Supporting Information for

"A spring barrier for regional predictions of summer Arctic sea ice"

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Contents

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Model Name	Model Years	SIC	SIT
ACCESS1.0	599-799	×	×
ACCESS1.3	549-749	×	×
BCC-CSM1.1	300-500	×	×
BCC-CSM1.1(m)	200-400	×	×
BNU-ESM	1808-2008	×	×
CanESM2	2910-3110	×	×
CCSM4	1100-1300	×	×
CESM1(BGC)	400-600	×	×
CESM1(CAM5)	119-319	×	×
CESM1(FASTCHEM)	91-291	×	×
CESM1(WACCM)	95-295	×	×
CMCC-CESM	4400-4600	×	×
CMCC-CM	1679-1879	×	×
CMCC-CMS	3983-4183	×	×
CNRM-CM5	2499-2699	×	×
CSIRO-Mk.3.6.0	300-500	×	×
EC-EARTH	2351-2551	×	×
FGOALS-g2	700-900	×	×
FGOALS-s2	2150-2350	×	×
FIO-ESM	1000-1200	×	×
GFDL-CM3	300-500	×	×
GFDL-ESM2G	300-500	×	×
GFDL-ESM2M	300-500	×	×
HadGEM2-CC	1899-2099	×	×
HadGEM2-ES	2236-2436	×	×
INM-CM4	2149-2349	×	×
IPSL-CM5A-LR	2599-2799	×	×
IPSL-CM5A-MR	1899-2099	×	×
IPSL-CM5B-LR	1929-2129	×	×
MIROC-ESM-CHEM	1900-2100	×	×
MIROC-ESM	2130-2330	×	×
MIROC5	2469-2669	×	×
MPI-ESM-LR	2649-2849	×	×
MPI-ESM-MR	2649-2849	×	×
MPI-ESM-P	2805-3005	×	×
MRI-CGCM3	2150-2350	×	×
NorESM1-M	1000-1200	×	×
NorESM1-ME	952-1152	×	×

Table 1. Names of the GCMs studied from the CMIP5 pre-industrial control simulations, the corresponding model years studied, and the variables considered: sea-ice concentration (SIC) and sea-ice thickness (SIT)

