

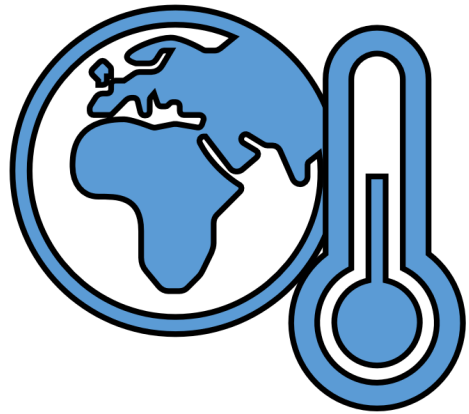


Causes of the weak relationship between modeled Last Glacial Maximum cooling and climate sensitivity, with consequences for emergent constraints

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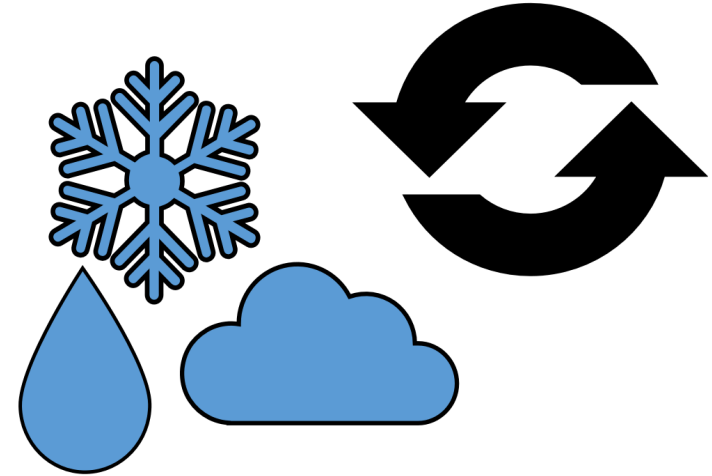
Definition of climate sensitivity



**Climate
sensitivity**

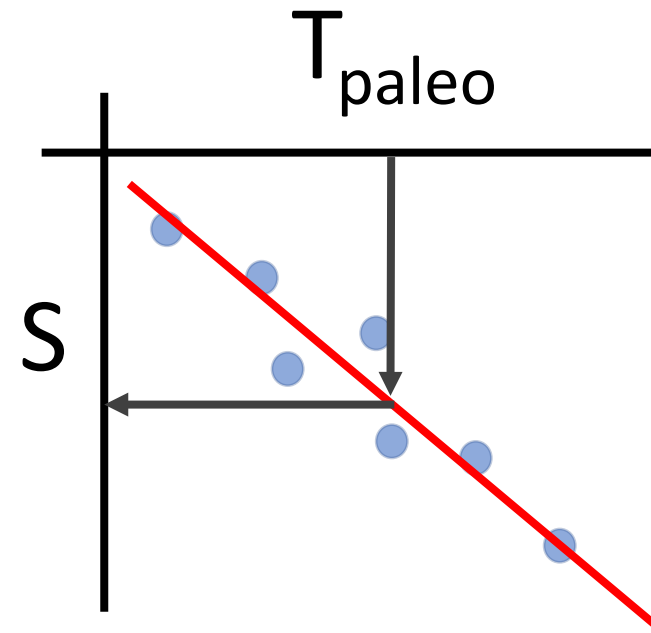
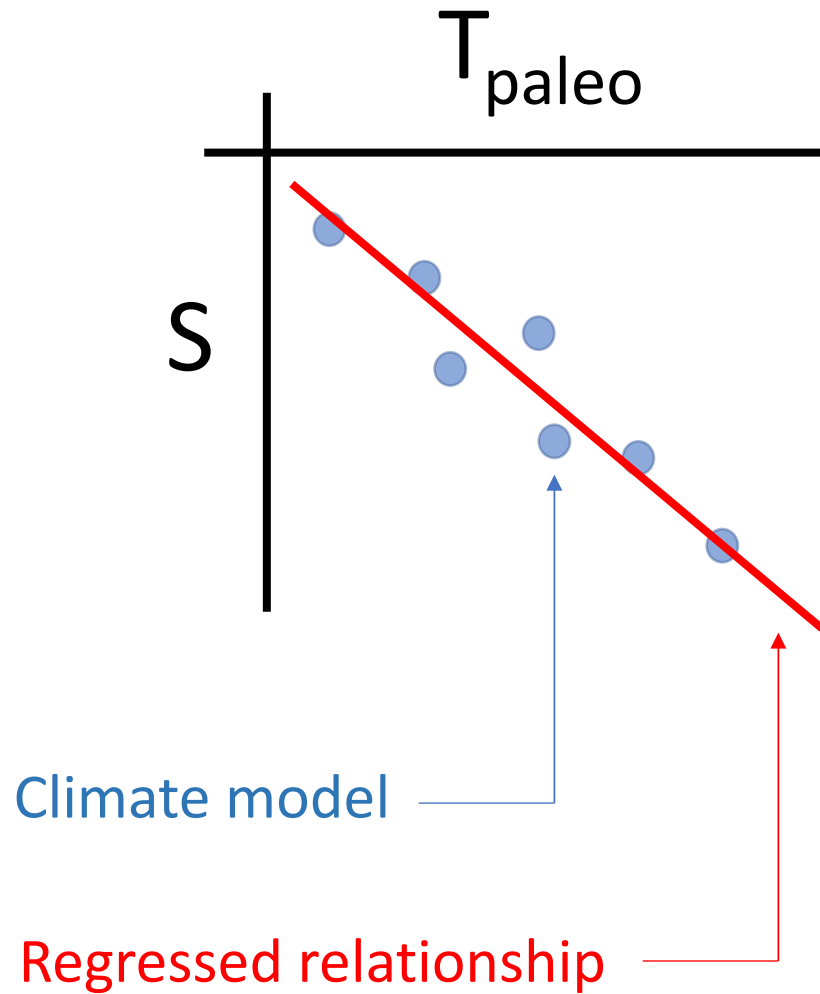
= CO₂ +

