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Earth Surface Dynamics Discussions

Interactive comment on "Relationships between regional coastal land cover distributions and elevation reveal data uncertainty in a sea-level rise impacts model" *by* Erika E. Lentz et al.

Anonymous Referee #2

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This manuscript presents a study of the skill and sensitivity of a model that predicts likelihood of response of low-lying areas to sea level rise. The researchers determine that data errors are most often found in areas of low elevation, but that seems to have little influence on the model's skill due to correlations between land cover and elevation, the two data sets used as inputs to the model. In addition, model sensitivity appears to mimic uncertainty in process, which waves a flag for improving process-based models.

The topic of this manuscript is of relevance to researchers in coastal science, applied coastal engineering, and those studying societal impacts of climate change. The manuscript is well-organized, but lacks critical details about how the model works, mak-

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Discussion paper

ing the results border on irreproducible. This can be substantially improved by adding a paragraph that provides explicit details of how the model uses the elevation and land cover data sets to compute likelihood of dynamic response. It appears that the Lentz et al. (2016) paper may provide more information about the model itself. If that is the case, I can appreciate that the authors chose not to be redundant by reiterating all of that information, but I, myself, found it difficult to read this paper as a standalone contribution. I acknowledge that researchers working on similar projects will likely have read the Lentz et al. (2016) paper, thereby making this manuscript more understandable.

This paper could be improved by some more detailed explanations and examples, particularly the Data and Methods section. Also, it would be helpful if the 'nuts and bolts' of the modeling were summarized, even if not fully detailed as I assume they are in the previous publications. If these improvements can be implemented, I would be happy to recommend this paper for publication, provided the specific comments below are considered and addressed as well.

Specific Comments:

Page 2, Line 3: "across increasing slopes" is confusing here – do the authors imply that as one moves landward from the shoreline, the topographic slope (dz/dx) increases necessarily? That is not the case.

Page 2, Line 4: "a relatively stable SLR rate"– do the authors mean "a relatively steady SLR rate", meaning there has been little acceleration over the last few thousand years? Or do they mean that sea level reached its current elevation a few thousand years ago and has only begun rising again in the last few centuries (likely due to anthropogenic influence)? The word "stable" is misleading (to me, at least).

Figures – much of the labeling is done in font so small that they are barely readable. Even changing the magnification on the computer screen results in pixilation. This aesthetic shortcoming undermines the value of the figures.

Page 2, Line 19: “The confidence of our probabilistic SLR predictions depends on... land cover and elevation data.” This doesn’t seem correct. It’s not SLR predictions themselves that depend on these inputs, but rather the inundation patterns resulting from SLR estimates that depend on LC and Elev., right?

Page 2, Line 31: It is unclear what is meant by “coastal response outcomes”. I see that on the first line of Page 3, the authors say that the “BN produced two outcomes...” for four different decades. Two outcomes of what? And for those decades, I assume the authors are implying that there are projected sea level elevations during those decades – what are they? As I read on, I see that the authors refer to the equation in the supplemental material, Figure S1, which tells us that adjusted elevation is present elevation minus sea level rise plus vertical land motion (VLM). How is VLM obtained? Also in Figure S1, it appears that coastal response can have one of two outcomes: “dynamic” or “inundate”. Is “dynamic” the right term here? Does it imply “non-inundate”?

Figure 1, Panel A: I don’t understand why the model predicts that everything within the 5-10m elevation bin is predicted to be “Marsh”. That seems to be an inaccurate prediction from the model.

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