

Article

Diatom Phenology in the Southern Ocean: Mean Patterns, Trends and the Role of Climate Oscillations

Mariana A. Soppa ^{1,*}, Christoph Völker ² and Astrid Bracher ^{1,3}

¹ Alfred Wegener Institute, Bussestraße 24, D-27570 Bremerhaven, Germany

² Alfred Wegener Institute, Am Handelshafen 12, D-27570 Bremerhaven, Germany

³ Institute of Environmental Physics, University of Bremen, D-28334 Bremen, Germany

* msoppa@awi.de, Tel.: +49(471)4831-1869.

Received: 8 March 2016; Accepted: 5 May 2016; Published: xx

1. Supplementary Figures

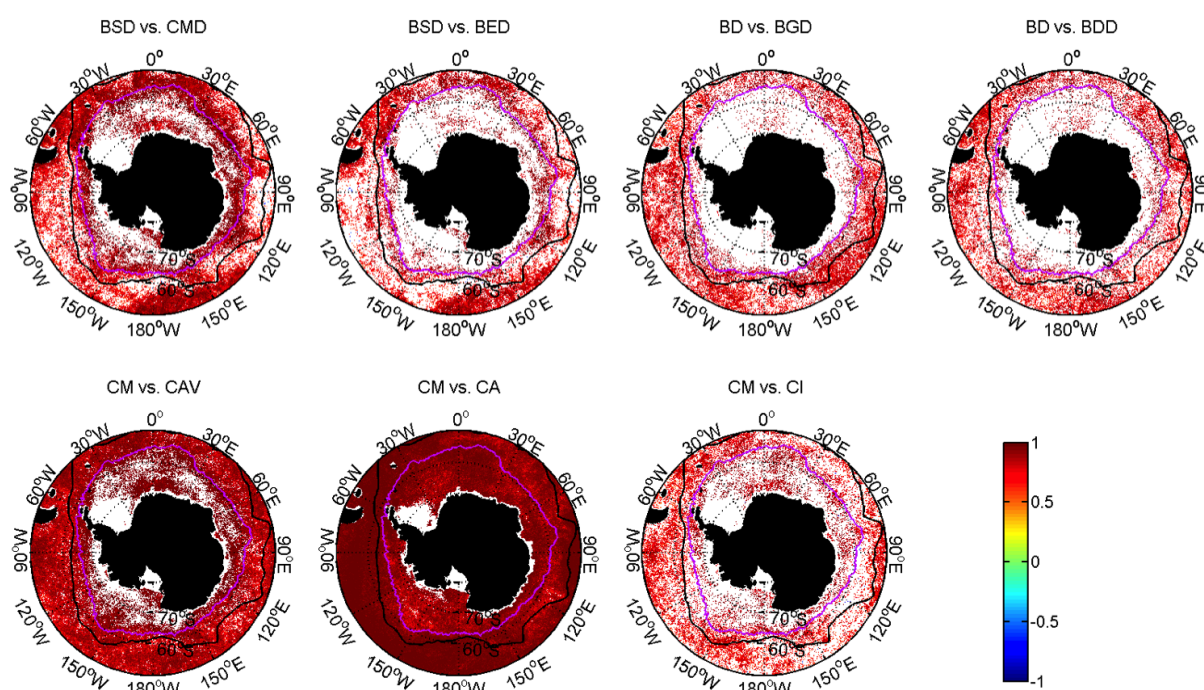


Figure S1. Spearman correlation coefficients between the time series of phenological indices (15-yr, 1997–2012): bloom start date (BSD), date of Dia-Chla maximum (CMD), bloom end date (BED), bloom growth duration (BGD), bloom decline duration (BDD), bloom duration (BD), Dia-Chla maximum (CM), Dia-Chla amplitude (CA), Dia-Chla averaged BGD (CAV), Dia-Chla integrated over BGD (CI). Only statistically significant trends ($p < 0.05$) are shown. White areas correspond to non-significant correlations or missing data. Black lines show the mean position of the Polar Front [1] over 1997–2012. Purple line displays the median position of the maximum sea ice extent [2] over 1997–2012.

