



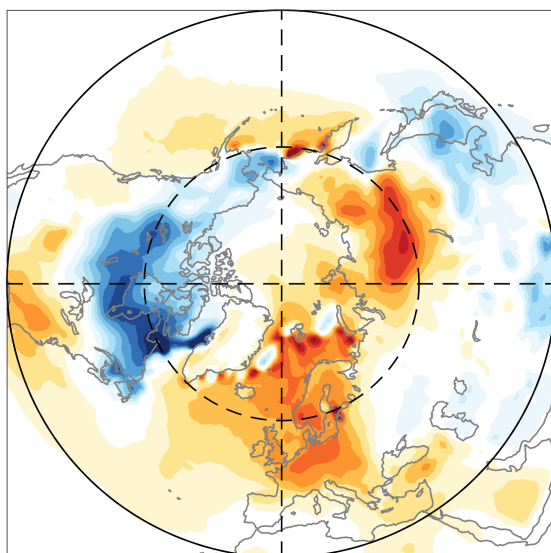
Using atmospheric variability to understand the wintertime regional warming and cooling patterns in the North Atlantic Sector

Dandan Tao, Erica Madonna, Camille Li

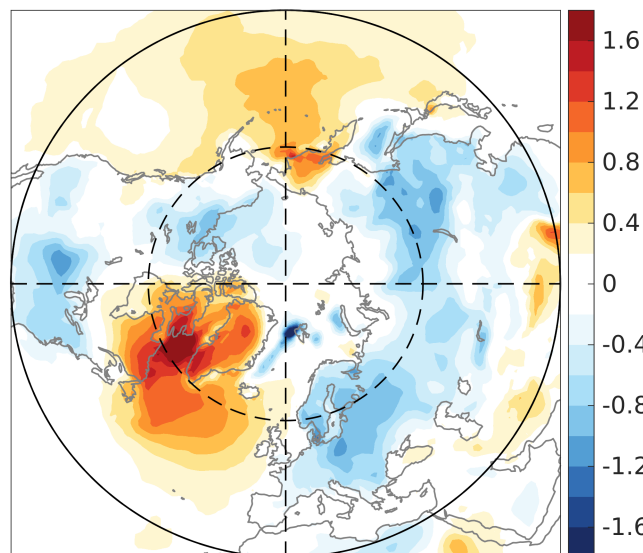
University of Bergen and Bjerknes Centre for Climate Research

DJF 2mT anomaly (detrended)

Period I: 1910-1939

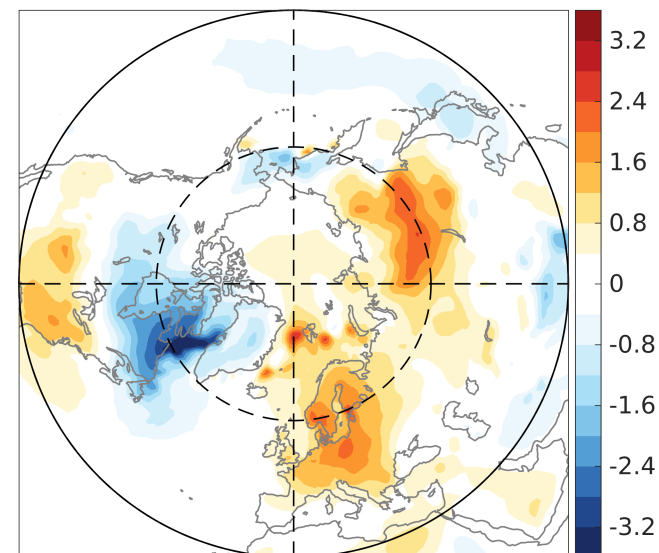


Period II: 1940-1969



°C

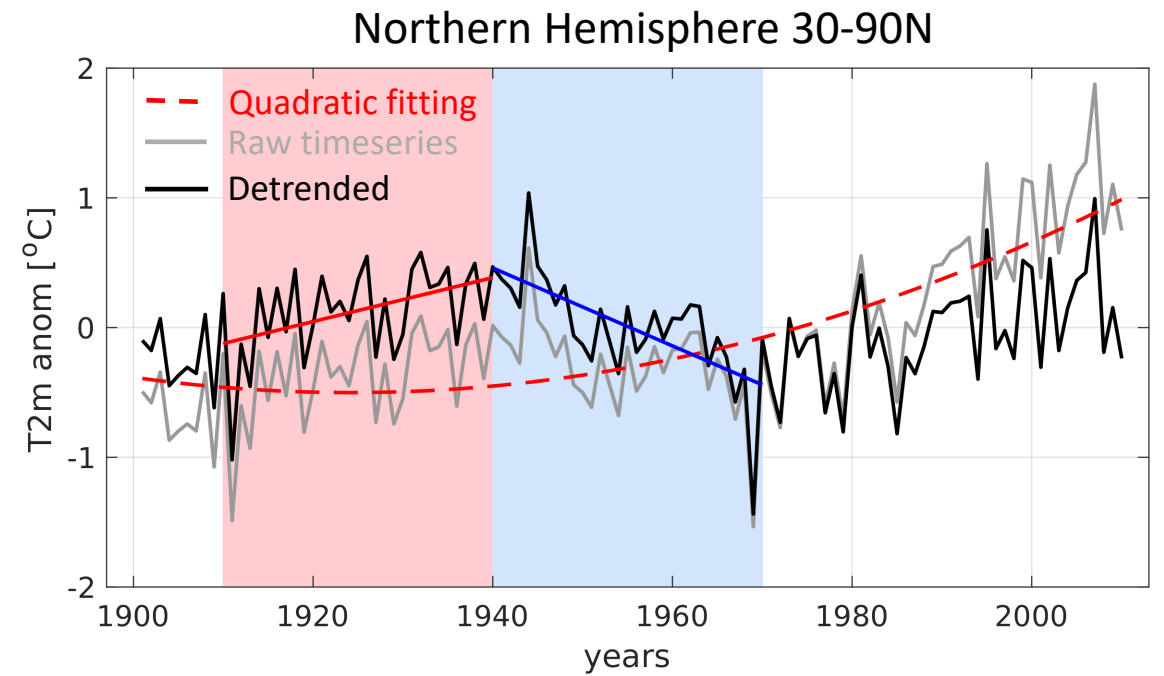
Period I minus Period II °C



Motivation

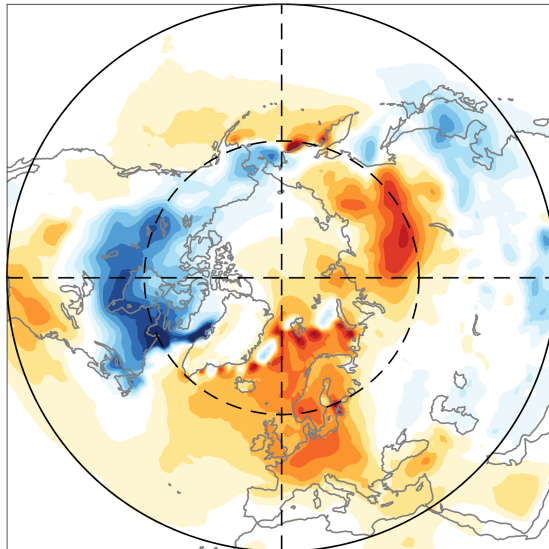
Q1: Can we explain differences in **30-year 2mT anomaly patterns** using **jet variability**?

Q2: Can we reconstruct **30-year 2mT anomaly patterns** using **jet variability**?

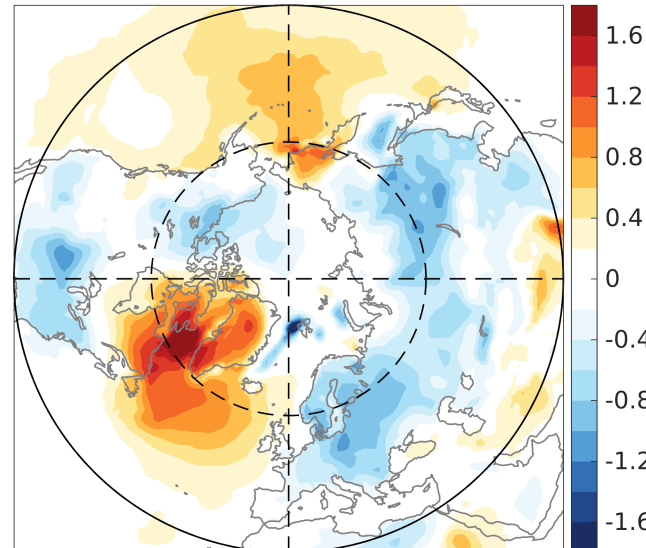


DJF 2mT anomaly (detrended)

