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Supplement of

Concurrent Bering Sea and Labrador Sea ice melt extremes in March 2023: a confluence of meteorological events aligned with stratosphere–troposphere interactions

Thomas J. Ballinger et al.

Correspondence to: Thomas J. Ballinger (tjballinger@alaska.edu)

1 Introduction

The supplement consists of four figures (**Figure S1-S5**) that are referenced within, but not central to, the main results presented in our manuscript.

2 Supplementary Figures

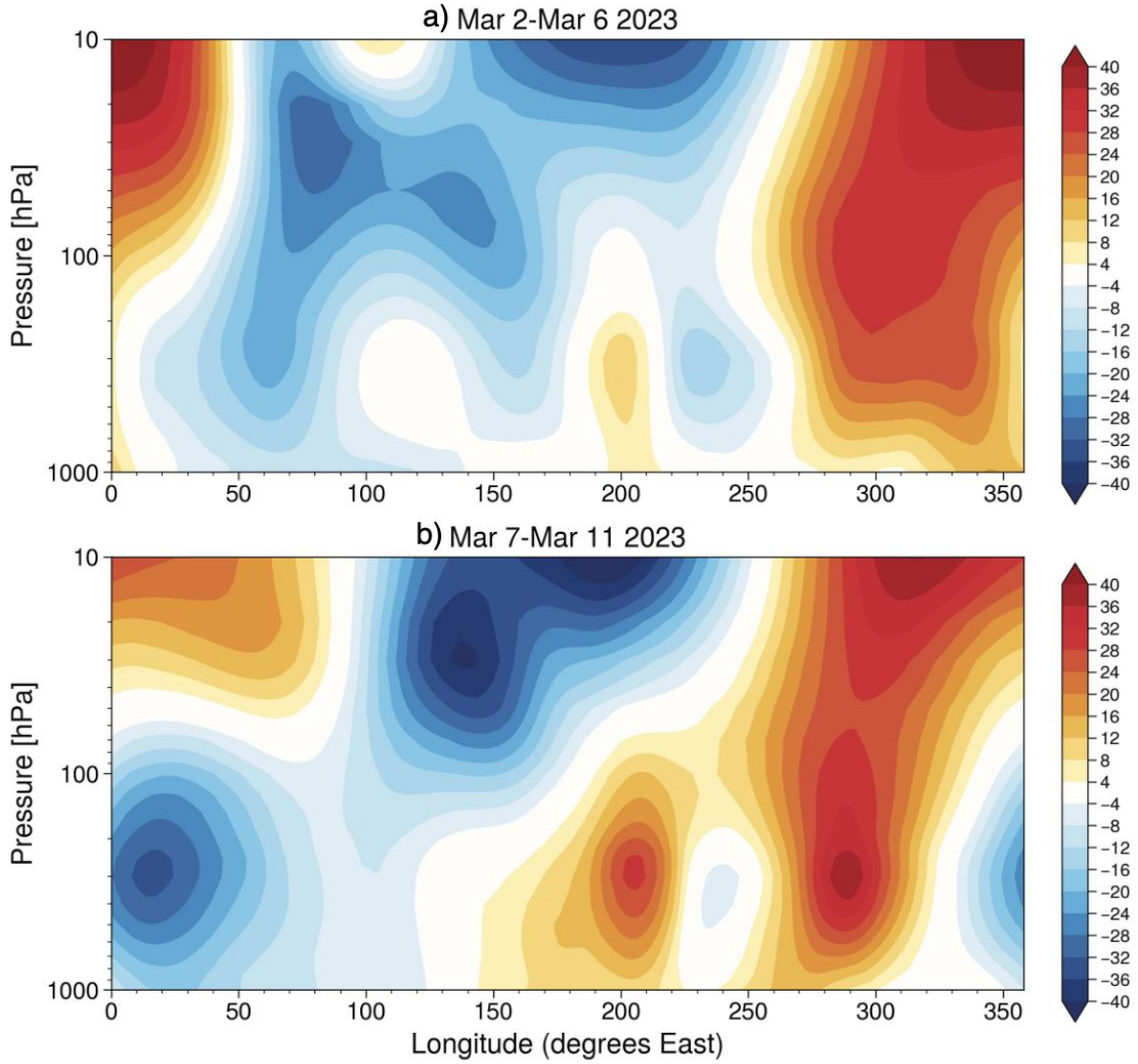

Figure S1. The 45-75°N eddy geopotential height anomalies (m) as a function of pressure versus longitude. These anomalies are calculated as the deviation from the zonal-mean for the periods relative to the 1979-2023 climatology for a) March 2-6 and b) March 7-11 2023.

