Supporting Information for "Snow on Arctic sea ice in a warming climate as simulated in CESM"

M. A. Webster[1*], A. K. DuVivier[2], M. M. Holland[2], D. A. Bailey[2]

[1]University of Alaska Fairbanks, Geophysical Institute, 2156 Koyukuk Drive, Fairbanks, AK 99775, USA

[2]National Center for Atmospheric Research, 1850 Table Mesa Dr, Boulder, CO 80305, USA

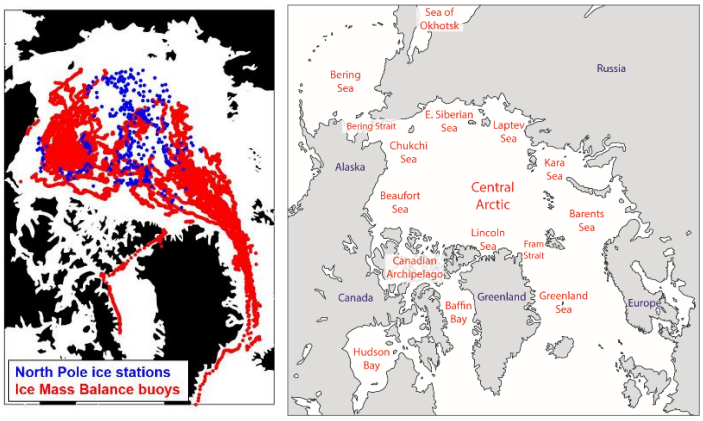
*M. A. Webster, University of Alaska Fairbanks, Geophysical Institute, 2156 Koyukuk Drive, Fairbanks, AK 99775, USA (mwebster3@alaska.edu)

Contents of this file

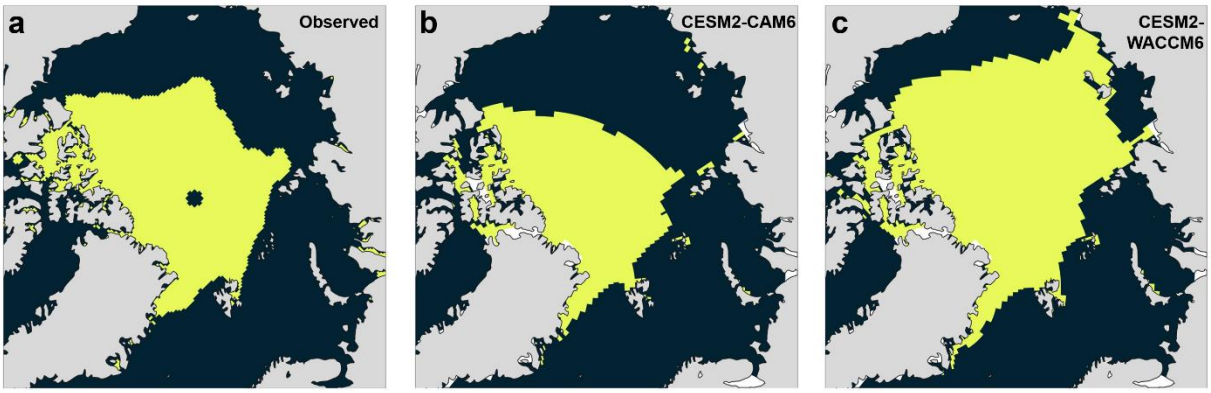
1. Supplementary Figures 1-8.

This auxiliary material contains eight figures, which are referred to in the main text.

