JGR-Oceans

Supporting Information for

The impact of a Southern Ocean cyclonic eddy on mesopelagic micronekton

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Tables

	North of the SAF	**South of the SAF**
Daytime	285	188
Night-time	174	128
Total	459	316

Table S1: Duration of sampling in hours for the different subregions extracted from the IMOS dataset

Figures

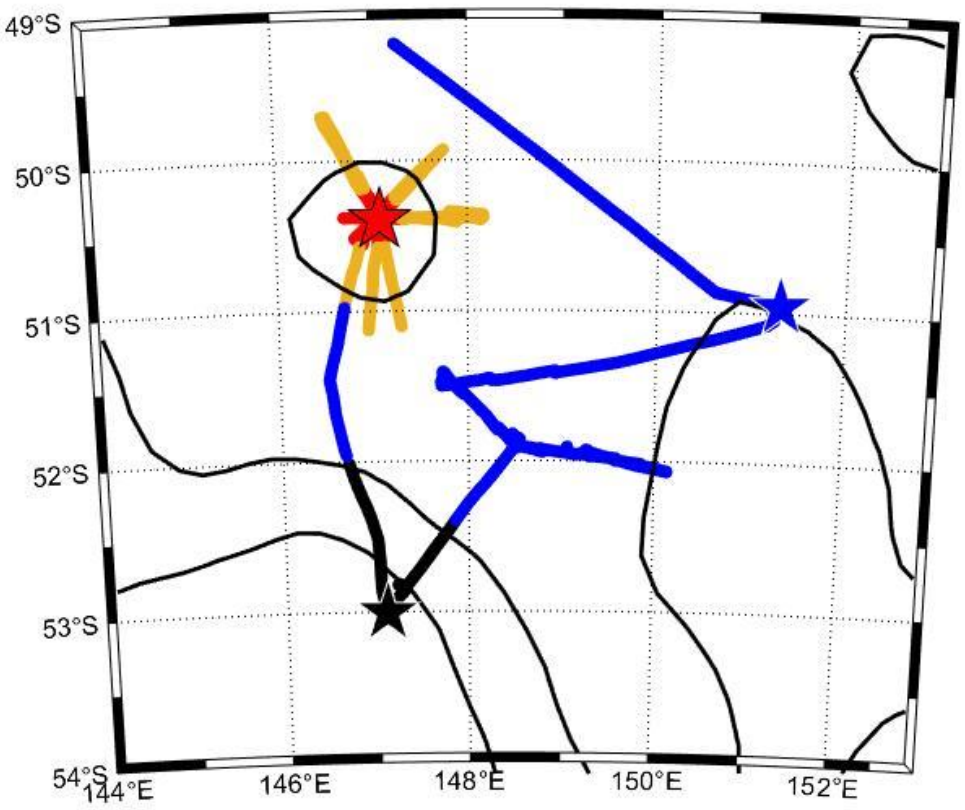

Figure S1: Map representing the sampling of the Sub Antarctic Zone (SAZ, blue), Sub Antarctic Front (SAF, black) and the eddy's core (red) and periphery (ochra). Stars (in red, black and blue) indicate the locations used as examples in Figure 3. Black contours show the -0.4 m and 0.2 m contours of Sea Surface Height corresponding to the northern and southern flank of the SAF during the study period, and the location of the eddy.

