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A Modest Defense of Geoengineering Research: a Case Study in the Cost of Learning

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Abstract

Recently, research into the possibilities of developing solar radiation management (SRM) and other geoengineering technologies has gained new momentum. Just last year, Cambridge University announced the opening of a "Centre for Climate Repair" as part of the university's Carbon Neutral Futures Initiative. Recent modeling work gives hope that SRM could confer more benefits than previously thought. But opposition to even conducting research into SRM remains strong. I use the case study of SRM to develop a framework, based on a theorem by I.J. Good, for thinking about the benefits and costs of acquiring new evidence and for thinking about the conditions under which new evidence could be harmful. I argue that the expected benefits of supporting public research in SRM technologies outweigh the expected costs and harms.

Notes

1. 1.

   There is controversy surrounding why the experiment, which was part of the Stratospheric Particle Injection for Climate Engineering (SPICE) project, was terminated. It seems to have mostly been overdetermined. In addition to pressure from environmentalists, the project faced questions about intellectual property and about the safety of a part of its apparatus. But what is clear is that the project came under heavy fire from many environmental groups (Cressey, 2012; Kuo, 2012).

2. 2.

The decision calls on members to "Ensure, in line and consistent with decision IX/16 C, on ocean fertilization and biodiversity and climate change, in the absence of science based, global, transparent and effective control and regulatory mechanisms for geoengineering, and in accordance with the precautionary approach and Article 14 of the Convention, that no climate-related geoengineering activities that may affect biodiversity take place, until there is an adequate scientific basis on which to justify such activities and appropriate consideration of the associated risks for the environment and biodiversity and associated social, economic and cultural impacts, with the exception of small scale scientific research studies that would be conducted in a controlled setting in accordance with Article 3 of the Convention, and only if they are justified by the need to gather specific scientific data and are subject to a thorough prior assessment of the potential impacts on the environment" https://www.cbd.int/decision/cop/?id=12299.

3. 3.

Most legal scholars seem to agree is not a legally binding moratorium (Reynolds, 2019b).

4. 4.

https://twitter.com/patrickgaley/status/1126809903492947968

5. 5.
The claim that geoengineering research is promoted by the fossil fuel industry is highly contested. See (Reynolds et al., 2016; Reynolds, 2019a), for example. More on this later.

6. 6.
See, for example, Jamieson (1996), Jamieson (2013), Blomfield (2015), Gardiner (2011), McKinnon (2019), and Lin (2013).

7. 7.
See Victor (2011) for some good discussion of why climate action has been harder to achieve than action on CFCs, for example.

8. 8.
Albedo is the tendency to reflect solar radiation back into space.

9. 9.
See Heyward (2013) for an excellent discussion differentiating different geoengineering strategies.

10. 10.
See Section 4 for more details on items 4–6.

11. 11.
See Lenton and Vaughan (2009) for support for all these claims.

12. 12.

One possible exception here might be that research into CDR, especially in the form of carbon sequestration and capture [CSC] at the source of fossil fuel, might be argued to have the greatest degree of moral hazard (which I discuss below). I do not explore this possibility any further.

13. 13.
(Good, 1967). See Myrvold (2012) and references therein for further discussions.

14. 14.
For a good example of an argument that research can have negative consequences despite Good’s theorem, see Kitcher (2003). He argues against the wisdom of conducting research into the biological origins of inequality. The basic framework I employ here is loosely structured around his work.

15. 15.
To be clear, arguments of this kind look prima facie like slippery slope arguments– “if we even do research into this it will inevitably be deployed, so reasons not to deploy are automatically reasons not to conduct research.” In Section 8, I discuss more carefully worries that research inevitably leads to deployment. For now, I simply want to get on the table the reasons some have given for worrying about deployment.

16. 16.
See Robock (2008).

17. 17.

The well-known climate scientist Gavin Schmidt has expressed something like this view, claiming that the first time the monsoon season failed in India, regardless of what caused the failure, they would go to great lengths to end an SAI program. https://twitter.com/ClimateOfGavin/status/1105848382000689152

18. 18.

    Given how hard it is to regionalize SAI, and the availability of other more powerful weapons to any country capable of developing such a system, this risk strikes some as farfetched.

19. 19.

    (Reynolds et al., 2016; Reynolds, 2019a).

20. 20.

    See Wilholt (2009) and references therein for details.

21. 21.

    The discrepancy noted above in studies of bisphenol A turned out to arise from the fact that industry sponsored studies tended to choose less estrogen-sensitive rats in their studies, whereas it was well understood that the toxicity of bisphenol A acted through a channel that mimicked estrogen. This has led to the adoption of standard in choices of model organisms that are permitted in toxicity studies.

22. 22.

    https://projects.iq.harvard.edu/keutschgroup/scopex

23. 23.
    http://climate.envsci.rutgers.edu/GeoMIP/index.html

24. 24.
    See Rabitz (2016) and references therein.

25. 25.
    In fact Fruh and Hedahl (2019) have argued that, under considerations of just war theory, some nations would be justified in implementing rogue SRM strategies, even if those strategies harmed other nations. I take no position on that claim other than to note that it does suggest the outcome is not entirely unlikely, whether or not it would be justified.

26. 26.
    See Victor (2011) for more details.

27. 27.
    (Jinnah & Nicholson, 2019).

28. 28.
    "One of the main ethical objections to geoengineering" is "moral hazard" according to the United Kingdom's Royal Society Report Geoengineering the Climate (Ming et al., 2014, 39).

29. 29.
    http://www.geoengineeringmonitor.org/2018/06/stratosphericaerosolinjection/

30. 30.
    See Neuber and Ott (2020) and citations therein for more on the prospects of "buying time" with SAI.

31. 31.
One prominent libertarian philosopher recently posted a story on Facebook about SAI technology and claimed that if "climate alarmists" really believed their projections, they would be furiously pursuing such technology.

32. 32.
See (Corner & Pidgeon, 2014; Merk, 2018; Merk et al., 2016; Raimi et al., 2019) and references therein for more details.

33. 33.
See especially Raimi et al. (2019) and Merk et al. (2016).

34. 34.
In addition to the specific findings about framing effects in SAI-related surveys, there are general reasons to doubt the results of this kind of research. See, for example, Bullock and Lenz (2019).

35. 35.
The above three quotations are assembled in Callies (2018).

36. 36.
But see Callies (2018) for a more detailed discussion.

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