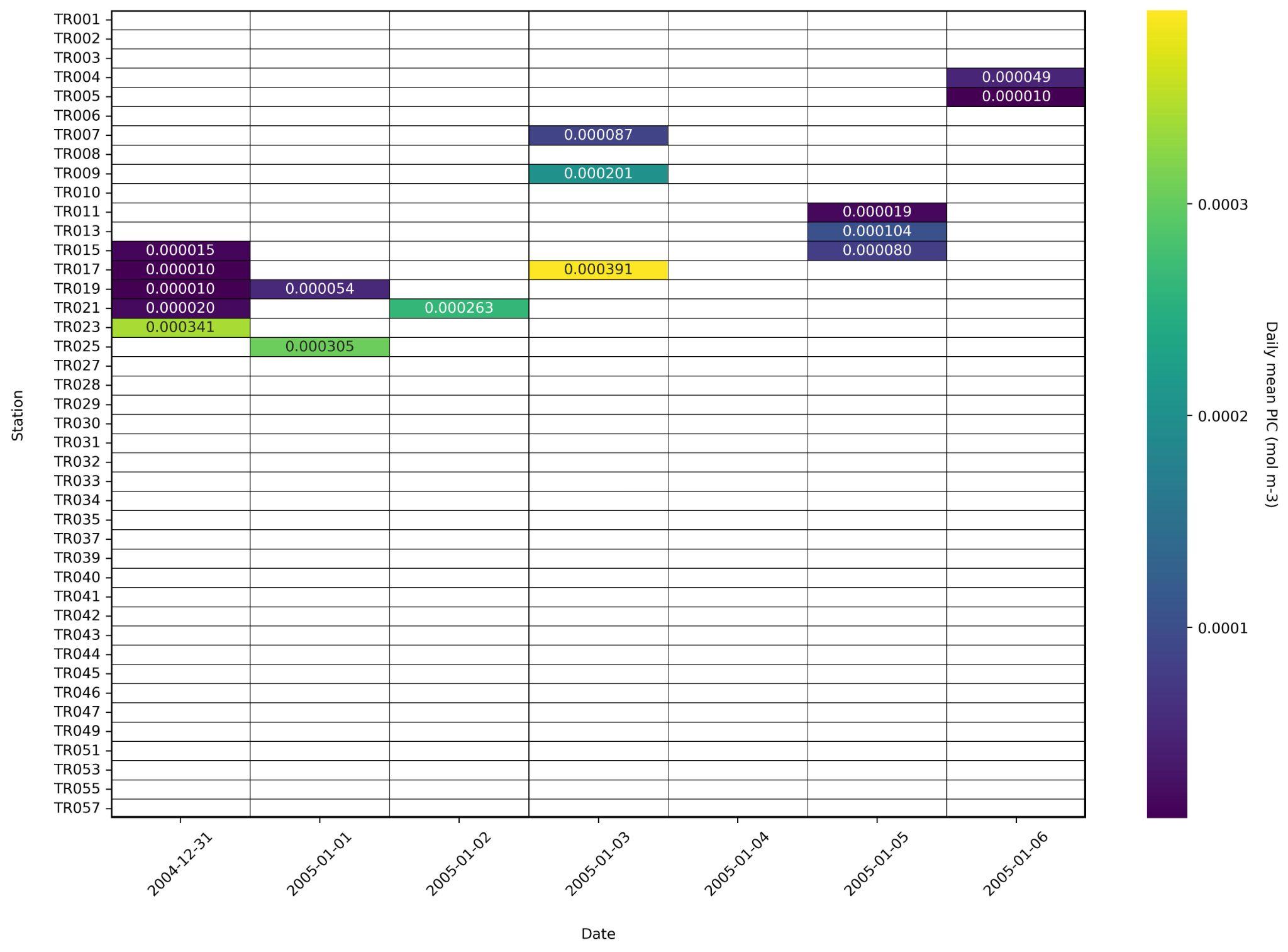
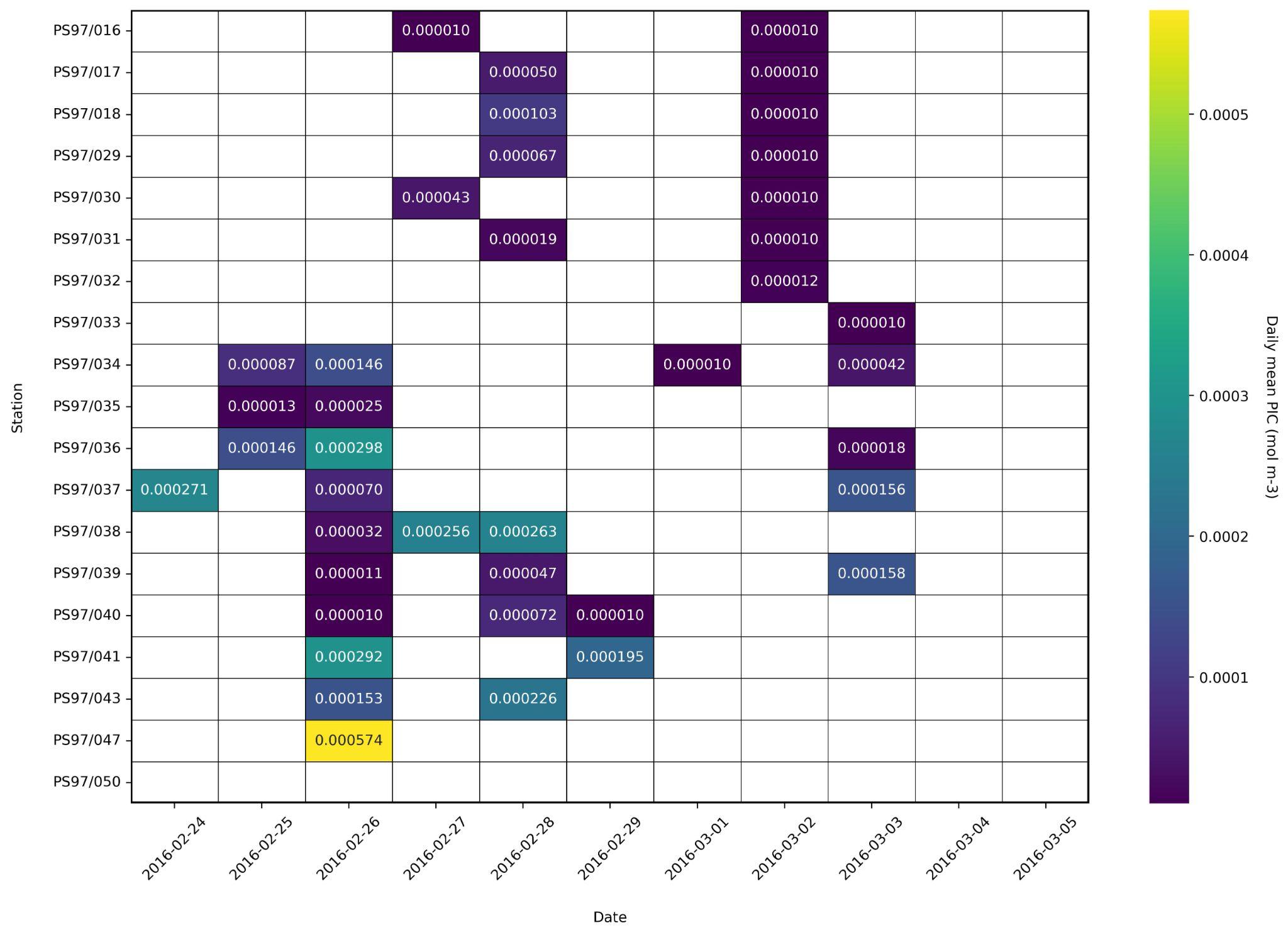
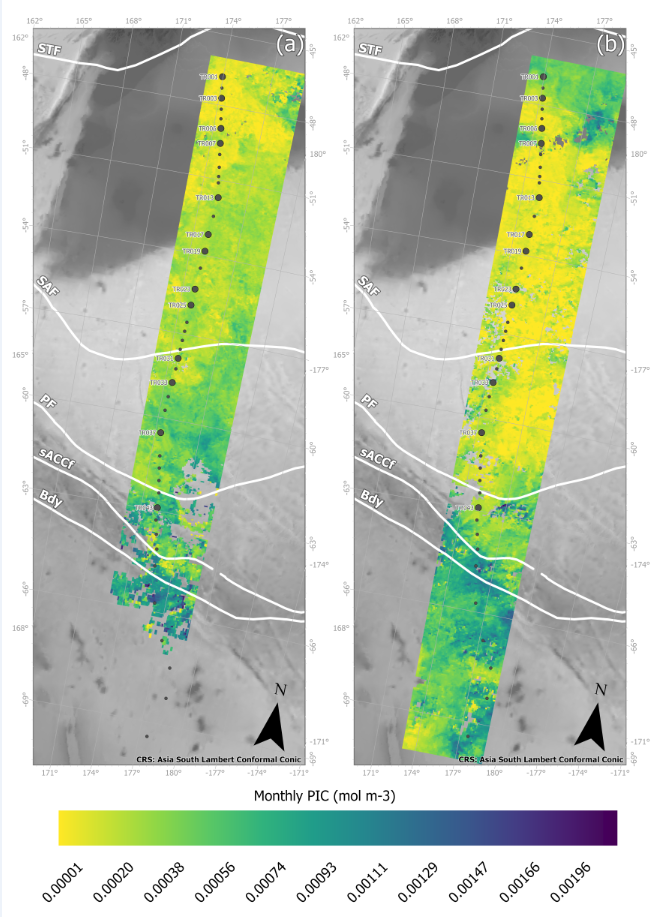
**Supplementary material**

