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Structural study of a Paleoproterozoic ductile shear zone - The Kynsikangas Shear Zone, SW Finland

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The NW-striking Kynsikangas Shear Zone (KSZ) is a prominent major ductile shear zone in SW Finland that formed during the Svecofennian Orogeny. The aim of the structural study of this ductile shear zone is to unravel the Paleoproterozoic structural evolution of the shear zone. The shear zone is approximately 4 km wide and is composed of highly strained metagranitoid and migmatite rocks displaying variable mineral foliation and -lineation geometry. Previous studies of the KSZ points at a deformation history with a purely strike-slip nature for the shear zone.

Structural geological mapping, micro-structural and petrographic analyses in combination with anisotropy of magnetic susceptibility (AMS) has been utilized to study the shear zone. The study indicates that the core of the shear zone is characterized by steep foliation surfaces, with NW-SE orientation and a pronounced sub-horizontal mineral stretching lineation together with distinct C-S fabric geometry. East of the fault core, there is a curvature in the strike of foliation from the NW-SE orientation towards a more E-W orientation and the mineral lineation is less pronounced. To the west of the fault core the foliation is NW-SE orientated with a moderate dip, while mineral lineation are moderately to steeply plunging towards east. Thus, the central and eastern part of the KSZ indicates prominent left lateral shearing, while the western part of the shear zone have a dip slip movement where kinematic indicators point at a reverse movement within these part of the KSZ.

The results infers a more complex deformation and kinematic history for the shear zone than what previously has been assumed. The data indicates a multiple stage geological and tectonic evolution for the shear zone where the studied structures indicates a roughly NE-SW directed shortening, that implies a deformation initially with reverse movement towards SW and then the onset of left-lateral shearing, trending NW-SE, when the progressive deformation continues.