



## Comparing different radar-raingauge precipitation merging methods for Tuscany region

**Rossano Ciampalini**<sup>1</sup>, Andrea Antonini<sup>2</sup>, Alessandro Mazza<sup>2</sup>, Samantha Melani<sup>2</sup>, Alberto Ortolani<sup>2,3</sup>, Ascanio Rosi<sup>1,4</sup>, Samuele Segoni<sup>1</sup>, and Sandro Moretti<sup>1</sup>

<sup>1</sup>Department of Earth Sciences, University of Florence, Italy (rossano.ciampalini@unifi.it)

<sup>2</sup>Consorzio LaMMA, Sesto Fiorentino, Florence, Italy

<sup>3</sup>CNR-IBE, Sesto Fiorentino, Florence, Italy

<sup>4</sup>Department of Geosciences, University of Padova, Italy

Radar-based rainfall estimation represents an effective tool for hydrological modelling. Nevertheless, this data type is subject to systemic and natural perturbations that need to be considered before to use it. Because of that and to improve data quality, corrections based on raingauge observations are frequently adopted. Here, we compared the efficacy of different radar-raingauge merging procedures over a regional raingauge-radar network focusing on a selected number of rainfalls events.

We adopted the methods: 1) Kriging with External Drift (KED) interpolation (Wackernagel 1998), 2) Probability-Matching-Method (PMM, Rosenfeld et al., 1994), and 3) a kriging mixed method exploiting the Conditional Merging (CM) process (Sinclair-Pegram, 2005) based on elaborations available at DPCN (Italian National Civil Protection Department). These methods have been applied on the Tuscany Regional Territory using raingauge recorded rainfalls at 15' time-step and CAPPI (Constant altitude plan position indicator) reflectivity data at 2000/3000/5000 m at 5' and 10'.

Relationships describing precipitation VS radar reflectivity were integrated and elaborated as part of the development of the merging procedures, while the comparison involved the analysis of variance and diversity coefficients. Kriging-based elaborations showed different spatial patterns depending on the applied procedure, with patterns closer to radar variability when using DPCN, and more reflecting the gauge data structure when adopting KED. The probabilistic method (PMM), instead, had the advantage of integrating the gauge data while preserving the spatial radar patterns, confirming interesting perspectives.