Numerical stress field modeling of the Marmara Region

T. Hergert, A. Eckert, O. Heidbach

Geophysical Institute, Karlsruhe University, Germany

During the last decades a westward propagation of large earthquakes along the North Anatolian Fault has reached the Sea of Marmara. A further continuation of this sequence would mean an earthquake beneath the Sea of Marmara threatening the city of Istanbul. Our major objective is to investigate the recent stress field evolution of the region south of Istanbul in space and time. In particular we will focus on earthquake hazard assessment along the various fault segments based on stress field calculations from deterministic numerical models using the commercial code ABAQUS. Even though a wide range of numerical models have been published in the last decade, additional improvements are necessary to meet our objective: The 3D model geometry will incorporate topography and bathymetry data, Moho variations, upper/lower crust boundary, and the active fault system using contact surfaces with Coulomb friction. We will implement non-linear visco-elastic rheology and boundary conditions applying gravity as well as tectonic forces imposed from the indentation of the Arabian plate and the retreat of the Hellenic arc subduction zone. To assess the quality of our model results, calibration data from GPS observations and stress data will be used. We will present first results concentrating on the boundary conditions, which provide an interseismic velocity field and background stress field for northwestern Anatolia. In the future, the best-fit boundary conditions will be applied to more detailed FE-models of the Marmara region.