Seismic Noise Tomography in the Chile Ridge Subduction Region

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We used cross-correlation of ambient seismic noise recorded in the Chile Triple Junction region to estimate inter-station surface wave time-domain Green's functions, and then inverted travel times to obtain crustal surface wave velocity models. Inter-station distances within the Chile Ridge Subduction Project temporary seismic network ranged from 40 to ~100 km. We selected 30 days with low earthquake activity, and cross-correlated and stacked 24 hours of vertical component data at 37 stations pairs, resulting in nominally 882 traveltimes along assumed-straight inter-station paths. Velocities in two-dimensional cells of 20 x 20 km were calculated using a linear least-squares inversion of the Rayleigh wave travel times. The process was applied to cross correlation pairs determined in two period bands, 2.5-10 sec, corresponding to shallow crustal velocities down to approximately 10 km depth, and 10-20 sec, for velocities down to around 20 km. Our results show that cell velocities correlate well with known geologic features: We find high crustal velocities where the Patagonian Batholith outcrops or is likely present at depth, and low velocities correlate with the active volcanic arc of the Southern Volcanic Zone. High velocities in the mountainous areas of the southeastern study area appear to correlate with outcropping older metamorphic units and plutonic intrusions.