

CESM2(WACCM6) forecast of the February 2023 SSW

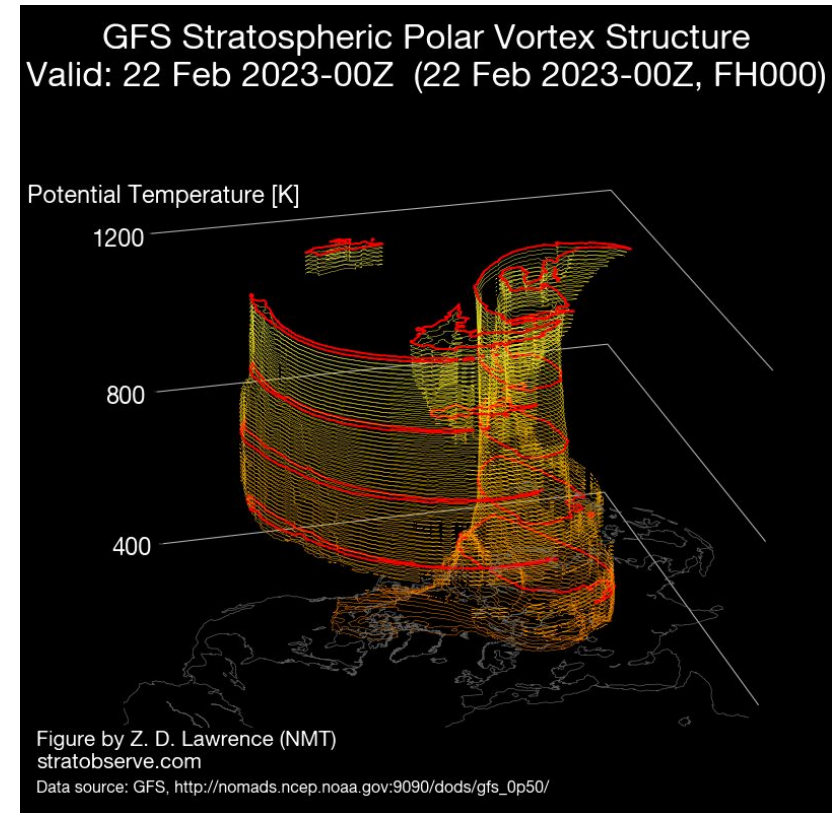
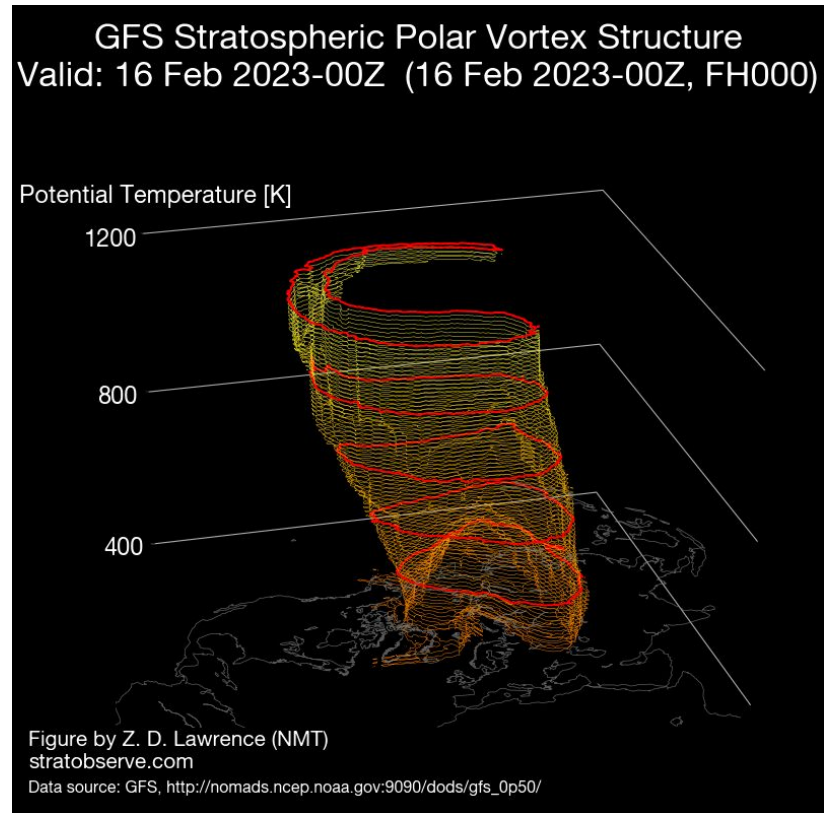
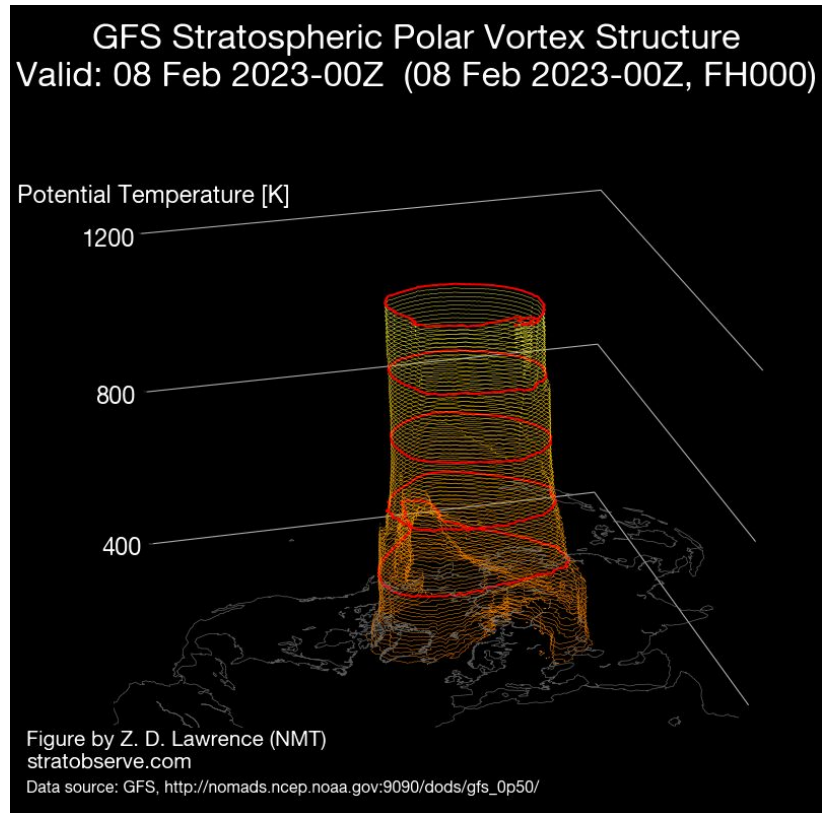
Nicholas Davis