Period I: 1910-1939

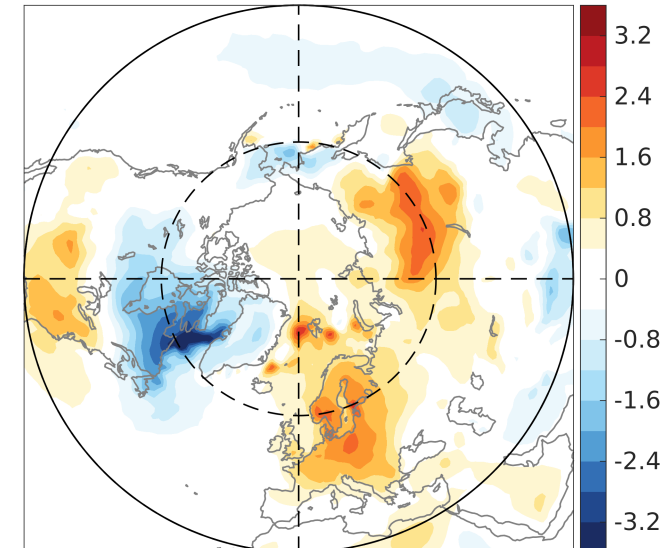


Period II: 1940-1969



°C

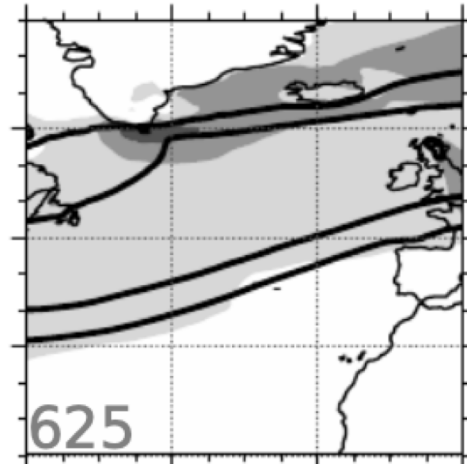
Period I minus Period II °C



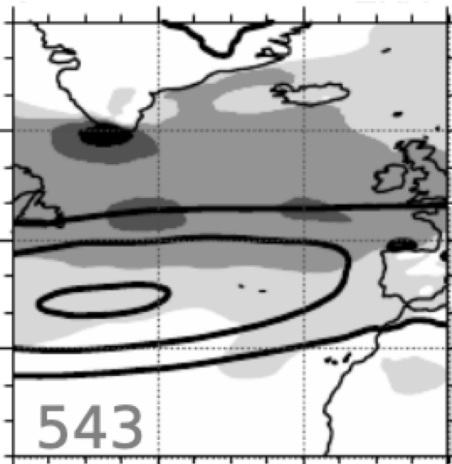
Motivation

Five winter jet configurations in the North Atlantic

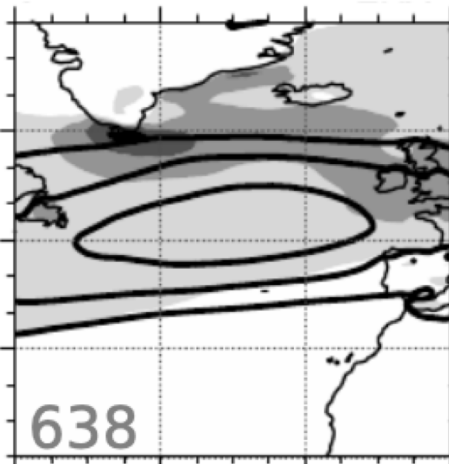
T (tilted)



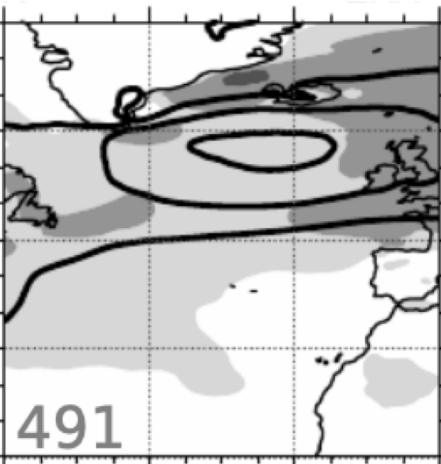
S (southern)



