

Comment on bg-2021-310

Anonymous Referee #2

Referee comment on "Drought recorded by Ba/Ca in coastal benthic foraminifera" by Inda Brinkmann et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2021-310-RC2>, 2022

This paper addresses the potential of using Ba/Ca on benthic foraminifera as a proxy for hydrological changes based on a case study from the Gullmar Fjord, Sweden. The results of the study indicate a potential for using especially Ba/Ca of *B. marginata* as an hydrological proxy, despite some caveats regarding specific conditions prevailing at the study sites and other factors that might influence the foraminiferal ratio. The paper is very well written und the figures are of high quality. The motivation of the study, experimental design and the results are very concisely presented and the data is thoroughly discussed including its limitations. In summary, I really enjoyed reading the manuscript and support its publication in Biogeosciences.

However, there is one important aspect that appears to be missing: According to the Material & Methods section, water samples have been obtained during the sampling campaigns, but no trace element analyses on the water samples are reported. This might be an important information, as the pore water profiles show no distinction between the different sampling periods, despite the presumed strong hydrological difference between the dry year 2018 and the wet year 2019. Hence, the different Ba/Ca signature of *B. marginata* between both years does likely not derive from differences in the pore water composition. Albeit bottom water Ba/Ca would also provide only snapshots, it might provide important information about the Ba-transfer into the pore water and the general amplitude of bottom-water Ba/Ca fluctuations in the Fjord. The authors use the hydrological observational data to indirectly infer Ba/Ca in the Fjord's water column but direct measurement of water composition might well be helpful. Hence, I would like the authors to comment if such measurements exists or add them if possible as water analyses are analytically relatively straight forward.

Further specific comments:

- The supplementary information should be separated for figures and tables. Supplementary Figure 4 has no caption.

- Fig. 2a: please indicate the location of the study area.