

Future changes in poleward moisture transport linked to atmospheric rivers

Richard Bintanja^{1,2}, **Jeroen Sonnemans**^{1,3}, Marlen Kolbe^{1,2}, Kiri Whan¹, Karin van der Wiel¹, Imme Benedict³

1. Royal Netherlands Meteorological Institute (KNMI)
2. Energy and Sustainability Research Institute Groningen (ESRIG), Groningen University (RUG)
3. Wageningen University & Research (WUR)



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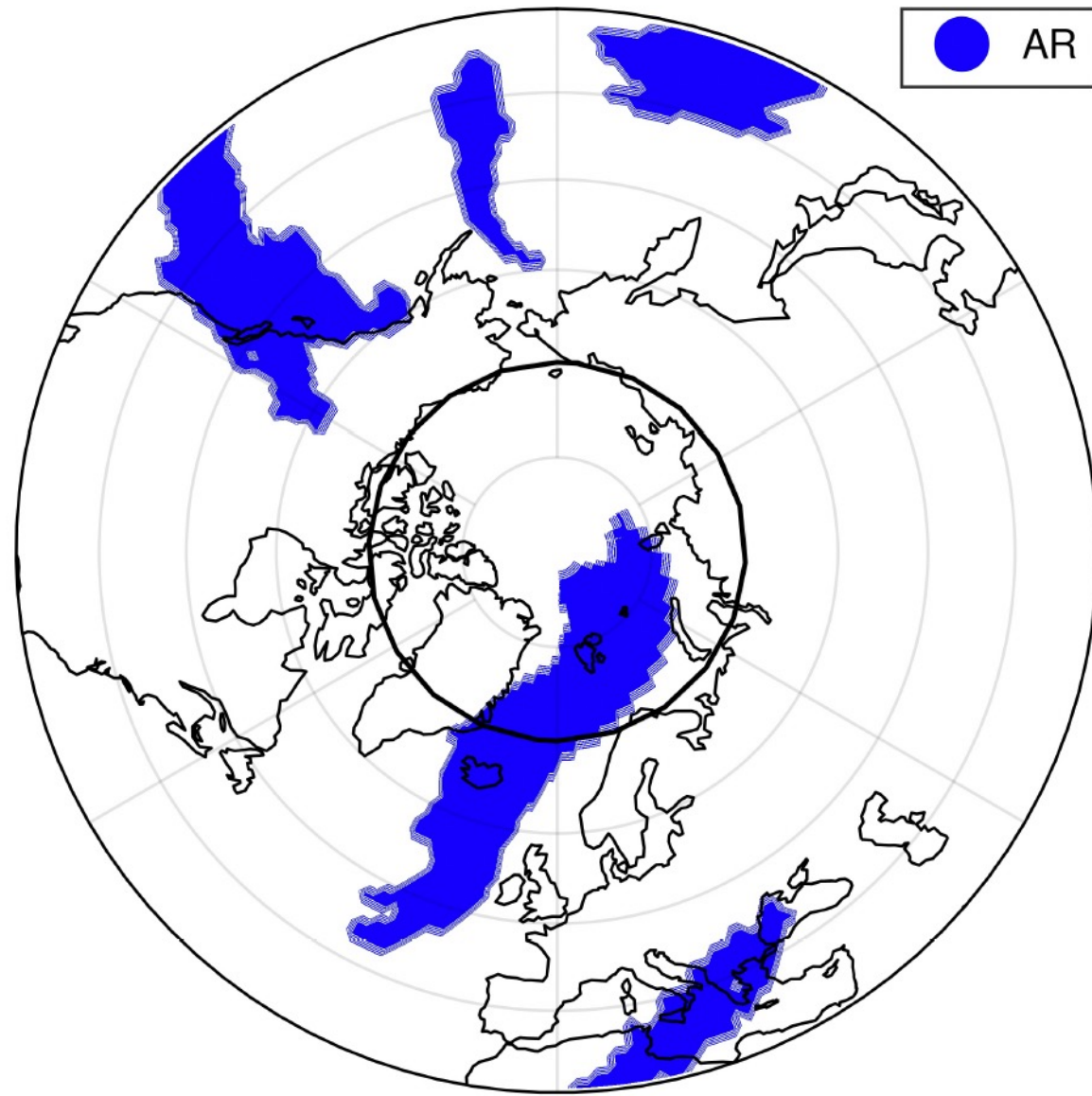
Svalbard residents evacuated ahead of 'extreme' storm

Residents in parts of Longyearbyen were evacuated on Monday and several roads were closed ahead of predicted heavy rains in the Svalbard archipelago in the heart of the Norwegian Arctic.