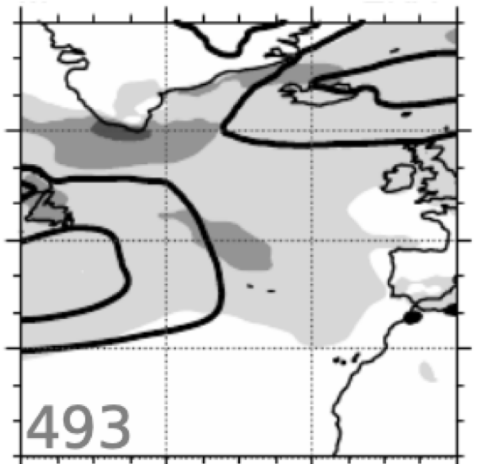
C (central)



N (northern)



M (mixed)



m/s

12

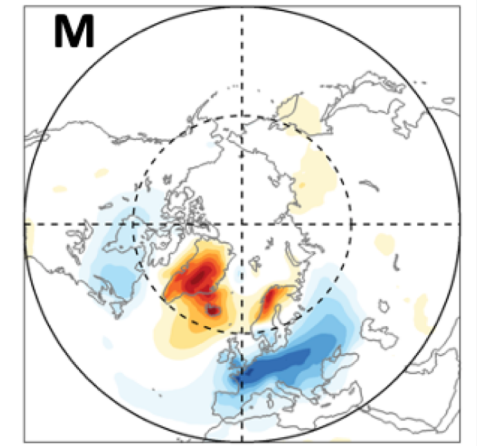
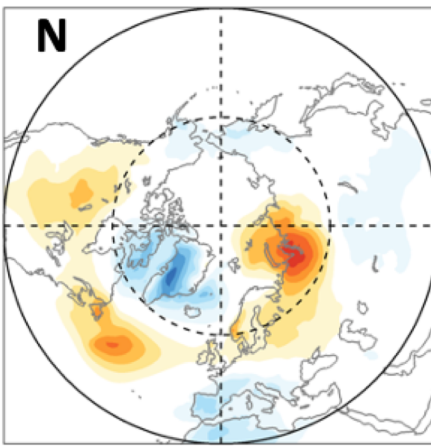
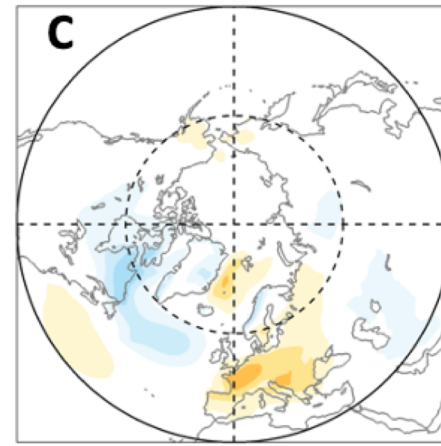
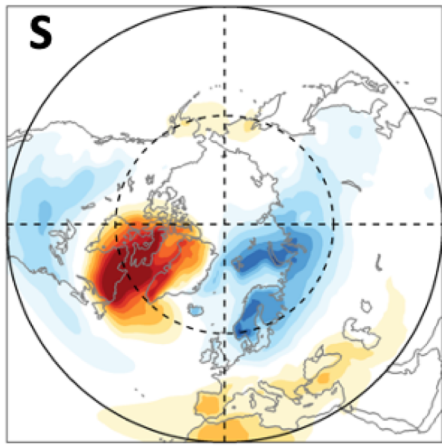
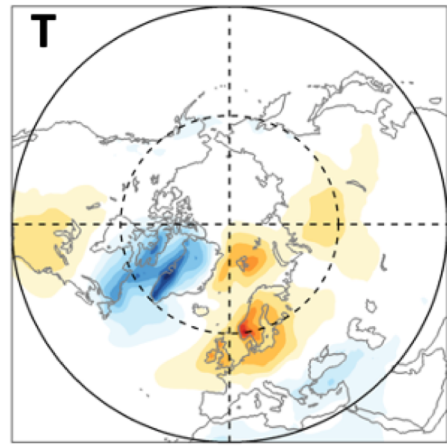
10

