Tuesday, 24 July 2018

0900-1000: noon MES/MMS joint meeting is brought to order by R. Lopes.
G.Cooper is introduced and:

1. Provides opening remarks
2. Recognizes new members Joel Figaroa (PR) and Jonathan Villagomez (CNMI)
3. With M. Angove, presents Certificate of Appreciation to C. Guard for his years of service

M. Angove provides overview of changes within Tsunami Warning Center and operationally focused activities:
Warning and public response activities are equally important. The focus of the NTWC over the next 5-10 years is on live forecasting of event rather than precomputed scenarios ('avoid the January 23 debacle'). New approaches to construct sources on the fly are underway to eliminate dependency on the now used pre-computed database that may not cover rupture area and to get warnings out more quickly. "With tsunamis, all of the uncertainty is up front". How do we actually characterize the source?

The newest deep-ocean sensing technology, the DART 4G (4th generation) has a 'nano' pressure transducer that can sample at 1HZ or higher. For this reason, the DART network is envisioned to filter out the seismic contribution to the signal from that of tsunami waves. NDBC will be deploying DART 4Gs to address DART II component obsolescence issues and to take advantage of potential near-source deployment making faster response possible however, more systems may be required. There is a fixed budget that comes into the NWS 'Observations portfolio' and the number is not changing that congress is appropriating so an increase in the number of DART systems is unlikely. HF radars are a piece of the solution.

Differences in the operation and forecast products between the two tsunami centers are being addressed with a new website that will help make the products between the two centers seamless.
Phone communications and procedures were a problem at the National Center during the 23 January tsunami. Procedures weren't followed, and no call was initiated. An assessment was done after the January event and although a live event is chaotic, NWS needs to get phones ringing somewhere else and get back to a check list of procedures. A live 23 January scenario drill internal to the NTWC in Alaska will be conducted on 9 August to test the training of the TWC staff and ensure that the lessons learned are being applied. A follow up widespread exercise with state partners may be occur at a later date.

Wireless Emergency Alerts (WEA) expanded messaging is still in progress: FCC is asking telecoms for 360 character messages instead of 90 character messages. After survey results, we will reconvene stakeholders' group to proceed with the final plans. How will the tsunami coastal polygons interface with the sever weather polygons used by the NWS and the NOAA Weather Radio? This will go through the FEMA IPAUS and will not affect NWR.

D. Nicolsky: Expressed concern about landslide sources and forecasting of tsunamis generated in regions of Alaska prone to them.
M. Angove: Forecasting of landslide tsunamis is likely not going to happen in the near future.

M. Dixon: Asked about breakpoints, US and Canada
M. Angove: Canada coastline is treated as any other US breakpoint. Issues with how we work with Canada during live event.

MMS Meeting

10:15-10:30 MMS Annual Workplace discussion and updates (D. Nicolsky & M. Eblé)

Agenda & logistics
10:15 - 10:30 MMS Annual Workplan (MMS Co-chairs)
10:30 - 11:15 Meteotsunami project: scope, study area, Workplan (Juan)
11:15 - 12:00 Inundation modeling and mapping Guidelines Status (Dmitry)
12:00 - 13:00 Lunch
13:00 - 14:00 MES - MMS Joint Maritime Task Discussion (MES Lead Discussion - Kevin Miller)
14:00 - 14:30 Tsunami Source Database: Status & Lessons Learned (Rick)
14:30 - 14:45 Break
14:45 - 17:00 Outcomes from the 1st Powell Center workshop (Stephanie) Development of logic trees, examples, simple cases (Hong Kie)

D. Nicolsky and M. Eble identified the need to select times/dates for regular MMS teleconferences. Initial thought is one hour prior to each Coordinating Committee meeting.

Schedule Change: The Assembly area discussion is moved to the MMS MES combined discussion.

Note-takers solicited. Thank you to these individuals who stepped up and provided the notes:
C. Guard: 8/24-26
S. Ross: 8/24 until noon
K. Stroker: 8/24 noon to 2:45?
D. Eungard & J. Allen: 8/24 2:45 -5 pm
J. Horillo - 8/25-26

MMS Annual Work Plan

1. Tsunami source database:
   1.1 Sediment transport bibliography. Should this be searchable?
   1.2 Powell Center efforts - Alaska sources focused meeting scheduled for October 2018
2. Maritime guidance: Presentations this afternoon
   2.1 Maritime guidance
   Status: In progress
   Joint, multi-year project with MES. Presentation Session is 1-2 pm with MES will include Hawaii's approach to addressing advisory level. Three states are going in slightly different directions. HI working with US Coast Guard. CA doing tsunami currents in harbors. AK looking at safety perspectives.

   R. Wilson: states moving in same direction; just different ways of generating products for locals.
   J. Allan: in all cases, working closely with Coast Guard.
   R. Wilson: we don't have HI's way of using it.
   F. Cheung: Coast Guard interested in moderate sized events, not ones needing a warning.
   R. Lopes: issue about annual items. looking for measurable progress within the year. Should be separated and listed in the vision plan.

3. Complete inundation, evacuation, and siren gap analysis (8/25 discussion on gap analysis)
   3.2 Gap Analysis
   Status: In Progress
   D. Belanger will share spreadsheet used to track the status of maps, sirens, TsuReady status in Alaska communities. Discussion set for tomorrow, 8/25.

4. Criteria for modeling tsunami currents (8/25 3-hr discussion)
   4.1 Need consistency with maritime guidance (3-hrs discussion 8/25 morning)

5. Updating mapping & modeling guidance (see D. Nicolsky read-ahead material)

6. Sediment transport modeling guidance. The literature search was conducted by the state of Washington.
   6.1 Not there yet. Grateful to state of WA for pulling together list of references on sediment transport. Sent document to Rocky to post during/after this meeting.

   D. Eungard (WA): Stephanie Earls created the document.
   T. Walsh: S. Ross, D. Belanger, C. Foreson and I sat down and gave Stephanie names of authors. It's not a systematic search, just a starting point.
   Dmitry: important for life safety and for houses built on sand dunes.

