

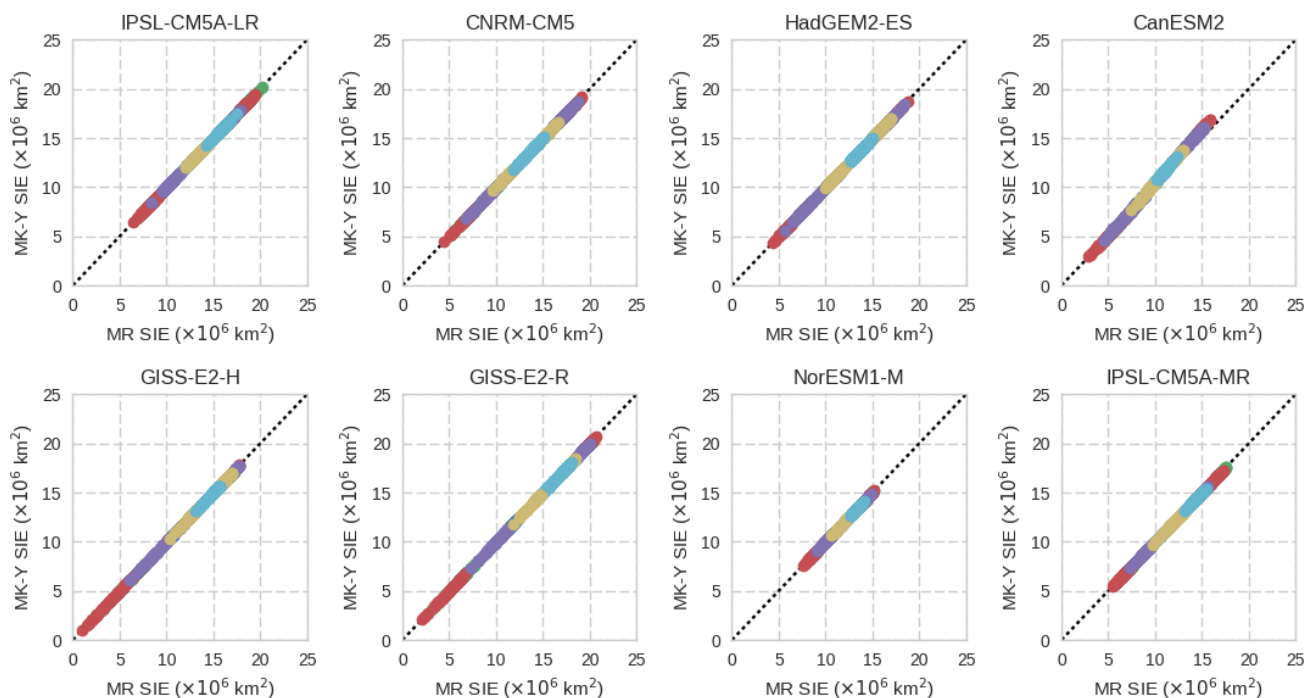
Supplementary Information for “Potential faster Arctic sea ice retreat triggered by snowflakes’ greenhouse effect”

Li, J-L F., Mark Richardson, Wei-Liang Lee, Yulan Hong, Jonathan Jiang, Eric Fetzner, Graeme Stephens, Yi-Hui Wang, Jia-Yuh Yu, Yinghui Liu

