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Discussions

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Interactive comment on "Mesoscale variability in the Arabian Sea from HYCOM model results and observations: impact on the Persian Gulf Water path" *by* P. L'Hégaret et al.

Anonymous Referee #2

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In this paper the authors try to describe characteristics of mesoscale variability in the Arabian Sea and to reveal their role in the spreading pathway of Persian Gulf Water by utilizing observational datasets and a numerical model. In my opinion, there are three critical deficiencies in the current manuscript, as listed below. The modeling itself looks successful, and additional analyses of the existing modeling results could make the manuscript suitable for publication in Ocean Science. However, the necessary revision is very extensive and would make the manuscript totally different from the current version. Therefore, I recommend rejection of this manuscript at this point and encourage resubmission after thorough rewriting.

1) Information is critically lacking in the setup and basic performance of the utilized

numerical model. Model domain is not described, nor is the treatment for open lateral boundaries. In particular, it is not described how PGW formation is modeled (if the Persian Gulf is included in the model domain) or how its water mass property and formation rate are imposed (if the Persian Gulf is not included). The authors should also note how stable the analyzed six-year period is. Isn't there any noticeable interannual variation or trend (or model drift) in the modeled mesoscale features and PGW transport?

2) The authors conduct EOF analysis in trying to describe mesoscale features and their seasonal variation in the Arabian Sea. However, I don't think EOF analysis is suitable for describing characteristics of moving disturbances. Associated with this point, I wonder how long the data interval used in the EOF analysis is. Judging from Fig.4, I guess the interval is monthly. But I think the monthly data interval is too long to capture mesoscale eddies, whose evolution time scale is well shorter than that as the authors describe in Section 4.

3) The EOF analysis is also used to show the pathway of PGW, but I'm in doubt about the validity of using this method, again. EOF analysis well depicts temporal oscillations of standing (non-moving) spatial patterns but is not suitable for tracking moving signals. Furthermore, the dynamical role of mesoscale eddies in transporting PGW is not clarified. The authors simply describe distribution of PGW simulated in the model. Its relationship with the eddy properties investigated in Section 4 is not discussed at all.

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