Report of Central American Tsunami Advisory Center (CATAC)

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CATAC Report

- **Notes**
  1)The CATAC Users guide (updated version 2023) can be downloaded from
  http://catac.ineter.gob.ni/doc/CATAC%20Guia%20de%20usuario%20SPANISH%2020190710.pdf

- A completely new version of the Users Guide will be elaborated in 2023 in a common initiative of all TSP´s of the ICG/PTWS to standardize to some extent the content of these guides among all centers.

- 2) A short history of CATAC (version 2023) is given as an annex of the present report in Word format.

- 3) The progress of CATAC was presented and discussed in the last 2 years in several meetings of the UNESCO system for tsunami warning, within the steering committees of PTWS, CARIBE EWS, and in the yearly meetings of TOWS.

See the report as Word document:

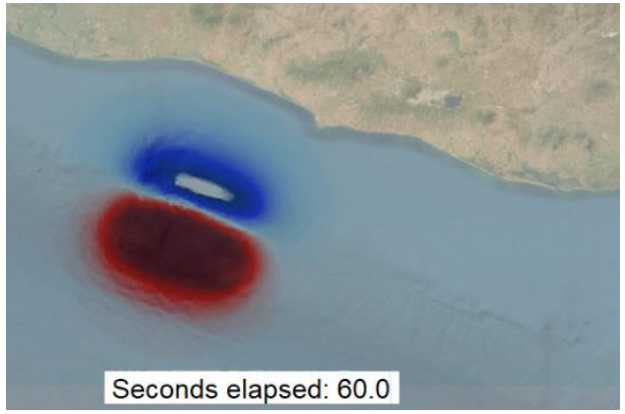
- Contents
  Background
  Situation of CATAC
  Recent activities and new projects
  Proposal for a decision of ICG/CARIBE EWS to admit CATAC to enter the full operation mode.
  Annex: Short history of CATAC

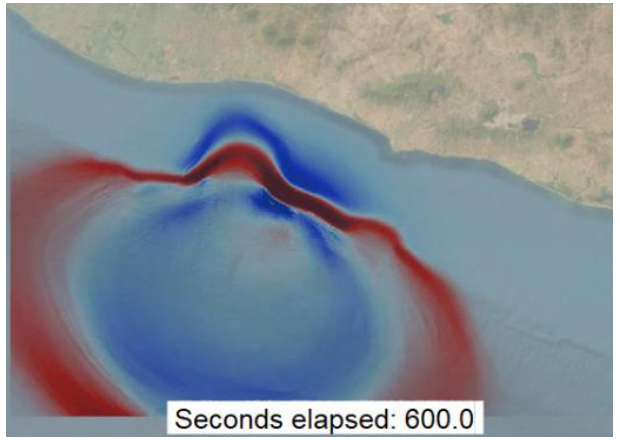
Identification of coastal areas with a reduced time of possible first impact by local tsunamis

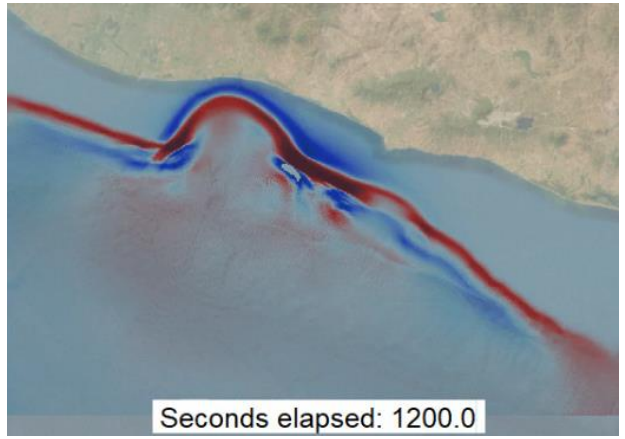
Causes:
1) The source is very close to the coast (Islands to the N of Honduras; San Juan del Norte in Nicaragua, El Limon in Costa Rica, Panama Canal).
2) Between the coast and the source zone there are very deep waters (Gulf of Chiriqui in Panama).
4)A deep sea channel that connects the source with the coast (South of Guatemala).
5) Faults along the coast (Costa Rica, Panama)

The existence of these zones imposes on CATAC and Civil Protection agencies the urgency to work very fast. Therefore, CATAC uses earthquake early warning methods and delivers first solutions within 2 minutes.

