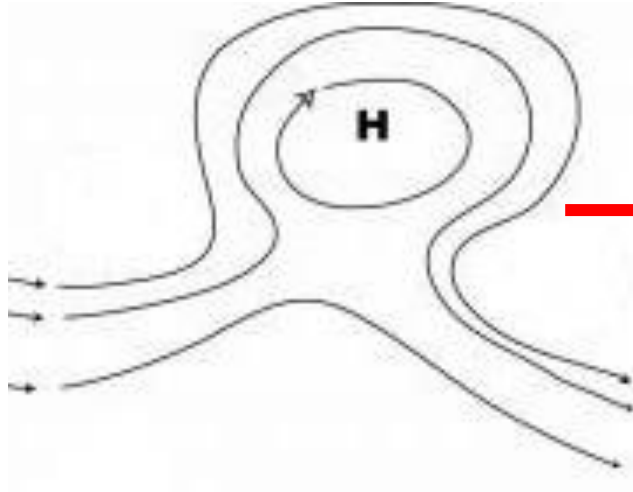


Blocking



Heatwaves

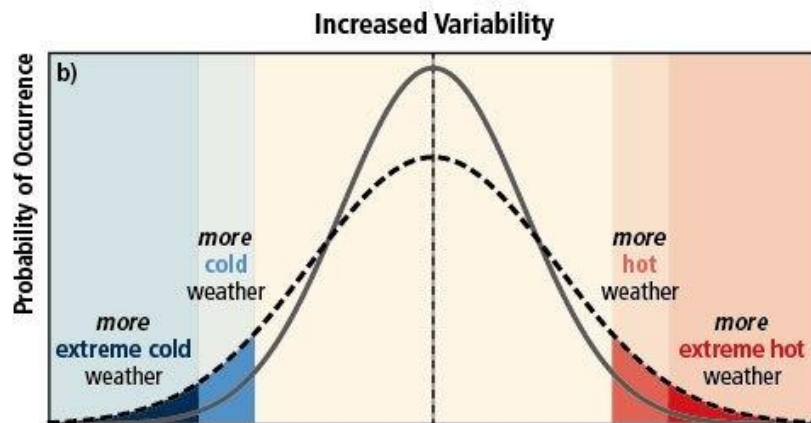
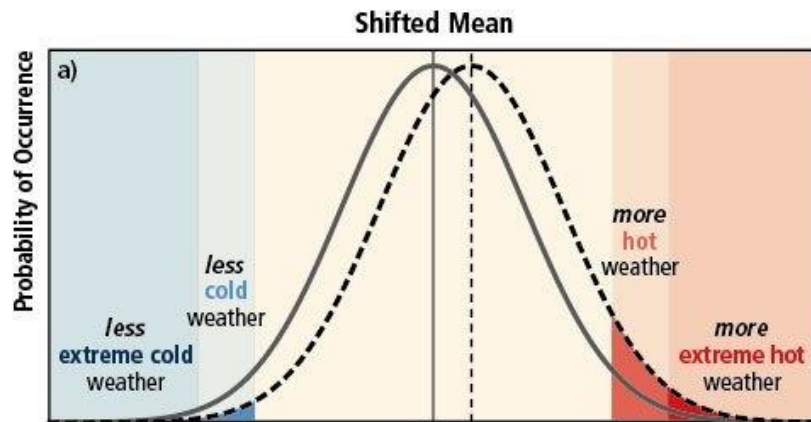


Less heatwave-driving blocking under global warming

Pak Wah CHAN (Packard)

