NTHMP 2025 Annual Meeting Summary

Anchorage, Alaska, May 20-22, 2025

Tuesday, May 20, 2025

Welcome Video from Sen. Lisa Murkowski, AK

NWS Program Update, Greg Schoor, AFS26 (Marine, Tropical and Tsunami Program Branch Chief)

- **Program Personnel**
  - The current NWS Tsunami Program personnel is:
    - Greg Schoor, Marine, Tropical, and Tsunami Branch Chief
    - Sarah Rogowski, Acting Tsunami Program Manager and NTHMP Administrator
- **Operational Alignment of the two Tsunami Warning Centers and ITIC**
  - NWS is pursuing formal approval to align the National Tsunami Warning Center (NTWC), the Pacific Tsunami Warning Center (PTWC), and the International Tsunami Information Center (ITIC) under the NWS's NCEP Ocean Prediction Center.
    - OPC is led by Director, AJ Reiss. James Gridley, former Director of NTWC, is the Deputy Director for OPC Tsunami Operations and Research, establishing a reporting structure up from both TWCs and the ITIC.
  - A number of individual projects are underway with the comprehensive goal of completing the operational alignment of the NWS Tsunami Warning Centers (TWC).
    - The alignment is a high priority for the NWS, given the technological challenges with seamless service backup/failover between the TWCs.
    - Additionally, there are working groups that are dedicated to specific topic areas and tasks that help to bridge longtime, known gaps in the overall system. As technical items are tested and evaluated, these groups are working together quickly to address them.
    - The new tsunami.gov webpage has been developed and there is a prototype site available for reviewing. Dave Snider, NTWC WCM has sent out a number of correspondence messages in the past several months, requesting user feedback on how usable and understandable the flow of the site appears to be. Dave will have a more detailed update later today.
  - A Common Analytic System (CAS) is being developed by the NOAA Office of Atmospheric Research's (OAR) Pacific Marine Environmental Laboratory (PMEL). CAS is expected to deliver fast, understandable information about tsunami potential, in the minutes following seismic and non-seismic driven tsunami events. This a foundational piece of the "unification" of the TWCs.
    - Work began on CAS in mid-to-late 2024, after iterative requirements validation within the NWS. This system and how it is designed to operate has been reviewed and approved by the TWCs and NWS Leadership.
    - A prototype is under development by PMEL with testing and evaluating of the data ingest and the data processing for the system. This promising early-stage work is being done rapidly and with steady coordination with the NWS.
  - The TWCs are in the process of installing ATOMS, an application that mirrors the functionality of AWIPS (in NWS Weather Forecast Offices) but is unique to the operational needs of the TWCs.
    - Benefits of ATOMS:
      - Provides consistency in the message products generated between the TWC's
      - Provides for site backup and the beginnings of a COOP solution.
      - Provides TWCs with a well supported platform standard across NWS.
  - Working Groups
    - With so much detailed technical work needed to stand-up new operating systems and procedures between the TWCs and ITIC, three working groups were formed in recent months, primarily made up of technical experts in the TWCs, NWS Headquarters, and other supporting NWS personnel.
    - These Working Groups, the Operations (Ops), CAS, and IDSS are working to refine and reform their procedures, given the technical and operational advancements, such as having an enterprise-supported system, ATOMS, operating at both TWCs.
    - The groups come together for tabletop and demonstration-based exercises, to test and evaluate progress on the items they are tasked with completing. The demonstrations are working to be more focused and comprehensive with expected progress.
  - IDSS Vision
    - The goal is to develop the appropriate baseline Impact-based Decision Support Services (IDSS) for routine and episodic tsunami events. Routine is essentially the event types that fit within the lower magnitude earthquakes or other non-seismic events that are not assumed to generate a tsunami or any type of alert-level product. Episodic events essentially means the big events, the events that are M7.0 and above and ones that normally have Watchstanders considering issuing alerts for a potential tsunami.
      - Both IDSS paradigms will require a full-scale review of the current procedures that occur within each TWC in order to understand the most modern, timely, and uniformly understandable outputs that will be effective for decision-makers.
      - This process will have routine partner and external stakeholder engagement to review and provide feedback on prototype or experimental output. There are also occasional non-routine methods of gaining feedback, as we have done with the work on the new tsunami.gov webpage.
    - We are also utilizing lessons learned from recent events, such as the early December 2024 northern California event and the early February 2025 event in the Caribbean, to provide clearer and more efficient support during an event.
      - Formal testing of the system, like PACIFEX, CARIBEWAVE and others, will also be used in understanding how to provide expedient and understandable products and services, in the minutes following the initial earthquake.
- **FY25 NTHMP Funding**
  - While we have a full year appropriation, we do not yet have an approved agency spend plan, nor clarification on funding levels for the NTHMP grants.
  - NTHMP partners can continue to draw-down funding from FY24 grants and any approved no-cost extensions from previous years. Partners should ensure that all work is in alignment with recent executive orders

