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Interactive comment on "Coastline evolution of Portuguese low-lying sandy coast in the last 50 years: an integrated approach" *by* Cristina Ponte Lira et al.

Anonymous Referee #4

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MANUSCRIPT REVIEW:

This manuscript presents an interesting global dataset of rates of shoreline change along the whole beach-dune systems of the Portuguese mainland coast. The article is appropriate to support the publication of the corresponding data set. In general, the article is written in good English, clear and easy to read, and the figures are overall of good quality. The methods are not novel but they are useful and correctly applied; they are described in sufficient detail, although some improvements and clarifications are strongly recommended (see detailed comments below). The weakest point of the manuscript is the referencing, as many pertinent citations to previous works are missing.

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Discussion paper

In general, I recommend publication of the manuscript subject to minor changes, provided the authors address all the points stated below.

Abstract:

- Line 8: add “coast” at the end of sentence.

- Line 17: change to “coastal sediment cells”.

- Details such as cell numbers should not appear in the Abstract.

Introduction:

- Page 2, line 21: change to “are not expected”.

- Page 2, line 23: delete the question mark after “Bettencourt and Angelo, 1992”.

Study area:

- Some general information on wave approach directions is necessary. Moreover, the approximate length of each cell should be indicated in this section.

- Page 3, lines 23-24: the cliffs at the south of sub-cell 1b and the rocky coast at the north of sub-cell 1c are not represented in Figure 1.

- Page 3, lines 24-26: references are needed here to support this information.

- Page 3, line 30: change to “presenting numerous pocket beaches”.

- Page 4, line 5: why is there information on dominant wave approaching direction only in cell 4 and not in the other cells?

- Page 4, line 9: the sector between Cape Espichel and Sado inlet seems to be part of cell 4 in Figure 1.

Methods:

- Page 5, line 6: change to “which focuses”.

- Page 5, line 8: change to “Del Rio and Gracia, 2013” (change also in the References section).

- Page 5, line 11: change to “could not be mapped”. This is an important issue: the authors could provide some comments on possible alternatives for shoreline mapping in these cases. What percentage of the total length of sandy beaches could not be mapped?

- Page 5, line 15: how many photos were used in total?

- Page 5, line 24: The authors should explain how could they generate the mosaics without first georeferencing the photos. This is a very uncommon procedure, as the distortions of non-georeferenced (uncorrected) aerial photographs usually hinder the generation of mosaics. How did the authors match the edges of each image to the neighbour one without having them corrected first?

- Page 5, line 26: change to GCPs. Information should be added on how many GCPs were used per image (on average), and also on what was the average RMSE of the georeferencing process.

- Page 6, line 3: change to digitization.

- Page 6, lines 4-5: Why did the authors reduce the detail of the shorelines from the original digitization scale (1:5000-1:8000) to 1:50.000 or smaller? This should be justified.

- Page 6, line 7: change to Digital Shoreline Analysis System.

- Page 6, line 21: change to “Del Rio and Gracia, 2013”.

- Page 6, line 22: Why were only three mosaics used for evaluating georeferencing uncertainty? Which ones? Were they representative? How many mosaics were used in total? This should be clearly explained and justified.

- Page 6, line 25: How was vectorization uncertainty estimated to be 7 m in the 1958

photos and 5 m in the 2010 orthophotos? This procedure should be clearly explained and justified.

- Page 6, lines 28-30: This expression for the calculation of uncertainty in coastline change rate should include at least the citation of Fletcher et al. (2003).

- Page 7, lines 1-5: It is not clear why the authors are calculating an average uncertainty, when every transect has the same uncertainty (0.2 m/yr).

Results and Discussion:

- In general, there is a clear lack of citations of (and comparisons with) previous works in which rates of shoreline change are calculated for different sections of the Portuguese sandy coast. These works (some of which are cited in the Introduction section) should be accounted for.

