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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 2, 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 version also include the corrections due to the comments by Referee #1.

This work presents some results provided by a ocean/wave high resolution coupled model, comparing with uncoupled runs and observations.

I would suggests to clarify the conclusions in the abstract. For example, it is said that 'the agreement of the modeled wave period improves...', but not respect to what.

The results explanation in the abstract has been improved.

I would like to see in the introduction how previous research work relates to the current research. For example, given that this work uses a high resolution model (350m), if the coupling influence depends on resolution in some way.

A new paragraph has been added at the introduction section in order to relate with previous work about WCIs. A comment on the grid resolution dependency has also been included.

Very often the authors comment on 'the current effect on waves', and care should be taken here as they are also coupling the sea surface height and the effect of both will have an influence in the results. Furthermore, in a two-way coupled model there will be a feedback between one model and the other, so that what they will observe will be the overall effect of coupling one model to the other.

Right, with "the current effect on waves" we wanted to say the effect on the wave field when the models were coupled, i.e. when the wave model included the effects of being coupled with the circulation model but not only and strictly the "current effects". This expression has been changed by "coupling effects on waves" all along the manuscript.

Besides, in order to follow the same criteria, the expression "wave effects on currents" has been changed to "coupling effects on currents".

The text should clarify if the instantaneous values of the coupling fields are passed between models at every coupling time step (20 minutes), or the average value between coupling steps.

The coupling uses instantaneous fields. The explanation in the manuscript has been improved (page 7 lines 14-15).

Table 1 should clarify if the winds are the 10m winds or the winds interpolated to 3m.

In order to be able to compare the modeled winds with the measured ones, the winds in Table 1 are at 3m. It has been specified in the table caption and in the manuscript text.

In the text or the table caption it is not well described the meaning of 'uncS' or 'cRS'.

Due to the previous revision of Referee #1, the naming of the different runs were included in the manuscript text in the first paragraph of section 2.3.2.

In the text some expressions such as Tm_{02} are used before their meaning is explained.

Right, the Tm_{02} was used before it was defined. This has been corrected in the new version of the manuscript.

The surface stresses are calculated by the changes in surface roughness. The expression for the surface roughness here is different to the one used to interpolate 10m to 3m winds, and it should be clarified why the same expression is not used in both cases. In the second case, there is the possibility of using the actual Charnock parameter that can be provided by the wave model, instead of using a default value.

As we understand it, two methods have to be distinguished. On the one hand, there is the formula used to extrapolate the wind data in order to be able to compare them with the measurements. This is used to calculate the statistical parameters (i.e., analyze the wind data quality) and to find the wind-jet events. On the other hand, there are the formulas used by the numerical model to compute the surface roughness, which are different in the uncR run and the cRS run (in the second case it will depend on the wave parameters but in the first case it will not). Maybe this could lead to some confusion, but we think it is important not to merge these different methodologies.

It should be better justified why it is considered that 24 hours are enough to spin-up the model.

The decision of using 24 h is based on different things: our knowledge of our models behavior, the analysis of the time series and the model configurations. We have to keep in mind that the ROMS model is initialized with data from IBI-MFC, so the spin-up time is expected to be short. A brief explanation has been added in the manuscript (page 9 lines 15-17).

One important conclusion is that the largest differences between coupled and uncoupled runs take place at shallower areas, but this is illustrated just by comparing results in two points in the domain. What I miss is a whole domain picture showing differences in some variable between coupled and uncoupled results to actually confirm that the largest differences occur at shallow places, instead of resulting of a fortunate selection of comparison sites.

According to our interpretation of this point, the current and Hs differences between coupled and uncoupled runs in the whole domain are already shown in Figure 7. This figure shows how the larger effects take place at shallow regions.

The article is centered in wave effects on currents, but might be it would be useful to look at other variables such as sea temperature or salinity, as they might better illustrate the effect of vertical mixing.

The effect of vertical mixing is shown by means of the Brunt–Väisälä frequency, which includes the temperature and salinity information. We have figures with the temperature and salinity evolution during the wind-jet event (see figures below) but we believe that they do not provide new information and it would be redundant. For this reason, we believe that it is better to not show these figures. It would increase the number of figures in the manuscript without giving additional information.

Please also note the supplement to this comment:
https://www.ocean-sci-discuss.net/os-2018-103/os-2018-103-AC2-supplement.pdf

Interactive comment on Ocean Sci. Discuss., https://doi.org/10.5194/os-2018-103, 2018.

