## **Supplement Material for the manuscript:**

## Arctic sea ice anomalies during the MOSAiC winter 2019/20

Klaus Dethloff<sup>1</sup>, Wieslaw Maslowski<sup>2</sup>, Stefan Hendricks<sup>3</sup>, Younjoo Lee<sup>2</sup>, Helge F. Goessling<sup>3</sup>, Thomas
Krumpen<sup>3</sup>, Christian Haas<sup>3</sup>, Dörthe Handorf<sup>1</sup>, Robert Ricker<sup>3</sup>, Vladimir Bessonov<sup>4</sup>, John J. Cassano<sup>5</sup>, Jaclyn Clement Kinney<sup>2</sup>, Robert Osinski<sup>6</sup>, Markus Rex<sup>1</sup>, Annette Rinke<sup>1</sup>, Julia Sokolova<sup>4</sup>, Anja Sommerfeld<sup>1</sup>

 <sup>1</sup> Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Telegrafenberg A45, 14473 Potsdam, Germany
 <sup>2</sup> Department of Oceanography, Graduate School of Engineering and Applied Sciences, Naval Postgraduate School, Monterey, CA 93943, US

<sup>3</sup> Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Am Handelshafen 12, 27570 Bremerhaven, Germany

<sup>4</sup> Arctic and Antarctic Research Institute, Center Ice and Hydrometeorological Information, Bering Street 38, St. Petersburg, Russia

<sup>5</sup> Cooperative Institute for Research in Environmental Sciences, National Snow and Ice Data Center and Department of Atmospheric and Oceanic Sciences, University of Colorado, Boulder, US
<sup>6</sup> Institute of Oceanology, Polish Academy of Sciences, Sopot 81712, Poland

20 Correspondence to: Klaus Dethloff (Klaus.Dethloff@awi.de) and Wieslaw Maslowski (maslowsk@nps.edu)

25

15

30

35

40

45

50



**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.



**Figure S2.** 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.



**Figure S3**. Thermodynamic sea ice volume tendencies (km<sup>3</sup>/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 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.



**Figure S4**. Thermodynamic sea ice volume tendencies (km<sup>3</sup>/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.



**Figure S5.** Dynamic sea ice volume tendencies (km<sup>3</sup>/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.



Figure S6. Anomalies of MSLP for November (top) and January (bottom) for hindcast (left) and two forecast ensemble members: 2 (middle) and 8 (right).



Figure S7. Time series of daily values of the AO index from October 2009 to May 2010 (black line) with 7-day running mean (red line). 180







