Ocean Science Discussions

Ocean Sci. Discuss., referee comment RC1
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Comment on os-2020-118

Anonymous Referee #1

Referee comment on "Lagrangian eddy tracking reveals the Eratosthenes anticyclonic attractor in the eastern Levantine Basin" by Alexandre Barboni et al., Ocean Sci. Discuss., https://doi.org/10.5194/os-2020-118-RC1, 2021

General comments:

This manuscript investigates anticyclonic and cyclonic activity in the Levantine basin focusing on the advection and interaction of mesoscale eddies in the area. It is mainly based on the DYNED dataset combining satellite tracked eddies with in situ vertical profiles. I found the topic potentially interesting but the methodology is not clearly explained and I have some doubts on the strategy chosen by the authors to count the transit of eddies in the area of interest. The attractor explanation proposed by the authors is based on their count strategy, which I find biased. I would suggest to have a look at other works tracking eddies in various basins (a few references below). Moreover, there are several grammar issues through the text, I stopped tracking them at page two unless they were altering the comprehension of specific sentences. I would suggest to resubmit the manuscript after extensive changes in the methodology and contents and I would also recommend English proofreading.

Chelton, D. B., Schlax, M. G., Samelson, R. M., and de Szoeke, R. A. (2007), Global observations of large oceanic eddies, *Geophys. Res. Lett.*, 34, L15606, doi:10.1029/2007GL030812.

Mason, E., Pascual, A., & McWilliams, J. C. (2014). A New Sea Surface Height–Based Code for Oceanic Mesoscale Eddy Tracking, Journal of Atmospheric and Oceanic Technology, 31(5), 1181-1188. Retrieved Feb 12, 2021, from https://journals.ametsoc.org/view/journals/atot/31/5/jtech-d-14-00019_1.xml

Daisuke Matsuoka, Fumiaki Araki, Yumi Inoue, Hideharu Sasaki, A New Approach to Ocean Eddy Detection, Tracking, and Event Visualization –Application to the Northwest Pacific Ocean, Procedia Computer Science, Volume 80, 2016, Pages 1601-1611, https://doi.org/10.1016/j.procs.2016.05.491.

Xing, T., & Yang, Y. (2021). Three Mesoscale Eddy Detection and Tracking Methods: Assessment for the South China Sea, Journal of Atmospheric and Oceanic Technology, 38(2), 243-258. Retrieved Feb 12, 2021, from https://journals.ametsoc.org/view/journals/atot/38/2/JTECH-D-20-0020.1.xml

Specific comments:

Abstract Line 9: "similar surface signatures correspond to very different physical properties." Is this sentence referring to the comparison between Eratosthenes and Tel-Aviv anticyclones? From fig. 12 even their surface signature seems quite different to me, the only similarity I see is being two anticyclones.

Line 65: which poles?

Lines 123-124: can you further clarify how the colocalization of new profiles was performed through maximum velocity contours? Is it a matter of profiles' time and space with respect to the velocity contours?

Lines 126-127: climatological background procedure not very clear to me. Please also mention the climatology usage and aim within the analysis.

Line 171: From fig.3 looks like it includes also eddies generated into the region itself?

Line 180: case (2) what happens if an order 1 eddy dies while merging with an external one?

Figures 1 and 4 (also relative caption and paragraph): I found different notations through the manuscript. Is it MDT (Mean Dynamic Topography) or the time mean of the Absolute Dynamic topography (ADT)?

Section 4.1 (and through the text): eddy exchange stands for advection from one area to another?

Lines 186-187: what if an imported eddy exits the domain (either keeping its identity or being split/merged)? Why it should not be counted as well as exported? Maybe the eddy is just in transit within the region. I would be curious to see the complete eddy tracks dataset superimposed on the area of interest. In Fig. 3 the number of exported eddies is very low compared to the imported ones, but probably because the eddies entering the domain are excluded from the count of the exiting ones?

Table 2: in the transition table, considering each line, the number of anticyclones born is not equal to the sum of termination region counts. Why? Is it because of splitting?

Line 200: I have some doubts on the strategy of imported/exported eddies definition, the authors state "an imported cannot be also defined as exported". It probably induces very low exported eddies count, and I would revise how the attractor definition apply to the investigated areas.

Sections 4.4-4.7: I would revisit this part according to the general comment and the comment above (Lines 186-187).

Line 409 and fig.11: considering the depth of the profiles, is it potential temperature and potential density?

Discussion and conclusions: I would revisit this part according to the general comment and the comment above (Lines 186-187).

Technical notes:

Abstract, Line 1: statistics of anticyclonic activity.

Abstract Line 4: complex eddy activity, which has not been fully characterized yet.

Abstract Line 11: extends down to

Intro, Line 22: bounded by

Line 33: first SST?

Lines 42-43: as early as the late?

Line 44: have not been

Line 48: has further improved

Line 51: successfully used

Line 60: but different subsurface

Line 179: if an eddy undergoes a splitting event and one of the split eddies spends…