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# Monitoring steep slopes hydrological behaviour through controlled infiltration test

G. Cassiani (1), G.B. Crosta (2), D. Franco (3), P. Frattini (2), **A. Godio** (3), S. Stocco (3), A. Villa (2)

(1) Universita' di Padova (giorgio.cassiani@unipd.it), (2) Universita' di Milano Bicocca (paolo.frattini@unimib.it), (3) Politecnico di Torino (alberto.godio@polito.it)

The description of hydrological response of steep hill-slopes is important for the description of catchment hydrological behaviour, landslides, and erosion processes. We present the results of a controlled infiltration test at a site in the Italian Central Alps with a slope gradient of 30-35°, and a soil cover about 1 to 1.5 m thick above variably fractured metamorphic rocks. On October 29, 2007, we applied 1000 mm of artificial rain on a 3 m x 3 m slope box over about 18 hours. We estimated the effective infiltration by subtracting the superficial runoff. Due to the climatic condition, and the limited irrigation time, the evapotranspiration was estimated to be negligible. The moisture variation within the soil has been monitored with an integrated strategy. We used 14 TDR probes and 4 electronic tensiometers for local measure of soil moisture up to a depth of 100 cm. At the same time we performed a 3D time-lapse cross-hole electrical resistivity tomography (ERT) survey at the small scale corresponding to the irrigated plot, and a larger scale (35.5 m) 2D time-lapse surface ERT survey across the irrigation area. Monitoring continued up to 30 days after the experiment. The cross-hole resistivity tomography was performed using a 3D array of six PVC tubes addressed with small steel electrode along. Each tube is 2 meters length with 12 electrodes; the acquisition was performed in dipole-dipole using all the complete data-set of measurement configuration in forward and reverse mode. The resistivity data acquisition was integrated by time-lapse TDR measurements with probes distributed along the 2D profile. As a results, we observed a fast vertical infiltration through the soil cover, also favoured by preferential flow patterns, followed by infiltration into the fractured

bedrock. The superficial layers showed a fast recovery of initial moisture condition, up to 80% in 12 hours. The lateral transmission of infiltrating water was negligible as compared to the vertical infiltration. The experiment results bear important consequences on the understanding of hillslope processes controlling the overall catchment response to heavy rainfall events.