Geophysical Research Abstracts
Vol. 14, EGU2012-7903, 2012
EGU General Assembly 2012

Architecture of the Cape Verde hotspot: implications for properties of the transition zone

L. Vinnik (1), G. Silveira (2), S. Kiselev (1), V. Farra (3), M. Weber (4), and E. Stutzman (3)

(1) Institute of physics of the Earth, Moscow, Russian Federation (vinnik@ifz.ru), (2) Instituto Dom Luiz, Lisboa, Portugal , (3) Institut de Physique du Globe de Paris, Paris, France, (4) Deutsches GeoForschungsZentrum, Potsdam, Germany

We investigated the crust, upper mantle and mantle transition zone of the Cape Verde hotspot by using seismic P and S receiver functions from several tens of local seismograph stations. Contrary to previously published arguments for the standard transition zone thickness (the separation in depths between the 660-km and 410-km discontinuities) our data indicate that this thickness under the Cape Verde islands is up to $\sim$30 km less than in the ambient mantle. This reduction is a combined effect of a depression of the 410-km discontinuity and an uplift of the 660-km discontinuity. Horizontal dimensions of the uplift are in a range of several hundreds kilometers. The uplift is in a contrast to laboratory data and some seismic data on a negligible dependence of depth of the 660-km discontinuity on temperature in hotspots. A large negative pressure-temperature slope suggested by our data implies that the 660-km discontinuity may resist passage of the plume. Our data reveal beneath the islands a reduction of S velocity of a few percent between 470-km and 510-km depths. The low velocity layer in the upper transition zone under the Capo Verde archipelago is very similar to that previously found under the Azores and a few other hotspots. In the literature there are reports on a regional "520-km" discontinuity, the impedance of which is too large to be explained by the known phase transitions. Our observations suggest that the 520-km discontinuity may present the base of the low-velocity layer in the transition zone.