NCAR/ACOM

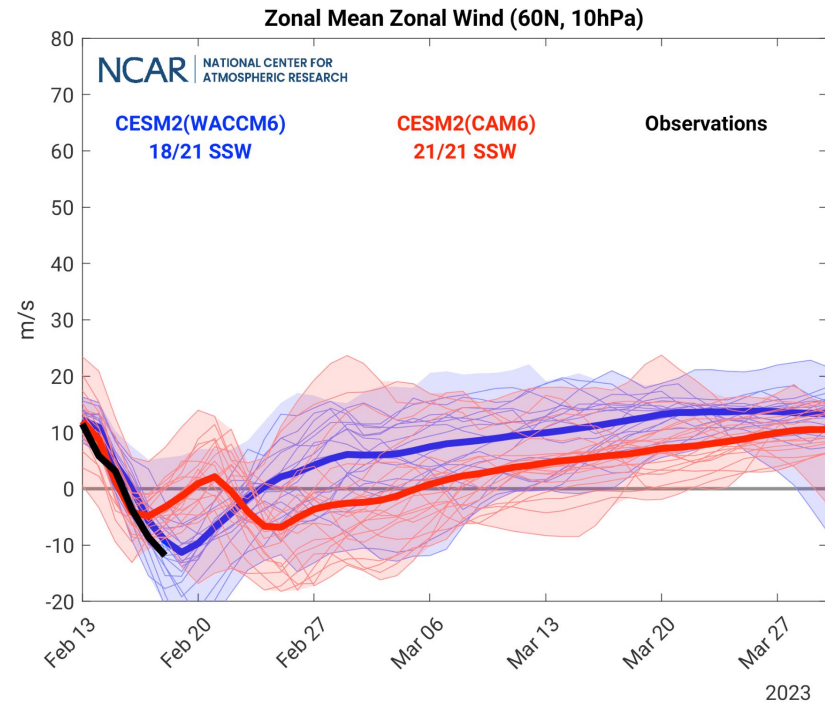
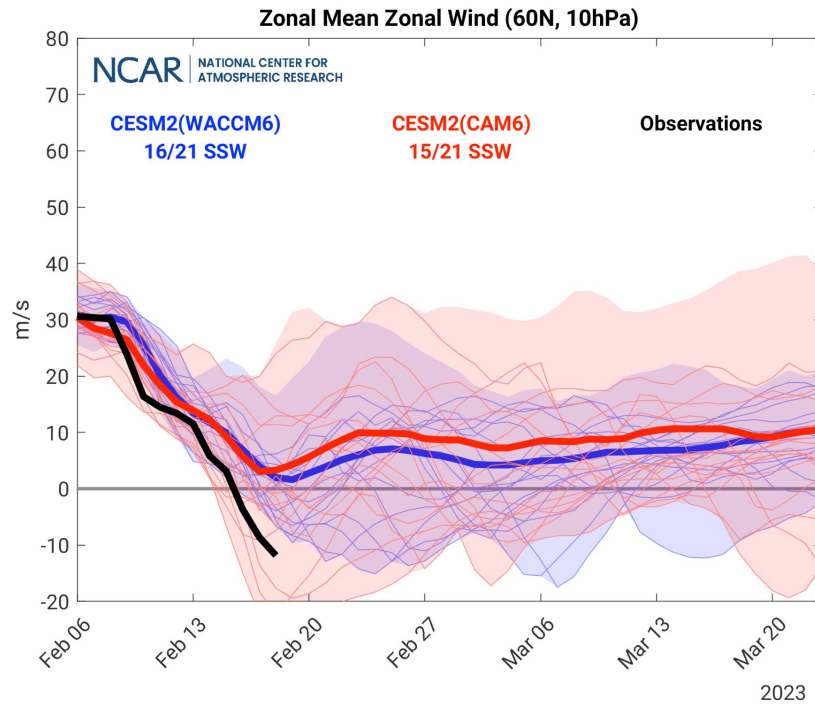
February 22, 2023



