



Elevated peneplains truncating Palaeogene basalts as evidence of post-rift erosion and uplift in East Greenland

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The landscape along the continental margin in East Greenland is generally characterised by a mainly ice-covered upland at 2 km or more a.s.l. with low relative relief. This upland is in part heavily dissected by deeply incised valleys that cut down to the present sea level. Whereas there is no debate about how to describe the landscape forms of this passive margin, there is a considerable debate whether these uplands represent rift topography or if the topography developed later, unrelated to rift processes.

Our landscape analysis, based on mapped surfaces that cut across Palaeogene basalts (c. 55 Ma) and older rocks has shown that the presently uplifted upland (peneplain) represent an erosional unconformity. Consequently, these surfaces (peneplains) are post-basalt in age and we suggest that they formed by fluvial erosion towards the base level of the nearby sea during the opening of the North Atlantic. The dissection of the surface by deep valleys demonstrates that the surface was uplifted subsequent to its formation. We therefore find that the topography developed substantially later than during continental break-up.

Detailed geomorphological mapping of the Kangerlussuaq area (68 – 70°N) reveal that there are two different erosion surfaces, separated by an escarpment. This stepped landscape is evidence of a history of erosion (to form the peneplains), followed by uplift (to dissect them). This cycle must have taken place twice to explain the presence of two uplifted surfaces.

Tentatively, we suggest correlating the formation of the higher surface with an Oligocene – Lower Miocene unconformity seen in the offshore record. New AFTA results from the Kangerlussuaq area reveal cooling phases that postdate formation of the high-lying erosion surface, with the implication that uplift to the present-day altitudes occurred since the Late Miocene.

We conclude that the upland erosion surface represent a period of near sea-level topography, while the incised valleys formed as result of subsequent uplift. AFTA data constrain the timing of these uplift events to the late Cenozoic.