretariat, CTIC, Working Groups and Task Teams thru meetings, conference calls, webinars and email correspondence. She thanked the continual support of the Puerto Rico Seismic Network ([PRSN](#)), Puerto Rico Emergency Management Agency ([PREMA](#)) and the ICG/CARIBE-EWS Technical Secretary in Paris, recognizing as well the key support of the National Oceanic and Atmospheric Administration ([NOAA](#)) and the National Weather Service ([NWS](#)) [Tsunami Program](#) for the approval of time, effort and funding to carry out her duties as Chair.

35 She welcomed the designation of TWFP/TNC for Cuba that increased to 47 out of 48 the number of Member States and Territories in the Caribbean that have nominated focal points for tsunami.

36 The **ICG noted** the report of the Chairperson.

3.3. ICG/CARIBE-EWS SECRETARIAT REPORT

37 The Technical Secretary for ICG/CARIBE-EWS, Mr Bernardo Aliaga, presented the report of the Secretariat. He provided information on the status of nominations of Tsunami Warning Focal Points (TWFPs) and Tsunami National Contacts (TNCs) and reported on the renewal of funding from the European Commission's Humanitarian Aid Office ([ECHO](#)) for tsunami preparedness projects in Haiti and Dominican Republic.

38 Mr Aliaga noted the very valuable support provided by the Caribbean Tsunami Information Center (CTIC) through Ms Alison Brome, Interim Director, and by United Nations Development Programme ([UNDP](#)) in Barbados and the OECS as well as from the Caribbean Disaster Emergency Management Agency ([CDEMA](#)) that provided direct support to CTIC. He

welcomed the re-engagement of Central American Member States with the ICG/CARIBE-EWS including through the proposed Caribbean Tsunami Advisory Center (CATAC)

39 The **ICG noted** the report of the ICG/CARIBE-EWS Secretariat.

3.4. REPORT OF THE CARIBBEAN TSUNAMI INFORMATION CENTER (CTIC)

40 The Interim Director of CTIC, Ms Alison Brome, introduced this item. She recalled that CTIC was formally established on 2 September 2013 at the Department of Emergency Management ([DEM](#)) of Barbados as a partnership initiative between the Government of Barbados and UNESCO/IOC.

41 Ms Brome reported that steady progress in the execution of the CTIC Work Plan was evident during the May 2014–April 2015 period despite strained financial and human resources. CTIC expenditure over the period May 2014–April 2015 by UNDP and UNESCO/IOC was USD \$157, 500 down from \$324,645.13 over the corresponding period May 2013–April 2014. Key CTIC-related activities executed during the May 2014–April 2015 period included CTIC support to UNDP-USAID/OFDA Proposal and Project on multi-hazard EWS in Holetown, Barbados; CTIC support to UNDP-DIPECHO Proposal and Project on multi-hazard EWS in Barbados, Dominica, St. Vincent and the Grenadines, Saint Lucia; CTIC support to the Regional Technical Cooperation Project (May 2014–March 2015) Chile-Spain triangular cooperation project “Strengthening of the Caribbean Disaster Emergency Management Agency (CDEMA) in the Technical Areas of Earthquakes and Tsunamis” to develop standards for earthquake/tsunami drills, inundation maps and simulations and transfer of knowledge on earthquake and tsunami hazards. This project will execute a pilot initiative in Jamaica. She highlighted also the support provided by CTIC to the Caribe Wave/Lantex 15 coordination activities in close cooperation with the Caribbean Tsunami Warning Programme (CTWP) and the participation in technical missions to Dominica and Anguilla (UK). She also highlighted that CTIC coordinated the hosting in Barbados of a 6-day Regional Technical Training Workshop on the Emergency Managers Weather Information Network (EMWIN) System in Bridgetown, Barbados, from 25 to 30 May 2015 (English and Spanish versions), funded by USAID/OFDA, organised jointly with NOAA/UCAR and announced by Circular Letter 2574 ([CL-2574](#)).

42 She reported that regrettably the anticipated level of human resource support from the CTIC host country and other ICG/CARIBE-EWS Member States has not been forthcoming to date. CTIC has one (1) dedicated full time staff member at the level of the Interim Director and this has resulted in:

- Adjustments to the CTIC work plans to reflect the level of available capacity;
- Implementation delays particularly of the CTIC website; and
- Interim Director, CTIC has had to focus on the implementation of activities and associated logistical tasks with limited emphasis on reporting, resource mobilisation and partnership building, which are key aspects of the strategic role of the Interim Director’s post.

43 Ms Brome indicated that the activities of the CTIC have been executed to date largely through funding received from UNESCO/IOC and [USAID/OFDA](#) with some facilitation through UNDP and CDEMA. Core financial resources to cover CTIC operational expenses (including salaries) beyond October 2015 are currently non-existent. There is therefore an urgent need for the development of sustainable mechanisms to support the operations of the CTIC including donor and Member State funding as well as partnerships. Options for securing resources for sustaining CTIC activities past October 2015 include:

- Continued preparation and submission of concept and project proposals to donor agencies;
- Continued pursuit of formal partnership agreements with key regional technical agencies including in order to maximise and harmonise financial resources;
- Lobbying to UNESCO/IOC by ICG/CARIBE-EWS Member States to provide adequate financial resources to support the CTIC; and
- Continued lobbying of ICG/CARIBE-EWS Member States by Technical Secretary, ICG/CARIBE-EWS and Interim Director, CTIC to make annual financial contributions to CTIC through MOUs, directly to the IOC Special Account or support to specific CTIC activities and identify potential sources of funding within the donor community.

44 Trinidad and Tobago as well as United States of America (USA), Chair Hillebrandt-Andrade, and the Secretariat intervened on this matter. All interventions highlighted that outreach, education and training is very important and CTIC is performing a commendable work in the Caribbean on this matter.

45 United States offered the services of the CTWP to formally support the CTIC in any international capacity building activities – especially those with technical elements that CTWP expertise may be useful – seen fit by the IOC. USA indicated they would ask for some formal recognition of the offer of an IOC role for CTWP. The Secretariat indicated that with respect to the sustainability of CTIC within the framework of IOC it is up to Member States to indicate their priorities to the UNESCO General Conference and IOC Assembly. Trinidad and Tobago expressed that it has been exploring the possibility of direct contributions to CTIC, which need to be followed up by CTIC and IOC.

46 Chair Hillebrandt-Andrade underscored that the main concern in the short term is that CTIC's core financial resources to cover its expenses including salaries beyond 2015 are not existent.

47 The **ICG noted** the report of CTIC.

48 The ICG **adopted** Recommendation ICG/CARIBE-EWS-X.1.

3.5. REPORTS FROM UN AND NON-UN ORGANIZATIONS

49 Dr Elizabeth Vanacore from the Puerto Rico Seismic Network (PRSN) provided a brief introduction to the activities of PRSN in support of the Tsunami and other Coastal Hazards Warning System for the Caribbean and Adjacent Regions, including through instrumentation and observing networks as well as hosting of meetings and trainings. She further reported on the development of SOP templates for hotels and on PRSN's contribution to the [TsunamiReady™](#) recognition programme in Caribbean US communities, with 100% of communities recognised in Puerto Rico (USA). Colombia and Anguilla (UK) suggested sharing the template for SOP for hotels with Member States. France thanked PRSN for their contribution on sharing seismic and sea level data through the Caribbean.

50 Dr Frédéric Dondin, on behalf of the Seismic Research Centre ([SRC](#)), indicated that SRC is actively involved in three of the four ICG/CARIBE-EWS Working Groups (WGs): Working Group 1 on Monitoring and Detection Systems, Working Group 2 on Hazard Assessment and Working Group 4 on Preparedness, Readiness and Resilience. In particular, he highlighted SRC's contributions in the area of earthquake and volcano monitoring capabilities, its involvement in the improvement of the assessment of the tsunami hazard and risk for the Lesser Antilles region via the evaluation of the potential tsunami hazard associated with the active submarine volcano Kick 'em Jenny using numerical simulation tools and its active contribution in the region for the dissemination of knowledge

on tsunami waves and their impact through its Education and Outreach campaigns, which included development of awareness materials for the public. He indicated that SRC's staff receives EASRS messages via text message and reported that SRC was asked by CDEMA to attend and follow the workshops of the [Chile-Spain-CDEMA project](#) that included ComMIT training.

51 In response to inquiries from British Virgin Islands about sharing the EASRS SMS messages with countries' Emergency Managers, Mr Dondin indicated that this is feasible but this is yet not operational, and indicated that seismic stations supported by SRC have problems with vandalism that is becoming a serious issue.

52 Dr Karl Feaux, GPS Operations Manager of [UNAVCO](#) Inc., provided an update on the status of UNAVCO-managed community networks in the Caribbean region and Mexico. The Continuously Operating Caribbean GPS Observational Network ([COCONet](#)) project, which is scheduled for completion in 2015, includes 83 new and refurbished cGPS-Met Stations, from which 71 stations have been completed (compared to 52 in the report presented in 2014), and 2 tide gauge stations already installed. When completed, the network will produce high-quality, low-latency data and data products continuously operating GPS/meteorological stations, (cGPS-MET) in the Caribbean region, as well as, bring data into the COCONet data archive from over 60 existing GPS stations in the region. Dr Feaux reported also on the Trans-boundary, Land and Atmosphere Long-term Observational and Collaborative Network ([TLALOCNet](#)) project which target the development of a continuous GPS-MET array in Mexico for atmospheric, climatic and seismotectonic research in the Americas to be implemented in a four years project started on 1 September 2013. Dr Feaux indicated that the sustainability of these networks after completion of the funded projects may be complicated but they have been working with partner States to maintain these equipments after the projects end.

3.6. STATUS OF OTHER ICGs

53 Mr Mike Angove (USA) reported that the Twenty-sixth Session of the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS-XXVI) was held in Honolulu, Hawaii, United States of America, from 22 to 24 April 2015, chaired by the ICG/PTWS Chair, Dr Ken Gledhill (New Zealand). The meeting was attended by 106 participants from 28 countries, and 18 Observer organizations. He summarised the main achievements of the ICG/PTWS in the intersession period which includes the new Enhanced Products developed by PTWC ([IOC/2013/TS/105 Rev.3](#)) under the guidance of Dr Gledhill, with his vision and capacity to listen and create consensus. Those Enhanced Products were explained and training provided to emergency managers and tsunami warning centres throughout the PTWS Member States, with direct involvement and sustained training efforts by ITIC. He indicated that a major development at the recent Twenty-sixth session of the ICG/PTWS is a new emphasis on public awareness and local preparedness at local level (communities).

54 Mr Aliaga (IOC Secretariat) reported on the latest developments in the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWS) including the launching of the Oman National Multi Hazard Early Warning System ([NMHEWS](#)) held in Muscat, Oman, the 23 March 2015; and the recent Tenth session of the ICG/IOTWS ([ICG/IOTWS-X](#)) held in Muscat, Oman, from 24 to 26 March 2015. He reported on the conference "[The Indian Ocean Tsunami Warning and Mitigation System 10 years after the Indian Ocean Tsunami: Achievements, Challenges, Remaining Gaps and Policy Perspectives](#)" held in Jakarta, Indonesia the 24 and 25 November 2014. The conference produced a *Summary Statement of the International Conference to Commemorate the 10th Anniversary of the Indian Ocean Tsunami* ([IOC/BRO/2015/2](#)). He indicated that the ICG/IOTWS is also focusing on community

preparedness and awareness, including through active inclusion of media in the regional SOP trainings.

55 Chair Hillebrandt-Andrade reported on the Eleventh Session of Intergovernmental Coordination Group for the Tsunami Early Warning and Mitigation System in the North-Eastern Atlantic, the Mediterranean and Connected Seas ([ICG/NEAMTWS-XI](#)) that was hosted by Cyprus from 12 to 14 November 2014. She indicated that, as Chair of the ICG/CARIBE-EWS, she presented a report and participated at the discussion on possible joint exercises. She reported that ICG/NEAMTWS has four centres, known as Candidate Tsunami Service Providers (CTSPs), which are currently providing tsunami products on a subscription only basis. The hosting countries of these CTSPs are: France (Western Mediterranean and North-Eastern Atlantic), Italy (All Mediterranean), Greece (Eastern Mediterranean) and Turkey (Eastern Mediterranean and Black Seas). Portugal has postponed delivery of services until 2015. She indicated that the exercise NEAMWave 14 ([IOC/2014/TS/114 Vol.1 & Vol.2](#)) took place the 28 and 30 October 2014 and was successfully conducted in 20 of the 39 Member States, with the next exercise to be held in 2016. It was recommended that ICG/CARIBE-EWS Chair participate in the organizing Task Team of the NEAMWave 16.

56 Ms Hillebrandt-Andrade also reported on the Eighth session of the Working Group on Tsunamis and Other Hazards related to Sea-Level Warning and Mitigation Systems ([IOC/TOWS-WG-VIII](#)) held in Morioka, Japan, the 12 and 13 March 2015. She provided details about the results and main recommendations of the Inter-ICG Task Teams that reported to TOWS-WG and highlighted the consensus on the definitions of National Tsunami Warning Centre (NTWC), Tsunami Warning Focal Point (TWFP) and Tsunami Service Provider (TSP) as listed below:

- National Tsunami Warning Centre (NTWC): A centre officially designated by the government to monitor and issue tsunami warnings and other related statements within their country according to established National Standard Operation Procedures.
- Tsunami Warning Focal Point (TWFP). A 24 x 7 point of contact (office, operational unit or position, not a person) officially designated by the NTWC or the government to receive and disseminate tsunami information from an ICG Tsunami Service Provider according to established National Standard Operation Procedures. The TWFP may or not be the NTWC.
- Tsunami Service Provider: Centre that monitors seismic and sea level activity and issues timely tsunami threat information within an ICG framework to National Tsunami Warning Centres/Tsunami Warning Focal Points and other TSPs operating within an ocean basin. The NTWCs/TWFPs may use these products to develop and issue tsunami warning for their countries. TSPs may also issue Public messages for an ocean basin and act as National Tsunami Warning Centres providing tsunami warnings for their own countries. Several ICG Tsunami Service Providers have been established

57 After these reports Haiti and France commented on the interest of having media invited to SOP trainings and Caribe Wave exercises. France reported that media has been formally integrated at the Caribe Wave exercises from 2011 in Martinique/Guadeloupe. The result is very positive, with very good coverage of the exercise and a major public awareness role. Haiti inquired about the experience of France in particular about the possibility of a “panic” reaction when the exercises are disseminated by the media. France responded that this was a step by step process, with no public emissions in 2011 and then inclusion of a public alerting component during the exercise Caribe Wave 14 ([IOC/2013/TS/109 Vol.1](#)) and

Caribe Wave 15 ([IOC/2014/TS/118 Vol.1](#)). There is a risk but if that is done on a step by step process, the risk is a controlled one. Haiti commented that there is a risk of confusion in the population therefore a reflection on this is required. France indicated that it is very important to explain to the population —3 or 4 days before it happens— that an exercise is planned and include media in the planning from the beginning. Trinidad and Tobago commented that they have done major exercises with inclusion of media several weeks ahead of the exercise itself. This has resulted in better exercises. Venezuela reported that media is closely involved in the exercises with also positive results, including social media (Youtube, Facebook).

3.7. NATIONAL PROGRESS REPORTS

- 58 Anguilla (UK) reported that they have been creative in terms of means of disseminating the warning to the population without using sirens. This includes the use of SMS. The recognition of [Anguilla as TsunamiReady](#) (pilot project IOC/NOAA-NWS) initiative that started in 2011 has been very useful in the process of developing the system further. Anguilla reported that the work at the community level has been very fruitful. The Caribe Wave Exercise continues to be a useful test of the national system including for example shelters' capabilities to receive a given number of people. Over the years they have consistently included the hotel sector in the activities of tsunami preparedness and expect to include them in the coming Caribe Wave exercises.
- 59 British Virgin Islands reported that it has been very proactive in educating the population as well as reinforcing the warning system. Their system includes seven sirens and use of media, social media (Tweeter) broadcasting, radio warning systems and text messaging. In the educational system they have a SMART SCHOOL programme that includes disaster risk reduction measures and climate change mitigation and adaptation. They have an agreement with the three telephone companies towards using emergency SMS messaging. The exercise CaribeWave/Lantex 15 exercise included the marine industry and several other businesses and triggered more requests from private companies on the tsunami threat and how they can be prepared for.
- 60 Colombia reported that it established a National Tsunami Warning Centre (NTWC) in Bogota in 2013 that coordinates two other centres, one for the Pacific in Tumaco, and one in Cartagena for the Caribbean. In the observational area, Colombia does have two meteorological/oceanic buoys in the Caribbean and six oceanographic buoys in the Caribbean. The data from these stations is available in real time through the General Directorate of Maritime and Port Affairs ([DIMAR](#)) website. A National Tsunami Warning System (NTWS) is formed by the National Geological Service ([SGC](#)), the DIMAR (warning centre) and the Sistema Nacional de Gestión de Riesgo (SNGDR, for risk management) coordinated through Standard Operating Procedures (SOPs). Colombia developed an automatic visualization system that has enabled a reduction of 12 to 2 minutes to issue the initial messages, through automatic text messaging to designated national authorities and institutions. In the preparedness area, Colombia reported that through the [SATREPS](#) (Science and Technology Research Partnership for Sustainable Development) programme of the Japan International Cooperation Agency ([JICA](#)), the project "Aplicación de las tecnologías más avanzadas para el fortalecimiento de la investigación y respuesta a eventos de la actividad sísmica, volcánica y tsunami, y el mejoramiento de la gestión del riesgo en la República de Colombia" is generating capabilities for tsunami monitoring, inundation maps in pilot areas and dissemination of warnings. It also reported that DIMAR is evolving to include all marine threats in its warning system. DIMAR is also generating a regional project to be a service provider for marine threats, with Colombia administrating a system that would include monitoring and warning information in a single website. They expect to present this proposal to the ICG/CARIBE-EWS in 2016. Colombia invited all Member States to its XVI national Seminar in Ocean Sciences ([COLACMAR](#)) that will be held in Santa Marta from 18 to 22 October 2015.

