

A parametric ensemble: ICO vs. LMDZ

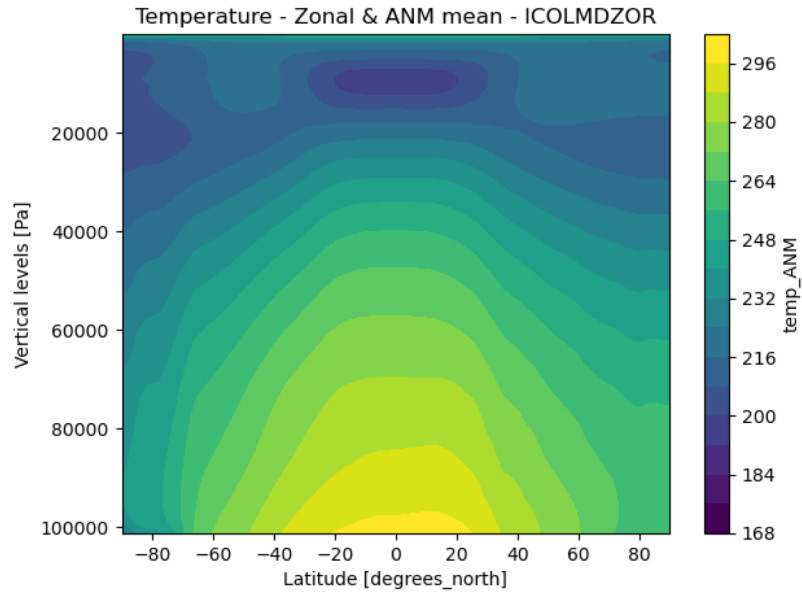
Thibaut Lurton & Sébastien Fromang

Two types of diagnostics:

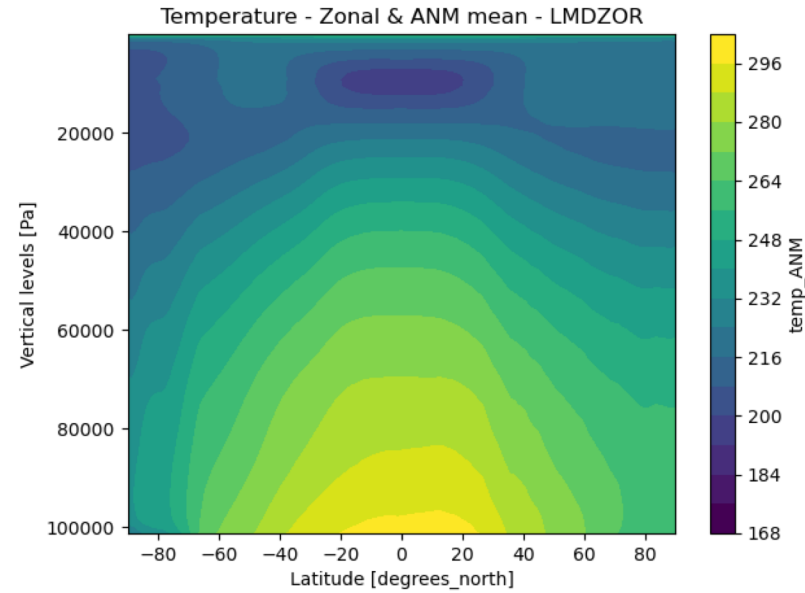
- Mean over all simulations & anomalies (ICO-LDMZ)
- Scatter plots (ICO vs. LMDZ)

Zonal & annual mean temperature

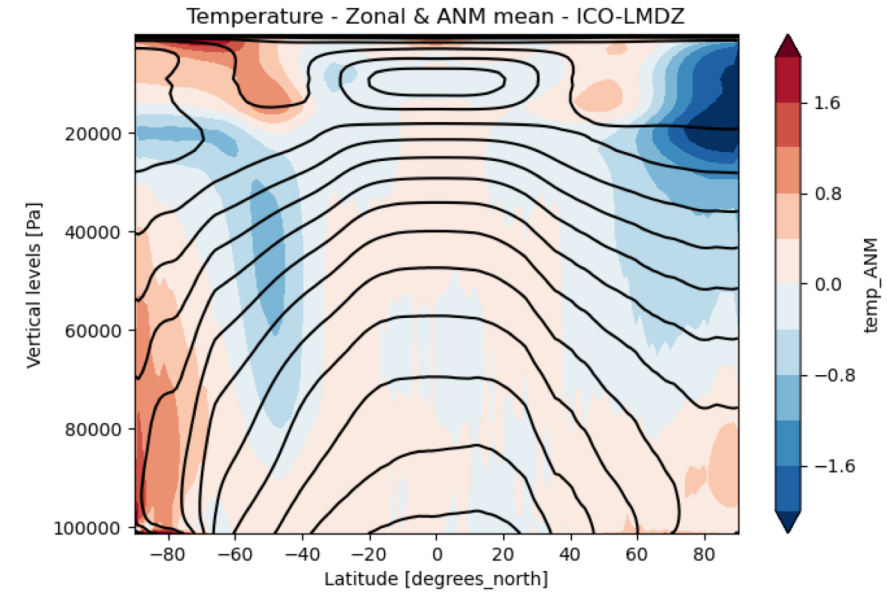
ICO



LMDZ

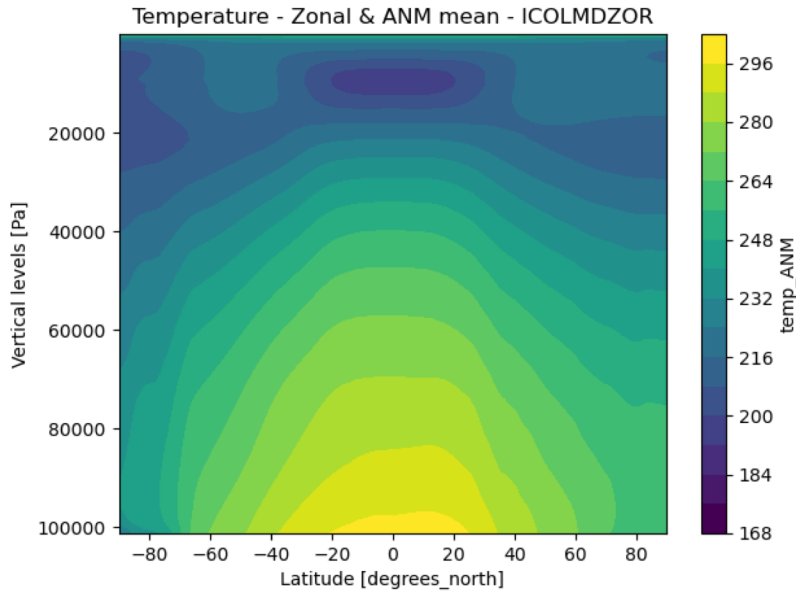


ICO-LMDZ

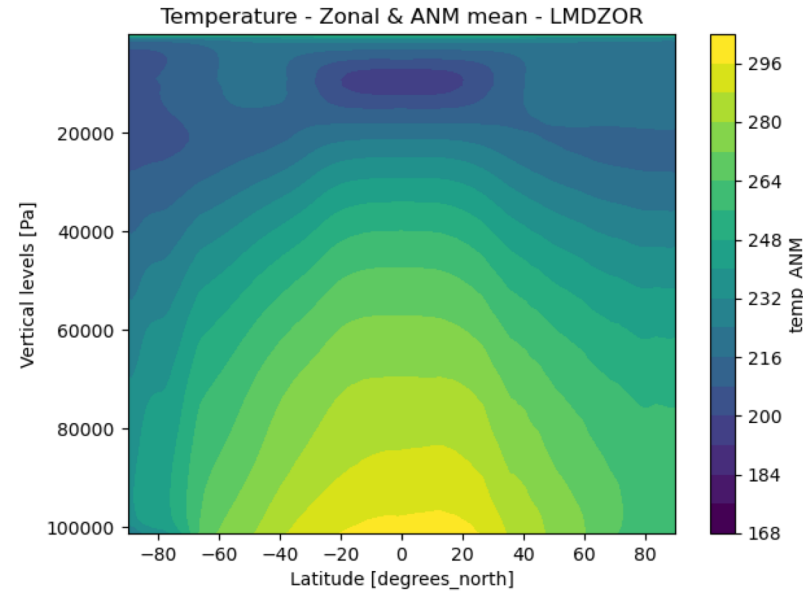


Zonal & annual mean temperature

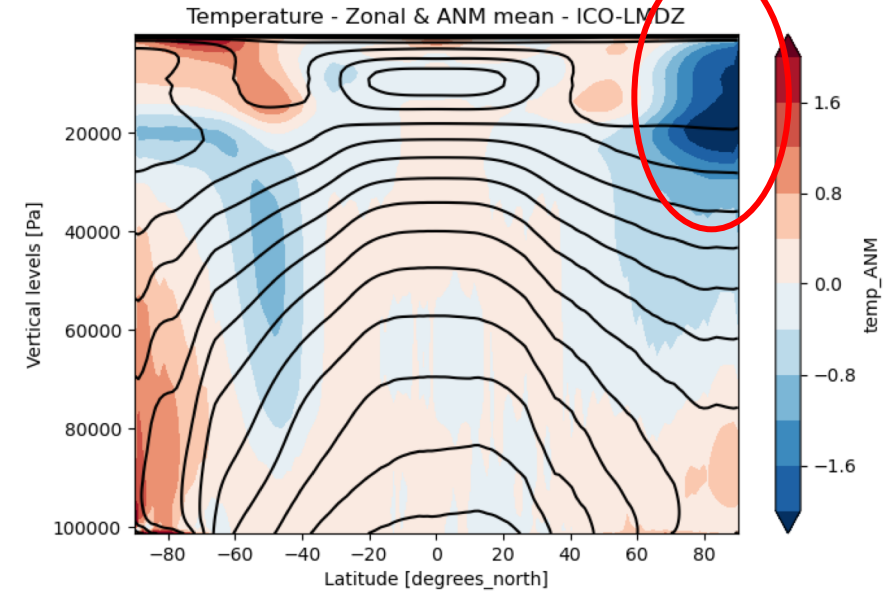
ICO



LMDZ



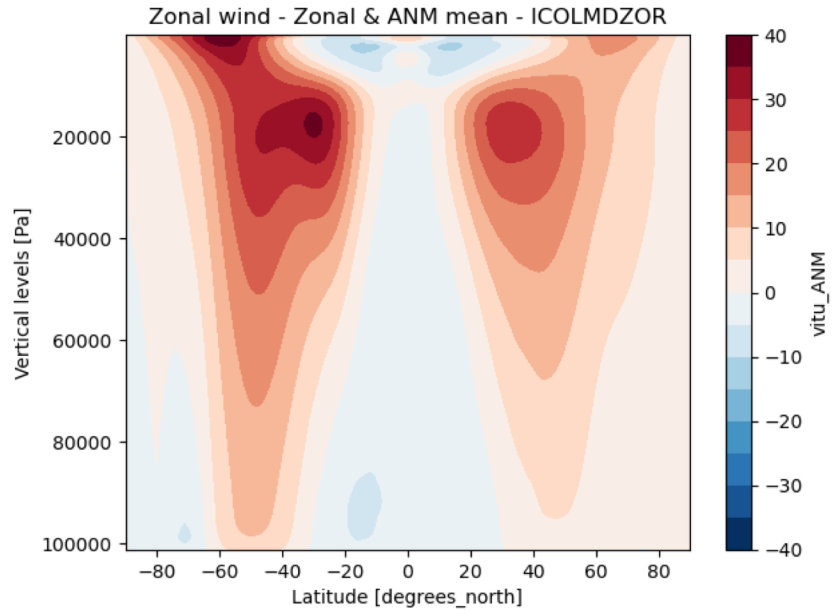
ICO-LMDZ



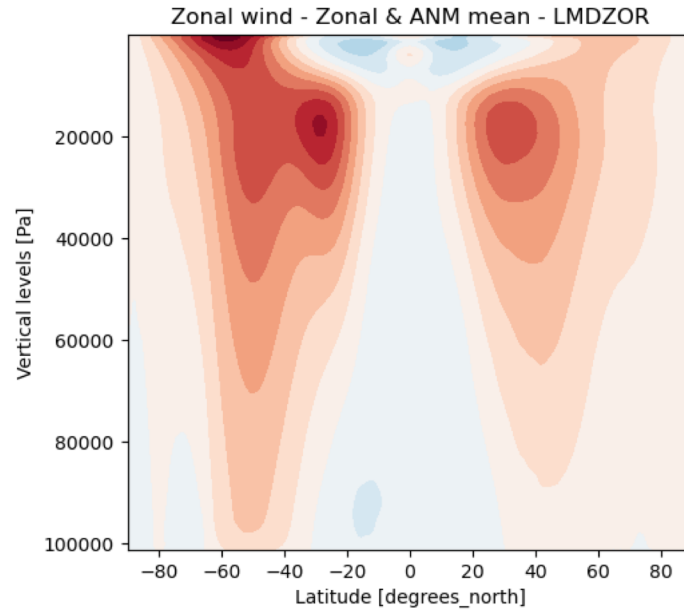
- Zonal mean temperature anomalies smaller than 2K
- Negative bias (-2K) in northern upper level troposphere

