

Hydrol. Earth Syst. Sci. Discuss., author comment AC3
<https://doi.org/10.5194/hess-2021-594-AC3>, 2022
© Author(s) 2022. This work is distributed under
the Creative Commons Attribution 4.0 License.

References - Reply on RC1

Marc Diego-Feliu et al.

Author comment on "Extreme precipitation events induce high fluxes of groundwater and associated nutrients to coastal ocean" by Marc Diego-Feliu et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-594-AC3>, 2022

References

Alorda-Kleinglass, A., Garcia-Orellana, J., Rodellas, V., Cerdà-Domènech, M., Tovar-Sánchez, A., Diego-Feliu, M., Trezzi, G., Sánchez-Quilez, D., Sanchez-Vidal, A., Canals, M., 2019. Remobilization of dissolved metals from a coastal mine tailing deposit driven by groundwater discharge and porewater exchange. *Sci. Total Environ.* 688, 1359–1372. <https://doi.org/10.1016/j.scitotenv.2019.06.224>

Anwar, N., Robinson, C.E., Barry, D.A., 2014. Influence of tides and waves on the fate of nutrients in a nearshore aquifer: Numerical simulations. *Adv. Water Resour.* 73, 203–213. <https://doi.org/10.1016/j.advwatres.2014.08.015>

Beck, A.J., Rapaglia, J.P., Cochran, J.K., Bokuniewicz, H.J., Yang, S., 2008. Submarine groundwater discharge to Great South Bay, NY, estimated using Ra isotopes. *Mar. Chem.* 109, 279–291. <https://doi.org/10.1016/j.marchem.2007.07.011>

Cerdà-Domènech, M., Rodellas, V., Folch, A., Garcia-orellana, J., 2017. Constraining the temporal variations of Ra isotopes and Rn in the groundwater end-member : Implications for derived SGD estimates. *Sci. Total Environ.* 595, 849–857. <https://doi.org/10.1016/j.scitotenv.2017.03.005>

Cho, H., Kim, G., 2016. Determining groundwater Ra end-member values for the estimation of the magnitude of submarine groundwater discharge using Ra isotope tracers. *Geophys. Res. Lett.* 43, 3865–3871. <https://doi.org/10.1002/2016GL068805>

Cook, P.G., Rodellas, V., Stieglitz, T.C., 2018. Quantifying Surface Water , Porewater , and Groundwater Interactions Using Tracers : Tracer Fluxes , Water Fluxes , and End-member Concentrations Water Resources Research. *Water Resour. Res.* 54, 2452–2465. <https://doi.org/10.1002/2017WR021780>

Diego-Feliu, M., Rodellas, V., Saaltink, M.W., Alorda-Kleinglass, A., Goyetche, T., Martínez-Pérez, L., Folch, A., Garcia-Orellana, J., 2021. New perspectives on the use of $^{224}\text{Ra}/^{228}\text{Ra}$ and $^{222}\text{Rn}/^{226}\text{Ra}$ activity ratios in groundwater studies. *J. Hydrol.* 126043. <https://doi.org/10.1016/j.jhydrol.2021.126043>

Folch, A., del Val, L., Luquot, L., Martínez-Pérez, L., Bellmunt, F., Le Lay, H., Rodellas, V.,

Ferrer, N., Palacios, A., Fernández, S., Marazuela, M.A., Diego-Feliu, M., Pool, M., Goyetche, T., Ledo, J., Pezard, P., Bour, O., Queralt, P., Marcuello, A., Garcia-Orellana, J., Saaltink, M.W., Vázquez-Suñé, E., Carrera, J., 2020. Combining fiber optic DTS, cross-hole ERT and time-lapse induction logging to characterize and monitor a coastal aquifer. *J. Hydrol.* 588, 125050. <https://doi.org/https://doi.org/10.1016/j.jhydrol.2020.125050>

