We sincerely appreciate the thorough review and feedback with（ID：EGUSPHERE-2024-3384）. We have carefully addressed all comments and editorial notifications. Below is our point-by-point response:

- Both "TelApy" and "Telapy" are used. Please be consistent.

Revision: All "Telapy" have been standardized to “TelApy” (e.g., Sections 2.2, 2.3, and captions), in accordance with the references(Audouin et al., 2017).

- Table 1 & 5, "e" used in the unit does not seem SI. Please define.

Revision: To improve clarity and conform to standard scientific writing conventions, the “e” notation (e.g., $1e^{-2}$) has been replaced with conventional scientific notation (e.g., $1e^{-2} = 1\times10^{-2}$) throughout the tables.

- Table 3, please do not use short-hand notation "5e-3" for "5×10^{-3}" where {-3} is superscript.

Revision: All values in Table 3 now use superscript notation (e.g., 5×10^{-3}).

- Figure 7(e), I do not see any scientific reason why the difference "Coupled - Single" is always positive. Why? Or do we have negative values but missing from the colorbar?

Response: The reason for this issue is mainly related to the choice of the colorbar. The salinity difference is most pronounced in the high-salinity contrast mixing zones (up to 35), while in other areas, such as the open ocean, the differences are less noticeable due to mixing effects. Previously, the colorbar was displayed using a linear scale, which made the negative values less visible. We have now modified it to a nonlinear scale to better highlight negative values and small differences across the domain.
Location: P18 Fig7

- Tables 4 and 5, All the numbers in these tables have a zero in the second decimal place ("8.70", "28.10", "16.70",...), which appears odd. In scientific data, a number "8.70" implicitly indicates an uncertainty range of [8.65, 8.74). If this is not the case, please truncate the numbers at the meaningful digit.

Revision: All values have been truncated to one decimal place (e.g., 8.7, 28.1, 16.7) to reflect measurement precision.

- In the response to general comment 3 from Reviewer 1, the result from "the preliminary analyses" are mentioned that the saltwater penetration and groundwater discharge rates are sensitive to salinity and temperature, respectively. I agree with the author that This sensitivity is "a critical

consideration". Is this found in the revised text? The authors might choose to included this discussion on sensitivity in the main text.

Response: We appreciate the reviewer's feedback. As noted in the revised Section 4 (Page 22, Point 5), future work will prioritize systematic parameter sensitivity analyses, including spatially variable salinity/temperature gradients and their impacts on SGD-driven nutrient fluxes. This will strengthen the model's applicability to diverse coastal settings.
Furthermore, Section 3.2.4 (Page 20, Table 5) discusses the influence of tidal-driven variations in salinity and temperature on SGD rates, highlighting that RSGD increases by 54% under tidal coupling due to dynamic salinity feedback. These sections reflect the model's sensitivity to these parameters and emphasize their key role in coastal dynamics.
Additionally, we have included an appropriate discussion on the model's sensitivity to salinity and temperature in the main text (Page 13, Lines 19–26). This section highlights how salinity gradients and temperature-dependent buoyancy effects influence saltwater wedge penetration and submarine groundwater discharge (SGD), referencing established mechanisms in the literature (Michael et al., 2005; Slomp & Van Cappellen, 2004). While the model focuses on tidal dynamics, the chosen parameter ranges reflect typical coastal conditions and underscore the importance of salinity and temperature in shaping coastal groundwater processes.

- In the response to the very last comment from Reviewer 1 (re: subsection 3.2.4), you have added a paragraph in P.19, Lines 32-35. The paragraph does not appear to reflect the supplemented analysis with "the coupled model without tidal forcing", that are described in the first paragraph of the reply. Please clarify where we can find the result of this supplemented analysis in the main text.

