



## **Déjà vu of East Greenland's paleotopography: Paleozoic to Cenozoic reuse of transgressive planes.**

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East Greenland's sedimentary record has long been known to record major transgressive events of Mid Devonian to Early Carboniferous, latest Permian to earliest Triassic, Mid Jurassic, Early to mid Cretaceous, and Early Cenozoic age. These transgressive events have been tied to rifting, often across faults adjacent to the present day limit of sedimentary outcrop. In this study we have described and traced transgressive surfaces from below the sedimentary cover and paleo-landwards away from the exposed cover.

Locally the paleo-topography appear directly controlled by the substrate lithologies. Where these are heterogeneous (e.g. gneisses), harder substrate lithologies form paleo-islands, often with distinct fossils flora and faunas of the wave and lee side. Where sediments or granites are transgressed the beveling appear more planar, although locally channeled. The field data are complemented with regional geologic and topographic data, supplemented by new LIDAR data, and satellite imagery. Using these tools paleosurfaces are traced up to a hundred km away from their sedimentary cover. Some surfaces are clearly not offset by the faults supposed to control the basin geometry, thereby questioning the rift nature, or at least the rift-geometry of the associated basins. On a regional scale, the paleosurfaces appear to be remarkable planar, and often project landwards into the same remnant paleosurface. Thermochronological data from rocks below these barren paleosurfaces further support those thick deposits once extended much wider than their present outcrop. Generally the Devonian-Carboniferous paleosurfaces are mountainous. In contrast the Late Permian and Mesozoic surfaces appear regionally planar, with exceptions of channels or faultscarps and are typically parallel or even coincide. Also the ca. 55 Ma pre-basalt surfaces generally follow the older surfaces, but are hillier. The most distinct surface is a mid Cenozoic surface,

which clearly cuts older surfaces after these were rotated. There is no sedimentary cover on this surface, but it is well documented in cooling ages.