Introduction to the Alaska Tsunami Program - History, Risks and Preparation, Bryan Fisher, AK Director of Emergency Management and Homeland Security and Anthony Picasso, Alaska Earthquake, Tsunami, Volcano Program Manager

Alaska, the largest US state, has 33,904 miles of coastline. DHS&EM is small, located only in Anchorage, requiring plane or boat travel due to limited road access. They partner with the Dept of Defense for event response. The NTHMP and TsunamiReady Program focus on community resilience, preparing them for long-term self-sufficiency post-disaster, as many evacuate to unsheltered hilltops. Alaska lacks a Level 1 trauma center, altering perceptions of care.

The 1964 Good Friday earthquake demonstrated Alaska's resilience through building codes and proper planning, minimizing loss of life despite significant infrastructure damage. Outreach and education are crucial.

Alaska faces challenging natural hazards. The NTHMP provides resources for evacuation, timing, and general management, supporting vulnerable communities with limited resources in life-or-death decisions. Geographical barriers include 33,904 miles of coastline, isolated communities, extreme weather, complex terrain, and seasonal access, balancing with subsistence activities. Challenges also include seismic activity, vast weather systems, and difficult access to small communities, impacting tsunami outreach.

Vulnerable communities:

- Over 80 remote communities at risk.
- Coastal locations are culturally and economically vital.
- High EM turnover in small communities.
- Limited evacuation without external aid.
- Many vulnerable residents: elders, those with health issues, non-English speakers.
- Historical disaster impacts.
- Critical infrastructure vulnerabilities.

Data collection challenges:

- Limited existing geographic data (low resolution or historical only).
- High cost of remote deployment (e.g., sirens).
- Equipment must withstand harsh environments (salt, rain, waves, wind, extreme temps, bears).
- AEC hosts most monitoring equipment, often helicopter-accessed, using innovative power solutions for tsunami threat updates.
- Recently, Seldovia and Ouzinkie, AK Native communities, received TR certification.

Implementation strategies:

- Community-specific hazard maps.
- Local emergency planning integration.
- Training for community leaders.
- Public information materials.

Future directions:

- Expanding comprehensive hazard assessments to high-risk areas (SW and Aleutians).
- Considering weather-induced hazards.
- Enhancing public access to digital information.
- Cross-agency coordination (including universities, researchers) to break down silos.
- Continued technological innovation to move from vulnerability to resilience.

The 1964 earthquake impacted Anchorage at low tide, despite a 33-foot tidal range. Alaska has a robust amateur radio community, reporting to the SEOC, regularly exercised, and aiding during events. DHS&EM is expanding this program with the defense department due to current threats.

Anthony's work involves bi-annual rural AK visits, long-term planning with FEMA, paperwork, and outreach, including engaging children. Alaska is dynamic with constant needs.

Alaska has 12 sirens, with 2 more going to Cordova. Statewide, 42 sirens are available, some all-hazard and voice-activated. In rural areas lacking cell or NWR coverage, sirens can be the only warning. Outreach includes teaching natural signs of tsunamis, which resonates with native traditions.

Alaska Tsunami Hazard Mapping Projects - Dr. Elena Troshina, University of Alaska Fairbanks

Alaska faces a unique and significant tsunami threat due to its active plate boundary and glacial fjords. The 1964 earthquake, where 92% of fatalities were tsunami-related (76% from local landslide tsunamis), highlights this risk. Beyond Barry Arm, 40 more landslide-prone areas need study. Alaska experiences 45,000 earthquakes annually, with many vulnerable communities in subsidence areas.

