

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

### **Anonymous Referee #2**

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

I would suggest 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.

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.

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

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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.

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.

Table 1 should clarify if the winds are the 10m winds or the winds interpolated to 3m. In the text or the table caption it is not well described the meaning of 'uncS' or 'cRS'. In the text some expressions such as Tm02 are used before their meaning is explained.

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.

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

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.

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.