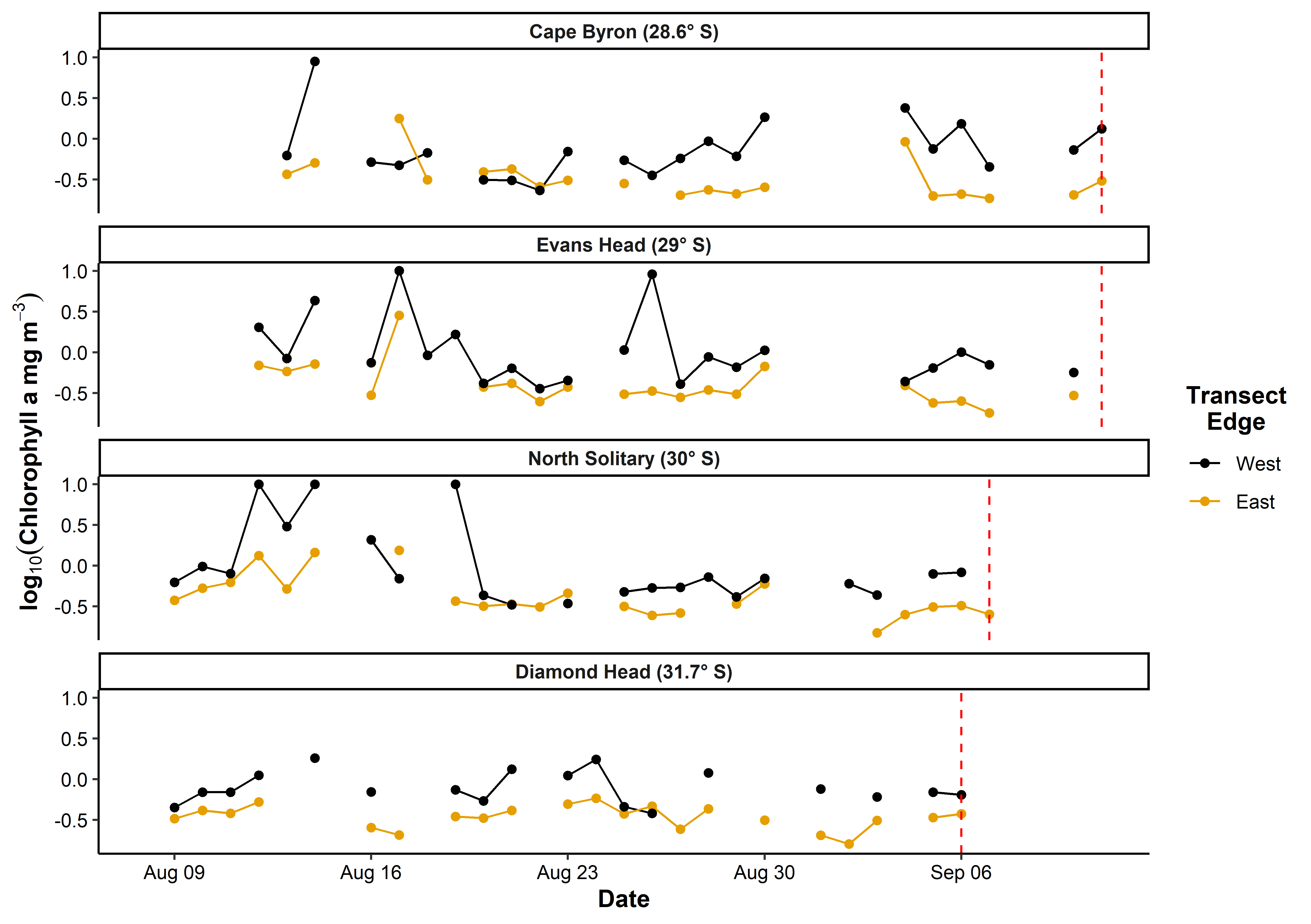
**Supplementary Material**

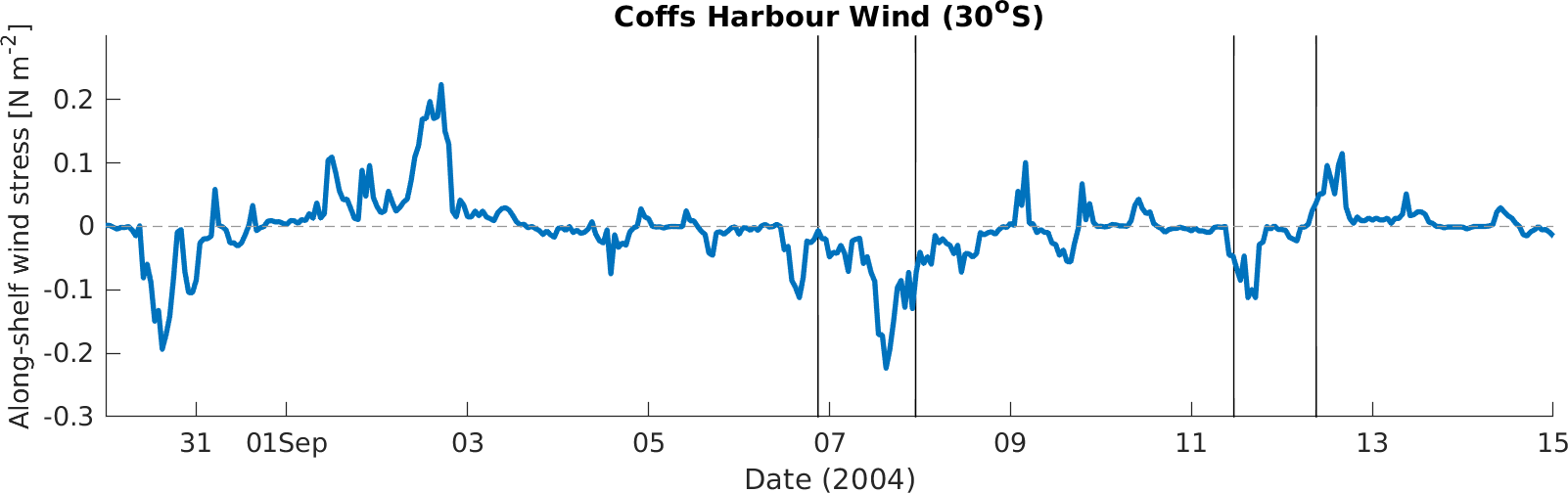
A close up of a map

Description automatically generated

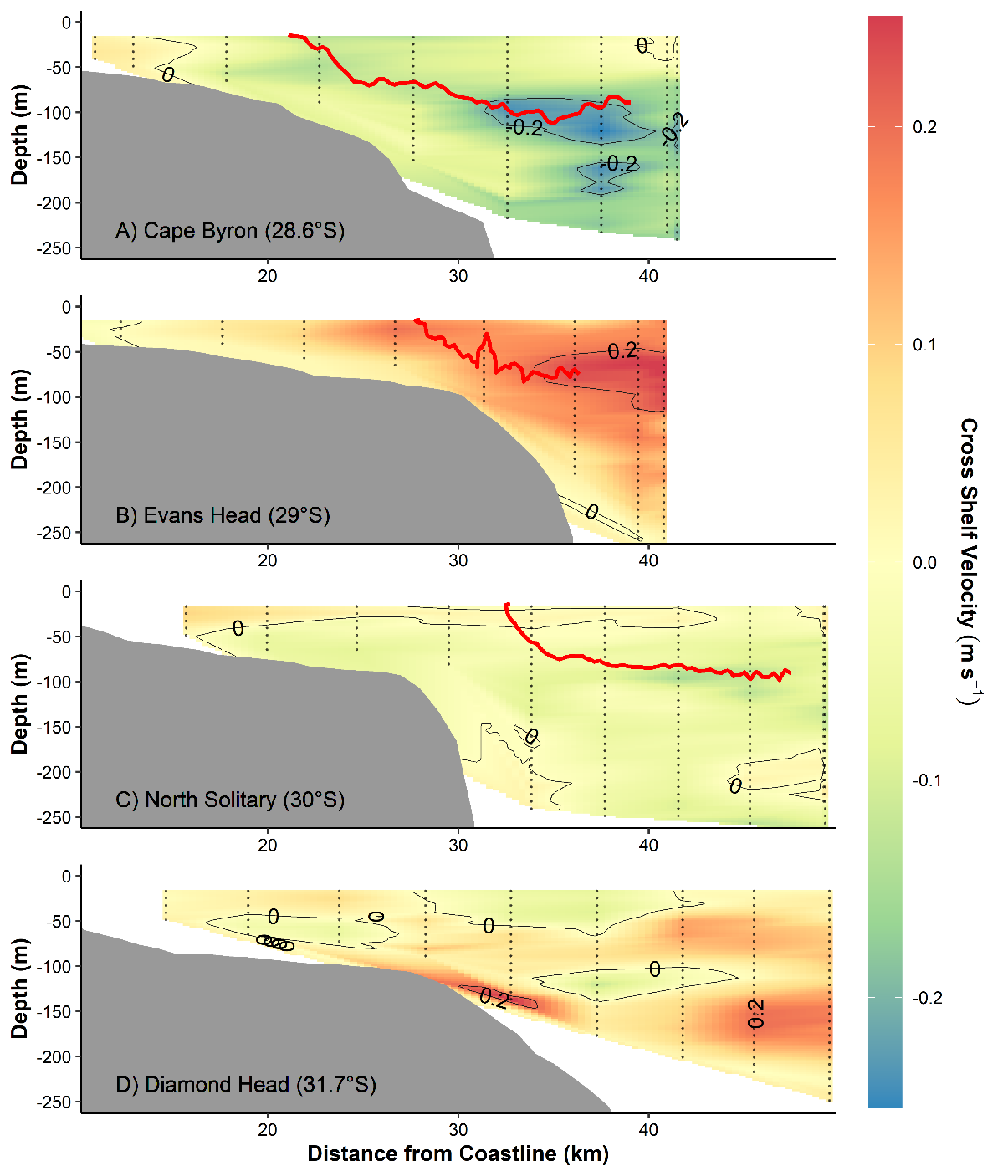
