

NTHMP/MMS 2015 Summer Meeting Notes

**National Tsunami Hazard Mitigation Program (NTHMP)
Modeling & Mapping Subcommittee (MMS)
Summer Meeting Notes (Reader is referred to *presentations for specifics*)
July 14, 15, 16, 2015
<http://nws.weather.gov/nthmp/2015mesmms/index.html>**

Rocky: Welcome, opening comments, and logistics

Kara: Plan for the day, including agenda changes to accommodate Aimee Devaris conflict

- Move discussion with Aimee Devaris and Mike Angove to 2:45
- Lunch moved to 11:30

9:15 – 9:30 Review of Goals (MMS co-chairs Dmitry & Kara)

Review of Goals

1. Finalize maritime guidance – led by Rick
2. Safe depths? Move towards consistent recommendations
 - a. Oregon and California are preparing a plan for vessel movement offshore
3. Discussion of models for landslides and currents (?)
4. Discussion on tsunami sources –led by Stephanie
5. MES/MMS Joint Meeting
 - a. Brief MMS about tsunami currents workshop, outcomes
 - b. Pedestrian evacuation travel time map development
 - i. MES has not yet asked us for anything, just initiating discussions
 - ii. Needs for models, e.g. 15” grid needs to be downsized to 3” grid for narrow passageways, bridges, etc.
 - iii. Hope is to identify best practices
6. DEM production and finalize FY16 list
7. Finalize the process on model benchmarking
8. Preparation for landslide workshop
9. Website – update and reorganize
10. Meeting wrap-up and work plan to finalize goals before next meeting

July 14 -----

9:30 – 9:50 **Discussion on updates to modeling results for offshore safe depths (Wilson)**

&

9:50-10:20 **Update from the NTHMP-US Coast Guard Work Group on minimum maritime offshore-safety limits/plans (Wilson)**

1. Offshore safe depth needed on both a state level and on a regional level
 - Going to be difficult to come up with a common standard based on results, however, MMS agrees it would be best to come up with consistent standards
 - Questions being asked: Is the regional geography limiting the ability for consistent offshore safety zones or is it the different scientific studies, models, and policy makers
2. Reviews handout entitled 'Maritime Vessel Evacuation – Minimum Offshore Safe Depths' document -> to be used by harbor masters and port authorities for mitigation and COOP planning

Tim: Brings up one Wa. State complication – At any time, there are always at least 3 ferries in the harbor. Moorage is not like large ships → if they are in the water, they are hosed, if they are moored, they are hosed...
3. Distant source guidance vs local source guidance – see document
Refer to table 1 for recommended safe depth area
Rick: Draft general maritime guidance, overall in decent shape for recreational and commercial boaters. Goal is overall coast guard involvement, not necessarily just port by port. Would be good if a sector of the coast guard can fall under one region according to the scientific information
Refer to table 1 for recommended safe depth area
Tim: Asks Rick who in the Coast Guard is he working with.
Answer: Randy Clark and immediate supervisor
Kara: What about guidance now coming from Hawaii?
Answer (Rick): Randy was concerned that cart was being put in front of horse. He would rather see more overall coast guard mentality instead of port by port - - Randy is handling that separately.
Chip Guard: Guam is in sector 10 and is following guidance – can live with Hawaii's guidance because Guam can easily get to 15-m area.
Kara: Need for clarification of local vs distant source
Dmitry: for CA, different guidance for near source vs distant source, but for AK a source that is local for one region may be distant source for another region
Rick: maybe need to give a limit, within one hour of the tsunami that would be local source
Fai: In the first hour, people are usually very confused
Chip: wording is going to be important, interpretation is one of the problems
Rick: if you are on shore and feel shaking, don't try to take boat offshore, if you're on the water you're not going to feel the shaking, will be getting alerts
Tim: In Puget Sound, most of the ships will be 2 hours away from earthquake.
4. Continued discussion on what is local and what is distant – criteria: shaking time?
Stephan: Are critical facilities separated from other ports? (Ports of Long Beach and LA vs. small local ports, for example.) Toured Ports of Long Beach and LA with Coast

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Guard and noted that the ports are quite vulnerable – Any perturbation to the local level can be disastrous.

Rick: This was addressed as part of the SAFER project, credit given to Stephanie. Large Alaska Aleutian event does cause problems within the ports, primarily currents and especially in channels. The ports are unrealistically optimistic as to what can be done during an event; ships can get underway quickly etc.

Stephan: Separate guidelines for general boaters and special contingency plans for large ports?

Rick: This is first general guidance, going toward specific guidance... There is still a lot of planning for ports needed. Captains are under port guidance, but each captain has their own authority to make decisions for their own ship.

Stephan: What about military guidelines? What do they base their decisions on? Is interested in Port of Norfolk

Kara: May be able to initiate contact through Joint Typhoon Warning Center

Rick: Single point moorings inside may be an option if boats cannot get offshore, as in the case of the east coast ports where there is a wide continental shelf.

5. Continued discussion on notifications for mariners:

Kara: Is this guidance for advisory tsunami, warning tsunami, are we going to specify?

Rick: difficult because every harbor is different, recommendation is based on arrival time and size

Kara: NTWC messages give arrival times for a limited number of local cities, need to get arrival time information to vessels; are the ETAs in USCG messages appropriate for vessels

Marie: some guidance on where vessels should get their messages

Kara: Does the Coast Guard disseminate full message information? Follow-up with the Coast Guard to learn what details, exactly, they transmit, when relaying TWC messages. We want to make sure adequate information is relayed for following the guidance.

6. Continued discussion on clarity in wording on local vs distant needed because of time considerations.

Kara : maybe another definition that needs to be determined is offshore (off the coast) vs. offshore in a bay

Kara: we have distant source at least 2 hours away, what if its 1 hour away? And there are tsunami events that are local but more than 10-15 min, still need some guidance, need to reword

Rick/Kara/Dmitry: maybe reword to “local tsunami with arrival less than 2 hours, may arrive within 10-15 min” or just “within minutes”

Marie: have space and time, could add in local because of where, then time to arrive

Tim: Emphasize variability between regions so there will likely be a need for non-standard guidance.

Rick: Purpose is to hit the highlights, keep it simple, but there will be other conditions.

Kara: Keep everything as general as possible, then each region can come out with modifications

Fai: Seems as though Islands can have their own procedures.

Rick: Maybe the categories cruise ships, tankers, etc need to be treated separately, but for most part large ships are going to be ok as opposed to smaller boats, need to

monitor mooring lines. Cites Crescent City as example. We are lumping recreational and commercial together here so need to keep separation.

