

We thank Hans Burchard and an anonymous referee for constructive comments.

In the revised version, we have added one figure (the new Fig. S7) to the Supplement. In addition, we have revised the text of the main manuscript based on the referee comments as elaborated below and as documented by the Track Changes in the revised manuscript.

“Original line numbers” refer to line numbers in the manuscript submitted after the first revision.

“New line numbers” refer to line numbers in the revised Track Changes manuscript in this submission.

## Referee 1 (Hans Burchard)

**Comment:** 205-206: Not sure what this two-line subsection serves for. Shouldn't it be integrated into the relevant subsection related to it?

**Response:** These lines (Sect. 2.4) have been deleted and the reference to statistical significance of correlation moved to the caption of Fig. 3 (new lines 193-194).

**Comment:** 351: “result” instead of “come”?

**Response:** The suggested change has been made (new line 363).

**Comment:** 536: What do you mean with “normally stratified”? Maybe “stably stratified”?

**Response:** The word “normally” has been changed to “usually” (new line 568).

## Referee 2

**Comment:** Still it is not clear to me why the model has not been run with more realistic or simply higher freshwater discharge? Authors write that discharge into the strait is large but somehow did not prescribe this amount.

**Response:** It is not quite clear to us, what the referee refers to here. The freshwater discharge was prescribed to the model as stated on the original lines 119-121 (new lines 119-121). Perhaps the problem is our use of the annually averaged discharge, rather than a value more appropriate for the season simulated or a variable discharge rate. We fully agree that it would have been advantageous to run the model with different discharge rates or even variable discharge. Unfortunately, limited access to computing resources prevented that. One benefit of our choice of the annual average is that it ought to represent typical conditions in the strait throughout the year, except for periods during summer with a stagnant bottom layer.

**Comment:** which is why validation ignores the surface layer.

**Response:** Again, we are not certain, how to interpret this comment, but we assume that it refers to the velocity validation (e.g., Fig. 2b,c and Supplementary Fig. S4). The reason for excluding the surface layer in this validation is that the measurements were made with bottom-mounted ADCPs, which cannot measure the surface layer due to side-lobe reflection from the surface. Certainly, the ADCPs should have been able to profile closer to the surface than they did, but the depth range used for validation was the maximum allowed by the quality controlled ADCP data sets made available to us.

**Comment:** To be acceptable for publication I expect this paper to include extensive comparison and co-interpretation with other works and concepts. Sure the study area is unique in certain ways but due to the large uncertainty in the model simulations one cannot be sure if this is an artefact. For example, the typical Fjord circulation has been described as three-layered (e.g. Valle-Levinson et al. 2007) while the estuarine circulation is typically two-layered (Geyer & MacCready, 2014).

**Response:** We have added some text on this to the discussion (new lines 552-563) where we try to provide more detailed comparison with literature on straits and fjords and briefly discuss the distinction between two- and three-layered fjord circulation.

**Comment:** Since the line of argumentation concentrates on tides, I wonder why tidal reflection at the southern sill of the Sundini strait is not discussed? It is quite improbable that all the kinetic energy is lost to mixing there, see for example Sohrt et al., 2021 describing tidal reflection in a similar (though shallower) setting.

**Response:** The referee is probably correct that we should have mentioned tidal reflection. This is now done (new lines 247-249) where we argue that our strait (in contrast to the examples discussed by Sohrt et al., 2021) is so short in relation to the wavelength of the tidal wave that this cannot explain our result. As to the question of kinetic energy loss, we did not intend to imply that this loss was due to mixing within the water column. This misunderstanding is probably due to our unfortunate phrasing in the conclusions section (original lines 540-542). We have now modified that text (new lines 572-573). Our argument was rather that strong bottom friction over the southern sill limits the amount of water that crosses the sill. We have modified the text in the results section to make this clearer (new lines 249-250). We have also added a conceptual model (new Supplementary Fig. S7), which allows an independent (of ROMS) estimate of the energy loss due to friction (new lines 286-292). The conceptual model supports the results from ROMS, but also highlights the importance of choosing an appropriate value for the drag coefficient in the ROMS model. This is now better emphasized in the discussion section (new lines 446-452).

**Comment:** In the Discussion now authors present further results like an estimation of the flushing time. My recommendation is to link their study to other works and more specifically the general concepts presented in these works. Reference list is now quite short and mainly contains references to methods and previous works of the co-authors (not all of them in english language!).

**Response:** At the end of the discussion, we have added some text with more detailed comparison with other studies (new lines 552-563).

**Comment:** In the reply to the referees' comments I missed direct answers to the questions. It is not enough to say "we did this, see the text". You need to either say what you improved directly or indicate where the change is to be found in the revised manuscript.

**Response:** Regretfully, we must agree that our previous response was not adequate in this respect. We hope that this is better now.

**Comment:** The language needs some improvement: There are many statements in quotation marks, many repetitions of certain word like 'veryfied' and often statements like "one cannot expect" which reads a little awkward. Please try to use objective and plain language.

**Response:** Most of the quotation marks have been removed, as seen in the Track Changes version of the revised manuscript. Similarly, we have to acknowledge that words like 'verify' and 'expect' were too frequent in our text. In the revised version, they have in most places been replaced by other words or text.