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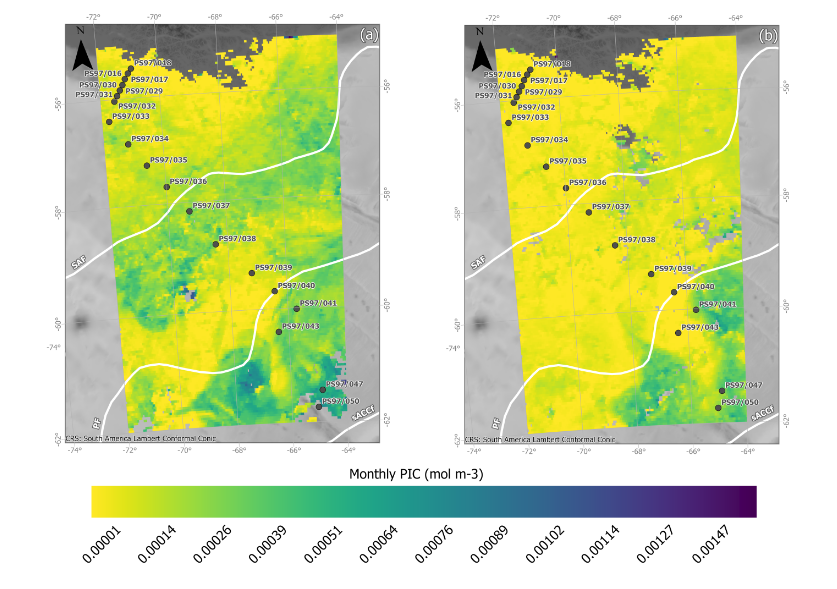
**Figure S1: Heatmap showing the MODIS-Aqua L2 PIC concentration values (mol m-3) for the New Zealand transect. Dates are shown in the X axis and stations (sorted by latitude, from North -up- to South -down-) in the Y axis. The heatmap shows the availability and distribution of daily satellite-derived PIC concentrations.**

