

2nd International Workshop on the Application of Fluid Mechanics to Disaster Reduction : Cyclone (hurricane/typhoon/extra-tropical) modeling and damage assessment (2015/316-17)

Theme : Storm surge, waves, tsunami

Location : Sendai Civil Auditorium and bus field trip along the Miyagi coast

URL: http://hydraulic.lab.irides.tohoku.ac.jp/app-def/S-102/2014/?page_id=268

On March 16, 2015, IRIDeS staff Jeremy D. Bricker and Volker Roeber (Hazard and Risk Evaluation Research Division) convened 22 researchers and practitioners from Japan, the US, the Netherlands, France, and Australia for a series of presentations and dialogue on 4 major topics:

1. Infrastructure, buildings, and damage due to cyclones,
2. Modeling and measurement of Typhoon Haiyan's storm surge and waves
3. Development and application of storm surge and wave models, and
4. State of the art in hydraulic and coastal engineering.

In addition to the presenters, about 30 others attended the workshop, representing China, Thailand, the UK, Indonesia, the Philippines, and Dubai. Applications of storm surge models in the US, the Philippines, Japan, and Taiwan were presented. Europe, the Americas, and Japan each use different models for weather forecast and reanalysis, so the necessity to compare results of these different models and the effect of differences on storm surge and wave prediction and hindcast came to light. The need for phase-averaged vs. phase-resolving wave models to simulate storm surge and wave phenomena striking cities near coral reefs and wetlands during typhoons and hurricanes were debated, applied to the recent examples of Typhoon Haiyan in the Philippines and Hurricane Sandy in the US. The study of tidal bores, which occur regularly and are thus easier to measure than unpredictable tsunamis or hurricanes, was discussed as a way to better understand the physics of destructive bores and plan countermeasures to such events. The tradeoffs between 2-D and 3-D models were also debated, including bottom stress parameterization, run time, and dispersion. Participants discussed methods to predict, survey, and mitigate hurricane damage to buildings, infrastructure, and utilities. Furthermore, sediment deposits were presented as a proxy for investigating prehistoric storm surge inundation extent, but also as a source of turbidity when entrained into terrestrial rivers.

During the March 17 field trip to the Miyagi coast, our engineers joined Prof. Iuchi's urban planning team to investigate the progress of reconstruction 4 years after the tsunami. Some of the participants had been on the initial JSCE survey team immediately after the event, and have come back regularly to observe the progress of cleanup and reconstruction. The first year had been characterized by debris removal, the second year by a period of waiting while planning was underway, the third year by the beginnings of earth movement, and this fourth year by full-scale terracing and levelling of hills, elevation and infill of flats, embankment and floodwall construction, and movement of people into new permanent public housing. Folks who hadn't been to these sites in a year were moved by the drastic changes in landscape they observed. The photos below show a reconstruction observation mound in Kesenuma (left) and a newly constructed evacuation facility near Sendai Port (right).

