eWaterCycle: Fully open en transparant hydrological data and modelling platform facilitates FAIR policy making

Rolf Hut¹, Caitlyn Hall², Niels Drost³, Nick van de Giesen¹

¹Delft University of Technology, the Netherlands ²Arizona State University, USA ³Netherlands eScience Center, the Netherlands

Abstract

In Spring 2019, eScience Center Netherlands and Delft University of Technology facilitated a workshop to develop a FAIR – Findable, Accessible, Interoperable, Reusable – multi-application platform that hydrological experts and non-experts can use to guide their decision-making. Many hydrologists believe that there are too many models in the field, yet that every non-expert should use her/his model when making decisions. Each new research generation strives to improve current methods with increasing complexity and developing individual models to fit specific situations - and to what end? If other experts struggle to adapt a model, it's unreasonable to expect a non-expert to gain meaningful insight to address challenges impacting a community or guide policy.

A community-driven platform (eWatercycle) has been developed by an international multi-disciplinary team of hydrologists, research software engineers, tinkerers, science policy advisors, and more. The diverse and inclusive team membership is critical to ensure that the best possible tool is developed to address multi-faceted questions and benefit a wide-reaching community. eWatercycle incorporates many popular hydrological models (e.g., SUMMA, PCRGLOB-WB, WFLOW, and HYPE). We have incorporated the massive ERA5 climate reanalysis dataset, as well as global stream gauge data, such that users can analyze a system for any region.

Considering the potential complexity from eWatercycle's inclusion of several model types, the team continues to develop this model framework in close cooperation with potential end-users. We envision end-users may include a government scientist working to inform policy decisions on water management or city officials developing risk management strategies for extreme weather events. Users of eWatercycle will not be required to learn new programming languages or overcome significant technical barriers to begin using the framework. As a result, users will be able to use eWatercycle to work towards solving region-specific problems with confidence by considering the outcomes of different hydrological models and access to potential uncertainty in the available data and modeling techniques.



More Info

See more information in our website: https://www.ewatercycle.org

See our code sources at GitHub: http://github.com/eWaterCycle

Contact us at: <u>ewatercycle@esciencecenter.nl</u>



Interactive Jupyter hub long running workflows

Data and model explorer

Multi-model coupling Data assimilation **HPC** models



Model curation 釟 Analyze Share Custom experiment Pre-defined analytics visualization Custom analytics Creation of DOIs Scoring and comparison

Dataset export, FAIR



eWaterCycle is a framework in which hydrological modelers can, for example, compare and analyze the results of models that use different sources of meteorological data. The goal of eWaterCycle is to advance the state of FAIR (Findable, Accessible, Interoperable, and Reusable) and open science in hydrological modeling.



The experiment runs in a Jupyter notebook, the model runs in a container, in any programming language, communicating through grpc4bmi, developed in our team.



About eWaterCycle