The February 16th sudden stratospheric warming



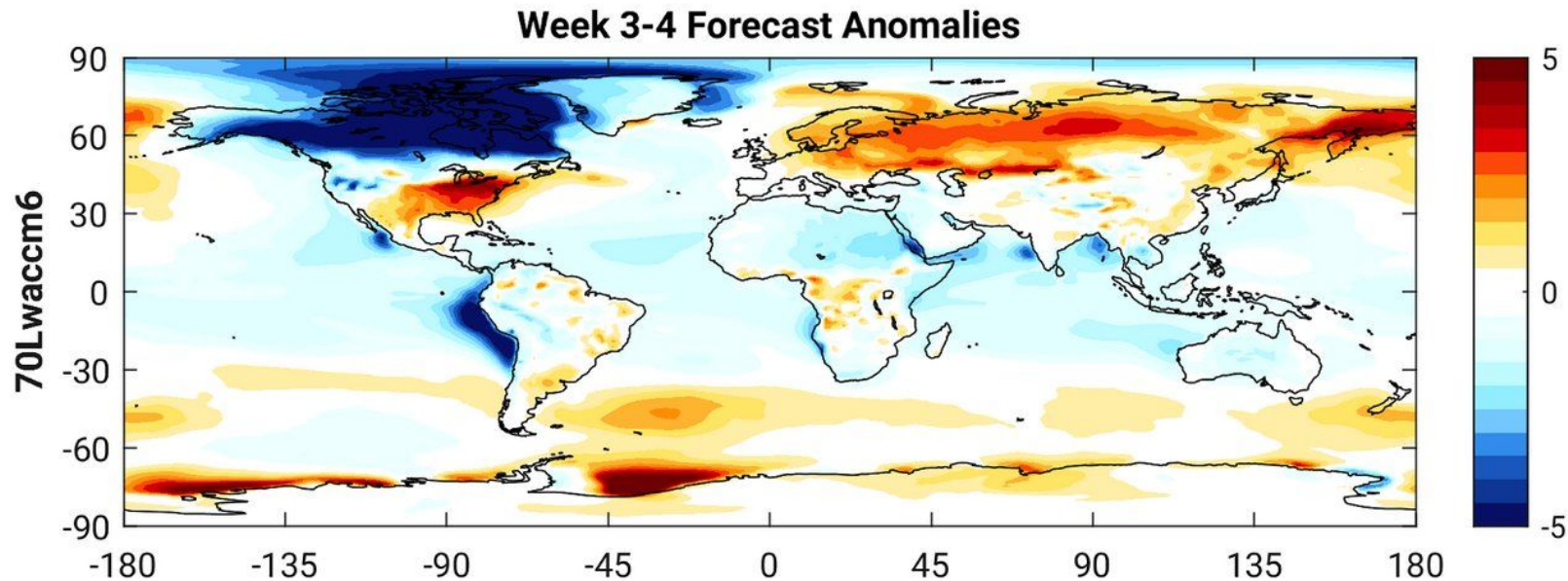
The February 16th sudden stratospheric warming