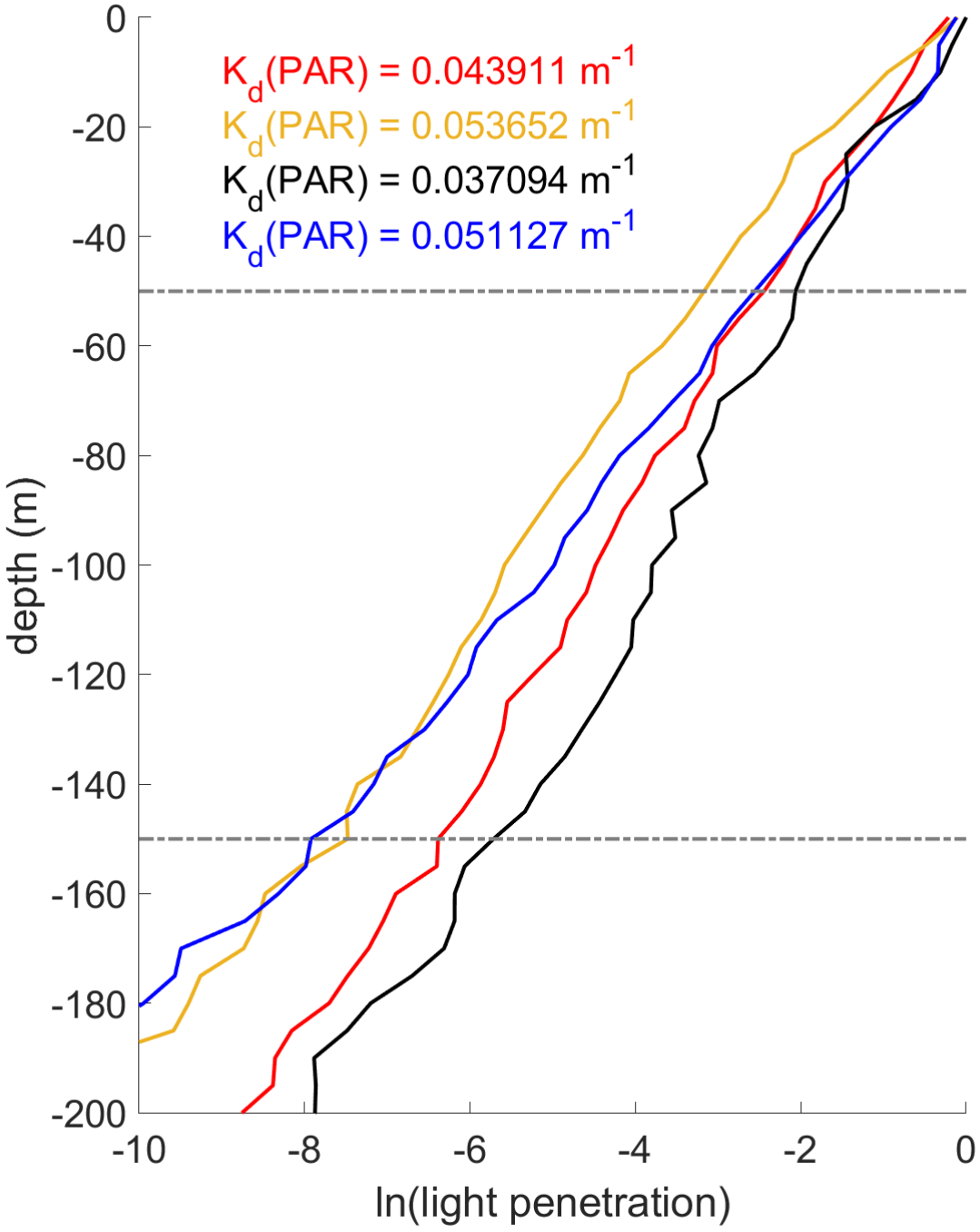

Figure S2 Estimation of the average light attenuation coefficient for the different subregions of this study. Red: eddy core, ochre: eddy periphery, black: PFZ, and blue: SAZ. The grey dashed lines indicate the interval between 50-150 m depths were the irradiance profiles were assumed to be logarithmic and their values used to estimate k_d(PAR).