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Arctic AR-event 2016-11-08



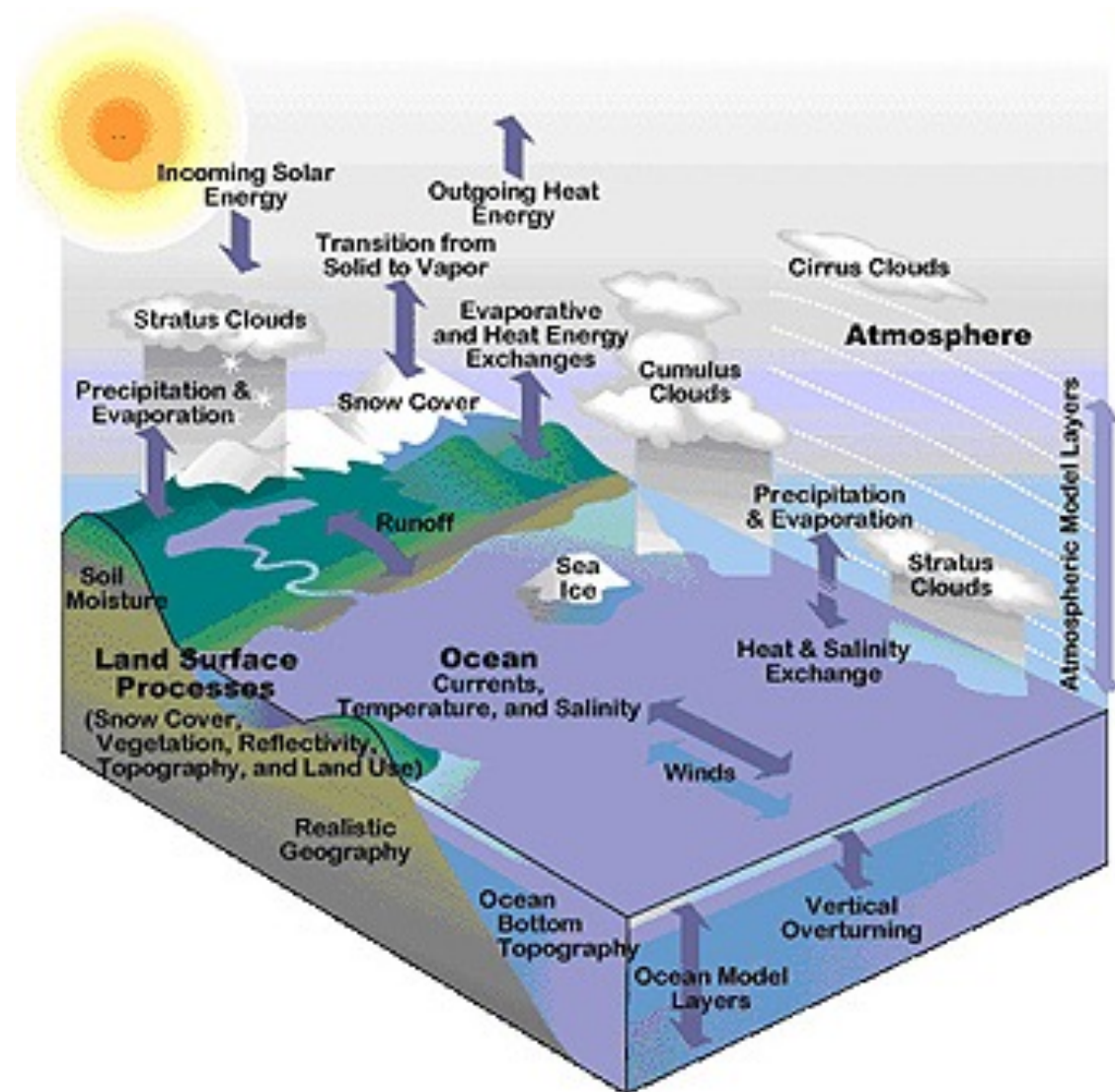
EC-Earth climate model

- EC-Earth: IFS-NEMO
- Simulated three climate states
 - Present day (PD)
 - Future (2C, 3C warmer)
- Large ensembles: 2000 years per climate state to assess variability and extremes
- Evaluate Arctic (70-90N) ARs using daily data

$$IVT = \frac{1}{g} \int_{p_{1000h Pa}}^{p_{100h Pa}} q \mathbf{V} dp$$

$\mathbf{V}$ = horizontal wind (m/s)

q = specific humidity (-)



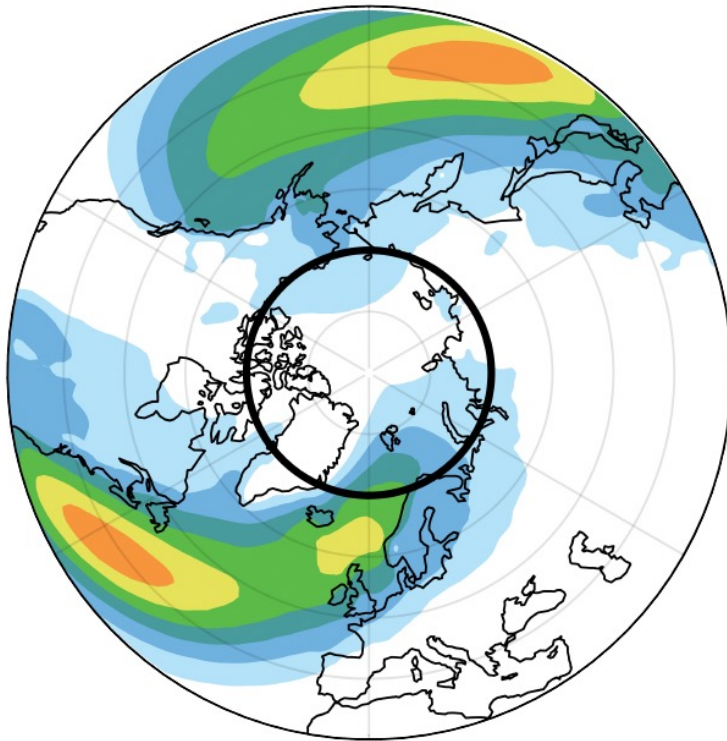
EC-EARTH VALIDATION IN TERMS OF AR'S

EC-Earth

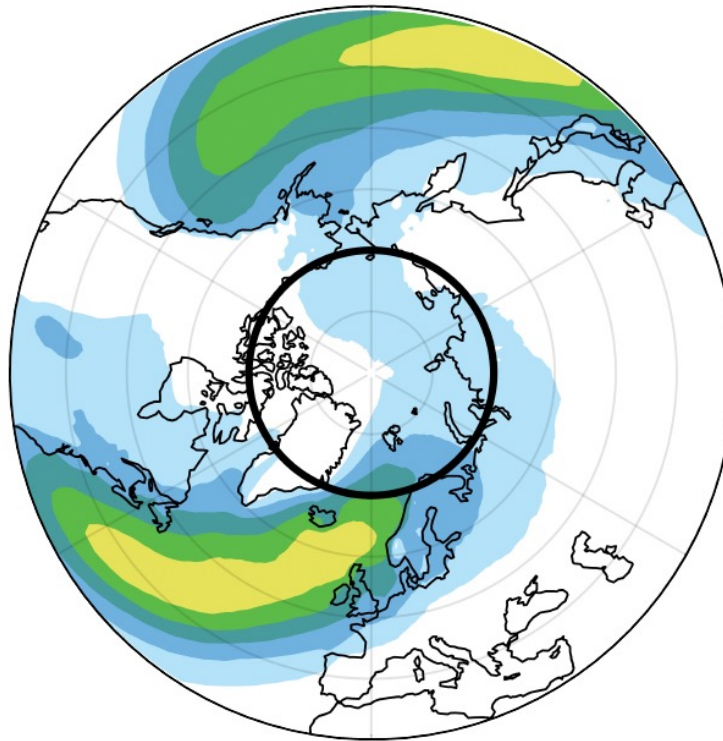
ERA5

NCEP

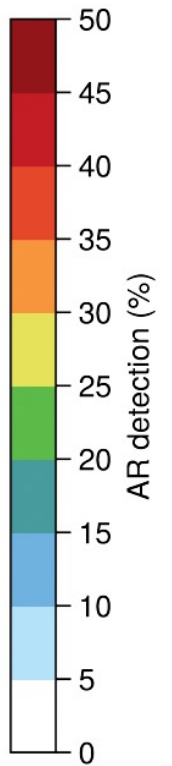
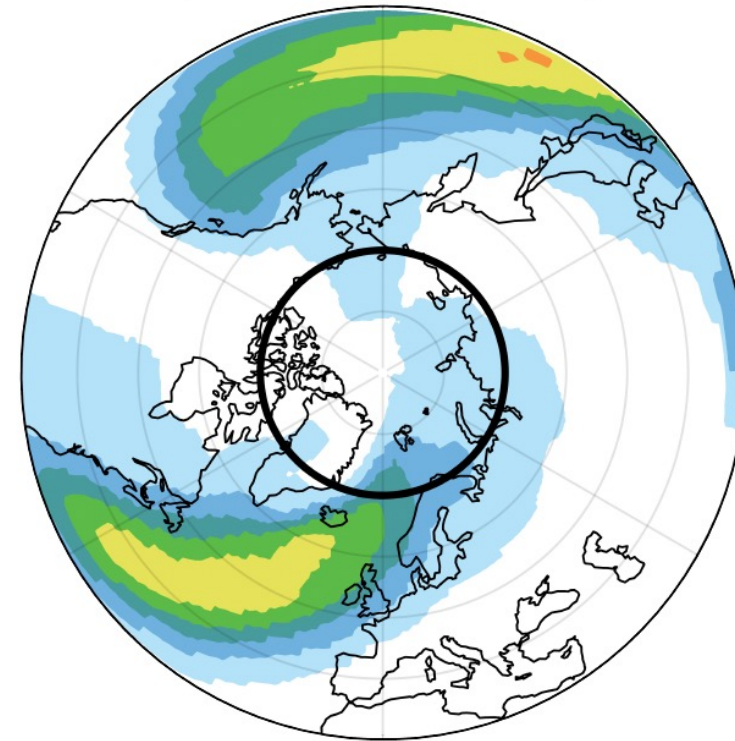
a) ARs ECEarth (1.125°x1.125°)



b) ARs ERA5 (1.125°x1.125°)