8

6

Contour – 850hPa zonal wind, shading – standard deviation of 850hPa zonal wind

Madonna et al. 2017



°C

4.5

3.5

2.5

1.5

0.5

-0.5

-1.5

-2.5

-3.5

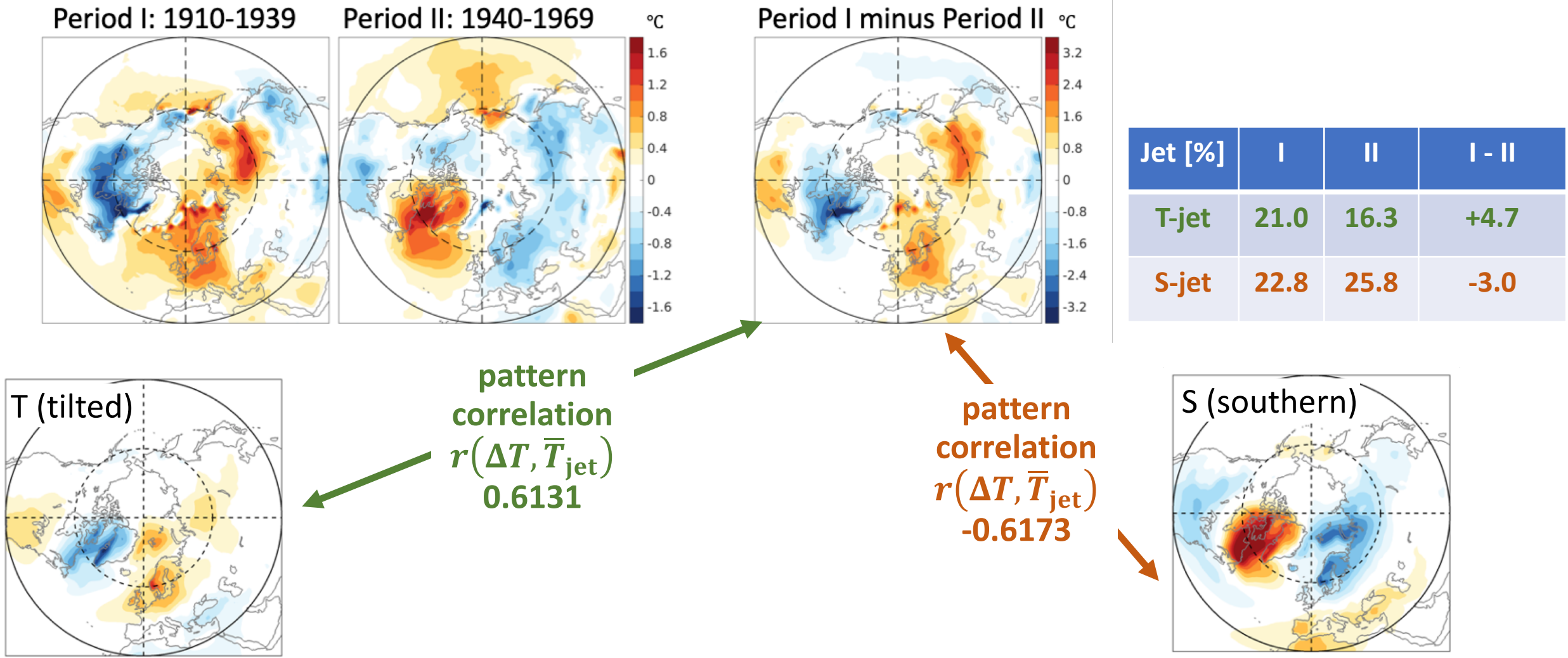
-4.5

1901-2010 from ERA20C

