Advancing Reproducible Hydrological Modeling for African River Basins Using eWaterCycle Traversing Data Scarcity (Oral)

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ABSTRACT

The goal of the eWaterCycle project is to facilitate hydrological modelling being done Findable, Accessible, Interoperable & Reproducible (FAIR).

Hydrological modeling is essential for understanding and managing water systems, but it suffers from major challenges: fragmented tools, lack of reproducibility, limited interoperability, and barriers to collaboration. Scientists often struggle to share, compare, or reproduce model-based results. There is a clear need for a modern platform that supports transparent, reproducible, and collaborative hydrological research.

eWaterCycle has been developed to take away programming and compatibility issues within hydrological modelling. It is designed in a FAIR way. Many models use different input/output formats, making interoperability hard. This is what eWaterCycle changes. It utilizes the Basic Model Interface (BMI) to improve interoperability between all models. Making sure that within the Jupyter lab environment you can run every model using the same methodology. Even allowing the user to let different models 'connect' and 'communicate'.

Using eWaterCycle, we will showcase a climate change impact analysis with a preliminary CAMELS Dataset of Ghana & Zimbabwe built under SAFE4ALL Africa*. CAMELS stands for Catchment Attributes and MEteorology for Large-sample Studies. CAMELS also contain river discharge data. CAMELS are available for USA, parts of Europe, India and Australia. These are the first activities towards CAMELS in Africa. Under SAFE4ALL, the aim is to show how modern tools such as eWaterCycle can help researchers to quickly run a single analysis workflow across multiple regions. It is important in data scarce environments to quickly check results, compare and adjust models. eWaterCycle gives users access to ERA5, ERA-Interim and CMIP6 data with ease by changing one data object.

eWaterCycle allows people from all positions on the academic ladder to do research. We have an impressive portfolio of Bachelor level research, and also PhD level research. And we provide the ability for higher levels of education to build upon the work done previously. Adding more insight and value to the research.

Because eWaterCycle has been built to be user friendly, we are able to showcase it live during and after the session.

* SAFE4ALL: Safeguarding African Foodsheds and Ecosystems for all Actors across Local, regional, and international Levels to manage migration. The work leading to these results has received funding from the European Horizon Europe Programme (2021-2027) under grant agreement n° 101137814. The opinions expressed in the document are of the authors only and in no way reflect the European Commission's opinions. The European Union is not liable for any use that may be made of the information.

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