Example: Pacific/Guatemala-El Salvador







Example: Immediate tsunami impact, M7.3, N Honduras, 28/05/2009

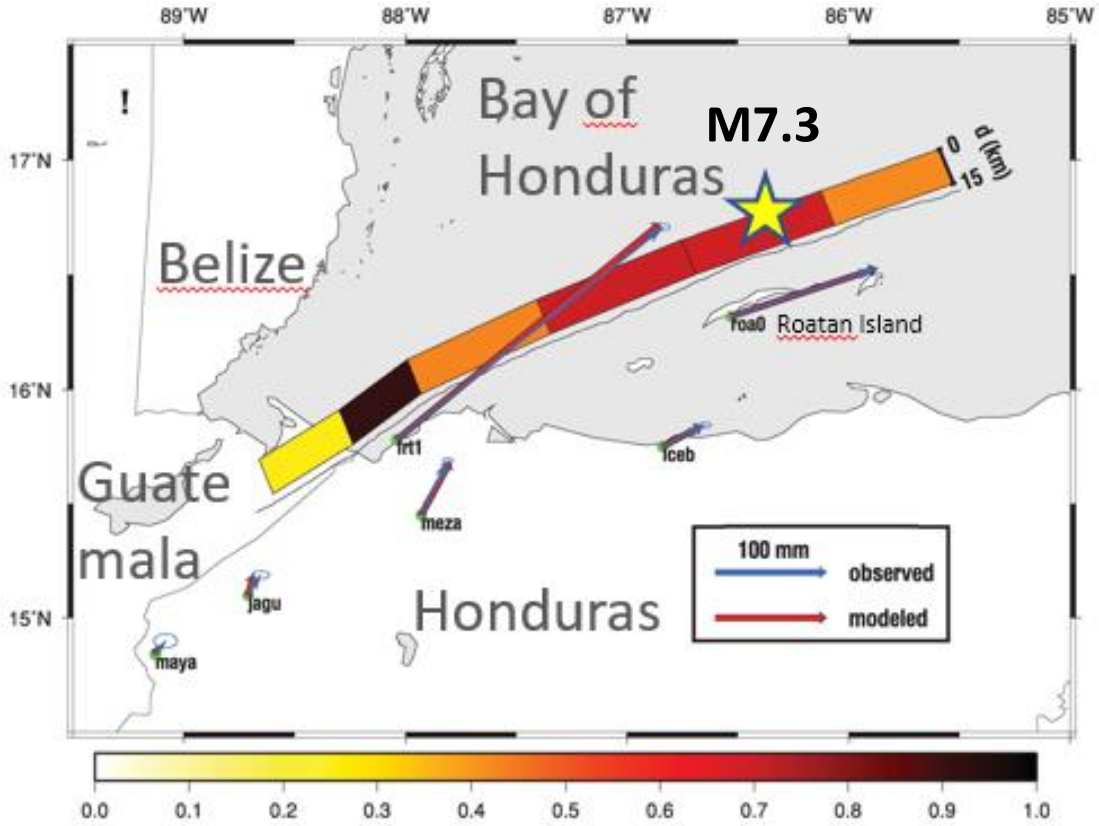
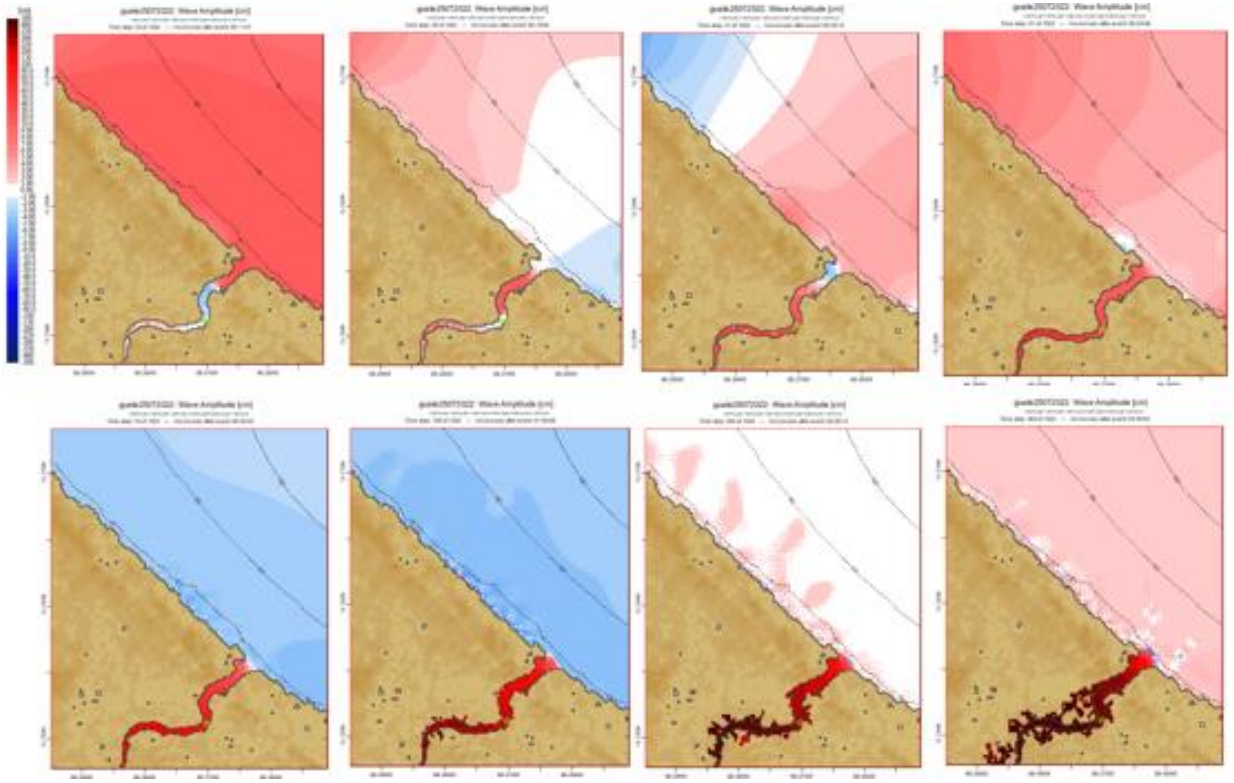


