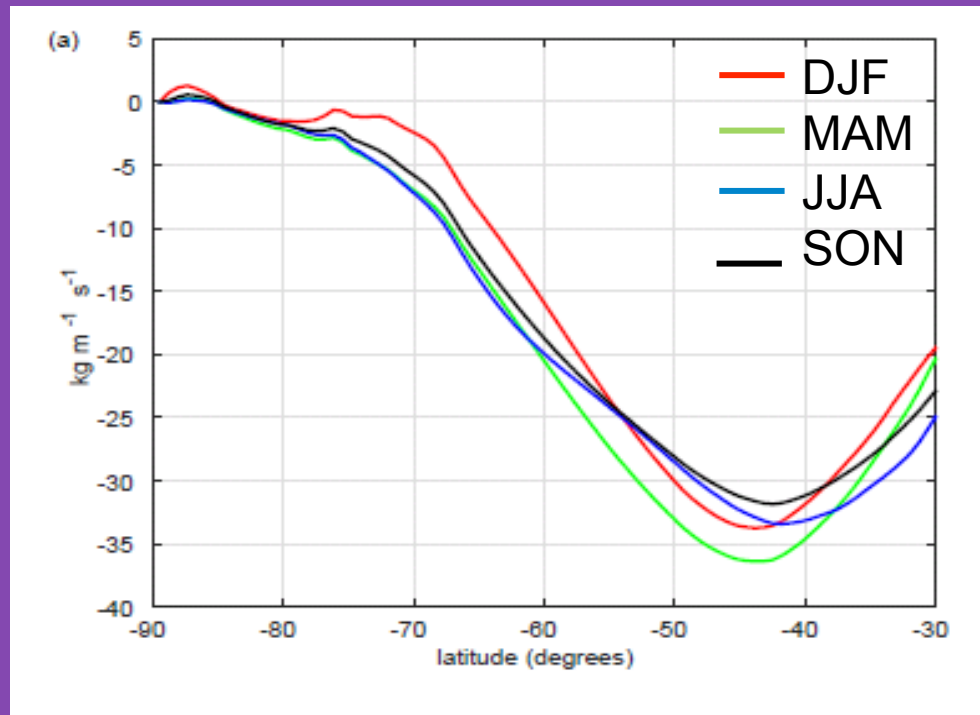


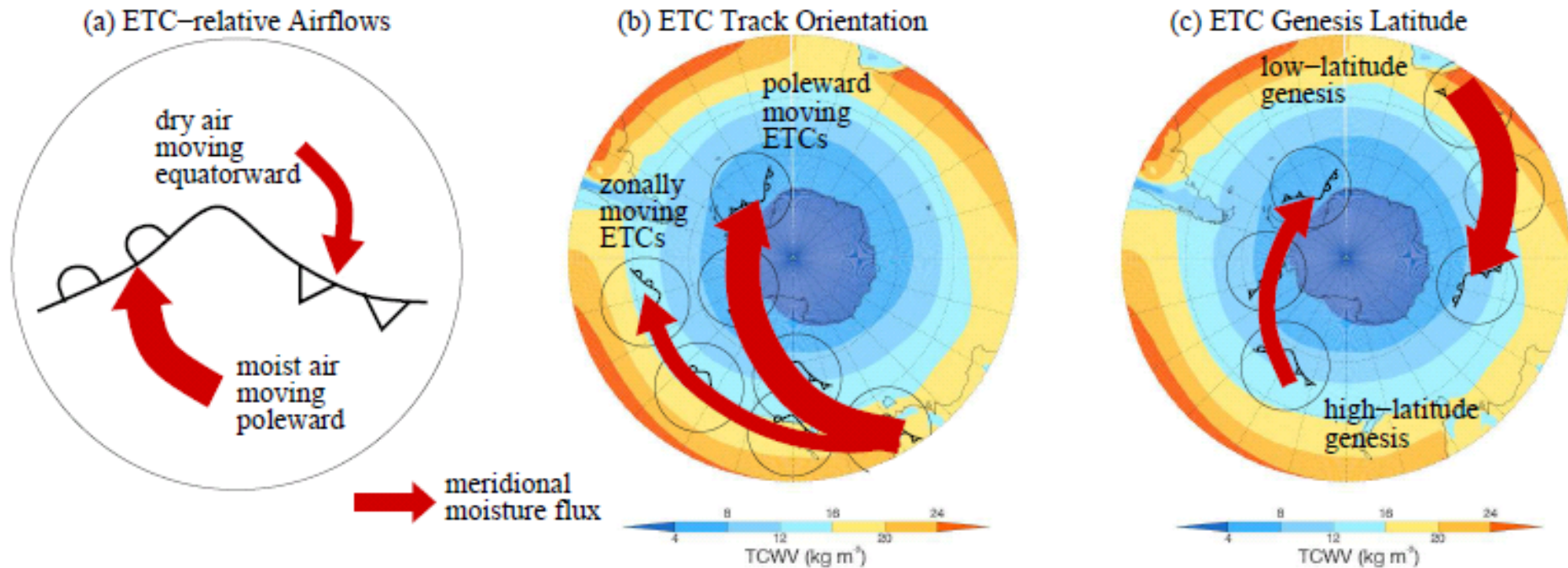
What factors govern the meridional moisture flux (MMF) to Antarctica?

