

Supplementary Material for:

Observed interannual changes beneath Filchner-Ronne Ice Shelf linked to large-scale atmospheric circulation

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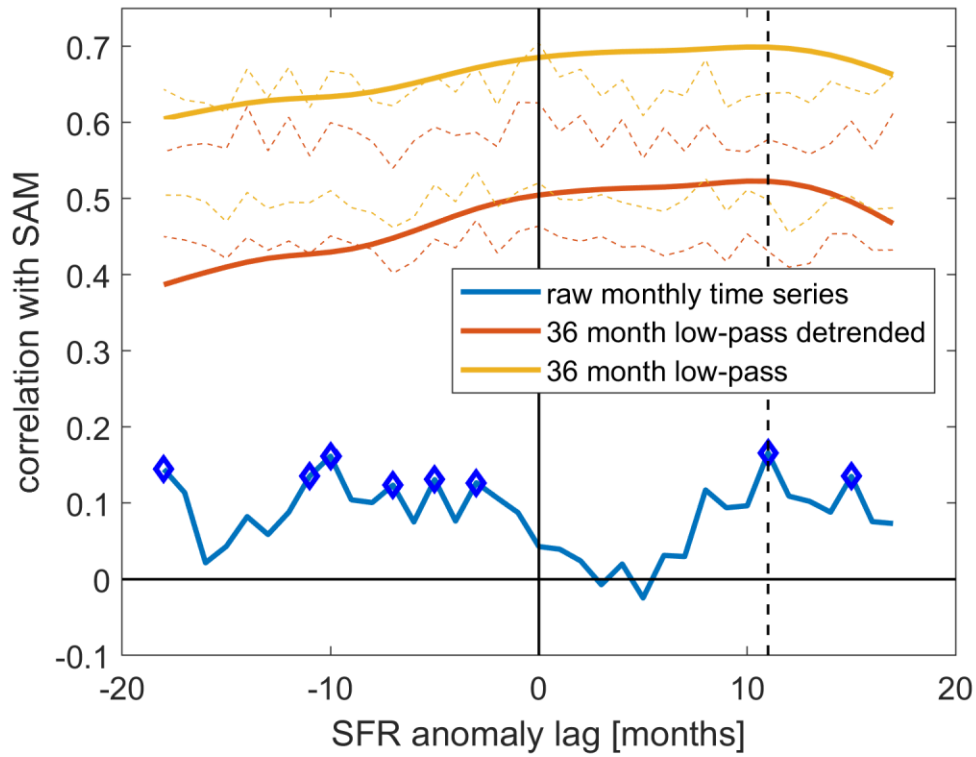
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Supplementary Figure 1. **Time-lagged correlation coefficients between SFR anomalies and**

SAM-index. Positive x -values indicate lag of SFRs behind SAM. Blue daimonds indicate

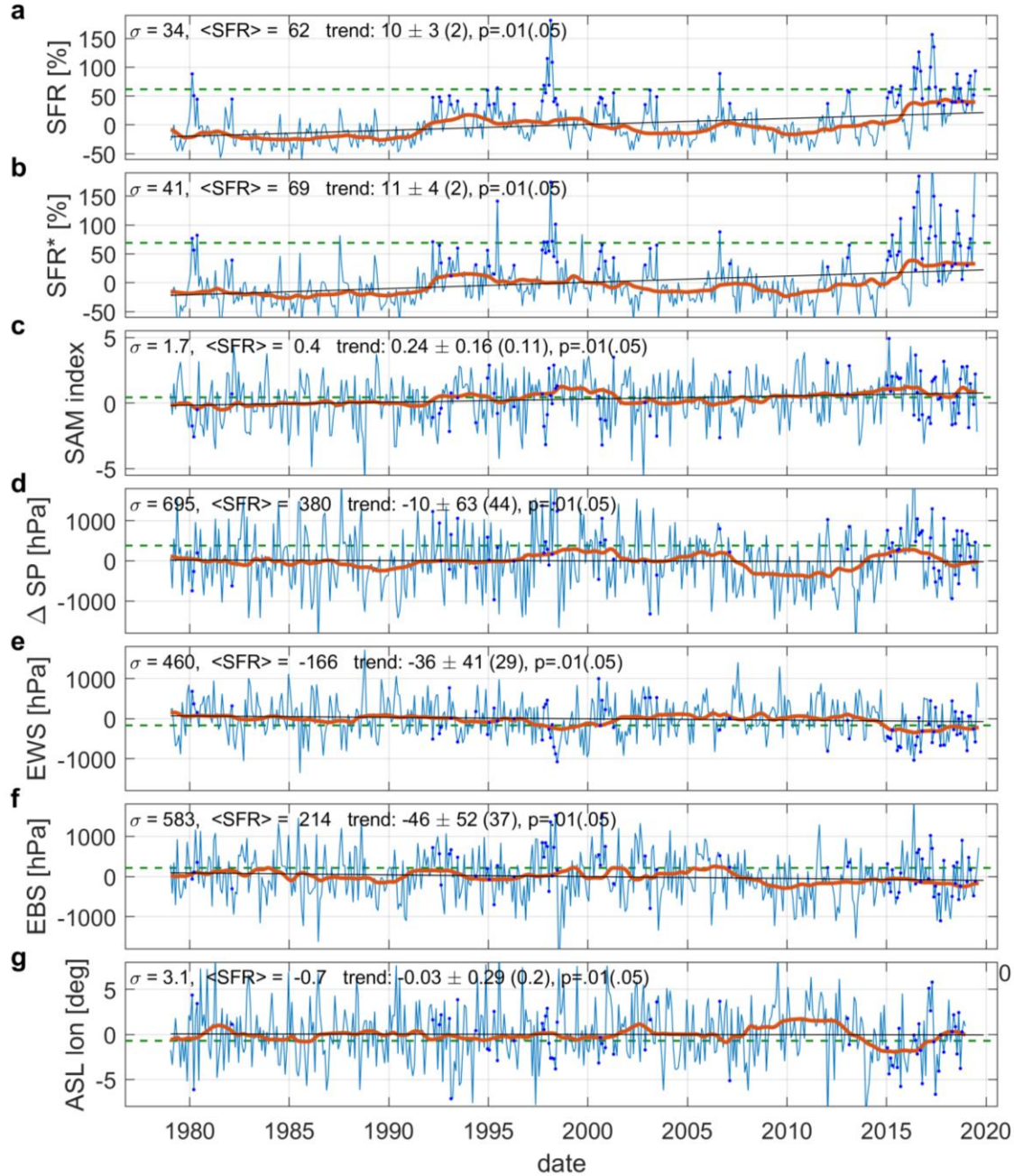
statistically significant ($p=.01$) correlations of the monthly time series. Dashed lines indicate 95

