

The study is quite well structured and the approach used modern and innovative although it requires further bibliographical references with respect to the topics involved. I believe major revisions are needed to emphasise the real purpose of this study and the limitations it has in dealing with a global-scale dataset. This approach is valid in attempting to categorise groundwater level patterns, but it cannot be a tool for coastal aquifer management planning at the local scale, where geological, hydrogeological, structural and resource exploitation characteristics as well as climatic conditions influence the hydrogeological behaviour of the aquifers. I believe that by revising the article in this sense, it can be a valid starting point for the categorisation of GWLs at a global scale.

We would like to thank reviewer 2 for the positive feedback and valuable suggestions and requests for more clarity about our objectives, and the potential and limitations of our study. We will revise our manuscript accordingly. Below, we respond (green) to individual comments made by the reviewer. We appreciate suggestions for improvement and corrections to individual words in the text, which we will carefully implement.

Abstract / General comments

Please, verify in the document to state everything before using acronyms. | [Line 11]: Please, provide the full word the first time you use GWL

We agree and will check the manuscript to ensure that abbreviations are always written out first.

Captions of figures and tables are often too long. Try to summarise them and include this information in the text

Thanks for pointing out. We will check where descriptions from the captions should be in the text.

Please, revise the abstract in order to better explain the main outcomes and limitations.

We agree that the preview of the results in the abstract might be too ambitious and instead plan to focus more on the meanings of our findings including limitations.

Methods

[Line 102]: in section 2.1 you stated that the dataset was compiled from 2019-2022. What does it means? please, clarify and revise

In Section 2.1 we describe the period in which we had access to the datasets used, while here we describe the period from which we selected time series from the dataset. We will clarify accordingly.

Results

[Lines 183-184]: Please explain this criterion and add a reference

We will provide a short explanation of the criterion in the methods section.

[Lines 330-332]: please, rephrase it

Thanks for pointing out the missing clarity in the sentence. We will revise the sentence.

Discussion

[Lines 383-384]: not only from a global perspective but also at local scale, affecting the establishment of an efficient monitoring and management strategy

We agree and will rephrase the sentence accordingly.

[Lines 398-399]: in coastal aquifer, the qualitative characterisation is quite important and needs to be coupled with the quantitative one, especially in arid and semi-arid regions.

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We thank reviewer 2 for this supporting formulation and the added reference. We plan to add to the discussion a more direct statement of how GWL dynamics classification results depend on the input data chosen (time series and indices derived therefrom). For further information, please refer to our response to reviewer 1's comment on lines 450-451.

Conclusions

[Lines 529-530]: I feel that it can be a starting point but that groundwater management requires specific studies on a local or regional scale. There are complex systems that are often unequalled in the world and for which any form of large-scale generalisation may be a limitation rather than an advantage.

Thank you for your thoughtful comment. We acknowledge the importance of detailed, site-specific investigations, recognizing the complexity and uniqueness of various hydrogeological systems. The intention behind our approach is not to replace localized studies but rather to complement them. By analyzing data from diverse coastal aquifers around the world, we aim to identify hydrogeological (dis)similarities that can inform broader frameworks for groundwater management. As both reviewers have also pointed out in the main comment, we believe that we need to clarify our study objectives in the abstract and the introduction. Furthermore, we plan to provide more focus in the conclusions on how our global perspective can support groundwater management on various scales via a) identifying regions that may share common characteristics or face similar challenges, b) identifying hydrograph characteristics that are important to consider in global modeling frameworks, c) providing evidence on the currently limited possibilities to explain GWL dynamics using attributes that are available for the global scale, d) while recommending to make use of self-learning algorithms to better understand and predict GWL dynamics beyond the local scale. We also refer to our response to reviewer 1's comment on lines 477-479 and lines 510-513 regarding the case study.

[Lines 534-535]: too strong as a statement, see previous comment

We agree and will remove pointing out the potential for unmonitored sites.