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OpenStreams: Open Source Components as Building Blocks for Integrated Hydrological Models

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Currently, Deltares is in the process of bringing out open source versions of most of its hydrology and hydrodynamics software. At the same time two packages are being developed as open source products from the start: OpenStreams aims to be a collection of (distributed) hydrological models and model components in which RTC-Tools targets at the implementation of various real-time control techniques. The aim is to come to a set of components that can work independently (e.g. through a command line interface) but can also be linked together through industry standards (such OpenMI) and more closely linked interfaces if needed. The system combines hydrological software written in different languages (Python with PCRaster extensions, C++, Fortran) and links these together using a C# layer that implements OpenMI. To do so all models and components first export their key functionality through an API in their native language around which the C# layers is wrapped using SWIG. The software presented here will be made available through http://oss.deltares.nl.
Here we present a first test case in which a distributed hydrological model for the Rhine basin is linked to an RTC-Tools component for a major reservoir and to a groundwater model (MODFLOW) for the whole basin.