**Initial
warming**



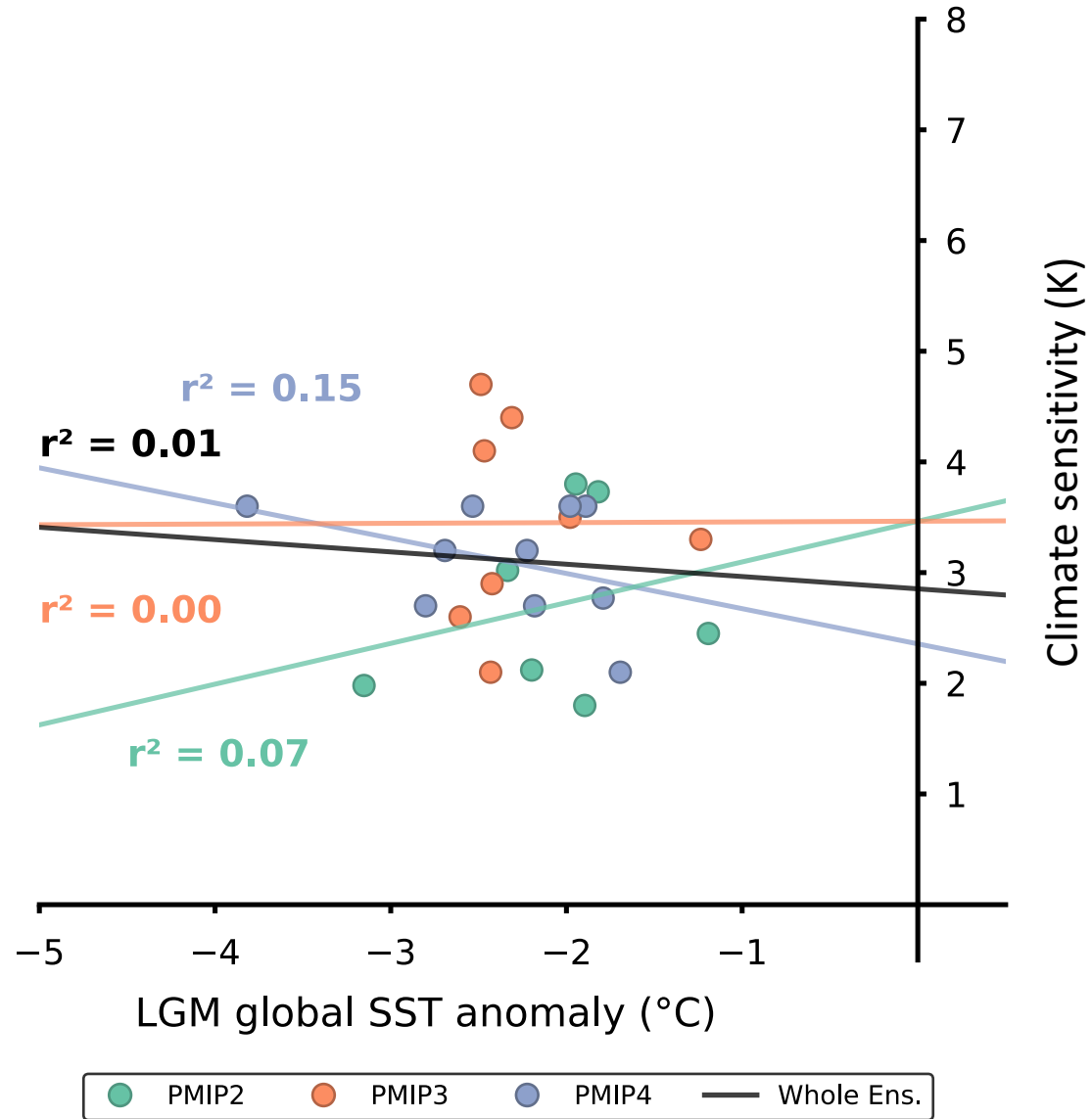
Feedbacks

Emergent constraint on S



$$S = aT_{paleo} + b$$

A weak constraint?