- **Kara:** Any studies on how ships fared during 2011 Tohoku? Were there large ships moored? – maybe harbors farther from the source that had ships ride it out, worth looking into to get some guidance from Japan on what worked or didn't

Fai: All large ships stayed put; small vessels evacuated.

Dmitry: Sites ship experiences during events in Sandpoint harbor. During some events, ships survived, but during others, ships were damaged.

Chip, Stephanie, and others: Discuss specific cases involving currents.

Kara: Let's make sure we are mapping their harbors correctly

STUDY: look into how ships fared during Tohoku as a real case study.

7. Safe depth table completion

- a. Puerto Rico? Victor – only does Puerto Rico and not entire Caribbean – 100M (55 fathoms). After further discussion, Victor thinks the 50 fathom specified for Caribbean is fine.

Victor: Should there be consideration of people on board cruise ship

Kara: We are choosing guidelines for ships. People best to go with ship. When ship is moored, there are micro decisions that may be best left to companies and ports. Discussion with these parties may result in some policies

Tim: Some issues 'we' have inside Puget Sound is that we can offer guidelines but different Ports inside the Sound may choose different responses.

Fai & Rick: Stick with general guidelines and let Ports work specific details out. Might be reasonable to initiate some working group to bring ports together?

8. Dmitry currents modeling presentation

- a. Presenting results on safe depth modeling in AK for Cascadia event, 30 fathom line seems to capture high current zones, but inside Dutch Harbor there are some deep passageways with high currents; local source: still high currents at 150 fathoms, 100 fathoms ok but would suggest 150 fathoms for local source

Rick: if straight line currents at 100 fathoms that they can still navigate, then probably ok

Kara: going back to guidance for advisory vs warning events: advisory – only going to have damage inside harbors

Rick: advisory vs. warning may be harbor-specific, could get no damage or a lot of damage even with an advisory

Kara/Dmitry/Rick: if 150 fathom suggestion for local source, could say at least 100 fathoms, if still feeling dangerous go to 150 fathoms

Kara/Dmitry: Update table for AK, distant source to 30 fathoms plus ½ mile offshore

Kara: maybe make wording consistent for all of west coast (depth + distance)

Kara: Any similar situations on West Coast?

Rick: No

Fai - Hawaii – for local source, have less than ½ hour to respond, so no guidance for getting offshore

Kara – Updating guidance for Pacific Islands, Hawaii, Guam: 50 fathoms
3 different regions: West Coast/AK, Pacific islands, east coast/gulf coast; within regions that have similar characteristics want to be consistent

Tim: What is travel time from Cascadia to here?

Dmitry: ~ 4hours

- b. Results shown for Unimak Island and then Kodiak

Local sources:

Travel time? Dmitry not sure

Modeling done for high tide only

Results show a safe depth in 100-150 fathom range.

Message: Ships in port should stay, those offshore should go further offshore.

Rick: Guidelines for ships inside impact region and outside impact region. **Chip:**

What is error bar for speeds? Dmitry: good question, not sure?

Kara: Advisory vs warning: everyone outside local area will be given an advisory. The worry is what guidance to provide. – How do we get back to guidance? Rick: The guidance is structured to whether or not you feel the earthquake and will be harbor specific. Some of the harbors, like Crescent City, are prepared to take ships offshore. Simple, if you feel the eq., go to high ground; if you are a ship offshore, go to safe offshore distance if possible; if in port, stay there.

Further discussion: 100 vs 150 fathoms – debris consideration? High current pockets?

Discussion leads to regional differences: East Coast/Gulf Coast/ Hawaii?

Pacific Islands, Hawaii, Caribbean: 50 fathoms

West Coast, Alaska:

East Coast: ??? Pending

Gulf Coast:

10:35 – 11:15

Update on the Tsunami Currents Benchmark Workshop report

(Pat Lynett, USC)

Benchmark #1 – generally speaking, all models did ‘pretty’ well with that.

Everyone had an offset in the numerical velocity, with u velocity lower than the data

Looks at 2 different comparisons:

1. Magnitude of fluctuations in speed
 - a. Take 1 min of model results, find zero-crossing, have mean height fluctuations, and standard deviation for fluctuations
 - b. Most models do not have all physics, meaning do not account for ‘real’ variations. Therefore, results show numerical unsteadiness of models
 - c. Models ordered in terms of increasing level of sophistication: 1-8 (Class I): shallow-water, 9-12 (Class II): weakly dispersive/quasi-3D, 13-14 (Class III): approaching 3D or fully 3D
 - i. In terms of averages, there is a clear benefit to using ‘better’ models (ie, 3-d models)
 - ii. Mean absolute relative error in fluctuation: general trend of error decrease as model sophistication increases, clearly a benefit of using a better model for this problem
 - iii. Mean absolute relative error in eddy period: on average, across models we capture the period much better than the speed

Dmitry: raises point of a model may be benchmarked but someone using the model may use it in a way that is not optimal, **Kara:** working under an assumption that modelers are competent, but that’s why there’s a need to review each other’s work

2. Total Kinetic energy
 - a. Could not ignore the glaring fact of significant offsets. Therefore, Lynett looked at time-averaged kinetic energy.

- b. Now instead of looking at top and bottom, entire in between is integrated.
- c. Results: For u-component, models generally under-predicted energy and for v-component, models generally over-predicted. Offset
Stephan: would error change if different locations in vicinity of observation?

Note: modelers had results and friction coefficients etc varied so that modeler could provide what they thought were best results

Benchmark #2

1. Hawaii case study
 - a. Hilo Tide gauge provides baseline scatter amongst models
 - b. Two velocity locations (ADCPs), 1 surface elevation location (tide gauge)
2. Statistics Analyzed
 - a. Use tide gage to establish an accuracy/model correlation for elevation
 - i. Shifted model time series to match at control point
 - ii. Take mean of each maximum/minimum, form envelope
 - iii. Relative error of envelope
 - iv. Model error ~20%, inter-model variability ~20% for 4 hours
 - b. Compare accuracy/model correlation for speed at ADCPs
 - i. Found out that data is averaged every 6 minutes
 - ii. Error grows with time (expected), inter-model difference does not grow (unexpected)
 - iii. Errors are larger, STD are consistent; a puzzling result
 - c. Mean and variation surfaces from maximum speed from each model
 - i. Examine as a wave envelope of crests
 - ii. Little variability in errors between models
 - iii. In general, in a controlled situation, expect errors of ~20% and intermodal variability of ~20%
 - iv. Examine resolution dependence, st. dev. map/mean map (relative variability between models)
 1. Debatable whether models have ability to capture physical eddies accurately, variability due partly to physics and partly to model differences
 - d. Examine numerical scheme and model physics dependence focusing on areas of high inter-model st. dev.
 - i. 20m/5m result, 10m/5m result to check convergence
 - e. Velocity threshold prediction through ensemble modeling to provide likelihood of high current speeds
3. Result Summaries
 - a. Model errors start at 10% and grow to ~50%
 - b. On average in ensemble sense, models agree with one another. For forecasting, even if go with ensemble modeling, will get large errors as time goes on.
 - c. Plots of inter-model 2-D
 - d. Pat: "When looking at currents, if in an area with eddies, it's a 'fool's errand'"
 - e. Consider mapping products using velocity threshold predictions through ensemble modeling to provide likelihood of high current speeds
4. Report development
 - o Pat - report layout: summary report, individual modeler reports

