



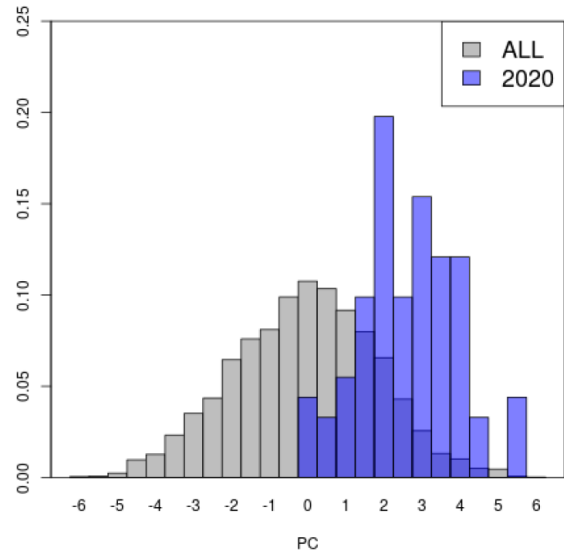
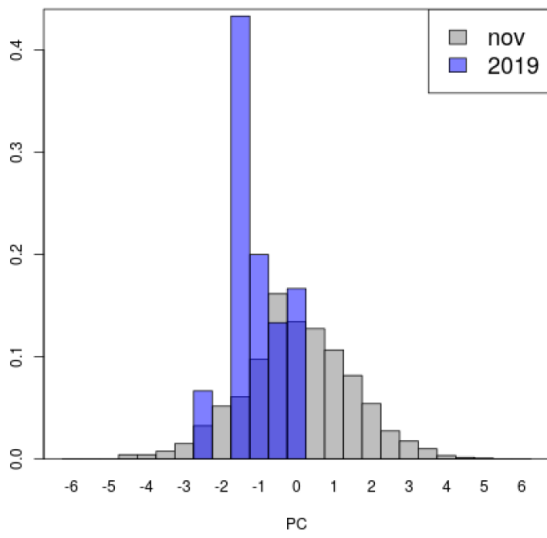
Supplement of

Arctic sea ice anomalies during the MOSAiC winter 2019/20

Klaus Dethloff et al.

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Figure S1. PDFs of daily AO indices (histograms) for November 2019 and for the three-month period JFM with prevailing positive AO-index in 2020. Shown are the distributions for the period 1979 until 2018/2019 in grey, and the distributions for November 2019 (left) and January-March 2020 (right) (in blue). Y-axis is Frequency.

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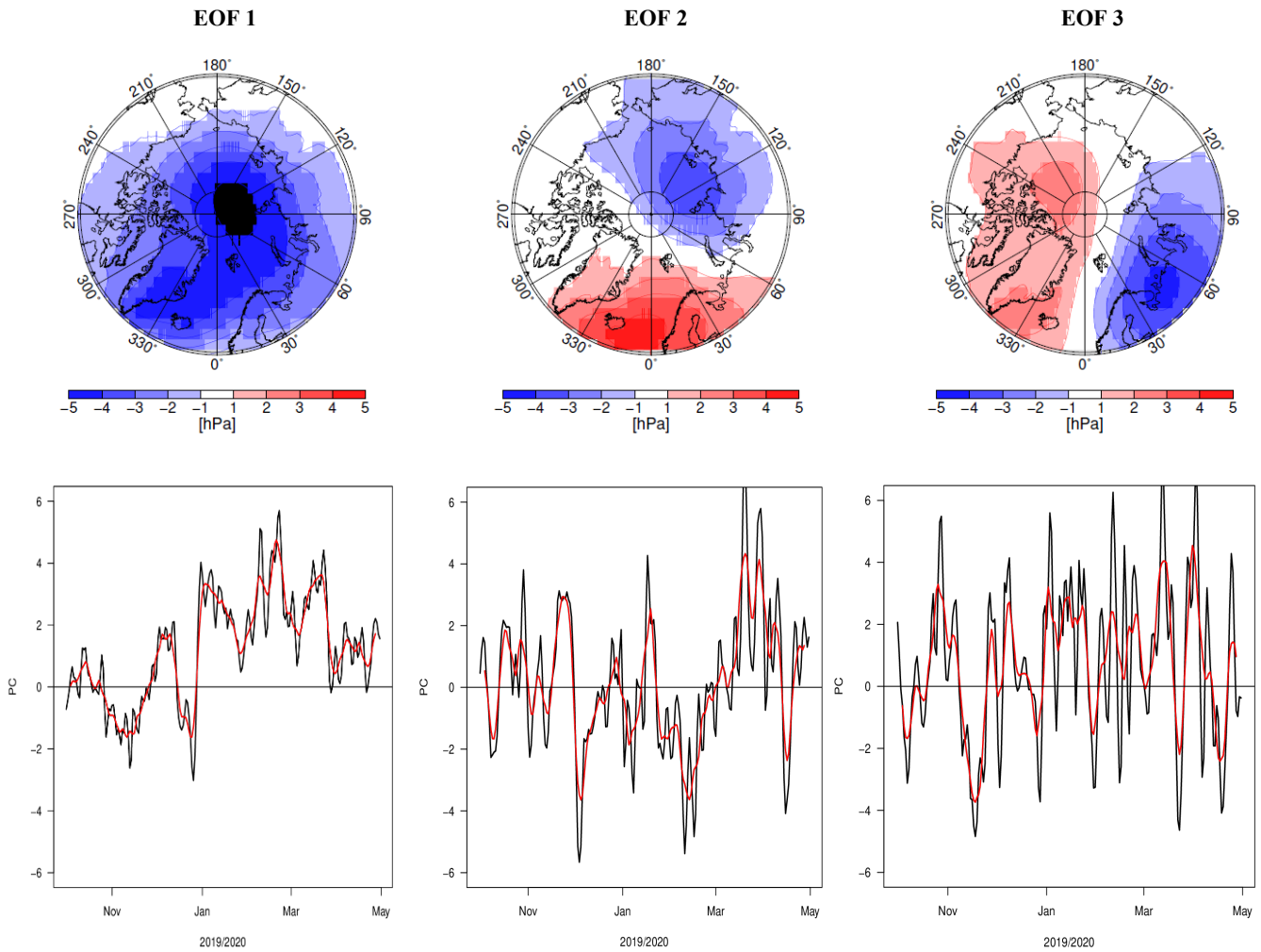
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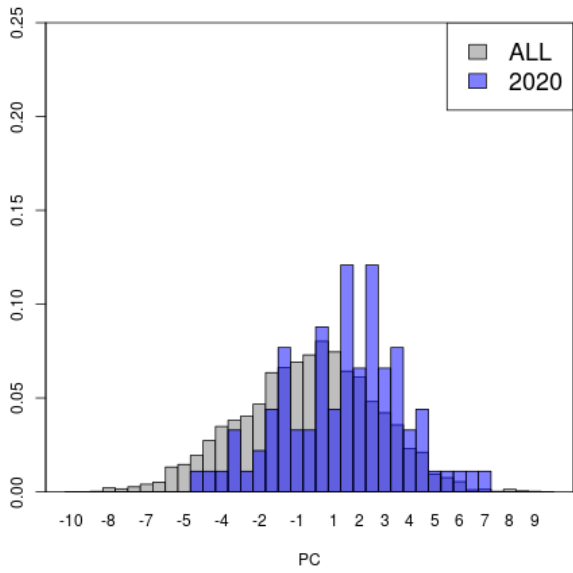
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Figure S2. EOF 1-3 based on monthly mean SLP data from 1979-2000 based on ERA5 over the domain 60-90N (upper row). EOF1 display the AO, EOF3 displays the AD pattern. Explained variance 35.2%, 15.0% and 13.6% for EOF1, EOF2, and EOF. Time series of daily values of the respective index from October 2019 to April 2020 (black line) with 7-day running mean (red line); (bottom row). The third EOF displays the Arctic Dipole (AD) pattern and its time series (right panels)

