



eWaterCycle: real time assimilation of massive data streams into a hyper-resolution global hydrological model

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This research is focused on the ICT challenges involved in assimilating massive remote sensing datasets into a hyper-resolution hydrology model. The development of a hyper-resolution (100m) global hydrological model has recently been put forward as a “Grand Challenge” for the hydrological community. PCR-GLOBWB is a unique hydrological model including lateral flow and groundwater as well as human intervention through water consumption, dams and reservoir operations. Over the past decade, remotely sensed states, parameters and fluxes have become available through satellite observations. Exponential growth can be anticipated in the volume of hydrologically useful remote sensing data given the current plans of JAXA, NASA and ESA with respect to Earth observation satellites. Real time assimilation of these data into a hyper-resolution hydrology model would allow us to constrain the estimated states and fluxes and improve the model forecasts. However, this poses significant hydrological and ICT challenges. This project is a unique collaboration between hydrologists, and the computer scientists of the Netherlands eScience Center. Together, we will explore existing and novel ICT technologies to address the CPU and memory requirements of running the forward model. In addition, we will add data assimilation to this model, requiring streaming, management and processing of massive remote sensing datasets, as well as running the model for large ensembles and performing assimilation on a global scale.