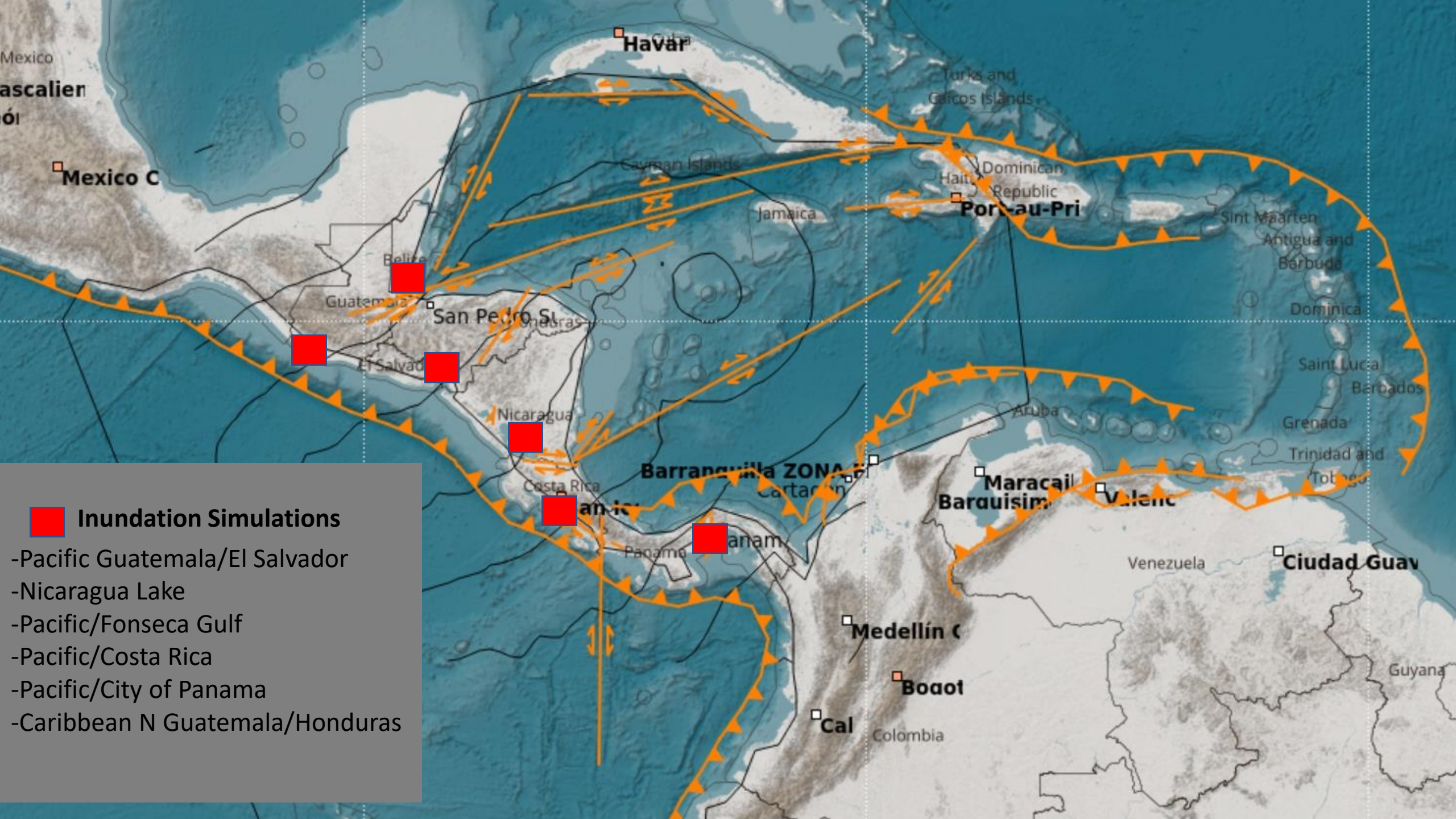
Figure 1. Slip distribution along the fault, yellow star denotes NEIC epicenter. Adapted from Graham et al. 2012. Arrows are GPS vectors post earthquake.



Series of water levels on the N Guatemalan coast and River Motagua, obtained in the simulation

The epicenter is at a distance of about 200 km from the fault segment with the máximum displacement and from the tsunami and river inundation occurrence.

