Global mean surface temperature response to Interdecadal Pacific Oscillation and Atlantic Multidecadal Variability in CMIP5

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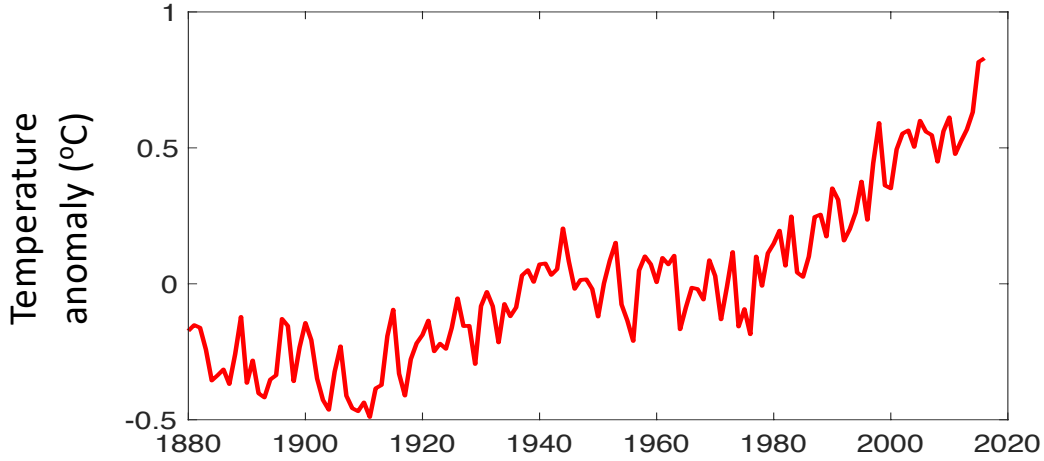
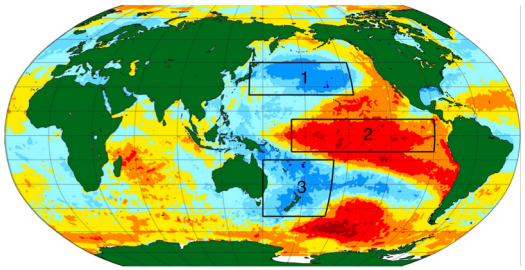
Global Mean Surface Temperature

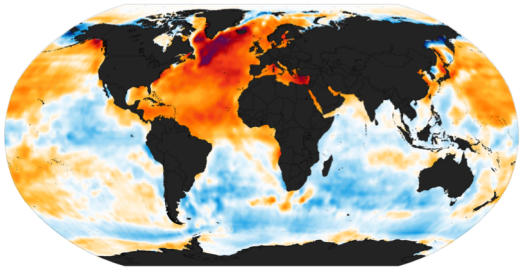


Aim: Assess the contributions to Global Mean Surface Temperature (GMST) variations by…



~15-30 year period

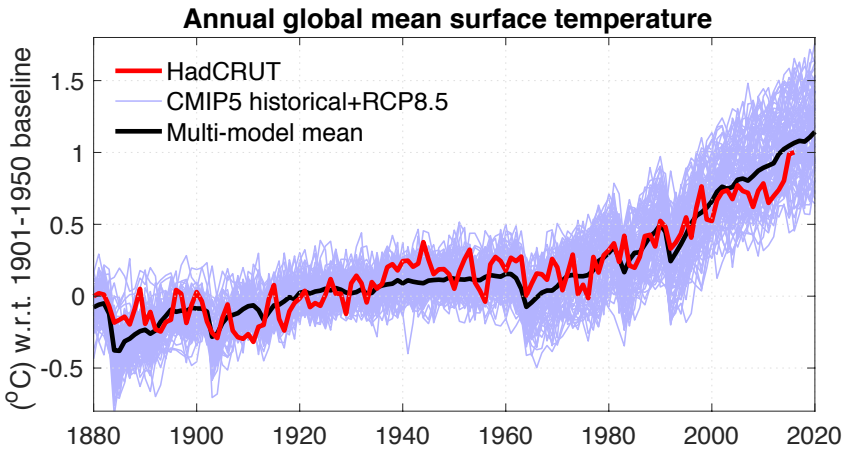
Interdecadal Pacific Oscillation (IPO)



