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How polar-midlatitude atmospheric teleconnections depend on regional sea ice fraction and global warming level

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CESM2	NH	Barents-Kara	Okhotsk	Labrador	Greenland	Chukchi-Bering	Antarctic
NH	**1.00**	**0.75**	**0.30**	**0.18**	**0.58**	**0.37**	**0.06**
Barents-Kara	**0.75**	**1.00**	**0.06**	**-0.11**	**0.32**	**-0.04**	0.01
Okhotsk	**0.30**	**0.06**	**1.00**	**-0.06**	**-0.09**	**-0.07**	**0.04**
Labrador	**0.18**	**-0.11**	**-0.06**	**1.00**	**0.20**	**-0.04**	**0.06**
Greenland	**0.58**	**0.32**	**-0.09**	**0.20**	**1.00**	**0.04**	**0.04**
Chukchi-Bering	**0.37**	**-0.04**	**-0.07**	**-0.04**	**0.04**	**1.00**	**0.03**
Antarctic	**0.06**	0.01	**0.04**	**0.06**	**0.04**	**0.03**	**1.00**

ACCESS-ESM1.5	NH	Barents-Kara	Okhotsk	Labrador	Greenland	Chukchi-Bering	Antarctic
NH	**1.00**	**0.72**	**0.41**	**0.57**	**0.43**	**0.21**	**0.05**
Barents-Kara	**0.72**	**1.00**	**0.18**	**0.15**	**0.27**	0.03	**0.04**
Okhotsk	**0.41**	**0.18**	**1.00**	0.03	**0.07**	**-0.11**	0.00
Labrador	**0.57**	**0.15**	0.03	**1.00**	**-0.07**	-0.02	**0.05**
Greenland	**0.43**	**0.27**	**0.07**	**-0.07**	**1.00**	**0.08**	0.00
Chukchi-Bering	**0.21**	0.03	**-0.11**	-0.02	**0.08**	**1.00**	0.01
Antarctic	**0.05**	**0.04**	0.00	**0.05**	0.00	0.01	**1.00**

Table S1: Correlations in total sea ice area between the various sea-ice regions, calculated over the period 1850 to 1950, when human induces trends are still small. Bold font indicates significance at the 95% level. Shading corresponds to the magnitude of the correlation coefficients.

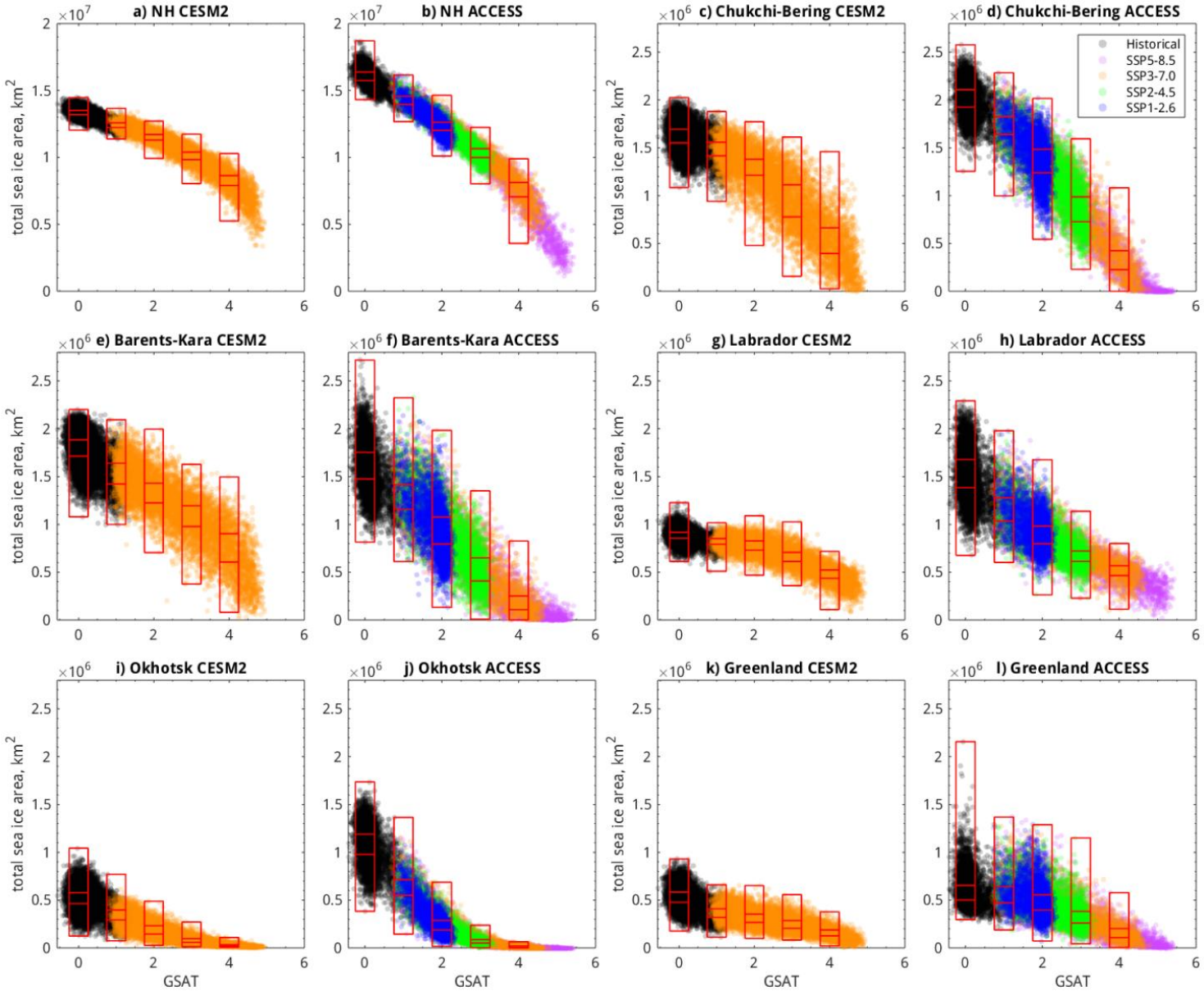

Figure S1: Scatterplots of January sea ice area against annual mean global surface air temperature for the various Arctic regions analysed, showing the points selected for "high" (top boxes) and "low" (bottom boxes) sea ice states for each warming level, i.e. the 30% highest and lowest sea ice areas respectively. CESM2 is shown in the first and third columns, and ACCESS-ESM1.5 in the second and fourth. The colours correspond to the scenarios, black for historical, blue for SSP1-2.6, green for SSP2-4.5, orange for SSP3-7.0, purple for SSP5-8.5. Note the difference y-axes for the first two panels, (NH=Northern Hemisphere).

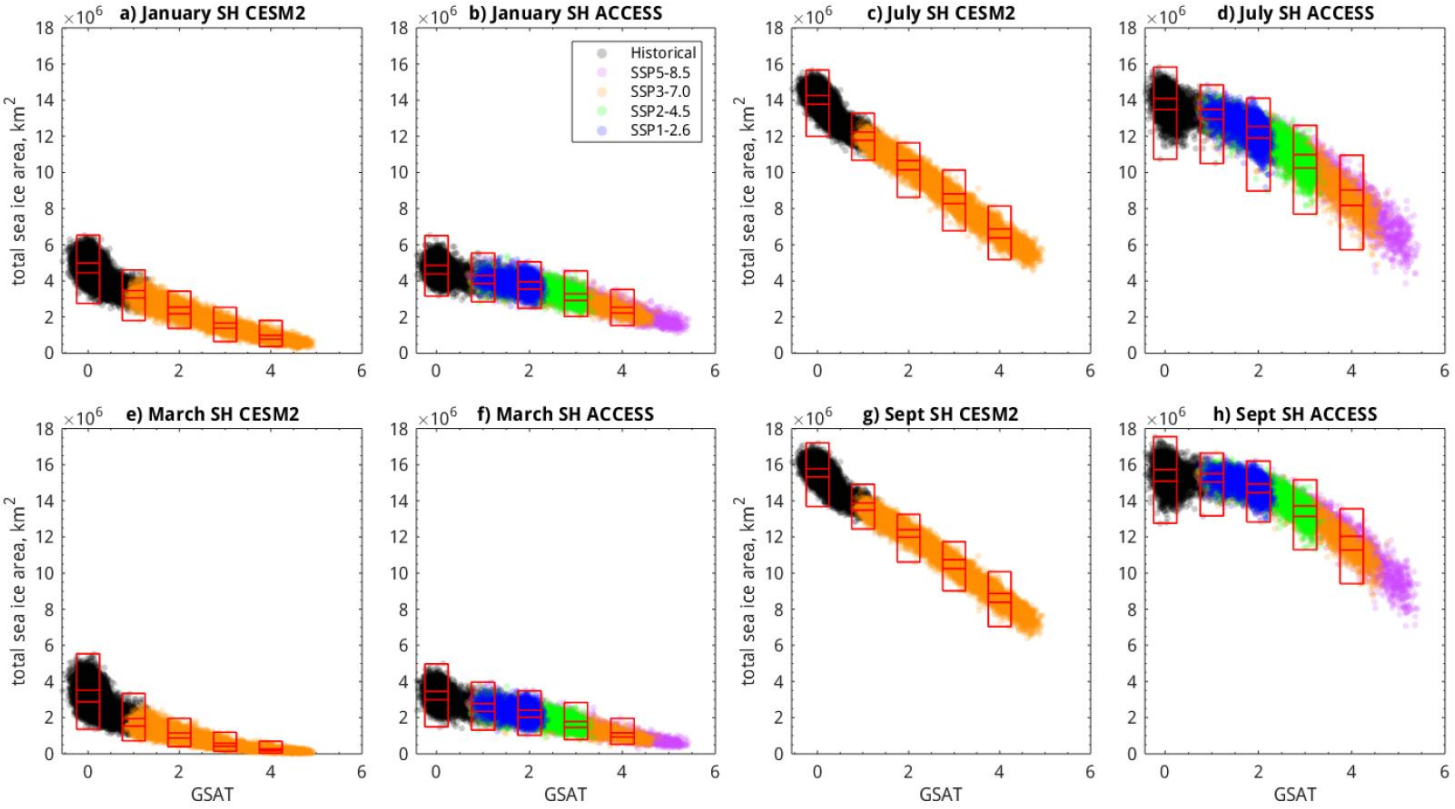

Figure S2: As for Fig. S1, but for Antarctic sea ice for January, March, July and September, (SH=Southern Hemisphere).

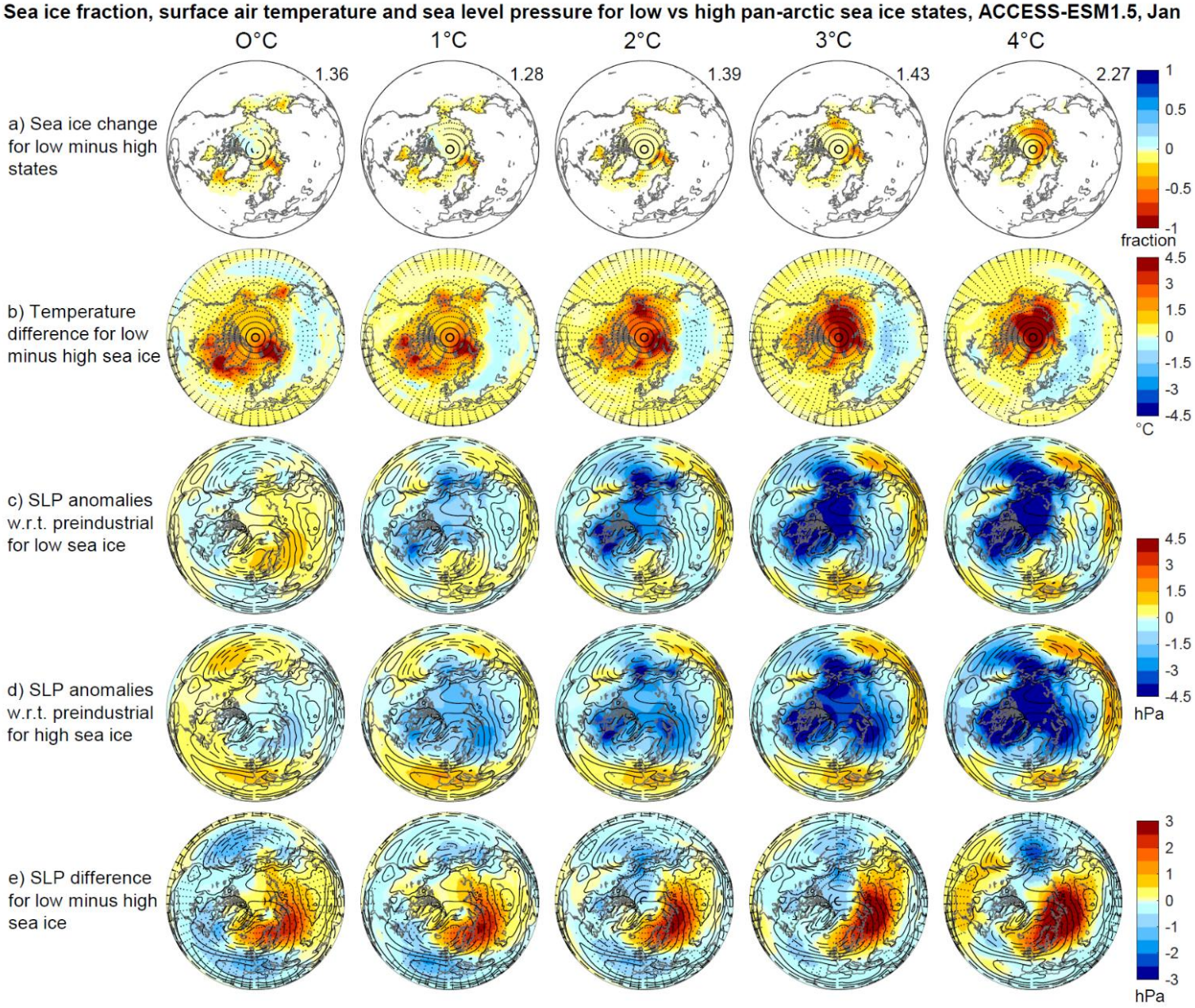

Figure S3: As for Fig. 2 but for ACCESS-ESM1.5.