N. Acosta, A. Cabrera, G. Argüello, W. Strauch (2022)Simulation of the Local Tsunami in the North Coast of Guatemala due to the Mw7.3 Earthquake, May 28, 2009, North of Honduras, LACSC, 2023


Havar
Mexico C
Cayman Islands
Jamaica
Dominican Republic
Belize
Guatemala
San Pedro Su
Honduras
El Salvador
Nicaragua
Costa Rica
Panama
Aruba
Venezuela
Colombia
Medellín
Bogot
Cal
Guyana
Saint Lucia
Barbados
Grenada
Trinidad and
Dominica
Sint Maarten
Antigua and Barbuda
Inundation Simulations
-Pacific Guatemala/El Salvador
-Nicaragua Lake
-Pacific/Fonseca Gulf
-Pacific/Costa Rica
-Pacific/City of Panama
-Caribbean N Guatemala/Honduras

Acceleration of Processing

Acceleration of automatic and manual Moment Tensor calculation

-Use of data from near accelerographic stations.

-Limiting the distance of stations to be used for the first message.

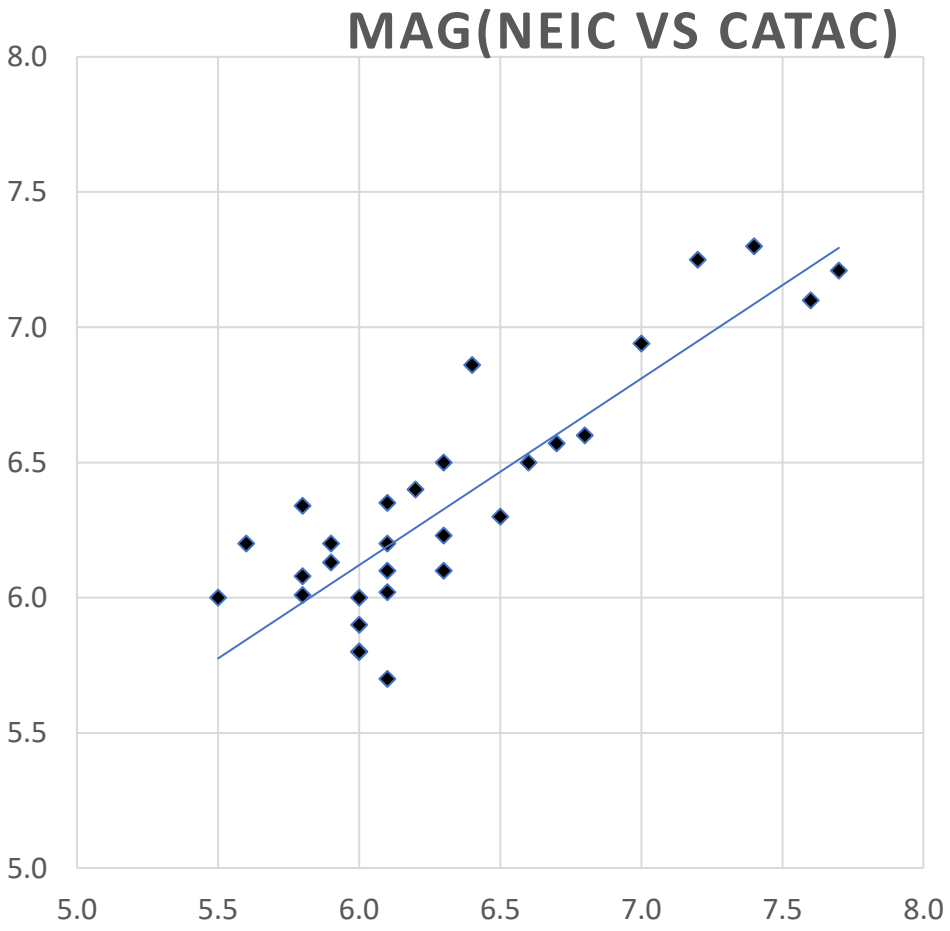
First solutions in less than 10 mins

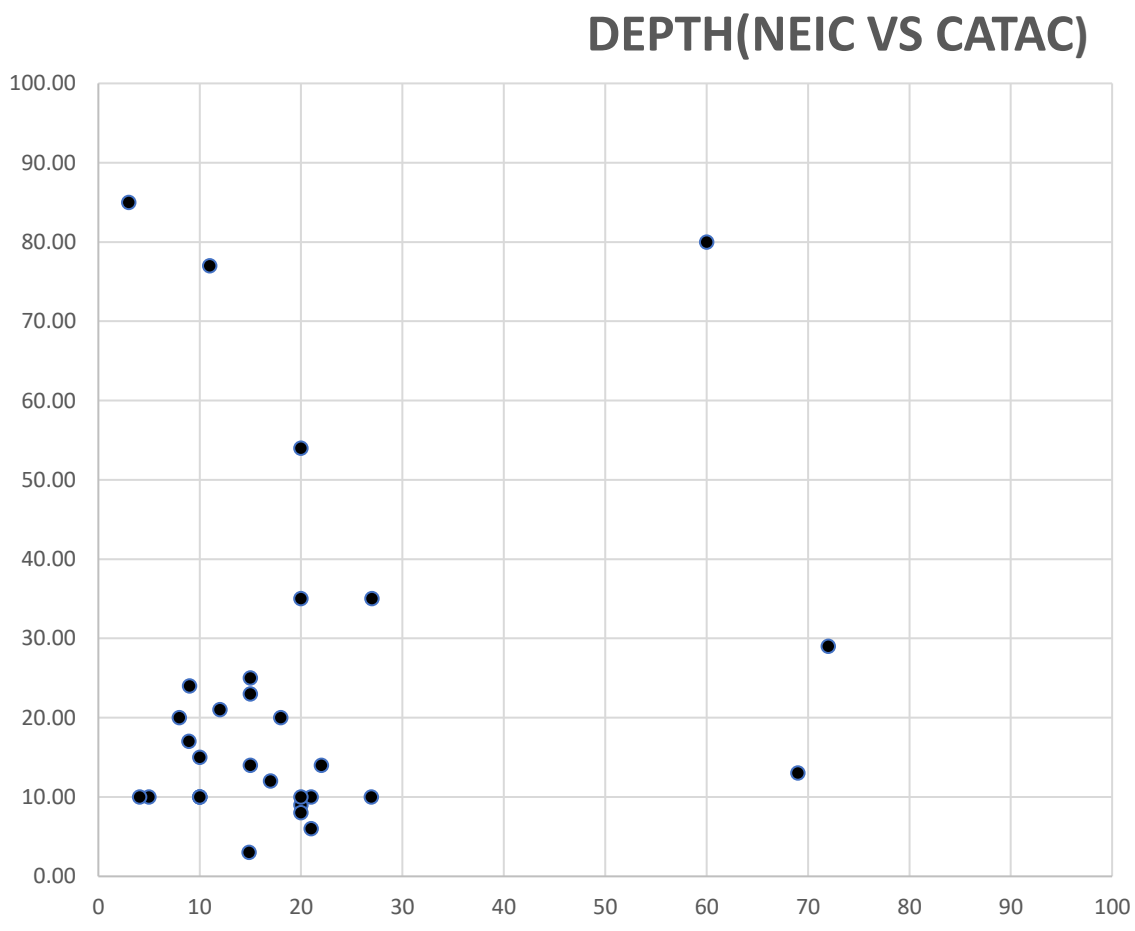
Improvements of Processing

2. Optimization of the configuration of tsunami simulations in the SeisComP module TOAST. GPU based calculations in several steps

Execution time for simulación with TOAST (easywave) GPU				
	Hours of tsunami propagation			
Bath. arcsec	**1**	**2**	**4**	**8**
15	29	92	716	1753
30	14	32	63	140
90	7	23	46	143

CATAC processed events bigger than M6, 11/2019 - 12/2022





Updating the contact list of CATAC (PTWC)

GUATEMALA			
DATE	**NTWC**	**TWFP**	**TNC**
11 February 2015 – Official Letter from the Comision Guatemalteca de Cooperacion con UNESCO / DICONIME	Instituto Nacional de Sismología Vulcanología (INSIVUMEH) **NTWC (Validated through diplomatic channels)** *Lic. Yeison Broderson SAMAYOA VELÁSQUEZ* Director General Tel: +50223105000, +50223105001, +50223105002 Fax: +50222613239 ybsamayoa@insivumeh.gob.gt direcciongeneral@insivumeh.gob.gt 7a Avenida 14-57, Zona 13 01013 GUATEMALA	Instituto Nacional de Sismología Vulcanología (INSIVUMEH) **TWFP (Validated through diplomatic channels)** Sección de sismología, Departamento de Geofísica