

Tracing mantle depletion along the ultra-slow spreading Gakkel Ridge, Arctic Ocean

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The global ocean ridge system extends for ~55,000 km and includes fast-, intermediate-, slow- and ultraslow spreading ridge types. The least studied ridge systems are ultraslow spreading ridges, characterized by average spreading rates of 12-18 mm per year, the existence of amagmatic ridge segments and the absence of transform faults [1]. The Gakkel Ridge in the Arctic Ocean is one of only two known ultraslow ridge systems with these properties. It extends from the north of Greenland to the northern coast of Siberia. Along-ridge variations in spreading rate [1], isotopic signature [2], and crustal thickness and magmatism [3] make the Gakkel Ridge a unique study area to investigate modes of crustal formation at divergent margins and underlying mantle heterogeneity. Key will be to identify links between the latter and the diversity in MORB chemistry. We present chemical and radiogenic/stable isotope data of basalts dredged from three distinct areas of known geotectonic and magmatic diversity. The Western Volcanic Zone (WVZ), the Sparsely Magmatic Zone (SMZ) and the Eastern Volcanic Zone (EVZ) display along-ridge geochemical variations that cannot be explained by melt generation processes alone. Major element systematics show higher $Na_{8.0}$ (~3.3) compared to Atlantic-Pacific MORB, confirming that Gakkel Ridge basalts are products of very low degrees of melting [4]. Hf-Pb and Fe isotope systematics will be used to trace the role of long-term mantle depletion [5] in Gakkel Ridge mantle sources.

[1] Dick et al. (2003), *Nature* **426**, 405-412. [2] Goldstein et al. (2008), *Nature* **453**, 89-93. [3] Schmidt-Aursch & Jokat (2016), *Tectonophysics* **691**, 85-97. [4] Hellebrand et al. (2002), *Chemical Geology* **182**, 227-235. [5] Stracke et al. (2011), *EPSL* **308**, 359-368.