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The Use of Remotely Sensed Rainfall to Predict Floods in Mountainous Basins

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One of the main advantages of satellite and radar precipitation remote sensing is their ability to provide information over remote areas such as complex terrain where sparse, or no, in-situ observations are available. This study focuses on a cascade of well-instrumented small-scale mountainous basins (ranging from 116 to 900 km2) in the Northeastern Italy aiming at i) evaluating an array of remote sensing rainfall products through a comparison with dense rain gauge observations and ii) investigating whether rainfall retrievals from the various remote sensing precipitation datasets can be utilized to predict flood occurrences in such complex terrain basin. The precipitation estimates considered will vary from high-resolution precipitation fields (200-m by 200-m) retrieved from an locally deployed X-band dual-polarization radar to coarser resolution fields (1-km by 1-km) from a distant (>30 km) C-band single-polarization radar, and finally from various satellite retrievals that combine passive-microwave and Infrared observations. The error of the various remotely sensed rainfall estimates is statistically characterized and its propagation effect to the hydrologic prediction is evaluated by using a distributed hydrologic model to simulate the rainfall-runoff transformation and compare the results with discharge observations. Finally, a statistical satellite error model will be used to derive ensembles of satellite rainfall estimates that forcing the hydrologic model will produce ensemble forecasts of hydrological variables at different basin scales.