Tel: +50223105040, +50223105052 Fax: +50222613239 geofisica.informa@insivumeh.gob.gt alfa.boletines@insivumeh.gob.gt Encargado de Departamento: Lic. Robin Onelio Yani Quiyuch Jefe Departamento de Geofísica Tel: +50223105088 royani@insivumeh.gob.gt 7a Avenida 14-57, Zona 13 01013 GUATEMALA	Instituto Nacional de Sismología Vulcanología (INSIVUMEH) **TNC (Validated through diplomatic channels)** *Lic. Yeison Broderson SAMAYOA VELÁSQUEZ* Director General Tel: +50223105000, +50223105001 Fax: +50222613239 ybsamayoa@insivumeh.gob.gt direcciongeneral@insivumeh.gob.gt 7a Avenida 14-57, Zona 13 01013 GUATEMALA
Communication Method		Primary (FAX): +50222613239 Alternate1(Email): geofisica.informa@insivumeh.gob.gt; alfa.boletines@insivumeh.gob.gt	

HONDURAS			
DATE	**NTWC**	**TWFP**	**TNC**
28 March 2014 – TWFP Official Letter from the Permanent Delegation of Honduras to Unesco. 10 June 2015 – TNC Official Email from the Permanent Delegation of Honduras to Unesco. 18 February 2016 – TNC Official Email from the Permanent Delegation of Honduras to Unesco.	Secretaria de Estado en los Despachos de Gestión de Riesgos (COPECO) **NTWC (Validated through diplomatic channels)** *Mr. Juan Jose REYES* Alerta Temprana/COPECO Tel: +50433994815 martincito1968@yahoo.com Aldea el Ocotal 500m. adelante del Hospital Militar, Carretera a Mateo, Comayagüela,F.M, HONDURAS	Secretaria de Estado en los Despachos de Gestión de Riesgos (COPECO) Centro Nacional de Monitoreo **TWFP (Validated through diplomatic channels)** *Mr. Juan Jose REYES* Alerta Temprana/COPECO Tel: +50433994815 martincito1968@yahoo.com Aldea el Ocotal 500m. adelante del Hospital Militar, Carretera a Mateo, Comayagüela, F.M, HONDURAS	Secretaria de Estado en los Despachos de Gestión de Riesgos (COPECO) **TNC (Validated through diplomatic channels)** *Ing Lester CARIAS* Director de la Direccion de Gestion para la Preparacion y Respuesta Tel: +50422290606 ext. 410 Cell: +50494852758 lester_carias@yahoo.com Lomas del Dorado Primera Etapa, Bloque No.1 Casa No.15, HONDURAS