Structural and state-dependent issues

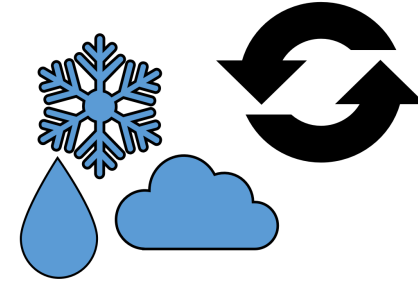


Structural issues

- Arise from the simulation of the LGM itself
- Due to uncertainties in boundary conditions



Ice sheet forcing (efficacy)



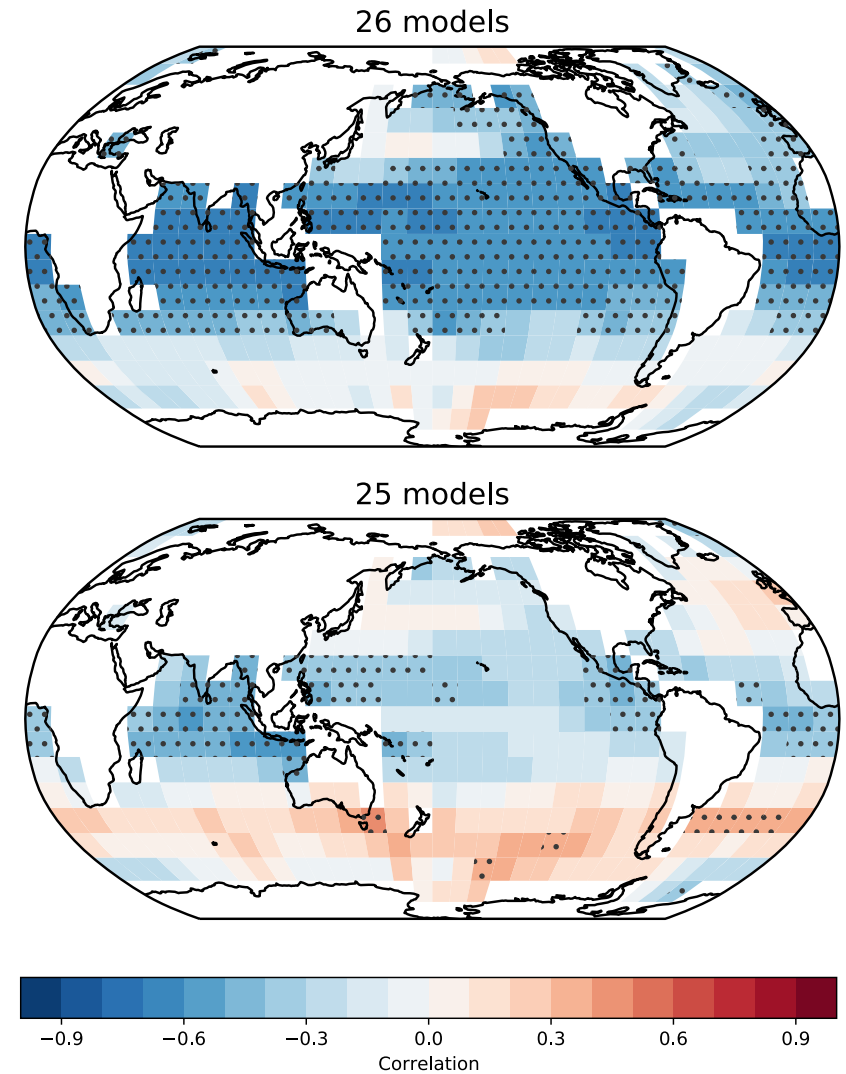
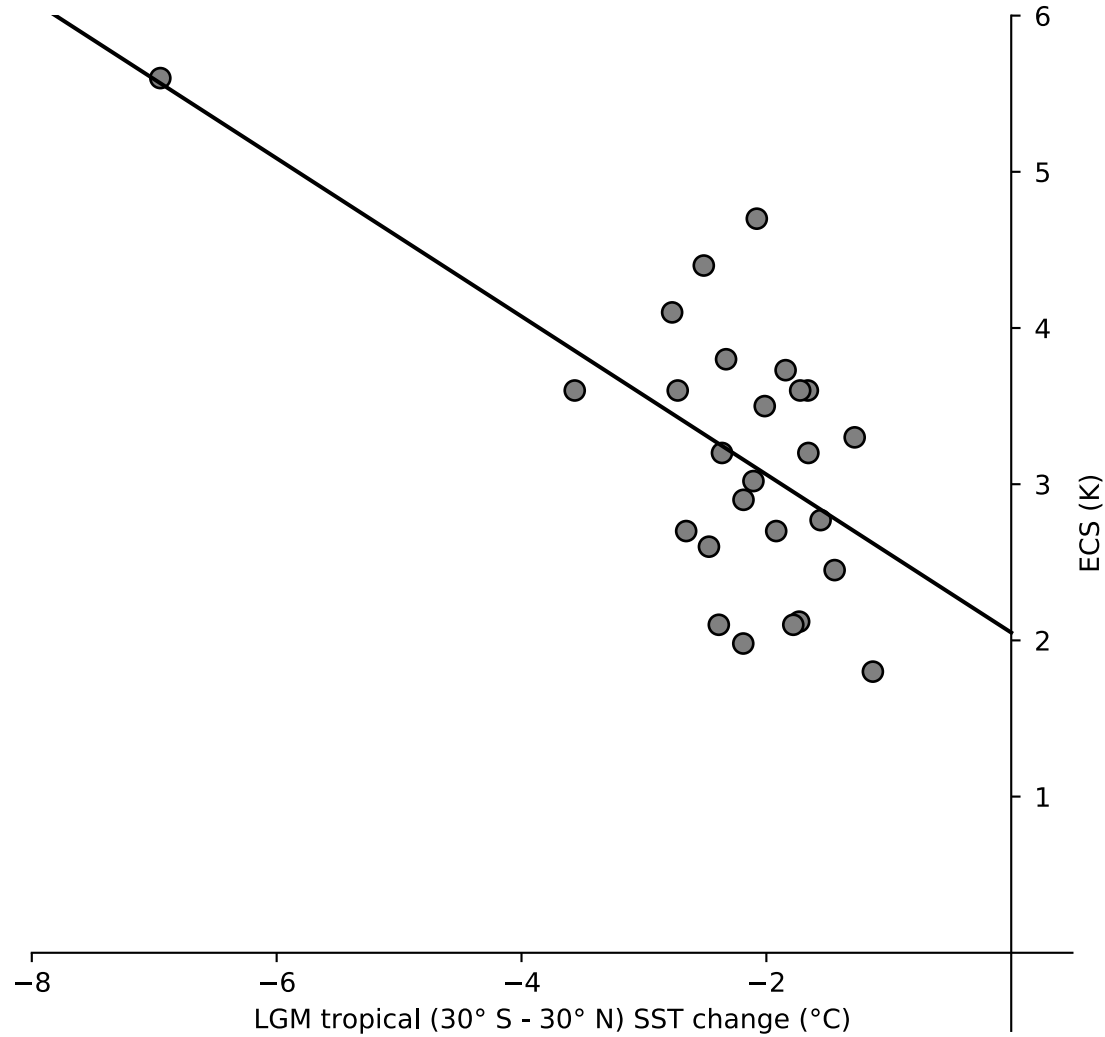
State-dependent issues

