**From: David Keith, Jan 2018**

**Reviews and perspectives**

Lawrence and Crutzen, *Earth’s Future*, 2017: *Was breaking the taboo on research on climate engineering via albedo modification a moral hazard, or a moral imperative?*

Paul Crutzen a Nobel laureate for atmospheric chemistry wrote a short scientific opinion piece that help to break the taboo against geoengineering research. This is part of collection of retrospective articles on the 10th anniversary of that paper. Mark Lawrence led the largest European research effort on geoengineering. Worth reading. Can skip some of the middle that reviews specific commentary accompanying the original article.

Keith, *Issues in Science and Technology*, 2017: *Toward a Responsible Solar Geoengineering Research Program.*

This piece aims to counter to some of the most common arguments against research. N.B. *Issues* is published by the NAS, small circulation but reaches science policy crowd in DC, often includes commentaries from legislators or senior staff.

Caldiera and Bala, *Earth’s Future*, 2017: *Reflecting on 50 years of geoengineering research.*

Ken’s look back. Don’t miss Figure 2 –the essential question about the future of this research.

**Science and technology**

MacMartin, Kravitz, Long, Rasch, *Earth’s Future,* 2016: *Geoengineering with stratospheric aerosols: What do we not know after a decade of research?*

High quality and compact summary of what we don’t know about stratospheric aerosols for solar geoengineering.

MacMartin, Kravitz, Keith, and Jarvis, *Climate Dynamics*, 2013: *Dynamics of the coupled human-climate system resulting from closed-loop control of solar geoengineering*.

One of a fascinating set of papers by Doug MacMartin collaborators applying control theory to climate. Ken will show you a bunch more this work.

Keith, Weisenstein, Dykema, and Keutsch, *PNAS*, 2016: *Stratospheric Solar geoengineering without ozone loss*.

Our most important recent technical paper. Draws together two separate lines of research to show that calcium carbonate might enable stratospheric aerosol while (a) restoring the ozone layer and, (b) reducing heating of the lower stratosphere.

Keith, Wagner, and Zabel, *Nature Climate Change*, 2017: *Solar geoengineering reduces atmospheric carbon burden*.

We point out that solar geoengineering would in fact have some carbon benefit. The science is obvious, the point here was that this topic has been ignored. Skim but no need to read the whole thing.

Kravitzet. al.*, Journal of Geophysical Research: Atmospheres*, 2013: *Climate model response from the Geoengineering Model Intercomparison Project (GeoMIP)*.

This is one of the most cited reviews from the model inner comparison project. Worth skimming, for background about the structure of GeoMIP, but probably not reading in its entirety. We will show you new results that build on this work.

Dykema, Keith, Anderson, and Weisenstein, *Philosophical Transactions of the Royal Society A*, 2014: *Stratospheric controlled perturbation experiment (SCoPEx): a small-scale experiment to improve understanding of the risks of solar geoengineering.*

The scientific rationale and design for our stratospheric field experiment. Frank and I will present details of the experiment’s current design and status. This paper is worth skimming as background.

Kravitz et. al.*, Environmental Research Letters*, 2014*: A multi-model assessment of regional climate disparities caused by solar geoengineering*.

One of the early papers to quantitatively assess the ability of solar geo to reduce regional changes in both temperature and precipitation.

**Social Science, Policy, and politics**

Parson, *PNAS*, 2017: *Climate policymakers and assessments must get serious about climate engineering*.

Opinion piece in PNAS (a rare commodity) smartly summarizing current state of play and arguing for assessment and policy action.

Pasztor et al, *Science*, 2017: *How to govern geoengineering*?

Editorial by Janos and his team providing their argument for the urgent need to tackle geoengineering governance and (as I see it) serving in part as an announcement of C2G2’s existence to larger science policy world.

Pierrehumbert, *Bulletin of the Atomic Scientists,* 2017: *The trouble with geoengineers “hacking the planet”.*

An argument against field experiments on, including direct semi-personal critiques of our work. This piece does a nice job capturing many of the arguments against research. Ray is one of the smartest and most creative thinkers in the geosciences. Also he’s a great writer. Ken can provide some insight into his views as they served together on the Academy report.

Caldeira and Ricke, *Nature Climate Change*, 2013: *Prudence on Solar Climate Engineering*.

Ken points out the deep challenges in regulating experiments on the basis of intent.

**Background**

National Academy of Sciences, 2015: *Climate Intervention: Reflecting Sunlight to Cool Earth.*

This is the full report from the NAS. Worth skimming.