Structural geology of the Naamivitikko and Riikonkumpu postglacial fault scarps in Finnish Lapland

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The resent availability of high-resolution LiDAR-based digital elevation models provides an outstanding possibility to discover and investigate postglacial fault scarps crosscutting glacial sediments and landforms (Palmu et al. 2015). In addition to establishing their geometrical characteristics, there is also apparent need to document the structural geological properties in more detail in order to gain understanding on the mechanisms and slip evolution of postglacial faults, which may further have implications e.g. for seismic hazard assessment for nuclear waste repositories.

The Riikonkumpu postglacial fault (PGF) scarp in Kittilä and Naamivitikko PGF in Kolari, northern Finland, were investigated with airborne LiDAR DEM, GPR, and lithostratigraphical studies of trenches excavated during the falls 2014 and 2015. The maximum height of the Riikonkumpu fault is 1.5-2 m and its SW-NE trending geometry can be traced about 15 km, whereas the Naamivitikko scarp is at least 6 m high but the scarp can only be traced for a length of 2-3 km.

Observations of the structures in the Quaternary sediments and bedrock can be used to assess the orientation of the actual fault planes but also the slip evolution of the faults, which in the case of the Naamivitikko PGF may indicate multiple slip events, in contrast to what is typically postulated for the PGFs. This paper describes results of these investigations.

References:

Palmu, J.-P. Ojala, A.E.K., Ruskeeniemi, T., Sutinen, R. and Mattila, J., 2015. LiDAR DEM detection and classification of postglacial faults and seismically-induced landforms in Finland: a paleoseismic database. GFF,
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