



# The Relationship between stratospheric flow regimes and multi-decadal variation in tropospheric circulation

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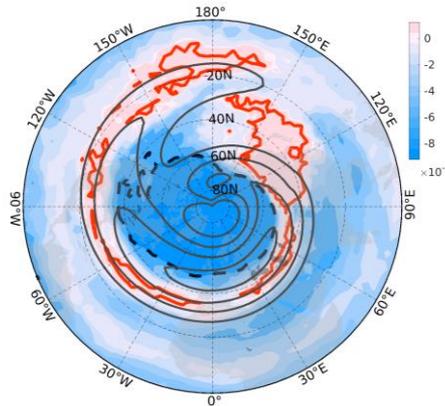


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# The Upper Stratospheric Flow Regimes

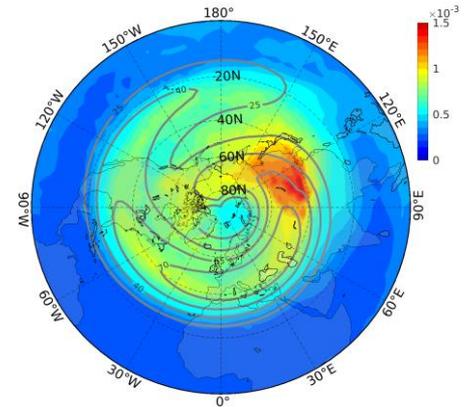
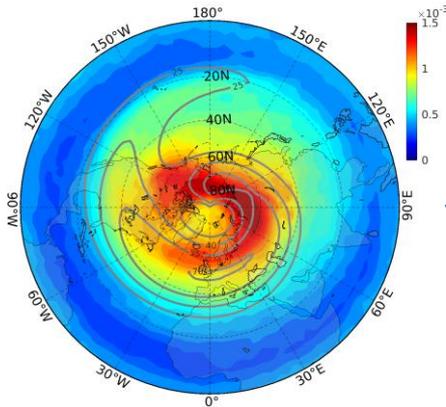
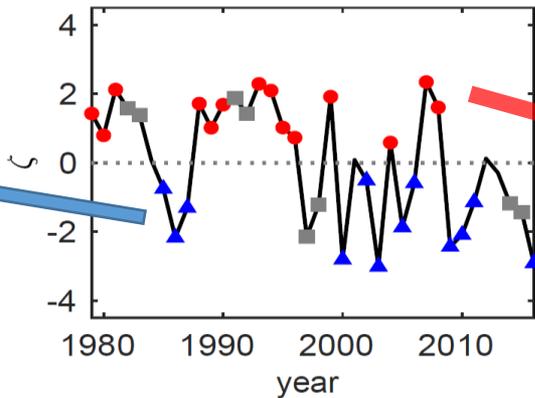
## EOF1 of EPV at 1500 K (~2 hPa)



Two flow regimes are detected in the upper stratosphere based on EPV in early winter.

The flow regime index has multi-decadal-variation with one flow regime occurs more (less) often before (after) 2000

## Flow regime index



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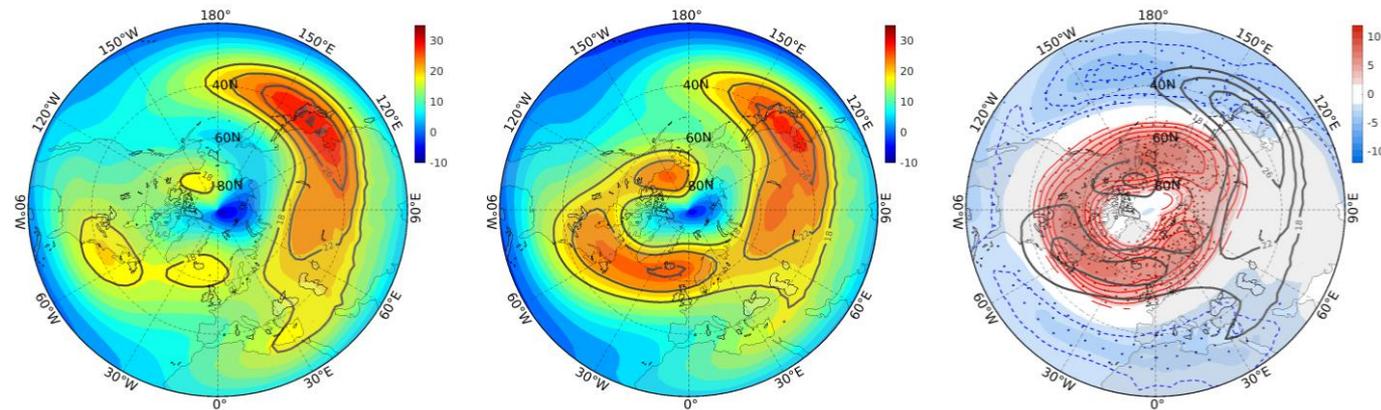
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# The UTLs Response in Middle Winter