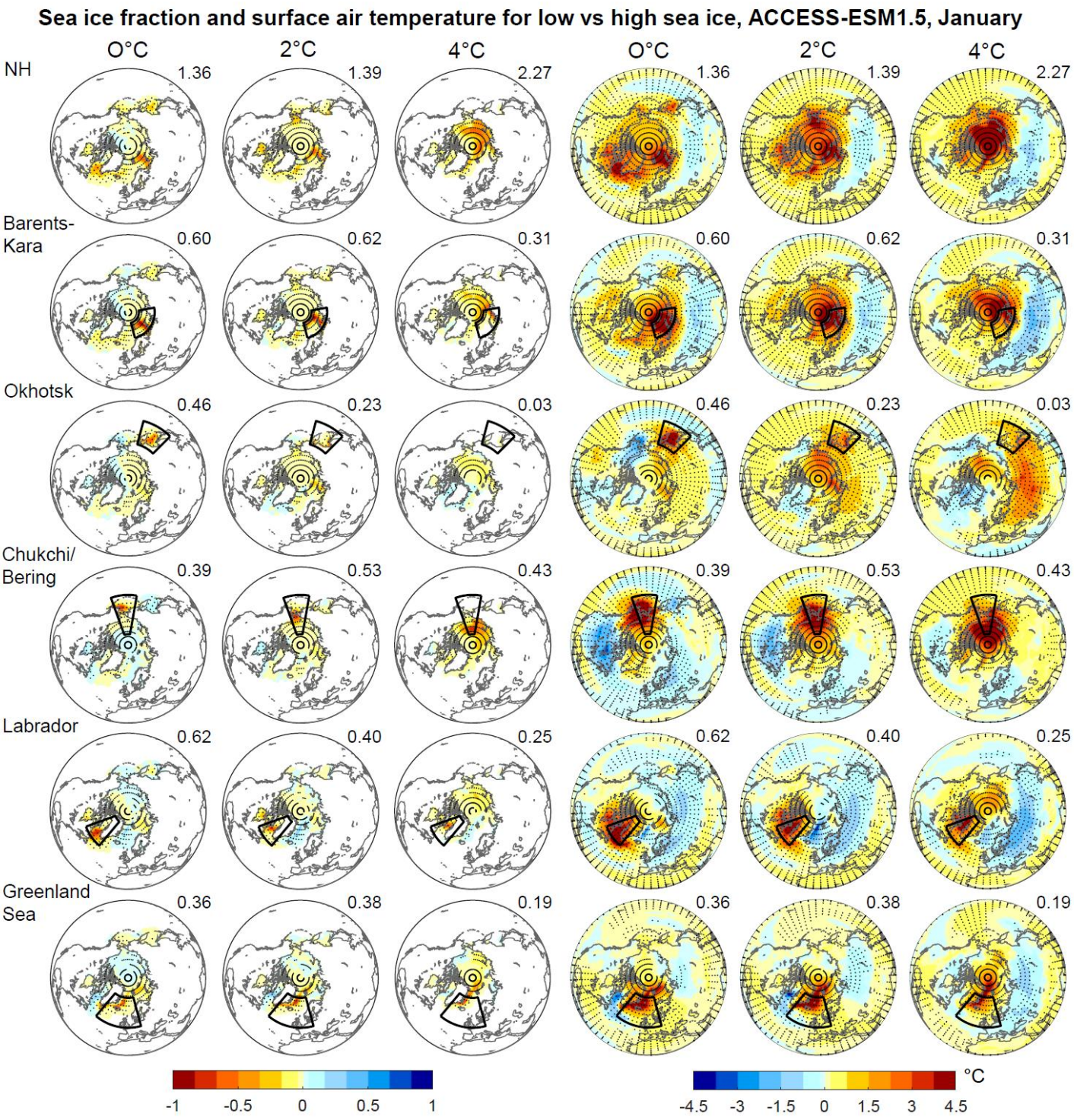

Figure S4: As for Fig. 3 but for ACCESS-ESM1.5

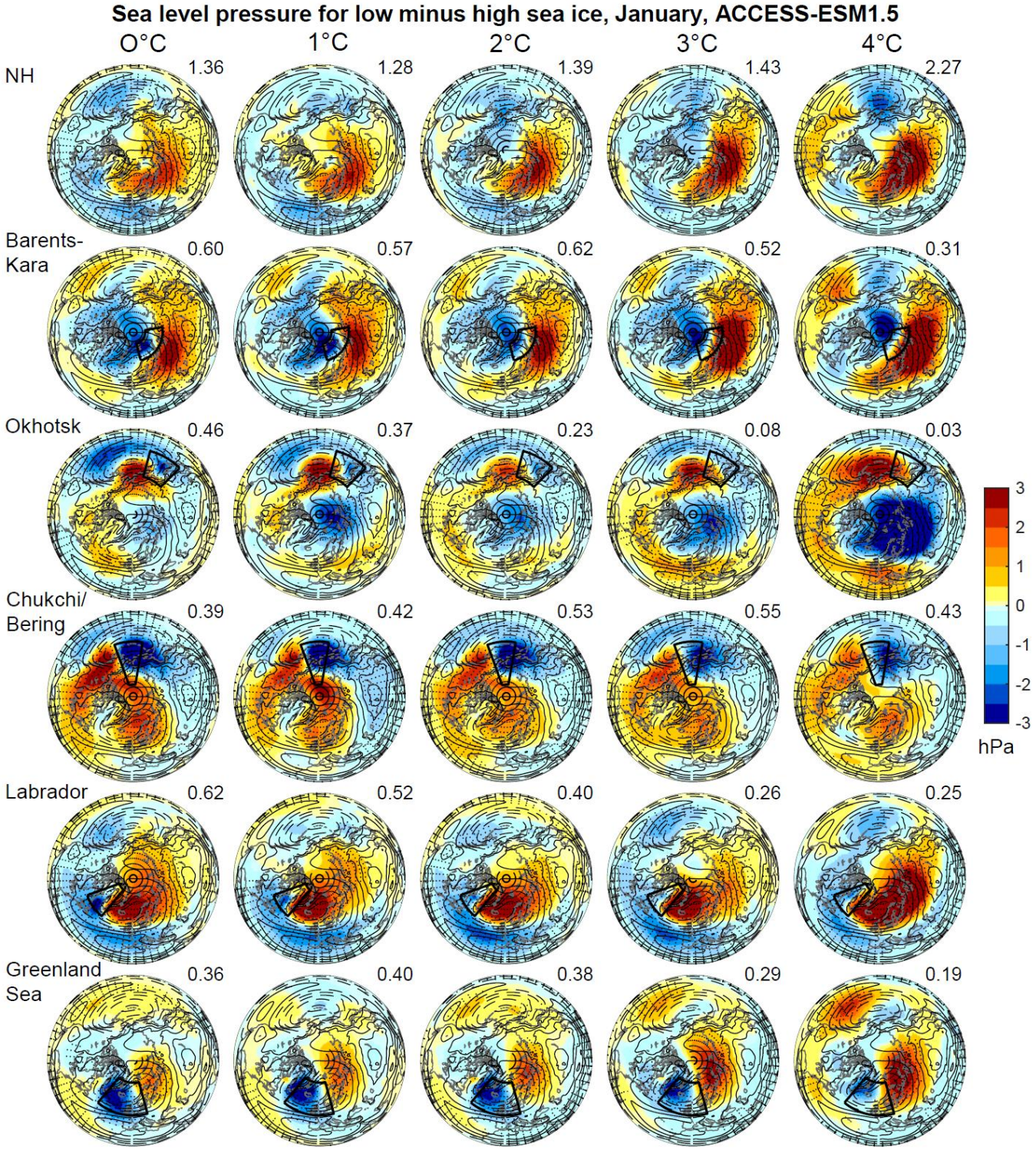

Figure S5: As for Fig. 4 but for ACCESS-ESM1.5

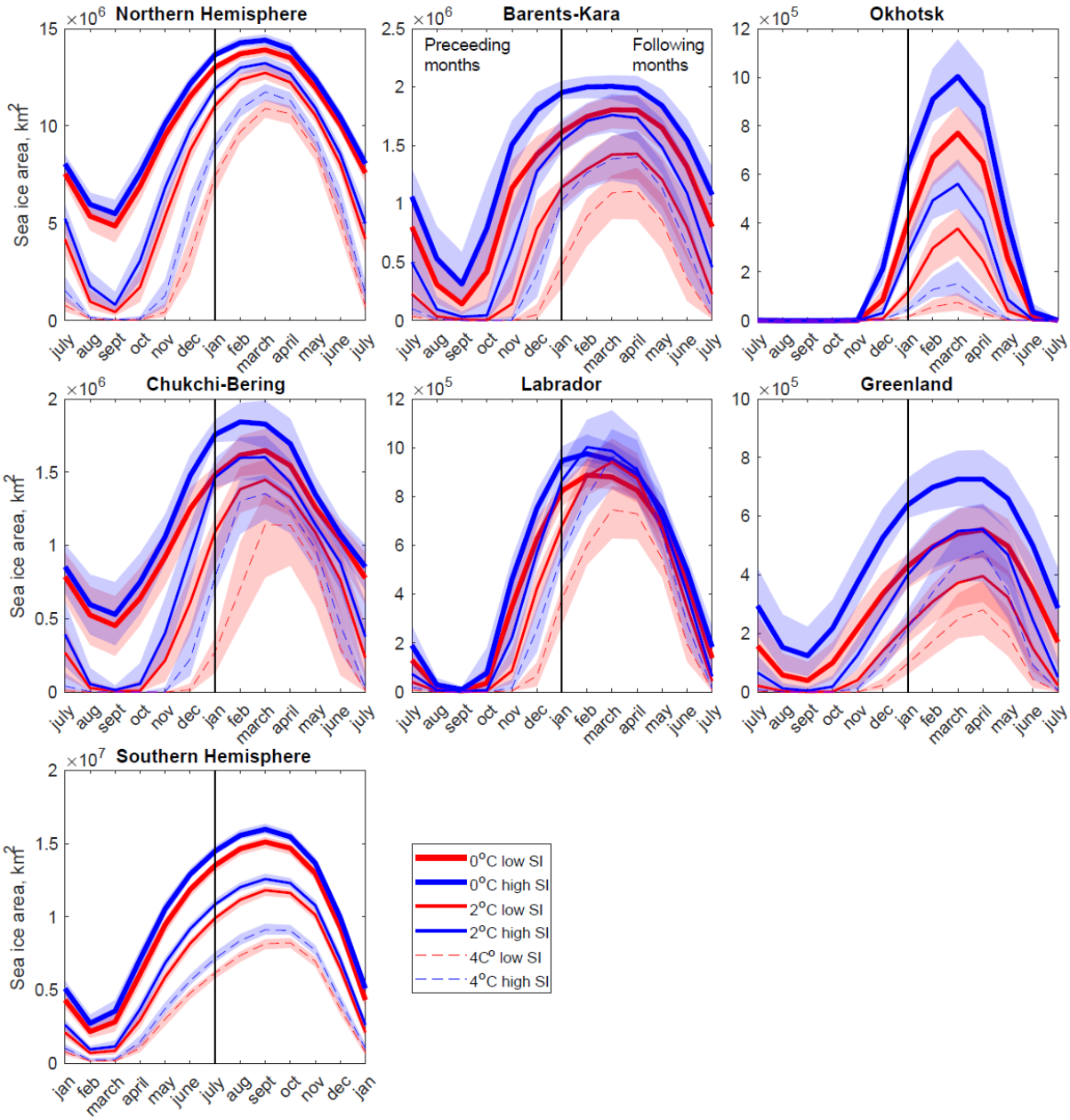

Figure S6: Lagged sea ice area for different warming levels and regions. High and low sea ice years are selected based on winter sea ice area (January in the Arctic, and July in the Antarctic) as demonstrated in Fig. 1, and indicated by the