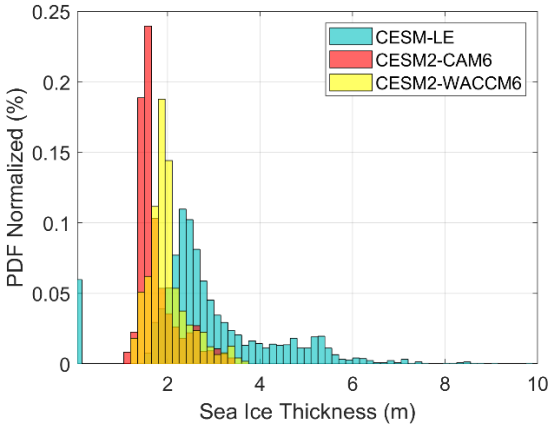
Supplementary Figures



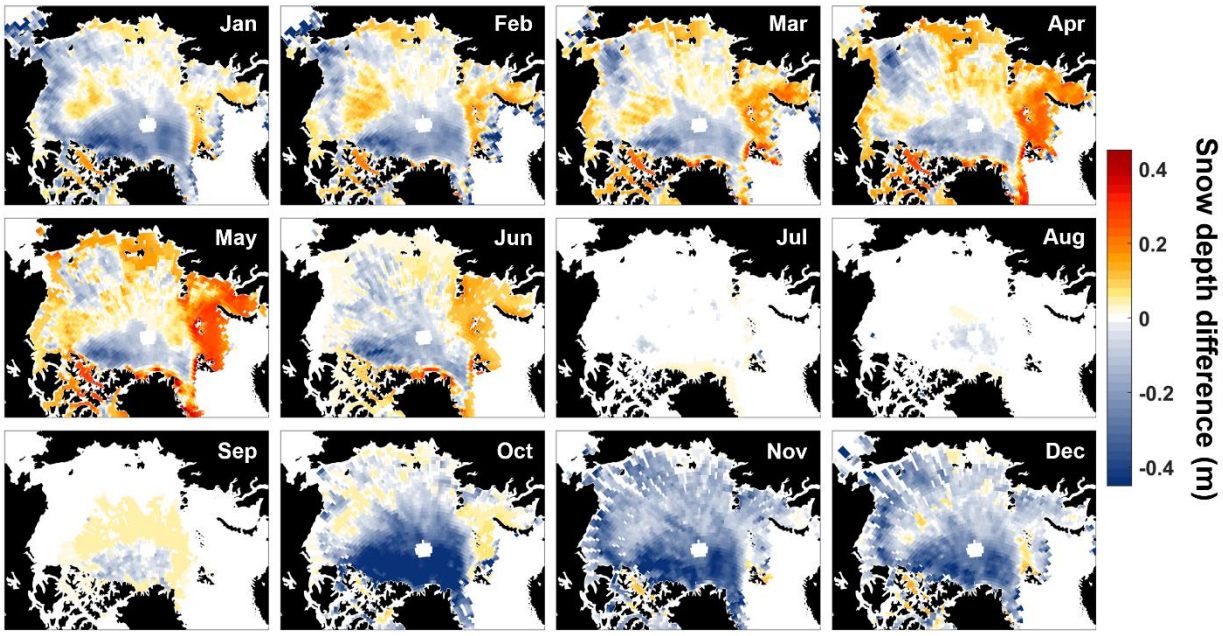
Supplementary Figure 1. Left: The locations of drifting North Pole ice stations (blue) over 1954-1991 and ice mass balance buoys (red) over 1997-2017. Right: A map of regions referenced in the main text.



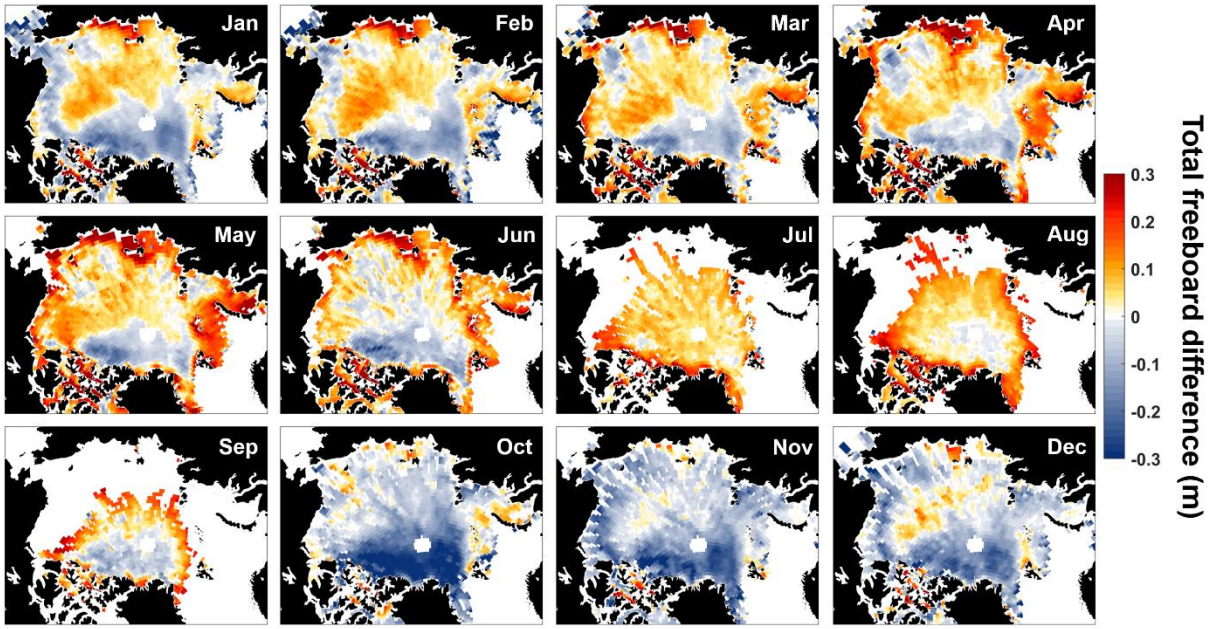
Supplementary Figure 2. The September sea ice coverage in yellow where sea ice concentrations are greater than 15% from (a) passive microwave observations in 2019 and the 2010-2019 average from (b) CESM2-CAM6 and (c) CESM2-WACCM6.



