

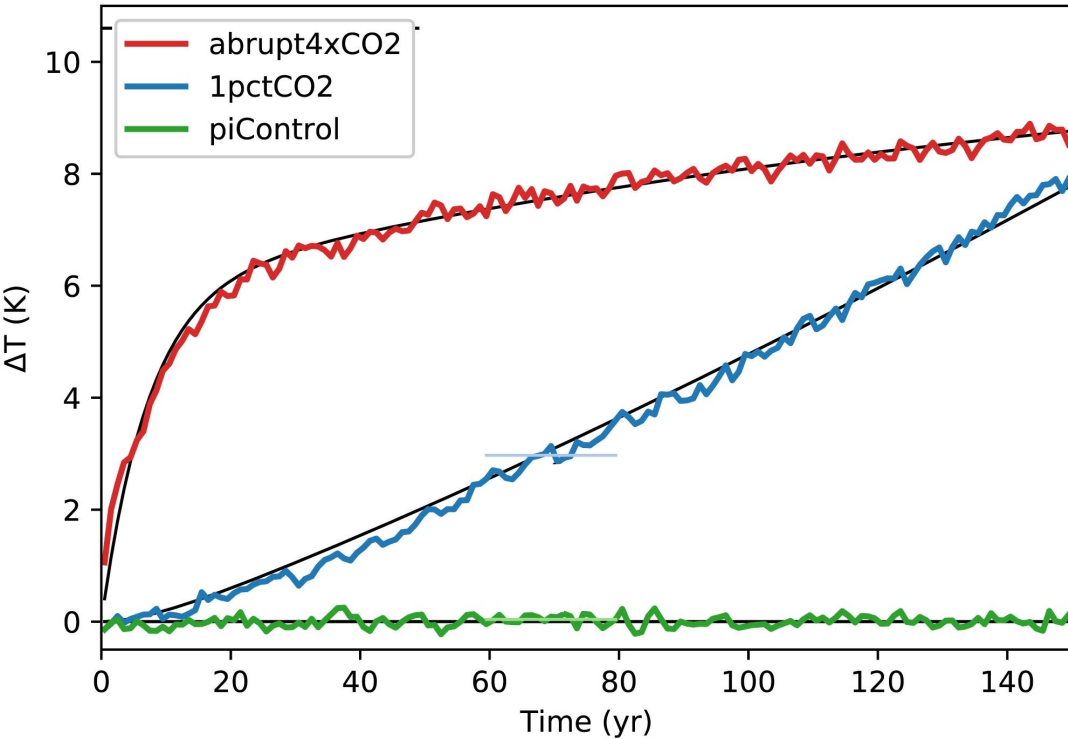


Too Hot To Be True?

‘Hot model’ issue in CMIP6 climate projections



Climate Sensitivity



Equilibrium Climate Sensitivity
(**ECS**):

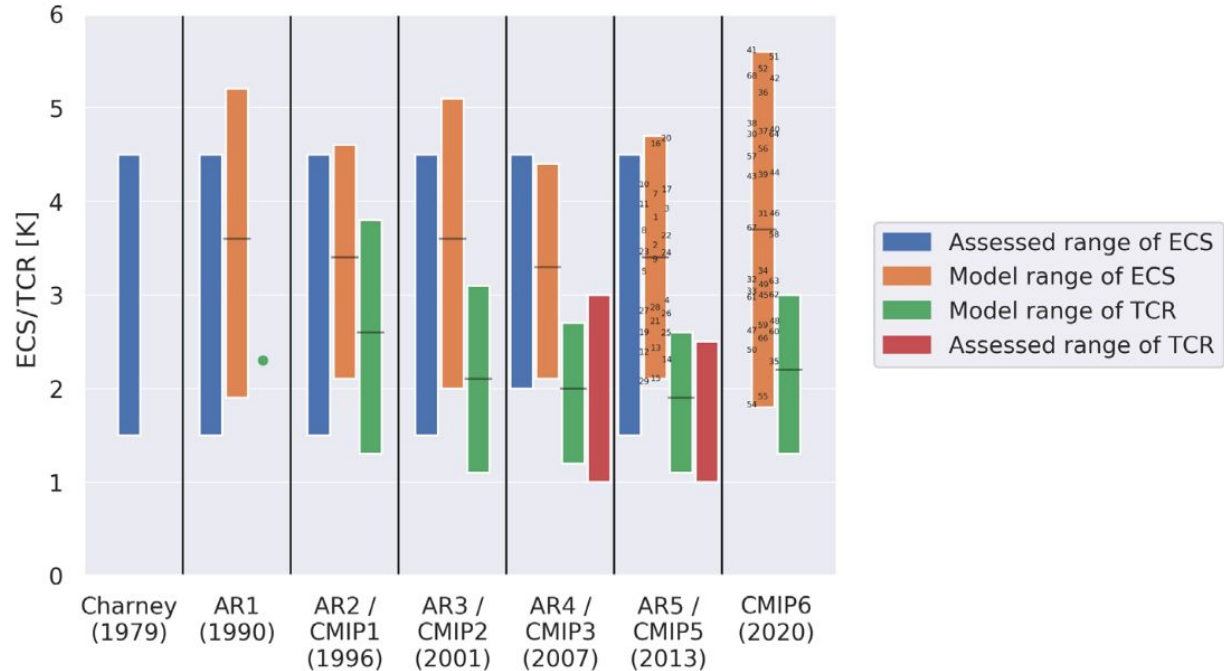
Long-term temperature response to doubled CO_2 concentration relative to pre-industrial level

