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3D contemporary regional stress state of the Marmara Sea region and its relation to seismotectonics

Tobias Hergert (1,2) and Oliver Heidbach (3)

(1) Institut de Physique du Globe, Paris, France (hergert@ipgp.jussieu.fr, (2) Karlsruhe Institue of Technology, Karlsruhe, Germany (tobias.hergert@gpi.uni-karlsruhe.de), (3) GFZ German Research Centre for Geosciences, Section 2.6 Earthquake Hazard and Stress Field, Potsdam, Germany (heidbach@gfz-potsdam.de)

We present the contemporary regional stress state of the Marmara Sea region derived from a 3D geomechanical model. We describe our new approach to define the initial stress state of the model as this is a critical issue for the resulting tectonic regime and the stress magnitudes of the model. The comparison of our model results with model-independent observations from focal mechanism solutions and their formal stress inversion, orientations of maximum horizontal compressional stress, the tectonic regime, and the distribution of seismicity in the Sea of Marmara is quite well in general and within the uncertainties of the observations. However, in particular in the vicinity of the fault bends deviations from the observed general trend are large. Furthermore, as stress magnitude measurements are not available in that region there is still uncertainties in the absolute stress state calibration of the model. An important result of our new model concept is that the model results are consistent with all available dynamic and kinematic observations as presented in the complementary paper by Hergert et al. in the same session. Furthermore, it provides for the first time a background stress field needed for the simulation of dynamic rupture propagation that is based on geophysical processes. The most interesting result in terms of seismic hazard assessment is that the normal stresses along the Main Marmara Fault are highly variable along strike. This result is consistent with the kinematic results that show 40% change of right-lateral fault slip rate along strike. These results allow to speculate on a possible segmentation of the Main Marmara Fault rather than a rupture of that whole seismic gap at once.