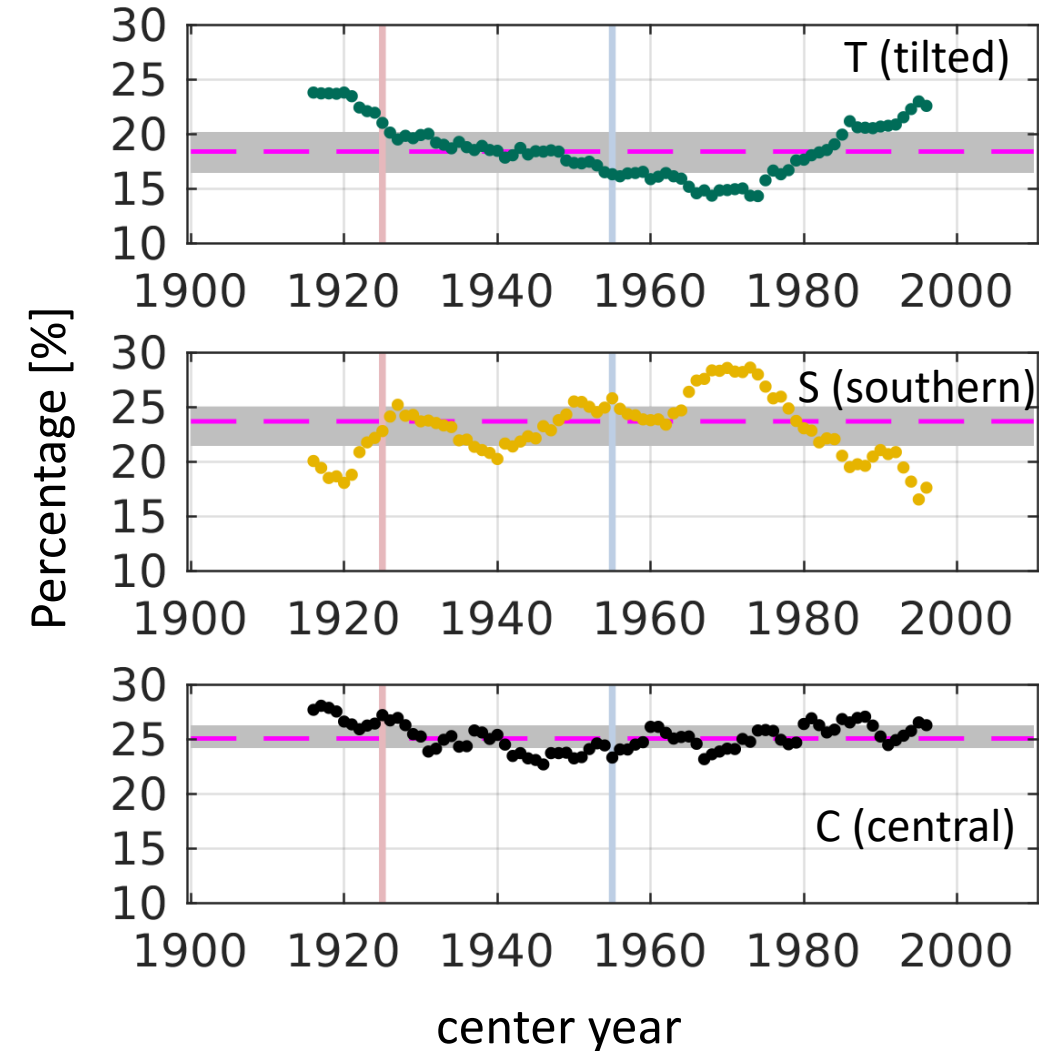
Five 2mT anomaly patterns with each jet configuration

Dandan.Tao@uib.no

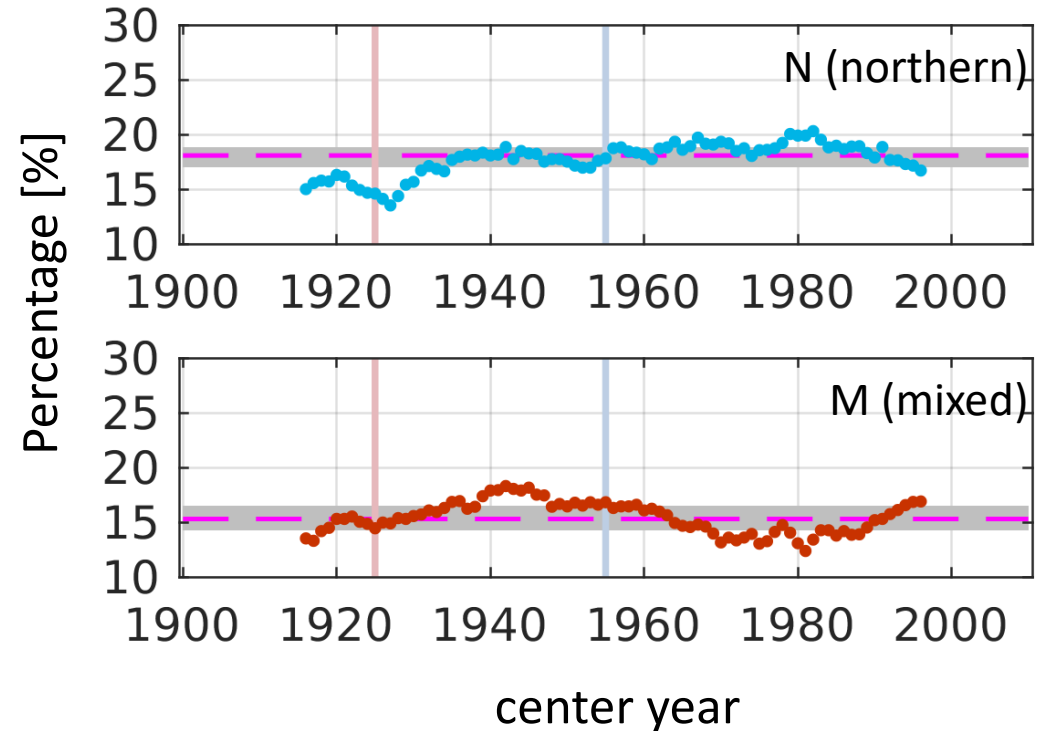
Q1: Can we explain differences in 30-year 2mT anomaly patterns using jet variability?



