

# Volcanic ash could help reduce carbon dioxide associated with climate change

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Volcanic debris flow avalanche on Soufriere Hills volcano, Montserrat. Credit: Martin Palmer

University of Southampton scientists investigating ways of removing carbon dioxide (CO<sub>2</sub>) and other greenhouse gases from our atmosphere believe volcanic ash could play an important role.

A team from the University's School of Ocean and Earth Science has modeled the impact of spreading volcanic ash from a ship to an area of ocean floor to help amplify natural processes which lock away CO<sub>2</sub> in the seabed. They found the technique has the potential to be cheaper, technologically simpler and less invasive than other techniques to remove harmful gases.

The researchers' findings are published in the journal *Anthropocene*.

Human-caused [climate change](#) is one of the most pressing topics in contemporary science and politics. The impact of hundreds of years of greenhouse gas emissions are becoming clearer every year, with environmental changes including heatwaves, droughts, wildfires, and other extreme weather events.

"As a result of overwhelming evidence, politicians have begun to take steps towards incorporating [emissions reductions](#) into policies, such as in the 2015 Paris Agreement with its long-term goal of ensuring that global average temperatures do not exceed 2°C above pre-industrial levels. However, it is becoming clear that to avoid the worst impacts of climate change, active greenhouse gas removal (GGR) will be required," explains study co-author and University of Southampton Professor of Geochemistry, Martin Palmer.

GGR techniques remove [carbon dioxide](#) and other gases from the atmosphere, thereby reducing the [greenhouse effect](#), and in the longer term, slowing climate change. There are numerous potential approaches to GGR, from the simple, such as reforestation, to the complex, such as actively removing CO<sub>2</sub> from the atmosphere.

Most volcanoes lie close to the oceans, and every year millions of tons of volcanic ash falls into them and settles to the seafloor. Once there, it increases carbon storage in [marine sediments](#) and reduces atmospheric CO<sub>2</sub> levels. This is important because the oceans are the greatest sink of manmade CO<sub>2</sub> on Earth.

"One of the ways oceans lock away CO<sub>2</sub> is by storing it in sediments on the seafloor as calcium carbonate and organic carbon. In our work, we discuss how this natural process may be augmented by artificially adding ash to oceans," says Jack Longman, lead-author and former Post-Doctoral Research Assistant at the University of Southampton, who now holds a position at the Institute for Chemistry and Biology of the Marine Environment (ICBM), University of Oldenburg.

The scientists modeled the effect of distributing [volcanic ash](#) from a ship to an area of [ocean](#). The results suggest that this method could sequester as much as 2300 tons of CO<sub>2</sub> per 50,000 tons of ash delivered for a cost of \$50 per ton of CO<sub>2</sub> sequestered—much cheaper than most other GGR methods. In addition, the approach is simply an augmentation of a naturally occurring process, it does not involve expensive technology and it does not require repurposing valuable agricultural land.

The scientists say further research is needed though to test the efficiency of enhanced ash deposition in the oceans and to make sure there are no unforeseen side effects, but initial indications suggest that it could be applied easily and cheaply in many areas of the world.

**More information:** Jack Longman et al, Viability of greenhouse gas removal via the artificial addition of volcanic ash to the ocean, *Anthropocene* (2020). [DOI: 10.1016/j.ancene.2020.100264](https://doi.org/10.1016/j.ancene.2020.100264)

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