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HuBLE-UK: the Hudson Bay Lithospheric Experiment: Insights into the Formation of the Canadian Shield From Broadband Seismology

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The Canadian Shield is one of the largest exposures of Precambrian rocks on Earth. It is a mosaic of several Archean terranes that were brought together during a series of Paleoproterozoic orogens culminating in the so-called Trans-Hudson orogen, which is thought to have been similar to the Himalayan orogen in scale and nature. The tectonic evolution and lithospheric subdivisions of this region are poorly understood, but new seismic networks in northern Hudson Bay provide fresh opportunity to place constraints on the Preachbrian processes that formed and shaped it. Using a combination of seismic tomography, anisotropy and receiver function analysis we show that the lithosphere of the northern Hudson Bay region retains a strong signature of Archean–Paleoproterozoic tectonics. We map the boundary between the upper (Churchill) and lower (Superior) plates that collided ca. 1.8 Ga and identify backazimuth dependent shear-wave splitting parameters (phi, dt) on Baffin Island that indicate complex anisotropy (e.g., dipping fabric) beneath the region. Our results support the view that significant lithospheric deformation occurred during the Paleoproterozoic and that modern-day plate tectonic processes were thus in operation by at least ca. 1.8 Ga.