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Preliminary analysis of high-resolution precipitation in Friuli Venezia Giulia region, Italy

Elisa Arnone[1], Dario Treppiedi[2], and Leonardo Noto[2]
[1]Università degli Studi di Udine, DPIA, Udine, Italy (elisa.arnone@uniud.it)
[2]Università degli Studi di Palermo, Dipartimento di Ingegneria

The northeastern area of Italy, and specifically of Friuli Venezia Giulia region (*FVG*), is characterized by the heaviest precipitation annual totals in the country. Effects of both prolonged and extreme precipitation can be particularly damaging in this area, causing debris flow, flash floods, avalanches. Due to the very short times of concentration and hydrological response of the mountain watersheds of the analyzed area, extreme and short events are of particular interest. The region has a dense ground-station network which is managed by the regional Civil Protection Agency, constituted by 2 main rain-gauges networks, based on CAE and Micros-SIAP technology, respectively; this last is co-managed by the OSMER-ARPA (*OSservatorio MEteorologico Regionale-Agenzia Regionale per la Protezione dell'Ambiente*) FVG. The networks count a total of about 200 rain-gauges; for some stations, data at 5-minute resolution are available since the 1996 (CAE network), whereas Micros-SIAP works continuously and at high resolution since the early 2000s. Over the last two decades, the temporal resolution of stations has been progressively increased up to 1-minute step.

This work presents a comprehensive analysis of the available dataset at high temporal resolution (i.e. 30 min, 5 min and 1 min) to verify whether trends in very short rainfall duration are underway. The continuous time series of data recorded by a sample of rain-gauges by the two networks are first analyzed. A preliminary analysis aims at verifying the consistency of the dataset at the higher resolutions. Statistical trends are then assessed by comparing two methods, i.e., the classical Mann-Kendall and the quantile regression at different thresholds and durations. Differently than the traditional methods that require a subset of data (e.g., the rainfall annual maxima), the quantile regression method allows to detect changes in the tails of the rainfall distributions and to screen the whole rainfall time series.