Wake Smith: Research program description

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"Climate Intervention" describes a set of prospective intercessions in the climate system intended to ameliorate climate change or its impacts. "Solar geoengineering" would seek to increase in various ways the albedo or reflectivity of the earth to slightly cool the planet. More specifically, stratospheric aerosol injection (SAI) would seek to deploy a thin layer of reflective aerosols into the lower stratosphere. The other main branch of climate intervention involves several prospective techniques by which to remove greenhouse gases either from emissions streams or from the atmosphere. I am researching, teaching, and writing about both branches of geoengineering, each of which remain controversial and under-researched.

Book project

- I have had subject matter experts review each of the chapters of my manuscript for *Pandora's Toolbox: The Hopes and Hazards of Climate Intervention.* I sent the revised and now reasonsbly complete version to the Cambridge University Press on March 30. We have commenced the process of editing and indexing the book. It goes into production in May and is scheduled for publication in February 2022. This will align well with the release of the IPCC's Sixth Assessment Report, which will for the first time evaluate the full range of prospective climate interventions and will cite at least two of my papers.

2021 Papers

- I have been asked to brief an agency of the federal government on the national security implications of the emergence of SAI technologies. In preparation for the mid-April briefing, I have presented my initial ideas in an M-RCBG Study Group. I expect work this will lead to a publication later this year.
- The National Academy of Sciences released a report in March that codifies a proposed federal research agenda for solar geoengineering. Buried deep in the report is a rather direct request that I complete a study on which I am currently engaged with several collaborators, naturally moving this to the top of my "to do" list. The study will illuminate the aeronautical feasibility and parametric costs of deploying aerosols as high as 25 kms rather than the more conventionally assumed 20 kms. My initial target journal for the resulting paper will be the Proceedings of the National Academy of Sciences.
- With David Keith, I am developing a commentary piece seeking to debunk the objection that SAI is a "sociotechnical imaginary" and may not be feasible. Citing two of my own papers and three others, we will argue that while there are many reasons for caution around SAI, not valid among them is a concern over whether it would be possible at altitudes up to 20 kms.
- Also potentially with David Keith, I intend a gaps analysis paper that compares the capabilities of the existing NASA high-altitude scientific research fleet with the likely high-altitude research requirements in respect of SAI. The paper will clarify what sorts of new research platforms would be required on what timeframes, and whether the research vehicles proposed in the above AIAA paper will fill the gaps.
- Also on the burner for 2021 is a paper intended to put to rest fears that SAI on a climate changing scale could be deployed covertly by a state or non-state actor. This question too arose in the recent National Academies report. By quantifying the scale of a program intended to

change global temperatures by a mere tenth of a degree Celsius in just one hemisphere, it becomes clear that such a program would be easily detectable by the uninvolved world.