7. HAZUS guidance.
   Status: Dropped from Plan
   7.1 WA State is lead. Was not funded in a grant because HAZUS is a FEMA program.
   7.2 Hazard risk analysis is valuable. Further discussion with MES on Thursday 7/26)

   R. Lopes: not funded because FEMA was already doing it.
   R. Wilson: can we leave it on there but put caveat that FEMA is doing it?
   D. Nicolsky: who's the lead?
   R. Wilson: could be Tamra. Should continue discussion.
   J. Allan: we're doing a lot of work with HAZUS assessing tsu hazard risk. We're willing to share our experience. Modified HAZUS module to suit our needs. Willing to share.
   D. Nicolsky: let's discuss this on Thursday with MES.
   Jon: probably 2 years away from guideline

8. Landslide-generated tsunami modeling guidance.
   Status: Workshop complete; Document in review
   D. Nicolsky: would like to see a summary and conclusions earlier than final document.

9. Travel to Powell Center Workshop.
   Status: On-going
   9.1 Workshop/meeting 1 held in Spring 2018 - provided framework for subsequent regional meetings
   9.2 Alaska AASZ sources meeting will be held 1-5 October 2018
      Many emails sent, many people invited. AK experts, state representatives.
      S. Ross will be talking later today about Powell Center activities.
      Thanks extended to Hong Kie for joining MMS meeting to talk about Powell Center work.

10. Tsunami assembly area terminology and guidance (with MES)
    Status: On-going with MES
    J. Allan: seems more appropriate to discuss with MES first.

11. NCEI DEM development (K. Stroker update)
    K. Stroker: Montauk, two in AK (Port Alexander, Wrangell), (see full list provided by K. Stroker)

Meteotsunami Project
J. Horillo, B. Knight, W. Cheng, and collaborators J. Kirby, S. Grilli, P. Chu, C. Wu

Prelude (Meteotsunami modeling guidance) by S. Grilli

1. Climatology: 548 potential MT over 20 years
2. Ten (10) largest events were chosen for study (See see table in S. Grilli's slides)
3. Looked at pressure jumps recorded from radar or weather source to determine storm geometry and speed. 3.1 Findings
   Model produces a pressure field that corresponds to the correct phase frequency/resonance
   Model captures the peaks well for 2012 events
   3.2 Next steps:
   Use historical records of events to pull out storm characteristics that setup tsunamis and then
   Run Monte-Carlo simulations to probabilistically:
   Estimate coastal hazard and
   Determine 50-year and 100-year return frequency

Discussion on methods of pressure inversion and comparison between the waveform and to peak

4. Publications/Conferences
   S. Grilli: East-Coast meteotsunami hazard (Kirby, Woodruff, Grilli)
   Observed meteotsunamis (MT) on the East Coast.
   Presentation at AGU in December 2018 by Dusek et al,
   Identified 548 potential MT events between 1997-2017 in east coast and Caribbean tide gauges.

Questions
M. Angove: how did you put the source in there?
S. Grilli: took max pressure jump recorded from radar/weather information.
M. Angove: so you create pressure field and model it as gravity wave.
J. Allan: just one variable? Are other variables involved in driving the change?
M. Angove: oh. You did an idealized post-inversion pressure field. Gives an idea of detail you'd need.

S. Grilli: wanted statistics to do hazard analysis based on Monte Carlo simulations

Range of characteristics for US east coast determined on largest pressure jumps, storm velocities and storm geometry

J. Allan: you're not getting to the peaks.
S. Grilli: main peaks are well captured.
M. Angove: it's a pretty good fit. He had to go back to an idealized pressure field.

M. Angove: did Dusek et al. look at Canadian maritimes? (They get big ones).
S. Grilli: East Coast and West Coast are very diff so expect statistics to look different.

Meteotsunami Project
Project Presentation - Scope, study area, work plan
J. Horrillo

Overview

Project is collaboration with B. Knight, W. Cheng with collaborators J. Kirby, S. Grilli, P. Chu, C. Wu.

In the Gulf of Mexico, meteotsunami can be triggered by extratropical cyclones in the winter and by tropical cyclones in the summer.
Waves could be 1-2 meters, but most are <0.5 meters; c=square root of gh; speed varied from 20-35 m/s.

M. Angove: do we have a sense for the extreme for the GOM meteotsunami?
J. Horrillo: Yes, 1 m

Pilot Study will be single location, possibly Panama City, Florida
Project Goal is to tell emergency managers that meteotsunami was generated.

Simple first pass, feasibility test case study presented:
Naples, FL 1/17/2016
Comparison of the St. Petersburg and Naples tide gauges.
Computed marigram. Model amplitude is 25% of observed.

Discussion/Questions
M. Angove: upper amplitude bounds are constrained (only up to a meter). Because MT is traveling in same general direction as the weather system, it's hard to separate those. From an EM standpoint, what do you do with it? On EC can treat them as separate events (hours apart). Forecast offices would need to message it. Weather will be bad, worse than usual.
R. Wilson: if treated as tsunami, can use tsunami evacuation zones.
J. Horrillo/S. Grilli: propagation and resonance.
M. Angove: have to be careful if talking about cm.
S. Grilli: doesn't matter with resonance.
M. Angove: do the frequencies drive the coastal amplitude? Is it binary?
S. Grilli: can answer that later.

J. Horrilo: refers participants to extremestorms.com

M. Eblé: will you look for information/guidance for other areas?
J. Horrilo: yes

D. Arcas: you check for primary resonance?
J. Horrillo: yes.

M. Angove: Forecast offices are now conditioned to understand this is a separate threat. Timing is good.
D. Arcas: we're getting good results with just pressure forcing without the wind forcing.

11:15-12:00 INUNDATION MODELING AND MAPPING GUIDELINES STATUS (D. Nicolsky)

D. Nicolsky references three (3) documents made available for review. Only received a few responses. Guidelines document is edited as part of meeting session.
Request is made of everyone to review the documents and provide comment.

Session took the form of long discussions on DEM specifications, scale of study areas, and model uncertainty and how each should be incorporated in maps as document was edited.
In northern latitudes, resolution is problematic as one direction is 1/3 arc-sec and the other is ⅔ arc-sec. Therefore, resolution in one direction does not' help determining resolution in the other and cannot resolve the higher frequency wave in areas where the resolution isn't sufficient to do so

Co-chairs referred members to the NTHMP web site as alternate way to access the original document.

J. Allan: under map types, (part II), previous version had information on grid resolution but new version doesn't. Is that to make it more flexible?
D. Nicolsky: constraint was added to Part I. "cell sizes less than 3 arc-seconds (~90 meter)"
R. Wilson: hope in CA never to go back to 90 meter resolution.