vertical line in this figure. For those same years, the amount of sea ice is shown for the 6 months before and after January or July. The mean sea ice amount is shown with the coloured lines, and the shading denotes the 10-90th percentile range, blue for high sea ice years and red for low sea ice. Thickest solid lines denote 0°C, medium solid for 2°C and dashed for 4°C.

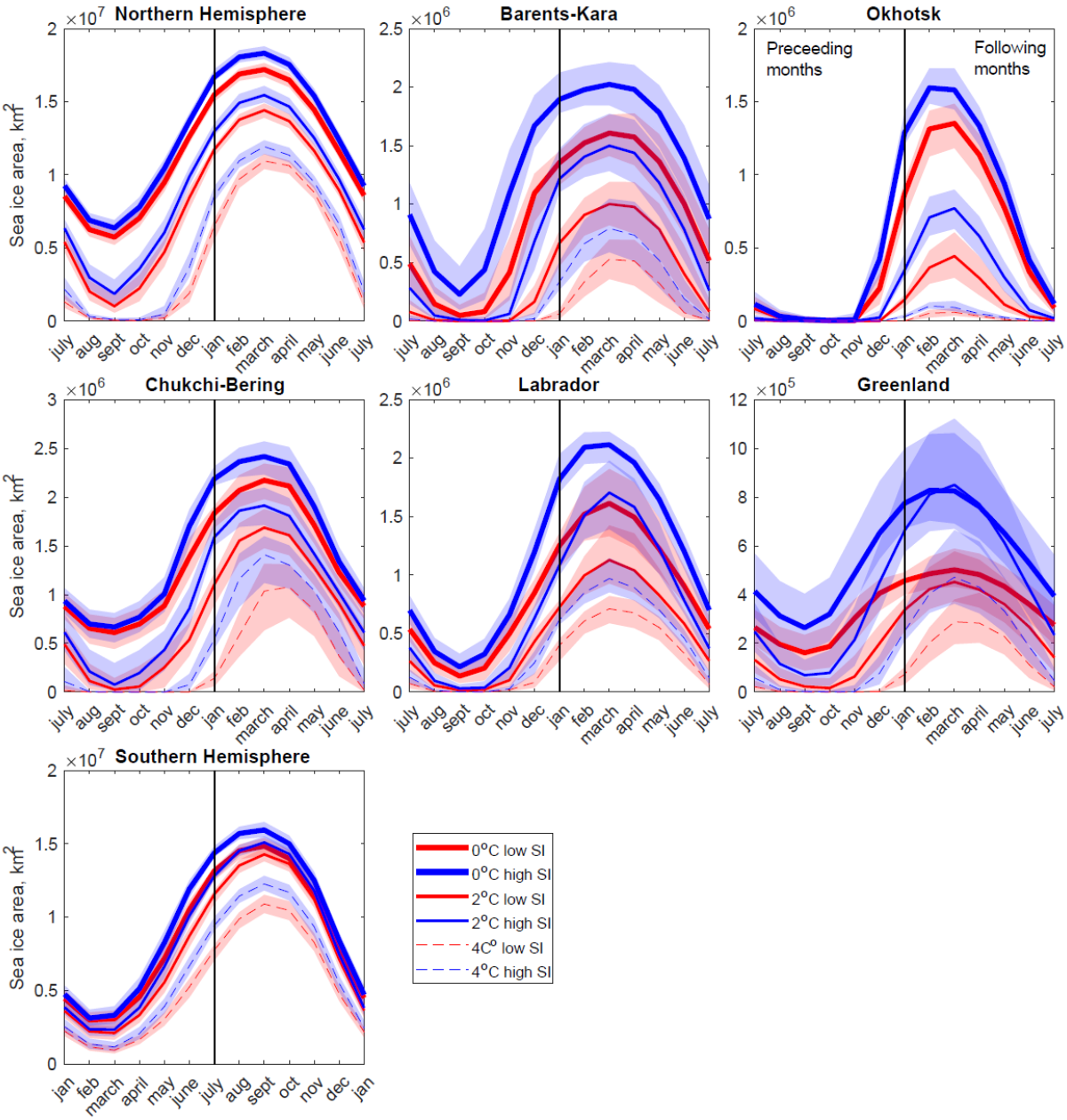

Figure S7: As for Fig. S6 but for ACCESS-ESM1.5.

