

A temporary, moderate and responsive scenario for solar geoengineering

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We provide a mix of citations and quotes to illustrate inaccurate claims that are, in our judgment, frequently made about Solar Radiation Management (SRM).

1. “Reduced precipitation is another frequently cited risk of SRM”

Two papers, Ferraro et al (2014) and Tilmes et al (2014) both show that if CO₂ concentration is quadrupled and sulfate aerosol SRM is used to restore temperatures to pre-industrial then there will be a large reduction in precipitation. This basic fact is unsurprising as *every* model study of SRM has shown a similar result, and that result can be deduced from a simple surface energy balance explanation. In discussing their results the author’s imply that global reduction in precipitation is a necessary result of SRM, whereas it is in fact contingent on the choice of scenario. As discussed in our paper, a scenario in which radiative forcing was adjusted to maintain global-average precipitation in the face of increasing CO₂ concentrations would show increasing temperatures but no secular decrease in average precipitation.

Papers:

Ferraro, A. J., E. J. Highwood and A. J. Charlton-Perez, “Weakened tropical circulation and reduced precipitation in response to geoengineering”, *Env. Res. Lett.*, **9** 014001 (2014).

Tilmes et al., “The hydrological impact of geoengineering in the Geoengineering Model Intercomparison Project (GeoMIP)” *J. Geoph. Res.* **118**(19), 11,036–11,058 (2013).

The researcher’s press release for Ferraro et al includes the following two statements

(<http://www.reading.ac.uk/news-and-events/releases/PR557440.aspx>):

“Artificially cooling planet would cause climate chaos, scientists say”.

“We have shown that one of the leading candidates for geo-engineering could cause a new unintended side-effect over a large part of the planet. The risks from this kind of geo-engineering are huge. A reduction in tropical rainfall of 30% would, for example, quickly dry out Indonesia so much that even the wettest years after a man-made intervention would be equal to drought conditions now.”

These statements were extensively reported in the press. For example, like Journalist Gwynne Dyer wrote about this research and concluded: “Forget about the geo-engineering safety net; it’s broken” <http://www.athensnews.com/ohio/article-41540-forget-about-the-geo-engineering-safety-net-it-rs-broken.html>. After being contacted by a colleague Dyer subsequently wrote a column acknowledging his error, but the original column and others like it can still be found online.

The researcher's press release for Tilmes et al includes the following two claims

(<http://www.prweb.com/releases/2013/11/prweb11288202.htm>)

"trying to resolve the problem through "geoengineering" could result in monsoonal rains in North America, East Asia, and other regions dropping by 5-7 percent compared to preindustrial conditions. Globally, average precipitation could decrease by about 4.5 percent."

"It's very much a pick-your-poison type of problem. If you don't like warming, you can reduce the amount of sunlight reaching the surface and cool the climate. But if you do that, large reductions in rainfall are unavoidable. There's no win-win option here."

2. "Some commentators conclude that such temporary SRM offers no benefits, suggesting that it must be maintained forever"

"Once you get to the point in terms of climate changes that you feel you have to use it, then you have to use [SRM] forever,"

Ray Pierrehumbert as quoted in David Rotman. "A Cheap and Easy Plan to Stop Global Warming." *Technology Review*. February 2013.

www.technologyreview.com/featuredstory/511016/a-cheap-and-easy-plan-to-stop-global-warming/

"What our study points out, and other studies have pointed out, if you do this for a while and CO2 keeps building up in the atmosphere, you have to keep doing it forever."

David Battisti as quoted in Jake Ellison in "UW researchers: We can't geoengineer our way out of global warming" *Seattle Post Intelligencer* 18 February 2014.

<http://blog.seattlepi.com/bigscience/2014/02/18/the-reason-we-cant-geoengineer-our-way-out-of-global-warming-us-we-says-uw-researchers/>