

NTHMP Mapping and Modeling Sub-Committee
Meeting notes for 11/18/08

Meeting began at 8:30 AM Tuesday 18 November

Round table introductions – attending:

Eddie Bernard (NOAA Research)
Susan McLean (NOAA Co-chair)
Craig Kohler (NOAA DART)
Rick Wilson (California)
Rob Witter (Oregon)
Roger Hansen (Alaska – Co-chair)
Tim Walsh (Washington)
John Schelling (Washington – EM)
Juan Horrillo (Gulf of Mexico – Texas)*
Lisa Taylor (NOAA – DEM Project / minutes)
Aurelio Mercardo (Puerto Rico)
Paul Whitmore (NOAA – TWC)
Jim Kirby (East Coast States – Delaware)*

Review and approval of minutes from September sub-committee meeting.

Minutes, Report to Coordinating Committee, Benchmarking Recommendations, and Terms of Reference with members as a separate file were all approved as final and will be posted to the NTHMP Web site (Action: McLean).

Review the CC action items.

Actions will be posted on NTHMP Web site (Action: McLean) and tracked by co-chairs.

Outstanding actions include States providing list of inundation mapping products (Puerto Rico – contact Christa von Hillebrandt-Andrade; Atlantic States – new member Jim Kirby; Gulf States – new member Juan Horrillo)

Agreed on the focus for the next M&M Sub-committee meeting (Boulder, TBD):

Development of guidelines and best practices for tsunami inundation map products

National prioritization of DEMs supporting inundation mapping

Note: see minutes for afternoon discussion with subset of MMS members

Review of the MMS spreadsheet Action items:

➤ Model Benchmarking

Rob Witter reminded team that only Joseph (OR) has commented on the PMEL Web site to enable benchmarking of models so far. Additional comments needed.

Paul Whitmore talked to Chris Moore, no comments sent, but concerns being addressed.

Roger Hansen talked about data available on website, not complete; PMEL needs more information from modelers.

Rob: PMEL website should link to NTHMP site (and visa-versa)

- NTHMP DEM inventory
 - Sue McLean mentioned we still need footprints of completed DEMs
 - Barry sent out email requesting information, not all available. Need PMEL regional grids to add to the viewer. Need Washington and California extents. Any other states?
 - Tim Walsh: OGI finite element models were sent to PMEL.
 - Eddie responded this was several years ago and PMEL does not have original DEMs and suggested that if required, WA go back to OGI to see if they have the originals.
 - Tim responded this was a dead end.

- Scoping Archive Requirements for NTHMP: Inputs/outputs and volume for products (what is out there that we should be preserving?)
 - Rob- When do we send materials?
 - Sue-Determine file sizes and formats first.
 - Rob- Can only provide estimates on what has already been produced.
 - Aurelio: How about maps produced with FEMA funds?
 - Roger/Sue- Yes, include these

- Action #11- database for tsunami sources with on-line sharing
 - Rick (CA) put a document together describing the effort and options to host site to share and discuss sources for all NTHMP (in CA funding proposal – other States represented on MMS encouraged to support).

 - Eddie questioned if this was to include all sources and Rick responded yes, with initial focus on California (already started). Eddie questioned if this included mega thrust with asperity?
 - Outstanding questions on how / if we “validate” sources or provide forum to discuss and foster consensus.

 - Rick-This is to provide a place for discussion, validation is not our job, but we can get a feel for what is valid. (ACTION: Rick - distribute the document to the group)

- Action #13- ComMIT. Subcommittee decided that it would discuss this later

- Review the NTHMP draft map DEM viewer:
 - Internet connection/server issues made it difficult to view online map viewer.
 - Discuss the utility of the viewer and how to improve it.
 - Roger: Alaska needs data, can this be used to improve data collection collaboration? What can we (M&M) do to better coordinate and influence?

Modeled after the NGDC DEM Discovery Portal, the draft NTHMP map DEM viewer is designed to assist the MMS with efforts to prioritize DEM development and show the availability of existing data.

NOAA draft online documents

NOAA Tsunami Strategic Plan, Hazard Assessment, and Data Management Plan documents are (finally) being printed and will be available on-line through NTHMP Web site with limited hard-copy distribution.

NTHMP Draft Strategic Plan. Milestones impacting MMS:

- Establish inundation map guidelines by 2009.