Zonal and annual mean zonal wind

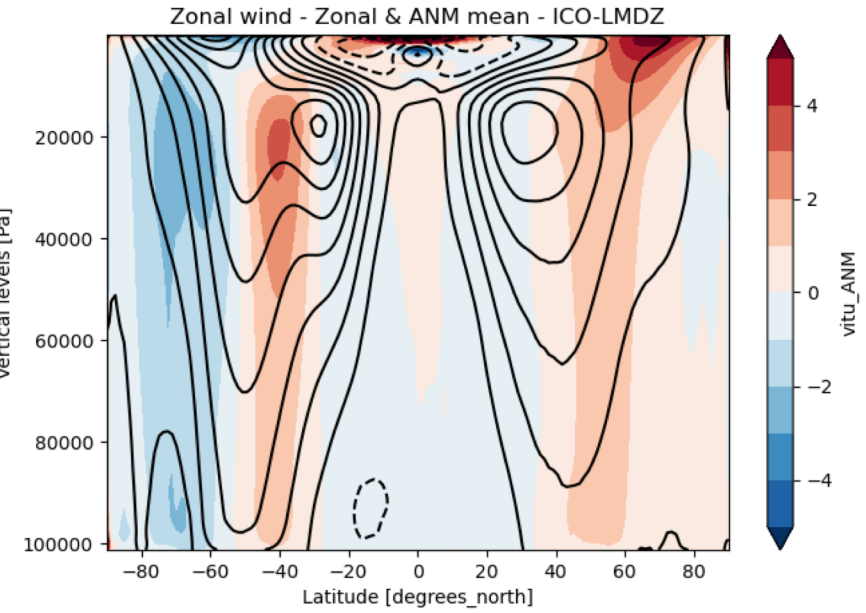
ICO



LMDZ

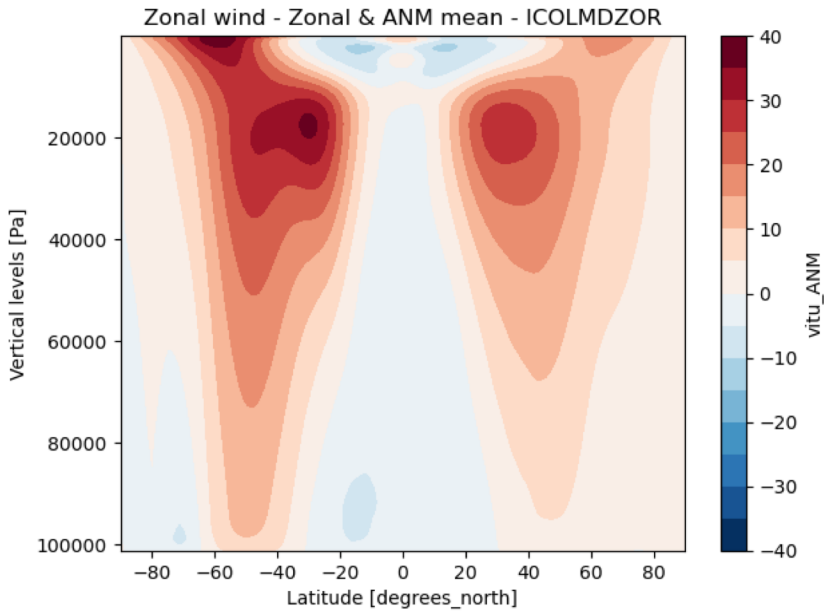


ICO-LMDZ

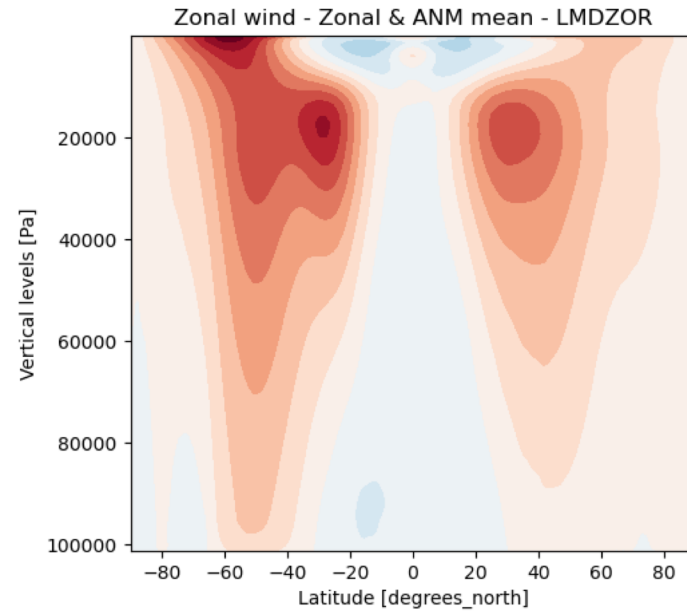


Zonal and annual mean zonal wind

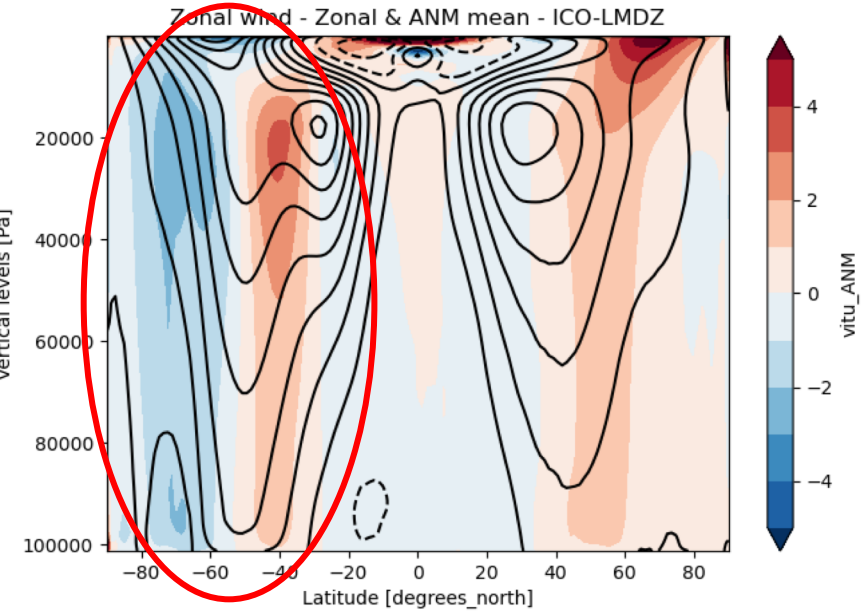
ICO



LMDZ



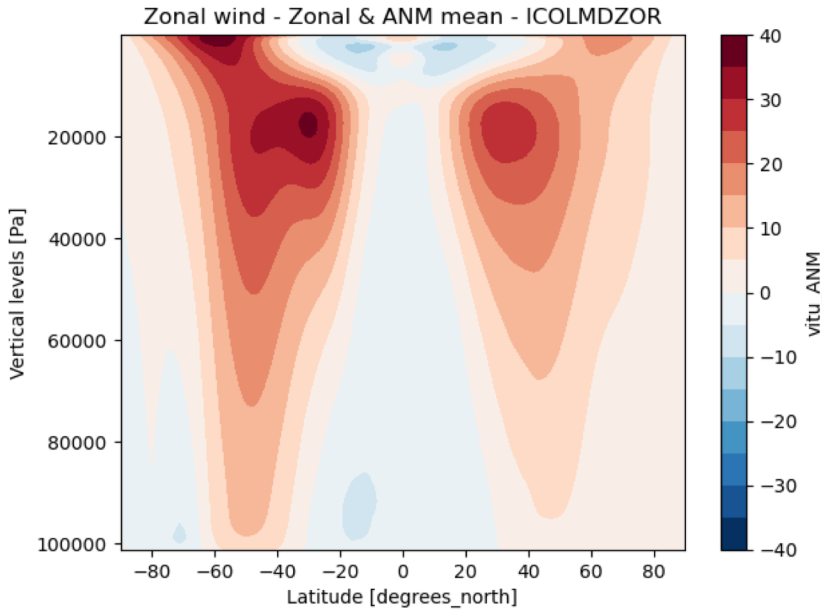
ICO-LMDZ



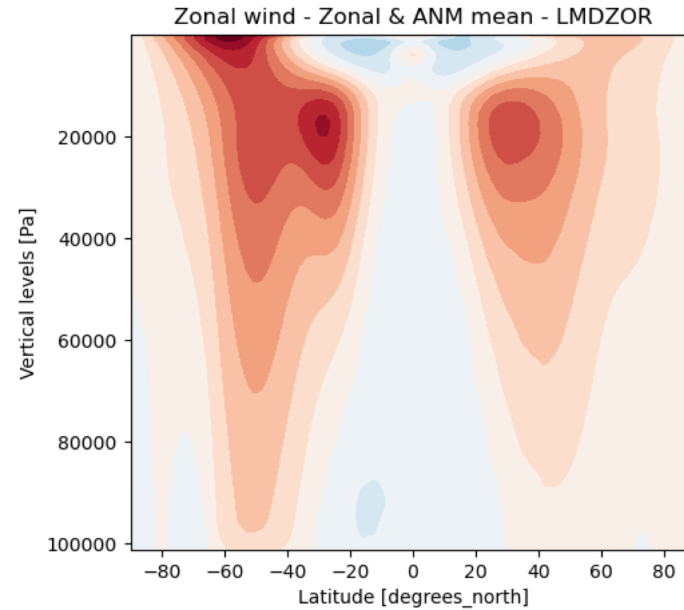
- Equatorward displacement in the SH
-

Zonal and annual mean zonal wind

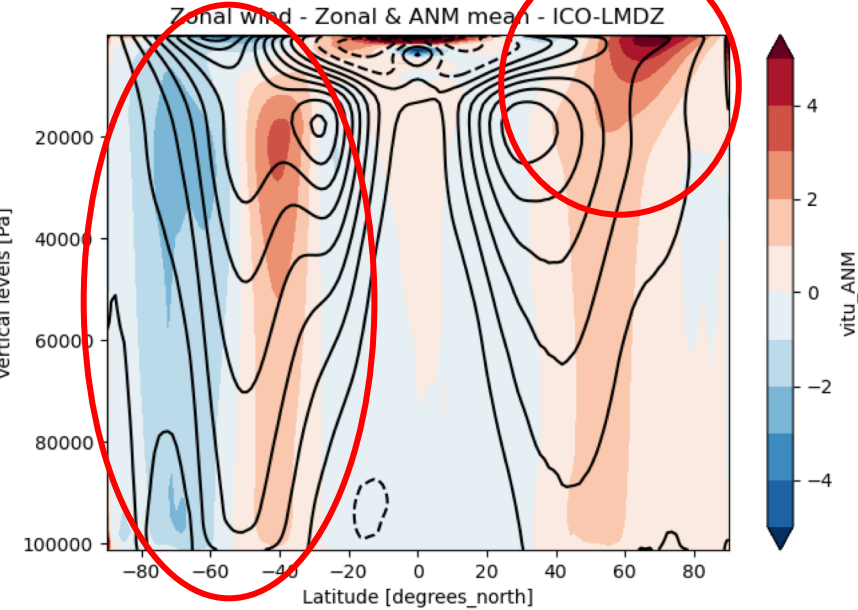
ICO



LMDZ