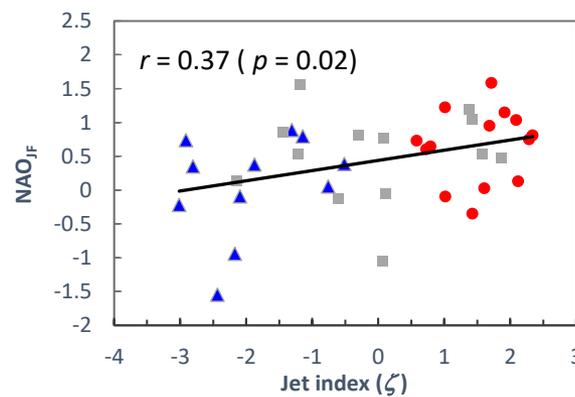
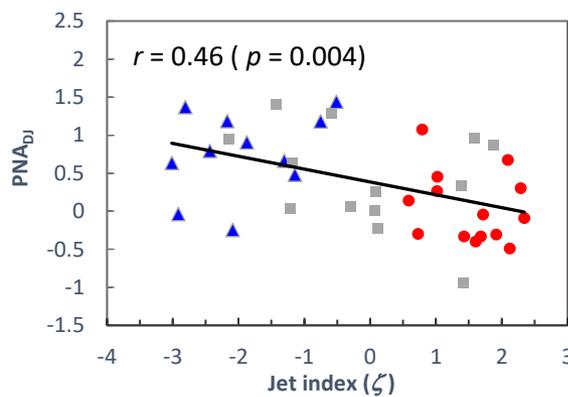
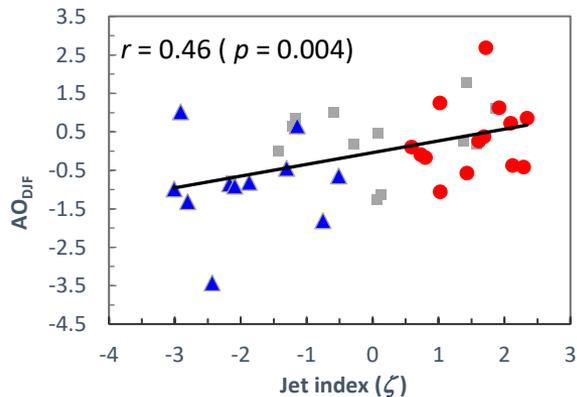
Flow Regime #1

Flow Regime #2

Difference



DJF mean zonal winds at 450 K (~90 hPa) differ significantly between two flow regimes. The difference is mapped onto the eddy-driven jet.



Early winter regime index in the upper stratosphere is significantly correlated with middle winter climate indices

# Conclusion Remarks

- Early winter variability in the upper stratosphere pre-conditions the downward influence of the stratosphere on the tropospheric jet streams' location and strength
- The pre-conditioning is investigated based on two dominant flow regimes near the stratopause
- The flow regime index in the upper stratosphere in early winter is significantly correlated with middle winter climate indices including the PNA, the AO and to a less extent with the NAO on intra-seasonal to seasonal time-scales
- AMV, Arctic sea ice and Siberian snow cover appear to play a major role in the downward coupling from the upper stratosphere to the troposphere
- Two research papers are in preparation with one paper looking into vertical connection and seasonal development, and another one looking into the mechanisms.

