Biogeosciences

Supporting Information for

Drivers of Phytoplankton Bloom Interannual Variability in the Amundsen and Pine Island Polynyas

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Table T1. Average bloom period chlorophyll-*a* (chl*a*) concentration (1998-2017) in mg m^{-3} and mg m^{-1}. The * marks the significant difference in mean chl*a* between the polynyas.

	ASP	PIP
Area integrated chl*a* (10^{11} in mg m^{-1})	3.31 ± 1.14 *	2.16 ± 1.11 *
Chl*a* (mg m^{-3})	5.21 ± 1.39 *	3.69 ± 1.11 *

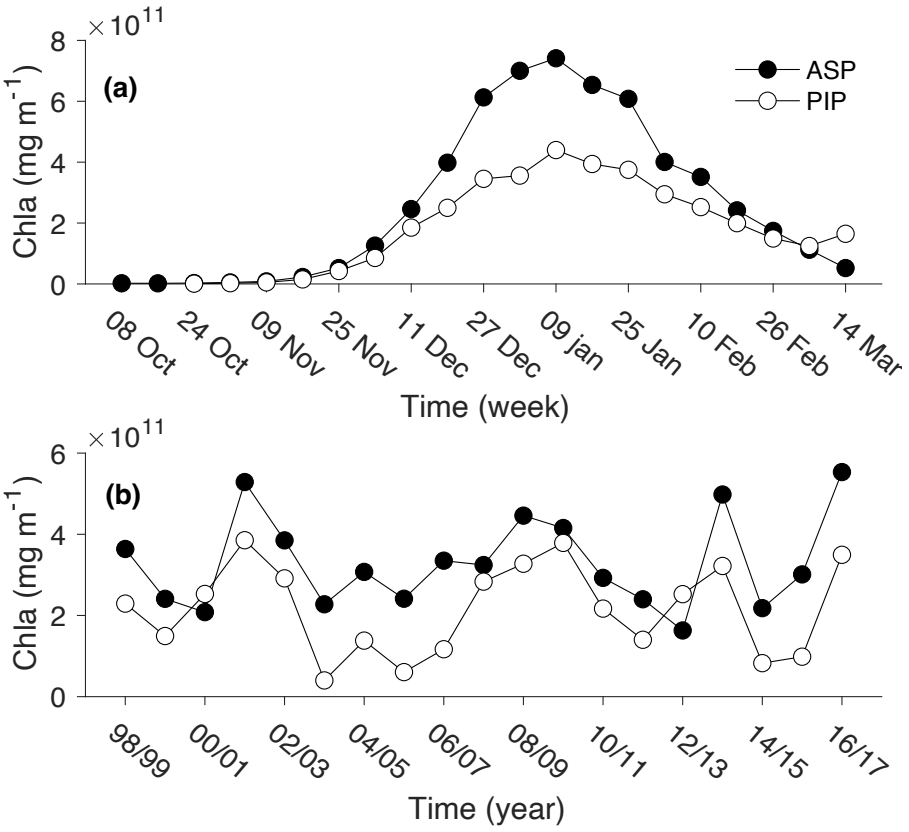

Fig. S1. (a) Weekly area integrated chlorophyll-*a* (chl*a*) climatology (1998-2017) for ASP (filled circles) and PIP (open circles). (b) October-March mean area integrated chl*a* time series of ASP (filled circles) and PIP (open circles).