Rob: What is the relationship between inundation map development and DEM requirements (already submitted by most States)? The group is looking forward to the input from the new east coast representative.

Sue: Since the East coast has only one representative (Jim), he will need to look at the region as a whole and communicate with the other states to pull together priorities. In addition, the region and the MMS need to consider what best practices are in areas with low tsunami hazard, but high coastal inundation hazard such as the East and Gulf Coasts. How can hurricane mitigation activities benefit from tsunami mapping – and visa-versa – in the Gulf and East coast areas? Co-chairs encourage our newest members to plan on attending the 2009 MMS meeting (date TBD).

Paul: MMS should keep in mind that the inundation priority list will drive the DEM priority list

Aurelio: Do FEMA standards automatically satisfy NOAA standards? Sue: Keep in mind that the standards NGDC uses to develop DEMs for NOAA are specified by the SIMs, based on research done by Vasily. DEMs developed by NGDC for AK are to standards specified by AK.

Eddie: There is a difference between measurement standards and derived product (DEM) standards. Hurricane studies (FEMA?) require smaller scale DEMs (1 km resolution) than needed for tsunami. Maybe the standards should be examined so government has only one set of standards (FEMA and NOAA share the same standards). Possible action for MMS.

- All NTHMP funded model code shall be open source by 2010.

This topic engendered spirited discussion, some of which is captured here. MMS will need to define exactly what is required to meet this milestone and get approval from the CC on the definition and action plan. There may be costs associated with implementation that need to be well defined and addressed.

Eddie: OGI study...big expense.....Don't think it can be done

Rob: What do we mean by open source (i.e. SELF code used by OR is available)? What is your definition of open source?

Aurelio: SWAN is a good example; it is well referenced.

Eddie: What does it cost per year to maintain SWAN? If we go this route we will have to budget for it.
Roger: Codes developed in AK are all open source.
Jim: Difference between providing code and documentation and continuously updating the code.
Paul: Read the strategic plan. Code is available to someone else to look at; I do not believe we are talking about the SWAN approach.
Eddie: Recommended changing the language from 'open source' to 'share'.
Roger: I feel strongly that we keep 'open source'.
Eddie: There are legal implications (implicit liability) with distributing "open source" code. That's why the act requires validation of the model.
Rob: Oregon's current model (SELFE) is benchmarked and tested
Eddie: research mode- not operational
Paul: 'Open source' does not affect liability issues
Roger: Law does not specify 'open source'

Review of items from September

- Sue presented a first draft of 1 page document "Enabling Tsunami Community Modeling" describing options NOAA is exploring for sharing MOST. The document describes the pros and cons of four options along with general resource impacts. This document is currently under review and revision within the NOAA Tsunami Program, but comments are welcome from the NTHMP MMS.
 - Rob: Question on availability of MOST code: How does this apply to NTHMP and how does it apply to the rest of the tsunami community? MOST is shared with only some modelers, not all modelers in NTHMP.
 - Eddie: Lots of papers published using the MOST model. He can't comment on everything that appears in print. We have tried to keep the benchmarked model as restricted as possible. When someone refers to MOST, it is a generic term and not necessarily the current validated version. The best way to allow access to MOST is through ComMIT, which is maintained by PMEL.
 - Auerlio: Australia only uses the propagation code from MOST. If ComMIT has the propagation code, we would have everything we need, and would not need the FORTRAN code. It would be ideal if ComMIT would allow you to enter your own source (not just the precomputed sources).
 - Eddie: The spectrum money may fund the web-based access to the model through ComMIT. ComMIT is the best way to make the code available.
 - Aurelio: The most difficult challenge in using the model is preparing the grid so the model won't blow up.

Voting Members Only:

- Discussion centered on funding proposals, brief-out, and membership.

Sue briefed the MMS funding for 2008 (\$26,260) and discussed funding left over (\$11,827) to partially fund a DEM workshop (insufficient to fully fund workshop) or to support a 2009 MMS meeting in Boulder (members

and modelers similar to September 2008). A poll was taken to determine the interest level in a DEM development workshop in Boulder, separate from the MMS. OR, East Coast, Gulf Coast, CA, expressed interest, with special interest in figuring out how to splice new LiDAR data into existing DEMs. Alaska indicated they have interest, but not as strong as before since NGDC is building their DEMs. Aurelio suggested including ADCIRC, which was supported. Recommendation is to have the GIS experts meet the week preceding the MMS meeting. (ACTION: if funded, Sue to organize meeting)