Globally, unrecognized tsunami hazards have led to devastation (e.g., 2004 Indian Ocean, 2011 Tohoku). In Alaska, there's concern the younger generation is forgetting 1964's lessons. Culturally appropriate communication is vital; a totem pole example showed a "volcano lady" symbolizing an eruption and tsunami.

Over 60 community-specific tsunami hazard maps exist in Alaska. NTHMP-funded efforts provide online evacuation zones and brochures. FEMA-funded initiatives include the Alaska Tsunami Hub (tsunami.alaska.edu), offering comprehensive information for communities like Valdez and Anchorage.

Future challenges include: constraining probabilistic scenarios, fostering generational tsunami knowledge transfer, prioritizing efforts with limited resources, and inventorying potential tsunamigenic rock failures and underwater slides.

Specific concerns:

- **Communicating with Children:** Speak of waves as "filled with junk" not scary.
- **School Access:** Email science teachers, cc principals.
- **Landslide-Generated Tsunamis:** USGS and DGGS map these. A new NTHMP program (with potential funding) addresses submarine landslide risk, exemplified by Puerto Rico's Landslide-Ready program, using HF Radio and smart cables for detection.
- **Anchorage Maps/Tidal Range:** Maps use Mean Higher High Water (MHHW), plotting static and dynamic tidal variances for Anchorage's 33-foot tidal range.

Status Update: National assessment of average annualized losses to tsunamis in the US - Dr. Nate Wood, USGS

- Calculating Average Annualized Losses:

- 1) Population vulnerability of residents, employees, and cruise-ship passengers to tsunami hazards of islands in complex seismic regions: a case study of the U.S. Virgin Islands (journal, published March 2025)
- 2) National assessment of population exposure and evacuation potential to earthquake-generated tsunamis (journal, published April 2025)
- 3) Estimated annualized tsunami losses for the United States (FEMA report, in USGS review)
- 4) Variations in estimated annualized building and population losses from earthquake-generated tsunamis in the United States (for journal, in preparation)

MRPWG Update: Elyssa Tappero, Ethan Weller, Nick Graehl

- 4 main subgroups
  - Communicating PTHA and other Hazard Products
    - Looking for a new lead for this subgroup (since Corina left) and the other subgroups as well
  - Funding Strategies Group
  - Tsunami Maritime Mitigation and Guidance
  - Tsunami Debris Recovery Planning
- WA updates
  - Tsunami Wayfinding Guide is now complete
    - Methodology used for Wayfinding Project – outlines the process for completing tsunami wayfinding for local/tribal communities and getting tsunami signs into the ground
    - Will be posted on EMD's website soon
    - Open to feedback and other resources for updates to share with our locals
    - Questions involved nighttime considerations, balancing local jurisdiction concerns (property values, tourists, etc.), and the process of tiering the signage
  - Two Maritime Response and Mitigation Strategies published
    - Neah Bay and Eagle Harbor (City of Bainbridge Island)
    - https://mil.wa.gov/tsunami#education
    - In progress with Port of Port Angeles (expected completion early fall)
  - Boater's Guide reviewed by USCG District 13 with minor edits
    - Will be posted on same section of website as maritime strategies above
  - VES efforts
    - Dante has shifted to a VES Project Manager role – helping communities through the BRIC application process
    - All projects have essentially been put on hold
      - Ocean Shores, Long Beach, Westport
    - Jon Allan asked if, given the current economic climate, there are efforts to identify refuges of last resort within communities
      - Elyssa mentioned that this would be a great discussion for a VES/evacuation subgroup to discuss moving forward
    - Christa highlighted efforts to bring VES to the Caribbean area, given that there is a need for extensive parking – parking garages have been discussed
    - Elyssa mentioned that any updates to funding or to the VES process will be shared during future meetings
- CA updates
  - Tsunami Modeling and Mapping Guidelines and Best Practices document available on MRPWG's website
    - This is the MMS guidance document previously completed (and now available for download)
  - Wayfinding
    - Lesson learned: the 429 suggested signs were not ranked by priority placement
  - Updated Harbor Improvement Reports with multi-hazard engineering assessments
    - This tool, in conjunction with PTHA maps, are aiming to inform local decisionmakers as a land-use planning tool for future development.
  - Tsunami BCA Workgroup
    - Toolkit does not currently have tsunami involved (although BCAs are required for VES projects)
    - Workgroup paused for the time being
- OR's Tsunami Debris Guidance document is available on their website
  - 2025-Tsunami-Debris-Technical-Guide.pdf
- Elyssa highlighted that both EM and science partners are welcome to attend MRPWG meetings – discussion can focus on recovery or mitigation topics
- Liz Vanacore is hoping to get some more non-West Coast participation in MRPWG
  - Elyssa highlighted that most MRPWG work has been WA, CA, and OR, and that other partners' participating in meetings would be able to lead to better and deeper discussions with perspectives from other jurisdictions