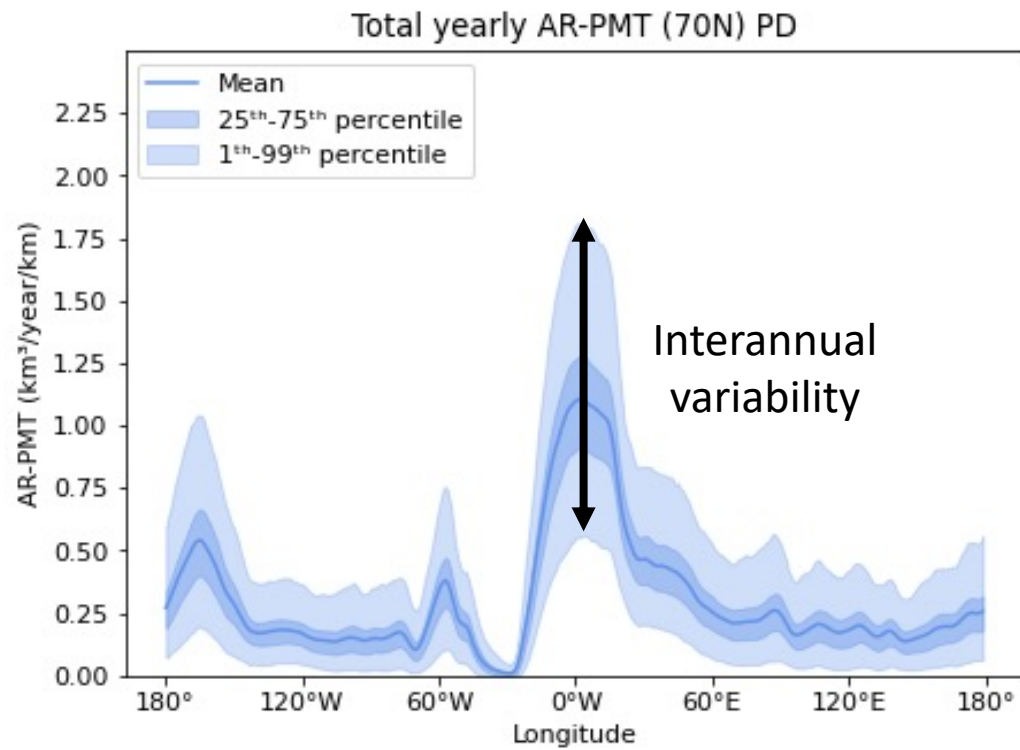


c) ARs NCEP (1.125°x1.125°)

