

Interactive comment on “Wave–Current Interactions in a Wind-jet Region” by Laura Ràfols et al.

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The authors acknowledge the helpful comments and corrections of Referee #1, which helped to improve the quality of the manuscript. Below, each comment is answered point-by-point. A marked-up version of the manuscript with the corrections is enclosed as a supplement file.

This paper is well written and an interesting contribution to the field. I particularly enjoyed the analysis of TKE and the Brunt-Väisälä frequency, showing that the vertical mixing of the water column is stronger when waves are considered. I therefore recommend it to be published after the following issues are addressed.

C1

Do you think there is any tide included in the results shown in Fig. 5? There appears to be a roughly 12.5 hour period to the oscillation, and this could be dominating the time series and masking the effect of the wind-jet. I know the tide is probably very small in this region, but it should be considered. I suggest you perform a harmonic analysis on the time series (make sure it is long enough) and subtract the tide from the time series, so you are left with a non-tidal residual. If the small changes during the wind-jet you describe are due to the wind-jet, then they should still be there.

Right, the current time series were not filtered and included the tide. We have subtracted the subinertial time series using the same filter we used in a previous study (Ràfols et al., 2017a). Figure 5 has been changed and the filter explanation included in the new version of the manuscript.

Page 6 Lines 4 – 9: Please state what boundary forcing was imposed on the nested models, i.e. water elevations and/or currents (barotropic / baroclinic), temperature, salinity?

The nesting between each SWAN domain consist on providing the energy spectra from the coarser domain to the boundary of the smaller domain. We have added this explanation in the manuscript. The boundary forcing of the ROMS model is the one that includes water elevations, currents, temperature and salinity, but this is explained in Page 6 Lines 21-29 of the revised version.

The naming of the model runs uncS, cRS and uncR are not well defined. They first appear in Table 1 and are used in a number of the figures. I suggest you define them in the text in the first paragraph in section 3.1. On reading the text it becomes evident what they are/mean but it is confusing at first.

C2

We have added the naming of the model runs at the first paragraph in section 2.3.2, where the system set-up is explained and the three model runs are first mentioned.

In section 3.2 (page 12, line 12) the wind-jet event is said to start at 02:00 UTC, yet Fig. 5 only starts at 03:00. I suggest you start the x-axis at 02:00 to correspond to the text. Also, please label the x-axis in Fig. 5, Time (UTC) or similar.

Right, it has been corrected. Now the Figure starts at 02:00 UTC and the x-axis label has been added.

Minor Comments / Revisions:

Page 1 Line 9: leading a larger mixed-layer depth → leading to a larger mixed-layer depth

Corrected.

Page 2 Line 29: has been previously → has previously been

Corrected.

Page 2 Lines 30-31 in the study region and the wind-wave characterization, and water shelf circulation was investigated → in the study region, and the wind-wave characterization and water shelf circulation were investigated

C3

Corrected.

Page 3 Line 22: data obtained → data were obtained

Corrected.

Page 3 Line 22: and an high-frequency → and high-frequency

Corrected.

Page 3 Line 33: KHz → kHz

Corrected.

Page 4 Line 8: and a two-ways coupling run → and a model run with two-way coupling

Corrected.

Page 4 Line 11: is N needed?

No, it has been deleted.

Page 9 Line 19: And Fig. 3 → Fig. 3

C4

Corrected.

Page 12 Line 14: What do you mean by “negative increase” exactly? Does that make it a decrease, or do you mean it becomes more negative. You could say that the magnitude of the current increases. Please rephrase.

Right, this explanation was not clear. It has been rephrased.

Fig. 5: add x-axis label, Time (UTC) or similar.

Done.

Page 14 Line 1: What do you mean by “water current” exactly? Do you mean depth-mean?

No, it is the surface current. It has been changed.

Page 14 Line 1: what do you mean by “mean differences”? I think you mean the “mean of the hourly instantaneous difference”. I would rephrase.

Right, it has been rephrased.

Fig. 9: I suggest you use the same x-axis range as Fig. 5, or would this make it harder to make your point in the text?

C5

Yes, it is reasonable to use the same x-axis range. It has been corrected.

Page 22 Line 25: . . . results have demonstrated to be physically reasonable, being capable of reproducing the well . . . → . . . results are physically reasonable, as they reproduce the well . . .

Corrected.

Page 22 Line 25: This has allowed to investigate the impact of the WCIs . . . → The results have enabled the WCIs to be investigated . . .

Corrected.

C6