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% and 99 % significance levels from the Monte Carlo bootstrapping method for correlations of

the low-pass filtered time series at corresponding color. I.e. most correlations of the low-pass

filtered series are significant above 99 % confidence for positive lag, whereas significance of correlations for the low-pass filtered and de-trended time series ranges between 95 % 99 %.



Supplementary Figure 2. **Time series of climatic indices.** Monthly and 36-month low-pass

5 filtered time series of **a** sea ice formation rates computed with constant and **b** time varying

winds, **c** SAM-index, **d** the difference between **e** SP anomalies in the eastern Weddell Sea and **f** SP anomalies in the eastern Bellingshausen Sea, as well as anomalies in the zonal position of the Amundsen Sea Low. Blue dots in all panels indicate months of enhanced SFR events identified in the time series shown in **a**, green dashed lines indicate the average over these months for the respective variable in each panel also stated as numeric value $\langle \text{SFR} \rangle$ together with standard deviation σ and linear trend including confidence intervals for each time series.

<i>r</i>	SFR	SFR*	SAM	EBS-EWS	EWS	EBS	ASL lon	ASL CP
SFR	1.00							
SFR*	0.93	1.00						
SAM	0.06	0.05	1.00					
EBS-EWS	0.33	0.38	0.23	1.00				
EWS	-0.18	-0.23	-0.69	-0.55	1.00			
EBS	0.26	0.27	-0.27	0.76	0.12	1.00		
ASL lon	-0.15	-0.15	0.02	-0.41	-0.03	-0.52	1.00	
ASL CP	0.07	0.09	-0.60	-0.05	0.53	0.35	-0.14	1.00

Supplementary Table 1. **Correlation coefficients between monthly anomalies.** spatially averaged (SFR) sea ice formation rates computed with constant and; (SFR*) time-varying winds; (SAM) Southern Annual Mode index; (EWS) pressure in the eastern Weddell Sea; (EBS) Eastern Bellingshausen Sea; (EBS-EWS) the pressure difference between these two locations, (ASL lon) the Amundsen Sea Low central longitude and; (ASL CP) the central absolute pressure. Bold numbers indicate statistical significance at $p = 0.01$.

r	SFR	SFR*	SIC	ΔT	U
SFR	1.00				
SFR*	0.92	1.00			
SIC	-0.70	-0.57	1.00		
ΔT	0.14	0.03	0.13	1.00	
U	0.22	0.51	-0.13	-0.26	1.00

Supplementary Table 2. **Correlation coefficients between monthly time series of spatially averaged anomalies of.** (SFR) sea ice formation rates computed with constant and; (SFR*) time-varying winds; (SIC) sea ice concentration; (ΔT) difference between the atmospheric temperature at 2 m height above the surface and the ocean surface freezing temperature and; (*U*) absolute wind speed at 10 m height above the surface. Bold numbers indicate statistical significance at $p = 0.01$.