



Array seismological investigation of the South Atlantic ‘Superplume’

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We apply the axisymmetric, spherical Earth spectral elements code AxiSEM to model seismic compressional waves which sample complex ‘superplume’ structures in the lower mantle. High-resolution array seismological stacking techniques are evaluated regarding their capability to resolve large-scale high-density low-velocity bodies including interior structure such as inner upwellings, high density lenses, ultra-low velocity zones (ULVZs), neighboring remnant slabs and adjacent small-scale uprisings. Synthetic seismograms are also computed and processed for models of the Earth resulting from geodynamic modelling of the South Atlantic mantle including plate reconstruction. We discuss the interference and suppression of the resulting seismic signals and implications for a seismic data study in terms of visibility of the South Atlantic ‘superplume’ structure. This knowledge is used to process, invert and interpret our data set of seismic sources from the Andes and the South Sandwich Islands detected at seismic arrays spanning from Ethiopia over Cameroon to South Africa mapping the South Atlantic ‘superplume’ structure including its interior structure. In order to present the model of the South Atlantic ‘superplume’ structure that best fits the seismic data set, we iteratively compute synthetic seismograms while adjusting the model according to the dependencies found in the parameter study.