

# Prominent thermal anomalies in the Mantle Transition Zone beneath the Transantarctic Mountains, Antarctica

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The tectonic history of the Transantarctic Mountains (TAMs), the mechanism promoting uplift, and the source for volcanism throughout Northern Victoria Land and the West Antarctic Rift is still debated, with the possibility of one or more mantle plumes contributing to the upper mantle anomalies. Numerous tomographic models have imaged apparent plume structures stretching to, and possibly through, the mantle transition zone (MTZ). We searched for anomalous features at MTZ depths using P-wave receiver function (PRF) analysis. We calculated more than 12,500 P-receiver functions from several arrays installed along the TAMs and in East Antarctica and migrated and stacked receiver functions using a 1-D global average velocity model and three different 3-D tomographic models. Where seismometers were located sufficiently close to each other, we stacked PRFs using a common conversion point approach and employed bootstrap resampling techniques to quantify uncertainty. Our results of MTZ thicknesses reveal a thinner than average mantle transition zone beneath the Central TAMs and Ross Island regions (~200-230 km). We suggest that a thermal anomaly may be connected to upper mantle low velocities (i.e. a mantle plume) in these regions and may have influenced either the current day or past mantle lithospheric processes and volcanism.

