

Exhumation of deep crustal granulites during Neoproterozoic terrane accretion, SW Greenland.

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The Neoproterozoic in SW Greenland was a time of regional-scale crustal thickening that eventually resulted in the collision of several terranes, each of which being characterized by a distinct thermal regime and PT history. The Nuuk region is interpreted to contain a paired metamorphic belt [1], formed during the convergence and collision of the Færingehavn terrane and the structurally overlying Tre Brødre and Tasiusarsuaq terranes. The Tasiusarsuaq terrane represents a deeply eroded section through the upper plate, mainly made up of granulite, amphibolite facies TTG gneiss and supracrustal rocks. In its centre, nappes of deep crustal granulites (800-950°C, 9-12 kbar) were exhumed into mid crustal levels at conditions of ~700° and 7-8 kbar. Nappe emplacement was associated with NW-vergent thrusting and the steepening of fabrics between ca. 2750-2720 Ma, coeval with the juxtaposition of the Færingehavn terrane beneath the upper plate. The deep-crustal granulites thus represent hot, ductile fold nappes such as those modelled for large hot orogens, for instance the Grenville orogen and Himalaya [2]. Abundant leucosomes, syn-tectonic pegmatite and leucogranite sheets testify to a rheologically weak crust in which deformation and nappe emplacement were assisted by partial melts. Based on structural geology, U-Pb zircon age data and pseudosection modelling, we show that the emplacement of the deep crustal granulites was a direct consequence of crustal convergence and collision of the terranes at ca. 2720-2700 Ma. We also show that the final terrane collision in the Nuuk region was associated with a switch from convergence related thrusting to co-axial shortening in the centre of the orogen, leading to the development of subvertical extrusion zones such as the Grædefjord gneiss belt.

[1] Dziggel, A. et al. (2014) *Prec. Res.* 242, 22–38.

[2] Beaumont, C. et al. (2006) *Geol. Soc. Spec. Publ.* 268, 91-145.