Author(s): Silveira, G (Silveira, G.); Vinnik, L (Vinnik, L.); Stutzmann, E (Stutzmann, E.); Farra, V (Farra, V.); Kiselev, S (Kiselev, S.); Morais, I (Morais, I.)

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Abstract: Seismic recordings of IRIS/IDA/GSN station CMLA and of several temporary stations in the Azores archipelago are processed with P and S receiver function (PRF and SRF) techniques. Contrary to regional seismic tomography these methods provide estimates of the absolute velocities and of the Vp/Vs ratio up to a depth of similar to 300 km. Joint inversion of PRFs and SRFs for a few data sets consistently reveals a division of the subsurface medium into four zones with a distinctly different Vp/Vs ratio: the crust similar to 20 km thick with a ratio of similar to 1.9 in the lower crust, the high-Vs mantle lid with a strongly reduced VpNs velocity ratio relative to the standard 1.8, the low-velocity zone (LVZ) with a velocity ratio of similar to 2.0, and the underlying upper-mantle layer with a standard velocity ratio. Our estimates of crustal thickness greatly exceed previous estimates (similar to 10 km). The base of the high-Vs lid (the Gutenberg discontinuity) is at a depth of-SO km. The LVZ with a reduction of S velocity of similar to 15% relative to the standard (IASP91) model is terminated at a depth of similar to 200 km. The average thickness of the mantle transition zone (TZ) is evaluated from the time difference between the S410p and SKS660p, seismic phases that are robustly detected in the S and SKS receiver functions. This thickness is practically similar to the standard IASP91 value of 250 km. and is characteristic of a large region of the North Atlantic outside the Azores plateau. Our data are indicative of a reduction of the S-wave velocity of several percent relative to the standard velocity in a depth interval from 460 to 500 km. This reduction is found in the nearest vicinities of the Azores, in the region sampled by the PRFs, but, as evidenced by SRFs, it is missing at a distance of a few hundred kilometers from the islands. We speculate that this anomaly may correspond to the source of a plume which generated the Azores hotspot. Previously, a low S velocity in this depth range was found with SRF techniques beneath a few other hotspots. (C) 2010 Elsevier B.V. All rights reserved.

Addresses: [Silveira, G.; Morais, I.] Inst Dom Luiz, P-1749016 Lisbon, Portugal; [Silveira, G.] Inst Super Engn Lisboa, Area Cient Fis, P-1959007 Lisbon, Portugal; [Vinnik, L.; Kiselev, S.] Inst Phys Earth, Moscow 123995, Russia; [Stutzmann, E.; Farra, V.] CNRS, UMR 7154, Inst Phys Globe Paris, F-75005 Paris, France

Reprint Address: Silveira, G, Inst Dom Luiz, Edificio C8, P-1749016 Lisbon, Portugal.

E-mail Address: mdsilveira@fc.ul.pt; vinnik@ifz.ru; stutz@ipgp.fr; farra@ipgp.fr; kiselev@ifz.ru; immorais@fc.ul.pt

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