

Response to Referee 1 - Final Comments
on the reviewed manuscript entitled:
*“Mesoscale dynamics of an intrathermocline eddy in the
Canary Eddy Corridor”*
(doi: 10.5194/egusphere-2025-99)

July 2025

We sincerely thank the handling editor, Prof. Ilker Fer, and Dr. Anthony Bosse (Referee #1) for their thoughtful and constructive final comments. We have carefully addressed the remaining issues raised during this last round of review. All comments were gratefully received and have been incorporated into the revised version of the manuscript. Each comment is presented as stated by the referee, followed by our response.

Response

On dissolved oxygen data:: "There is no mention of dissolved oxygen calibration. Did you perform winkler oxygen titration during the cruise and compared the CTD values with it?"

Response: We thank Dr. Bosse for pointing this out. Winkler oxygen titration was indeed performed during the cruise, specifically for calibrating the dissolved oxygen measurements collected during the OcéT phase. The resulting calibration yielded a linear relationship with a slope of 1.0957, an offset of $-1.0462 \mu\text{mol kg}^{-1}$, and a coefficient of determination $R^2 = 0.9908$. The precision of the Winkler titrations, expressed as the coefficient of variation, was 0.54% ($\pm 1.01 \mu\text{mol kg}^{-1}$). Although no discrete oxygen samples were collected during the SeaSoar phase due to its continuous sampling configuration, oxygen records from both phases were highly consistent, indicating stable and reliable sensor performance throughout the cruise. These details have been incorporated into the final version of the manuscript (lines 182–187 of the revised version). Furthermore, the description of Section 3.4 has been updated (lines 467–493 of the revised manuscript) to reflect the use of calibrated oxygen data. While the main qualitative features of the oxygen distribution remain unchanged, the corrected values resulted in minor adjustments to the quantitative interpretation. These include slight shifts in the magnitude of subsurface oxygen minima and the amplitude of lateral gradients, but they do not alter the overall conclusions of the study.

Figures 5 and 7: Figure 5 : It seems more logic to me to have T,S and then N in third panel. (same with fig 7 : T,S then sigma)

Response: We agree with Dr. Bosse. The panels in Figures 5 and 7 have been reordered accordingly: conservative temperature (Θ) and absolute salinity (S_A) now appear in the first two panels, followed by brunt-väisälä frequency (N) in Figure 5 and potential density anomaly (σ_θ) in Figure 7.

1431/Figure 9: I would like the authors to discuss the effect of cyclogeostrophy as a source of the observed ageostrophic velocities..

Response: We thank Dr. Bosse for this important remark. A dedicated evaluation of the cyclogeostrophic balance as a source of the observed ageostrophic velocities has been included in the revised manuscript (Section 3.3, lines 446–466). In particular, we calculated the cyclogeostrophic Rossby number and analyzed the relative contributions of centripetal and Coriolis forces within the eddy structure. Furthermore, a brief discussion of these results has been added to the Discussion section (lines 767–778) to better contextualize the dynamical regime of the eddy in relation to previous studies in the region. These additions reinforce our interpretation of the eddy as being partially in cyclogeostrophic balance, especially near its inner core.

We hope that our responses satisfactorily address all of the reviewer's comments, and that the revised manuscript is now suitable for publication in *Ocean Science*.