Final Response : Technical note: HydroModPy – a Python toolbox for deploying catchment-scale shallow groundwater models

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Referee comments on "Technical note: HydroModPy – a Python toolbox for deploying catchment-scale shallow groundwater models" by A. Gauvain et al., Hydrology and Earth System Sciences Discussions., https://egusphere.copernicus.org/preprints/2026/egusphere-2026-868/.

Thank you for your review. Referee comments are shown in black, and our point-by-point responses are provided in blue italics.

1 RC3: "Comment on egusphere-2026-868", Anonymous Referee 3, 21 May 2026

The authors present a toolbox for developing groundwater models entirely within a python workflow. This is a valuable contribution that will be useful as a research and teaching tool. Reviewers 1 and 2 have already provided positive assessments and I agree with their comments. I have a few minor comments to add:

We thank the reviewer for this positive feedback and useful suggestions.

In exploring the GitLab page I do not see a section for bug reports, feature requests, etc. from outside of the core development team. If this does not exist can it be added? Or if it does exist it should be mentioned in the paper and ideally be more obvious on the GitLab/ReadTheDocs page. If HydroModPy is a community initiative that welcomes members of the community to suggest or contribute new features, code, examples, teaching tools, etc. this should be stated somewhere with the recommended approach to doing so. If not that should also be stated.

Thank you. The GitLab repository has been moved to GitHub (https://github.com/HydroModPy/HydroModPy/tree/v1.0) to facilitate community engagement, and we have added a clear issues section where users can report bugs, request features, and contribute to discussions (https://github.com/HydroModPy/HydroModPy/issues). We also updated the paper in "code and data availability section: "Bug reports can be submitted at the following link: https://github.com/HydroModPy/HydroModPy/issues"

The ReadTheDocs page has some great examples that appear to run 'out-of-the-box' - ie., they come with all the data required to run them. These are mentioned in the code and data availability section but I think they should feature more prominently in the paper. At the very least, in Section 3.2 it should be mentioned that the full example, including data, is available as a jupyter notebook. These examples could also be highlighted in Section 4.3.

Thank you for this suggestion. The examples are now available at this link: (https://hydromodpy.github.io/v1.0/examples.html). We strengthened the manuscript text to highlight reproducible out-of-the-box notebook examples and explicitly referenced them in Sections 3.2 and 4.3.

In Section 3.2: "Note that other examples, including all required input data and expected outputs, are provided as fully executable Jupyter notebooks in the HydroModPy documentation at https://hydromodpy.github.io/v1.0/examples.html, enabling users to immediately replicate and adapt the workflow to their own study areas."

In Section 4.3: "HydroModPy's documentation includes a comprehensive set of ready-to-run Jupyter notebook examples (available at https://hydromodpy.github.io/v1.0/examples.html) that demonstrate key functionalities with pre-packaged datasets. These out-of-the-box examples significantly reduce the barrier to entry, allowing students and researchers to immediately engage with the tool, visualize results, and modify parameters."

It's unclear if the model could be used to simulate groundwater on small islands (including the freshwater lens), or saline water intrusion in coastal aquifers. The authors mention solute transport but not specifically variable density flow. If it is possible, I think this application should be mentioned.

We thank the reviewer for this comment. Variable-density flow (and therefore applications such as freshwater lens dynamics in small islands or saline intrusion in coastal aquifers) is not supported in the current version of HydroModPy, which assumes constant fluid density.

However, this limitation is not fundamental to the modelling framework, and such processes could be implemented in future developments by coupling HydroModPy with a variable-density groundwater flow formulation.

L 158: Some repetition

Corrected. The repetition at this location was removed.

L 349: Is this the NSE of streamflow? Does HydroModPy also provide workflows to calibrate to groundwater heads?

