

Focused magmatism at extreme slow spreading rates in the Arctic Ocean close to the Laptev Sea

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The ultraslow spreading ridges represent a poorly understood type of plate boundary consisting of magmatic and amagmatic segments that expose mostly mantle peridotite and only traces of basalt and gabbro. The slowest part of the global spreading system is the eastern Gakkel Ridge in the Central Arctic Ocean where crustal accretion is characterized by extreme focusing of melt to discrete magmatic centers. Close to the eastern tip of the ridge is the Gakkel Rift Deep (GRD) with an unusual up to 5200 m deep rift valley in contrast to a broad sediment-filled rift valley towards the east and west. Here we report an isotopic age for a pillow basalt dredged from a seamount on the rim the GRD. Geochemical and Sr-Nd-Pb data are consistent with an alkaline MORB-type pillow lava with unusual trace element enrichment attributed to particularly low degrees of partial melting, at greater than normal depth, of a source region that has experienced prior geochemical enrichment (veining?).