Zonally averaged MMF



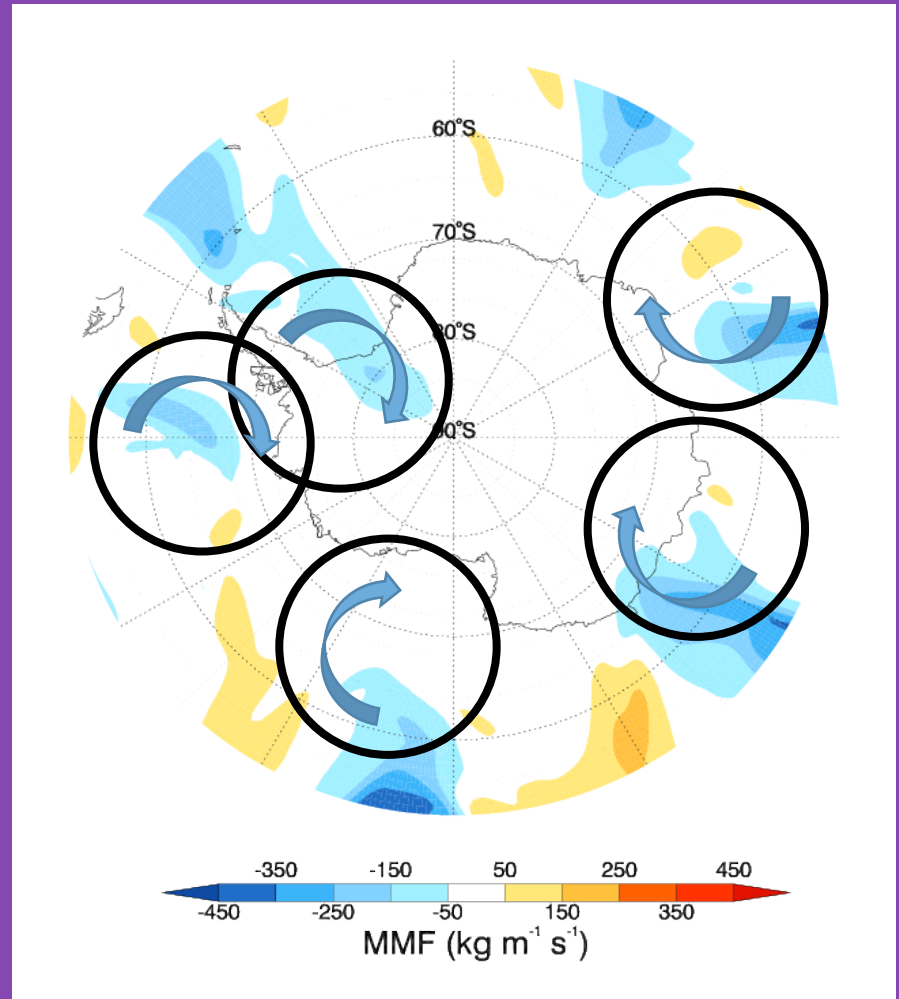
Helen Dacre (University of Reading)
Victoria Sinclair (University of Helsinki)

Which ETC characteristics control MMF to Antarctica?

