Geophysical Research Abstracts
Vol. 12, EGU2010-6345, 2010
EGU General Assembly 2010

HuBLE-UK, the Hudson Bay Lithospheric Experiment: Insights into the Formation of the Canadian Shield From Seismic Tomography and Shear-Wave Splitting.

Ian Bastow (1), David Thompson (1), J-Michael Kendall (1), George Helffrich (1), James Wookey (1), David Snyder (2), David Eaton (3), and Fiona Darbyshire (4)

(1) Department of Earth Sciences, University of Bristol, Bristol, United Kingdom., (2) Natural Resources Canada, Geological Survey of Canada, Ottawa, ON, Canada., (3) Department of Geoscience, University of Calgary, Calgary, AB, Canada., (4) Centre GEOTOP, Universite du Quebec a Montreal, Montreal, QC, Canada.

Hudson Bay lies in the Precambrian core of North America that comprises the Canadian Shield and contiguous platform regions. The region is underlain by one of Earth's largest lithospheric keels and is the site of one of the largest negative geoid anomalies. We have deployed a network of 12 broadband seismic stations in the northern part of Hudson Bay that complement existing POLARIS and CNSN networks in the region. Here we present SKS shear-wave splitting analyses, independent tomographic inversion of P- and S-wave travel-time data, and receiver function results in order to: 1) understand better the origin and evolution of the Hudson Bay cratonic interior basin; 2) to illuminate possible relationships between the lithospheric keel, sub-lithospheric mantle flow and formation of the Hudson Bay basin; 3) to improve understanding of postglacial isostatic rebound; 4) to map the lithospheric structure of the Trans-Hudson Orogen (THO) in a region characterized by extreme salient-reentrant geometry, possibly analogous to the western syntaxis of the Himalayan front. SKS fast directions appear sensitive to Paleoproterozoic THO lithospheric fabrics, not trends that would be predicted by mantle flow or plate motion basal drag hypotheses. SKS delay times vary from 0.5-1.6s, which indicate a lithospheric-scale anisotropic layer at least 150km thick. Tomographic images of the region also shed new light on the THO and neighboring Archean terranes. Our work complements ongoing HuBLE studies that focus on dispersion analysis of teleseismic Rayleigh waves, and applications of ambient noise tomography that extract additional complementary information about lithospheric structure of the region.