**Figure S1** MODIS Chlorophyll *a* (mg m-3) in the region during our study showing low amounts of Chlorophyll at all the transect sites (black lines) during our study.



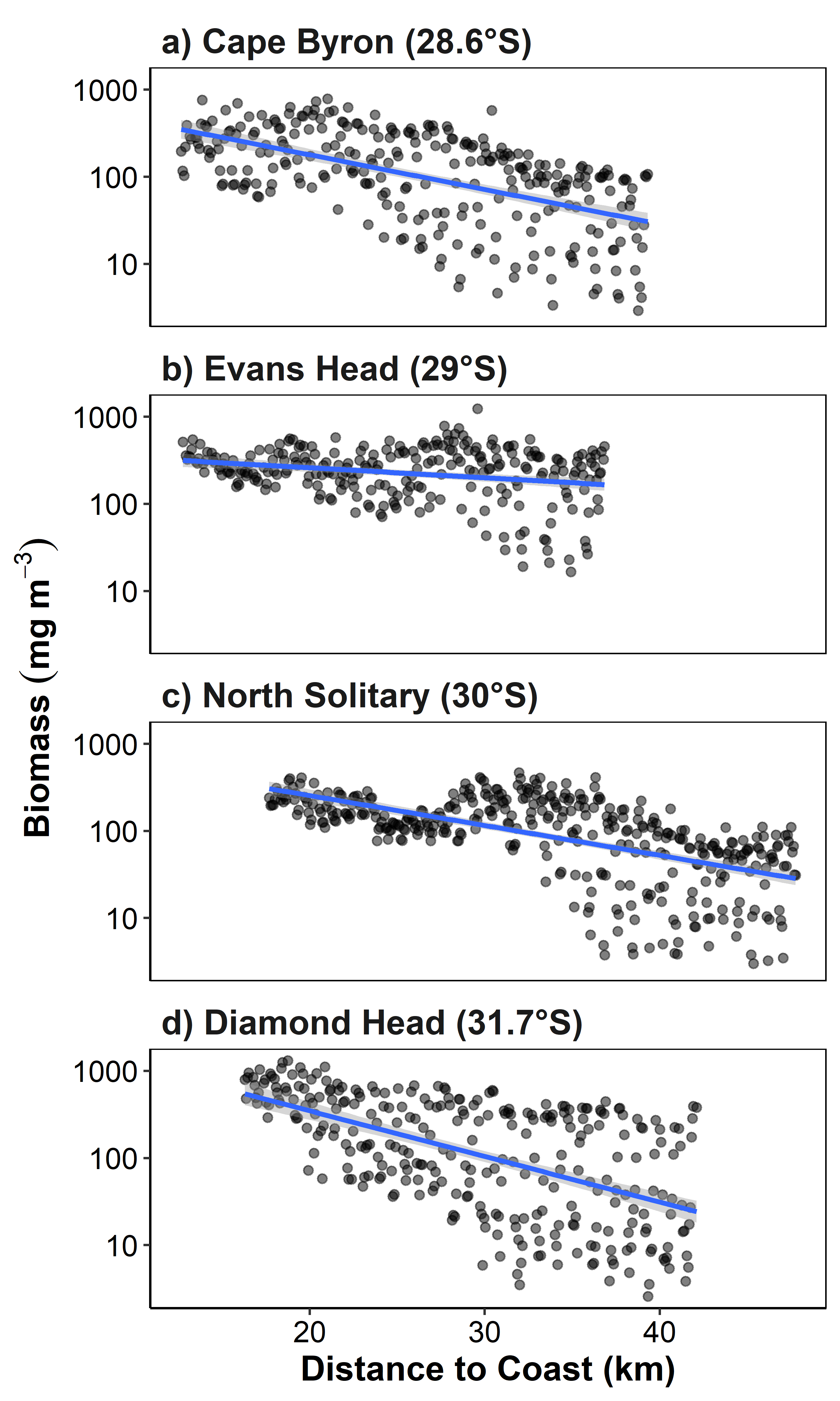
