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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Sea cliff instability susceptibility at regional scale: a statistically based assessment in southern Algarve, Portugal" *by* F. M. S. F. Marques et al.

Anonymous Referee #1

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The paper describes an attempt to model the past distribution of cliff failures along the southern coast of Algarve, Portugal, and to use the results of the modelling to classify (i.e., zone) the studied coast based on the predicted susceptibility to cliff failures. For their modelling, the authors used to well known approaches: the Information Value Method, and a multivariate linear regression analysis. Although the techniques used and the approached followed is not new, it's application to costal cliff problems is interesting and – to some extent – innovative.

In the followings, I list general and specific comments to the text, and the accompanying tables and figures. In the General comments I also propose amendments or

additions to the text, the analysis and the discussion that could improve the quality and significance of this work.

General comments:

In Section 3.1, I do not see the need for presenting the two methods used (Information Value and Logistic Regression is such detail. These are, and particularly LR, very consolidated methods well known in the literature.

The authors show the non-cumulative statistics of the cliff retreats using a simple histogram (Fig. 3). There is a problem with the histogram and its significance due mainly to the selection of the classes, of irregular size. I reckoned that the authors determine and show the non-cumulative frequency-density (or probability-density) of the cliff retreats. My understanding is that this figure will represent better the statistics of the coastal retreats. Two (or three) curves can be prepared, for the events in Miocene & Plio-Plaistoce sediments, for the events in the Cretaceous sediments, and for all the events. To determine the frequency (or probability) statistics the authors can use different methods and tools, including e.g. the tool proposed by Brunetti and others, Probability distributions of landslide volumes. Nonlineal Processes in Geophysics, 16, 179-188, 2009.

I am not really convinced that the Information Value Method ads anything significant to the results, or the discussion. This is not surprising, giving the simplicity of the model, compared to a Logistic Regression model. Although not shown, I presume that a susceptibility zonation prepared using the IVM is similar to the susceptibility zonation prepared using LR, and shown in Fig. 8. The authors should consider deleting the parts of the text, and the analysis dove with the IVM.

Section 6, Conclusion does not really read as a Conclusion chapter. The main relevant findings and lessons learnt are not clearly identified in this important section of the paper. Consider rewriting the text, entirely.

Specific comments:

Page 1967, lines 6: What does it mean “consolidated urban areas”?

Page 1967, lines 11: “(retreat rates)”. Redundant. Consider cancelling it.

Page 1968, lines 5-10: Consider also the recent work by Katz, O., and A. Mushkin (2013), Characteristics of sea-cliff erosion induced by a strong winter storm in the eastern Mediterranean, Quaternary Research, 80(1), 20–32, doi:10.1016/j.yqres.2013.04.004,

Page 1968, lines 20-125: Consider the recent work of Dewez, T. J. B., J. Rohmer, V. Regard, and C. Cnudde (2013), Probabilistic coastal cliff collapse hazard from repeated terrestrial laser surveys: case study from Mesnil Val (Normandy, northern France), Journal of Coastal Research, (65), 702–707, doi:10.2112/SI65-119.1.

P. 1969, L. 13-14. “low height”. Please be more specific?

P. 1969, L. 21-28. Language in this paragraph is difficult to follow. Please rewrite.

P. 1970, L. 19. Between 1947 and 2007 there are 61 years, and not 60 years. Please check the exact length of the period. This has consequences on the computation of the rates.

P. 1970, L. 20. Here, and in other parts of the text, do not use “photo(s)” but “photograph(s)”.

P. 1970, L. 27. And ROC curves?

P. 1971, L. 16. The text “The geological structure is mainly tabular, horizontal or gently dipping to E or SE” is unclear, or the text redundant. Please clarify. P. 1972, L. 1-8. Text in this paragraph needs to be clarified. What is a “general slope of 60–90°”? Explain “karst sinkhole exhumation”. P. 1972, L. 19. “geological and gemorphological aspects”. I am not sure I agree. Major lithological units; geological structure (bedding dip in relation with the cliff faces; presence of faults) are geological factors. The presence and

type of cliff toe protection can be geomorphological but also antropogenic, depending on the kind of protection. Please be more specific. Here, and were you explain the different variables used for the analysis.

