

Comment from Referee #3

This dataset provides in situ temperature and salinity observations in the new coordinates of mesoscale eddies. The concept of the eddy coordinate itself is not significantly novel, but I think this global product is quite useful not only for physical oceanographers but also for biological and chemical oceanographers. I basically agree with accepting this manuscript, but I would like to add minor comments that could help to further improve its usefulness.

Response: Thank you very much for your positive evaluation and constructive suggestions. We greatly appreciate your recognition that this global dataset with mesoscale eddy-following coordinates is valuable for research across physical, biological and chemical oceanography. We have carefully studied your suggestions and revised the manuscript accordingly to improve the quality of the manuscript and dataset. Specifically, we added a normalized eddy-age variable to the dataset, expanded the validation analyses, and strengthened the discussion of dataset limitations and potential applications. We hope that the revised version meets your expectations. Our point-by-point responses are provided below.

The present dataset is directly applicable if the eddies are assumed to move with frozen structures. However, it would not be straightforward if temporal variations of the structure were considered. Even with the same eddy ID, the structure of the eddy would vary temporally, partly due to the vorticity dissipation, especially for eddies that last more than a few years. Therefore, I think it would be useful to include an index like “eddy age” (the period after its generation), which can be extracted from the original eddy database based on satellite altimetry data.

Response: Thank you for your valuable suggestion. We have added a normalized eddy-age variable to the revised dataset. Specifically, the observation sequence number along each eddy trajectory was normalized to a range between 0 and 1. As you suggested, we expect this information to facilitate future investigations of temporal variations in eddy structure during eddy evolution. Relevant descriptions have been added in Lines 131–133 and Table 1 of the revised manuscript.

Another index I believe useful is “vertical displacement.” Some eddies behave like waves, so the vertical displacement of the thermocline propagates westward rather than holding the water mass. The eddy's movement keeps the temperature and salinity anomaly when the specific water mass moves with it. Meanwhile, when the vertical displacement propagates, the strength of the temperature and salinity anomaly would depend on the background structure. Therefore, I think it would be useful to estimate the vertical displacement using the background structure, in addition to the anomalies.

Including those indexes would significantly increase the advantage of this database.

Response: Thank you for this insightful suggestion. We agree that separating water-mass transport signals from vertical displacement signals is important for understanding eddy-induced thermohaline variability. In the present dataset, we provide both the original temperature/salinity profiles and the corresponding anomaly fields relative to the climatological monthly mean state, which may facilitate future estimation of vertical displacement signals based on background stratification structures.

However, robust estimation of vertical displacement requires additional assumptions regarding eddy trapping ability (or nonlinearity), and may vary substantially among different oceanic regions and eddy individuals. Considering that the primary goal of this study is to provide a general-purpose eddy-collocated profile dataset, we did not include a dedicated vertical-displacement index in the current version. Nevertheless, we agree that this is a valuable direction for future development and will keep

it in mind. Thank you again for this insightful comment.