Q2: Can we reconstruct 30-year 2mT anomaly patterns using jet variability?

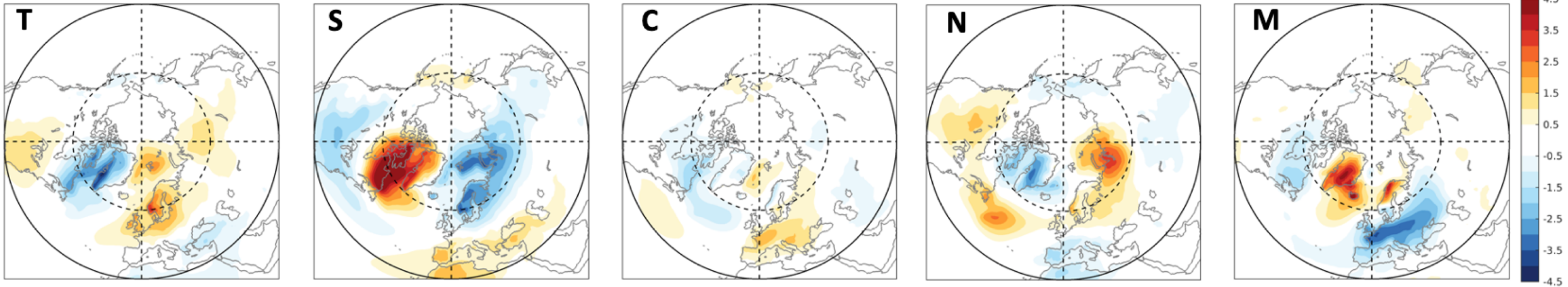


$$T_{\text{reconstruct}} = \sum_{\text{jet}} \%(\text{jet}) \times \bar{T}_{\text{jet}}$$