D. Nicolsky: also need to look at sources, not just grid resolution.
D. Eungard: resolution matters depending on topography. Example: river channel. In some cases 90 m is sufficient, but not at all suitable for other cases (river channels). "Do not use these results for river channels" kind of language.
T. Walsh: had some text that river channel captured in at least 3 grid cells.
D. Nicolsky: "Grid should be of a cell size sufficient to resolve significant coastal features and narrow passages".
S. Grilli: bare earth example.
R. Wilson: most of the structures we deal with are wood frame houses.
Stephan: we don't go to that level of detail but could leave the door open.
R. Wilson: why did we break out the map types? Had that question 10 years ago. I'm not sure it's helpful.
T. Walsh: always been a contingent who wants to put a quality standard on it. Got very complicated, weren't able to pull it off.
D. Arcas: when we get DEMs from NCEI, when working across equator it's okay, when get to WA it's worse (half the cell size in longitude as in latitude). Determines wave frequencies. If don't have it in one direction, doesn't help to have it in the other direction. In WA state 1/3 arc-sec in one direction, 2/3 in the other. Can not really resolve higher frequency waves with that. Doing extra work in one direction that can't be used.
M. Angove: goes to the idea of tiles, Kelly?
K. Stroker: does make sense to move away from using arc-sec instead of meters for resolution. But tiles defined by arc-sec not meters.

D. Nicolsky: categories a, b, c. probably best to work towards idealized version of a map.
R. Wilson: do have another guideline for that.
D. Nicolsky: sometime have to do some assessment without highest quality data. Need to give it some sort of gradation to explain on maps. We have 2 types of maps – high resolution mapping and modeling report vs coarser. Categories A and B.
J. Allan: if have categories, need guidance about the resolution. It's currently deleted. Or get rid of types and give some description.
R. Wilson: or go with regional vs. site specific. We already have the two guidances.
T. Walsh: site-specific has multiple meanings. Some of this is obsolete now.
R. Wilson: we never use types 1, 2, 3 for our maps. We need a minimum standard and an idealized standard.
S. Grilli: comment on 10 m resolution. We recently did that as part of barrier island. We looked at max inundation and elevation at fixed isobaths. It's not just bathymetry, it's tsunami specific.

D. Nicolsky: How do we change the types?
Community level vs site specific

Leave type 1 as is.
Type 2. (see Dmitry's file with changes he made on the fly). Maps developed using data sufficient to resolve all bathymetric and topographic features (10 m resolution).
Type 3: site specific maps developed using data with the level of resolution depending on the tsunami impact project (structures, dunes, tide currents, etc.)

J. Horrillo: source uncertainty.
D. Nicolsky: I added a line: "the landward limit of inundation needs to be extended further in-land from the maximum extent of inundation to incorporate an uncertainty …."

Benchmarking of numerical models occurs with some level of uncertainty. Ex. 5-10 % uncertainty in numerical model. Then also uncertainty in source area. At most model 15 sources for a site.

J. Allan: still unclear.
R. Wilson: I'm also uncomfortable applying a percentage.
D. Arcas: the contour line doesn't coincide with evacuation map, to give a buffer to help take care of these uncertainties. Dmitry was talking about increasing the flow depth/runup by 20%.
R. Wilson: I'd like to see more discussion without numbers of uncertainty.

T. Walsh: and difference between inundation and evacuation maps.

D. Nicolsky: project specific, but need to do minimal something.

D. Eungard: erring on conservative side of things is preferred in all map products.
T. Walsh: in engineering communities, they say they use engineering judgement. We should be willing to do something similar.
R. Wilson: say something like "errors have been found to be 10-20%. Be aware of this". Worry about phrases like "needs to be".
J. Allan: in OR we have 5 inundation lines – small to XXL.

M. Eble: lunch time. This is a good conversation to have with MES.
R. Wilson: table this. Have a call to have it done by ___.

J. Allan: one more controversy. Line about sand dunes.
D. Nicolsky: put it in there to engender discussion.

Break for lunch

13:00 - 14:00 Joint MES-MMS Meeting (K. Miller lead)

Joint meeting focused on tsunami hazards that could directly affect harbors and boaters.
The goal is to provide these constituencies with clear mapping products along with guidelines and best practices .

International and Domestic Mapping Products activities:
Creating SOPs at the international level, training, and outreach to international partners.
Create guidelines for evacuation mapping based on COMMIT data with QGIS.
New focus is now on maritime guidance.
Vertical evacuation guidance from Washington. Discussed Japanese guidance and the issues with translating the information they have.

1. Maritime Guidance - Guidelines and Best Practices for Maritime Communities (K. Miller)
   1.1 Strategic Plan Review
   1.2 Guidance for Safe Minimum Offshore Depth—all locations have satisfied this need
   1.3 Maritime Response and Mitigation Planning Products: California, Oregon, Alaska
   1.4 Determining Appropriate Maritime Planning and Response Guidance:
      * 2-level response guidance
      * multiple-level response guidance
   1.5 Status of NTHMP Partner Maritime Planning
   1.6 NTHMP Tsunami Current Model Benchmark Workshop
   1.7 Playbooks
   1.8 Harbor damage assessments
   1.9 Harbor Improvement Reports (HIR)
   1.10 Maritime Tsunami Recovery Guidance
   1.11 D. Nicolsky: Add guidance for local tsunamis.

2. UNESCO IOC TOWS Program (L. Kong)
   2.1 Overview and efforts
      Purpose is to make sure practices/best practices are shared
      Task Team members - Laura and Christa
      Standard Operating Procedures (SOP) Manual:
         Plans and Procedures for Tsunami Warning and Emergency Management
      Working on an international TsunamiReady-type program
      Develop Maritime and Ports Tsunami Guidance and Best Practices
      Structural Design and Vertical Evacuation Guidance and Best Practices
         2.1.1 Japan has several handbooks, including handbook for constructing vertical evacuation
         2.1.2 Document of Guidance for Ports and Harbors
         2.1.3 Response against tsunami

3. Tsunami Source Characterization Database/Spreadsheet (R. Wilson)
   Overview: NTHMP MMS project - Supports the Powell Center Meetings/Workshop series

   R. Wilson expressed appreciation of effort by everyone to send sources in use by respective State.
   Consistency was major driver to the source compilation.
   Source characterization: consistency among users; methods of characterizing/comparison of sources; collection of existing sources (subduction zones, landslides, crustal faults)
   Oregon has done great work as has Washington.

   Data type inputs into database:
      a. Range from spreadsheet entries to GIS and full dynamic models.
      b. SZ, crustal fault, and landslides dominant though all tsunami sources considered.
   * Discussion on slip patches and the change of the science since the early 2000's to today.

