13.48 GEOSTATISTICAL MERGING OF X-BAND WEATHER RADAR AND A SPARSE RAIN GAUGE NETWORK OVER AN URBAN CATCHMENT

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Optimal Quantitative Precipitation Estimation (QPE) of rainfall have been proven to be crucial to the accuracy of hydrological models, especially over urban catchments. Small to medium-size towns are usually equipped with a sparse rain gauge network that struggle to catch the variability of rainfall with adequate spatial and temporal resolution. For these purposes, X-band Local Area Weather Radars (LAWRs) can provide a cost effective solution to meet this challenge.

In this study, we examine two geostatistical methods to merge X-band weather radar data with the combination of rain gauges from the network of the city of Clermont-Ferrand (13 local gauges with a 5 minutes temporal resolution) and regional Meteo France stations (7 gauges with a 6 mintes temporal resolution): Conditional merging and Kriging with an external drift (following Velasco-Forero et al., 2009). A simple method to expand the rain gauge network was introduced, using the X-band radar data to build artificial gauges to complement the already existing network and produce a new expanded network that is denser and spread over the entire study area. The effects of this expansion were found to greatly improve the retrieved QPE despite being dependant on the quality of the weather radar data.

The interpolation performance of both geostatistical blending techniques was investigated using both the ordinary kriged rainfall actual and expanded networks using a continuous time series of six months representing the summer of 2013, while further work on longer data sets is ongoing. To the contrary of previous studies using C-band radars: the modified kriging with an external drift technique performed noticeably better in our study than the conditional merging one for both the whole data set and for a subset of gauges selected through three quality control filters. Hence, this illustrates the benefits of using an X-band weather radar despite its limitations, to produce quality QPE products and support realistic QPF developments as currently investigated.