

Interactive comment on “The land-sea coastal border: A quantitative definition” by Agustín Sánchez-Arcilla et al.

Anonymous Referee #2

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Review: “The land-sea coastal border: A quantitative definition”, by Sánchez-Arcilla et al.

Recommendation: major revision.

Summary: The authors attempt to provide a quantitative and generalizable definition of “land-sea” zone, i.e., cross-shore width of that particular marine area that is strongly affected by the presence of the continent. The methodology is based on the measure of anisotropy of specific, vectorial and/or scalar fields of environmental parameters. For this work, the authors use wind velocity and significant wave height from well-calibrated and validated numerical outputs.

General comments The work the authors present is really intriguing and I particularly

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like the idea of defining a "coastal zone" by using environmental variables in a quantitative fashion. However, while the specific variables the authors consider in this application (i.e. wind velocity and significant wave height) are particularly suitable for the study area they might not work for a different environment, where, for instance, wind and wave patterns do not actually characterize the coastal zone. As stated by the authors, river plumes or, more in general, bio-geochemical processes may lead for a better definition of a "coastal area" and, as a consequence, the methodology here proposed might not be suitable. All this is at the base of my main criticism: to state that such a methodology provides a "quantitative definition for the land-sea (coastal) transitional area" is too strong; although I like generalizations, I still believe that a "land-sea (coastal) transitional area" can be defined by starting from the specific physical, and/or biogeochemical, and/or geological, and/or ecological process we want to investigate. A second comment regards the poor connection between the pure mathematical/statistical part and the environmental application. I would have appreciated a better explanation of the statistics by starting from the environmental data, also discussing physical meanings and assumptions. To present the theoretical background as it is leaves the reader with some doubts regarding the feasibility of the methodology.

Specific, minor comments

Abstract - replace "perpendicular" with "cross-shore" in line 2

Introduction - There are several definitions of what a Land-sea border is (Shaw et al., 2008; Geleynse et al., 2012). I would avoid (at least, at the beginning) to frame the land-sea border within this specific definition. Instead, it would be better to state that over land-sea border areas occur specific met-ocean dynamics that actually characterize land-sea coastal border. The aim of this work is to quantitatively define the extension of this area. (see general comment).

- "Sentinel data" (in line 3-pag 2) ; the general reader might not be familiar with the sentinel missions and, therefore, might not understand that here authors are referring

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to satellite data. Please, introduce the Remote Sensing approach properly.

- “Because of that” (in line 5-pag 2); Please, be more specific. It’s not clear the use of Sentinel data in defining land-sea limits and what the authors mean with degradation of data. “necessary”; too strong, I would write “useful” rather than necessary.

- “coastal anisotropy” (in line 13-pag 13); I would write “anisotropy of environmental parameters” rather than coastal anisotropy

Theoretical background - $G(x)$ in line 10 should be $G(y)$, as far as I am missing something; As I suggest in the General Comments, this section would be much clearer (and the ms much stronger) if the theoretical back ground is explained by starting from environmental variables. As it is, the reader might get confused.

Study area - By reading the section it comes natural to think that the analysis is particularly suitable for this study area, thus difficult to generalize

References Shaw, J. B., Wolinsky, M. A., Paola, C., & Voller, V. R. (2008). An image-based method for shoreline mapping on complex coasts. *Geophysical Research Letters*, 35(12).

Geleynse, N., Voller, V. R., Paola, C., & Ganti, V. (2012). Characterization of river delta shorelines. *Geophysical Research Letters*, 39(17).

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