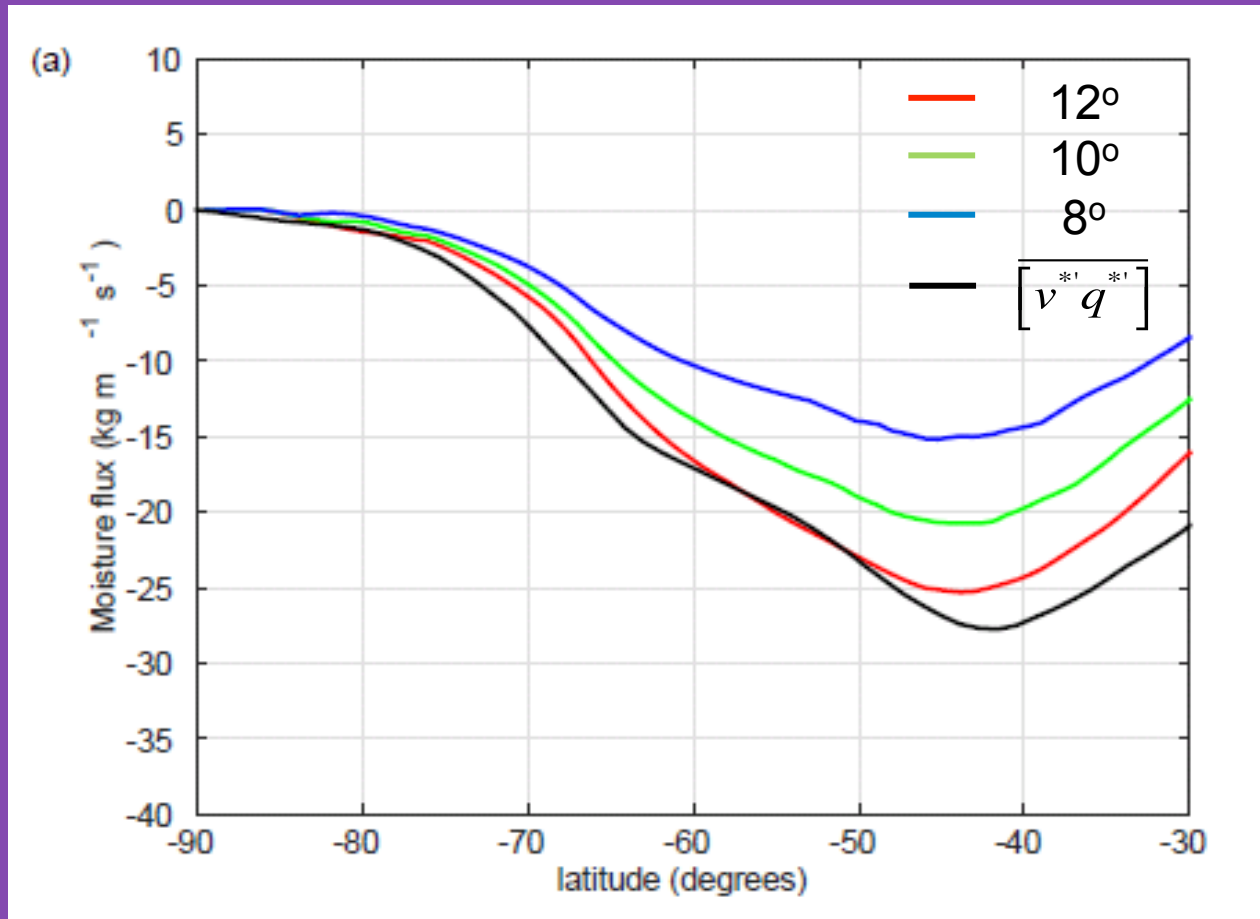


ETC Masking Method

- 35 years ERA-Interim reanalysis data
- Identify and track all ETCs in Southern Hemisphere
- Area influenced by ETC is given by 12° circle centred on ETC
- ETC mask is calculated for each time step



