

Regional ensemble forecast for early warning system over small Apennine catchments in Central Italy

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Quantitative precipitation forecasts from weather prediction models have considerably improved in recent years. The exponential growth in computing power has led to higher spatial resolutions and the development of new parametrization schemes for representing sub-grid scale processes.

However, precipitation estimation is still affected by errors implicitly impacting in the hydrological model results. A potential solution consists on Ensemble Prediction Systems (EPS) which represent one of the areas from which the largest benefits in predictive skill has been obtained in the context of numerical weather prediction (NWP). Even though EPS are generally characterized by a lower resolution respect to deterministic forecasting, information

regarding forecast uncertainty, and severe-to-extreme events occurrence likelihood can be estimated through the assessment of ensemble members distributional properties.

In this study a meteo-hydro ensemble system is built and evaluated in the context of a severe hydrological event occurred over Central Italy on November 15, 2017. During this period, a flash flood hit the Abruzzo region, producing

damages with a high impact on social and economic activities. This event was characterized by a deep trough over Central Italian regions causing precipitation up to 200mm/24hours.

Contextualized within the regional early warning system, particular attention is paid on the added values of probabilistic

ensemble forecast. In fact, this latter allows:

(i) to predict the event few days in advance;

(ii) to assess uncertainty related potential flood events characterizing uncertainties in the precipitation forecast;(iii) to investigate how the uncertainty involving the precipitation forecast propagates in the hydrological sphere constituting an ensemble of hydrological forecasts.

Although the modeling framework is implemented on the basins of Abruzzo region, it is portable and applicable to other areas.