Collaborators: Jennifer Catto & Mat Collins

Factors in heatwave frequency



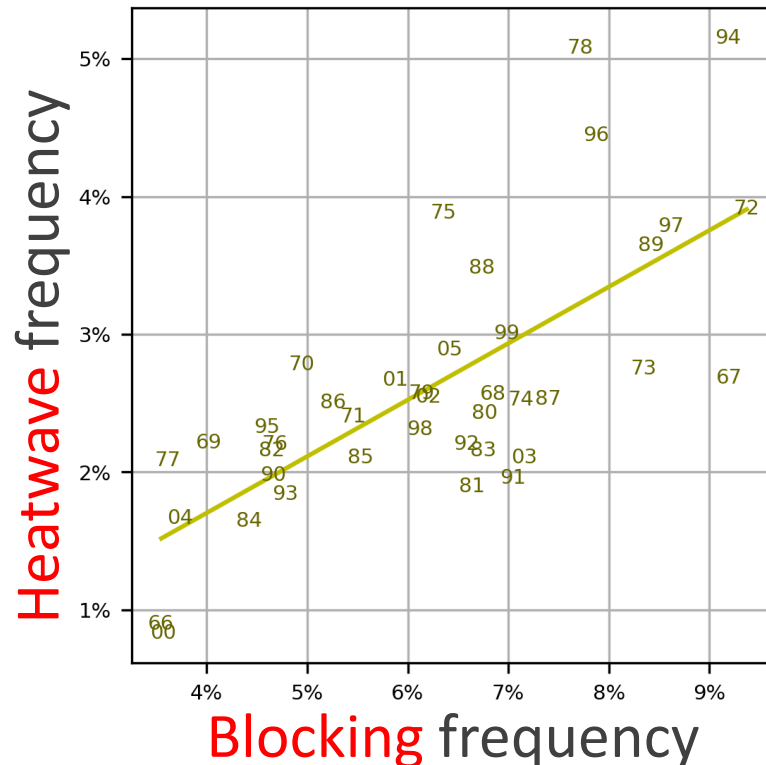
IPCC 2012

- Mean temperature
 - Global warming
- Variability in forcing
 - E.g., **blocking**
- Sensitivity
 - E.g., soil moisture