- 61 Costa Rica reported that its Tsunami National Monitoring System (SINAMOT, Sistema Nacional de Monitoreo de Tsunamis) was created in April 2014, a NTWC which analyses the tsunami threat and contributes on communities' tsunami preparedness. SINAMOT obtains seismic data from [OVSICORI](#), RSN and/or LIS, which are the three existing seismic networks in Costa Rica. These data include: Mw, depth, location and source (local fault, subduction). SINAMOT analyses the seismic data and decides the threat level, and then communicates it to National Emergency Commission ([CNE](#)). If there is enough time, CNE decides on issuing warnings and/or evacuation orders. SINAMOT has not 24/7 staff, but the CNE does. Then CNE communicates with SINAMOT every time there is a Tsunami Bulletin from PTWC, SINAMOT performs the analysis and elaborates a report for CNE. SINAMOT also receives the information directly from PTWC. Costa Rica is about to start the elaboration of tsunami evacuation maps, however priority is given to the Pacific coasts. Costa Rica has plans to expand its sea level network in the Caribbean in a near future. Costa Rica is also performing tsunami inundation numerical modelling in the Caribbean, together with researchers of other countries. Costa Rica indicated that while this is the first time it participates at a ICG/CARIBE-EWS session, they have several Caribbean locations that have tsunami threat including Puerto Limón and Tortuguero.
- 62 Cuba reported that the tsunami system is coordinated by Civil Defence National Headquarter and the [Institute of Oceanology](#) (IDO). The Civil Defence National Headquarter is responsible for issuing early warnings based on technical and scientific information provided by [Institute of Oceanology](#) (IDO), the National Center of Seismic Research ([CENAI](#)S) and the [Institute of Meteorology](#) (INSMET). The earthquake intensity reported through 1502-2007 shows that there is a seismic risk through the entire island. Paleotsunami studies have identified sea originated boulders lifted to higher ground, which could have been shifted by hurricanes or tsunamis, in several places through the coast of Cuba. Cuba reported that it has 16 sea level stations all with data loggers out of a plan for a total of 22 stations. Quasi real data is available but no real time data is yet available. Detailed bathymetry is available for the entire coast of Cuba and a scale of 1:2,000 is available for the island. Cuba thanked all experts and specialist of several countries and international organisations that have continually supported Cuba to be able to attend trainings and benefit of their support to keep working on tsunami matters while the country had not yet joined the ICG/CARIBE-EWS.
- 63 France indicated that in April, 2015, the TWPF and the NTWC were officially appointed by France for Martinique, Guadeloupe, Saint-Martin and Saint-Barthélemy. Work concerning the instrumentation (WG1) and the modelling (WG2) continued this year in a similar way than in previous years. The effort the most mattering during this inter-sessional period concerned the actions on WG3 and WG4. The experts of WG1 and WG2 assisted the actors of WG3 and WG4. The WG3 was strengthened by providing the official TWFPs for every French West Indies island. The WG4 was strengthened this year, with the arrival of new members including a representative of the inter-ministerial Service of Disaster and emergency services of Guadeloupe, a representative of the Regional council of Martinique and a representative of the community of Saint Martin.
- 64 With respect to the exercise CARIBE WAVE, France noted that only the "Dummy" message, announcing the beginning of the exercise is transmitted by GTS of the WMO. This is in opposition to one of the objectives of the exercise because it does not allow measuring the success of transmission of messages. France considers as crucial to proceed to an actual sending of messages by the real channels (e.g. GTS, EMWIN) planned for that purpose so that the exercise is really a test of transmission of alert in nominal condition. Indeed, this exercise is the only moment of the year where focal points can test in real conditions the end to end warning system. The procedures of the rising alert, the monthly tests or the un-scheduled transmissions tests do not allow the decoding and the translation in the absence of virtual earthquake. France noted as well that the arrival time of the first wave

on the French territories of Saint-Martin (Baie Blanche 1738Z) and Saint-Barthélemy (1727Z) was of about 30 minutes later than that indicated for Sint-Marten (Simpson Bay 1700Z) Anguilla (1708Z) and other islands which are close. France considers that there is there an anomaly in the modelling and would wish that this is pointed to the PTWC and to the NOAA.

65 It is interesting to indicate that France included a realization of a test including use of the rescue helicopter to alert the population, in particular for the littoral zones with difficult access.

66 Haiti reported that it has been working on strengthening its knowledge on tsunami hazard and consolidating procedures for effective decision making for tsunami warning, through validating its Standard Operating Procedures (SOPs), revisiting flood maps and deepening scientific studies to better know the tsunami threat in Haiti, including in the North coast. It has also strengthened local government response capabilities through the development of response plans in Cap Haitien and Port de Paix. To reinforce public awareness and preparedness, it has implemented simulation exercises and activities at school level, including through its participation at the Exercise Caribe Wave/Lantex 15, with 35 participants from 10 different institutions in order to validate the SOPs and test the communication lines from the central authorities to the Departmental Technical Coordinators (CPC). In the area of seismic monitoring, Haiti reported that the Seismic Technical Unit (UTS) of the Bureau of Mines and Energy (BME) operates 24/7 for recording earthquakes of magnitude greater than 2.6. It also reported that 8 VISAT stations and 6 GURALP stations will be installed to improve the seismological network. Haiti does operates a Center for Maritime Data Observation and Operations (CODOMAR) at the Navigation and Maritime Service of Haiti (SEMANAH) for surveillance of the sea which involves monitoring of PTWC messages, monitoring of the California Integrated Seismic Network (CISN) interface and monitoring of its three tide gauges and those in the region. Haiti reported that a 24/7 CODOMAR monitoring service is still considered. Haiti reported that a Scientific and Technical Coordination for Natural Hazards in Haiti (CST-RNH) was established including a Scientific and Technical Coordination for Seismic and Tsunami Hazards (CST-RST) with the mission to coordinate scientific activities for the control of natural hazards and the strengthening of technical provisions which may increase the resilience of the population to natural phenomena.

67 Mexico reported that the Mexican Tsunami Warning Center (CAT) in its three years of life has been able to integrate all seismic and sea level stations networks through the country to issue a tsunami warning in a maximum time of seven minutes. It has issued 300 bulletins, produced four technical report and 15 tsunami flooding maps, organized 9 national drills and seven international drills, as well as 19 training courses. In the last year, Mexico created a mobile CAT allowing operation to continue in case an evacuation of Headquarters is required, using a Type Cargo Van vehicle equipped with redundant computing and communications effects to be able to send and receive information and consulting services on different web pages related to seismic and sea level, mainly. This year, a communication network will be installed to warn of tsunamis in the region of the Middle America Trench. Additionally, an alternate CAT will be created in an area of low seismic risk to ensure operations continuity.

68 Netherlands reported that the Royal Netherlands Meteorological Institute (KNMI) is responsible for the installation and maintenance of seismic stations in the Caribbean territories of the Kingdom. In addition, for tsunami warning, Curaçao hosts the TWFP for the system.

69 Nicaragua reported that the Instituto Nicaragüense de Estudios Territoriales (INETER), a governmental institution which is the largest geosciences institution in Central America with 400 co-workers, 40 of them in the Geophysical Department, identifies

tsunamigenic events. The seismic activity is monitored by the seismic data centre at INETER (24x7, 2 watch persons) using online data from 88 stations in Nicaragua, around 100 stations from other countries in Central America and around other 200 stations worldwide. Data processing is carried out by a number of SeisComP3 systems. The Centre of Operations of the Civil Defense and SINAPRED have a graphical client of INETER's SeisComP3 which presents in real time the graphical (Epicentral Map) and alphanumeric information of the occurring seismic events. First seismic event characterizations should be available within 1 minute for events in Nicaragua. Tsunami warning should be declared within 5 minutes. INETER communicates the tsunami information to the Presidency of Nicaragua, the National System of Disaster Prevention (SINAPRED), and the Centre of Operations of the Civil Defence of Nicaragua. The President of Nicaragua decides about the declaration of the emergency. SINAPRED informs all related parts of the national disaster prevention system about the emergency, and coordinates their efforts to mitigate the impact to the population and infrastructure. Civil Defence activates the 60 automatic sirens on the Pacific Coast, communicates the emergency to the Army of Nicaragua and coordinates the efforts for the evacuation of the population under risk. Civil Defence also monitors via Internet the results of the Pacific Tsunami Warning Center (PTWC), the National Earthquake Information Center (NEIC), and seismic data centres in Central America. If the communication to INETER and/or Presidency fails (e.g. due to the impact of the earthquake) and they became aware about a possible tsunami threat, they would emit tsunami warning to the population by their own decision observing the thresholds defined in the national tsunami protocols.

70 Trinidad and Tobago reported specifically on the Exercise Dark Storm held from 24 to 26 March 2015. It was the Sixth National Exercise conducted by the Office of Disaster Preparedness and Management (ODPM), which included on 25 March: a Tsunami School Evacuation Exercise that was designed to test the tsunami preparedness of 131 vulnerable schools within two (2) miles from the Trinidad and Tobago coastline. At this exercise done in coordination with the Exercise Caribe Wave/Lantex 15, all schools within 2 miles of coastline evacuated at the same time at 10:30 a.m. on Wednesday 25 March 2015, and it was done simultaneously with the Coastal School Evacuation Exercise in Tobago (Tobago Emergency Management Agency, TEMA). Lessons learnt and recommendations for future exercises and improvement of risk management at schools were produced.

71 Turks and Caicos reported on its participation at the Exercise CaribeWave/Lantex 15 where they evacuated secondary and high schools. Some gaps were identified including the lack of tsunami plans in several of the schools. The absence of evacuation plans was also identified as a major gap. It reported that a draft SOP is available and needs to be finalized. Poor emergency radio communications operation was also detected. A draft communications protocol has been developed and continuation of awareness and education programme is foreseen. Tidal gauges are needed and sirens for public warning as there is no quick dissemination public system for tsunamis in the country.

72 USA reported progress on support of the New PTWC Products that would move from prescriptive to informative implying a paradigm shift to focus on keeping the NTWC services able to do this warning. CTWP will help, and this is being recognized by the US Congress in its current legislation as essential, to doing the outreach needed to build capabilities of the Member States in the region to receive and make actionable the forecasts of PTWC. USA highlighted that a successful tsunami warning in the CARIBE-EWS is dependent on the knowledgeable TWFP and/or capable NTWCs in Member States. USA is committed in partnership with USAID/OFDA to support necessary training for Member States. Along those lines, USA offers the services of the CTWP to formally support the CTIC in any international capacity building activities – especially those with technical elements that CTWP expertise may be useful – seen fit by the IOC. USA would ask for some formal recognition of the offer IOC role for CTWP. USA reported that PTWC will be assuming domestic responsibilities for US Virgin Islands and Puerto Rico by the end of September 2015 providing more

consistency for national and international forecasts. Even if there are some more information for certain islands – it will help to have one centre solving the problem. USA continues to improve forecasting modelling and is dedicated to science and technological development. Another area that the National Oceanic and Atmospheric Administration ([NOAA](#)) is exploring is the GIS (GNSS) Deformation in Real-time based on the NASA project which could provide an important augment for seismic analysis in the near field tsunami generation. NOAA noted possible pilot projects in GNSS (Global Navigation Satellite System) and that there may be some additional sensing capabilities - sea level gauge installation considered in 2015-16. USA referred to the Tsunami Ready™, one of the primary measures of tsunami community preparedness recognized by the US Congress, indicating that it has 184 TsunamiReady™ communities. USA is happy to see component parts of the Tsunami Ready™ piloted internationally in the CARIBE-EWS and supports the development of a CARIBE-EWS tsunami recognition programme, as preparedness is at least half of the issues. USA reported that it successfully hosted the International Tsunami Symposium 2015 “[Making the Pacific Ready for the Tsunami Threat](#)” in Honolulu, Hawaii, the 20 and 21 April 2015 to celebrate the 50 years of the PTWS. This event brought together many of system operators, with disaster managers, and decision makers to discuss evolution of the system and commit to its sustainability in the future.

- 73 Venezuela reported that through the project "Strengthening the System of Marine Protected Areas in Venezuela" it activated a plan to review the tide gauge network of the Simon Bolivar Geographic Institute of Venezuela ([IGVSB](#)). It entails the installation of 8 multipurpose stations off the coast of Venezuela, 4 of which are sea level gauges stations. To secure its implementation, international financing through the Global Environment Facility ([GEF](#)) and the United Nations Development Programme ([UNDP](#)) has been acquired. Also, within the establishment of the Vice Ministry of Risk Management and Civil Protection an Operations Plan for Planning and Execution of the Exercise Caribe Wave/Lantex 15 Coasts was achieved, with the support of the Ministries of Defence, Interior, Justice, and Technology. Venezuela is seeking a reinforced communications system, including GTS and AFTN. The Venezuelan Foundation of Seismological Research ([FUNVISIS](#)) has trained personnel in numerical modelling, and workshops and trainings on risk management are maintained to strengthen capacities at the interagency level. FUNVISIS developed a Tsunami Room at the National Seismological Museum to strengthen preventive education and training to the population. Venezuela reported the Exercise Caribe Wave/Lantex 15 under a joint action plan between the Ministry of People's Power for Interior, Justice and Peace ([MPPRIJP](#)) and FUNVISIS. The exercise was developed in 6 States: Zulia, Falcon, Vargas, Miranda, Anzoategui and Nueva Esparta with the presence of authorities from the central government, state government and local government, with a total participation of around 20,000 people.

3.8. INTERIM ADVISORY SERVICES REPORT (PTWC)

- 74 Dr Chip McCreery, Director PTWC, will report on the interim services provided to ICG/CARIBE-EWS. The floor will be open to comments from Delegates after this report.
- 75 Dr Charles McCreery, PTWC Director, gave a report on the activities of PTWC during the intersessional period. He showed maps of the dozens of seismic and sea level stations currently supporting PTWC operations for the Caribbean and thanked Member States for their support to these networks. They are the key to rapid and accurate evaluation of any potentially tsunamigenic earthquake as well as rapid detection and measurement of tsunami waves, accurate forecasting, and determination that the threat has passed. He mentioned about the continuing need to fill certain gaps in these networks and about the sustainability going forward.

76 Regarding PTWC operations, he noted that PTWC staff typically respond to a dozen or more earthquakes each day, most of them small, and that they issued 581 “Observatory Messages” during the inter-sessional period containing PTWC’s preliminary earthquake parameters. A total of five Tsunami Information Statements were issued for qualifying events in the Caribbean/Atlantic Region ($M_w \geq 6.0$ in Caribbean, $M_w \geq 6.5$ in the Atlantic), one in the eastern Caribbean, one in the northern Atlantic and three in the southern Atlantic. No CARIBE-EWS tsunamis warnings were issued and no tsunamis were observed since ICG/CARIBE-EWS-IX.

77 Dr McCrery reported that the Unscheduled Communication Test showed a slight improvement with 22 of 36 places confirmed timely receipt, compared to the 20 of 36 places which confirmed timely receipt in May 2014. However, at the second test of TWFP email for New Enhanced Products only 9 of 36 places confirmed timely receipt.

78 PTWC Director also reported briefly on the implementation of the Enhanced Products for PTWS that officially started on 1 October 2014. From the start of these products, PTWC has gone through 26 Information Only Events and 6 Threat Events. These events and earlier experience during the transition phase have enabled that several procedures, content and dissemination adjustments. The Enhanced Products for CARIBE-EWS can take advantage of this PTWS experience.

79 Lastly, the PTWC Director reported that in early 2015, PTWC moved its operations from its old buildings in Ewa Beach, Hawaii, where it has been located since the early 1960s, to a newly-built facility called the NOAA’s Daniel K. Inouye Regional Center ([IRC](#)) located on Ford Island inside Pearl Harbour, Hawaii. This new facility gives PTWC much-needed space for its operations, offices for all of its staff, and a more modern, capable, and secure IT infrastructure.

