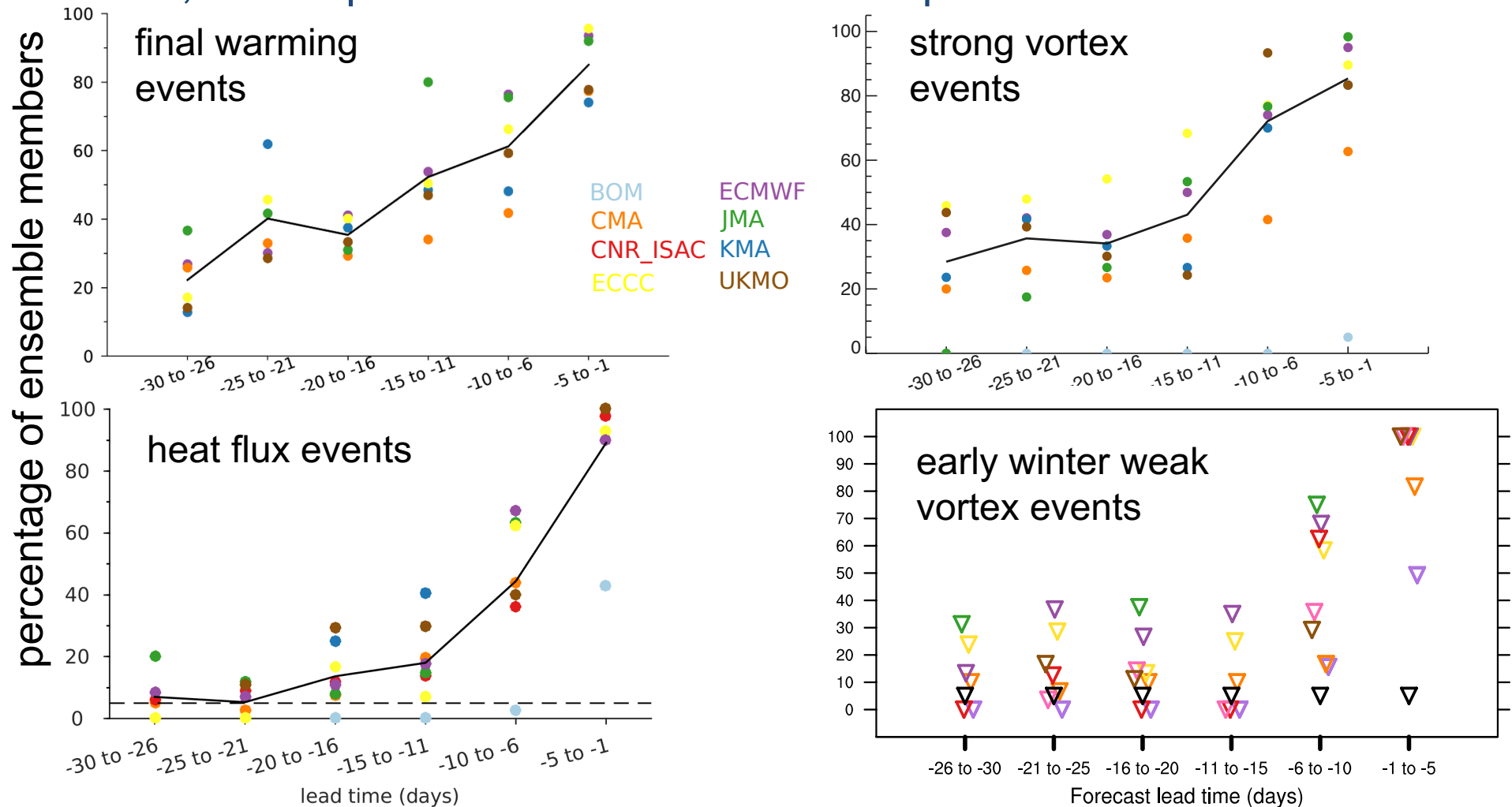


PREDICTABILITY OF EXTREME STRATOSPHERIC EVENTS (NH)

