



New insights into the mineralogy of D'' beneath the North Atlantic region

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In this study we provide new insights into D'' mineralogy and P-T conditions beneath the North Atlantic region based on a combination of P and S wave data. We use the Mw 6.3 earthquake that occurred on April 2010 in Spain and was recorded at some 700 seismic stations of the USarray. In order to investigate the D'' layer we look for waves reflected on the top of it, namely PdP and SdS, and we compare them to reference phases, such as PcP and ScS, so that the difference between both is sensitive to almost only D''. Because USarray is a very dense array we are able to provide a continuous map of the detection or not of PdP and SdS waves in the North Atlantic region, with a resolution of ~ 250 km. We then perform $\delta t_{PcP-PdP}$ and $\delta t_{ScS-SdS}$ delay time measurements that we invert for D'' Vp, Vs and thickness applying a Bayesian approach. We find that the D'' layer should be ~ 292 km thick and waveform modelling yields velocity jumps across the D'' discontinuity of about 2% in both Vp and Vs. These values suggest that a pure iron post-perovskite is unlikely and instead, it is more likely to be caused by chemical anomalies with/without temperature variations.