



Carbon cycle feedbacks amplify the effect of climate sensitivity uncertainty on future warming

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Positive feedbacks between climate and the carbon cycle have the potential to amplify atmospheric CO₂ growth, and consequently to increase future climate warming. Future climate warming in response to anthropogenic CO₂ emissions is itself highly uncertain, largely due to uncertainty in the sensitivity of the climate system to CO₂ increases. This climate sensitivity also affects the strength of carbon cycle-climate feedbacks, since the extent of climate warming has a direct effect on how much carbon sinks are affected by climate changes. In this paper, we demonstrate that the range of future warming projections that results from uncertainty in climate sensitivity is expanded considerably when an interactive carbon cycle is included. In an ensemble of model simulations, with climate sensitivities ranging from 1 to 8 degrees warming per CO₂ doubling, carbon cycle-climate feedbacks amplify the warming simulated over the next two centuries, with greater amplification occurring at higher climate sensitivities. This increases the probability associated with larger warming and leads to an increase in the probability of exceeding a given warming threshold.