~60-70 year period

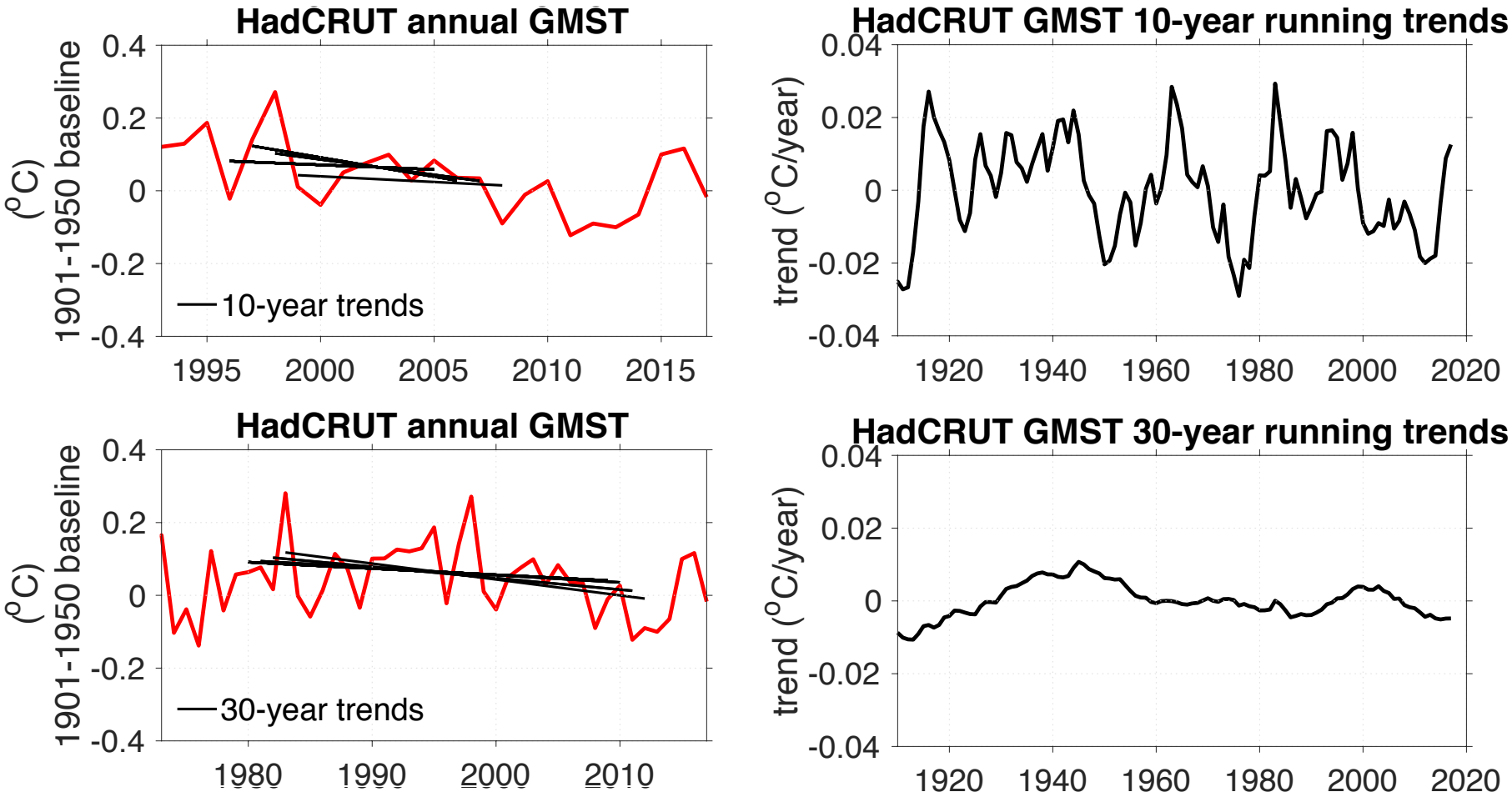
Atlantic Multidecadal Variability (AMV)

