NTHMP Mapping and Modeling Sub-Committee
Meeting Minutes for April 27-29, 2009

Meeting began at 1:30 PM Monday, April 27, 2009

Members in attendance:

Susan McLean (NOAA Co-chair)
Rob Witter (Oregon, Co-chair)
Rick Wilson (California)
Tim Walsh (Washington)
Juan Horrillo (Gulf of Mexico – Texas)
Lisa Taylor* (NOAA – DEM Project)
Aurelio Mercardo (Puerto Rico)
Bill Knight (NWS –WCATWC)
Vasily Titov* (PMEL)
Barry Eakins* (NGDC)
Jim Kirby (East Coast States – Delaware)
Dmitry Nicolski (Alaska)
Rod Combellick* (Alaska)
Aggeliki Barberopoulou *(California)
Megan Craw (Hawai'i)
Joseph Zhang* (Oregon)

* denotes non-voting member/guest

Monday, April 27, 2009
Purpose: NTHMP member presentations – Perspectives on mapping and modeling guidelines
Introductions, opening remarks, and review of the agenda.

Dmitry Nicolski (for Roger Hansen), Alaska (key issues):

- Community based approach
- Products: inundation lines, flow depth, flow velocity, drag force, historic field data
- Each community requires a specific set of sources (1964 is key).
- Use ArcGIS database technology
- Converts to KML files for use with Google Earth as education tool
- 1 arc-sec grids, 60 Gb/ model run
- Impressive modeling interface to supercomputer, potential shared use

Rick Wilson, California (key issues):

- Maps for emergency response planning not land use
- Sources: emphasize "credible worst-case scenarios," 25 distant and 25 local sources
- 90 m and 30 m DEMs used for modeling; 3m to 5m on-shore DEMs used to enhance inundation line location
- Inundation lines are revised through field inspection and checked with end users
- Working with local outreach groups, e.g., Redwood Coast Tsunami Working Group on releasing new maps
- Future work: 1) is there a need to use higher res DEMs to map inundation? 2) Creating a tsunami source database; 3) Use empirical/geologic data to check inundation lines; 4) Exploring ways to develop land-use planning tsunami maps
- Considerable discussion on intent to collaborate with ODOT/URS to develop probabilistic tsunami hazard maps.

Jim Kirby, Atlantic / East Coast (key issues):

- No established prior practice for tsunami studies for East coast
- NGDC DEMs are becoming available
- FEMA does storm surge modeling and mapping, work is contracted out to ACOE or private firms
- Jim suggests that we might gain from a presentation by FEMA on how storm surge maps are developed
- Cautioned that 10 m horizontal resolution DEMs not precise enough for resolving important features (e.g., dunes, waterways, jetties, etc.)
- Many "storm surge" maps on east coast are known to be horribly bad
- Several areas are being remapped by FEMA using ADCIRC
- SLOSH is used for forecasting (known to be inaccurate compared to actual storm surge)
- Need to resolve small features and waterways

Megan Craw, Hawai'i (key issues):

- Max credible scenarios for Hawaii are the five largest trans-Pacific tsunamis that have hit Hawaii historically
- Hawaii tsunami review panel helps Megan and others evaluate what sources to evaluate
- Compare modeled runup to historical runup records
- Evacuation zones meet or exceed runup from historical records
- Should we recommend a flow depth threshold (i.e., FEMA indicates damage is negligible under sustained flow less than 1 ft)?
- Progress on Big Island – only mapping populated areas
- Unpopulated cliffy regions – maybe address these areas with general statements at beach/bluff access points
- How do you define "worst-considered scenario?"

Rob Witter, Oregon (key issues):

- Three map products: (1) maps of tsunami inundation zone produced in 1995 restricting new construction; (2) tsunami hazard maps for 10 communities; and (3) tsunami evacuation maps for 23 communities.
- New evacuation maps designed for people with color/vision disabilities
- Map development team of 3: tsunami modeler, earthquake deformation modeler, geologists
- Local source (Cascadia subduction zone) large consideration
- Dynamic Coulomb Wedge Theory (Wang & Hu, 2006) describes a velocity strengthening behavior of outer accretionary wedge that imposes an updip limit on slip, which decreases towards the seafloor, and accretionary wedge splay faults can be activated
- Megathrust geometry and frictional behavior on deformation is key for reproducing tsunami waveforms
- Presented list of best practices as input for guideline development – used in Tuesday's workgroups

Aurelio Mercado, Puerto Rico (key issues):

- Original maps supported by FEMA

- Inundation considers the maximum of the maximum tsunamis
- Raised an important question on whether it is appropriate to include buildings in DEMs, or just use “bald earth” DEMs for modeling?

