Dependency of tsunami simulations on bathymetry, grid resolution and bottom friction

C. Wekerle[1], **S. Harig**[1], **W. Pranowo**[1], **A. Androsov**[1], **A. Fuchs**[1], **N. Rakowsky**[1], **J. Schröter**[1] and **J. Behrens**[2]

[1]Alfred Wegener Institute
Bussestraße 24, Bremerhaven, Germany
Claudia.Wekerle@awi.de

[2]KlimaCampus, University of Hamburg
Grindelberg 5, Hamburg, Germany

After the devastating 2004 Sumatra-Andaman Tsunami the ocean modeling group at Alfred Wegener Institute started to build up a database of tsunami scenarios in the context of the GITEWS project (German Indonesian Tsunami Early Warning System). These scenarios cover the Sunda trench where most tsunamigenic earthquakes threatening Indonesia and surrounding countries occur. Scenarios serve as a forecast for tsunami early warning by estimating arrival times of the wave and maximum wave heights.

For modeling wave propagation and inundation, the unstructured mesh shallow water code TsunAWI was developed. TsunAWI is based on a finite element discretization. Unstructured meshes have the advantage that complex geometries such as the coastline can be accurately represented and a local refinement of the mesh in regions of interest can be easily carried out. The code comprises coastal inundation.

In this presentation we analyse the sensitivity of tsunami simulations with regard to bathymetric and topographic data, mesh resolution and bottom friction parameters. As a test case we investigate the 1993 Okushiri tsunami generated by a M_w7.8 earthquake off the southwest coast of Hokkaido, Japan. This field benchmark serves for validating tsunami models (Synolakis et al., 2007). NOAA supplies detailed measurements of bathymetry and topography, tide gauges and run-up.

References

Synolakis, C.E., E.N. Bernard, V.V. Titov, U. Kânoğlu, and F.I. González (2007), Standards, criteria, and procedures for NOAA evaluation of tsunami numerical models. NOAA Tech. Memo. OAR PMEL-135, NOAA, Seattle, WA.