Long-wavelength geoid anomalies and dynamic of subduction zones: effects of a layering at 660km.

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We investigate the effect of a layering at 660km on the dynamic and surface observables (such as geoid) of a subduction zone, using a finite element code (Zebulon) which allows for a wide variety of rheologies. We have developped a two-dimensional non-newtonian viscoelastic flow model incorporating a fault, representing the interface between the rigid overriding and subducting plates. A low viscosity wedge is also included. The flow is driven by a body force imposed in the slab, corresponding to the negative buoyancy of the cold sinking part of the lithosphere.

Free slip boundary conditions are applied for the two vertical and horizontal boundaries. As the physical processes that may influence the flow across the 660-km boundary remain relatively unknown and difficult to quantify, we decided to apply surface anomalies at 660-km proportional to the mass anomalies needed to achieve a perfectly layered circulation. So, the efficiency of the transition is parameterized by a single coefficient, characterizing the reduction of mass exchange across the discontinuity with respect to the whole mantle flow (See *Cadek and Fleitout, 1999* for more details). Preleminary results point toward a significant influence of the 660 discontinuity on the observables, and may eventually provide sufficient resistance to limit the need for a large viscosity increase at 660km.

References:

Cadek O. and L. Fleitout. A global geoid model with imposed plate velocities and partial layering. J. Gephys. Res. 104 (B12), 29055–29075, 1999.