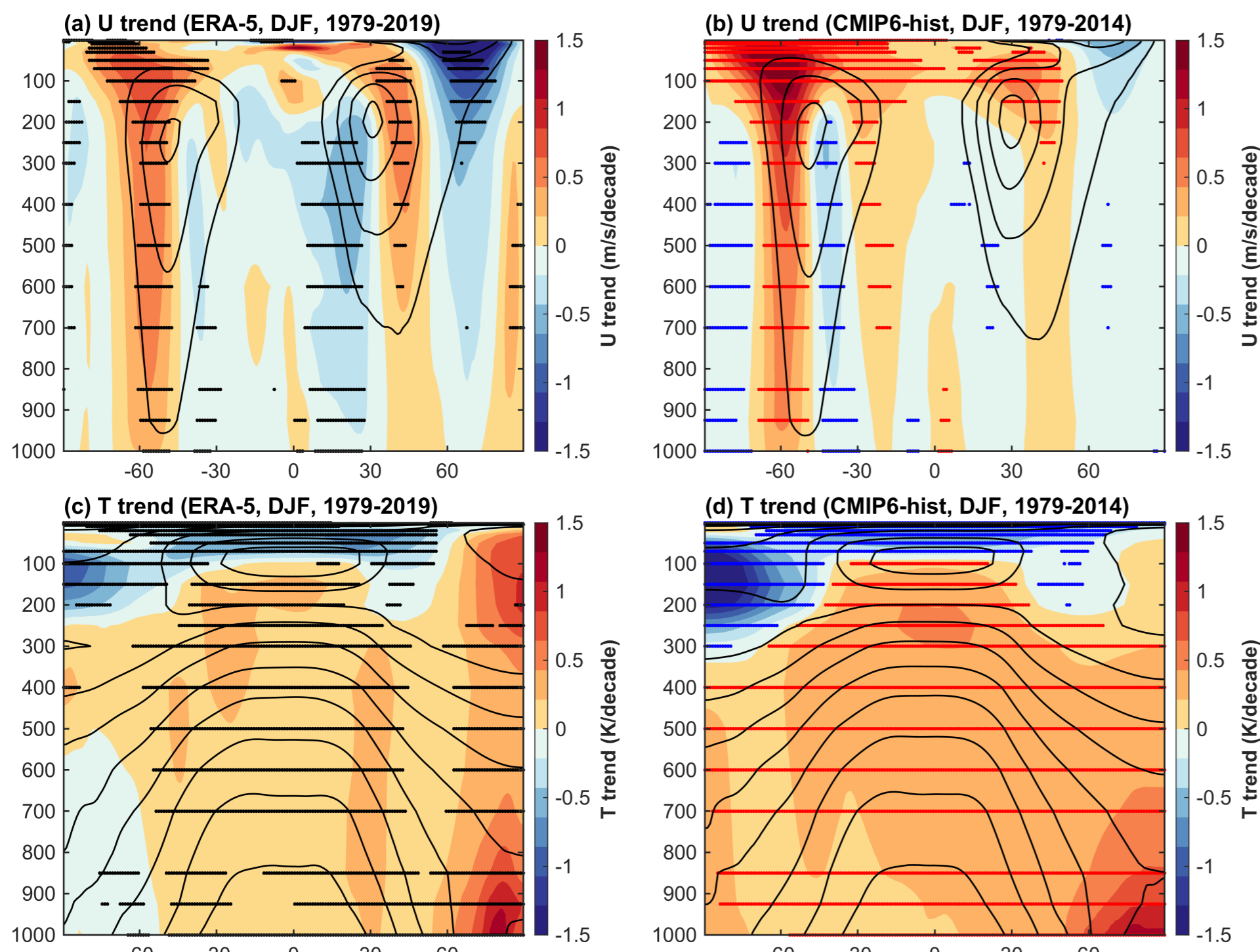


# Revisiting observed jet stream trends and tropical warming

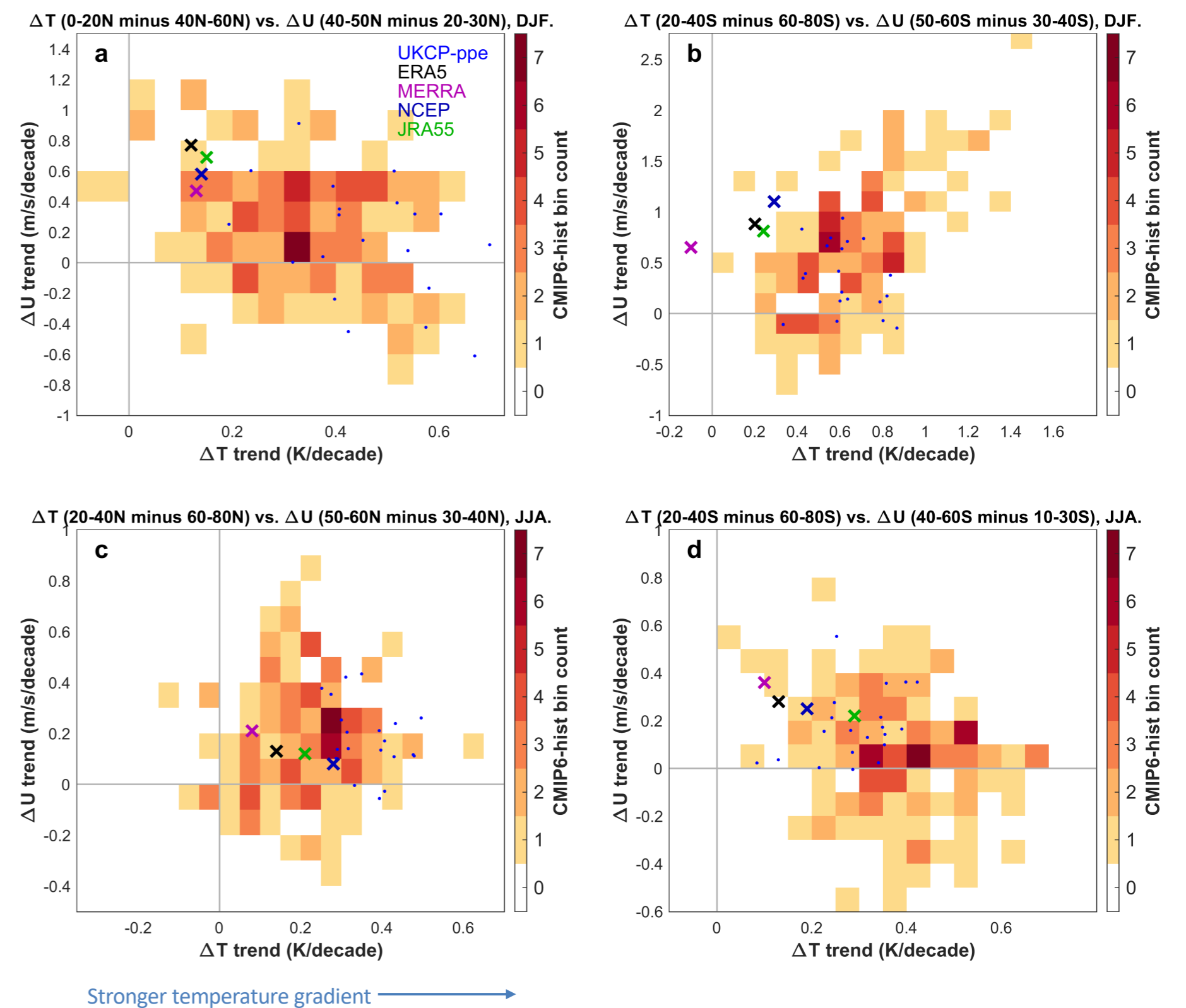
Tim Woollings, Marie Drouard, Christopher O'Reilly, David Sexton and Carol McSweeney  
(Oxford Physics, tim.woollings@physics.ox.ac.uk)



Comparison of recent trends in zonal mean zonal wind and temperature between reanalyses and CMIP6 historical simulations.

