Ocean Sci. Discuss., 11, C101–C103, 2014
www.ocean-sci-discuss.net/11/C101/2014/

Ocean Science
Discussions
Open Access

Interactive comment on "Modelling Seasonal Circulation and Thermohaline Structure of the Caspian Sea" *by* M. Gunduz E. Özsoy

M. Gunduz E. Özsoy

murat.gunduz@deu.edu.tr

Received and published: 20 March 2014

Modelling Seasonal Circulation and Thermohaline Structure of the Caspian Sea

by M. Gündüz and E. Özsoy

Reviewer's original comments are in *italics*,
Our responses follow after the reviewer comments.

OSD

11, C101–C103, 2014

This is a detailed analysis of a simulation of the Caspian Sea using the HYCOM ocean model with climatological atmospheric forcing. There are two generic limitations of such a simulation, a) how well does the model capture the features of the actual Sea and b) how strong is the inter-annual variability that is being ignored. The extent to which the model captures actual features is covered in the paper, and appears to be high. Inter-annual variability will have to wait for a follow up simulation with inter-annual winds (and inter-annual river flow if available). Overall, this is a valuable addition to our knowledge of the Caspian Sea.

We would like to thank referee #1 for the very constructive comments. As already stated by referee, based on what little we could find in terms of in-situ observations, and in view of satellite data that we could use, the model appeared to reproduce the observed oceanographic features of the Caspian Sea, supported by comparison of the model results with the available satellite SST and chl-a data and drifter observations. We have set-up a completely new model of the Caspian Sea, for a first level investigation of its seaonal behaviour. As rightly said by the reviewer, the interannual simulatons would have to follow up later. It is also noteworthy to mention the flat geography of the northern reaches of the Caspian Sea coast that presents an inherent difficulty to simulate the inter-annual variability of the Caspian Sea without a wetting-drying algorithm incorporated in the model. In a new set-up of the model the coastline is fixed with respect to the high sea level conditions. A new version of HYCOM with a wetting-drying option possibly will be set-up in our follow-up studies for inter-annual simulations.

Specific Comments
HYCOM can include isopycnal layers, but here it is configured as a sigma-z system with 14 sigma levels above 50 m and 16 fixed depth z-levels below 50 m. This should be made clearer in the text.

A clear description of the model vertical sigma-z coordinate option was added to the model description section of the manuscript.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

A discussion of the mixed layer is the only missing piece of this comprehensive paper.

As stated in the first section of the reply, we already set-up a new version of the model with high sea level conditions. We are planning to investigate the mixed layer properties more deeply by using this new set-up. As it is known, the mixing properties of the sea is very different between high sea level conditions and low sea level conditions. There is evidence from some observations that the whole Caspian Sea can be mixed from surface to the bottom in extreme cases, which is believed to be strongly linked to the sea-level changes in response to the water budget.

Why was 0-30m, 30-150m, and 150-300m chosen as vertical averaging intervals for most of the figures, and also why 0-10m, 50-100m, and 200-1000m was chosen for figure 12?

At the surface there is no big difference in therms of circulation characteristics between the 0-10m and 0-30m average. The wide eastern shelf of the Southern Caspian Sea (SCS) extends to depths of 150-200 m, so this is a critical depth range for the SCS. The northward flow of the eastern current is usually evident from surface up to 150-200 m, disappearing at deeper levels (as shown in Figure 12c). For this reason we chose 200 m as the upper boundary of the deeper circulation.

Technical Corrections
model day should be ordinal day (in the year). Rather than, or in addition to, ordinal day I suggest providing the actual date, which will be more familiar to most readers. The sentence on page 274 lines 11-14 is not well constructed English. Figure 7, are these 0-30m currents? Say what they are in the figure caption. Figure 10, should be labeled potential density in sigma-theta(?) units.

All the technical corrections were done according to referee #1 suggestions.

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper