

Natural variability of sea ice in pre-industrial control runs

The Arctic September sea ice minimum

- ▶ Composite of atmospheric and oceanic fields in years of low September extent
- ▶ Low September extent is defined as extent values one standard deviation below the mean
- ▶ Sea Level Pressure (SLP) causes thinning of ice (Eurasian basin).
- ▶ SLP signal strengthens, hence, model agreement increases

SLP anomalies in months leading to the September minimum

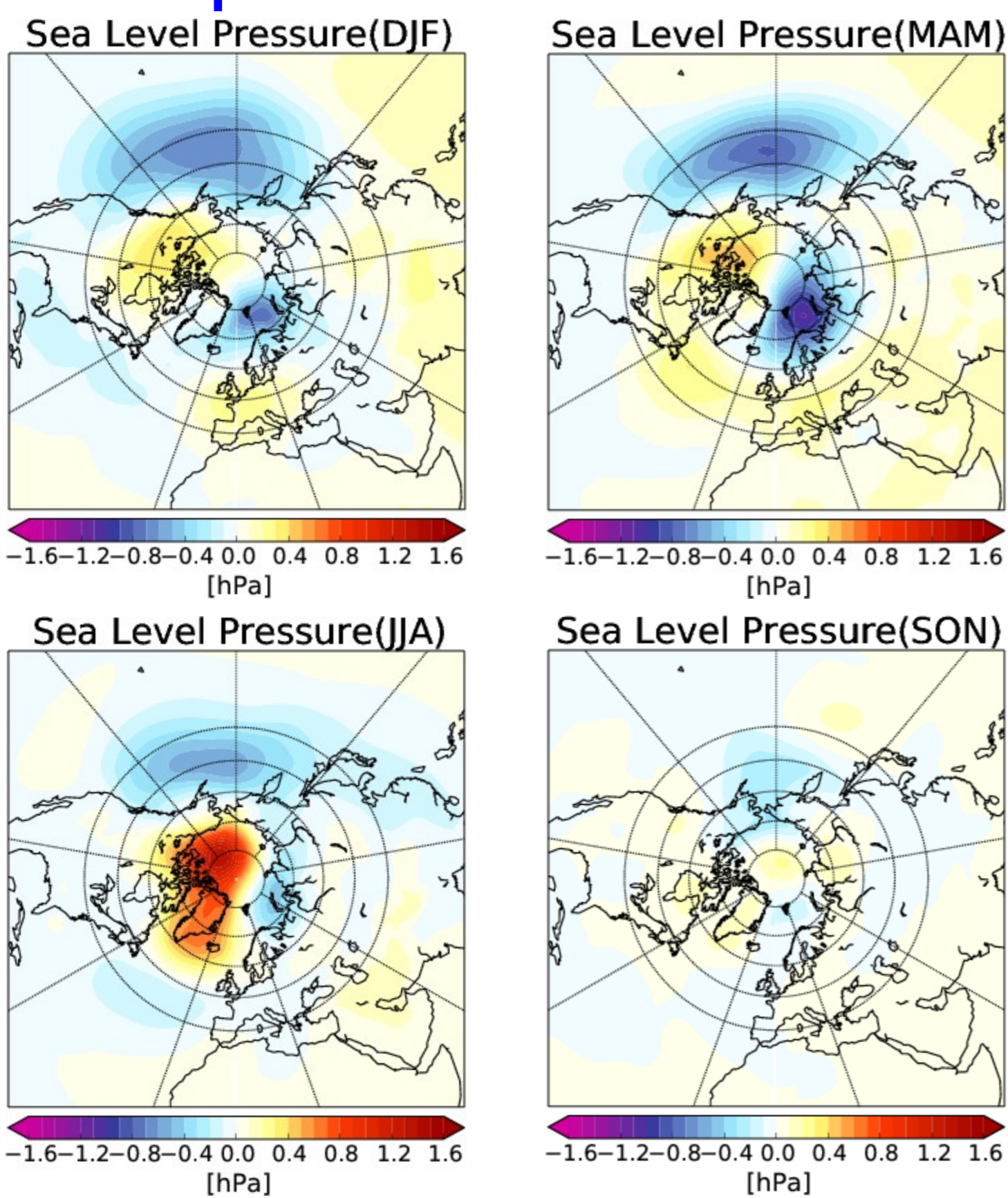


Figure 1: Model mean sea level pressure composites based on years of low September sea ice

