



Quantitative precipitation and streamflow forecast for two recent extreme hydro-meteorological events in Southern Italy with a fully-coupled model system

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Two severe hydro-meteorological events affected Calabria Region (Southern Italy) in the second half of the year 2015. The first event, on August 12th, focused on a relatively small area near the northern Ionian coast, resulted in a rainfall intensity of about 230 mm in 24 hours involving flash flooding with several million Euros of damages. The second event mainly affected the southern Ionian coast, was more persistent (it lasted from October 30th to November 2nd), interested a wider area and led to recorded rainfall values up to 400 mm in 24 hours and 700 mm in 48 hours, resulting in severe flooding, landslides and a human loss.

The fully two-way dynamically coupled atmosphere-hydrology modeling system WRF-Hydro is used to reproduce both the events, in order to assess its skill in forecasting both quantitative precipitation and streamflow with initial and lateral atmospheric boundary conditions given by the recently available 0.25° output resolution GFS grid dataset. Precipitation estimates provided by 2 km-resolution atmospheric model are compared with both ground-based data and observations from a National Civil Protection Department single-polarization Doppler radar. Discharge data from the rivers and creeks affected by heavy precipitation are not available, then streamflow results are compared with either official discharge estimates provided by authorities (first event) or recorded river stages (second event).

Results show good performances of the fully-coupled hydrometeorological prediction system which allows an improved representation of the coupled atmospheric and terrestrial processes and provides an integrated solution for the regional water cycle modeling, from atmospheric processes to river outlets.