Geoscientific
Model Development
Discussions

Interactive comment on "Development of a Submerged Aquatic Vegetation Growth Model in a Coupled Wave-Current-Sediment-Transport Modeling System (COAWST v3.4)" *by* Tarandeep S. Kalra et al.

Jon Hill (Referee)

jon.hill@york.ac.uk

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Summary:

This paper details a new seagrass model incorporated into COAWST that includes two-way interactions with both physical and biological processes included in the model. The paper describes the complex set of equations used in the seagrass model and shows the model performance on two examples: an idealised case and a more realsitic case. In both examples, the effects of two-way coupling is shown , but there is a focus on the

biological reactions, rather than the impact of seagrass changes on hydrodynamics.

Overall the paper is generally well-written and clear, but lacks some sort of validation or verification of the sea grass model. My main criticism of the paper is that this verification is lacking and it is therefore difficult to ascertain if the model works compared to some lab or case study. Whilst the two examples seem sensible it does not show proper functioning of the code. I didn't attempt to run the code in question as part of the review, but I couldn't actually find the seagrass model in the code repository easily, so could not even check equation as written in the paper match the code.

Requested changes:

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Major:

- Add some sort of verification. I assume this has been done as part of some sort of testing infrastructure, so should be trivial to add to the paper.

- Check code availability and make it clearer which parts of COAWST are part of this paper. As the editor has indicated, a Zenodo archive, coupled with some indication of which code this paper refers to would be a great help.

- Equations in 2.2 are very difficult to read with "words" being used as symbols in a lot of cases; especially when "lim" is used in a symbol it makes it difficult to know of this is the mathematical limit of or a symbol at a glance. Symbols such as lambda_SAV-max (eq 3) should be altered to remove operation symbols from them. There are also symbols such as kl. Is this k * l or a symbol kl? I would recommend the use of single symbols where possible and remove as many "words" as possible. Same applies to table 1.

Minor:

- The abstract has a few complex sentences, e.g. "Recent observational studies..."

(lines 11-13) and "Modelled SAV biomass is represented..." (lines 16-17), etc. Best to rewrite into simpler sentences or make them clear - the use of lists, with multiple "and"s make it unclear to work out what is being referred to at times.

- Line 25, pg 2 - extra () round reference

- Line 26, pg 11 - typo: "diel"

- Figure 3 - remove orientation axes. It's plan view, so z isn't on!

- Fig 4 - Capital letters in axes title

- Fig 5 - triangle and dot not explained in caption. Capital letters in axes titles

- Fig 6 - Capital letters in axes titles. Remove "Figure" from sub captions

- Fig 7 - Capital letters in axes titles.

- Fig 8 - replace "rainbow/jet" colour scheme with colour-blind friendly scheme. See here for examples: https://matplotlib.org/cmocean/

- Fig 10 - as above.

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