

## ***Minutes of NTHMP M&M Subcommittee Meeting***

***September 9-11 2008 Boulder, CO***

In attendance: Aggeliki Barberopoulou, Rick Wilson, Megan Crow, Victor Huerfano, Aurelio Mercado, Roger Hansen (AK co-chair), Elena Suleimani, Timothy Walsh, Rob Witter, Joseph Zhang, Vasily Titov, Susan McLean (NOAA Co-chair), Paul Whitmore, Jenifer Rhoades (NOAA/NTHMP Program), Lisa Taylor, Barry Eakins. Chris Moore joined the meeting on September 10 and Vasily Titov left the meeting in the afternoon of September 10.

Day 1 September 9: Coffee, tea, introductions 8:00-8:30 AM

1. Meeting started at 8:30 September 9 with a welcome from the co-chairs and adoption of the revised agenda
2. Jen Rhoades discussed new role of subcommittees in light of new NOAA Chair (Vickie Nadolski), the draft NTHMP strategic plan, and the action items from the Coordinating Committee. Tim Walsh added that the various parts of the NTHMP should keep in mind when developing products the potential utility to others and work together to maximize broad use of products.
3. Reviewed the draft Terms of Reference as contained in the NTHMP Rules of Procedure. Revised Terms to remove names of specific people, include content on communications and roles of chairs, and add text on succession for chairs of M&M. Revised document tentatively accepted with final review and acceptance for Day 3.
4. Presentations by NTHMP Partners focused on inundation modeling and mapping
  - Presentation by Megan Crow (Hawaii) Tsunami Inundation Modeling and Mapping
    - Working to refine and update existing tsunami evacuation maps
    - Numerically model source events from generation to runup and inundation with a non-linear 2D shallow water mode
    - Compile internal computational grids with LiDAR, SHOALS, Multibeam and GEBCO relief data
    - Hindcast inundation and runup for 5 destructive historical events affecting Hawai'i over the last century (provides reference for operational model testing)
    - Test hypothetical tsunami events for worst case scenario investigation
    - Consider maximum inundation and runup envelope of historical and hypothetical events for evacuation map planning
    - Completed Oahu inundation calculations, next priority is the island of Hawai'i
  - Presentation by Rick Wilson (California) Modeling and Mapping
    - California is creating maximum tsunami inundation maps for all populated areas, nearly half of the state's coastline.
    - USC tsunami modelers use the MOST model with bathymetric grids of 90m and 30m.

- Lower resolution inundation grids are enhanced using high-resolution (3m to 10m), onshore DEMs.
  - All inundation maps are validated in the field with local (county) emergency managers.
  - Workshops with each county emergency planning group will follow map production.
  - Future work/needs include: 1) publishing results for scientific review, 2) helping create science-based tsunami scenario database and discussion forum, 3) collaborating with NGDC on tsunami deposit database, and 4) evaluating submarine landslide tsunami sources/hazards in more detail.
- Presentation by Victor Huerfano (Puerto Rico) Seismic sources and Inundation Mapping
  - Numerical model used in mapping from the Japanese TIME code
  - More than 300 potential scenarios were modeled and compiled in the MOM (maximum of maximums)
  - Tsunami evacuation maps compiled for three Puerto Rico cities: Mayaguez, Anasco and Lajas, working on Carolina and Dorado.
  - Plans:
    1. Update the data used in modeling,
    2. Compare MOST and TIME results,
    3. Implement a forecasting tool for Puerto Rico and the Caribbean.
- Discussion Topics:
  1. Scientifically valid common database (updatable and accessible) of rupture sources
  2. Forum to enable ongoing scientific discussion to validate and update source database
  3. Common issues with processing LiDAR to bare earth
- Presentation by Barry Eakins (NOAA) on Coastal Digital Elevation Modeling
  - Discussion: NOAA priority list for tsunami forecast sites led by Paul Whitmore
  - NOAA has milestone to meet of 75 forecast models by 2013
  - TWCs identified priority communities (more than 75) with tide gauges to validate runups at coast
  - TWCs worked with State NTHMP EM to prioritize list
  - DEMs are developed from this list, modified by availability of data, datums
  - This list not complete with full State community priority list, but is a starting point for developing a National list for inundation and forecast
  - Paul made point that DEMs requirements for inundation and forecast have significant overlap
  - How easily can products for forecast be used in other (mitigation) applications?
  - How often do we need to redo inundation maps? Significant new data or capability, every 10 years, never...
- Presentation by Vasily Titov (NOAA) on MOST and ComMIT
  - History, overview of tsunami modeling and develop of MOST