Objective: Partition $\Delta(\text{heatwave})$ coming from these factors

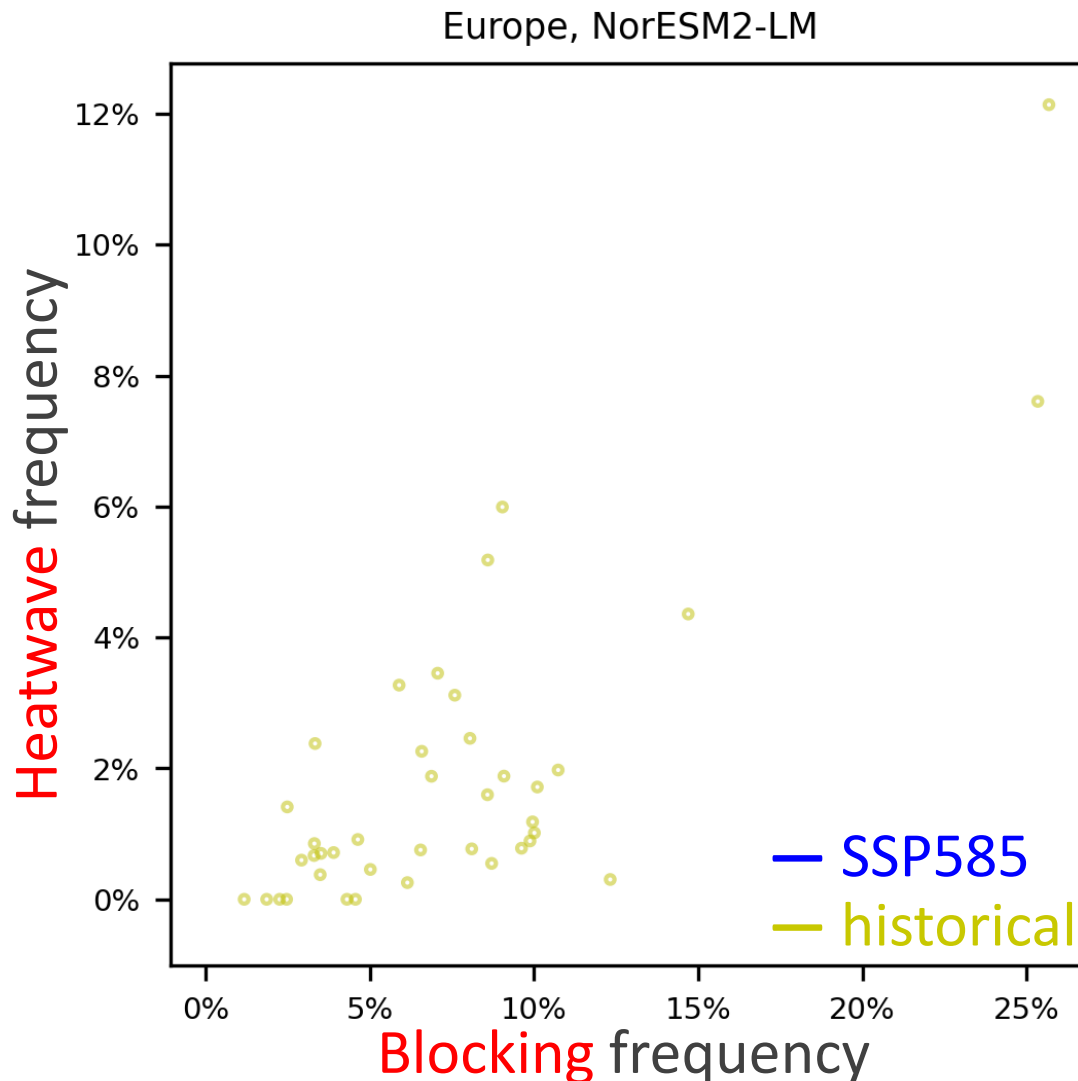
Optimized blocking index

- Maximizes corr (heatwave, blocking)
[framework from Chan et al. 2019 GRL]
- Optimized blocking index
:= Dole & Gordon 1983 (anomaly-based) with $A=1$ stdev, $D=5$ days

