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Title: Geoengineering Earth's radiation balance to mitigate CO₂-induced climate change

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Abstract

To counteract anthropogenic climate change, several schemes have been proposed to diminish solar radiation incident on Earth's surface. These geoengineering schemes could reverse global annual mean warming; however, it is unclear to what extent they would mitigate regional and seasonal climate change, because radiative forcing from greenhouse gases such as CO₂ differs from that of sunlight. No previous study has directly addressed this issue. In the NCAR CCM3 atmospheric general circulation model, we reduced the solar luminosity to balance the increased radiative forcing from doubling atmospheric CO₂. Our results indicate that geoengineering schemes could markedly diminish regional and seasonal climate change from increased atmospheric CO₂, despite differences in radiative forcing patterns. Nevertheless, geoengineering schemes could prove environmentally risky.

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