- Discussion: The ComMIT interface provides access to a controlled/approved MOST model that is updated by PMEL (distributed via FTP), to the database of 1,500 sources, and enables modelers to control input parameters, add own sources (in NETCDF CF1) and models and publish results on OpenDAP server. Not sure if MOST runs on Cray. ComMIT is “distributed” during training; can NTHMP Modelers get an “introduction” to ComMIT – something less than full-blown training given for non or new modelers? Open question on how well ComMIT works with near-field sources – Vasily has compared to several near-field events and feels does well
- Model must be able to reproduce real events including Okushiri 1993 (good data); Adnreanov 1997 first with DART to check deep-ocean propagation; Amchitka 2003 first real-time check of MOST with DART and tide gauge at Hilo (Gold Standard DART and Tide and Source)
- Database of 1500 sources available on-line,
- Can add sources to ComMIT in NETCDF; local knowledge and expertise essential
- ComMIT can be used to produce inundation output; propagation sources pre-computed, can modify, select best combination to match DART/Tide, and run inundation
- What “type” worst case? 60 year, 100 year, 500year... Vasily indicated important

#### General Conclusions

- MMSC has a draft revised Terms of Reference with responsibilities of chairs, succession times for chairs, communications and reporting responsibilities.
- Many States have Web sites to access tsunami products, others are developing Web sites. MMSC needs to develop a single point of access / entry to the various Web resources, an inventory of public products, and identify non-public products and risks of sharing products
- MMSC needs to agree on method to prioritize and integrate DEM requirements with “75 forecast communities”, resulting in National DEM list
- MMSC needs to develop a revised list of “SIM” DEMs both completed and planned, showing DEM name, geographic extent, communities within DEM, and status – Web map and table – help devise list.
  - NGDC volunteered to develop Web map and include NTHMP DEMs.
  - NTHMP partners (State and Federal) will deliver footprints of own public DEMs along with description and link or DEM for download
  - NGDC and States revisit non-public grids to see if sources allow use for inundation as well as forecast
- MMSC believes SIFT and MOST has some applicability to mitigation in those cases where we work together collaboratively (States and NOAA) to identify priorities, sources, etc. and the effort results in products for State mitigation as well as forecast for TWC.
- ComMIT has potential as an interface to models (MOST and others) and to propagation grids; NTHMP modelers expressed interest in further introduction,

possibly short workshop on ComMIT. PMEL indicated willingness to do this but that individual training is not their preferred method due to time and resource constraints.

