

Supplementary Figures

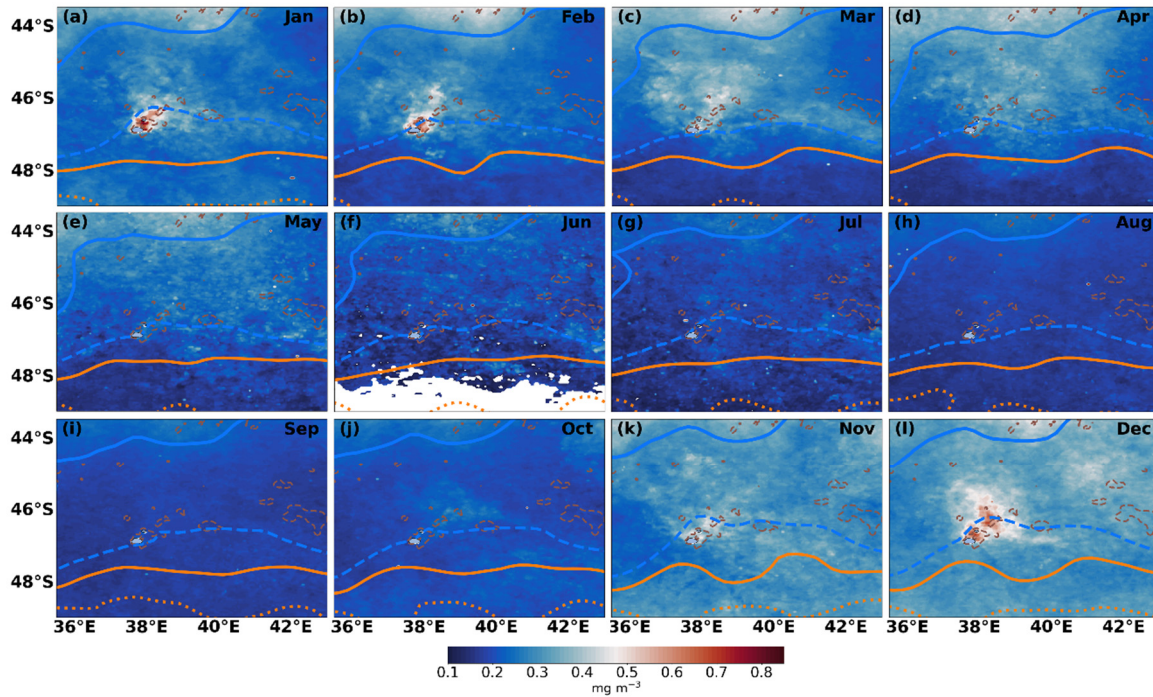


Figure S1: (a–l) Monthly (January to December) Ocean-Colour Climate Change Initiative (OC-CCI) chlorophyll *a* (chl*a*; mg m^{-3}) climatology (1997-2020) in the Prince Edward Island (PEI) region. The dashed brown contour indicates the 1000 m isobath. The solid and dashed thick blue lines show the climatological mean positions of the middle (M-SAF) and southern (S-SAF) branches of the sub-Antarctic Front, respectively. The solid and dotted thick orange lines illustrate the climatological mean positions of the northern (N-APF) and middle (M-APF) branches of the Antarctic Polar Front, respectively. White shading indicates regions where there are no observations during the 1997-2020 period.

