

PROPOSED GEOENGINEERING TECHNOLOGIES

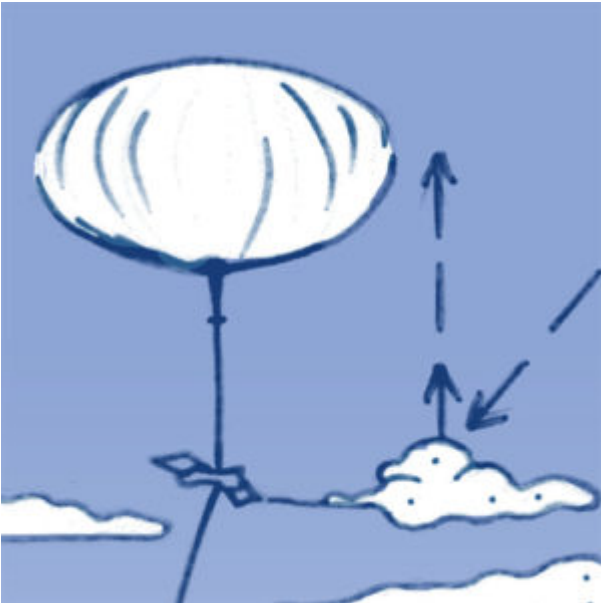
novembre 28, 2014

The following “technologies” are mostly hypothetical proposals advanced by various geoengineering advocates. Nonetheless, we are keeping close track of each one.

Geoengineering technologies can be categorized by different approaches (solar radiation management, carbon dioxide removal, weather modification), or by where they seek to intervene in the planetary ecosystem (land, air, water). For more background, see: [What is Geoengineering?](#) and [Reasons to Oppose](#).

Filter by keyword:

Stratospheric Aerosol Injection (SAI)



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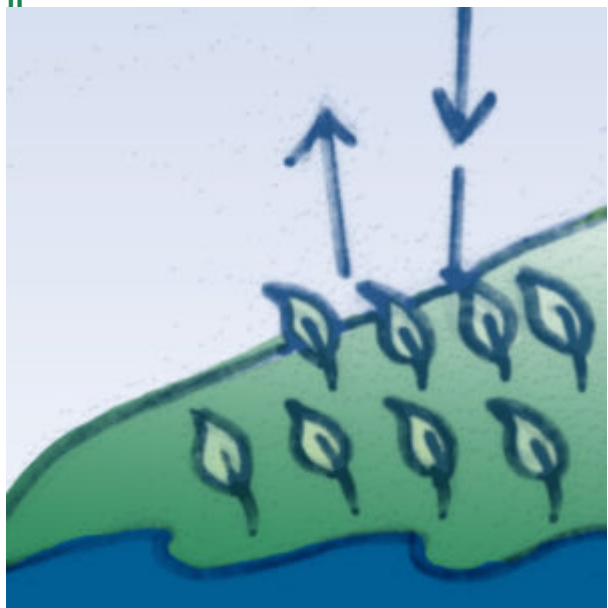
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SAI proposes to spray large quantities of sulphur particles (e.g. sulphur dioxide) into the stratosphere (the upper layer of the atmosphere) to act as a reflective barrier against incoming sunlight. Proposals range from shooting particles from artillery guns, using large hoses to the sky or emptying particles from the back of aircraft. The design of self-levitating particles, as well as the use of particles of other reflective minerals (e.g. titanium or aluminum) have also been considered.

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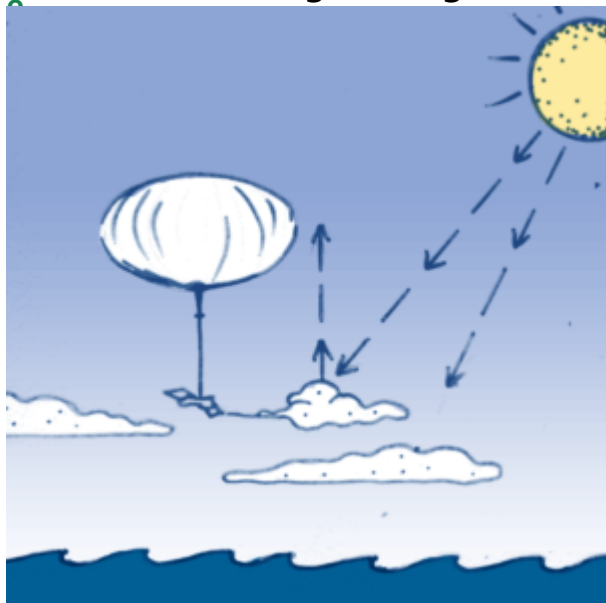
Surface Albedo Modification



A wide range of proposals fall within the category of surface albedo modification – from genetically engineering crops to reflect more light, to the clearing of boreal forest in snow-covered areas; from covering large desert or ice areas with reflective materials to whitening mountaintops and roofs with white paint – all with a common goal: to increase the earth’s surface albedo.