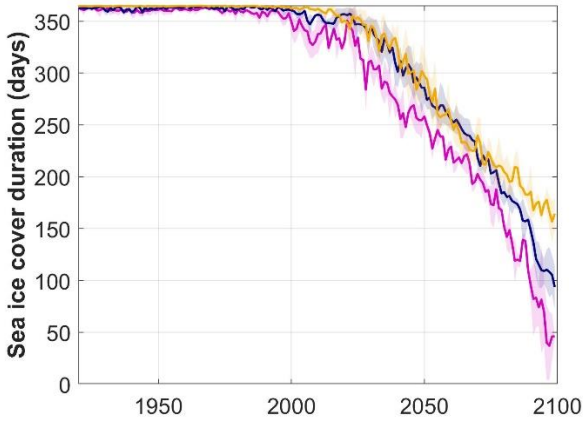
Supplementary Figure 3. The 2009-2017 average sea ice thickness distributions along the Operation IceBridge flight line surveys. The bin width is 0.15 m.



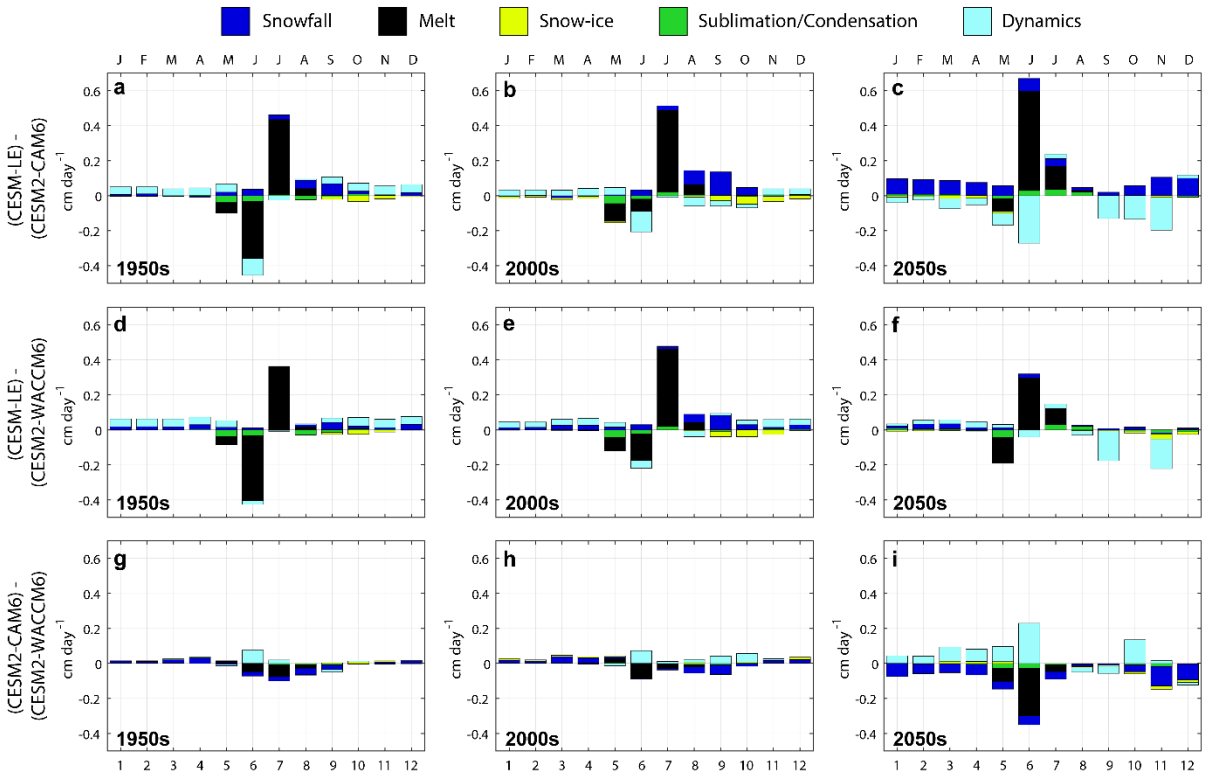
Supplementary Figure 4. The difference in snow depth directly available from CESM2-CAM6 minus that derived from ICESat-2 data (using CESM snow depth and sea ice thickness). The CESM2-CAM6 data were averaged over 2010-2019, while the ICESat-2 data are available for 2018-2019.