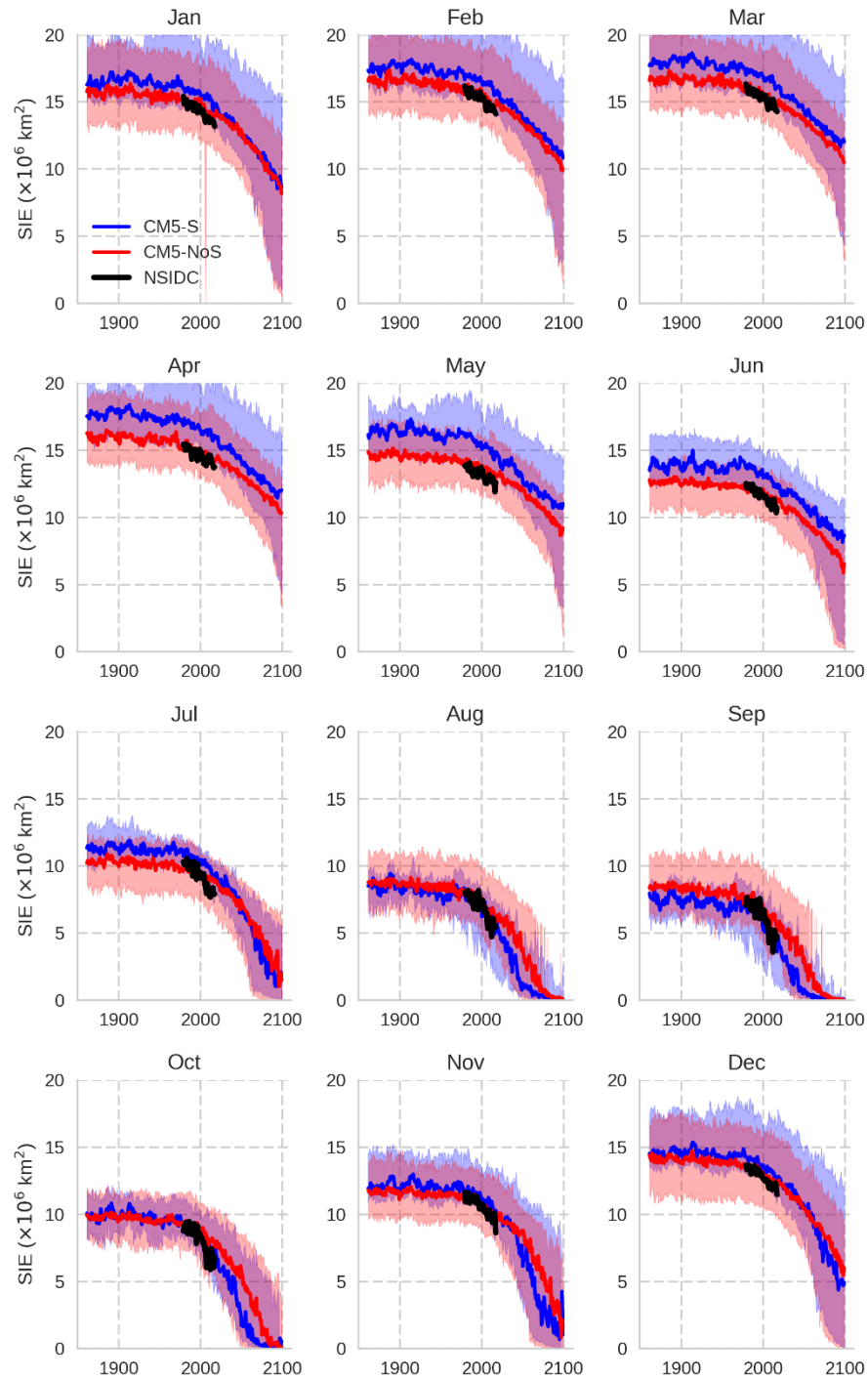
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Supplementary Table 1: List of CMIP5 models used in this study separated according to whether they exclude falling ice radiative effects (i.e. no falling snow radiative effects, NoS) or whether they include these effects (i.e. snow radiative effects on, SoN). This subset is all those for whom the r1i1p1 simulations are available for all the used scenarios and whose output included all necessary surface flux and sea ice fields.

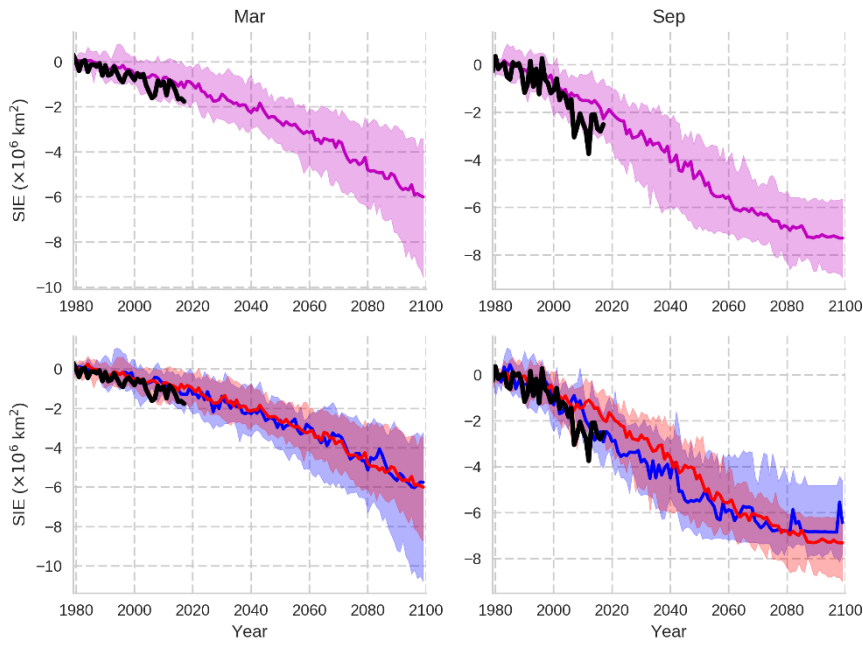
CMIP5 models without FIRE (NoS)	CMIP5 Models with FIRE (SoN)
ACCESS1-0	GFDL-CM3
ACCESS1-3	GFDL-ESM2G
BNU-ESM	GFDL-ESM2M
CCSM4	GISS-E2-H
CESM1-BGC	GISS-E2-R
CNRM-CM5	HadGEM2-CC
CanESM2	HadGEM2-ES
FGOALS-g2	
IPSL-CM5A-LR	
IPSL-CM5A-MR	
IPSL-CM5B-LR	
MIROC-ESM	
MIROC-ESM-CHEM	
MPI-ESM-LR	
MPI-ESM-MR	
MRI-CGCM3	
NorESM1-M	
NorESM1-ME	



