Intergovernmental Coordinating Group for
the Tsunami and other Coastal Hazards Warning
System for the Caribbean and Adjacent Regions (Caribe EWS)

Status Report WG1
Monitoring and Detection Systems,
Warning Guidance

Emilio Talavera, Chair
Miguel Palma, Vice-Chair (Seismic)
Sebastien Deroussi, Vice-Chair (Sea Level)

ICG-VIII
Port of Spain, Trinidad and Tobago
April 30, 2013
**WG1: Monitoring and Detection Systems, Warning Guidance**

**Purpose:** To review and recommend to the ICG priorities and actions required towards the full establishment of a coordinated regional tsunami warning system.

**Functions:**

1. Advise member states on the monitoring and detection capabilities needed for operating national tsunami warning centers.

2. Define the threshold criteria for the monitoring and warning systems.

3. Assure the compliance with the agreed standards for the detection systems.

4. Ensure the effectiveness of the warning system by promoting the open exchange of seismic, sea level and other observational data in real time.

5. Promote the sharing of experience and expertise and capacity building essential to the effective monitoring and issuance of warnings.

6. Ensure the establishment of a fully interoperable regional tsunami warning system.
WG1: Membership

- Emilio Talavera M, Instituto Nicaragüense de Estudios Territoriales, Nicaragua, Chair
- Miguel Palma, Vice Chair (Seismology), FUNVISIS, Venezuela
- Sebastien Deroussi, Vice Chair (Sea Level), Observatoire Volcanologique et Sismologique de la Guadeloupe, France
- Gloria Romero, FUNVISIS, Venezuela
- Daniel E. McNamara - NEIC (USGS), United States of America
- Christa G. von Hillebrandt-Andrade, Caribbean Tsunami Warning Program (USA) - Invited Expert
- Lloyd Lynch, Research Fellow-Instrumentation-, Seismic Research Unit - Invited Expert
- Arthur Rolle, Director, Meteorological Service, Bahamas
- Marie Paule Bouin, Sismologue, Observatoire de la Guadeloupe, France
- Jean-Marie Saurel, Engineer, Observatoire de la Martinique, France.
- Capitán de Corbeta Nelson Murillo, DIMAR, Colombia
- Claudio Martínez, ONAMET, Republica Dominicana
- Mr. Venantius Descartes, Deputy Director, Saint Lucia Met. Services
- Allison Allen, NOAA National Ocean Service, USA
- Jennifer Larreynaga, Ministerio del Medio Ambiente y Recursos Naturales, El Salvador
- Donald Simon, Antigua and Barbuda Meteorological Service
- Doug Wilson, IOCARIBE-GOOS Regional Project Coordinator
- Marvin Ryan Forde, Caribbean Institute for Meteorology and Hydrology, Barbados – Invited Expert
- Pedzi Grigori, Meteorological Department Curaçao (MDC), Curacao
- Mark Oduber, Departamento Meteorologico Aruba, Aruba
- Andre Anglade, Observatoire Volcanologique et Sismologique de la Guadeloupe, France
- Hampden Lovell, Department of Meteorology, Barbados
- Bernard Naigre, Conseil Général de la Martinique, France
WG1: Technical Requirements

- Sea level data from international, regional, national and local networks
  - Report data within 5 minutes.

- Seismic stations
  - All earthquakes of magnitude about 4.5 or greater or strongly felt coastal earthquakes in the region will be processed and the results disseminated. Standardized seismic location, magnitude and depth parameters should be disseminated within 5 minutes with a location error of <10km.
• Three of the members of the Working Group or their representative attended the Third IOC-GLOSS-IOCARIBE-CARIBE EWS Caribbean Training Course for Operators of Sea Level Stations which took place from June 5-9, 2012 in Mérida, México and discussed several issues pertaining to the sea level component of the Working Group.