Garcia-Orellana, J., Rodellas, V., Tamborski, J.J., Diego-Feliu, M., van Beek, P., Weinstein, Y., Charette, M.A., Alorda-Kleinglass, A., Michael, H.A., Stieglitz, T., Scholten, J., 2021. Radium isotopes as submarine groundwater discharge (SGD) tracers: Review and recommendations. *Earth-Science Rev.* 103681. <https://doi.org/10.1016/j.earscirev.2021.103681>

Kiro, Y., Weinstein, Y., Starinsky, A., Yechieli, Y., 2014. The extent of seawater circulation in the aquifer and its role in elemental mass balances: A lesson from the Dead Sea. *Earth Planet. Sci. Lett.* 394, 146–158. <https://doi.org/10.1016/j.epsl.2014.03.010>

Knee, K.L., Crook, E.D., Hench, J.L., Leichter, J.J., Paytan, A., 2016. Assessment of Submarine Groundwater Discharge (SGD) as a Source of Dissolved Radium and Nutrients to Moorea (French Polynesia) Coastal Waters. *Estuaries and Coasts* 39, 1651–1668. <https://doi.org/10.1007/s12237-016-0108-y>

Kwon, E.Y., Kim, G., Primeau, F., Moore, W.S., Cho, H., DeVries, T., Sarmiento, J.L., Charette, M.A., Cho, Y., 2014. Global estimate of submarine groundwater discharge based on an observationally constrained radium isotope model. *Geophys. Res. Lett.* 41, 8438–8444. <https://doi.org/10.1002/2014GL061574>

Luijendijk, E., Gleeson, T., Moosdorf, N., 2020. Fresh groundwater discharge insignificant for the world's oceans but important for coastal ecosystems. *Nat. Commun.* 11. <https://doi.org/10.1038/s41467-020-15064-8>

Martínez-Pérez, L., Luquot, L., Carrera, J., Angel Marazuela, M., Goyetche, T., Pool, M., Palacios, A., Bellmunt, F., Ledo, J., Ferrer, N., del Val, L., Pezard, P.A., García-Orellana, J., Diego-Feliu, M., Rodellas, V., Saaltink, M.W., Vázquez-Suñé, E., Folch, A., 2022. A multidisciplinary approach to characterizing coastal alluvial aquifers to improve understanding of seawater intrusion and submarine groundwater discharge. *J. Hydrol.* 127510. <https://doi.org/10.1016/j.jhydrol.2022.127510>

Michael, H.A., Charette, M.A., Harvey, C.F., 2011. Patterns and variability of groundwater flow and radium activity at the coast: A case study from Waquoit Bay, Massachusetts. *Mar. Chem.* 127, 100–114. <https://doi.org/10.1016/j.marchem.2011.08.001>

Palacios, A., Ledo, J.J., Linde, N., Luquot, L., Bellmunt, F., Folch, A., Marcuello, A., Queralt, P., Pezard, P.A., Martínez, L., Bosch, D., Carrera, J., 2019. Time-lapse cross-hole electrical resistivity tomography (CHERT) for monitoring seawater intrusion dynamics in a Mediterranean aquifer. *Hydrol. Earth Syst. Sci. Discuss.* 1–30. <https://doi.org/10.5194/hess-2019-408>

Ramos, N.F., Folch, A., Fernández-García, D., Lane, M., Thomas, M., Gathenya, J.M., Wara, C., Thomson, P., Custodio, E., Hope, R., 2020. Evidence of groundwater vulnerability to climate variability and economic growth in coastal Kenya. *J. Hydrol.* 586, 124920. <https://doi.org/10.1016/j.jhydrol.2020.124920>

Robinson, C.E., Xin, P., Santos, I.R., Charette, M.A., Li, L., Barry, D.A., 2018. Groundwater dynamics in subterranean estuaries of coastal unconfined aquifers: Controls on submarine groundwater discharge and chemical inputs to the ocean. *Adv. Water Resour.* 115, 315–331. <https://doi.org/10.1016/j.advwatres.2017.10.041>

