Comment on egusphere-2022-649 titled as: How subsurface and double-core anticyclones intensify the winter mixed layer deepening in the Mediterranean Sea" by Alexandre Barboni et al.,

The temporal evolution of MLD in the Mediterranean Sea is investigated in this ms. It is shown that the MLD restratification delay and connection with preexisting subsurface anomalies appear to be determinant in MLD modulation by mesoscale eddy and highlights the importance of interaction with eddy vertical structure. The study is novel and will advance our understanding of the impact of mesoscale eddies on the dynamics of seawater properties. The manuscript is well structured and discussed in detail. I recommend publication, after minor modification and changes. The general and specific comments are given below.

Abstract

In general, the quality of abstract is not keeping with the entire ms and requires couple of modifications. It is recommended to review the abstract and re-written it, specifically form line 1 to 12.

Some few examples are given below:

Line 2: ….., shoaling very: check the grammatic of the sentence, and replace the comma with an and.

Line 2-6, I suggest to focus on your achievements rather than what is done previously (this is more in the introduction section), if it is really important to mention, put it in a way that shows what you have improved in comparison to previous works.

Line 13: cooling of MLD, does not make much sense, do you mean reducing the strength of that?

please be more specific: Line 13-14: how often it is reaching to more than 2 months. Line 10: at a fine temporal scale on the order of week, you could directly mention how many week(s) ?

Line 16: it is not in the opposite of the former sentence, rather an additional information.

Introduction:

Line 40-50: He et al., 2018 show that eddy amplitude is related to surface T anomalies with different behavior for AE and CE, how does their finding cooperate to Gaube et al., 2019?

The ms is focused on the subsurface mesoscale eddies, therefore, it is suggested to briefly explain the subsurface eddies and their differences with other typical type of dominant eddies in the Mediterranean Sea.

line 70: I was looking to read the reasons why the MS is an interesting region to study eddy influence on MLD. The text is very scatter and does not clearly explain why MS is an interesting region.

Line 77: remove the sentence here: -All these structures should have a different impact on the mixed layer. You are seeking to find this in the ms.

Data:

Are the 157053 profiles unique data or some data are repeated in your data bank?

Line 112: why 2 set of different data sets are used?

Line 110-125: please name couple of successful application of using AMEDA on detecting/analyzing eddies in the other regions apart from MS (and preferably not from the co-author of this ms).

Figure 2: D--->D0

Line 190-195: why did you choose the background of an eddy by time/spatial averaging with the given time and radius, rather than climatological averaging at the location of the eddy by removing the eddy events following previous studies such as Gaube et al., 2019.

Results and discussions

Figures 2,4 and 5: It is suggested to change the colorbar specially from 0 to -5000 m, as it may get confused with the eddy contours or alternatively change the eddy contours line colors.

Figure 4-5: Keep the unit in the figures and text consistent, either °C/m (it is suggested as the profile depths does not cover a km) or °C/km. Does the red region quality in figure 4-5 between 0 and 100 m depth improve, if the colorbar covers a larger number for example to -30 instead of -20?

Would it be possible to add an extra column to table 1 with the eddy life time since the generation day?

Please pay more attention in using abbreviations in the entire text. An example of inconsistency: PEL is first introduced in Fig3 and line 231 without explaining! Then in line 318.

Figure 6: would it be possible to add the eddy path trajectory for the indicated eddies in this figure?

The section 5.5 is suggested to be removed from the ms as i) it is not well discussed ii) out of the focus of the ms.

Appendix:

How does the quality control algorithm work? How does it remove bad quality data? How to you define bad data/spikes in T/S profiles?