   This effort sets the stage for Powell Center regional workshops by looking at what information each state considers important for modeling in order to develop useful products.

   What is needed for developing a tsunami hazard map?
   - NTHMP Guidance
   - Historical docs and events
   - Deposits
   - Numerical modeling
   - Bathymetry/topography
   - DEMs
   - Recurrence intervals

Tsunami Source Characterization

1. Consistency - by each user at the state and fed level
2. Methods of characterizing/comparison
   - database/spreadsheet
   - Source references and images
   - GIS/KMLs
   - Dynamic models
   - Collection of existing sources
   - Various source types
   - Rick showed the CA subduction zone sources and other states
   - AS includes normal and combination faults. A lot of detail
   - Puerto Rico - volcano threat as well >500 sources
     What is the magnitude threshold for volcanic landslides?
   - Guam - underwater volcanoes not modeled

Next Steps

1. Combine all into one spreadsheet
2. Create definitions
3. Consider a simple spreadsheet with links to images/GIS data
4. Alternative database formats
   Database at NCEI - $40-$50k
5. Purpose - compare everyone's models and sources to form consensus or consistency.
6. Retrospectively, rather than live, develop format usable by others.
7. The meteo and volcano work would eventually be included
8. Purpose: Would satisfy national academy of sciences request for repository

Diego - when putting together the different sources from modeling groups, they do not all have the same locations for fault center, etc. It would be good to have standard definitions for this. If we don't pay attention to this, we will have many differences. Try to standardize this.

P. Lynett - is this because they are using different deformation models? (Eg PMEL defines differently than Randy LV at UW)

J. Allan - could some of that be addressed in the GIS? Ideally if groups are sharing that kind of data. Do we try to standardize or mention that it is different.Can you identify differences in the database. Is it at the end of one corner of a subfault or the center, etc. Depth and location vary widely from one model to another. As long as we keep track of how we are defining each source, we can get to the task of aligning things. We could add these files to the database but we need to do it now before we get too far down.

D. Nicolsky: there is no source that is tectonic and landslide. Triggered landslides working together to cause tsunami

S. Grilli: there is an infinity of possibilities so how to include. We can only look at historical

J.Horrillo: There will be an experiment for volcanic eruptions; contributions are:
the eruption, landslide, and pyroclastic flow

D. Arcas: Different people/agencies use different definitions for different parameters; for example,
is a segment taken from the top or bottom of the segment?
Is the location taken from the center or corner of the segment?
Landslides have more problems; locations are not repetitive in the same location.

Summary: There was much discussion about database usage, needs, format, and hosting. Considerations included future updates, additional fields (for landslides etc.), integration into a single database, creation of supporting documentation, and alternate database format. Challenges include maintaining source definition parameters given differences in model techniques. A main benefit is a stable repository for reference.

4. Powell Center Meetings (S. Ross)

Meeting schedule
MMS-USGS Workshop 2016: Standardization of tsunami sources; Powell Center grant;

Outcomes from the 1st Powell Center workshop (Stephanie)

1. 2016 Workshop - a tsunami source database would be helpful
2. There was no clear path forward for analysis and synthesis
3. Tsunami Source Standardization for Hazards Mitigation in the US - softened to "Towards consistency"
4. Went over working group members
5. The plan is for a series of workshops, one planning and the remainder regional, as follows:
   Workshop 1 April 9-13, 2018 Decided on info needed for regional meetings
   Workshop 2 Alaska sources
   Workshop 3; Caribbeans sources
   Workshop 4 Pacific Sources other than Alaska; how will we handle Cascadia?
6. Outcomes of Workshop 1:
   Efforts prioritized as: Subduction zone sources and parameters, Landslides
   Work plan - White paper in final stages of development
   Work plan for regional meeting - long list of bullets in slide
   After regional meeting - compile results, provide summary to NTHMP
   Representation from the warning centers would be beneficial
   Suggested participant list for Caribbean and Pacific workshop
   *Too many on the list. Need to trim down

P. Lynette: Summarized the Powell Center Plans as:
Mostly earthquake with 1-1.5 days for landslide; several scenarios; recurrence rate not a factor for landslides; focus on design scenarios through a sensible range. There are 7 steps:
Landslide source logic tree; complex.

7. Engage MES Colleagues in discussion on recurrence period/acceptable risk
   R. Wilson - it would be helpful to obtain a minimum risk level. Emergency managers.
   Event recurrence and inundation recurrence are not the same. Should not choose an event and base your inundation around it. Complicated question
   C. Guard - has anyone worked out the recurrence for American Samoa. Fai - 1000 years.
   Emergency manager? - is it maximum/maximum.
   This will vary with geography (eg Ocean shores and bellingham)
   D.Nicolsky - hard to talk about recurrence intervals with stakeholders.
   They look to us for the response and want to know what will happen in next 50-100 yrs.
   Do we want to consider an event once in 10000 or tectonic & landslide together?
   Choi: Alaska Logic Tree; need to update the 2007 data bases.
   Consider past events, observations, lack of large events in last 3000years, plate rates.
   Assumptions: multi-segment slips; model separated at 180 longitude—eastern Aleutians and western Aleutians; Complex decision trees;18 different branches
   Rick - Japan was developing for 500-yr events but also included larger events.
   Japan now closer to 1000 years.
   J.Allan - engineering requirements and evacuation requirements are different.
   D. Arcas - given the average slip you can expect and then the max possible.
   PMEL has assumed the max slip happens right in front of the community.
   Is recurrence determined in terms of max or avg slip? May get twice as much inundation.
   Using this as a factor of safety. Worst case condition on worst part of fault (Max of max)
   What is the probability of having this happen?
   R.Lopes - Advice from social science - never use probability. It doesn't work.

And don't tell emergency managers they can't look at your website; they will find it.
California - going to probabilistic and will have to talk to engineers, emergency managers and maybe general public. Google Dennis Molleti probabilistic.

R.Lopes thanked Stephanie for her work to secure extra funding for NTHMP members on this.

Alaska Regional Workshop plan (D. Nicolsky)
Presented on the Alaska sources under consideration for Alaska regional workshop in October. These serve as a possible testbed for logic tree development, includes 3 fault segments that ruptured introducing conditional probabilities. Given the 1964 event happened ~50 years ago, what is the next maximum credible earthquake what could we expect in the next 100 years? Chip wanted to know if any effort has been made to establish this, Dimitri expects that some information is available based on the asperities from the rupture that there is lingering strain in the plate.