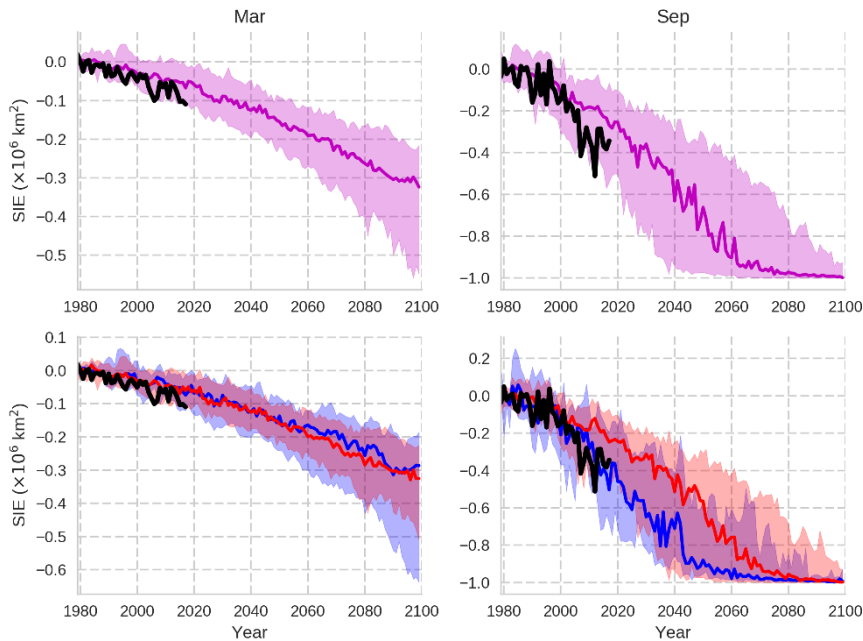
Supplementary Figure 1: Month-by-month comparisons of calculated sea ice extent by the authors (MR SIE, x axis) and for the same values previously published (Kirchmeier-Young et al., 2017) for eight historical-RCP8.5 simulations over 1960—2020. Each colour of point represents a single month and the 1:1 relationship is plotted as a black dotted line.



