Ocean Science
Open Access
Discussions

Interactive comment on "Influence of frontal cyclones evolution on the 2009 (Ekman) and 2010 (Franklin) Loop Current Eddy detachment events" *by* Y. S. Androulidakis et al.

Anonymous Referee #1

Received and published: 9 September 2014

Review of "Influence of frontal cyclones evolution on the 2009 (Ekman) and 2010 (Franklin) Loop Current Eddy detachment events."

This manuscript investigates the role of frontal eddy in the shedding of two warm core eddies (Franklin and Ekman) during the period 2009-2010. It uses, the GoM-HYCOM system, altimetry data as well as hydrographic data deployed in the context of Deep Water Horizon incident. The manuscript compares first the model skills with the hydrographic data and altimetry level-4 map. It provides then a very detailed description of the evolution of the cyclones and their spatial configuration for each of the shedding event. Finally, it investigates the role of coastal upwelling over the Campeche Bank (CB) to the formation of the CB eddy. The manuscript is well written, rigorous and

presents some novelty in the understanding of the growth of the CB frontal eddy. It makes no doubt that after some modifications/clarification the manuscript would make a relevant publication.

Comments:

It is unclear what data Gom_HYCOM is assimilating and at which frequency. Page 1954 Line 25 -> 19545 line 5) it says it assimilates all NRT data + in-situ data from DWH. While in Page 1956 line 9 "it is noted that these data are not assimilated in the model , or Page 1958 Line 21 it says that "these altimetry data are also not assimilated", suggesting that neither the in-situ nor the altimetry are assimilated.

P1957 Line 26, I guess the sharp temperature increase indicates of a transition into Loop Current Water?

The shape, size and orientation of the LC eddies differs between the model and AVISO ADT that is known to be an accurate and reliable data product. Even more worrying the model suggest a strong cyclonic eddy (24 N,90 W) in Figure 3a, which is not visible in the data product. This is expected if the model does not assimilate altimetry data. It is correct that the model has some skill and is skillful enough to investigate the role of the CB upwelling in the Frontal eddy growth but AVISO product seems a wiser choice to track frontal eddies and timing of eddy shedding (Figure 5) . It may be interesting to add the Global T,S,U,V,H Armor-3D L4 in the in situ comparison. Overall I find that the model validation is distracting the reader from the main objective of the paper which is to investigates the role of frontal eddy in the shedding of two warm core eddies. (All this is only suggestions).

There are redundancy between Section 4.1 4.2 4.3 and 5.1 making the paper hard to follow. Maybe it would be good to organize the paper w.r.t to the two eddies shedding and put less focus on the model validation.

The part about the contribution of the CB upwelling in the formation of the CB eddy is

very interesting, but one mechanism remains unclear to me. Is the upwelling "creating" PV, which then takes about 7 days to reach the Yucatan Current or is PV already presents over the bank and upwelling causes the flushing ?

I do not understand how layer 1 vanishes (is masked) over the Campeche Bank while layer 2 is not masked. Could it be that PV is masked because it is above the range of the colorbar ?

It seems also to be some inconsistency between Figure 15 and Figure 11-12: Layer 1 is not masked over the CB in Figure 15. Value seems larger than in Figure 11. (It is hard to tell because colorbar are not comparable, but PV layer 1 seems larger than in layer 2 ?)

Is potential vorticity analysis meaningful for layer one when HYCOM is not isopycnal and thus PV not conserved ?

The major growth of the PV blob in Layer 2 (between 31/05-> 30/06), occurs while contribution of PV from the Campeche Bank is minimal, which suggesting that CB contribution is not critical in triggering the formation of the CB eddy. On the other end, Figure 13d and 13-e highly correlate suggesting that contribution from the Yucatan Channel (YC) is constant? It would be interesting to show the contribution from the YC.

Interactive comment on Ocean Sci. Discuss., 11, 1949, 2014.