Geophysical Research Abstracts
Vol. 13, EGU2011-8029, 2011
EGU General Assembly 2011

Introduction to Postglacial Faults and the ICDP Drilling Project (PFDP)

Ilmo T. Kukkonen (1), Odleiv Olesen (2), and Maria V.S. Ask (3)

(1) Geological Survey of Finland, Southern Finland Office, Espoo, Finland (ilmo.kukkonen@gtk.fi, +358 2055 012), (2) Geological Survey of Norway, NO-7491 Trondheim, Norway (Odleiv.Olesen@NGU.NO), (3) Luleå University of Technology, SE-971 87 Luleå, Sweden (Maria.Ask@ltu.se)

During the last stages of the Weichselian glaciation (ca. 9,000 - 15,000 years B.P.), reduced ice load and glacially affected stress field resulted in active faulting in Fennoscandia with fault scarps up to 160 km long and 30 m high. These postglacial (PG) faults are usually SE dipping, SW-NE oriented thrusts, and represent reactivated, pre-existing crustal discontinuities. Postglacial faulting indicates that the glacio-isostatic compensation is not only a gradual viscoelastic phenomenon, but includes also unexpected violent earthquakes, suggestively larger than other known earthquakes in stable continental regions.

We are currently developing a new ICDP project 'Postglacial Fault Drilling Project' (PFDP) which aims at investigating, via scientific drilling, the tectonic and structural characteristics of postglacial (PG) faults in northern Fennoscandia, including their hydrogeology and associated deep biosphere. The research is anticipated to advance science in neotectonics, hydrogeology and deep biosphere studies, and provide important information for nuclear waste and CO2 disposal, petroleum exploration on the Norwegian continental shelf and studies of mineral resources in PG fault areas.

We expect that multidisciplinary research applying shallow and deep drilling of postglacial faults would provide significant scientific results through generating new data and models, namely:

(1) Understanding PG fault genesis and controls of their locations;
(2) Deep structure and depth extent of PG faults;
(3) Textural, mineralogical and physical alteration of rocks in the PG faults;
(4) State of stress and estimates of paleostress of PG faults;
(5) Hydrogeology, hydrochemistry and hydraulic properties of PG faults;
(6) Dating of tectonic reactivation(s) and temporal evolution of tectonic systems hosting PG faults;
(7) Existence/non-existence of deep biosphere in PG faults;
(8) Data useful for planning radioactive waste disposal in crystalline bedrock;
(9) Data on rock stress changes in the periphery of the inland ice;
(10) Stress pattern along the Norwegian continental margin in relation to the bending spreading ridge and Plio-Pleistocene erosion, uplift and sedimentation with implications for fluid migration and sealing properties of petroleum reservoirs.
(11) Data useful in predicting future seismic activity in areas of current deglaciation due to ongoing climatic warming.