

## The crustal structure of Lomonosov Ridge, Marvin Spur and Alpha Ridge

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The 2016 Canada-Sweden Polar Expedition acquired seismic reflection and refraction data to increase the understanding of the tectonic evolution of the Arctic Ocean. The expedition was part of the Canadian UNCLOS program and utilized two icebreakers: the Swedish Oden and the Canadian Coast Guard Ship Louis S. St-Laurent. For the refraction work, sonobuoys and on-ice seismometer stations were used. Results from five lines are presented here: two transects across Lomonosov Ridge, two lines on the northern flank of Alpha Ridge and one profile on the crest of Marvin Spur. Velocity models for the crust were developed by forward modelling of travel times, supplemented by gravity modelling to provide better control on deeper structures, in particular the Moho depth. The two lines on Alpha Ridge reveal a velocity structure that is compatible with other refraction data from the ridge. The crust is up to 18-km-thick with velocities  $>6.8$  km/s in the lower crust. On Marvin Spur, a double reflection supports the presence of a high-velocity lower crust with a Moho depth of 23 km. Lower crustal velocities are 6.3 km/s in support for a continental affinity of the spur. The models for Lomonosov Ridge show a magmatic intrusion into the continental crust on one line, in support for a local HALIP-related overprint of the ridge. In the continent-ocean transition towards Amundsen Basin, a zone with rather smooth basement and velocities of 5.2 km/s is interpreted as highly serpentinitized and exhumed mantle, questioning interpretations that seafloor spreading started at Chron C25.