

RC1: 'Comment on egusphere-2025-4206', Anonymous Referee #1, 30 Oct 2025

Overall, this is a well-written paper with solid analysis and provides some useful new insights into the role of intraseasonal oscillations in driving variability in chlorophyll fluorescence and gross chlorophyll productivity at the subsurface chlorophyll maximum. I have found no major issues with the analysis or interpretation, but I have highlighted some minor revisions below.

We thank the reviewer for their constructive feedback. We have carefully reviewed all comments and improved the manuscript accordingly. We have copied the reviewer comments in bold and responded below them.

L35 – should “oscillate” be “oscillates”?

Adjusted.

L99-101. “We note fitting a log-transformed curve...” – I don’t understand this sentence. You didn’t fit a log-transformed curve, you fitted an exponential curve. You also refer to supplementary materials, but I don’t see any discussion of the precision error being “not equally weighted” in these supplementary materials. Please clarify this sentence.

We have simplified the text to: “To estimate the diffuse attenuation averaged by depth, K_d (m^{-1}), the raw measurements of downward irradiance were grouped in time and depth into 3 h and 4 m bins, respectively, and then least-squares fitted to an exponential curve. Irradiance was then interpolated back to the original $O(10\text{ min})$ time resolution (see supplementary materials for further details).”

Supplementary material and units of I . In the supplementary materials, you state that I is the vertical change in irradiance, with units $\mu W\text{ cm}^{-2}\text{ nm}^{-1}$. Firstly, it’s not clear why you use $\mu W\text{ cm}^{-2}$ rather than $W\text{ m}^{-2}$? A conversion factor would be involved, but the numbers would only be different by 10^{-2} . Secondly, if this is a *vertical change* in irradiance then shouldn’t these units be divided by vertical distance (e.g., per metre)?

We have modified the supplementary materials so we use scientific notation. We clarify that irradiance should be the irradiance over depth, not vertical change in irradiance. In the supplementary, we change “vertical change in irradiance” to “depth-variable irradiance”.

L134: “Corrected ChlF was small with the 9th percentile of 0.016 [micrograms per L]” – do you mean that the correction to ChlF was small? Figure S2 seems to support this, but actual values of ChlF were much larger (order 1).

Yes, our text is incorrect. We have fixed to “The NPQ correction to ChlF was small, with a 95th percentile of $0.016\text{ }\mu\text{g L}^{-1}$. Further details are available in the supplementary materials.” Thank you for identifying this.

L181 – Why is the SCM at a deeper/denser isopycnal in the BGC argo float data than the wirewalker observations?

The difference in isopycnal may be due to the difference in record length between the Wirewalker (19 days) and the BGC-Argo float (~ 1 year), or the sampling frequency of these profilers. For example, the BGC-Argo observed a bloom between 1020 kg m^{-3} and 1023 kg m^{-3} in November, and if it had only sampled this bloom, we may not have selected the 1022 kg m^{-3}

contour as the SCM but a slightly less dense contour. We have added to the text, “Individual months could have enhanced ChlF near a slightly different isopycnal, like the 1021.5 kg m⁻³ isopycnal used when analyzing the DBASIS floats, but we simply use the same isopycnal year-round.”

L202: “deployed at the intersection of two eddies” – is this shown anywhere? How do you know this to be the case?

We have replaced Fig. 1 with two new figures. The new Fig. 1 shows satellite Chl, the coastal plume, and the two eddies. We now state on lines 220-225, “The DBASIS array was deployed at the intersection of two eddies, as inferred from sea surface height (SSH, Fig. 1). Low-SSH (SSH < 0.5 m) and high-SSH (SSH > 0.5 m) eddies were present to the northwest and southwest, respectively. Between these two eddies, a plume of elevated surface chlorophyll was advected more than 400 km from the coast toward the DBASIS array (Fig. 1a). This coastal plume exhibited elevated turbidity and surface chlorophyll-a fluorescence (ChlF), both of which reduced light penetration into the upper ocean (Fig. 2). Similar coastal plumes have been observed elsewhere at the intersection of cyclonic and anticyclonic eddies (i.e., eddy dipole, Malan et al., 2020).”

Fig. 2. I find it very hard to follow which day is which from the bottom panel to the top panel. I think this figure would be improved if panels (a) and (b) were switched, so that the daily-averaged values in panel (e) could be more easily linked to the raw values in (a).

In addition, Fig. 2 has numerous instances of poor formatting – in particular, the title text for several panels overlaps with the plotting area. The colorbar for panel (b) is also not labelled.

We have made these adjustments and updated figure citations accordingly.

L221: “The time-derivative of SCM ChlF” – is this shown anywhere? Perhaps a better way to phrase this would be to say that PAR is maximum at this time and the SCM ChlF typically increases rapidly, as seen in Fig. 2c.

We have adjusted the text to, “The noon maximum in PAR_{SCM} (Fig. 3b teal) coincided with a rapid increase in ChlF_{SCM}, as found previously in the bay (Lucas et al., 2016)”.

L239-244: For a while, I was confused by this paragraph as I thought subsurface PAR was PAR at -0 m (I know you refer to the latter as surface PAR in water, but hopefully you can see where the confusion comes from). I would suggest using SCM PAR rather than “subsurface”, especially here.

We have changed ‘subsurface PAR’ to ‘PAR_{SCM}’ here and elsewhere in the manuscript. We also clarified the first and last sentence of this paragraph to improve readability.

L256: “temperature <= 1°C the sea surface temperature” – insert “lower than” or similar.

Adjusted.

L257: “density increase... corresponds to a temperature increase of 1 °C” – I think you mean decrease? Increasing temperature decreases density!

Yes, thank you for identifying our error.

L261: “July 17.8” – typo?

Fixed.

L264-269: I'm not convinced by this argument, I think it needs more evidence. From what I can see, the SCM ChlF is not strongly affected by the shoaling of the MLD. There is almost no effect of the MLD shoaling from day 16-18 on SCM ChlF – this only increases after 20 July as the MLD increases in depth. Therefore, the final two sentences of this paragraph seem very speculative.

We have modified the text to, “The thick barrier layer that formed from the rain event should theoretically isolate upper ocean mixing from the SCM. The observed increase in ChlF_{SCM} and GCP_{SCM} from July 18 may therefore be due to both the sustained sunny break conditions and a decrease in SCM mixing from the barrier layer formation (Fig. 3d).”

L315: “from southern BoB” → “from the southern BoB”

Adjusted.