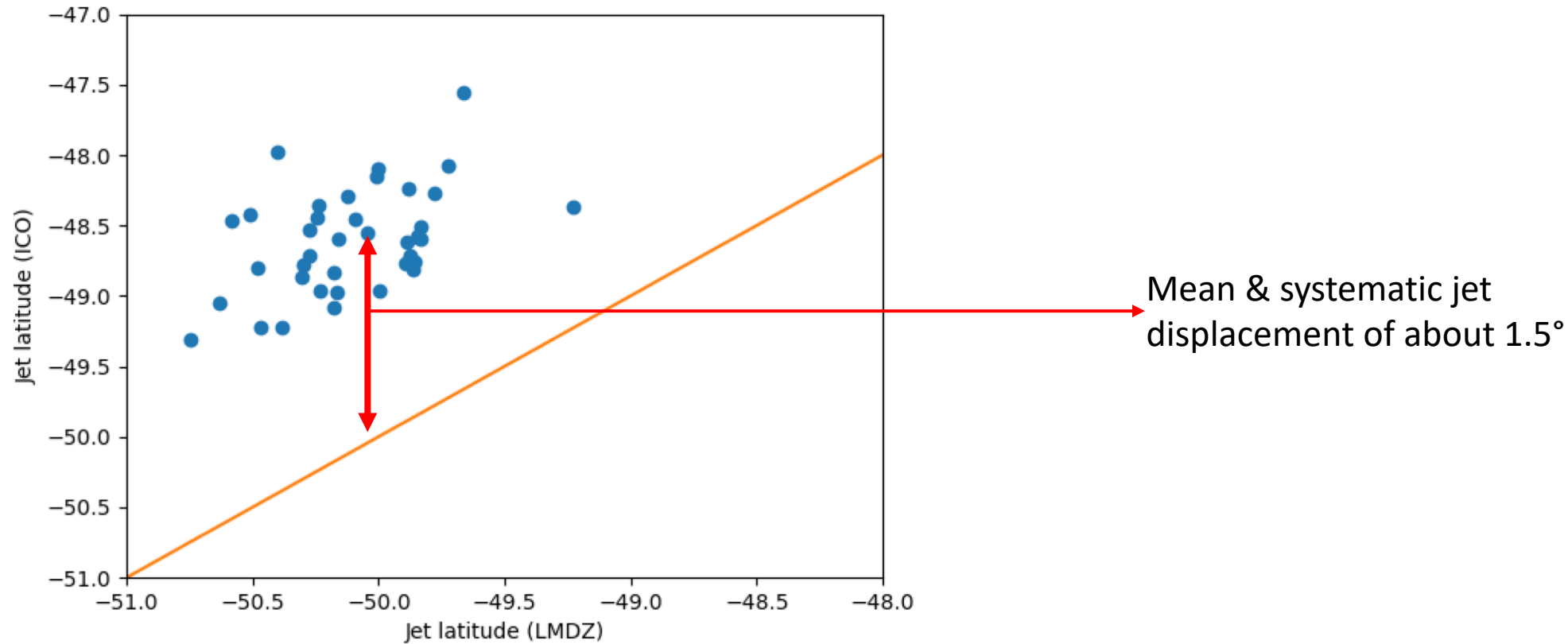
ICO-LMDZ



- Equatorward displacement in the SH
- Poleward displacement in the NH ↔ Link with T anomalie

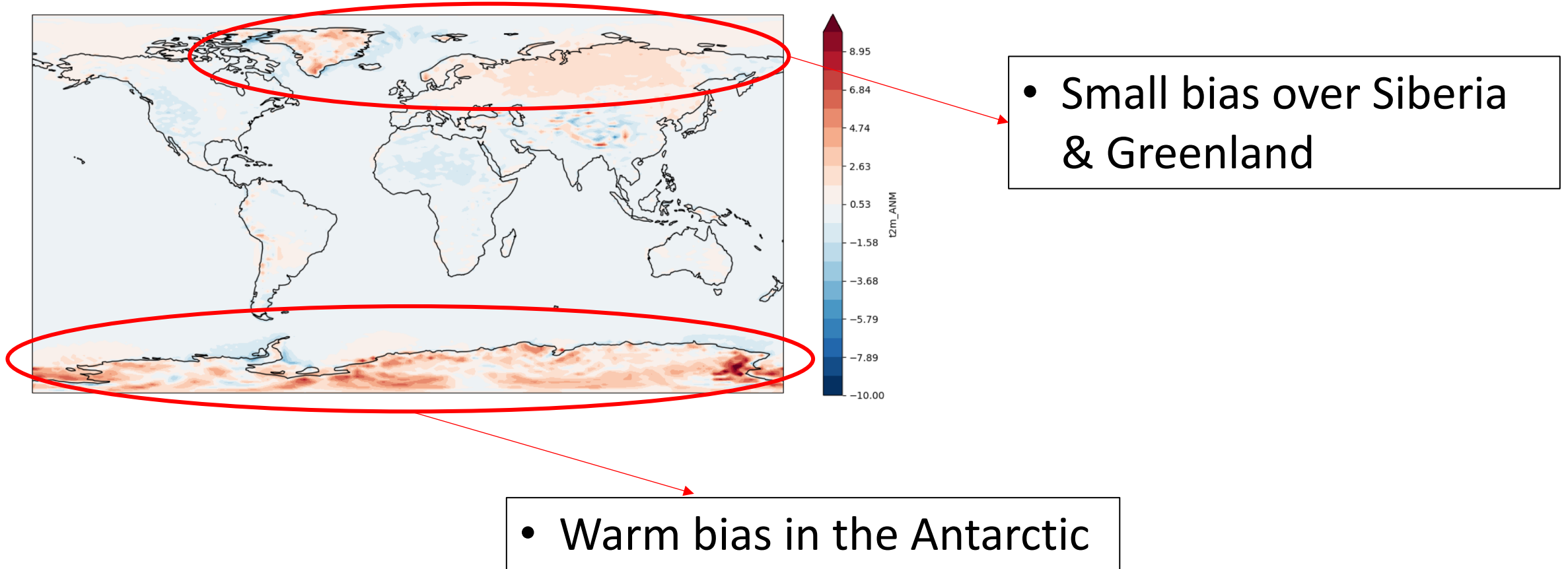
Jet latitude in the SH

$$\phi_{Jet} = \frac{\int_{-90^{\circ}S}^{-70^{\circ}S} u_{10} \phi d\phi}{\int_{-90^{\circ}S}^{-70^{\circ}S} \phi d\phi}$$

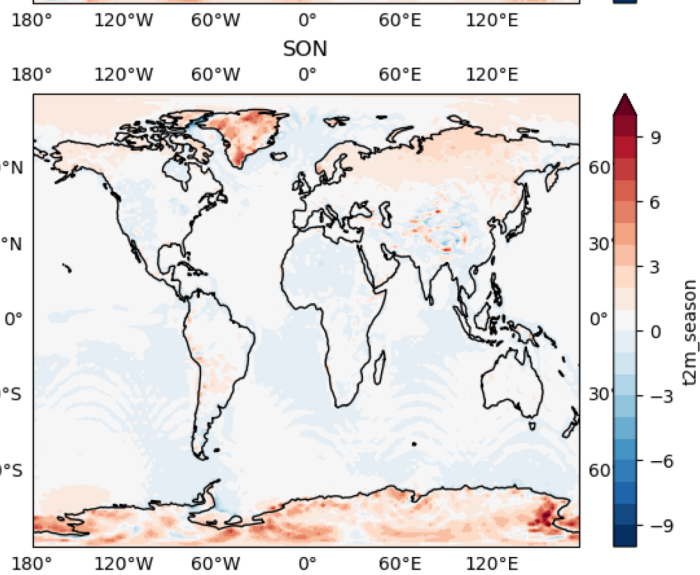
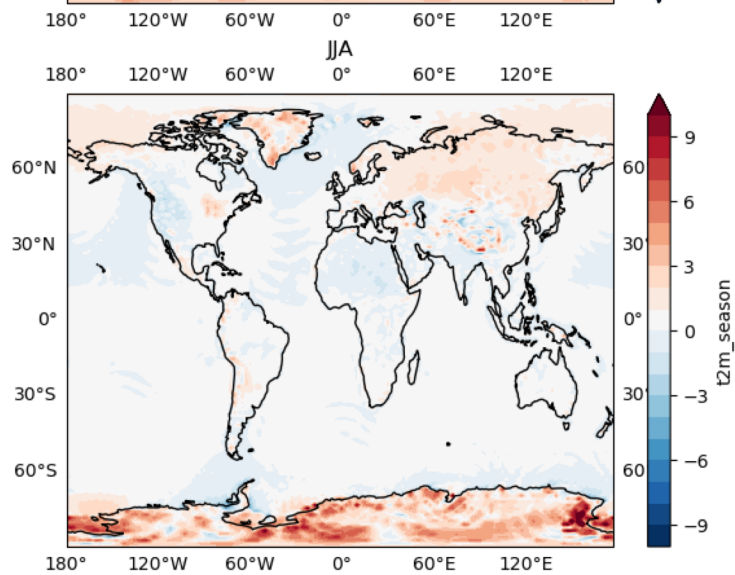
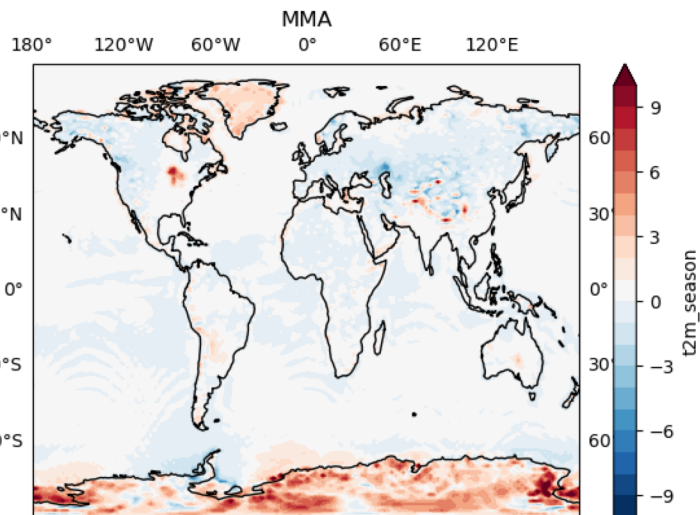
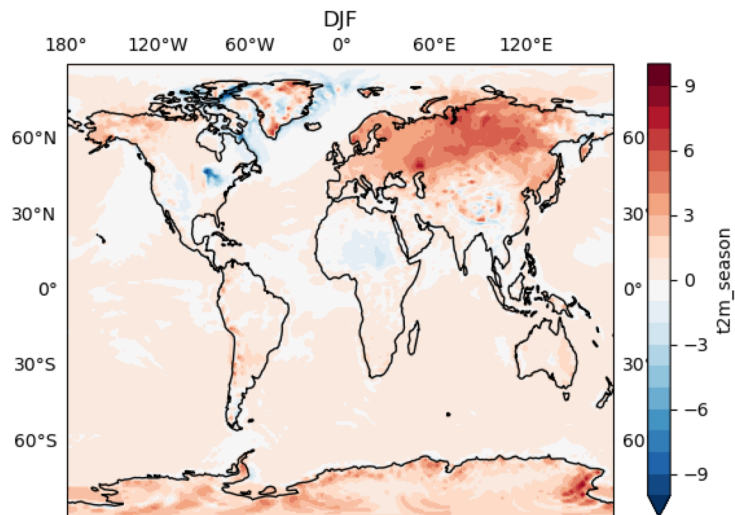