- Rodellas, V., Garcia-Orellana, J., Masqué, P., Feldman, M., Weinstein, Y., 2015. Submarine groundwater discharge as a major source of nutrients to the Mediterranean Sea. *Proc. Natl. Acad. Sci.* 112, 3926–3930. <https://doi.org/10.1073/pnas.1419049112>
- Rodellas, V., Garcia-Orellana, J., Trezzi, G., Masqué, P., Stieglitz, T.C., Bokuniewicz, H.J., Cochran, J.K., Berdalet, E., 2017. Using the radium quartet to quantify submarine groundwater discharge and porewater exchange. *Geochim. Cosmochim. Acta* 196, 58–73. <https://doi.org/10.1016/j.gca.2016.09.016>
- Rodellas, V., Stieglitz, T.C., Tamborski, J.J., Beek, P. Van, Andrisoa, A., Cook, P.G., 2021. Conceptual uncertainties in groundwater and porewater fluxes estimated by radon and radium mass balances 1–19. <https://doi.org/10.1002/lno.11678>
- Santos, I.R., Chen, X., Lecher, A.L., Sawyer, A.H., Moosdorf, N., Rodellas, V., Tamborski, J.J., Cho, H., Dimova, N., Sugimoto, R., Bonaglia, S., Li, H., Hajati, M.-C., Li, L., 2021. Submarine groundwater discharge impacts on coastal nutrient biogeochemistry. *Nat. Rev. Earth Environ.* 108–119. <https://doi.org/10.1038/s43017-021-00152-0>
- Santos, I.R., Eyre, B.D., Huettel, M., 2012. The driving forces of porewater and groundwater flow in permeable coastal sediments: A review. *Estuar. Coast. Shelf Sci.* 98, 1–15. <https://doi.org/10.1016/j.ecss.2011.10.024>
- Sawyer, A.H., Lazareva, O., Kroeger, K.D., Crespo, K., Chan, C.S., Stieglitz, T., Michael, H.A., 2014. Stratigraphic controls on fluid and solute fluxes across the sediment-water interface of an estuary. *Limnol. Oceanogr.* 59, 997–1010. <https://doi.org/10.4319/lo.2014.59.3.0997>
- Spiteri, C., Slomp, C.P., Charette, M.A., Tuncay, K., Meile, C., 2008. Flow and nutrient dynamics in a subterranean estuary (Waquoit Bay, MA, USA): Field data and reactive transport modeling. *Geochim. Cosmochim. Acta* 72, 3398–3412. <https://doi.org/10.1016/j.gca.2008.04.027>
- Tamborski, J.J., Cochran, J.K., Bokuniewicz, H.J., 2017. Application of ^{224}Ra and ^{222}Rn for evaluating seawater residence times in a tidal subterranean estuary. *Mar. Chem.* 189, 32–45. <https://doi.org/10.1016/j.marchem.2016.12.006>
- Taniguchi, M., Dulai, H., Burnett, K.M., Santos, I.R., Sugimoto, R., Stieglitz, T.C., Kim, G., Moosdorf, N., Burnett, W.C., 2019. Submarine Groundwater Discharge: Updates on Its Measurement Techniques, Geophysical Drivers, Magnitudes, and Effects. *Front. Environ. Sci.* 7, 1–26. <https://doi.org/10.3389/fenvs.2019.00141>
- Weinstein, Y., Yechieli, Y., Shalem, Y., Burnett, W.C., Swarzenski, P.W., Herut, B., 2011. What is the role of fresh groundwater and recirculated seawater in conveying nutrients to the coastal ocean? *Environ. Sci. Technol.* 45, 5195–5200. <https://doi.org/10.1021/es104394r>
- Wong, W.W., Applegate, A., Poh, S.C., Cook, P.L.M., 2020. Biogeochemical attenuation of nitrate in a sandy subterranean estuary: Insights from two stable isotope approaches. *Limnol. Oceanogr.* 65, 3098–3113. <https://doi.org/10.1002/lno.11576>
- Yu, X., Xin, P., Lu, C., Robinson, C.E., Li, L., Barry, D.A., 2017. Effects of episodic rainfall on a subterranean estuary. *Water Resour. Res.* 53, 5774–5787. <https://doi.org/10.1002/2017WR020809>