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ADDED VALUE OF THE REGIONAL CLIMATE
MODEL MAR COMPARED TO REANALYSES
FOR ESTIMATING THE ANTARCTIC
SURFACE CLIMATE, 1979-2017.



Surface climate datasets for model evaluation

Ground-based:

- **Monthly 2m Temperature, 10m Wind speed and direction, surface pressure:** READER (64), USAP (20), IMAU (8), AUS (3)
- **10m-depth temperature:** IMAU (64 « individual » data)
- **Radiation:** BSRN stations (3), AWS Adélie Land (2), AWS Dronning Maud Land (8)
- **SMB:** GLACIOCLIM SAMBA, SUMup radar transects
- **Density:** 11 sources, 0.5 to 2m depth, 220 grid points.

Remote:

- **Melting:** Microwave radiometers 1979-2015 (Picard and Fily 2006)
- **Surface temperature:** MODIS 2001-2013 (Freville et al. 2014)
- **Snowfall:** CloudSat 2007-2010 (Palerme et al. 2014)

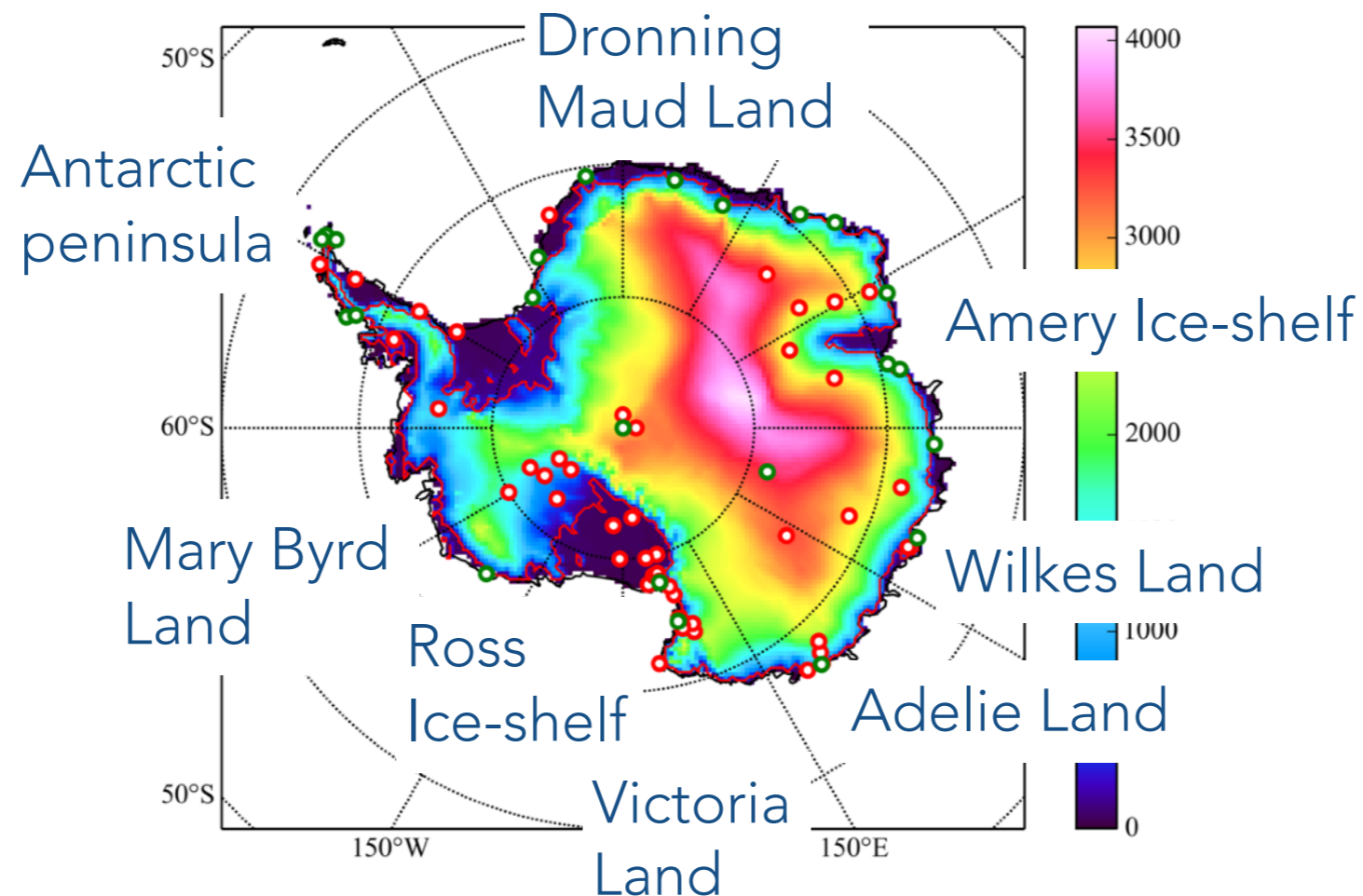
MODELLING THE ANTARCTIC CLIMATE

Surface climate datasets for model evaluation

Monthly 2m Temperature, 10m Wind speed and direction:

READER (64), USAP (20), IMAU (8), AUS (3)

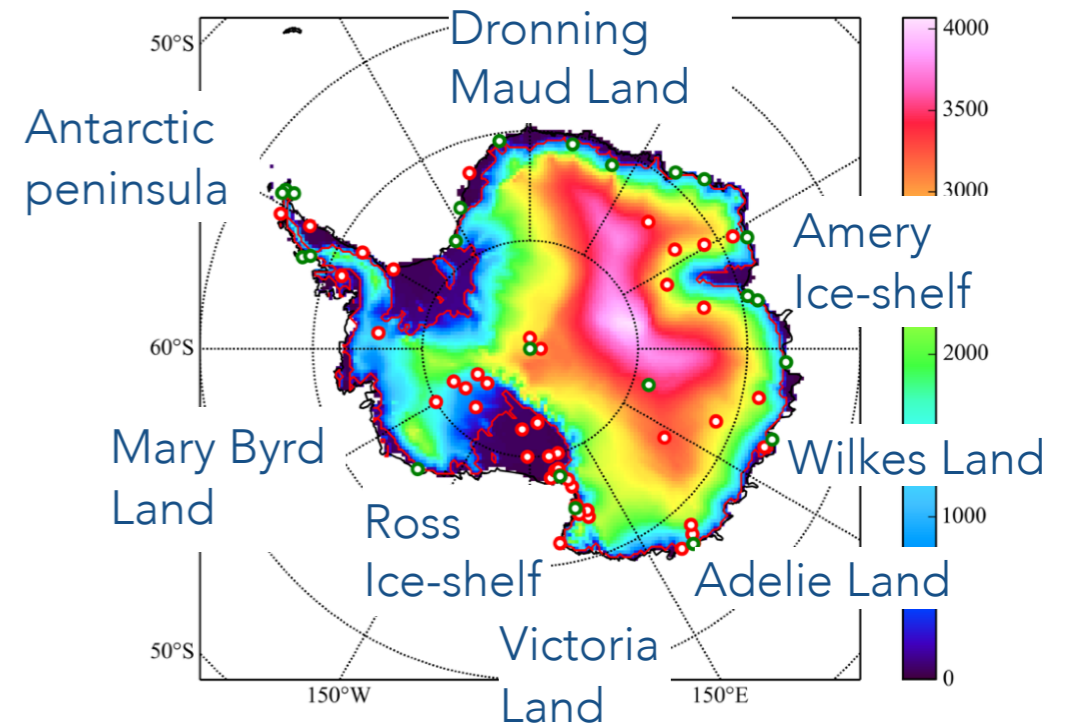
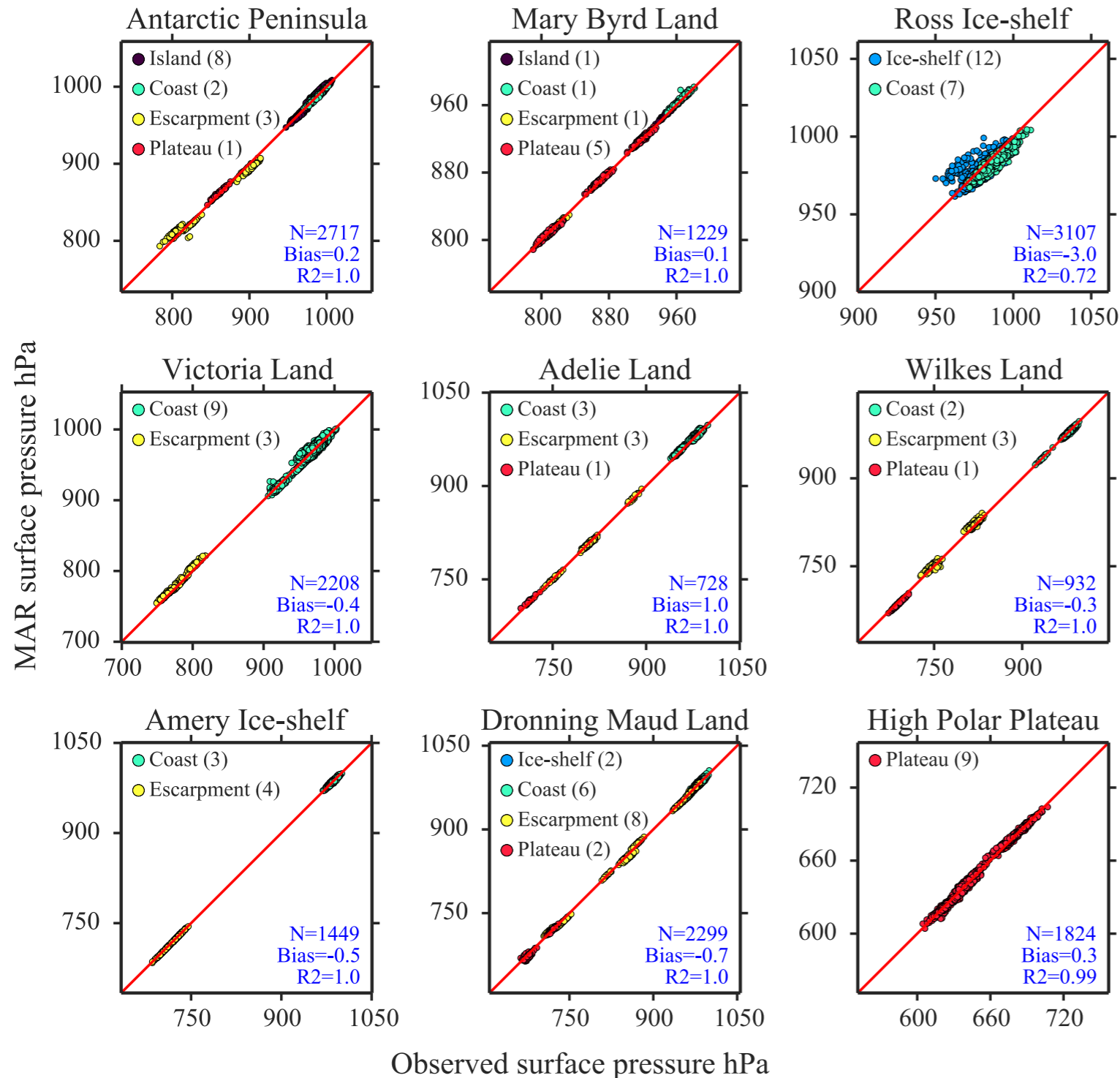
WARNING: Big bugs for wind speed in READER (conversion knots / m.s-1)



MODELLING THE ANTARCTIC CLIMATE

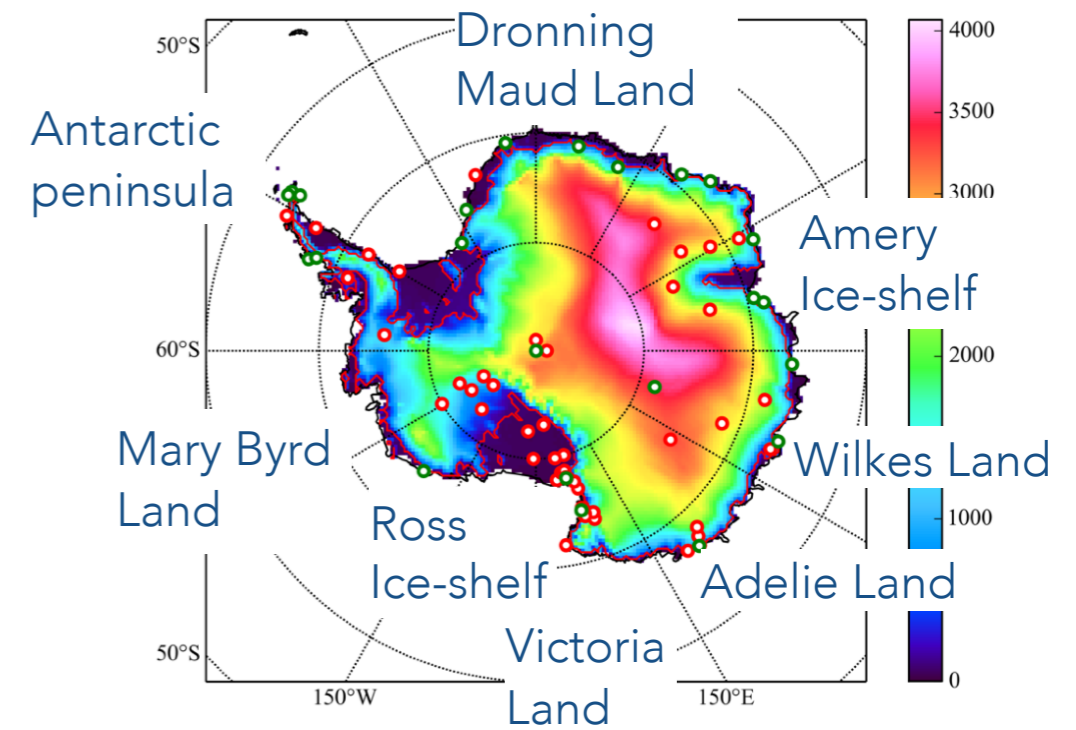
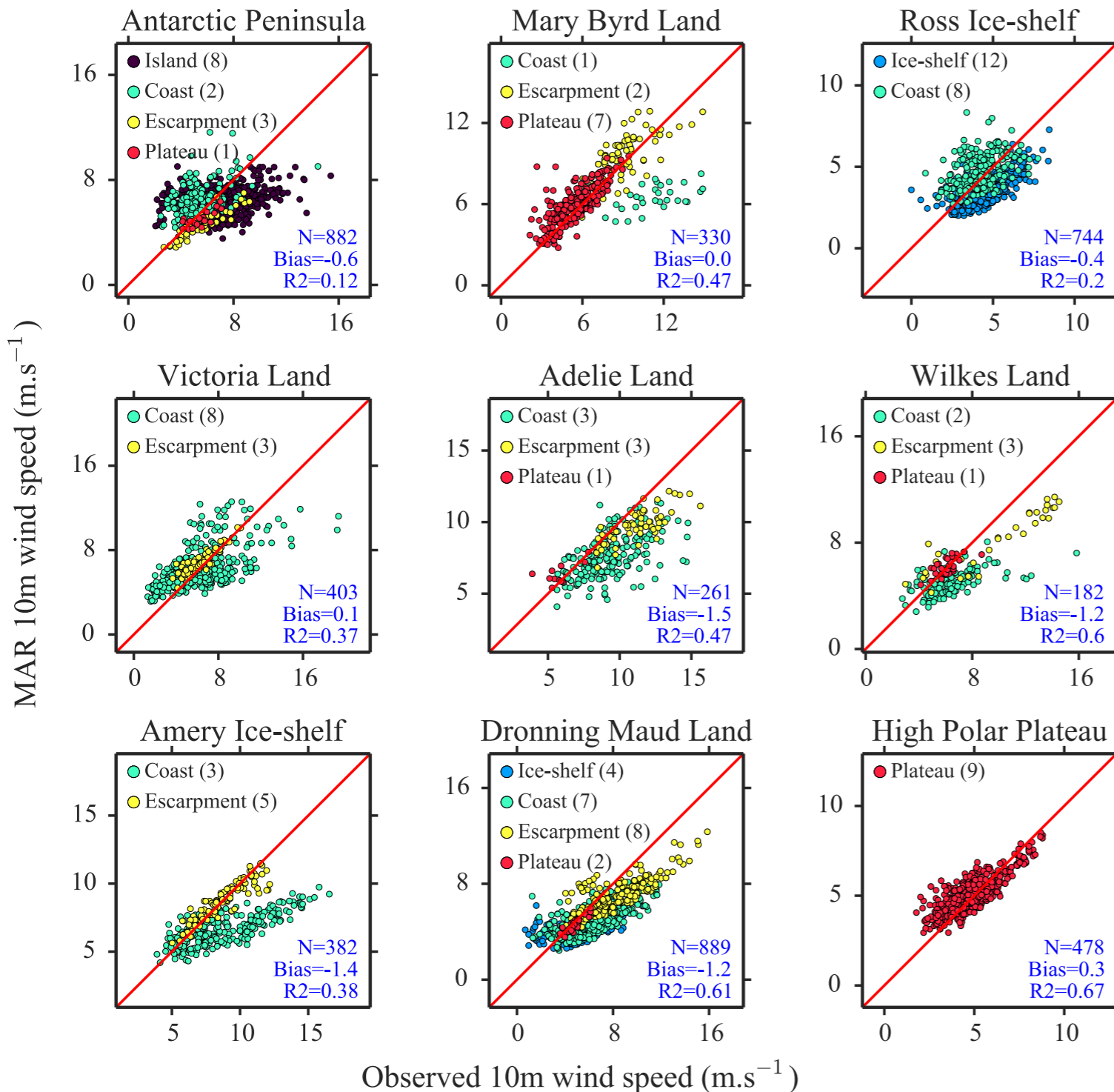
READER surface pressure (monthly)

