Operational procedure for derivation of areal rainfall for the River Rhine basin

A.H. Weerts (1), D. Meissner (2), S. Rademacher (2), P. Krahe (2), and E. Sprokkereef (3)

(1) Deltares, IWS - Operational Water Management, Delft, The Netherlands (albrecht.weerts@deltares.nl), (2) German Federal Institute for Hydrology (BfG), Koblenz, Germany, (3) Dutch Centre for Water Management (WMCN), Lelystad, The Netherlands

Areal precipitation, as one of the most important hydrometeorological input parameter for rainfall-runoff modelling, is basically available in form of high resolution raster data sets for the River Rhine basin. These datasets were built up in a daily time step using station data with the highest possible spatial density. However, such a product is not available operationally and in an hourly discretisation. During operational forecasting of water levels and discharges in the River Rhine basin, as applied by the German Federal Institute of Hydrology (BfG) and the Dutch Centre for Water Management (WMCN), the areal rainfall estimate must be derived from operationally available rainfall data at a limited amount of rainfall stations. This paper describes a procedure to emulate high-quality areal rainfall estimates as much as possible during operational forecasting. The daily precipitation totals observed at the raingauges are distance depending interpolated to grid values in form of relative deviations from the climatological precipitation reference value (background field method). This new approach is tested for the German part of the River Rhine catchment against a high-quality rainfall product and estimates derived with the simplified interpolation method used in the operational system so far. The areal rainfall estimates derived with the new interpolation procedure emulate the precipitation data better for most catchments, especially in those areas where orography plays a role, like the Black Forest. In the River Moselle area, the new interpolation procedure leads to better simulations of the discharge. For those catchments, where the old method outperforms the new interpolation scheme, the difference between the two methods is always small. The method can easily be used elsewhere.