Geophysical Research Abstracts
Vol. 14, EGU2012-12333, 2012
EGU General Assembly 2012

Coupling alpine lake sediments with slope deposits using a combined geophysical and sedimentological approach, Leirvatnet, Jotunheimen, southern Norway

H. Juliussen (1), E.N. Støren (1), I. Lecomte (2,3), G. Sauvin (2,3), S. Tissot (2), S.-E. Hamran (4), D. Petrakov (6), I. Lavrentiev (6), and S. Kutuzov (6)

(1) Department of Geography, University of Bergen, Bergen, Norway, (2) International Centre for Geohazards (ICG), Oslo, Norway, (3) NORSAR, Kjeller, Norway, (4) Department of Informatics, University of Oslo, Oslo, Norway, (5) Norwegian Defence Research Establishment (FFI), Kjeller, Norway, (6) Moscow State University, Faculty of Geography, Department of Cryolithology and Glaciology, Moscow, Russia

Lake sediments have previously been used to reconstruct debris flow activity back in time (e.g. Støren et al., 2008). In the present study we further develop this type of research by investigating direct linkages of lake sediments to specific slope deposits on land. To do this we use a combined approach, including sediment core analysis and geophysical surveys, to map colluvial deposits on a debris-flow slope and identify the associated fine-grained deposits in the adjacent Lake Leirvatnet in Jotunheimen, southern Norway.
Ground Penetrating Radar (GPR) and Electrical Resistivity Tomography (ERT) are performed on the slope, and a total of 10 sediment cores and 16.6 km of GPR profiles are acquired from lake Leirvatnet. In total 20 GPR profiles was made on the lake and 10 on the adjacent slope. Frequencies used were 50 MHz on the lake and 50, 100 and 200 MHz on the slope. The lake profiles were obtained by using a 9.5 m long 110 mm plastic tube around a Rough Terrain Antenna, which was towed behind a small rubber boat. One ERT profile was made along one of the GPR profiles on land. Sediment cores were obtained from the lake using a HTH gravity corer (7 cores) and a piston corer (3 cores). Cores are analyzed using magnetic susceptibility (Bartington MS2) and an ITRAX core scanner for high-resolution X-ray fluorescence (XRF) elemental analysis and radiographic imaging.
Preliminary results indicate large temporal variability in debris flows. Following the mapping and thickness estimate of the sediment cover on the lake bottom obtained from the GPR profiles, we try to evaluate the spatial continuity of reflectors associated with sections of high debris-flow activity and relate these sections to debris-flow deposits on land. The sediment thickness of meager 1 meter in the lake reflects the thin sediment cover in this high-mountain area. Three of the collected cores penetrated the sediments and went into the underlying glacial till and we therefore expect to have obtained a complete Holocene sedimentological history from the lake.

References

Støren, E.N., Dahl, S.O. & Lie, Ø. 2008. Separation of late-Holocene episodic paraglacial events and glacier fluctuations in eastern Jotunheimen, central southern Norway. The Holocene 18(8), 1179-1191.