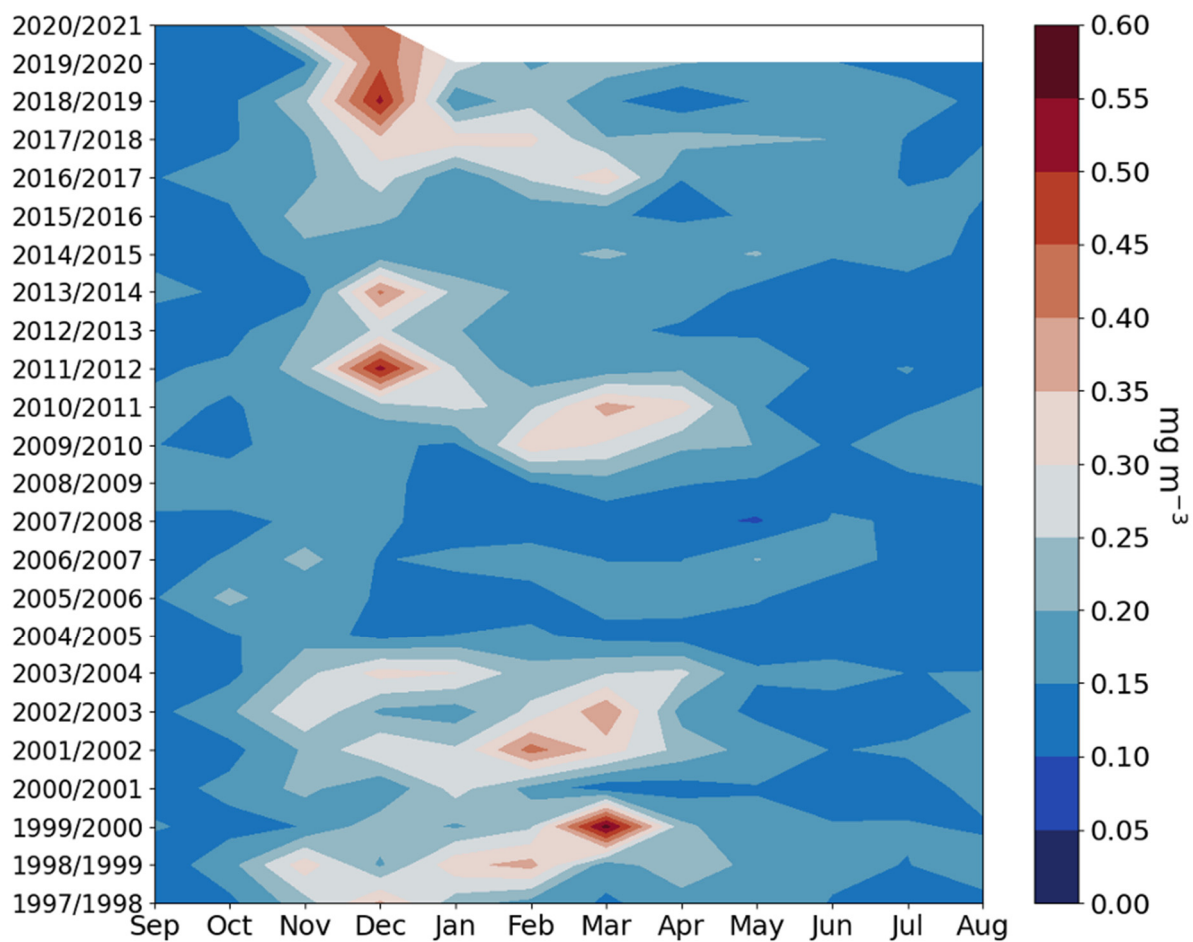


Figure S2: Temporal variability of the monthly mean Copernicus-Globcolour chlorophyll *a* (chl *a*; 1997-2020), extracted and averaged over the region (45.5-46.5 °S; 38-39 °E) encompassed by the long-term mean 0.18 mg m^{-3} chl *a* isopleth northeast of the Prince Edward Islands. White shading indicates no observations.

