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Some constraints for scenarios of the northern Barents Sea margin evolution

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The northern Barents Sea continental margin has remained the least investigated province of the Barents Sea because of very limited seismic data due to a largely permanent ice cover. An understanding of the structure and the evolution of the continental margin is essential to figure out the history of geological development and the hydrocarbon potential of the northern Barents Sea region.
A series of crustal-scale geotransects illustrating the architecture of the continental margin were constructed using seismic reflection profiles and both inverse and forward gravity modeling.
The applied method includes solution of the inverse gravimetric problem with respect to the gravity effect of a thermally differentiated mantle. An iterative grid-based gravity inversion for Moho depth and stretching factors was applied. Two-dimensional gravity inversion for Moho depths was carried out along synthetic profiles taking into consideration the distribution of sedimentary cover from sparse seismic profiles and depth to magnetic source estimates.
The crustal transects reveal a narrow and steep continent-ocean transition which is characteristic of sheared more than rifted margins. This may reflect a short-lived phase of shear during breakup prior to the opening of the Eurasia Basin which was initiated at the Paleocene-Eocene transition.
The free-air gravity field shows large positive anomalies associated with Plio-Pleistocene glacial fans deposited in front of the Franz-Victoria and St. Anna troughs, which are prominent bathymetric features in the northern Barents-Kara Sea. These sediments were derived from uplifted and eroded areas in the Barents-Kara Sea region.