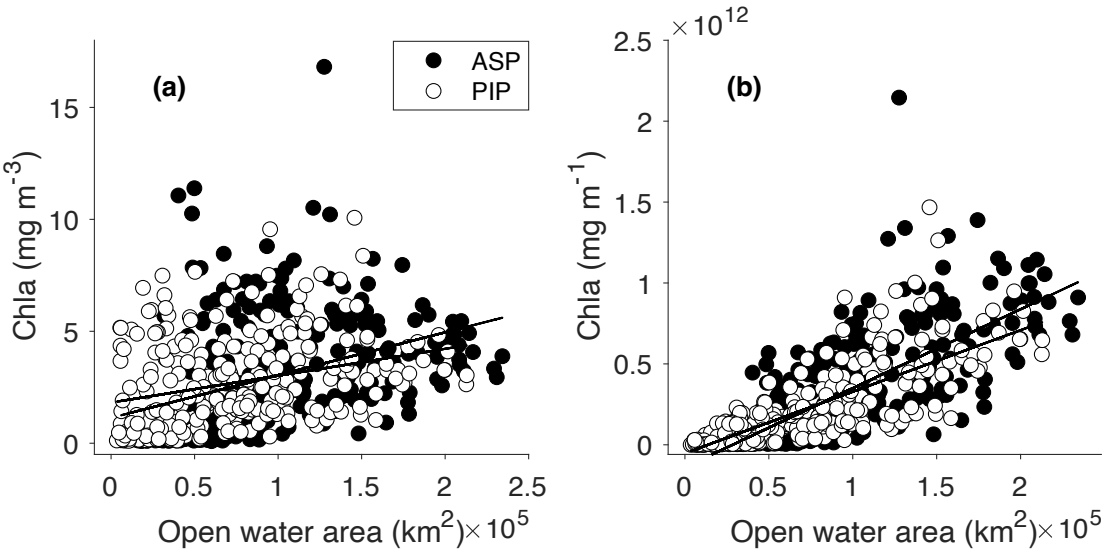

Fig. S2. Relationship between the polynya size and average chlorophyll-*a* (chl*a*) in (a) mg m^{-3} and (b) mg m^{-1} for ASP (filled circles) and PIP (open circles). All relationships are significant at 95% confidence level.

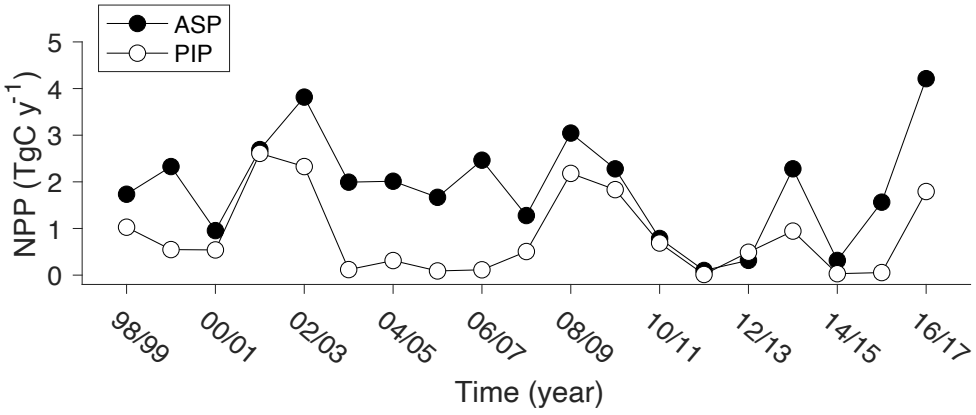

Fig. S3. Annual integrated net primary productivity (NPP) for the ASP (filled circles) and PIP (open circles).

