

This manuscript introduces AQUA v1 (Application for QUality Assessment), a Python-based framework developed within the Climate Change Adaptation Digital Twin of the Destination Earth (DestinE) initiative. The tool is designed to support the automated evaluation of kilometer-scale, high-resolution global climate simulations.

The paper is well-written and represents an important contribution to the community by providing a useful tool for high-resolution climate model evaluation. The authors provide a good amount of detail, specifically focusing on the architecture and core functionalities of the AQUA core, which effectively handles data ingestion, standardization, and pre-processing.

A major strength of this work is the strategy presented in the package design. The manuscript demonstrates a reasonable degree of thought regarding the flexible and modular use of the package. By building on widely adopted Python libraries, AQUA successfully delivers a modular infrastructure that allows for scalable, out-of-core computations and handles data access across varying formats. Furthermore, its ability to integrate into automated workflows and user-defined pipelines makes it highly valuable for both operational and research-oriented applications. As an open-source, actively maintained framework, it is well-positioned to serve as a community tool that ensures interoperability, usability, and reproducible climate data analysis across different projects and institutions.

Overall, this manuscript provides a thorough and well-designed contribution to the climate modeling community. I have a few minor comments and technical suggestions detailed in the next section. Therefore, I recommend that the paper is acceptable for publication after the authors address the points raised in the specific comments below.

*We thank the reviewer for finding our manuscript an important contribution to the community. We've addressed the comments listed below and answered them individually when more explanation was needed. Together with these comments, we've updated the text for features which are now part of the code or to an updated stage with respect to the original draft.*

Specific comments:

Line 44: Please consider including the following reference for CMOR, which is the following one.

Mauzey, C., Doutriaux, C., Nadeau, D., Taylor, K. E., Durack, P. J., Betts, E., Cofino, A. S., Florek, P., Hogan, E., Rodriguez Gonzalez, J. M., Kettleborough, J., Nicholls, Z., Ogochi, K., Seddon, J., Wachsmann, F., & Weigel, T. (2026). The Climate Model Output Rewriter (CMOR) (3.14.3). Zenodo. <https://doi.org/10.5281/zenodo.19869925>

Line 66: Please use the representative reference paper for the PMP: Lee, J., Gleckler, P. J., Ahn, M.-S., Ordonez, A., Ullrich, P. A., Sperber, K. R., Taylor, K. E., Planton, Y. Y., Guilyardi, E., Durack, P., Bonfils, C., Zelinka, M. D., Chao, L.-W., Dong, B., Doutriaux, C., Zhang, C.,

Vo, T., Boutte, J., Wehner, M. F., Pendergrass, A. G., Kim, D., Xue, Z., Wittenberg, A. T., and Krasting, J.: Systematic and objective evaluation of Earth system models: PCMDI Metrics Package (PMP) version 3, Geosci. Model Dev., 17, 3919–3948, <https://doi.org/10.5194/gmd-17-3919-2024>, 2024.

*The two citations have been added to the final version of the manuscript.*

Lines 65-73: Those two paragraphs are shorter than others, maybe they could be merged into one paragraph?

*We have merged the two paragraphs as suggested by the reviewer.*

Lines 162-165: The authors note that the analysis performed with the integrated diagnostic suite will be covered in a separate publication ("Paper II"). While it is understandable that the detailed analysis is reserved for a future paper, the manuscript would be significantly strengthened by providing a brief overview or a high-level summary of the specific diagnostics currently considered or implemented in AQUA. Even a concise description or a bulleted list of key metrics and diagnostic categories would give readers a clearer, more immediate understanding of the package's practical capabilities.

*We included in this paragraph a brief sentence of the available diagnostics, without going into details or providing a full list. The explanation on how the diagnostics are designed will be one of the important points of the companion paper, so that a more detailed description of the available diagnostics will be available in that paper with adequate context about the design choices.*

Lines 517–521: The authors set an excellent and ambitious vision for AQUA to serve as a "blueprint for next-generation climate data analysis software." To further strengthen this concluding point, it would be highly beneficial to explicitly contextualize AQUA within the existing landscape of open-source, community-driven climate analysis packages. Since several successful community tools already share a similar open philosophy, briefly acknowledging these established frameworks would provide valuable context. This would help clarify how AQUA builds upon or uniquely complements existing efforts, making the manuscript's conclusion even more impactful.

*We have modified the last paragraph and toned down the statement according to this comment. As now explained in the new version of the manuscript, one goal of AQUA is to allow interoperability among different projects. At the same time the modular nature of the code allows to expand or adapt a specific part of the codebase in order to be useful for other tools as well as ingest other modules provided by other tools, enhancing the collaboration among different codes. Additionally, as it will be described in detail in the Paper II, is it a possibility of aqua-diagnostic to eventually use diagnostics already available in the analysis packages ecosystem, with the goal of synergizing with other tools rather than duplicating the effort.*