

# ***Interactive comment on “Biogenic sediments from coastal ecosystems to Beach-Dune Systems: implications for the adaptation of mixed and carbonate beaches to future sea level rise” by Giovanni De Falco et al.***

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General comments.

This is a useful article in establishing the important contribution of sea grass meadows to development and maintenance of positive sediment budgets along shorelines occupied by beach-dune systems, which in turn provide buffers of stored sediments acting against coastal erosion. There is some lack of clarity and consistency in the use of terminology. Also, given the limited age data, assumptions made in the calculation of sediment accumulation rates should be more fully discussed.

## Specific comments

In the abstract mixed use of tons, m<sup>3</sup> and % makes it difficult to grasp the significance of the data without getting out a calculator.

In the abstract and throughout, the use of the terms beach, beach-dune system, beach-face are confusing to me as geologist. Figure 4 helps explain the terminology, but it should be spelt out somewhere early on in the body of the article. Unconventional (to me) terminology should not be used in the abstract if it can only be understood by reading the article.

Use of the terms terrigenous sediments, marine sediments, bioclastic and biogenic need to be checked for consistency and correctness. Are sediments of marine origin which are reworked through erosion of coastal cliffs, terrigenous or marine? Is there a difference between sediments which, in the article, are termed bioclastic versus those termed biogenic?

Delivery of sediment to the beach-dune system may have been partially controlled by minor Holocene relative sea level changes or storm activity as opposed to simply sea-meadow productivity. Periods of equilibrium or erosion may have been interrupted by periods of relatively rapid sediment accumulation. The anomalous older age of dune deposits SG-D4 may, for example, reflect an early pulse of dune activity. More age data at depth intervals below the sediment surface would help establish the rates of deposition.

Technical corrections and recommended rewording.

Page 1.

Line 9. Suggest: “produce and store carbonate particles”

Line 17. What is the distinction here, and later, between bioclastic and biogenic?

Lines 21 to 24. Can these data be simplified? What is the conclusion? Apart from the

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mixture of units (It is a bit bewildering when to my mind the use of the terms beach-dune system and beachface are not conventional. The word “beach” (last word of the paragraph) on its own is not defined anywhere. These inconsistencies crop up later.

Line 25 and 26. Awkward sentence. I suggest dividing into 2 sentences: “. . .P.oceanica, which our data can help quantify. The value of this sediment-supply service is in addition to the other important ecological services provided by seagrass meadows.”

Page 2.

Line 3. Suggest rephrasing: “by the supply and delivery of sediments from the land (fluvial, cliff erosion) and from the sea (nearshore).”

Line 6. Again I am not sure of the intended meaning of terrigenous (is it based on chemistry or provenance?). Suggest: “in areas where supply from the land is scarce”.

Page 3.

Line 7. “Mixed” definition?

Line 19. This may be the place to add a sentence. “. . .carbonate factories. For the purposes of this study we define the beach-dune system as . . .”. Cite any previous research which has used this definition.

Line 32. Insert loose or unconsolidated before “sedimentary deposits”

Page 4.

Line 3. Is “bioclastic” a better term than “biogenic”? Biogenic would be a reef or an oolite perhaps,. Line 14. Substitute “range” for “water displacement”

Line 19. Substitute “height” for “amplitude” unless Simeone et al., 2014 used the term “amplitude” to convey changes in height.

Page 5.

Line 1. Is the “submerged sector of the beach”, the coastal wedge?

Page 6.

Line 16. Use of the term “beachface” runs into problems here. Usually the beach comprises a beachface (inter-tidal), berm and upper beach (supra-tidal) which merge into the foredune.

Page 7.

Line 4. Suggest “..considering a span of ages from approximately 0.5 to 4.4 ka Bp based on ...”

Line 27. Suggest: “prevents the preservation of vertical cliffs favouring, instead, the formation of 15m high seaward sloping talus deposits which have resulted from slumping.”

Line 29. Substitute “down to” for “up to”.

Page 8.

Lines 7 and 8. Delete these two lines. The information is repeated in the following paragraph.

Line 10. Re-phrase this sentence which is difficult to follow.

Page 9.

Line 16. There must have been more to calculating the sediment production than just measuring the surface area. Explain the other factors.

Line 20. What are the assumptions that are made? Is the sediment considered so well mixed, vertically and horizontally, that more age data are not required?

Page 10.

Line 10. Suggest: ” ..them, but we have demonstrated that a significant proportion,

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estimated at 15% to 34% (?), is exported outside. . .”

Line 12. Awkward sentence. Should it begin “This is the first study to quantify. . .” ?

Line 29. Substitute “contribution” for “input”.

Line 31. Suggest: “The calculation made by Vassallo et al. (2013) is an exception and probably..”

Line 33. Suggest: “Our data quantify not only the volumes of sediment retained in the meadows but also the proportion that is exported to the beach-dune system. This facilitates a more detailed evaluation, than had previously been possible, of the respective ecosystem services provided by the seagrass.

Page 12.

Line 9. Suggest: "beach-dune system corresponds"

Line 13. Suggest: “85% of the total beach-dune system volume”

Page 20.

Line 8. Substitute “Beach-dune system compartments” for “beach compartments”

Page 21.

Figure 4. Substitute “sediment volume” for “beach volume”

Page 21.

Figure 4. I suggest an over-arching bracket across top of figure to illustrate what the “beach-dune system” includes. i.e Coastal wedge, Beach(face), and dune.

Page 26.

Table 1. Are the sample locations shown on a map somewhere? If so, then the map should be referenced.

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