Effects of sea spray geoengineering on global climate

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Anthropogenic climate warming is leading to consideration of options for geoengineering to offset rising carbon dioxide levels. One potential technique involves injecting artificial sea spray into the atmosphere. The sea salt particles would affect Earth's radiation budget directly, by scattering incoming solar radiation, and indirectly, by acting as cloud condensation nuclei, which could lead to whiter clouds that reflect more radiation.

But the potential effects of this method, especially the direct effects, are not fully known. Partanen et al. studied the effects of artificial sea spray using climate model simulations. They find that outside of the most heavily clouded regions the direct effect of scattering of radiation is an important part of the total effect. They also examined the effect of particle size and find that decreasing the size of injected particles could improve the efficiency of the geoengineering technique.

In addition, they conducted one simulation with aerosols injected over all Earth's oceans to identify regions that were most susceptible to cloud whitening, then carried out simulations with aerosol injections just in those specific regions. They find that geoengineering in just those regions would not be enough to offset the warming from the doubling of carbon dioxide since preindustrial times, but if enough sea salt were injected into the atmosphere over all oceans, it would be possible to compensate for much of the warming due to higher atmospheric carbon dioxide levels.

The authors stress, however, that their study did not address some of the potential side effects of this geoengineering technique, such as changes in the hydrological cycle, and they note that models of sea spray geoengineering still have significant uncertainties.

More information: Direct and indirect effects of sea spray geoengineering and the role of injected particle size, *Journal of Geophysical Research-Atmospheres*, doi:10.1029/2011JD016428 , 2012

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