Yes, this NSE refers to streamflow. We clarified this and added that HydroModPy will in the future support calibration workflows using groundwater head observations when such data are available (see these references on the topic if you are interested: https://doi.org/10.1016/j.jhydrol.2026.135118 and https://doi.org/10.1016/j.jhydrol.2024.131859).

Line 401: It's unclear what is meant by a 'better understanding of the code structure'. Is integration of a 3D geological model currently supported or would this require edits to the source code? Is there an example showing how to do this?

Thank you. We rewrote this sentence to be explicit: "However, it is important to note that many of these limitations can be overcome by making use of HydroModPy's advanced functions and modular structure."

3D geological model integration is not currently supported in this first version of HydroModPy and would require source code modifications.

Section 4.2: The authors propose quite a long list of areas for future development. Are all of these additions realistic? Can the authors provide an estimated timeline for their development or indicate which are being prioritized?

Yes, these additions are realistic, and some of them have already been under development since the submission of the manuscript. These developments can be viewed in the GitHub repository (dev branch): https://hydromodpy-docs.readthedocs.io/en/dev/inde

Line 421: should read "Currently two land surface models...". The writing here is also a bit confusing - it says the models are already implemented but the benefits (e.g. specifying spatially variable climate data) are in the future tense. Please clarify.

Agreed. The models are not yet fully implemented and integrated, but we are actively working on this. We clarified the wording to reflect that the integration is in progress: "Currently two land surface models are under implementation in HydroModPy."

Line 436: Specify Metropolitan France unless overseas territories are included.

Overseas territories are included.

Line 437: It's not clear if the authors plan to create tools for importing data from all these resources (CAMELS, Caravan, GRDC, ERA5-Land, etc.)?

Yes, this is our objective. We clarified that connectors to these resources are planned progressively:

"At a global scale, for instance, we can cite resources such as Caravan (a series of CAMELS: Catchment Attributes and Meteorology for Large-sample Studies) (Kratzert et al., 2023), GRDC for the Global Runoff Data Centre (https://grdc.bafg.de/), or ERA5 for climate information (Hersbach et al., 2023). We plan to progressively develop connectors to these and other global data sources, prioritizing resources based on API maturity, data licensing terms, and community demand. Once implemented, these connectors will enable users to directly harvest diverse datasets (topography, geology, land cover, water use, etc.) relevant to their specific modeling objectives."

Line 484: I think a more correct citation for CMIP scenarios would be the Earth System Grid Foundation (https://esgf.github.io/nodes.htm
75 and O'Neill et al (2016). Copernicus simply redistributes these data.

O'Neill, B. C., Tebaldi, C., van Vuuren, D. P., Eyring, V., Friedlingstein, P., Hurtt, G., Knutti, R., Kriegler, E., Lamarque, J.-F., Lowe, J., Meehl, G. A., Moss, R., Riahi, K., and Sanderson, B. M.: The Scenario Model Intercomparison Project (ScenarioMIP) for CMIP6, Geoscientific Model Development, 9, 3461–3482, https://doi.org/10.5194/gmd-9-3461-2016, 2016.

Thank you for this recommendation. We added the suggested CMIP scenarios reference (O'Neill et al., 2016).

References

Hersbach, H., Bell, B., Berrisford, P., Biavati, G., Horányi, A., Muñoz Sabater, J., Nicolas, J., Peubey, C., Radu, R., Rozum, I., Schepers, D., Simmons, A., Soci, C., Dee, D., and Thépaut, J.-N.: ERA5 hourly data on single levels from 1940 to present, https://doi.org/10.24381/cds.adbb2d47, 2023.

Kratzert, F., Nearing, G., Addor, N., Erickson, T., Gauch, M., Gilon, O., Gudmundsson, L., Hassidim, A., Klotz, D., Nevo, S., Shalev, G., and Matias, Y.: Caravan - A Global Community Dataset for Large-Sample Hydrology, Scientific Data, 10, 61, https://doi.org/10.1038/s41597-023-01975-w, 2023.