Geophysical Research Abstracts, Vol. 9, 08147, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-08147

Localized ductile deformation of meta-quartzites related to the emplacement of mini-laccoliths - an example from the Paleoproterozoic Västervik Formation (SE-Sweden)

A. Thust, B. Leiss, A. Vollbrecht and I.C. Kleinhanns

Geoscience Centre of the University of Goettingen, Goldschmidtstr. 3, 37077 Goettingen, Germany (Thusti81@web.de)

The Västervik area (SE-Sweden) is situated within the transition zone between the Svecofennian Domain and the Transscandinavian Igneous Belt, which are related to an E- to NE-dipping Paleoproterozoic subduction zone within the Baltic Shield. Due to extensive lithospheric uplift and erosion during the late Proterozoic and early Paleozoic deep tectono-metamorphic levels rose to the surface. In the Västervik area the corresponding rocks are mainly represented by several generations of granitoids which intruded between 1850 and 1800 Ma into strongly-deformed siliciclastic metasediments (Västervik Formation) that were deposited between 1880-1850 Ma, supposedly in a back-arc region at the southern margin of Svecofennia.

In restricted areas, meta-quartzites of the Västervik Formation display intensive mylonitization and complex folding in the m- to dm-scale, which are in contrast to comparatively simple and large-scaled fold patterns in the surroundings. We argue that these structures formed in response to the emplacement of mini-laccoliths, which were supplied by anatectic melts, segregated from arkosic members of the lower Västervik Formation. The proximity of underlying intrusions is indicated by leucogranitic dykes and thin sills parallel to mylonitic foliation. Their anatectic origin is indicated by an U/Pb zircon age of about 1950 Ma (this study) representing preserved ages of detrital zircons of the meta-sedimentary/migmatic protolith. Moreover, in neighbouring areas corresponding leuco-granitic intrusions (extracted melt blobs) have been observed within their migmatic source rocks.

The increased heat flow and probably localized fluid influx in the vicinity of these leuco-granitic intrusions may have decreased the flow strength of adjacent quartzites, which in turn promoted the up-doming of the laccoliths. The related high-temperature deformation was associated with significant ductile flow, leading to distinct mylonitic microstructures and textures, and the obliteration of primary sedimentary structures, which are very common outside of these high strain domains. Within the quartz mylonites they occur only as relic “porphyroclastic” lenses.

The structural development may be attributed to two development stages: (1) passive dragging during the up-doming phase and (2) subsequent gravitational collapse of the steeply- inclined strata at the flanks of the laccoliths. Weakly-developed circular lineaments, as visible on Landsat radar images, are attributed to corresponding up-doming structures within the Västervik Formation.