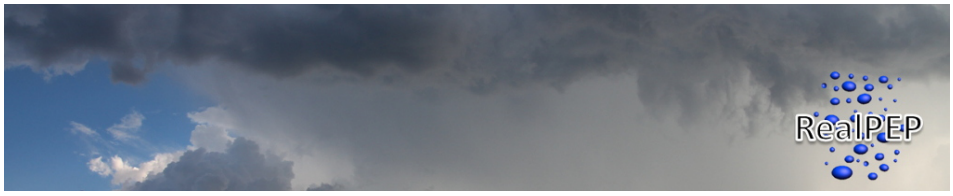

Contribution ID: **76** Type: **Oral presentation**

Flash flood hydrologic and geomorphic response: observations needs for improved risk and basin management

Wednesday, October 7, 2020 9:40 AM (20 minutes)

The changing frequency and severity of extreme flood events are becoming increasingly apparent over multi-decadal timescales at the global scale, even though confidence in climate risk scenarios is clouded by the confounding effects of hydrological and landscape system dynamics and time-varying factors such as land use changes. Improved flood risk management builds upon disentangling climate change impacts from other controlling factors, thereby contributing to the debate over the need for societal adaptation to extreme events. In this work we focus on the coupled hydrologic and geomorphic controls of flood risk at the catchment scale. Sediment (and large wood) transport events, of both high and low magnitude, have the potential to reshape channel and floodplain topography, thus introducing an additional source of uncertainty in the quantification of flood hazard. However, determining the extent to which such events are actually able to modify channel geometry is rather complex. Indeed, not all the large floods cause major reshaping of the river corridor, whereas relatively low-magnitude, high-frequency floods may result in major morphological changes.

Post-flood surveys designed to integrate interlinked observations of hydrologic response together with sediment and large wood transport provide key data for better understand and predict extreme floods and their morphological responses. In turn, the knowledge of flood runoff response and its morphological effects may inform improved flood risk management strategies and interventions at the basin scale, especially in poorly gauged basins. However, integrated observations of hydrologic and geomorphic response are difficult, and even more is the identification of the their controlling factors, as large geomorphic changes introduce large uncertainties in the post-flood estimation of peak discharges.

Here we revisit the lessons learnt from several integrated post-flood surveys carried out in Italy in the last five years in gravel bed rivers draining areas up to approximately 1000 km^2. This provides also the opportunity to discuss how to translate the knowledge gained through post-flood surveys into flood risk management and basin management practice.

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Session Classification: Flash Flood Prediction