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Supplement of

Response of the Nordic Seas to the 2–6 February 2020 marine cold air outbreak in the GLORYS12 ocean reanalysis

Svenya Chripko et al.

Correspondence to: Svenya Chripko (svenya.chripko@uib.no)

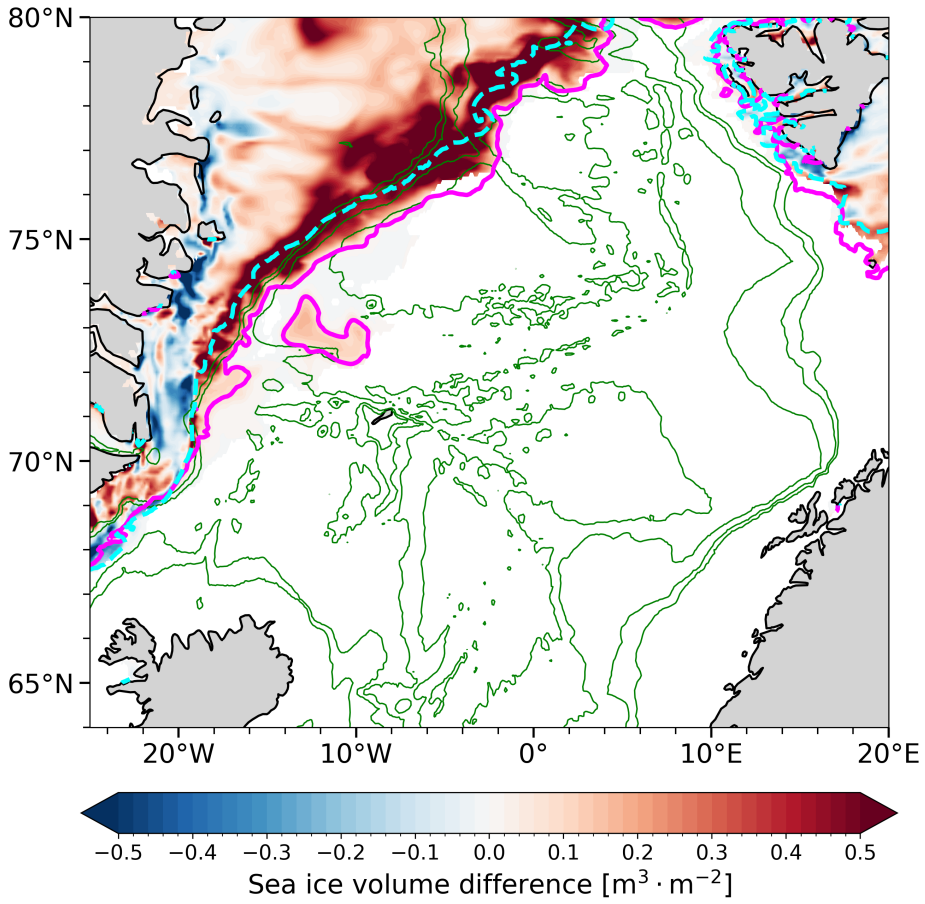

Figure S1. Difference in sea ice volume (m^3· m^{-2}), between the end-MCAO (06/02/2020) and pre-MCAO conditions (31/01/2020). The magenta and dashed cyan lines, respectively, correspond to the end-MCAO and pre-MCAO sea ice edges at 15 % sea ice concentration. The 500-, 1000-, 2000-, and 3000-m isobaths are shown as thin green contours.

