Review : « *A High Dense Temperature-Salinity Dataset Observed by Automatic Underwater Vehicles toward Mesoscale eddies' Evolutions and Associated Submesoscale Processes in South China Sea* »

Review : The authors present a 9-year dataset (2014-2022) collected by AUGs and AUVs to observe mesoscale eddies (MEs) in the South China Sea (SCS). These high-resolution data (<7 km, <6 hours) allow the study of the distinct life stages of MEs and their associated submesoscale instabilities. It is an invaluable dataset of observations from autonomous platforms, which has led to significant advances in the understanding of MEs dynamics in the SCS, as detailed by the authors. Despite the importance of the dataset, there are major issues with this paper, and in its current state, it should be rejected. However, if the necessary revisions are made, it could be resubmitted to this journal. I am listing my main comments/concerns first, followed by some minor points.

Main comments :

1/ The dataset, in its current form, is unusable by the scientific community due to a lack of proper metadata and description. Key information is missing, such as:

- The location and dates of the measurements,
- The measured parameters,
- The units of measurement,
- The instruments used for the measurements,
- The geographic coordinates,
- The data processing or correction methods applied.

Additionally, the dataset is not in the widely adopted NetCDF format, which is the standard for ensuring interoperability and accessibility across platforms and software in the scientific community. Without these essential elements, the dataset cannot be effectively utilized or shared, and its scientific value is significantly diminished.

2/ l 141-147 : The authors describe the quality control (QC) performed on the data. However, no information regarding this QC process is included in the dataset itself. It is difficult to properly assess the dataset without knowing the various processing steps and the corresponding quality flags (which

are absent). For instance, in systems like ARGO, one should be able to trace the QC steps and quantify the impact of each stage on the final data product. This is not possible with the current dataset.

As stated by UNESCO/IOC (1993): “To ensure the data consistency within a single data set and within a collection of data sets, and to ensure that the quality and errors of the data are apparent to the user who has sufficient information to assess its suitability for a task.” This principle, which seems to be the goal for data publication in ESSD, has not been achieved here.

3/ The authors describe the applications of this dataset for tracking the evolution of mesoscale eddies, indicating that these data can resolve the MEs’ spatial scales (50-300 km). As is typically the case when sampling large eddies with slow-moving platforms like gliders, the issue of synopticity needs to be addressed, particularly given the stated goal of capturing the evolution of mesoscale eddies. Gliders are relatively slow vehicles, though no specific information about their speed is provided in the paper. At an average speed of around 0.20 m/s, it would take approximately 18 days for a glider to cross a 300 km eddy, assuming favorable currents, which could further impact their ability to capture synoptic features. While AUVs might operate at higher speeds and thus be less affected by this issue, it is essential to discuss how these limitations apply to the gliders used in the study, particularly in relation to the temporal evolution of the MEs.

Minor comments :

- Tables or figures can be viewed independently of the article, so all acronyms must be defined within them. For example, in Table 1, "SCS" should be defined.

- l 133-134: What are the technical characteristics of the platforms used in this study (AUGs, AUVs)? For example, the similarities and differences between the platforms described in Table 2 should be clarified.

- Table 3: How was the number of qualified profiles determined? Additionally, it would be important to specify how many profiles were discarded and at which stage of the data processing they were eliminated.

- Table 3: The table summarizes the shared dataset, but there is no trace of oxygen, chlorophyll-a, or current data in the shared matrices. Therefore, these should either be removed from the table or it should be clearly stated that these data are not provided in the current dataset.

- Figure 1: It would be beneficial for all tick marks across the subplots to be of the same size; for instance, the coordinates are readable in subplot 1b, but not in subplot 1h. Additionally, it is challenging to clearly locate the study area—an overview map showing the general region, such as the SCS, would be helpful. Finally, the legend should mention that the SLA was averaged over the entire duration of the campaign, as indicated in the text.

- l 150: I do not see a black star in Figure 1e as mentioned.

- Figure 3: What type of interpolation was applied? Was it linear interpolation or objective mapping? It is crucial to discuss the interpolation method used and its impact on the final dataset or results.

- Figure 4: It is unclear whether AUVs or AUGs, or both, are being compared with the ship CTD, as the text refers to "ship installed CTD and AUV installed CTD" and later mentions "Different symbols are the different AUG." A clear legend is needed to distinguish between AUVs and AUGs, as they are not the same platforms.

- Figure 5: The legend is incomplete, with parts c-f missing.

- l. 189: Specify "negative temperature anomaly."

- l. 238: Specify "geostrophic velocity."

- l. 205: The reference "Yi et al., 2024" is missing in the biblography.

- Gliders are not « automatic » but « autonomous ».