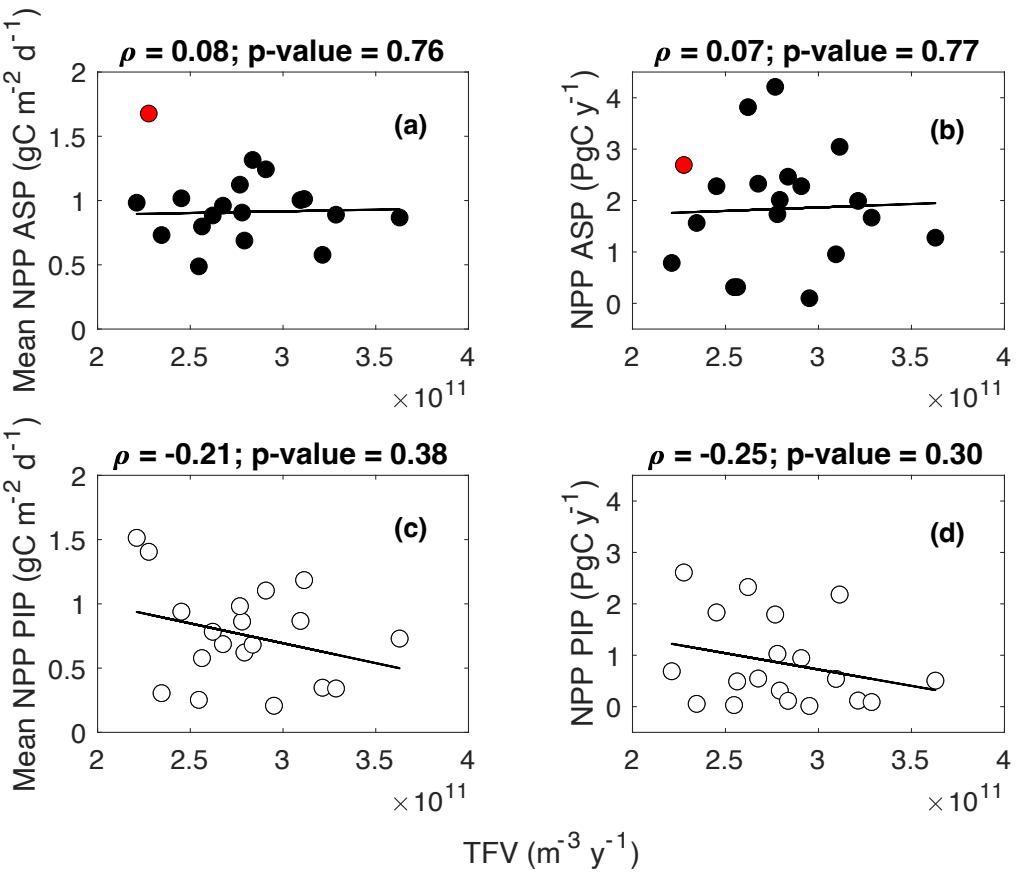

Fig. S4. Scatter plots of mean and integrated net primary productivity (NPP) with total volume fluxes (TVF) for (a-b) the ASP and (c-d) the PIP from 1998 to 2017. The fitted lines and statistics exclude the 2001/02 year (red outlier) for the ASP regressions to match Fig. 3. TVF is an annual integral representing the sum of all ice shelves (see methods section) for the Amundsen Sea Embayment.

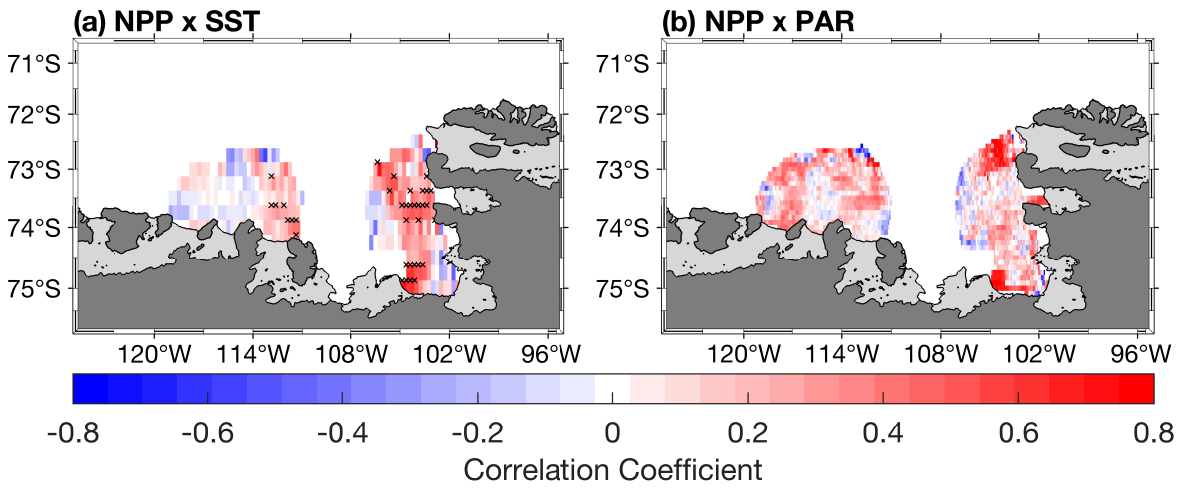

Fig. S5. Spatial maps of the correlation between net primary productivity (NPP) and (a) sea surface temperature (SST) and (b) photosynthetically available radiation (PAR). Data are monthly and span 1998 – 2017 from October to March (n=114). The black crosses represent significant correlation at 95% confidence level. Data outside of the summer climatological polynyas boundaries were masked out.

Table T2. Linear fit statistics for chlorophyll-*a* (chl*a*) and net primary productivity (NPP) as a function of sea surface temperature (SST) and photosynthetically available radiation (PAR) in the ASP and PIP (n=19).