EL SALVADOR			
DATE	**NTWC**	**TWFP**	**TNC**
27 Nov 2015: Official information received from PermDel for TNC	Direccion del Observatorio Ambiental del Ministerio de Medio Ambiente y Recursos Naturales (MARN) **NTWC (Not validated through diplomatic channels)** *Mr Luis MENJIVAR* Director General Tel: +50321329671, +50378563588 Mob.: +50378567807 Luis.menjivar@marn.gob.sv Km 5 ½ Calle a Santa Tecla y Avenida Las Mercedes, Edificio MARN, Local ISTA, contiguo al parque de Pelota Bengoa, San Salvador EL SALVADOR	Centro de Monitoreo de Amenazas Naturales **TWFP (Not validated through diplomatic channels)** Tel: +50321329566, +50378564381 Fax: +50322245500 Mobile: +50378605850 sismologia@marn.gob.sv;deslizamientos@marn.gob.sv; cph@marn.gob.sv; Luis.menjivar@marn.gob.sv; gmarroquin@marn.gob.sv; ahernandez@marn.gob.sv; mdiaz@marn.gob.sv; fgavidia@marn.gob.sv; franciscogavidia@hotmail.com; mgmarroquin@yahoo.com; douglas_hc@yahoo.com; mrdiazflores@hotmail.com Km 5 ½ carretera a Nueva San Salvador. Calle y Colonia Las Mercedes. EL SALVADORe	Ministerio de Medio Ambiente y Recursos Naturales (MARN) **TNC (Validated through diplomatic channels)** Oceanographer *Mr. Francisco GAVIDIA* *Tel:* +50321329610 Fax: +50322245500 Mobile: +50378568796 franciscogavidia@hotmail.com fgavidia@marn.gob.sv Km 5 ½ carretera a Nueva San Salvador. Calle y Colonia Las Mercedes. EL SALVADOR
Communication Method		Primary (SMS): +50378563588 / +50378564381 / +50378549469 / +50378567095 / +50378563660 / +50377298430 / +50378605850 / +50377457571 Alternate1(Fax): +50322245500 Alternate2(Email): sismologia@marn.gob.sv; deslizamientos@marn.gob.sv; cph@marn.gob.sv; Luis.menjivar@marn.gob.sv; gmarroquin@marn.gob.sv; ahernandez@marn.gob.sv; mdiaz@marn.gob.sv; fgavidia@marn.gob.sv; franciscogavidia@hotmail.com; mgmarroquin@yahoo.com; douglas_hc@yahoo.com; mrdiazflores@hotmail.com Alternate3(GTS): MSLP (Aeropuerto Internacional Monseñor Arnulfo Romero, La Paz, +50323492287 Telephone number for voice communication : +50378605850 / +50378563588 / +50378564381 / +50378549469 / +50378563660 / +50378567095	

Updating the contact list of CATAC (PTWC)

National Tsunami Warning Center (NTWC), Tsunami National Contacts (TNC) and Tsunami Warning Focal Points (TWFP), according IOC webpage

- Often not updated
- Often only one institution is represented (scientific)
- Few contacts

In the discussion the interest was expressed to inlcude more persons and more institutions

06

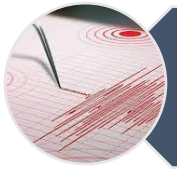
Cooperation with CEPREDENAC

Regional Simulation - General Objetives

Contribute to strengthening the capacities of the National Civil Protection and ISDR Systems, Civil-Military relations with the UHR, measure the socioeconomic impact of disasters, test the mechanisms, tools and technical guidelines for intervention in emergencies in the health sector and position the use of information and communication technologies for response to humanitarian crises and disasters.