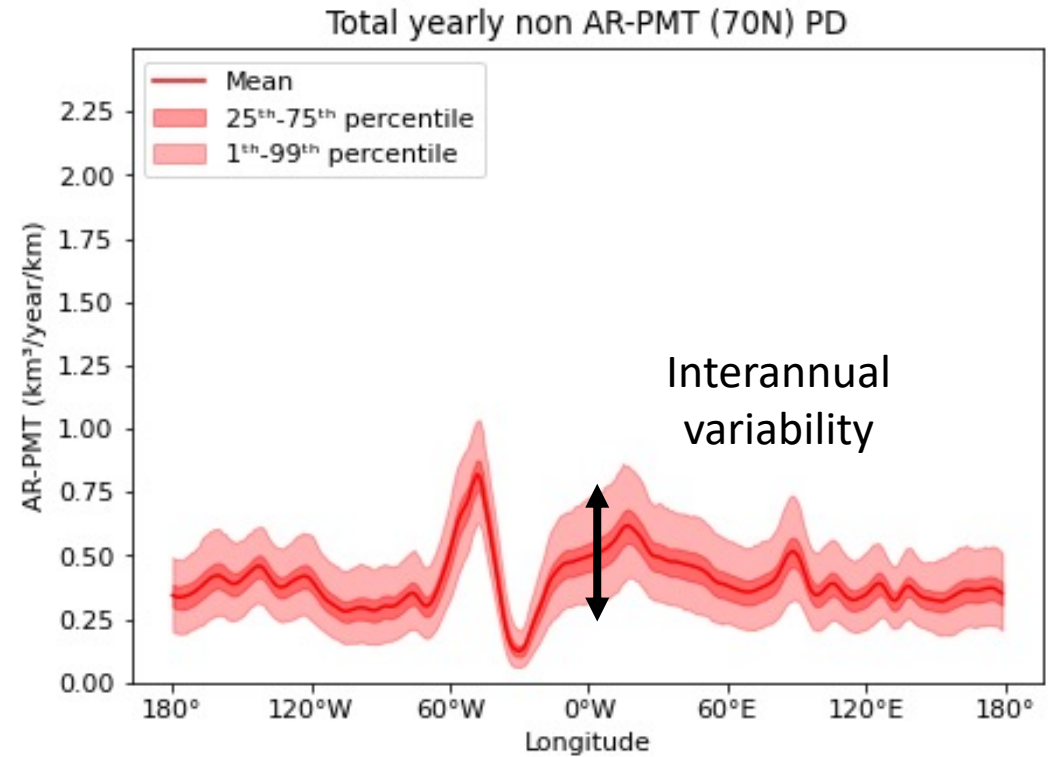


POLEWARD MOISTURE TRANSPORT

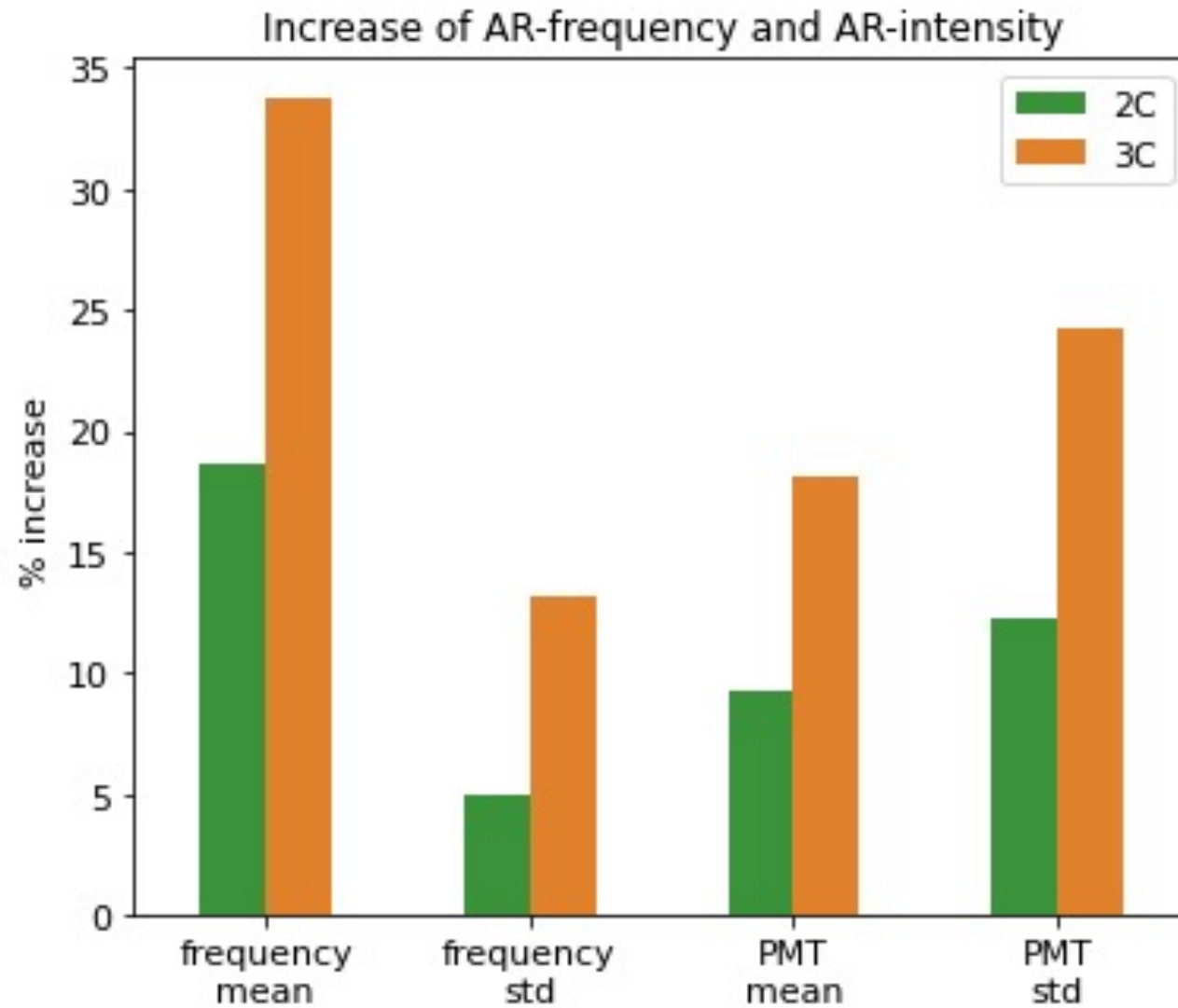
AR-related



Non AR-related



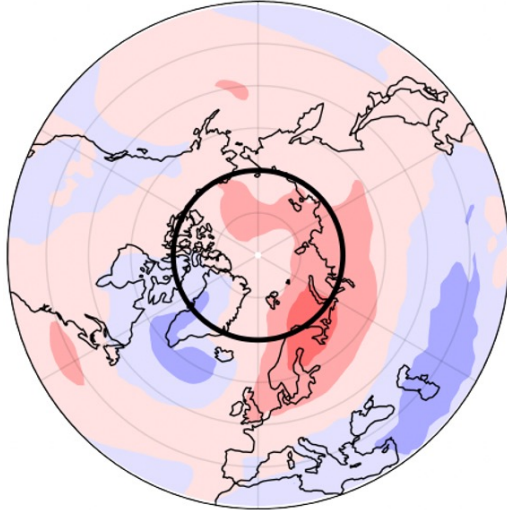
