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Interactive comment on "Sunda Shelf Seas: flushing rates and residence times" *by* B. Mayer et al.

Anonymous Referee #1

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Flushing rates and residence times on the Sunda Shelf to depths up to 200m were investigated with a hydrodynamic regional model based on the HAMSOM. Two different approaches were taken: first, flushing times in different areas (domains) of the shelf were calculated by evaluating the simple ratio volume/flux, and, secondly, these results were compared with results from a simple Lagrangian tracer model. The two model yielded very different results, and leads to important questions as to how residence times and flushing rates are calculated, and the validity of these.

The questions raised by the authors are interesting. However, the paper in its current form is lacking some rigor to be published in Ocean Science. Essentially, residence times were calculated from HAMSOM model output using a simple ratio, and compared with results of a Lagrangian tracer model. If the authors can add some more

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rigour to their discussion, which is very brief, then it could be ready to publish. For example, they mention the importance of flushing rates and residence times on bio-geochemical processes and pollution. They would need to include some examples of this in their discussion. Also, their is very little mention of the Lagrangian model, they would improve the paper by discussing processes associated with the Lagrangian model.

Concerning the structure and content of the paper: The paper is well structured and the language is on occasion fine. On the other hand, there are some shortcomings which are outlined below. 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.

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. 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.

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.

The results are presented in section 3. In 3.1 p.874, line 4, the authors state 'High

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flushing rates mean low water exchange ...' I am confused. I thought high flushing rates mean fast inflow and rapid exchange. 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.

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.

Fig. 6 needs to be Fig. 2

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.

I do not wish to discourage the authors but I think with some more rigourous presentation, argument and discussion, the manuscript can be improved and made ready for publication

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Interactive comment on Ocean Sci. Discuss., 12, 863, 2015.