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Comment on nhess-2020-412

Anonymous Referee #1

Referee comment on "Deep uncertainties in shoreline change projections: an extra-probabilistic approach applied to sandy beaches" by Rémi Thiéblemont et al., Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2020-412-RC1, 2021

This paper examines the extent of deep uncertainty in studies on projections of shoreline changes.

First of all, I find elegant the definition of deep uncertainty based based on the concept of "possibility" in an "extra-statistics" context.

This could be indeed an interesting tool to assess more correctly the variability of predictions, when we have a reasonable range for the epistemic uncertainty.

The paper is well written and well structured. The explanation of what possibility is and of the model(s) used for shoreline predictions and their parameters is clear.

I believe a few lines would be useful, summerizing how the montecarlo over the "possibility", possibly with references. Is a possibility distribution treated mathematically like a probability distribution? Or is it used to select a CDF?

Apart from this request of clarification, I have only minor comments.

- formula 1: the angle is missing after tan. I would suggest to call the angle "beta" as "alpha" can be confused with the confidence level used earlier, and beta this is the symbol generally used in the Bruun formula.

- line 156, a brief explanation of what nx, Tx and lvar are should be given here, mentioning that the terms will be explained later in more detail.

- line 157, substitute "in the following" with "below".

- figure 2: I would appreciate a brief summery on how the hybrid montecarlo works.

- line 173-174: is lvar an uncertainty term, with and unknown sign? It would look like this, as it is computed as a standard deviation. This should be made more clear, for example writing +/- lvar in the formula.

- line 277: the acronym GNSS should be defined.

- line 308: the acronym SONEL shoudl be defined.

- table 1: I would suggest to indicate also the possibilistic choice of the model here.

- line 240 and elsewhere: check what sign you use to indicate erosion/accretion. Here and in figure 4, a positive change is erosion. But looking at figure 5, it looks that the reverse convetion is used (a negative shoreline change where you have erosion).

- figure 6: I would suggest to add lines to identify the extent/position of the ambiguity and of the high/low ends.

- figure 7: Is it possible that fixing some param values the ambiguity increases? Maybe a line explaining this would be useful.

- figure 8: the figure is truncated, the x axis is missing.