

Paleoproterozoic collisional history of northern Fennoscandia

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Northern Fennoscandia is a collage of at least three Archean continental blocks: Kola/Murmansk, Karelia and Norrbotten. The Kola-Karelia collision produced the Lapland-Kola orogen where the most conspicuous component is the Lapland granulite belt, formed during the SW thrusting (D1a) at ≥ 1.91 Ga. Nearly simultaneously a collision between the Norrbotten and Karelia continental blocks is seen as an east vergent thrusting (D1b) where both the Kittilä allochthon and the Martimo belt show thin-skin style thrusting whereas the Central Lapland aulacogen probably evidenced more thick-skin style deformation. The collision vectors rotated anticlockwise towards the NE in central Fennoscandia and caused orogen parallel shortening towards N (D2) and a partial basin inversion in the Central Lapland aulacogen at 1.89-1.88 Ga.

Major accretion and collision stage between 1.88-1.87 Ga in the southern and central part of Fennoscandia is seen in the SW-NE shortening (D3) phase in northern Fennoscandia. The effects of this shortening are strongly partitioned and localized, and are often seen as composite structures (D2/D3). The effects of proposed buckling around 1.87-1.86 Ga, forming the Bothnian oroclines in central Fennoscandia and an orocline in the NW part of Fennoscandia, are not clear but the 1.87-1.85 Ga extension associated with migmatization and magmatism in northern Fennoscandia are tentatively linked to the buckling.

The extension-related subhorizontal structures in the Central Lapland aulacogen were folded (D4) due to NW-SE shortening at 1.85-1.81 Ga. This folding and associated NW and SE doubly vergent reverse faults are also seen in other parts of northern Fennoscandia. This event can be linked either to strong shortening occurred in southern Finland at ca. 1.83-1.82 Ga and/or to an unknown collision event (e.g., Nagssugtoqidian orogeny in Greenland).

A continued NE-SW near-orthogonal shortening (D5) with increasing transpressive component at 1.80-1.76 Ga is a dominant feature in the NW part of northern Fennoscandia, along the Norrbotten-Karelia boundary and in the Central Lapland aulacogen. The D5 deformation as a whole is seen as a strong 1.79-.77 Ga tectonometamorphic event in northern Fennoscandia. We attribute D5 either to a major continent-continent collision or an advancing accretionary orogen (Andean-type) with retro-arc fold and thrust belts.