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Surface wave mantle anisotropy tomography of the Azores-Madeira-Canaries region using UPFLOW data: initial results

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Upward mantle flow is key to understand global mantle geodynamics yet its imaging remains challenging due to potential associated low velocity contrasts and small lateral dimensions. In this study we use the UPFLOW ocean bottom seismometer (OBS) dataset to build images of radial anisotropy to constrain the patterns of mantle upwellings in the Azores-Madeira-Canary Islands region. We use the partitioned waveform inversion (PWI) method whereby non-linear waveform fitting of surface waves filtered between T~ 16 s and T~ 300 s is performed using a successive series of time-frequency windows in two stages. Firstly, the surface wave fundamental mode is extracted via phase match filtering and is used to obtain path average perturbations in shear radial anisotropy and isotropic shear wave velocity from a smoothed combination of the 1-D mantle model ak135 and the crustal model CRUST1.0. These perturbations establish a new initial model, which is subsequently used to estimate the path averaged radial anisotropy model that leads to the best fit between the observed trace and the synthetic waveform obtained by summing all overtones (up to n = 20). An iterative, regularized least squares inversion is used to invert for 3-D radially anisotropic mantle structure. Uncertainties are automatically quantified and used to interpret resolved seismic structures. Preliminary results are compared to previous tomographic models of the Atlantic region.