Figure S2. GEUS PROMICE weather station two-meter air temperature (T2m; °C) 1 January – 31 March 2023 daily time series (gray lines) overlapping the multi-sectoral melt event for a) QAS_L and b) NUK_K. Considering all days from 1 January to 31 March for the respective stations full periods of record (see Section 2.1), the mean T2m (black line), 1st percentile (blue dashed line), and 99th percentile (red dashed line) are shown in each graphic. The sudden stratospheric warming event on 16 February 2023 is labeled with a green diamond, and to draw attention to the dates around the Labrador Sea and Bering Sea melt events, the period from 2-10 March 2023 is identified by yellow triangles. Missing data (17 February at NUK_K) are omitted from respective time series. For reference the weather stations are overlaid on **Figure 1**.

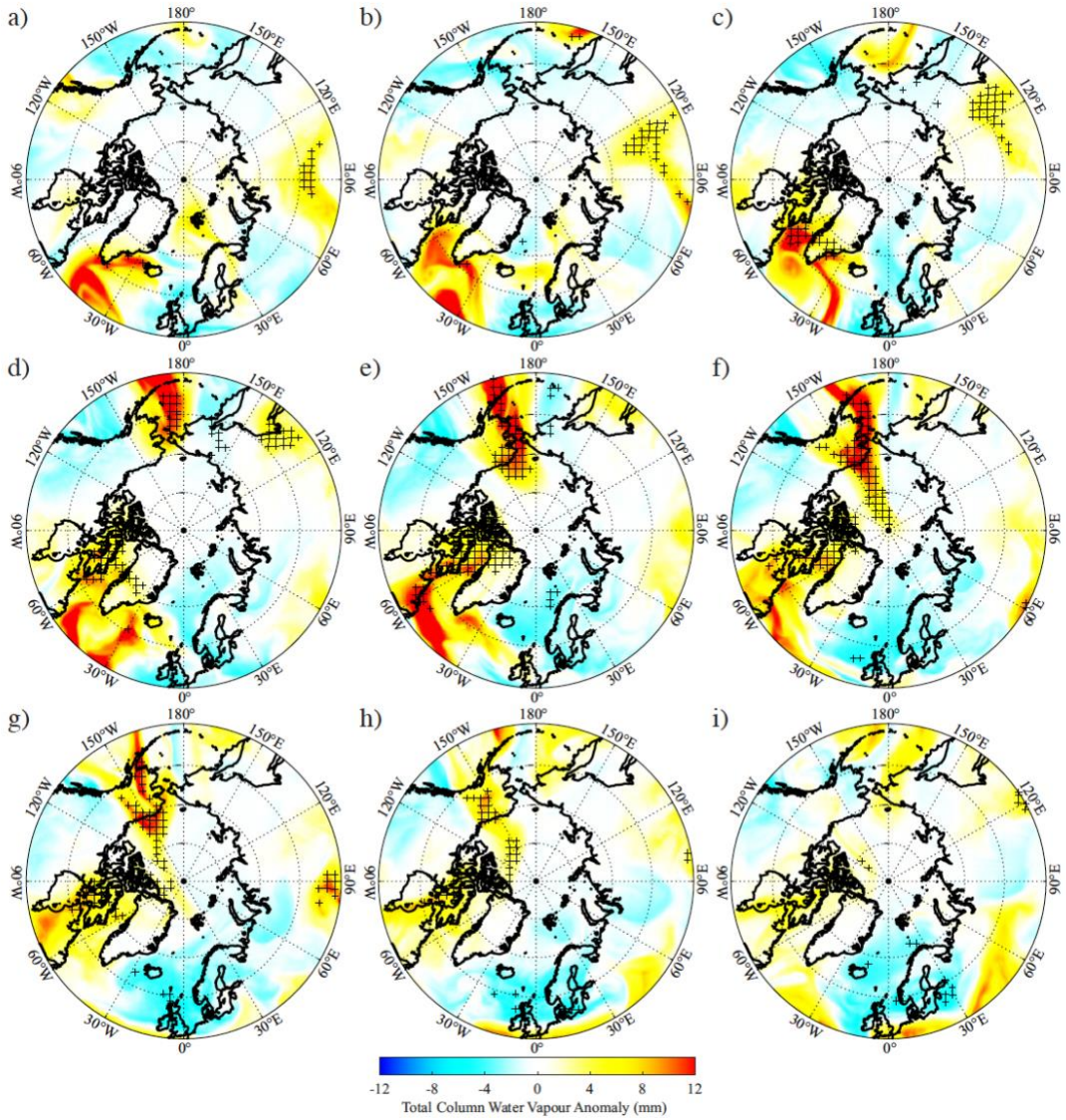

Figure S3. Total column water vapor anomaly (mm) from the ERA5 at 0 GMT on: a) 2 March, b) 3 March, c) 4 March, d) 5 March, e) 6 March, f) 7 March, g) 8 March, h) 9 March, and i) 10 March 2023. The anomalies are with respect to the period 16 February – 15 March 1979-2023. Gridpoints where the anomalies are less than the 1st percentile (blue hues) or greater than the 99th percentile (red hues) based on the above period are indicated with the '+'.

