EMS Annual Meeting Abstracts,
Vol. 6, EMS2009-476, 2009
9th EMS / 9th ECAM

9th EMS Annual Meeting
9th European Conference on Applications of Meteorology
High resolution meteorology
- applications and services

Generation of observational rainfall ensembles by means of stochastic simulation

S. Krähenmann and B. Ahrens

University of Frankfurt, Institute for Atmospheric and Environmental Sciences, Frankfurt am Main, Germany
(bodo.ahrens@iau.uni-frankfurt.de)

The purpose of this investigation was to find a method of mapping rainfall in the area of Germany, which is easy to use and which gives satisfactory results both in terms of statistical performance and consistency with meteorological mechanisms. Among the interpolation methods described in the literature, the application of conditional Gaussian stochastic simulation has been found attractive by reason of easy provision of ensembles of interpolated realizations of rain fields, which can be used, for example, in probabilistic evaluations of ensemble forecasts by ensemble-ensemble comparisons and in robust estimation of interpolation uncertainty. The method conditions the interpolated fields on point precipitation measurements, their areal mean, and their covariance structure. Additionally, the method is adapted to consider regional and seasonal rainfall characteristics. For example, the area of Germany is split into sections with different topographical structures (Alpine, hilly, and flat terrain) leading to different covariance structures and thus variograms, which were interpolated to avoid jumps at the borderlines between the sections. Based on daily data of the year 2007 seasonal variograms were estimated from standardized and normalized (by log-transform) observations. For daily analysis the variogram sill is rescaled with the observed field variance. The comparison of the stochastic interpolation method with regression-based interpolation methods like Kriging or with inverse distance weighting shows promising results. This result is supported by the evaluation of the method with the very dense precipitation data provided by the Universities Vienna and Frankfurt for the Summer 2007 in the COPS area in Southern Germany. The consideration of terrain effects by simple means adds value to the interpolated precipitation fields, thus improving the final mapping.