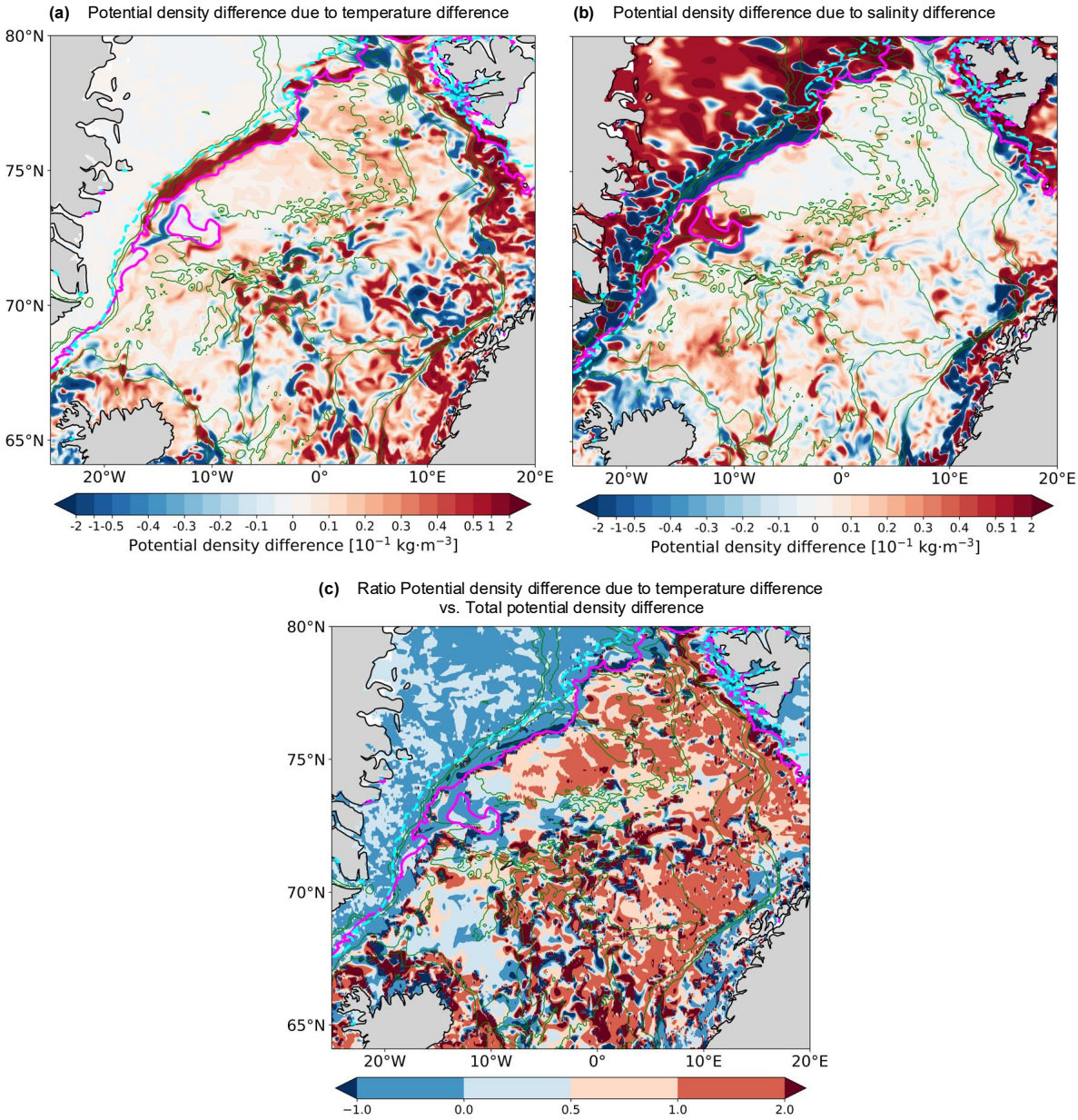

Figure S2. Relative contribution of Conservative Temperature Θ and Absolute Salinity S_A differences with respect to potential density ρ difference at the surface (10^{-1} kg·m^{-3}). **(a)** ρ difference due to Θ difference, with constant S_A. **(b)** ρ difference due to S_A difference, with constant Θ. The sum of the two contributions in panels (a) and (b) is equal to the total potential density difference in Fig. 4c. The difference is computed between the end-MCAO (06/02/2020) and pre-MCAO (31/01/2020) conditions. **(c)** Ratio between ρ difference due to Θ difference in panel (a), and the total ρ difference in Fig. 4c. A ratio larger than 0.5 indicates areas where the temperature difference contributes at least to 50 % of the density difference (orange shading), while a ratio between 0 and 0.5, or negative (both in blue shading), indicates areas where the salinity difference contributes the most to the density difference, or where the salinity difference only has the same sign as the density difference.

