Operational tsunami modeling with TsunAWI - Examples for Indonesia and Chile

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The numerical simulation code TsunAWI was developed in the framework of the German-Indonesian Tsunami Early Warning System (GITEWS). The numerical simulation of prototypical tsunami scenarios plays a decisive role in the a priory risk assessment for coastal regions and in the early warning process itself. TsunAWI is based on a finite element discretization, employs unstructured grids with high resolution along the coast, and includes inundation.

This contribution gives an overview of the model itself and presents two applications.

For GITEWS, the existing scenario database covering 528 epicenters / 3450 scenarios from Sumatra to Bali was extended by 187 epicenters / 1100 scenarios in the Eastern Sunda Arc. Furthermore, about 1100 scenarios for the Western Sunda Arc were recomputed on the new model domain covering the whole Indonesian Seas. These computations would not have been feasible in the beginning of the project. The unstructured computational grid contains 7 million nodes and resolves all coastal regions with 150m, some project regions and the surrounding of tide gauges with 50m, and the deep ocean with 12km edge length. While in the Western Sunda Arc, the large islands of Sumatra and Java shield the Northern Indonesian Archipelago, tsunamis in the Eastern Sunda Arc can propagate to the North. The unstructured grid approach allows TsunAWI to easily simulate the complex propagation patterns with the self-interactions and the reflections at the coastal regions of myriads of islands.

For the Hydrographic and Oceanographic Service of the Chilean Navy (SHOA), we calculated a small scenario database of 100 scenarios (sources by Universidad de Chile) to provide data for a lightweight decision support system prototype (built by DLR). This work is part of the initiation project "Multi hazard information and early warning system in cooperation with Chile" and aims at sharing our experience from GITEWS with the Chilean partners.