

Upper mantle deformation of the Terror Rift and northern Transantarctic Mountains in Antarctica: Insight from P-wave anisotropic tomography

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A large number of teleseismic travel-time data are used to determine the first P-wave radial anisotropy tomography beneath the Terror rift, the northern Transantarctic Mountains (NTAM) and the Wilkes Subglacial Basin (WSB) in Antarctica. Our results show that variations of radial anisotropy occur in both horizontal and vertical directions. In the NTAM, a high-velocity zone with positive radial anisotropy is revealed at shallower depths, which reflects the lithospheric deformation pattern formed during the Ross Orogeny. In contrast, negative radial anisotropy appears at depths > 200 km under the NTAM, which is caused by the characterization of olivine fabric rather than foundering lithosphere. Beneath the western WSB, a two-layer lithosphere exists that contains rift-induced cracks. To the east of the NTAM, asthenospheric upwelling occurs at shallow depths beneath the Terror rift. Then the upwelling asthenosphere flows northward to Mt. Melbourne and southward to Mt. Erebus.