Monthly



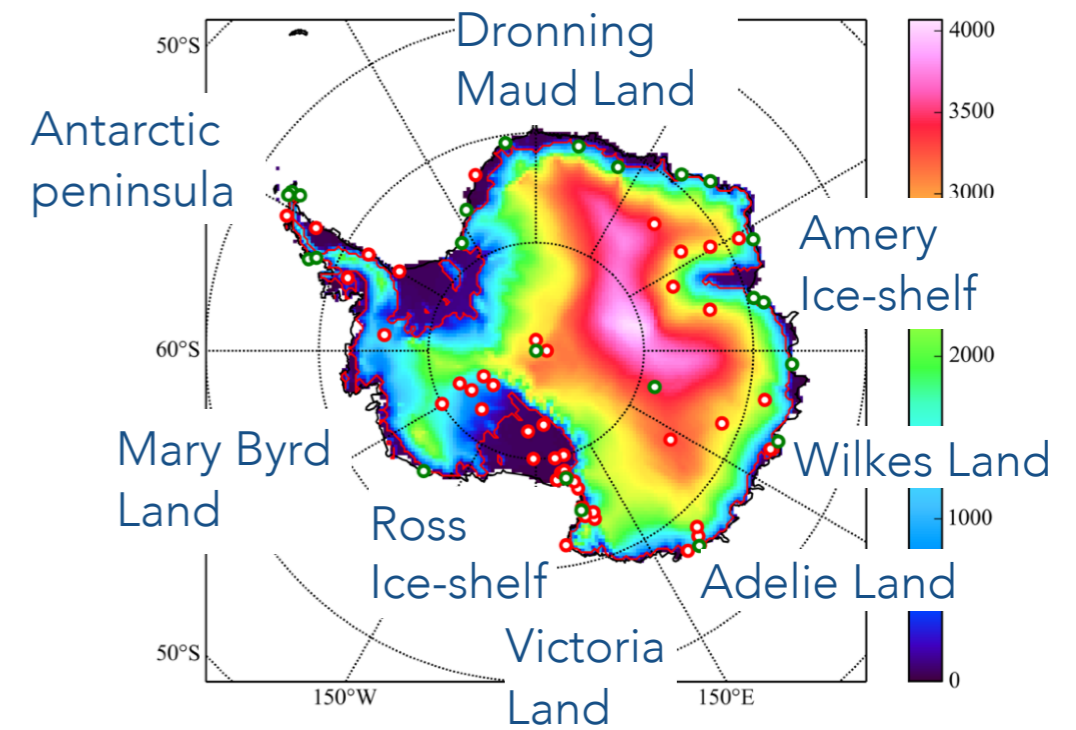
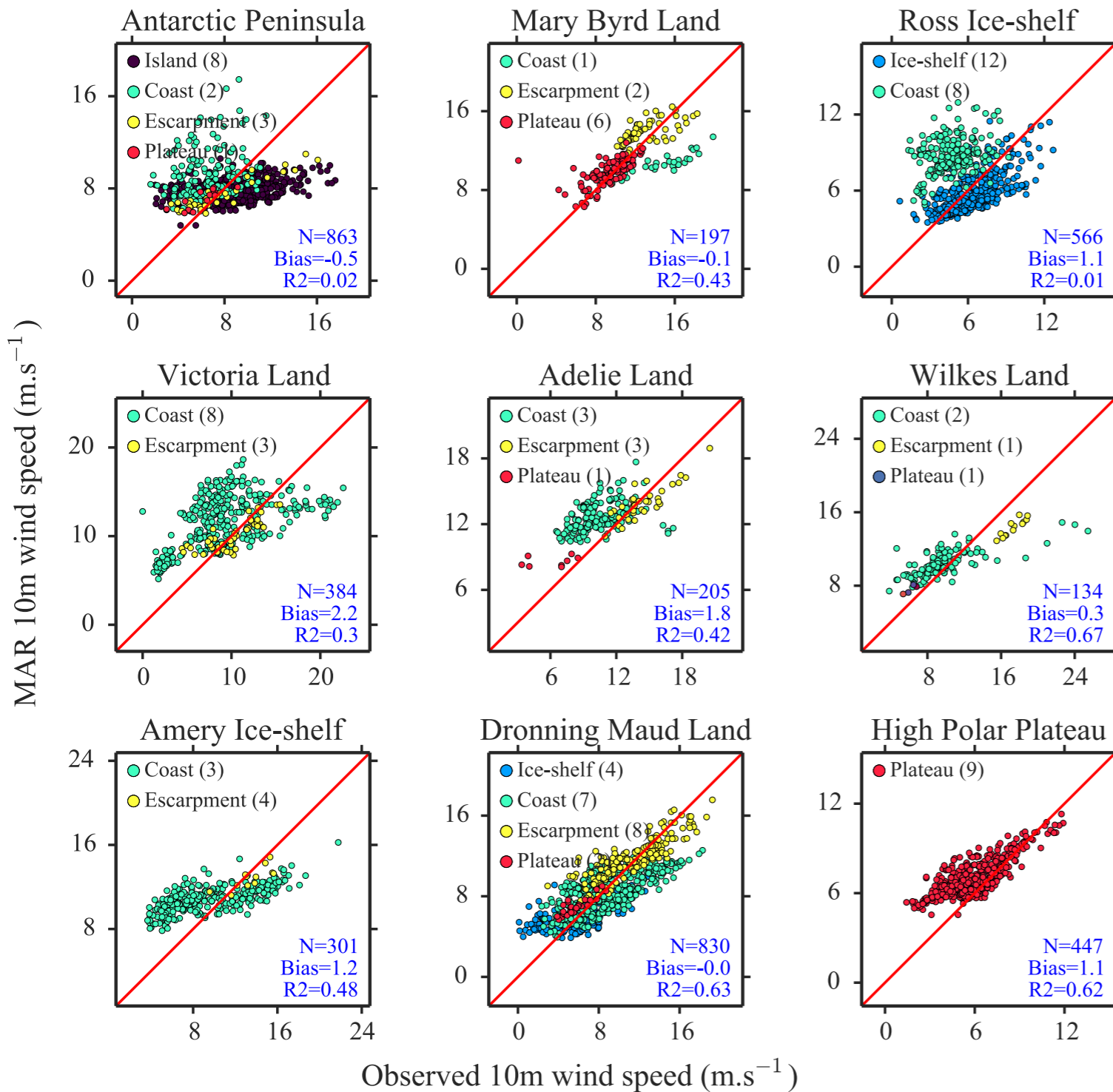
MODELLING THE ANTARCTIC CLIMATE

