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The effect of short- and long-wavelength lateral viscosity variations on geoid predictions

N. Tosi (1), Z. Martinec (1)

GeoForschungsZentrum Potsdam. Department 1, Geodesy and Remote Sensing. Potsdam, Germany

We use a newly developed spherical-harmonic finite-element code to model present-day mantle convection in presence of lateral viscosity variations (LVV). Besides the technical and numerical difficulties related to the modeling of LVV, the problem of understanding if - and if yes how - LVV influence the predictions of the Earth's geoid is still open. In particular, it is unclear whether or not short-wavelength lateral heterogeneities of viscosity, such as those due to subductions, play a significant role in the prediction of the long-wavelength part of the geoid spectrum. We employ a spherical, axisymmetric Earth's model to investigate how the LVV, associated to either a highly viscous craton and/or a highly viscous slab, affect the estimate of the long-wavelength geoid. To this purpose, we choose a cross-section of a global seismic tomographic model that passes through the Australian craton, that serves as example for long-wavelength LVV, and the Tonga-Kermadec subduction zone, whose slab exemplifies a short-wavelength LVV, and discuss how these structures influence the geoid prediction.