The eastern Gakkel Ridge: Crustal asymmetry, ridge segmentation and propagation into the Laptev Sea revealed by geophysical data

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The present day plate boundary between the Eurasia and North America plates, the Gakkel Ridge, runs through the Eurasia Basin in the High Arctic, and is considered the slowest mid-ocean ridge on Earth (c. 6-13 mm/yr). New Russian seismic data and other available geophysical data reveal the asymmetry of the basement and sedimentary structure of the eastern Eurasia Basin. We describe new tectonic structures, previously undetected: few seamounts in the Amundsen Basin, a detailed asymmetric structure of the eastern Gakkel Ridge, and a peculiar deep mid ocean ridge valley, the Gakkel Ridge Deep (GRD), and its volcanic flanks, formed at the slowest spreading segment of the Gakkel Ridge. We find that GRD is anomalously wide and may host much more volcanic-like features than expected for an ultra-sow spreading segment. From GRD, the Gakkel Ridge continues towards the Laptev Sea as a magmatic segment characterized by high seismicity and occurrence of seamounts, among them the Shaykin and Trubyatchinsky seamounts. In the easternmost part of Eurasia Basin, close to the Laptev Sea shelf, the Gakkel Ridge can be seen as a deep, buried mid-ocean ridge valley, and its current activity is reflected by the recent dense faults that disturb the younger sediments and the seafloor. The continuation of the Gakkel Ridge into the Laptev Sea complex rift system may have been offset by transform faults, and we show evidence of Eocene strike-slip motion along the Khatanga-Lomonosov Fault.