EMS Annual Meeting Abstracts
Vol. 12, EMS2015-134, 2015
15th EMS / 12th ECAM

Statistically quantifying rain radar reflectivity errors using measurements from a radar network

Claire Merker (1), Marco Clemens (1), Katharina Lengfeld (1,2), Felix Ament (1,3)

(1) Meteorologisches Institut, Raum 1632, Hamburg, Germany (claire.merker@uni-hamburg.de), (2) Universitat Politècnica de Catalunya, Centre de Recerca Aplicada en Hidrometeorologia, Barcelona, Spain, (3) Max-Planck-Institut für Meteorologie, Hamburg, Germany

Quantification of radar rainfall measurement errors is of ongoing interest for application both in meteorology and hydrology, for example for weather prediction or rainfall runoff simulations. Radar reflectivity measurements are affected, amongst other influencing factors, by calibration errors, noise, ground clutter, or attenuation. These sources of errors show complex interdependencies and their combined impact on measurement accuracy is difficult to quantify. A better description of error magnitude and distribution, especially with regard to spatial and temporal structure, is desirable for an improved quality assessment of radar rainfall estimates.

A statistical study of radar reflectivity errors will be presented, with the aim of delivering an uncertainty field corresponding to a given, measured reflectivity field. The analysis is done using data from a network comprising four single-polarised X-band weather radars and seven K-band profilers (micro rain radars) located in Northern Germany, for the period from April to September 2013. Weather radar measurement errors are studied and their dependence on factors like distance from radar and rainfall intensity is investigated by taking advantage of the numerous collocated weather radar and profiler measurements, the large data set available, and the high spatial and temporal resolution (30s, 60m in distance and 1° in azimuth for X-band and 10s, 35m in height for K-band). The identified relations between radar measurement errors and analysed predictors allow for the computation of an error margin for each pixel of a measured reflectivity field. The uncertainty field resulting from this study is variable in space and provides the basis for analysing the temporal evolution of the radar error structure in time in ensuing steps.