

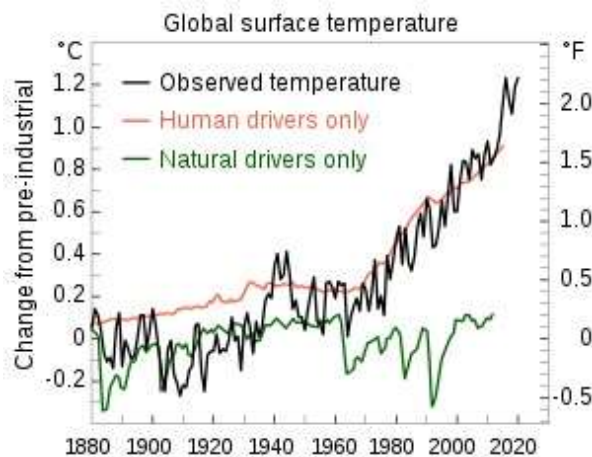
Diamond Dust in the Sky?

SCoPEX - Stratospheric Aerosol Injection (SAI) Experiment

“If we implement all currently planned climate protection measures, we will run towards a global warming of at least 2.4° C degrees. We know the havoc this wreaks. So the question is not whether we should hurry - we have to release the brakes in all areas”.

[Janine Wissler, Party Leader, Germany, in “Der Spiegel” Nr. 20/15.5.2021]

The need to slow down and eventually reverse the global warming and the associated climate change is undisputed and a lot of declarations and reduction goals have been defined, however no actual change, let alone reversal of the observed trends have been achieved.



Observed temperature from NASA vs the 1850–1900 average used by the IPCC as a pre-industrial baseline. The primary driver for increased global temperatures in the industrial era is human activity, with natural forces adding variability. [1]

One of the most controversial of potential approaches to reduce the effects of climate change is Stratospheric Aerosol Injection (SAI). SAI proposes to reflect sunlight back into space in order to lower the earth's temperature by spraying large quantities of tiny reflective particles high into the Earth's stratosphere. [2]

The main researchers of a SAI experiment, called Stratospheric Controlled Perturbation Experiment (SCoPEX) project are Frank Keutsch, Professor of Chemistry and Chemical Biology at Harvard and David Keith, Professor of Applied Physics at Harvard. The project is hosted at Harvard University. The stated aim of the planned SCoPEX field tests is to disperse particles from a high-altitude balloon, monitor the injected particles for chemical reactions with the atmosphere, observe their dispersion in situ and measure how much sunlight they block from reaching the earth. [2]

In Keutsch's opinion the experiment can help us to better understand the effects and risks of solar geoengineering. It is about to reflect the sunlight back into space in order to cool off Earth. With the first ascent of the 600 kg payload to an altitude of 20 km only the active navigational characteristics of the 45 m long balloon will be tested, **no** material will be released.

“We propose this experiment because we are afraid that the consequences of climate change can no longer be ignored and the public pressure on politics will increase accordingly. In such a situation climate engineering might be called for to be done immediately, than we would have no time to research any possible undesirable consequences. SCoPEX is supposed to create scientific fundamentals, to allow an informed discussion about the pros and cons”, justifies Keutsch. [3]

The first field test flight is scheduled for June 2021, hosted at the Swedish Space Corporation (SSC) in Kiruna, Sweden and intends to test the hardware. Further flights will be announced in the fall of 2021, these flights may release particles into the stratosphere. [2]

According to Keutsch the material should reflect sunlight from space without being heated up by the heat radiation from the Earth, and it should not destroy the ozone layer. According to available laboratory data, diamond dust would be the best material. However, effects of this material when

drifting down on Earth again are unknown, therefore calcium carbonate is the favorite right now should material be released in a follow up experiment.

We as scientists are not deciding explains Keutsch, Harvard's Solar Geoengineering Research Program established an Advisory Committee. The independent Advisory Committee is necessary to create trust and transparency. This committee not only examines the scientific part of SCoPEX, but also examines the financing by various non-profit organizations. This is important so that we cannot be accused of pursuing an agenda. Social participation is also checked. [3]

Critics point out that an Advisory Committee with members appointed by a small group of scientists selected by Harvard University officials related to the project is in no way a path towards multilateral democratic governance of SAI. And it is far from an inclusive, democratic process with the communities and rights holders that would be affected by SAI. [2]

Keutsch hopes that international partners can be attracted to use the research platform. We would like to take instruments from as many countries as possible on board, a bit like you know it from the International Space Station (ISS). For example, we would like to have researchers from China and especially from the Global South joining us. Because of course with climate experiments there is the danger that economically weaker regions in particular feel overwhelmed by an all-out of the western industrial nations.

“We may learn that putting calcium carbonate in the stratosphere is dangerous. Then it should be fine with me to break off the experiment, it would still be a success for science and for humanity”. [3]

Keutsch also points out that if we do not rapidly reduce carbon dioxide emissions or actively remove CO₂ from the atmosphere, but only rely on solar climate intervention, then we would have to maintain this for an indefinite period of time. Solar climate intervention can reduce the temperature in the meantime, but the long-term climate effect of CO₂ is only incompletely masked, not reversed. [3]

Outspoken criticism comes from many organizations and other scientists like Dr. Bill Hare, Professor at Murdoch University, Perth, Australia: “Solar radiation management is a very dangerous technology, deeply unwise and deeply unhelpful”. [4]

Obviously there is no easy solution to the climate threat, but something has to be done now. Acquiring scientific knowledge of even such remote possibilities as SAI will not hurt, but definitively is not the “one” solution nor the plan-B solution which comes without heavy impacts on our current life style, but it could be a small step of solving the giant problem of global warming.

In the Poll of this issue of the Journal you can cast your opinion whether the SCoPEX project is a meaningful contribution to reduce climate change effects.

References:

- [1] Temperature Prediction <https://en.wikipedia.org/wiki/Climate>
- [2] Geoengineering Briefing Feb. 7, 2021 www.geoengineering.org
- [3] DER SPIEGEL Nr.14/3.4.2021 “Diamanten am Himmel“
- [4] Dr. Bill Hare on SCoPEX <https://www.youtube.com/watch?v=qCrle7IrsCU>
- [5] SCoPEX https://www.youtube.com/watch?v=w_qkmavwE54