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Index Terms

- Atmospheric Composition and Structure: Aerosols and particles
- Global Change: Atmosphere
- Atmospheric Processes: Climate change and variability

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Abstract

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Efficient formation of stratospheric aerosol for climate engineering by emission of condensible vapor from aircraft

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Recent analysis suggests that the effectiveness of stratospheric aerosol climate engineering through emission of non-condensable vapors such as SO_2 is limited because the slow conversion to H_2SO_4 tends to produce aerosol particles that are too large; SO_2 injection may be so inefficient that it is difficult to counteract the radiative forcing due to a CO_2 doubling. Here we describe an alternate method in which aerosol is formed rapidly in the plume following injection of H_2SO_4, a condensable vapor, from an aircraft. This method gives better control of particle size and can produce larger radiative forcing with lower sulfur loadings than SO_2 injection. Relative to SO_2 injection, it may reduce some of the adverse effects of geoengineering such as radiative heating of the lower stratosphere. This method does not, however, alter the fact that such a geoengineered radiative forcing can, at best, only partially compensate for the climate changes produced by CO_2.

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