80 The **ICG noted** the report of PTWC.

3.9. REPORT OF EXERCISE CARIBE WAVE/LANTEX 15

81 Ms Christa von Hillebrandt Andrade (USA), Chair of the Task Team CaribeWave 15 reported on the Exercise CaribeWave/Lantex 15. She recalled that on 25 March 2015, two regional tsunami exercises took place in the Caribbean and adjacent regions, the Caribe Wave/Lantex (Panama Scenario) and the Lantex (Florida Scenario). Thirty-two Member States and 16 territories participated in this fourth regional tsunami exercise. This represents a participation rate of 100% of all the Member States of the ICG/CARIBE-EWS, for the first time in the history of the exercises. This is an increase from 98% participation in 2014, 75% in 2011, and 94% in 2013. Registered participants included designated UNESCO CARIBE-EWS Tsunami Warning Focal Points (TWFPs) and National Contacts, in addition to more than 1,000 other international, state, territorial, and local Emergency Management Organizations, government agencies, academic institutions, private businesses and organizations, health facilities, media, as well as communities and individuals. A total of almost 200,000 people participated, including over 98,000 people in Puerto Rico, 20,000 people in Venezuela, 9,377 people in French West Indies, and 4,700 in the U.S. Virgin Islands. This high level of participation reflects an improved level of understanding of the tsunami threat in the area, and a commitment to tsunami preparedness in the region.

82 The Start of Exercise (“Dummy”) messages were issued by the PTWC and US National Tsunami Warning Center ([US NTWC](#)) at 14h05 UTC for the Panama scenario and 13h02 for Florida scenario. To test communication, these were disseminated over all standard TWC broadcast channels (Global Telecommunications Satellite, Weather Wire, AWIPS, Aeronautical Information System Replacement, Emergency Managers Weather Information Network, email, fax) to all official TWFPs. The Start of Exercise messages were

also sent out through Twitter for the first time in the history of the exercise. During the exercise, communities were alerted through use of local warning systems including sirens, SMS and EAS, as well as social media outlets such as Facebook, Twitter, and Instagram. Through participation of people throughout the Caribbean, #CaribeWave2015 was the #11 top trending topics on Twitter for over five hours.

83 Thru the exercise it has been possible to:

- Validate the issuance of tsunami products from the PTWC and U.S. NTWC which currently serve as the tsunami service providers for the region.
- Validate the receipt and dissemination of tsunami products by TWFP's. Most TWFP's continue to be strongly dependant on fax and email, with a few indicating receipt of messages thru EMWIN, GTS and AISR. Email and fax were also used predominantly to disseminate information to the Disaster Management Organizations. In 38% of the MS and Territories, messages were also disseminated to the public; the principal mechanism for this dissemination was radio, TV and police.
- Continue with the exposure to proposed enhanced PTWC products, which include graphics. The Member States continue to support these products.
- Validate the readiness of the CARIBE-EWS countries to respond to a distant tsunami. Most countries also indicated that they had emergency response plans for distant tsunamis, as well as local and regional events. Nevertheless, most countries indicated that they do not have tsunami inundation, nor evacuation maps or mass evacuation plans.

84 Ms Christa von Hillebrandt Andrade explained that planning for the Exercise Caribe Wave/Lantex took over a year and was coordinated by a Task Team led by the US NWS CTWP and included the CTIC, CARIBE-EWS officers, the PTWC, the U.S. NTWC, the PRSN, the International Tsunami Information Center (ITIC), regional emergency management organizations, Tsunami National Contacts and TWFPs.

85 Feedback on the exercise was received from 47 CARIBE-EWS Member States and Territories through an online questionnaire. This represents feedback from a total of 43 TNCs/TWFPs, in addition to four other officials from a total of 47 countries and territories in the region (46 ICG/CARIBE-EWS Member States and Territories, as well as Brazil).

86 The **ICG noted** the report of the Task Team.

4. WORKING GROUP PROGRESS REPORTS

4.1. PROGRESS REPORT OF WORKING GROUP 1: MONITORING AND DETECTION SYSTEMS

87 This agenda item was presented by Mr Jean Marie Saurel (France), Chair of Working Group 1 (WG1).and Mr Sébastien Deroussi (France), Vice-Chair of Working Group 1.

88 Mr Saurel reported that for the seismic network new data online is available from several networks and there are some additional stations that would be soon added from Costa Rica, Cuba, and Panama. New plans for stations installations and updates for the upcoming years are also available from Dominican Republic, Haiti, Honduras and Venezuela). He indicated that 95% of stations from the Implementation Plan are contributing data (compared to 88 % in 2014), that 76% of stations have data archived in IRIS (compared to 66 % in 2014) and that data availability is above 90 % regularly for 65% of the network (compared to 60 % in 2014).

- 89 Mr Deroussi (France) reported that 9 new sea level stations were installed during the intersession period, two of them funded by COCONet and TLALOCNet projects. This increased the number of sea level stations to a total of 69 contributing stations in real-time, mainly on GOES satellite with 6 minutes slots. He indicated that the 2014 sea level monitoring capability maps show the dramatic improvement in the network since 2006 and helped to identify 3 main gap zones: the North-Western part of the Caribbean basin, some Southern parts of the Caribbean basin (Panama, Colombia, Venezuela) and the North-Eastern part of the Lesser Antilles (Anguilla, Saint-Martin, Sint-Marteen, Saint-Barthelemy). He stated that the North-Western gap diminished thanks to COCONet stations. He reported that the DART buoy 42407 located inside the Caribbean Sea had been declared lost in December 2014.
- 90 Mr Deroussi indicated that the WG1 found that the current sea level specifications based on GLOSS standards are high and may discourage some operators to contribute or install sea level stations in the ICG/CARIBE-EWS. It recommended developing a subset of Global Sea-Level Observing System ([GLOSS](#)) requirements, specifically for tsunami warning purposes with a two level specifications table: minimum and optimum requirements, and a summarized version of the actual requirements focused on technical specifications.
- 91 With respect to continuous GPS network, Mr Saurel reported that COCONet and TLALOCNet projects continued over the intersession period, with 2 new sea-level stations installed in Jamaica and Mexico and three mirror or regional data centres designated in Barbados, Colombia, and Nicaragua. He highlighted that other GPS networks exist in the region that have the ability to share data or that already share data.
- 92 Mr Saurel underscored that CTWP is of great help in tracking sea-level and seismic network data availability and providing monthly report (IRIS, PRSN, PTWC, NTWC and IOC provided statistics), also hosting monthly conference calls between network operators. He indicated that PRSN organized and hosted the Fourth Training Course for Operators of Sea Level Stations in the Caribbean and Adjacent Regions, in Mayagüez, Puerto-Rico, USA, from 3 to 7 November 2014 and hosted a Working Group 1 (sea level members) meeting.
- 93 USA indicated that the USA Data Buoy Cooperation Panel (DBCP) is tracking the Caribbean DART 42407 that has been located close to the coast of Texas and will be recovered and put back in service soon.
- 94 Under this agenda item, Dr Gerald Bawden from the [NASA Science Mission Directorate](#), presented on use of GPS/GNS stations for tsunami early warning. He indicated that it was the 11 March 2011 Tohoku-Oki earthquake that demonstrated the full potential of GPS for tsunami warning. The large GSI network captured the displacement dynamics of the earthquake. Unfortunately, these data were not available in real time but all post processing of these data subsequently made available to international researchers was nothing short of amazing. Data indicated that the maximum horizontal displacement was 5.3 metres and the maximum vertical subsidence was 1.2 metres. A post-event numerical modelling of that data gave a reasonable magnitude approach by 200 seconds and a very precise calculation by 300 seconds. He explained that expanding the earthquake and tsunami early warning globally requires access to shared real time GNSS data in areas that are seismically active and where coastal communities may be impacted by tsunamis. The National Aeronautics and Space Administration ([NASA](#)) is available to share software and contribute to enhance capabilities for TEWS in partnership with regional/national TWCs. An example is available from the Real-Time Earthquake Analysis for Disaster Mitigation ([READI](#)) Network project.
- 95 France asked for the minimum detection threshold. Dr Baldwen indicated that this depends on the distance of the stations to the epicentre but in principle a 5 cm displacement can be detected through the GPS data. PRSN indicated availability to cooperate.

96 The **ICG noted** the report of Working Group 1 and adopted Recommendation ICG/CARIBE-EWS-X.2.

4.2. PROGRESS REPORT OF WORKING GROUP 2 ON HAZARD ASSESSMENT

97 This agenda item was introduced by Dr Alberto López (Puerto Rico, USA), Chair of Working Group 2 (WG2), who reported on three main action items that were recommended on previous ICG/CARIBE-EWS sessions: a Workshop on Tsunami modelling and mitigation, the definition of Caribbean Tsunami sources, and a Bathymetry Inventory. WG2 also dealt with two other items that came up during the year, namely: the Chile-Spain Trilateral Project and a Caribe Wave/Lantex 15 collaborative project.

98 He reported that the [Experts Meeting Workshop on Tsunami Modelling and Mitigation \(ICG/CARIBE-EWS/WG2-THA/3\)](#) held in Cartagena de Indias, Colombia, from 1 to 3 December 2014, was hosted by the Dirección Marítima de Colombia ([DIMAR](#)) and attended by 16 expert participants, full report is available. The meeting discussed numerous issues related to the topics included in the agenda, unfortunately, discussion time had to be limited due to time constraints. Yet, the group was able to present valuable recommendations based on these discussions, among these: issues related to bathymetry data (availability, access, format, etc.) exploring collaborations among countries for data collection and training, tsunami Evacuation map stages: fixed-height to modelling-based maps, identifying priority areas for tsunami evacuation maps based on population, tourism, infrastructure, seasons and on Tsunami Hazard Assessments (probabilistic and deterministic).

99 With respect to the definition of Caribbean Tsunami sources, Dr Lopez recalled that developing a list of tsunami scenarios for the Caribbean region has been on the WG2 recommendation list for many years. In recent years, several publications coming from a diverse group, including governmental and academic institutions, have addressed this issue partially. Although more information is available today than in the past, the recommended lists must be compiled and evaluated before a comprehensive list can be made available for the usage of the tsunami modelling community. He offered a work-in-progress report available as document in the [meeting website](#).

100 Dr Silvia Chacón-Barrantes (Costa Rica), member of the WG2 reported on the availability of coastal bathymetry and/or tsunami evacuation maps within member states of the ICG/CARIBE-EWS. The availability was estimated through an email survey to TNC and TWFP of all Member States and Territories during February, March and April 2015, asking availability and extent of Tsunami Evacuation Maps (TEMs), Tsunami Inundation Maps (TIMs), and Bathymetric data. Thirty Member States and Territories answered the survey. Twenty-six answers (76%) identified availability of bathymetric data, 5 of them as Nautical Charts and 13 of them as surveys. On availability of Tsunami Inundation Maps only 3 responses (8%) were positive and nearly 50% (18) of the answers indicated that TIMs are not available. More than half of the answers (20) indicated they do not have Tsunami Evacuation Maps (TEMs). A significant number of answers (4 out of 20) do have TIMs but do not have TEMs.

101 Dr Lopez indicated that the WG2 suggests that for 2015-2016 it focus on launching a second stage of the bathymetry survey, explores offering a ComMIT webinar, creates an Expert Team of Tsunami Modellers for virtual meetings and/or visits to Member States and engages in hands-on training and capacity building, compiling best-practices in the development of tsunami evacuation maps based on the expertise in the region. Additionally, WG2 offers to list countries in need of developing tsunami evacuation maps based on tsunami fixed-height, and help these countries to develop such maps.

102 In response to a question from France about the possible links and synergies of WG2 with the WMO Coastal Inundation Forecasting Demonstration Project ([CFIDP](#)), Ms Hillebrandt-Andrade indicated that former Chair of WG2 Dr Aurelio Mercado was invited to the initial workshop of CFIDP in Dominican Republic. It was agreed that the Secretariat will communicate with WMO to make sure that WG2 current Chair Dr Lopez is aware of the activities and tools developed by CFIDP.

103 The **ICG noted** the report of Working Group 2 and **adopted** Recommendation ICG/CARIBE-EWS-X.3.

4.3. WORKING GROUP 3 ON TSUNAMI RELATED SERVICES

104 This agenda item was introduced by Mr Antonio Aguilar (Venezuela), Chair of the Working Group. Mr Aguilar reported that the new name and Terms of Reference of WG3 were approved through Recommendation ICG/CARIBE-EWS-IX.4 of the [Ninth Session of the ICG/CARIBE-EWS](#), which new purpose is to advise the ICG on mechanisms and effective and innovative procedures, to ensure end to end communication and dissemination of early warnings, based on existing capacities and existing in each country, focusing on guidance alerts and dissemination and communication of products related to tsunamis.

105 WG3 explored and studied existing communications platforms to establish the scope and limitations they have. It has been significantly explored the use of social networks for the dissemination of public information, and also as a platform for contact between national and international institutions, in an effort to promote the redundancy of communications. Special case is the involvement of civil radio operators (amateurs), who maintain domestic and international communications with low cost and high performance.

106 Regarding communication protocols and dissemination of warnings to their final destination, there exist unresolved issues which arose from the Enhanced Products and new criteria issued by the PTWC in the document *User's guide for the Pacific Tsunami Warning Center: enhanced products for the Pacific Tsunami Warning System (IOC/2013/TS/105 Rev.3, English and Spanish)*. The more important issue is that many countries in the region do have SOPs with defined criteria or information about public warning for tsunami, that do not match the definitions of the Enhanced Products. If every country should have alert levels according to their own realities and contexts, how to propose a common base from which you can compare, evaluate and improve these systems, allowing its evolution?

107 Mr Aguilar made a call to incorporate social communicators in order to win them as allies in case of tsunami occurs, but especially for information campaigns on self-protection measures and preparation to the tsunami threat.

108 Finally, he invited Member States to document and share their experiences about communication problems in terms of means and technologies for communications, and successful experiences in order to serve as reference to other States in the region. In this regard, the WG3 offered to compile these experiences for dissemination within the ICG.

109 Chair Ms Hillebrandt-Andrade requested all WGs to make sure they have a look at the questionnaire of Caribe Wave exercises and see if their specific surveys could be accommodated through it, to avoid sending too many and uncoordinated surveys to Member States.

110 The **ICG noted** the report of Working Group 3.

4.4. PROGRESS REPORT OF WORKING GROUP 4:
PREPAREDNESS, READINESS AND RESILIENCE

111 This agenda item was introduced by LtC Patrick Tyburn (France), Chair of Working Group 4 on Preparedness, Readiness and Resilience. Lt Tyburn reported that the WG4 did not meet during the intersessional period and provided support to the activities of CTIC through direct advice about the CTIC website and logo. WG4 also participated at the meeting and works of the Task Team on Tsunami Recognition Programme and was directly involved in the Chile-Spain CDEMA Project. WG4 is prepared to accompany Member States in the implementation of national Public Awareness and Education strategies, elaborate a tsunami evacuation exercise guide for communities and organise virtual meetings in the next intersessional period.

112 The **ICG noted** the report of Working Group 4.

5. **ESPECIAL INVITED LECTURES:
COMMUNITY-BASED TSUNAMI WARNING SYSTEM**

113 Under this agenda item, the Chairperson recalled [Recommendation ICG/CARIBE-EWS-IV.4](#), which urges Member States to consider the recommendations of the workshop on [Good Practices on Tsunami and Coastal Hazards Community Preparedness and Readiness in Central America and the Caribbean](#) held in Panama City, Panama, from 11 to 13 August 2008. In this respect, representatives of Sint Maarten and Saint Martin (France) were invited to make a presentation with focus on the development of their community-based warning systems.

114 Mr Paul Martens, Director of the Office of Disaster Management Organization of the Fire Department of Sint Maarten, indicated that hurricanes and tropical storms are the most common disasters on Sint Maarten, but this does not exclude any other possible disasters, including tsunamis. He recalled that in 1995 Sint Maarten was hit hard by hurricane Luis and that triggered a better definition of the actions to be undertaken to mitigate the effects of these events as much as possible. These actions included adapted legislation, the definition of a Disaster Management System with a key coordination role for the Fire Department, structural measures including construction, drainage and infrastructure improvements, a curfew system and Public Awareness.

115 The organizational structure for Disaster Management in Sint Maarten does have a direct command line from the Prime Minister to the Fire Chief as National Disaster Coordinator and includes 10 Emergency Support Functions (ESF). The ESFs are small specialized groups/teams lead by government agencies but including NGOs. Their tasks during disaster situations are similar to regular activities/operations but on a larger scale. ESF-coordinator is the respective Director, Secretary General or Department Head of the Agency, which is responsible during the preparatory and repressive phases for the various disaster processes. ESFs require coordination, cooperation and interaction within and between the groups and the costs of its operations is covered by budget of respective agency. Mr Maarten provided a detailed description of the mandates and functions of the 10 ESFs.

116 Mr Martens indicated that as a Small Island Developing State (SIDS), Sint Maarten has most of its critical infrastructure at or near sea level which makes it highly vulnerable to tsunamis. Considering the situation of Sint Maarten in the context of the known tsunamigenic zones of the Caribbean Sint Maarten has started modelling of tsunami risk that will be used to determine safe areas and evacuation routes. With this information, public information and community planning will be implemented in the country. As the national DMO system is very much hurricane oriented an improvement process has started, including on the information

procedure on possible threats and the implementation of early warning systems. Tsunami related affairs are now on the agenda and the new governmental institutions would need to be incorporated.

