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Rain gauge – radar rainfall reanalysis of operational and research data in the Cévennes-Vivarais region, France, estimation error analysis over a wide range of scales.

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In the Cévennes -Vivarais region in France, flash-flood events can occur due to high intensity precipitation events. These events are described in a detailed quantitative precipitation estimates, to be able to better characterize the hydrological response to these rain events in a number of small-scale nested watersheds (<100 km^2 typically), sampling various landscapes of the Mediterranean region.
Radar - rain gauge merging methods described by Delrieu et al (2013) are applied to the 9 events of the autumn of 2012. Rainfall data is merged for both the operational networks in the Cévennes-Vivarais region in France on a 160 x 200 km window, as well as a research network, in the same region on a window of 15x30 km.
The radar and rain gauge data of the operational network are collected from three organisms (Météo-France, Service de Prévision des Crues du Grand Delta and EdF/DTG). The research network contains high resolution data are from research rainfall observation systems deployed within the Enhanced Observation Period (autumn 2012-2015) of the HyMeX project (www.hymex.org). This project aims at studying the hydrological cycle in the Mediterranean with emphases on the hydro-meteorological extremes and their evolution in the coming decades.
Rain gauge radar merging is performed using a kriging with external drift (KED) technique, and compared to the ordinary kriging (OK) of the rain gauges and the radar products on the same time scale using a cross-validation technique.
Also a method is applied to quantify kriging estimation variances for both kriging techniques at the two spatial scales, in order to analyse the error characteristics of the interpolation methods at a scale range of 0.1 – 100 km^2 and 0.2 – 12 h.
The combined information of the reanalysis of the data of the operational network and the research network gives a view on the error structure of rainfall estimations over several orders of magnitudes in spatial scale. This allows understanding of the error structure of these rain events, their relation to availability of data, and gives insight in the added value of detailed rainfall data on the understanding of the rainfall structure on very small, 'missing', scales (smaller than 1km2 and 1 hour time steps).