**ATOC/CIRES SEMINAR**
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**Sievers Conference Room SEEC S228**

## Stratospheric Sulfur Geoengineering – Benefits and Risks

Professor Alan Robock
Department of Environmental Sciences
Rutgers University
New Brunswick, NJ 08901-8551 USA

E-mail: robock@envsci.rutgers.edu

Geoengineering, also called climate engineering or climate intervention, has been proposed as a "solution" to global warming, involving "solar radiation management" by injecting particles into the stratosphere, brightening clouds, or blocking sunlight with satellites between the Sun and Earth. While volcanic eruptions have been suggested as innocuous examples of sulfate stratospheric aerosols cooling the planet, the volcano analog actually illustrates many potential risks of stratospheric geoengineering, including of ozone depletion and regional hydrologic responses. No such systems to conduct stratospheric geoengineering now exist, but the least expensive option would probably be to invent airplanes that could put sulfur gases into the stratosphere. Nevertheless, it may be very difficult to create stratospheric sulfate particles with a desirable size distribution.

Our Geoengineering Model Intercomparison Project, conducting climate model experiments with standard stratospheric aerosol injection scenarios, is ongoing. We have found that if there were a way to continuously inject $SO_2$ into the lower stratosphere, it would produce global cooling, stopping melting of the ice caps, and increasing the uptake of $CO_2$ by plants. But there are at least 27 reasons why stratospheric geoengineering may be a bad idea. These include disruption of the Asian and African summer monsoons, reducing precipitation to the food supply for billions of people; ozone depletion; no more blue skies; reduction of solar power; and rapid global warming if it stops, with devastating impacts on natural ecosystems. Furthermore, there are concerns about commercial or military control, and it may seriously degrade terrestrial astronomy and satellite remote sensing. Global efforts to stop anthropogenic emissions of greenhouse gases (mitigation) and to adapt to climate change are needed no matter what, if we choose to prevent dangerous anthropogenic interference with the climate system. Whether implementation of stratospheric geoengineering would be make the situation more dangerous needs to be answered by ongoing research.

### Biographical Sketch
**robock@envsci.rutgers.edu, http://www.envsci.rutgers.edu/~robock/**

**Dr. Alan Robock** is a Distinguished Professor of climate science in the Department of Environmental Sciences at Rutgers University. He graduated from the University of Wisconsin, Madison, in 1970 with a B.A. in Meteorology, and from the Massachusetts Institute of Technology with an S.M. in 1974 and Ph.D. in 1977, both in Meteorology. Before graduate school, he served as a Peace Corps Volunteer in the Philippines. He was a professor at the University of Maryland, 1977-1997, and the State Climatologist of Maryland, 1991-1997, before coming to Rutgers. Prof. Robock has published more than 400 articles on his research in the area of climate change, including 250 peer-reviewed papers. His areas of expertise include geoengineering, climatic effects of nuclear war, effects of volcanic eruptions on climate, and soil moisture. He serves as Associate Editor of *Reviews of Geophysics*, the most highly-cited journal in the Earth Sciences. His honors include being a Fellow of the American Geophysical Union, the American Meteorological Society (AMS), and the American Association for the Advancement of Science, and a recipient of the AMS Jule Charney Award. He recently served as a member of the Board of Trustees of the University Corporation for Atmospheric Research, which operates the National Center for Atmospheric Research. Prof. Robock was a Lead Author of the 2013 Working Group 1 Fifth Assessment Report of the Intergovernmental Panel on Climate Change (awarded the Nobel Peace Prize in 2007). In 2017 the International Campaign to Abolish Nuclear Weapons was awarded the Nobel Peace Prize for "for its work to draw attention to the catastrophic humanitarian consequences of any use of nuclear weapons and for its groundbreaking efforts to achieve a treaty-based prohibition of such weapons" based on the work of Prof. Robock.

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DIRECTIONS: The Sievers Conference Room is located in the SEEC Building (on the northwest corner of Colorado Ave and Foothills Pkwy) Room S228. You can find information on "Getting Here" at https://seec.colorado.edu/. From main campus, the Stampede Bus (http://www3.rtd-denver.com/schedules/getSchedule.action?runboardId=2653&routeType=11&routeId=STMP&serviceType=3) will drop off on the west side (towards the mountains) of the building. There is metered parking in the circular lot on the west side of the building and in the parking lot on the northeast side of the building on the west side of the lot. Take the stairs or elevator on the south end of the lobby to the second floor and walk straight ahead to the Sievers Conference Room, it will be on the right hand side.