P. 1975, L. 25-26. Doesn’t this depend on the scale of the available photographs? It would be useful to have a table listing the main characteristics of the aerial photographs used.

P. 1976, L. 14. What is a “sea stack”?

P. 1976, L. 19. “Horizontal area”? Is this the planimetric area? Clarify.

P. 1976, L. 25. 61 years. Please check.

P. 1977, L. 21. “local long term water pipe rupture”. Is this antropogenic, then? For how long? Is this common?

P. 1978, L. 5. “for this type of studies”. What type of study? Please be specific.

P. 1979, L. 16. “by order of dominance in each class”. Please clarify.

P. 1979, L. 15 to P. 1980, L. 8. This is rather boring to read. The authors should consider reducing this part considerably, and adding a new Table with the same information.

P. 1980, L. 12. “Systematic checking”. Can you be more specific?

P. 1980, L. 19-25. Consider a different analysis. Use only the areas not affected by the landslides, and check if the statistics are similar, or not.

Table 1. This is a rather long table. Is it really useful? The author should consider putting it as an “Ancillary material”.

Figure 1. This Figure needs to be improved, significantly. Geographical coordinates for the main map are needed. The legend is inconsistent. Either you show ages of the rock, or the type of the rocks. In the graphical legend one can use symbols, and

then explain the symbols in the caption. Dashed lines are uncertain, buried (?) faults? The caption of the figure is incomplete, and the text unclear. It is not really clear here (and also in the text) how the sectors were "defined according space frequency of cliff failures and corresponding horizontal area lost at the cliff top." This should be clarified.

Figure 2. Font sizes for axis labels and explanations are too small. x-axis is in bold, y-axis is not. Delete reticule, add specific reference to the sectors defined and shown in Fig. 1. You can use different colours for the symbols, depending on sector. Use of colour is free in this journal. Use of the cumulative distribution does not add much to the figure. Consider using a simple histogram, or better to show the histogram and the cumulative distribution.

Figure 3. Font sizes for axis labels and explanations are too small. x-axis is in bold, y-axis is not. Delete reticule. Why using such odd classes for the bins, like 2.4, or 3.6? Explain if lower/upper limits of the class is contained or not in the class. You can use different colours for the different lithologies shown, with reference to Fig. 1, if possible.

Figure 4. Why using such odd classes for the bins, like 2.4, or 3.6? Explain, or use round numbers. Explain if lower/upper limits of the class is contained or not in the class. Use colours for the symbols, preferably the same colours used in Fig. 4. Why do you show the dashed line? It does not show a physical limit, really. You can have retreats larger than H, for a failure that involves a cliff of height = H.

Figure 5. If possible, make the to graphs the same size. Font sizes for axis labels and explanations are too small. Use same font in the charts, and for the A and B letters. Delete reticule. (A) Why using bins of different sizes? What was the rationale for selection the size of the bins?

Figure 6. Use the same font used in the other figures. Font sizes for axis labels and explanations are too small. Delete reticule.

Figure 7. Use the same font used in the other figures. Font sizes for axis labels and

explanations are too small. Delete reticule.

Figure 8. This is a very important Figure. I suggest enlarging it, as much as possible. For a better understanding of the results, all the different sections should be shown at the same scale. No need to repeat the legend in all the sections. The map can be simplified. In each section, the upper map shows the presence (1, red) or the absence (0, green) or cliff failures. This same information can be shown e.g., with a black dot inside each terrain unit of the susceptibility map. Where the dot is shown, cliff failure = 1, where the dot is not shown, cliff failures = 0. This can save a considerable amount of space, and allow for larger figures.

Minor language copy editing suggestions:

Quality of the English language should be improved, locally. Below, I list just two possible suggestions, but many others are possible.

Page 1966, Lines 22-23: Use . . . are the dominant and more visible process of sea cliff retreat (Trenhaile, 1987; Sunamura, 1992), a significant source of natural hazard, and a constraint.

Page 1967, lines 4: Use . . . for exceptional location building areas for houses, beach and leisure resorts. Locations over cliff tops . . .

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 1, 1965, 2013.