U.S. Territory of Guam

National Tsunami Hazard Mitigation Program
2019 Annual Meeting
Wallace F. Bennet Federal Building
Salt Lake City, Utah
August 19-23, 2019


Charles “Chip” Guard - Guam Science Representative / Warning Coordination Meteorologist, NWS Weather Forecast Office Guam

www.ghs.guam.gov
weather.gov/gum/
Guam: “Where America’s Day Begins”

- Guam Introduction

Guam HS/OCD Mission:
To Coordinate and facilitate all Government of Guam, Military, and Federal Liaison Response Agencies and their resources in mitigating, preparing, responding, and recovering from any and all types of emergencies in order to protect the lives, environment, and property of the island of Guam.

Guam Demographics

<table>
<thead>
<tr>
<th>Category</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Population (Guam Census, 2010)</td>
<td>159,378</td>
</tr>
<tr>
<td>Military Population (Guam Bureau of Statistics and Mines, 2014)</td>
<td>13,071</td>
</tr>
<tr>
<td>Total On Island Population (Guam Visitors Bureau, 2016)</td>
<td>185,734</td>
</tr>
</tbody>
</table>

U.S. Territory of Guam
NTHMP Guam Tsunami Program

- Public Outreach and Community Education Campaign
  - Public Outreach and Building Culture of Preparedness
  - First Responders and Community Training and Exercise Program
  - TsunamiReady and StormReady Community (Since 2006)

- Tsunami Evacuation Maps and Signage
  - Tsunami Evacuation Maps; Signage for Safe Evacuation Routes and Assembly Areas

- Reproduction of Outreach Materials
  - Tsunami Maps; Tsunami Wheels; Tsunami Ready Cards in Multiple Languages; Boating Safety Brochures; Tsunami Posters; Earthquake-Tsunami Coloring Books

- Alert Warning Notification
  - All Hazards Alert Warning System (pole-mounted, building mounted and trailer-mounted); Emergency Alert System; Vehicle-Mounted Sirens and Annunciation

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NTHMP Guam Tsunami Program

Whole Community and Whole Government Hazard Mitigation and Catastrophic Planning Initiatives

- Guam Catastrophic Plan
- 2019 Guam Hazard Mitigation Plan (Hazard and Risk Assessments; Guam Mitigation Actions; Guam Mitigation Strategy)
- Guam Comprehensive Emergency Management Plan (Ongoing Update: Logistics Distribution Management, Evacuation Plan; Disaster Financial Management; Catastrophic Disaster Housing; Resilient Communication; and Continuity of Operations/Continuity of Government)

Partnership with the Whole Community, Leveraging with Various Grants and Funding Sources, and Regional Collaboration

- Guam Silver Jackets (USACE’s Flood Study of Guam, etc.)
- Coastal Zone Program (Assembly of Planners Workshop, etc.)
- FEMA Hazard Mitigation Assistance (Mitigation Strategies and Opportunities Workshop, etc.)
- ITIC and PTWC (Technical Assistance and Pacific Wave Exercise)
- Joint Guam-CNMI Typhoon “Pakyo” Full Scale Exercise (Regional Response on a Catastrophic Scenario, Supply Chain, Mutual Aid, etc.)

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NeoWave Modeling Projects, Outreach and Development of Users’ Manual

- Apra Harbor – project completed; stakeholders presentation completed; Users’ Manual developed
- Agana Bay – project completed; stakeholders presentation completed
- Tumon Bay – project completed; stakeholders presentation completed
- Agat Bay – ongoing

User’s Manual developed to provide a quick reference capability for decision makers based on NeoWave results

Workshop for key users to demonstrate how to use the manual

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Site Visit, Community Input, and Debriefing

Site visits and stakeholder meetings to define data products
- USCG Sector Guam
- Port Authority of Guam
- Naval Base Guam Emergency Management
- Guam Power Authority
- Guam Waterworks Authority
- Guam Visitors Bureau

Data Products for Maritime Communities
- Advisory-level tsunami scenarios in support of USCG’s severe weather plan
- Extreme tsunami scenarios for evacuation guidance

Data Products for Infrastructure Assessment and Planning
- Extreme tsunami scenarios for vulnerability assessment of power plant, fuel storage, and wastewater treatment plant

Timelines
- Kick-off meeting with stakeholders: January 2018
- Presentation of Apra Harbor data products: August 2018
- Presentation of Agana Bay and Tumon Bay data products: August 2019
- Mapping for Agat: September 2019 – August 2020
Apra Harbor

Tsunami scenarios from Global Earthquake Model

- Advisory level to the preferred maximum magnitude

Four critical subduction zones to Guam

- Marinas: Mw 7.7 to 8.3
- Nankai: Mw 8.1 to 8.7
- Philippine: Mw 7.9 to 8.5
- New Guinea: Mw 8.2 to 8.8
Data Products

Tsunami Inundation Maps
- Computed at MHHW
- Aggregated from the *preferred* maximum earthquakes at the four critical sources: Mariana, Philippine, Nankai, and New Guinea

In-harbor hazard maps
- Computed at MSL
- Advisory to warning-level tsunami scenarios from the four critical sources

Offshore hazard maps
- *Preferred* maximum at Mariana (local source)
- Aggregated from *preferred* maxima at Philippine, Nankai, and New Guinea (distant sources)
- Determination of refuge areas for evacuated vessels
### Summary Table Example: Nankai Trough Events

#### Nankai Mw

<table>
<thead>
<tr>
<th>Surge (m)</th>
<th>Drawdown (m)</th>
<th>Period (min)</th>
<th>Current (m/s)</th>
<th>Period (min)</th>
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<tr>
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<td>24, 17</td>
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#### Kilo Wharf

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#### Port of Guam

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#### Inner Basin Entrance

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<td>23, 46</td>
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Questions...

Si’ Yu’us Ma’ase!
Thank you!