

ESTIMATING HIGH RESOLUTION RAINFALL FIELDS BASED ON METEOROLOGICAL RADAR AND RAIN GAUGES FOR OPERATIONAL WATER MANAGEMENT

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When distributed hydrological models are to be used for operational water management, rainfall is probably the most important input variable. At present, a major problem plaguing the distributed hydrological models is the mismatch between model complexity due to the spatial detail and the availability of high resolution input data. The most important and widely used systems providing rainfall measurements at present are ground based rain gauges and meteorological radar. Rain gauge precipitation measurements are relatively accurate but give little information about the spatial distribution as the network density is low. Meteorological radar measurements on the other hand are more or less continuous in space but suffer from several errors. In this study we generate high resolution rainfall fields (50 x 50 m) for different time scales (hourly to daily) based on radar fields (2.5 x 2.5 km) and an experimental dense network of 30 rain gauges within The Netherlands. Two different statistical methods are used and will be discussed. The first approach is a (colocated) cokriging procedure, which uses the rain gauge measurements as first variable and radar measurements as secondary variable. A cross validation procedure is done to identify the reliability of the prediction. Applying kriging in this case has some drawbacks. First of all it produces smoothed images of reality. Secondly, these geostatistical methods are based on Gaussian and thus symmetrical probabilities. Rainfall densities are typically not. Therefore a second technique will be discussed, avoiding these shortcomings. The second method is a statistical disaggregation technique based on wavelet analysis. From the experiment the Marginal Variance Reduction Function (MVRF) is obtained that quantifies where and at which scale variance is added. Based on this MVRF we try to stochastically simulate rainfall fields conditioned upon both radar and rain gauges.