117 Ms Charlotte Terrac, Project Manager on Managing Major Risks of the [Collectivité de Saint-Martin](#) and Mr Emmanuel Effantin, Chef de cabinet du Préfet de la Préfecture de Saint-Martin, reported on tsunami warning and preparedness in St. Martin (France). They indicated that the Organization of the Civil Security Response (ORSEC) is a unique disaster contingency plan, under a single authority, the Préfet, exceeding the current level of the civil daily safety. It does interact with the Territorial Protection Plan (PTS) at the *Collectivité* level that includes all documents regarding the competence of the *Collectivité*, compatible with the ORSEC plan, contributing to the preventative information and protection of the population. Ms Terrac and Mr Effantin described the coordination process as applied to the Exercise Caribe Wave/Lantex 15: PTWC messages arrive directly to the TWFP [Météo France](#) who distribute warnings to the French West Indies Emergency Management Organization (EMIZA) that communicate it to the Prefecture de Saint-Martin that coordinates the operational services. For this exercise, the warning dissemination to the media, the other actors of civil security and the private schools were made by a test message without specifying « tsunami exercise ». In order to prepare the exercise, the participating teams were divided on 10 work areas and a support card was created to identify and map secure areas above 10 metres. The objectives of the exercise at the school level were to test the reception of the alert message, dispatch the alert to the teachers and children, join the existing secure area in the school, check that there is nobody in the classrooms and toilets and think about a higher ground close to the school. The schools of Saint-Barthélemy implemented the full exercise including climbing to higher ground. From this exercise, the team concluded that a digital elevation model for coastal management is required in St. Martin, that a database is essential for risk prevention, and that a sea level gauge in the area is required. Dissemination systems like a siren network or cell broadcasting are under analysis and closer cooperation with Sint Maarten is envisaged.

118 Colombia, France and Sint Maarten contributed comments about the time required for both sides of the island to get the message out to the population considering the different nature of the two systems.

119 France and PRSN commented on the recommendations for vertical evacuation and potential for tsunami in the Lesser Antilles.

120 France and Sint Maarten indicated they are interested in operational cooperation for disaster management.

6. POLICY MATTERS

6.1. REPORT OF THE TASK TEAM ON TSUNAMI SERVICES

121 Chair Hillebrandt-Andrade introduced this topic recalling that according to Recommendation [ICG/CARIBE-EWS-II.3](#), the Group decided to establish a Caribbean Tsunami Warning Center to be located in the region. She reminded that Recommendation [ICG/CARIBE-EWS-IV.5](#) approved the criteria for a Regional Tsunami Warning Centre as identified in the Working Group 1 report on Technical, logistical and administrative requirements of a Regional Tsunami Warning Centre for the Caribe EWS ([ICG/CARIBE-EWS-IV/13](#)) and the Tenth session of the ICG/CARIBE-EWS (ICG/CARIBE-EWS-X) decided to create a Task Team to describe tsunami services as part of the Caribbean Tsunami Warning System, including the current capabilities, required information, products, and

services and instructs it to propose a system model to serve as a guideline toward a fully functional Caribbean Tsunami Warning System.

122 Jean Marie Saurel (France) reported on the results of the work of the Task Team. He indicated that the [Task Team on Tsunami Services Model](#) met in Cartagena de Indias, Colombia, the 4 and 5 December 2014, hosted by DIMAR. The Task Team received updates on the seismic and sea level network capabilities in the region. The Task Team recalled that according to the definitions recommended by the TOWS-WG a Tsunami Service Provider (TSP) monitors seismic and sea level activity and issues timely tsunami threat information within an ICG framework to Tsunami Warning Focal Points (TWFPs), National Tsunami Warning Centres (NTWCs), and other TSP(s) operating within an ocean basin. Regional TSPs should be selected based on requirements to be defined, should provide performance key indicators and send products to all the Member States and Territories of the ICG/CARIBE-EWS. Sub-Regional TSPs send products only to Member States and Territories that have subscribed to their services. In both cases, TWFP, NTWC & DMO gives information back to RTSP(s) and SRTSP(s) regarding local actions accomplished and responses to the threat products received. Another key component of a Tsunami Services Model is the Monitoring Network Operation Services (MNOS) which monitor and report the status of seismic, sea level and GPS data and networks. It is hosted in the region and has links with the network operators and the RTSP(s).

123 The Task Team on Tsunami Services Model reached the following agreements:

1. Products to be sent: Hypocentral Location, Magnitude & Travel Time in less than 5 minutes, while Focal Mechanism & Tsunami Forecast later on.
2. Products should be issued in several languages: Spanish, English and French.
3. In order to improve time response, language issues and integrate local data & knowledge, sub-regional centres are encouraged to be created.
4. Continue to encourage PTWC to provide its interim service and the Enhanced Products to the region until the completion of the proposed Caribbean Tsunami Service Model.
5. Encourage technical/educational development of each country in the Caribbean on the tsunami topics and its ongoing work with communities.
6. Propose the creation of the official website of RTSP(s) to publish information and actions about tsunami threat level adopted by TWFP/NTWC in each country.
7. Propose a new Task Team, or otherwise extend the function of the current group to define requirements of the proposed model and related products.

124 The intersession Working Group on Enhanced PTWC Products and Monitoring and Detection Systems (which included Tsunami Services Model), Co-Chaired by Dr Charles McCreery (USA) and Mr Jean Marie Saurel (France) reported under this agenda item. The Group discussed and clarifications on the Tsunami Service Model presented, commented about different interactions between the Sub-Regional Tsunami Service Providers (SRTSPs) and the Regional Tsunami Service Providers (RTSPs) in the Pacific and proposed to remove the DMOs from the scheme developed by the Task Team as its role depends on country specific SOPs. The scheme agreed by the intersession Working Group is available as ANNEX IV.

125 Colombia, Costa Rica, Curaçao, France, Trinidad and Tobago and USA intervened under this agenda item about the role and responsibilities of Sub-Regional Tsunami Service Providers (SRTSPs) in particular *vis a vis* alert dissemination to the public. There was consensus that this function is specific to each country and mostly performed by Disaster Management agencies.

126 In response to a question from France on the need for a regional scope technical document similar to those of WMO for hurricane operations that describe the SOP at regional level, Mr Saurel indicated that the current [PTWC Communications Plan for the CARIBE-EWS](#) performs that role.

127 The **ICG noted** the report of the Task Team and **adopted** Recommendation ICG/CARIBE-EWS-X.2.

6.2. EXERCISE CARIBE WAVE 16

128 The Chair recalled that at the Eighth 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](#)) held in Port of Spain, Trinidad and Tobago, from 29 April to 1 May 2013, the ICG decided to conduct Caribe Wave exercises on an annual basis and therefore an exercise is to be scheduled for 2016.

129 A proposal for Caribe Wave/Lantex 16 to be held on 16 March 2016 at 14h00 UTC was presented by the Chair of the Task Team on Caribe Wave 15, Ms Christa Hillebrandt-Andrade. She indicated that two scenarios have been proposed: the Venezuela scenario is a Mw 8.4 earthquake with an epicentre at 11.0 N and 66.0 W with a uniform slip of 8 m. This scenario is based on an earthquake and tsunami which occurred on 29 October 1900 and according to the Tsunami Database of the National Centers for Environmental Information ([NCEI](#), previously known as NGDC) the maximum water height was 10 metres. The Northern Hispaniola scenario is an Mw 8.7 earthquake with an epicentre at 20.0 N and 72.0 W with a uniform slip of 10 m. This scenario is based on an earthquake and tsunami which occurred on 7 May 1842 and according to the Tsunami Database of the National Centers for Environmental Information (NCEI, previously known as NGDC) the maximum water height was 5 metres. The scenario is taken from the recommendation of the Experts Meeting Earthquake and Tsunami Hazard in Northern Haiti: Historical Events and Potential Sources held in Port au Prince, Haiti, the 10 and 11 July 2013 ([IOC/2013/WR/255](#)). The source was recently also modelled by Grilli et al (2015 in press). She indicated that once the source is selected, CTWP will coordinate with the Pacific Marine Environmental Laboratory ([PMEL](#)) so that the source is uploaded in TWEB (online NOAA Tsunami Forecasting Tool).

130 The intra-session Working Group Caribe Wave 16 provided an initial review and then produced the final recommendations for the exercise. Thursday, 17 March 2016 was proposed as date for the Exercise Caribe Wave 16, with the two suggested scenarios (Northern Hispaniola and off Venezuela) starting at differentiated times in the day. The intra-session Group also recommended moving the subscription system from the PRSN to [www.tsunamizone.org](#). The Group also recommended that the Caribe Wave Task Team begins to consider volcanic or landslides tsunami sources as potential scenarios for future exercises and that the ICG considers holding wide-basin exercises always on Thursdays or Tuesdays to ensure the full participation of French schools throughout the region. The Group also suggested the adoption of a long term plan for the Caribe Wave exercise.

131 Venezuela accepted the change in date but asked if consideration can be given in the future to not coincide or avoid to making exercises too close to other important dates that deviate the attention of Civil Protection and other bodies (Holy Week). Mexico shared their experience that is to avoid exercises in the Holy Week because participation is too low.

132 The ICG **adopted** Recommendation ICG/CARIBE-EWS-X.4.

6.3. PTWC NEW PRODUCTS FOR CARIBE-EWS

133 The Chair recalled that the ICG decided at its Ninth session that a decision regarding the timing for full implementation of the Enhanced Products not be made until at least the Tenth Session of the ICG/CARIBE-EWS. It further proposed that an exercise based solely on the Enhanced Products be conducted in 2015 and satisfactorily evaluated prior to full implementation of the Enhanced Products; and recommended that the Intersessional Task Team on PTWC Enhanced Products be continued until the enhanced products are fully implemented.

134 Dr Charles McCreery (USA), Chair of the Task Team on Enhanced Products and Director of PTWC reported on the status of the Enhanced PTWC products for the ICG/CARIBE-EWS. He provided a summary of the current status in the development of enhanced text and graphical products for the CARIBE-EWS. He reminded that the Enhanced Products introduce a paradigm change where PTWC provides threat forecast and is up to Countries to convert that forecast into alert levels. He recalled that the existing Products are composed by text only, that deliver a single alert level (Watch or Nothing), indicating Estimated Time or Arrival (ETAs) but no indication of expected impacts. Enhanced Products do include text messages but add Polygons Map of Forecast Threat Levels, Forecast Deep-Ocean Amplitudes, Forecast Coastal Amplitudes, KMZ File of Coastal Amplitudes and Table of Statistics for Each Polygon. He provided examples of all these types of information products.

135 Director PTWC suggested the following implementation schedule:

- 1 October 2015, begin in parallel with current products :
 - Update the User's Guide for the Enhanced Products.
 - Issue enhanced products in parallel with current products on non-interference basis.
- October 2015 – February 2016, Simulated Product Tests:
 - Likelihood of threat events small.
 - Issue enhanced products for some simulated events (email).
- Ongoing, further Training on the Enhanced Products
- 1 March 2016, begin Enhanced Products

136 On training needs for the enhanced Products, Ms Hillebrandt indicated that the CTWP is available to support Webinar based trainings of Enhanced Products and proposes to focus the potential in person trainings in the Eastern and Northern Caribbean area considering the Central America countries have been going through trainings on PTWC new products in the framework of the PTWS. For that, CTWP is hoping that some countries could volunteer to host trainings in the coming 9 months.

137 Mr Saurel (France) reported on behalf of the intrasessional Working Group on Enhanced PTWC Products and Monitoring and Detection Systems (includes Tsunami Services Model). He indicated that the Group suggested to accept implementing the new products as proposed by PTWC and discussed about the technical details of the implementation (transmissions media, interim period, size of graphical products) as well as about the need for trainings during the interim period in a similar way as the Caribe Wave 15 webinars were performed (several and in English, French and Spanish). The Group proposed a draft recommendation to the Plenary.

138 Discussions about the graphical products being private (only sent to TWFP/NTWC) or public.

139 In response to a question from France, PTWC indicated that the Enhanced Products will be sent in parallel but only to NTWC/TWFPs.

140 The **ICG adopted** Recommendation ICG/CARIBE-EWS-X.5.

6.4. REPORT OF THE TASK TEAM ON TSUNAMI RECOGNITION PROGRAMME

141 Chair Hillebrandt-Andrade recalled that at the Eighth 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](#)) was held in Port of Spain, Trinidad and Tobago, from 29 April to 1 May 2013, the ICG agreed to Instructs Working Group 4 to establish a Task Team to develop a strategy or business proposal for a Performance Based Tsunami Recognition Programme. She indicated that through [Recommendation ICG/CARIBE-EWS-IX.1](#), the ICG endorsed the continuation of the work of the Task Team on Performance Based Tsunami Recognition Programme and recommended continued implementation of the NWS NOAA-UNESCO/IOC TsunamiReady pilot project to support the development and validation of the CARIBE-EWS Performance Based Tsunami Community Recognition Programme.

142 Ms Alison Brome, Interim Director CTIC, on behalf of Task Team Leader, Kerry Hinds (Barbados), presented the report of the Task Team. She recalled that TsunamiReady™ is a US-based tsunami recognition programme implemented since June 2001 by NWS NOAA which aims to support community leaders and emergency managers to strengthen their local operations that entails an application, verification and renewal processes following standard guidelines. She also recalled that a NWS NOAA-UNESCO/IOC Pilot Project was developed in the framework of the ICG/CARIBE-EWS to explore the applicability of this concept to the wider Caribbean region. Under this Pilot project, 2 territory-wide recognitions were delivered, to Anguilla (2011, renewal in 2014) and British Virgin Islands (2014). Considering the above experiences, the Eighth session of the ICG/CARIBE-EWS in 2013 established the Tsunami Recognition Programme Task Team to advance the development of the strategy or business proposal for a Community Performance Based Recognition Programme including the parameters, possible metrics or performance measures, the feasibility, and potential sources of funding for the programme. The Task Team met in November 2013 in Mayaguez, Puerto Rico, USA, visited 2 TsunamiReady communities, interviewed emergency management personnel and reviewed the TsunamiReady guidelines, application form and processes. The [Task Team](#) met again in Mayaguez, Puerto Rico, the 8 and 9 April 2015, and recommended the Tsunami Recognition Programme to be CTIC-led (technical support & coordination, marketing etc.), considering scalability and generic parameters, and put in place a piloting of ICG/CARIBE-EWS Recognition Programme, including standardization (information, maps, signage/symbols) and integration of special needs and vulnerable groups.

143 The intra-session Working Group on Tsunami Recognition Programme, Chaired by Ms Alison Brome, reported that it reviewed in detail the [proposed Guidelines](#) and requirements developed at the Task Team Meeting held the 8 April 2015 and further adapted it based on the input of the Intra-session Working Group. In its deliberations, the Group considered the experiences of Anguilla (UK), British Virgin Islands and Puerto Rico (USA). It also discussed and agreed a definition of CARIBE-EWS Recognized Community as “A national/territorial/local government entity or facility that has the authority and ability to adopt the recognition guidelines within its jurisdiction”. The Group also proposed the composition and broad roles of the Regional Tsunami Recognition Board and National Tsunami

Recognition Board and discussed the name of the Community Performance Based Tsunami Recognition Programme for the Caribbean and Adjacent Regions

144 A brief exchange on the translation of Tsunami Ready into other languages took place, the **ICG agreed** to use the official translation of UNESCO for the terms Tsunami Ready once it becomes available.

145 The **ICG adopted** Recommendation ICG/CARIBE-EWS-X.6.

6.5. CENTRAL AMERICA TSUNAMI WARNING CENTER (CATAC)

146 Ms Hillebrandt-Andrade informed the ICG that within the framework of the ICG/PTWS Regional Working Group on Tsunami Warning and Mitigation System on the Central American Pacific Coast, its Member States have conducted consultations over a proposal of Nicaragua to establish and host a Central America Tsunami Advisory Center (CATAC). Ms Hillebrandt recalled that a Recommendation on CATAC was approved at the recent Twenty-sixth session of the ICG/PTWS and was made available through the [meeting website](#).

147 Mr Strauch reported that Nicaragua has offered to host CATAC and has consulted with a number of institutions in the Central America region including with Civil Protection organizations and with seismic and geophysical centres. He indicated that the proposal of a Central America Tsunami Warning Center was discussed at the First meeting of the Regional Working Group on Tsunami Warning and Mitigation System on the Central American Pacific Coast held in Managua, Nicaragua, from 4 to 6 November 2009([ICG/PTWS-WG-CA-I/3](#)), the Second meeting was held in San Salvador, El Salvador, from 28 to 30 September 2011([IOC/PTWS-WG-CA-II/3](#)), and the Third meeting was held in Managua, Nicaragua, the 29 and 30 September 2014 ([IOC/PTWS-WG-CA-III/3](#)).

