Geoscientific
Model Development
Discussions

Interactive comment on "Development of an automatic delineation of cliff top and toe on very irregular planform coastlines (CliffMetrics v1.0)" *by* Andres Payo et al.

Anonymous Referee #2

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This paper presents a cliff top and toe delineation method that is much quicker than existing manual or semi-automated approaches. The work and code are a useful contribution, however the setup of the sensitivity analysis and comparison to the hand-drawn maps lacks detail. Analysis methods are not always justified sufficiently for the reader. Below are some specific comments related to these points.

Line 125, presumably LiDAR could also be used, but more widely available data sets such as global DEM (ASTER, SRTM) might have insufficient quality? It would be interesting to comment on DEM source if they authors have any insights because NEXTMap is UK focused?

Line 140: Is this something that could be illustrated in the figure? As presented it's obviously not possible to see the effect of changing resolution from 5 - 50m. Also, if the resolution is changed from 5 to 50 m how can the cliff top shift by only 10 m where the resolution is only 50. Does this not imply that at least at some locations the cliff top and bottom will have to move by 25 m?

Section 2.1 Why not use the same locations for the sensitivity analysis and hand drawn analysis? Please justify the choice of sites and decision to use different sites for the various analysis

Line 164: Would it be possible to define seed locations on islands to avoid having to manipulate the input DEM? Also do you have islands in your test cases, the text was slightly vague is this regard?

Line 200: please explain and justify your choice of sensitivity analysis method. It seems that you have done a one-at-a-time analysis rather than used any of the more advanced method available in the referenced toolbox (I'm not sure from the text)? Presumably interactions between the parameters are not thought to be important?

Line 211: Is NEXTMap accurate to 0.5 m in steep areas? I'd have thought less accurate, could you give a citation for this or consider increasing the range of the parameter if its linked to DEM quality. Could your maximum threshold be below the accuracy of the DEM in some steep locations?

Section 3.3: Here I was expecting some form of test that the automatically derived line was not statistically different to the hand drawn ensemble. This looks like it might be the case of the FH 1&2 toe but is less clear in the other cases, especially at DG site where the model-based estimates appear to have diverged from the hand drawn ensemble (if I have interpreted the plots correctly). Its half done in the discussion but only the variances are compared not the ensembles. Furthermore, would different parameterisations of the model have produced top or toe delineations closer to the hand drawn ensemble mean and does the model also flip between different cliff lines

when given different parameters, if not why not?. There is some discussion of the hand drawn results in the discussion section but for me insufficient discussion on the model behaviour. How did you decide that the sensitivity of model outputs was less than the hand digitised uncertainty where there is no specific analysis of this in section 3.3? Is less sensitivity desirable if you do not capture the same ensemble mean (assuming hand delineation is the accepted benchmark)? There is no discussion of this point.

Section 4: discussion: A preamble is needed for the discussion to set up the reader.

Finally, in the discussion are the variances reported for the sensitivity analysis from a different site (St Bees) to the hand drawn maps (Sandhead & Flamborough head). If so this comparison is completely invalid and the sensitivity analysis is needed at the hand drawn sites? Even if this is not the case it does read as if two separate analysis have been conducted and put together rather than a progression of analysis towards a complete picture of the methods suitability.