Geophysical Research Abstracts
Vol. 12, EGU2010-8328, 2010
EGU General Assembly 2010

Morphology and evolution of density heterogeneities in a convecting mantle

Anne DAVAILLE (1) and Pierre AUGIER (2)

(1) FAST (CNRS / UPMC / Univ. P-Sud), ORSAY, France (davaille@fast.u-psud.fr), (2) Ecole Polytechnique, PALAISEAU, France

Density heterogeneities in the mantle can either be due to the remains of a primordial stratification of the mantle, or to melting processes occuring at the surface or at the CMB and subsequent reintroduction within the bulk of the mantle by convective instabilities such as subducted plates and hot plumes. These density heterogeneities in turn influence the characteristics and evolution of thermal convection in the mantle. However this influence depends on the magnitude of the density anomaly, and on its size compare to the size of typical thermal instabilities.
We present new laboratory experiments aiming at following the morphology and distribution of chemical density anomalies as an initially stratified mantle is suddenly heated from below and cooled from above. Temperature, velocity and concentration fields were followed in situ through time. Three types of heterogeneities morphologies were observed: layers, 3D blobs and thin filaments. Their characteristics and distribution are followed as a function of time. They are then compared to the seismic tomographic images (which gives informations on the present-day large scale morphology within the mantle) and to the variability registered by geochemical data (which provide temporal informations on the surface at all scales).