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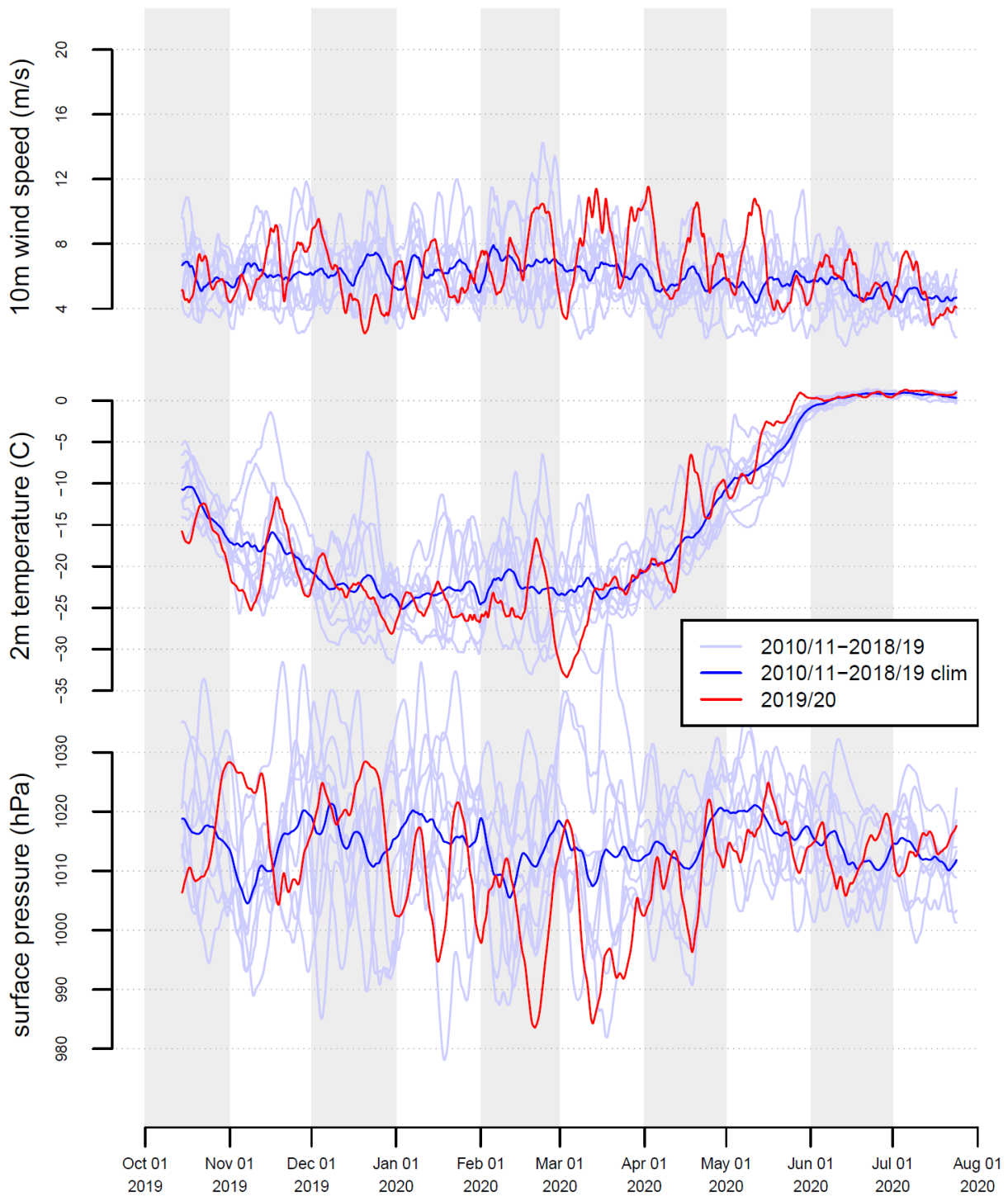
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Figure S3. PDF (histogram) of daily AD index for the three-month period JFM. Shown are the distributions for the period 1979 until 2019 in grey, and the distributions for January-March 2020 (in blue). Y-axis is Frequency.

