Geophysical Research Abstracts
Vol. 14, EGU2012-12591, 2012
EGU General Assembly 2012

Fault-slip analyses of brittle structures in the Corruvagge valley along the Pärvie fault in North Sweden

A. Bäckström (1), N. Rantakokko (2), and M.V.S. Ask (1)

(1) Luleå University of Technology, Civil, Mining and Environmental Engineering, Luleå, Sweden (maria.ask@ltu.se, +46-920 49 1935), (2) Geological Sciences, Stockholm University, Stockholm, Sweden

More than a dozen large faults have been subjected to glacially-induced faulting in northern Scandinavia. These faults are usually SE dipping, SW-NE oriented thrusts, and they could be of Precambrian age with a long deformation history including repeated periods of reactivations. Based on their size, it has been proposed that these faults have hosted unusually large intraplate earthquakes.

These faults are the targets for a scientific drilling project under development for the International Continental Scientific Drilling Program (ICDP), the "Drilling into Active Faults in Northern Europe" (Kukkonen et al. 2010). A major issue to be address before submitting the full IDCP proposal regards the question: Did the fault scarps host one large mega-earthquake or has it hosted several smaller events. To address this question, a field study was conducted in the summer of 2011, at three locations along the Pärvie fault in northern Sweden. The Pärvie fault scarp is $\sim$160 km in length and 10-15 m in height, and it is the longest known postglacial fault in the world. It is suggested that the Pärvie fault hosted a mega-earthquake ($M \leq 8.2$; Arvidsson, 1996) at the end or just after the last ice age, and seismic monitoring reveal that it remains seismically active today (e.g. Lindblom, 2011), with several hundreds of microearthquakes a year ($M \leq 3$).

Brittle structures were first collected in two locations by Riad (1990). Additional data have now been collected at three new locations. The Corruvagge valley is the most impressive site from the recent campaign, where data were collected along a profile that followed a dried-up river valley that cuts the Pärvie fault at approximately a perpendicular angle. This site offers a unique opportunity for a detailed investigation of brittle deformation from the hanging wall to the foot wall. About 1000 kinematic indicators were collected, in at least three different fracture filling minerals.

We are currently in the process of evaluating structural fault-slip analyses of brittle structures; (2) chemical identification of minerals; and (3) assess the age of one sample. The anticipated results from the fault-slip analysis is the relative age between structures and together with the paleostress analysis and the absolute dating it will strengthen the chronological order of the different stress fields that has affected the fault through time.

References

Arvidsson R, 1996. Fennoscandian earthquakes; whole crustal rupturing related to postglacial rebound. Science. 274(5288), 744–746.

Kukkonen, I.T., Olesen, O., Ask, M.V.S., and the PFDP Working Group, 2010. Postglacial faults in Fennoscandia:targets for scientific drilling. GFF, 132:71–81.

Lagerbäck, R. & Sundh, M., 2008. Early Holocene faulting and paleoseismicity in northern Sweden. Geological survey of Sweden. Research paper, C 836. 80 p.

Lindblom, E, 2011. Microearthquake Study of End-glacial Faults in Northern Sweden. Uppsala University: Licentiate thesis, 54 pp-

Riad, L., 1990. The Pärvie fault, Northern Sweden, Uppsala University. Research report 63. 48 p