- Arise from differences in dynamics between warm and cold climate
- Due to climate sensitivity being diagnosed from warming simulations (4xCO₂)

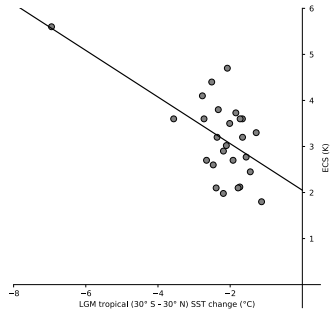


Climate feedbacks

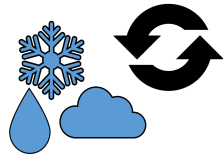
A lack of high sensitivity models



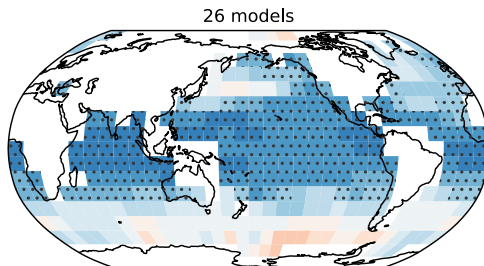
Summary



The LGM constraint is weak: median $S = 3.2$ K, but large uncertainties.



Mainly due to state-dependency and structural issues.



Sensitivity experiments and high ECS models would benefit the method.