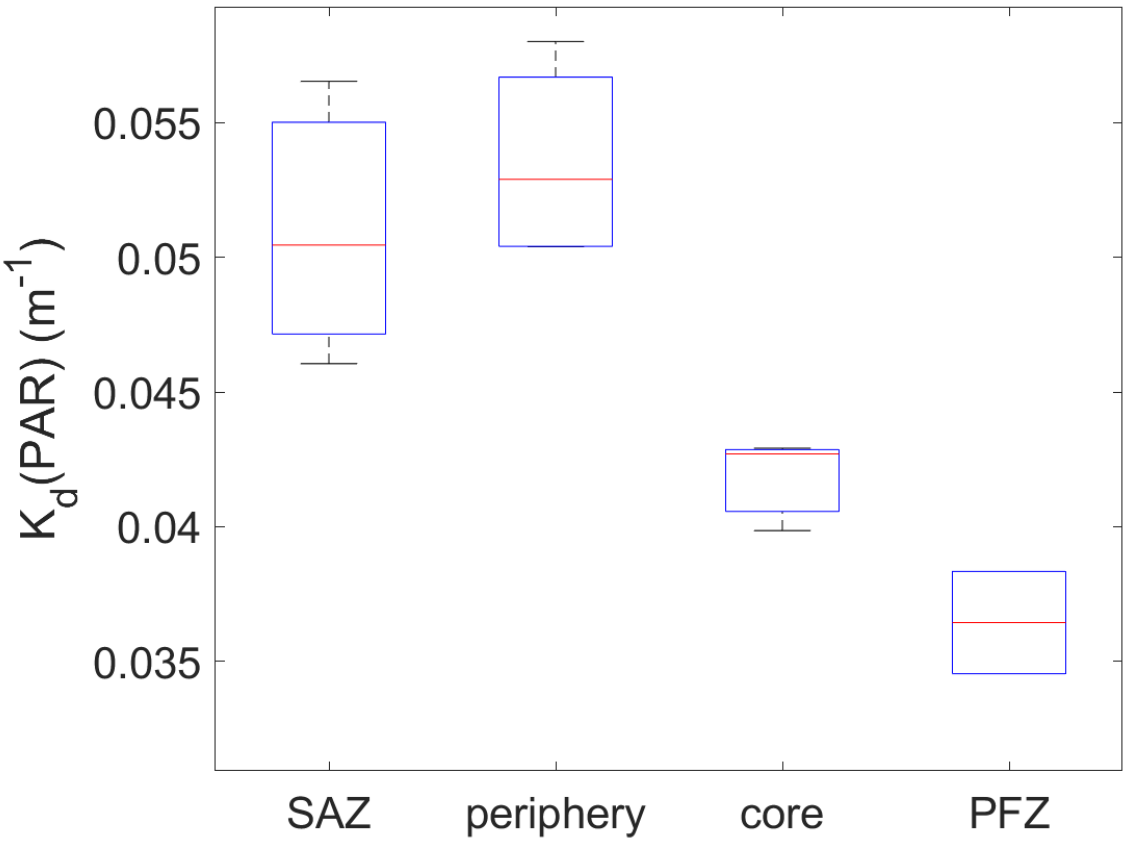

Figure S3 Distribution of K_d(PAR) across the subregions of this study. A Student's t-test confirmed that the differences between the eddy core and the periphery ($p<0.05$) and the SAZ waters ($p<0.05$) are statistically significant, while the differences between PFZ are considerably smaller and might be a result of the limited sample size of our observations ($p=0.07$).