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- In progress. Pat estimates at ~50% complete. Complete draft late July/early August
- Only benchmarks 1 & 2 will be presented in report. Benchmarks 3, 4, and 5 are mentioned but no detail of results will be presented nor discussed.
- Report summary: Summary with each modeler report appended in subsequent sections.
- Large authorship, internal revisions and comments may take a few weeks
- Kara – determined steering committee for revisions at last meeting
- Pat – report layout: summary report, individual modeler reports

11:00-12:00 **Completion of the maritime mapping and modeling guidance**
(Wilson)

1:00 – 2:15 PM **Completion of the maritime mapping and modeling guidance, cont.**

1. Rick: Leads discussion on “Manifesto of Maritime Guidance”
 - a. Goal is to finalize the part MMS is responsible for
2. Guidance Review
 1. Tsunami Hazard Analysis, Modeling, & Mapping; Response
 - a. Long discussion on terminology. Definition of ‘Maritime Community’ and use of “Individuals” as intended audience.
 - i. Rick/Tim/Kara – need a definition for “maritime community”, will start an email discussion
 2. discussion on verification, validation, and mention of benchmarking.
 3. discussion on appropriateness of including in guidelines since response is outside the purview of the NTHMP. Retained for MES comment
 4. discussion on what an ‘appropriate’ source is, what constitutes high resolution
 5. Removed ‘how products should be used’
 6. Needs some tweaking. Second part of sentence redundant
 7. discussion on seiches resulted in suggestion to add “Tsunami induced” at sentence beginning.
 8. Page 4: Replace MMS with NTHMP
 9. **Additional currents benchmarking discussion -----**
 - a. Kara – MMS hasn’t had a chance to review results of workshop proceedings, premature to include in the guidance right now
 - i. Marie/Dmitry – shouldn’t mention anything about “absolute accuracy”
 - ii. Marie – say results from workshop are still being discussed/evaluated
 - iii. Wait for workshop proceedings to be finalized before we finalize guidance document
 1. Page 5: Decided that it is premature to include
 2. Page 7: Decided that it is premature to include
 3. Page 8: Decided that it is premature to include
 4. Page 9: Decided that it is premature to include
 - b. Current velocities and relationship to damage, product guidance:
 - i. Jim/Stephan – convergence of models with increasing resolution doesn’t mean its converging to correct result

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- ii. Kara – *Again need to wait until benchmarking proceedings are finalized to finalize this section*
 - iii. Dmitry/Marie/Rick – *need to say resolution needs to be appropriate for specific harbor/conditions*
 - 1. *For now, set minimum resolution at 30m*
 - iv. Rick to reword
 - c. *Identify areas where eddies may occur:*
 - i. Marie/Dmitry – *Who would review maps to identify areas where eddies will occur?*
 - ii. Kara – *assume an experienced modeler is doing the modeling*
10. General suggestion (Vasily): Add an executive summary
 11. Page 10: Product Guidance (FASTER)
 12. Tim: In “Essential Guidance for NTHMP Funded Agencies”, change “Agencies” to “Entities” since some members don’t work for government agencies, also change in guidance #1 (changed by Rick Wilson)
 13. Change to “Numerical models should be verified and meet criteria using the benchmark tests...”
 14. Dmitry – 10m grids shouldn’t be required, e.g. AK doesn’t have 10m grids available
 - a. Stephan/Kara – reword to “or the best resolution possible”
 - b. Marie – highest resolution possible may not be appropriate
 - c. Rick – change 10 m resolution to “high-resolution,” leave open for discussion on what is high resolution
 15. Marie/Tim – remove “and how they should be used”; reworded by Kara
 16. Rick – added “and tsunami from local and distant sources”
 - a. Tim/Kara – should also give plan for when no alert is given

Maritime Guidance Wrap-Up, Kara: Everybody needs to send their track changes. Postpone any outcome and summaries for tsunami currents. Hold a conference call in a month to finalize from feedback. Then another conference call to incorporate tsunami current information later.

2:45 – 3:30 PM

Welcome and discussion with NTHMP Chair Aimee Devaris and NWS Tsunami Program Manager Mike Angove

Rocky introduces Aimee Devaris and Mike Angove

1. Aimee:
 - Provides recognition of Rocky for meeting organization, Kevin Miller, and NTHMP partners for making the trip.
 - Reinforces her appreciation of NTHMP partner collaboration
 - Takes every opportunity to showcase the work of the NTHMP at HQ
2. Mike Angove:
 - State of the program is reasonably healthy. There remains an appetite to sustain program capability. We have Congressional interest, we’ve done a good job of making our appropriators aware of the importance of what we’re doing
 - Language in this year’s bill to authorize \$6M against NTHMP Grants. ~\$5.2M was authorized. Why? Program balances all needs. Not everyone was happy but...
 - Partners are encouraged to ask questions freely.