148 Mr Strauch indicated that Nicaragua, at the Twenty-sixth session of the ICG/PTWS proposed CATAC to cover both the coasts of the Pacific and Caribbean within the framework of ICG/PTWS and ICG/CARIBE-EWS. In this context, he requested the ICG/CARIBE-EWS to support a common ICG/PTWS and ICG/CARIBE EWS Task Team on CATAC.

149 The **ICG adopted** Recommendation ICG/CARIBE-EWS-X.7.

7. PROGRAMME AND BUDGET FOR 2016-2017

150 This agenda item was introduced by the Technical Secretary, Mr Aliaga, who reported on the status of regular funding from UNESCO for the Tsunami Unit (TSU) and, in particular, for the ICG/CARIBE-EWS.

151 He indicated that out of a total US\$ 510 million approved regular budget for the entire UNESCO, the Tsunami Unit has been authorised a maximum of 254,400 USD for the biennium 2014–2015. From this amount, the ICG/CARIBE-EWS has been allocated a total of 60,000 USD, evenly distributed into three main areas of activity: Promote integrated and sustained monitoring and warning systems; educating communities at risk with respect to ocean-related hazards prevention; and contribute to develop Member States capacities for coastal hazard assessment.

152 He provided details about the spending of these amounts in 2014-2015 that are mainly to support the ICG coordination work including the meetings of its Working Groups and Task Teams. He also indicated that for 2016–2017 it is expected that IOC would obtain a

slight increase in its regular funding that would positively impact on the funding available for ICG/CARIBE-EWS coordination activities.

153 Mr Aliaga also provided information on extra budgetary funding, in particular on the approval of two funding proposals to ECHO for activities on tsunami preparedness in San Cristobal, Dominican Republic, and Haiti. Both proposals were elaborated in partnership with other agencies.

8. NEXT SESSION

8.1. CONFIRMATION OF DATE AND PLACE OF ICG/CARIBE-EWS-XI

154 The Chairperson recalled that, at the Ninth Session of ICG/CARIBE-EWS, Colombia announced that they will consider hosting the Eleventh Session.

155 The representative of Colombia reiterated the offer to host the Eleventh Session of the ICG/CARIBE-EWS in Cartagena, Colombia, in early May 2016.

156 Haiti suggested extending the meeting to four days instead of three, and considered allocating time for a field trip. Colombia indicated that an optional fourth day for a field trip would be advisable, given funding to host four days is more expensive than three days.

157 The ICG **decided** to accept the offer of Colombia to host the meeting in early May 2016.

8.2. TARGET DATE FOR ICG/CARIBE EWS-XII

158 The Group was requested by the Chairperson to decide on a target date for the Twelfth Session of the ICG/CARIBE-EWS.

159 Costa Rica indicated its availability to host the Twelfth Session of ICG/CARIBE-EWS in the Central Valley of Costa Rica.

160 The ICG **acknowledged** the offer of Costa Rica and **decided** to hold the Twelfth Session of the ICG/CARIBE-EWS in May 2017.

9. ANY OTHER BUSINESS

161 No other business was discussed.

10. ADOPTION OF DECISIONS AND RECOMMENDATIONS

162 Based on the reports of the Working Groups and discussions at the Plenary Sessions, the ICG adopted seven Recommendations.

163 The ICG **decided** the following Chairpersons for Working Groups:

- Working Group 1 on Monitoring and Detection Systems:
 - Chair :Jean-Marie Saurel (France, 2013-),
 - Vice-Chair (Seismology): Dan McNamara (USA, 2015-),
 - Vice-Chair (Sea Level): Sébastien Deroussi (France, 2012-)

- Working Group 2 on Hazard Assessment:
 - Chair: Alberto Lopez, (PRSN, USA, 2014-),
 - Vice-Chair: Franck Audemar (Venezuela, 2014-)
- Working Group 3 on Tsunami Related Services:
 - Chair: Antonio Aguilar (Venezuela, 2014-),
 - Vice-Chair (Technology and communications platform for alerts): Ernesto Morales (USA 2014-),
 - Vice-Chair (Protocols for end to end communication and dissemination of warnings): Eric Mackie (Trinidad and Tobago, 2015-)
- Working Group 4 on Preparedness, Readiness and Resilience:
 - Chair: Patrick Tyburn (France, 2014-),
 - Vice-Chair (Resilience): Susan Hodge (Anguilla (U.K.), 2014-),
 - Vice-Chair (Public Awareness): Stacey Edwards (SRC, Trinidad & Tobago, 2013-)

164 The ICG **decided** on the continuation or establishment of the following Task Teams:

- Task Team Performance Based Recognition Programme
 - Chair: Kerry Hinds (Barbados, 2013-).
- Task Team Caribe Wave 16
 - Chair: Elizabeth Vanacore (PRSN, USA, 2015-2016)
- Task Team PTWC Enhanced Products
 - Chair: Charles McCreery (USA, 2013-)
- Task Team Tsunami Services Model
 - Chair: Jean Marie Saurel (France, 2015-)

11. CLOSE OF THE SESSION

165 The Chair recognised the services of audio/translation and extended the recognition to Mr Paul Martens and Ms Marcellia Henry, Secretary General UNESCO, Sint Maarten for the excellent organization of the session, and the Government of Sint Maarten for the hosting of the meeting. The meeting closed at 18:15 hrs on 21 May 2015.

ANNEX I

AGENDA

1 WELCOME AND OPENING

- 1.1 REPRESENTATIVE OF THE INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION OF UNESCO
- 1.2 CHRISTA VON HILLEBRANDT, ICG/CARIBE-EWS CHAIR
- 1.3 WELCOME ADDRESS BY NATIONAL AUTHORITIES

2 ORGANIZATION OF THE SESSION

- 2.1 ADOPTION OF AGENDA
- 2.2 DESIGNATION OF THE RAPPORTEUR
- 2.3 CONDUCT OF THE SESSION, TIMETABLE AND DOCUMENTATION

3 REPORT ON INTERSESSIONAL ACTIVITIES

- 3.1 IOC EXECUTIVE SECRETARY'S REPORT
- 3.2 CHAIR'S REPORT
- 3.3 CARIBE EWS SECRETARIAT REPORT
- 3.4 REPORT OF THE CARIBBEAN TSUNAMI INFORMATION CENTER (CTIC)
- 3.5 REPORTS FROM UN AND NON-UN ORGANISATIONS
- 3.6 STATUS OF OTHER ICGs
- 3.7 NATIONAL PROGRESS REPORTS
- 3.8 INTERIM ADVISORY SERVICES REPORT (PTWC)
- 3.9 REPORT OF CARIBE WAVE 2015

4 WORKING GROUP PROGRESS REPORTS

- 4.1 WORKING GROUP 1: MONITORING AND DETECTION SYSTEMS
- 4.2 WORKING GROUP 2: HAZARD ASSESSMENT
- 4.3 WORKING GROUP 3: TSUNAMI RELATED SERVICES
- 4.4 WORKING GROUP 4: PREPAREDNESS, READINESS AND RESILIENCE

5 SPECIAL INVITED LECTURES: COMMUNITY-BASED TSUNAMI WARNING SYSTEM

6 POLICY MATTERS

- 6.1 REPORT OF THE TASK TEAM ON TSUNAMI SERVICES
- 6.2 EXERCISE CARIBE WAVE 2016
- 6.3 PTWC ENHANCED PRODUCTS FOR CARIBE EWS
- 6.4 REPORT OF THE TASK TEAM ON TSUNAMI RECOGNITION PROGRAMME
- 6.5 CENTRAL AMERICA TSUNAMI WARNING CENTER (CATAC)

7 PROGRAMME AND BUDGET FOR 2016–2017 (UPDATE)

8 NEXT SESSIONS

- 8.1 CONFIRMATION OF DATE AND PLACE OF ICG/CARIBE-EWS-XI
- 8.2 TARGET DATE FOR ICG/CARIBE-EWS-XII

9 ANY OTHER BUSINESS

10 ADOPTION OF DECISIONS AND RECOMMENDATIONS

11 CLOSE OF THE SESSION

ANNEX II

RECOMMENDATIONS

Recommendation ICG/CARIBE-EWS-X.1

Caribbean Tsunami Information Centre (CTIC) Work Plan

The Intergovernmental Coordination Group for the for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE EWS),

Acknowledging the contribution of Barbados to host CTIC, and the continuing efforts of Venezuela and France to realize the support as promised,

Notes the ongoing negotiations between the government of Barbados and the UNESCO-IOC regarding the hosting arrangements of the CTIC;

Recognizing CTIC's essential function in the region and its potential to attract funding for preparedness projects,

Noting that the CTIC's core financial resources to cover its expenses including salaries beyond October 2015 are non-existent, and that the recommendations from the last ICG on how to solve this issue yielded no solutions,

Concerned that the CTIC, despite its essential function in the region, may not be able to continue to function without sustained core funding,

Encourages Member States to have this priority addressed by the Director-General during the UNESCO General Conference;

Further encourages the timely resolution of the negotiations between the government of Barbados and UNESCO/IOC;

Appreciating the continuous technical and training services provided by the NOAA Caribbean Tsunami Warning Program (CTWP) and recognizing that these activities compliment the current activities of CTIC,

Encourages other Member States to find ways to assist CTIC with contributions to fulfil its tasks as specified in its terms of reference;

Recommends the U.S. contribution of the CTWP be recognized as a formal component of CTIC; fulfilling parts of the TOR that the CTIC is currently unable to accomplish with its resource constraints;

Recommends a Task Team be installed to review the terms of reference and business model of CTIC and present recommendations to ICG/CARIBE-EWS- XI;

Recommends that CTIC and Venezuela's Funvisis explore the possibility of submitting a joint project to CYTED - Iberoamerican Science and Technology Program for Development (Programa iberoamericano de ciencia y tecnología para el desarrollo) to complement the activities of CTIC;

Further recommends that CTIC sends an official cooperation request to the Government of France and French West Indies Local Collectivity in order to facilitate their contribution to CTIC activities.

Recommendation ICG/CARIBE-EWS-X.2

Tsunami Monitoring and Detection Systems, Warning Guidance

The Intergovernmental Coordination Group for the for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE-EWS),

Considering the report of Working Group 1 on Monitoring and Detection Systems, Warning Guidance and having reviewed the status of the observational data availability in the Caribbean and Adjacent Regions,

Recognizing the difficulty for regional seismic network operators to maintain numerous stations at a high availability level and the past efforts that lead to match the expected requirements in several regions,

Recommends the addition of sea level stations from Punta Maisi and Morros de Piedra from Cuba, Luerto Cabello, La Guaira, Cumana and Puerto de Hierro from Venezuela, and four new stations around Trinidad and Tobago to the sea level Core station list. **Further recommends** the Implementation Plan be updated to integrate the new proposed sea level stations requirements;

Recognizing the efforts of the COCONet and TlalocNet projects to deploy continuous GPS networks and the installation of three GNSS data centers in the region,

Welcomes the two sea level stations installed by the COCONet project in Jamaica and Yucatan peninsula;

Encourages GNSS network operators to contribute continuous data to COCONet and help COCONet to maintain an inventory of the existing continuous real-time GNSS stations in the region;

Further encourages Member States to support operators' efforts in maintaining the sea-level, seismic and GNSS stations in order to avoid situations seen in the past where stations fall into disrepair;

Requests the Caribbean Tsunami Warning Program to continue producing monthly maps and reports based on current CARIBE-EWS sea-level and seismic stations and available real-time stations in the region;

Encourages the use of continuous high rate GNSS measurements for high magnitude earthquakes rapid detection and improved Tsunami Early Warning;

Endorses NASAs and NOAAs exploration of a GNSS-based tsunami early warning capability throughout the Caribbean and Adjacent Regions;

Recommends that Member States support projects which investigate new monitoring techniques (permanent Ocean Bottom Seismometers) close to the trenches and tsunamigenic sources to decrease detection time in those areas;

Urges Member States to continue their efforts to fulfill gaps in monitoring networks (seismic and sea-level) toward the completion of the CARIBE-EWS, according to the seismic and sea-level capabilities maps;

Acknowledges the effort of Aruba for offering to host a sea-level data center for the region;

Appreciates the offer of the Puerto Rico Seismic Network to organize and host the next training course and relative Working Group 1 meeting within the Inter-session period;

Agrees with the principles of the Draft Tsunami Service Model presented by the related Task Team and recommends that the Task Team pursues its work to further describe in detail the Service model, further encouraging Member States to participate in this Task Team.

Recommendation ICG/CARIBE-EWS-X.3

Tsunami Hazard Assessment

The Intergovernmental Coordination Group for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE-EWS),

Urges Member States with no possibility of acquiring bathymetry data to work towards the digitization of nautical charts and have it archived and ready for their use in tsunami and other coastal hazards assessments;

Requests that Working Group 2 develop homogenized and simplified tsunami evacuation mapping guidelines to support the requirements of the tsunami recognition programme at the community level;

Urges Member States that do not have tsunami evacuation maps to develop a preliminary tsunami evacuation map based on a fixed-height in accordance to the guidelines;

Recognizes that some Member States lack the appropriate resources and expertise to carry out bathymetric surveys, while other have and are capable;

Encourages collaboration to facilitate the collection of the necessary bathymetric data of coastal zones of a country that is unable to collect the data on its own;

Considering that some Member States have either bathymetric data, tsunami inundation maps and/or tsunami evacuation maps,

Recommends Member States with tsunami inundation maps and no tsunami evacuation maps to continue the efforts underway to keep working towards the development of tsunami evacuation maps;

Acknowledges that a group of expert modellers within Working Group 2 has been formed and is available for helping interested Member States in carrying out tsunami simulations;

Further recommends Member States with no tsunami inundation maps nor tsunami evacuation maps to request the assistance from expert modellers for training and capacity building towards the production of tsunami inundation maps;

Acknowledges that the number of people living or visiting coasts vulnerable to tsunami effects is seldom a fixed number; population density can increase substantially with time of day, week and months;

Recommends Member States that already have tsunami evacuation maps to consider developing advanced evacuation maps such as interactive maps that take into consideration population density as a function of time;

Recognizes deterministic tsunami hazard assessment may be uncertain so that the probabilistic approach could be used to bridge the gap;

Therefore, **recommends** carrying out deterministic tsunami hazard assessment first and then augmenting the assessment with probabilistic methods;

Recommends a second workshop on ComMIT for member states interested in carrying out their own tsunami simulations;

Also recommends WG2 expert modelling group to set up a pilot study to develop inundation maps for a member state, that will be chosen based on the results of the second stage of the WG2 bathymetry survey;

Further recommends this pilot study lead to the creation of a Bathymetry Data Trust and increase the modelling capacity of Caribbean States;

Acknowledges PTWS is organizing a pilot course on basic tsunami preparedness: plans, maps and evacuation procedures for both Pacific and Caribbean coasts of Central America that will be held entirely in Spanish;

Requests IOC to involve Spanish-speaking countries within the ICG/CARIBE-EWS not belonging to the PTWS on this course;

Recommends improving the Caribbean tsunami sources database presented at the ICG/CARIBE-EWS-X and updating it regularly.

Recommendation ICG/CARIBE-EWS-X.4

Exercise Caribe Wave 16

The Intergovernmental Coordination Group for the for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE-EWS),

Decides that Caribe Wave 16 will have two scenarios, a Northern Hispaniola and a Northern Venezuela events and **further decides** that the exercise takes place on Thursday March 17, 2016 and commences at 1500 UTC and 1400 UTC for the Hispaniola and Venezuelan scenarios respectively;

Recommends a similar schedule as Caribe Wave/Lantex 15 with the initial draft handbook due on 15 August 2015. Webinars and other benchmarks should follow the same or similar schedule as the Caribe Wave/Lantex 15 exercise;

Recommends that a survey be conducted as part of the 2016 Caribe Wave exercise;

Encourages that the registration process be moved from the PRSN to www.tsunamizone.org with the following caveats:

- a. Recommends that it is confirmed that a mechanism for follow up with registrants is available for designated TWFPs and NTWCs.
- b. Recommends that a French version of the site is developed starting with the registration page and if needed to seek funding to support the French translation.

Encourages that an e-mail notification or PDF copy of the Caribe Wave handbook be sent to the designated TWFPs and NTWCs 24 hours prior to the publication of Caribe Wave materials on-line;

Encourages that all future exercises include scenarios with a measurable impact across the region and Member States such that modeled inundation levels reach >1 meter in the Member States;

Recommends that the Task Team Caribe Wave 16 begin to consider volcanic or landslide tsunami sources as potential scenarios for future exercises;

Encourages Member States to convene a national tsunami preparedness week including the Caribe Wave Exercise;

Encourages the adoption of a long term plan for the Caribe Wave exercises using the following event locations and **further encourages** recommendations for possible exercise candidates for A.c and B.b below:

- A. Caribe Wave 17
 - a. Lesser Antilles: Based upon the historical 1843 event
 - b. Costa Rica based on the historical 1991 event
 - c. Santiago, Cuba
- B. Caribe Wave 18
 - a. Puerto Rico event as part of the 100 year anniversary of the 1918 tsunami
 - b. One or two events;

Decides to establish a CARIBE WAVE 16 Task Team modelled after past Caribe Wave Task Teams.