Island Caucus Meeting - Facilitated by Chip Guard:

1. Welcome, Introductions of new members.
   a. Note: Since time is so short, it would be great if each Island jurisdiction could provide a few written paragraphs for items two, three and four. Even 5 minutes per island will take up two-thirds of the meeting time. Then, each island--American Samoa, CNMI, Guam, Hawaii, Puerto Rico, and the US Virgin Islands--can take 5 minutes to highlight its top items or issues regarding the tsunami program and TsunamiReady.
2. Effectiveness of the implementation of TsunamiReady at your island.
3. How you overcome the Challenges you face as an Island with the implementation of Tsunami and TsunamiReady Program. Consider items such as:
   a. Funding
   b. Minimum personnel
   c. Siren program
   d. Signage program
   e. Modeling
   f. Stress "sea-level rise"; it doesn't have to be tied to Climate Change.
4. Creative solutions that you use in your communities to assist in tsunami preparedness.
5. Planning ahead with programmatic funding "What if's":
   a. When you return to your island, consider running through some budget "cut drills" for possible program reductions: 10%, 25%, 35%, 50%, 75%. What would your program look like if these reductions were enacted? Impacts? Something to think about, talk over, and put on paper ahead of time.
6. New Business

a. Vote for new co-chair (to replace Wildaomaris) Regina Browne, USVI nominated and approved. Will add to CC for final approval.
b. Any other items?

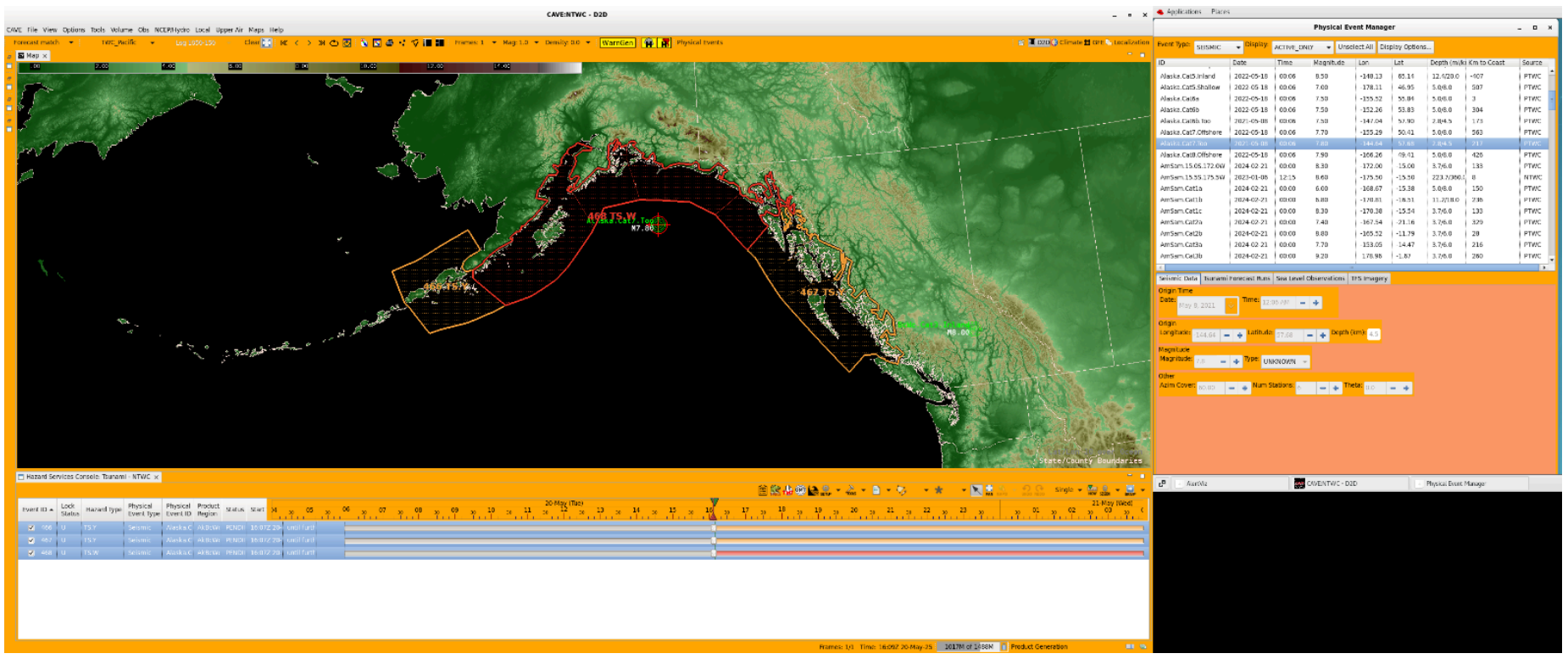
7. Closing
    a. Thanks to Maximillian and Ethan for the Multi-phase Project: Deep Dive into Tsunami Alerting Timelines and Gaps, Needs and Challenges.
    b. Thanks to Anne and Casey of the FEMA team and Dr. Nate Wood for work on the Tsunami inputs for the National Risk Index.
    c. Thanks to Anthony , the Alaska team, and Sarah for setting up this meeting.
    d. Any further comments?
    e. Motion to close the meeting.