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145 **Figure S4.** 5-days averaged atmospheric conditions along the MOSAiC drift trajectory according to ERA5 in 2019/2020 (red) and in the climatology 2010-2019 (light blue; average in dark blue). Top: 10 m wind speed; Middle: 2 m temperature; Bottom: surface pressure.

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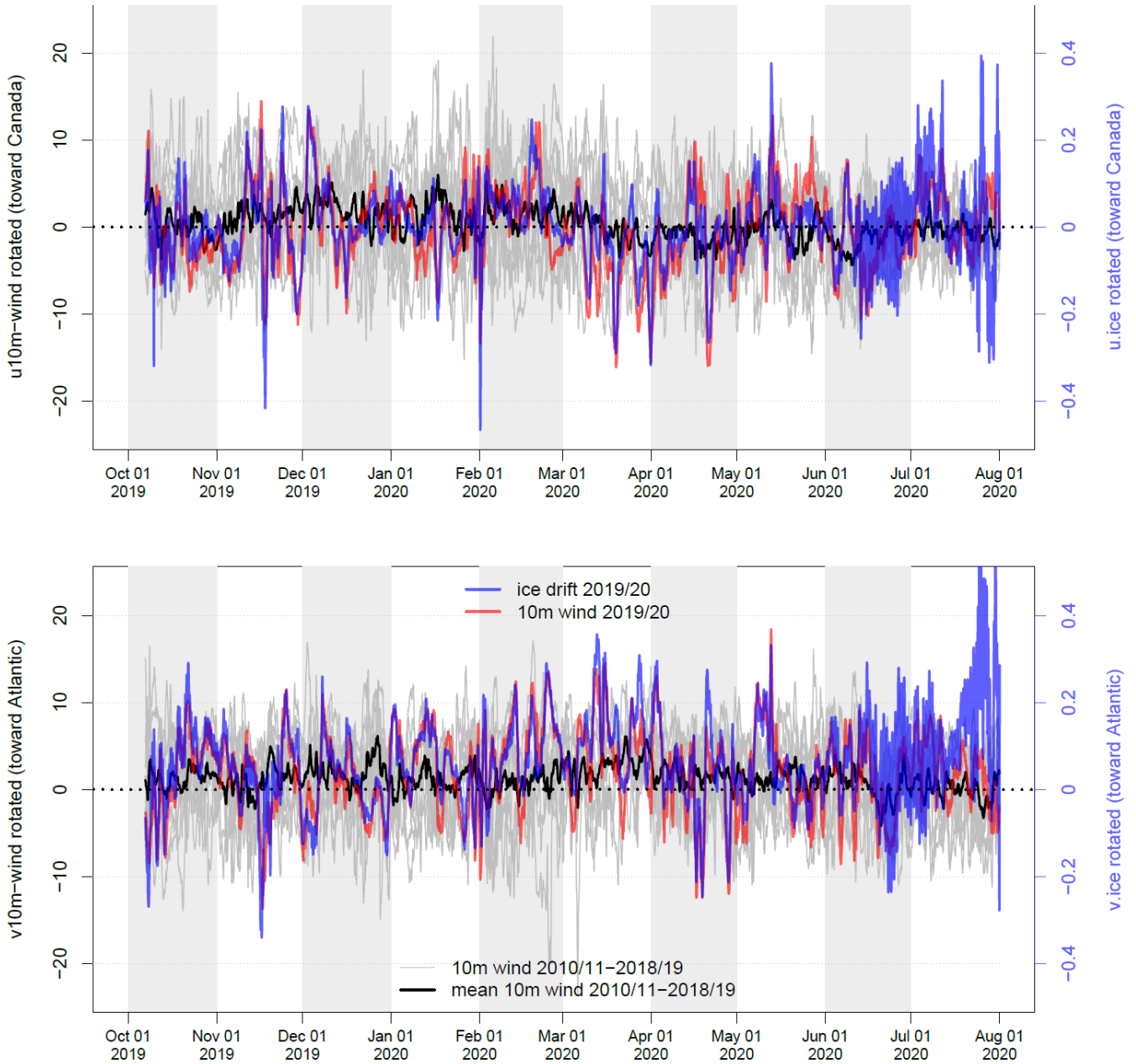


Figure S5. Hourly sea-ice drift (m/s) (blue) and ERA5 zonal and meridional 10m-wind components (m/s) (red) at the MOSAiC Central Observatory, in a rotated coordinate system with one pole at 0°N/14.6°W (in the equatorial Atlantic) so that along the MOSAiC path a positive v-component (bottom) points toward Fram Strait and a positive u-component (top) points toward Canada. Grey curves denote the ERA5 10m-wind components along the same path during the previous eight years, and the black curves denote the ERA5 climatology 2010-2019.