09

Hypothesis



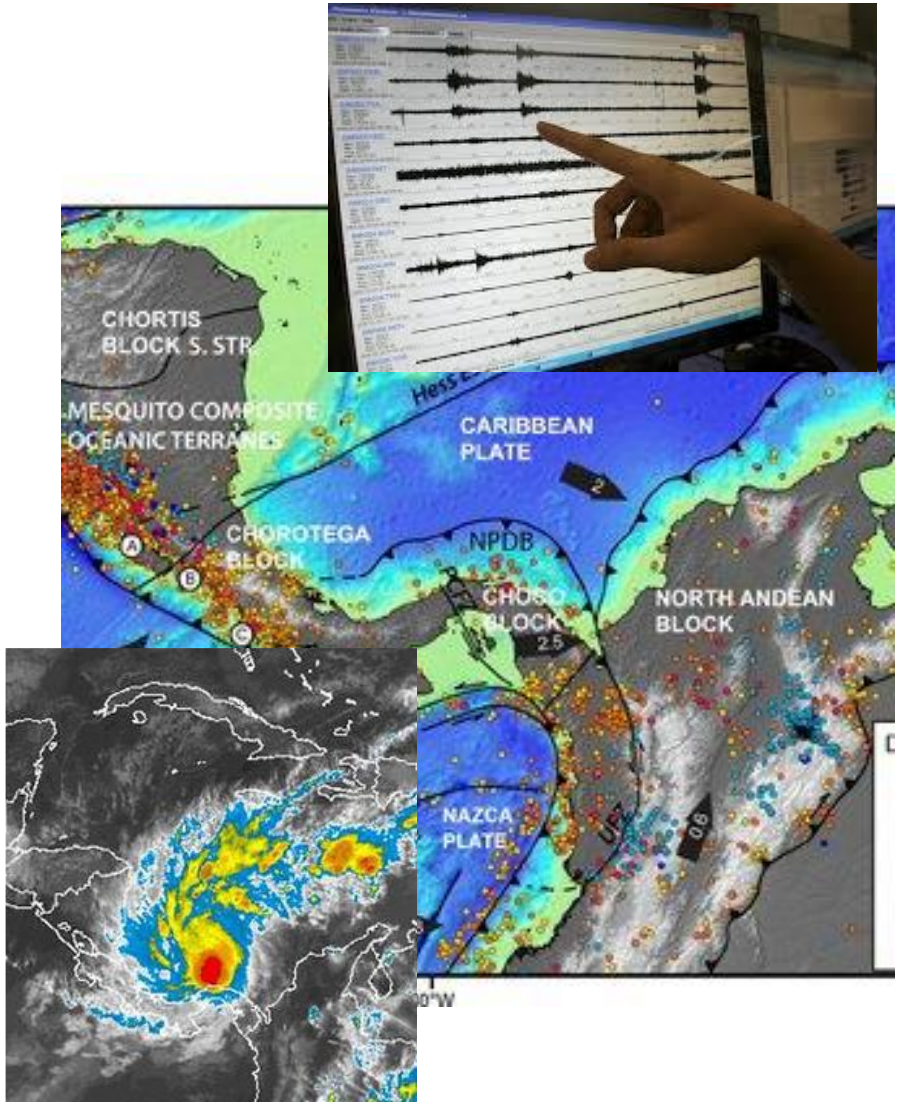
Earthquake magnitude 7.5 at a depth of 10 km, in Panama City with epicenter located in the Pedro Miguel fault, (8º58'N 79º33'W).

Damage to human settlement buildings and basic living infrastructure

trapped and missing persons, structural fires and hazardous material spills.

Passage of Tropical Wave #10 causes rivers to overflow in the provinces of Chiriqui, Bocas del Toro, Cocle and Colon causing major flooding.

Threat of Biological contamination by monkeypox



Webinar about the use of CATAC products, Feb-Mar 2023

#	Fecha y Hora	País	Institución	Tipo institución	Modalidad	Horas
1	20/2/2023 10:00	Nicaragua	SINAPRED	Protección civil	Presencial	2
2	20/2/2023 14:00		Defensa Civil	Protección civil	Presencial	2
3	21/2/2023 10:00	El Salvador	MARN	Científica	Virtual	2
4	21/2/2023 14:00		Protección Civil	Protección Civil	Virtual	2
5	22/2/2023 10:00	Guatemala	INSIVUMEH	Científica	Virtual	2
6	22/2/2023 14:00		CONRED	Protección Civil	Virtual	2
7	23/2/2023 10:00	Honduras	UNAH	Científica	Virtual	2
8	23/2/2023 14:00		COPECO	Protección Civil	Virtual	2
9	14/3/2023 10:00	Costa Rica	SINAMOT-UNA	Científica	Virtual	2
10	14/3/2023 14:00		CNE	Protección Civil	Virtual	2
11	15/3/2023 10:00	Panamá	IG-UPA	Científica	Virtual	2
12	15/3/2023 14:00		SINAPROC	Protección Civil	Virtual	2
13	16/3/2023 10:00	**República Dominicana**	Sis-USAG	Científica	Virtual	2
14	16/3/2023 14:00		Defensa Civil	Protección Civil	Virtual	2
15	17/3/2023 10:00	**Belice**	Servicio Meteo.	Científica	Virtual	2
16	17/3/2023 14:00		Protección Civil	Protección Civil	Virtual	2
17	21/3/2023 10:00		CEPREDENAC	Protección Civil	Virtual	2