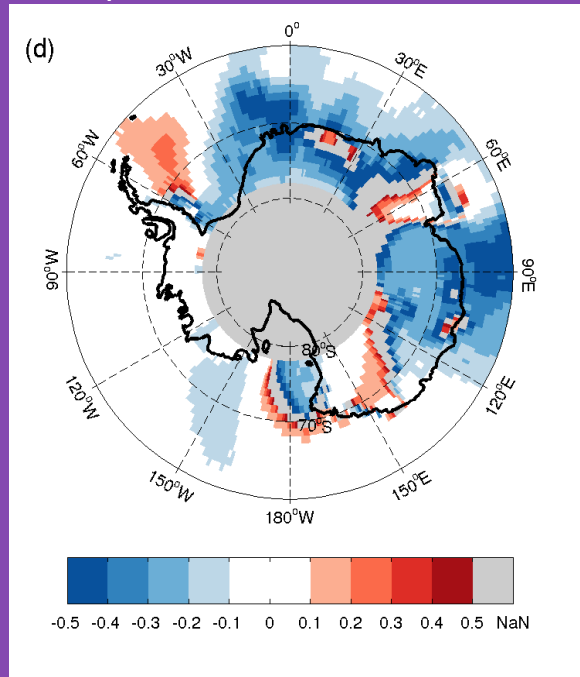
Zonally Averaged MMF due to Transient Eddies and ETC-mask of varying radius



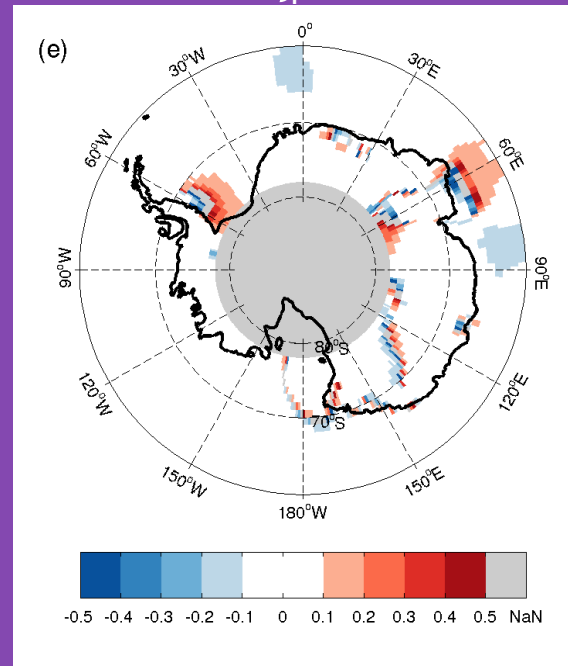
- ETC-related MMF contributes 80-85% of total MMF at 65°S

Contribution to MMF per ETC mask – Intensity (850hPa ξ_r)

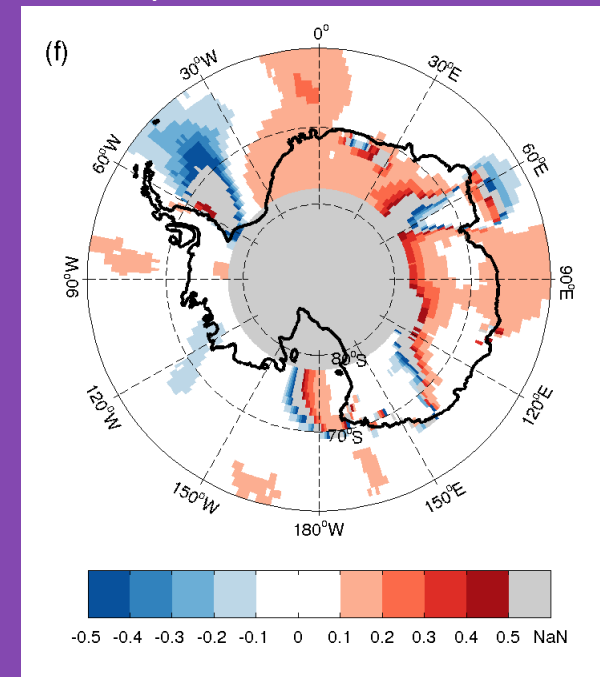
$\xi_r < 6.5 \times 10^{-5} \text{ s}^{-1}$



