Geophysical Research Abstracts
Vol. 14, EGU2012-12726, 2012
EGU General Assembly 2012

Link between Mid-Ocean Ridge kinematics and uplift of passive continental margins

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Tectonic models predict post-rift subsidence of rift margins after initial flexural rebound and transgression of a sedimentary wedge over the subsiding mar¬gin as the lithosphere cools with time. However, studies of North Atlantic rifted margins show that thermal subsidence following breakup at the Paleocene-Eocene transition was interrupted by signi[U+FB01]cant uplift movements. These vertical movements represent a long-standing enigma and they have been linked to sea-level [U+FB02]uctuations, climate deterioration and tectonics but as yet they remain unexplained. Here we combine regional Multi-Channel Seismic re[U+FB02]ection data across the NE Greenland Shelf, the Greenland Fracture Zone (GFZ) and continental East Greenland Ridge (EGR) in the northern NE Atlantic and stratigraphic data from a drill core. We show that a mid-Miocene change from down-faulting to uplift along the GFZ-EGR correlates with signi[U+FB01]cant uplift of the NE Greenland margin. This tectonic change is associated with a regional unconformity that marks the first occurrences of mass-¬wasted deposits in the deep sea off the NE Greenland Shelf and the development of prograd¬ing mega-sequences and angular truncation of hemipelagic sediments below the unconformity, respectively, on the outer and inner NE Greenland Shelf. We attribute the tectonic changes at the GFZ to the development of a modern, continuous spreading system along the Mohns-Knipovich Ridge segments that led to an opening of the Fram Strait corridor, to large-scale changes in ocean circulation and climate and possibly to medium-scale (20–30 m) sea-level [U+FB02]uctuations. While these consequences of the tectonic changes may have affected the amplitude of uplift in NE Greenland, they cannot explain the uplift at the GFZ-EGR in deep sea. We therefore find that plate-tectonic changes produced the driving force for the mid-Miocene uplift in NE Greenland.