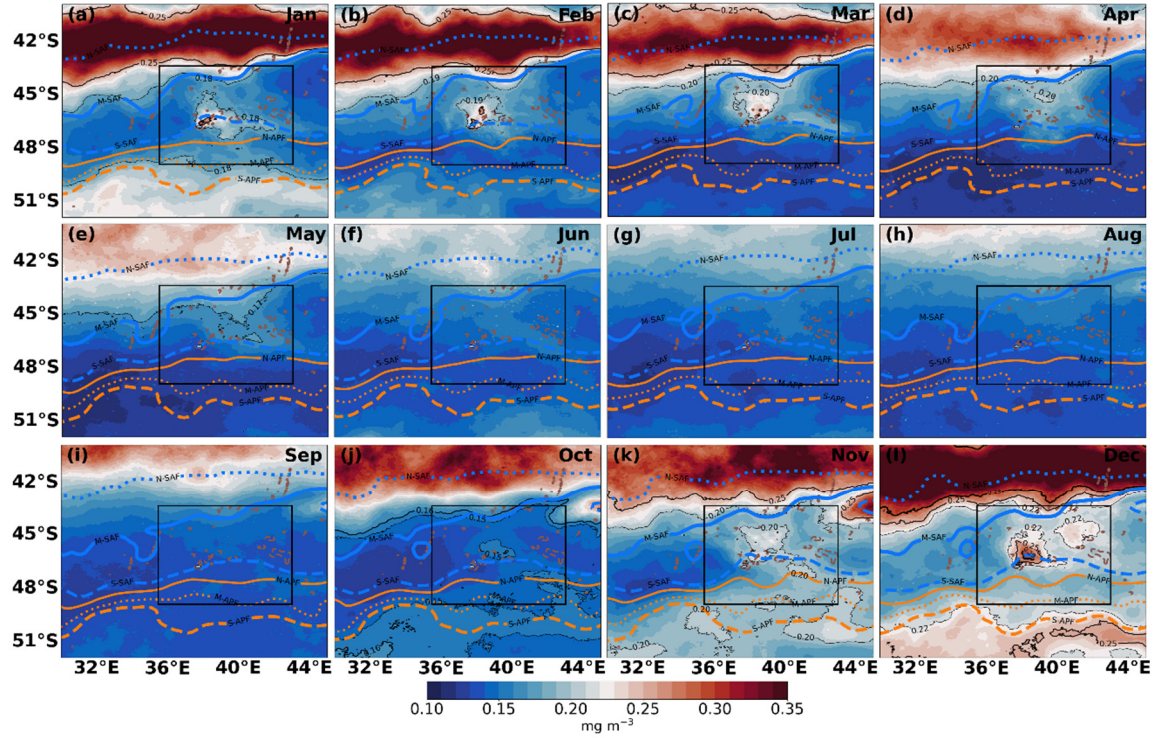


Figure S3: (a–l) Monthly (January to December) climatology (1997–2020) of the Copernicus-Globcolour chlorophyll *a* (chl*a*; mg m^{-3}) over a larger area around the Prince Edward Islands (PEIs). The black box highlights the area around the PEIs illustrated in the main text and in Figure S1. The black contours indicate chl*a* isopleths (0.18 and 0.25 in January, 0.19 and 0.25 in February, 0.20 and 0.25 in March, 0.20 in April, 0.17 in May, 0.15 and 0.16 in October, 0.20 and 0.25 in November, 0.22, 0.25, and 0.29 in December). The dashed brown contour indicates the 1000 m isobath. The dotted, solid, and dashed thick blue lines show the climatological mean positions of the northern (N-SAF), middle (M-SAF), and southern (S-SAF) branches of the sub-Antarctic Front, respectively. The solid, dotted, and dashed thick orange lines illustrate the climatological mean positions of the northern (N-APF), middle (M-APF), and southern (S-APF) branches of the Antarctic Polar Front, respectively.