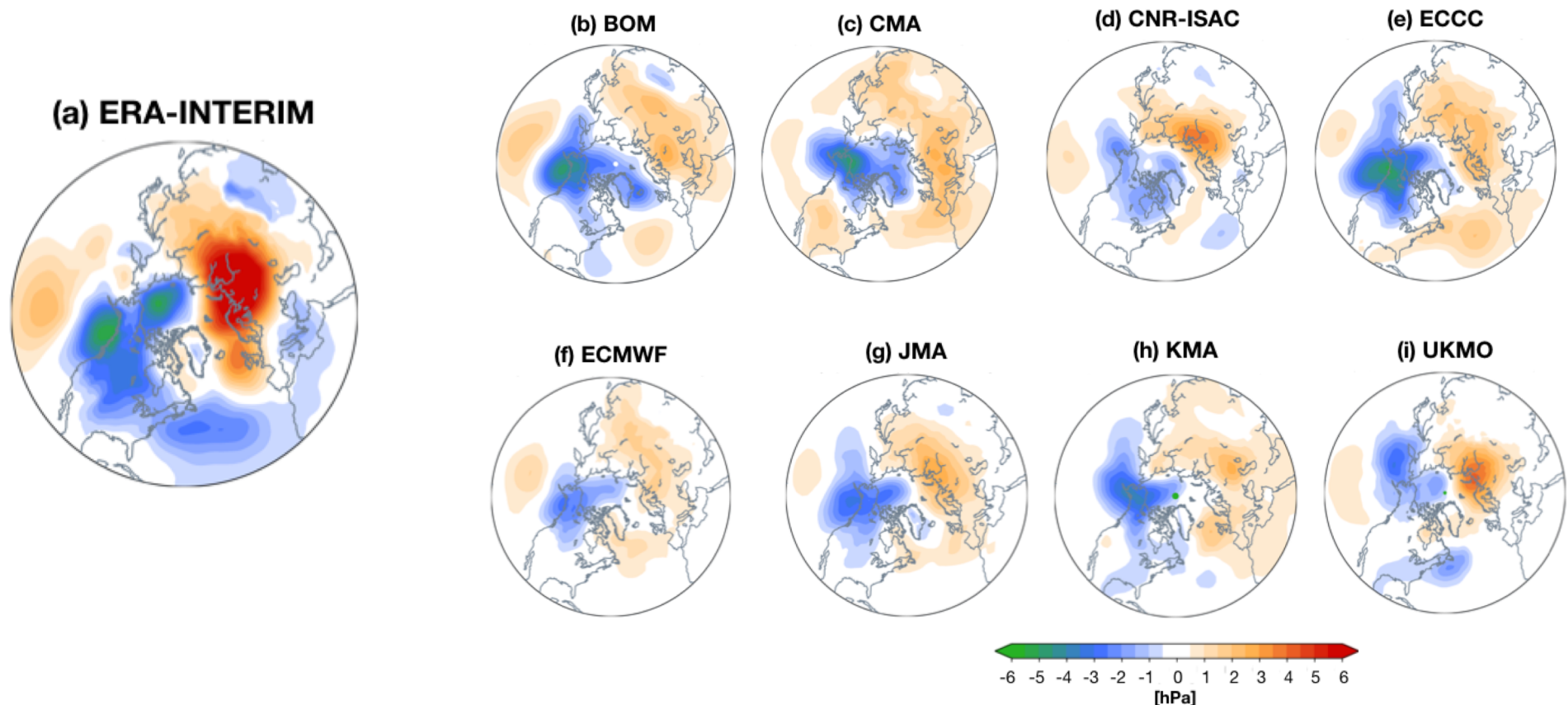
Overall, stratospheric events are difficult to predict on S2S timescales



Figures: A. Karpechko, A. Butler, A. Lang, E. Dunn-Sigouin

PRECURSORS TO STRATOSPHERIC EVENTS (EXTRATROPICAL TROPOSPHERE)