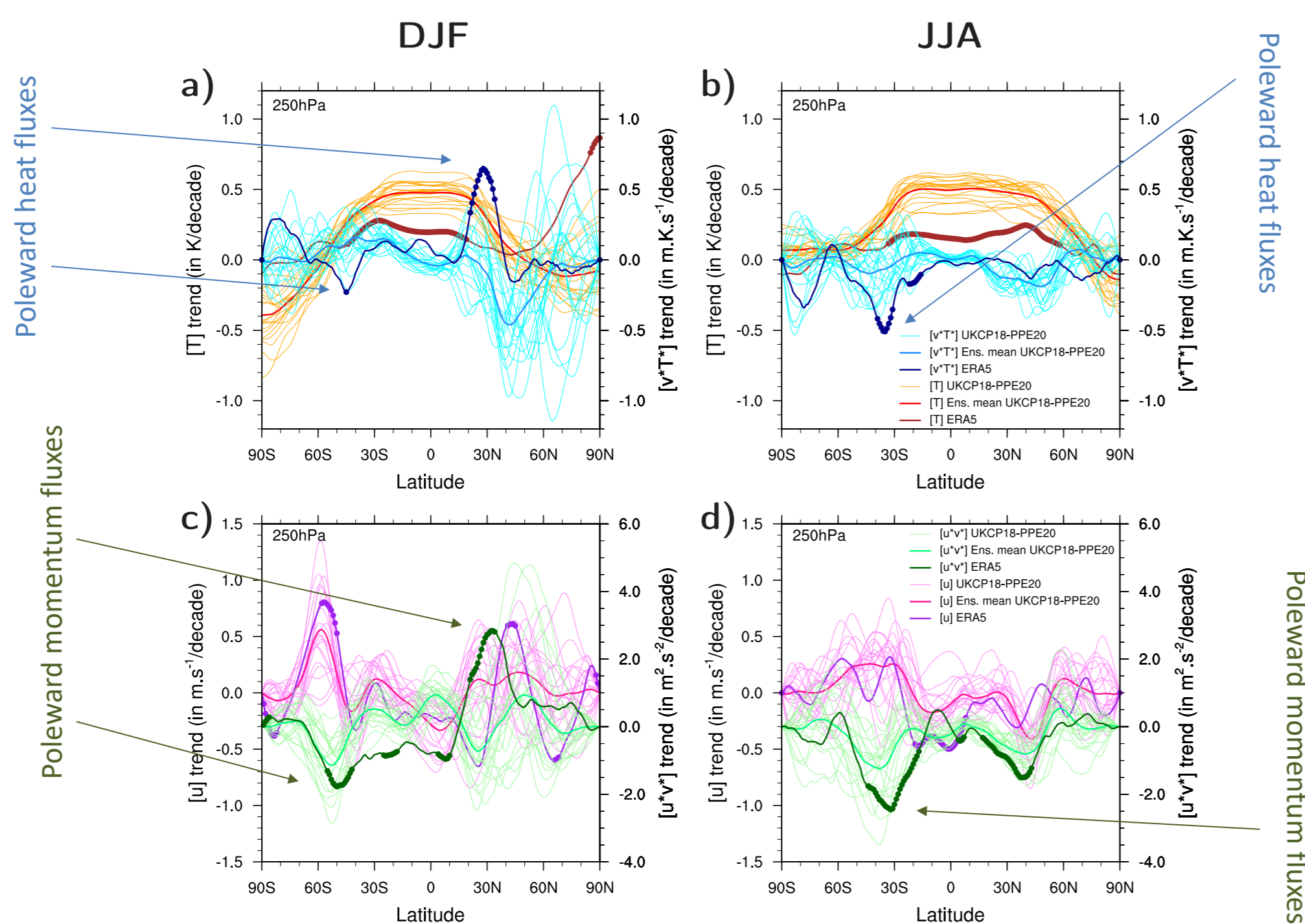
Zonal means in ERA5 and CMIP6 (left).

