

Response to re-review report 1 of Ekeröth et al., *Egusphere-2026-707*

Our responses are in blue text and the reviewer comments are in black text.

The authors' answers to my questions are a bit disappointing.

Actually, it is not « the integrated benthic silicate flux in the Baltic Sea (which) suggests a major land-derived reactive silicon source » but the fact that to reach a reasonable Si budget the authors' estimate for the silicic acid benthic flux is not explainable by classical biogeochemists views.

We do not agree. From where would the reactive Si come if not from land or freshwater via rivers, ground water or dust deposition?

In the previous response to reviews, and in the revised version of the manuscript dated 10 May 2026, we wrote: "However, we are not aware of any observations of a legacy bSi pool in Baltic sediments, nor the quantity of it or any change of this quantity. This is due to the fact that published data on solid phase bSi in Baltic sediments are scarce, and on other forms of particulate rSi are largely absent. For this reason, we assume that the contribution to the integrated benthic dSi flux from any legacy bSi pool is quantitatively of less importance." Hence, we still suggest that the most likely origin of the "extra" rSi is terrestrial and freshwater systems.

This might be aligned with updated views on the Si cycle in marine waters (e.g. Trapp-Müller et al, 2026) that show the importance of long-term Si fluxes derived from detrital silicate weathering, the authors' study has a great potential interest.

We cited Trapp-Müller et al. (2026) already in the original version of the manuscript. We have already included the possibility of detrital silica weathering since we consider it part of the process of dissolution of land derived particulate amorphous and/or lithogenic Si. But we have also, in the previously revised version of the manuscript, included likely contributions from freshwater diatoms and terrestrial phytoliths. To further clarify, we have changed the title of the manuscript from "The integrated benthic silicate flux in the Baltic Sea suggests a major land-derived reactive silicon source" to "The integrated benthic silicate flux in the Baltic Sea suggests a major land- or freshwater-derived reactive silicon source".

However, neither in the first version nor in the revised version, the authors give DIRECT evidence that this is the case for the Baltic Sea ecosystem.

We have not had the intention to provide DIRECT evidence of this, but our results strongly suggest that this (and other contributions) may significantly contribute to the integrated benthic dSi flux in the Baltic Sea. To provide DIRECT evidence is the topic for other future studies, and probably a number of such studies are necessary to provide such evidence.

In other words, only if the manuscript focused on « An integrated benthic silicic acid flux in the Baltic Sea » it deserves publication.

We are convinced that good science is produced not only by presenting data and results, but by also analysing and interpreting the results and suggesting plausible implications of the results. If we changed the manuscript title to «An integrated benthic silicic acid flux in the Baltic Sea» it would mean that we attempted to publish a data report. We have a higher ambition than that. By suggesting sound and highly plausible implications of our results,

which we believe we have done, we move the frontiers of research on the Baltic Si cycle forward much more profoundly than by only presenting the results *per se*.

Response to re-review report 2 of Ekeröth et al., *EGU* 2026-707

Our responses are in blue text and the reviewer comments are in black text.

The manuscript has been largely improved during the revision.

We thank the reviewer for this assessment.

I have two more major suggestions listed below:

1) What the authors wanted to say is the dissolution of land-derived reactive silicates in the Baltic sediments may contribute to benthic dSi flux, not terrestrial silicates themselves. This has to be clarified in the abstract, discussion and conclusion.

What we want to say is that land- and freshwater-derived reactive silicon, transported by rivers or groundwater to the Baltic Sea, is deposited and undergo dissolution in sediments of the Baltic Sea and in a major way contribute to the integrated benthic dSi flux in this sea. We think this already is clearly explained in the revised version of the manuscript (submitted May 10, 2026).

As we see it, terrestrial silica is part of land-derived reactive silica, which also include material from for example freshwater diatoms and phytoliths. So we do not really understand this suggestion from the reviewer. For clarification we have changed the title of the manuscript from “The integrated benthic silicate flux in the Baltic Sea suggests a major land-derived reactive silicon source” to “The integrated benthic silicate flux in the Baltic Sea suggests a major land- or freshwater-derived reactive silicon source”.

2) I am not convinced that the authors do not attempt to refine a Baltic Si budget given such a good dataset with decadal-long Si budget. Reviewer 1 has pointed out a practical way to establish the budget, and uncertainties could be discussed within the context, but it is a pity that the authors remove original Fig 6. For examples, there is no data showing terrestrial silicate dissolution in the Baltic sediments,

It is true that we have not presented data which prove that terrestrial silica *per se* dissolves in Baltic sediments. The data we have do not allow us to prove this, and there are no data in the literature which can be used to prove or disprove this. However, we show that the autochthonous export production only explains about one third of the seafloor deposition of reactive Si. This strongly suggests that land- (likely including terrestrial silica) or freshwater-derived reactive silica, deposited in sediments of the Baltic Sea, contributes to the integrated benthic dSi flux. As we have previously explained, this is the main point of our manuscript, and we think this main point make our manuscript worthy of publication in *Biogeosciences*.

but there are some numbers from other areas (as the authors have referenced in the ms), given the lower salinity and terrestrial silicate mineral types in the Baltic

We have not studied which types of terrestrial silica minerals that exist in sediments of the Baltic Sea, and such data or information does also not exist in the literature.

, the authors could make an educated guess of the rates

Since we have no information on which types or amounts of terrestrial silica minerals that exist in Baltic sediments, we do not find it meaningful to make an educated guess of dissolution rates.

In the manuscript we estimate that 6390 kt of reactive Si of land or freshwater origin dissolves per year in an area corresponding to the seafloor of the entire Baltic Sea.

and see how it fits into their benthic flux and the overall Si mass balance.

Overall, I think this is a valuable dataset that deserve more efforts to dig further with the potential of the data. I encourage the authors to give a full assessment of the Si budget based on their fluxes together with literatures, which may shed lights in futhre Si research directions in the Baltic.

Our intention with this manuscript is not to present a revised Si budget for the Baltic Sea, and this is not possible considering the scarcity of data at present existing in the literature on the Baltic Sea. Furthermore, all earlier published budgets only discuss dissolved silicate, not particulate Si, and regarding sediments, no data on other solid Si phases than biogenic Si exist. All this is in contrast with the present knowledge of N and P in the Baltic Sea. There are too few data available in the literature (our study included) at present to build a realistic Baltic Si budget. Future research could be directed towards this. We have presented one piece of the puzzle for the future construction of a revised Baltic Si budget. We have also suggested what should be studied to fascilitate the construction of such a budget.