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Interactive comment on “Variability in the air–sea interaction patterns and time-scales within the Southeastern Bay of Biscay, as observed by HF radar data” by A. Fontán et al.

Anonymous Referee #1

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General Comments:

This manuscript describes a 2-year study of wind-driven currents in the southeastern part of the Bay of Biscay based on NCEP (National Centres for Environmental Prediction) reanalysis data of wind patterns and directly-measured surface currents (upper 2–3 m) from two land-based high frequency (HF) radars. The radars were deployed along the southern coastal boundary of the Bay of Biscay near where the coastline exhibits a 90 degree change of direction. The main result of the paper is that two current patterns prevail: (1) Ekman transport to the right of the wind at this northern hemisphere site; (2) a rotary flow pattern. A diurnal wind pattern commonly occurs in

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the study region and the authors speculate that it extends beyond the area covered by the HF radars. Figure 3 nicely summarizes the spatial patterns of the diurnal wind component. The analysis procedures are well described and thorough.

The paper could be improved with a more extensive analysis of the results. For example the relationship between wind and current directions is only qualitatively described. The magnitude and variability of the interesting rotary current pattern of CCA mode 2 was not explained in any detail.

Overall, I think this is a solid contribution in its description of winds and ocean circulation in the interesting “corner” region of the Bay of Biscay with its changing coastline direction, offshore canyons, and variable shelf widths.

Specific Comments:

I have a couple of structural issues with the paper.

First, the paper devotes much of its text to the methods used such as canonical correlation analysis (CCA) and empirical orthogonal function analysis (EOF), both of which are appropriate for this analysis. There was considerable mixing of methods with results that I found distracting. For example, practically all the text on page 2801 could have been moved to Section 2 Data and Methods.

Second, I would have liked a clearer separation between what is new here and previous results. Perhaps a discussion section could be added where new results from this study are considered in light of previous results.

Page 2801, lines 15-16: It was not explained why currents were filtered with a 3-hr moving average; this could have been done in Section 2.

Page 2801, lines 17-18: It would have been helpful to explain exactly how the CCA modes were scaled in units of the original fields.

Page 2802, line 25: As mentioned by the authors and shown in Figure 5, current

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vectors lie typically to the right of the wind for mode 1, but the angle varies considerably. I was surprised the authors did not explore this more thoroughly. For example, the angle appears to be greater for locations offshore of the 200 m isobath and decrease at shallower depths. However, this is only an impression based on the figure. Quantifying variation of the angle would require more analysis and might provide new insights.

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