Forced response removal



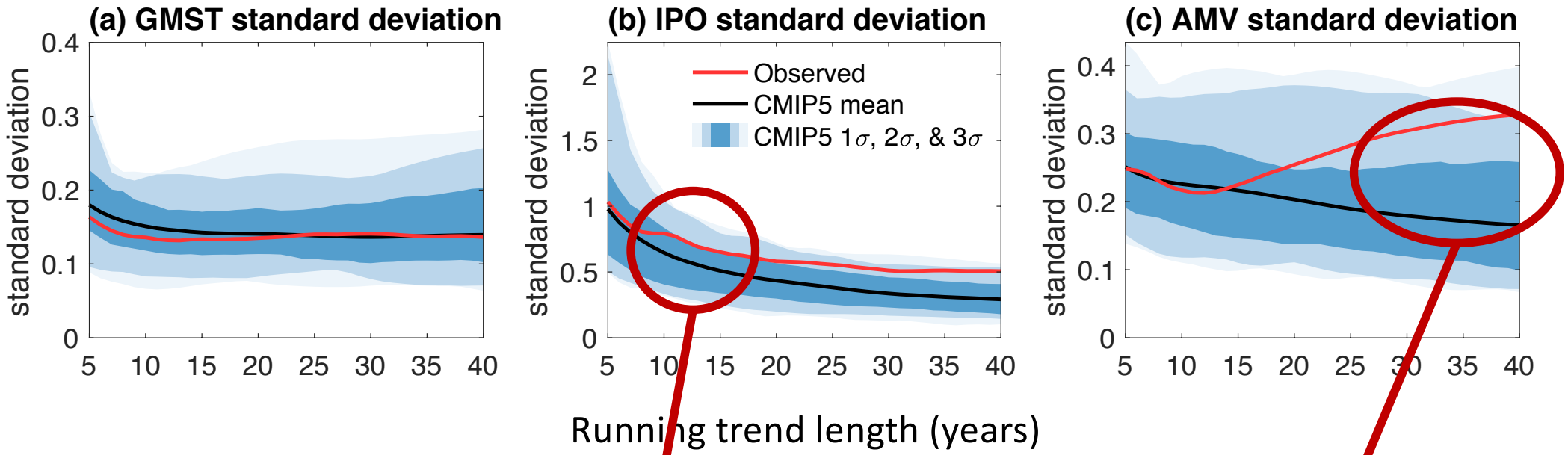
- Observed time-series contains <u>forced responses</u> (e.g. GHGs, volcanics, aerosols)
- Want to isolate <u>internal variability</u>
- Approach: remove a scaled, multi-model mean signal
- We analyse observations and CMIP5 historical simulations

Running trend analysis



Variability in trends over different time-scales

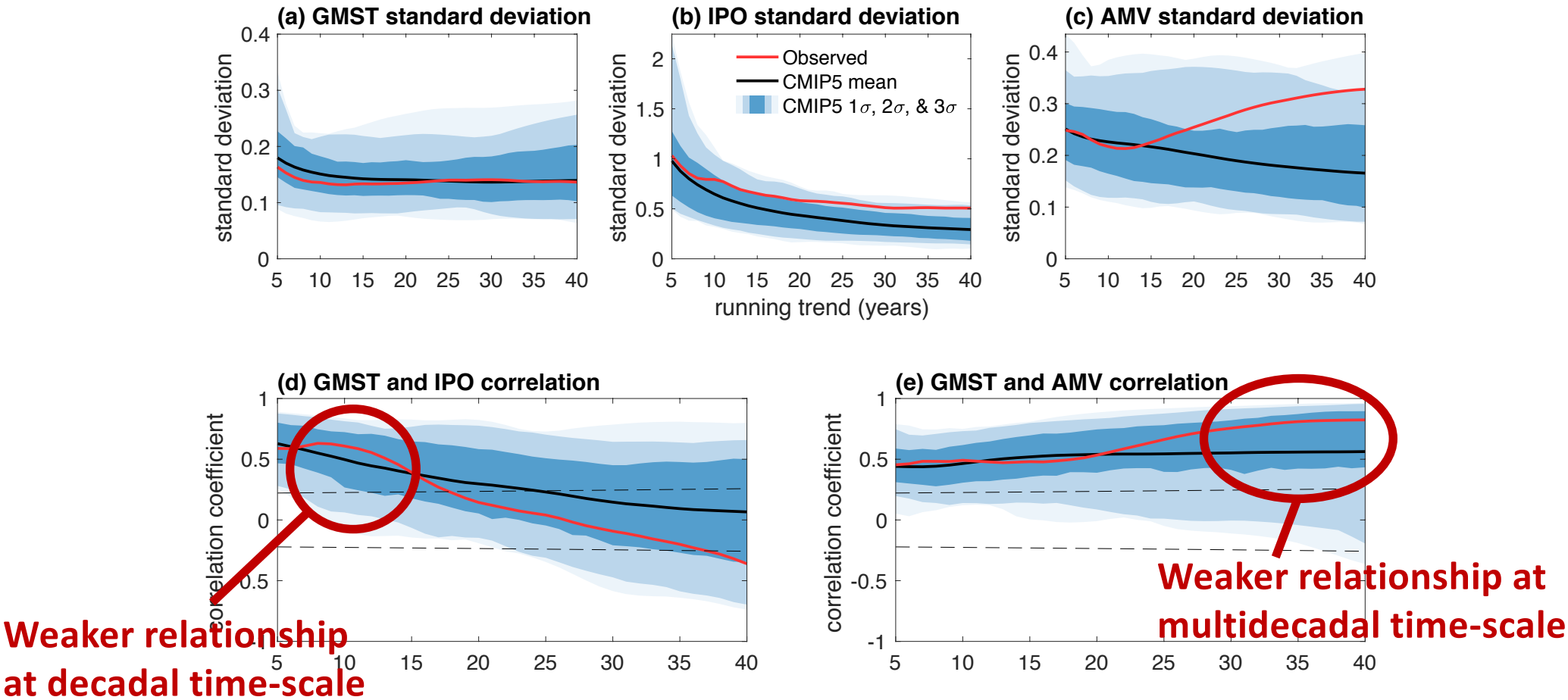
CMIP5 historical+RCP8.5 (1880-2017)



