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HyMUSE: a multi-model framework for Hydrology.

Inti Pelupessy (1), Niels Drost (1), Rolf Hut (2), Jerome Aerts (2), Simon Portegies Zwart (3), Arjen van Elteren (3), Gijs van den Oord (1), Ben van Werkhoven (1), Stefan Verhoeven (1), and Berend Weel (1)

(1) Netherlands eScience Center, Amsterdam, Netherlands (i.pelupessy@esciencecenter.nl), (2) Delft University of Technology, Faculty of Civil Engineering and Geoscience, Delft, Netherlands, (3) Leiden Observatory, Leiden University, The Netherlands

We present the Hydrological Multipurpose Software Environment (HyMUSE), a Python framework for Hydrological model simulations, that will form part of the computational core of the eWaterCycle project. The eWaterCycle II project aims to develop a platform for researchers to easily develop and use hydrological models and deploy them on HPC resources. HyMUSE is being developed at the Netherlands eScience Center using technology developed in the AMUSE and OMUSE projects, which where developed for the astrophysical and oceanographic domains.

HyMUSE presents the user with a homogeneous interface to different hydrological simulation codes. For this it provides a number of services such as unit conversion, encapsulation of the internal model data to a common object oriented representation and maintaining the simulation in a consistent state. HyMUSE can be accessed from within the online notebook environment of the eWaterCycle toolset, where researchers can explore, adapt and collaborate on simulations models. The use cases for HyMUSE range from running simple numerical experiments with single codes and the addition of data analysis tools in model runs, to running large model run ensembles or setting up coupled solvers for problems where different types of physics interact. In addition to AMUSE-type low level interfaces, it is possible in HyMUSE, to interface directly with the CSDMS Basic Model interface (BMI). For this we have developed an interoperability layer for the BMI, that can optionally route its low level communication through the newly developed GRPC4BMI library, which enables models to be run on remote HPC resources. We discuss the current status of the project, and the medium and long term development goals, as well as giving example applications.