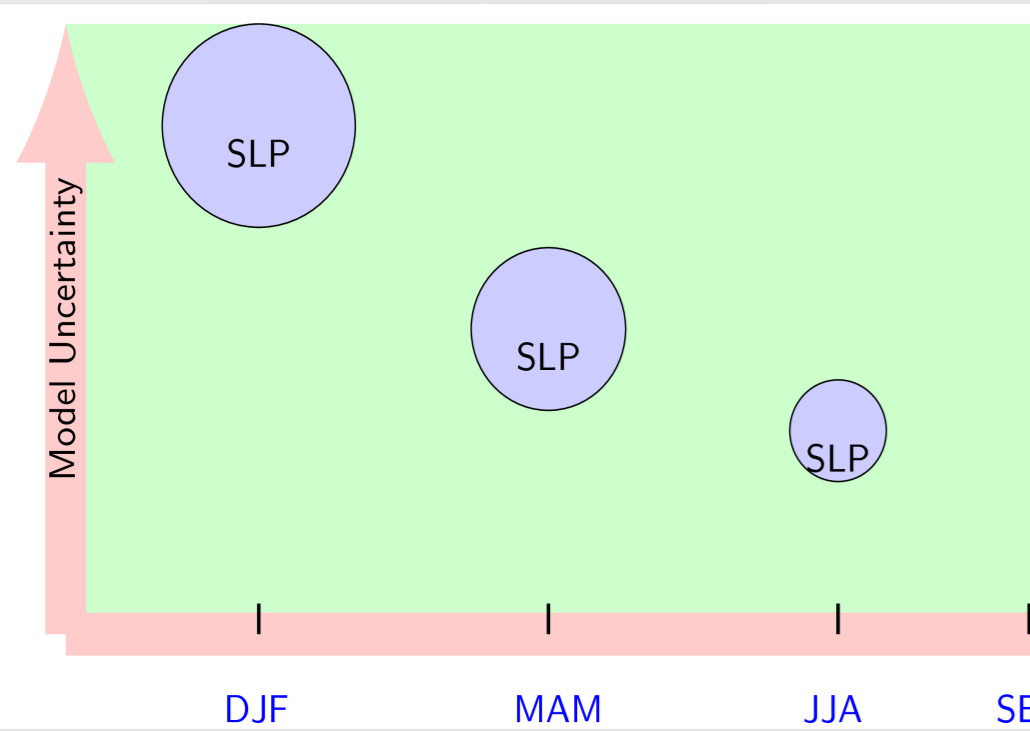


Figure 2: Level of inter-model uncertainty when regarding the model mean SLP as a predictor, as we advance towards the September minimum

Inter-model uncertainty regarding the September sea ice minimum

Conclusions Arctic

- (1) When examining the September sea ice minimum in the Arctic, AWI-CM and a number of CMIP5 models show a degree of uncertainty
- (2) Nevertheless we can detect precursors
- (3) Inter-model uncertainty decreases with time