READER 10m wind speed (monthly) Summer (DJF)



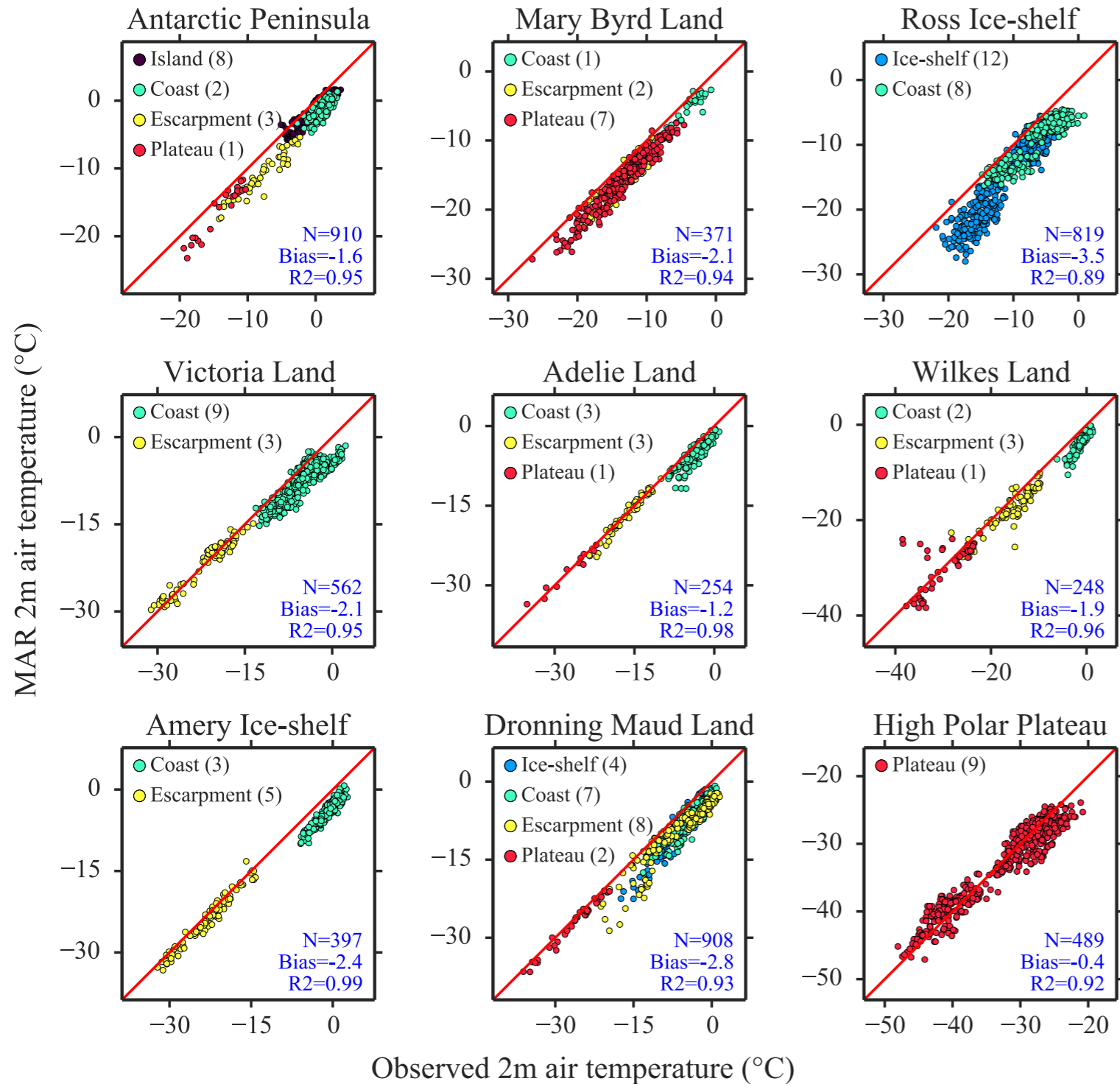
MODELLING THE ANTARCTIC CLIMATE

READER 10m wind speed (monthly) Winter (JJA)