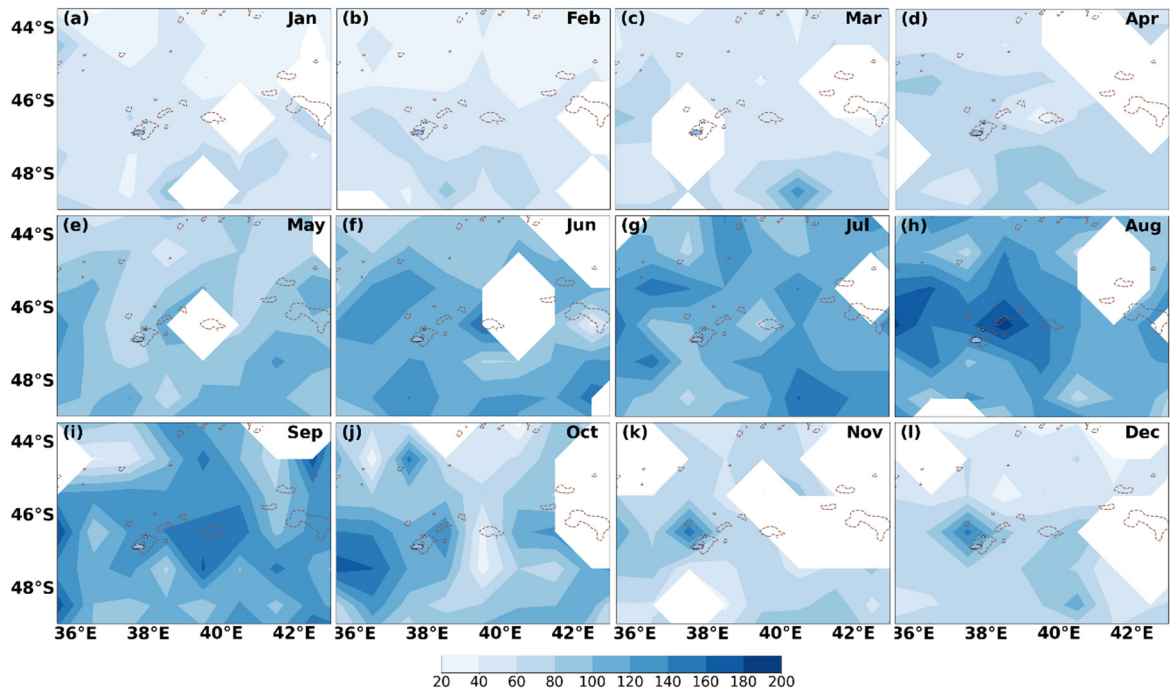


Figure S4: (a–l) Monthly (January to December) climatology (2000-2019) of the mixed layer depth (m) computed from Argo profiles (Holte et al., 2017) in the Prince Edward Island (PEI) region. The dashed brown contour indicates the 1000 m isobath. White shading indicates regions of no data for the 2000-2019 period.

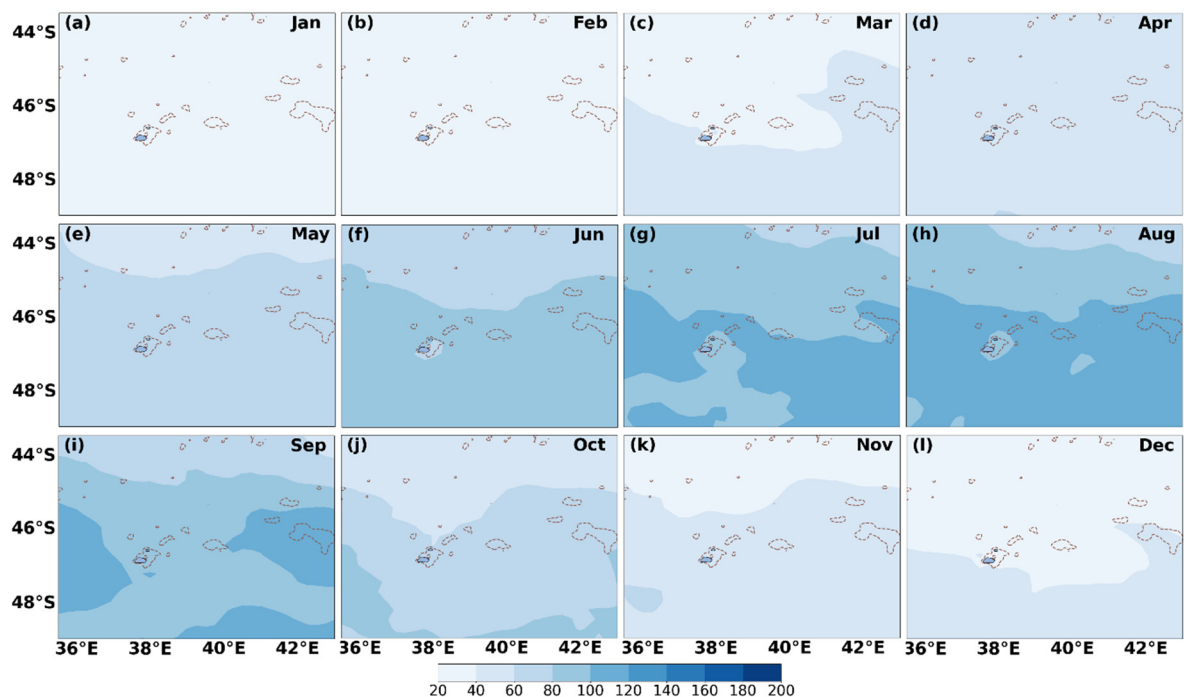


Figure S5: (a–l) Monthly (January to December) climatology (1993-2019) of the GLORYS2V4 simulated mixed layer depth (m) (Lellouche et al., 2013) in the Prince Edward Island (PEI) region. The dashed brown contour indicates the 1000 m isobath.