- The MMS brief out was reviewed, modified, and approved. The modifications indicate the 2009 MMS meeting would focus on
 - (1) Developing guidelines and best practices for inundation maps and products
 - (2) Prioritizing inundation mapping areas/DEMs

- Leveraging / Coordinating Data Collection: Tim would like to know what we (NGDC/NOAA/NTHMP) do to leverage data collection resources, such as USACE, and how we can improve access and coordination with groups like the Pudget Sound Lidar Consortium. NGDC is already working with the USACE to obtain data and informing them of data needs. This is also true with NOAA/NOS and we hope to expand on this through such activities as the Integrated Ocean Coastal Mapping Program and the California Seafloor Mapping Project. Aurelio said Jim Suggs (USACE) may know of what lidar is planned and underway. States were asked to send their priority areas for inundation mapping. NGDC can look at what data currently exists and identify the poorest data areas. Tim indicated that we need to facilitate more transparency to leverage resources. Rob questioned whether or not other groups, such as NOS / USACE / USGS, could use the NTHMP DEM viewer to plan surveys. This is possible, since the viewer is public.

- Co-chairs need to look at the subcommittee list of actions for 09 and ensure they reflect and support the Strategic plan items:

Discussion regarding applicability of forecast efforts

How can we better leverage....Not currently working with communities and states.

Roger: Needs to be driven by the states.....DEM priorities based on forecast needs not integrated with community needs. Greater impact if there was more input from the states. Source scenario (states); can states use results of forecast efforts?

Eddie: Worked with WA

Tim: This work was funded outside of forecast modeling

Rob: Suggest word smith into last bullet (ComMIT).

Sue edited the last bullet: A better understanding of the PMEL forecast modeling process (e.g. CommMIT).....

Other Business:

- NTHMP Chair tasked subcommittees with reaching a reasonable number of representatives to enable action on milestones. Recommended make-up is 10 members. MMS currently has 12 planned (2 vacant) and felt this was a reasonable composition.
New members of the MMS:
 - Jim Kirby, University of Delaware, represents the East Coast – including FL
 - Juan Horrillo Texas A&M University represents the Gulf Coast States.Vacancies remain for the US Virgin Islands and Pacific Islands. Recommend that the representative from Puerto Rico coordinate with the USVI for MMS issues and the representative from Hawaii do the same for the Pacific Island States.

- Rotation of co-chair:
 - The MMS discussed current composition and terms of reference calling for rotation of chairs on alternating years.
 - Sue indicated she will rotate out next year and suggests replacement with warning center person or Lisa from NGDC. The group determined that we should maintain the planned rotation for the co-chairs to avoid rotation of two chairs at the same time next year.
 - Roger recommended we nominate someone to replace him. Sue and Roger recommended Rob Witter (OR).
 - Rob accepted and Roger will make the recommendation to the CC. Roger will stay active on the committee.
 - The MMS thanked Roger for his efforts over the last two years and expressed appreciation for his willingness to reinvent and reinvigorate the MMS.

- Eddie announced that the labor of love, ‘The Sea’ by Eddie Bernard and Allan Robinson is now published. It includes a variety of tsunami articles with an emphasis on forecasting. Can order now on-line from:
www.hup.harvard.edu/catalog/BERTSU.html

- Afternoon meeting will focus on refining the topics and agenda for 2009 MMS meeting.

- The meeting adjourned for lunch at 11:30.

Minutes, Afternoon session: 1 pm – 5:00 pm

Members in attendance:

Roger Hansen (AK), Juan Horrillo (TX – Gulf States), Aurelio Mercado (Pto Rico),
Tim Walsh (WA), Rick Wilson (CA), Rob Witter (OR)

Purpose of afternoon session was to discuss two topics:

- (1) Guidelines and best practices for tsunami inundation mapping
- (2) Prioritization of DEM development

Topic 1 – Guidelines and best practices for tsunami inundation mapping

The group briefly discussed the different components involved in developing tsunami inundation maps. Components distinguished include:

- (1) inundation modeling
 - a. computer code
 - b. benchmark procedures
 - c. validation
 - (2) preparation maps
 - a. tsunami source models (earthquake source)
 - b. inundation maps (hazard maps)
 - c. evacuation maps
- There was some uncertainty within the group about the extent to which the action item addresses modeling guidelines and best practices as distinct from guidelines for mapping. However, there was general consensus that all map products should include statements that clearly define the assumptions used in models, what grids were used, input specifications and data, etc.
- A proposed approach to develop guidelines for mapping would differentiate methods of tsunami inundation mapping by level of detail, from simple to more sophisticated. For example, the following array begins with simple methods like delineating elevation contours and progresses toward more detailed mapping that includes sophisticated models:
- Method A – Inundation maps that depict flooding up to a particular topographic contour determined from historical data (e.g. measured runup or flow depths from post-tsunami surveys)
 - Method B – Map inundation along a contour determined from simple engineering models that estimate wave elevation at the shoreline (using propagation modeling vs. inundation modeling).
 - Method X – Maps developed from sophisticated numerical inundation models that depict multiple tsunami inundation scenarios, flow depth, flow velocity, time histories, etc.)

- Method Y – Probabilistic tsunami hazard assessment (there was some question whether this method has been appropriately applied to inundation mapping. It's not clear what the results mean).
- Number of methods described would be limited to general overview of most common approaches.
 - Rick Wilson suggested that we include model inputs like sources and DEMs under the mapping guidelines because they are inputs to the process, outside the models and their codes. These inputs should be evaluated and chosen by both the modelers and the "mappers."
 - Other ideas about guidance included: the critical importance of subjecting inundation maps to review by end users, particularly evacuation maps for life safety; and all maps should be accompanied by some form of explanatory material or technical report that describes the mapping and modeling methods, findings and recommendations.
 - The group also discussed the feasibility of devising appropriate grading, rating or standards for inundation maps. Some expressed concern that such a grading or rating system should not leave an impression that certain types of maps are "bad" or poor quality and other maps are "good" or high quality. Instead, developing guidelines for different methods as described above could potentially result in high quality maps derived through different mapping techniques. The different techniques used should be determined by level of risk, the availability of data and resources, and other considerations.

Topic 2 – Prioritization of DEM development

- DEMs developed by NGDC are used as grids for tsunami modeling and are generally developed according to the specifications of the MOST model for tsunami forecast and warning applications by PMEL.
- NGDC plans to complete development of 75 DEMs for U.S. coastal areas by 2014. The task put to the M&M subcommittee is devising a way to prioritize the remaining DEMs that have not been completed.
- Questions raised by the subcommittee:
 - (1) How do we ensure equitable prioritization among the various NTHMP partners?
 - (2) Are there opportunities to share data, methods, resources with the private sector pertaining to tsunami modeling for critical facilities like nukes and LNG terminals?
 - (3) Should we review the specifications for the DEMs? Are the current specifications useful for all model applications/users?

- (4) Should the planned DEMs be reviewed to avoid redundancy? We looked at many overlapping DEM footprints in the Puget Sound area that seem like they could be accomplished in one or two DEMs.
 - (5) Assuming we can come up with a way to prioritize the DEMs, if we identify some high priority areas that lack bathymetric data could we use the priorities to motivate acquisition of new data?
- The group asked Aurelio to explain the process of SIM development. Most of us were unfamiliar with SIM development, the spatial differences between the SIM and DEMs, and the resolutions of various optimized and other grids used for forecast and warning. Aurelio showed us two time series at the Garibaldi warning point, including output for a high resolution SIM and a lower resolution (optimized grid) SIM.
 - Juan suggested exploring new models for overland flow like TUFLOW and FLOW2D used for tsunami and storm surge modeling. We also agreed that model domains should be sufficiently large to resolve effects of bathymetric features (e.g., Mendocino escarpment).
 - The group recommended a preliminary approach to prioritizing DEMs for the purposes of forecast, warning and inundation mapping by NTHMP partners. The approach uses a decision matrix that cross-correlates planned DEMs with SIMs, prioritized state communities, hazard, data availability and equitable distribution across all regions.
 - Actions:
 - (1) For the 2009 M&M meeting (yet to be funded), we propose that each member bring a representative example of an inundation map and technical explanatory materials for their region.
 - (2) Also for the 2009 M&M meeting, each member will be requested to present mapping methods they use and what guidelines/best practices they would recommend.
 - (3) In the 2009 M&M meeting or earlier (Feb meeting?) we need to finalize the benchmarking process. Suggest appointing a tiger team to take this on.
 - (4) Develop a master list of DEMs, associated SIMs and communities prioritized by NTHMP partners to use as basis for developing a decision tree.