Response: The addition to Section 3.2 (Page 13, Lines 27–34) explicitly clarifies the two-phase model design and its purpose. However, to address the reviewer's request for visibility of the "coupled model without tidal forcing" results in the main text, we have further enhanced the manuscript as follows:
Added a direct comparison between Phase 1 (no tide) and Phase 2 (with tide) in the revised paragraph (Page 21, Lines 1–5):

By comparing Phase 1 (steady-state, no tidal forcing) and Phase 2 (transient tidal dynamics), we quantify the impact of tides on groundwater discharge and saltwater intrusion. For instance, tidal forcing increases the average discharge rate from $25.5\times10^{-5} m^3/s$ (Phase 1) to $28.0 \times10^{-5} m^3/s$ (Phase 2), representing a 10% enhancement (Table 5), and highlights the critical role of cyclic porewater exchange in modulating aquifer–ocean interactions.

P.6, L.6, "In this equation, Where:"
Revision: P.6, L.6: Corrected to "In this equation, where:"

P.9, L.31, "he benefits"
Revision: P.9, L.31: Corrected to "The benefits"

Respond to the editorial notifications.

a) **Please add more details to affiliations 2 and 3 (institution, city, and country).**

Response: Additional details (institution name, city, and country) have been added to affiliations 2 and 3. The revised versions now read:

[2] Hydrogeology Group (UPC-CSIC), Barcelona 08034, Spain
[3] Laboratori d'Enginyeria Marítima (LIM/UPC), Barcelona 08034, Spain

b) **From the author list it is not clear if the corresponding author's main affiliation is part of the Consejo Superior de Investigaciones Científicas (CSIC). If this is the case, please check the financial support page: https://www.ocean-science.net/about/financial_support.html > CSIC**

Response: Thank you for your comment. To clarify, the corresponding author's main affiliation is with the Department of Civil and Environmental Engineering (DECA), Universitat Politècnica de Catalunya (UPC), Barcelona, Spain. Additionally, the second affiliation, "Associated Unit: Hydrogeology Group (UPC-CSIC)," refers to a collaborative research group between UPC and the Consejo Superior de Investigaciones Científicas (CSIC). The author is not directly affiliated with CSIC.

c) **You do not refer to your supplement gif file in your manuscript.**
Response: Thank you for your comment. We have carefully reviewed all the supplementary figures, including the GIF file, and have now provided corresponding references and explanations in the revised manuscript to ensure they are properly integrated with the main text.

P.8, L.3,13: A more detailed description of the coupling steps has been added, guided by the updated flowchart shown in Figure 1

P14 . lines 5, 14, 16, 24, and 27
According to the revised Figure 5, the description of salinity in the figure has been updated for better clarity. The identified salinity lines are highlighted, pointing out the black isohalines that represent equal salt levels. The saltwater front is marked by a dashed red line, showing the edge of the main saltwater area (saltwater intrusion front). The movement of saltwater is tracked, explaining how these lines (isohalines and the front) shift inland or back towards the sea with the high and low tides, demonstrating how the saltwater wedge changes size. The tidal lag is also explained, showing how the

saltwater movement into or out of the groundwater slightly lags the tide changes.

P16 . According to the revised Figure 6, the description of Figure 6, showing temperature changes, has been updated for better clarity (P17,line2). The identified temperature lines are highlighted, pointing out the black isotherms that represent equal temperatures (P16,line7). The temperature changes are explained by showing how the spacing of these lines indicates the rate of temperature variation. Steeper changes are shown by closely spaced lines. The cool water from the ground (SGD) is tracked, following how it mixes with ocean water during high and low tides. Specific temperatures, such as 15-18°C for the cooler water and 22°C for the ocean water, are also included (P16,line10,P17,line9).

P19 line 29-34. We also have revised the manuscript to include a more detailed explanation of Figure 7(e). The additional description clarifies the salinity differences between the coupled and single models and highlights the regions where the most significant variations occur.

d) FYI: the original figure files were removed from the supplement. They will be requested at a later stage.

Acknowledgment: We confirm that high-resolution figure files will be provided upon request during the production stage, following the journal's guidelines.

We thank the reviewers for their valuable comments. All suggested revisions have been completed, and the manuscript has been fully revised accordingly.

Sincerely,
Jiangyue