1. Source area selected coincides with 1963 Alaska earthquake rupture.
   Reasoning:
   - A set of tsunami sources for this area have been developed.
   - This area is important. People are asking when the next big earthquake will occur and what might impact hem and their children in the next century
   - Much research ihas been done n this area over the last 50 years
   - These data can help to validate logic trees and hazards curves
   - Three (3) different segments, each with different recurrence intervals, will be addressed
     Kodiak Island
     Prince William Sound
     Yakatak.

C.Guard: would like a way to estimate what the potential is now 50 years later

8. Development of logic trees, examples, simple cases (Hong Kie)
Presented the Alaska CZ probabilistic models based on ASCE 7-6 and noted a large variety of earthquake recurrence based on data from the USGS. The Alaska source model (logic tree) includes source distribution at the head and various source parameters at the tail. Recurrence rates range from 2,000 to 10,000 years. Each major part of the model tree has 18 branches, overall with epistemic uncertainties included it produces nearly 1000 solutions. Every EQ has 3 asperities that occur at 1/3 of the total length of the rupture.

Main take away is that the source model is consistent with USGS Seismic Hazard maps.

1. Specifics
   - 2007 USGS model - 7 or 8 different segments -> Table of segments and their recurrence models shows that high variability in rates for big earthquakes
   - Constraints
     Event observations (including age) for Takataga, PWS, Kodiak
     Lack of lg events - Shumagin gap currently creeping. No events in last 3000 yrs
     Plate rates and convergence rates vary quite a lot along the arc
   - Assumptions
     Segmentation following Jacobs and Nishenko
     Multi-segment ruptures possible
     Lg rupture extend from 180 degrees long E/W - there is a break where the Aleutian islands bend. The convergence rate is low. Divided the model at 180
     Rupture can involve the Shumagin segment - jump the Shumagin segment. Rick - will the slip amount be lower? No, slip as a normal earthquake. Jon - how big is the Shumagin? 150-200 km
     Convergence rates across segments vary quite a bit from 5 mm/year (Komandorsky) to 70 mm/year (Unimak)

Questions/Comments:

C. Guard: Is there feedback into the model?
Hong Kie: slip rates are checked to ensure they do not exceed the plate rate.
D. Arcas: Could Alaska logic tree be used for other regions or is it Alaska specific?
Ans: Parts of the logic tree can be used elsewhere as the physics and the parameters are the same everywhere. Subduction zone specifics are not transferrable to other regions.
M. Eble: comments - this is reason for building the database with so many variables.
P. Lynett: approves of this method as it defines the variables that are needed for a database. This would apply to both probabilistic and deterministic modeling.
J. Allan: how is the co-seismic response computed (how are they constrained), example provided being the Cascadia scenarios which include some extreme subsidence ranges?
Ans (Hong Kei): Response is accounted for in a separate model tree for ASCE-7.
T.Walsh: Are uplift and subsidence coupled or no?
Ans (Hong Kei): one is computed and coupled with the other.

2. LOGIC TREE

- Segmentation model - intermediate multisegment ruptures. Scenarios can and will be computed for any branch.
- With different segments rupturing together. This makes it easier to keep things consistent with each other
- All segments rupturing together - mag 9.5-9.6 earthquakes
- Possible to get many thousands of options from multiplication of the branches chosen as important.
- Creates a template to populate the database. Everything you need whether you are probabilistic or deterministic is in this logic tree
- This is a living tree - more input added all the time like the USGS seismic hazard maps
- This is a template that the experts meeting in Oct will be able to define and add inputs
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Questions/Answers
1. How does the logic tree approach handle scaling relationship - gives you that plus distribution

2. Where does the magnitude appear in the logic tree?
Ans: At the far right end. Defining width, depth & scaling relationships which gives magnitude.
3. D. Arcas - is this methodology that a modeler from South America could take and apply and come up with the sources they want to run?
Ans: In general yes. The results will be dependent on the group conducting the analysis. Best to have a group of people looking at the analysis like for the Powell Center
4. How is the coseismic response treated in this?
Ans: Coseismic is in there for each. Every source will have its own coseismic signal.

9. Alaska Landslide Tsunami Sources (P. Lynett)
Alaska landslide sources were presented.
Considerations are:
Geometry of mass movement (including failure plane)
Mass failure mechanism and the slide material
Coefficients that govern material behavior
Needs for single location source logic tree are:
Lat/lon
Volume
Aspect Ratio
Slide Material
Failure Mechanis

For Alaska, there is a list of 14/15 locations, recognized as not all inclusive

Once mass is defined, downslope methods may vary widely as there are models for a number of failure methods (uniform vs stochastic slip on faults). Combinations of volume and failure factors will be solved with a logic tree. Recurrence rates will not be used in any probabilistic sense. This could be done with a database of previous events (does not yet exist), or could be correlated with a given trigger. The first phase will focus on the list of 15 pre-identified locations; others may be added based on historic events (1964), or could be grouped by similar geophysical character. Volcanic sources, presumably flank collapse Prioritization of source will be key as Powell Center workshop will only have time for one or two. With no recurrence information this leads us to simply state that it is an extreme event with low chance of occurring.

Questions
S. Grilli: how can people come to a concensus on so many possibilities?
Ans: Can replace a column of boxes with a distribution
P. Lynett: plan for Alaska is to see what works and what doesn't work and modify for future workshops.
S. Grilli and J. Horrillo briefly explain their process of running shelf failure models for the east coast; a distributional approach rather than the weighted approach.
P. Lynett: we are testing this at the workshop for Alaska first knowing that the East Coast is much more complicated. Eventually the lessons learned will be circled back to the Alaska folks.

Powell Center Summary: The broad needs that created the project for tsunami sources and synthesis through the Powell Center were reviewed and discussed. The effort focuses on developing sources through careful consideration of parameters and then developing recurrence intervals for use in deterministic and probabilistic modeling of tsunamis. The first workshop was held in April and planning is underway for Workshop 2, the regional workshop on Alaska sources. Alaska, Washington, Oregon, California, and Hawaii representatives will be participants. Funding is provided for 3 regional workshops so options for a 4th, Cascadia-focused workshop, are being explored in consideration of a separate Powell Center working group that is now looking at recurrence intervals along Cascadia. A white paper that documents the outcomes of the first workshop and serves as preparation material for subsequent workshops is being finalized by M. Eble.

