

Authors present a method for assessing the consequences of erosion processes (in terms of beach surface loss) acting at different time scales on a pocket/bay beach, and apply it to a beach in South Korea. The topic is in line with one of the targets of NHESS and, in this sense, the manuscript can be of interest for many NHESS readers.

Despite this, the manuscript presents some points that need to be addressed to improve its content and increase its interest for readers before being considered for publication. In what follows, some observations/comments/suggestions are given.

General comments

[1] The manuscript needs a thorough revision of the **English language**. Grammatical errors (and unusual sentence constructions) are very frequent throughout the manuscript and will not be indicated here except in selected cases. This is not a trivial thing because it will affect the message you want to convey.

[2] The **title** does not adequately reflect the content of the paper. The use of the word “interpretation” in the title (and throughout the manuscript) is misleading and provides no useful information. You can simply change “Quantitative interpretation” by “Assessment”

[3] One important thing to mention explicitly is that **the method** you are presenting is **only valid** (or it has been developed) **for bay/pocket beaches** where the lateral ends bound a closed sedimentary cell. This should be included in the introduction to adequately frame the methodology to be presented.

[4] [Lines 37-47] Essentially, in this paragraph you are stating that erosion is a multi-scale (temporal and spatial) process. Please add some references on this from theoretical and/or practical standpoints (e.g. Toimil et al. 2017; Ballesteros et al. 2018).

Toimil et al (2017). Managing coastal erosion under climate change at the regional scale. *Coastal Engineering*, 128, 106-122.

Ballesteros et al. (2018). Erosion consequences on beach functions along the Maresme coast (NW Mediterranean, Spain). *Natural Hazards*, 90(1), 173-195.

[5] [Lines 58-59] This is only valid for closed littoral cells (such as bay/pocket beaches).

[6] [Line 60] Change “to estimate the correlation of ...” by something like “to assess/predict the longshore sediment transport rate ...”.

[7] [Line 62] This means that the study (and method) you are going to present is only applicable to areas influenced by coastal structures. This is related to comment [3]. In fact, the method you are presenting is valid for bay/pocket beaches where you modify one of the ends by including a structure.

[8] [Line 80] "*Encroachment accumulation curve*". The use of this term seems rather "forced" and without an explanation it is difficult for a reader to understand what it refers to. I recommend to look for an alternative (and more intuitive) term (e.g. erosion cumulative curve).

[9] [Lines 80-89] Although the basic definition of the encroachment accumulation curve (or alternative term, see [8]) can (and, probably, must) be introduced here, most of the paragraph can be moved to methods.

[10] Please include a paragraph where you explicitly state the aim of the paper. Something like "The main aim of this work is"

[11] Beach erosion risk

[Lines 110-113] Change the paragraph by something like "we present a method to assess the potential erosion risk induced by the cumulative action of processes acting at different time scales".

In this first section it is also necessary to specify the conditions for which the methodology is developed.

[12] Definition of beach risk

[Line 115] Where does this definition come from? It is not the usual definition of risk.

[Line 119-120] "planar ultimately damaged by erosion according ...". What does "damaged" refer to?

[Line 121] What is the "sand buffer zone"?

[Line 123] Now, you use the term "vulnerability". This introduces another term that, again, does not follow the usual way of usage. Please consider to rephrase the entire paragraph (Lines 115-124).

[13] Risk potential of beach erosion

[Line 126] "planar are change of the beach" -> "eroded beach surface"

Please make a reference to Fig 1.

[Line 128] "high wave incidence" -> "storm impact"

[Line 134] "previous two cases" -> "first two cases"

[Line 146-147] "reduction in sediment budget from river supply W_c ". This is very restrictive definition since this component will be present there even in the absence of a river. Why not use something more generic like "long-term or background erosion"? For instance, this would also include

“alongshore sediment deposit” -> alongshore sediment redistribution

[Line 157] “origin of the circle” -> It is not necessarily a circle (“reference pole”?)

“encroached boundary” -> beach landward limit? hinterland?

“encroached aspect” -> boundary configuration?

[14] Calculation process of the beach erosion risk

[Line 169] Eq (2) -> Eq (3)

[Line 169] is substituted for -> is substituted by

[Line 176] This will depend on the time scale of the study and the relative magnitude of each component.

[Line 177] “if the buffer section is sufficient” -> “if the beach is wide enough”?

[Line 178] change “quantitatively estimating” by “assessing”

[15] Quantitative interpretation

Please change the section heading. This is not “interpretation”. Here you are describing how to compute/calculate each component.

[Lines 186-188] Here you say the same two times in a slightly different way.

[Line 191] “vertical height of the littoral zone” -> if you are using the concept of depth of closure (d_c), this will be the vertical dimension of the active beach. Moreover, if this component is associated with the long-term (which is the one relevant for the changes in the sediment budget you are referring to), you need to consider (mention) how this will affect d_c .

[16] Longshore sediment deposition potential

Please consider to change the section heading. Maybe something like “Alongshore sediment redistribution”

[Lines 206-207] Changes in the wave field along the beach will be induced by a modification of the wave diffraction pattern. In other words, this erosion component will only be present if a coastal structure is built (which will modify the position of the diffraction pole) or if the incident wave direction changes.

[Line 228] β' is not indicated in Fig 5. Please indicate it, and how to measure (it is not evident from the angle β' shown in Fig 11)

Eq (13) -> I think that by substituting the values of the example shown in Fig 11 in eq (13), the results are different to those by using eq (14). Can you check it?

[17] Cross-shore sediment retreat potential

[Line 239] Please mention that the surveys per year (four in your text) should adequately reflect the seasonal variations of shoreline position and the effect of storm impacts.

[Lines 254-256] When estimating the shoreline retreat associated with a return period, this is usually done after fitting an extreme distribution to shoreline retreat data. These data must reflect the impact of storms in your study site. Just by taking four measurements per year, you are not sure they are properly reflecting this component.

[18] Case study

[Line 286] Fig 8 is not necessary.

[Line 315] Change Fig 11 to Fig 10.

[19] Discussion

I would not say that this section is properly a discussion. This can be included in the methodology section.

Here you need to discuss the applicability and limitations/uncertainty of the method. It will also be relevant to compare the proposed methodology with other existing approaches.

[20] Concluding remarks

Most of this section is more of a summary than conclusions.

[Lines 420-428] Part of this could be included in the discussion section.