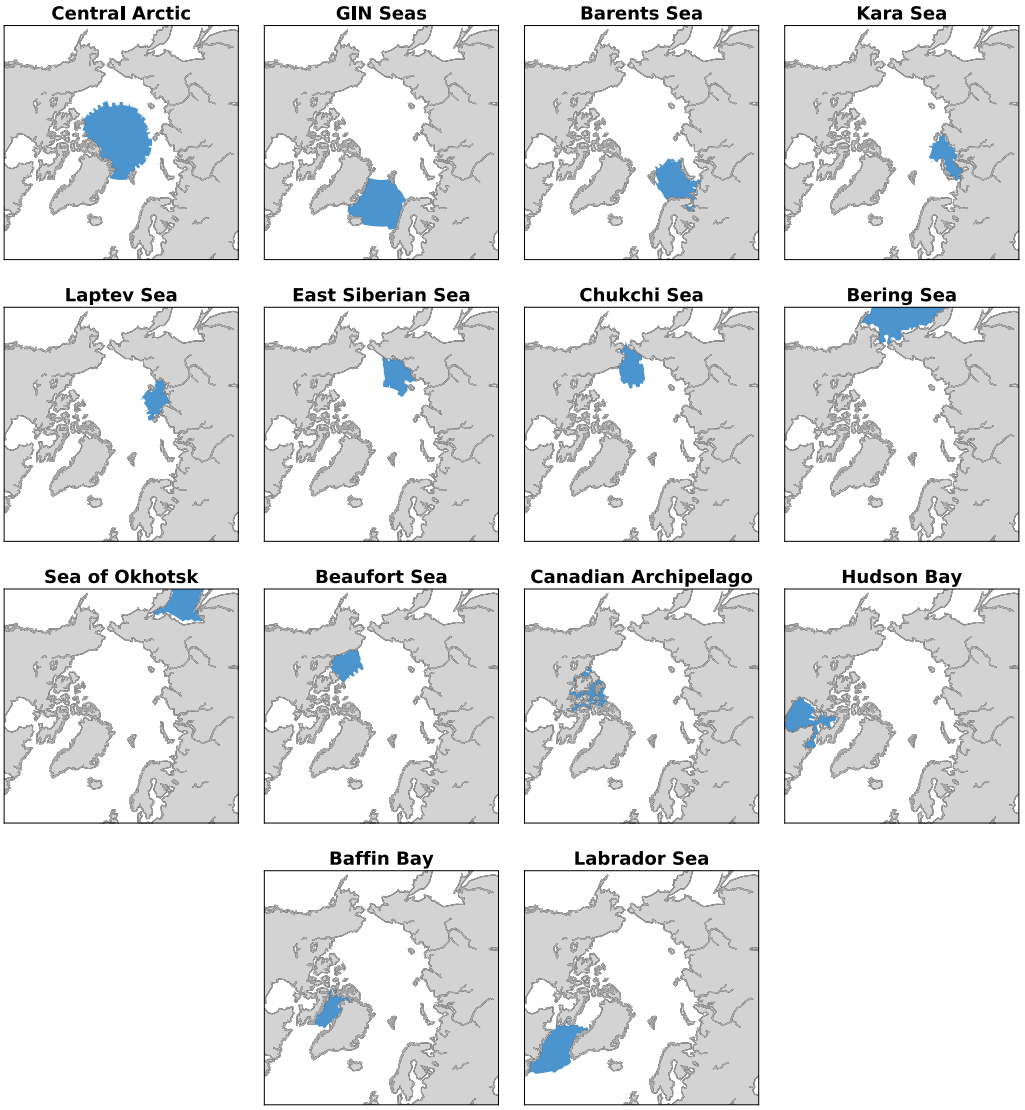

Figure S1. The 14 regional Arctic domains considered in this study.

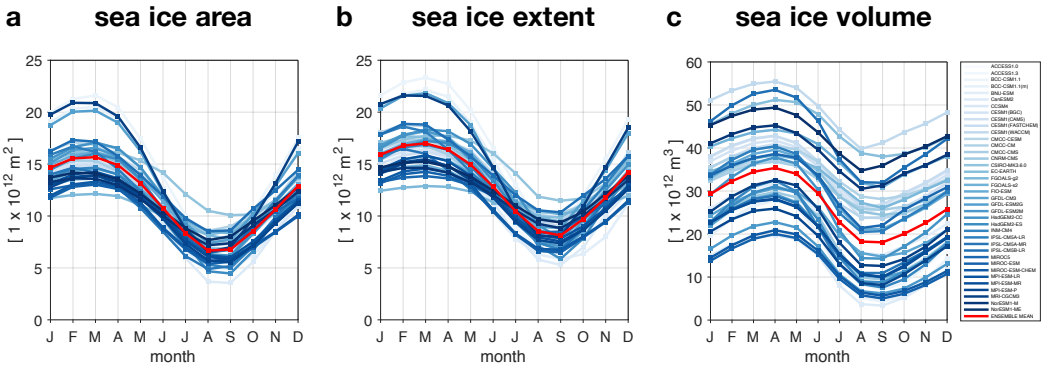

Figure S2. Seasonal climatologies of (a) sea ice area, (b) sea ice extent, and (c) sea ice volume across all 38 GCMs. The red line corresponds to the ensemble mean.