Extensive discussions on recurrence interval highlighted their importance. Those engaged in Powell Center activities, expressed a need to know state preferences. Given the difficulty in generating consensus on recurrence interval due to different application needs by stakeholders, it was decided that states could later choose which recurrences to model since a suite would be an outcome of each workshop. Rocky reinforced that care should be taken discussions of probabilities with EMs and the public since they do not necessarily understand the background math. R. Wilson contributes that probabilistic studies will be the way of the future, and we will have to start working on the explanations sooner rather than later. .

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Wednesday, 25 July 2018

09:00 - 12:00 Maritime modeling products and guidelines; Development of benchmarks for tsunami current modeling

D. Nicolsky leads the discussion with a question; how do we go about preparing maritime modeling and guidance documents?
C. Guard: Identify off-shore safe distance, add buffer for debris avoidance, and work with USCG to make sure partners were on board.
F. Cheung: Modeling for Guam utilized the worst case local scenario, consistent with inundation models (future modeling for other Pacific territories will be done as well).
R. Wilson: This was done by everyone to generate the existing guidance document. Also California is working on updated/enhance guidance for a more complex scenario.
Group: There is no one size fits all solution

J. Allan: We may be benefitted to have other experts (naval architect) to help us understand issues that we may not be aware of.
Group: a number of people have worked with pilots before, found it to be a helpful discussion.
R. Wilson: are we looking to create a guidance document for modeling or for use of models by the stakeholders?
D. Nicolsky: He sees it satisfying both, or that both documents should be produced.
J. Kirby: he is not familiar with a sufficient body of work exists to prove that a worst case scenario tsunami may produce the worst case currents.
D. Nicolsky: Agree

Discussion of events in Guam from the historic events that they have experienced.
R. Wilson: Multiple levels of tsunami, Advisiory->Warning may be helpful for the end user as it gives them more options. Additional issues besides max currents must be considered, i.e. grounding, vorticity, etc.
J. Allan: for large river systems, tidal effect plays a major role with river flow, a much more complicated picture
J. Horrillo: How do you define or establish "safe" areas (the group strongly opposed the use of this word).
R. Wilson: anything less than 3 knots would be considered "safe"
J. Allan/D. Eungard: Some places do not have sufficient depth to have any regions that would meet current guidance, and we need to do more.
J. Allan: To some extent having avoidance areas may be more useful than "safe" areas

D. Nicolsky: What models should we use to conduct current modeling?
M. Eble: Patrick Lynett (USC) had a report that he generated and that this could be a base starting point.

R. Wilson: an example of issues they had was the MOST model did not capture eddies and they manually called out areas that regions with likely eddy formation (pre-benchmarking). MOST turns out to be conservative with regards to current modeling. 10 meter resolution was the minimum grid size that was able to capture currents with high accuracy, was comparable to the Boussinesq model. Everyone wants to use their own model, and to some degree is not a bad idea as they understand them and can make the corrections necessary to make them work.
M. Eble: Comparisons should be made between models to understand the pro/cons of each, also that is what the workshop is for, and ensemble models could solve this
R. Wilson: ensemble models may be too costly and is not feasible for all partners
D. Arcas: different models use different physics and to some degree changing resolution would not improve model results.
Lots of discussion about different models and the physics plus the 2D-3D issue.

R. Wilson: Should we require verification of models against field events?

D. Arcas does not think enough field data yet exist to make overarching decisions on this yet.
M. Eble brings everything back to the fore and asks how can we communicate to the EMs we give them results, how can they trust them?
R. Wilson/D. Arcas/J. Allan: We should not be prescriptive in our results and that a great deal of work must be conducted before we can be more affirmative in our statements. This is a first generation product that will need to be revisited and redeveloped in the future.
D. Nicolsky: brings a discussion back to the guidance development and notes that only a half dozen to a dozen models exist, combination of shallow water, boussinesq, and navier-stokes.

Suggestion was made to make an NSF proposal to do current velocity studies based on wave-tank studies of harbor to provide additional data for validation studies. East Coast members will take the lead on this though it would be a multi-stakeholder effort.

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R. Wilson leads the discussion with the slides he presented at a Washington State maritime workshop. The information is also in their guidance documents that California is developing. Get links to presentation from R. Wilson.
S. Grilli: one product we can produce is evacuation time of various category of ships to give captains a better idea of where they would be if they tried to evacuate given the time allotted.
J. Allan: people are already looking at this.
D. Arcas: Do the models need to be run again at MLW to get minimums?
R. Wilson: California took the maximum wave height and just added a minus sign to say the maximum would be an inverse to the minimum. This may be a simplification, but would be conservative and not add cost to projects.
C. Guard: what is the bottom clearance needed for ships?
F. Cheung: for sandy bottoms .5 meter and 1 meter for hard bottoms.
Checklists available to help states that have not started the process or are ongoing to save time/cost and also have consistency between groups.
Next step, California is finishing the update to the guidance and also add more to the mitigation and outreach components of the guidance.

Break for lunch

13:00 - 14:00 Updates on: Mutual Workplan projects

- **Gap analysis,**
- **Pedestrian Evacuation Modeling**
- **Going from inundation map to evacuation map**
- **Definition of the Geologically Plausible, Maximum Credible scenarios, what is the return period**

D. Nicolsky shows gap analysis spreadsheet, East Coast and Alaska are leads on this project. D. Nicolsky's spreadsheet has communities, population, tsunami ready status, tsunami inundation lines, evacuation map, sirens, threat level potential, local sources.
J. Allan /R. Wilson: better to couch it as hazard rather than risk or matching it to the warning/advisory level
R. Wilson: break threats down to local (<1hr), regional (1-3 hr), distant (>3 hr)
Extensive group discussion about local vs regional vs distant sources.
J. Allan: Add columns for evacuation and maritime modeling/maps
Group discussion to share the draft spreadsheet with the MES at the joint meeting.

Discussion moves on to the Pedestrian evacuation modeling:

D. Eungard presented their modeling process, issues that arose, and steps forward. The pedestrian evacuation toolkit (Nathan Wood, USGS) does not have an upper limit on slope; WA is looking closer at ground cover (not much difference in 30 m USGS resolution and a higher resolution; WA made 55% slope and wetlands as impassable
V. Huerfano presents products that they created based on Nathan Wood's work at USGS.
D. Nicolsky: Alaska plans to use evacuation on the "roads only" and uses a pace of 0.84 m/s because of the snow that most communities have to deal with.
J. Allan: Oregon uses a similar approach as Alaska, they use a beat the wave, look at choke points, liquefaction, landslides, etc. walking on liquefaction is similar to walking on sand; OR also assesses landslide potential; scenarios for bridge is out.
R. Wilson: They are running a statewide analysis of modeling at 4 travel times, this is all based on State laws requiring plans for mitigating known hazards.