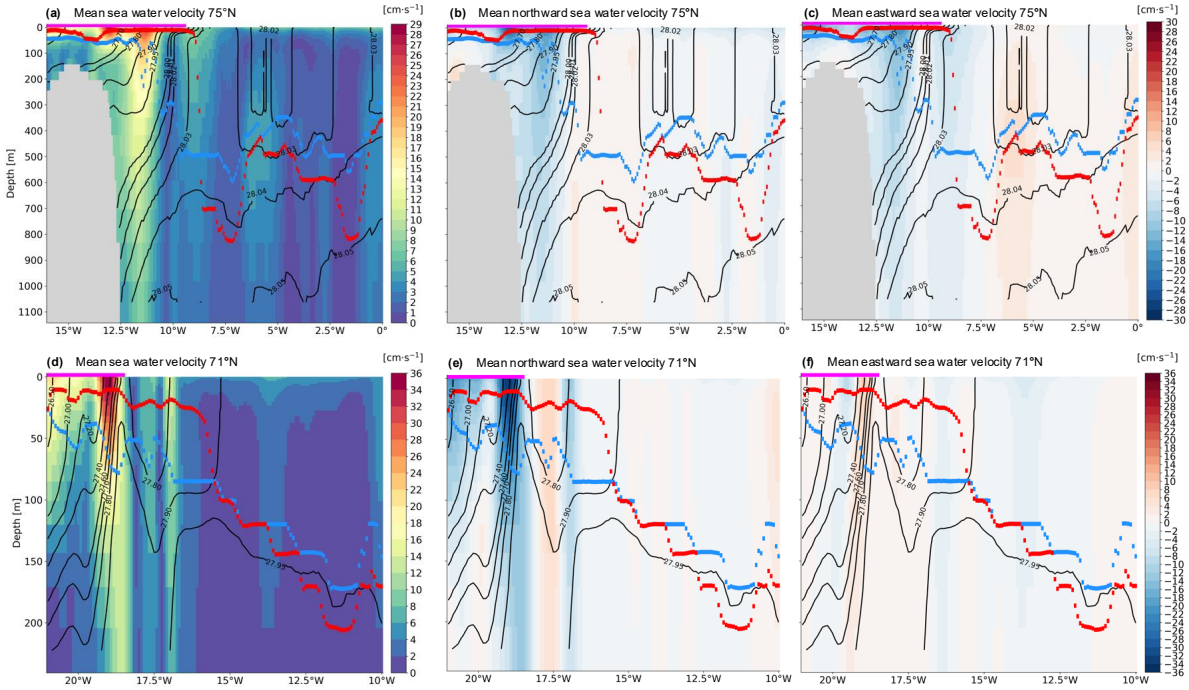

Figure S3. Vertical cross-sections of mean sea water velocity ($cm \cdot s^{-1}$) during the MCAO (02/02/2020-06/02/2020) at 75°N in the Greenland Sea (first row) and at 71°N in the Iceland Sea (second row). The respective total magnitudes are shown in **(a)** and **(d)**, the northward components are shown in **(b)** and **(e)**, and the eastward components are shown in **(c)** and **(f)**. The thick blue and red lines indicate the mixed-layer depth during the first (02/02/2020) and last (06/02/2020) MCAO days, respectively. The magenta lines indicate the maximum sea ice extent occurring during the MCAO with at least 15 % sea ice concentration. The thin black contours correspond to the density contours during the last day (06/02/2020).

