



Are Superplumes a Myth?

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Two large seismically slow lower mantle regions beneath the Pacific and Africa are sometimes referred to as “superplumes”. This name evokes associations of large-scale active upwellings, however it is not clear whether these are real, or rather just regular mantle plumes occur more frequently in these regions. Here we study the implications of new results on dynamic topography, which would be associated with active upwellings, on this question. Recently, Hoggard et al. (2016) developed a detailed model of marine residual topography, after subtracting isostatic crustal topography. Combining this with results from continents, a global model can be expanded in spherical harmonics. Comparison with dynamic topography derived from mantle flow models inferred from seismic tomography (Steinberger, 2016) yields overall good agreement and similar power spectra, except at spherical harmonic degree two where mantle flow models predict about six times as much power as is inferred from observations: Mantle flow models feature two large-scale antipodal upwellings at the seismically slow regions, whereas the actual topography gives only little indication of these. We will discuss here what this discrepancy could possibly mean and how it could be resolved.