

# **Mörtsjö fault - 'new' Glacially-triggered fault discovered following geomorphic analysis of the 'Hudiksvall seismic cluster', Sweden**

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We present geomorphic, sedimentologic, and stratigraphic evidence of a previously unknown Holocene fault complex in central Sweden. The discovery was made in two steps: remote-desktop study with LiDAR-based imagery, and machine trenching of two suspected faults scarps. The study is funded by Swedish Nuclear Fuel and Waste Management Company (SKB) and is part of a larger project investigating the cluster of high seismic activity in the Hudiksvall area.

The first step focused on finding landforms influenced by glacially-triggered faulting, such as cross-cutting relations between scarps and raised shorelines or glacial features, as well as landslides in till. Features were mapped manually using the 1 m resolution, LiDAR-derived national height model. The distribution and character of landslide scars are a work in progress. Over six hundred such features were mapped, in step one, and the distribution can be correlated to known or suspected GTF's. The remote desktop study is summarized in an SKB report which is under review.

In the second step two sites were selected for machine trenching. The geomorphology shows cross cutting relations of the mapped scarps to raised shorelines and drumlins. Sedimentologic documentation reveals landslide events and folded, as well as, ripped fine-grained sediments sections. The sites, Snaten and Ers-Pers, are collectively referred to as the Mörtsjö fault complex.

Radiocarbon dates on samples from the Snaten fault landslide deposit are consistent with an average of 3180 cal yr BP. This 'maximum age' is by far the youngest fault rupture documented in Sweden. The varve stratigraphy at Ers-Pers shows that the landslide occurred below water c. 40 yr after deglaciation, c. 10 600 cal yr BP. However, the sedimentology also indicates secondary movements suggesting that the fault has been active at least twice since deglaciation.