T2m anomalies – Annual mean

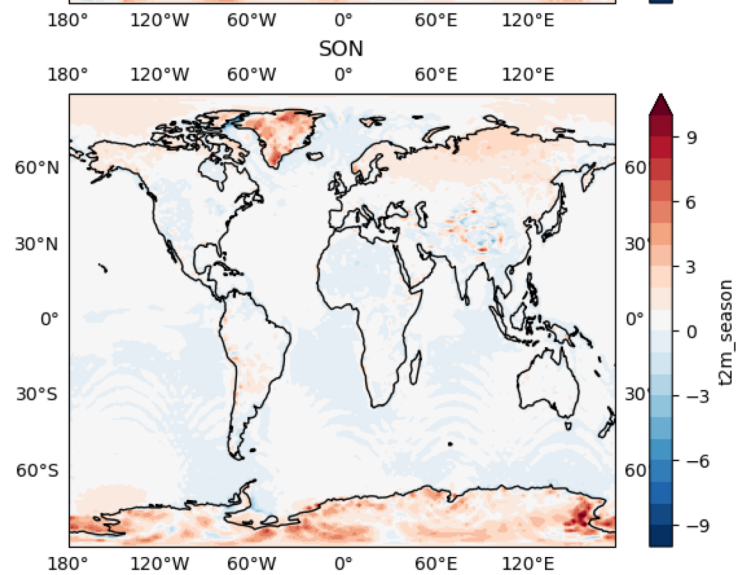
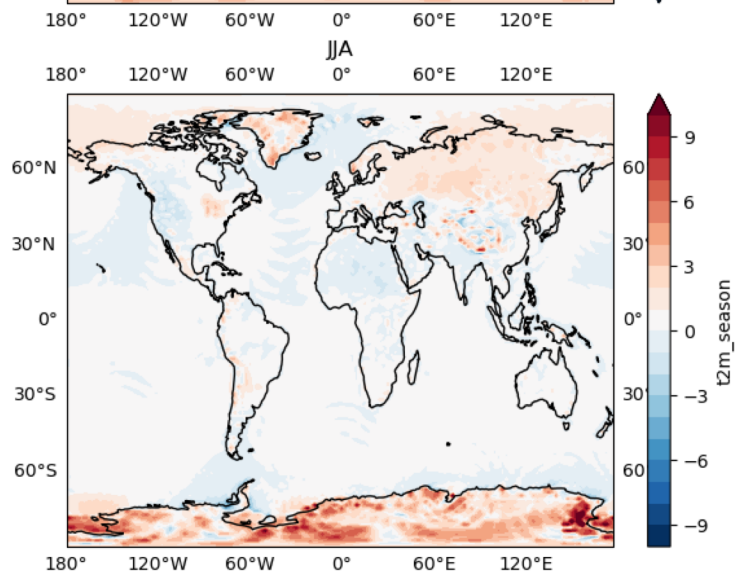
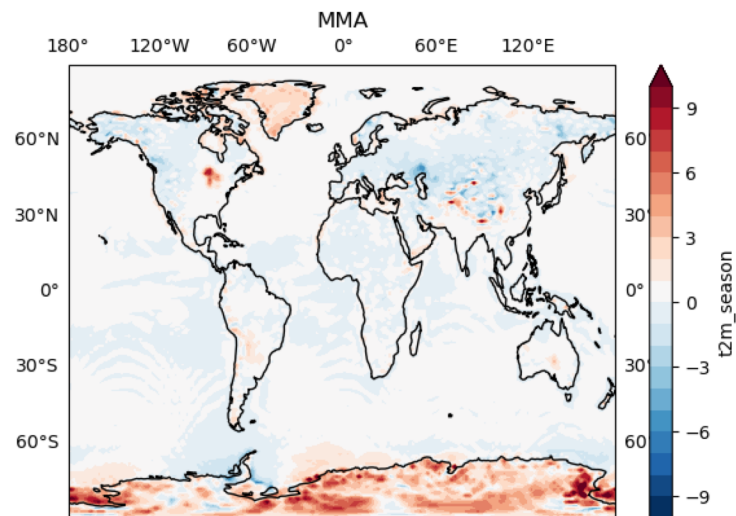
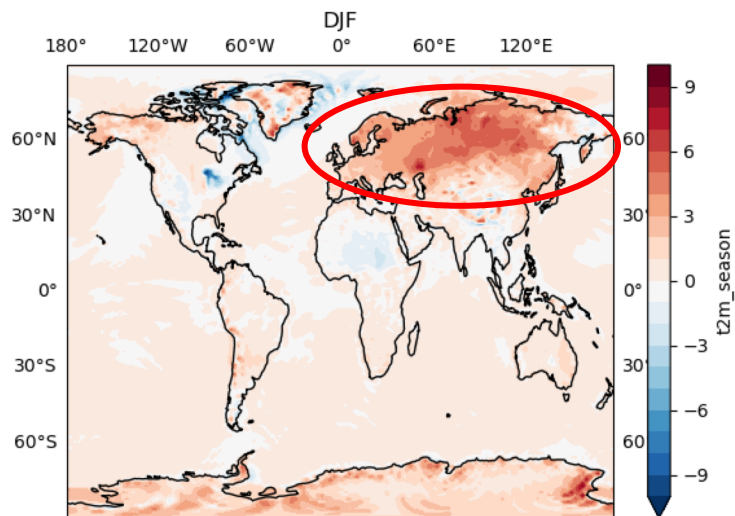
ICO-LMDZ



T2m anomalies – Seasonal cycle

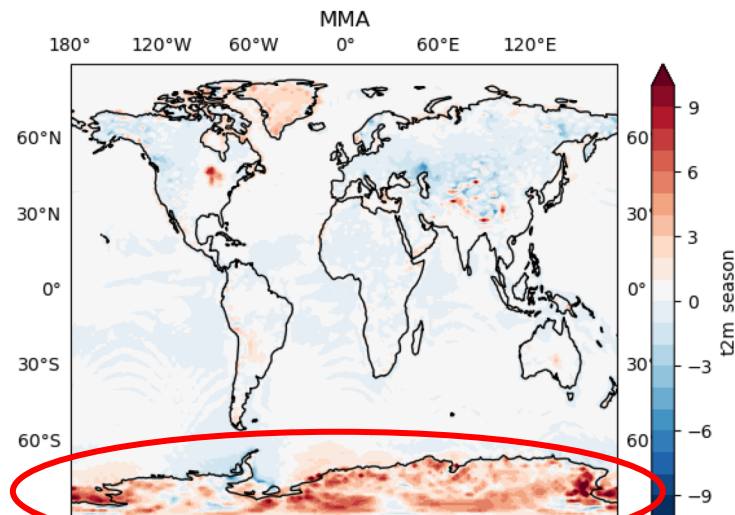
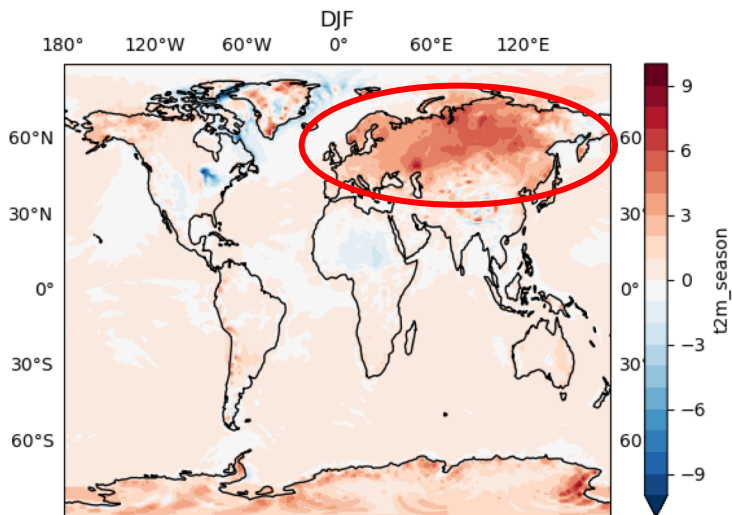


T2m anomalies – Seasonal cycle

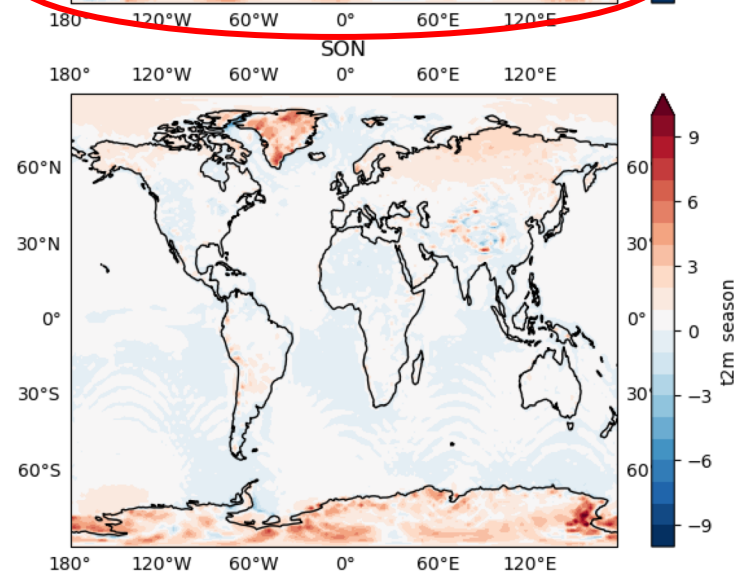
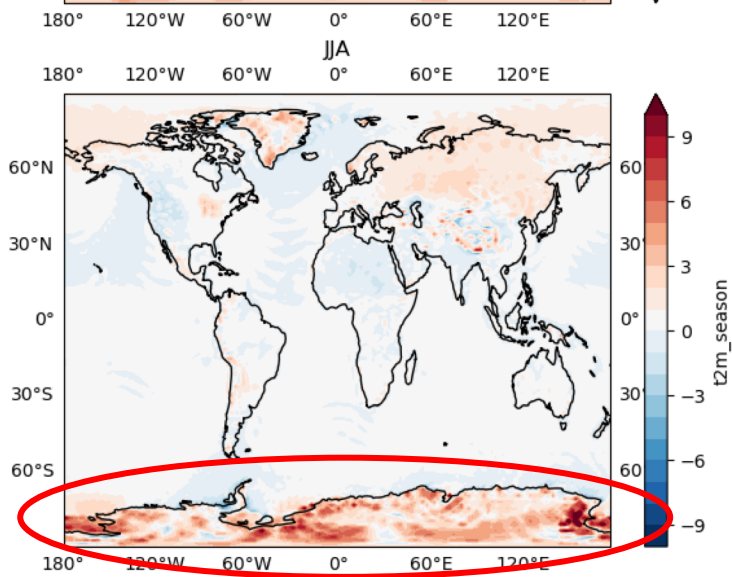


Warm bias over Siberia larger in DJF ⇔ Link with sub-grid scale orography param?

T2m anomalies – Seasonal cycle



Warm bias over Siberia larger in DJF ⇔ Link with sub-grid scale orography param?



