

Geosci. Model Dev. Discuss., referee comment RC1  
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## **Comment on gmd-2021-344**

Anonymous Referee #1

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Referee comment on "The eWaterCycle platform for open and FAIR hydrological collaboration" by Rolf Hut et al., Geosci. Model Dev. Discuss.,  
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The ewatercycle platform presented in this paper is a very welcome development to hydrology because computational hydrology suffers from a lack of reproducibility, time "lost" to coding, and a preference for models already used in the research group (because this is easiest and not because they are scientifically most appropriate). ewatercycle (partially) addresses these problems and thereby could be a very valuable contribution to hydrological sciences.

The presented paper provides an introduction and overview of ewatercycle, and gives a few examples of how the platform can be used for various experiments. The description there is largely clear. In its current form, the paper seems to be publishable but sharpening the writing may benefit the readers and thereby also the uptake of the platform.

The paper is largely an overview description of the framework, and some examples, without any science being presented. My comments therefore largely focus on how the framework can better serve its users. I hope the authors find these comments useful, and I also invite them to disagree in case they do not think the suggestions will better the paper/framework.

## Main comments.

- How does ewatercycle support studies that use multiple (many) catchments at once? The current interface of selecting a catchment seems to be useful for studies of individual catchments, but not really optimal for studying multiple catchments at once (which is common in many hydrological experiments).
- In addition, most scientific modeling studies in hydrology will use some other sources of data that are not provided in ewatercycle. How will ewatercycle facilitate such studies and their reproducibility? This would be isotope data, groundwater levels, etc. In addition, the paper talks about ERA-5 and ERA-interim being available as forcing. I understand that such gridded global gridded "data" products are the most convenient to work with, but most published catchment-scale studies will require data from actual observation stations in and around the catchments. How will ewatercycle facilitate such studies? I do not think this is possible with the ESMValTool?
- ewatercycle ties together many existing components, largely from services provided by others. How does ewatercycle ensure that past simulations are also feasible to repeat in the future (for example when those outside services have been updated, or become unavailable)?
- The paper states that "the technologies developed for the eWaterCycle platform are portable to other domains of (geo)science where researchers work with each other's models and datasets". This is an interesting and relevant thought, but to what extent this statement is accurate seems to really depend on the field and the type of data used. In sciences where data is gridded and standardized this seems to be the case, but in sciences that use more soft data, and unique (and less structured) field info for their models the approach seems not to be transferable?

- The examples provided give an indication of how a hydrological model (or more models) are run in various set-ups. I would argue that most hydrological science nowadays (hopefully) goes far beyond running a rainfall-runoff models and comparing observed and simulated hydrographs. How would the ewatercycle platform facilitate modeling studies that go beyond this “simple task”. For example:

- Investigating water age: Harman, C. J. (2015). Time-variable transit time distributions and transport: Theory and application to storage-dependent transport of chloride in a watershed. *Water Resources Research*, 51(1), 1-30.
- Investigating human water interactions: Elshafei, Y., Coletti, J. Z., Sivapalan, M., & Hipsey, M. R. (2015). A model of the socio-hydrologic dynamics in a semiarid catchment: Isolating feedbacks in the coupled human-hydrology system. *Water Resources Research*, 51(8), 6442-6471.
- Coupled water and vegetation dynamics: Kyongho, S., & Tague, C. (2019). A top-down soil moisture and sap flux sampling design of a rain-snow transition mountain watershed. *Hydrological Processes*, 33(11), 1553-1568.
- Coupled hydrology and landscape dynamics: Hancock, G., & Willgoose, G. (2001). The interaction between hydrology and geomorphology in a landscape simulator experiment. *Hydrological Processes*, 15(1), 115-133.

- In addition, Hutton and colleagues stated that “some form of code is used to produce the vast majority of hydrological research papers, from data processing and quality analysis [Teegavarapu, 2009; Mcmillan et al., 2012; Coxon et al., 2015], regionalization and large-scale statistical analysis across catchments [Blöschl et al., 2013; Berghuijs et al., 2016],”. This part of (still) computational hydrology provides a large part of the hydrological literature, but remains undiscussed in the current manuscript. I understand that eWaterCycle cannot solve all our problems, but I think it would be unfair to say the framework solves the problems raised by Hutton, while it is really at present only a solution for a small subset of computational hydrology.

- At times the paper is rather unspecific about how things are done. The paper for example states "can be easily added to" without specifying how this is done. I would encourage the paper to state how it's done, rather than a vague description that it is easy. This applies to many steps presented in the paper.

**Abstract:**

L2: There is an inconsistency between the "we" in for example, "We replied" (where "we" refers to Hut and 2 colleagues" and the author list of the current manuscript. Please rephrase to avoid confusion.

L6: Personally, I would omit: "our"

L11: "MARRMoT" is not a model, but a set of other existing models?

L27-31: The main message of this paragraph seems clear, but the wording is rather convoluted and imprecise. Also, do we really understand how water moves through soils locally (See e.g., Evaristo & McDonnell 2015)? Do we really understand how water moves through plants if the sources of this plant water use remain uncertain even at extensively studied sites?

L33: why the "\*" with Beven?

L33: are hydrologists “forced” or do they “choose” to work with effective parameters? (or ignorantly “pick”?).

The second part of the introduction (section 1) already reads like a description of the Ewatercycle. I do not think this adds to the clarity of the paper, by already integrating that here.

Section 1.1. Would the paper benefit from making this a supplement at the end?

L170. If I understand this section correctly, ewatercycle is currently not yet really operational for foreign users. In that case, this needs to be reflected in how the abstract and other key summary parts of the paper are written.

L388: “of BSc student Thomas Albers” is OK, but I think conventionally we remove such irrelevant clauses (because we do also not include that with any of the other references in the paper).

Figure 9: what is “the MARRMoT model”? In my understanding, MARRMoT is a suite of models.

Many figure legends are placed outside the hydrographs. I understand that this is easier, but it gives a lot of whitespaces that seems unnecessary.