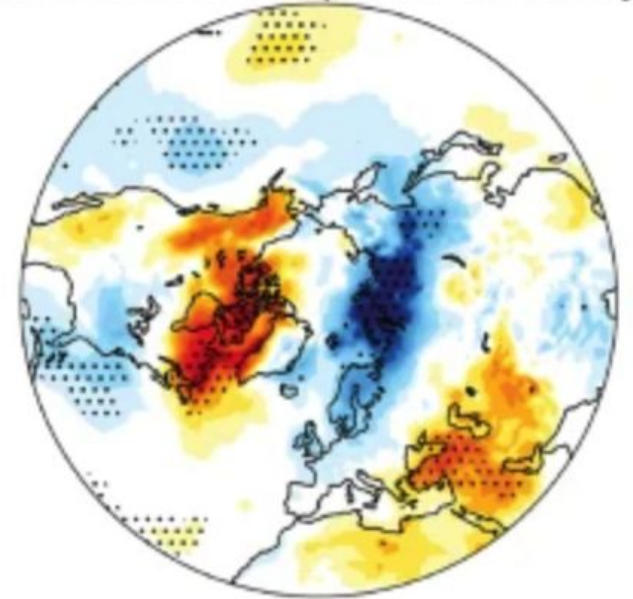
CESM2 had some visibility on last week's sudden stratospheric warming (SSW) by late January, but forecasts converged strongly on an event two weeks beforehand.

Not your average SSW

13-Feb-2023 Prediction for Week 3-4: 27-Feb-2023 to 12-Mar-2023

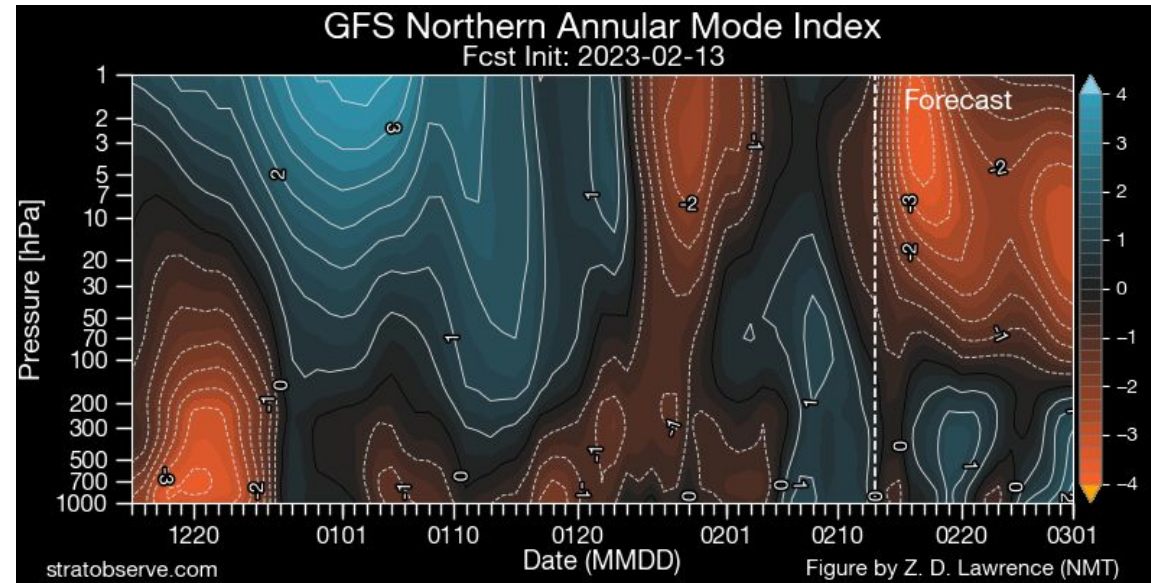
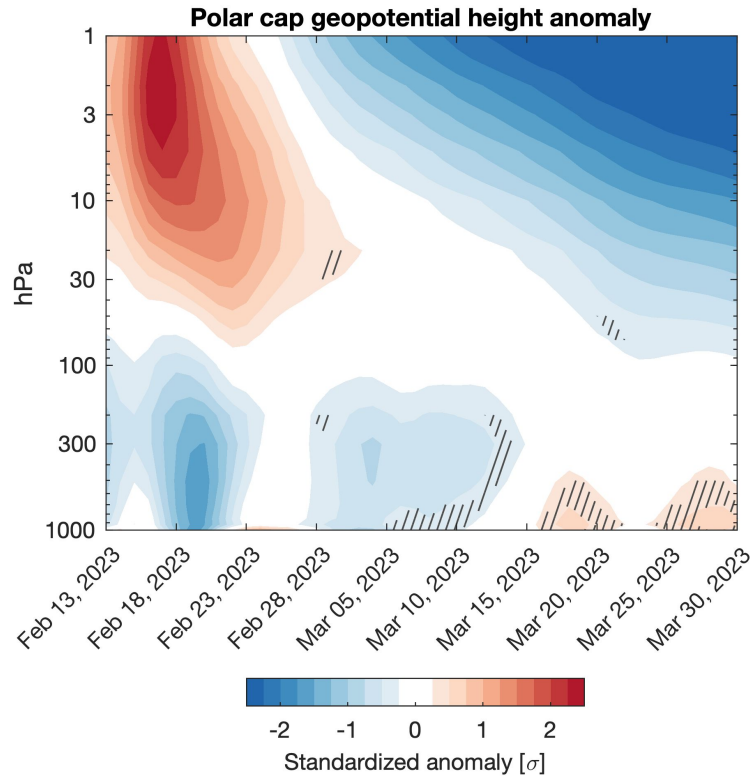


