

Interactive comment on “An estimate of the Sunda Shelf and the Strait of Malacca transports: a numerical study” by F. Daryabor et al.

Anonymous Referee #3

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General This paper describes some analyses of a nested ROMS model implementation for South-east Asia and the South China Sea. The models are used to estimate transports of water, heat and salt through the Sunda Shelf and Strait of Malacca and compare these with previous estimates from models and observations, including a re-analysis data set and satellite-derived surface currents. This study is a further analysis of a model system implemented in Daryabor et al (2015) as published in Ocean Dynamics. As such, it is quite a short contribution, with a dense concentration on comparative results. It appears to provide a well-validated model and some useful results for transports but it does not fully refer to the earlier paper and needs more information to provide the context, both geographic and oceanographic. The introduction needs to show how this paper builds on the previous results and present better the motivation for the work. It comes over as rather too model-driven. The paper is reasonably well

C215

presented but is difficult to read due to the density of information and the way it is organised. Figure 1 needs improvement to show the location of the nested models in the western Pacific more clearly and the red lettering is rather illegible. The list of model results from other studies should be organised in tabular form for easier comparison rather than embedded in the text. Tables 1-5 do provide this information but are not referred to in the earlier part of the paper where lists of results are given in the text. The reader is left with a question about what is the new contribution to knowledge here so the authors are advised to tighten up the presentation, especially the introduction and conclusions to make this clear. In summary, this is a good technical exercise of implementing and validating a model but it does not clearly draw out the new results. Specific 1. Abstract – do not provide detailed numerical values of transports but state results comparatively e.g. ‘this study shows that the transports are in good agreement with observations’ and the relative split between the Sunda Strait and Malacca Strait. The actual numbers provided are not so useful out of context. 2. Introduction – please describe more clearly the previous understanding of the circulation and fluxes in the study area e.g. seasonal reversal of fluxes. Indicate on Figure 1 what sea area is meant by ‘Sunda Shelf’ and describe its extent. It does not have as clear a delineation as the Malacca Strait and Karimata Strait. It would be useful to include part of section 3 – lines 18-23 on p 282 to this section to describe the sea area. Section T1 is a long section, likely to have different fluxes along its length on- and off-shelf. Make lettering clearer on Figure 1b. Please make a clearer distinction between the motivation, background and approach used in the paper and identify what new results have been obtained. On p 278, line 9 it is stated that the motivation for this work is ‘to use the ROMS model with finer. . .resolution. This is not motivation but approach. The motivation should be something like ‘to better understand the processes and quantify the fluxes’. Refer to the results already published from the same model setup in Daryabor et al. (2015) and explain how the present paper extends these. In the quotation of transports from previous work which is given here, it would be good to clarify some pattern without which the list of umerical values is confusing, some are annual, some

C216

seasonal, some long- or short-term. 3. Model description – this could be greatly shortened by reference to Daryabor et al (2015), which appears to use the identical model setup (please explain how it is different if that is the case). Various model options are given but no explanation of why these are used. Start a new paragraph at p 281 line 14, between the end of the model description and the model run. 4. It would be better to separate the results and discussion sections as the distillation of the implications of the results is mostly buried in a list of comparative numbers. For example – is the fundamental good agreement in SST, SSS and circulation due to the model being controlled by the initialisation and boundary conditions from WOA climatology? The point of using a model is that processes can be isolated and their effects quantified. It does appear that the resolution and bathymetry of the model is good enough to capture the main observed feature, but how robust is this result? Are all the results taken from the finer-grid model and can anything be learned from comparison with the coarser model? 5. In the summary and conclusions there is a rather weak ending: 'Nevertheless, a better estimate of transport is necessary to understand the changes in the ocean circulation as well as to enhance our knowledge on the role of transport distribution such as heat and freshwater which in turn affect the changes of the ocean's ventilation rates and pathways. This provides a better picture to assess the changes in the net uptake of gases such as O₂, CO₂ which influence the distribution of the nutrient balance in regulation changes in the marine ecosystem. ' What is meant by the second last sentence – is it re-iterating the original motivation or stating that after the present work there is still a need for better estimates of transport? The last sentence seems out of place – again this is part of the motivation, but has not been discussed in this paper.

Technical 1. Some spelling mistakes: modeled – p284 line 17; August – p290, line 12
2. Replace Sect. by Section on p 278, line 15. 3. P 281, lines 23-24, reorder 'Ocean Surface Current Analyses-Real time (OSCAR) ' 4. Insert 'currents' after 'monthly mean' on p 281, line 23; insert 'water' after 'warmer' on p 284, line 13 5. p 284, line 17 – warmer than what? 6. Insert 'be' after 'may' on p 286, line 18 7. P 292, line 1, change 'estimate' to 'estimates'. Are the transports in Fig 10 decreasing monotonically with

C217

increasing resolution? 8. Insert 'they' after 'where' on p 292, line 13 9. Delete 'In' before 'consistent' on p292, line 17 10. P 293, line 27, insert 'a' before 'coarser' 11. P 294, line 2, replace 'in resolving' by 'to resolve' 12. P 294, line 12, remove 'equally'

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