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Thin crust in the southern Nansen Basin imaged with multi-channel seismic data

Rüdiger Lutz, Dieter Franke, Kai Berglar, Ingo Heyde, and Peter Klitzke
Federal Institute for Geosciences and Natural Resources (BGR), Hannover, Germany (r.lutz@bgr.de)

We study the oldest crust of the Nansen Basin formed at the slow spreading Gakkel Ridge in the Arctic Ocean and its transition to the continental northern Barents Sea margin. Our data cover the transition from the continental northern Barents Sea margin across a narrow continental margin into the oceanic Nansen Basin. Across the margin, the seafloor drops down more than 2 km over a distance of about 10 km accompanied by two large normal faults, clearly imaged in seismic data. We interpret this as the expression of a transform margin.
The crust in the southern Nansen Basin does not resemble the style of typical oceanic crust and the continent ocean boundary might be situated several tens of kilometers north of the transform margin as defined by deeply-reaching normal faults.
Farther to the north, normal faults separate individual rotated blocks. Towards Gakkel Ridge faults bend and form listric normal faults which root in an undulating reflector at a depth of 0.3-1.3 s (TWT) below the top of the acoustic basement.
Magnetic anomalies are well developed in the Nansen Basin and interpreted by various authors to at least chron C24. An analysis of these anomalies show, that spreading velocities at the Gakkel Ridge changed over time from slow to ultra-slow spreading at present. Our reflection seismic data image ∼170 km of the Nansen Basin and reach magnetic anomaly C22 at the northernmost part, thus covering a time span of about 5 Myr. In this contribution, we discuss the nature of the crust and the transition from continental rifting to slow seafloor spreading. Potentially, the continent-ocean transition is formed by blocks of extended continental crust. Farther to the north, exhumed mantle-derived rocks may form the blocks.