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Burial and exhumation history of southern East Greenland after opening of the NE Atlantic

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The voluminous plateau lavas of southern East Greenland erupted onto a largely horizontal plain near sea level at breakup of the NE Atlantic at the Paleocene–Eocene transition. Our synthesis of geological observations, stratigraphic landform analysis and apatite fission-track analysis data in 90 rock samples, shows that three phases of uplift and exhumation subsequently shaped the present-day margin and controlled the discontinuous history of the Greenland ice sheet. A Late Eocene phase led to formation of a regional erosion surface near sea level (the Upper Planation Surface, UPS), a Late Miocene phase led to formation of the Lower Planation Surface (LPS) by incision below the uplifted UPS, and a final phase that most likely began in the Early Pliocene, led to formation of fjords and valleys below the uplifted LPS and to peaks reaching 3.7 km asl. Local uplift affected the Kangerlussuaq area ($\sim$68ºN) in the Early Eocene during the emplacement of the Kangerlussuaq Intrusion and in the Late Oligocene during block movements that may be related to the detachment of the Jan Mayen microcontinent from Greenland. Middle Miocene thermal activity heated rocks around the Kangerlussuaq Basin. The regional uplift phases are synchronous with phases in West Greenland, North America and Europe. Uplift at the Eocene–Oligocene transition coincided with the restart of Iceland plume activity and a major change in spreading directions in the NE Atlantic that was preceded by a drop in spreading rates. We suggest that the stress that build up during changes in plate motion drive vertical movements along passive continental margins. The present-day high elevations in the study area are also probably supported by flow within the Iceland plume.