ICAM8 Abstracts
Lithosphere dynamics & seismology

New maps and transects of the crustal structure of Ellesmere Island

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Analysis of receiver function data acquired during the Ellesmere Island Lithosphere Teleseismic Experiment (ELLITE) resulted in a crustal velocity model along a ~460 km long NNW-SSE oriented transect crossing the major tectonic and structural domains of Ellesmere Island. This model, together with geological constraints, formed the basis of a gravity model following the same transect. The new models were integrated with existing seismic constraints and an existing gravity Moho model covering Ellesmere Island and adjacent areas to produce new maps of inferred depth to basement, thickness of the crystalline crust, as well as Moho depth.

Moho depths can be interpreted in terms of Eurekan (Cenozoic) and Ellesmerian (Palaeozoic) deformation. Thick metasediments throughout central Ellesmere Island correlates with areas of dominantly Ellesmerian accretion. The WSW-ENE orientated Hazen Stable Block, which displays upper crust strongly deformed in the Palaeozoic but essentially undeformed in the Cenozoic, correlates with shallow Moho with high velocity/density lower crust. This zone clearly separates a thick crustal block to the north from the North American-Greenland Craton to the south. High velocity/density lower crust may be related to igneous activity during various episodes of rifting in the area and/or the Cretaceous-Palaeocene High Arctic Large Igneous Province. A correlation appears to exist between topography, Moho depth and the presence of dykes in Nansen Sound suggesting a common tectono-magmatic origin. Lincoln Sea shows consistently thin crust likely related to rifting.