



Is the Climate Sensitivity Even More Uncertain?

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Uncertainty in climate sensitivity is a fundamental problem for projections of the future climate. Climate sensitivity is defined as the equilibrium response of global-mean surface air temperature to a doubling of the atmospheric CO₂ concentration from the preindustrial level (≈ 280 ppm). In spite of various efforts to estimate its value, climate sensitivity is still not well constrained, posing a difficulty to informing climate change policy. Here we show that the climate sensitivity is in fact even more uncertain than has been found by earlier studies. Our results suggest that uncertainty in historical radiative forcing has not been sufficiently considered, calling for more attention to the treatment of the forcing uncertainty in addition to the temperature uncertainty. Furthermore, we show that including the carbon cycle feedback, which in principle offers an additional constraint on climate sensitivity, does not reduce the uncertainty in climate sensitivity due to the poor knowledge of the global carbon budget before the year 1850.