

Climate constraint reflects forced signal

Objective

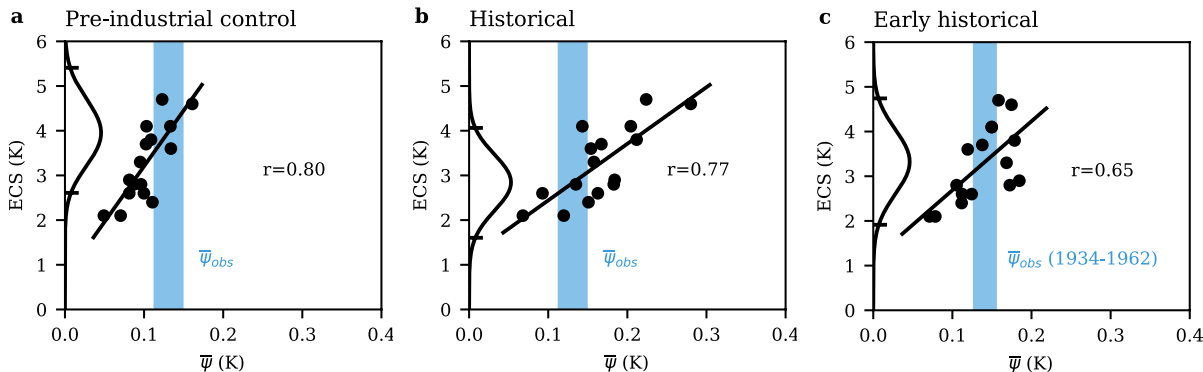
- To explore the robustness of a newly proposed equilibrium climate sensitivity (ECS) constraint that is based on observations of natural variability. This constraint purported to rule out the possibility of high and low climate sensitivity values.

Research

- Test the robustness of the proposed climate sensitivity constraint to:
 - different model experiments
 - a larger ensemble of models
 - External climate forcing from different time periods

Impact

- Natural internal variability – the key predictor of ECS – is strongly modified by external forcing
- Model experiments that sample natural internal variability alone yield a large climate sensitivity estimate
- When all available models are included, the proposed ECS constraint is weak, undermining the robustness of the proposed ECS constraint



Although a metric of climate variability (Ψ) is a significant predictor of ECS in both pre-industrial control simulations (a) and historical simulations (b), the observational constraint yields very different estimates of climate sensitivity in each experiment (denoted with the probability distribution on the y-axis). Sampling periods in which human and natural forcing is substantially smaller yields a less robust constraint with a relatively large value of ECS, demonstrating that the time period sampled influences the Ψ -ECS constraint (c).

Reference: Po-Chedley, S., C. Proistosescu, K. C. Armour, B. D. Santer, 2018: Climate constraint reflects forced signal. *Nature*, **363**, 7729, E6 – E9, doi: 10.1038/s41586-018-0640-y