Recommendation ICG/CARIBE-EWS-X.5

Enhanced PTWC Products for the CARIBE-EWS

The Intergovernmental Coordination Group for the for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE-EWS),

Recalling Recommendation [ICG/CARIBE-EWS-IX.7](#) “Enhanced PTWC Products for the CARIBE-EWS”,

Acknowledging the scientific and technological advances that have been made since the formation of the CARIBE-EWS to better forecast tsunami impacts in real time and to present forecast information graphically;

Recognizing that PTWC has developed and offered to the CARIBE-EWS a new suite of enhanced operational tsunami forecast products based upon such advances and upon TOWS-WG recommendations for more globally consistent and useful TSP products;

Recognizing that similar products have now been implemented in the Pacific by PTWC for the PTWS and that some Central and South America CARIBE-EWS Member States have coasts in both systems;

Considering that multiple trainings about and exercises using the Enhanced Products have been conducted in the region over the past few years to help prepare Member States for the implementation of these products;

Accepting that the Enhanced Products do not contain alert levels and that Member States will now be fully responsible for tsunami alerts in their own countries and territories according to their SOPs;

Agrees with the PTWC proposed implementation schedule that begins issuance of the Enhanced Products in parallel with current products on 1 October 2015 and fully transitions to the new products on 1 March 2016;

Recommends that additional training on the products be made available prior to full implementation that will at least include several webinars conducted in English, Spanish and French as well as in-person trainings, and encourages Member States and donors to support such trainings;

Recommends that during parallel issuance, all new products be disseminated exclusively by email and only to the designated TWFPs, and National Tsunami Warning Centres (NTWC) and then when fully implemented only the main text product and its derivatives such as an SMS, Facebook, or Twitter statement be distributed more widely via the internet, GTS, AISR/AFTN, and IOC distribution lists, etc.;

Also recommends that during the overlap period PTWC generates and sends some sample products by email to the TWFPs and NTWCs, not as an exercise but as a way to aid in preparing for full implementation since the likelihood of having real events during the overlap period is small;

Further recommends that in consideration of some TWFP and NTWC internet bandwidth limitations for email, the main text product be sent separately, and that the graphical and statistical products be divided as necessary in emails to minimize their size.

Recommendation ICG/CARIBE-EWS-X.6

Preparedness, Readiness, Resilience and Tsunami Recognition Programme

The Intergovernmental Coordination Group for the for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE-EWS),

Taking into account the needs for tsunami preparedness, monitoring and response to tsunami hazard along the coastal regions, the Tsunami Recognition Programme Guidelines to be followed by Member States within the Caribbean and Adjacent Regions,

Recommends the approval of the guidelines for the Community Performance Based Tsunami Recognition Programme for the Caribbean and Adjacent Regions as outlined in Appendix I for implementation on a pilot basis;

Decides that the Task Team continue its work on the development of the strategy for a Performance Based Recognition Programme as required by the ICG;

Recommends consultation with the US regarding the adoption of the name “Tsunami Ready” with the corresponding French, Spanish and Dutch translations and other relevant

languages as the official name for the Community Performance Based Tsunami Recognition Programme for the Caribbean and Adjacent Regions;

Requests through the Secretariat, that Working Group 4 conducts a survey of Member States to evaluate the national implementation of the tsunami awareness programmes in alignment with the provisions of the Regional Tsunami Public Awareness and Education Strategy; and **further requests** that the survey be included within the Caribe Wave survey subsequently;

Recognizing the important role the media within the tsunami early warning system, **requests** that Working Group 3 develop a regional Tsunami Media Guide;

Requests that Working Group 3 produce a resource guide on communication and technologies for use by communities in the dissemination of tsunami information alerts, in support of the guideline requirements;

Noting the requirements of the Community Performance Based Tsunami Recognition Programme for the Caribbean and Adjacent Regions, **requests** that Working Group 4 develops a technical guideline on how to plan and implement community tsunami exercises;

Further requests that Working Group 4 prepares guidelines for the public display of tsunami information including maps, signs and symbols to ensure a level of standardisation in support of the guideline requirements;

Invites Member States and donor agencies to support pilot projects under the Community Performance Based Tsunami Recognition Programme for the Caribbean and Adjacent Regions.

APPENDIX I

Proposed Guidelines for CARIBE-EWS Community Recognition

Guidelines for designation are given in the following table. Each guideline is fully discussed following the table. The guidelines are based Preparedness, Mitigation and Response Categories.

	Completed
PREPAREDNESS	
Prep-1. Produce easily understood tsunami evacuation maps as determined to be appropriate by local authorities in collaboration with communities.	
Prep-2. Develop and distribute outreach and public education materials	
Prep-3. Hold at least three outreach or educational activities <u>annually</u>	
Prep-4: Conduct an annual tsunami community exercise.	

	Completed
MITIGATION	
Mit-1. Have designated and mapped tsunami hazard zones.	
Mit-2. Have a public display of tsunami information	
RESPONSE	
Resp-1. Address tsunami hazards in the community's emergency operations plan (EOP).	
Resp-2. Commit to supporting the emergency operations center (EOC) during a tsunami incident if an EOC is opened and activated.	
Resp-3. Have redundant and reliable means for a 24-hour warning point (and EOC if activated) <u>to receive</u> official tsunami watch, advisory, and warning alerts	
Resp-4. Have redundant and reliable means for 24-hour warning point and/or EOC <u>to disseminate</u> official tsunami watch, advisory, and warning alerts to the public.	

CARIBE-EWS PROPOSED GUIDELINES - FOUNDATION

The Guidelines in this document will be required for recognition for the Community Performance Based Tsunami Recognition Programme for the Caribbean and Adjacent Regions. Until this date, the 2001 US TsunamiReady Guidelines were used for U.S., while a Pilot Project adapted these for the CARIBE-EWS for joint recognition by NOAA/NWS and UNESCO.

Coastal communities seeking CARIBE-EWS recognition should meet all elements. The specific actions required to meet each element will vary among communities depending on the types of tsunami hazards and related vulnerability and as determined by the local, state, national or regional TsunamiReady Board (composed of warning and disaster management national/regional experts as identified by the CARIBE-EWS).

Communities with plausible local tsunami threats should include efforts that enable individuals at risk for tsunami inundation to take self-protective actions, in addition to strategies for all coastal communities that address regional and distant tsunamis. Determination of the range of plausible local, regional, and distant tsunami threats in a particular community rests with the designated Board who will be in close communication with tsunami experts, Tsunami Service Providers, Tsunami Warning Centres and emergency managers, universities, or consultants.

- PREPAREDNESS (PREP)
 - **Prep-1. Produce easily understood tsunami evacuation maps as determined to be appropriate by local authorities** in collaboration with communities that depict tsunami evacuation routes and assembly areas (see

Mit-1). Maps should be based on tsunami hazard zone mapping and in accordance with the community's emergency operations plan. Maps should be made available via appropriate print and/or digital media. These maps should follow standards as developed by the CARIBE-EWS. *Note: for communities that do not have inundation mapping, a "baseline tsunami hazard zone" can be prepared and, where observed, is approved to meet this guideline.*

- **Prep-2. Development and distribution of outreach and public education materials** that include, where appropriate, tsunami evacuation maps, evacuation routes, safety tips, and information about when and how to respond to warnings (including natural warnings for regions with a local tsunami threat). They should be tailored to meet local information needs and be based on location-specific tsunami threats. All schools within the community requesting recognition should receive a copy of the materials. Distribution should use three or more wide-reaching diverse methods, including, but not limited to:

- Brochures and flyers distributed at public venues and/or bulk mailed to local residents and businesses
- Newspaper inserts
- Public utility/service industry bill safety notices
- Local faith-based and civic organization bulletins/mailings
- Local radio and television
- Billboard, roadside, highway, or educational signs
- Historical markers and interpretative signs
- Websites/Social media
- Bulk email

Possible physical locations for distribution of materials include:

- Schools
- Visitor centers and local tourist businesses (e.g., restaurants, bars)
- Hotels, motels, and campgrounds
- Public libraries
- Community centers
- Recreation centers
- Kiosks or information centers (e.g., malls, stores, etc.)
- Child care centers
- Banks
- Utility companies
- Health centres
- Ports of entry

- **Prep-3. Hold at least three outreach or education activities annually** to educate community residents, businesses, and visitors, with an emphasis on those in the tsunami hazard zone, on tsunami hazards, evacuation routes, how warning information will be received (including natural warnings for regions with

a local tsunami threat), safety, and response. These activities may be multi-hazard as long as they include tsunamis in the content. The number of activities required for a given community is to be determined by the Board but will generally include three activities, where at least one is a community-wide event.

Acceptable activities include, but are not limited to:

- Leveraging of national, state, and regional campaigns through use of social media.
 - Multi-hazard events or presentations.
 - Booths at community events and county fairs.
 - Community tsunami safety workshops, town hall, or similar public meetings.
 - Presentations or workshops for faith-based organizations, community or civic groups.
 - Local public safety campaigns, such as “Tsunami Preparedness” week/month.
 - Media workshops
 - Local business workshops to help them develop response and business continuity plans.
 - Information for business owners for employee training, outreach, or education that targets high-occupancy businesses in tsunami hazard zones (e.g., hotels, restaurants, fisheries, industrial sites).
 - Door-to-door safety campaigns targeted to residents and businesses living or working in the community’s tsunami hazard zone.
- **Prep-4. Conduct an annual tsunami community exercise.** The exercise can focus solely on the tsunami hazard or can be a multi-hazard exercises that also address the tsunami hazard. The exercises could be tabletop, functional, or full-scale. The exercise should include a communications test. An effort should be made for the schools within the mapped evacuation zone to participate by conducting an evacuation drill. These exercises can be conducted as part of a multi-hazard drill (for example, combined with a fire, hurricane, volcano exercise).

- **MITIGATION (MIT)**

- **Mit-1. Have designated and mapped tsunami hazard zones.** The primary source for mapping potential tsunami hazard zones is inundation modeling, which illustrates expected areas to be flooded by the tsunami. If models are unavailable, other acceptable sources include guidance from tsunami experts from technical agencies, universities, or consultants. These modeling and mapping efforts should follow standards as developed by CARIBE-EWS. *Note: for communities with no modeling a “baseline tsunami zone” can be used and, where observed, is approved to meet this requirement. SLOSH or other storm surge modeling is also approved for use for this purpose.*
- **Mit-2. Have a public display of tsunami information and response that identifies for example: (1) tsunami danger area and/or hazard zone (entering and leaving signs), evacuation routes, and assembly area; and (2) provides tsunami response education (go to high ground).** Signage

should be implemented according to national and local policies and as determined to be appropriate by authorities, the Board, and with possible assistance from partners. These signs should follow standards as developed by the CARIBE-EWS. Wherever possible, signage should comply with specifications aimed at standardization so that all coastal communities eventually will have identical signage. Continuity of signage benefits domestic residents and international visitors. Multi-hazard signs and displays that include the tsunami hazard are adequate for this item.

- RESPONSE (RESP)

- **Resp–1. Address tsunami hazards in the community’s emergency operations plan (EOP).** If a community-level plan does not exist, other acceptable plans include a countywide EOP or a state or local comprehensive emergency management plan. To meet this requirement, plans should:
 - Identify tsunami as a hazard and provide a risk assessment
 - Present tsunami-hazard profile, including source locations, extent of inundation, run-up or height that a wave reaches above sea level, previous tsunami occurrences, and likelihood of future tsunamis
 - Describe community vulnerability, including areas exposed to inundation and an impact summary of the resident population and specific sub-populations of people expected to be affected (e.g., individuals with access and functional needs, visitors, seasonal workers), businesses, infrastructure, and critical facilities
 - Detail 24-hour warning point procedures relating to tsunamis
 - Specify emergency operations center activation criteria, staffing expectations
 - Specify tsunami criteria and procedures for the activation of the public warning system in its area of responsibility
 - ◆ Criteria and procedures for siren activation, cable television override, and/or local activation in accordance with Emergency Alert System plans, warning fan-out procedures, and communication to functional and access needs populations
 - Provide contact information for all jurisdictional agencies and response partners, including the TWFP, NTWC, Tsunami National Contact, Regional Tsunami Service Providers
 - Include evacuation plans for tsunamis, roles of community entities/agencies, tsunami hazard zone maps with evacuation routes, and protocols for access and functional needs populations
 - Include procedures for updating information and determining when to advise it is safe for (1) emergency response personnel to enter the evacuated zones, and (2) when it is safe for the public to return to homes and businesses in the evacuated zone(s)
 - Include procedures for providing security for the evacuated zone(s)
 - Include procedures for reporting tsunami impacts in the community
 - Include schools and critical facilities in the emergency operations plan and encourage schools and critical facilities to include in their emergency response plans. a tsunami

- **Resp–2. Commit to supporting the emergency operations center (EOC) during tsunami incidents if an EOC is opened and activated.** Ensure that the EOC can execute tsunami warning functions (public notifications) based on predetermined guidelines related to CARIBE EWS tsunami information and/or tsunami incidents.
 - Has 24-hour operations or plan to activate an EOC for tsunami incidents in accordance with the EOP
 - Has warning reception and dissemination capability
 - Has the ability and authority to activate the public warning system in its area of responsibility
 - Maintains the ability to communicate within and across jurisdictions; Maintains established communication links with Tsunami Warning Centers to relay real-time weather and flood reports to support the warning decision making process
- **Resp–3. Have redundant and reliable means for a 24-hour warning point (and EOC if activated) to receive official tsunami watch, advisory, and warning alerts** from CARIBE-EWS Tsunami Service Providers, National Tsunami Warning Centers/Tsunami Warning Focal Points, or other officially recognized agencies such as local emergency management agencies. Alerts must be able to reach the 24-hour warning point by at least three of the following:
 - Public Alert Radio Systems, like Radio Digital Signals (RDS), NOAA Weather Radio (NWR) receiver
 - National/Territorial warning call out tree system (documented in writing with backup indicated)
 - Instant messaging programs available via the Internet used by operational personnel to share critical warning decision expertise and other significant information
 - Emergency Management Weather Information Network (EMWIN) receiver: Device that receives satellite feed and/or VHF radio transmission of NWS (Tsunami Service Provider) products
 - National/Territorial telecommunications system: California Integrated Seismic Network (CISN) Display Program
 - Amateur Radio transceiver: Potential communications directly to National Tsunami Warning Center or Tsunami Warning Focal Point
 - Alerts provided through a third-party provider: Typically received via phone, email and/or a texting service to a smartphone, tablet, or computer
 - Local Radio: Emergency Alert System, LP1/LP2
 - Active Internet monitoring capability, including social media such as Facebook and Twitter
 - Direct email from CARIBE EWS Tsunami Service Provider or National Tsunami Warning Center or Tsunami Warning Focal Point
 - Direct fax from CARIBE EWS Tsunami Service Provider or National Tsunami Warning Center or Tsunami Warning Focal Point

- Text message or direct pager message from CARIBE EWS Tsunami Service Provider or National Tsunami Warning Center or Tsunami Warning Focal Point
 - Coast Guard (CG) broadcasts: warning point monitoring of CG marine channels
 - Other communications channel (e.g., active participation in a state-run warning network, two-way, local emergency responder radio network, etc.), please explain.
- **Resp-4. Have redundant and reliable means for 24-hour warning point and/or EOC to disseminate official tsunami watch, advisory, and warning alerts to the public.** Alerts must be able to be disseminated from the 24-hour Warning Point and/or EOC through at least three of the following methods:
- Emergency Alert System (EAS) message initiation and broadcast
 - Cable television audio/video overrides
 - Local flood warning systems ideally with no single point of failure
 - Plan for siren/megaphone notification on emergency vehicles
 - Outdoor warning sirens
 - Other local alert broadcast system
 - Local pager/texting system
 - Amateur radio operator network (ham radio)
 - Telephone mass notification system
 - Call out tree
 - Coordinated jurisdiction-wide radio network
 - For counties, parishes, islands, boroughs, etc., a countywide communications network that ensures the flow of information between all cities and towns within its borders, including acting as the surrogate warning point and/or EOC for communities without those capabilities
 - Social media usage (Twitter, Facebook, etc.)
 - Lifeguards on beaches and on patrol
 - Other, please explain

All response requirements should recognize that during a local tsunami event, initial response would be performed primarily by at-risk individuals. Individuals in local tsunamis, including emergency personnel, will need to take personal responsibility for evacuating after recognizing the natural warnings or environmental cues of a possible or imminent tsunami (e.g., ground shaking from an earthquake, unusual rapid rise or fall of a shoreline). Official communications and warnings may be difficult to perform given the potential for infrastructure and telecommunication damage from the preceding earthquake and the limited time between the generation and arrival of the first wave in the tsunami.