Antarctic warm bias larger in MMA JJA

Back to highResMip (Plots from 06/2022)

HighResMip protocol: historical forced simulations (1950-2014)

4 runs with ICOLMDZOR:

- LR:	Low Resolution	200 km	2°
- MR:	Medium Resolution	100 km	1°
- HR:	High Resolution	50 km	0.5°
- VHR:	Very High Resolution	25 km	0.25°

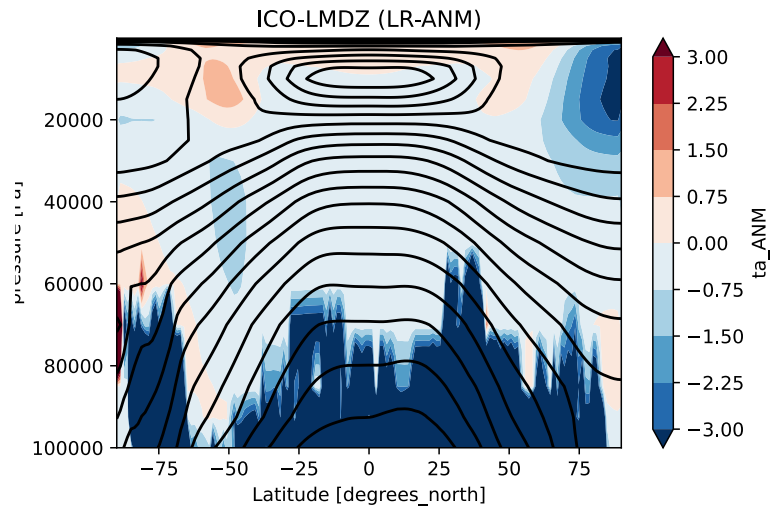
2 runs with LMDZOR:

- LR:	Low Resolution	200 km	2°
- HR:	High Resolution	50 km	0.5°

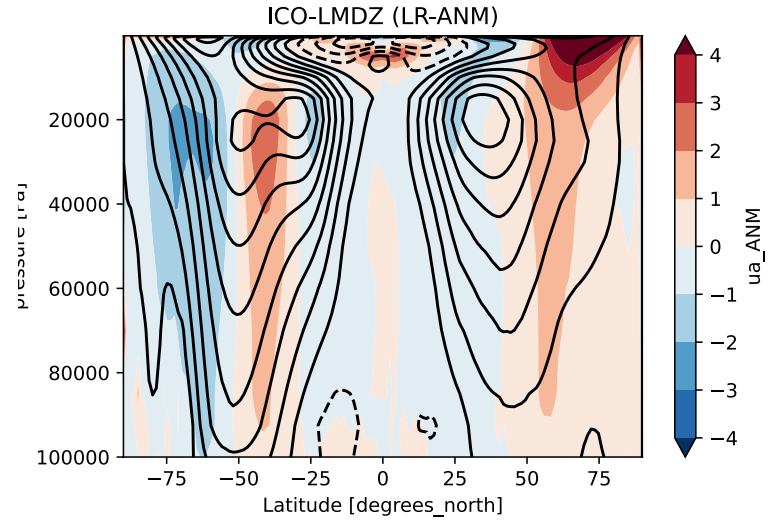
Temperature & zonal wind (ICO-LMDZ)

Temperature

LR (200 km)



Zonal wind

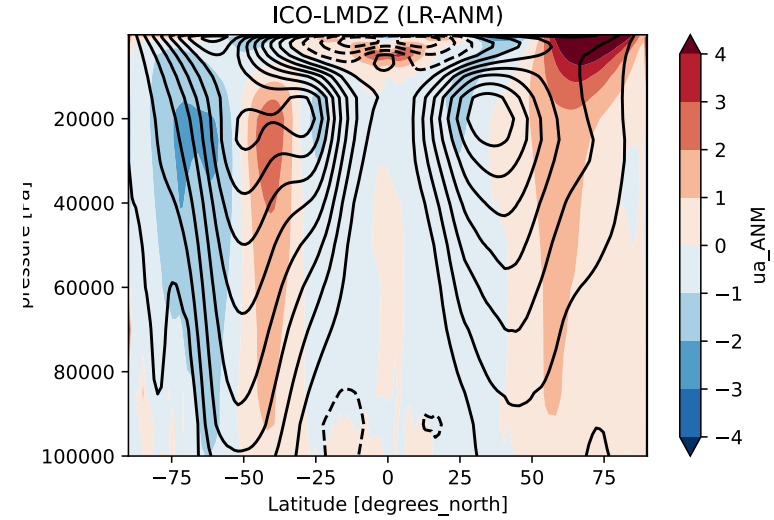
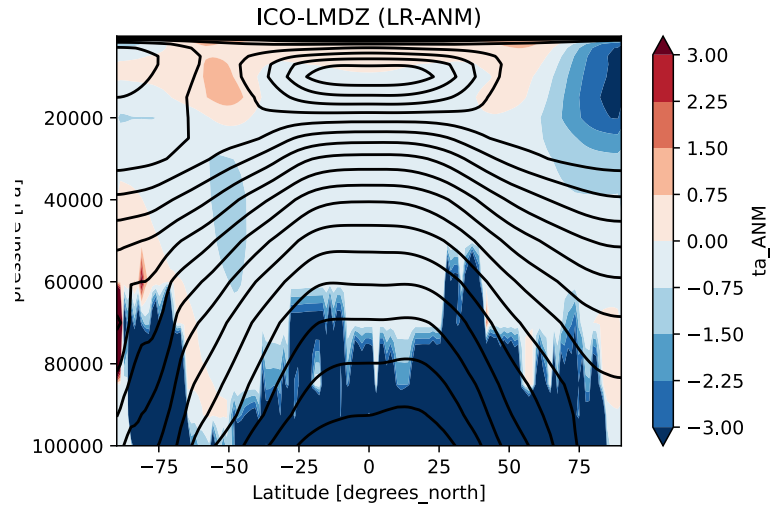


Temperature & zonal wind (ICO-LMDZ)

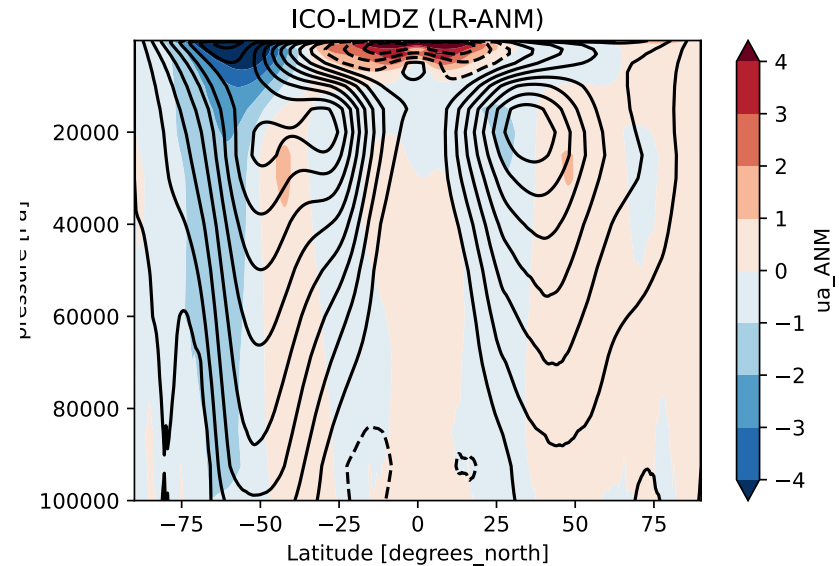
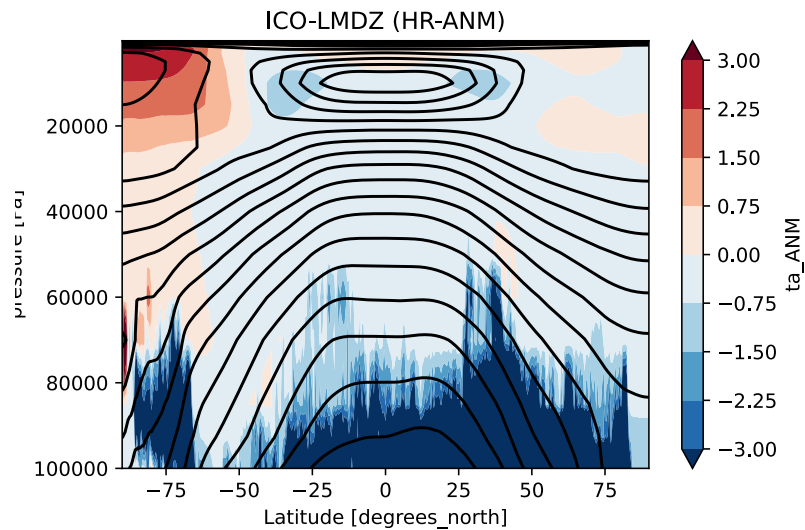
Temperature

Zonal wind

LR (200 km)

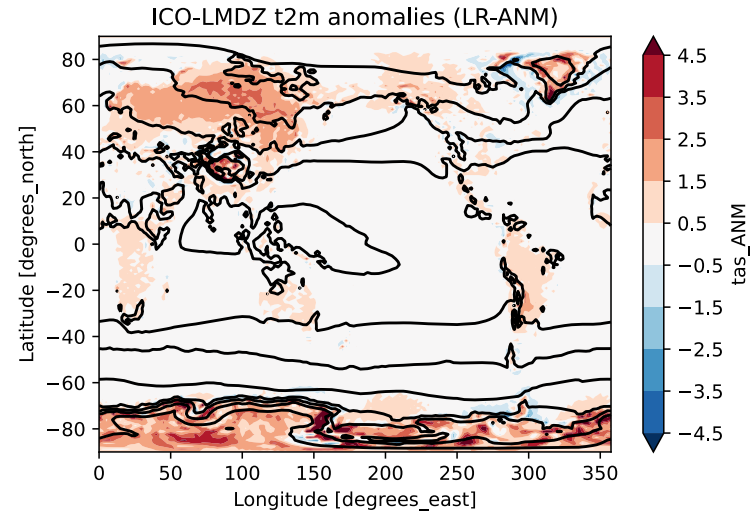


HR (50 km)



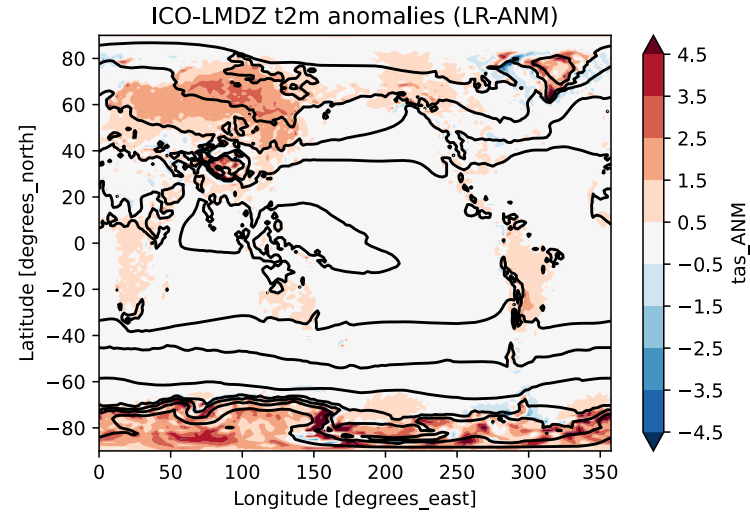
T2m (ICO-LMDZ)

LR (200 km)

