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# Reproducing an extreme flood and associated shallow landsliding with post event observations and a coupled hydrological-geotechnical model

Elisa Destro (1), Francesco Marra (2), Davide Zoccatelli (2), William Amponsah (3), Lorenzo Marchi (4), and Marco Borga (1)

(1) Department of Land, Environment, Agriculture and Forestry, University of Padova, Legnaro, Italy, (2) Institute of Earth Sciences, Hebrew University of Jerusalem, Israel, (3) Department of Agricultural and Biosystems Engineering, University of Science and Technology, Kumasi, Ghana, (4) Istituto di Ricerca per la Protezione Idrogeologica, Consiglio Nazionale delle Ricerche, Padova, Italy

This work investigates the flash flood and associated shallow landslides occurred on the Lierza basin (7.4 km2) on August 2, 2014, by using a spatially distributed coupled hydrological and geo-mechanical model. The aim of the analysis is to investigate the role of the initial soil moisture conditions and of the spatial distribution of rainfall depth on the hydrological and geomorphic response. The high intensity flash flood event (with a specific peak flood of around 18 m3 s-1 km-2 at a basin scale of 7.4 km2) impacted a completely ungauged basin. Thus, observations used for this study are provided by post-event analysis of both the flash flood response and the shallow landslides. Observations include: quantitative radar estimates of rainfall rates, available at high time (10 min) and space resolution (0.5 km), rain gauges data from stations outside the basin, flood peak estimates from post-flood surveys at multiple sections across the impacted river network, flood peak time from eyewitnesses, and field surveys of 400+ shallow landslides triggered by the rainfall event. The model is able to reproduce with a reasonable accuracy both the hydrological and shallow landsliding response. It is shown that the sensitivity of model results to initial soil moisture status is higher for the case of shallow landslides than for the flood response. On the contrary, the sensitivity of model simulations to spatial distribution of rainfall depth is higher for the flood response than the shallow landslides.