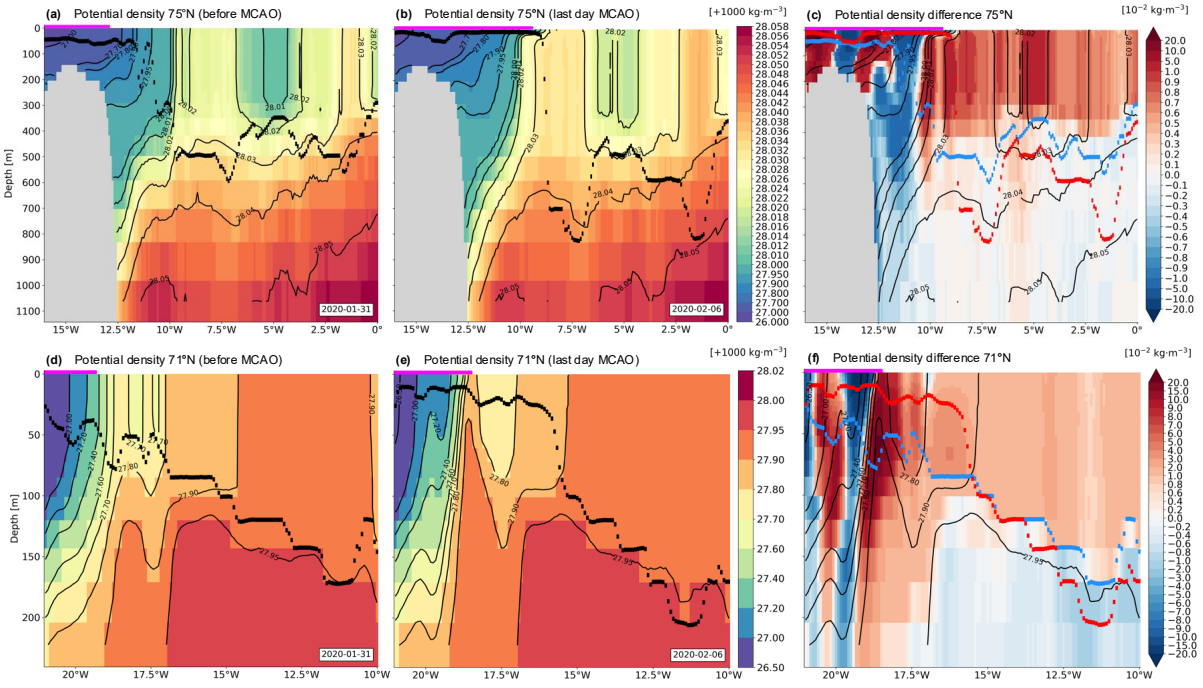

Figure S4. Vertical cross-sections of potential density (+ 1000 kg·m^{-3}) at 75°N in the Greenland Sea (first row) and at 71°N in the Iceland Sea (second row). Conditions before the MCAO (31/01/2020) are in panels (a) and (d), and conditions during the last day (06/02/2020) are in (b) and (e). The differences between the end-MCAO and pre-MCAO potential densities are in (c) and (f). Note the non-linear scale in all panels. The thin black contours in panels (a), (b), (d), and (e) highlight the density contours on the considered day, while in (c) and (f) they correspond to the density contours during the last day (06/02/2020). The thick black lines in panels (a), (b), (d), and (e) indicate the mixed-layer depth on the considered day, while thick blue and red lines in (c) and (f) indicate the mixed-layer depth before the MCAO (06/02/2020) and during the last day (06/02/2020), respectively. The magenta lines indicate areas where the ocean surface is covered by at least 15 % sea ice concentration during the considered day in (a), (b), (d), (e), and during the last day in (c) and (f).