(a) Mean Surface Temperature Anomaly



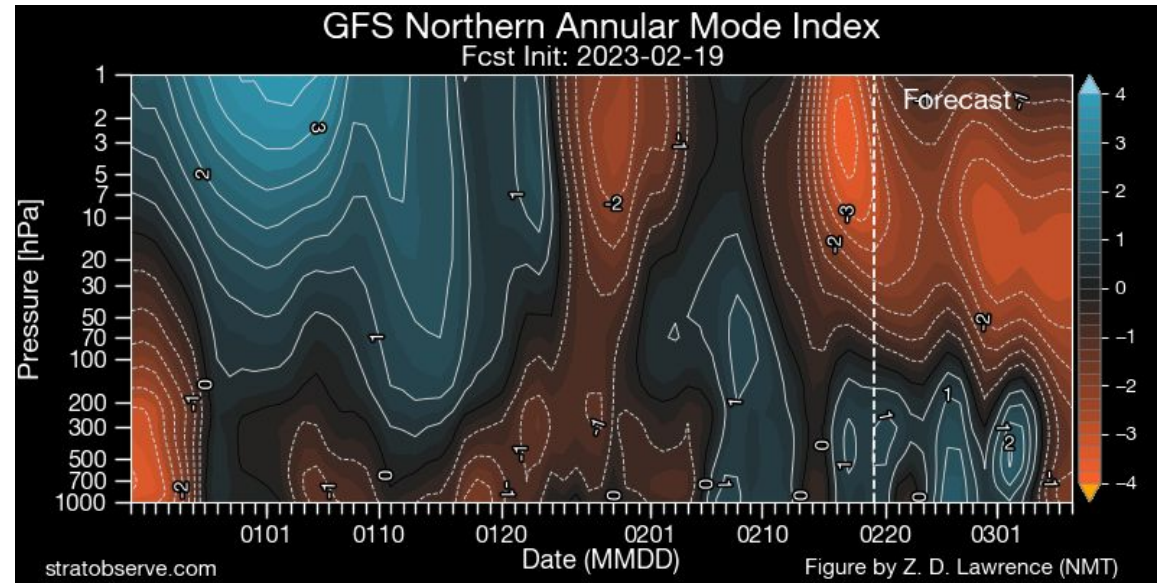
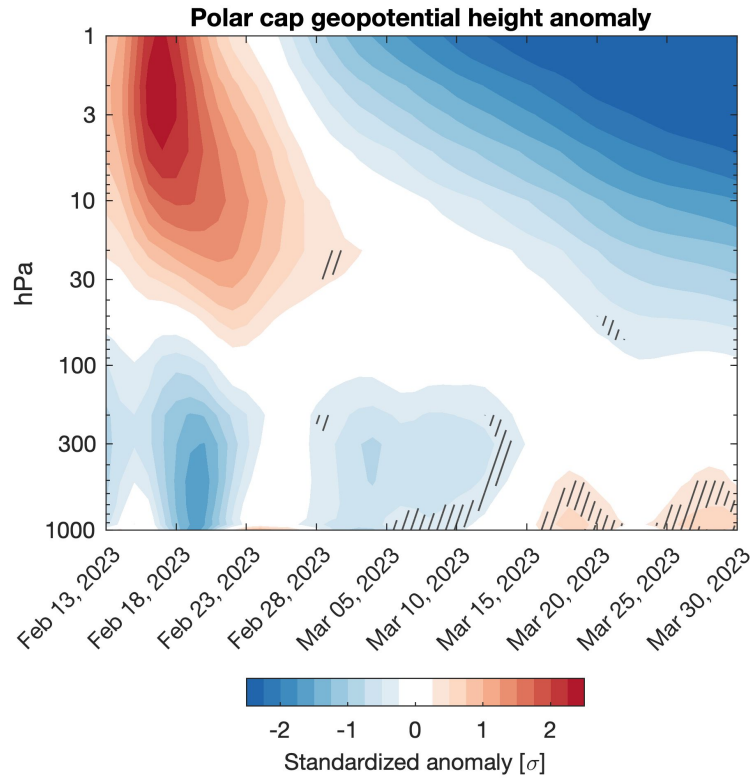
CESM2 weeks 3-4 surface temperature forecasts (left) predicted a pattern nearly orthogonal to the negative-NAM-like surface temperature anomalies in the month following SSWs (right) [Domeisin and Butler 2020].

