



An analysis of three disastrous rain events occurred in Italy: Rome, Cinque Terre and Genoa

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During autumn 2011, three dramatic floods occurred in Italy causing deaths and terrible injuries: in Rome on October 20, in Liguria and Tuscany on October 25, and in Genoa on November 4. One of the hardest-hit areas was the Cinque Terre, a national park with a marine protected area; its landscape was completely changed by the landslide caused by the heavy precipitation. The three events are characterized by localized heavy precipitation occurring over short periods; the maximum recorded precipitation is approximately: 200 mm accumulated in 2 hours in Rome and 300 mm accumulated in 3 hours at Cinque Terre. At a few stations the 12-hour accumulated precipitation reaches 400 mm near Genoa, and approximately 500 mm at Cinque Terre.

The mechanisms causing the floods are analyzed in this study using both observations (rain-gauge, radar-reflectivity, and satellite data) and model simulations. The goal is to understand the mechanisms leading to the very heavy precipitation recorded in the three cases, analyzing the interaction between the large scale and the local circulation and to investigate the ability of our model to forecast the very rapid development of such events. The model simulations are carried out using the Weather Research and Forecasting (WRF) model on two domains, one at 12 km horizontal resolution, over Europe, and one at 3 km, over Italy. The influence of high spatial resolution on the simulation, particularly on the enhancement and location of the heavy rain, is also addressed by performing simulations at 1 km and 500 m horizontal resolution.