Geophysical Research Abstracts
Vol. 14, EGU2012-13108, 2012
EGU General Assembly 2012

Predictive control of water distribution in the Dutch National Hydrological Instrument (NHI)

J. Talsma (1), S. Patzke (2), B.P.J. Becker (3), D. Schwanenberg (4), and M. Jansen (5)

(1) Deltares, Delft, Netherlands (jan.talsma@deltares.nl), (2) Deltares, Delft, Netherlands (simone.patzke@deltares.nl), (3) Deltares, Delft, Netherlands (bernhard.becker@deltares.nl), (4) Deltares, Delft, Netherlands (dirk.schwanenberg@deltares.nl), (5) Deltares, Delft, Netherlands (mischa.jansen@deltares.nl)

In the Netherlands, water is extracted from rivers, lakes and canals for drinking water supply as well as industrial, agricultural and environmental water demands. These water extractions must be managed in such a way that constraints such as water quality, safety and minimum water levels for navigation are maintained as long as possible. The National Hydrological Instrument (NHI) has been developed for modeling the water distribution in the Netherlands and supporting the development of water management strategies. It is also integrated into the national Dutch forecasting system for predicting dry periods and their impacts on water supply, agriculture, aquatic ecosystems and navigation. With such setup, the NHI will be a fundamental tool for drought forecast in the Netherlands.

The NHI consists of a groundwater model (MODFLOW), an unsaturated zone model (Metaswap) and surface water models which interact with each other in every time step via an OpenMI interface. The surface water models consist of a hydrological model MOZART for representing the regional catchments and computing a desired water demand, a SOBEK open channel flow model for flow routing in the network of the larger rivers, lakes and canals, and a real-time control component (RTC-Tools). The latter links the water demand generated by MOZART to the availably supply in the network for generating optimum water allocation policies within the prediction horizon of 10 days of the operational forecasting system. The approach relies on predictive control consisting of a simplified internal model of the network within a system-wide optimization algorithm. In a period of water shortages, the user can refine the water allocation by defining specific objectives and related priorities. Finally, the optimum water extractions from RTC-Tools are passed back to MOZART and SOBEK as allocated values.

The RTC-Tools integration into the NHI is an ongoing activity. We present the new functionality based on a pilot system and demonstrate the ability of the approach dealing with different drought situations and distributed, prioritized water demands. Furthermore, we discuss the added value of the approach compared to previous NHI set-ups focusing in particular on operational drought management features.