

## Gravitational Spreading of the Central Part of the Svecofennian Orogen

K. NIKKILÄ<sup>1</sup>\*

<sup>1</sup>*University of Helsinki, Department of Geosciences and Geography, Helsinki, FINLAND*

*(\*correspondence:kaisa.nikkila@helsinki.fi)*

The central part of the Paleoproterozoic Svecofennian orogen formed in arc-collision at 1.91 Ga. The collision led to crustal thickening and partial melting of the crust. The partial melting formed a large batholith (Central Finland granitoid complex; CFGC) at the upper-middle crustal transition zone and a weak middle crust, which enabled crustal scale gravitational spreading in the central part of the orogen.

It is used analog modeling, geophysical data, geochronology, geochemistry and field observations to study 1) existence, and duration, timing and amount of gravitational in the central part of the Svecofennian orogen, 2) formation and deformation of crustal scale structures, and the CFGC during gravitational spreading, 3) explanations for the stabilized, but thick crust in the area.

**1)** The analog models are proposing that crustal scale structures, which earlier are connected to shortening, may also be explained by westward gravitational spreading. The duration of gravitational spreading of 45-50 % may be varying between 16 and 23 my depending on the amount of the reactivated weakness zones. The age results are proposing the start of the gravitational spreading at ca.1884 Ma and duration between 9 and 24 my in the CFGC, and the analog models are proposing up to 50 % of spreading. **2)** The exhumation is explained by the gravitational spreading, which has reactivated and rotated the large scale weakness zones such as terrane and arc boundaries in the area, and have uplifted, rotated and subsided crustal scale blocks. The deformation can be detected as changes in the metamorphic grade, in the texture or in the structure at the exposure level, or as changes at the Moho depth. The resulted deformation pattern is dependent on the mechanical properties of the crust. The deformation degree is not following the emplacement ages and all rock types is having both deformed and undeformed varieties in the CFGC. Hence the deformation degree cannot be used as a criterion for rock classification, but are reflecting the exhumation of the rocks. **3)** The analog models suggest that the Paleoproterozoic and the Archean side have thinned up to 20 % and 10 %, respectively. This can explain the remained thick crust in the central Svecofennian orogen.