$6.5 \times 10^{-5} \text{ s}^{-1} < \xi_r < 9.5 \times 10^{-5} \text{ s}^{-1}$



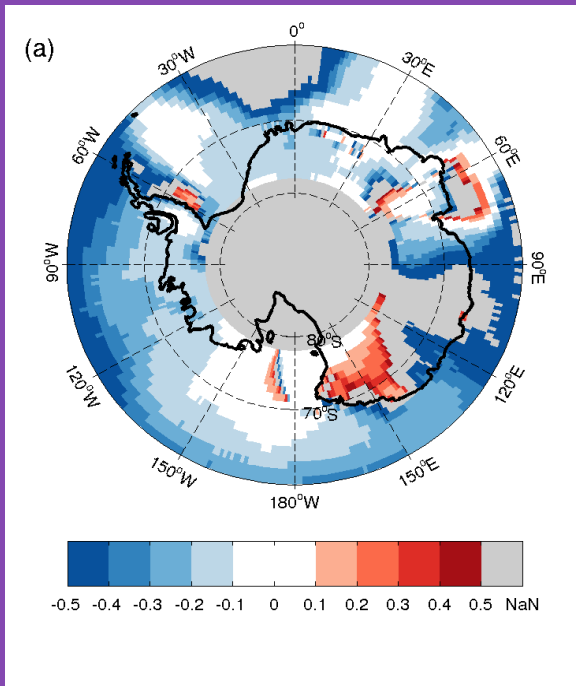
$\xi_r > 9.5 \times 10^{-5} \text{ s}^{-1}$



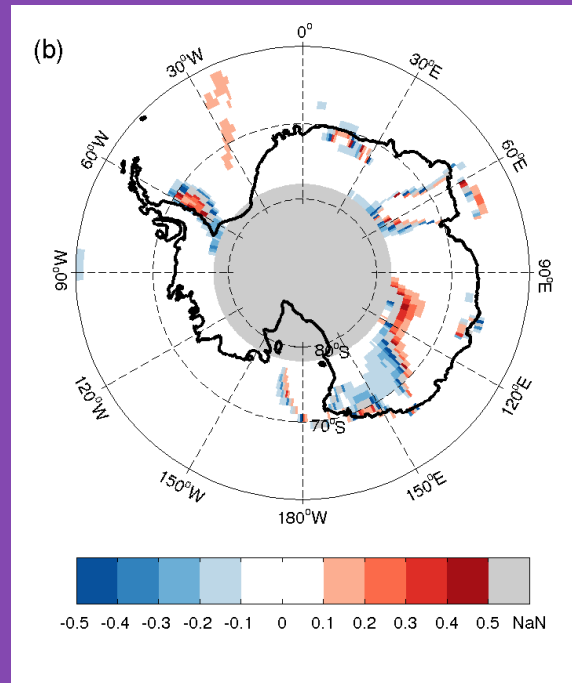
- Strong ETCs transport more moisture polewards in Southern Atlantic and Indian oceans than weak ETCs