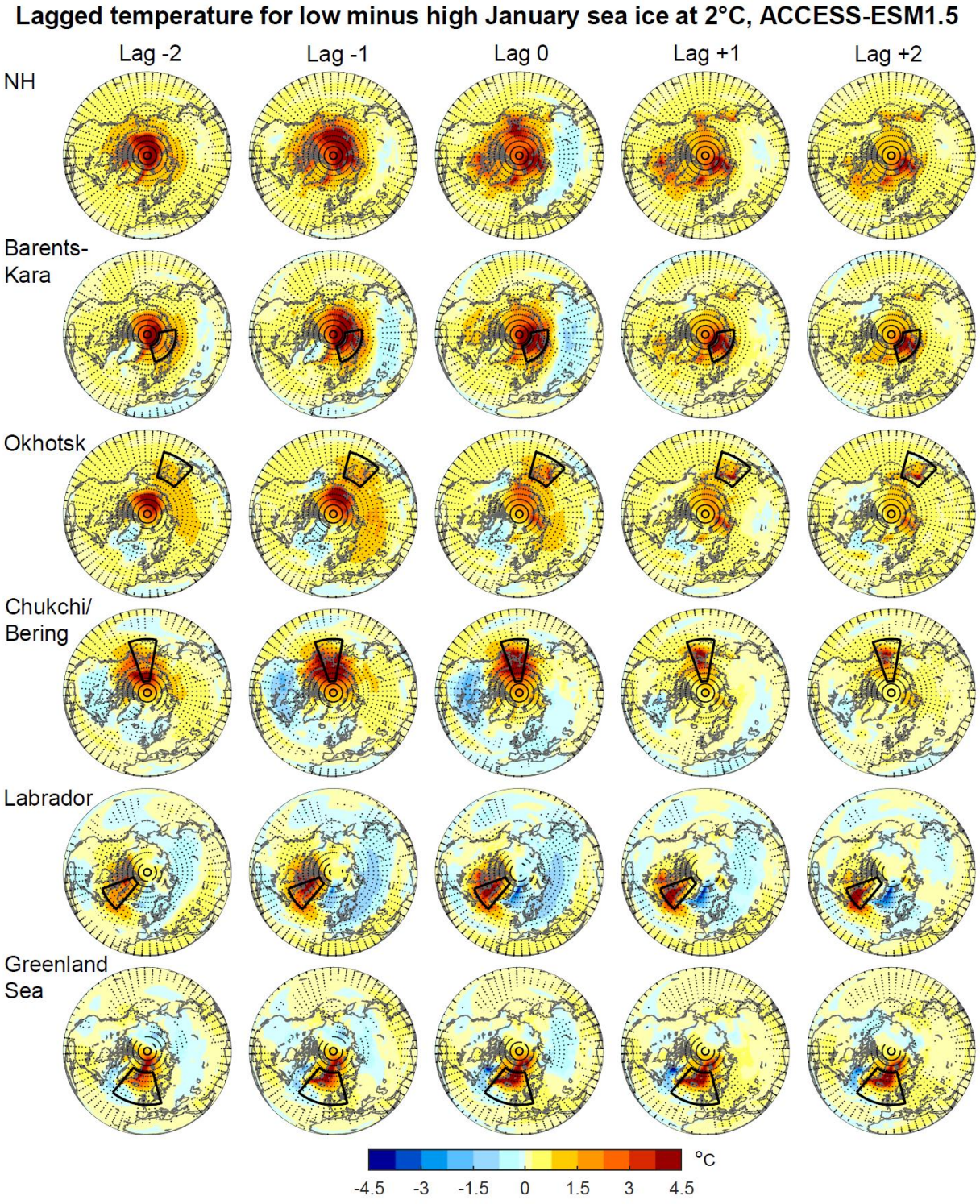

Figure S8: As for Fig. 5 but for ACCESS-ESM1.5.

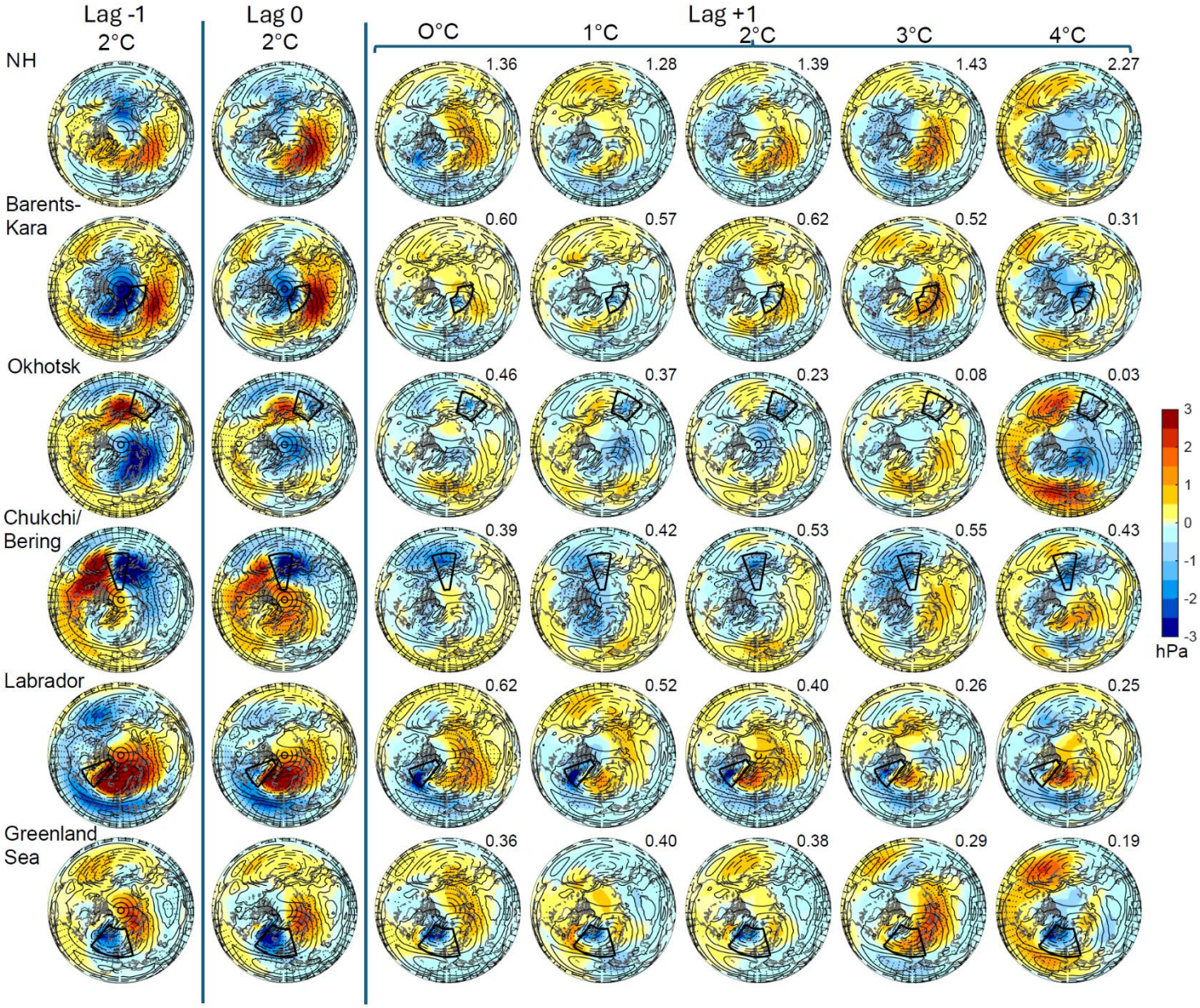

Figure S9: As for Fig. 6 but for ACCESS-ESM1.5

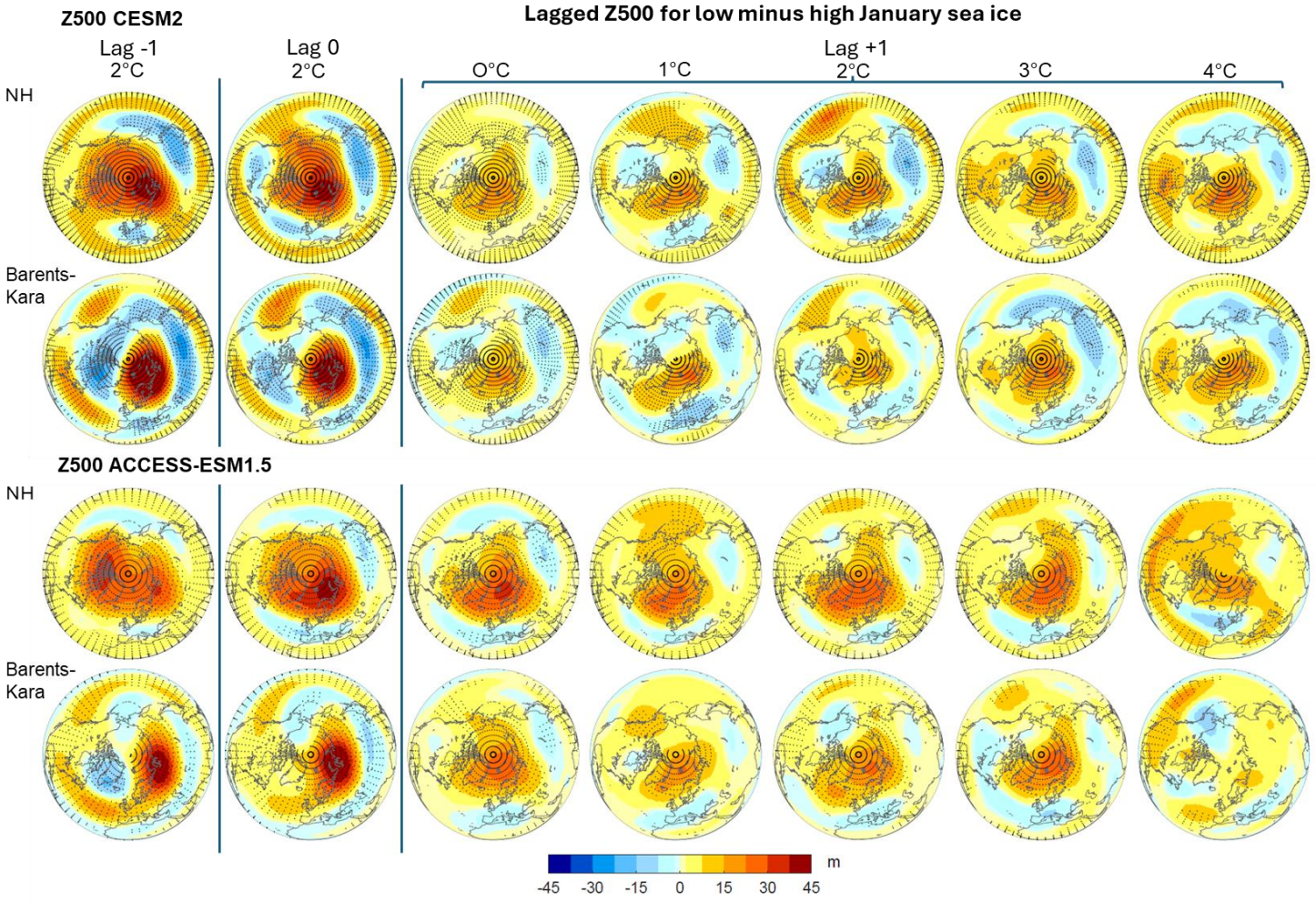

Figure S10: As for Fig. 6 but showing 500 hPa geopotential height patterns associated with pan-Arctic (NH = Northern Hemisphere) and Barents-Kara sea ice reduction in January, for CESM2 (top) ACCESS-ESM1.5 (bottom).