GLOSSARY OF TERMS

TERM	DEFINITION
24 Hour Warning Point (WP)†	A communication facility at a state or local level, operating 24 hours a day, which has the capability to receive NWS alerts and warnings, plus has the authority and ability to activate the public warning systems in its area of responsibility.
Boards (ICG Regional and National/Territorial)	<p>The ICG Regional Tsunami Recognition Board should be comprised as follows:</p> <ul style="list-style-type: none"> • *ICG/CARIBE EWS Chair • CDEMA/ CEPREDENAC/EMEZA • UNESCO/IOC Representative • Manager, CTWP • GROUP4 CHAIR • Tsunami National Contact (NON-VOTING Member) • Director, CTIC <p>*Chair, Regional Tsunami Recognition Programme Board</p> <p>The Regional Board shall be convened when the nomination is nation-wide.</p> <p>The National Tsunami Recognition Programme Board should be comprised of:</p> <ul style="list-style-type: none"> • *Director, National Disaster Management Organization • Tsunami National Contact • Tsunami Warning Focal Point (TWFP) • Director, CTIC • Local Seismic Networks/technical or scientific community • Community Representative [Non-Voting Member] <p>*Chair, National Tsunami Recognition Programme Board</p> <p>This Board shall be convened when the nomination is presented on a phased approach, comprised of individual communities over a specific period of time.</p>
CARIBE-EWS Recognized Community	A national/territorial/local government entity that has the authority and ability to adopt the recognition guidelines within its jurisdiction.
The term “local government” means	<p>a. A county, parish, borough, municipality, city, town, township, local public authority, indigenous groups, intrastate district, council of governments, regional or interstate government entity, or agency or instrumentality of a local government.</p>

TERM	DEFINITION
	b. A national or territorial government would seek recognition under the CARIBE EWS Board. For local governments a National/Territorial Board would be established to provide recognition.
The term “facility” for a community includes but is not limited to	Universities, colleges, military installations, state/national parks, power plants/utilities, major transportation centers (i.e., airports, harbors, ports, railroad stations and other large transit complexes), theme parks/entertainment complexes, corporate business complexes, factories and large event venues (i.e., stadiums, arenas, race tracks, convention centers and other venues that temporarily host large gatherings of people). For local governments a National/Territorial Board would be established to provide recognition.
Communications/Dispatch Centre	Agency or interagency dispatch centers, 911 call centers, emergency control or command dispatch centers, or other facility and staff who handle emergency calls from the public and communication with emergency management/response personnel. This centre may act as a 24-hour warning point.
Critical Facilities	<p>A critical facility provides services and functions essential to a community, especially during and after a tsunami. Examples of critical facilities requiring special consideration include:</p> <ul style="list-style-type: none"> • Police stations, fire stations, critical vehicle and equipment storage facilities, and emergency operations centers needed for tsunami response activities before, during, and after a tsunami • Medical facilities, including hospitals, nursing homes, blood banks, and health care facilities (including those storing vital medical records) likely to have occupants who may not be sufficiently mobile to avoid injury or death during a tsunami • Schools and day care centers, especially if designated as shelters or evacuation centers • Power generating stations and other public and private utility facilities vital to maintaining or restoring normal services to tsunami-hit areas • Drinking water and wastewater treatment plants • Structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic, and/or water-reactive materials
Emergency Operations Center (EOC)	The physical location at which the coordination of information and resources to support incident management (on-scene operations) activities normally takes place. An EOC may be a temporary facility, a permanently established facility or located at a higher level of organization within a jurisdiction. EOCs may be organized by major functional disciplines (e.g.,

TERM	DEFINITION
	fire, law enforcement, medical services), by jurisdiction (e.g., federal, state, regional, tribal, city, county), or by some combination thereof.
Distant Tsunami (Also referred to as a tele-tsunami)	A tsunami originating from a faraway source, generally more than 1,000 km/621 miles or 3 or more hours tsunami travel time from its source to the area impacted. What may be a distant tsunami in one location can be a local tsunami for another location. A distant tsunami may also be referred to as a “far-field” tsunami hazard. The most common distant threats are from dangerous and unpredictable currents resulting in possible significant harbor and shoreline damage.
Emergency Operations Plan (EOP)	<p>A document maintained by various jurisdictional levels setting procedures for responding to a wide variety of potential hazards. It should include the following:</p> <ul style="list-style-type: none"> a. Describe how people and property will be protected b. Detail who is responsible for carrying out specific actions c. Identify the personnel, equipment, facilities, supplies, and other resources available d. Outline how all actions will be coordinated
Emergency Management/Response Personnel	Includes federal, state, territorial, tribal, sub-state regional, and local governments, nongovernmental organizations (NGOs), private sector organizations, critical infrastructure owners and operators, and all other organizations and individuals who assume an emergency management role.
Incident	An occurrence, natural or manmade, that requires a response to protect life or property. Incidents can, for example, include major disasters, emergencies, terrorist attacks, terrorist threats, civil unrest, wildland and urban fires, floods, hazardous materials spills, nuclear accidents, aircraft accidents, earthquakes, hurricanes, tornadoes, tropical storms, tsunamis, war-related disasters, public health and medical emergencies, and other occurrences requiring an emergency response.
Inundation	The horizontal distance inland that a tsunami penetrates, generally measured perpendicularly to the shoreline.
Local Tsunami	A tsunami generated from a nearby source with less than 1 hour tsunami travel time from its source to the area impacted. What may be a local tsunami in one location can be a regional or distant tsunami for another location. A local tsunami may also be referred to as a “near-field” tsunami hazard. A local tsunami includes tsunamigenic influences due to tectonics in the source zone such as uplift, subsidence, landslides, and strong shaking. It is the focus of major destruction.

TERM	DEFINITION
Regional Tsunami	A tsunami generated from a regional source, generally between 100 km/62 miles and 1,000 km/621 miles away or between 1 and 3 hours tsunami travel time from its source to the area impacted. What may be a regional tsunami in one location can be a local tsunami for another location. Regional tsunami also occasionally have very limited and localized effects outside the region. In comparison with a local tsunami, it gives a little more time for authorities to respond than the case of local earthquakes.
Tsunami	A tsunami is a series of waves that can cause dangerous fluctuations of water along shorelines, and are generated by earthquakes, volcanic eruptions, or landslides that cause a large scale and rapid displacement of the water. Tsunamis can last minutes, hours, or even days. Tsunami is a Japanese word meaning harbor wave. Tsunamis are often incorrectly called tidal waves; they have no relation to the daily ocean tides.
Tsunami Evacuation Map	A graphical representation of coastal areas that outlines the hazard zones and designates limits beyond which people must be evacuated to avoid harm from tsunami waves. Evacuation routes and assembly areas are generally designated to ensure efficient movement of people out of the evacuation area and to areas of safety. Tsunami evacuation maps should be based on tsunami inundation model outputs or the best available science.
Tsunami Evacuation Zone	Evacuation zones are much larger in surface area than hazard/inundation zones. There is a margin of error in estimation of the hazard/inundation zone. Some areas may not be flooded by tsunami activity but those areas may be isolated by flood waters. This essentially cuts these areas off from other areas. As such, people in those areas are requested to evacuate to prevent them from requiring rescue by first responders
Tsunami Hazard Zone (aka Tsunami Inundation Zone)	The area expected to be flooded or inundated by water in coastal areas. Hazard is synonymous with inundation in this sense, even though there are instances where simple inundation (flooding) may not necessarily be hazardous.
Tsunami Information Centres	Centres which provide education, outreach, technical and capacity building assistance to Member States and public in preventing, preparing, and mitigating measures for tsunamis. Among other activities, the centers manage post event performance surveys, serve as a resource for the development, publication, and distribution of tsunami education and preparedness materials and information on tsunami occurrences, and may support risk assessment and mitigation activities.

TERM	DEFINITION
Tsunami Service Provider (TSP)	Centre that monitors seismic and sea level activity and issues timely tsunami threat information within an ICG framework to National Tsunami Warning Centres/Tsunami Warning Focal Points and other TSPs operating within an ocean basin. The NTWCs/TWFPs may use these products to develop and issue tsunami warning for their countries. TSPs may also issue Public messages for an ocean basin and act as National Tsunami Warning Centres providing tsunami warnings for their own countries.
Tsunami Source	Point or area of tsunami origin, usually the site of an earthquake, volcanic eruption, or landslide that caused a large scale and rapid displacement of the water resulting in a tsunami. A comet or meteorite impacting the ocean may also be considered a tsunami source.
Tsunami Warning Centre	Facilities that have responsibility to detect, forecast, and issue tsunami alerts.

Recommendation ICG/CARIBE-EWS-X.7

Central American Tsunami Advisory Center (CATAC)

The Intergovernmental Coordination Group for the for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE-EWS),

Recalling that the Intergovernmental Oceanographic Commission (IOC) adopted Resolution [EC-XLI.6](#), for Member States around regional seas, as appropriate, actively promote the development, establishment and sustained operation of national and sub-regional Tsunami Warning and Mitigation Systems within the framework of the ICG/PTWS and ICG/CARIBE EWS,

Remembering that the six countries of Central America and the Coordination Centre for the Prevention of Natural Disasters in Central America (CEPREDENAC) during a meeting held in Managua, Nicaragua on 3 September 2003 decided to start the process for a Regional Tsunami Warning System, and requested IOC/ITSU assistance for its development,

Further remembering that the Nineteenth session of the ICG/PTWS decided to assist the Central American countries in this process and established the Central America Subregional Working Group (CA-WG) for this purpose,

Further recalling that the [ICG/PTWS-XXV.1](#) recommended to determine whether El Salvador or Nicaragua (or both countries in cooperation) could establish an interim Tsunami Warning Centre for disseminating warnings to all Central American countries and the Implementation of a Technical Committee for the development of a Regional Tsunami Warning and Mitigation System,

Recognizing that Nicaragua, El Salvador and Costa Rica, already operate National Tsunami Warning Systems,

Acknowledging that there have been considerable improvements in Central America regarding the capabilities applicable to real time seismic data exchange between countries, automatic seismic data processing, availability of sea level data, tsunami hazard mapping and training of personnel,

Having considered the reports of the following meetings:

- The First meeting of the ICG/PTWS-WG-CA, held in Managua, Nicaragua, 04-06 November 2009,
- The Second meeting of the ICG/PTWS-WG-CA, held in San Salvador, El Salvador, 28-30 September 2011
- The Third meeting of the ICG/PTWS-WG-CA, held in Managua, Nicaragua, 29-30 September 2014,

Noting the efforts towards the establishment of a Central American Regional Seismic Network as documented in the Third meeting of the ICG/PTWS-WG-CA,

Further noting that the Center for the Coordination of the Prevention of Natural Disasters in Central America (Spanish: Centro de Coordinación para la Prevención de los Desastres Naturales en América Central, or CEPREDENAC) is the corresponding agency for disaster prevention within the Central American Integration System (Spanish: Sistema de Integración Centroamericana, or SICA),

Noting also the decision of the council of representatives of CEPREDENAC in their meeting on 6 February 2015, “to recognize within the priorities of CEPREDENAC the development of the Regional Tsunami Warning Center for Central America (Spanish: Centro Regional de Alerta de Tsunamis en América Central, or CATAC) and the creation of a Regional Seismic Network to be established in the Republic of Nicaragua and elevate to SICA”,

Having considered the recommendation of CATAC at ICG/PTWS-XXVI and presentation of Nicaragua at ICG/CARIBE-EWS-X on the proposed development of CATAC to cover both the coasts of the Pacific and Caribbean within the framework of PTWS and CARIBE-EWS,

Recommends that in Spanish, the Centre be referred to as Centro de Asesoramiento de Tsunamis de América Central;

Noting the report of the IOC/[TOWS-WG-VI](#) and [VII](#) and its recommendations for harmonized tsunami services, products and terminologies,

Noting with appreciation that PTWC is providing tsunami services for Central America,

In addition, **recognizing** the remarkable advances of Nicaragua in its National Tsunami Warning and Mitigation System,

Noting the offer of Nicaragua to host and develop the CATAC at the Instituto Nicaragüense de Estudios Territoriales (INETER) in Managua, Nicaragua,

Accepts Nicaragua’s offer to host and develop the Central America Tsunami Advisory Center (CATAC) as a sub-regional Tsunami Service Provider under the guidance of the PTWS Regional Working Group for Central America Pacific Coast and within the framework of ICG/PTWS, ICG/CARIBE-EWS and TOWS-WG;

Encourages members of the WG-CA to actively participate in and contribute to the establishment of the sub-regional Tsunami Advisory and Mitigation System within the framework of the ICG/PTWS, ICG/CARIBE-EWS and TOWS-WG;

Invites other countries outside the Central American region to provide appropriate support to develop the sub-regional Tsunami Advisory and Mitigation System within the framework of ICG/PTWS, ICG/CARIBE-EWS and TOWS-WG;

Further encourages its concerned Member States to participate in the inter-sessional meeting of the ICG/PTWS-WG-CA in mid-2015 and in the PTWS Task Team on the Establishment of a Regional Tsunami Advisory Center for Central America (TT-CATAC) with the following Terms of Reference:

- Purpose: To assist the Central American Working Group in the establishment of the CATAC until it has the ability to provide operational services
- Mandate: Under the guidance of the ICG/PTWS-WG-CA, the task team shall strengthen coordination and cooperation among the CA countries to establish the CATAC:
 - Develop capability guidelines and performance indicators for the CATAC;
 - Explore ways for facilitating the sharing and exchange of data and relevant information necessary for the establishment of the CATAC;
 - Consult with National Tsunami Warning Focal Points, National Tsunami Warning Centers and Tsunami National Contacts of the Central American region to determine appropriate requirements for tsunami services;
 - Develop the SOP and the contents of tsunami services for the CATAC;
 - Identify potential resource requirements for the establishment of the CATAC;
 - Keep contact with PTWC and NWPTAC (JMA) for technical guidance and assistance.
- Membership: Representatives from the Member States of the ICG/PTWS-WG-CA and ICG/CARIBE EWS (Nicaragua, Guatemala, El Salvador, Honduras, Costa Rica, Panama, Mexico, Colombia) and invited experts; representatives of PTWC and NWPTAC (JMA), ITIC and CTWP; with Chairperson and vice Chairperson to be elected.
- Modus operandi: The task team will work mainly by correspondence and virtual meetings and prepare reports for the WG-CA meetings;

Welcomes an invitation from the ICG/PTWS to the ICG/CARIBE-EWS to the inter-sessional and other relevant meetings towards the development of the CATAC.

ANNEX III

OPENING SPEECHES

Ms Christa von Hillebrandt
on the occasion of the Tenth Session of the ICG/CARIBE-EWS
Sint Maarten, 19-21 May 2015

Over the past 10 years since its establishment, we have seen great advances in the CARIBE-EWS. The observational backbone of the Warning System has been implemented reducing to minutes the detection time of earthquakes and tsunamis and we have strengthened and exercised protocols at the national and local level with tens of thousands of people participating yearly in the CARIBE WAVE regional tsunami exercise. A tsunami public awareness and education strategy has also been developed and two institutions in support of these efforts have been established in the region, the Caribbean Tsunami Warning Program in Puerto Rico and the Caribbean Tsunami Information Center.

Although we will be celebrating and recognizing the national and regional achievements and advances of the tsunami warning system, most importantly we will be focusing on how we are going to continue to strengthen tsunami risk reduction in the Caribbean and Adjacent Regions. Specifically, at this session we will be considering recommendations on the way forward with regards to a Tsunami Service Model, a Tsunami Community Recognition Program and the complementary CARIBE WAVE 16 regional tsunami exercise and evacuation maps, as well as a strategy for funding mechanisms.

Earlier this year, in Japan the governments of the world adopted the 2015-2030 Sendai Framework for Disaster Risk Reduction and reiterated their commitment to disaster risk reduction and the building of resilience. It is important that our Tsunami and other Coastal Hazard Warning System is aligned and contributes to the outcome and goals of the framework.

In the Caribbean tsunamis are no longer “El Peligro Olvidado”, the “Forgotten Danger”, the devastation in the Indian Ocean, Japan and Chile reminded us all of the power of these waves and the need to be ready, and therefore my call to each of the participating Members States and Organizations at the Session is to actively participate in the discussions on how can we best protect our residents, visitors and economies from these infrequent but deadly waves that will one day strike again our shores.

We thank the government of Sint Marten for kindly hosting this meeting and providing such an appropriate backdrop on why a Tsunami Warning System in the Caribbean is so important: beautiful beaches and warm waters that attract thousands of residents and visitors year round and for whose lives and livelihoods we are responsible.

8 May 2015

Mr Marcel Gumbs
Prime Minister of Sint Maarten

Honourable Act. Governor Mr Reynold Groeneveldt,
Chair of the ICG/CARIBE-EWS Mrs. Christa von Hillebrandt-Andrade,
Colleague Ministers,
Distinguished Guests,
Ladies and Gentlemen,
Good Morning,

Sint Maarten is proud to host the 10th session of the intergovernmental coordination group for the tsunami and other coastal hazards warning system for the Caribbean and adjacent regions.

As a young country susceptible to natural disasters, the Government of Sint Maarten values this opportunity to learn the issues, best practices, trends and developments related to tsunami risk reduction. As we are all aware, our state of readiness for disasters determines the extent to which casualties can be mitigated and for this reason I must compliment UNESCO for its continued efforts and dedication in helping countries build capacities and capabilities to minimize the risk brought about by disasters such as tsunamis.