FUTURE INCREASE IN AR-FREQUENCY AND AR-INTENSITY



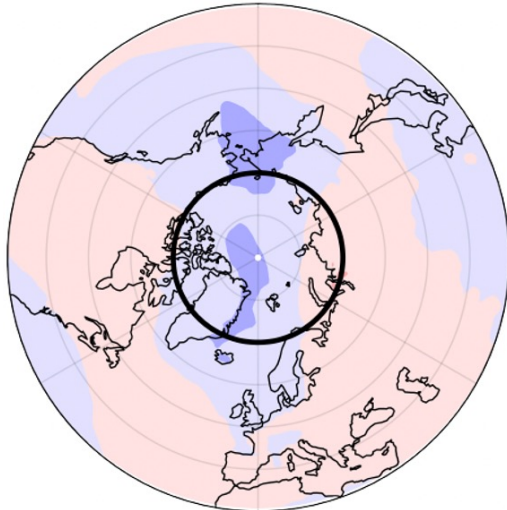
HOW DO 'ARCTIC' AR'S AFFECT TEMPERATURE AND PRECIPITATION?

TEMPERATURE

b) Correlation T with AR-PMT 3C

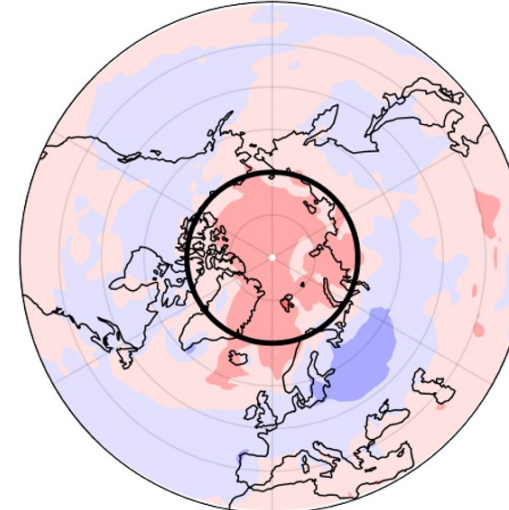


f) Correlation T with non-AR-PMT 3C

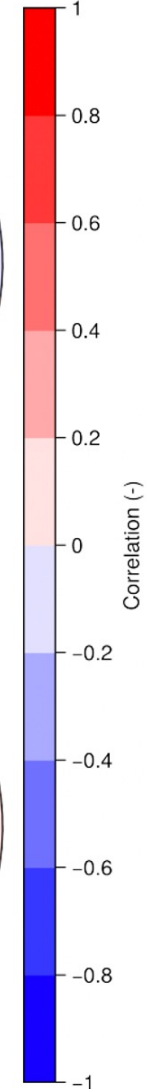
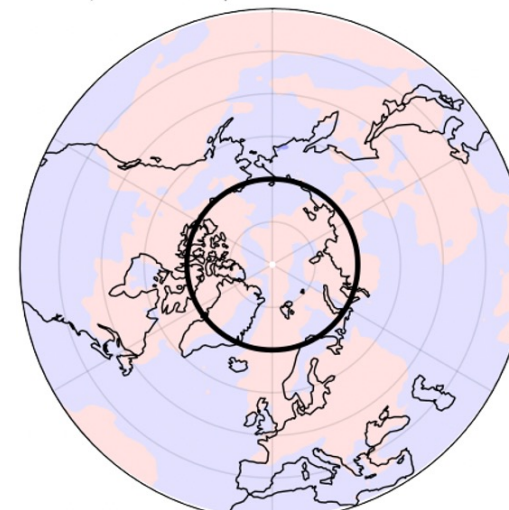