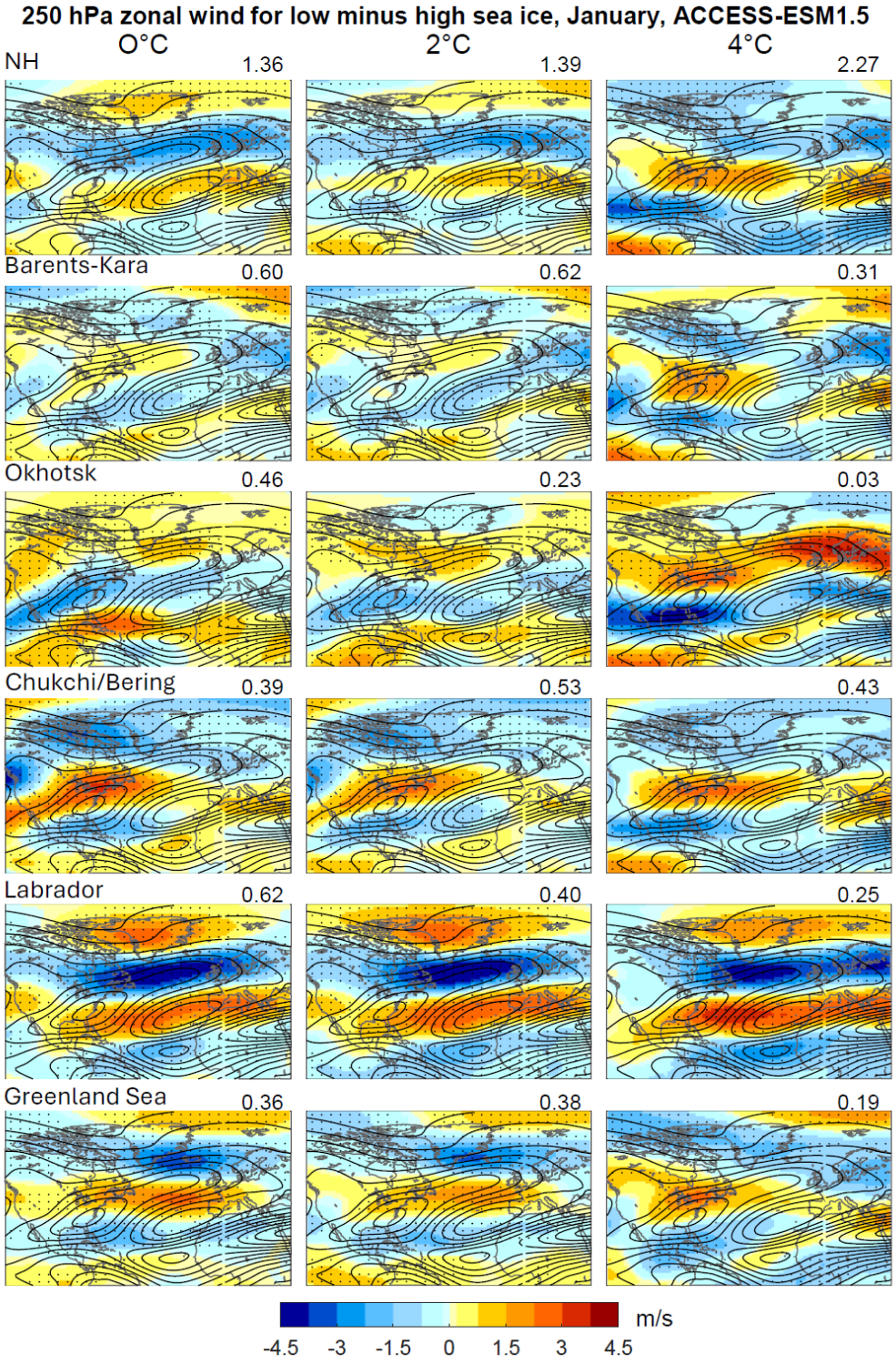

Figure S11: as for Fig. 7 but for ACCESS-ESM1.5

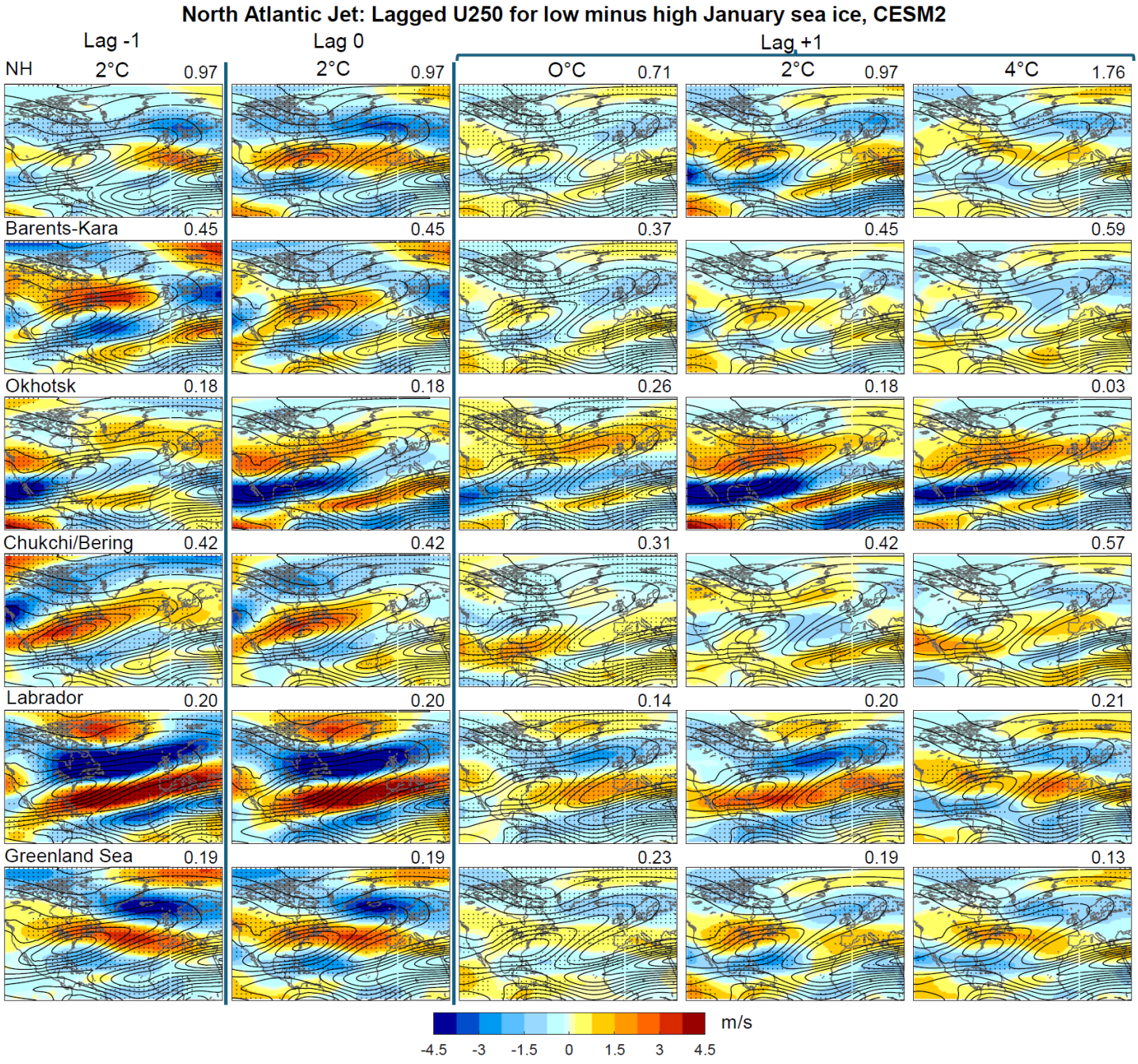

Figure S12: Zonal wind difference for low minus high January sea ice states for CESM2, as in Fig. 7, but showing lagged analysis. Lag +1 is for the zonal wind response in the month following the sea ice decline (i.e. February) and is shown for a selection of global warming levels (0, 2 and 4°C), lag 0 and -1 (zonal wind one month before low sea ice) are shown for 2°C for comparison.

