



Geostatistical Mapping of hourly Precipitation from Rain Gauges and Radar for an extreme Storm

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Multivariate geostatistical methods are used for spatial interpolation of hourly rainfall from rain gauges using additional information from radar, from daily precipitation of a denser network and from elevation. Data of the storm period from 10th to 13th of August 2002 that led to the extreme flood event in the Elbe river basin in Germany are utilised to illustrate the techniques. Cross validation is applied to compare the interpolation performance of the multivariate methods External drift kriging (EDK) and external drift indicator kriging (EDIK) using different additional information with some univariate reference methods. Special attention is given to the analysis of the sensitivity of the semivariogram estimation on the interpolation performance. Hourly and average semivariograms are inferred from daily, hourly and radar data considering either isotropic or anisotropic behaviour using automatic and manual fitting procedures. The multivariate methods EDK and EDIK clearly outperform the univariate ones with the most important additional information being radar followed by precipitation from the daily network and elevation, which plays here only a secondary role. Using all additional information simultaneously with EDK shows the best performance. EDIK provides partly smaller root mean square errors than EDK, but at the expense of a significant loss of variance. The sensitivity of the semivariogram on interpolation performance is not very high. The best results are obtained using an automatic fitting procedure with isotropic variograms either from hourly or radar data.