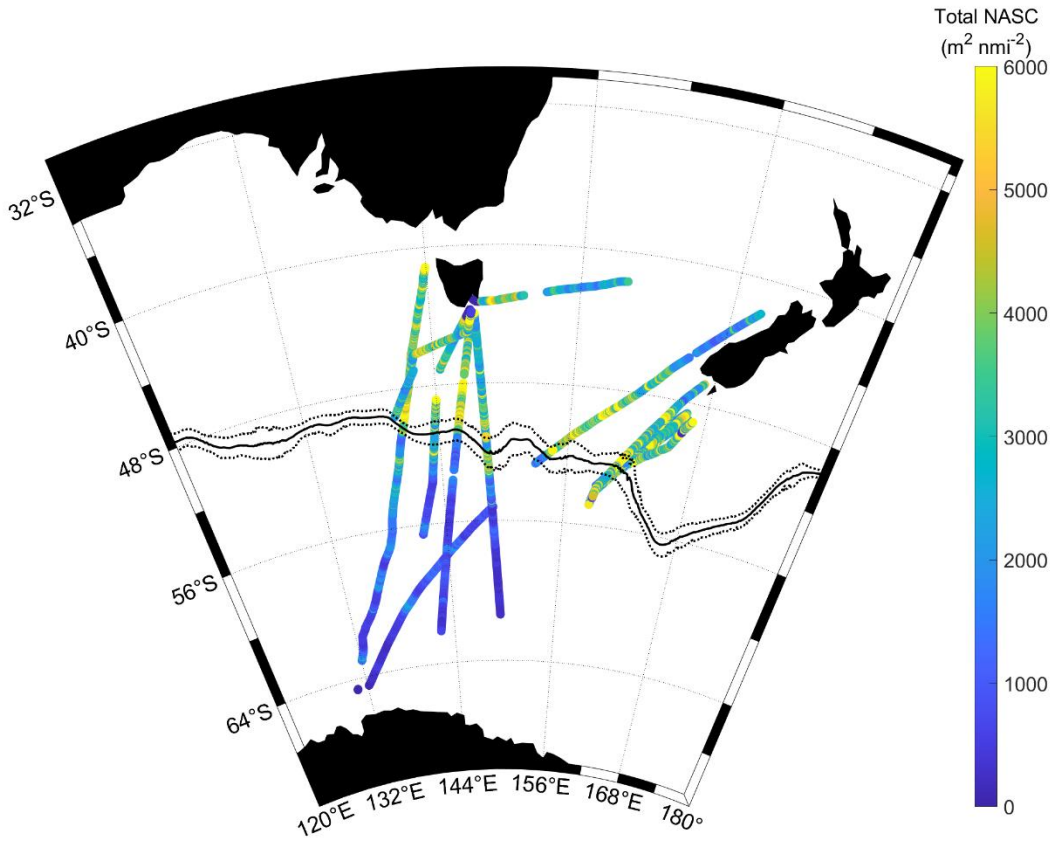

Figure S4 Historical observations of acoustic backscattering at 18 kHz from the IMOS database. The solid black line indicates the average location of the Sub-Antarctic Front, estimated using Sea Surface Height maps. Dashed lines indicate the standard deviation of the latitude of the front.