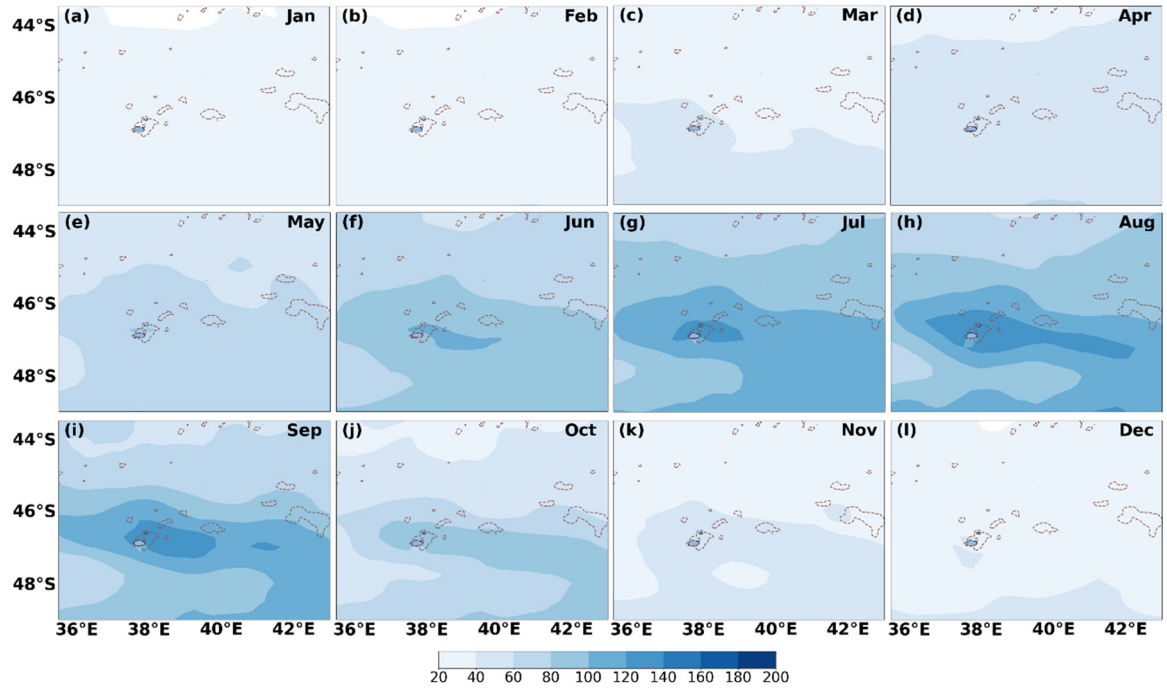


Figure S6: (a–l) Monthly (January to December) climatology (1993-2019) of the C-GLORS05 simulated mixed layer depth (m) (Storto et al., 2016) in the Prince Edward Island (PEI) region. The dashed brown contour indicates the 1000 m isobath.

