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Spatial and temporal uncertainty characterization in radar-based precipitation estimates

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The quality of radar-based Quantitative Precipitation Estimates (QPE) has improved significantly in the last years due to a better knowledge of the underlying physics and technological advancements in the hardware. Nevertheless, even using the most advanced processing algorithms, the resulting precipitation estimates are still affected by uncertainties, and its characterization is a major issue to complete the precipitation field description. The full characterization of the uncertainties associated to the measurements will also open the door to probabilistic applications of radar estimates.

This work proposes a methodological framework to assess the associated uncertainties to the QPE estimates and their structure (distribution, spatial and temporal correlation). The methodology makes possible to infer the 3D (spatial 2D plus temporal) error structure of the radar-based QPE estimates.

Precipitation ensembles (set of equiprobable scenarios), compatible with the observed data and the inferred error structure, can be generated as a way to represent the uncertainty associated to the precipitation estimates.

The results obtained on several case studies on the Catalunya testbed are used to show the potential of the methodology. The potential interest of these ensembles of radar QPE and QPF in hydrological probabilistic applications will be also discussed.