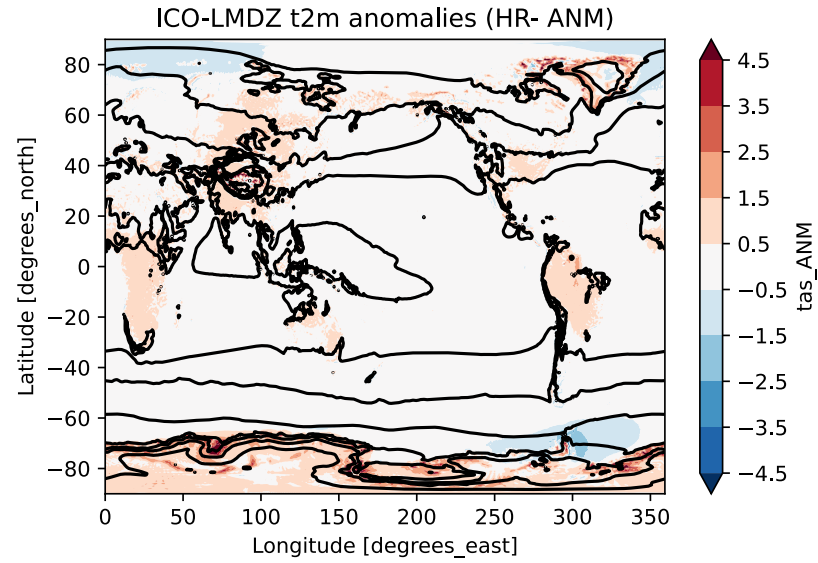


T2m (ICO-LMDZ)

LR (200 km)



HR (50 km)



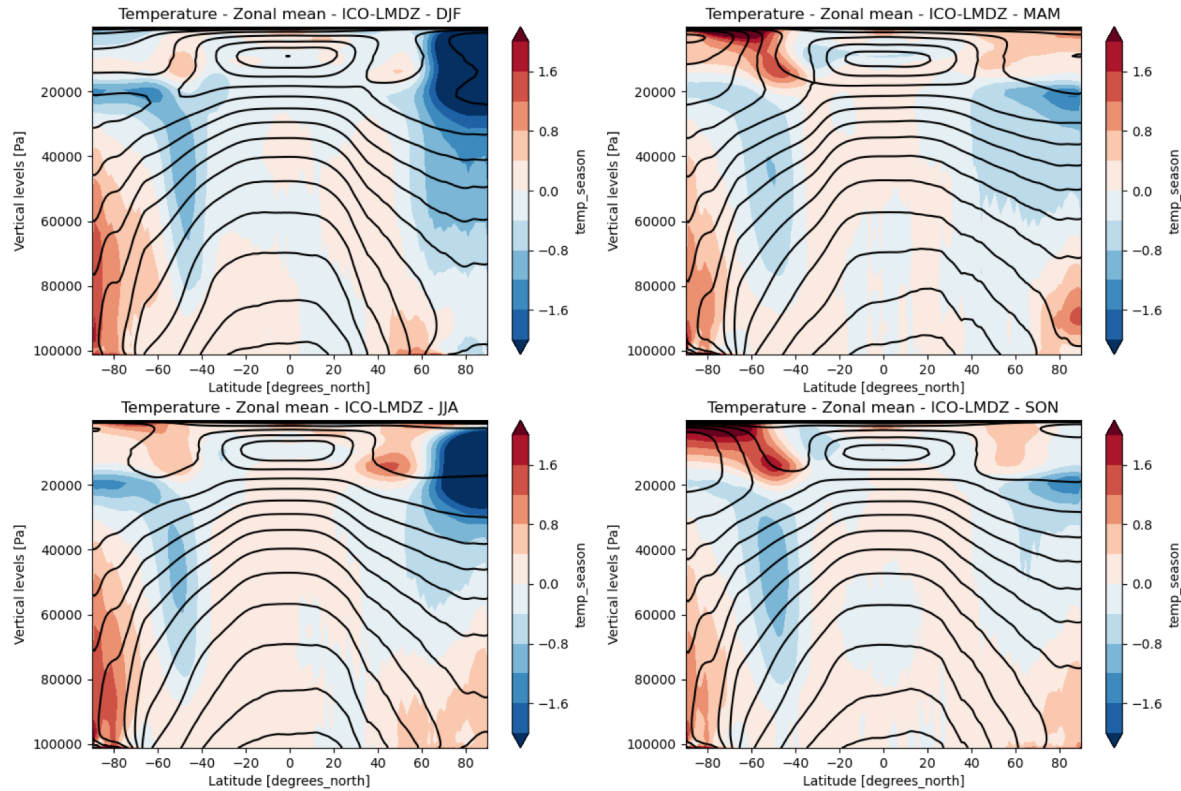
CONCLUSIONS

- **Comparaison ICO vs. LMDZ: climatology ok**
- **Southern jet shifted equatorward in ICO**
 - Linked to resolution?
- **Northern jet shifted poleward**
 - Linked to pole negative T bias???
- **Warm bias over Antarctic**
 - Linked to ...?

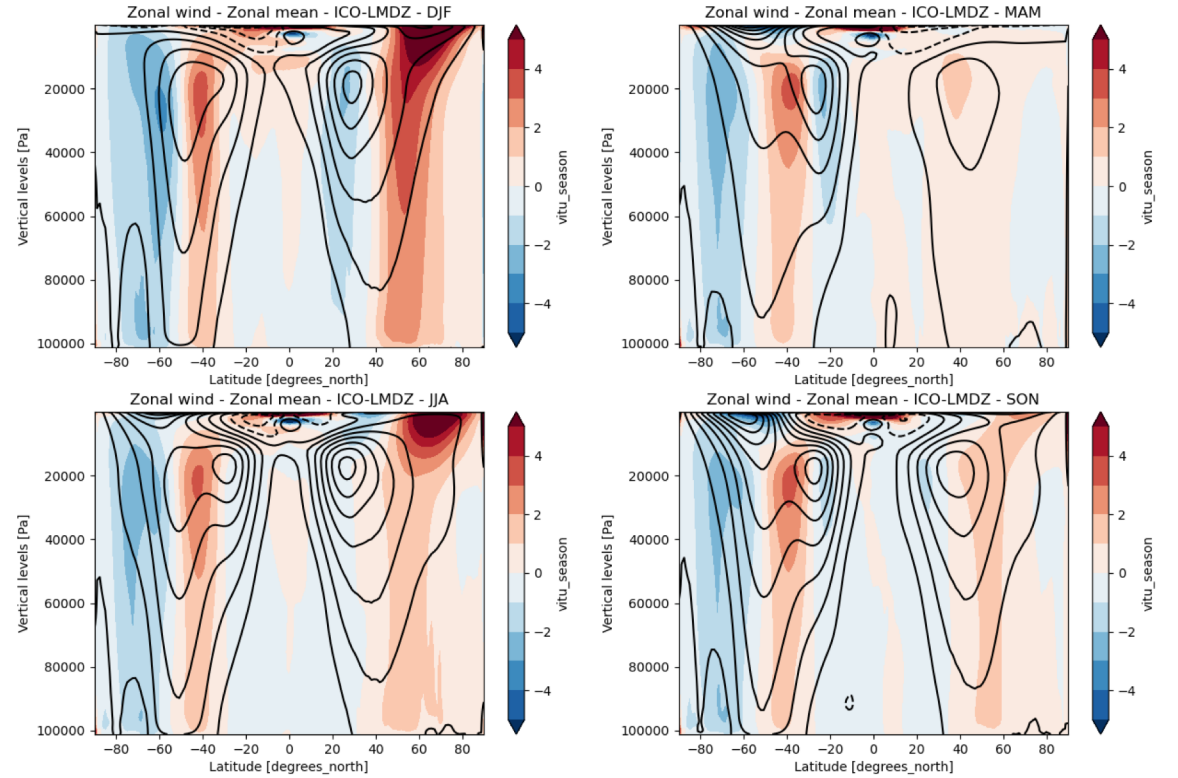
Higher resolution (nbp=60) needed!?

Temperature & zonal wind anomalies (seasonal)

Temperature



Zonal wind



Temp vs Temp ERA5 (Zonal mean - ANM)

ICOLMDZ

LMDZ

ICO-LMDZ

LR temperature anomalies (ANM)

LR temperature anomalies (ANM) for LMDZ

ICO-LMDZ (LR-ANM)

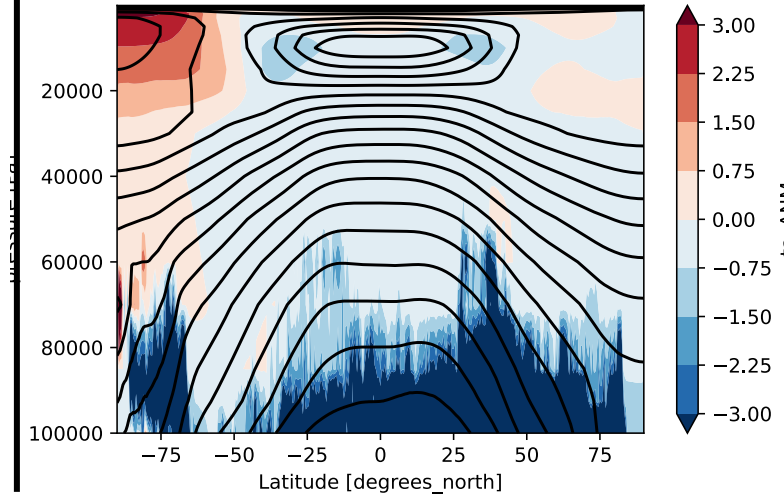
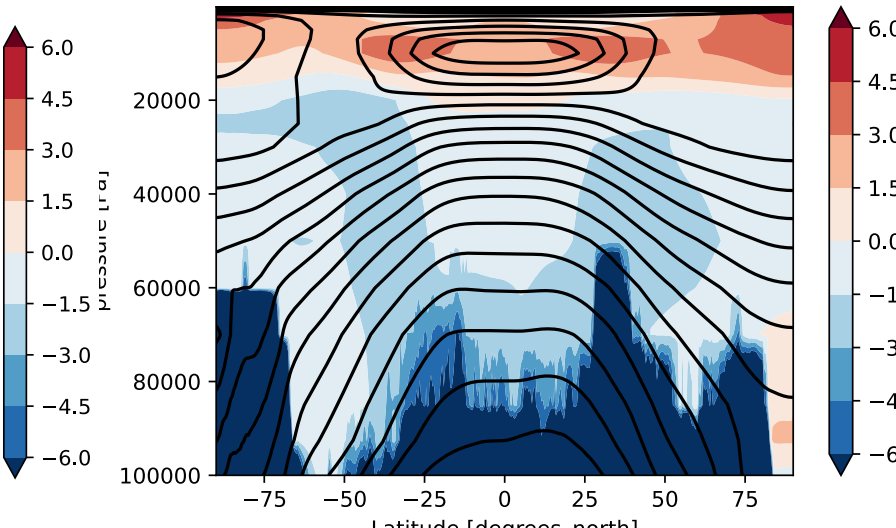
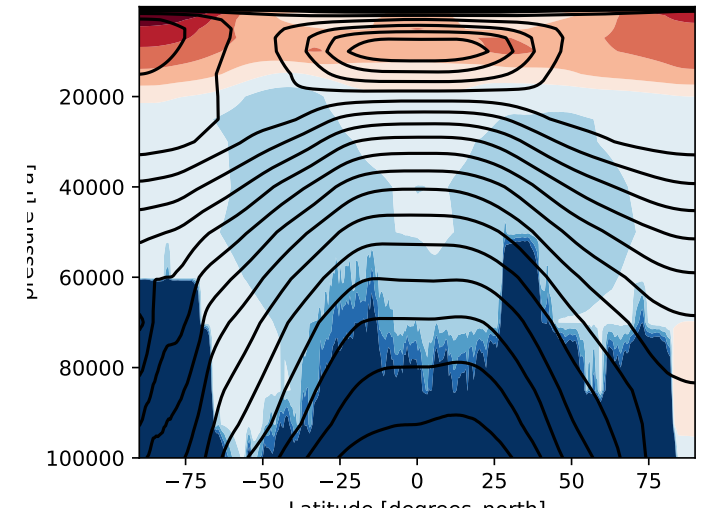
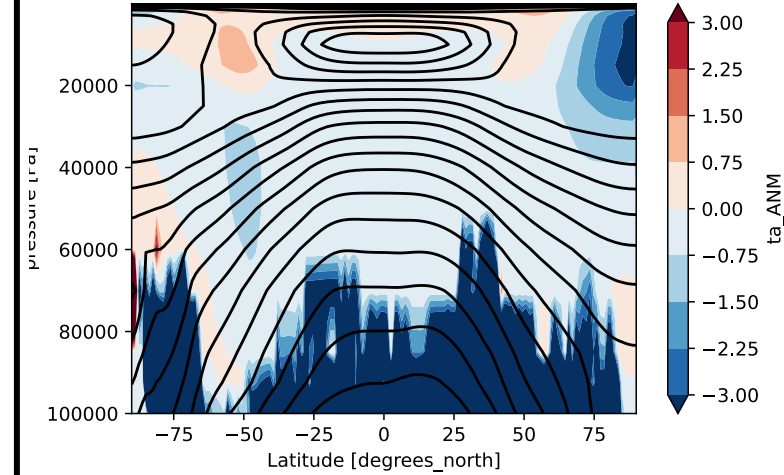
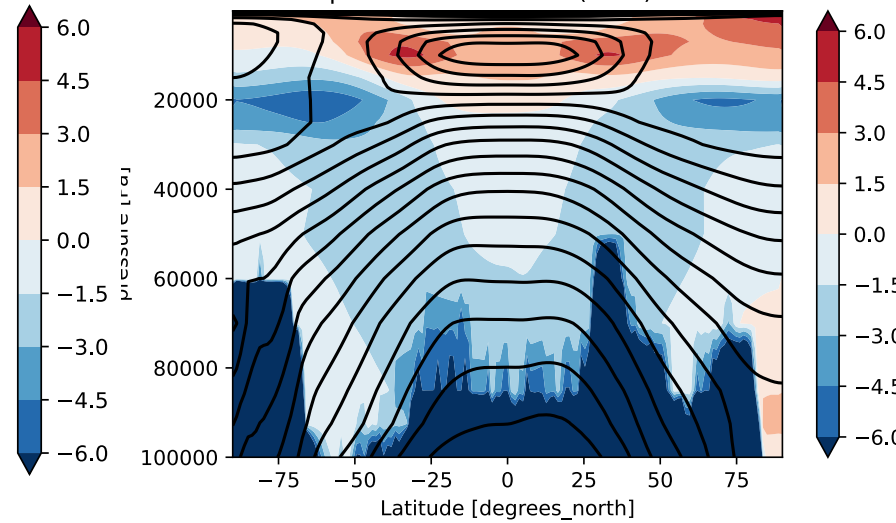
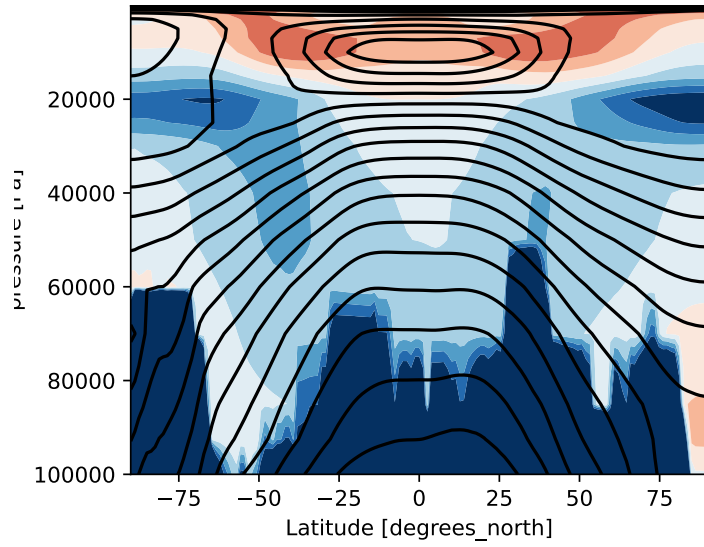
HR temperature anomalies (ANM)