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- **Rocky:** Every federal review is different because all partner needs are different. Cites one partner's lack of meeting deliverables so Grant was pulled. We have to be careful that the money that's provided is used according to plans, but understand that things change and willing to work with groups on e.g. no-cost extensions; there was some confusion on the provision this year for things that need longer time to complete within the 2 year limit (personnel limited to 1 year periods), will try to clarify in next year's information. Rocky continues with accolades to partners for their quick attention to questions posed by the review panel. All award applications were submitted by the 3pm 10 Jul deadline.
- **Mike:** Picks up on Rocky's comments to say that NWS Director, Uccellini, went to Congress to voice concern about NWS ability to work in environment with fine detail requirements. Congress gave NWS to identify and work within broad areas. ** Result is higher scrutiny. Department again requested that the Grants not be funded. This is an annual expectation and, up to now, the funds have been restored.
- **Aimee:** Takes every opportunity to serve as proponent of NTHMP. had opportunity to promote NTWC and NTHMP to Admiral Devany, focus within NOAA now seems to be more on weather-ready and resilient communities, especially coastal communities, opportunity for NTHMP to consider breadth of impact of work; NTHMP investment activities report is good but needs emphasis on value of collaboration/relationships, Aimee will add spotlight from the Chair on benefits of our collaboration. **Rick:** Asks question about Devany's response to NTHMP slant. Do they get a sense of the effort?
Aimee: Congress is very interested in collaboration and value to taxpayers and country. President has issued a number of executive orders promoting collaboration and information exchange across a wide spectrum of activities.
- Challenges: yearly Grants pullback dance; potential reprogramming of funds.
- **Tim:** Question on TWERA: any news? –in line to become a passed bill, Mike sees a trend towards a passable version of the bill and it has passed the house.
- **Stephan:** Comment on coastal resiliency: Inundation from tsunami and that from storms are the same thing. Reinforces the notion that tsunamis are important and should work to get resiliency piece of NTHMP work more visible and integrated into other mitigation activities. Multi-hazard floodmaps for the US on the agenda for a lot of agencies. Vertical evacuations... how does NTHMP fit into US "coastal resiliency".
Mike: Recognizes the importance of doing a better job of broadening collaboration.
Aimee: Reinforces the need to improve collaboration with NOAA Ocean Services (NOS).
- **Rocky:** discusses NOS Grants: \$500-\$1M minimum with matching requirements – tough for many to meet the matching criteria. There is a possibility that bill would include a change to Grant process that would open up Grants to 501-c non-profit groups, which could limit funding available to current NTHMP entities
Mike: would certainly like to see the new bill.

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- **Dmitry:** NGDC has done great job providing quality DEMs for tsunami research, would like to highlight this work, ensure it continues (Mike assures it will, has been identified as a critical need)
- **Rick:** could share names of state contacts with govt officials so they can get more information. Question (and concern) on "Investment Activity Report" states could share 1-page summaries on where money has gone with their officials to support the NTHMP investment report

Rocky: The report is already 16 pages long; we are under pressure to make it even shorter. There is no room to add one page per NTHMP partner – plus, to be fair, we would have to have reports from all, not just some, and unfortunately, all partners do participate as much as others. The report really tries to highlight the accomplishments completed by grants and still remain fair.

Rick: Would like input into report

Rocky: Report is pretty much complete. There is one remaining data call. This report is really specific to NTHMP Grants; funds distributed and outcomes. There still needs to be annual report of NTHMP but that needs to be a separate document.

Kara: More information about preparing for the annual report?

Rocky: We would like to have an annual report from NTHMP. This should be brief and direct, showing completed outcomes and soon to be expected completions. Written in laymen's terms. Will be discussed more at the CC Meeting.

3:30 PM **Juan: presentation on Gulf of Mexico modelling for offshore guidance**
(not on agenda, related to Maritime offshore safety depths discussion from earlier)

Juan: Results from 3 historical sources and some probabilistic landslides for current velocity in GoM. Regional issue of a very wide and shallow continental shelf. . Looks like about 100-200 meters would be a good offshore safe depth. 100 fathom depth ok - but we would need weasel words for if you reach that level and still can't maneuver. Also, it would take a long time to get there... so maybe more like: if offshore go farther out if possible, if close to shore stay there

Jim: shallow shelf means a lot of friction, significant decrease in wave heights from shelf to shore, may be better

3. Modeled Mississippi landslide - One of the 3 historic sources, ran higher resolution model for specific locations
 - a. Results for this case show 3-6 knot range
 - b. Local Gulf of Mexico 'safe depth' looks to be 100 fathoms.
 - i. Alyssa points out that the problem is getting out there.

Rick: Are there any areas within the gulf that would be considered a distant source for other areas within the Gulf?

Kara: Probably no.

Juan: Points out that travel time to some locations could be on order 4 hours.

Kara: Juan's 100-fathom mark is good for local and anything considered distant (Gulf is a closed basin so no energy really enters the Gulf).

Kara: Still seems that regional grouping of safe depth is holding up.

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- **Kara/Marie:** MMS could use the GEM report and work with USGS to identify primary sources and create slip distributions as needed.

Kara: The TWCs would like to ensure that the operational forecast models are updated with the latest subduction zone data, such as Slab1.0, to align with CMTs and FFMs produced by USGS during and post-event

Dmitry: Slab 1.0 has deficiencies....which should be addressed. Some areas in Alaska.

Stephanie: USGS has yet to update it hazards maps for AK, so possibly some upcoming NTHMP collaboration there.

Jim/Stephan/Dmitry: additional landslide sources to be considered off coast of Florida, Cuba; still a lot of unknowns for landslides, working with USGS for landslides is important. USGS landslide help is needed in the evolving landslide sources... areas where slides haven't fallen. Make landslide sources for EC tsunami hazard a priority within USGS strategic plan

- Possibly MMS could draft a letter of support?

Victor: also include underwater volcanoes as potential source for emergency response issue

Stephanie: There is no tsunami coordinator for USGS. Tsunami Source working group is Adhoc. **Rick:** should it be more formal?

A list of all sources that have been used. Can we make a national database with tsunami sources. Towards this end.... Dmitry to send out and other people fill in. Add extra columns if needed. Or submit your own.

Titov: There is a list from the working group that he will forward on as well

Plan for USGS 2-day meeting before Annual Meeting (M-T) in Boulder. Co-chairs will bring this to the attention of the CC. USGS people cannot travel or have time constraints. The majority of them needed for this workshop are in Golden at NEIC. Boulder can only be a cost effective meeting place in the winter...

To Do: Come up with a list of needs. Co-chairs to send out an email to the group. Plan a workshop around them and Use it to bring the right people to the workshop. At workshop prioritize needs by feasibility and come up with a plan for moving forward. Kara can help prep the workshop. We need to bring in people from the GEM study and PMEL group to help plan this as well. Talk to Marie for names if needed.

