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Topography response to instantaneous mantle dynamics of the European-Mediterranean region

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Our research is concerned with the establishment of links between deep mantle processes and surface deformation. We focus on the instantaneous mantle dynamics of the European-Mediterranean region and its surface topography response. We have started constructing instantaneous 3-D dynamics models, including a regional model (with the focus on the European-Mediterranean region), a global test-model, as well as a global model with regional refinement. We have tested our modeling approach with the long wavelength tomography model SMEAN (Becker and Boschi, 2002) using isoviscous rheology and compared the results with that of Seatree (Solid Earth Teaching and Research Environment; http://geosys.usc.edu/projects/seatree/) which shows good agreement in predicting surface topography. We are now in the process of computing the global and regional mantle flow based on a detailed global tomography model (UU-P07, M. Amaru, PhD thesis, Utrecht University, 2007, van der Meer et al., Nature Geoscience, 2010). We present the topography response for this model based on a number of assumptions regarding the scaling of tomography to temperature and density, and rheology. For these initial computations, both a simple isoviscous rheology and a more complex temperature and pressure dependent rheology are assumed. Future work will include constraints from motions of the larger tectonic plates, as well as other key modeling steps.
1) Our research is part of the EUROCORES TOPO-EUROPE, particularly of project TOPO-4D