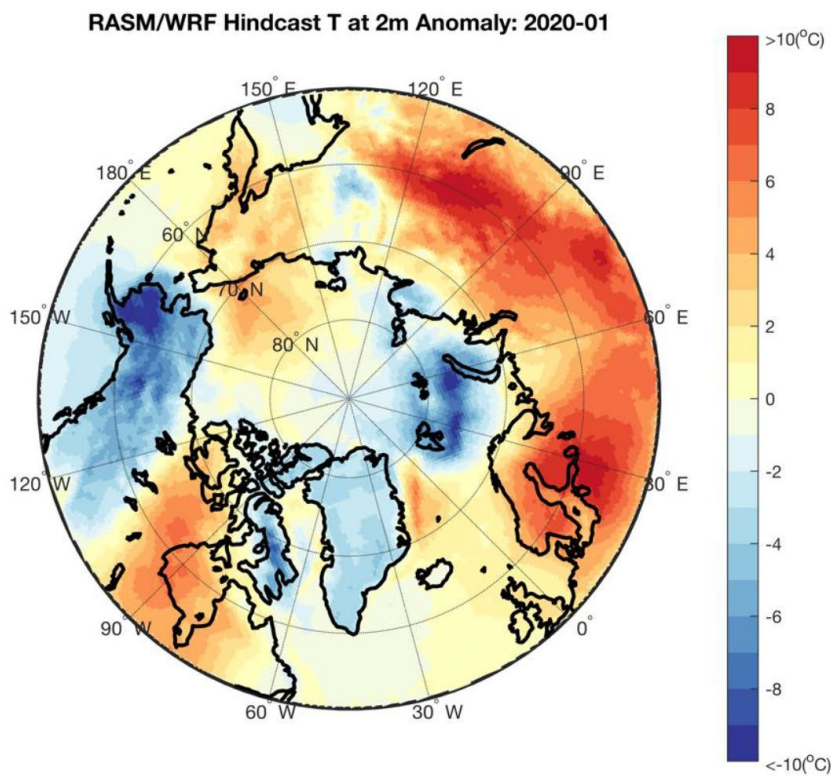
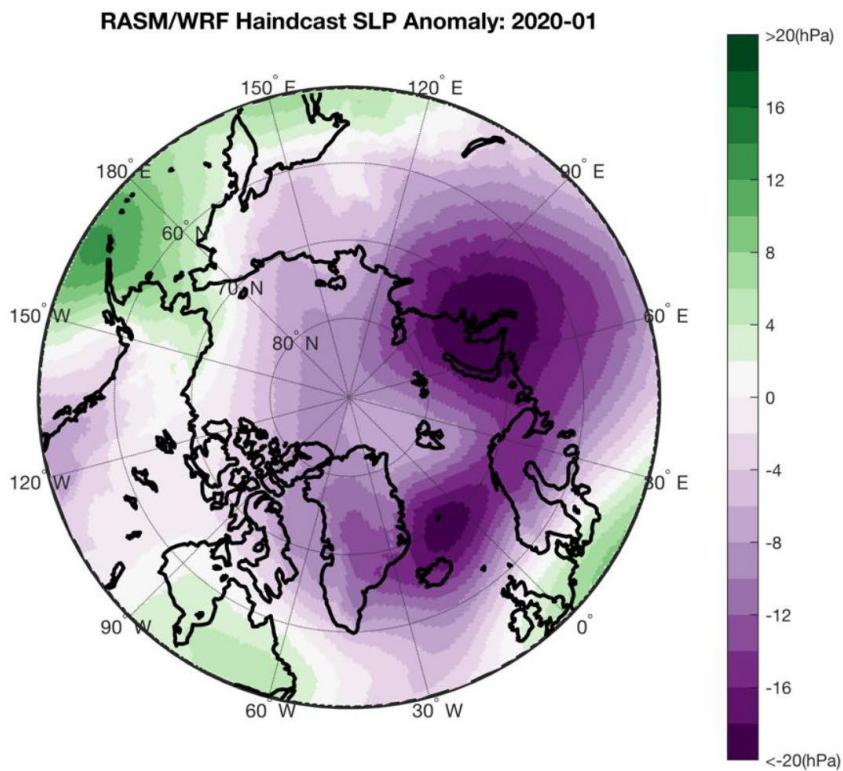