Joint MMS & MES Meeting Begins -----

10:30 – 11:00

Maritime Guidance Update - Presentation (Wilson)

Status and what is needed from the afternoon joint work session to complete the task outcome

NTHMP has more experience with tsunamis so wants to provide consistent procedures for USCG

1. Provides context with video's showing tsunami impact on San Diego
 - Identifies collaborative efforts underway or in planning stage
 - Video: 2010 Chile (Maule)
 - Video: 2011 impact to south part of shelter island– very strong currents

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- More than 2 dozen harbors were damaged to the tune of ~\$100M over the course of 24 hours from two Advisory level events
 - Long term recovery issues, Crescent City waited almost 9 months to dredge the harbor because the sediment was contaminated with fuels and what not.
2. In 2010, initiated discussion on providing guidance for maritime community
 - a. Background on guidance direction – Puerto Rico had elements in place.
 - b. California has produced example products as a result of prototype work
 - c. Document development:
 - Hazard Analysis, Modeling, and Mapping is just about ready to hand off to MES for input
 - Two additional sections need development. These are 1) Response, Preparedness, and Education and 2) Mitigation and Recovery
 - Specifics of document (the reader is referred to Maritime Guidance document)
 - Discussion of efforts to determine minimum safe depth.
 - General guidelines mentioned
 - Christa vonH...: question about specification on time (clarity needed). Also has a problem with the use of the term 'large' for source size.
 - Laura: Integration with TWC messages?
 - Mike A: Confirms that this is developed in conjunction with Coast Guard. Also interested in integration with TWCs messaging
 - Discussion tabled for afternoon discussion period.
 - Rick summary: Safe depth is regionally different (3 regions): LOCAL: 1) West Coast & Alaska (30 fathoms); 2) Puerto Rico, Hawaii, Gulf Coast (50 fathoms) 3) East Coast (TBD – long continental shelf)
 - John-Sees this as a great advance & would love a color-coded map
 - Questions for group: Should there be (3) separate documents? Who should take the lead on development of each?
 1. Decision to leave as one document where subsections could be updated individually.

11:00 – 11:30

National Tsunami Hazard Assessment Update – Presentation

(Stroker, NGDC) Presenting for Paula Dunbar

1. Background: runs through NTHMP requested initial 2009 report
 2. Goals
 - a. 1st Assessment: Qualitative assessment of the hazard
 - b. 2nd Update of the 1st assessment with new database searches
- * The two documents, therefore, are not independent of one another

The presentation:

1. Most notable differences covered in updated report are for American Samoa, due primarily to the 2009 Samoa tsunami event
2. Need for additional information
3. Meteotsunamis have been identified since 1st Assessment, but as there has only been two confirmed reports, there was not enough information to include this category into update Assessment

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4. Differences between assessments presented in table form and discussed
 - a. Samoa upgraded in threat based on the 2009 event
 - b. CA is listed as VERY HIGH (change from last report), VERY HIGH => can expect runups in excess of 3 m every 50 years
5. Various tables of results presented, such as frequency of occurrence & tsunami events per State. Some clarification questions asked.
3. Special consideration for Atlantic Coast where landslides are expected to be the primary tsunami source
 - a. Note that more data is needed to do probabilistic and deterministic landslide source characterization and hazard for the EC
4. Summarizes USGS work and Canadian National Tsunami Hazard Assessment by Leonard *et al*, 2012. Correlation with US report bins provided: Canadian WC = high, Canadian NE coast = low
5. Summary: Assessment changes from 1st Assessment exist for American Samoa, Guam, N. Mariana Islands, and US West Coast
6. **Rocky:** Is there a recommended update cycle or is it event dependent?
Is there a plan for a press release?
Kelly: NCEI does plan to do a public release. Rocky requests that NTHMP be involved in some capacity. Good PR.

11:30 - 12:00

Update on FEMA's HAZUS for Tsunami - Presentation (*Biasco*)

Presenting for those who did the work

1. Background
 - a. FEMA funded methodology development in 2012-2013
 - b. Intention was to develop pilots but FEMA did not have funds at the time
 - c. Tamra provided FEMA contractor to do the work
2. Two scenarios were selected in conjunction with PMEL and WA DNR
 - a. Funded two Counties: Grays Harbor and Pacific
PMEL provided data into Hazus (Max H(x,y) and MaxV(x,y) at grid point (x,y).
Two scenario levels were run.
Provided a comparative assessment of Tsunami Methodology and Hazus Coastal flood methodology
3. Results
 - a. Economic Impact
 - b. Sensitivity analyses 1: (10m vs 30m DEM) – huge difference
 - c. Sensitivity analyses 2: damage functions
 - d. Sensitivity analyses 3 level 1 vs level 2
4. Contractor recommendations
 - a. Significant difference in results between level 1 and level 2 analyses
 - b. DEM resolution makes a huge difference in results
 - c. Future study should assess tsunami risk to lifeline components and consider damage from earthquake itself, primarily debris
5. Next steps
 - a. Pilots current out for RFP with FEMA contractors for Hilo and Crescent City
 - b. HAZUS, in general, is going through a major update to move all modules to web-based platform. The update activity is highest funding priority at this time.

Tim: Notes the importance of a building-by-building approach.

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1:00 – 1:45

Evacuation Guidelines White Paper – Work session and discussion (*MES leads*) Discussion will also address the decision support tool for populations at risk.

1. Basic model information and mapping output needs to be clarified.
 - a. Goal is to bring models out of 'black box' category
 - b. These maps have so far only been for planning and research, but is not quite a public product yet... and how the public product is best presented is under debate.
 - c. Use of mapping and modelling results is still being developed or might be iterative as we move along.

Dmitry: suggests adding information on:

- d. Model verification/validation (QA/QC) – someone notes that you could get some quality control data just from school evacuation practices.

Althea: reminds everyone that there needs to be an educational component for using these maps.

Nate: Maybe it is too young to be going out with this. This really is 'green' so maybe it's not a product for States to roll out.

John: There is always a possibility of this getting out to the public due to forces outside the NTHMP control.

Althea: recruited to help write the 'context'

Kara: Output format? Answer: Tool is ARCmap and data are raster

Rocky: Desired time frame for having a fleshed out draft? Nate thinks a draft can be ready for Jan/Feb annual meeting.

Continued discussion...

1:45 – 2:30

MMS Maritime Mapping Guidelines Discussion (*Wilson*)

1. Continuation of NTHMP Maritime Guidance
2. Breakthrough: Safe depth can be regionalized!
3. Document contents
 - a. Purpose, Intended audience, objective...
 - b. Products (thresh holds, duration, fluctuations, safe depth...)
 - c. General Maritime guidance – would like MES contribution
 - d. Appendices provide examples of two proposed products
 - Oregon maps
 - California Playbooks

*Concern raised about coordination with forecasts in real time.

Mike: Who are these playbooks for?

Rick: answer=Port Captains are the intended recipients of these playbooks.

John: How close is this to operationalizing this as a product?

-Products disseminated through Tweb?

Chip: Is buy-in by Coast Guard needed? – Yes!

Rocky: There is a national level relationship with Coast Guard

Rocky: Commends MMS and Rick for this collaborative work

HOMEWORK: MES assign a working group to contribute to the guidelines.

