National Tsunami Hazard Mitigation Program (NTHMP)
Model Benchmark Validation Workshop

Dates: March 31 – April 1, 2011

Venue: Mitchell Campus Texas A&M University at Galveston (TAMUG)

Objectives:

1. NTHMP Mapping and Modeling Subcommittee (MMS) established a Model Validation Team in January 2010. This team will identify a series of objective criteria that NTHMP models have to meet with respect to the benchmarking data (e.g., analytical, experimental, or field runup) to be deemed approved for tsunami inundation mapping (e.g., correlation coefficient, RMS error, mean/max error,…).
2. Based on the criteria selected, and in accordance with NTHMP guidance that models meet NOAA PMEL – 135, modelers will benchmark all models used for NTHMP tsunami inundation mapping, for the various tsunami sources being considered (i.e., co-seismic; underwater landslide; subaerial landslide).
3. Modelers will present the results of the benchmark cases, following the MMS Model Validation Team template and presentation guidelines. Presenters will have 30 minutes with 10 minutes for discussion.
4. In view of the performance of models presented at the workshop on the various benchmarks, the MMS will make recommendations on: (i) where improvements are needed in models for use in NTHMP; (ii) which type of models should be used for which types of sources/problems; (iii) what types of new benchmark problems may need to be designed for future validation.
5. In view of the above, the MMS will recommend to the NTHMP standards for model approval for tsunami inundation mapping from a specific tsunami source, e.g., a combination of: (i) results on objective criteria for a series of recommended benchmarks for a specific tsunami source; (ii) peer-reviewed publication(s) of the model bases, equations and basic validation.

Organization:

1. All NTHMP State representatives and lead NTHMP modelers are invited to attend, together with a limited number of guest observers (space available).
2. NTHMP state representatives may invite other modelers to participate in the workshop (both US and foreign based), if they think such contributions would be valuable to achieve the workshop objectives. Participation is on a space available basis and travel is not supported by the NTHMP. Invitations must be coordinated through the MMS co-chairs and MMS Model Validation Team.
3. All participants will complete at least a set of the proposed benchmarks for each type of tsunami source and present their results at the workshop in the required format (see next section).

4. It is planned to publish the benchmarking results of each modeling group as a series of peer-reviewed papers constituting a special issue of a relevant journal to be determined (e.g., Coastal Engng., J. Coastal Engng., Natural Haz. Earth Sc. Syst., Pure Appl. Geophys,…).

Procedure:

1. PMEL-135 is retained as the basic document describing how to proceed with tsunami model benchmarking. This set will be enriched, based on the decisions of the MMS Model Validation Team to potentially include a recent actual event field validation case. Additionally, three subsets of benchmark problems will be identified among the total of 14 problems corresponding to benchmarking: (i) co-seismic; (ii) underwater landslide; and (iii) subaerial landslide sources. It is understood that modelers can elect to validate their model for only one or several of these sources (i.e., using the relevant subset of benchmarking problems), and hence in such a case their model will receive NTHMP approval only for the selected sources.
2. The MMS Model Validation Team will post all the necessary benchmark problem information 3-months prior to the workshop (on the PMEL website http://nctr.pmel.noaa.gov/benchmark/). This will consist in a description of each (14) individual problem and of the available benchmarking data, as well as the list of benchmark problems relevant for each of 3 subsets pertaining to the 3 main types of tsunami sources (see above).
   Each benchmark problem will have an associated Matlab script containing the benchmarking data, and plotting it in a standardized manner (see next item).
3. At the workshop, in their presentation, all modelers must:
   (i) *Briefly describe their model* (i.e., equations, numerical methods, basic validation, published references);
   (ii) *Explain which benchmark subset* (i)-(iii) they selected and justify why this is relevant to their geographic area;
   (iii) *Demonstrate numerical accuracy* by verifying both mass conservation and convergence when using their model.
   As part of the workshop, it was decided that modelers could limit this verification of numerical accuracy to a minimum of two canonical benchmark problems outside of the selected subset (however modelers are free to choose more): (i) solitary wave propagation on a simple beach (one-dimensional); (ii) solitary wave on a conical island (two-dimensional).
   (iv) *Benchmark their model* for the selected subset of problems, by comparing model results to the analytical, experimental, or field data provided for each benchmark problem in the selected subset. This comparison will be both graphical and quantitative (with the computation of the value of the selected objective criteria defining model skill). To facilitate and standardize this process, the modelers will be provided with a Matlab script file for each problem that will automatically plot and calculate the criteria values, when provided with model results in a given format.

List of attendees (Final based on responses 21 January 2011)

