



Atmospheric Chemistry
Observations & Modeling

ACOM Seminar

Towards quantitative comparison between the benefits and harms of solar geoengineering

David Keith

University of Chicago

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ABSTRACT

Decisions about solar geoengineering (SG) entail risk-risk tradeoffs between the direct risks of SG and SG's ability to reduce climate risks. Quantitative comparisons between these risks are needed to inform public policy. We evaluate SG's effectiveness in reducing deaths from warming using two climate models and an econometric analysis of temperature-attributable mortality. Combining our results with prior estimates of SG impacts on air quality and UV-attributable cancer mortality enables the first quantitative comparison of risk-risk tradeoffs. We find SG's impact on temperature-attributable mortality is uneven with decreases for hotter and poorer regions and increases in cooler and richer regions. Global mortality is reduced by around 1 million per year for cooling of 1 °C from 2.5 °C above preindustrial. We find no evidence that mortality reduction achieved by SG is smaller than the reduction that could be achieved by equivalent cooling from emissions reductions. Comparing reduced temperature-attributable mortality with previous estimates of direct mortality risks of sulphate aerosol injection, we find the mortality reductions outweigh mortality increases from SG's risks by at least 10x and up to 100x. This is in no way a comprehensive evaluation of the risk-risk tradeoffs around SG, yet by comparing some of the most consequential impacts on human welfare it is a useful first step. These findings are robust to a variety of alternative assumptions about socioeconomics, adaptation, and solar geoengineering implementation.

For more information, please contact Qing Ye (qingye@ucar.edu) or Kyle Zarzana (kzarzana@ucar.edu).

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