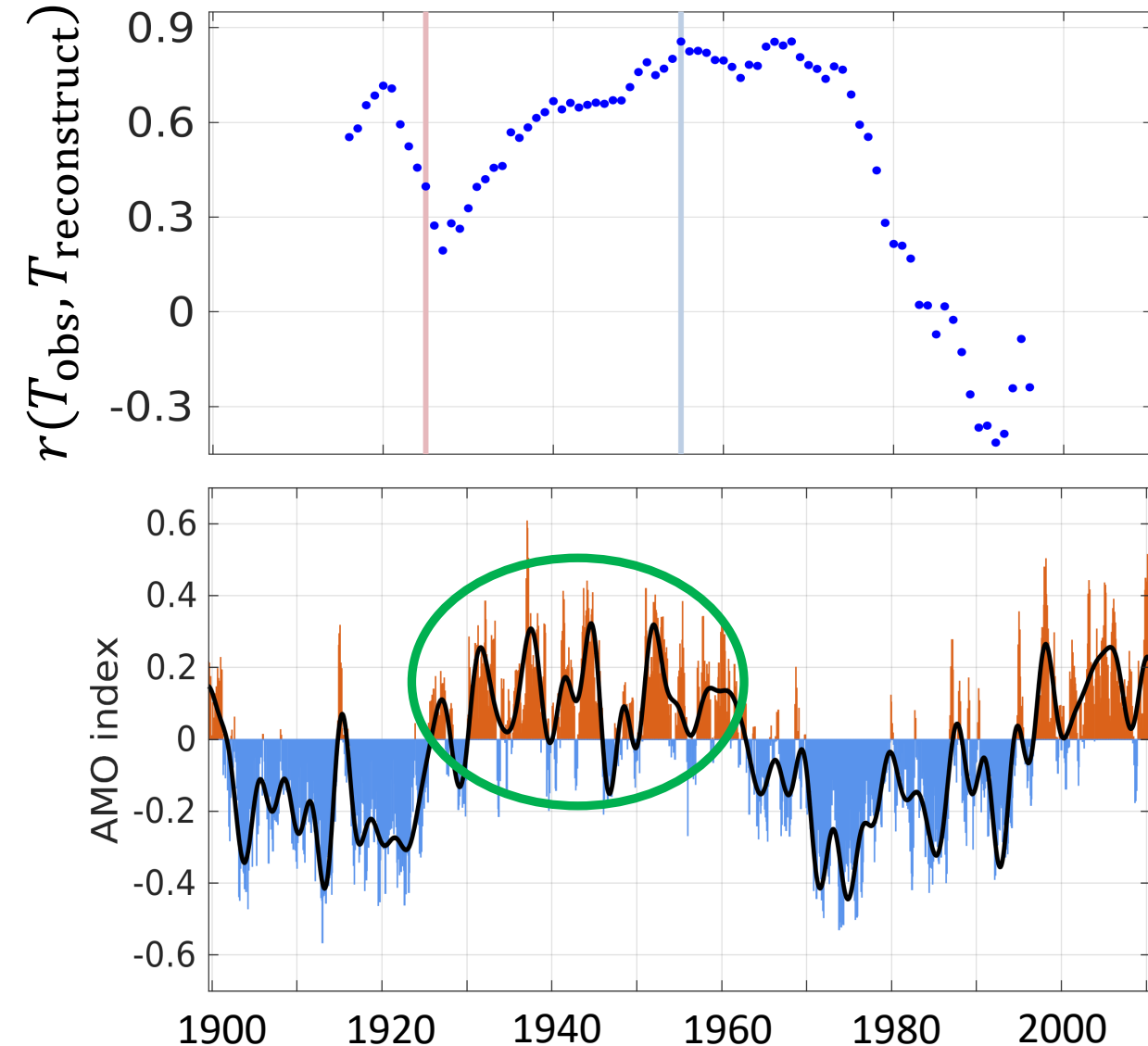


Q2: Can we reconstruct 30-year 2mT anomaly patterns using jet variability?

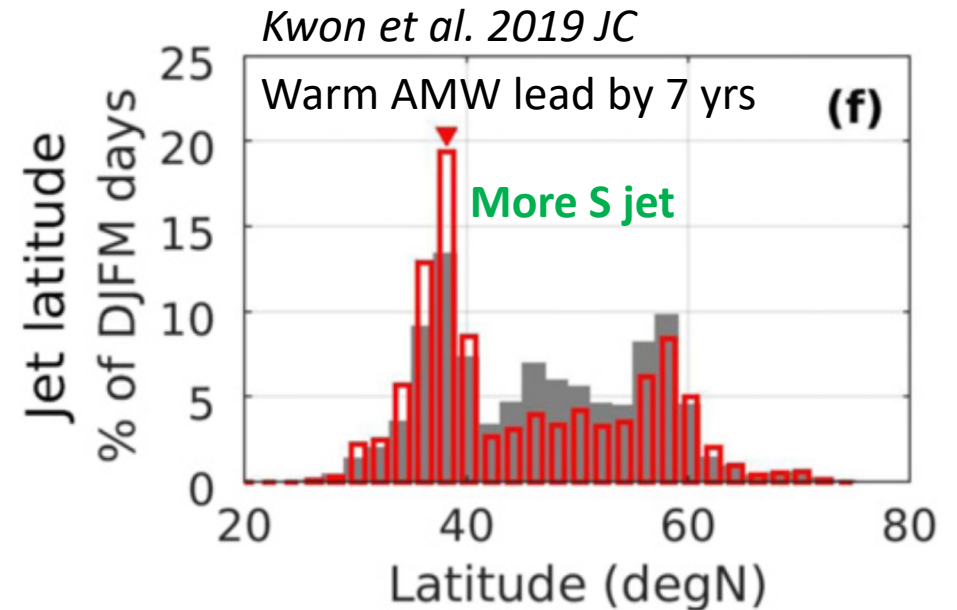
$$T_{\text{reconstruct}} = \sum_{\text{jet}} \%(\text{jet}) \times \bar{T}_{\text{jet}}$$



Q2: Can we reconstruct 30-year 2mT anomaly patterns using jet variability?



$$T_{\text{reconstruct}} = \sum_{\text{jet}} \%(\text{jet}) \times \bar{T}_{\text{jet}}$$



Q1: Can we explain differences in 30-year 2mT anomaly patterns using jet variability?

Conclusion 1: Yes

Decadal variations of Tilted and Southern jets -> 2mT anomaly pattern change

Q2: Can we reconstruct 30-year 2mT anomaly patterns using jet variability?

Conclusion 2: Conditional Yes

Warm AMW -> more Southern jets (strongest 2mT anomaly signal) -> High reconstruction skill