Discussion on the Geologically Plausible, Maximum Credible scenarios is tabled until the MES-MMS meeting.

14:00 - 16:00 Poster session, Partner Updates:

J. Horrillo presents on his activities in the Gulf of Mexico, 9 sources are currently modeled with a combination of earthquake and landslide sources. Current modeling includes part of the Florida coast (Naples). Two new landslide sources provided by USGS are among the models; high escarpment oriented east-west focuses energy toward Padre Island and Corpus Christi and also the Panhandle of Florida.

R. Wilson presents work on the FASTER approach. Mutually beneficial work: 3 areas: Real-time forecast information is very valuable but they use FASTER to determine actual inundation/maximum runup; tides are important; ATFM and SIFT are used by NTWC; RIFT is used by PTWC; 91% of advisories; 84% were accurate or conservative; SIFT is considering the astronomical tide; FASTER adds tides, SL elevation M. Angove is concerned about this on a procedural side and how this is not being satisfied by SIFT currently. The FASTER approach takes a more localized approach could be in their playbook.

J. Allan presents the Tsunami Modeling for the Columbia River: Towards Tsunami Maritime Planning: Incorporates tides and river flow into the tsunami modeling; 35 simulations; used 1964 Alaska tsunami event to evaluate model performance; modeled all the way to Portland (4 hours); 34 minutes to Astoria, 42 min for max wave; Kelso 3 ft, Portland negligible; tides have a big influence.

F. Cheung presents hazards for maritime in his communities. Unlike our states on the west coast the pacific islands has higher involvement from the USCG in their process. Several animations exist for his area that he developed as well that show the currents as well.

S. Grilli presents the tsunami modeling updates for the East Coast for submarine landslides off of the continental shelf. J. Kirby also talked briefly about meteotsunami modeling and an interesting observation that surge amplitude are inverse from the tsunami amplitude. They are also using a neural network(?) to do their stuff, not exactly sure what that means. V. Huerfano wants to know if Jacksonville Port has been studied at all as it is the staging area for Puerto Rico.

Thursday, 26 July 2018

09:00 – 10:00 Update on the landslide modeling workshop (J. Kirby)

- **Proceedings**
- **Development of the guidance documents**

J. Kirby summarizes results of the Landslide Modeling Benchmark Workshop. There are models that work for the distance field; hydrostatic models do not work; non-hydrostatic models do work. Hydrostatic models can only capture a single phase speed, but there are frequent changes in the distance field phase speeds.

Tested 19 different model runs; some models were run in up to 4 modes (e.g., hydrostatic and non-hydrostatic); working on the Technical Report and a peer-reviewed Journal manuscript. Website includes the final technical report http:www.udel.edu/Kirby/landslide. Most data is linked to and is not in the Technical Report. There were no blind tests; all modelers were given the input parameters. Hydrostatic models have a greatly accentuated drawdown; dispersion models do a good job on the wave speed

R. Wilson asked about recommendations.
J. Kirby hydrostatic models are not sufficient (for some parameter range). They also still need to look at the refracted wave effect.
T. Walsh: will there be a clear statement on what models to use?
J. Kirby: any class models with frequency dispersion will be good to use.
S. Grilli: Anybody in NTHMP doing landslide is using a dispersive model. So we are safe.
R. Wilson: The Powel center meetings can provide source information for landslide HA.
J. Kirby: Wavelet analysis clearly shows the problems with the hydrostatic models in propagating the different frequencies at the right speed. Model for paper authorship will be similar to what Lynett did. We might have supplemental document specifying what hydrostatic models could be used and under what set of parameters.
R. Wilson: Did you receive funding for this?
J. Kirby /S. Grilli: yes
D. Nicolsky: the error in the hydrostatic models, how does this error compare the error in the source?
J. Kirby: Benchmark 2 has very good source characterization, other benchmarks are less so. No blind tests were done at this workshop, and acknowledging that actual geologic problems are a mess for characterization purposes.
C. Guard: Do you have a good/bad threshold?
J. Kirby: Showed a graphic from the report showing modeled maximum water level vs. observations for the different models. The hydrostatic models showed larger discrepancy with observations.
C. Guard: How about the speed?
J. Kirby: Showed the solid slide case for one particular model. Dispersive models did a pretty good job at reproducing the waveform. This is a highly viscous slide. For the lab experiments results show dispersive models do well.
D. Nicolsky: Will you be delivering a guidance document?
J. Kirby: yes, probably as a draft word document.
D. Nicolsky: Will these be the benchmarks for future models?
J. Kirby: Herman Fritz's experiments in OSU could be used, but we did not get a lot of submissions for other experiments. If the MMS decided that there are new experiments that become relevant for new models, we could all do additional tests.
J. Allan: new models that did not go through this process, will have to replicate what is in the paper?
J. Kirby: As a minimum, yes.
M. Eble: we can be flexible on new model submissions to the benchmarking process. We have done it with the other validation studies.
J. Allan: What is the time for the paper?
J. Kirby: We plan to submit to Ocean Modeling. Not sure exactly, but the turn-around is very short.

10:00 – 10:45 Sediment transport; review of existing cases

- **Presentations (up to 10-mins each) by those with information to share**
- **Discussion of needs**

J. Kirby presents results on the depth-integrated suspended load model, morphology adjustments; test calculations carried by lab dam break experiment and Crescent City 2011, examples of erosion of barrier islands. Also ran in a multi-layer non-hydrostatic model. Model had trouble with net erosion and deposition rates, possible corrections possible with known soil properties also scour holes are not as well represented.

Patterns of sediment transport appear very similar, magnitudes a bit off. Effects of erosion hazard levels are presented for Ocean City, Maryland. Examples presented reflected three different sources and showed changes with/without sediment transport enabled. Showed that inundation extents varied significantly with/without erosion of dunes turned on. Basically, inundation extents increased significantly when dunes were treated as erosional. In general, smaller earthquake sources experienced larger differences in inundation extents, compared with the maximum earthquake sources (did not change substantially). Inundated areas increased by 10-20% for major events and over 50% for small events. Roughly 5 waves modeled in the wave train. Paper submitted to Coastal Engineering initially rejected (lacked bed load transport and sketchy lab tests), revised paper pending soon.

D. Eungard presents the bibliography as asks people to review it, several people are keen on reviewing it.

General group discussion on the viability of a sediment workshop, J. Kirby indicates that we are a few years out from having sufficient benchmarking options to conduct such a workshop. Overall conclusion it is still too early for a sediment transport workshop (need good benchmarking test cases for comparisons).