Day 1 Meeting adjourned at 6 PM

Day 2 September 10: Coffee, tea, 8:00-8:30 AM

1. Meeting started at 8:30 with adoption of the revised agenda
2. Presentations on modeling with focus on benchmarking and standards
  - Joined via teleconference:
  - Presentation by Elena Suleimani – Benchmarking Alaska’s Model using OAR PMEL-135
    - Multi-step process with model generating an inundation map that is validated against historic record, ground truth with site visits, community eventually generates the hazard map and EM with partners generates the evacuation map; Stressed that caution in selecting the input source data is essential because poor data can result in bad outputs even if a model meets the benchmarks and these outputs are used to create mitigation products
    - Make a list of benchmarks with accuracy requirements
    - Create a web site that has all necessary input data, grids, lab results, necessary for benchmarking (action Vasily)
    - Identify links to existing benchmark pages/sites
    - Develop a procedure for decision-making on whether the code validates
    - Make a list of recommended journals for publication
  - Paul Whitmore raised issue of intermediate sources (i.e. Vancouver Island) and whether anyone was modeling such sources. OR – no, HI – no, WA – will be running intermediate sources next month, but no plans to revisit existing evacuation maps
  - Presentation by Chris Moore ComMIT Design and Tools
    - Stressed that ComMIT is a flexible tool and PMEL willing to work with NTHMP to adjust input sources, output products
  - Open discussion including teleconference group
    - Rich Patchen [Rich.Patchen@noaa.gov](mailto:Rich.Patchen@noaa.gov) Chief Scientist, NOS/OCS/CSDL
    - Jesse Feyen [Jesse.Feyen@noaa.gov](mailto:Jesse.Feyen@noaa.gov) Physical Scientist, NOS/OCS/CSDL/MMAP
    - Edward (Ed) Myers [Edward.Myers@noaa.gov](mailto:Edward.Myers@noaa.gov) Physical Scientist, NOS/OCS/CSDL/MMAP
    - Unable to attend, but interested in working with tsunami:
      - From NOAA's Environmental Modeling Program:
      - Alan Leonardi, Darien Davis, and Sreela Nandi: NWS/OST/PPD/SPB
      - Frank Aikman [Frank.Aikman@noaa.gov](mailto:Frank.Aikman@noaa.gov), Super Phy Sci, NOS/OCS/CSDL/MMAP
      - Marie Colton in NOS and Steve Payne of the Navy additional good resources

- Recommendation from teleconference group is that we follow the IOOS guidelines and data standards for models and observations; use the NETDCF with DF1 and do not lock into any specific system for operations; Openness and flexibility with community partnerships key to success
- Presentation by Aurelio Mercado on PR modeling activity for PMEL SIFT
  - Model used is MOST with NGDC-developed DEMs at 1/3 arc-second resolution and USGS/NOAA FACTS for the sources. Believes “Bare Earth” but discussed problems with processing LiDAR data and requirements to truth the DEMs.
- General discussion that the modelers get together over lunch and refine requirements as an action and recommendation from M&M to the CC.
- Afternoon presentations from OR on modeling and OR, WA, AK on inundation mapping
  - Joseph Zhang – Oregon Modeling for Inundation Mapping
    - Oregon uses unstructured grid for modeling; results are field-tested against historic data, deposits, and community memory/history.
  - Rob Witter – Oregon Inundation Mapping
    - Oregon has adopted a new evacuation product format that depicts the safe-zone as a green shaded relief along with two evacuation zones: orange for a distant event and yellow for a local Cascadia event. Colors were tested to ensure readability for the color blind.
  - Tim Walsh – WA Inundation Mapping
  - Elena Suleimani – AK Inundation Mapping and Google Earth product

Adjourned for day 6:15 PM

Dinner at the Red Lion at 7 PM

Day 3 September 11: Coffee, tea, 8:00-8:30 AM

Focus of day was to reach agreement on the revised Terms of Reference, Report on Action Items for the Coordinating Committee, draft activities to enable NTHMP benchmarking of models, compile M&M actions with due dates and leads. Several hours of active discussion and debate accomplished these items. The group broke at 1:30 to see NOAA Science on a Sphere.

Documents generated:

- Revised terms of reference: M-MTerms\_of\_Reference
- Report on Action Items for the CC: Boulder\_Report\_to\_CC\_11Sept\_Final
- Benchmarking activities: Boulder\_Benchmarking\_Actions.doc
- M&M master list of actions: M-M\_Action\_Tracker.xls

The meeting wrapped up by reviewing what was accomplished, identifying areas that were not covered or not adequately covered, and identifying the focus for a next M&MSC workshop.

- Recommendation approved to submit a multi-State proposal to evaluate ComMIT, identifying areas to improve the utility of PMEL modeling for State inundation mapping.
- Recommendation approved to submit a proposal to fund a workshop focused on developing guidelines for NTHMP Inundation Products.
- Suggestion that the M&M meet for a full day at the National NTHMP in November to continue progress on actions.

The meeting adjourned at 4:15 PM. with general agreement that considerable progress had been made in an open and supportive environment and a commitment to continuing to move forward.

Minutes drafted by Susan McLean

Minutes reviewed by attendees