**Ocean Science
Discussions**

Interactive comment on "Numerical simulations of spreading of the Persian Gulf outflow into the Oman Sea" *by* M. Ezam et al.

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ezam@srbiau.ac.ir

Dear anonymous referee 2

We appreciate the referee for constructive and reasonable comments concerning our manuscript. AS we have responded to the anonymous referee #1 and your comments concerning the manuscript our answers are: 1. We are preparing the revised version of the manuscript including mean monthly sea surface temperature (SST) form AVHRR (advanced very high resolution radiometer) and mean monthly net short wave radiation flux at the surface. In addition, surface salinity boundary condition with applying mean monthly evaporation and precipitation are included (detail are presented in the paper), hence we have included thermohaline forcing. It is appropriate to say that we found interesting results that remove the concerns in our previous findings.

2. Concerning the open boundary condition for temperature and salinity, in order to do our simulation for the whole of the year in the new modeling effort, we have now used the mean monthly climatological values of temperature and salinity at all open boundaries from WOA05 (0.25 degree resolution) and interpolated them on the model grid at the boundaries. As you mentioned that there is a lack of comprehensive hydrological data in the Persian Gulf and also in the southern and eastern boundaries in the Oman Sea for better representations of thermohaline characteristics of the inflow water into the model domain through out the year. Therefore, we have now carried out the simulations with mean monthly climatological values and presented the results in the revised version. Finally we have compared the new results with available CTD measurements and found considerable better consistencies than before.

3. Regarding the integration time, in the previous work the simulations were performed for each of the two times until the quasi steady sate solution was gained (it was about 300 days for each simulation). In the new version, the time series of the domain averaged kinetic energy and averaged salinity are shown in order to represent the integration time for stabilization of the model results.

4. Regarding the comment concerning the penetration depth of the outflow into the Oman Sea we agree with you. It is appropriate to say that after carrying out the simulations (with surface thermohaline forcing included) for the whole of one year we found that at least in some times of the year (especially in the first half) the outflow appears at deeper than 300 m down to 500 m. In addition, in some literatures the existence of the effects of depth of the Persian Gulf outflow in the Oman Sea has been pointed out. For example Senjyu et al. (1998), using direct CTD measurements during January 1994 have specified an anti-cyclonic eddy in the Oman Sea (namely Peddy) in depths 240-400 m with salinity more than 36.8 at its center (see figure below) that is related to the outflow. Another justification for these findings is that in terms of the limited number of sigma layers that we have employed (32 layers) in vertical that lead to noticeable layer spaces in deep regions (e.g. at the region with 3000 m depth the layer spaces

are up to 100 m at mid depths). Hence the poorer resolution at these depths may have led to deeper than observed outflow in the Oman Sea. In addition (as you motioned), the uncertainty of salinity of the source water of the inflow at the western boundary due to interpolation, uncertain used bottom drag coefficient, unrealistic ambient water in the Oman Sea or insufficient mixing induced by tide may have led to deeper outflow in the simulations. However, more direct observations are also needed during the year to specify the depth variations of the outflow as we have pointed out in the new manuscript.

Yours sincerely M. Ezam and A. A. Bidokhti

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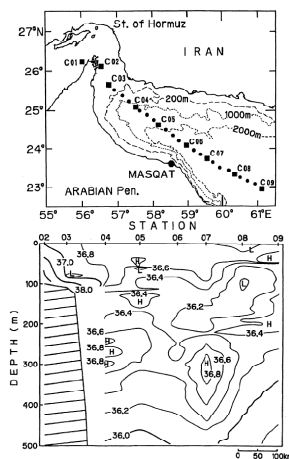
Fig. 1. Location of CTD measurements (up), salinity lens in the Oman Sea from CTD measurements (down), (Senjyu et al. 1998).