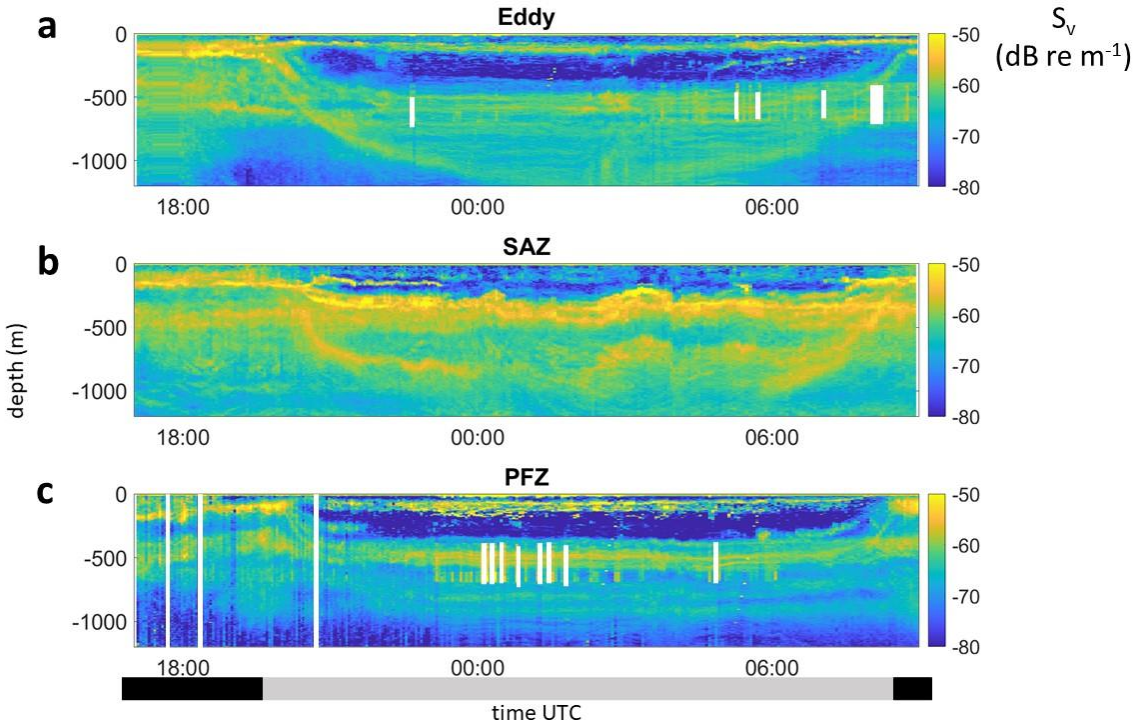

Figure S5: Examples of daytime echograms inside the eddy core (a, referring to 2016/4/4), in the surrounding SAZ waters (c, referring to 2016/4/12) and in the PFZ(d, referring to 2016/4/6) where the eddy was originated.

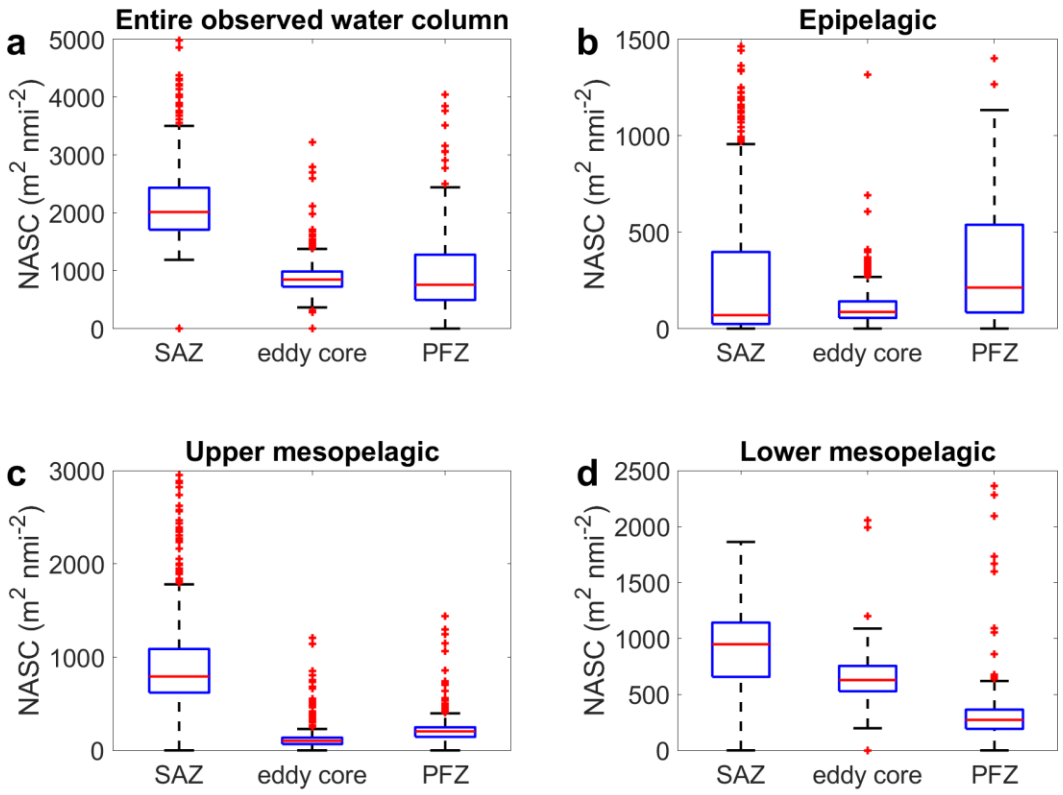

Figure S6 Integrated values of daytime acoustic backscattering in the Sub-Antarctic Zone (SAZ), eddy core, and Polar Front Zone (PFZ). These diagnostics were calculated for the entire observed water column (down to 1200 m, a), for the epipelagic (20-200m, b), the upper mesopelagic (200-600m, c) and lower mesopelagic (600-1200m,d).

