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Ocean Science Discussions

Interactive comment on "Operational ocean models in the Adriatic Sea: a skill assessment" *by* J. Chiggiato and P. Oddo

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The manuscript focuses on the assessment of the operational skill of two Adriatic sea operational modelling systems (AREG and AdriaROMS), comparing the related results with observational data, remotely sensed (AVHRR) surface temperature (SST) and with results from a Mediterranean Sea operational forecasting systems (MFS). The skill assessment is done at the statistical level. The argument treated is very interesting and important and the operational systems are state of the art. However, I do not think that the manuscript can be published as it stands now and that a major revision effort (along the lines defined by the itemised list below) is needed in order make the results and findings more reliable, clear and (not less importantly) readable. The revised manuscript will need a second round of reviewing.

We thanks the reviewer for his/her positive comment on the treated argument and we

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agree with his/her comments about readability. Major effort was spent during the revision phase trying to improve this manuscript lack. Besides, we would like to apologize for taking so long time to complete the review process.

General Comments 1. The Skill assessment is done at the level of the modelling system (Numerical model+forcing functions) as a whole (and this should be stated more clearly in the text). However, it is recommended to investigate better the role of the different surface forcing functions in improving/worsening the skill of the model. The basic question is: if the two numerical models (POM and ROMS) were forced with exactly the same forcing functions, their behaviour should be more coherent among each other or not?

We thanks the reviewer for this comment, and we have now stated clearly that the assessment has been done on the full system, not just the core ocean models themselves.. With respect to this, the main issue of the manuscript is not a ocean models comparison (POM vs. ROMS, some well-designed idealized case study are already available in the literature see i.e. Ezer et al 2002 Ocean Modelling). What is interesting to us here is to what degree the operational systems as a whole- perform in the area in order to provide a benchmark of performance and to identify critical issues. We understand the importance of the question done by the reviewer and in order to help the reader to understand the role of the (different) surface forcing, we have added a new sub-section (2.5) about diagnosed surface fluxes.

2. The data used to carry out the assessment are not entirely coherent among each other also because AREG derived analyses and Adria ROMS derived forecast were used. The possible limitation imposed by this on the assessment should be better investigated.

We have now added a full sub-section to clarify this issue (section 2.4). this section explains why we used three different time series (forecast/ hindcast /analysis). The key point here is that at the time of the work at least- AREG (and MFS) were running

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once a week, therefore just merging different forecasts would have included a weekly drift due to forecast worsening with time range. How much is this worsening cannot be assessed here (and it is stated that the performance over the forecast range is beyond the aim of this paper) because the most important dataset we have at hand (CTD casts) are spanned over 2 weeks only, and this would mean the assessment on 2 runs only, then likely not a robust assessment in terms of statistical significance. However, the difference between AdriaROMS forecast and AREG hindcast is the use of the first day of each forecast of LAMI and ECMWF analysis instead of forecast, which in most cases is negligible compared to the differences between the two atmospheric models. Another issue is that AREG hindcast makes use of the measured Po river while AdriaROMS forecast makes use of the persistence of the measurements one day before. This of course may impact the Po river delta region, with AdriaROMS presenting a daily delay.

3. The paper structure is very confused and this make the manuscript (together with other formal aspects) very, very difficult to be read. Sentences in the various sub chapters are very often unrelated (or poorly related). Concepts are very often expressed with a very contorted sentence structure. A total revision of the paper structure is absolutely needed in order to improve clarity and readability. The Authors should ask themselves what is the message they want to pass at the reader. By reading the manuscript in the present form one gets the opinion that the Authors had not clear in mind the shape and structure they would give to the paper.

We agree with the reviewer8217;s comment and we apologize for the low quality of the manuscript structure. We have now reshaped the structure of the paper, adding new sub-sections (2.4 and 2.5), moving formulae to the appendix, and in general the revision has been devoted to enhance the readability and the logical sequence of the paper. Sorry for not being this way in the previous version.

Specific Comments 4. Section 2.2 Very scanty information about the surface forcing functions used by AREG is given.

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The reviewer is right and we added a short sentence about the air-sea interactions in AREG, however we decided not to explain in depth all the features of the systems when it is possible to redirect the reader to published papers (for AdriaROMS this is not possible so the paragraph is a little bit longer than for AREG or MFS).

5. Page 2094. Please expand the consideration about the possible model drift. What could be the consequences on the skill assessment?

We have decided to drop this sentence from the manuscript during the revision phase, in order to avoid unjustified warnings. Below we discuss the remark anyway; In case of realistic application with very limited (in time) observational data-set, model drift is very difficult to be estimated. Looking at the heat and salinity content time-series however (see links below) it can be noted that the relative rating of the content amongst forecasting systems do no change in the period considered. Much of the difference is very likely due to different initialization field. Heat content amongst models is slightly changing: AREG -0.5°/year, AdriaROMS -0.2°/year and MFS 0.0° /year however the relative rating is conserved. Change in salinity content are similar amongst models (AdriaROMS -0.06 PSU /year, AREG -0.04 /year, MFS -0.04 year).

NOTE TO THE REFEREE: it is not possible to add plots to the reply, so we posted them on imageshack. you can have access to the plot reaching the following link:

http://img153.imageshack.us/my.php?image=tempcontentfs6.png

Figure R2-A: heat content time-series. Note that the content in AREG is actually lower compared to the previous years (see Oddo et al., Sci. Total .Environment 2005, figure 5) but we can't state if it is real or spurious drift. Previous plot for AdriaROMS are not available, because of its recent initialization.

http://img156.imageshack.us/img156/9844/saltcontentnw6.png

Figure R2-B: salt content time-series. The behaviour amongst models is pretty much similar, although MFS shows a maximum in salt content in late autumn likely as a

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consequence of the relaxation time-scale.

Editorial Comments 6.Beyond the structural problems the Authors should give attention also to wording punctuation, grammar and Syntaxes. In particular they should try to avoid the use of colloquial sentences.

We are sorry for possible typos, punctuation and grammar errors; we tried to fix all of them in the revised version of the manuscript.

Interactive comment on Ocean Sci. Discuss., 3, 2087, 2006.