



Estimation of rainfall field by combining radar data and raingauge observations: the modified conditional merging technique

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The estimation of rainfall fields, especially its spatial distribution and position is a crucial task both for rainfall nowcasting and for modeling catchment response to rainfall. Some studies of literature about multisensor datafusion prove that combining data from raingauges and radar represents the best way to obtain an enhanced and more reliable estimation of QPE and of the associated river discharge. Sinclair and Peagram (2004) have proposed the Conditional Merging (CM) technique, a merging algorithm which extract the information content from the observed data and use it within an interpolation method to obtain the rainfall maps. The raingauges provide a punctual measure of the observed “real” rainfall while the remote sensors (radar network or satellite constellation) supply rainfall estimation maps which give an idea of the correlation and structure of covariance of the observed field. In this work is studied an enhanced algorithm based on CM, called Modified Conditional Merging, which can be used in real-time to produce the optimal rainfall maps. The area of interest is Italy, where are both available a dense network of raingauge measurements (about 2000 stations) and a QPE estimated by the Italian Radar composite. The main innovation respect to classical CM is to estimate the structure of covariance and the length of spatial correlation λ , for every raingauge, directly from the cumulated radar rainfall fields. The advantages of this method is to estimate the local characteristic of the domain to obtain information at smaller scale, very useful for convective events. An operative use and a validation are presented and discussed.