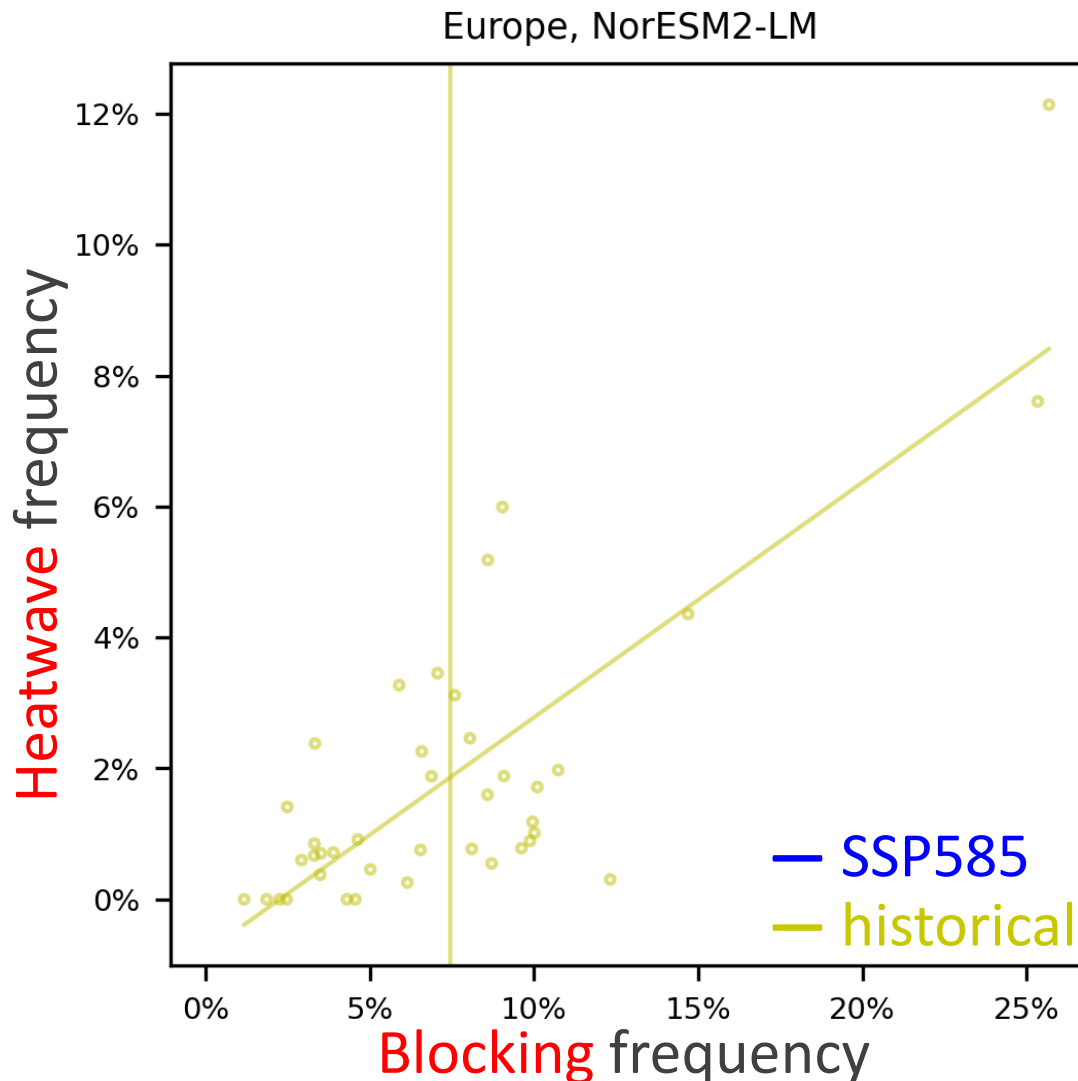


$r = 0.74$

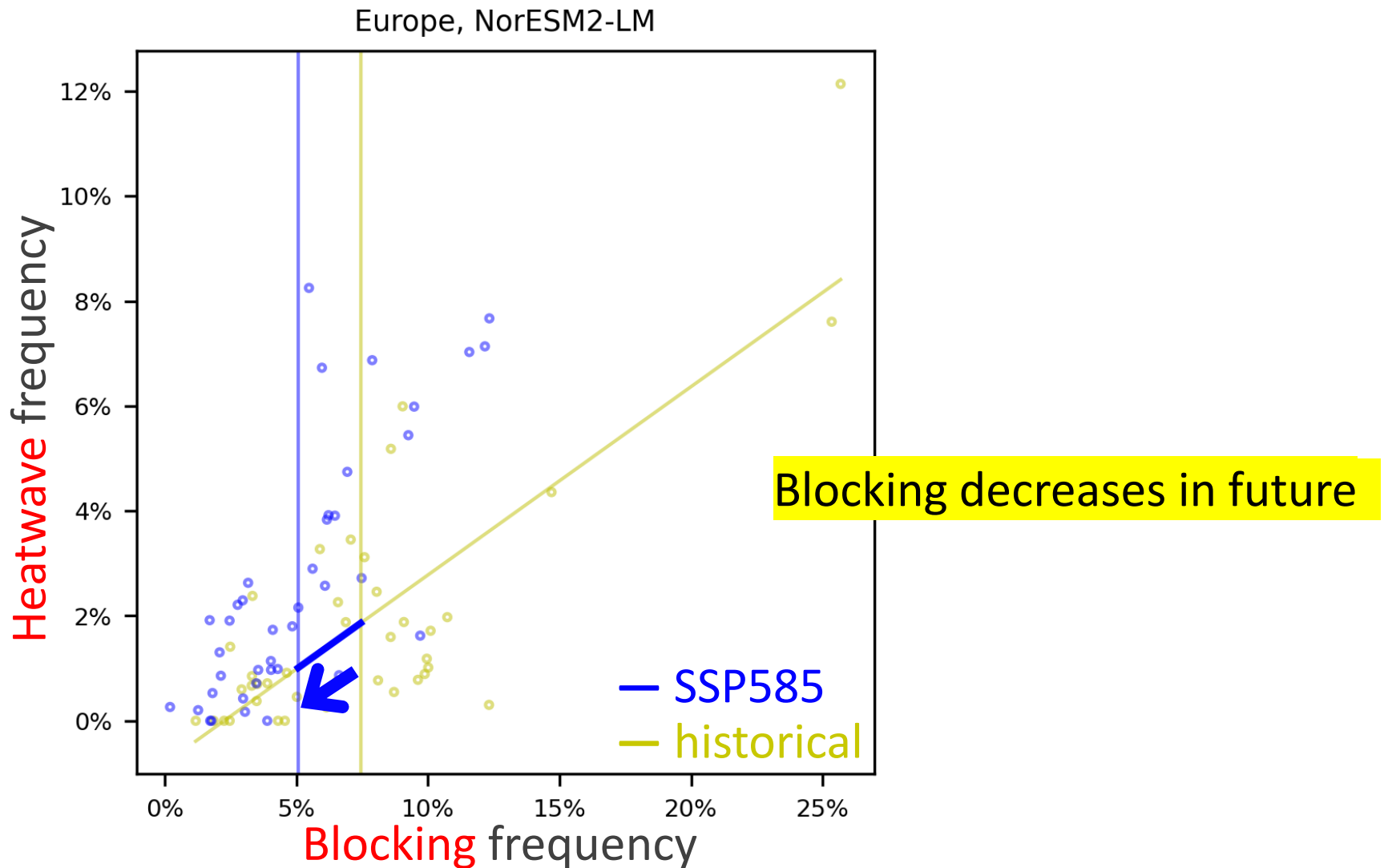
Europe in one CMIP6 model



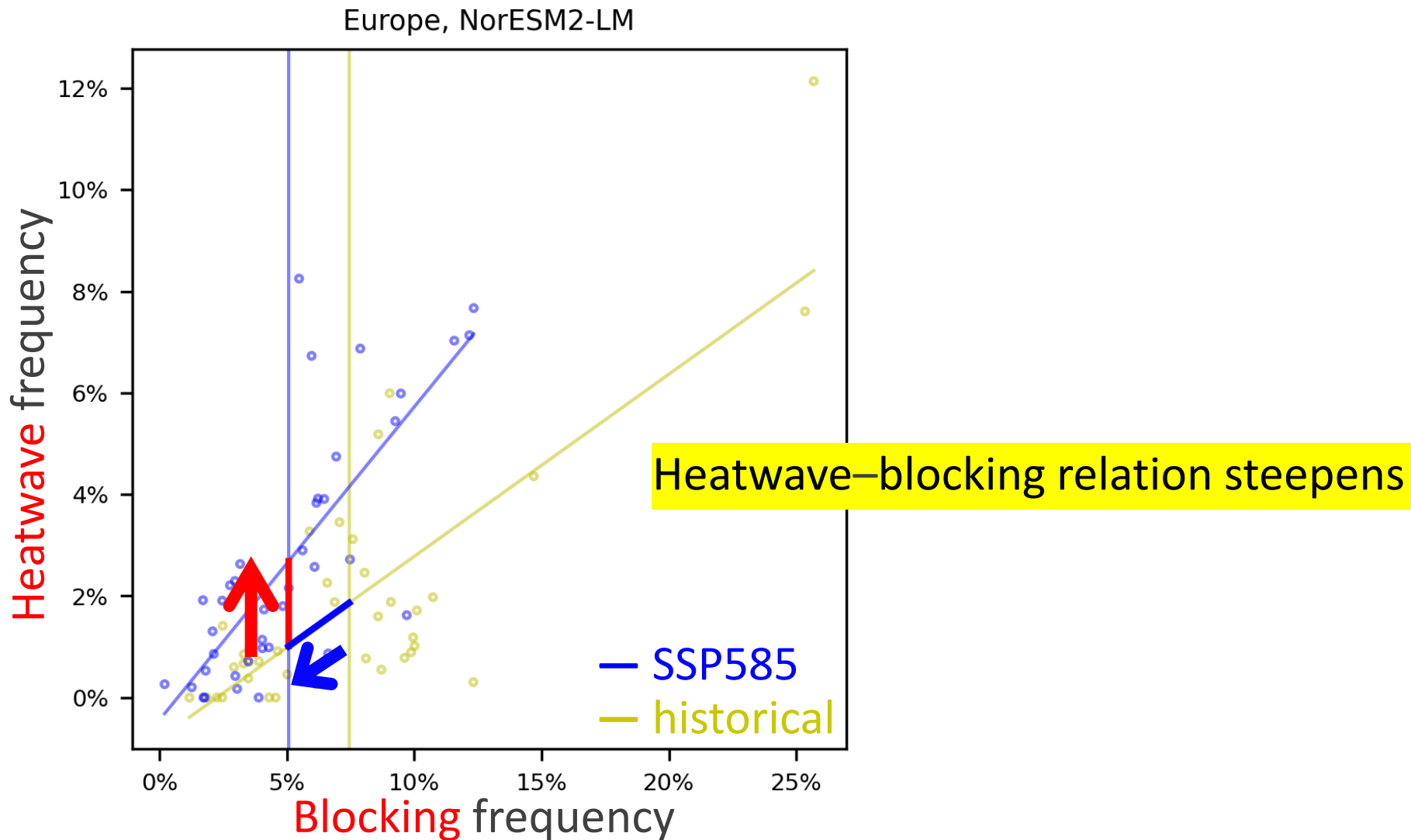
Europe in one CMIP6 model



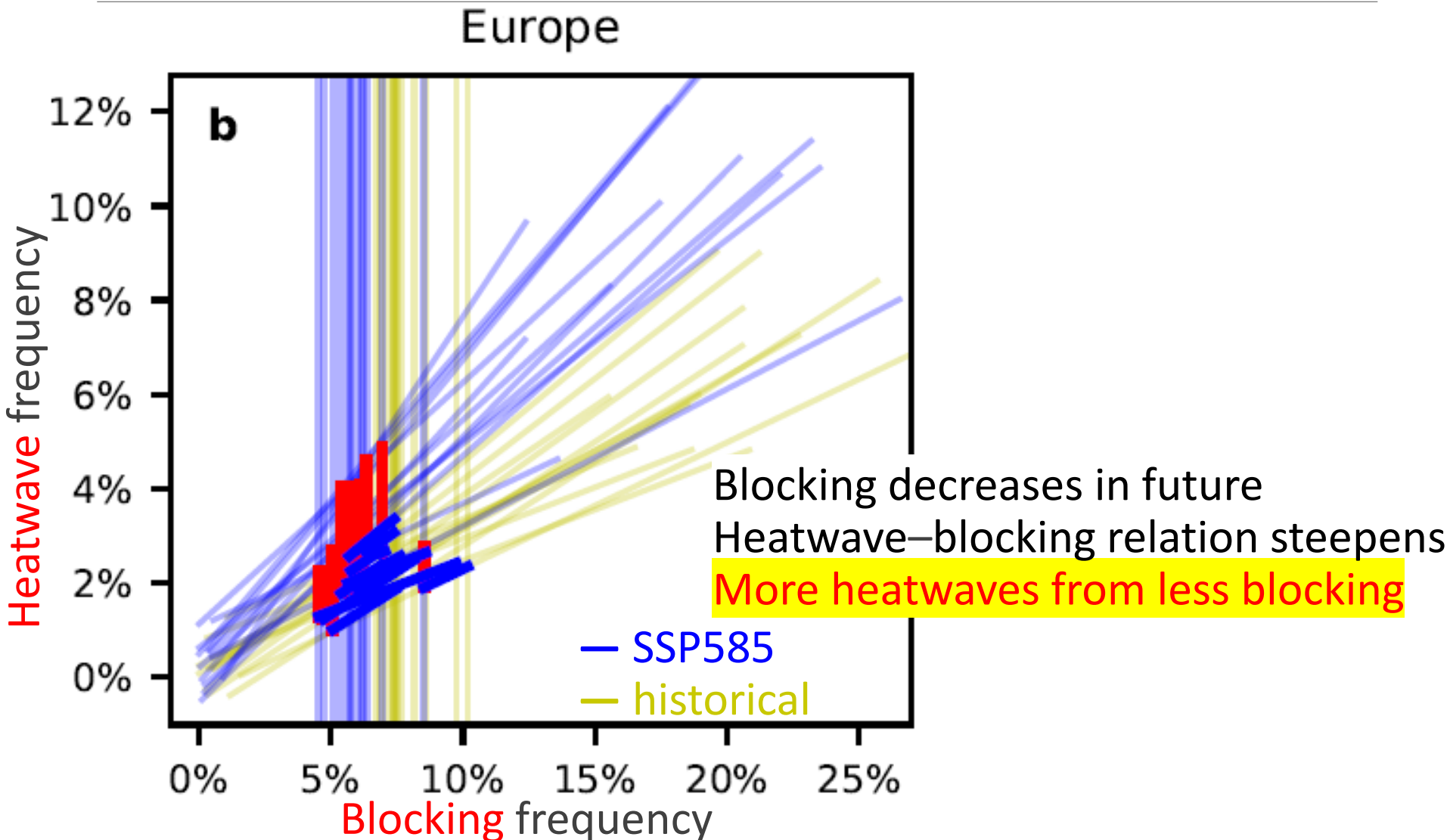
Europe in one CMIP6 model



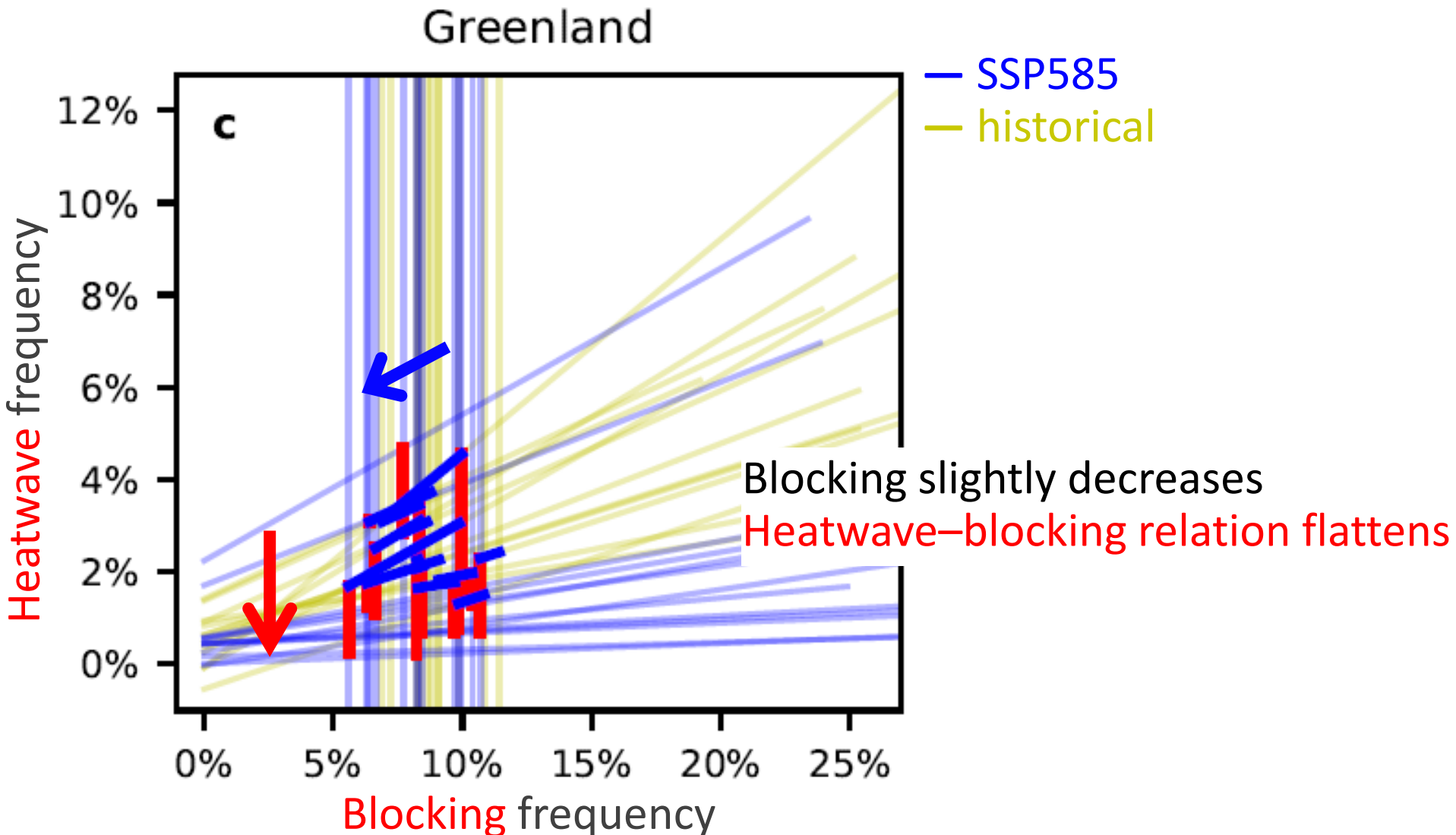
