



Sensitivity of a mountain basin flash flood to initial soil moisture and rainfall variability

Efthymios I. Nikolopoulos (1,2), Emmanouil N. Anagnostou (1,2), Marco Borga (3), Enrique R. Vivoni (4), and Anastasios Papadopoulos (1)

(1) Institute of Inland Waters, Hellenic Center for Marine Research, Anavissos, Greece (enikolop@enr.uconn.edu), (2) Civil and Environmental Engineering, University of Connecticut, Connecticut, USA, (3) Department of Land and Agroforest Environment, University of Padova, Padova, Italy, (4) School of Earth and Space Exploration & School of Sustainable Engineering and the Built Environment, Arizona State University, Arizona, USA

In this study, the sensitivities of runoff generation to rainfall variability and initial soil moisture conditions were examined for a major flash flood event that occurred during August 29, 2003 on the upper Tagliamento river basin in the eastern Italian Alps. A distributed hydrologic model was used to simulate the hydrologic response over a range of sub-basins. A series of hydrologic simulations were performed for different initial soil moisture conditions and rainfall forcing resolutions in order to evaluate the sensitivity of runoff generation to those variables. The results suggest that both antecedent wetness and rainfall resolution affect significantly the simulated peak flow and runoff volume during the flash flood event. Sensitivity to initial soil moisture exhibits scale dependence with the sensitivity increasing with basin scale. The bias introduced to basin-averaged rainfall due to aggregation had a significant effect on runoff generation for all basin scales, while the effect of variability smoothing was important only for the larger scale basins. Furthermore, the sensitivity of the flood hydrograph to rainfall aggregation was more important for the drier soil moisture states.