AGU 100 ADVANCING EARTH AND SPACE SCIENCE
FALL MEETING
Washington, D.C. | 10–14 Dec 2018

DI53A-0047: Investigating Ultra-low Velocity Zones in the Southern Hemisphere Using ScP Waveforms

Friday, 14 December 2018
13:40 - 18:00
Convention Ctr - Hall A-C (Poster Hall)

The core mantle boundary (CMB), where the solid silicate mantle meets the liquid iron-nickel outer core, represents the largest density contrast on our planet, and it has long been recognized that the CMB is associated with significant structural heterogeneities. One CMB structure of particular interest are ultra low-velocity zones (ULVZs), laterally-varying, 5-50 km thick isolated patches seen in some locations just above the CMB that are associated with increased density and reduced seismic wave velocities. These variable characteristics have led to many questions regarding ULVZ origins, but less than 20% of the CMB has been surveyed for the presence of ULVZs given limited seismic coverage of the lowermost mantle. Therefore, investigations that sample the CMB with new geometries are critical to further our understanding of ULVZs and their potential connection to other deep Earth processes.

The Transantarctic Mountains Northern Network (TAMNNET), a 15-station seismic array that was recently deployed in Antarctica, provides a unique dataset to further study ULVZ structure with new and unique path geometry. Core-reflected ScP phases from the TAMNNET dataset well sample the CMB in the vicinity of New Zealand in the southwestern Pacific, providing coverage between an area to the north where ULVZ structure has been previously identified and another region to the south, which shows no ULVZ evidence. This area is of particular interest because the data points sample across the boundary of the Pacific large low shear velocity province (LLSVP). The Weddell Sea region in Antarctica is also well sampled, providing new information on this area that has not been previously studied. By identifying and modeling pre- and post-cursor ScP energy, we have explored new portions of the CMB and found evidence for ULVZs in both regions. Given that ULVZs are detected within, along the edge of, and far from the Pacific LLSVP, our results may support that ULVZs are actually present everywhere along the CMB but that they are sometimes undetectable given associated methodology resolution.

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