



## **Variability in transient climate response in a model ensemble**

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We examine transient climate response (TCR) in a 100-member ensemble of the MPI-ESM1.1 (TCR is the warming after 70 years in a model with carbon dioxide increasing by 1%/year). The model runs start in 1850 and evolve under identical forcing until 2005. The only difference among the ensemble members is the initial conditions of the run. We find significant spread in TCR among the various ensemble members, with TCR varying between 1.1 and 1.9 K. This is important because it suggests that TCR estimated from the observational record of the 19th and 20th century may depart significantly from the climate system's true TCR. We find further that this variability in TCR can be explained by 2 factors: 1) variability in the amount of energy sent into the deep ocean and 2) variability in the amount of trapped energy that is subsequently radiated back to space.