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Interactive comment on "The circulation of the Persian Gulf: a numerical study" *by* J. Kämpf and M. Sadrinasab

Anonymous Referee #3

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Overall judgement:

The paper presents a modelling study of the Persian Gulf. The subject it deals with is not totally new, however it contributes some important new aspects to the existing knowledge. Moreover, it is nicely written in a clear and precise form and the figures have an acceptable quality. However, a salinity drift of 1 psu/year and unrealistically high velocities along the open boundaries indicate that there is still an error in the model. After correction I am sure the paper is suitable to be published in Ocean Sciences Discussions. I must admit, that I am no expert of the Persian Gulf itself, thus my comments will mainly tackle the general aspects of shelf sea modelling.

Specific comments:

Page 132: please explain acronym IOSW at the beginning.
Page 133: How to explain the stated conflict between John et al., 2003 and SB2003.

Page 136: The use of climatological mean wind forcing data causes the general problem that not enough surface mixing is produced, since peak wind events are filtered out. This normally would cause problems of a too shallow thermocline.
Page 137: Please give average and range of Ah calculated with the Smagorinsky scheme.
Page 137: The free parameter IN this scheme... .
Page 139: This drift of 1 psu/year is a very crucial problem. I doubt that the upwind scheme is the reason for this drift. A well formulated upwind scheme is diffusive but mass should be conserved. The authors should carefully check the forcing terms for salinity, i.e., evaporation, precipitation and river runoff. Also the open boundary conditions should be analysed. The strong velocities parallel to the open boundary in figs. 8–11 indicate that there is a problem related to the OBC. I would strongly suggest the use of an Orlanski-type boundary condition for S and T, which as I understood from the paper, has not been used by the authors. I would strongly recommend to perform the calculation of a salinity balance considering the different sinks and sources. Since the salinity strongly effects the baroclinic pressure gradients such a strong trend in the salinity is not acceptable. It is very likely that the entire pressure field is strongly effected by this trend. Moreover, as one can see in figs. 8–11 the artificial strong flow along the open boundary also heavily effects the flow field in the interior of the model domain. Therefore a correction is definitely needed.
Page 141: Please give a short description of the principles of the geostrophic adjustment theory from Kämpf, 2005.
Page 144: Please explain acronym ICJ.
Page 145: For an adequate comparison with observational data it is necessary to use the actual meteorological forcing data which are available for NCEP on a 6–hourly basis. Only the use temporally resolved river runoff data and spatial varying atmospheric data as proposed by the authors seems not to be sufficient.

Interactive comment on Ocean Science Discussions, 2, 129, 2005.