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2:45 – 3:00

Update on tsunami currents benchmarking workshop – Presentation (Kirby)

1. Describes process, defines expected goals and outcomes
2. Cites the enlistment of Pat Lynett to identify and set up benchmarks, summarize results, and spearhead findings publication
3. Summarizes findings

3:00 – 3:15

Laymen’s summary of MMS tsunami models – Discussion on DRAFT (Gately)

1. Table of benchmarked models
 - a. Fields (caveats/limitations; ease of use; etc.)

Kevin Richards: We are looking for a decision-making tool; not the specifics of the model; would also like cost information and contact.

Vasily: Can include tons of information but is the information necessary.

Rocky: Emergency managers might want to select a model and get

Kara: Should we include previous usage? (i.e., what projects were these used for already?)

John: Glossary should be provided with included terms

Tim: Notes that private companies are now using some of these models commercially. Should we be questioning the use of these models?

Vasily: Looks like we are building a resume for the models. Technical part is done but the usage is needed.

Laura: Can MMS identify some of the more popular models used years ago and comment on their usage?

Fai: Would NOAA allow us to post comments on someone else’s model?

Laura: Some country is using x. Should I be recommending a benchmarked model? If I do, I will be asked why.

Kevin R: The answer to why: these models have been benchmarked.

Rocky: Reinforces Fai’s comments. Should not post comments on anything on Federal website. Just post benchmarked models.

Christa: Very often asked if models are open sourced. This leads to commercial use.

Kara: List website access and affiliation, along with major projects or uses on back

HOMEWORK: MES provide required information.

3:15 – 4:00

NTHMP Outreach Products – Discussion Media outreach strategy (Miller & Rabenold)

1. Products
 - Who will make them?
 - How do we get them?Materials
 - Update Media Guide
 - Working group exists. Interest from MMS solicited.
Kara: will participate in working group
Althea: Can provide examples of Oregon products
Kelly: Notes the NCEI communications resource
John: suggest creation of a NTHMP hashtag

Continued discussion of possible resources and participants

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- Develop commemorative resource

Aimee parting remarks

1. Reinforces importance of work and impressive nature of collaboration

4:00 – 5:00

NTHMP Coordinating Committee Meeting

See Separate Agenda

[CC Meeting Minutes](#)

July 16 -----

9:00 – 10:15 AM

The landslide tsunami workshop (*Grilli and Kirby*)

Diff types of landslide (LS) tsunami mechanisms:

- SMF
- Subaerial
- Volcano collapse

Can have LS tsunamis occurring at smaller EQ magnitudes (6.7 for example) as opposed to EQ- generated tsunamis.

Use proxies using seafloor information. Conservative, but a first step.
Estimate volume, etc.

Workshop will be focused on modeling itself!

There are still scientific uncertainties on the modeling.

Complexity comes from large range of mechanisms. Underwater (rigid, rock, mud) slides, Subaerial (rigid, rock) slides... many types of mods required in simulations.

Paleo-slides off palos verdes shelf (los angeles). Borrero at al, 2001. Complex shapes and material props, variety of mechs, but idealization for modeling and experimental purposes.

Many NTHMP partners have LS tsunami potential: AK, OR, CA (Goleta, Big Sur, etc), HI (Kalapana 1975, big chunk of volcano facing Kona – volcanic collapse caused mass failure, GOM (MS delta, etc.), PR (Mona passage) , East coast (Currituck and many others, grand bank, ..)

Workshop rationale and proposed organization (tiger team or steering committee). Rocky would like to participate, helping with logistics and planning. Workshop targeted for next summer meeting, either right before or after to minimize costs.

- kick off meeting during summer meeting 2015 plus conference calls
- initial BM selection and workshop agenda
- select venue (before/after summer mtg 2016)
- preliminary list of potential BMs to follow

Will prepare pre-workshop webpage :

- BM data
- Workshop organization
- simulate BMs with variety of models and compare results

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-reach consensus on acceptable error threshold and models to use

Should it be NTHMP web site or separate for privacy? Start with Beta not on ***NTHMP.
Can they make section of NTHMP website password protected?

Invitation will be sent to potential participants with information to access site:

- ten supported participants from MMS modelers
- fifteen selected experts and grad students (\$20k support)
- minimum set of BM to perform to receive financial support

Dmitry question on fundable vs nonfundable: BM modeling not currently listed as allowable item. Rocky and Marie: expensive. Funds limited. May take people widely varying amounts of time. Rocky: allowable expenses include inputs to inundation models that meet NTHMP standard of accuracy or to demonstrate conformity with standards (Very close to BMarking!).

NOT: acquisition of raw data and development of models

Rick: changed ROP too

Rocky: may not be able to fund all BMing requests and hard to fund some but not others. If MMS prioritizes, that helps them make financial decisions.

Review of Slide lab experiments:

underwater rigid block slides (non- and streamlined) on a plane slope:
2D and 3D (see PPT slide for refs –Grilli, Imamura, etc.)

Subaerial rigid block slides (nonstreamlined) on a plane slope: 2D and 3D

SUBaerial granular slides (gravel, glass beads) on a plane slope: 2D and 3D
Granular means non-cohesive

Underwater granular slides (sand, glass beads) on a plane slope: 3D

Underwater mud slides on a plane slope: 3D

Review of lab experiments (this is also the review of BM cases: see PPT slides for details and list)

Subaerial granular: AK fjords, WA 1949, ..

Movie of lab experiment of underwater granular slide (glass beads) on a plane slopes: can see recirculation of material, as predicted

Underwater mud flow: no data on surface elevation.

Review of models/modeling approaches

Potential flow/Euler eq. modeling of rigid block (streamlined) SMFs on a plane slope:
Many case studies: PNG 1998, Unimak 1946, Kalapana 1975, Tohoku 2011, Goleta, Currituck, ... (Fryer, Watts, Day, Tappin, Greene, Geist, Grilli : see PPT for reference details)
Tohoku is controversial, probably too early to be community accepted.

Collaboration with USGS Jason Chaytor, who just did new mapping of Currituck slide (cores, etc.). Don't know what type of LS was generated

Kara: What about Grand Banks for a BM? Only have rupture time of underwater cable, not well mapped. Don't know geometry well.

Dmitry: Seward or Whittier may also be good case studies.

**Rigid slide/inviscid 3D BEM-FNPF
Computations vs. gage measurements
NHWAVE simulation of Enet and Grilli's slide experient**

See ppt for more details of Navier-stokes modeling

Modeling rigid, non-streamlined, slide as viscous fluid

Two Case studies:

1. Hypothetical: CVV flank collapse (Abadies et al., 2012). Canary islands. Very young volcano. Evidence of at least 2 prior collapses (>100,000 years old?). Simon Day thinks see evidence of recent movement

extreme scenario vs. more moderate scenario (450 cubic km vs. 80)

modeling moves from 3D domain (cylindrical) then boussinesq eventually to propagation, and then finer resolution boxes as nears shore (see simulation of it hitting Chesapeake Bay)

2. Papua New Guinea (PNG) 1998. Very complex geology (Tappin, 2003). Amphitheatre. Simulations show that LS source fits observed runup much better than straight seismic source.

