Natural Hazards
and Earth System
Sciences
Discussions

Interactive comment on "Coastal ocean forecasting with an unstructured-grid model in the Southern Adriatic Northern Ionian Sea" *by* I. Federico et al.

Anonymous Referee #2

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This well-written paper describes a new model system of the southern Adriatic and northern Ionian Seas, focusing on the Gulf of Taranto and Mar Grande of Taranto. The model produces a 3 day forecast of physical ocean properties in high spatial resolution. The focus of the paper is a validation of the modelled temperature, salinity, sea level and currents for a 1 day forecast. The validation is limited to one measuring campaign. However, this campaign seems to be fit for purpose. Operational ocean modelling is important for forecasting natural hazards on the sea and in the coastal region, and the topic is thus highly relevant for the journal. However, these issues could be discussed in more detail, as suggested below.

General questions / request for comments:

1) Considering the topic of the journal, please comment on the importance of the forecasts in relation to natural hazards of the area? Storm surges?

2) The model is reanalysed every day. I would expect a continued simulation from the day before to run equally well and possible allow more detailed coastal phenomena to build up, while saving computer resources. Please discus this option. I assume the arguments could be better assimilation in larger model domain? Challenges at the model boundary? Drift/instabilities of the model system?

3) What do the authors consider to be the smallest meaningful spatial resolution of the model? Hydrostatic approximations assume that the depth is much smaller than the length scales considered.

General notes

4) In some points below, I suggest to discuss various aspects of the results. Please consider if these discussions are best placed in the results text or in a new discussion section.

5) Check font sizes on all figures

6) Figure 7a, 8a and 9a: please add curves for the MFS model

7) Check spacing between numbers and units, and whether these are in italics

8) Please check commas, especially commas are missing after conjunctive adverbs at the start of a sentence

Specific notes (P: page, l: line)

9) Title: please add dash (–) between "Southern Adriatic" and "Northern Ionian"

10) P1 l4: please capitalize "system"

11) P1 l6: please capitalize Eastern in "South-eastern"

12) P1 l6: please change "500-50" to "50-500"

13) P2, l9: consider to change "could" to "can"

14) P2 l28-29: I find the description "The Southern Adriatic sea extends approximately southward along the latitude of 42°N" unclear

15) P3, l11: consider deleting "at least"

16) P4, l3: please add references to the different bathymetries used, or state the data source.

17) P4, l6: please state the maximum layer thickness

18) P4, l8: no comma after "where"

19) P4, l10: Please consider moving the reference towards the end of the sentence

20) P4 l26-30: please capitalise first letter in each sentence

21) P5 l 17: add "." after "et al"

22) P5 l26: consider deleting "only"

23) P5 l29: the sentence is a bit unclear. I assume that you mean "including tidal components" and not "including tidal free components"?

24) P8 l3-9: Addition of MFS curves as suggested in my point 5) will highlight if the effects come from the MFS model. To me it also seems likely that the model would benefit from a lower salinity in the river runoff forcing (makes sense with higher resolution), and that the mixing is influenced by the addition of tides. Please discuss.

25) P8 l15-19: Please discuss the effects of assimilation further. Which types of data are assimilated into the MFS system, how important is this for the model system, and how frequent are data available? This leads to the questions: Are the validation results of LS2 representative of the "normal" operating mode of the model, or is it more "normal" not to have data for assimilation as in LS1? How important would it be to have a more permanent source of observations?

C3

26) P8 l23-28: is the effect of assimilation of LS1 into MFS also included here?

27) P9, l7: the feature (iii) is very small in the observations. Is it reported in other studies?

28) P9, l 24: Or, could it be that the rain is accompanied by increased winds/waves that could introduce upwelling, mixing or advection of colder water? The temperature drop seems to come in the beginning of the rainy periods.

29) P10, l2: It seems there is a (non-tidal?) sea level signal, causing sea level deviations of 5-10 cm. Comments?

30) P10, l12: Please add reference to Fig. 14 at "(G1)"

31) P10, l27-28: Please revise sentence and re-place parentheses

32) P11, l3: Please add dash (−) between "Southern Adriatic" and "Northern Ionian"

33) P11, l11: Please add that the difference is due to assimilation

34) P11, l19: "signal of rain": see note 28) and revise accordingly

35) P12, l23: remove comma after 1869

36) P12, l26: add dot after pp

37) Table 1: consider changing "ECMWF and COSMOME" to " ECMWF or COSMOME"

38) Figure 1: is it possible to insert a small overview map (e.g. in the top right corner, covering e.g. 36-46N, 12-22E). Also, please mark Gulf of Taranto and Mar Grande of Taranto

39) Figure 2b: add latitude-longitude, or mark domain on figure 2a