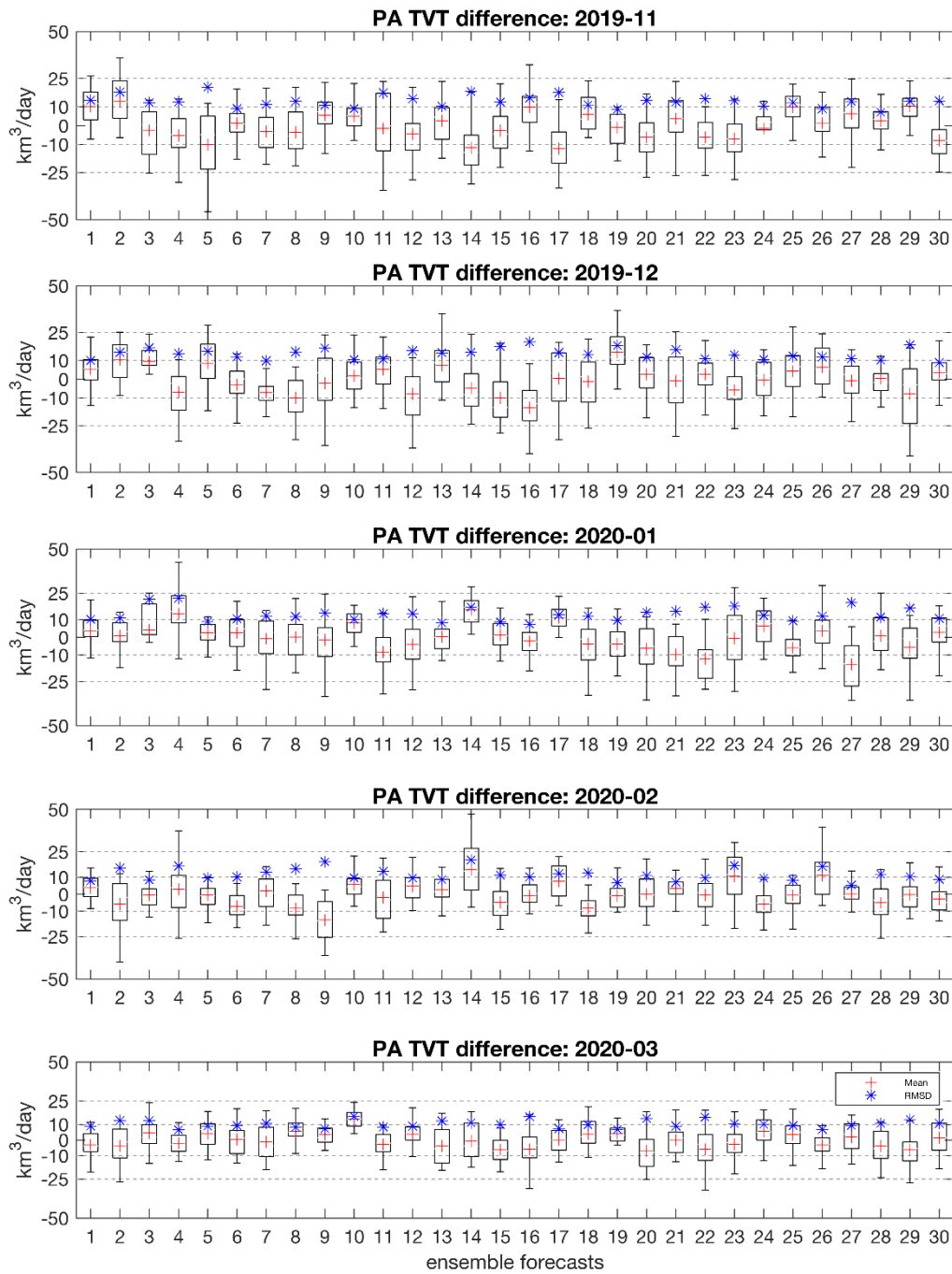
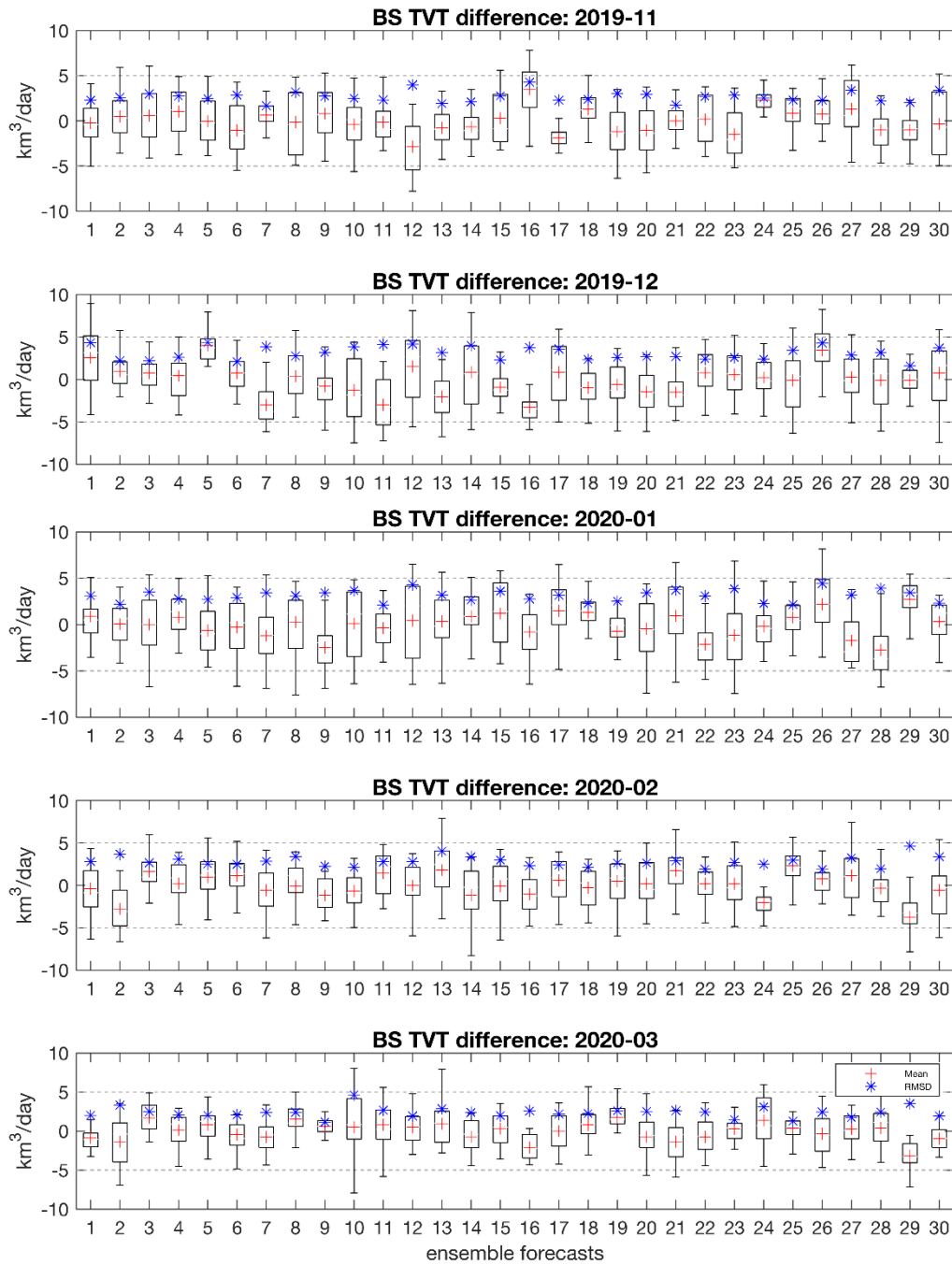


