

Cost of cloud brightening for cooler planet revealed

December 16 2014, by Sam Wood



Cloud in Nepali sky. Credit: Wikipedia

University of Manchester scientists have identified the most energy-efficient way to make clouds more reflective to the sun in a bid to combat climate change.

Marine Cloud Brightening is a reversible geoengineering method proposed to mitigate rising [global temperatures](#). It relies on propelling a fine mist of salt particles high into the atmosphere to increase the albedo of [clouds](#) – the amount of sunlight they reflect back into space. This would then reduce temperatures on the surface, as less sunlight reaches the Earth.

Clouds form when water droplets gather on dust or other particles in the

air. Increasing the amount of salt particles in the atmosphere allows more of these [water droplets](#) to form, making the clouds denser and therefore more reflective.

A new paper, published in the journal *Philosophical Transactions of the Royal Society A*, has looked at four different ways of getting the particles into the sky, to compare how effective they may be. The researchers found that a technique called the 'Rayleigh Jet' proved to be best.

Named after Lord Rayleigh, who provided the theory, the technique relies on spraying a fine jet of water that breaks down into small droplets into the sky. The [liquid droplets](#) evaporate quickly, leaving behind just the salt particles.

These particles, say the paper's authors, could be generated from specially built ships that could travel the world's oceans spraying salt particles into the air where they then hang in the atmosphere for several days until they return to Earth as rain.

Previous studies have optimised the size of the salt particles needed to produce the best increase in cloud reflectance but haven't taken into account how much [energy](#) the technique would need and how much it would cost to operate. This new paper, by teams at the universities of Manchester, Washington and Edinburgh, tackled this question. The researchers tested each technique so there was an increase in reflection of 5%, a figure that would combat the predicted effects of increased carbon dioxide levels over the rest of this century. They then looked at how much energy each would consume.

The scientists say that the Rayleigh jet method could produce the desired effect using 30 megawatts of energy, about the same energy that two large ships produce.

Dr Paul Connolly, based in the School of Earth, Atmospheric and Environmental Sciences at The University of Manchester, said: "It can be incredibly energy intensive to propel water high into the atmosphere and the energy required had never really been tested before. Our paper optimises the [salt](#) particle sizes to produce the required change in cloud reflectance for the least energy cost. It is an important finding if these techniques should be needed in the future.

"I am not recommending that we use any of these techniques now, but it is important to know how best to use them should they become necessary. Should no progress be made to reduce CO₂ levels, then geoengineering techniques, similar to this, might become necessary to avoid dangerous rises in global temperatures."

More information: "Factors determining the most efficient spray distribution for marine cloud brightening." *Philos Trans A Math Phys Eng Sci.* 2014 Dec 28;372(2031). pii: 20140056. [DOI: 10.1098/rsta.2014.0056](#).

Provided by University of Manchester

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