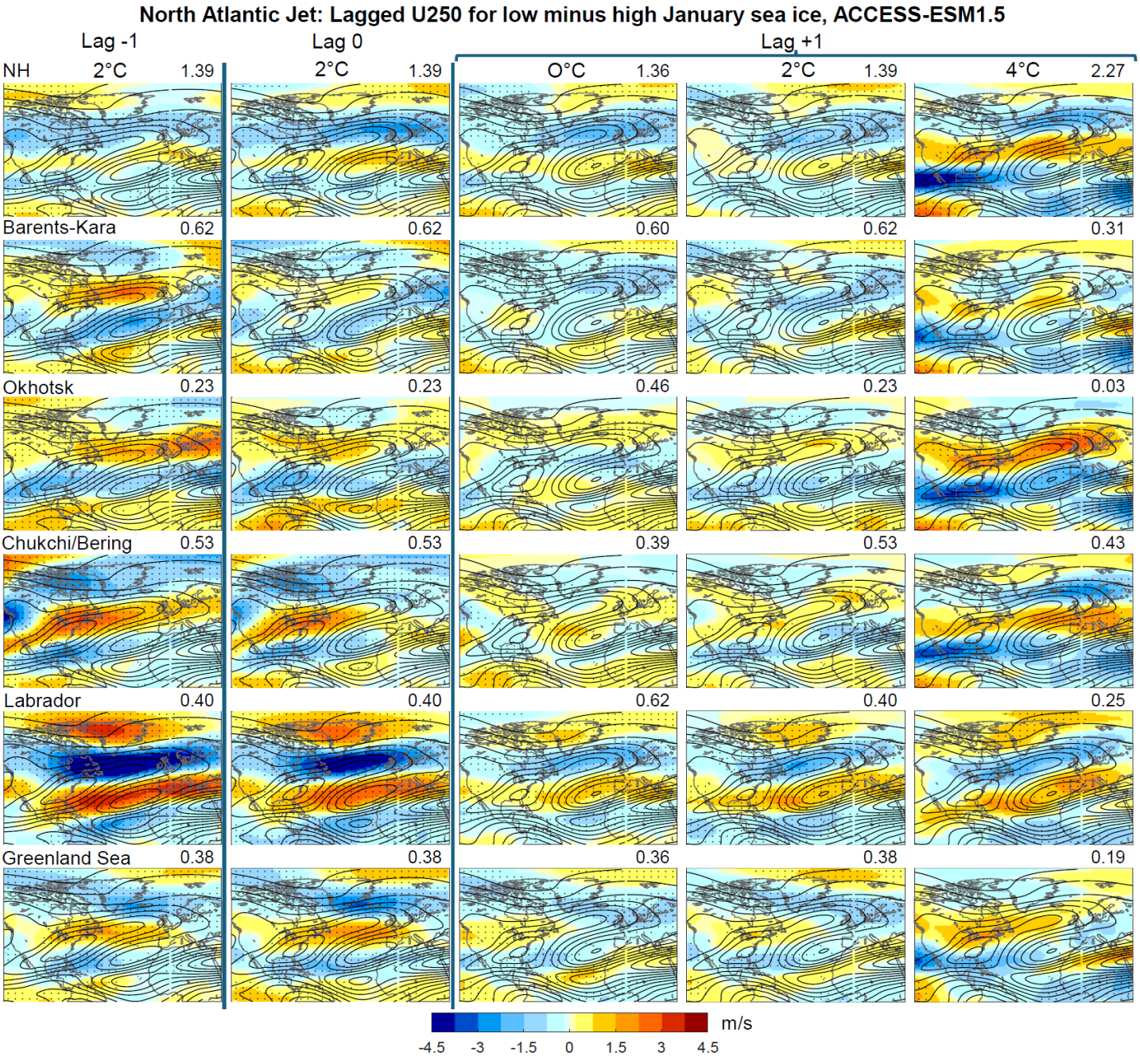

Figure S13: as for Fig. S12 but for ACCESS-ESM1.5

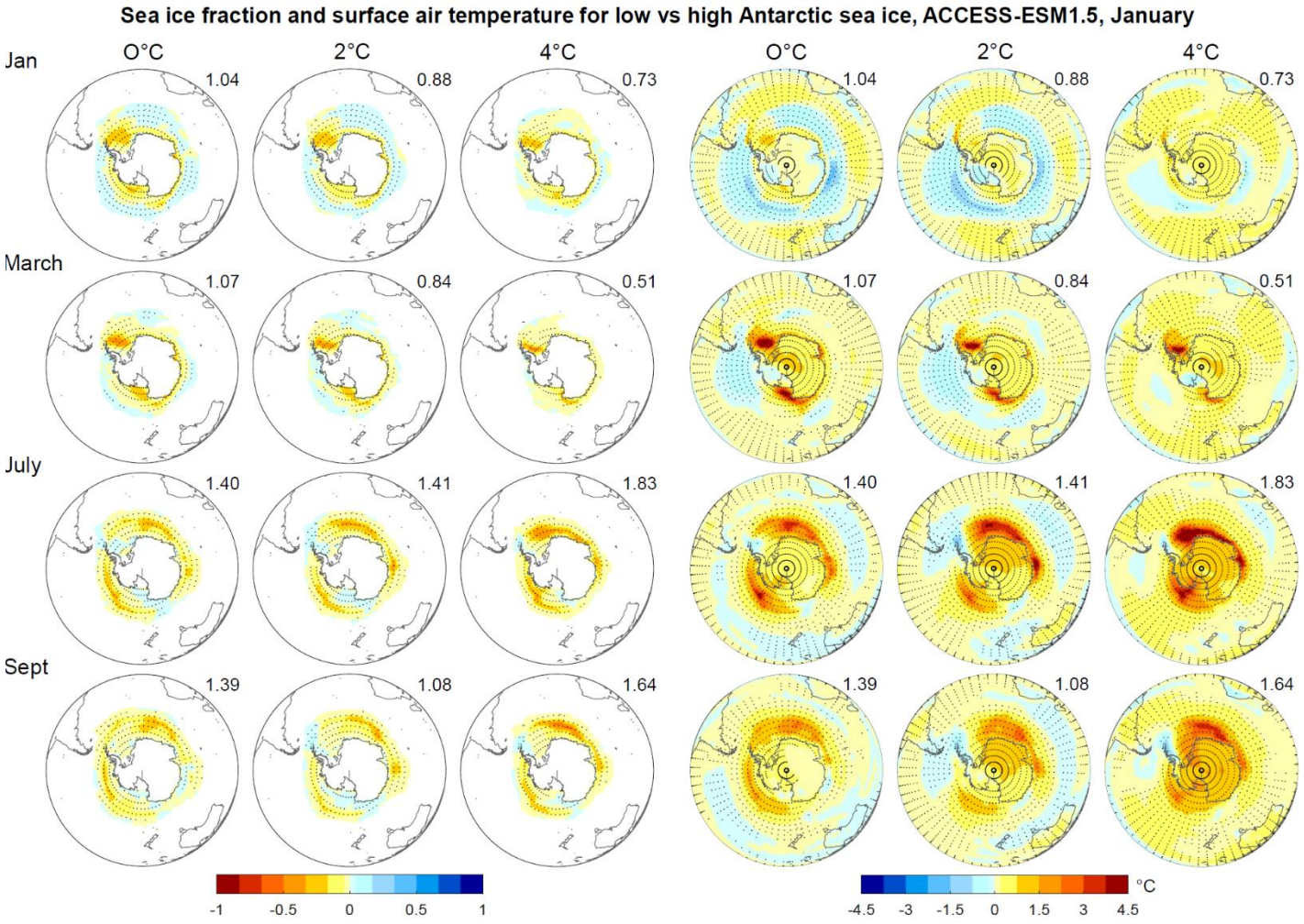

Figure S14: As for Fig. 9 but for ACCESS-ESM1.5