Currituck (Grilli et al, 2015, Natural Hazards)

Chesapeake Bay.

Possibility of breaking into undular bores. Shorter wavelength breaking waves. Don't affect inundation too much but provide high momentum flux from breaking waves.

Discussion

Dmitry: interested to see a BM that has a subaerial LS and realistic geometry in the harbor. Have subaerial landslides that are at base of harbor for AK...

Jim: 1975 case is similar, but observational data base is sparse.

Maybe need to have people suggest cases?

Fai: some of the models are coupled, so what is the objective?

Are we validating the landslide model or the ocean model, or a coupled model?

Dmitry: a complicated situation, landslide model and ocean model... we are not benchmarking only the landslide model at all... (Jim) there is some of that... (D) do we specify the dynamics of the rigid body or let the model determine it...?

Kara: Which of these 5 types is MOST important for modeling the HAZARD (areas where we have "very high" listings) for the US coastline. Then which is best for EC and GoM where this is the most likely type of event to happen. What types common in Alaska, CA, WA, other places?

Stephan: gives a long list.

Kara: As BMs are developed, need to make sure we hit the most common/important cases.

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Dmitry: PNG is a good BM

Designated a steering committee with the following members: Dmitry, Juan, Fai, Vasily, Alberto Lopes, and Rocky wants to help with the workshop preparations.

Timeline:

Next couple months conference calls and emails. Draft proposal.
By October 1 have list of BMs to discuss via MMS conference call.
Also a list of attendees (non-NTHMP people).

10:30 – 11:00 AM **DEM production/issues** (*Stroker, NGDC*)

(note: NGDC is now the National Center for Environmental Information, NCEI)

Jim Kirby comment on new USGS subaerial data for Hurricane Sandy area...

Marie question about whether state partners see DEMs before they go public. Kelly said that they always go out to the state partners and they rarely get a response. Tim clarified that maybe they don't go to the right state partners. Maybe there needs to be a list. Kara said this has been discussed before and that the NTHMP reps are the primary state partners. Should be sent to them before being sent to other state agencies.

Dmitry circulated a document asking what different states wanted regarding DEMs. [The list he compiled should be used.](#)

Chip asked what database they're using for Guam and CNMI; have been waiting on information in order to be able to respond to Dmitry.

Dmitry wants the wish list for FY16. First need to find out what FY15 items were done. Chip can't find out what the latest DEMs are; he hasn't been able to find them. Kara found that Guam DEM 1/3 arcsec (10m) completed 2008, Mariana Trench 6 arcsec 2012.

Fai's students complain that DEMs from NCEI don't compare with aerial photos (more than a pixel). Kelly said that NCEI needs to hear problems like that, so please let them know!

First test should be to have students capture the issues in a powerpoint, etc. and send it back to NCEI.

Some people (for example Chris Goldfinger) collect data on NSF funds but don't share it openly; they don't even share where it was collected.

Over and over we are noticing a need for a well documented procedure for DEM development and delivery...

Summary of steps:

1. Need list of all state point-of-contacts (POCs) to make it easier for Kelly.
 - a. Each state rep will be the POC, and it is their responsibility to disseminate information and needs forum NCEI further

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- b. The list of state reps is kept up-to-date on the MMS website
2. DEM prioritization occurs at the summer meeting
3. Once a model is selected for development, all known and local data will be passed on from the state POC to NCEI in timely fashion.
 - a. States need to let NCEI know about problem areas, issues, mismatches.
4. NCEI will notify to state POC via email when the DEM is complete and ready for review
 - a. MMS co-chairs will be CC'ed on the email
5. The state POC will have one month to review (with an option to extend for another month).
 - a. States need to let NCEI know about problem areas, issues, mismatches.
 - b. Co-chairs will follow up after 3 weeks if no feedback returned
6. NCEI will consider the DEM final and post to their website

***This process is to be written up and submitted as a **Guidance DEM document**

Rick question on CA issues: Long Beach – have you remodeled using new version of L.A. grid? Kelly said could extend grid into Port of Long Beach. Still seem to be some questions. Not sure if grid was redeveloped; may have just been a spot correction. Kara and Marie will look into it.

DEM wish lists for FY16: (see Dmitry's table in the PPT that he updated on the spot)

- Destin
- Cape Coral, FL Region south of Tampa Bay
- Possibly CNMI or Guam
- False Bay
- Larsen Bay
- Port Lions
- Karluk
- New lidar of EC could provide updates.
- Kelly will look into data,

Rick: CA doesn't need anything; AK is more pressing.

Rocky: If there's any work proposed by CNMI for FY15, regretfully the grant will not be awarded.

Tim: asked in general about the priority about having one new data set cut into these as opposed to all new? Tim should talk with Sue and Kelly. If there's new data and you'd like to see an update, discuss it with them to help them prioritize. Don't need anything for FY16.

Jim: don't need update unless new data is collected. Although, do have new subaerial data.

Kara: Maybe prioritize at our 2-month call.

Dmitry: Why do we have to prioritize?

Kara & Marie: Funded for 4 NTHMP selected DEMs per year and 4 PMEL-selected DEMs per year (for forecasting). If the NTHMP 4 overlap with the PMEL selected ones, they go down the list of NTHMP priorities.

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Fai: using mean high high water for datum? That's problematic for a large area. No, it's mean high. Rick said they offered to do one that was maybe NAD80 instead. A different datum can be used if it's requested. Fai uses mean sea level and makes local adjustments. CA would still want mean high water for inundation mapping. Marie said that can introduce slopes because each tide gage is different. Rick: may be good to find out how much extra work it is to use Vdatum. Marie said they do the original datum first and then the adjustment.

Agenda change: Dmitry's talk will be later today.

11:15 – 11:30 **Update on Steps for MMS Benchmarked Models** (*Gately*)

Updated matlab script will be available on NTHMP website.

NOAA can't make an approval on a recommendation but NTHMP can.

Jim: description of issues is different than what's in table 4. Like this version (what Kara's showing) better than the report's table 4 version. Lots of discussion.

Should draft papers be available for review by other people than just MMS?
Could be inundated with models to be benchmarked. Could be good or bad.

Presenting to MMS: can request a delay if don't approve, if it's not looking good.

Kara will update the document one more time (get rid of all the comments) and send it out in about a month.