prepared with CEPREDENAC, JICA

In support of 3rd regional disaster simulation, CEPREDENAC, Jun2 2023 in Panamá

15 Webinars – done.

2+1 Webinars to be organized next week

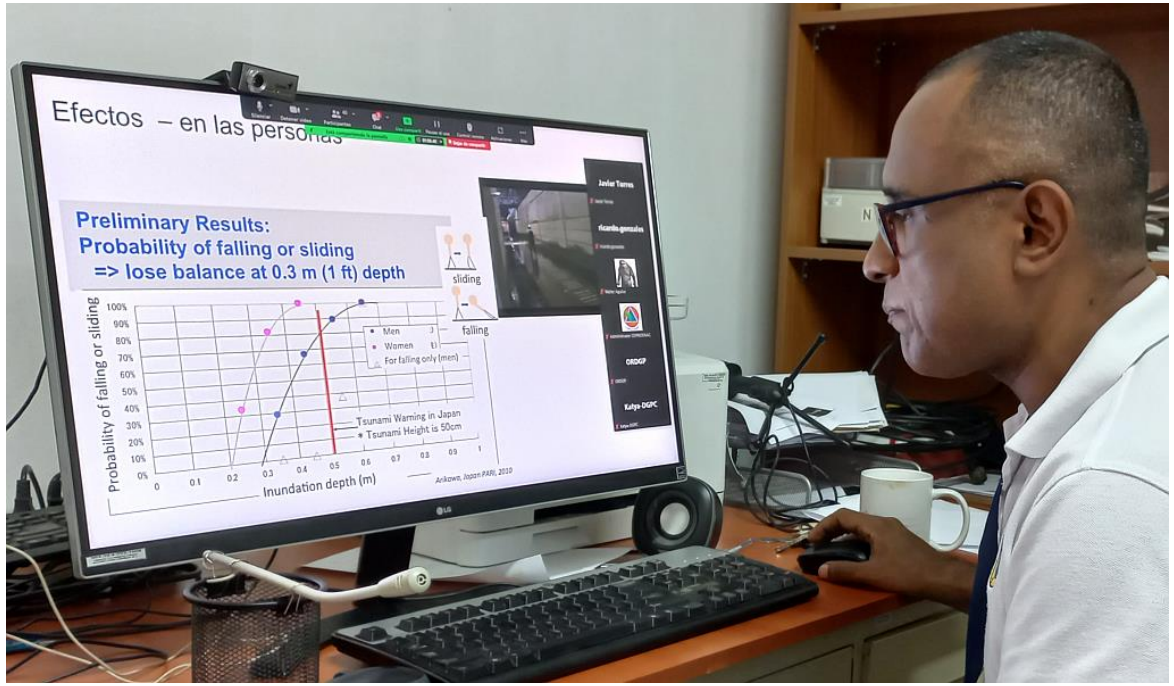
Included Belize and Dominikan Republik on request of CEPREDENAC.

During the simulation, in June 2023, meetings to be organized with Panamanian institutions to advise Panama on CATAC's performance in rapid earthquake and tsunami processing, CATAC's products and how Panama can benefit from its services.

Webinar topics

- Tsunami Hazard country specific
- Minimum dangerous tsunami height
- Zones with small impact times
- CATAC procedures
- Tsunami simulation
- Warning products
- Warning messages
- Warning methods (social networks)
- Recipients of messages
- Country protocols
- Proposals

Webinar with Insivumeh/Guatemala



Norwin Acosta, CATAC, explains mínimum dangerous tsunami height

New Project for Regional Capacitation at CATAC 2023-26

- Support by JICA
- Each November: Presential capacitation with CATAC users at INETER/Managua
- Several Zoom meetings each year with user institutions
- Visits to the institutions in the countries
- Funding of software licences SeisComP 5
- Funding of equipment for capacitation

Proposal to use Starlink

CATAC proposes to use the new facilities offered by STARLINK (https://www.starlink.com/) relatively cheap satellite based internet with very low delay and high reliability to improve the Internet connection between CATAC and the NTWC´s and seismic stations in remote areas, as for instance islands.

- No es afectado por terremotos.
- **Precios (privado):**

500 US$ initial payment

25 US$ monthly payment

- **Parameters**

Up to 200Mbps

Delay below 50ms

- **Very simple installation**

Cooperation CATAC-MARN El Salvador

- Idea: MARN acting as backup center of CATAC
- 2022-23 several Zoom meetings

Actions 2023

1. February-March 2023, with JICA/CEPREDENAC

   Webinar (Zoom) of all relevant CA institutions about the use of CATAC´s products in 6 Central American countries, additionally Dominican Republic and Belize.

   17 sessions (2 hours) with JICA &CEPREDENAC

2. Follow up of the Webinar, revision of SOPs
3. Adaptation of CATAC Procedures according proposals at Webinar
4. April Start of new JICA project
6. 24-28/04/2023 ICG/CARIBE EWS meeting
7. June 2023, in Panamá: Capacitation for institutions in Panama (during regional exercise)
9. Nov 2023, with JICA/CEPREDENAC

   Capacitation – presential, at CATAC/Managua, for all institutions receiving our product

   (all Central America institutions plus Dominican Republik and Belice, November 2023, 1 week for 15 participants with JICA & CEPREDENAC

Exercises

1. March 2023 CARIBEWAVE
2. June 2023 Regional EQ 7.5 exercise in Panama organized by CEPREDENAC
3. Sep-Nov 2023 PACWAVE 2023