Testing a flood forecasting system with the use of meteorological ensembles and analysis of forecast errors

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Supplementary to the work done within the 5th Framework Programme of the European Commission, European Flood Forecasting System (EFFS) Project series of hindcasting experiments were carried out. The goal of the original project was the setup and semi-operational testing of a continental-scale flood forecasting system for major river basins in Europe. The principal research aim was to explore the possibility to extend the lead-time of the flood warning process up to 10 days into the future. This was to achieve with the use of numerical weather forecasts. Various deterministic and ensemble forecasts delivered by national and international meteorological services have been used within the system to drive a sequence of hydrological rainfall-runoff models and hydraulic models for principal river systems or selected pilot basins. The weather forecasts were downscaled through nesting form global circulation models to high resolution local models (Gouweleeuw et al., 2004). The raster based hydrological model LISFLOOD (De Roo et al., 2000) and other hydrological models as HBV (Bergström, 1976), TOPKAPI (Ciarapica and Todini, 2002), the FloRIJN model system consisting of the HBV model and the hydrodynamic SOBEK model, the Hron model (Szolgay et al, 2003), the NAM model, the VIDRA model and the GAPI-TAPI (NHFS) system also have been implemented and tested for the particular basins. Operational use of the NHFS system often revealed the uncertainty of QPF taken into consideration while calculating expected Danube hydrographs. To test the feasibility of the use of meteorological ensembles an experiment was designed. The aim of the investigation was also to assess the extent of prior estimates of uncertainty which can be given by the selected approach. Distributions of hydrological ensembles have been compared with natural variability of the hydrological regime and hydroclimatic values.