Contribution to MMF per ETC mask – Genesis Latitude

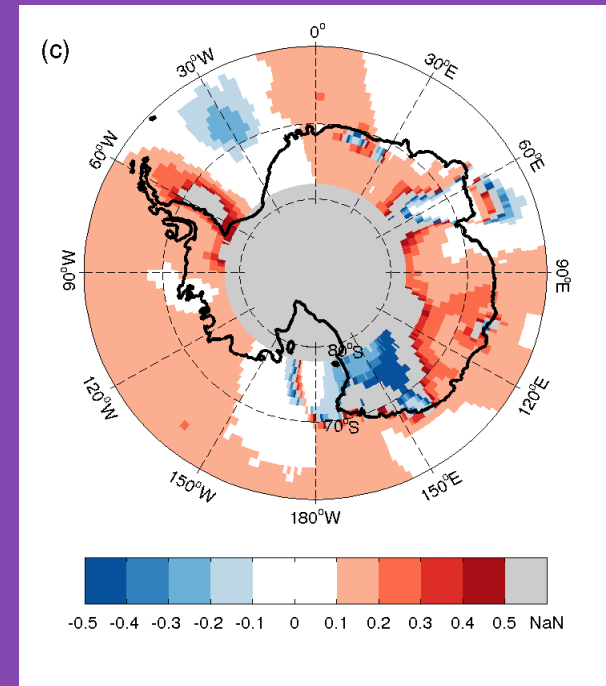
Genesis < 62.5°S



62.5°S < Genesis < 45°S



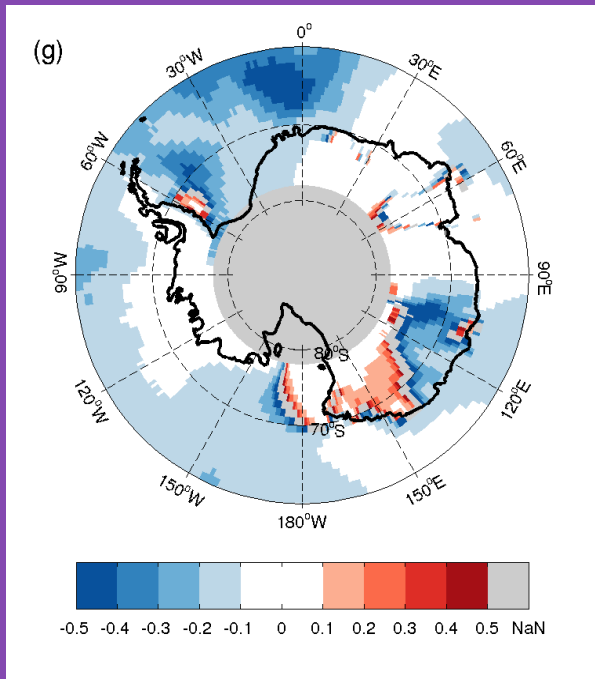
45°S < Genesis



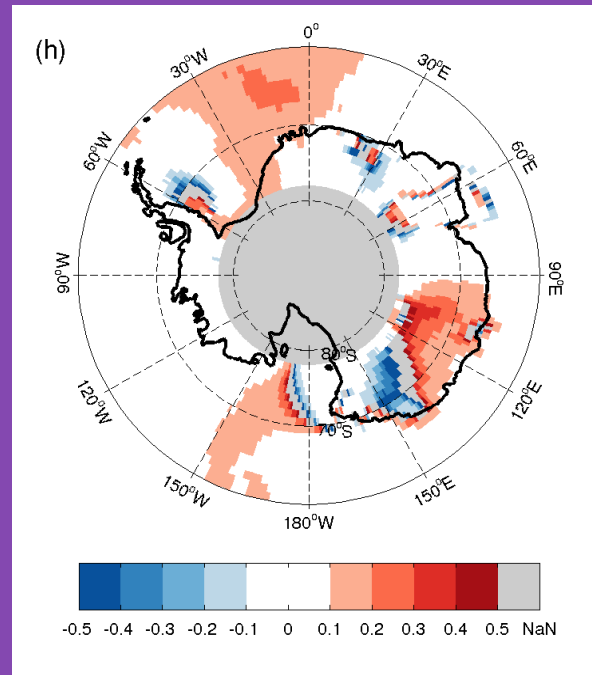
Low-latitude genesis ETCs contribute more to ETC-related MMF than high-latitude genesis ETCs, particularly in East Antarctic interior

Contribution to MMF per ETC mask – Meridional Speed

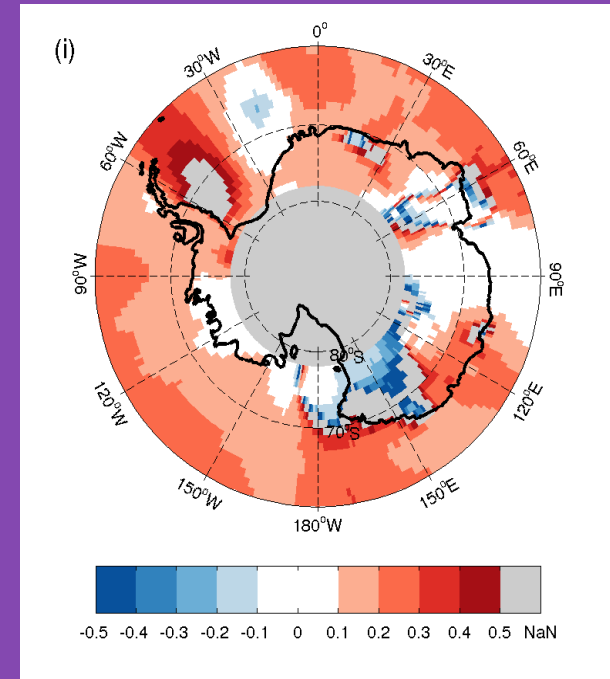
speed < 4° lat day⁻¹



4° day⁻¹ < speed < 8° day⁻¹



speed > 8° day⁻¹



- ETCs with poleward orientated tracks contribute more to ETC MMF than those with zonal tracks