A non-surface-coupling sudden stratospheric warming?



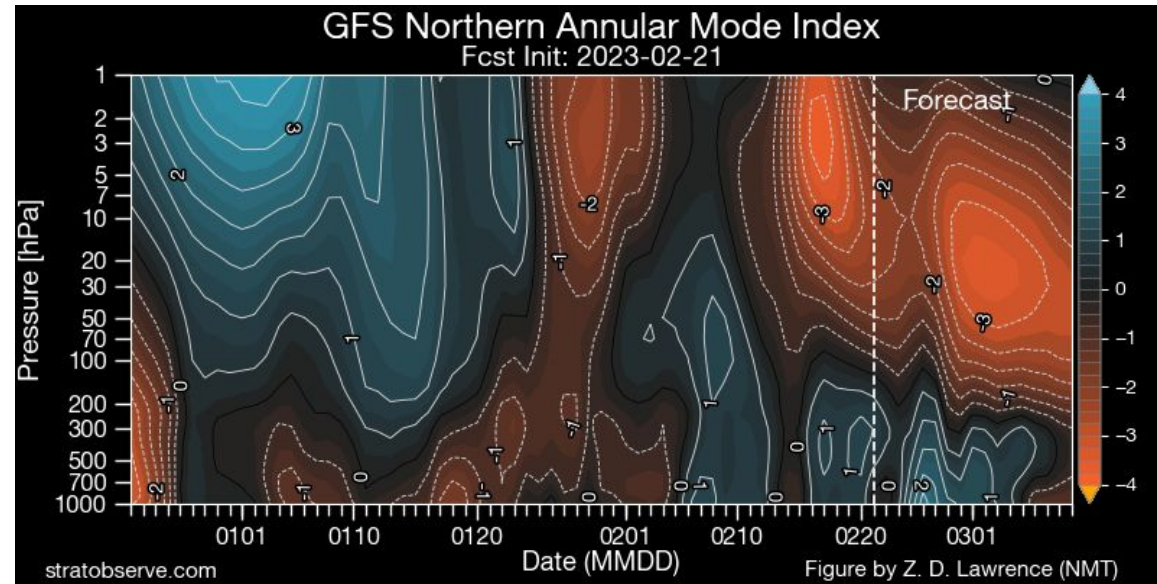
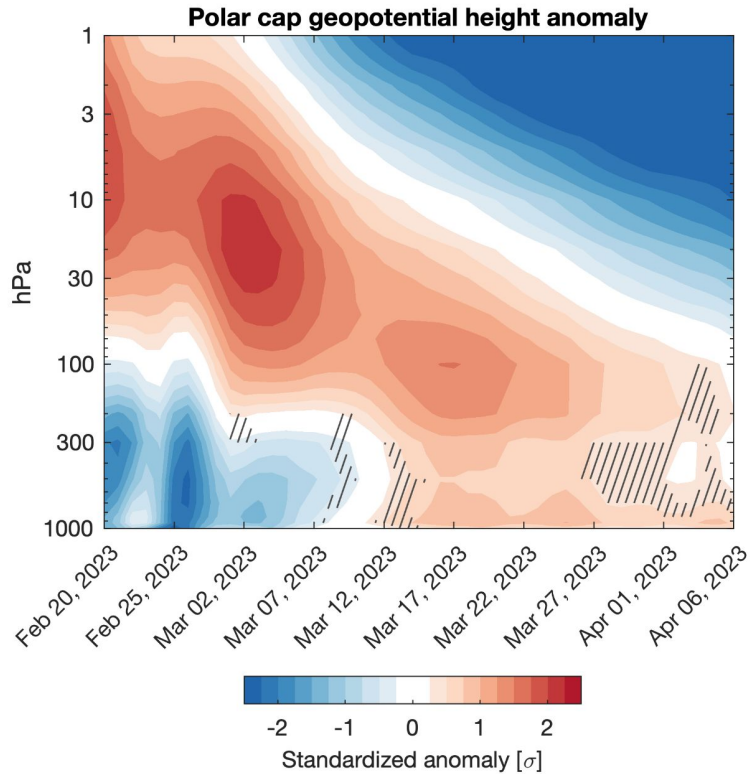
Both CESM2 and GFS forecasted an SSW followed by neutral/negative Northern Annular Mode (NAM) conditions at the surface, at least through the end of February. GFS predicted a second weakening of the vortex...

