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A simulation approach to estimate radar measurements uncertainties

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The error characterization of the rainfall estimates are becoming just as important as the retrieval estimates themselves in data assimilation into Numerical Weather Prediction models, hydrologic models, satellite-ground data comparison, and in many other applications using remote precipitation measurements. Providing an estimation of the error structure of the measurements to be used jointly with the estimations will be also a key requirement for the Global Precipitation Measurement (GPM) mission.

In this new context of determining data uncertainties, a simulation approach to estimate some of the errors related with ground- and space-borne radar rainfall estimates is proposed.

Three steps compose this simulation framework; the first one is the generation of high-resolution 3D precipitation fields using real radar data –that will be considered reference fields-; the second is the simulation of the various instruments (ground- and space-borne radars, raingauges, etc.) observations over the reference fields; and the last one is the comparison of the different observations against the reference rainfall fields, both in rainfall and in hydrologic terms.

The application of this framework to a wide range of cases aims to provide an estimation and characterization of the errors that affect ground-based and satellite-based instruments measurements and their interaction (what could be referred as the error structure).

This work is being developed within the UE VOLTAIRE project with the aim to support the scientific and technical GPM supersite candidature of Catalunya.

The presentation will focus on the generation of the 3D precipitation fields, base of

the simulations. In order to obtain 3D high-resolution precipitation fields with realistic features, a downscaling technique combining wavelets, Fourier analysis and homotopy of vertical profiles has been developed. The simulation scheme, and the full downscaling process including some examples will be presented.