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Lithospheric shear velocity and discontinuity architecture of Hudson Bay

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Hudson Bay overlies some of the thickest lithosphere on Earth and, due to its age, contains important clues to the earliest workings of plate formation. The Hudson Bay Lithospheric Experiment (HuBLE) has thus far constrained its seismic wavespeed, anisotropy, and discontinuity structures. In this study, we combine surface wave dispersion curves with P to S receiver functions to jointly invert for 1D shear velocity at HuBLE stations. Additionally, we use S to P receiver functions to generate a common conversion point volume (CCP) throughout the region, incorporating the 1D shear velocity to map the receiver functions to depth. We then generate a map of crustal thickness for the region based on bootstrap resampling of H-k stacking results of P to S receiver functions and the Moho defined in the joint inversion. We find regions of constant crustal thickness between 33 and 39 km with up to 4 km uncertainty. Similarly, we made $\sim$5000 observations of the apparent Lithosphere-Asthenosphere boundary (LAB) on the S to P CCP and use bootstrap resampling to estimate lithospheric thicknesses ranging from $\sim$210-300 km with up to 8 km uncertainty. The observed pattern of thick lithosphere shows the thickest lithosphere in the center of Hudson Bay, consistent with earlier studies based on surface waves alone. Finally, we observe laterally limited regions of negative conversions within the lithosphere, which we attribute to fossil lithospheres which formed prior to or during the terminal collision of the Trans-Hudson Orogen.