Figure S6. Sea level pressure anomaly (hPa) for January 2020 (top) and the 2m temperature anomaly (°C) (bottom) from the RASM hindcast simulation compared to the climate mean 2010-2019.



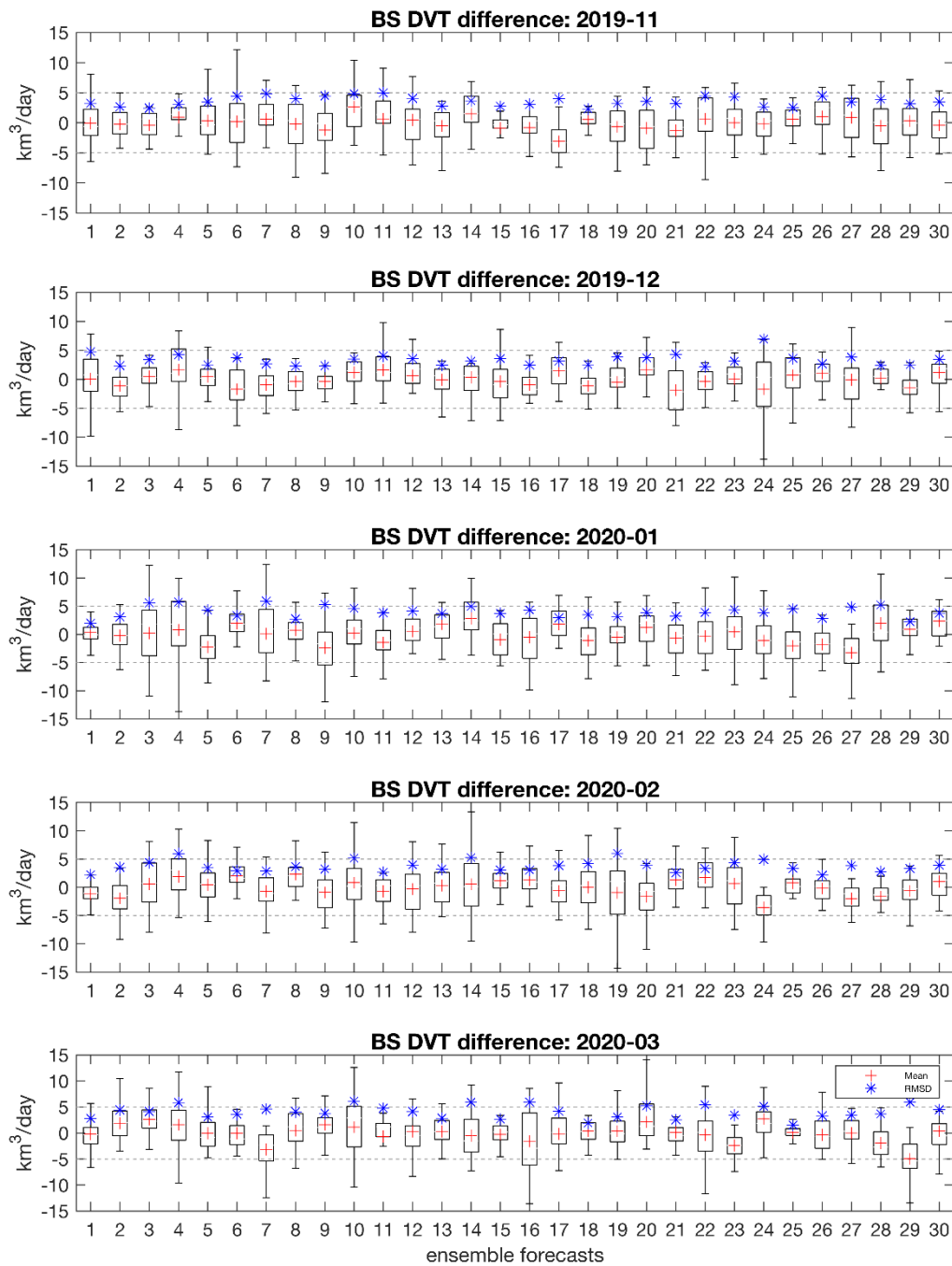
190 **Figure S7.** Thermodynamic sea ice volume tendencies (km^3/day) of all 30 ensemble members for the Pan-Arctic domain from November 2019 until March 2020. Blue stars represent the root mean square error RMSD based on differences of daily values relative to the ensemble member daily mean. Red crosses are the monthly means of daily differences. The rectangular boxes display the spread of the 50 % of model results. Black whiskers represent the spread of 99.3 % of model results assuming the normal distribution.