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Marine Cloud Brightening (MCB)



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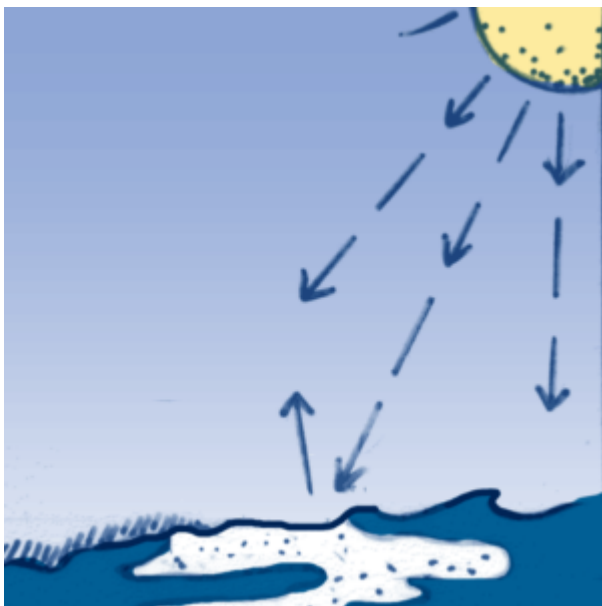
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Microbubbles



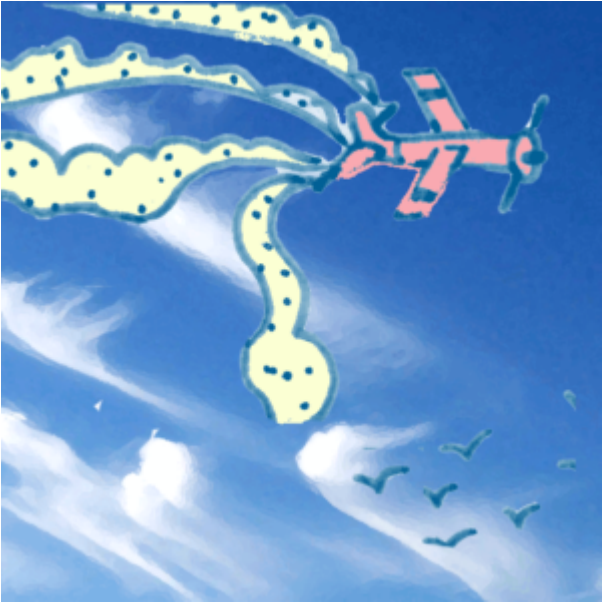
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Microbubble proposals suggest that by generating millions of tiny air bubbles in the ocean, large areas could be made to reflect more sunlight back into space.

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Cirrus Cloud Thinning

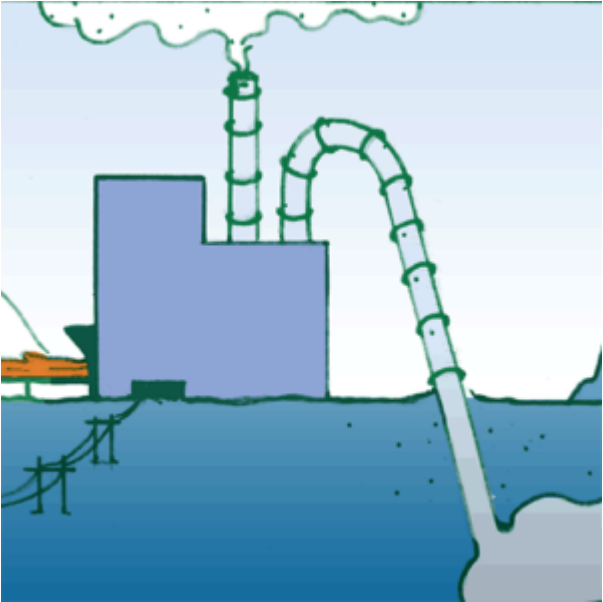


Timeline:

By thinning cirrus clouds (wispy, elongated clouds at high altitudes), some researchers have proposed that more heat could be allowed to escape into space, creating an overall cooling of the climate.

