Geophysical Research Abstracts,
Vol. 11, EGU2009-11232, 2009
EGU General Assembly 2009

Estimating infiltration rates from time-lapse electrical resistivity imaging

H. K. French (1), N. Forquet (2), and A. Binley (3)

(1) Norwegian Institute of Agricultural and Environmental Research, Bioforsk, Soil and Environment, Ås, Norway, (helen.french@bioforsk.no), (2) SHU-ENGEES, Strasbourg University, Strasbourg, France (nicolas.forquet@engees.u-strasbg.fr), (3) Department of Environmental Science, Lancaster Environment Centre, Lancaster University, Lancaster, UK (a.binley@lancaster.ac.uk)

The infiltration processes during two periods of snowmelt (2006 and 2007) were monitored using time-lapse electrical resistivity imaging, measured with shallow electrodes in a glacial deposit near Oslo airport, Norway. During the same period, weather data and snow storage on the surface was measured in addition to soil temperatures in a vertical profile and local changes in water content using TDR. Soil samples from the site were tested in the laboratory to develop calibration curves relating changes in electrical conductivity to changes in water content. These were used to estimate changes in water contents at the field site from the time-lapse electrical resistivity images. The calibration curves reveal large effect of small scale variability, especially at high water contents. This implies uncertainty of the interpretation of changing water contents from the time-lapse measurements. This uncertainty is quantified. Changes in water contents in a homogeneous and heterogeneous unsaturated zone under various infiltration scenarios are estimated with numerical simulations. Through the comparison between numerical simulations and time-lapse electrical resistivity imaging, we examine the reliability of infiltration rates estimated from the electrical geophysical measurements.