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## SPACE WIRE

### Geo-engineering: the planet's savior or untested danger?

SAN DIEGO, California, Feb 21 (AFP) Feb 21, 2010

US researchers are studying the steam from ships, condensation trails of airplanes and volcanic eruptions as they try to understand how and even if the fledgling science of geo-engineering could slow global warming.

But where some researchers are forging ahead with the new science of tinkering with the atmosphere to change the climate, many others are warning that geo-engineering is untested, potentially dangerous and distracting the world from reducing greenhouse gases.

Geo-engineering is based on the principle that making tweaks to the atmosphere, such as seeding the clouds to make them brighter and more reflective, could bring down global temperatures.

One geo-engineering study showed that large ships spewing tiny particles into the sky changed the characteristics of clouds, making the droplets in the clouds more numerous and smaller.

A cloud with more droplets is brighter and reflects more sunlight, preventing it from hitting the Earth's surface and warming it up.

Another model for geo-engineers is major volcanic eruptions, which spew sulfurous gases into the air and also result in cooler temperatures afterwards.

Some scientists have suggested as a geo-engineering strategy shooting sulfurous gas into the air from jets that fly at high altitudes. The gas would condense and form particles in clouds, making them more reflective, they have theorized.

"There's a huge scope for new methods because once you realize you can make things by direct condensation from vapor, then all different sorts of compounds are possible," said David Keith, a professor of earth sciences at the University of Calgary at the annual meeting of the American Association for the Advancement of Science..

"But it's much harder to figure out the environmental risks and effectiveness of these new methods unless you put them up. That is going to be a fundamental ongoing problem," said Keith.

"We need to have a little more insight," said James Fleming, a professor of science, technology and society at Colby College in the northeastern state of Maine.

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"We should avoid pitfalls and not rush forward, claiming we know how to fix the sky," he said.

Geo-engineering is not only untested, but could be dangerous if it fell into the wrong hands, the scientists say.

"The bottom line is some geo-engineering strategies are so cheap, any small state or even individual can do it, and that's a very dangerous thing," said Keith.

It would also pose a moral dilemma, because models have shown that reflecting the sun away from the earth to bring down temperatures would "damage some places", such as the southern Asian monsoon belt, which could see less rainfall, but "offset climate change in most places," said Ken Caldeira, a scientist at the Carnegie Institution.

Geo-engineering also doesn't address why we got to the point of needing to bring down global temperatures in the first place, because it is not an attempt to stop pumping greenhouse gases into the air.

It works on bringing down the fever rather than trying to prevent it.

"We should base our decision-making not on what we think we can do now or in the near future but on what we have and have not done in the past and how we got to this point as a society," said Fleming.

But most of the scientists agreed that geo-engineering should be studied and developed, because just bringing down greenhouse gas emissions will not do enough to slow or reverse global warming.

"Emissions reduction alone is not going to make the world start cooling this century," said Caldeira.

"It might in future centuries but what happens if in 20, 30, 40 years, temperatures are so high that crops are failing in tropical regions and millions of people are threatened with famine?"

"Do we say OK, maybe in this century if we stop emissions, things will start to get cooler? Or do we try to do something to diminish that damage?" he said.

"I don't know if there's something we can do but we'd better try to find out if there is, because it's the only way we can realistically stop the earth from warming during the course of this century," he said.

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