Europe in one CMIP6 model



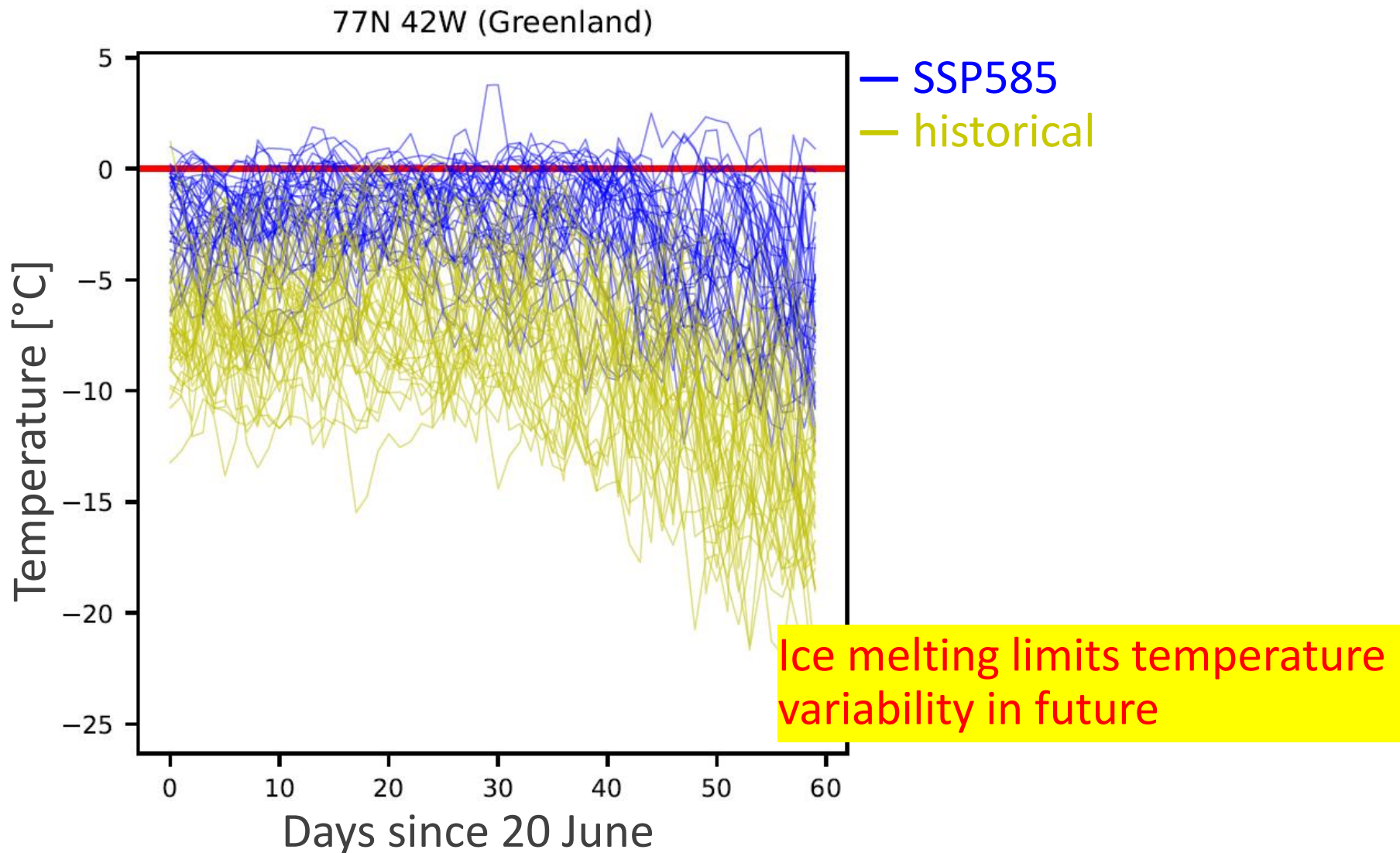
Europe in 13 CMIP6 models



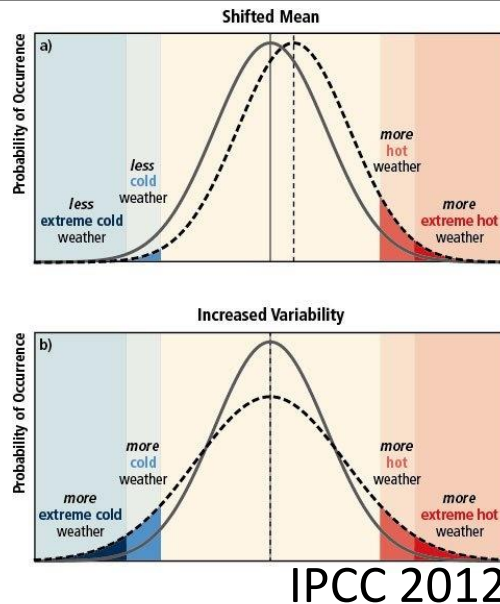
Greenland in 13 CMIP6 models



Greenland: Why relation flattens



Conclusion

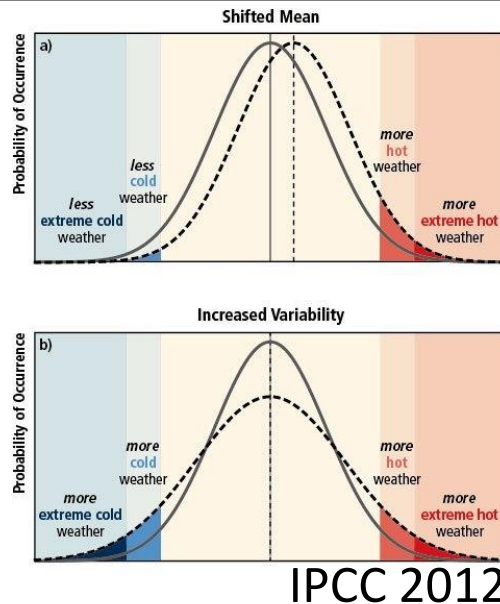


(Historical heatwave freq = 2.5%)

- Mean temperature **↑60%**
 - Global warming
- Variability in forcing **↓0.6%**
 - E.g., **blocking**
- Sensitivity **↑1.4%**
 - E.g., soil moisture

**Heatwave–blocking relation change
likely dominates over
less blocking**

Conclusion



(Historical heatwave freq = 2.5%)

- Mean temperature **↑60%**
 - Global warming
- Variability in forcing **↓0.6%**
 - E.g., **blocking**
- Sensitivity **↑1.4%**
 - E.g., soil moisture

CMIP6, **applying optimized index:** Chan, P. W., Catto, J. L., & Collins, M. Heatwaves in warmer future: Heatwave–blocking relation change likely dominates over less blocking, *revised*.

Reanalysis, **finding optimized index:** Chan, P.-W., Hassanzadeh, P., & Kuang, Z. (2019). Evaluating indices of blocking anticyclones in terms of their linear relations with surface hot extremes. *Geophysical Research Letters*, 46(9), 4904–4912.