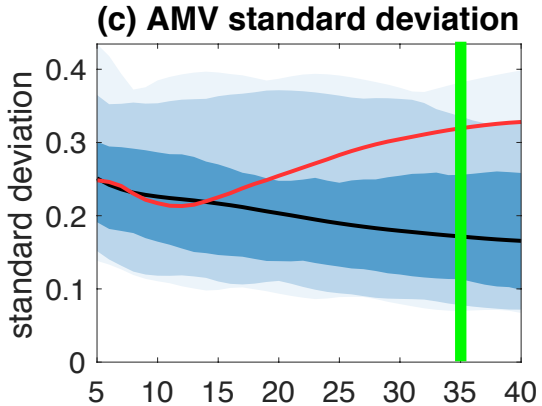
Weaker decadal IPO variability in models

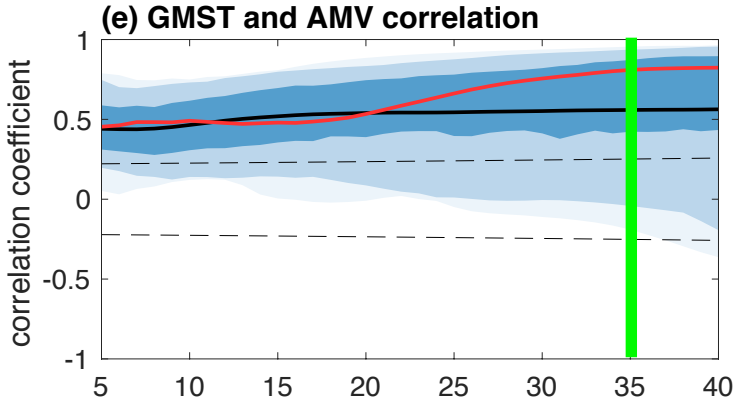
Weaker multidecadal AMV in models

Correlations in trends over different time-scales

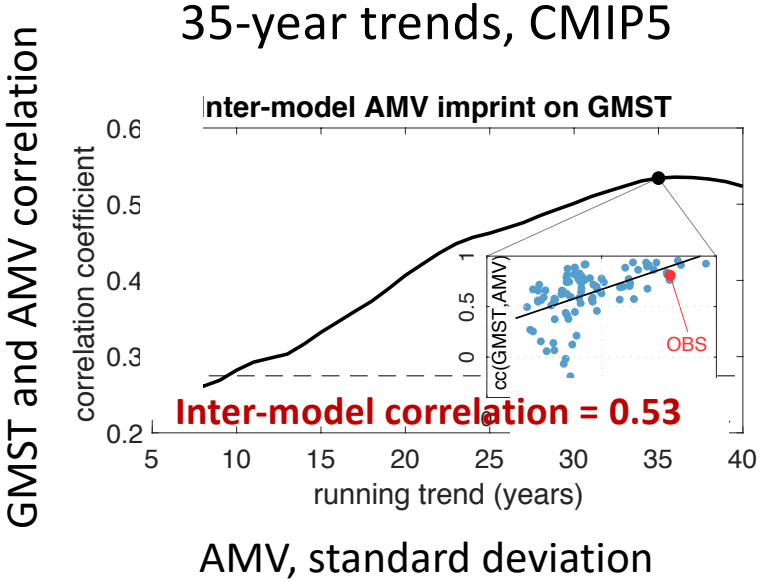