	Name (Validation team bold)	**Contact**	**From**	**Purpose**	**Fund and Arrange Travel**	**Fund and Arrange Lodging**	**Attend Land-slide**	Lodging is for Tues - Fri night.
1	Costas Synolakis		NTHMP MMS	Organize workshop & follow-on publication	No reply	No reply	No reply	No reply
2	**Dmitry Nikolsky**	907-388-9563 djnicolsky@alaska.edu	Alaska model	Validate & present GI'-T and GI'-S models	Yes	Yes	Yes	provide early travel
3	Roger Alan Hansen	907-474-5533 roger@kiska.giseis.alaska.edu	Alaska rep	MMS AK Science rep	Yes	Yes	No?	
4	**Bill Knight**	907-745-4212 william.knight@noaa.gov	NOAA Alaska TWC	Validate and present ATFM, WCATWC rep	Fed	Fed	Yes	provide early travel
5	Vasily Titov	206-526-4536 vasily.titov@noaa.gov	NOAA & WA		Fed	Fed	?	
6	Elena Tolkova	206-526-4890 Elena.Tolkova@noaa.gov	WA CI	Validate and present NOAA MOST	Yes	Yes	?	
7	Frank Gonzalez	figonzal@u.washington.edu	Univ of WA	Validate and present GeoClaw	Yes	Yes	No?	
8	Robert C. Witter	(541) 574-7969 rob.witter@dogami.state.or.us	OR rep	Co-chair and OR science rep	Yes	Yes	No?	
9	Yinglong Joseph Zhang	(503)748-1960 yinglong@stccmop.org	OR model	Validate and present SELFE Model	Yes	Yes	Yes	
10	Rick Wilson	(916) 327-0981; Rick.Wilson@conservation.ca.gov	CA rep	MMS CA Science rep	Yes	Yes	No?	
11	Aggeliki Barberopoulou	206-795-7603; 795-7603 aggeliki.barberopoulou@gmail.com	CA model	Validate and present CA MOST Model (?)	Yes	Yes	?	
12	Hong Kie Thio	213-996-2250 hong_kie_thio@urscorp.com	CA - Visitor	Space-available; no funding	No	No	No?	
13	**Juan Horrillo**	Organizer of Landslide follow-on workshop horrillj@tamug.edu	Gulf of Mexico	Validate and present TSUNAMI3D	No - Local	No - Local	Yes	3D-VOF code initialize NEOWAVE
14	Amanda Wood	Juan's colleague wooda@tamug.edu	Gulf of Mexico	Also attending; GOM	No - Local	No - Local	Yes	

15	Volker Roeber	808-956-8198 volker@hawaii.edu	Hawaii	Lab benchmark and nearshore wave model BOSZ	Yes	Yes	?	
16	Yoshiki Yamazaki	(808)-429-8512 yoshikiy@hawaii.edu	Hawaii	Validate NEOWAVE	Yes	Yes	Yes	
17	**Stephan Toni Grilli**	401-874-6636 grilli@oce.uri.edu	East Coast Atl	FUNWAVE & Landslide Boussinesq model validation	Yes	Yes	Yes	provide early travel if desired
18	Jim Kirby	302-831-2438 kirby@udel.edu	East Coast Atl	FUNWAVE runup and inundation	Yes	Yes	No?	
19	Victor A. Huerfano	787 833 8433 victor@prsn.uprm.edu	Puerto Rico / USVI	MOST, Not validating?	Yes	Yes	Yes	provide flex travel
20	Aurelio Mercado	787-265-5461 aurelio.mercado@upr.edu	PR/USVI MMS	MMS Science Rep/Modeler	Yes	Yes	No?	provide flex travel
21	Fengyan Shi		ECA – Delawar e	Working with Jim Kirby	Yes	Yes	Yes	
22	Stéphane Abadie	401 782 6185 stephane.abadie@univ-pau.fr	ECA – Rhode Isl	THETIS, 3D-VOF code initialize Funwave	Yes	Yes	Yes	
23	Barry Eakins	303 497 6505 Barry.Eakins@noaa.gov	DEM NTHMP	Attending / observer;	No	Yes	Yes	
24	Eric Geist		USGS	Landslide tsunami	NO - Fed	No - Fed	Yes?	Through NWS

Federal travel arranged and funded through tsunami program, NWS (Lewis Kozlosky 301-713-1677)
Non-federal travel arranged and funded through UCAR for NTHMP

Presenters

AK	Dmitry Nikolsky	Validate GI'-T and GI'-S models
TWC	Bill Knight	Validate ATFM
PMEL	Elena Tolkova	Validate MOST
WA	Frank Gonzalez	Validate GeoClaw
OR	Yinglong Joseph Zhang	Validate SELFE Model
CA	Aggeliki Barberopoulou	Validate CA MOST Model
GOM	Juan Horrillo	TSUNAMI3D, The 3D-VOF initialize NEOWAVE
HI	Volker Roeber	Validate BOSZ
HI	Yoshiki Yamazaki	Validate NEOWAVE
EC	Stéphane Abadie	THETIS, the 3D-VOF code initialize Funwave
EC	Jim Kirby	FUNWAVE runup and inundation
EC	Stephan Grilli	FUNWAVE & Landslide Boussinesq

Agenda

~ 12 Models to validate

Day 1 Wed 30 March

8:00	8:20	Arrival and coffee (TAMUG arrange)
8:20	8:40	Welcome - Vice President, Dr. William Seitz
8:45	10:15	Present two models (40 min each)
10:15	10:30	Break (coffee, tea, soda, water - TAMUG arrange)
10:30	12:00	Present two models (40 min each)
12:00	13:15	Lunch - UCAR arrange with TAMUG catering
13:30	15:00	Present two models (40 min each)
15:00	15:15	Break (coffee & cookies TAMUG arrange)
15:15	17:00	Wrap-up and discussion (success of validation?)

Day 2 Thursday 31 March

8:00	8:30	Arrival and coffee (TAMUG arrange)
8:30	10:00	Present two models (40 min each)
10:00	10:15	Break (coffee, tea, soda, water - TAMUG arrange)
10:15	11:45	Present two models (40 min each)
11:45	13:15	Lunch - UCAR arrange with TAMUG catering
13:30	15:00	Present two models (40 min each)
15:00	15:15	Break (coffee & cookies TAMUG arrange)
15:15	17:00	Wrap-up and discussion (success of validation?)

Day 3 Friday 1 April

8:00	8:30	Arrival and coffee (TAMUG arrange)
8:30	10:00	Review and recommendation on validation
10:00	10:15	Break
10:15	11:45	Recommendation for future validation criteria
11:45	12:00	Closing
5:00		Wine and cheese reception followed by group dinner