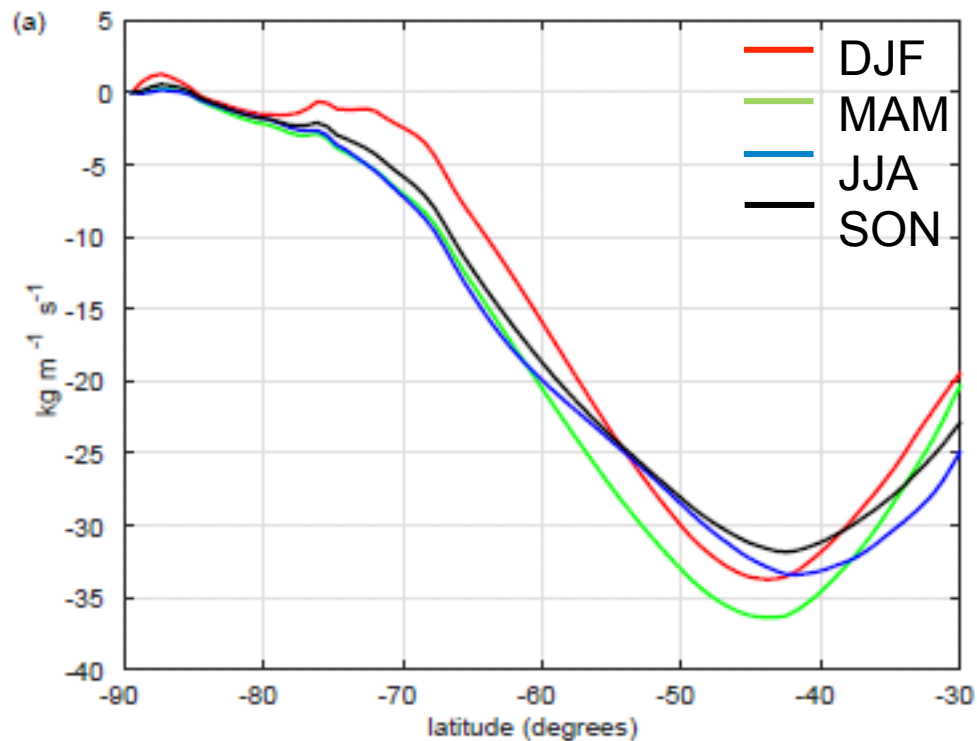
Conclusions and Future Work

- Meridional propagation speed of ETC important for determining its MMF to Antarctic coastline
- Genesis latitude of ETC important for determining its MMF to East Antarctic interior
- GCMs have significant biases, most models have a SH jet/storm track that is too zonal (Ceppi et al. 2012, Lee et al. 2015)
- Dynamical mechanisms leading to changes in SH storm track variability in the context of climate change need to be investigated