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200 **Figure S8.** Thermodynamic sea ice volume tendencies (km^3/day) of all 30 ensemble members for the
 Barents Sea domain from November 2019 until March 2020. Blue stars represent the root mean square
 error RMSD based on differences of daily values relative to the ensemble member daily mean. Red
 crosses are the monthly means of daily differences. The rectangular boxes display the spread of the 50 %
 205 of model results. Black whiskers represent the spread of 99.3 % of model results assuming the normal
 distribution.

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Figure S9. Dynamic sea ice volume tendencies (km³/day) of all 30 ensemble members for the Barents Sea domain from November 2019 until March 2020. Blue stars represent the root mean square error RSMD based on differences of daily values relative to the ensemble member daily mean. Red crosses are the monthly means of daily differences. The rectangular boxes display the spread of the 50 % of model results. Black whiskers represent the spread of 99.3 % of model results assuming the normal distribution.

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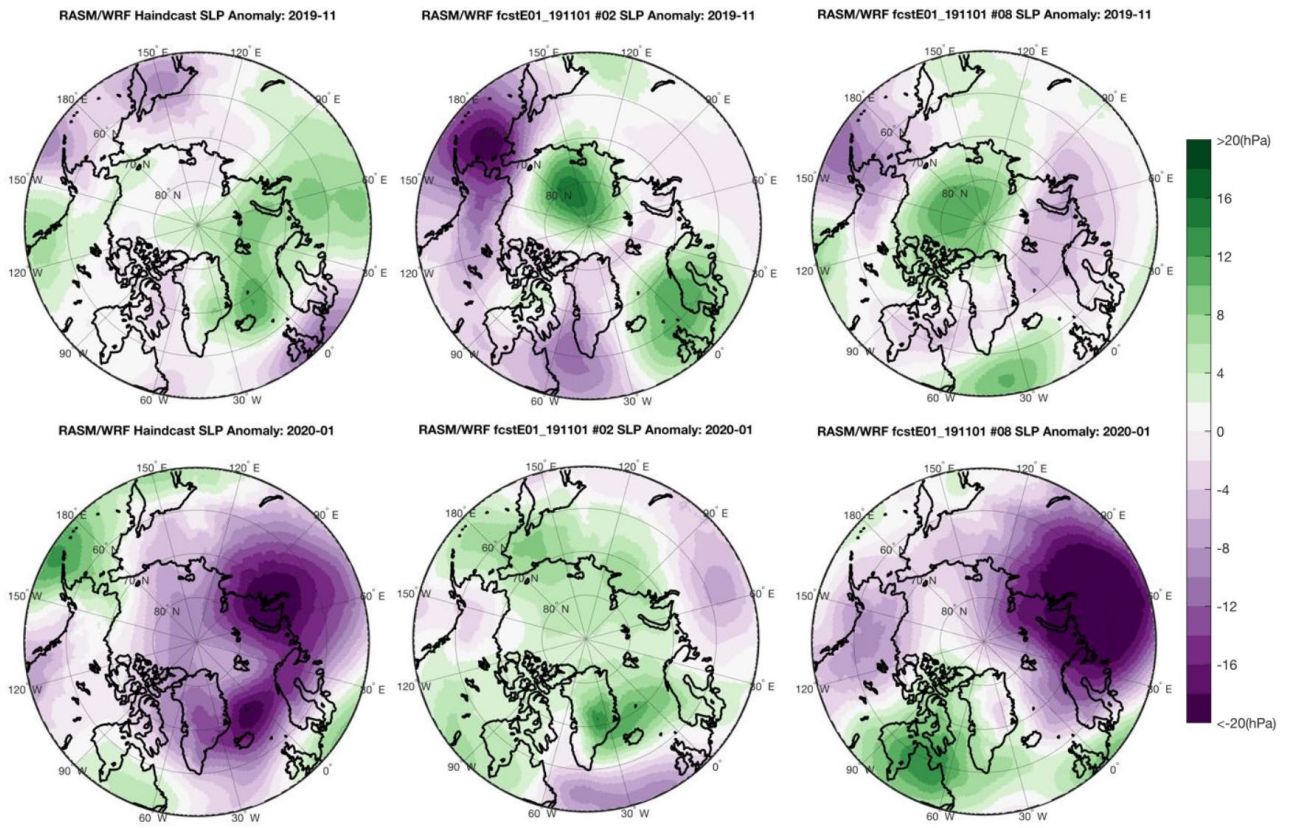
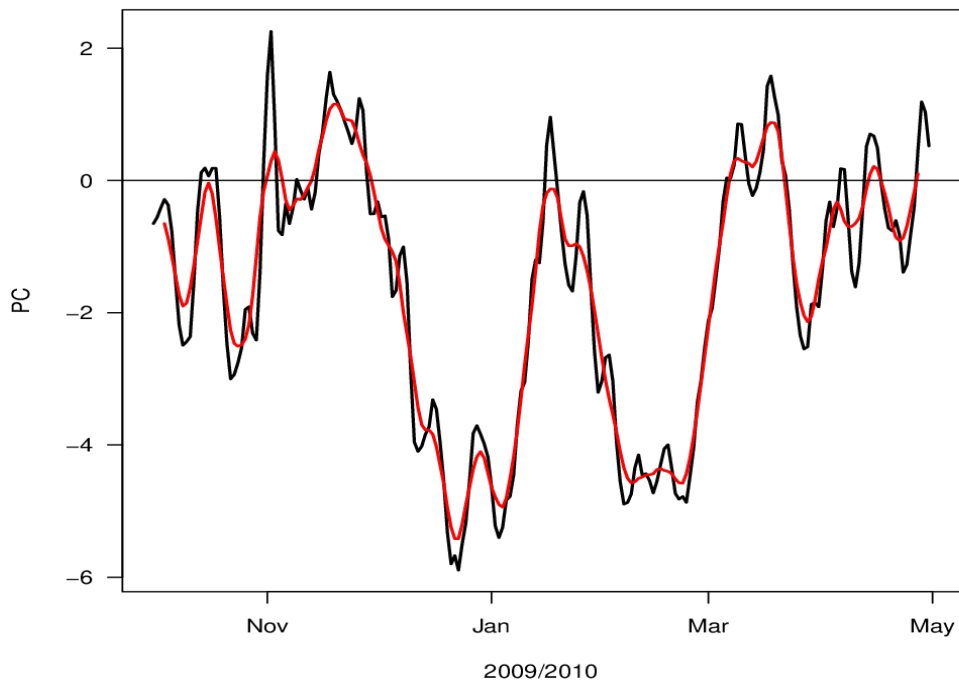