	ASP						PIP					
	Mean chl*a*		Max chl*a*		NPP		Mean chl*a*		Max chl*a*		NPP	
	Rho	p-value	Rho	p-value	Rho	p-value	Rho	p-value	Rho	p-value	Rho	p-value
SST	0.51	-0.16	-0.12	0.62	0.11	0.66	**0.58**	**0.009***	**0.61**	**0.006***	**0.62**	**0.006***
PAR	0.35	0.14	**0.47**	**0.04***	0.44	0.07	**0.62**	**0.007***	**0.58**	**0.01***	**0.73**	**<0.001***

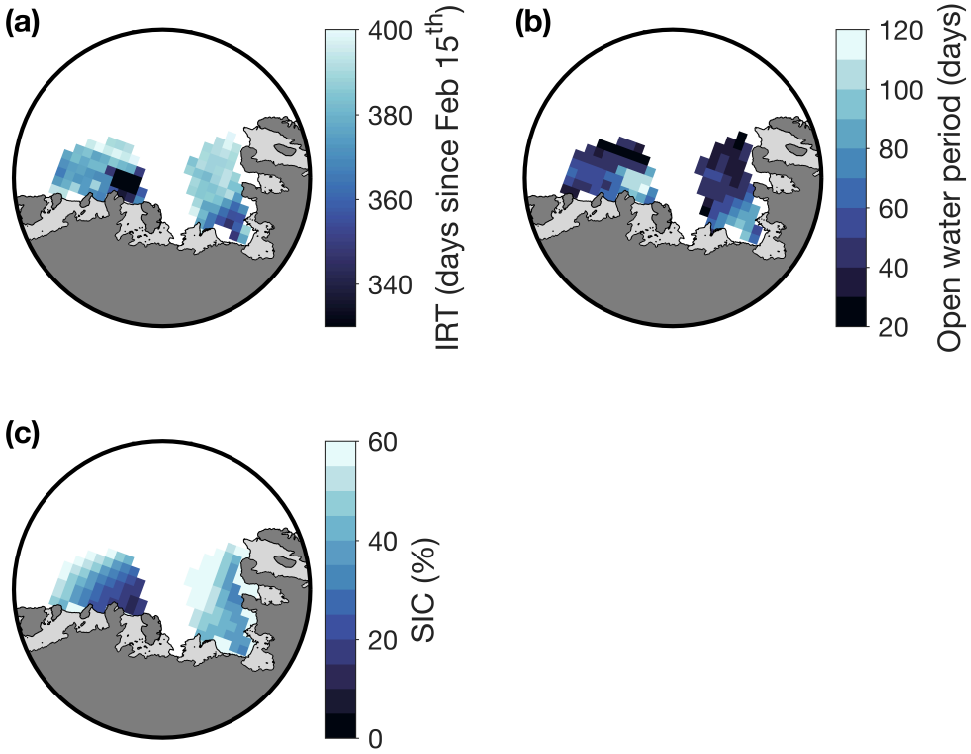

Fig. S6. Sea-ice phenology metrics climatology maps (1998-2017) of (a) ice retreat time (IRT), (b) open water period, and (c) sea-ice concentration (SIC). The SIC climatology is from October to March. Open water period was determined using a 15% SIC threshold. Data outside of the summer climatological polynyas boundaries were masked out.