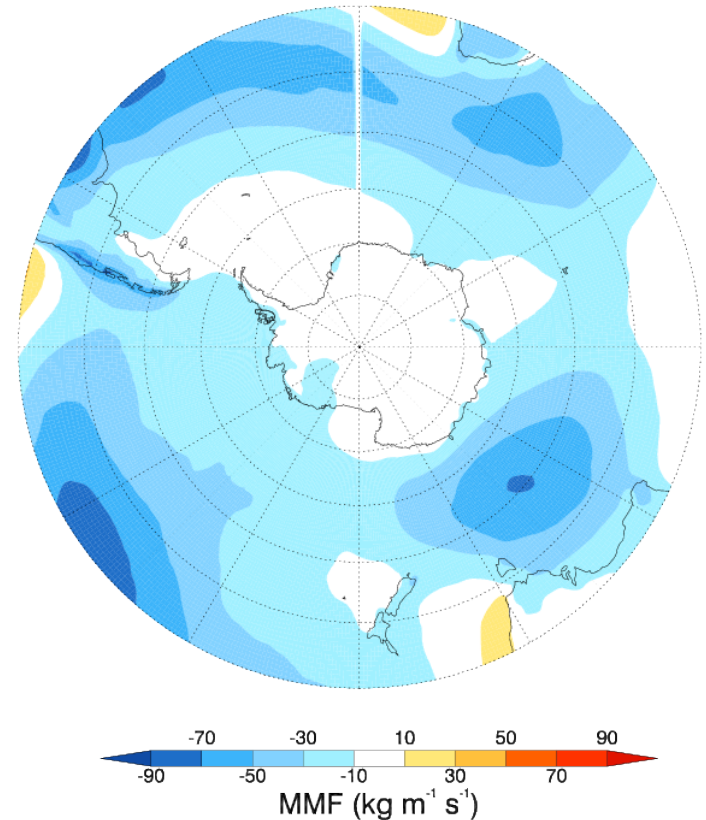
EXTRA SLIDES

35-year JJA climatology of MMF

Zonally averaged MMF

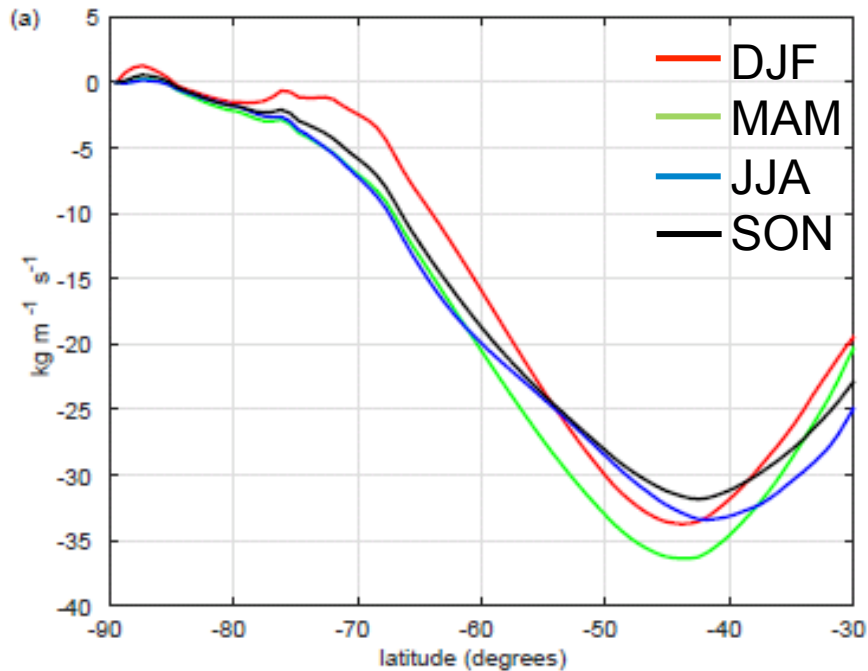


JJA MMF

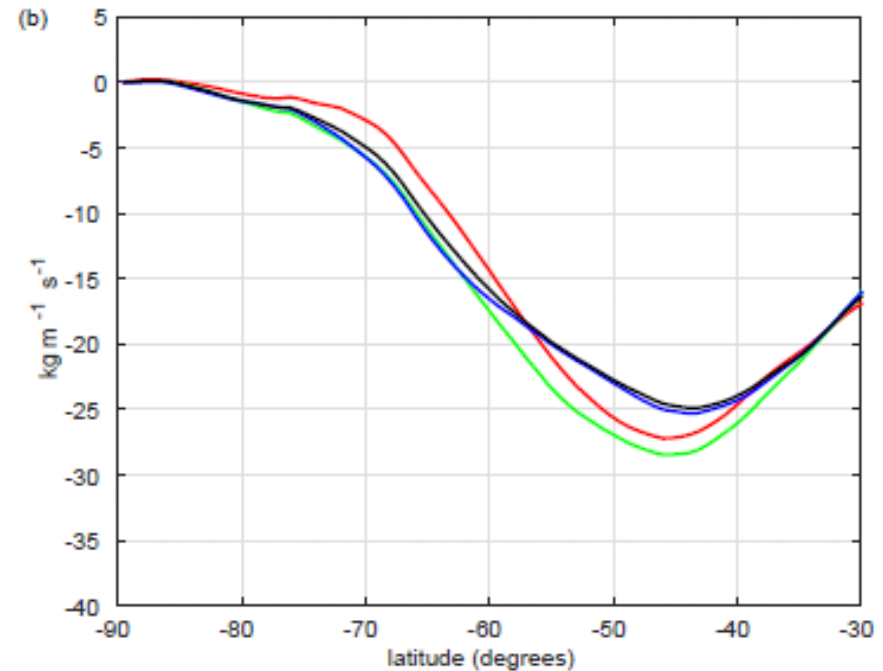


Zonally averaged MMF due to ETC

Total MMF



ETC-related MMF



- ETC-related MMF contributes 80-85% of total MMF at 65°S