A non-surface-coupling sudden stratospheric warming?



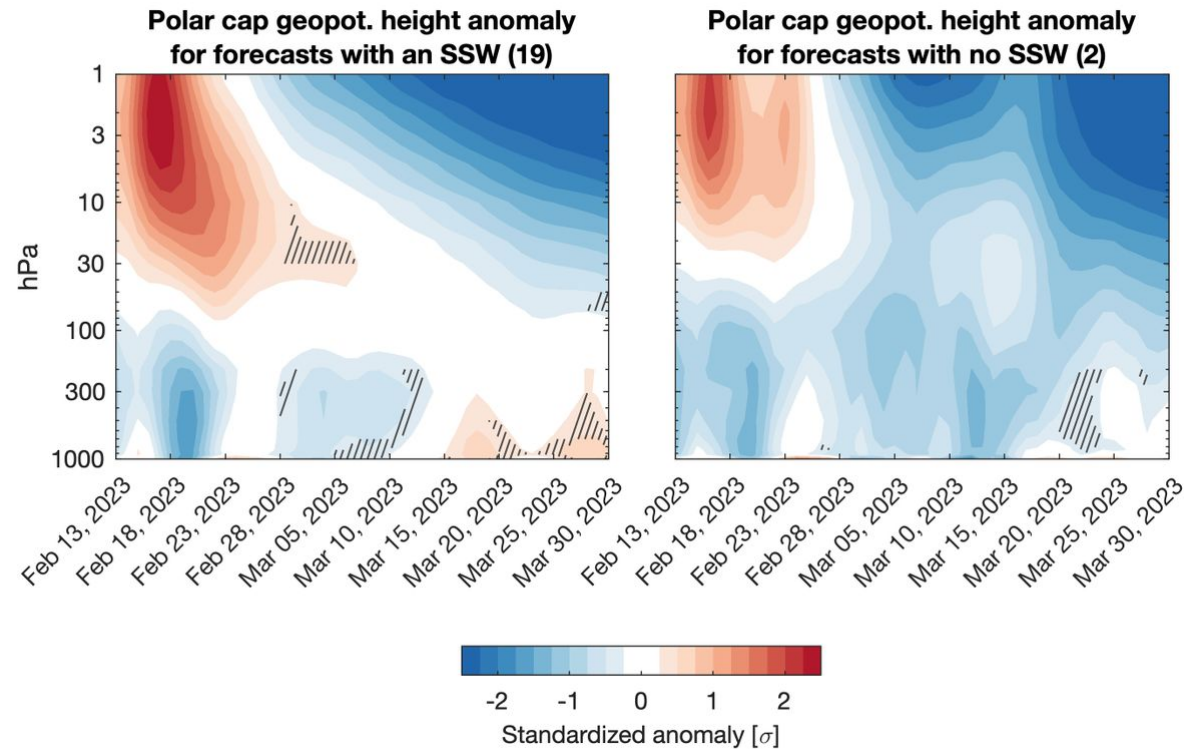
...which last week started to hint at a negative surface NAM in early March (cold air outbreaks in US and Europe). However...

