Evolution of the Crustal Structure of the Svecofennian Orogen

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We have studied the evolution of the Svecofennian orogen using a conceptual PURC orogenic model developed by Jamiesson and Beaumont (2013) to help in identifying the similarities and the differences in the architecture of the various areas. The Svecofennian orogen is characterized by LP- HT metamorphism that usually develops in transitional to plateau stages. Deep seismic reflection profiles BABEL and FIRE are interpreted using PURC concepts: prowedge, retrowedg, uplifted plug, subduction conduit and elevated plateau.

A pronounced super-infra structure, typical of plateau stage, is imaged along FIRE3 and FIRE12. The Central Finland Granitoid Complex could represent an elevated plateau underlain by a midcrustal flow structure. The Bothnian belt could be either a retrowedge or a prowedge. The Raahe-Ladoga zone shows signs of both uplifted plug and of a transform zone. Pirkanmaa belt could represent a prowedge.

BABEL1 and BABEL3&4 profiles image a less well-developed orogenic domain, where a prowedge (Bothnian belt), an uplifted plug (Vaasa dome) and a retrocontinent (Skellefte and Savo belts) would have developed just prior to freezing of the collisional process.

BABELB, C and 1 profiles image a transitional orogen. Southern Sweden would comprise prowedge underlain protocontinent whereas the Södermanland basin, the Bergslagen area, the Häme belt would comprise retrowedge underlain by retrocontinent.

Altogether the architecture suggests a long-lived south-westerly retreating subduction system, with continental back-arc formation in its rear parts and well developed system of prowedge-retrowedge-uplifted plug close to a subduction conduit. Changes in the relative velocities of the upper and lower plate may have resulted in repetitive extensional and compressional phases of the orogeny as has previously been suggested for the southern part of the Svecofennian orogen.

References:

Jamieson, R.A. and Beaumont, C., 2013. On the origin of orogens. Geol. Soc. Am. Bull., doi:10.1130/B30855.1.