Antarctic melt-to-growth reemergence of sea ice extent

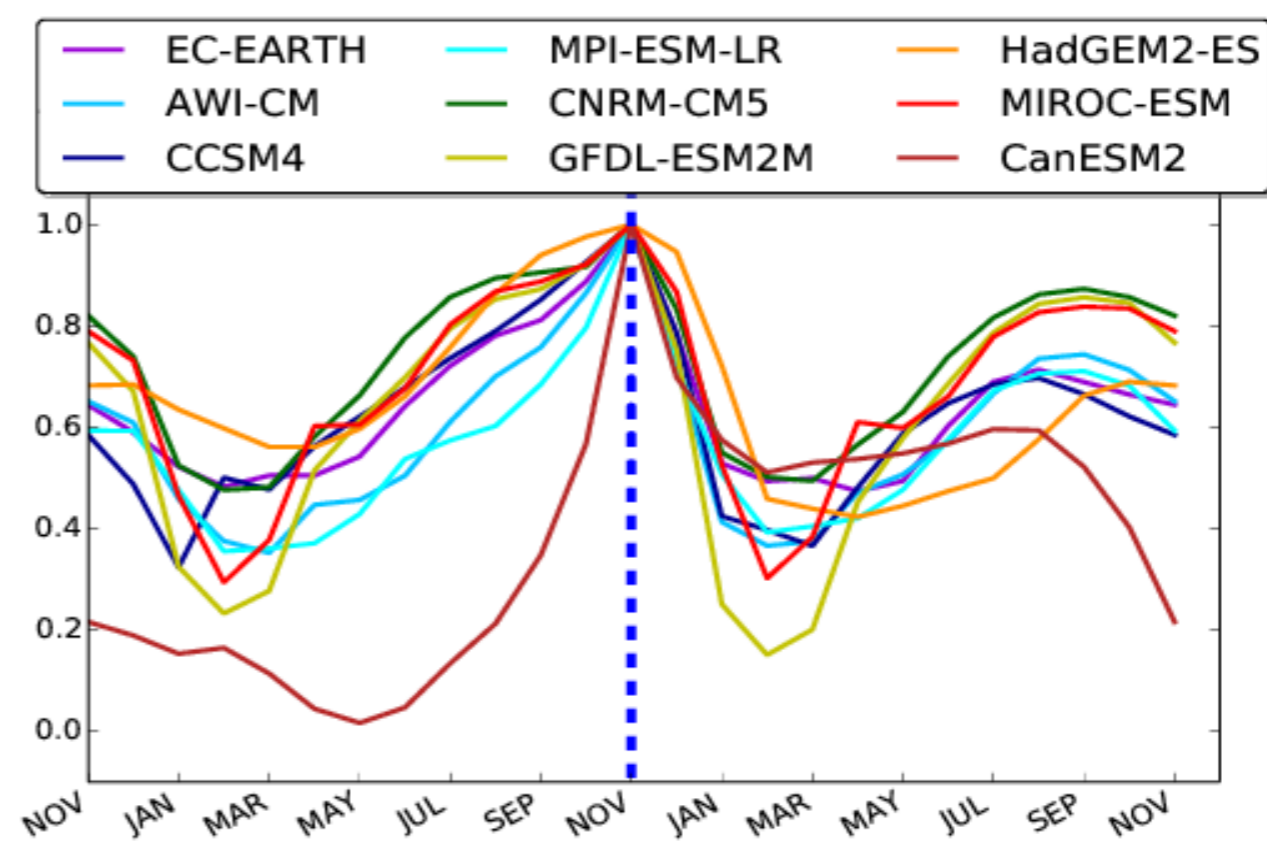


Figure 3: Antarctic November sea ice extent cross correlations with the following and previous 12 months. Correlations quickly decay only to reemerge again the following growth season

