Mantle plumes, geoid variations and surface dynamic topography in axisymmetric spherical geometry

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We used finite element method of convection in 2D axisymmetric spherical models, to study the relation between plumes and the geoid by calculation of dynamic topography and temperature. To approach this subject we used a series of models of mantle convection where plumes originate as instabilities of a thermal boundary layer at the base of the lower mantle. We assumed different temperature and pressure dependent viscosity laws and a variety of initial temperature conditions and resolutions. We show in these preliminary models dynamic that topography has a positive effect on the geoid signal while temperature has a negative effect. The net effect depends on the particular rheology law. As the plumes are strongly time-dependent, the geoid and topography are as well. It is necessary to add more details and build complex models to determine the influence and compute accurate geoid from model for comparison with observation from GRACE to understand upper/lower mantle structure and classify plumes.