

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 remains controversial and under-researched.

Book project

- *Pandora’s Toolbox: The Hopes and Hazards of Climate Intervention* is in production and scheduled for publication in March 2022. This will align well with the release of the Working Group III Chapter 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.

Forthcoming Papers

- I have submitted to the Proceedings of the National Academy of Sciences a paper that responds directly to a question posed in a March 2021 NAS report that proposes a federal research agenda for solar geoengineering. The report asked for clarity on the feasibility and costs of deploying aerosols as high as 25 km rather than the more conventionally assumed 20 km. The short answer my paper provides is that not only costs but safety hazards multiply substantially above about 21 km and that climate modelers should understand that these last few km are far from free.
- Next up for submission is a paper intended to allay persistent 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.
- I have commenced a paper on the logistics, costs, and governance implications of commencing SAI just at the poles rather than globally. Injections poleward of 60°N/60°S would cool the regions that are warming the fastest and provide global benefit in slowing sea level rise while placing aerosols directly overhead of very few people or countries. This would reduce costs and physical risks dramatically, but it is unclear whether it would reduce the nearly insurmountable challenges associated with governing SAI and establishing its legitimacy.
- Veering out of my “SAI deployment” lane a bit, I have also commenced a paper comparing the efficacy of the market interventions being undertaken in the four states that currently lead the world in motivating the development of large-scale flue gas capture and sequestration projects, which will be utterly essential in hastening a pathway to Net Zero Emissions. The UK, Netherlands, Norway, and the US are taking very different approaches in spurring the build-out of Carbon Capture and Storage infrastructure in the absence of carbon prices high enough to drive emitters to install such facilities of their own accord. We aim to identify best practices that other countries wishing to travel the same path might pursue.

- Along with my team of retired Boeing engineers, we will submit to the American Institute of Aeronautics and Astronautics a paper in November presenting a preliminary design for a liquid hydrogen powered narrowbody airliner.