Comparing the impact for hydrology of the new ERA5 reanalyses dataset over ERA-Interim for 8 hydrological models in 6 catchments using the eWaterCycle community modelling environment

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Abstract

The release of the European Centre for Medium-Range Weather Forecasts (ECMWF)'s Re-Analysis 5 (ERA-5) global climate forcing dataset is expected to greatly improve the quality of hydrological modeling. Following this release there is great interest in assessing the improvements of ERA-5 relative to its predecessor ERA-Interim for hydrological modeling and predictions.

In this study we compare streamflow predictions when using ERA-interim vs ERA-5 as forcing data for a suite of hydrological models from different research groups that capture the variation in modelling strategies within the hydrological modelling community. We check whether physically based models, defined as those that do not require additional parameter calibration, would lead to different conclusions in comparison to conceptual models, defined as those that require calibration. Based on the hydrological model structure we expect that conceptual models that need calibration show less difference in predicting discharge (skill) between ERA-5 and ERA-Interim, where-as the physical based (non-calibrated) models most likely will benefit from the improved accuracy of the ERA-5 input. This assessment will provide the HEPEX community with answers on how the ERA-5 dataset will improve hydrological predictions based on different hydrological modelling concepts.

An additional key objective while conducting this study is compliance to the FAIR principles of data science. To achieve this we held a workshop in Leiden, the Netherlands, where multiple hydrological models were integrated into the eWatercycle II system. eWatercycle II is a hydrological model platform containing a growing number of hydrological models. The platform facilitates research and cohesivity within the hydrological community by providing an Open-Source platform built specifically to advance the state of FAIR and Open Science in Hydrological Modeling. We also use this study to demonstrate the feasibility of eWatercycle II as a platform for FAIR hydrological models.

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More Info

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

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

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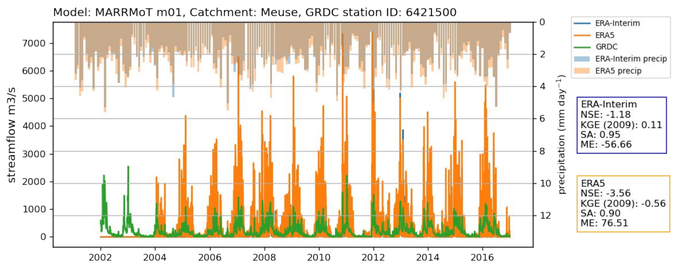
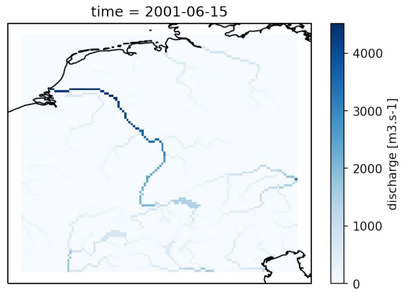
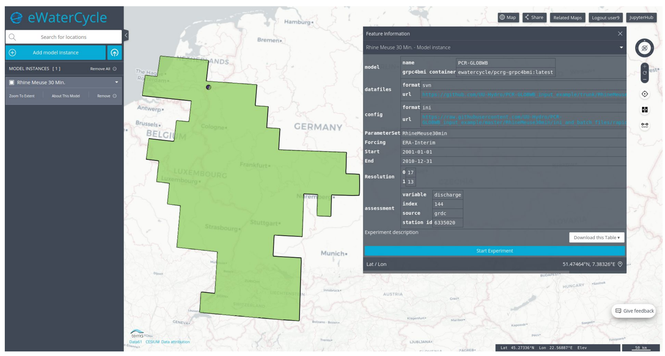


Example output from the conceptual Marrmot model for the Meuse.

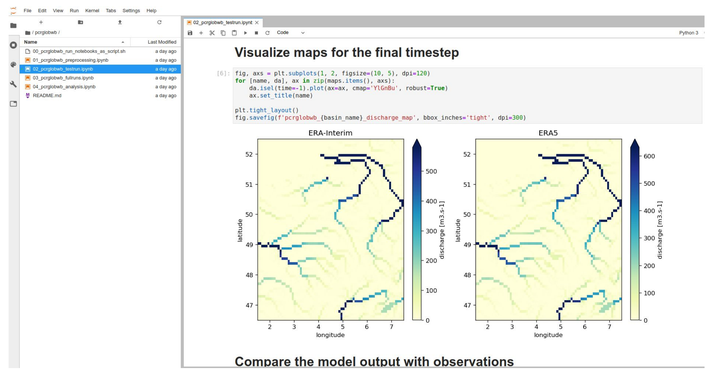


Example output from the distributed PCRGlobWB model for the Meuse.

About eWaterCycle



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.