D. Nicolsky's controversial "remove the dune" suggestion is discussed within the framework of inundation map needs vs. maritime needs. If the goal is only inundation results, then removing the dune (or partially removing it) could make sense. Group decides that making a blanket requirement to remove or alter dunes as part of inundation mapping is premature. Possibly include a statement to the effect that MMS is trying to gather information on how to move forward. Group tabled discussion to ensuing bi-monthly meeting discussions, particularly as it relates to potentially holding a future benchmarking workshop.

10:45 – 12:00 Poster session, Partner Updates (continuation).

D. Eungard presents on WA State evacuation maps for Port Angeles, evacuation area is occupied by ~500 people during tourist season.
R. Wilson, Cascadia event overtops entire spit?
D. Eungard: Yes, the tsunami gets to be between 19-22m. Spit elevation is <20m.
D. Nicolsky: What scenario?
D. Eungard: L1
R. Wilson: Will you model the XL?
D. Eungard: No. Our state standard is the L1.
M. Eble. What is your take away for those 500 people?
D. Eungard: Emergency managers were not terribly surprised. We have been trying to include language in their SOP (harbormaster). They are changing their minds about that because of liability issues.
T. Walsh: Ships could get to 60 fathoms (near the spit). The problem is get past the eddies of the tip of the spit.
R. Wilson: This did not include liquefaction or any other effects?
T. Walsh: You would not expect to get much liquefaction because it is all above the water table. You may have a lot sand-blows popping up. You could significant lateral spread.
J. Allen: What about landslide type constraints.
D. Eungard: We are not including that right now. Some areas in the region are known to create landl-side.
S. Grilli: Subaerial slides?
T. Walsh: yes.
D. Eungard: Slumps there are mostly weather related. There are lots of issues there. We have not published this yet is because local Ems want to work out all the issues before putting this out.
R. Wilson: We have developed a 2-page doc just as a watch-out for these things.
T. Walsh: we have a 2d liquefaction map for the entire state, we decided not to include it here for clarity.
R. Wilson: You could have man-made hazards (downed powerlines,…) during an event. How would you handle that during an evacuation.
J. Allen; In Oregon we are working with the university on how to build maps that could be presented in a way that the public understands the different hazards in the map.

R. Wilson: If we can help identify, hot spots like powerlines, bridges,…so that people can do something about it in advance.
D. Eungard: Port Townsend has a lot of brick buildings that will block evacuation routes. Local authorities will have to recognize the problems and will have to do something about it (burying powerlines,..)
T. Walsh: One of the things we are finding challenging, is locations where travel time is between 1-2:30 hours, because it allows us to do more things.

D. Arcos presents the results of PMEL work at the USVI, issue with determining sources for events in the area. Biggest model ever run both in scale and grid size, run with HYSEA rather than MOST due to the computational costs. Largest source 8.7 Mw, used propagation database to determine the most impactful source location. Originally request a 60 hour run, was able to negotiate 30 hours. Took a week to run at 7 GPU (50 km by 50 km, at 10 m).

D. Nicolsky presents on his work with inundation mapping from submarine landslides. He applies a buffer to his models to add additional conservatism.

Break for lunch.

13:00 - 14:00 Plan joint MES - MMS afternoon meeting: Prioritize information and updates to share. Wrap-up discussion of the Annual Workplan completion (MMS Co-chairs).

D. Nicolsky inquiries about tsunami worst case scenario… common questions from emergency managers are How likely this scenario to occur? Alaska uses 1000 years
J. Allan: Oregon uses 500 to 10000 years
Group discussion: There is not a simple solution… probably, move to a probabilistic solution.
R. Wilson volunteered to lead discussions to EMs (EMs like to know what type of recurrence is acceptable on term of risk).
M. Eble emphasized on the careful use and meaning of the word "Risk" clarifying the word in the context.
M. Eble/R. Wilson: instead of risk… probably use "acceptable frequency" or "acceptable level"
R. Wilson said that they are re-evaluating old map products, on what is the acceptable … for instance: 1000 years is an acceptable level
T. Walsh: talked about inundation vs earthquake recurrence and he said that considering or comparing both is the best way to look at it.
F. Cheung: indicated that in Hawaii:

Recurrence time is from 1 to 200 years for level 1 tsunami
Recurrence time is from 1 to 2000 years for level 2 tsunami

These levels (1 or 2 level) are used because most of the time tsunamis are small. This makes easier the evacuation of people, avoiding high cost associated to it.
T. Walsh/R. Wilson discussed and said that history has shown that the Maximum of Maximum tsunami consideration has been over exceeded many time.
R. Wilson: talked that in CA the grid resolution for maps is now 10m enough to get details of levees; talked about harbor improvement report, which is mostly an engineering analysis. Example: debris movement. This is a FEMA funded project, and the report addressed how to mitigate hazard for a specific harbor under the harbor existing condition.
R. Wilson wants to see MMS members' feedback on this report (guidance to get the vulnerability of the harbor analysis). Pat Lynett (USC) is doing the engineering evaluation.
J. Allan: raised concern about the right person of doing the evaluation of harbor for the vulnerability of the harbor analysis.
R. Wilson: explained that this is a no a deep engineering analysis and in addition Pat Lynett is working with an expert engineer (Adam Kim).

14:00 – 15:00 Data sharing for NSW-NOAA-NTHMP requirement of public available product data

D. Nicolsky: how to organize information?
J. Kirby/ V. Huerfano: there is a big amount of data to be stored or dealt with, mentioning that the data can be in the order of the terabytes and manifested concern about the data/info will be accessible to the public.
D. Arcos: probably only deliverable products data and directing to: for example, Washington State Univ. for the massive data.
M. Eble: Talked about the legitimacy of the data.
T. Walsh/J. Allan/D. Arcos: concerned about managing the data, the old data and how long to keep them.
M. Eble said that there is some info, for example: sets of grids/nested grids that there is not a problem to be accessible; but she raised concern on models' results which are of several time order of magnitudes larger. She discussed also the extra effort of making it available and all additional efforts on copyright, etc.
D. Nicolsky / J. Kirby said: google drive them, and make them searchable.
T. Walsh: mentioned about the two fellow contractors hired long time ago by NCEI.
D. Nicolsky: addressed if there is a possibility to established links on previous works (by individuals or regions) as an initial baby step toward the new NSW-NOAA-NTHMP requirement of public available product data.