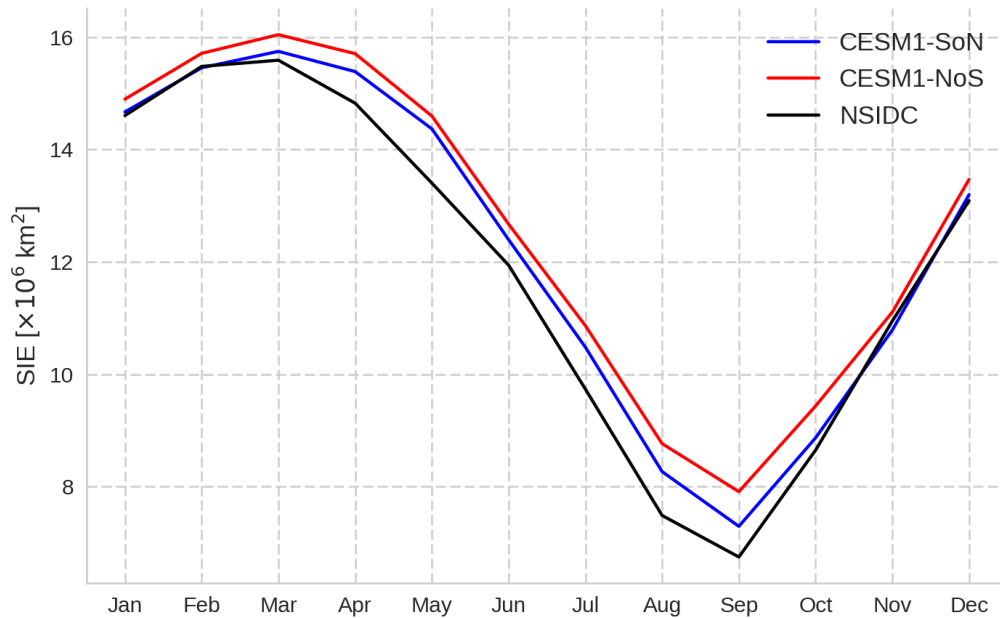
Supplementary Figure 2: As main text Figure 1 except for sea ice extent changes in all calendar months. NSIDC observations in black, the CMIP5-NoS ensemble median and its 10—90 % range in red, and the same for the CMIP-SoN in blue.



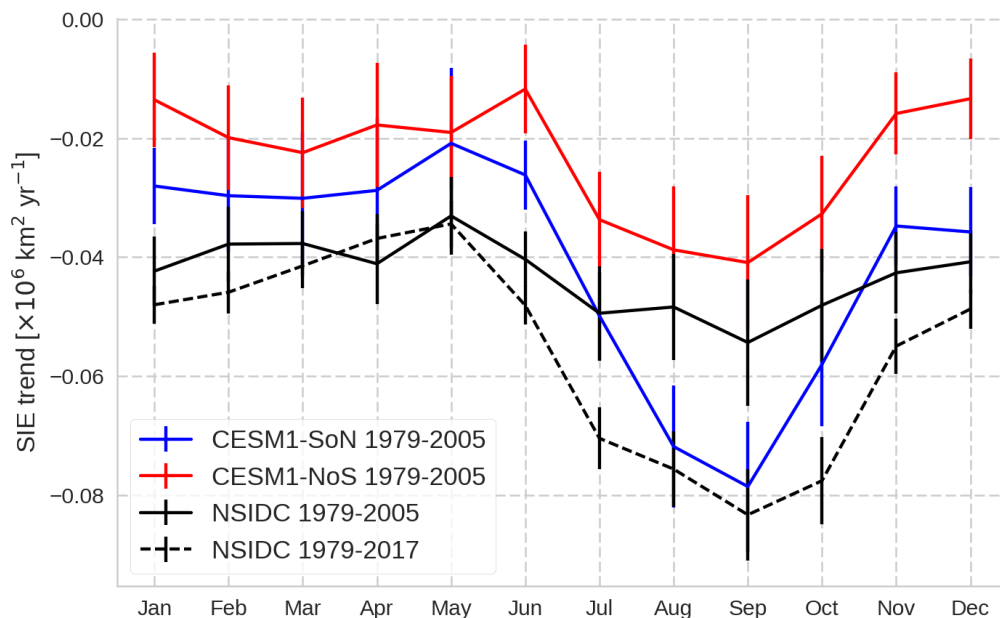
Supplementary Figure 3: As main text Figure 1 except that SIE is presented as an anomaly relative to 1979—1984. Each CMIP5 simulation's anomaly is calculated relative to its own 1979 value.



5 Supplementary Figure 4: As main text Figure 1 except that SIE change is shown as a fraction relative to its 1979—1984 mean. Each CMIP5 simulation's fractional change is calculated relative to its own 1979—1984 mean.



Supplementary Figure 5: Mean annual cycle of sea ice extent over 1979—2005 in CESM1-SoN (blue), CESM1-NoS (red) and NSIDC observations (black). No uncertainties are shown as they would be expanded greatly by the long-term trend.



5 Supplementary Figure 6: Annual cycle of 1979—2005 trend in CESM1-SoN (blue), CESM1-NoS (red) and NSIDC observations (black solid). An update through 2017 is shown in the black dashed line. Error bars are $\pm 1\sigma$ from standard linear regression with assumed white noise, and so may be an underestimate (autocorrelation structure varies, with lag-1 correlation from -0.16 to 0.58 depending on the source and time period).