

Miocene uplift of the NE Greenland margin linked to plate tectonics: Seismic evidence from the Greenland Fracture Zone, NE Atlantic - DTU Orbit (08/11/2017)

Miocene uplift of the NE Greenland margin linked to plate tectonics: Seismic evidence from the Greenland Fracture Zone, NE Atlantic: Margin Uplift and Plate Tectonics

Tectonic models predict that, following breakup, rift margins undergo only decaying thermal subsidence during their post-rift evolution. However, post-breakup stratigraphy beneath the NE Atlantic shelves shows evidence of regional-scale unconformities, commonly cited as outer margin responses to inner margin episodic uplift, including the formation of coastal mountains. The origin of these events remains enigmatic. We present a seismic reflection study from the Greenland Fracture Zone – East Greenland Ridge (GFZ-EGR) and the NE Greenland shelf. We document a regional intra-Miocene seismic unconformity (IMU), which marks the termination of syn-rift deposition in the deep-sea basins and onset of: (i) thermo-mechanical coupling across the GFZ, (ii) basin compression, and (iii) contourite deposition, north of the EGR. The onset of coupling across the GFZ is constrained by results of 2-D flexural backstripping. We explain the thermo-mechanical coupling and the deposition of contourites by the formation of a continuous plate boundary along the Mohns and Knipovich ridges, leading to an accelerated widening of the Fram Strait. We demonstrate that the IMU event is linked to onset of uplift and massive shelf-progradation on the NE Greenland margin. Given an estimated middle-to-late Miocene (~15-10 Ma) age of the IMU, we speculate that the event is synchronous with uplift of the East and West Greenland margins. The correlation between margin uplift and plate-motion changes further indicates that the uplift was triggered by plate tectonic forces, induced perhaps by a change in the Iceland plume (a hot pulse) and/or by changes in intra-plate stresses related to global tectonics.

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