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Crustal Structure Around the Tristan da Cunha Hotspot Derived from Ambient Noise

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According to classical plume theory, the Tristan da Cunha hotspot is thought to have played a major role in the rifting of the South Atlantic margins and the creation of the aseismic Walvis Ridge during and after the breakup of the South Atlantic. Between February 2012 and January 2013 a network of 24 broadband ocean-bottom seismometers was in operation around the volcanic archipelago of Tristan da Cunha. Ambient noise data from the OBS and a seismic station on Nightingale Island were used to constrain the crustal and uppermost structure around the island. From the vertical and hydrophone recordings of more than 300 days we could reconstruct the ambient noise Green's functions by cross-correlation. The dispersion curves of Rayleigh/Scholte waves could be derived from the cross-correlations in the period range from 2 to 32 seconds. Group velocity maps were determined for each individual period using travel time tomography. These group velocity maps were converted to depth by dispersion curve inversion to construct a 3D S-wave velocity model of the crust and uppermost mantle in the region. This model shows a strong velocity anomaly beneath the Tristan da Cunha archipelago. The influence of the water depth on the inversion is discussed.