Geophysical Research Abstracts
Vol. 15, EGU2013-4024, 2013
EGU General Assembly 2013

Adaptive reconstruction of radar reflectivity maps based on their space-time structure

Shinju Park (1,2) and Marc Berenguer (1)

(1) Universitat Politècnica de Catalunya, Centre de Recerca Aplicada en Hidrometeorologia, Barcelona (Spain), (2) Current affiliation: Department of Astronomy and Atmospheric Sciences, Kyungpook National University, Daegu (South Korea)

The production of Radar Quantitative Precipitation Estimates (QPE) requires processing the observations to ensure their quality and its conversion into the variable of interest (i.e. precipitation rates). This processing is done through a chain of algorithms applied to mitigate the sources of uncertainty affecting radar observations. Some algorithms involve the reconstruction of the meteorological signal in areas where the signal is lost or strongly contaminated, for instance in areas affected by ground, sea clutter, total beam blockage or severe path attenuation by heavy rain.
For post-processing of radar uncorrected moment data, the reconstruction has been done with spatial interpolation after the identification of clutter based on the analysis of statistical properties of radar measurements. The aim of this work has been to develop an improved reconstruction method that adapts to the different rainfall situations by using the information of the time and space variability of the rainfall field.
The n-dimensional semi-variogram is formulated to reconstruct the radar fields in a n-Dimensional Ordinary Kriging framework: i.e. (i) the horizontal plane, (ii) the closest non-contaminated PPI, and (iii) the closest radar volume scan in time. The last one takes into account the effect of the motion that is very similar to the extrapolation of reflectivity observations to the future in many nowcasting algorithms.
Each formulation of the reconstruction methods and their combinations have been studied. The radar fields have been reconstructed over the areas labeled as clutter (with a fuzzy logic algorithm) under different rainfall situations, including scattered convection, organized convection, and widespread precipitation. Also, the comparison between the reconstructed radar rainfall accumulations and collocated raingauge observations have been used for the evaluation.