Tropospheric precursors to SSW events

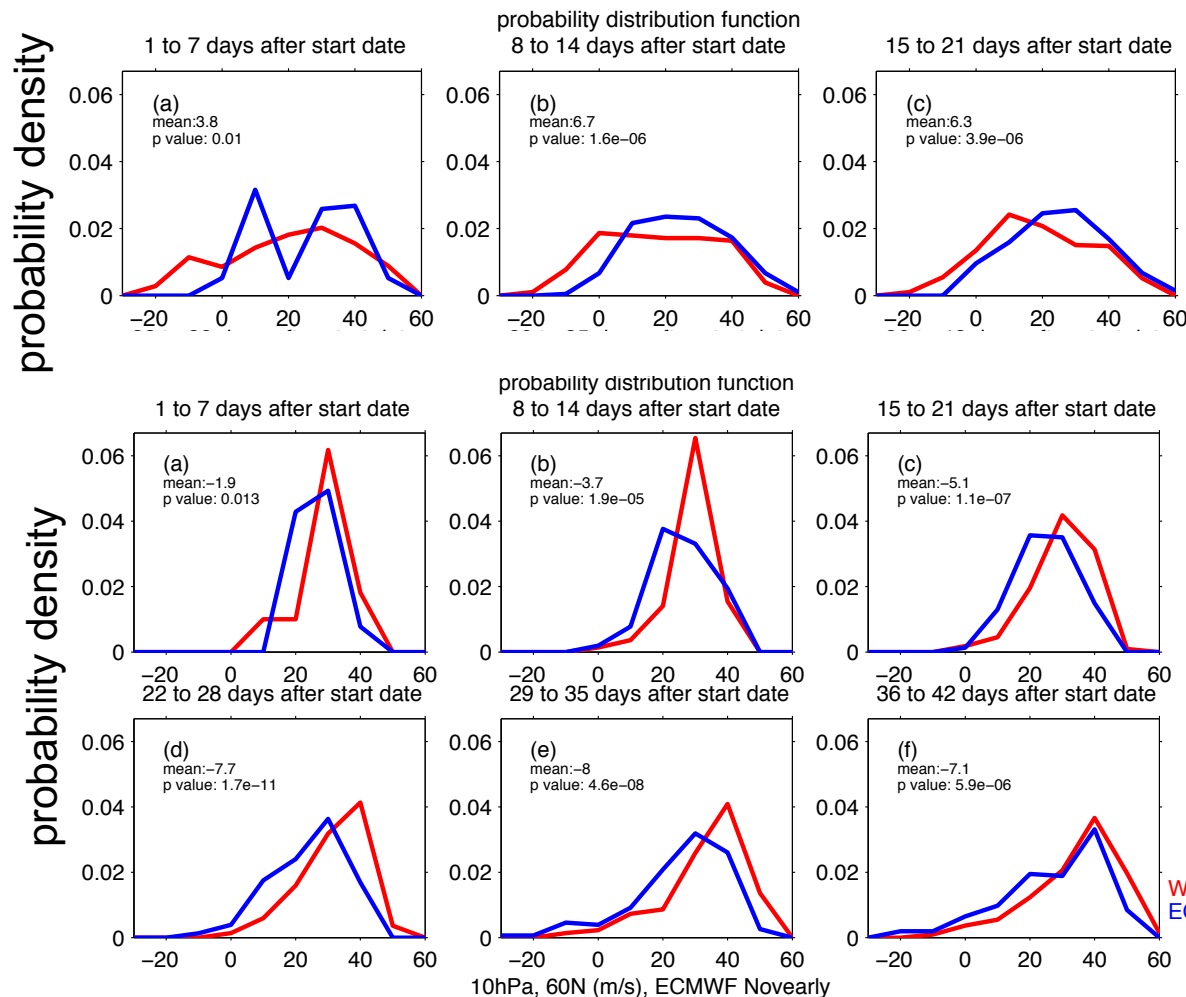


Sea level pressure anomalies before major SSW events
(days -21 to -14)

Figures: J. Furtado

PRECURSORS TO STRATOSPHERIC EVENTS (TROPICS)

The MJO and Quasi-Biennial Oscillation can affect polar vortex variability



Winds at 10hPa, 60N in ECMWF model, for:

MJO (NDJF)

MJO phase 2 (209 cases)

MJO phase 6 (385 cases) -> weaker polar vortex

see also:

Schwartz & Garfinkel, 2017, JGR

QBO (early Nov)

easterly QBO (220 cases) -> weaker polar vortex

westerly QBO (154 cases)