Tsunami.gov update

- The new Tsunami.gov version 2.0 will launch in Fall 2025.
- The update focuses on a user-centric design for better understanding during alerts.
- Key improvements include real-time alerting, a history tool, and informational resources.
- The new site aims to reduce confusion and improve confidence for users.
- Future developments will incorporate social science findings and language support.

AWIPS Tsunami Operations Messaging System (ATOMS) Project Update - Chris Popham, NTWC

- ATOM Goals:
    - Provide a consistent IDSS, product generation, and dissemination capability to the Tsunami Warning Centers
    - Based on the Advanced Weather Interactive Processing System (AWIPS), it will be centrally managed and maintained along with the AWIPS systems currently deployed throughout NWS
    - Fundamentally enhances each center's back-up capacity / TWC redundancy.
    - It will provide a consistent foundation for future expansion to the current capabilities of the TWCs
- Where we are:
    - “ATOMS 1.0” - First Step is to recreate both centers current capability
    - Intent is that changes & Partner requests will be EASIER to accommodate.
        - But not happening with this phase
    - Testing currently happening at both centers.
    - Initially looking at product formatting and Procedural Accuracy
    - Forecast incorporation and subsequent messaging will be tested next.
- This is NOT TOPS:
    - GSL has been an excellent group to work with, very responsive and collaborative.
    - Updates every couple weeks based on previous week’s observations
- ATOMS Environment



