



The eastern Gakkel Ridge: Crustal asymmetry and ridge segmentation 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). For the first time, a large number of seismic data enables now to study the structure of the slowest part of the Gakkel Ridge, together with its oceanic flanks, and its continuation into the rifted Laptev Sea and neighboring areas. The new seismic and other available geophysical data reveal the asymmetry of the basement and sedimentary structure of the eastern Eurasia Basin. The seismic data presented here reveal 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. 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 newly described structure of the eastern Gakkel Ridge is compared with the western Gakkel Ridge and other ultra-slow spreading centers, including the Southwest Indian Ridge, in an attempt to identify how the Arctic mid-ocean ridge structure is related to similar ultra-slow mid-ocean ridges. We find that the Gakkel Ridge Deep is anomalously wide and may host much more volcanic-like features than expected for an ultra-slow spreading segment calling for a re-evaluation of our understanding of the interplay between tectonic and magmatic processes in this special settings.