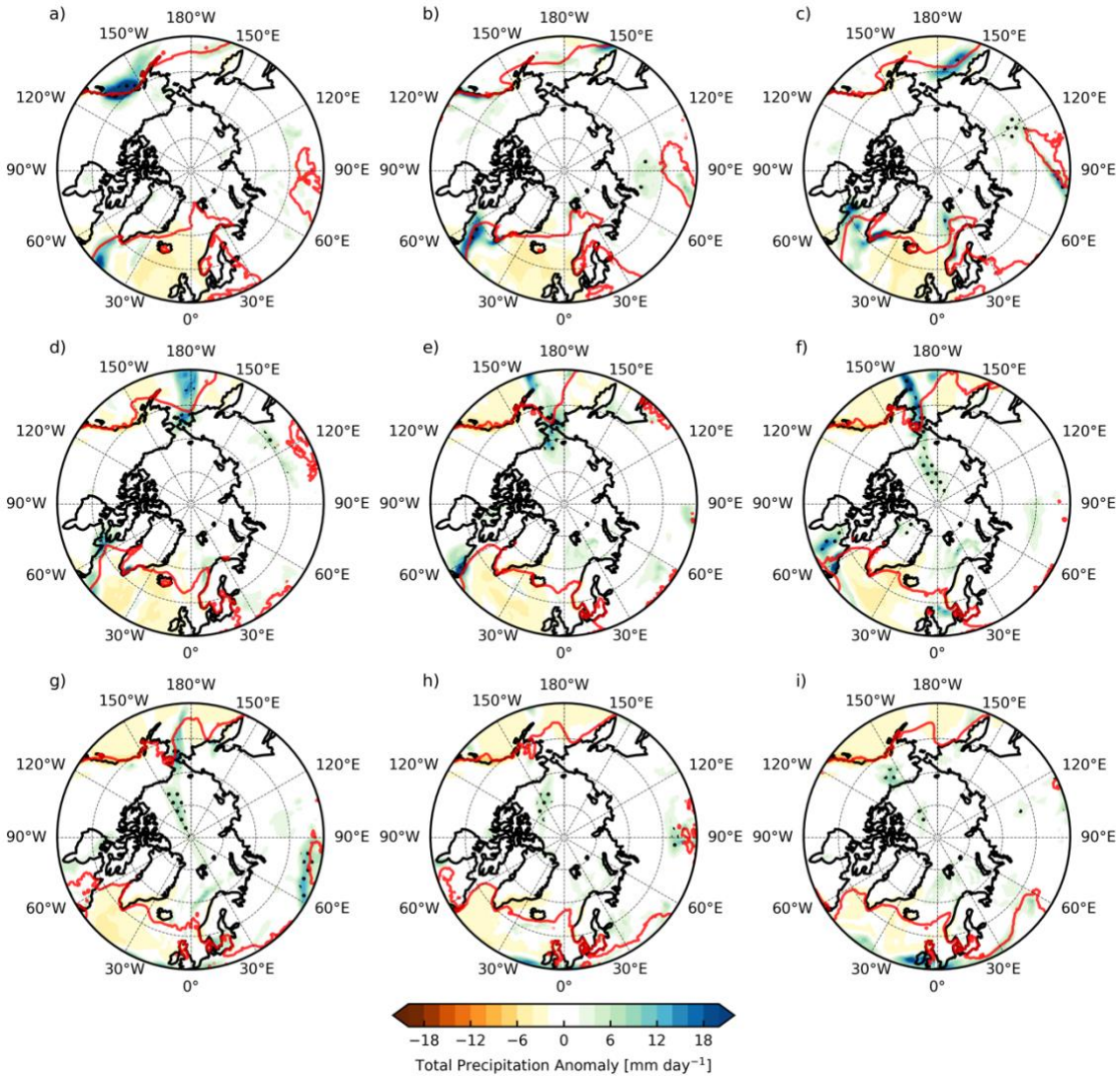

Figure S4. Total daily precipitation (mm/day) from the ERA5 for: a) 2 March, b) 3 March, c) 4 March, d) 5 March, e) 6 March, f) 7 March, g) 8 March, h) 9 March, and i) 10 March 2023. The anomalies are shown with respect to the period 16 February – 15 March 1979-2023. Gridpoints where the anomalies are greater than the 99th percentile (blue hues) based on the above period are indicated with the '•'. The red curves represent the 0°C isotherm in the two-meter air temperature fields.

