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Postglacial faulting in Norway: A review

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Reports of neotectonic deformation in Norway, including Svalbard and offshore areas, were in the NEONOR project (Neotectonics in Norway 1997-2000) graded into five classes depending on the quality of documentation and their most likely origin. Several new claims have during the last ten years added to the long list of neotectonic reports. After an updated evaluation of almost one hundred neotectonic claims in Norway, three of these have now been classified as 'A - Almost certainly neotectonics' and another seven as 'B - Probably neotectonics.' The majority of the reports are attributed to effects other than tectonic. The present grade A claims include two postglacial faults in northern Norway and one area of active subsidence in the Ranafjord area in northern Norway. The Berill fault was previously thought to represent a postglacial fault of tectonic origin but is now reclassified as a gravity-induced structure related to the collapse of the Middagstinden mountain (i.e. a sacking structure).

The NE-SW-oriented, reverse Stuoragurra Fault in western Finnmark constitutes the Norwegian part of the postglacial Lapland Fault Province. The NW-SE-striking Nordmannvikdalen fault in northern Troms is a normal fault trending perpendicular to the large system of NE-SW-trending reverse faults in northern Fennoscandia. The Ranafjord area is currently subject to E-W extension and relative subsidence as revealed by fault plane solutions, InSAR PS data and GPS studies. The grade B claims include supposed secondary effects of large-magnitude earthquakes such as abundant liquefaction structures, rock-slope failures and other collapse structures in northern and western Norway.

The Lapland Fault Province occurs within the Archaean province of low heat flow in northern Fennoscandia, indicating that the lithospheric strength was sufficiently high to accommodate a significant stress accumulation due to ridge push, glacial loading and coastal unloading during the last glaciations. The stress was released during the last deglaciation along reverse faults accompanied by large-magnitude earthquakes.

The NE-SW-trending, postglacial Stuoragurra Fault (SF) extends for 80 km in the Masi-Iešjav'ri area in the Palaeoproterozoic of Finnmarksvidda. The SF is manifested on the surface as a fault scarp up to 7 metres high. The Stuoragurra fault seems to occur within a Paleoproterozoic duplex structure along the Mierujavri-Sværholt shear zone. A dextral component of the dominating reverse postglacial faulting is indicated by an offset esker and a sag pond between two overlapping fault segments. Four drillholes down to a depth of 135 metres revealed that at shallow depth the postglacial fault has a dip of c. 40º to the SE and consists of several thin (a few cm thick) zones of clay minerals within a 1.5 m-thick interval of fractured quartzite. The fractured zone occurs within a 25 m wide interval containing several 2-3 m-thick zones of lithified breccia partly coinciding with the margins of deformed Palaeoproterozoic albite diabases. Magnetic modelling of the albite diabase in the vicinity of the drillholes shows a dip of c. 40º to the SE. The 21 January 1996 earthquake (M 4.0) in the Masi area was most likely located along the SF at a depth of c. 10 km.