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**Figure S2: Heatmap of MODIS-Aqua L2 PIC concentration values (mol m-3) for the Drake Passage transect. X axis shows Dates are shown in the X axis and stations (sorted by station name) in the Y axis. The heatmap shows the availability and distribution of daily satellite-derived PIC concentrations.**

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**Figure S3: Monthly MODIS-Aqua L3 PIC concentration values (mol m-3) in the New Zealand transect corresponding to (a) December 2004 and (b) January 2005, over a bathymetry background (GEBCO Compilation Group, 2022). White lines indicate the ACC fronts (Orsi and Harris (2019) from north to south: SAF (Subantarctic Front), PF (Polar Front), sACCf (Southern ACC Front) and Bdy (Southern Boundary). The Southern Ocean zones are labeled on the side of each map: STZ, Subtropical Zone; SAZ, Subantarctic Zone; PFZ, Polar Frontal Zone; AZ, Antarctic Zone.**

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**Figure S4: Monthly MODIS-Aqua L3 PIC concentration values (mol m-3) in the Drake Passage corresponding to (a) February 2016 and (b) March 2016, over a bathymetry background (GEBCO Compilation Group, 2022). White lines indicate the ACC fronts (Orsi and Harris (2019) from north to south: SAF (Subantarctic Front), PF (Polar Front), sACCf (Southern ACC Front) and Bdy (Southern Boundary). The Southern Ocean zones are labeled on the side of each map: STZ, Subtropical Zone; SAZ, Subantarctic Zone; PFZ, Polar Frontal Zone; AZ, Antarctic Zone.**

Table S1: Morphometries of *Emiliania huxleyi* in the New Zealand transect. Type of *E. huxleyi* (\*), researcher who performed the measurements, station, latitude, longitude, name of the image used / reference, coccolith length (major, in µm), coccolith width (minor, in µm), number of T-elements, distal shield element width (ray.width, in µm), tube width (tube.width, in µm), shape factor and calculated coccolith mass following Young and Ziveri (2000) (in pg). (\*) “Bilay” indicates bilayered coccospheres and “diss”, dissolution observed.

Table S2: Morphometries of *Emiliania huxleyi* in the Drake Passage transect. Type of *E. huxleyi*, researcher who performed the measurements, station, latitude, longitude, name of the image used / reference, coccolith length (major, in µm), coccolith width (minor, in µm), number of T-elements, distal shield element width (ray.width, in µm), ray.flag (i.e. if the coccobiom2 t-element count is reliable (0) or not (-1)), tube width (tube.width, in µm) shape factor, and calculated coccolith mass following Young and Ziveri (2000) (in pg).

Table S3: Morphometries of *Calcidiscus leptoporus* in the New Zealand transect. Sample, coccosphere diameter (in µm), coccolith diameter (in µm) and number of elements.

Table S4: *Emiliania huxleyi* data in the Drake Passage transect. Sample, name of the image, layers (nothing denotes a single layer and bilayered, at least two layers of coccoliths), SEM picture number (for reference), coccoliths counted and number of coccoliths per coccosphere.