HR temperature anomalies (ANM) for LMDZ

ICO-LMDZ (HR-ANM)

LR (200 km)

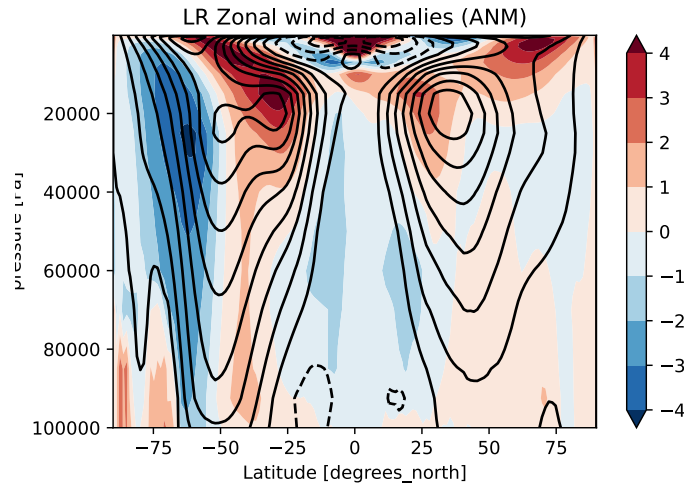
HR (50 km)



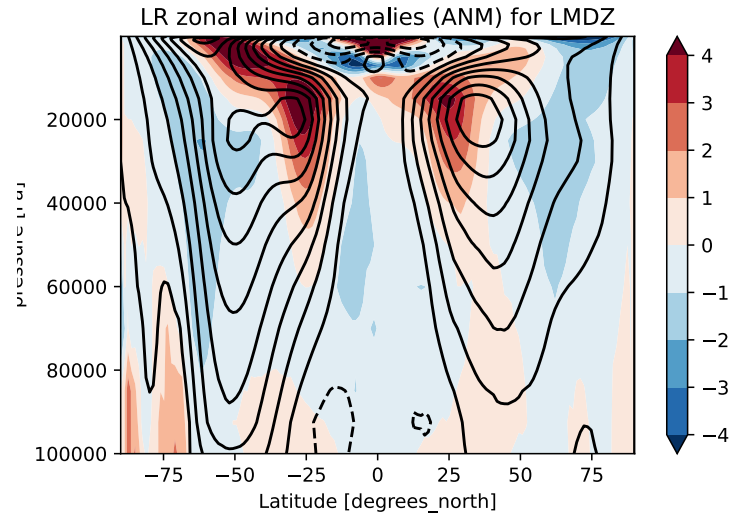
Zonal wind (ICO vs. LMDZ – ANM)

ICOLMDZ

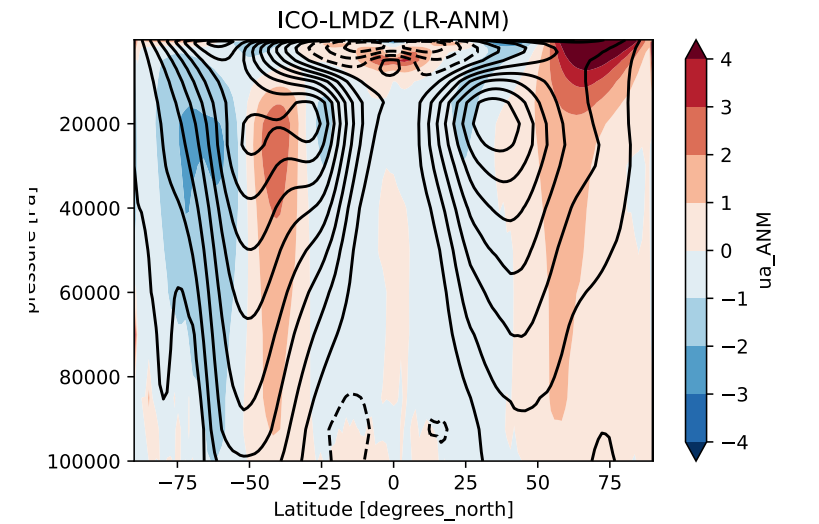
LR (200 km)



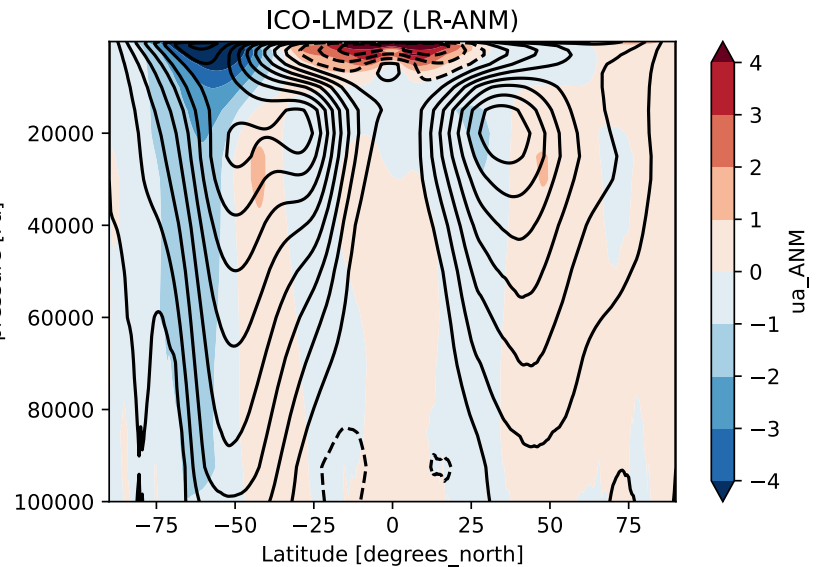
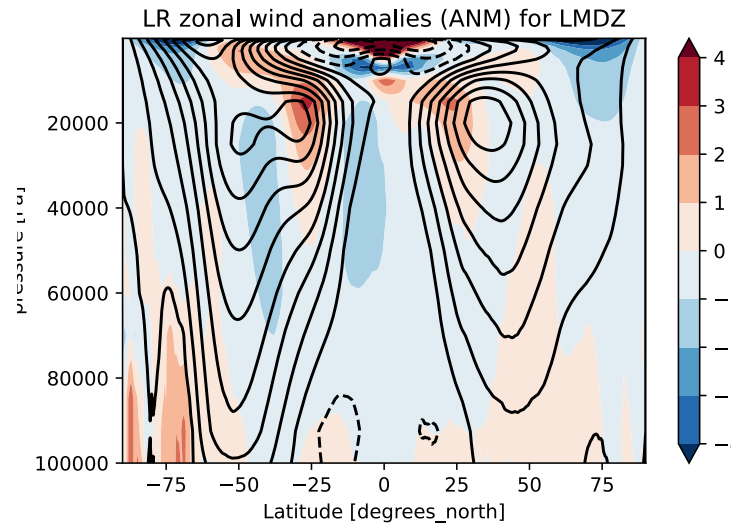
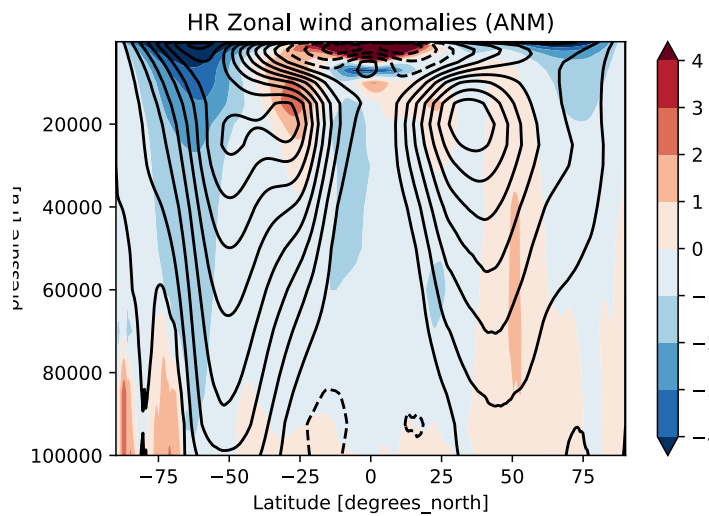
LMDZ