A non-surface-coupling sudden stratospheric warming?



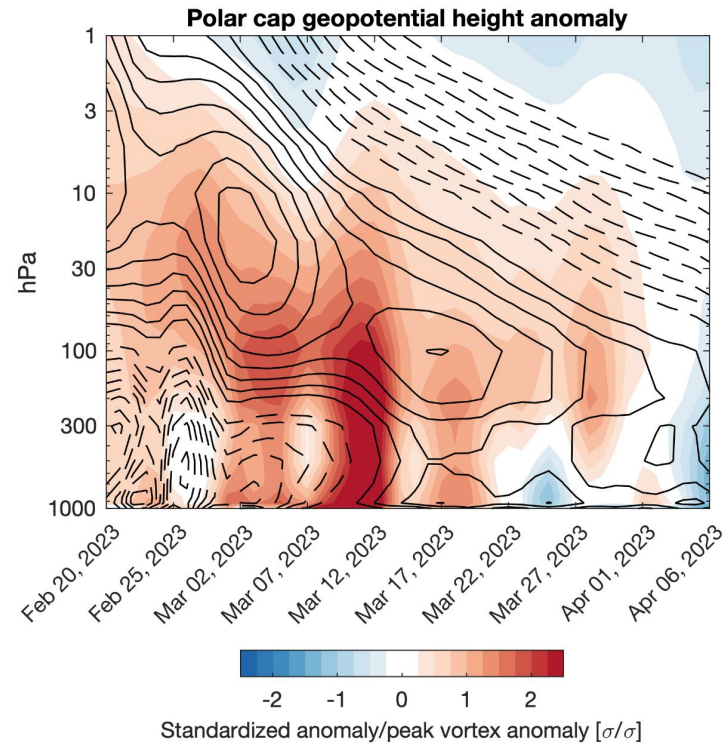
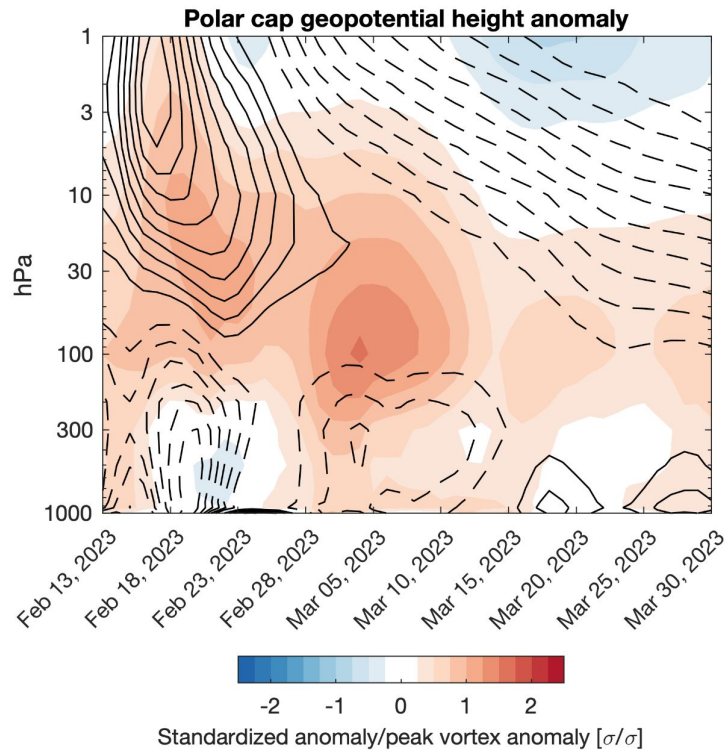
...recent GFS forecasts have again shifted toward a negative/neutral surface NAM in late February/early March, while CESM2 is now predicting a second disruption late next week.

The SSW and disruption *are* coupled with the surface



Members that forecasted a stronger SSW (higher polar cap geopotential heights at 10 hPa) also forecasted more neutral conditions than would have otherwise occurred - this SSW coincides with *shifting* surface conditions, even though we don't see a clear surface NAM signal. Also applies to the secondary disruption.

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