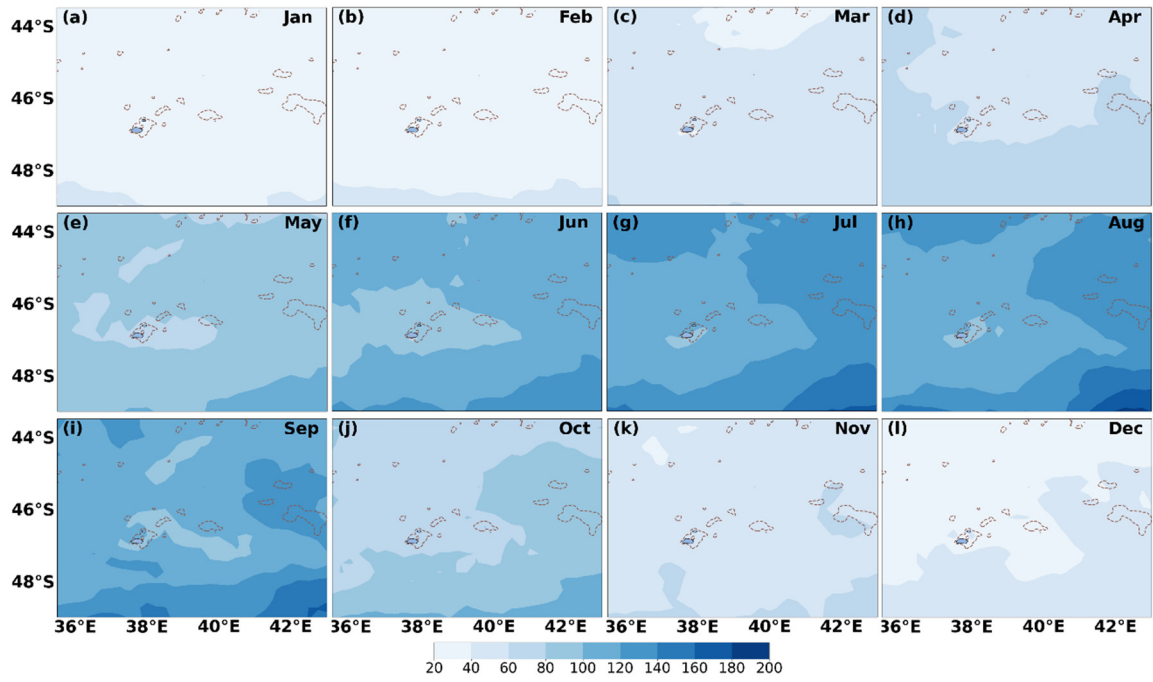


Figure S7: (a–l) Monthly (January to December) climatology (1993–2019) of the GLOSEA5v13 simulated mixed layer depth (m) (MacLachlan et al., 2015) in the Prince Edward Island (PEI) region. The dashed brown contour indicates the 1000 m isobath.

