HYDRATE: Development of an observation strategy to mitigate flash flood forecasting uncertainty

D. Norbiato and M. Borga

Department of Land and Agroforest Environments, University of Padova, viale dell'Università 16, 35020 Legnaro (PD), ITALY

Lack of observations hamper advances on understanding the hydrological processes at work during flash floods, and, consequently, on forecasting the stream response to extreme precipitations.

Observational limitations mainly stem from the fact that flash floods develop at space and time scales that conventional observation systems of rain and river discharges are not able to monitor. As these events are locally rare, they are also difficult to capture during classical field-based experimentation, designed to last a few months over a given region. In this sense, flash flood forecasting exemplifies the ungauged basin problem under extreme conditions.

The roadmap to provide the observations needed to advance flash flood research is through the development of an observational strategy capable to provide high-resolution data on storm and stream/landscape response during flash floods. The main motivation of the strategy is to observe these locally rare events wherever they occur in a region and not only in places where refined observation system actually exist. The strategy develops on three pillars:

- availability of good quality radar data;

- availability of good quality and relatively dense conventional hydrometeorological data;

- execution of post-event field surveys to provide indirect estimates of event peak discharges.

The paper provides feedback from the first applications of this observation strategy to some major flash flood events, occurred in France and Northern Italy. Data from these events are used to investigate the meteorological and hydrological processes at work during flash flood, to examine their inherent scales, and to identify their best use to reduce uncertainties in flash flood forecasting.