Using zonal indices on U500 and T250 (below).



## Conclusions:

- Poleward jet shifts are emerging on the global scale over the last 40 years.
- The reanalysis trends are *not inconsistent* with the model spread.
- But the jet trends appear relatively strong despite relatively weak temperature gradient trends.



Comparison of ERA5 and UKCP\_PPE large ensemble.

Eddies found to be transporting heat out of tropics in ERA5, a process that is not seen in the model.

Seasonal / sub-seasonal timescales dominate the eddy fluxes, as opposed to the fast eddies.

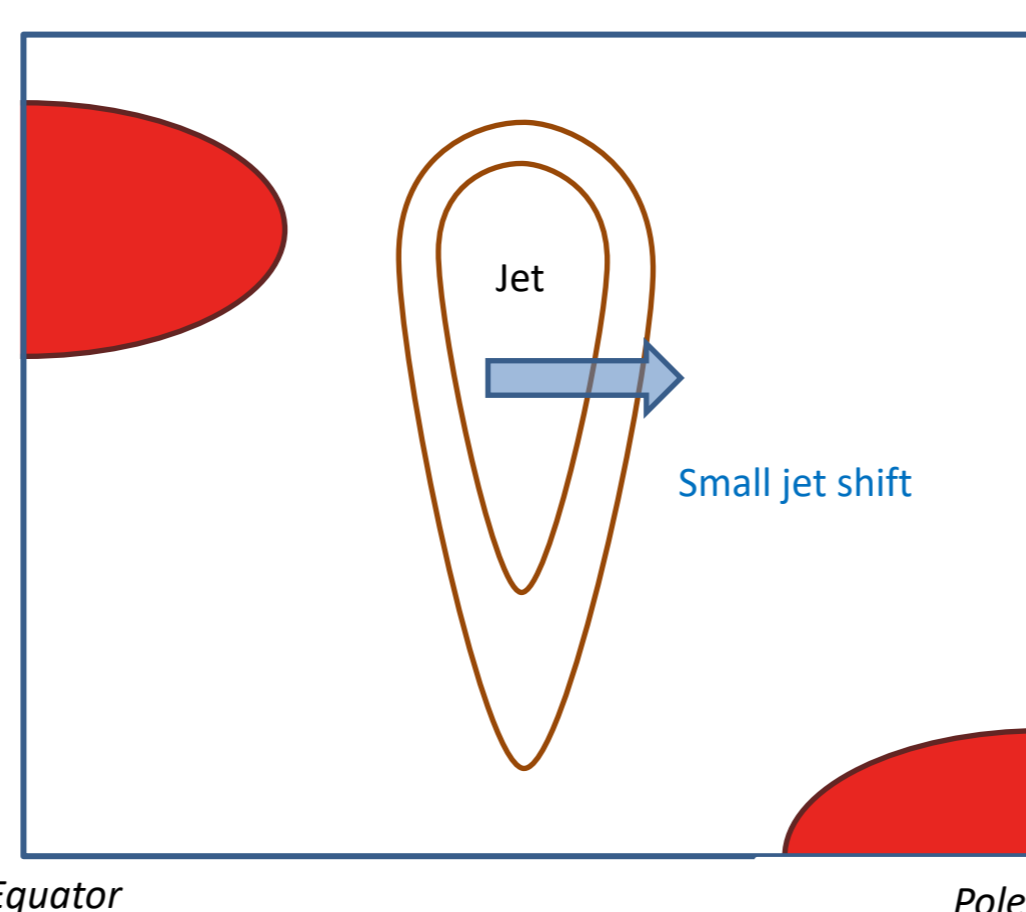
## Hypothesis

Observed trends could be more dynamical than models, with circulation shaping warming pattern as well as vice versa.

Hypothesis: Dynamical diffusivity  $D$  is too weak in models

$$[v^*T^*] = -D \frac{\partial T}{\partial y}$$

Models: strong tropical warming and weak jet shift



Observations: weak tropical warming and strong jet shift

