Ocean Science

Discussions

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Interactive comment on "Long-Term Evolution of the Caspian Sea Thermohaline Properties Reconstructed in an Eddy-Resolving OGCM" *by* Gleb S. Dyakonov and Rashit A. Ibrayev

Anonymous Referee #1

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The authors have reconstructed the thermohaline properties of the Caspian Sea for a period of 40 years (1961-2001) using a numerical model. The model results are then used to study the impact of external forcing on the evolution of salinity, temperature and density at different depths of the Nothern, Middle and Southern Caspian Sea. One of the interesting features is the impact of the climate shift in 1976-1978 on the thermohaline properties. The paper also discusses the challenges of long term modeling of the Caspian Sea. These include accumulating model errors caused by advective and diffusive mixing and bottom drag parameterization in the shallow areas of Northern Caspian Sea.

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Discussion paper

To my knowledge, this is the first study to model long-term (40 years) variability of the Caspian Sea. Therefore, it contributes to a better understanding of the impact of climate shift on the physical properties of the area. It is also a good reference for numerical modelers that aim at reconstructing long-term variability of enclosed water bodies, as it points out the difficulties of modeling such environments. Hence, I propose that the paper is accepted with minor revisions:

1. It is mentioned that the downsloping cascading process of cold saline waters along the slope of nothern and eastern shelfs are not fully taken into account by the model. Is this due to using z-level grids in the model? If not, it would be interesting to know how this process can be better resolved in numerical models.

2. The model is validated against sea surface height at Baku and is shown to be able to well reproduce its long-term variability. However, for the salinity and temperature evolution, the comparison against observed data has not been shown (Although it is mentioned that the model is in good agreement with observations). It would be interesting to have a more detailed comparison of the model thermohaline structure against observations shown in Tuzhilkin and Kosarev, 2004. My understanding is that the model shows more salinity stratification in the period of 1960-1978 in the middle Caspian Sea. However, it is hard to reach a conclusion because the results shown in the study are averaged over the entire MidCaspian basin, while the observations are for the deep-water area.

3. Regarding the abstract, if possible, I think it is useful to have a more extensive abstract that includes some of the results mentioned in the conclusion. For example, the effect of regime shift of global climate on the different regions of the Caspian Sea.

4. Technical error, misspelling: Line 15, page 7: "compared to" instead of "comparted to"

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