**Figure S2** Satellite observed chlorophyll *a* in the month prior to each transect based upon a 10 x 10 km region around the western and eastern edges of each transect. Gaps are due to days with no data due to cloud cover. The vertical red line shows the day each transect was sampled.



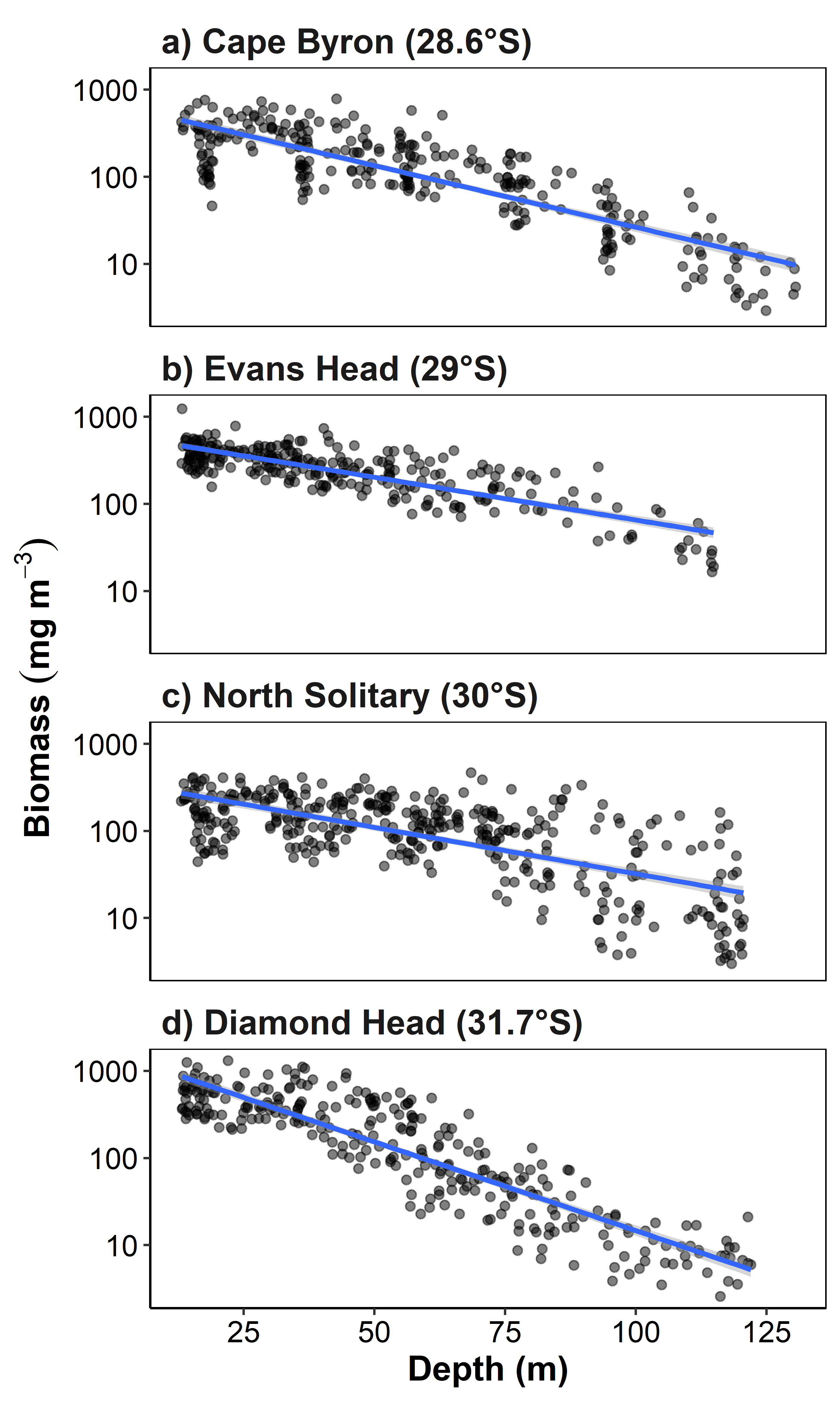
**Figure S3** Time-series of along-shelf (northward) wind stress component calculated from the observed wind at Coffs Harbour (30° S, local time). Negative values show upwelling favourable winds. The vertical black lines show the times of the 4 transects in this study, in chronological order these were Diamond Head, North Solitary, Evans Head then Cape Byron.



