



Climate sensitivity estimated from ensemble simulations of glacial climate

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Uncertainty in climate sensitivity dT_{2x} is a key issue determining the spread in future climate projections. Recent ensemble simulations have demonstrated that it is not possible to exclude dT_{2x} estimates far above the upper IPCC limit when constraining the model performance by observational data from anthropogenic climate change or by present day climatology. We performed a large ensemble of the CLIMBER-2 model versions with differing feedback strengths and constrained the model sensitivity by analyzing the large simulated temperature change between the pre-industrial and glacial climate (LGM) using different regional paleo temperature reconstructions. Our analysis suggests that this test can be effective in reducing the uncertainty range of dT_{2x} as we infer an upper limit close to the IPCC estimate of 4.5°C . We demonstrate that an omission of glacial dust and vegetation forcing for this kind of analysis yields a systematic overestimate in dT_{2x} . The fundamental basis of our approach is that we infer an almost linear relationship between $2x\text{CO}_2$ warming and tropical LGM cooling, whose magnitude can be estimated from paleo proxies. This strong relation is investigated in view of its model dependency and implications for forthcoming PMIP-2 results are discussed.