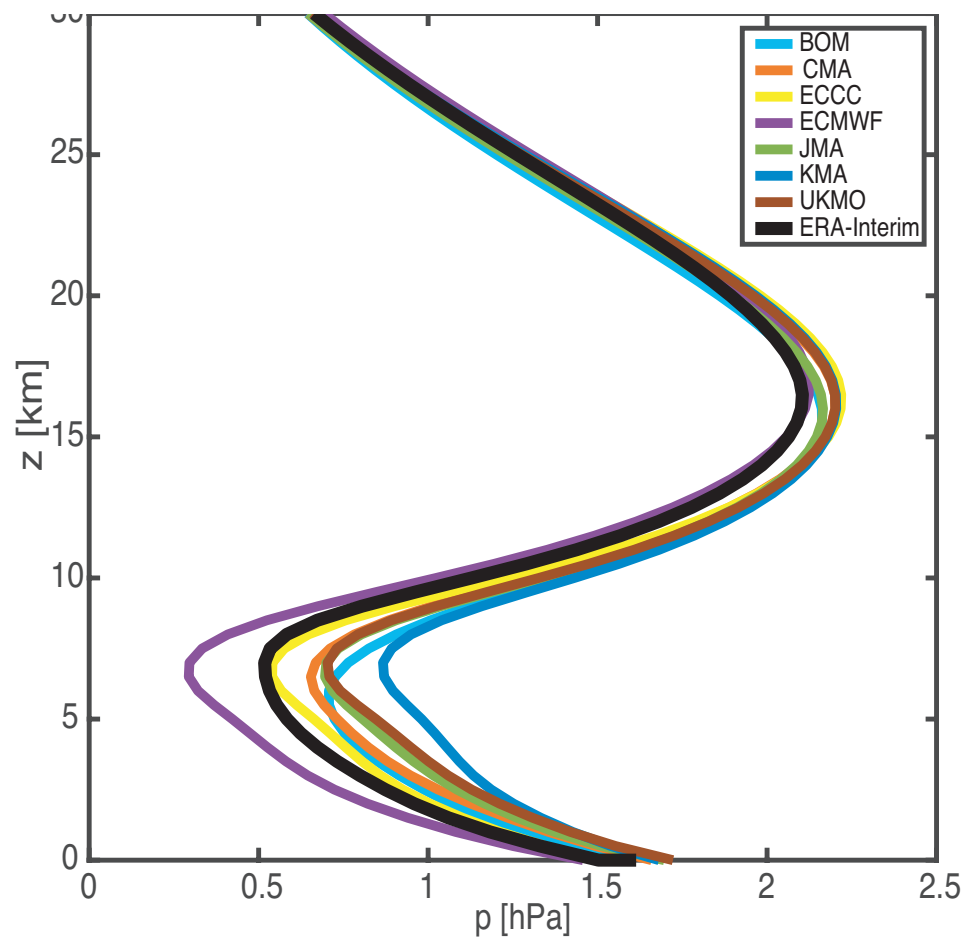
see also:

Garfinkel et al., 2018, JGR

Figures: C. Garfinkel

DOWNWARD COUPLING FROM THE STRATOSPHERE

There is a surface amplification of the stratospheric signal



regression of the anomalous polar cap pressure on 100-hPa temperatures averaged over 65-90N in January-March for the period 1981-2013

Figure: B. Ayarzagüena

SURFACE IMPACT AFTER STRATOSPHERIC EVENTS

SSW and strong vortex events have opposite surface impacts

ERA-interim

multi-model mean

2m temperature anomaly (week 3 + 4) after:

weak vortex events (SSW):
negative NAO

strong vortex events:
positive NAO

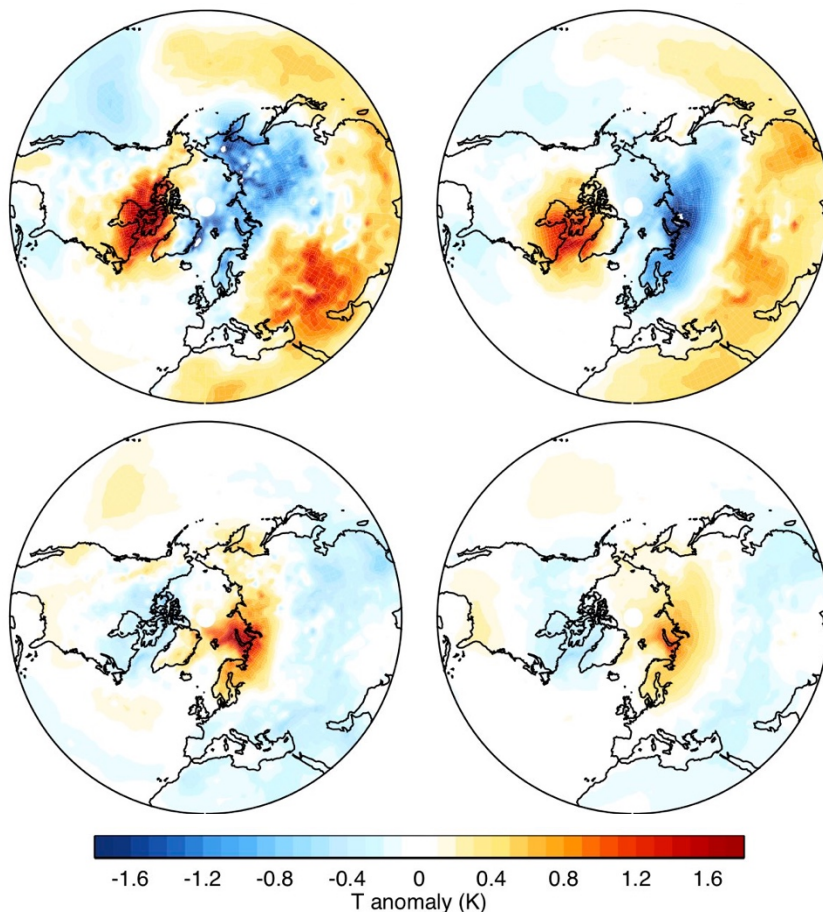
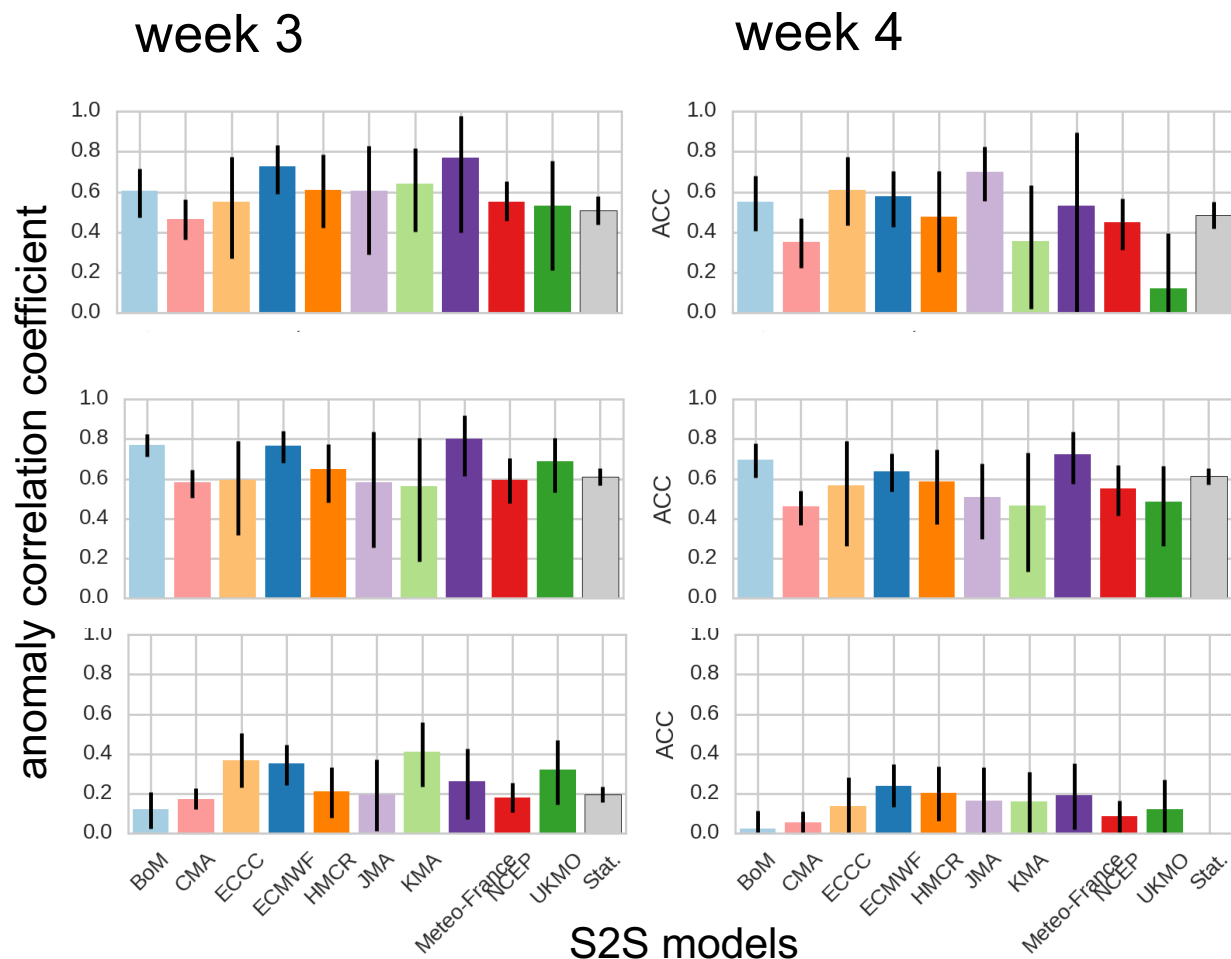


