



Trends in extreme precipitation for the alert areas of Calabria (southern Italy) using observation-validated satellite data

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The use of validated gridded data in assessment procedures is of fundamental importance, as it allows to calculate trends and changes not only at locations equipped with meteorological stations, but to whole regions. Using validated data can help in developing a more precise risk assessment especially in regions with a complex orography and sub-regional scale microclimates.

In this study, we have used the CHIRPS dataset, an observation-validated satellite dataset, to assess extreme precipitation in the eight alert areas of Calabria (southern Italy). CHIRPS is a quasi-global gridded rainfall dataset, spanning 50°S-50°N at all longitudes, incorporating 0.05° resolution satellite imagery with in-situ station data starting in 1981 (Funk et al., 2015).

The Calabria region has been selected for this assessment study, as it is a challenging region with complex orography, and with a high number of rain stations, used in previous gridded data validation studies. The CHIRPS dataset was validated for Calabria for the 1981-2010 time period by means of the registrations of 79 rain gauges of the Multi-Risk Functional Centre of the Regional Agency for Environmental Protection. Metrics used were the mean error and standard deviation (Caroletti and Coscarelli, 2019). The alert areas were defined according to the Directive “Sistema di Allertamento regionale per il rischio meteoidrogeologico ed idraulico in Calabria” (Resolution of Regione Calabria Government n. 535 of November 15th, 2017). Four areas are located on the western side of the region, and four on the eastern side.

We investigated the changes in the number of extreme events and the values of extreme precipitation in each area in the 1981-2017 time period. We considered extreme all precipitation events that occurred over the 99th percentile threshold for the study period.

By using 5-years running means of precipitation at each satellite data cell, CHIRPS showed an increase in the magnitude of extreme events for seven of the eight alert areas. The increase is especially strong in four areas (the three southernmost eastern alert areas and the Lamezia Terme area in the west).

The number of extreme precipitation events, which also shows a growing trend, in contrast with the decrease of precipitation days overall, can explain the slight growing trend in yearly precipitation for these same areas over the 1981-2017 time period.