

Interactive comment on “Assessment of the importance of the current-wave coupling in the shelf ocean forecasts” by G. Jordà et al.

Anonymous Referee #2

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G. Jordà, R. Bolaños, M. Espino and A. Sánchez-Arcilla: Assessment of the importance of the current-wave coupling in the shelf ocean forecasts.

The paper discusses wave effects on currents (modification of surface wind stress and bottom drag; wave-induced mass flux) and currents causing wave refraction. The assessment is via sensitivity experiments in an operational model configuration for the southern Catalan shelf (NE Spain).

This is within the scope of OS. Novelty is primarily in the sensitivity experiments in this context. I am aware of similar work in other contexts but not much in the open literature. The introduction is rather narrow, focused on the Mediterranean Forecasting System, and should include more about the generic issue of wave-current interaction

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elsewhere insofar as published. We know for example that, in shallow water, waves can retard tidal currents near the bottom (Baumert et al. 2000; Prandle et al. 2000). The methods and results here seem valid and sufficient for the interpretations made and are clearly outlined. Conclusions are clear in the context, but there would be merit in more discussion about the expectations in other contexts where the balance between the different types of interaction would differ.

There is a general lack of data for validating models of wave-current interaction - hence the sensitivity study (only). This is a weakness. Application to an area with some data would have been an improvement. Nevertheless, it can still be argued that the sensitivity study is needed anyway; the importance of the various interactive effects is specific to location. Application to another area may better test the model but does not help to assess the strength of interactions on the Catalan shelf.

The description of the wave model refers to WAM and not to inclusion of shallow-water effects, e.g. wave refraction by depth, dissipation by bottom friction (and of course the effect of the altered dispersion relation on the non-linear interactions). There are hints that it may be “only” the deep-water WAM - this should be made explicit. More pointedly, this is a limitation on the results in the shallower areas of the Catalan shelf.

The overall presentation is well-structured and clear, the language is mostly OK (a list of detailed points is appended). Below are other points for clarification or improvement. I think that the paper will be suitable for publication in Ocean Science when these points are met and the remarks above are discussed in the paper.

More detailed points.

The title and abstract are OK.

Page 1829 lines 20-22. Are the resolution values 30 cm, 80 cm correct? They cannot be “typical” of many near-surface levels; the total 20-41 levels span depths to > 2000 m. Also contradicts page 1838 line 11 “.. the first velocity level in the OGCM is at 5 m

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..”

Page 1832 line 9 “..direction (insert "theta") ..” equation (1) and lines 12-13. R is earth’s radius, “.. latitudinal (insert "phi") and longitudinal (insert "lamda") ..”

Page 1833 equation (2). What is the significance of the subscript “r” in f_r ? It seems to be missing from the integration variable f .

Page 1836 line 14. What is SMC-CIIRC? Why are these forecasts needed for “wave data” while WAM is being run?

Page 1847 lines 16-25. Also in areas where the waves are often of lower frequency and so longer, waves can affect bottom friction over more of the shelf area because the wave currents extend deeper.

Figure 1. The stars for time-series locations need to be clearer.

Figure 4 has poor quality as it presently appears.

Figure 10a,b have poor quality as they presently appear and in figure 10c I cannot distinguish between “whole domain” and “inner shelf” curves.

References

Baumert, H., G. Chapalain, H. Smaoui et al. (2000). Modelling and numerical simulation of turbulence, waves and suspended sediments for pre-operational use in coastal seas. Coastal Engineering, 41, 63-93.

Prandle, D., J.C. Hargreaves, J.P. McManus et al. (2000). Tide, wave and suspended sediment modeling on an open coast - Holderness. Coastal Engineering, 41, 237-267.

Detailed “English” for text, and “typos”.

“associated to” (several places) is usually “associated with” in normal English usage.

“significative” (several places) should be “significant”.

Page 1827 line 2 “.. in order not to diverge from reality. ..”

Page 1828 line 1 “..dynamics are Ebro river”

Page 1830, line 3. “.. stress. In ..”

Page 1835, lines 6-7. “.. description can be found ..”

Page 1837, line 13. “.. west fluxes..” is unusual and I think refers to winds towards the west (given the location of high pressure). In later lines I think N, NW means winds from N, NW.

Page 1838 line 12. “is clear that ..” Line 22 “field. Their shape ..”

Page 1839 line 6 “.. which ..”

Page 1842 line 16 “.. although” Line 21 “.. and the horizontal density gradients being quite important ..” Line 28 “.. although ..”

Page 1844 line 14 “.. although ..”

Page 1845 line 4 “whether ..”

Page 1846 line 8. Whatever is meant, “notorious” is the wrong word. Lines 13, 14. Meaning of “field variability” is not clear. Lines 23-24. “..usually never..” is not sensible. Either “never” or “rarely”.

Page 1847 line 12 “choose”

Figure 4 caption. “.. significant height differences ..”

Interactive comment on Ocean Sci. Discuss., 3, 1825, 2006.

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