Geophysical Research Abstracts,
Vol. 10, EGU2008-A-02468, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-02468
EGU General Assembly 2008

Spatial and temporal variability of soil moisture patterns related to preferential flow measured using distributed temperature sensing in large scale infiltration experiment

D.M.Pradzynska, T.A. Bogaard, M.C. Westhoff
Water Resources Section, Delft University of Technology, Delft, the Netherlands

To make progress in mountain hydrogeomorphological hazard analyses, it is necessary to be able to quantify the groundwater recharge processes of preferential infiltration of rainfall and consequently the triggering of slope movements. A large scale infiltration experiment was carried out at black marls mudslide of Super-Sauze in the southern Alps, in France. The aim of this experiment was to study the hydrological system in a slope and the role of preferential water flows on landslide triggering. During two periods of three days continuous artificial rainfall of approximately 15 mm/hr was applied on an infiltration experiment area of around 14x7 m. Abundant hydrologic and geophysical equipment was installed to monitor the infiltration process, such as 37 piezometers, 9 nests of soil moisture profiles, water quality sampling for tracer detection and resistivity and seismic geophysics.

Moreover, high resolution temperature measurements were done in order to test the use of temperature as a tracer for spatial distribution of soil moisture in the experimental infiltration area. These so-called distributed temperature sensing (DTS) measurements use 130 m fiber optic cable that was installed in the soil, at average depth of 25 cm. Temperature measurements had a spatial resolution of 1 m and temporal resolution of 1 min. Spatial and temporal trends of temperature measurements were studied and related to differences in hydrological characteristics of the area.

Furthermore, the DTS measurement results were compared with Near Sensing Cam-

era Field Equipment (NESCAFE) and in-situ soil moisture observations. NESCAFE pictures were taken from an attitude of 8 m using a carbon fiber fishing rod.

Our work will discuss the possibilities of distributed temperature sensing and near surface photogrammetry for hydrological studies. We will present the results obtained during the large scale infiltration experiment for studying the role of preferential flow in highly heterogeneous mudflow of Super-Sauze, France.