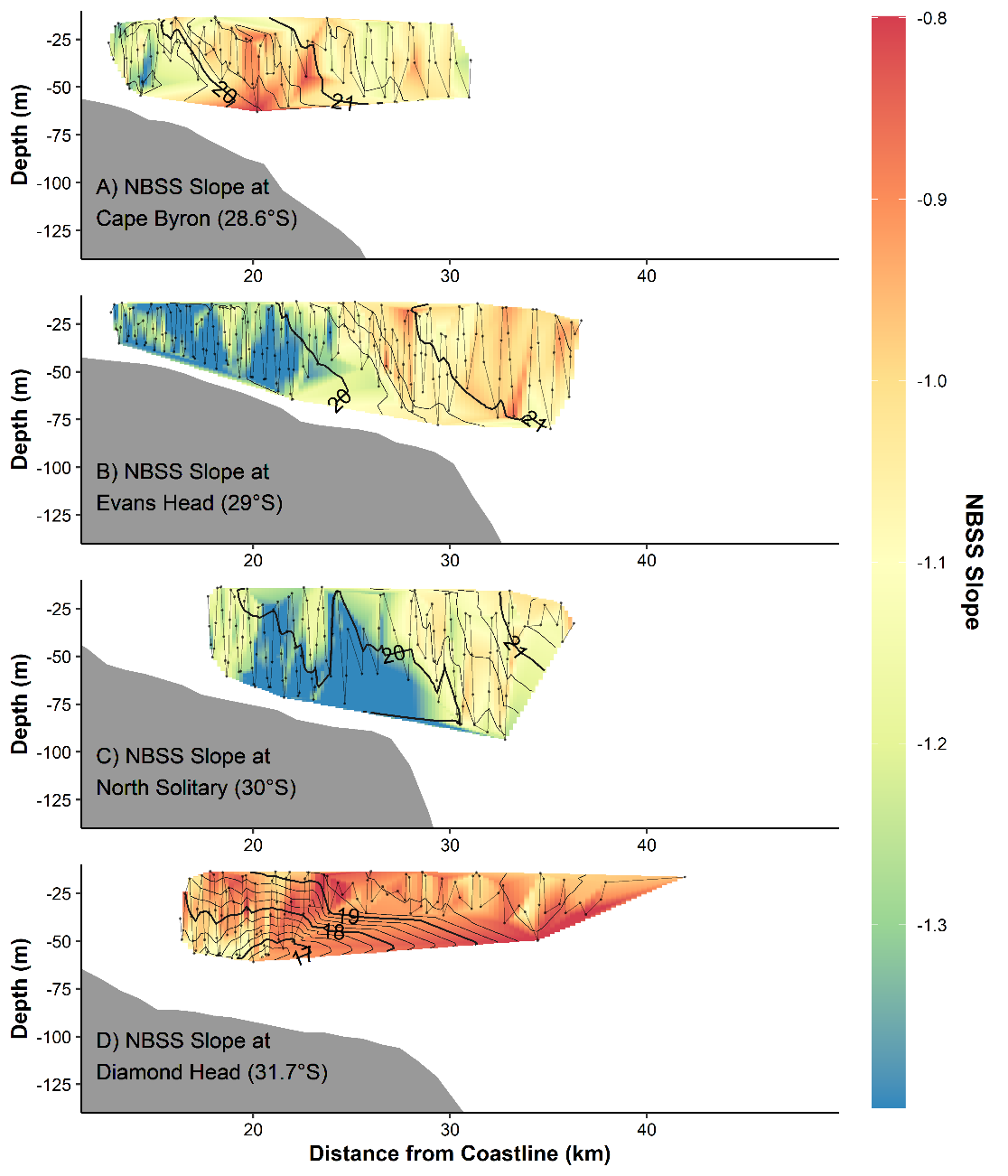
**Figure S4** Cross-shelf velocity across the four cross shelf transects (Figure 1). Transects were conducted with an Acoustic Doppler Current Profiler during a CTD Transect. Grey lines join areas of equal velocity. The red line shows the 21°C isotherm based on the SeaSoar transect. Note there was no 21°C isotherm for Diamond Head.

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**Figure S5** Biomass by distance from the coast for the four transects. Note the log10 transformed y-axis. Each dot represents a 6 s integration from the OPC mounted on the undulating towed body. Blue lines represent the linear trend line with the 95% confidence intervals shown in grey.



**Figure S6** Biomass by sample depth for the four transects. Note the log1­0 transformed y-axis. Each dot represents a 6 s integration from the OPC mounted on the undulating towed body. Blue lines represent the linear trend line with the 95% confidence intervals shown in grey.



**Figure S7**Interpolations of the zooplankton size spectra slope using the Normalised Biomass Size Spectrum (NBSS) method. Transects were conducted from inshore to offshore with an undulating towed body with the path shown by the grey line with midpoints of each sample shown as dots. Temperature (° C) isotherms are shown in black. The NBSS slope estimate was strongly correlated to the pareto *c* chape parameter (*r* = 0.934, *t*535 = 60.362, *p* < 0.001, Figure S7). Note the smaller coverage compared to the pareto *c* shape parameter due to the inability of the NBSS estimate to handle datapoints with few particles.