PRECIPITATION

d) Correlation pr with AR-PMT 3C



h) Correlation pr with non-AR-PMT 3C



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FUTURE CHANGE IN AR-FREQUENCY

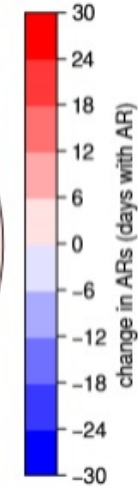
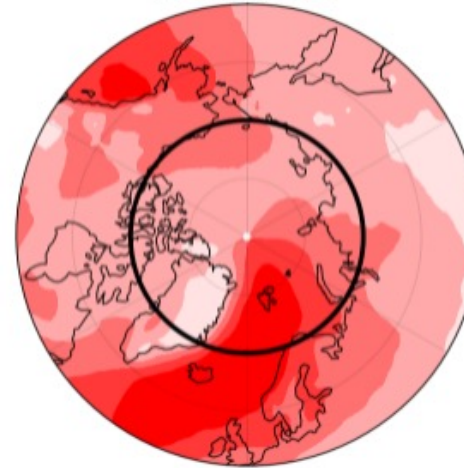
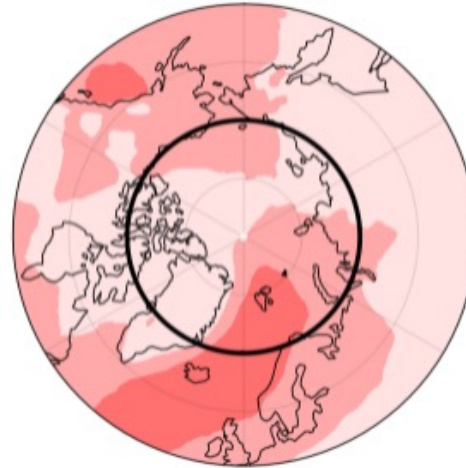
MEAN

2C

3C

ARs 2C - ARs PD

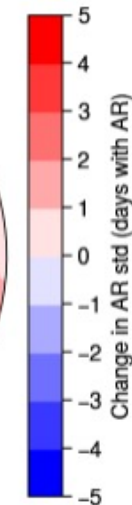
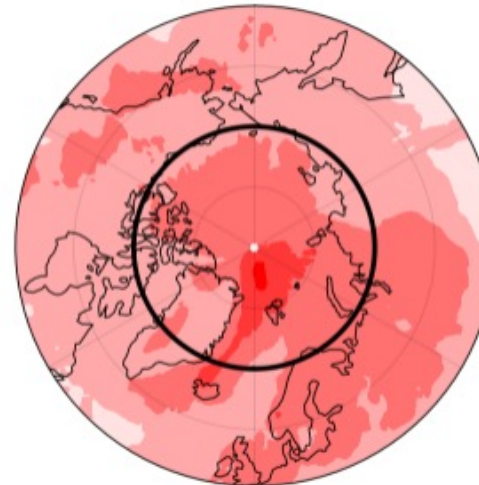
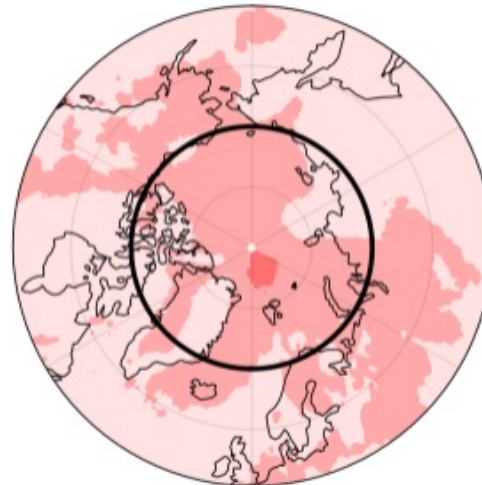
ARs 3C - ARs PD



VARIABILITY

ARs std 2C - ARs std PD

ARs std 3C - ARs std PD



SEASONAL VARIATION IN AR-OCCURRENCE

