

# Interior of the Earth

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## Contributors

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# **Investigating Ultra-low Velocity Zones beneath the Southwestern Pacific**

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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 40% 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 and PcP phases from the TAMNNET dataset particularly 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. By identifying and modeling pre- and post-cursor ScP and PcP energy, we are exploring a new portion of the CMB with a goal of better understanding potential ULVZ origins. Our study area also crosses the southern boundary of the Pacific Large Low Shear Velocity Province (LLSVP); therefore, our investigations may allow us to examine the possible relationship between LLSVPs and ULVZs.