Response to the second round of comments of referee #1 on “Determining the depth and pumping speed of the equatorial Ekman layer from surface drifter trajectories” (egusphere-2025-089) by Paldor and De-Leon

We Thank the reviewer for his/her careful reading of the second version of the manuscript and for the additional round of comments, all of which were implemented in the revised version.

Response to the second round of comments of referee #2 on "Determining the depth and pumping speed of the equatorial Ekman layer from surface drifter trajectories" (egusphere-2025-089) by Paldor and De-Leon

We thank the reviewer for his/her careful reading of the revised version of the manuscript and for suggesting another list of comments. Nearly all the reviewer's comments were implemented in the 3rd (current) version of the manuscript and the few exceptions are detailed below, identified by the line number (of the second version) in the list of comments and reproduced here over gray background.

L152f: I still do not fully understand this criterion. What do you do with drifters deployed at the equator, such as in Hans et al. (2024, https://doi.org/10.1029/2023JC020870), their Fig. 1? Are such drifters, deployed at the equator, included or not? Would it make sense to count all drifters that reach a position near the equator and subsequently move poleward, regardless of their prior trajectory, including whether they may have crossed the equator earlier or not?

We tracked drifters that were deployed between $1^{\circ}S$ and $1^{\circ}N$ so 0° does not pose any special case or value. We consider this

L155: launch position: Here, I would suggest to define a starting position for the calculation instead of a launch position. Anyway, taken the launch position does not yield zero meridional velocity at the trajectory start.

The initial velocities are not known and are presumably small and directed randomly in all possible directions.

L158f: No information …: It might not be used here, but the Global Drifter Program (GDP) flags the presence or absence of drogues in its dataset and information is available. Might not be the case for older drifter. See, e.g. https://doi.org/10.5194/essd-13-645-2021

We now state that we haven't screened for drifters that lost their drogues prior to reaching the final latitude

L171: If I understand correctly only mean tau_x is used instead of tau_x calculated for each drifter separately (i.e. averaged over the period of drift and longitude range) and then averaged for all drifters. This should be stated clearly right from the beginning. Which longitude ranges and periods are used for averaging?

That's correct and is now clarified in the text

L197: How is H estimated, just as an arithmetic mean? As the distribution is skewed, one could use other statistical expression such as the median. What is the difference between mean and median?

The text now shows the calculation of H for each drifter (denoted by the subscript "i" and in t_i and $y_i(0)$) and then averaged over all drifters.

L237: I don't know how the given equation for the period fit to Figure 1a showing 3 oscillations in 80 days for zero wind stress.

The scale is derived for $\tau^x \neq 0$ while the oscillations in Fig. 1 are calculated for $\tau^x = 0$ (and $\mathrm{U}(0) \neq 0$). Clearly, a finite $\mathrm{U}(0)$ can be used to introduce another scale for the period.