



The mountains of North-East Greenland and Norway are not remnants of the Caledonian topography

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It has been suggested that the present-day mountains in North-East Greenland and Norway represent remnants of the original Caledonian topography, and that these areas have undergone slow, steady exhumation since ~250 Ma. This view has been supported by inverse modelling calibrated by apatite fission-track data from samples of exposed Caledonian basement. However, apatite fission-track data on their own register only cooling and must be integrated with geological evidence to reveal episodes of reheating, reflecting re-burial. The rocks of the Norwegian mountains are Caledonian or older and thus provide no direct insight into the post-Caledonian evolution on the European side of the Caledonian orogen. However, the well-documented geological record of North-East Greenland shows that the Caledonian mountains were obliterated as topographic features during the late Palaeozoic and provides clear evidence of a history involving episodic, post-Caledonian exhumation and re-burial. The high-grade metamorphic basement was at great depth during the Devonian and was exhumed to the surface before being reburied by up to 2 km of Upper Carboniferous and younger sediments. These sediments were then partially removed during renewed, Early–Middle Jurassic exhumation that led to the formation of a low-lying landscape which eventually subsided and was buried below a km-thick cover of Middle Jurassic and younger sediments. This cover was then partially removed during later phases of uplift and exhumation that eventually led to the formation of the present-day relief in post-Jurassic times. The geological record in East Greenland is clearly incompatible with the idea of slow, steady exhumation since the Caledonian orogeny.