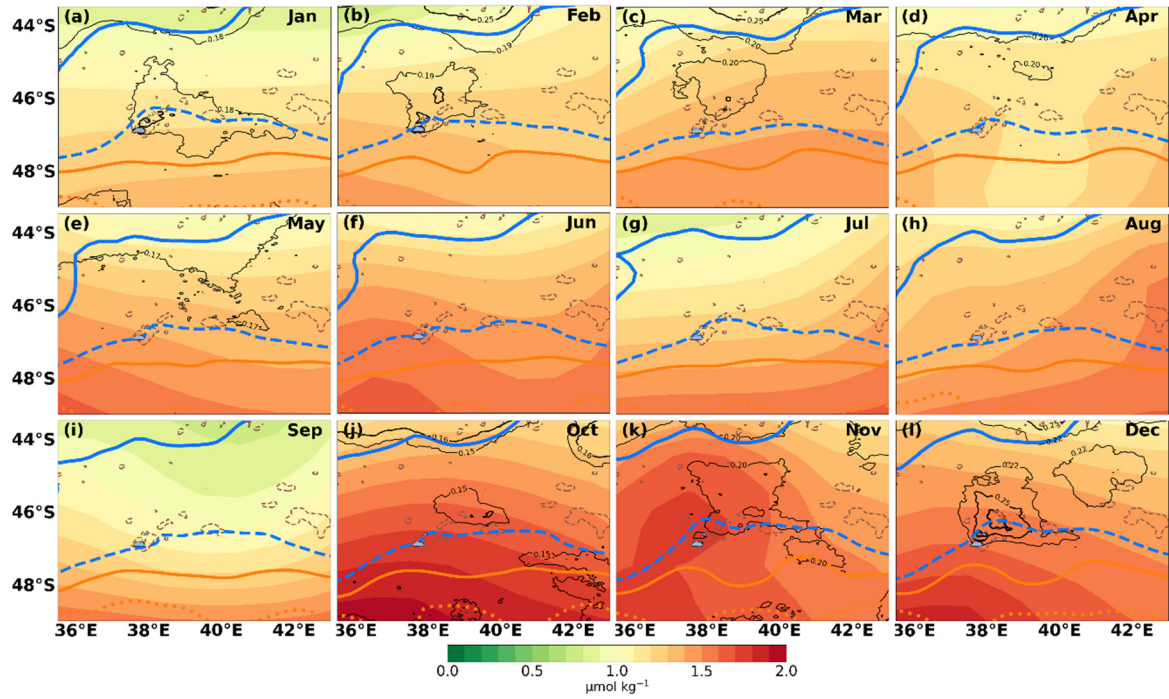


Figure S8: (a–l) Monthly (January to December) World Ocean Atlas 2018 climatology of phosphate ($\mu\text{mol kg}^{-1}$). The black contours indicate chl a (mg m^{-3}) isopleths (0.18 and 0.25 in January, 0.19 and 0.25 in February, 0.20 and 0.25 in March, 0.20 in April, 0.17 in May, 0.15 and 0.16 in October, 0.20 and 0.25 in November, 0.22, 0.25, and 0.29 in December). The dashed brown contours indicate the 1000 m isobath. The solid and dashed thick blue lines show the climatological mean positions of the middle (M-SAF) and southern (S-SAF) branches of the sub-Antarctic Front, respectively. The solid and dotted thick orange lines illustrate the climatological mean positions of the northern (N-APF) and middle (M-APF) branches of the Antarctic Polar Front, respectively.

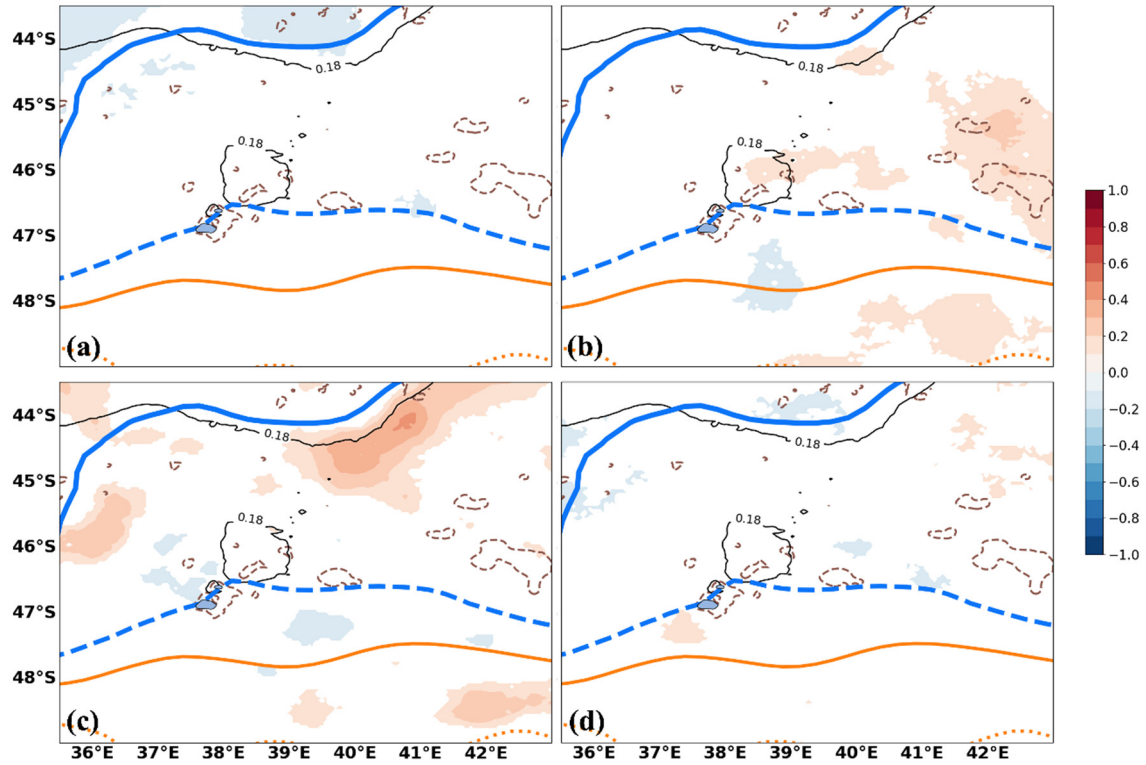


Figure S9: Pearson correlation between monthly chlorophyll *a* (chl*a*) and **(a)** wind speed, **(b)** wind stress curl, **(c)** geostrophic current speed, and **(d)** Ekman current speed. The dashed brown contours show the 1000 m isobath. The black contours illustrate the long-term mean 0.18 mg m⁻³ chl*a* isopleths. The solid and dashed thick blue lines show the long-term mean positions of the middle (M-SAF) and southern (S-SAF) branches of the sub-Antarctic Front, respectively. The solid and dotted thick orange lines illustrate the long-term mean positions of the northern (N-APF) and middle (M-APF) branches of the Antarctic Polar Front, respectively.

References

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