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Geoscientific Model Development Discussions
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Interactive comment on "CoastalME version 1.0: a Coastal Modelling Environment for simulating decadal to centennial morphological changes" *by* Andrés Payo et al.

Anonymous Referee #2

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GENERAL COMMENTS

This paper proposes a new method to simulate the evolution of decadal to centennial morphological changes and could be use to help decision making in coastal management studies. The approach is based on a new modular framework that links independent software together such as the one implemented in OpenMI.

Here the focus is on large-scale coastal evolution and a great development effort has consisted in transposing the behavioural rules of each independent model together in order to pass the information from one model to another. Three models are currently coupled within the CoastalME framework namely: COVE, SCAPE and ASMITA. A great emphasis is made in the manuscript on the first 2 models whereas the integration of

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ASMITA model with the two others is lacking details and illustrations.

The framework development mainly consists in passing information between each model spatial reference system and consequently involves a lot of geometrical calculations that are fairly well described in the paper. For any given iteration, the model outputs are then stored on raster grid used by the authors as the main spatial representation for their framework. In my view, some parts of the paper in regards to how the model conserves volume through the successive interpolation and smoothing functions is still unclear and will need more explanations.

The authors do not provide any validation examples of their new framework in this paper as it is left for another paper. Two examples are however described in the last section of the manuscript but I found them not really illustrative of the framework capability, as they do not address the problem of decadal to centennial morphological changes that is what this work is about. I also think that these examples will need to be reworked quite extensively to be more appropriate for publication.

SPECIFIC COMMENTS

+ Page 2 line 18: space missing “in particular be theOpen Modelling Interface. . .”

+ Page 4 line 4: space missing “specific models(Murray..”âĂĺ

+ Page 4 line 16: change “provide as a significant “ to “provide a significant “

+ Page 4 line 24: change “meso-escale” to “meso-scale”

+ Page 6 line 16: missing) after Wadden Sea).

+ Page 8 line 4 to 6: indeed CA models have been used on regular grid but I don’t see why you are citing them here most current hydrodynamic/sediment transport models are based on gridded spatial discretisation. I will just delete this sentence. . .

+ Page 8 line 14: delete “More seriously,”

+ Page 8 line 17: space missing “-LewyCondition” âĂĺ

+ Page 9 line 10: Model output of the model âĂĺconsists. . .

+ Page 10 line 27: “SWL can be fixed or assumed to change linearly every time step”, does the user input a sea-level curve and SWL is linearly interpolated based on this curve ? If this is the case you will need to make it clearer in this paragraph.

+ Page 11 lines 3 & 14 and page 12 line 14: how do you ensure mass conservation when using smoothing algorithm?

+ Page 11 line 15: how to you set the profiles on the grid edge and why aren’t they normal to the coastline? Additional explanation is required. . .

+ Page 13 line 15: instead of “(code availability)” provide the link to the configuration file (maybe using a shorten url: (http://www.coastalme.org.uk/doku/doku.php?id=inputs_and_outputs:myinputs.dat)

+ Page 13 line 29: again instead of code availability, provide a direct link to where this information can be found on the web.

+ Page 14/15 1ines 25 to 29 and 1 to 3: you should reference Figure 4 in this section to make it more clear to the reader and add some of the defined notations to Figure 4.

+ Page 15 line 12/13: smoothing the coastal profiles require an additional step in the computation in comparison to the method implemented in COVE, you should explain how the resulting curvature calculation improves the prediction of alongshore sediment transport algorithm in the context of CoastalME.

+ Page 16 line 13: you should provide the equation for the downwearing erosion ε âĂĺ

+ Page 16 line 25: Is it possible to set some spatially variable active layer availability factors for each sediment? How is the availability factor for the active layer related to the active layer through time? For example let assumes that α âĂĺis set to 0 for a given sediment type and that through simulation time steps some of these sediments start to

be deposited, does it mean that they will never been eroded away. I guess this is not the case but it requires better explanation in this section.

+ Pages 17 to 19 section 3.3 will need to be shortened and will greatly be improved with a figure or diagram to help readers. This is really important as it defines the alongshore transport algorithm. Something similar to what is done in section 3.5 with Figure 11 will be really helpful.

+ Page 21 line 28: “is considered to have its base a user-specified depth d1 below the SWL, “ this sentence doesn’t read well and needs to be rewritten.

+ Page 23 line 6: is the sediment porosity depth dependent, in other word do you account for compaction of sediment with time? I guess this could be important considering that the code is designed to look at centennial morphological changes.

+ Page 23 line 8: like comments above I will suggest that instead of code availability, you should provide a direct link to where this information can be found on the web.

+ Page 23 lines 10 to 27: you only mentioned the duration of your model in the Figure 12 caption this needs to be provided in the text as well. The purpose of this new code is to work at decadal to centennial scale I understand that you are planning to do a second paper but it will be good to have an example that is relevant to this scale in this paper. I would also like to see the full DEM result as well and not only a small part of it in Figure 12. You should also provide the time involved to simulate this 1-year morphological evolution so people can judge on the performance of the code.

+ Page 24 line 1: COVE2015 needs to be changed to COVE.

+ Page 24 lines 11 to 19: there is no mention of the settings of this experiment and of its duration. . . you wrote a “sufficiently long time” you will need to provide some numbers here. I think this part needs to be more developed. At the moment the description and interpretations of the results are lacking.

+ Page 25 lines 7 to 9: you will need to provide some metrics of the code efficiency and

CPU time to make it clearer in your manuscript. Page 25 lines 10 to 12: can you be more specific are you referring to a possible alternative to model like CAESAR? This last sentence will need to give the reader a better idea of how this could be done more references or should be deleted.

REFERENCES

Several of the references are from Wikipedia, you should provide citable references instead. In several parts of the manuscript (as pointed above) you refer to “code availability”instead you should provide the link to the places where the reader can find the information on the code website. I found 3 references which are not complete and are missing journal names or editors: - Hutton 2014 - Stive 1997 - van Rijn, 2002

FIGURES

+ Page 35 Figure 5 will need a color bar for the DEM on the left side and the resolution of this figure will need to be improved

+ Page 36 Figure 6 line 4-5: change ‘”this” (white dot) coastline node” to “the considered coastline node (white dot)”.

+ Page 37 & 38 Figures 7 & 8: resolution needs to be improved

+ Page 39 & 40 Figures 9 & 10: resolution of the text parts needs to be improved. In Figure 10 I think you should not plot the breaking wave height legend it is confusing as there is no colored dot on the figure itself.

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