Admittedly, the threat of a tsunami to this region causes great concern for the Government of Sint Maarten. Our geographic location makes us vulnerable to climate related events such as storms and hurricanes that are forecasted days in advance, however tsunami related events generated by the movement of the faults of the earth's crust can occur at moment's notice, and depending on the location of the tsunami very little time is given for evacuation. This small window of opportunity for preparation and mobilization makes us realize the importance of an inclusive and effective approach when it comes to an early warning system for the islands in the region. When we speak of tsunami risk reduction we must be cognizant that we are only as strong as the weakest link, and therefore it is important for all islands in the region to be equally prepared and capable of managing a tsunami event.

Ladies and gentlemen, when it comes to risk reduction, cooperation is the key and for this reason, I happy to learn of the joint regional approach this organization has taken to address the challenges and adopt the strategies for risk reduction. With this in mind, I wish the participants much success and I look forward to reading the outcome document listing the decisions and recommendations. And as a final note, I know that the meeting agenda is quite full and participants of this session have long working days ahead of them, but as Prime Minister of this beautiful country, it would be remiss of me, if I did not impress upon you to take some time out to enjoy Sint Maarten.

Mr Vladimir Ryabinin
Executive Secretary of IOC

Dear Colleagues and Friends,

Since the beginning of March this year I have been serving as Executive Secretary of the Intergovernmental Oceanographic Commission of UNESCO. I have learnt a lot in these two months, and one of the most impressive revelations for me has been how enthusiastic the tsunami community is! You do a very important job protecting millions of people on the coasts of the world ocean and it is gratifying to see that you are energetic, devoted, and highly professional. It is the combination of expertise and energy that moves this world forward!

The Caribbean Tsunami and other Coastal Hazards Warning and Mitigation System provide tsunami threat information to 48 Member States and Territories. It is one of the three “youngest” components of the IOC network of regional Tsunami Warning Systems. As you know IOC tried to establish this system before 2004 without success. The devastating Sumatra tsunami in 2004 was needed to set in motion the development of the International System in the Caribbean Sea, as it was the case in the Mediterranean and North East Atlantic, and in the Indian Ocean. It is very unfortunate that such needed systems only have obtained strong incentives and resources for their establishment after tragic tsunami events. With the establishment of the Caribbean system I hope that we collectively are contributing to break this very sad rule.

Ten years is an important anniversary for the Caribbean System. As the Executive Secretary of IOC, I really wanted to be with you today, to show the level of support that IOC is committed to provide to you and to express to you how thankful IOC is for your work. Unfortunately, I have other commitments that make impossible for me to be with you at this time.

Let me say a few words about where the Caribbean system is now after 10 years of hard work. In 2004 there were only 10 seismic stations available in real time in the Caribbean, now there are almost 100 and earthquakes can now be located in less than a minute and tsunami warnings can be issued in less than 5 minutes. Similarly, in 2004 it would have taken over 3 hours to verify a tsunami in some parts of the Caribbean due to the scarcity of sea level stations delivering data in real time. Now you have 71 sea level stations contributing data! And for most tsunamigenic source locations in the region it will be possible to have a sea level reading for confirmation/cancellation within half an hour. Clearly your work is delivering concrete results. Also, I know you are leading the discussions about a tsunami recognition programme for communities. I sincerely hope that you will be able to come up with such a programme as it is especially important in the Caribbean where the warning time is very little in some locations.

For the future, IOC hopes the Caribbean system will successfully continue its development - including through new Enhanced Products as it has been the case in the Pacific system. Equally important is a strong educational and awareness creation component - through work with civil protection and local communities, as well as continuous further improvement of standard operating procedures. I am told that the Caribbean has excelled on this with its annual CARIBE WAVE exercises that mobilize hundreds of thousands of people, making more and more citizens aware about this hazard in the region.

The Caribbean Tsunami Warning System is a truly international network. But you are meeting in Philipsburg, Sint Maarten. Let me use this opportunity to deeply thank the Government of Sint Maarten and the Kingdom of Netherlands for hosting this Tenth session

of the Intergovernmental Coordination Group for Tsunami and Other Coastal Hazards for the Caribbean and Adjacent Regions (ICG/CARIBE-EWS).

What is the future of disaster risk reduction activities, seen from the international perspective, particularly as the world is considering the post-2015 development agenda? We are aware that people continue to migrate to coastal zones, and the exposure of people and assets to marine and ocean hazards is constantly increasing in time. At the 3rd United Nations World Conference on Disaster Risk Reduction, recently hosted by the Government of Japan in Sendai, countries from all around the world underscored the increasingly important role of Multi-Hazard Early Warning Systems. Your own system definition of a Tsunami and Other Coastal Hazards Early Warning System meet this change in paradigm and perhaps is an open door for you to re-engage work with governments to make sure that this system is sustained into the future. In my view, it is important that the current trends in the domain of disaster risk reduction are taken into account in planning of the further development of tsunami warning systems. This may help to sustain the tsunami warning systems as part of major national and international developments.

I wish you all a very successful meeting, and hope that its outcomes will be very positive and fruitful. Once again, please allow me to reiterate that the Intergovernmental Oceanographic Commission of UNESCO stands ready to continue the support and provide for effective intergovernmental coordination of tsunami warning systems around the world.

ANNEX IV

TSUNAMI SERVICES MODEL

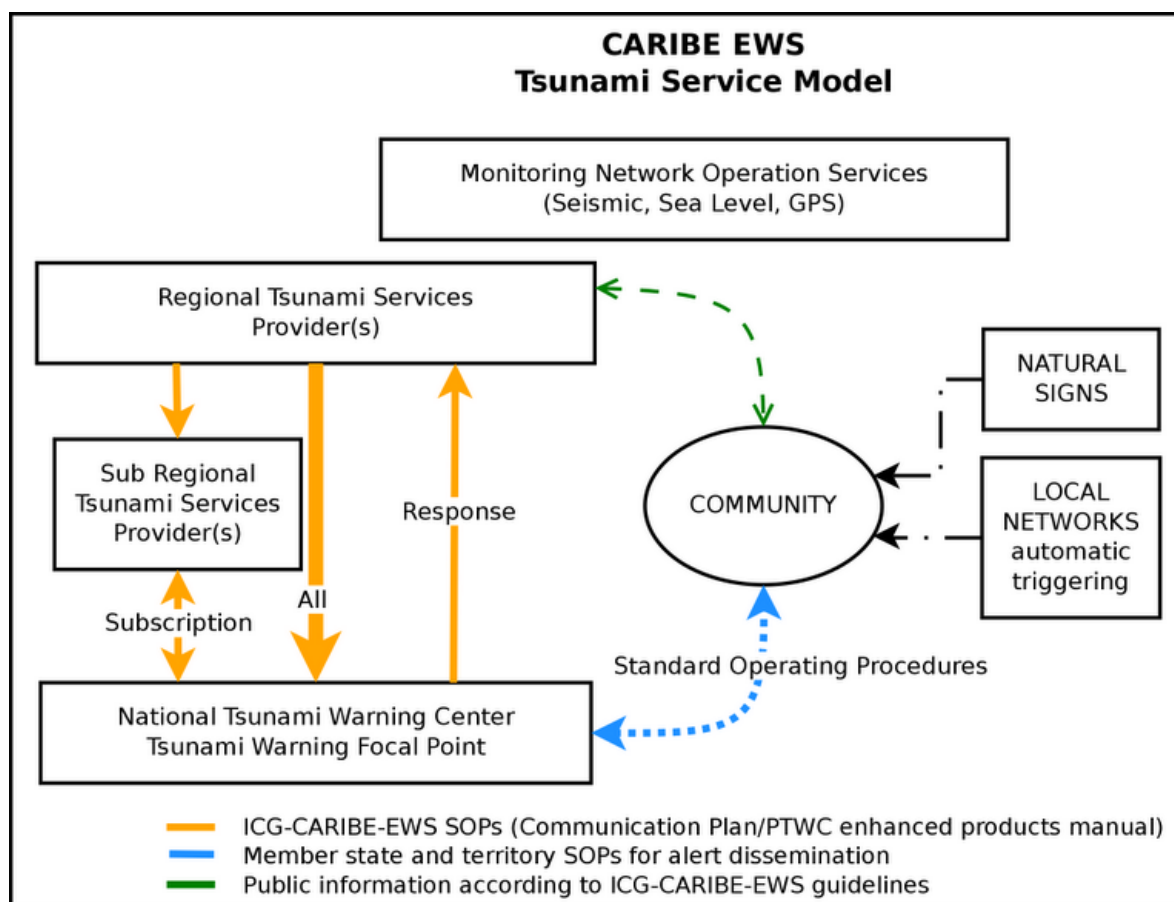


Image IV-1. CARIBE-EWS Tsunami Service Model

ANNEX V

LIST OF DOCUMENTS

WORKING DOCUMENTS		
Agenda Item	Code	Title
2.1	ICG/CARIBE-EWS-X/1 Prov.	ICG/CARIBE-EWS-X Provisional Agenda
2.3	ICG/CARIBE-EWS-X/1 Add. Prov. Rev 1	ICG/CARIBE-EWS-X Provisional Timetable
3.2	ICG/CARIBE-EWS-X/6	Chair Report 2015
3.4	ICG/CARIBE-EWS-X/7	CTIC Report
3.4	ICG/CARIBE-EWS-X/8	CTIC flyer
3.4	ICG/CARIBE-EWS-X/9	CTIC ICG/CARIBE-EWS report 2014–2015
3.4	ICG/CARIBE-EWS-X/10	Finalised Report UNESCO Mission–Minister's mtg
3.5.2	ICG/CARIBE-EWS-X/11	SRC Notes
3.7	ICG/CARIBE-EWS-X/12	National Report from Mexico 2015 CARIBE-EWS
3.7	ICG/CARIBE-EWS-X/13	National Report from St Kitts and Nevis 2015 CARIBE-EWS
3.7	ICG/CARIBE-EWS-X/14	National Report from Costa Rica 2015 CARIBE-EWS
3.7	ICG/CARIBE-EWS-X/15	National Report from Colombia 2015 CARIBE-EWS
3.7	ICG/CARIBE-EWS-X/16	National Report from Anguilla 2015 CARIBE-EWS
3.7	ICG/CARIBE-EWS-X/17	National Report from British Virgin Islands 2015 CARIBE-EWS
3.7	ICG/CARIBE-EWS-X/18	National Report from Venezuela 2015 CARIBE-EWS
3.9	ICG/CARIBE-EWS-X/19	CARIBE WAVE 2015_MediaReport_Draft
3.9	ICG/CARIBE-EWS-X/20	CARIBE WAVE 15 Draft Report
4.1	ICG/CARIBE-EWS-X/21	WorkingGroup1Report_ICG_X_v1.2
4.2	ICG/CARIBE-EWS/WG2-THA/3	Workshop on tsunami modelling and mitigation
4.2	ICG/CARIBE-EWS-X/22	WG2 Report
	ICG/CARIBE-EWS-X/23	WG2 Sources
4.2	ICG/CARIBE-EWS-X/24	Bathymetry Inundation InventoryReport_v3
4.2	ICG/CARIBE-EWS-X/25	WG2 ICG/CARIBE-EWS-X session_Draft report

WORKING DOCUMENTS		
Agenda Item	Code	Title
4.3	ICG/CARIBE-EWS-X/26	WG3 Report (Spanish)
4.4	ICG/CARIBE-EWS-X/27	WG4 Progress report
4.4	ICG/CARIBE-EWS-X/28	Questionnaire on the implementation of the PAE strategy
5.1	ICG/CARIBE-EWS-X/29	Presentation DM system and tsunami ICG/CARIBE-EWS-X
5.2	ICG/CARIBE-EWS-X/30	St Martin invited lecture (French)
6.1	ICG/CARIBE-EWS-X/31	Task Team report CTWS
6.1	ICG/CARIBE-EWS-X/32	Caribbean Tsunami Warning Service–Diagram 2
6.2	ICG/CARIBE-EWS-X/33	EXERCISE CARIBE WAVE 2016_PROPOSAL
6.3	ICG/CARIBE-EWS-X/34	PTWC New Products Report
6.4	ICG/CARIBE-EWS-X/35	Tsunami Recognition Programme Report
6.4	ICG/CARIBE-EWS-X/36	Draft Report 2015 TR TT Mtg
6.5	ICG/CARIBE-EWS-X/37	Nicaragua presentation CATAC
6.5	ICG/CARIBE-EWS-X/38	Draft PTWS Recommendation on Regional Tsunami Advisory Center for Central America CATAC
6.5	ICG/CARIBE-EWS-X/39	DRAFT - Recommendation CATAC – ICG/CARIBE-EWS TWS
10	ICG/CARIBE-EWS-X/40	DRAFT - Recommendation CATAC – ICG/CARIBE-EWS TWS

BACKGROUND DOCUMENTS	
Code	Title
	Letter from Netherlands to IOC/ICG-CARIBE-EWS-X (2015-04-13)
IOC/2009/TS/73	Implementation Plan of the Tsunami Early Warning and Mitigation System in the North Eastern Atlantic, the Mediterranean and Connected Seas
	CARIBE EWS ICG organizational structure and governance-(Ver 28-Jan-2015)

ANNEX VI

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ANNEX VII

LIST OF ACRONYMS

BME	Bureau of Mines and Energy
CATAC	Central America Tsunami Advisory Center
CDEMA	Caribbean Disaster Emergency Management Agency
CENAI	National Center of Seismic Research
CFIDP	Coastal Inundation Forecasting Demonstration Project
CISN	California Integrated Seismic Network
CNE	National Emergency Commission
COCONet	Continuously Operating Caribbean GPS Observational Network
CODOMAR	Center for Maritime Data Observation and Operations
CTIC	Caribbean Tsunami Information Center
CTSP	Candidate Tsunami Service Providers
CTWP	Caribbean Tsunami Warning Program
DEM	Department of Emergency Management of Barbados
DIMAR	General Directorate of Maritime and Port Affairs of Colombia
ECHO	European Commission's Humanitarian Aid Office
EMIZA	French West Indies Emergency Management Organization
ESF	Emergency Support Functions
ETAs	Estimated Time of Arrival
FUNVISIS	Venezuelan Foundation of Seismological Research
GEF	Global Environment Facility
GLOSS	Global Sea-Level Observing System
ICG	Intergovernmental Coordination Group
ICG/CARIBE-EWS	Intergovernmental Coordination Group for the Tsunami and other Coastal Hazards Warning System for the Caribbean and Adjacent Regions
ICG/IOTWS	Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System

ICG/NEAMTWS	Intergovernmental Coordination Group for the Tsunami Early Warning and Mitigation System in the North Eastern Atlantic, the Mediterranean and Connected Seas
ICG/PTWS	Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System
IGVSB	Simon Bolivar Geographic Institute of Venezuela
INETER	Instituto Nicaragüense de Estudios Territoriales
IOC	Intergovernmental Oceanographic Commission
IRC	Inouye Regional Center
ITIC	International Tsunami Information Center
JICA	Japan International Cooperation Agency
KNMI	Royal Netherlands Meteorological Institute
MPPRIJP	Ministry of People's Power for Interior, Justice and Peace of Venezuela
NASA	National Aeronautics and Space Administration
NEIC	National Earthquake Information Center
NMHEWS	National Multi Hazard Early Warning System
NOAA	National Oceanic and Atmospheric Administration
NOAA	National Oceanic and Atmospheric Administration
NTWS	National Tsunami Warning System
NWS	National Weather Service
ODPM	Office of Disaster Preparedness and Management
ORSEC	Organization of the Civil Security Response
PREMA	Puerto Rico Emergency Management Agency
PRSN	Puerto Rico Seismic Network
PTWC	Pacific Tsunami Warning Center
PTWC	Pacific Tsunami Warning Center
READI	Real-Time Earthquake Analysis for Disaster Mitigation
RTSPs	Regional Tsunami Service Providers

SATREPS	Science and Technology Research Partnership for Sustainable Development
SEMANAH	Navigation and Maritime Service of Haiti
SGC	National Geological Service of Colombia
SIDS	Small Island Developing State
SINAMOT	Sistema Nacional de Monitoreo de Tsunamis
SINAPRED	National System of Disaster Prevention
SNGDR	Sistema Nacional de Gestión de Riesgo
SRC	University of the West Indies Seismic Research Centre
SRC	Seismic Research Centre
SRTSPs	Sub-Regional Tsunami Service Providers
TEMA	Tobago Emergency Management Agency
TEMS	Tsunami Evacuation Maps
TIMs	Tsunami Inundation Maps
TLALOCNet	Trans-boundary, Land and Atmosphere Long-term Observational and Collaborative Network
TNC	Tsunami National Contact
TOWS-WG	Working Group on Tsunamis and Other Hazards Related to Sea-Level Warning and Mitigation Systems
TWFP	Tsunami Warning Focal Point
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
US NTWC	US National Tsunami Warning Center
UTS	Seismic Technical Unit
WCDDR	World Conference on Disaster Risk Reduction
WMO	World Meteorological Organization

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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 <i>ad hoc</i> 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-Commission 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, Papete, 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 (IOPCARIBE), 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 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*