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Nonlinear Processes in Geophysics
Discussions

Interactive comment on "OSSE for a sustainable marine observing network in the Marmara Sea" *by* Ali Aydoğdu et al.

Anonymous Referee #1

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The manuscript presents an OSSE study in the Marmara Sea. The study is interesting for publishing in the Nonlinear Processes in Geophysics, because it provides an insight on how combining models and observations may improve the monitoring of the Marmara Sea characterized with complex dynamics. I have some important comments that should be addressed by the authors before accepting the manuscript for publication.

Major comments

1. Temperature and salinity observations are assimilated and the evaluation of impacts is made only with temperature and salinity. The assimilation of temperature and salinity observations, however, impacts all other model fields. The evaluation of the observational impacts should be extended at least to currents.

2. It seems that using the Ferrybox system for observing temperature and salinity near the surface is more feasible than using floats or gliders. On the other hand, does the improved estimate of temperature and salinity fields near the surface significantly improve the support for the most important applications of oceanographic forecasts in the Marmara Sea?

3. There are many technical details about specific solutions implemented in the data assimilation scheme, but impacts those solutions are not tested in the study.

4. I think that the style of writing should be improved. It is very difficult to read and interpret many sentences providing important information.

Minor comments

1. Page 2, line 2: The "high resolution" of what?

2. Page 2, line 3: What are "integral models"?

3. Page 2, line 12: The OSSE abbreviation is introduced, but it is not explained.

4. Page 3, line 14: same as comment 2.

5. Page 3, lines 19-20: This sentence is not related to the scope of the study.

6. Page 4, line 11: What is "covariance information" in this context?

7. Page 4, line 12: What is "prior information" in this context?

8. Page 4, line 13: Which covariances are updated?

9. Page 4, lines 20-24: Is vertical diffusion the most important for correctly simulating the depth of the interface? Vertical diffusion should be governed by slowly varying large-scale fields and perturbing it at the high frequency may add processes that may be unphysical.

10. Page 4, line 35: Localization may introduce strong dynamical imbalances. This contrasts the sentence on lines 11-13.

11. Page 6, lines 29-30: I do not understand this sentence.

12. Page 9, line 3: Argo floats and gliders are not instruments.

13. Page 9, lines 18-20: How is the sampling rate of 1 minute obtained output frequency of 1 hour.

14. Page 9, line 24: What is the meaning of stochastic in this context?

15. Page 9, line 25: Do you want to say that errors of observations are uncorrelated?

16. Page 10, line 16: Updates are smaller than what? It looks like temperature and salinity are compared by magnitude, but they are two different physical parameters.

17. Page 11: The bottom paragraph should be reformulated by using the correct terminology.

18. Page 12, lines 1-4: I do not understand why there are outliers in an OSSE experiment? Are observations wrong, or some assumptions are not valid?

19. Page 15, line 4: Innovations are better than what?

20. Fig. 11: Salinity differences have very large gradients. I suspect that they form strong density gradients impacting currents. Currents should be included in the evaluation of the assimilation.

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