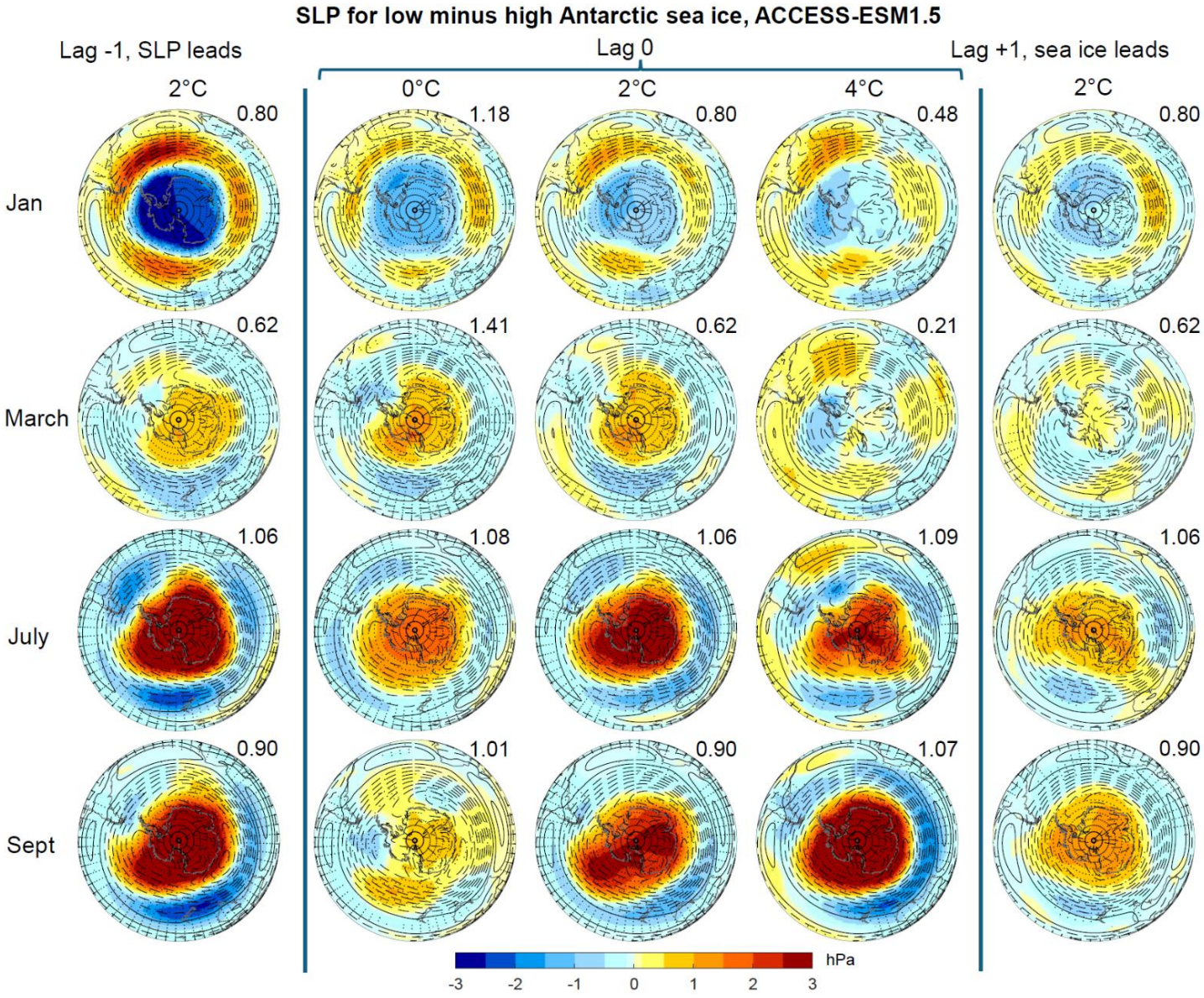

Figure S15: As for Fig. 9 but for ACCESS-ESM1.5

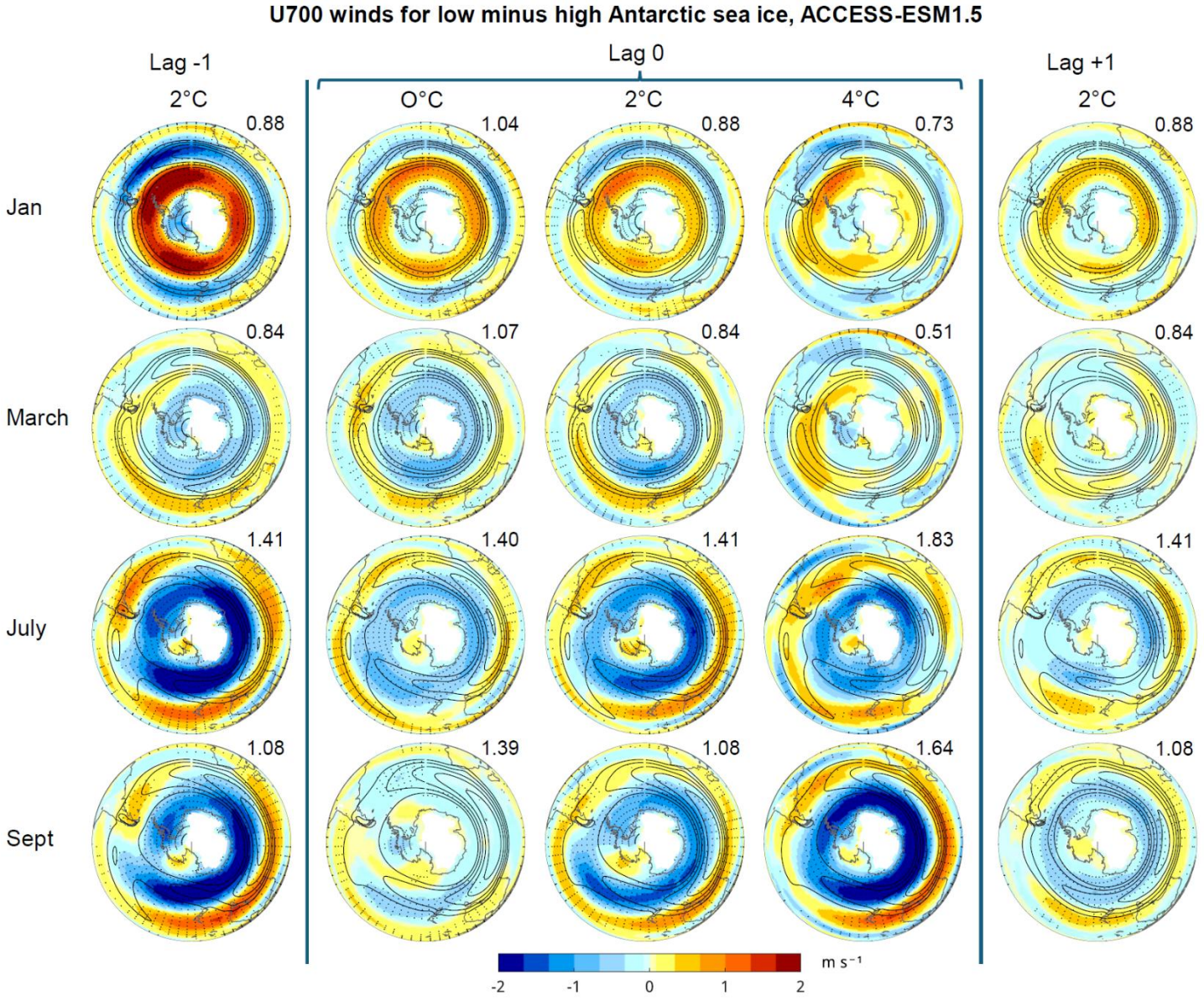

Figure S16: As for Fig. 10 but for ACCESS-ESM1.5