

Heat flow measurements from central Arctic Ocean – considering the seafloor to the mantle

Grace E. Shephard, Steffen Wiers, Evgenia Bazhenova, Lara F. Pérez, Luz María Mejía, Carina Johansson, Martin Jakobsson, Matt O'Regan

grace.shephard@geo.uio.no

Constraints on the tectono-thermal evolution of the Arctic Ocean are hampered by notably sparse heat flow measurements. Previous results from the submerged continental fragment of the Lomonosov Ridge, and the adjacent oceanic seafloor of the Amundsen Basin, reveal variable magnitudes, including those higher than expected considering plate cooling or simple uniform stretching models. New heat flow results gathered from 17 sediment cores acquired during the “Arctic Ocean 2016” and “SWERUS-C3” expeditions are presented. Three sites located in the Amundsen Basin reveal heat flow of 71-95 mW/m², in line-with or slightly higher (1-21 mW/m²) than expected from oceanic heat flow curves. These values are substantially lower those of another study that found 104-127 mW/m² on similarly aged oceanic crust in the Amundsen Basin. A slow upper mantle seismic anomaly in the vicinity of the North Pole might explain some of this discrepancy. Sites from the Lomonosov Ridge and Marvin Spur recovered heat flow in the order of 53-76 and 51-69 mW/m², respectively. When considering the potential enhanced surface heat flux from radiogenic heat production in the crust, these variable measurements are broadly in line with predictions from uniform extension models for continental crust. The regional complexity highlights the difficulty in disentangling temporally and spatially evolving crustal, lithospheric and mantle processes to present-day surface heat flow measurements.