



Extreme rainfall and flooding from a quasi stationary MCS in north-western Italy

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This work aims to analyse the hydrometeorological and hydrological controls of an extreme storm and flood event occurred on 5 June 2002 over the upper Piemonte region, near Biella, in North-western Italy. The region received amounts of rainfall up to 400 mm in 24 hours, with accumulations close to the local rainfall of record. The event was produced by a quasi-stationary Mesoscale Convective System which lead to the formation of a supercell thunderstorm. The hydrometeorological analysis is based on volume scan data of reflectivity observations from the Bric della Croce weather radar and from the dense regional hydrometeorological network of ground stations. Analysis of the structure, motion and evolution of the storm system provides a conceptual framework for interpreting the hydrometeorological controls on scale-dependent flash flood response. Discharge data collected at a number of streamgauge stations serve as a basis for stream flow analysis. A distributed hydrological model is used to identify possible inconsistencies in the available data, concerning both rainfall and runoff volumes, and the timing of the runoff response with respect to the space-time rainfields. Then, model results are used to gain insights into the effect of initial soil moisture and the runoff dynamics. Furthermore, the model offer a way to analyse the scale-dependent flood response in terms of the space-time variability of rainfall as viewed from the spatial perspective imposed by the drainage river network.