Ocean Sci. Discuss.,
https://doi.org/10.5194/os-2018-83-RC1, 2018

Ocean Science
Discussions

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

Anonymous Referee #1

Received and published: 5 October 2018

GENERAL COMMENTS This study is aimed at assessing the definition (say distance from the coast) of land-sea boundary. For this purpose, wind (from UKMO) and wave (using SWAN) model data are used. No additional oceanic/atmospheric variables are taken into account. The whole analysis is based on the calculation of anisotropy of 2-D fields, which is computed along four transects of the Catalan Coast (used as test site). The paper is well-written, but it lacks a connection with other methods currently employed to define that boundary (e.g. using oceanic variables, as salinity, or depth) and uses an unique strategy (anisotropy + quantile threshold) for the identification of the boundary. In my opinion the paper can be improved and worthy to be published after a major revision that assesses the stability of the boundary computation and its seasonality.

SPECIFIC COMMENTS Title. Since the definition is based on wind and waves I suggest mentioning them in the title. Or at least making it clear that in the study a methodology is proposed (which can be then used with other variables).

Abstract. o "The more robust estimator [. . .]". How the robustness of the estimator is expressed? Did authors check, for example, the sensitivity of the results on the quantile threshold? o Can authors show the distribution function of anisotropy for wave and wind fields?

Introduction. o The land-sea border problem is presented by means of references mostly pointing to the same group that wrote the paper. My suggestion is to improve the overall view of the problem. o It seems to me that other references are more appropriate for the SWAN model.

Theorethical background. o I warmly suggest improving this section to make the reader more familiar with the concept of anisotropy. A couple of examples (high anisotropy, low anisotropy) using different set of wave/wind data will help to familiarize with the concepts here presented. o The definition of R seems not to be consistent with the one given by Chorti and Hristopulos (2008). I suggest improving the presentation of the method. o Is there a difference between the adopted method and others used to compute the consistency of spatial fields, such as the structure tensor? o For the Copula function, I suggest changing (u, v)-variables with other symbols as they are already used for the definition of anisotropy.

Methods o How the covariance of anisotropy is computed? o I suspect the wind model resolution is not 2.5° and 3.75°. However, were they km (instead of degrees), the model seems not to be enough resolved to provide accurate data at 2-3 km scale, which is the final value provided for the border. The SWAN model at 600 m close the shoreline is at limit in this respect (the border encompasses 3-4 grid points). Can authors comment on this aspect? o If you define the resolution in meters, I guess it is smaller near the coast, not higher. o Which period is spanned by the analysis? (February 2017? Why

not using a longer period, say 2016-2017?). o As far as waves are concerned, using the proposed methodology, the distance of the border should change between August (instead of November, Fig. 9) and February. A season-based classification of the border would be a sound improvement of the paper. o About the radius and quantile threshold. Those two values seem to me quite arbitrary and not directly physically-based. Authors could do a sensitivity analysis to show how the results depend upon those values (the quintile, in particular). This is an important task in order to evaluate the stability of the proposed methodology (and then make it usable in other contexts) and provide the uncertainty of the location of the boundary. o It would be useful to plot the quantile values on the heatmaps. o Please explain what is the count in the heatmap's caption? o I suggest putting the wave model assessment in a dedicated sub-section separated from the results of the anisotropy analysis. o Is there a reason why in the panels of Fig 8 and 9 the dashed green vertical lines are not aligned (horizontal axes seem consistent)?

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