Geophysical Research Abstracts,
Vol. 10, EGU2008-A-03647, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-03647
EGU General Assembly 2008

Surface response of mantle convection: Results from numerical simulations

A. Fahl, C. Stein, U. Hansen

Institute for Geophysics, Münster, Germany (afahl@uni-muenster.de / http://earth.uni-muenster.de/dyn)

Earth's interior structure can be inferred from results of seismic tomography, which invert seismic velocities from traveltime-curves of earthquakes. Horizontal variations in the velocity of propagating seismic waves result from differences in the elastic constants and density. These can be related to the horizontal gradients in density that drive mantle flow.
A difficulty in interpreting seismic tomographic images is due to the fact that variations in seismic velocity are not only related to density variations, but also to phase changes and chemical composition. Laboratory experiments which investigate material under the mantle conditions can give important indications for these relations.

Another hint is given by the surface response of mantle convection. Due to pressure and velocity pertubations the mantle flow generates dynamic topography at the surface. Additionally, density variations in mantle plumes generate anomalies in Earth's gravitational field.
By means of numerical simulations we investigate the topographic and gravitational surface response of flows related to mantle convection. We show the connection between the variations and structures like plumelike upwellings and sheetlike downwellings. This can give an insight to understand long wave fluctuations of Earth's real gravitational field and dynamic topography and their relation to the interior.