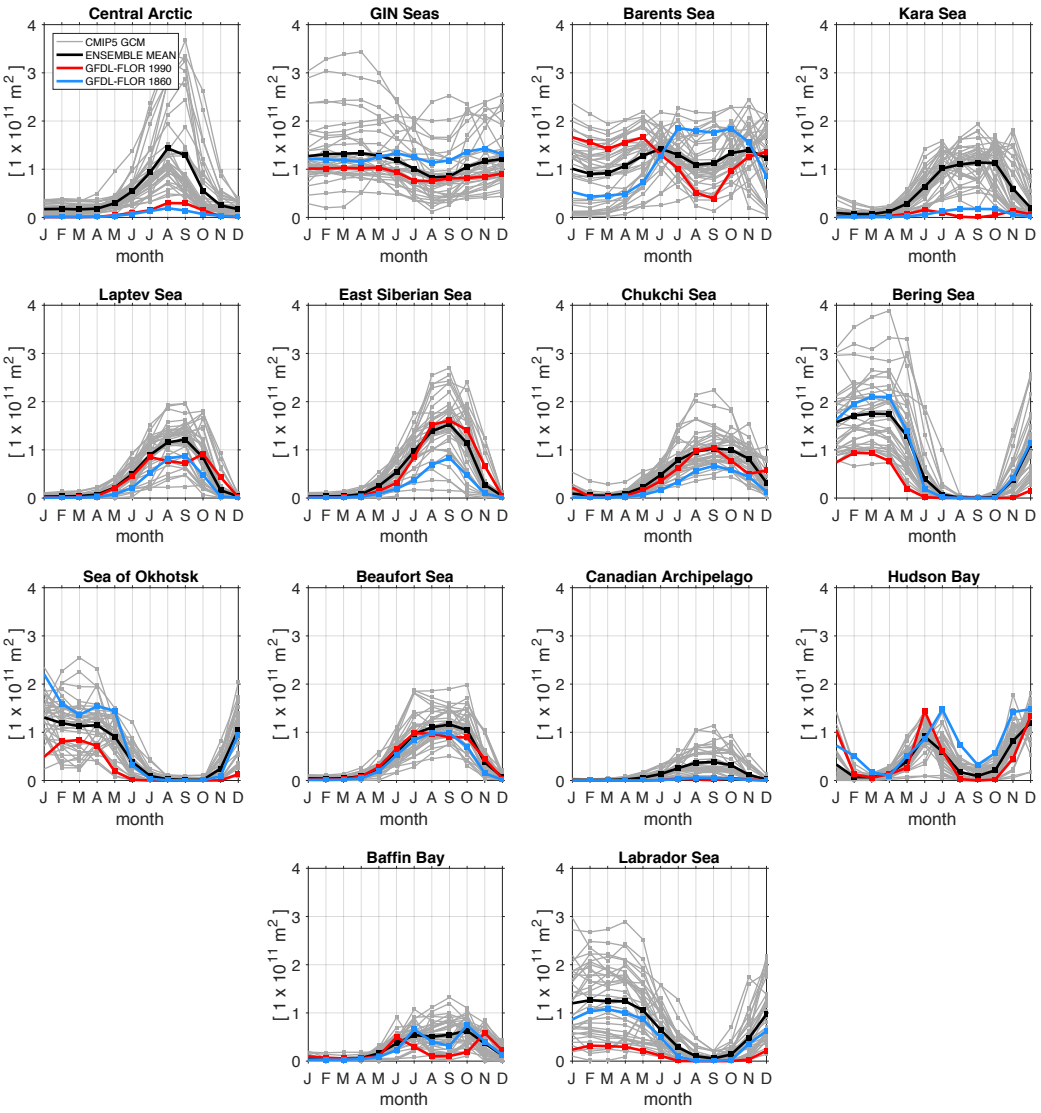

Figure S3. Standard deviation of seasonal sea-ice area (SIA) in each of the 14 regional Arctic domains based on a 200 year time series for the CMIP5 GCMs (gray lines) and GFDL-FLOR (red lines). The black line corresponds to the ensemble mean of all 38 GCMs.