Transient Climate Response
(**TCR**):

Amount of global warming in the year in which CO_2 concentration has doubled after having steadily increased by 1% per year starting at pre-industrial level

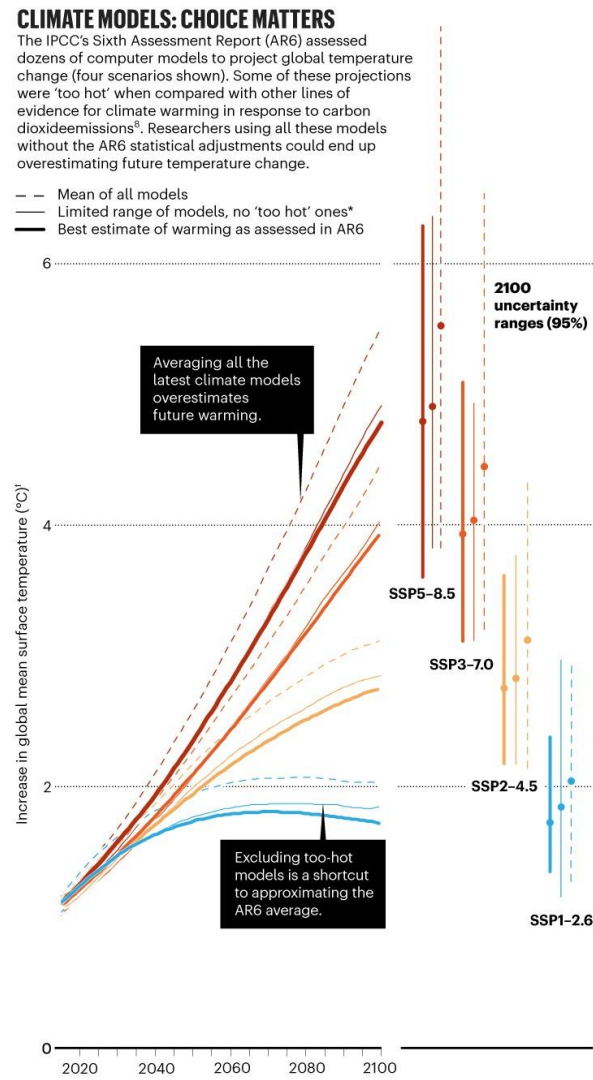
CMIP6 has some very sensitive models

Equilibrium climate sensitivity (gregory method) and transient climate response



Hausfather et al. (2022) commentary

- Novum in AR6: WG1 no longer considers temperature projections from different CMIP6 models as equally plausible
- Based on evidence from palaeoclimate, observations of surface temperatures and ocean heat content, and models of physical processes
- AR6 WG1 presents ‘assessed’ warming estimates
- In particular ‘hot models’ assessed as likely too hot
- Hausfather et al. (2022) say climate impact assessments should follow suit



Exaggerated climate impacts?

- CMIP6 models warm faster than CMIP5 models
=> climate impacts emerge earlier in impact simulations based on CMIP6
=> larger impacts in 2100 compared to simulations based on CMIP5
- Example from ISIMIP3b (2 out of 5 ISIMIP3b GCMs are 'hot models'):



Climate impacts on global agriculture emerge earlier in new generation of climate and crop models

Discussion points

- Are the 'hot models' really too hot?
- What to do about it in ISIMIP?
- Hausfather et al. (2022) suggest to
 - (i) base analyses on global warming levels
 - (ii) screen out models with a TCR outside the AR6 assessed 'likely range' (40% of all models)
- Experts: Colin Jones, Richard Betts, Chris Jones (all Met Office), Olivier Boucher (IPSL), Roland Séférian (CNRM)

CLIMATE MODELS: CHOICE MATTERS

The IPCC's Sixth Assessment Report (AR6) assessed dozens of computer models to project global temperature change (four scenarios shown). Some of these projections were 'too hot' when compared with other lines of evidence for climate warming in response to carbon dioxide emissions*. Researchers using all these models without the AR6 statistical adjustments could end up overestimating future temperature change.

