Mantle convection and plate motion models with weak plate margins in a 3-D spherical shell

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Numerical Simulation of an instantaneous viscous flow in a 3-D spherical shell driven by the negative buoyancy forces due to the subducting slabs has been conducted to understand the effects of lateral lithospheric viscosity variations on the surface motions, the geoid and intraplate stress. The density heterogeneity models used are those inferred from the seismicity and the subduction history. The radial distribution of the viscosity is 3-layerd. The ratio of the viscosity at weak plate margins to that of the plate is changed from 1 to 10**(-3). The change of viscosity contrast in the lithosphere make each plate have characteristic plate motions. The toroidal enaergy of plate motion comparable to the poloidal energy appears, when the viscosity contrast becomes less than 10**(-2).