Figure S10. Anomalies of MSLP for November 2019 (top) and January 2020 (bottom) for hindcast (left) and two forecast ensemble members: 2 (middle) and 8 (right).

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280 **Figure S11.** Time series of daily values of the AO index from October 2009 to May 2010 (black line)
with 7-day running mean (red line).

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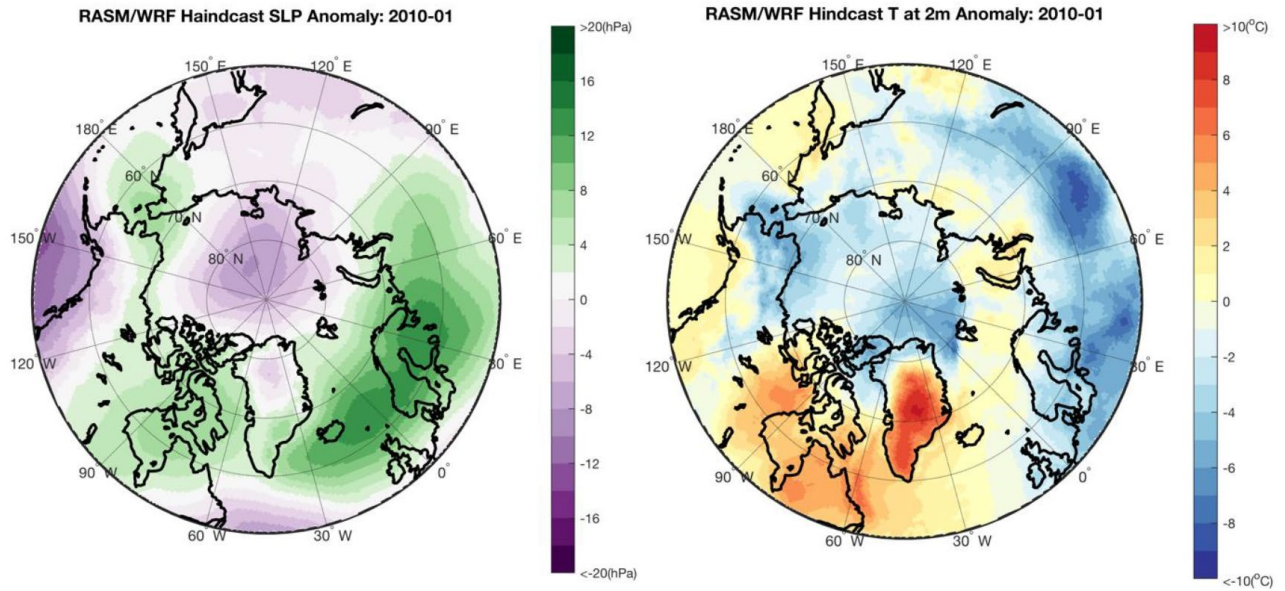
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Figure S12. RASM hindcast anomalies of MSLP and 2m Temperature for January 2010 relative to the 2010-2019 climatology.

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