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Structure and geomorphology of Mesozoic and Cenozoic landscapes of South Greenland: uplift, erosion and basement reactivation

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The continental margins of South Greenland developed due to Mesozoic/ Cenozoic rifting and break-up during the development of the Labrador Sea and North Atlantic Ocean. However, the structural styles of these margins appear markedly different. The preliminary analysis of the large-scale topography indicates a separate development of the eastern and western coasts of South Greenland: the south-eastern coast is characterized by an elongate, anticlinal structure with elevations above 2 km almost to the southern tip of Greenland at 60ºN; the west coast is dominated by near-horizontal surfaces reaching 1 km southwards to the northern part of Kobberminebugt at 61ºN. This study uses a combination of structural geological mapping, geomorphology and new apatite-fission track analysis (AFTA) data to demonstrate the tectonic development and influence of pre-existing structures on the development of these margins.

Detailed field studies were carried out in south-western Greenland in order to analyse fault patterns and landforms in Kobberminebugt and how these relate to the Mesozoic rifting in the Labrador Sea. This region marks a distinct left-lateral step on the margin of SW Greenland. This step is coincident with the transition from Archaean basement rocks to the north and rocks of the Ketilidian orogenic belt to the south. In the west there is a marked topographic change in the region of Kobberminerbugt. This is coin-

cident with the Border zone of the Ketilidian Orogen. This topographic expression is not apparent on the east coast where the lithological contrast is the same. Fault patterns and movements in Kobberminebugt all appear to be consistent with a regional NE-SW extension direction and the orientation of strike-slip faults appears to fit with dextral transtension. As the area studied lies in a left-lateral step on the rifted Labrador Sea margin, we suggest that this system may have developed as an oblique transfer zone during Mesozoic rifting.

In contrast, the south eastern margin of Greenland shows none of these characteristics of basement inheritance. New AFTA data shows that the uplift history of this margin is markedly different to that of the west. These variations may be either the result of differing pre-existing basement structure or style of breakup.