Figure: I. Simpson

SURFACE PREDICTABILITY AFTER STRATOSPHERIC EVENTS IS INCREASED

Stratospheric events increase surface predictability on S2S timescales



Predictability (ACC) at 1000hPa
(polar cap average) after:

weak vortex events (SSW)

strong vortex events

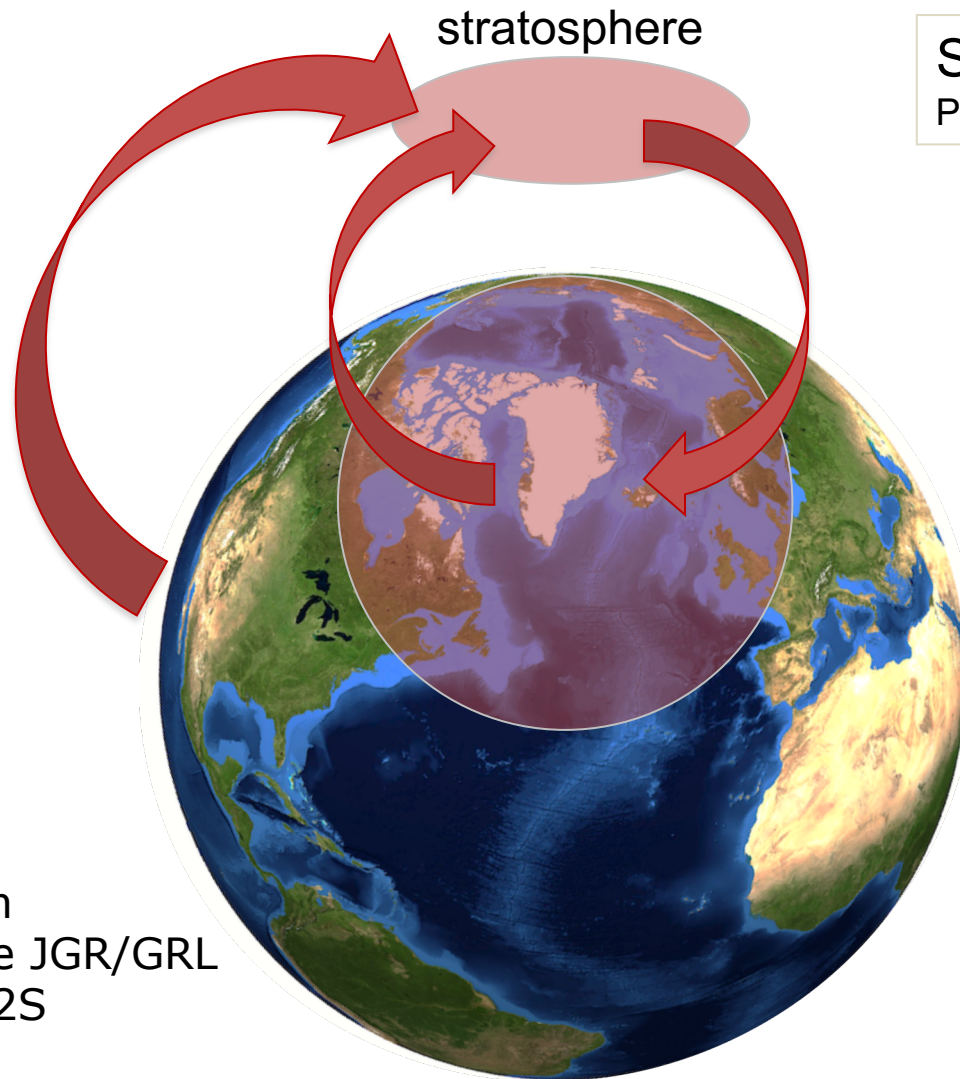
neutral vortex
(minimal stratospheric influence)

Figure: A. Charlton-Perez

SUMMARY

Although the stratosphere itself exhibits limited predictability on S2S timescales, it is an important factor for adding predictability to the troposphere on S2S timescales

Domeisen et al., in preparation for the JGR/GRL special issue on S2S prediction



Stratospheric event
Predictability: days to weeks

Tropospheric impact
Persistence: weeks to months

Thank you!

 @Domeisen_D