

Structural and geochronological studies on the crustal-scale Pajala Deformation Zone, northern Sweden

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Geological and geophysical investigations were conducted to constrain the tectonic history along the Pajala Deformation Zone (PDZ). The PDZ is a 50 km wide deformation zone that strikes along the border between northern Sweden and Finland. Recently, it has been postulated that the PDZ marks an old suture zone between the continents Norrbotten and Karelia (Lahtinen et al. 2015).

Interpretations of the geophysical data (VLF, magnetics, gravity) reveals a series of steeply dipping shear zones and faults, which are striking N-S to NW-SE. These structures bound strongly elongated tectonic lenses composed of tightly folded migmatites and paragneisses. Geological field mapping and 3D structural modelling indicates a dome geometry of the tectonic lenses, which we interpret as large-scale, steeply plunging sheath folds that became progressively flattened during E-W to NE-SW shortening.

The westernmost shear zone of the PDZ is considered to be the main tectonic boundary accommodating several kilometers of vertical displacement that juxtaposed rocks affected by metamorphism of medium grade to the west and high grade to the east.

The timing of metamorphism within the PDZ is constrained to 1820-1780 Ma (Bergman et al. 2006). A formation age of 1804 ± 5 Ma was obtained in this study by U-Pb SIMS zircon dating of a strongly foliated quartz monzonite, which suggests that at least part of the shearing along the PDZ occurred after 1800 Ma.

References:

Bergman, S., et al. 2006: U-Pb age evidence for repeated Paleoproterozoic metamorphism and deformation near the Pajala shear zone in the Fennoscandian shield. *GFF* 128

Lahtinen, R., et al. 2015: New Geochronological and Sm-Nd constraints across the Pajala shear zone of northern Fennoscandia: Reactivation of a Paleoproterozoic suture. *Precambrian Research* 256, 102-119.