Tony Mignone- Overtopping of seawalls

- deals with waves and wave generation and their affects on infrastructure and the shore
- Scituate, MA- length of over a mile seawall- two basin areas behind the seawall and there are depth measures
    - GIS and lidar data with depth of the water to find volume of water
- 3 ft diameter pipe drains the basin under the seawall
- all water in the basin from event was above the ocean storm tide level
- wave height and wave period plus algorithm for off shore, freeboard adjustment all go into parameterization
- data logger records in 6 minute intervals because it corresponds with other data that are available for water collection as well
- problem with larger waves breaking off shore, carrying more energy but not directed at seawall, smaller waves, less energy, break at the wall so normalize them ?
- SWAN model has plot to incorporate angle – direction and magnitude of wave groups
- Two types of wave groups/ fetch areas involved in this particular site
- Volume of basin areas using lidar from USGS and GIS tools
- Catch basin can get caught up with ice and debris which can affect the computation

Questions:

- how common are these basin splash over spots?
    - This is the only site where I know of where the topography is conducive to measuring
- It is great that you can have a way to measure and compare to parameterization, but in the parameterization you were looking at water flowing out of the pipe but what about the water coming back over the seawall in other spots?
    - When the water in the basin gets to the seawall height it does go back over or it drains into the second basin area but did not account for that in the parameterization
- In relatively short period, you had three situations where the wall was overtopped, is the town trying to address that?
    - Can't answer that because it is not in our offices area responsibility, just focusing on the science

Cameron Adams- Hurricane inundation mapping

- don't often see category 1 or 2, usually tropical storms
- SLOSH modeling- runs over small, specific sections of coasts and takes into account a lot of factors that affect surge levels
- Deterministic and probabilistic approach relies on real time
- But tier 3- composite approach- more proactive.
- Using sandy as example to test SLOSH
    - Really close to actual flooding- not perfect but in terms of evacuation and emergency management it is very effective

- So for Maine:
    - USACE did a series of maps in 2005 using an older version of SLOSH- larger grid, less accurate bathymetry, fewer hypotheticals
    - Acquired lidar based DEMs now which have improved models now
    - Updated maps last year funded by FEMA via grant to Maine floodplain office
    - Used an additional 20% because of factors that are not included in the SLOSH model (waves, freshwater flooding)
- Limitations and assumptions
    - Waves and freshwater flooding aren't included which causes under predictions
    - Lidar is a snapshot in time
    - Bare earth DEMs take out bridges and piers so might be misleading if you are looking at a bridge
    - Only use for general planning purposes and emergency management planners
- What about astronomical tide levels?
    - Mean high tide is used for the SLOSH model, but there will be much more feet of flooding because of other tide levels like king tide

Questions:

- how do we account to the bridges?
    - Our solution has been to manually figure out the elevation of the bridge and figure out if it is above or below the prediction flood level. We have done the bigger ones
- If we know the surface elevation of water, and the bridge elevations, can we assume?
    - Yes, that is what we do
- If the approaches are dry on the maps, cant we assume that the bridge is dry too?
    - Yes
- Floodplain maps for insurance companies have been updated, how do these SLOSH maps compare?
    - Floodplain maps are based on actual past storm level data, no projecting, these maps are all projections and specifically hurricanes. Cant really compare
- Do you always give 20%? When the NWS does the warning does it include them?
    - No, it is not always included…I am not sure
        - 10% exceedance levels are included but graphics editors can change
- what are the mean tide levels that are used?
    - There are three locations for Maine, not just Eastport
- Is there consideration for geography?
    - Bathtub model

Qingping Zou- forecasting wave, flooding and erosion potential

- when a big storm comes, what happens to our coastline?
- We have past photos of what has happened so what will happen if we look to the future?
- Maine is planning for 2 feet of sea level rise and that needs to be considered in forecasting
- Objective to provide real time forecasting which will help planning and emergency managers
- Clouds to coast model- try to combine atmosphere data and tide, surge and wave, also surf zone model to account for the most
- ADCIRC is a state of the art model, WRF is a popular model used now
- In the past people use structured grid (coarse and uniform) but maine has very complex shore lines and bathymetry so using structured grid is not most appropriate
- Predictions compared pretty well with the actual observations from patriots day storm.

Questions:

- how close to the shore were you able to get with the unstructured grid with the wave heights?
    - It will give you up to 10 meters water depth so that is why funwaves model is used there. Still predict reasonably well depending on the situation. Use a surf zone model after 10 meters
- In the Saco bay model circulation is that all surface currents?
    - Yes but that seems to be good enough

John Cannon- creating storm surge watch and warning maps

- Portland flood surge is 12 feet but largest storm surge is 14 feet
    - Top 16 are from high tide
- When we issue warning and watch graphics, this is what we would see (Experimental storm surge watch/warning graphic slide)
- Hurricane center spent a lot of time studying social science and involving what the product should look and feel like and what goes into it
- Storm surge is not understood- more people die from storm surge
- Rarely evacuate could be a generational thing- been a long time since a storm happened
- Specific actions means you need to convey early on how and when to evacuate
- Get mapping available for nor'easters too
- Used Sandy as example of social science aspects
- Category does not necessarily relate to storm surge of a hurricane but gets a lot of attention- slide about category scale that is not used anymore
- Mind map includes cognitive and emotions as well as social parts= mental models- people are either risk aversive or risk seeking and that determines **evacuation tendencies**

Questions:

- do you ever think of erosion in these models? Show you are safe on a dune but it can get flattened

    - weather service has been forecasting beach erosion but only up until recently are they actually measuring dune loss from storms using beach profiling. We are working on it now.
    - We want to hook up a camera and take one-minute pictures as a storm is coming and compare it to our models.
- Can you say something about the boy who cried wolf phenomenon?
    - It is a huge issue and it drives me nuts. In our office we try to issue for most likely but hurricane center issues worst-case scenario. I try to get people to issue more for most likely so that we don't cry wolf. But we are dealing with different animals so it is hard
- Question to group: I can see how your forecasting feeds into emergency planning and response, what is the probably that one of these storms at high tide event, on social science side, how do they take what you are showing them and use it?
    - We just picked up another area as well so we give two forecasts (emergency management level) they get a most likely scenario and a more extreme/less likely scenario
- But in terms of a town saying they will replace a bridge, do they use your forecasts
    - They are starting to take into account some of the higher levels but the question is always what is the new design standard? People respond in much different ways using different things- hurricane maps, flood maps, etc. and what assets are at risk.