

EGU Biogeosciences Review

Manuscript: “*Ideas and perspectives: Land-ocean connectivity through groundwater*”

Recommendation: Accept subject to minor revisions

Review:

This manuscript gives an overview of land-ocean connectivity through groundwater and highlights knowledge gaps in the current knowledge of the connection between meteoric groundwater discharged at the coastline and groundwater discharged offshore. The authors describe methodologies used to characterize flow paths, connectivity, and quantify discharge via groundwater and highlight the difficulties associated with connecting groundwater and its related impacts across the terrestrial-aquatic interface. The authors identify research areas to be addressed in future work to better understand groundwater across spatial and temporal scales. They stress the importance of leveraging interdisciplinary teams in order to accurately work across land and sea boundaries and to fully understand the impacts of groundwater in the face of anthropogenic stresses and a changing climate.

Previous reviewers offered suggestions to clarify the manuscript, add references, and suggest a more compelling conclusion. The authors addressed these suggestions in their response and made changes to clarify the manuscript. They make it clear that this article aims to be a discussion of knowledge gaps rather than a full review of the literature or a detailed description of a framework for future research. I feel this manuscript is suitable for publication in Biogeosciences. I suggest the authors consider only a few minor revisions prior to publication the manuscript, which are outlined below. I feel these minor comments will add to the clarity of the manuscript and make a more citable paper.

Overall comments:

- There are a lot of complex lists and parentheses throughout the manuscript that can make it hard for the reader. It may be worth varying sentence structure a bit and breaking up some long sentences.
- It was suggested by a previous reviewer to have a ‘conclusions’ section. I found the authors rebuttal to adding this section adequate, but I would urge the authors to consider adding a few sentences that add value to their recommended future research areas. Although it is clear the authors do not hope to provide a framework for how to conduct interdisciplinary groundwater research, simply identifying the need for interdisciplinary work does not feel like a very novel conclusion or suggestion for the field. Perhaps the instead of ending with the need for interdisciplinary teams and then how this work will address the sustainable development goals, this last section could be rearranged to conclude with reiterating the impacts of groundwater globally and why these research areas and interdisciplinary action to address them are so vital to understanding the global ocean. The sustainable development goals could provide structure for these suggested few sentences to re-establish the importance and take-home point of the paper.

Specific Comments:

- Line 58: The sentence “Coastal margins play a disproportionately important role for productive marine ecosystems compared to the open ocean due to their greater biological productivity, sediment-water...” reads awkwardly. I suggest removing the first word ‘productive’ and simply say “important role for marine ecosystems”

- Line 75: The sentence, “The first comprises meteoric groundwater flux from terrestrial aquifers through the seabed (including the intertidal zone) into the coastal ocean,...” has awkward wording. Perhaps “The first is comprised of the meteoric groundwater flux from terrestrial aquifers..”
- Line 146: “OFG resides beneath the seafloor along continental shelves and, in contrast to FSGD, is commonly assumed to have minimal groundwater flow velocities (e.g. Micallef et al. 2020).” Perhaps “have low groundwater flow velocities”
- Line 417: “FSGD and the associated fluxes of biogeochemical tracers might affect the physical structure, chemical composition and reactivity and the (micro)biology of the coastal ocean ecosystems.” I would add a comma after reactivity and I would remove “the” before coastal ocean ecosystems
- Figure 1: The Arrows in figure 1 are very small and hard to see – I didn’t realize they were arrows at first. Perhaps they could be made a different color that stands out or made larger.