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Retrospect on the tsunami simulation efforts for the German-Indonesian Tsunami Early Warning System

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Starting in 2005, the GITEWS project (German-Indonesian Tsunami Early Warning System) established from scratch a fully operational tsunami warning system at BMKG in Jakarta. GITEWS was succeeded in 2011 by the smaller project PROTECTS for training the Indonesian staff and consolidating the technical system. With the official end in March 2014, it is time to draw a balance and evaluate the approach.

This presentation focuses on the contribution of the tsunami modelling group at the Alfred Wegener Institute. We will give a short overview on the developments of the numerical tsunami simulation model TsunAWI, of the scenario database built with TsunAWI, and of the simulation module SIM that interfaces the database to the decision support system. Some distinctive experiences will be highlighted.

Topics include the modeling part as well as the matching process after the database is already set up. On the modeling side, unstructured mesh generation with focus on local bathymetric features and inclusion of precise coastline position as well as numerical parametrization and post processing are covered. The matching of pre calculated scenarios with incoming data in case of a tsunamigenic earthquake is performed in the simulation system SIM, which processes the data of multiple sensors and employs various metrics to limit the choice of possible scenarios from the database.

One challenge was that the development of the matching algorithm had to start without having access to real sensor data except seismic information on epicenter and magnitude. Therefore, the algorithm is designed with robustness in mind. Still, the conservative approach allows to narrow down the scenario selection even with limited sensor information. Given more experience in the typical
behaviour of sensor data in real events, the algorithm parameters can easily be calibrated towards a more restrictive scenario selection.

Another challenge was to ensure the quality control of the data products derived from all 4500 scenarios that currently fill the database. Though we can rely on the high quality of TsunAWI, that does not produce numerical artifacts provided model parameters are calibrated and the computational grid is built with care, manual checking remains essential. During GITEWS and PROTECTS, tools were developed to allow for a semi-automatic process of visualizing, checking, and annotating scenarios.