Geophysical Research Abstracts
Vol. 16, EGU2014-10737, 2014
EGU General Assembly 2014

Flood forecasting with DDD-application of a parsimonious hydrological model in operational flood forecasting in Norway

Thomas Skaugen and Ingjerd Haddeland

Norwegian Water Resources and Energy Directorate, Norwegian Water resources and Energy Directorate, Oslo, Norway (ths@nve.no, 0047-22-95-92-16)

A new parameter-parsimonious rainfall-runoff model, DDD (Distance Distribution Dynamics) has been run operationally at the Norwegian Flood Forecasting Service for approximately a year. DDD has been calibrated for, altogether, 104 catchments throughout Norway, and provide runoff forecasts 8 days ahead on a daily temporal resolution driven by precipitation and temperature from the meteorological forecast models AROME (48 hrs) and EC (192 hrs). The current version of DDD differs from the standard model used for flood forecasting in Norway, the HBV model, in its description of the subsurface and runoff dynamics. In DDD, the capacity of the subsurface water reservoir M, is the only parameter to be calibrated whereas the runoff dynamics is completely parameterised from observed characteristics derived from GIS and runoff recession analysis. Water is conveyed through the soils to the river network by waves with celerities determined by the level of saturation in the catchment. The distributions of distances between points in the catchment to the nearest river reach and of the river network give, together with the celerities, distributions of travel times, and, consequently unit hydrographs. DDD has 6 parameters less to calibrate in the runoff module than the HBV model. Experiences using DDD show that especially the timing of flood peaks has improved considerably and in a comparison between DDD and HBV, when assessing timeseries of 64 years for 75 catchments, DDD had a higher hit rate and a lower false alarm rate than HBV. For flood peaks higher than the mean annual flood the median hit rate is 0.45 and 0.41 for the DDD and HBV models respectively. Corresponding number for the false alarm rate is 0.62 and 0.75 For floods over the five year return interval, the median hit rate is 0.29 and 0.28 for the DDD and HBV models, respectively with false alarm rates equal to 0.67 and 0.80. During 2014 the Norwegian flood forecasting service will run DDD operationally at a 3h temporal resolution. Running DDD at a 3h resolution will give a better prediction of flood peaks in small catchments, where the averaging over 24 hrs will lead to a underestimation of high events, and we can better describe the progress floods in larger catchments. Also, at a 3h temporal resolution we make better use of the meteorological forecasts that for long have been provided at a very detailed temporal resolution.