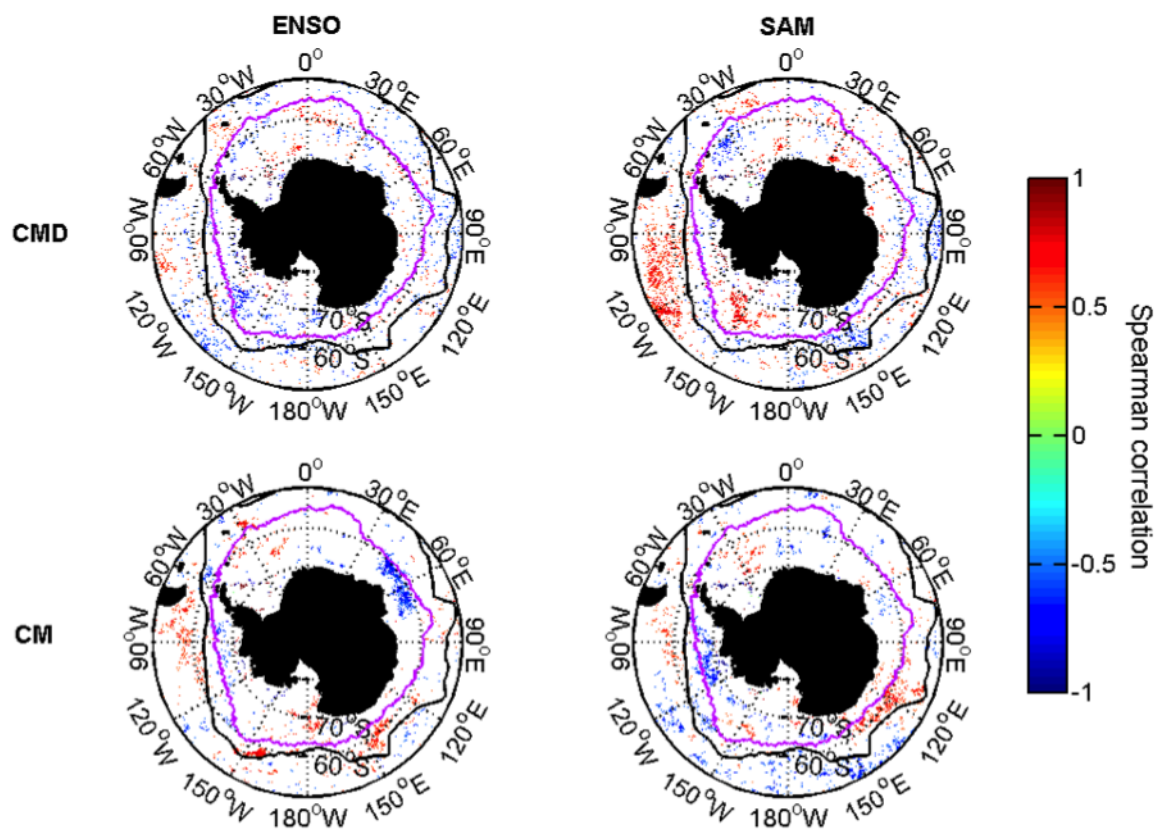


Figure S2. Partial correlation coefficients of the standardized anomalies of date of Dia-Chla maximum (CMD) and Dia-Chla maximum (CM) *vs.* ENSO (MEI) and SAM (AAO) indices. Only statistically significant trends ($p < 0.05$) are shown. Black lines show the mean position of the Polar Front [1] over 1997–2012. Purple line displays the median position of the maximum sea ice extent [2] over 1997–2012.

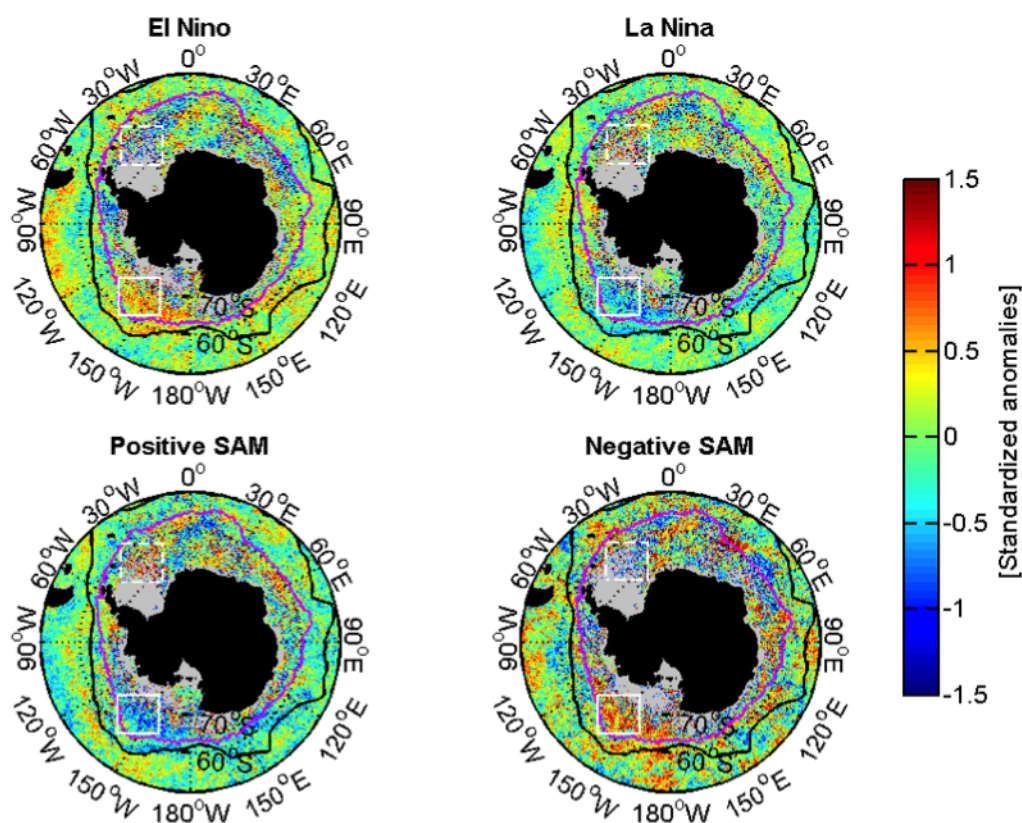


Figure S3. Composites of bloom duration (BD) standardized anomalies during El Niño ($N = 6$), La Niña ($N = 8$), positive SAM ($N = 7$) and negative SAM ($N = 4$) years. Grey areas represent missing data. Black lines show the mean position of the Polar Front [1] over 1997–2012. Purple line displays the median position of the maximum sea ice extent [2] over 1997–2012. The white boxes depict the Weddell Sea region (dashed) and the sector between 120° W and 180° W.

References

1. Sallée, J.; Speer, K.; Morrow, R. Southern Ocean fronts and their variability to climate modes. *J. Clim* **2008**, *21*, 3020–3039.
2. Fetterer, F.; Knowles, K.; Meier, W.; Savoie, M. Sea Ice Index. Boulder, CO: National Snow and Ice Data Center. *Digital Media* **2002**, *6*. Available online: <ftp://sidads.colorado.edu/DATASETS/NOAA/G02135/shapefiles/> (accessed on 13 May 2016).



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