

## ***Interactive comment on “A high resolution free surface model of the Mediterranean Sea” by M. Tonani et al.***

### **Anonymous Referee #2**

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Comment on the article “A high resolution free surface model of the Mediterranean Sea” by M. Tonani, N. Pinardi, S. Dobricic, I. Pujot, and C. Fratianni.

### General Comments:

The paper discusses the implementation and verification of an operational ocean general circulation model of the Mediterranean Sea. The model domain includes the Mediterranean Sea and part of North Atlantic Ocean and has a high vertical resolution with 71 levels. The authors develop a way to correct the water balance in a closed model domain, which conserves mass under the conditions of negative surface net water flux. Two experiments are performed (1) Experiment P with monthly mean seasonal forcing and (2) Experiment I: with ECMWF 6h atmospheric forcing. Model characteris-

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tics are compared with satellite altimeter data and in-situ T and S observations.

Specific Comments:

(i) Figure (3) shows the model kinetic energy for the two runs P and I. It is not clear why the kinetic energy of Run I for January 1, 1997 is equal to zero. If the Run I is initialized with the fields from the Run P after 6 years of integration, one would expect that the kinetic energy on January 1, 1997 in Run I will be equal to the kinetic energy at the end of year 6 in Run P, which differs from zero.

(ii) Authors discuss in details the relatively low summer steric component of model sea level and the reason for the model ssh error. There is however another difference between the data and model curves on Fig. 9. The ssh maximums and minimums in the model solution are in most of the years shifted in time with 1-2 months from the corresponding maximums and minimums in ssh data. Moreover, one can observe in some of the years two local minimums in the model ssh during the winter months. The ssh data, on the other side, always have just a single winter minimums. It is interesting to know the authors interpretation of this difference between the timings of maximums and minimums in the model and data sea surface heights.

Technical corrections

(i) There are typing errors in the formulas (13), (14) and 15.

(ii) The sensible heat flux  $H$  is missing in the expression about surface heat flux (24)

(iii) Fig. 3: The time period of averaging of the kinetic energy should be mentioned in the caption.

(iv) The units on the upper panel of Fig. 5 are missing

(v) The explanation the lower panel of Fig. 7 in the text (line 18, page 226) says it shows “the wind stress and the wind curl superimposed with the eastward transport”. At the same time there are only two curves on the lower panel of Fig. 7.

(vi) Fig. 10. It would be interesting to present also a plot of model - ARGOs density rms in the blank lower panel on the right.

(vii) Please use characters a), b), c),... for different panels in all of the plots. In this way, it would be much easier to refer the figures in the text.

(viii) Most of the captions need to be improved and to provide precise information about the figures. Authors provide important information about the plots on the top of each panel of the figures which in many cases is not readable. This information should be present in the captions of the figures

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