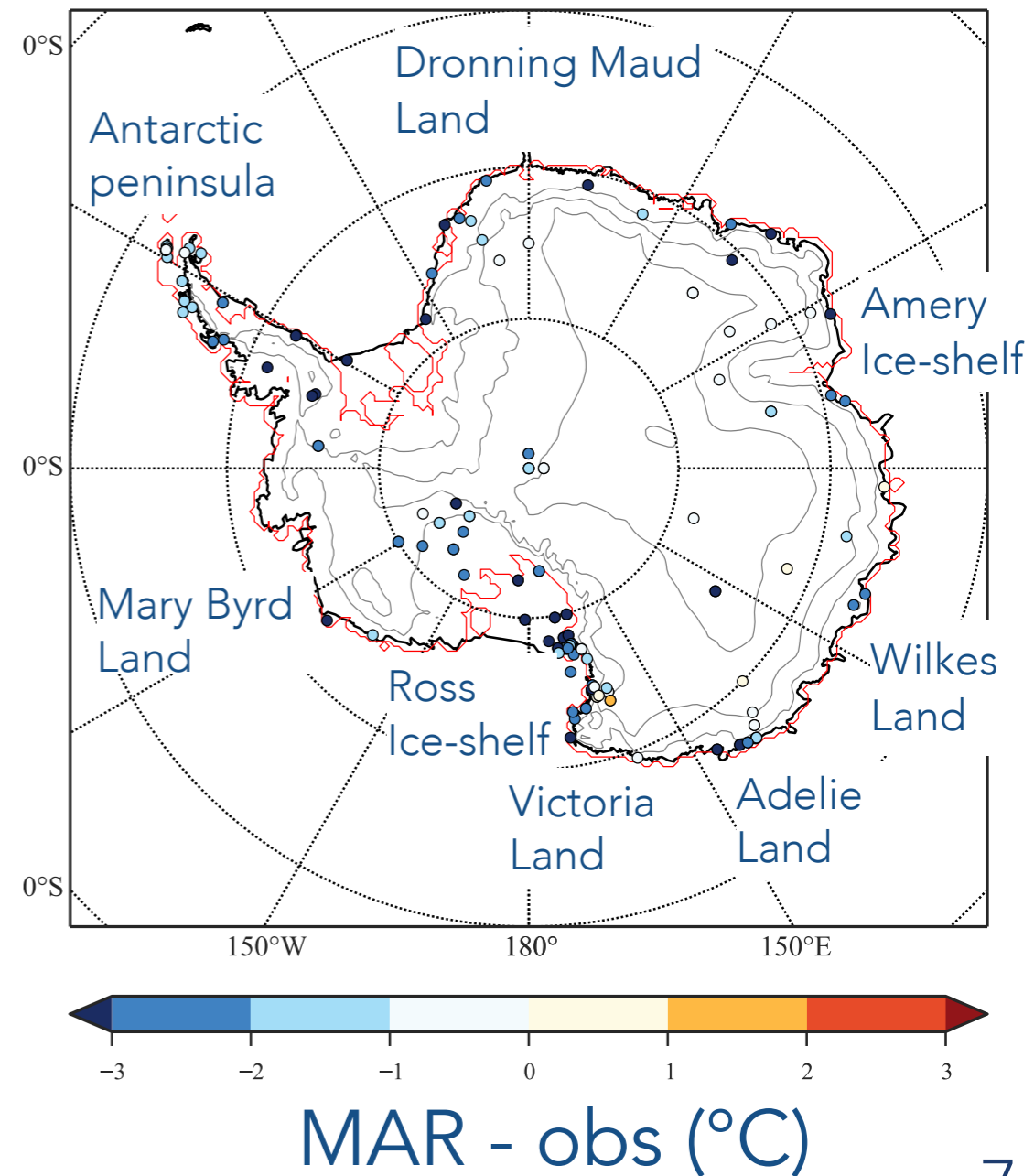


MODELLING THE ANTARCTIC CLIMATE

READER 2m air temperature (monthly) Summer (DJF)

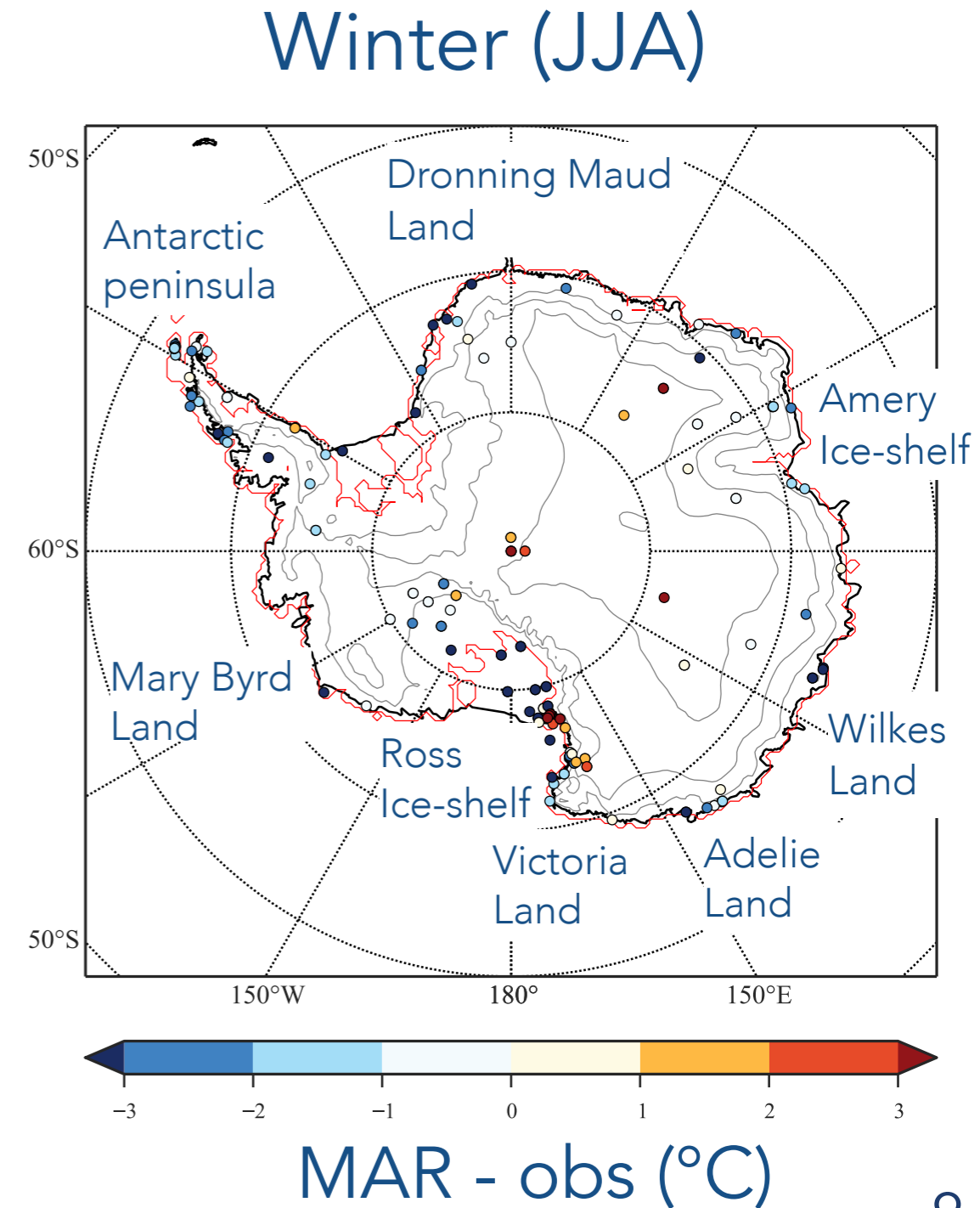
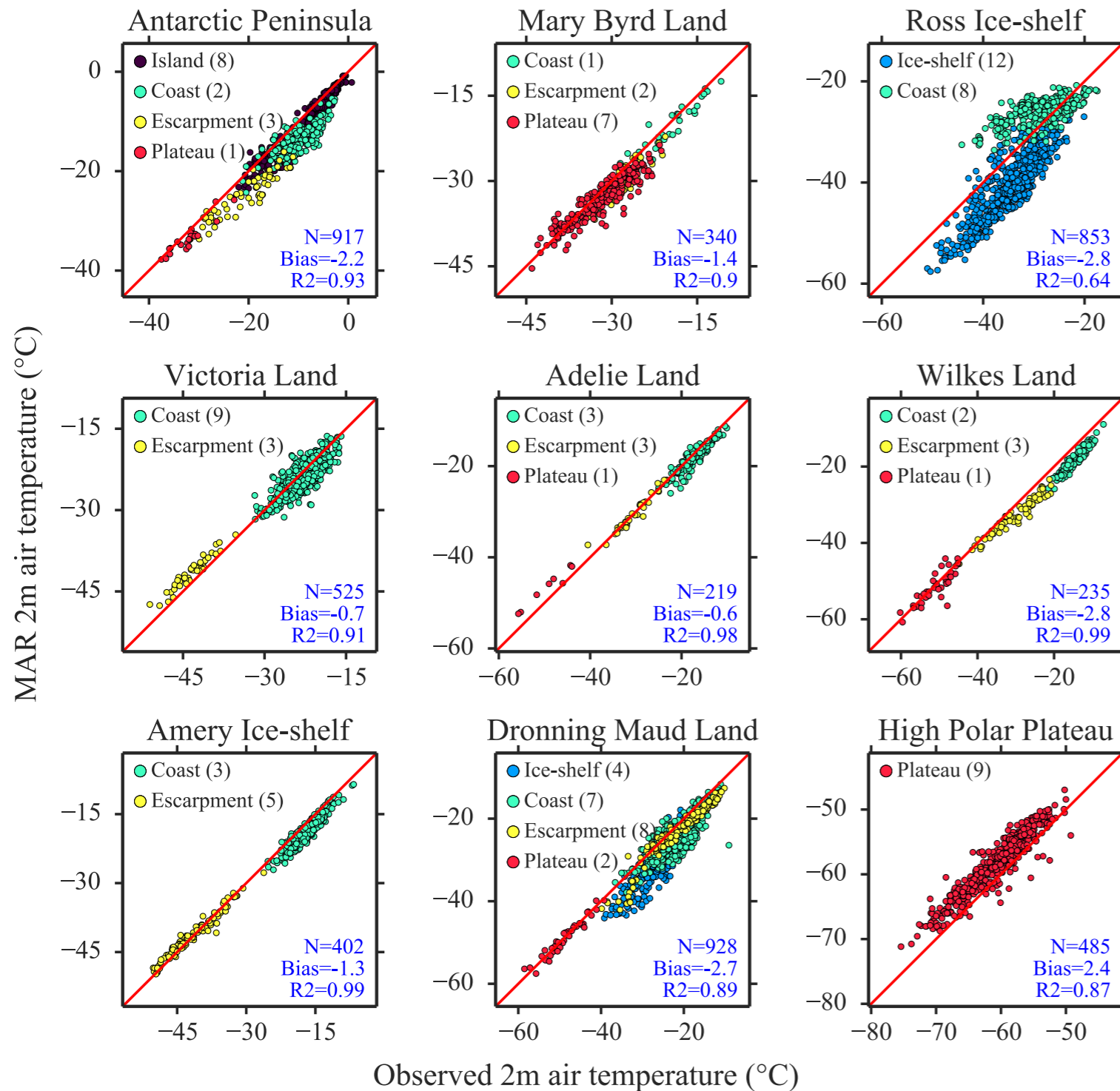


