

Interactive comment on “A nested circulation model for the North Aegean Sea” by V. H. Kourafalou and K. P. Tsiaras

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General comments:

We thank the reviewer for the constructive criticism which has helped us improve the analysis and presentation of our results. We have prepared a revised manuscript that is ready to be submitted to OS. We paid particular attention to the suggestion to use our simulations to examine the effects of higher resolution and improved topography in the nested model. We have performed such analysis as will be explained below. We also accommodated the suggestion to employ observations for evaluation of model fields, a difficult task since data availability for the simulation period (January 2003) was extremely limited. We have added 4 Figures and a substantial amount of text.

We have tried to clarify the philosophy behind this study and to articulate our objectives.

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The strategic study goal, in the context of the MFSTEP project, is to develop a nested modeling system for the North Aegean that can achieve pre-operational capabilities and be suitable for incorporation in local forecast systems. In this study we focus on building the nested system and evaluating the ability to perform short term hindcasts when initialized from a longer term running outer model. We feel that these steps are extremely important for building a successful forecast system and it is important that we undertake them with free-running simulations, in preparation for future runs that involve data assimilation. In this context, we consider that the outer model is our “nature run”, i.e. it has an adequate representation of the key circulation features in our study area, following a similar methodology of certain Ocean System Simulation Experiments (OSSE’s). Our focus is then to adjust our numerical procedure (vertical resolution, initial and boundary conditions) to ensure good agreement with the outer model. Furthermore, we examine the energetics and the new features that evolve in the nested model. Following the reviewer’s comments, we have examined flows through island passages and straits, where the relative influence of horizontal resolution and topography is more pronounced.

As per the reviewer’s suggestions, we performed certain comparisons to observations. We have used a near surface temperature record from the only moored observations available in this period. We have shown that the nested NAS model had a better agreement with the data than the outer ALERMO model. Certain discrepancies between model and data were attributed to the buoy location. As the buoy resided in the frontal area between cooler Northwestern Aegean and warmer Southeastern Aegean waters, short term changes that are not due to the local atmospheric forcing, are hard to be captured by the models, in the absence of data assimilation. We analyzed all the available satellite observations, but decided not to use them, as inconsistencies in the data made our comparisons inconclusive. However, we were pleased to find a reasonable agreement on temperature spatial patterns. An evaluation of the model predicted circulation was made possible by employing lagrangian data from an ancillary drifter study. We have added a comparison of model and drifter trajectories, both with the

nested NAS and the outer ALERMO models.

Specific comments:

_ Model setup: Fig. 1 has not been changed, as it provides a clear image of the North Aegean Sea topographic particularities: shallow and deep areas, peninsulas, islands and straits. The DBDB1 topography is the best available topography for the study domain.

_ We have added comments to point out that no high frequency inflows were available for rivers or the Dardanelles. We agree with the reviewer that this is a shortcoming and it has to be addressed for the purposes of a reliable forecast system; however, it is not a critical issue for the current study.

_ Daily averaged fields for the open boundary conditions were the only fields available.

_ All suggestions under “Model simulations” have been accommodated in the revised manuscript.

_ We thank the reviewer for the positive comments on our overall presentation of the model and simulations.

Interactive comment on Ocean Sci. Discuss., 3, 343, 2006.

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