THE PUERTO RICO LA ISLA DEL ENCANTO
The mission of the Puerto Rico Seismic Network (PRSN) is to rapidly determine the location and size of all earthquakes and tsunamis in the Area of Responsibility (AOR) and to immediately disseminate this information to concerned agencies, scientists, and the general public. PRSN compiles and maintains an extensive geophysical database on earthquake parameters, continuous waveforms (ground motion and sea level) and their effects which serve as a solid foundation for basic and applied earth science/oceanography research in Puerto Rico and the Caribbean.
Tsunami Ready Program

Helps **Communities** at Risk

- “Grass roots” program that promotes tsunami hazard readiness.
- Collaborative effort between government, academia and the public.
- Improve public safety during tsunami emergencies.
- Prepares communities for tsunami hazard.
- Create minimum standard community guidelines for adequate tsunami readiness.
- Increase public awareness and understanding of tsunami hazard.
- Improve community pre-planning for tsunami disasters.
- Encourage consistency in educational materials and response.
- Recognize communities that have adopted Tsunami Ready guidelines.
MANAGUA, NICARAGUA.
MARCH 15-17, 2010
Dr. VICTOR HUERFANO, PRSN
ICG/CARIPE EWS-V

Communications
- Real Time Monitoring
- Real Time Dissemination
- Community Preparedness
- Administration

Research and Vulnerability

Information Reception
- Ways to receive tsunami messages
- Ways to monitor rt seismic/tide data
- Ways to disseminate messages
- Coordination with public

Tsunami Evacuation Maps
Social Research
Education and Outreach
24/7 Focal Warning Point... SOP’s
Emergency Operations Center

Earthquake/Tsunami safety talks
Training and Education
Planning revisions
Comprehensive Operations Plan
Coordination with key players
Continuous revisions
Evaluations

PR/VI TRP
PRTWMP
Earthquakes and Tsunamis in the Northeastern Caribbean
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Tsunami Evacuation Maps and the PR TWMP

_Saving lives and property depends on how well the community is prepared_

- Bathymetry/Topographic data
- Population and Infrastructure

- Hypothetical Tsunami Scenarios
  (Seismology/Previous work)

- Initial Conditions
  (Mansinha and Smylie)

- Propagation and run up
  (TIME project, Shuto)

- Real Time Monitoring
- Forecasting
- Observations

- Computer Simulations

- Numerical Modeling
- Numerical Data Base

- Historical Observations
- Instrumental Data Base

- Alert System

-_messages (Protocols)_

- Worst Case Scenario
  Vulnerability

- Tsunami Hazard Planning
  Education and Outreach
Earthquake Scenarios in PRSN AOR

- **Puerto Rico Region**
  - Faults: 102
  - Segments: 268
  - Maximum M (Faults): 7.6
  - Maximum M (Segments): 7.2
  - Seismic Catalogue: 10031
  - Waveform Catalogue: 3518
  - Quakes used: 4422
  - Depth: ≤ 50 km
  - Offshore Seismicity
  - Completeness: 3.2 ML (Outside)

- **Eastern DR.**
  - Segments: 9
  - Maximum M: 7.2
  - Recurrence T: 800

- **Septentrional F.**
  - Segments: 14
  - Maximum M: 7.8 (ref)
  - Recurrence T: 1900

- **Leeward LZ.**
  - Segments: 11
  - Maximum M: 7.0
  - Recurrence T: 3000

- **Mona Canyon**
  - Segments: 24
  - Maximum M: 7.5
  - Recurrence T: 2000

- **North Platform**
  - Segments: 25
  - Maximum M: 6.8
  - Recurrence T: 2500

- **Negada P.**
  - Segments: 28
  - Maximum M: 7.7
  - Recurrence T: 3700

- **PRT-A**
  - Segments: 24
  - Maximum M: 8.0
  - Recurrence T: 3800

- **PRT-B**
  - Segments: 27
  - Maximum M: 8.0
  - Recurrence T: 3800

- **SOMBRERO SZ**
  - Segments: 16
  - Maximum M: 7.6
  - Recurrence T: 3300

- **Anegada P.**
  - Segments: 28
  - Maximum M: 7.7
  - Recurrence T: 3700

**Seismic Catalogue:** 10031
**Waveform Catalogue:** 3518
**Quakes used:** 4422
**Depth:** ≤ 50 km
**Offshore Seismicity**