Summer (DJF)



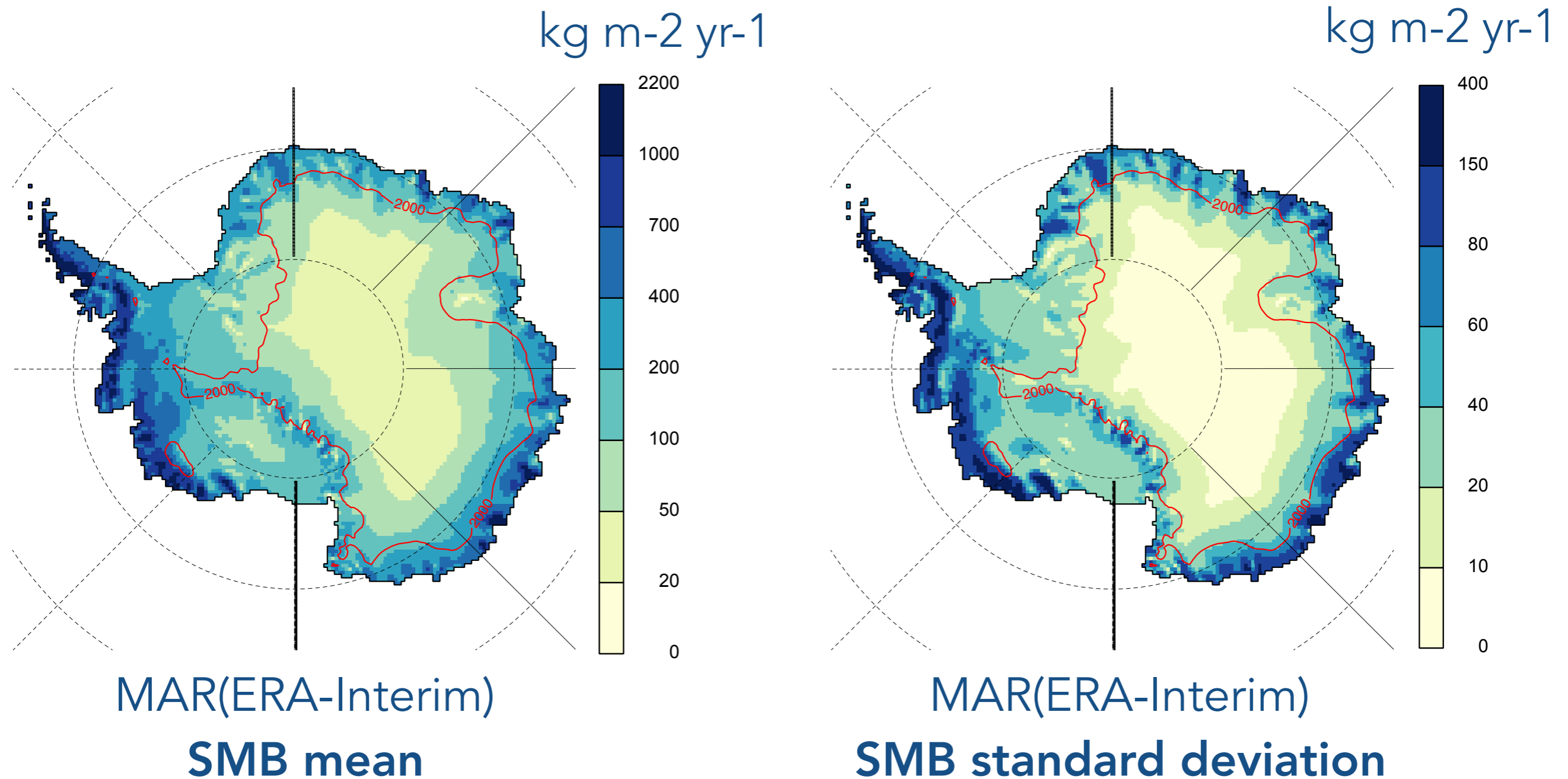
MODELLING THE ANTARCTIC CLIMATE

READER 2m air temperature (monthly) Winter (JJA)



MODELLING THE ANTARCTIC CLIMATE

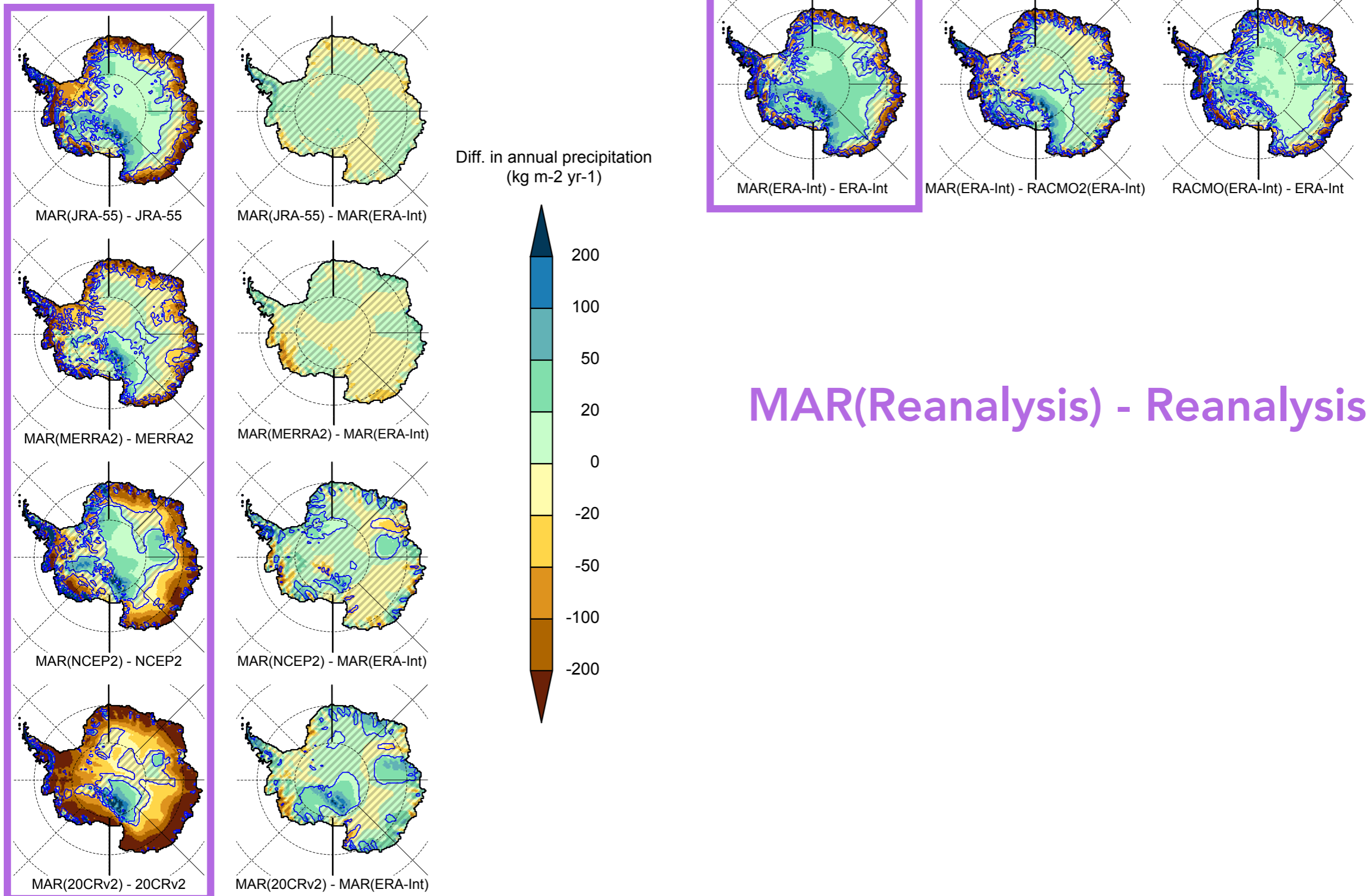
Annual surface mass balance (kg m⁻² yr⁻¹)