**Table S1** Details of the additional studies used in the global summary of inshore-offshore zooplankton patterns.Empty cells represent no data.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study (Fig 7 ref. #)** | **Region** | **Latitude (°)** | **Longitude (°)** | **Inshore Biomass (mg m-3)** | **Offshore Biomass (mg m-3)** | **Biomass Ratio** | **Inshore Abundance (ind. m-3)** | **Offshore Abundance**  **(ind. m-3)** | **Abundance Ratio** | **Inshore NBSS Slope** | **Offshore NBSS Slope** | **NBSS Slope Ratio** | **Notes** |
| Becker et al 2018 (#1) | Southwest Atlantic Santa Catarina shelf | -28 | -47.5 |  |  |  | 2406 | 580 | 4.15 |  |  |  |  |
| Beckley 2018 (#2) | NW Australia | -15.5 | 122 | 1.34 | 0.33 | 4.06 |  |  |  |  |  |  | biomass converted from ml m-3 |
| Coyle & Pinchuk 2005 (#3) | Gulf of Alaska | 59 | -149 |  |  |  | 267 | 103 | 2.60 |  |  |  |  |
| Irigoien et al 2009 (#4) | Bay of Biscay - East | 45.5 | -1.5 |  |  |  |  |  |  | -1.25 | -0.75 | 1.67 |  |
| Irigoien et al 2009 (#4) | Bay of Biscay - South | 43.7 | -2.5 |  |  |  |  |  |  | -0.75 | -0.75 | 1 |  |
| Lopes et al 2006 (#5) | Southern Brazilian Shelf | -25 | -46 | 0.35 | 0.12 | 2.92 |  |  |  |  |  |  | highest biomasses from intrusions |
| Marcolin et al 2013 (#6) | SE Atlantic - Abrolhos Bank | -18.5 | -39 | 162.9 | 57.3 | 2.84 |  |  |  | -0.96 | -0.86 | 1.12 |  |
| Sabates et al 1989 (#7) | Western Mediterranean | 42.5 | 2 | 5 | 100 | 0.05 |  |  |  |  |  |  | strongly related to front. |
| Schultes & Lopes 2009 (#8) | SE Atlantic - Abrolhos Bank | -18.5 | -39 |  |  |  |  |  |  | -1.68 | -1.3 | 1.29 |  |
| Skarðhamar et al 2007 (#9) | Northern Norway | 69.5 | 17 |  |  |  | 2000 | 750 | 2.67 |  |  |  | also high at front. |
| Sourisseau & Carlotti 2006 (#10) | Bay of Biscay - East | 45.5 | -1.5 |  |  |  | 17500 | 800 | 21.88 | -1.25 | -0.85 | 1.47 | converted from ind. L-1 |
| Thompson et al 2013 (#11) | Southwest Atlantic | -45 | 58 | 47.9 | 28.8 | 1.66 |  |  |  | -0.58 | -0.41 | 1.42 | non-linear slopes offshore, smaller particles inshore |
| Vandromme et al 2014 (#12) | Bay of Biscay - East | 45.5 | -1.5 |  |  |  |  |  |  | -1.05 | -0.6 | 1.75 |  |
| Vandromme et al 2014 (#12) | Bay of Biscay - South | 43.7 | -2.5 |  |  |  |  |  |  | -0.85 | -0.9 | 0.94 |  |
| Zeldis & Willis 2015 (#13) | New Zealand | -36.6 | 175 |  |  |  | 877 | 377 | 2.33 |  |  |  |  |
| Zhang et al 2019 (#14) | South China Sea | 20 | 116 |  |  |  | 1500 | 500 | 3 |  |  |  |  |
| Schilling et al (This study #15) | Eastern Australia | -30 | 153.5 | 362 | 132 | 2.75 | 7037 | 2340 | 3.01 | -1.18 | -1.09 | 1.08 |  |