**Completeness:** 3.2 ML (Outside)
PR TR Mapping
**Vulnerability in PR (Top ten)**

<table>
<thead>
<tr>
<th>City</th>
<th>Population</th>
<th>%Exposure</th>
<th>Total Homes</th>
<th>%Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mayagüez</td>
<td>18,950</td>
<td>19.25%</td>
<td>7,500</td>
<td>19.05%</td>
</tr>
<tr>
<td>San Juan</td>
<td>6,308</td>
<td>1.45%</td>
<td>3,896</td>
<td>2.14%</td>
</tr>
<tr>
<td>Arecibo</td>
<td>5,551</td>
<td>5.54%</td>
<td>2,273</td>
<td>5.83%</td>
</tr>
<tr>
<td>Aguada</td>
<td>4,798</td>
<td>11.41%</td>
<td>1,954</td>
<td>12.53%</td>
</tr>
<tr>
<td>Carolina</td>
<td>4,576</td>
<td>2.46%</td>
<td>4,513</td>
<td>6.33%</td>
</tr>
<tr>
<td>Ponce</td>
<td>3,617</td>
<td>1.94%</td>
<td>1,416</td>
<td>2.13%</td>
</tr>
<tr>
<td>Loíza</td>
<td>3,344</td>
<td>10.28%</td>
<td>1,212</td>
<td>11.09%</td>
</tr>
<tr>
<td>Aguadilla</td>
<td>2,801</td>
<td>4.33%</td>
<td>1,191</td>
<td>4.79%</td>
</tr>
<tr>
<td>Cabo Rojo</td>
<td>2,400</td>
<td>5.12%</td>
<td>2,358</td>
<td>10.17%</td>
</tr>
<tr>
<td>Añasco</td>
<td>2,389</td>
<td>8.43%</td>
<td>904</td>
<td>8.43%</td>
</tr>
</tbody>
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Alert Dissemination Plan Diagram Puerto Rico

Information Sources

Regional Networks
- PTWC
- NEIC
- PRSN
- WC/ATWC

Information Clients
- Focal Warning Points

CDERA Caribbean
- WEB
- Service List
- Dedicated Programs
- SMS (Short Message Service)
- Amateur Radio

At risk general public
- Sirens
- Dedicated Circuits
- Local Systems

Tsunami Protocol: Withmore, ten Brink, Caropollo, Huerfano, Night, Sammler and Sandrik
**WARNING**
- DANGER!
- Run for High Ground!
- Follow local Emergency instructions.

**ADVISORY**
- Possible Strong and Dangerous local Current.
- Stay tuned for local Emergency guidance.

**WATCH**
- Potential Danger alert.
- Stay tuned for more information.

**INFORMATION**
- Relax.
- No Danger.

**STATEMENT**

---

**Aviso**
- ¡Peligro!
- ¡Corra a tierras altas!
- Siga las instrucciones de emergencia.

**Advertencia**
- Posibles olas y corrientes fuertes y peligrosas.
- Salir del agua y playas
- Estar pendiente a más información

**Vigilancia**
- Peligro potencial.
- Permanezca alerta para más información.

**Declaración de Información**
- Permanezca tranquilo.
- No hay peligro.
- Una cuenca oceánica distante puede estar en riesgo.
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PR/VI TRP

PRTWMP
Tsunami Warning reception/Dissemination (24/7)

1. Internet
   - Email service list
   - Dedicated client programs
   - Web pages
   - Text messages, feeds
2. Fax and Phone red lines
3. SMS
4. Emergency Alert System (EAS)
5. Reverse 911
6. NOAA Weather Radio
7. Sirens
8. VSAT satellite (IP)
9. EMWIN GOES link
Other systems unique to area
Dedicated Internet Client programs
Dedicated Internet Client programs
Current Real Time Earthquake Information

Post earthquake
1. 1/2 minutes: Location and size
2. 3/5 minutes ShakeMaps

Map of observed ground shaking available within minutes after an event. Real time loss estimation, Early Warning
3. Tsunami Messages... Forecasting

USA: II, IU, LI, CU, US
Puerto Rico: PRSN, PRSMP
Dom. Republic: ISU
Montserrat: MVO
Aruba: MA
Panamá: BARU
Nicaragua: INETER
EL Salvador: SNET
Costa Rica: OVSICORI
México: Colima
France: G
Dutch: NA
Trinidad & Tobago: SRC
Colombia: INGEOMINAS
Germany: GE
Community Preparedness
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ICG/CARIBE EWS-V
TR Ceremony, Aguadilla, 2010

Aguadilla es un Municipio
TsunamiReady

Está entrando en una zona de peligro de tsunami
En caso de un tsunami fuerte o
Aviso de tsunami
Múévase inmediatamente a un Lugar Alto o Alejado de la Costa

Dr. VICTOR HUERFANO, PRSN

MANAGUA, NICARAGUA.
MARCH 15-17, 2010
MANAGUA, NICARAGUA. MARCH 15-17, 2010

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PRTWMP
TR Ceremony, Dorado, May 2009
AVISOS DE TSUNAMI EN EFEITO PARA PUERTO RICO Y LAS ISLAS VIRGENES