→ evaluation in Agosta et al. 2018 (in review, TCD)

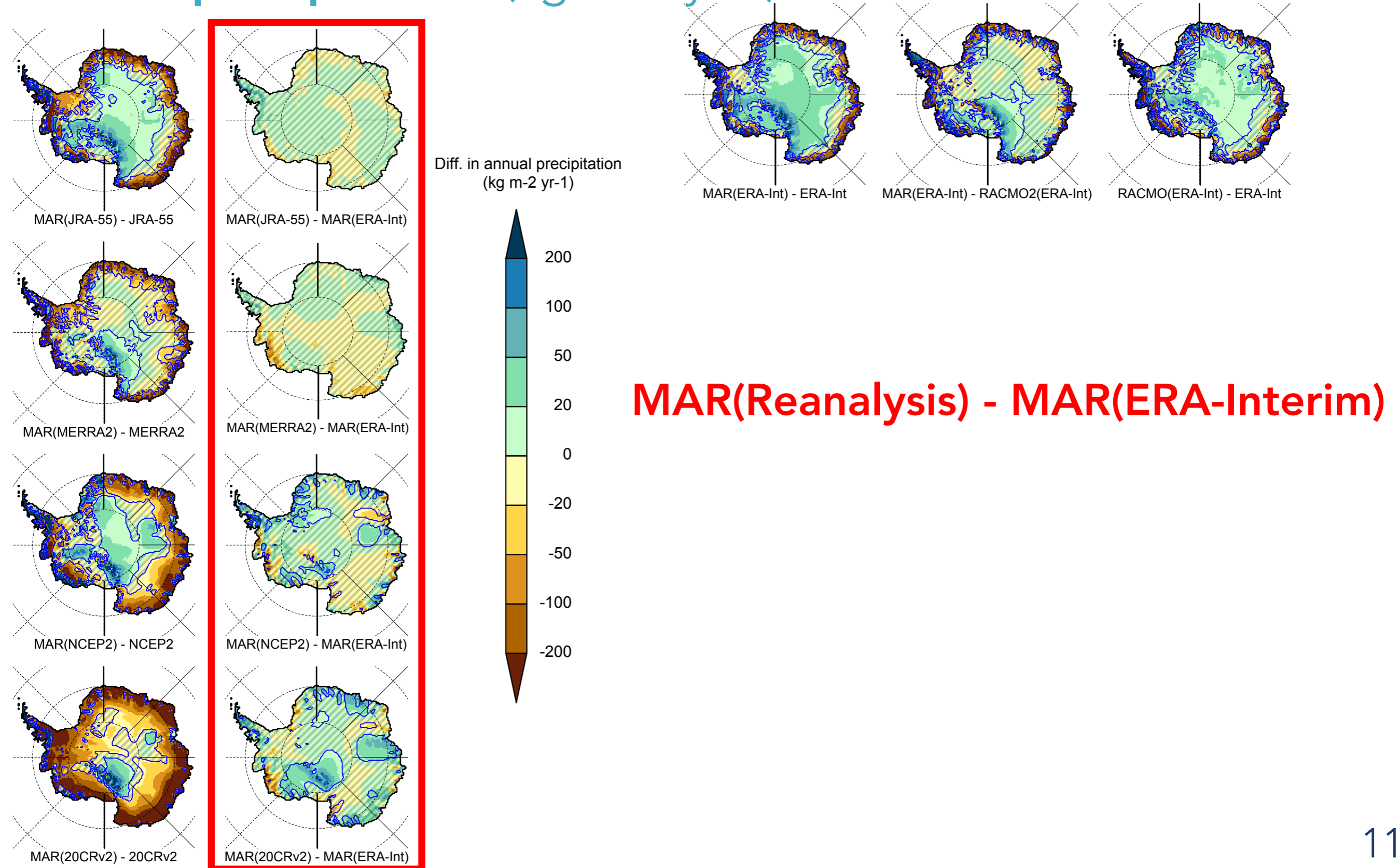
MODELLING THE ANTARCTIC CLIMATE

Annual precipitation (kg m⁻² yr⁻¹)