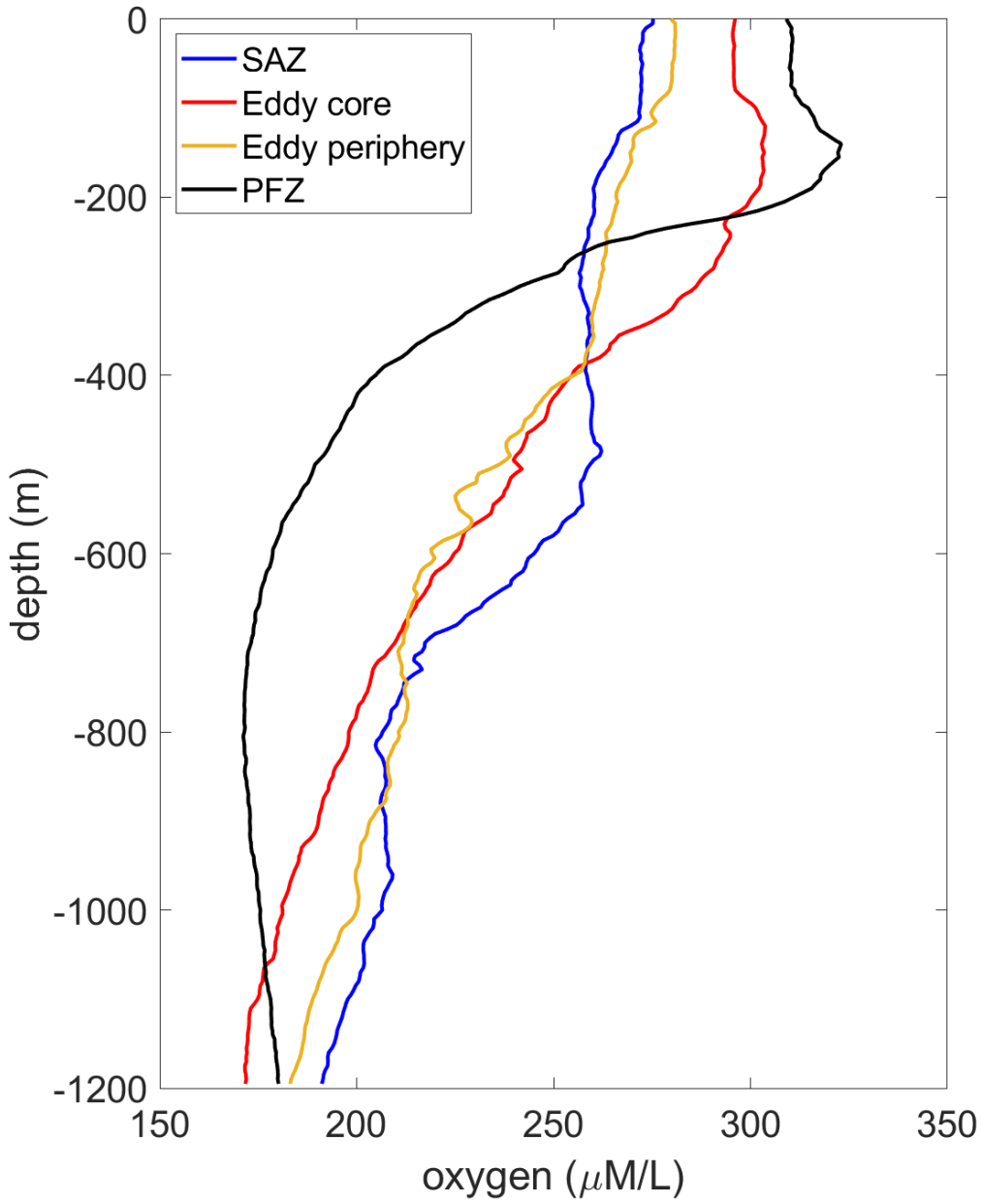

Figure S7 Average profiles of oxygen concentration for the different subregions of this study. Oxygen was measured during the same CTD casts as the ones used to estimate the light attenuation coefficients using a photometric oxygen system (Patel et al., 2020). We observed significant differences in oxygen concentration between the eddy core (red line) and both its origin (PFZ, black line), and SAZ and eddy periphery waters (blue and ochre lines respectively).