• During the intersessional period the WG1 did not meet. All communications were via emails, except on April 25th when all members were invited to participate in a conference call to review report and recommendations of WG1 for ICG VIII, only 5 members participated, though others provided input virtually.

• The monthly reports on the status of the sea level and seismic stations were distributed to all the members of the working group and key regional data partners. Very limited feedback was received regarding the email communications.

• As of March 2013, 85% (112/132) of the seismic stations of the CARIBE EWS implementation plan are contributing in real time. The most significant development was the addition of Venezuela stations, France also added some stations and stations were repaired in Dominican Republic.
Existing real-time seismic stations available (NO UPDATED)

Stations of CARIBE EWS Core Seismic Stations on IRIS and PRSN
NOAA NWS Caribbean Tsunami Warning Program
http://www.srh.noaa.gov/srh/ctwp/

Seismic stations in the Caribbean (March, 2013).
Existing real-time seismic stations available (April 2013)

Modeled detection time using existing real-time seismic stations available to the CTWP and PTWC. As of April 2013.
• According to the CARIBE EWS Implementation Plan, the goal of data availability per station is at least 90%. According to the CTWP, for February 2013, at PRSN 67% (up from 54%) had a data availability of 90-100%, at WCATWC 65% (up from 55%) had a data availability of 90-100% and for IRIS 59% (up from 57%) of the stations had data availability in the range of 90-100%. Regarding data availability last year for the Hispaniola region, two stations from the Dominican Republic were reintegrated into the system, but still only 1 station from Haiti is transmitting data to the Centers.

• On IRIS a virtual seismic network was established to view the status of seismic data from Caribbean seismic stations being archived at the Data Management Center (http://www.iris.edu/gmap/_CARIBE-EWS). The PRSN also has a graphical tool where one can view data from seismic stations contributing to the warning component of the system (http://prsn.uprm.edu).

• Guadeloupe has installed 4 new additional BB stations. Martinique has installed 3 new additional BB stations. PRSN installed a full (GPS, Accelerometer and Seismometer) station in the Virgin Gorda, British Virgin Islands and repaired the Punta Cana station in Eastern Dominican Republic. PRSN also installed two additional stations in Guayama and Patillas.

• UASD installed a new broad band station in Santiago, Dominican Republic. This station replaced the PUCM station.
WG1: Activities and important developments (3/3)

- Two new strong motion stations were installed at **Diego Martin** and **Couva** in **Trinidad**. The Pointe-a-Pierre (TPP) seismic station was upgraded to digital with accelerometer and a 30 second seismometer.

**Schedule on 2013-2014**

- 4 additional BB stations in **Dominica, St. Lucia, Antigua and Cariacou** are scheduled in 2013.
- Two more stations are planned in 2013, one in **Martinique** and one in **Saint-Barth**.
- **Nicaragua** is planning on installing 8 new BB stations.
- **PRSN**, Baylor University and UASD will relocate the equipment of the old PUCM station in Santiago to San Francisco de Macoris in **Dominican Republic**.
- **FUNVISIS** will be installing a new joint seismic and GPS station on Aves Island.
- **SRC** and the Earthquake Unit, **Jamaica** received a grant from CCRIF to upgrade the region’s strong motion instrument network. 15 accelerometers were purchased and these will be deployed during 2013. Also, another four strong motion station deployments are planned for Trinidad and Tobago over the next six months.
Modeled detection time using existing real-time seismic stations available to the CTWP and PTWC in 2006. Seismic network performance standards were poorly met throughout the region.
Modelled detection time using existing real-time seismic stations available to the CTWP and PTWC in 2013. Seismic network performance standards are nearly met throughout the region.
Seismic Network Capability

Recent network additions (Nicaragua, Colombia, México, Cayman Islands and Venezuela) have reduced detection threshold.
P-wave detection time model for the complete CORE network. The “CORE” network is currently composed of existing seismic stations (△), stations that do not yet exist but fill gaps in the network (▲), and planned stations (▲) that do not yet exist.
Sea level station network (March 2013)
New sea level stations:

2 in Colombia (UHSLC and PRSN, USA funding)
1 in Panama (UHSLC and PRSN, USA funding)
1 in Barahona, Dominican Republic (PRSN and ONAMET)
1 in Barbados (UNESCO-Barbados-CTWP)
1 in Guadeloupe (TSUAREG project, EU funding, data quality control)

Upgraded for satellite transmission:

Pointe à Pitre (Guadeloupe),
Le Precheur (Martinique, data quality control)
Iles du salut (French Guyana)
Travel Time to nearest sea level station: in 2006
Travel Time to nearest sea level station: in 2013
Travel Time to nearest sea level station: all stations

Map showing the travel time to the nearest sea level station for all stations in the Caribbean region.
Third IOC-GLOSS-IOCARIBE-CARIBE EWS Caribbean Training Course for Operators of Sea Level Stations.
June 5-9, 2012 in Mérida, Mexico. (IOC-UNESCO, NOAA and UNAM).
37 sea level station professionals participated

CTWP provided training to hotel and tourism officials of the Dominican Republic on tsunamis, presented at the Tsunami Vertical Evacuation in Puerto Rico in June 2012. Attended by over 100 officials from Puerto Rico and the Caribbean. The CTWP also provided organizational support.
Data visualization and analysis tools

IOC website (VLIZ/IOC):
http://www.ioc-sealevelmonitoring.org/

IOCARIBE and the CTWP (2010):
http://www.srh.noaa.gov/srh/ctwp/

NOAA / PTWC : Tide tool, system for visualization and tide gauges data analysis.

PRSN 2012 : data availability web base tool kit
http://www.prsn.uprm.edu/Spanish/EstacionesV2/mareografos.php
Plans for 2013 - 2014 (not exhaustive)

Fundings from Brazil and St. Vincent and the Grenadines to CARIBE EWS via UNESCO

Upgrades / Installation + training courses (PRSN)

- 2 Stations in Haiti
- 1 in Cayman islands
- 1 in Guatemala
- 1 in St Kitts
- 1 in St Vincent
  - +
- 1 in Corn Island, Nicaragua (new request)
Progression of coastal sea level stations in the Caribbean and Western Atlantic
Recommendations (1/2)

• **Urge** seismic and sea level station and data gaps continue to be addressed in support of tsunami warning and research in accordance with CARIBE EWS approved requirements and Implementation Plan and in addition to new stations, try to leverage other regional efforts.

• **Continue to Urge** the planning and execution of technical training for seismic and sea level network operators, on the proper installation, maintenance and usage of instruments and the need for funding for such activities.

• **Encourage** enhanced robustness of the existing seismic network and stations, by improving data quality and efficiency and reducing their vulnerabilities and by conducting network resilience study.

• **Continue to Encourage** other nations to further develop their capacities and additional tsunami warning centers in support of the Caribbean Tsunami Warning Centre: Nicaragua, Venezuela and USA.

• **Request** the CTWP to complement the Monthly Reports with monthly phone calls among the operators of the seismic and sea level stations in the CARIBE EWS (feedback strategy).
Recommendations (2/2)

- **Recommend** that WG1 establish a task team to conduct a sea level network capability study, determining the minimum detection time of tsunamis to coastal stations and tsunameters within the Caribbean and Adjacent Regions and present its findings and recommendations on sitting of stations at ICG IX.

- **Recommend** that the warning guidance functions of Working Group 1 be integrated into a restructured and renamed Working Group 3, Tsunami Services, as proposed in the 2013-2017 CARIBE EWS Implementation Plan.

- **Support** the efforts towards the establishment of a regional GPS data center in support of COCO Net and other national and regional GPS efforts.

- **Recognize** the success of the Sea Level Network Operators Course held in México in 2012 for the advancement of the sea level network in the region.
Thank you!
¡Muchas Gracias!
Merci!
Dank u!
Mèsi!