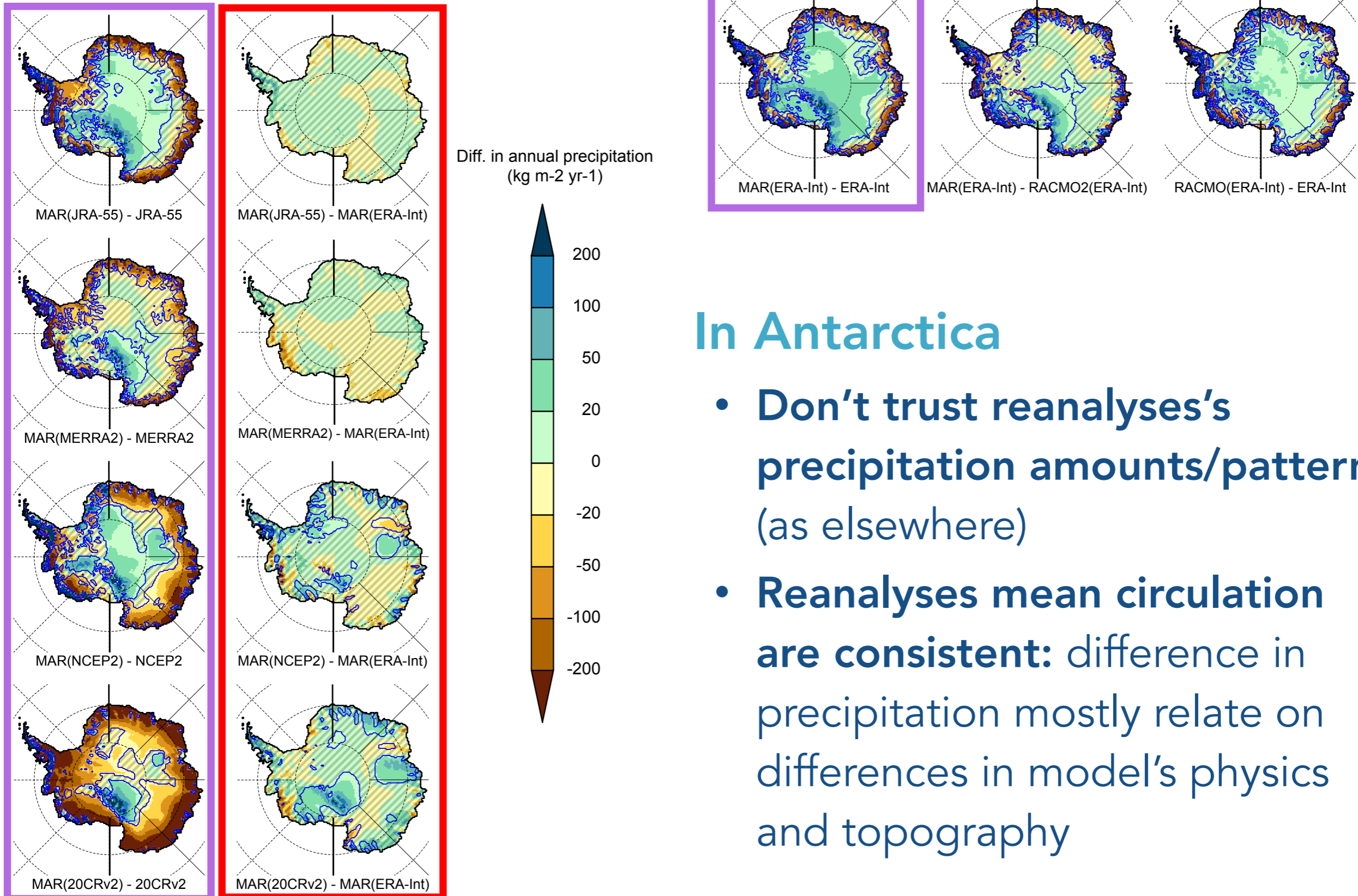
MODELLING THE ANTARCTIC CLIMATE

Annual precipitation (kg m⁻² yr⁻¹)



MODELLING THE ANTARCTIC CLIMATE

Annual precipitation (kg m⁻² yr⁻¹)

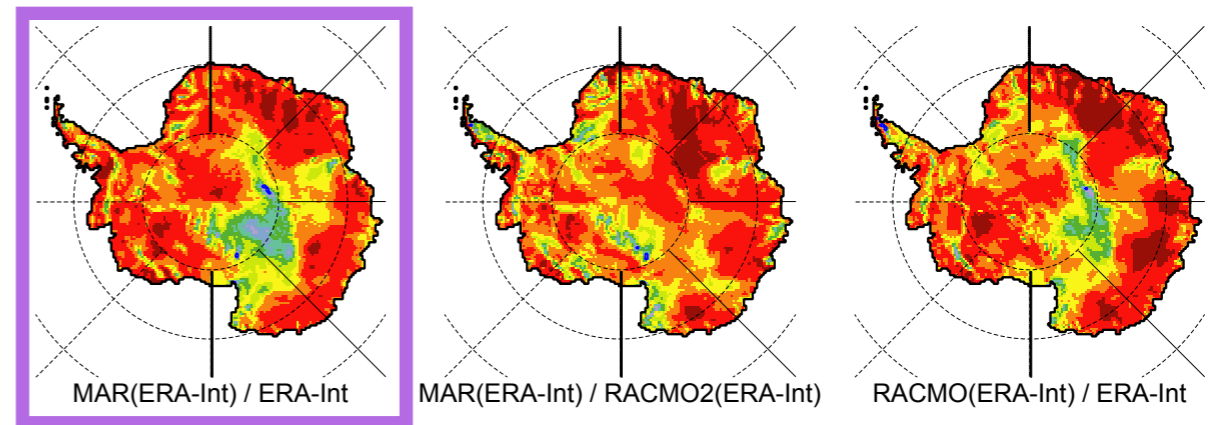
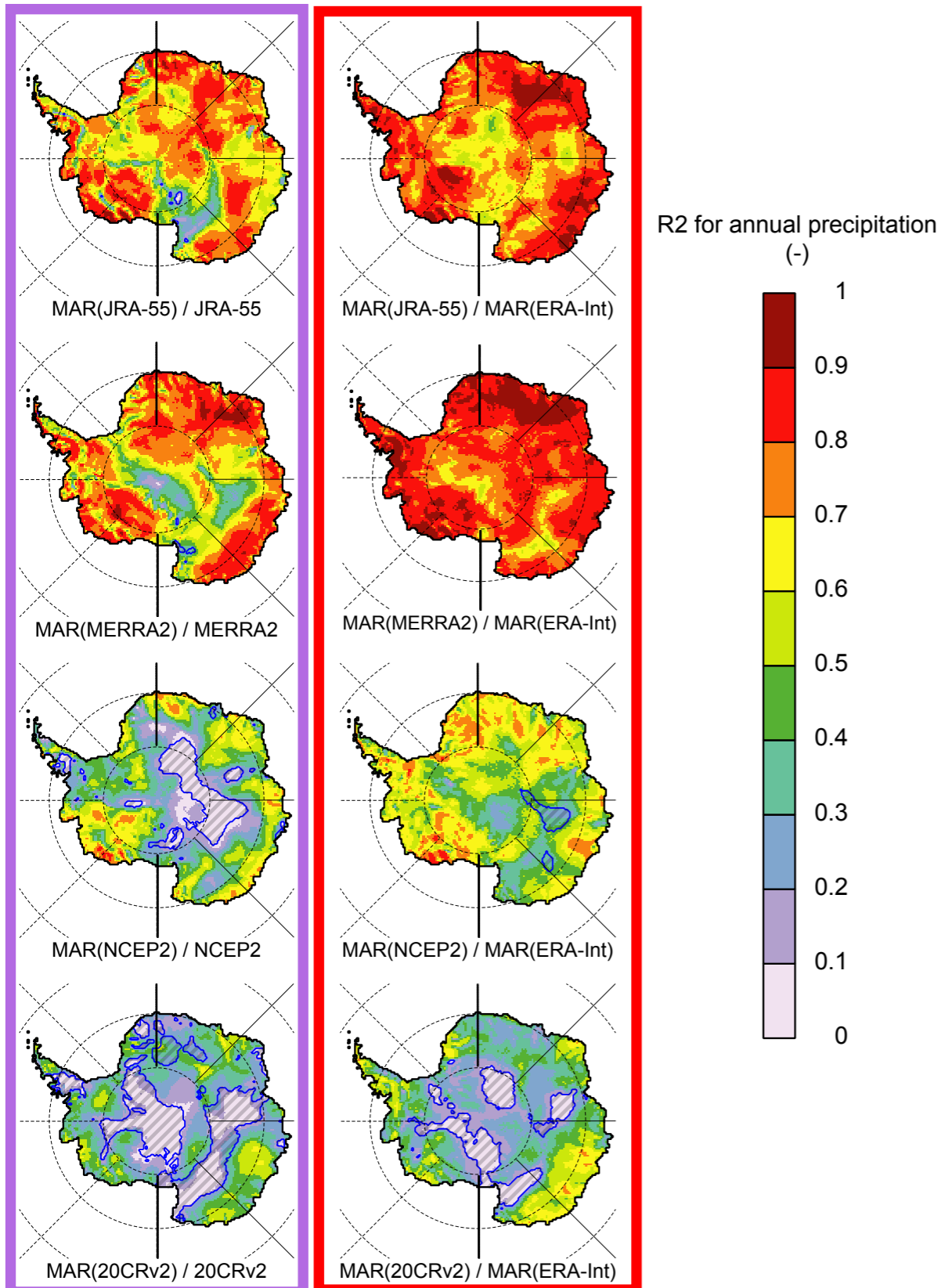


In Antarctica

- Don't trust reanalyses's precipitation amounts/pattern (as elsewhere)
- Reanalyses mean circulation are consistent: difference in precipitation mostly relate on differences in model's physics and topography

MODELLING THE ANTARCTIC CLIMATE

Annual precipitation, R2



In Antarctica

- Temporal variability is reanalyse-dependent
- Don't trust temporal variability of NCEP and 20CR