Juan Horillo, Gulf of Mexico (key issues):

- Storm surges are much more complicated than tsunamis
- Adopt some methods and techniques for flood hazard mapping for hurricanes
- Assess need for flood hazard mapping, assign priorities
- Tsunami generation mechanisms important

Tim Walsh, Washington (key issues):

- Legacy maps – inherited Cascadia sources from Priest and others in mid 90s
- Investigating ways to develop probabilistic tsunami maps
- Concentrate on tsunami sources, use paleoseismic info
- Focusing on Tacoma and Seattle faults and landslides

General discussion and summary of key points
Meeting adjourned 6 PM

Tuesday, April 28, 2009
Purpose: Develop draft NTHMP guidelines for inundation modeling and mapping
8:00 AM: Opening remarks, review of agenda and summary of yesterday’s discussion

Bill Knight, NOAA-WC/ATWC

- Objective: monitor seismic activity and sea level; 450 seismometers
- Persistent change in shoreline caused by coseismic vertical deformation should be anticipated and perhaps incorporated into maps
- Alaska concerned with local sources - changes in bottom friction, channel cross-sections, subsidence leading to additional flooding and its subsequent rebound
- Perspective on grids – 15 arc-sec, 3 arc-sec ,46 forecast warning points
- WCATWC is not focused on inundation, rather emphasis is for forecasting tsunami warnings for the 46 points in Washington, Oregon, California

Vasily Titov, NOAA-PMEL

- Real time forecast – event specific, real-time assessment, impact assessment before tsunami arrival
- Long-term forecast – site specific, probable maximum tsunami, multiple scenarios for Probabilistic Tsunami Hazard Analysis (PTHA), comprehensive hazard assessments
- Need to define quality controls for the different long-term vs. real-time products
- Question: is long-term forecast a redundant product?
- CRITICAL QUESTION: What happens when the real-time forecast exceeds the evacuation zone?

- Long-term forecast is necessary for emergency planning – both real-time and long-term are complementary
- Implications for guidelines:
    - Define goal – create inundation/evacuation map
    - Define source requirements (probabilistic level)
    - Define accuracy requirements -10 m DEM, model standards
    - Define product requirements – GIS products, paper maps
    - Define update schedule (shelf life of maps)
    - Guidelines should emphasize MINIMUM REQUIREMENTS

Barry Eakins, NOAA-NGDC

- Guidelines for DEM development:
    - Data availability
    - Desired DEM boundaries
    - Future surveys
    - Data resolution
    - Vertical datum requirements
- Vertical datum is an issue – how far inland is it necessary to project tidal datum in DEM?
- What are impacts of DEM variability on tsunami modeling?
- Can tsunami models capture uncertainty in DEM elevations?

Open discussion/brainstorming: Tsunami mapping guideline framework
Topics covered:

- Define inundation map purpose: tool used (by small, specific audience) to develop evacuation zones
- Use bathy/topography to resolve coastline and coastline features where applicable
- Model each event to capture max inundation/runup
- Map levels/categories: distinguish between maps developed with extensive inundation mapping, high resolution calculations, and areas with limited or no data
- Emphasize minimum requirements and best practices
    - Specify source, modeling, technical parameters used to develop map
    - Information content of the map

Workgroup Breakout sessions (1:15 hours)

- Modeling workgroup: Sue, Joseph, Megan, Aurelio, Juan, Bill, Jim, Aggeliki, Vasily, Barry, Dmitry
    - Focused on Minimum Guidelines and Best Practices section
    - 10 draft guidelines developed, final document requires additional work
- Mapping workgroup: Rod, Rick, Rob, Tim, Lisa
    - Draft Guidelines and Best Practices developed; final document requires additional work
- Draft documents presented to full group
    - Made wording corrections
    - Suggested missing guidelines

    - Looked for overlap between groups
- Meeting adjourned 4:30 PM for group hike and dinner

Wednesday, April 29, 2009
Purpose: Prioritize DEMs for inundation mapping
8:00 AM: Summary of workgroup guidelines; review of agenda and the day's objectives.

Open discussion: Added guideline for map review, revision and update: when any of the following occur:

- New tsunami event occurs
- Every 5-10 years
- New data becomes available (high resolution bathy/topography, paleo data)
- Significant development in modeling technology becomes available
- Unconsidered source is discovered
- Dependant on resources available

Prioritized communities for inundation mapping

- Developed spreadsheet listing DEM priorities for 9 states/regions

Barry reviewed CIRES travel voucher/claim process

Barry Eakins, NOAA-NGDC: NTHMP DEM Portal [NOTE: Approved portal now live at: http://map.ngdc.noaa.gov/website/mgg/nthmp/]

- Purpose of the map viewer is to provide a single source where the extents and basic information related to completed and planned or needed DEMs can be shared and viewed
- Catalog only – data not available for download through current system
- DEM delivery (jsp), tsunami inundation grid products (GOS, GCMD)
- Database management – oracle spatial tables
- Do we need additional information or capability?
    - Identify communities, availability / status of inundation maps
- Should DEM's developed by PMEL prior to 2006 as "restricted to NTHMP" be released to the public?
    - Yes, unless proprietary information restrictions – states will double check

Final topics addressed:

- Reviewed Draft Guidelines
- Brainstormed possible contingency funding ideas
- Reviewed Action Items
- Outlined next steps:
    - Review team to finalize draft guidelines (web conference / teleconference). Volunteer team includes: Sue, Rob, Megan, Dmitry, Tim and Rick
    - M&MS follow up meeting (web conference / teleconference) – define purpose of fall meeting

Group photo

Meeting adjourned 4:30 PM

Figure 1 NTHMP MMS Spring 2009 Attendees