Inter-model relationship between variability and correlations





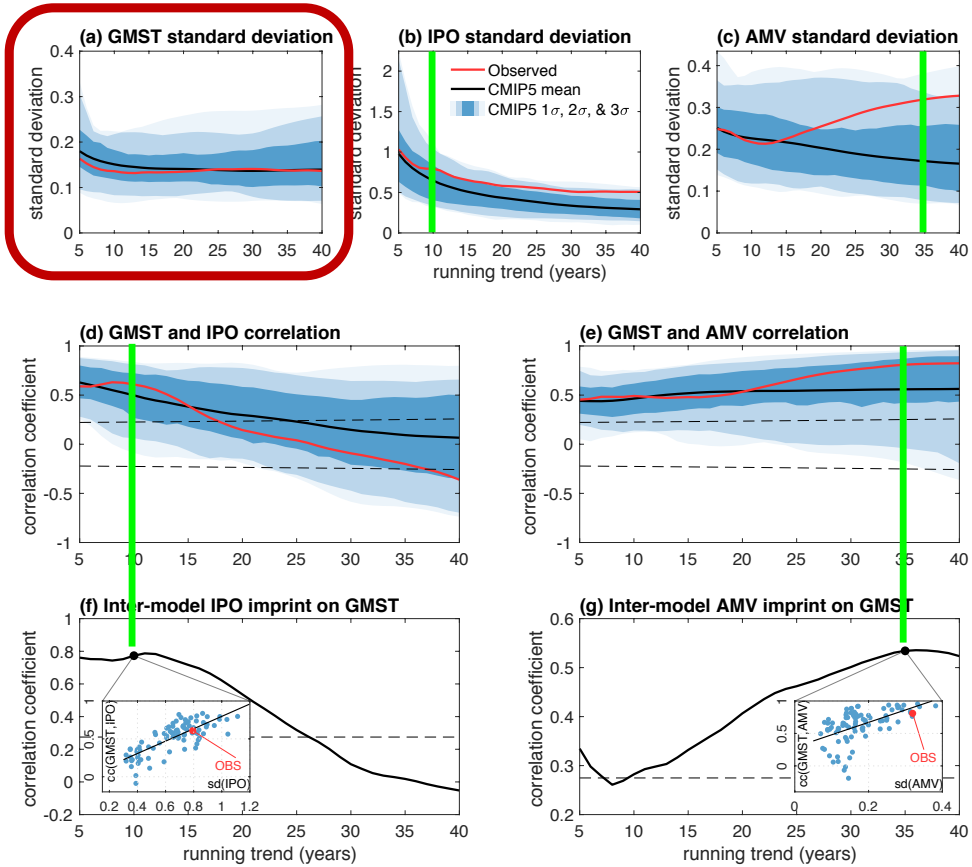
35-year trends, CMIP5



AMV, standard deviation

Enhanced AMV across models at multidecadal time-scales
→ Stronger imprint of AMV on GMST

