A demonstration of the performance of the Omani tsunami early warning system on historical and synthetic scenarios

Dr. Bernd Weber¹, Dr. Andrey Babeyko², Ahmed H. M. Al Harthi³

¹ gempa GmbH, Germany
² GFZ Potsdam, Germany
³ DGMET, Oman

In 2013 and early 2014 an advanced warning center has been established at DGMAN, Oman, integrating proven components of modern tsunami warning centers such as the seismic analysis system SeisComP3 complemented with the Mw-phase based MT calculations and a fast GPU-based tsunami simulation performed “on the fly”. These “on the fly” simulations, predicting arrival times and amplitudes of the tsunami wave for exposed coastlines, can be compared or even aggregated with the integrated pre-calculated tsunami scenario database. While the traditional tsunami warning systems based only on pre-calculated scenarios are limited by their inability to model atypical situations such as earthquakes stronger than assumed or having unidentified sources or mechanisms, the presented system allows an immediate reaction on unforeseen situations.

The efficient computational and communication infrastructure handles real time acquisition, processing and analysis of national and international multi sensor data as for example seismic, tide gauge, wave radar and GPS data. The powerful and user-friendly graphical user interfaces give intuitive access to relevant information to review or revise earthquake parameters, tsunami observations and confirm or cancel tsunami warnings. Automatic templates based bulletin generation by the dissemination system guarantee immediate publications of bulletins and warnings.

To test the performance of the system, synthetic seismograms, tide gauge and GPS data were generated for the Mw 8 Macran Zone earthquake on 28.11.1945 as well as for a hypothetical extreme case scenario. The synthetic data was fed into the standard tsunami early warning procedure to analyze the performance of the system. The results are presented here.