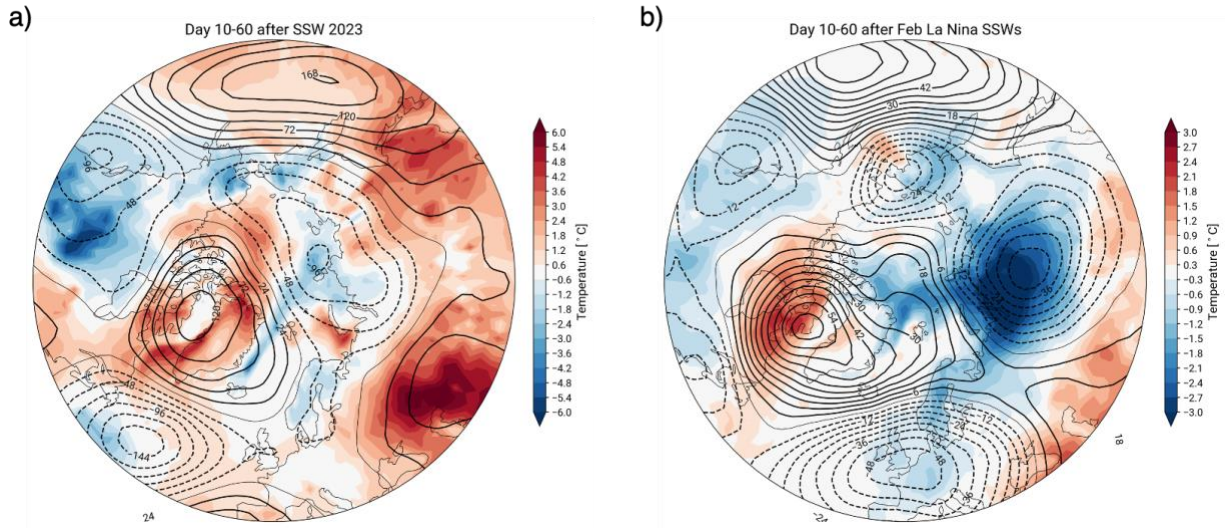

Figure S5. a) T2m (shading) and z500 (contours) fields averaged over the 10-60 days following the 2023 SSW event. b) Same as a), but for late January to mid-February SSW onsets that occurred during other La Niña years (1984, 1989, 1999, 2001, 2006, 2008, 2009, and 2018 included). The 10-60 day averaging window is used as the timing of tropospheric response to SSW can vary across events thus requiring a relatively long period to filter out noise.