Source of Reemergence

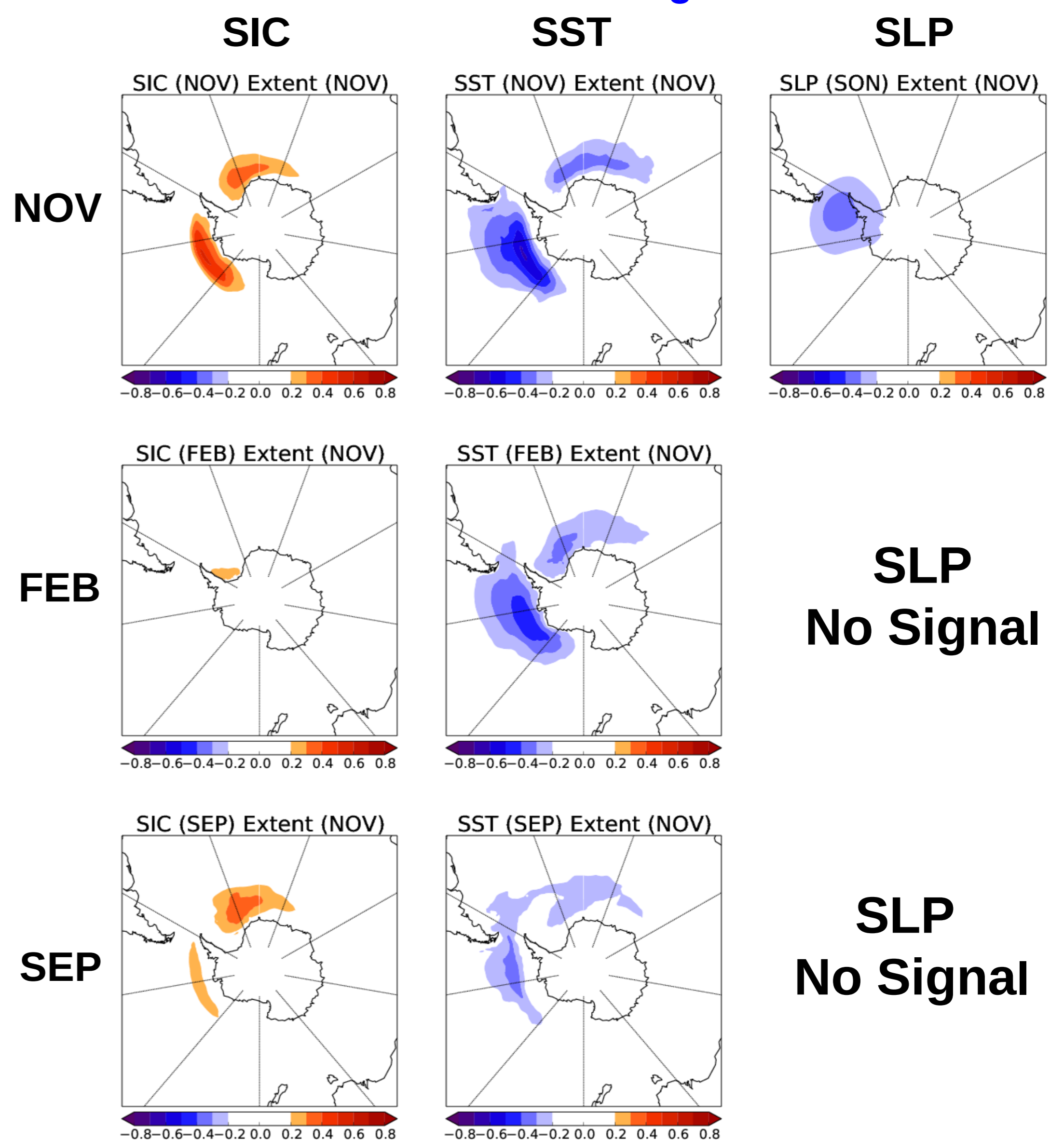


Figure 4: Correlation maps between November sea ice extent and Sea Ice Concentration (SIC), Sea Surface Temperature (SST), and Sea Level Pressure (SLP) in November (upper panel), February (middle panel) and September (lower panel). The months November, February and September correspond to the beginning time of the cross correlations in figure 3, the time of loss of correlation and the time of reemergence of correlation.

Conclusions Antarctic

- (1) Reemergence from melt-to-growth season has been found for the AWI-CM and a number of CMIP5 models
- (2) Sea ice extent in the melt season (NOV) correlates with sea ice concentration. This correlation is lost in FEB only to reemerge the following SEP
- (3) Possibly, persistence of SST anomalies is the source of reemergence