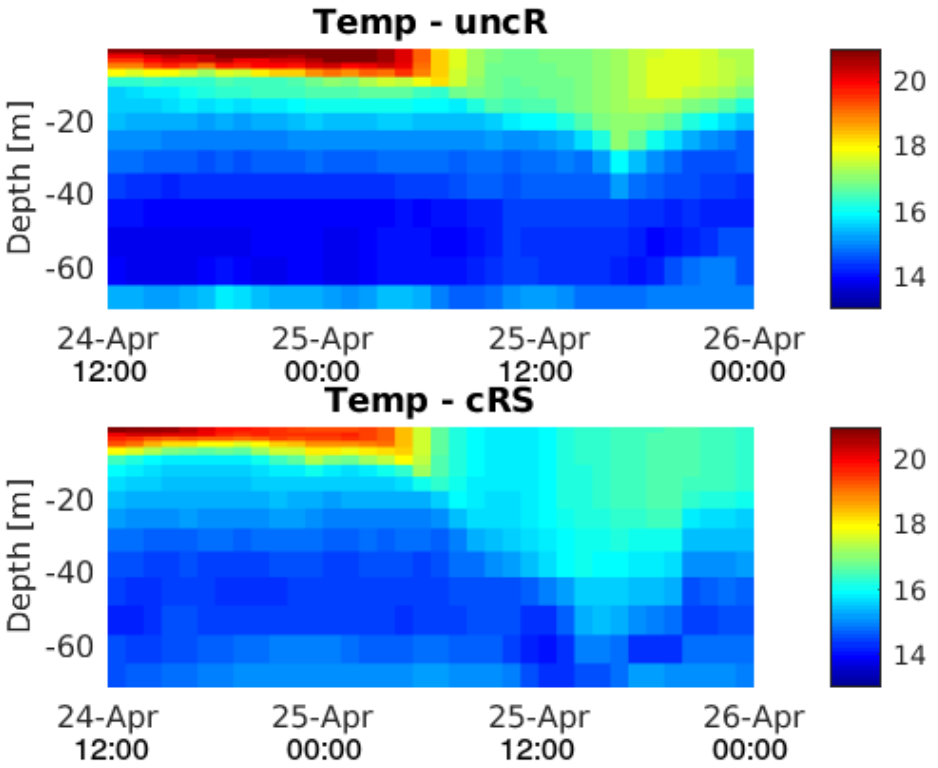

Fig. 1. Temperature evolution throughout the wind-jet event E3 at point P1.

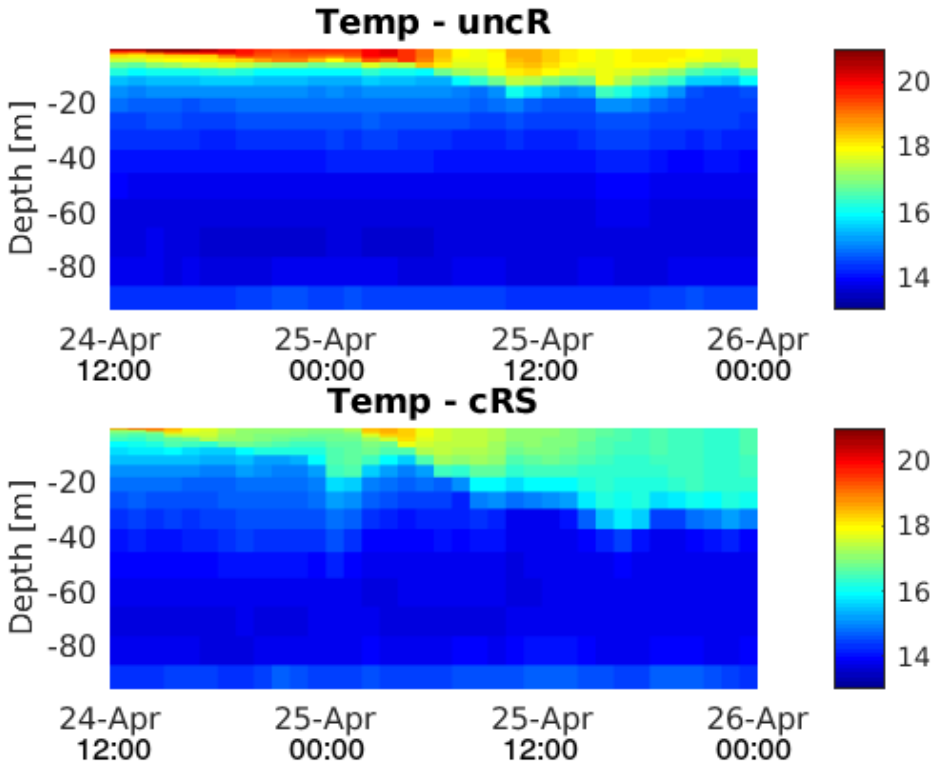

Fig. 2. Temperature evolution throughout the wind-jet event E3 at point P3.

