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Paleo-bathymetry of the Davis Strait, a polar gateway between Canada and Greenland

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The Baffin Bay and the Labrador Sea are connected via the Davis Strait. As a bathymetric high of less than 700 m water depth, the Davis Strait is an obstacle for the water transport between the northern latitudes and the Atlantic Ocean. For climate models of the past, the heat transport by ocean currents plays a major role. Bathymetric models are therefore essential to understand past ocean-current developments.
By backstripping of the sediments, calculation of thermal subsidence of the crust, and rotation in a plate kinematic model we obtained the paleo-bathymetry of the Davis Strait area, including the northern Labrador Sea. The grids are calculated for time steps from Eocene to Cretaceous. For these calculations we collected interpretations of seismic data and drill sites to combine these with our new seismic data. The backstripping process includes flexual unloading (isostatic compensation), sediment decompaction, and global sea-level changes. The paleo-location of the profiles and the age structure of the crust, which is needed for the thermal subsidence calculations, are derived from our recent plate kinematic model.
Although the paleo-bathymetry grids include large uncertainties, we can conclude that a water transfer via the polar gateway Davis Strait was not possible prior to Oligocene times. Our grids represent the first regional paleo-bathymetry models of the Davis Strait/Labrador Sea region. Combined with previous work in the North Atlantic they can be used for paleo-climate simulations.