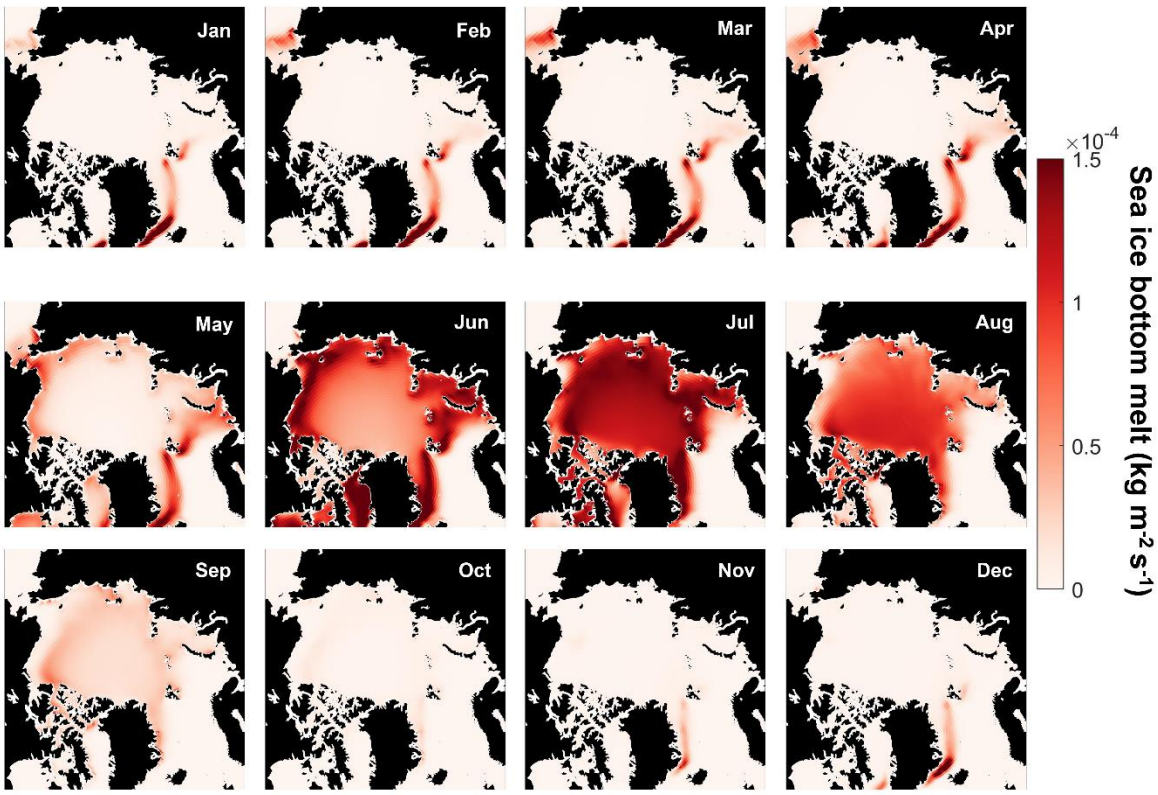
Supplementary Figure 5. The difference in total freeboard derived from CESM2-WACCM6 (using CESM snow depth and sea ice freeboard variables) minus that from ICESat-2 data. The CESM2-WACCM6 data were averaged over 2010-2019, while the ICESat-2 data are available for 2018-2019.



Supplementary Figure 6. The duration of the sea ice cover over 80-90ºN for CESM-LE (yellow), CESM2-CAM6 (magenta) and CESM2-WACCM6 (dark blue).



Supplementary Figure 7. The differences in snow processes that comprise the snow mass budget for (a-c) CESM-LE minus CESM2-CAM6, (d-f) CESM-LE minus CESM2-WACCM6, and (g-i) CESM2-CAM6 minus CESM2-WACCM6. The decadal averages for 1950s, 2000s, and 2050s over 80ºN-90ºN are shown.



Supplementary Figure 8. Average rates of sea ice bottom melt for 2000-2009 in CESM2-WACCM6.