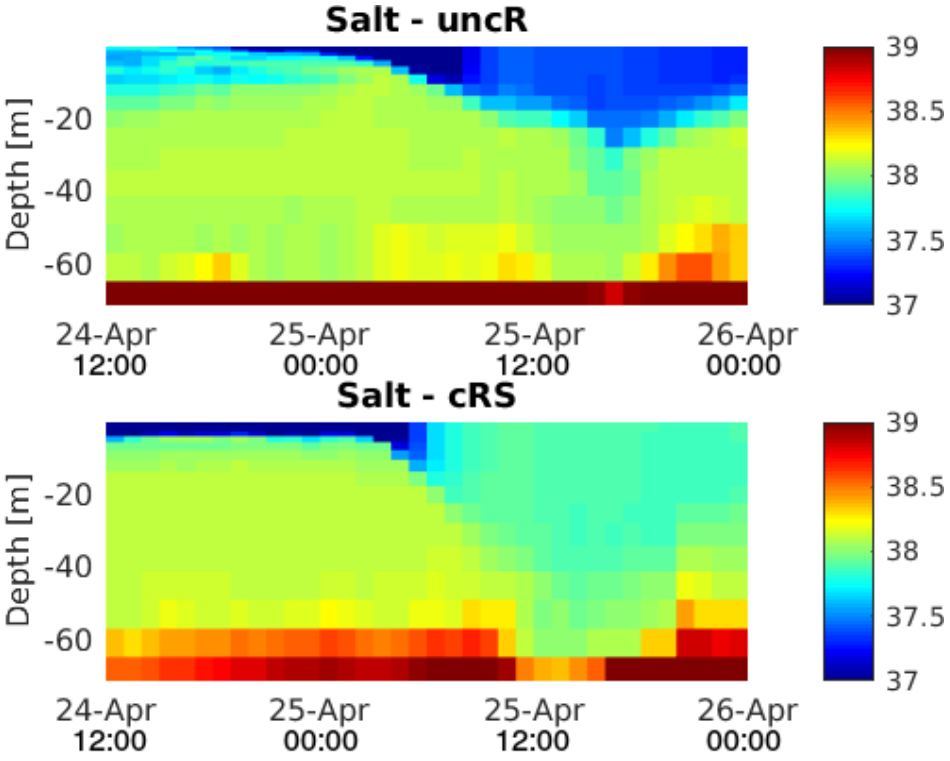

Fig. 3. Salinity evolution throughout the wind-jet event E3 at point P1.

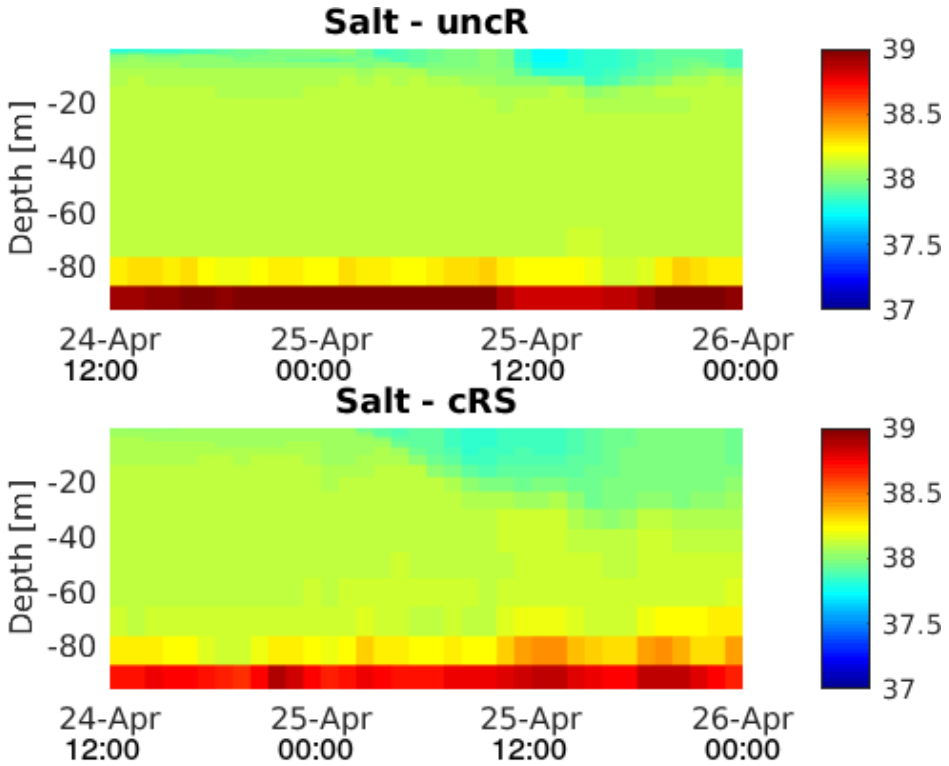

Fig. 4. Salinity evolution throughout the wind-jet event E3 at point P3.