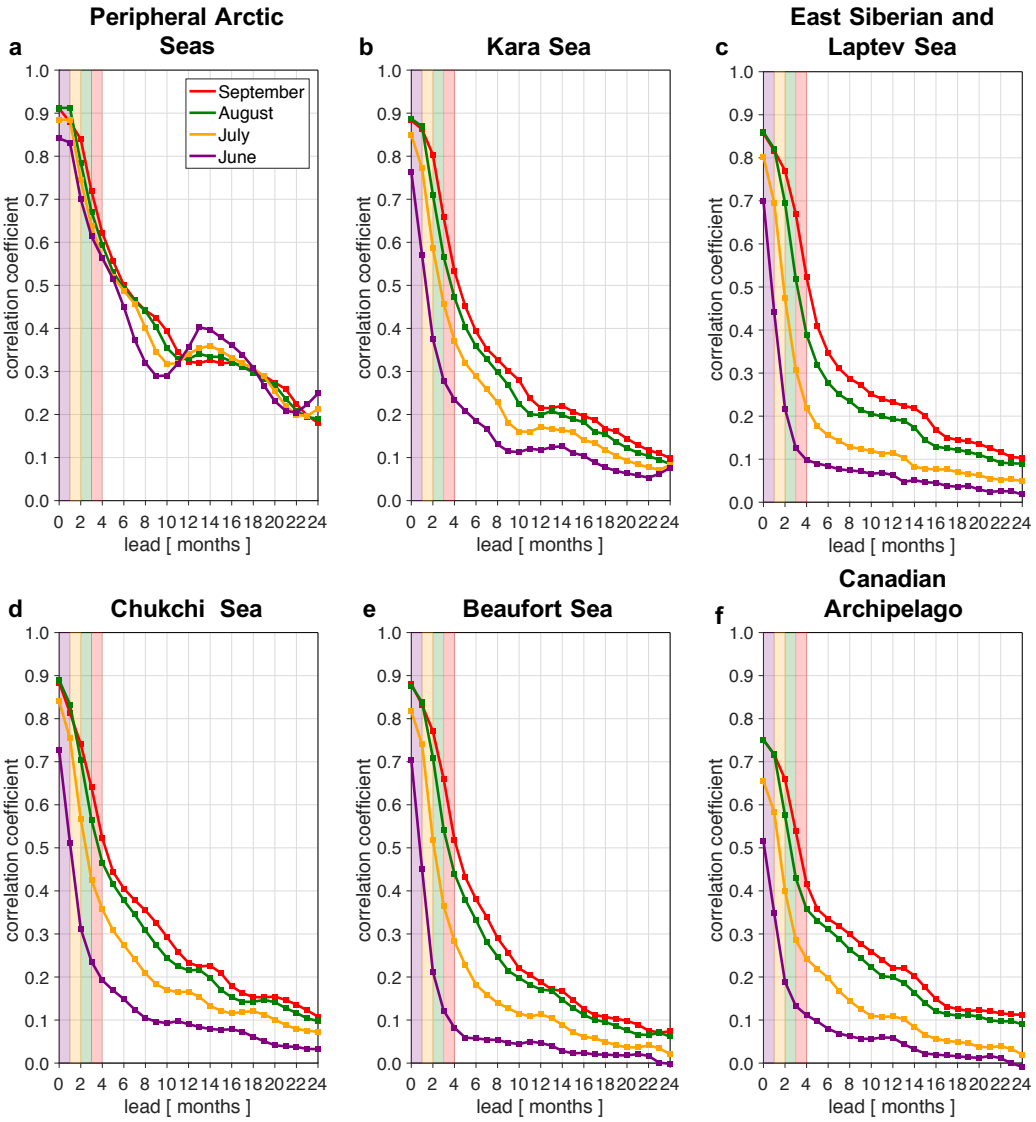

Figure S4. Pearson correlation coefficient of sea ice area (SIA) at June (purple line), July (yellow line), August (green line), and September (red line) target months with sea ice volume (SIV) at lead times of 0 to 11 months in the: (a) Peripheral Arctic Seas, (b) Kara Sea, (c) East Siberian and Laptev Sea, (d) Chukchi Sea, (e) Beaufort Sea and (f) Canadian Archipelago. Correlation values are based on a 200-year time series and are shown for the ensemble mean of 38 GCMs. The shaded regions denote the June to May SIV transition.

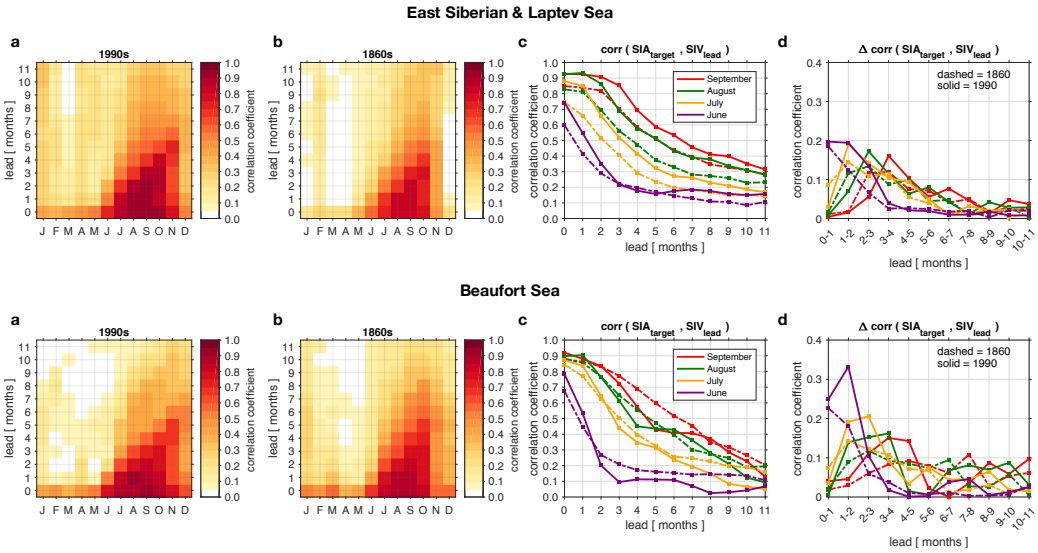

Figure S5. Comparison of a GFDL FLOR control run in 1990 and 1860 for the East Siberian and Laptev Sea and Beaufort Sea. (a) Pearson correlation coefficient of sea ice area (SIA) at January through December target months with sea ice volume (SIV) at lead times of 0 to 11 months for the 1990 control run. (b) Pearson correlation coefficient of sea ice area (SIA) at January through December target months with sea ice volume (SIV) at lead times of 0 to 11 months for the 1860 control run. (c) Pearson correlation coefficient of sea ice area (SIA) at June (purple line), July (yellow line), August (green line), and September (red line) target months with sea ice volume (SIV) at lead times of 0 to 11 months. (d) Change in correlation across each lead time for June (purple line), July (yellow line), August (green line), and September (red line) target months.