Deep Plumes in the Earth’s Mantle

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In the past few years, incorporation of wave-diffraction effects in seismic tomography has led to significant improvements in the imaging of small-scale structure in the earth’s mantle. The new tomographic images clearly show the source region of many hotspots. The majority of hotspots cap plumes originating deep into the lower mantle. This figure shows an example of a family of plumes beneath three well known hotspots: Azores, Canary and Cape Verde. They have been obtained by inverting GSN data measured by cross-correlation. The left image has been obtained by jointly inverting the long period data with a selection of short-period P waves from the International Seismological Centre (ISC) data base. The image on the right has been obtained by inverting long-period S waves only. These are 40 by 40 degree cross-sections centered around Canary. Vertical scale has been exaggerated to avoid overlapping of the horizontal sections. Colors indicate the percentage P- and S-wave velocity perturbations with respect to a 1D background reference model.