Wednesday, May 21, 2025

MES Update - Nic Arcos, Stephen Cahill

- Key highlights by region:
  - **Alaska**: Faces the highest tsunami risk in the U.S. due to its extensive coastline and history of devastating tsunamis. The program provides crucial funding for sirens, mapping, research, and education. Key achievements include new inundation maps for Cook Inlet and the Seldovia Village Tribe achieving TsunamiReady certification. Challenges include funding uncertainty and the increasing risk of landslide-tsunamis.
  - **California**: Features an overview of the California Tsunami Program, including a simulated offshore Cape Mendocino Tsunami Warning scenario (December 2024) highlighting WEA messages, exercises, drills, and evacuation signage. There was high participation in Tsunami Preparedness Week activities registered on TsunamiZone.org.
  - **Guam**: Discusses new inundation modeling for Northwest Guam, extensive outreach efforts through community events, hotels, and schools, and the operational status of the All Hazards Alert Warning System (AHAWS) network. New outreach media featuring "Tsunami McKenna" aim to educate the public on safety and alerts.
  - **Hawaii**: Showcases the Hawaii Tsunami Ambassador Program, including interactive presentations at the Pacific Tsunami Museum and a "Tsunami Summer Jam" event. It also highlights the 2025 Tsunami Preparedness Video and broad agency involvement in tsunami awareness month.
  - **Oregon**: Details projects like coastal roadshows, participation in Girl Scouts STEM Day, and training for employees. The state is also developing guides for tsunami debris planning and vertical evacuation structures.
  - **Washington**: Presents updates on projects such as the second edition of the WA Tsunami Vertical Evacuation Structures Manual, new pedestrian evacuation walk maps, and tsunami sign installations. It also mentions ongoing maritime projects and educational outreach.
  - **American Samoa**: Focuses on outreach programs, including in-person drills and digital billboards, as well as siren rehabilitation and repairs. It also highlights the creation of tsunami evacuation maps for coastal villages and displays for schools.
  - **Puerto Rico**: Celebrates the first TsunamiReady Supporter Marina and the San Juan LMM International Airport becoming the first airport in Puerto Rico (and second in the U.S.) to receive TsunamiReady recognition. The document also details the significant participation in the Caribe Wave 2025 exercise, including a statewide emergency alert systems test.
  - **U.S. Virgin Islands**: Launched a new PSA and outreach campaign featuring "Alfred the Leathery Turtle" and conducted a social science-driven tsunami awareness survey. They also expanded the TsunamiReady Program and improved tsunami alert level education.
  - **Commonwealth of the Northern Mariana Islands (CNMI)**: Highlights education and outreach activities at schools, participation in the Great ShakeOut Earthquake Drill, and the completion of the Tsunami Alerting and Response Timeline document with assistance from Chip Guard. Regular maintenance of tsunami signage is also emphasized.

MMS Update - Jason Patton, Liz Vanacore, Hannah Rabinowitz-Pratt (remote)

- **NCEI/DEM Development:** Elliot Lin from NCEI/University of Colorado provided an update on the completion of 1/9" and 1/3" DEM tiles for the US East Coast and US West Coast, embedded in coastal relief models. Discussions focused on datum adjustments (NAVD88 vs. MHW/MHHW), the challenges of combining datasets with different resolutions, and the need to improve VDatum for NTHMP. NCEI is open to receiving custom DEM data from collaborators.
- **Benchmarking Workshop (BMW):** Stephan Grilli highlighted the need to update tsunami benchmarks, as the last workshop was in 2011. A two-stage approach is planned, with initial funding sought for planning (approx. $15k each from Allan and Grilli's FY25 proposals) and an estimated $50k-$70k needed for the workshop itself. The goal is to develop more realistic models and address uncertainties, with interest from groups like ASCE for building codes. The importance of versioning for benchmarks was also discussed.
- **Landslides:** Stephan Grilli presented his work on landslide-generated tsunamis in the East Coast and Gulf Coast, including a published paper on 12 sources for the East Coast PLTHA. He discussed methods for simulating large and smaller volume landslides and their application in places like Palu. The potential for applying these methods elsewhere, training future modelers, and the need for existing landslide databases were discussed.
- **PTHA (Probabilistic Tsunami Hazard Assessment):** Stephanie Ross provided an update on the USGS Powell Center Tsunami Sources project, prioritizing OR and WA. The PR NSHM is now incorporated into PTHA, and a paper on the Pacific (non AASZ, non CSZ) workshop has been published. A 7th workshop is planned for spring 2026, pending funding. There's a strong emphasis on capacity building and restarting PTHA training. The integration of NSHM with offshore sources, particularly for the US West Coast, was highlighted as a key area for future collaboration.
- **Project Proposals:** Jason R. Patton proposed an MMS-supported project to conduct probabilistic Sea-Level Rise tsunami modeling for California using Pat Lynett’s Celeris tool, including a tutorial and training. Concerns were raised about unqualified users, but Patton emphasized that similar issues exist with other tools like GeoClaw. The group suggested Patton and Lynett develop a white paper and formal summary for future review and voting once FY25 funding is available.

WCS Update - Dave Snider, Maximilian Dixon, Chip McCreery

1. (Dave) Follow-up Tsunami Warning Center Service Questions (follow-up from Monday NWS Program Update, Tsunami.gov topics, if any).
2. (Chip, virtual) PTWC minor language changes in domestic products
3. (Dave/Chip) Follow-up discussion for 12/05/24 CA/OR Warning and 02/08/25 Advisory in the Caribbean (02/08/25)
    a. California proposal for WEA wording changes

WA Deep Dive Discussions - Maximilian Dixon, Ethan Weller, Elyssa Tappero, Tyisha Brown El