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FINDING CRUSTAL THICKNESS IN THE NORTHERN TRANSANTARCTIC MOUNTAINS AND WILKES SUBGLACIAL BASIN USING S–WAVE RECEIVER FUNCTIONS AND RAYLEIGH WAVE PHASE VELOCITIES

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The Transantarctic Mountains (TAMs) are a 3500 km long mountain range with peak elevations higher than 4000 m, making them the largest non-compressional mountain range in the world. Yet, little is known about them and their origin since most of the TAMs are ice-covered and geologic data is limited. The TAMs are the dividing feature between old craton in East Antarctica and rifting in West Antarctica, and understanding the origin of the TAMs has important implications for both the tectonic history of Antarctica and non-compressional mountain building processes in general. To investigate the subsurface structure of the TAMs, data from a new 15-station seismic array, the Transantarctic Mountains Northern Network (TAMNNET), as well as data from 4 stations operated by the Korean Polar Research Institute (KOPRI) are being employed. These stations extend from Terra Nova Bay inland about 300 km across the TAMs and into the Wilkes Subglacial Basin. In this study, S-wave receiver functions (SRFs) and Rayleigh wave phase velocities are used to analyze both the TAMNNET and KOPRI data to estimate crustal thickness beneath the study area. Preliminary results indicate a maximum crustal thickness of 47km under the TAMs with an error of ±4km. The average crustal thickness for sites further inland in East Antarctica is 43km. The difference in crustal thickness between these two places lies within error bounds indicating a lack of a crustal root or a root no larger than ~5km. The lack of a crustal root is important in differentiating between origin models that have been proposed to explain the TAMs formation and favor a model where uplift is supported by thermal buoyancy and/or flexural uplift.

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<< Previous Abstract | Next Abstract >>