Sunda Shelf Seas: flushing rates and residence times

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Response to Reviewer #1

We'd like to thank the reviewer for the comments. We will reply to all comments in the following. Our response is in blue colour.

The introduction is generally OK. However, there needs to be a bit more convincing motivation as to why this study should be done, and there needs to be an outline of what is to be presented in the paper at the end of this section, so the reader knows what to expect.

> We added some further comments on the importance of knowledge about water renewal rates for local processes.
> We added a paragraph with paper outline.

In section 2, the models are presented and introduced. The authors state that a suite/system of four models was used. But it appears that output from the global MPIOM are only used at the open boundaries of the regional model, whereas output from the MPIHM, which is on a 0.5 degree grid, is used to calculate river fluxes. There is no explanation how this is done, and I would like to see this included. Finally, there is only a very brief few sentences of how the Lagrangian model works, and needs to be expanded and clarified. Need to tell us more about how tidal friction is incorporated into the model.

> We added a a description to explain, how the results of MPIHM are incorporated in the regional model.
> We extended the description of the regional hydrodynamical model and the Lagrangian model, which was indeed short.
> We also argued clearer, how the tidal friction is roughly included and added some remarks in the discussion section about tidal effect on the flushing rates.

In subsection 2.2 water renewal parameters are calculated. However, I don't understand the second to last paragraph, p.869, lines 6-13 and this needs to be clarified.

> We reformulated this paragraph to make it clearer. We also changed slightly the description of the velocities or volume transports used for the upcoming calculations.

The model (HAMSOM ?) is verified in section 2.3 using comparison with mooring and satellite data. The model agreement is generally quite good. However, the mooring data is outside of the Sunda Shelf and I wonder if this is an issue. The authors need to at least comment on this.

> At the beginning of section 2.3.1, as a second paragraph, we inserted a comment on the comparison with data from moorings outside the shelf.

The results are presented in section 3. In 3.1 p.874, line 4, the authors state 'High flushing rates mean low water exchange ...' I am confused. I thought high flushing rates mean fast inflow and rapid exchange.

> Thank you, this is confusing. Therefore, we changed "High flushing rates" into "Long flushing rate".

In section 3.2, I don't understand the first paragraph, specifically the second sentence beginning line 24. Similarly, the paragraphs beginning p.876, line 17 and p.877, line 9 are hard to follow. I cannot follow the language in the second example.

> We reformulated all three paragraphs to make them clearer.

The discussion is weak, as mentioned above, and could be improved by including a further discussion on comparison of processes in the hydrodynamic v. tracer model. A discussion of biogeochemical processes would also help, if this is possible.

> We added examples of importance of water exchange rates in the Introduction section. We added some remarks on the considered processes in hydrodynamic and tracer models in section 2.1 (model description) and in this section as well.

Fig. 6 needs to be Fig. 2:

> We wonder why. Figs 1-5 show regional model domain and verification and are mentioned first, Fig. 6 presents particular results and is mentioned after Figs 1-5. This is, why we think the order of figures is fine.

Finally, the language varies between very good and not so good. Sometimes the sentences are too long and need to be shortened, e.g., first sentence in introduction. Moving further down the introduction to the sentence at the start of paragraph 4, p.865, line 13 'For the Ind ....' End the sentence at water and start a new sentence 'These are usually done ... for estimates ...' not estimations p.865, last line 'This meteorological behaviour has a heavy impact ....' replace behaviour, change 'heavy impact' to something like 'strongly influences/effects' p.866 line 11 receive doesn't make sense line 23 new paragraph starting The regional model based on the HAMSOM .... p.867, line 17 The MPI HM is regularly used in .... Abstract: replace 'with a strong impact from human activities' with 'which are heavily influenced by human activities' and so on through the manuscript. The language needs to be improved right through.

> We are thankful to the reviewer for her or his hints on the language. Indeed, there were some quite long sentences and some words had to be exchanged. We therefore incorporated all suggestions and further revised the text.