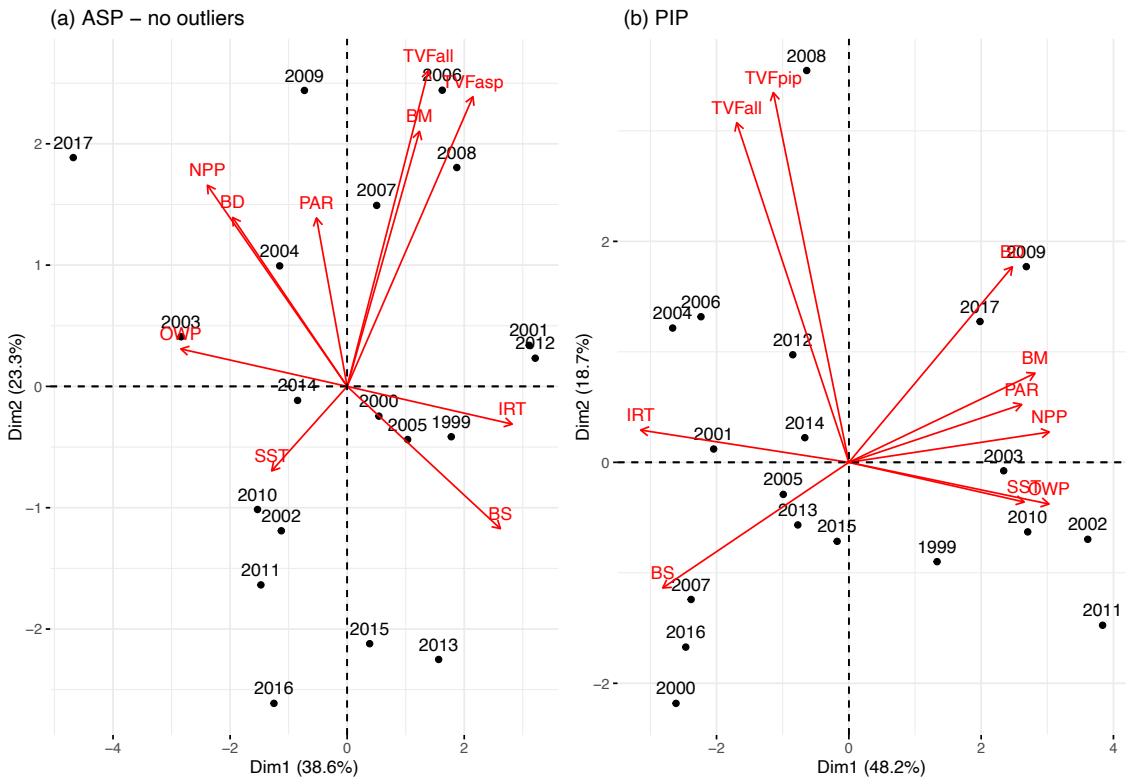

Fig. S7. Principal component analysis biplot of environmental parameters (red) and years (black) for (a) the ASP and (b) the PIP. Same as Fig. 7 in the main manuscript but without the anomalous 2001/02 summer for the ASP.

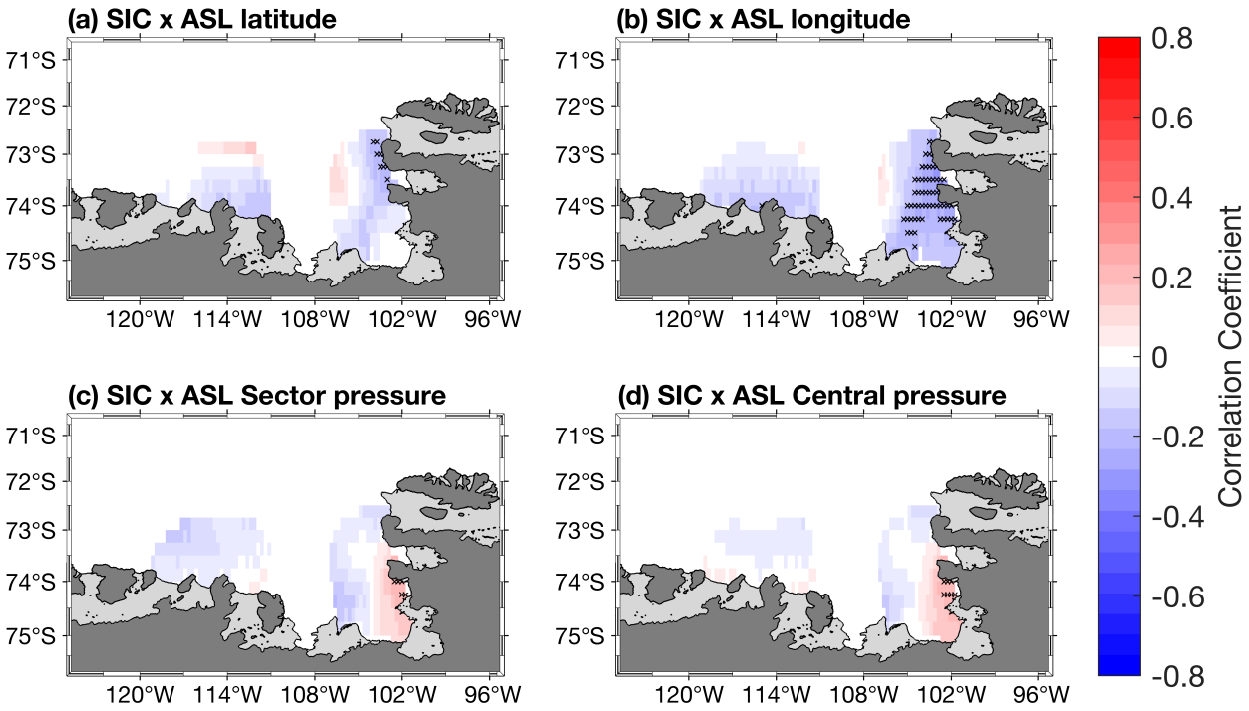

Fig. S8. Spatial maps of the correlation between sea-ice concentration (SIC) and (a) Amundsen Sea Low (ASL) latitude, (b) longitude, (c) mean sector pressure and (d) actual central pressure (n=114). The black crosses represent significant correlation at 95% confidence level. Data outside of the summer climatological polynyas boundaries were masked out. Seasonality was removed from the data before preforming the correlation like in Fig. 6.