- A description of the type of coast and general geomorphological characteristics of each cell is included for cells 1 to 5, but not for cells 6 to 8. Why? It should be added for the latter too.

- Page 7, lines 1-2: Total length of digitized coastlines is included in Table 1, but it would be convenient to mention it in the text as well.

- Page 7, line18: The erosive trend is more related to the high percentage of eroding transects, rather than to the average rate of shoreline change.

- Page 8, line 5: is this really a whole sediment cell? From the description it looks more like a series of minor cells without any transport between them.

- Page 8, line 12: change to “From Cova do Vapor to Bicas”.

- Page 8, line 19: A rate of shoreline change of 0.04 m/yr is not significant at all, so it should not be described as an erosive trend. The percentage of eroding or accreting transects should rather be considered for this.

- Page 8, line 25: change to “are broadly homogeneous”.

- Page 8, line 30: Some comments would be needed about the type of coast and the extremely short length of beach-dune coastline in this cell.

- Page 8, line 32: change to “Figure 5”.

- Page 8, line 35: please add “an overall accretional trend in the few stretches of sandy coastline”.

- Page 9, lines 1-7: As stated above, citations of previous works are needed here, so for instance a comparison with results of studies published by the research group of the Universidade do Algarve should be included in this cell.

- Page 9, line 3: Figure 8 should not appear in the text before Figure 7.

- Page 9, line 7: remove “evolution”.

- Page 9, line 10: Highlighting an average value (-0.24 m/yr) where such contrasting trends exist is not significant at all.

Conclusions:

- Page 9, line 26: Again, this average value is not significant. Please add “display extremely variable evolution”.

- Page 9, lines 30-32: These three lines are identical to the final lines of the Discussion section. Please remove them from one of the sections.

- Page 10, lines 4-5: Some comments could be included about possible improvements or changes that would be necessary to apply the methodology described to rocky or mixed coasts.

Tables:

- Table 1: considering the amount of transects included on each cell, and the extremely variable rates of shoreline change, I recommend to include standard deviation instead

of uncertainty in the column of mean evolution rate.

Figures:

- Figure 1: Scale is missing in this figure. The fact that cells are not displayed in geographic N-S order is a bit confusing.

- Figure 7: For consistency, the rate of change ranges for representation must be <-1.0 (red), from -1.0 to 1.0 (white), and >1.0 (green). Again here and as suggested for Table 1, the uncertainty of 0.02 m/yr is not meaningful at all, so I recommend to substitute it by SD of the different transects (accounting for spatial variability of shoreline changes along the cell).

- Figure 8: The location of these areas should be indicated in Figure 6.

DATA REVIEW:

The presented data are relevant, new and can potentially be useful for further studies. They are fully accessible via the provided identifier. In general they are complete, although some additional information and improvements would be very convenient (see below). The error estimates are included in both shorelines. Overall, the dataset is usable in its current format on any GIS software. As for the metadata, the coordinate reference system must be specified, as currently it is missing in the Data description website.

Specific comments on the datasets:

- The shapefiles of coastlines are correct, but some useful additional information could be included in the attribute tables. I suggest dividing each shapefile into different features (one for each cell), and including a column in the attribute table with the cell number.

- The shapefile of the rate of change is clearly subject to improvement due to several reasons:

a) The columns Date_xxxxx (distance to baseline) are useless without the baseline shapefiles, so they should be removed to avoid confusion.

b) The transects are not consecutively numbered, so it is difficult to identify each rate from the table. In fact, the numbering is chaotic, with transects from North to South being 1855-1865, then 1812-1851, then 1682-1807 etc. Many transect numbers are missing (I presume that due to removal of useless or not-included transects) and this is confusing. I recommend to re-number all transects in a new column, where transect 1 will be the northernmost one and transect 1241 will be the last one before the Guadiana river.

- The layer file should include the versions of the software that can open it, as e.g. it cannot be accessed with ArcGIS 9.

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