ICO-LMDZ



HR (50 km)



T2m vs T2m ERA5 (ANM)

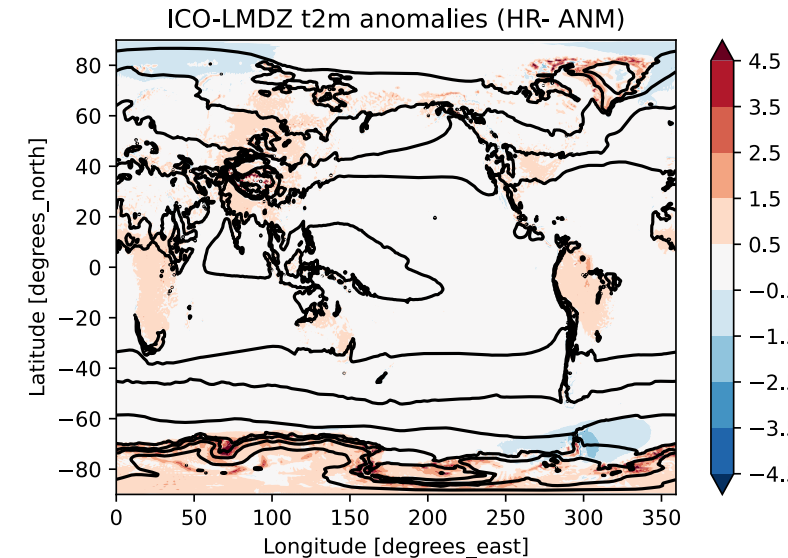
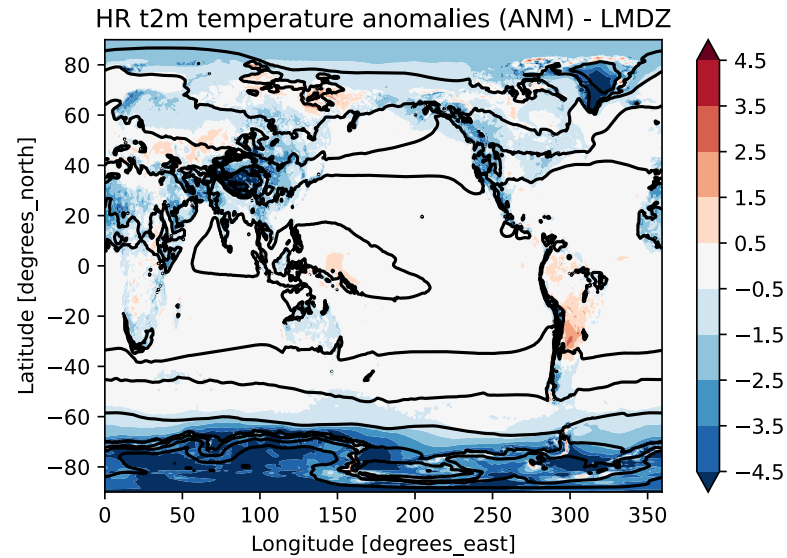
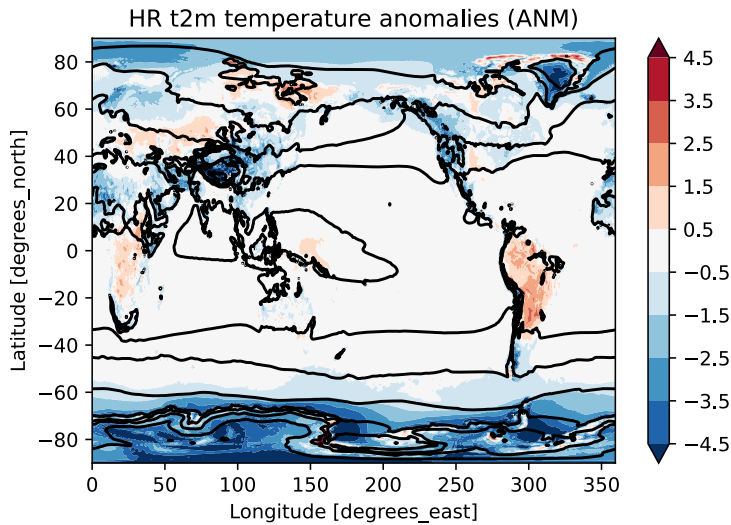
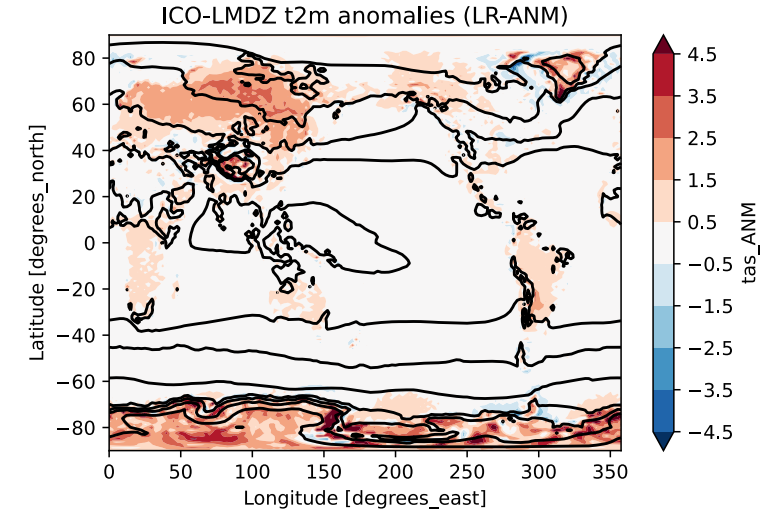
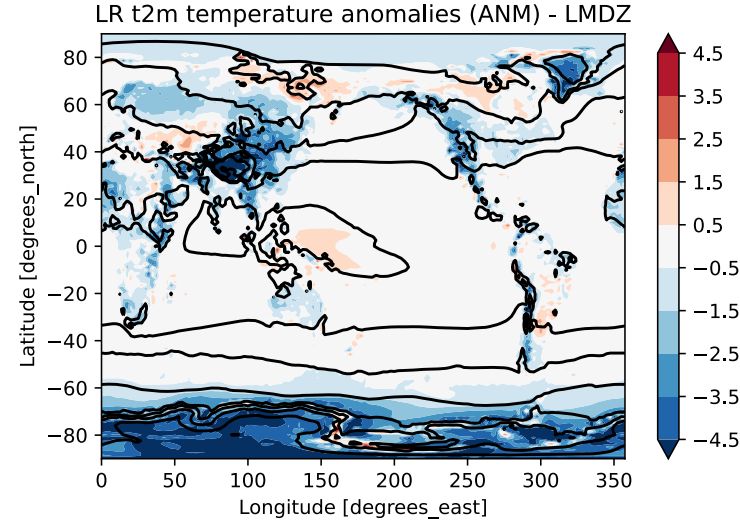
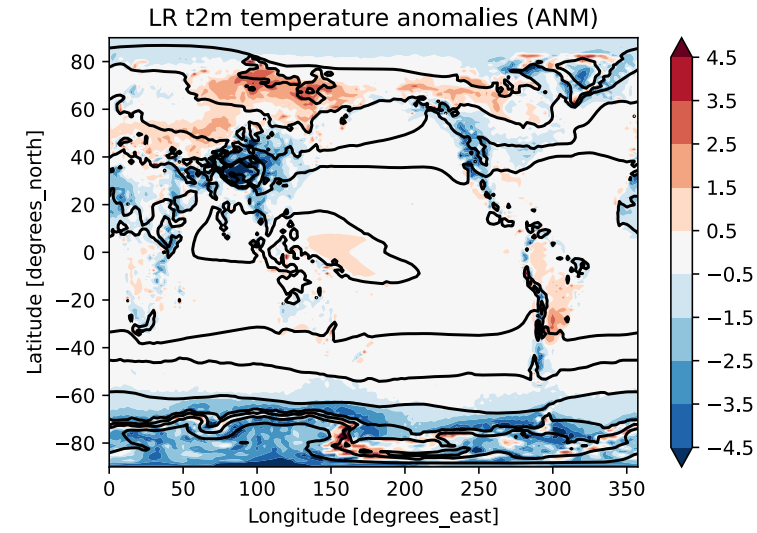
ICOLMDZ

LMDZ

ICO-LMDZ

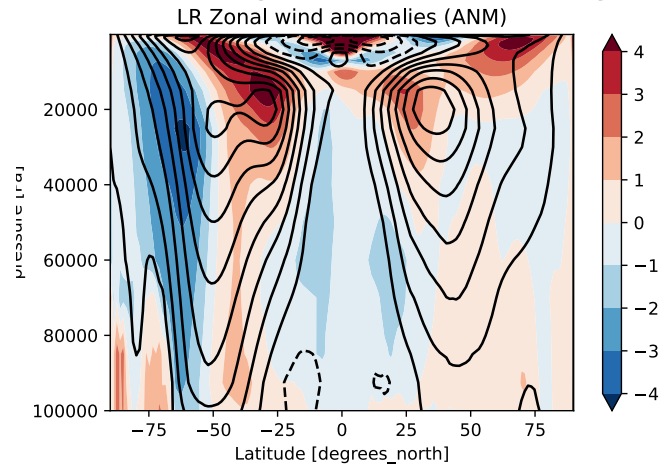
LR (200 km)

HR (50 km)

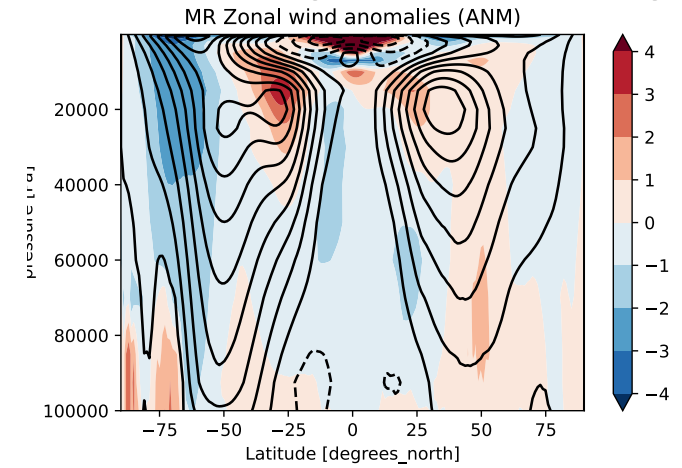


Zonal wind (ICO vs. ERA5 - Zonal mean – ANM - ICOLMDZ)

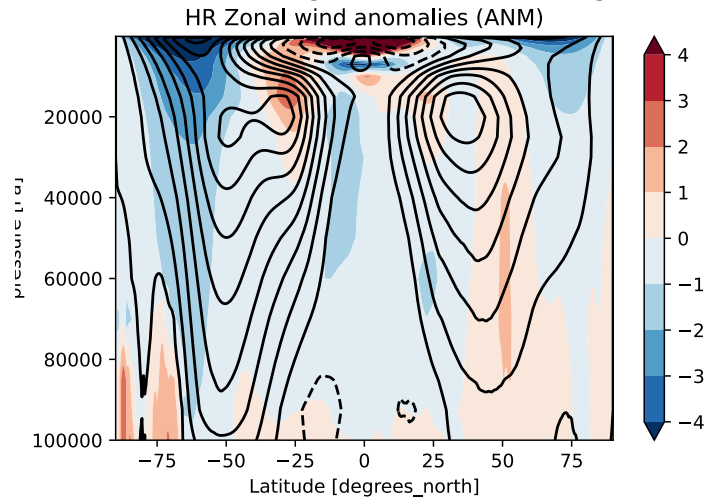
LR (200 km)



MR (100 km)



HR (50 km)



VHR (25 km)