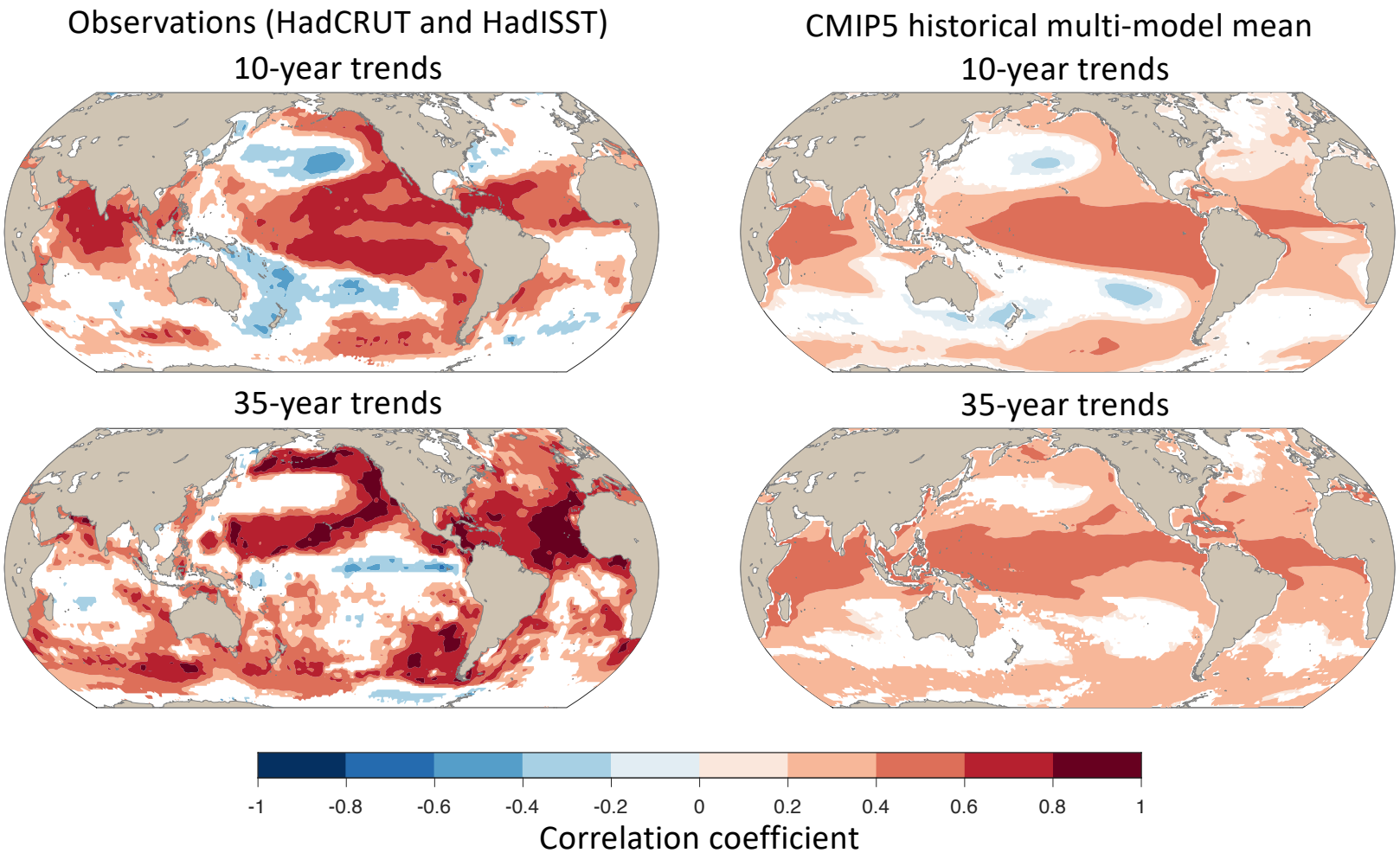
Inter-model relationship between variability and correlations



IPO 10-year trends:
→ Strongest observed correlation with GMST
→ Strongest inter-model relationship

AMV 35-year trends:
→ Strongest observed correlation with GMST
→ Strongest inter-model relationship

Correlations between GMST and grid-point SST trends



Summary

Decadal IPO

- Under-represented in models
- So too is correlation with GMST
- Stronger IPO → stronger correlation between IPO and GMST

Multi-decadal AMV

- Under-represented in models
- So too is correlation with GMST
- Stronger AMV → stronger correlation between AMV and GMST

- However, relationships between GMST and IPO or AMV are largely consistent in observations and models – but appropriate forced response removal is crucial
- Relationships are similar in piControl, giving some reassurance in the forced response removal procedure

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