Do we want to keep the requirement that they're open source? People could use the models in inappropriate ways.

11:00 – 11:15 **Update of Inundation Map Guidelines Document** (*Nicolisky*)

See Dmitry's updated document.

Discussion of adding something about an external peer review of maps, on page 2

Discussion of how the maps are reviewed. USGS standards? Individual state standards? Internal vs. external standards. Rocky suggested to trust the states that they'll have people developing maps following reasonable standards. Adding peer review to the process will bog things down. Rick suggested a softer statement that new maps, or maybe just their inputs should be presented to the MMS. Marie asked if we want to burden the MMS with that much extra work, also that there was a task identified yesterday to compile all the sources used by the NTHMP partners. Rocky suggested that if there isn't a problem we shouldn't be taking on extra work. Rick suggested as example that the east coast group presented their maps and got feedback from MMS. Tim pointed out that maps are notoriously hard to review. Rick suggested that could add "if the modelers want feedback, they can present maps to the MMS".

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Rewrite #6 on page 2. "all relevant tsunami sources must be considered" might be too encompassing. "Relevant" means different things for different uses. Change to "a suite of tsunami sources reviewed by the state geological survey or an equivalent entity".

"Collaboration between forecast and inundation modeling groups is encouraged". Good sentence. Leave as is!

"The NTHMP MMS is the review body to ensure NTHMP funded proposals generating inundation maps meet these guidelines". Do we really want to add a review process, or maybe just a discussion of the quality of the product? Rocky: semi-annual progress review: just are you making progress, it's not about the quality of the work. Want the grant review process by the co-chairs to be "yes" or "no", not details that can add difficulties. Table this discussion and pick it back up via email.

Map categories: do we need 3?

Table whole discussion for now, running long.

11:30 – Noon **Maintenance: Review & update of outdated materials on website** (*Gately*)

A redrawn version of the website was presented with more organization and structure. Many things are out of date. Suggest adding dates to documents or links so users know when they were updated. Maybe add a nice graphic.

All the benchmarking documents should be organized together, maybe open up to their own page. Modeling guidance: it has the only link that opens to a separate page as opposed to a pdf.

Under GIS products: Would like people to be able to quickly find the best website location for accessing NTHMP inundation mapping products... including online viewers and GIS downloads.

Kelly has a nice living document on google drive for DEM updates and development. We could use it and maybe do an update to the website every 6 months or so. (Grab from the google drive every 6 months or so, NOT LINK TO THE DRIVE).

Kara will send out an updated MMS website design (with updated documents) to Rocky and they will work together to come up with a mock-up website, which MMS can then review before going live.

1:00 – 1:30 PM **Review and Evaluation of MMS Performance Metrics (new tasks and guidance based on the NTHMP Strategic Plan)** (*MMS Co-Chairs*)

Update outcome terminology: change to "inundation and/or evacuation maps" instead of "all NTHMP-funded inundation model results" publicly available.

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Marie suggested putting things on big discovery portal (NOAA's?)

Show of hands who's testing higher resolution model results: CA, WA, East Coast ...

Develop a list of harbors and ports soon, so that can see how many need to be done to meet 25% by 2017. How define maritime products: currents, playbooks, overtopping, offshore safety zones; the key is maximum currents. (Work on that one). Rick suggested that probabilistic work could also fall under this.

=====

MMS co-chairs: Finalize MMS workplan for FY15 and FY16

See Kara's notes.

All comments on maritime guidance by August 10. Rick will send a clean version.

Tsunami Currents BM workshop proceedings.

Draft by Pat out for review by mid august

Steering committee to begin work on intro: Develop draft oct.1?

No cost extension has been approved

USGS collaborations

-letter of support

-develop workshop planning committee: Gately, Ross, Wilson

List of needs from NTHMP/MMS for USGS (need it ASAP): these needs should include MES (Nate will send email asking for their input)

Then Nate and Stephanie will come up with USGS people to meet those needs

.....[see Kara's ppt]

2:15 – 2:30 PM **Items needing CC approval and planning for the 2016 Annual Meeting** (*MMS Co-Chairs*)

Gary Chock offered to speak on ASCE tsunami standards

2:45 – 3:15 PM **NHWAVE - Tsunami inundation benchmark presentation to MMS** (*Jim Kirby, East Coast*)

Benchmarking: Synolakis et al. from PMEL

10 BM tests (see Jim's ppt)

NHWAVE Model description: fully nonlinear non-hydrostatic 3D solver for surface wave motion developed by Ma et al (2012). (see ppt for more details including governing and momentum equations, grid configuration, time stepping and spatial finite volume scheme, hydrodynamic considerations).

Grid configuration: Godunov-type finite volume method.

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All code is available to everyone. (Only one part is from somewhere else and it's publically available).

Analytic BM

Documentation provided to MMS

BP (BM Problem) 1: solitary wave on a simple beach.

BP4: solitary wave on a simple beach (breaking case and nonbreaking case).
Fai Cheung pointed out that waves can become very steep if you don't turn off the dispersion term.

BM6: solitary wave on a conical island by Briggs et al (1995)

BM7: Monai Valley. Don't have a comparison of where wave gauges are.

ENET-GRILLI LANDSLIDE:

Discussion: need more information from USGS to help identify where the potential slide deposits are now and how big they are, instead of modeling ones that have already failed.

Waves die off faster than seismically produced tsunamis.

Dmitry: runup at Monai:
How to go forward? Circulate report.....

3:45 - 4:15 PM **Revisit any MMS unfinished business, items of concern, or hot topics of discussion (MMS Co-Chairs)**

3:30 Rick: Maritime response planning.
Example from Marina del Rey and King Harbor workshop 6/4/2015
(see Rick's ppt with agenda for marina del rey and King Harbor tsunami response playbook workshop)

Tabletop exercises using playbook. Cascadia (less than 2 hours to respond). Northern Chile.

Evaluation of docks overtopping piles using FASTER water-level value
Question: in terms of overtopping, how well do you have it timed/correlated to the tide?

Question: isn't it cutting close on that piling in the example photo? Answer: There's 30% built in so that's as high up the piling as it will go.

Keep the maximum line on the maps? Keep the map with max inundation line for the community in the playbook but put the decision back on the community.

Question: how confident are you with your error bars that you're not exposing yourself to liability? Rick responded that they're trying to be very conservative.

Units: m/s vs. knots (about 1.1 mph)

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Let Rick know if you'd like any information. Fai would like a summary. Rick will be putting that together.

Dmitry: Going forward with the mapping guidelines. Will send the version with yellow highlights and ask us to review them.

4:12 Summary and Adjourn