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Carbon Capture and Storage (CCS)



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CCS usually refers to the mechanical capture of CO2 emissions from power plants or other industrial sources. The CO2 is typically captured before the emissions leave the smokestack, generally with a sorbent chemical. The liquified CO2 is then pumped into underground aquifers for long term storage. CCS is not regarded as geoengineering under the UN Convention on Biodiversity's definition.

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Direct Air Capture (DAC)



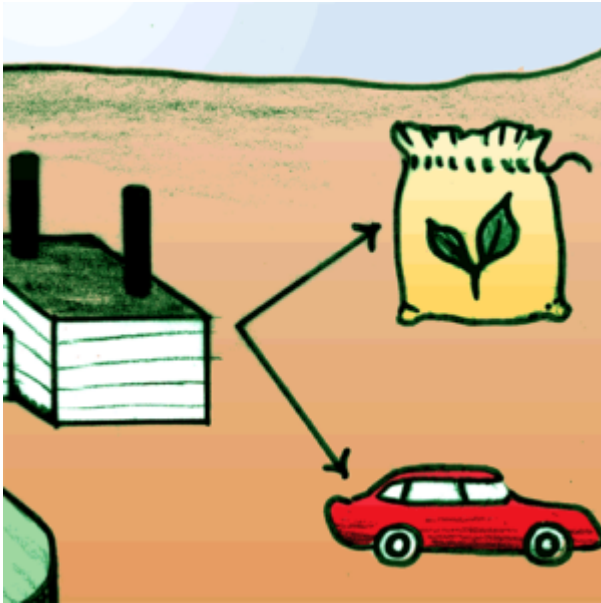
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Extracting CO2 or other greenhouse gases from the atmosphere by chemical and mechanical means, generally using a chemical sorbent and large fans to move air through a filter. The CO2 is then available as a stream of gas for CCS or EOR or other uses.

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Carbon Capture Use and Storage (CCUS)



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The idea that captured CO₂ from either industry or the atmosphere can be used as a feedstock for manufacturing, resulting in CO₂ stored in products. One hypothetical example involves feeding captured CO₂ to algae which produce biofuels; another is reacting CO₂ with calcifying minerals to produce concrete for building purposes.

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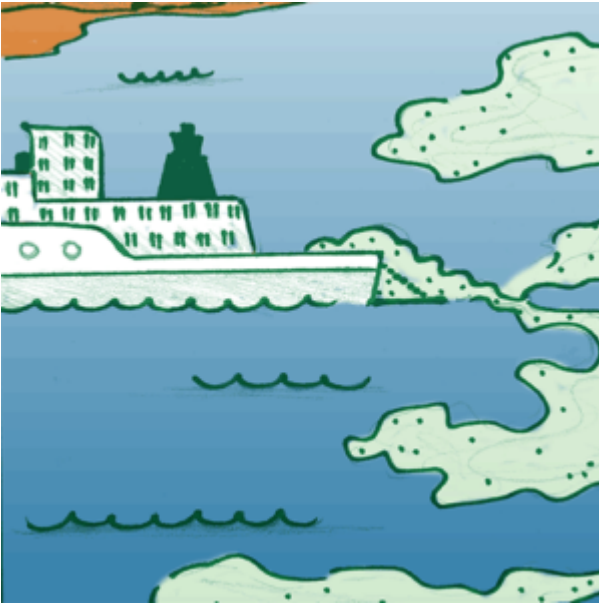
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Carbon Dioxide Removal, Air Cutdowns, and the Resurgence of Fossil Fuels

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Ocean Fertilization



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Ocean fertilization refers to dumping iron (as powdered iron sulphate) or other nutrients (e.g. urea) into the ocean in areas with low biological productivity in order to stimulate phytoplankton growth. In theory, the resulting phytoplankton draw down atmospheric CO₂ and then die, falling to the ocean bed and sequestering carbon.

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Enhanced Weathering (EW)



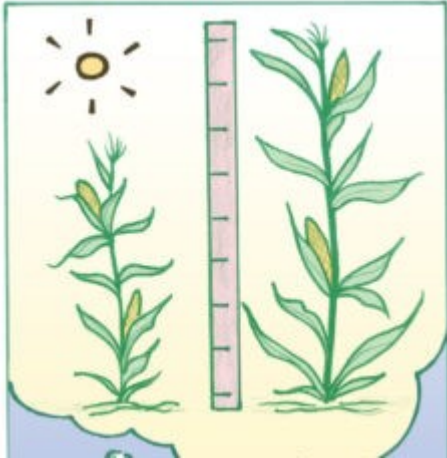
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EW techniques propose to dissolve crushed minerals (particularly silicate minerals) on land or in the sea in order to react with and fix atmospheric carbon dioxide into oceans and soils.

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Enhanced Photosynthesis



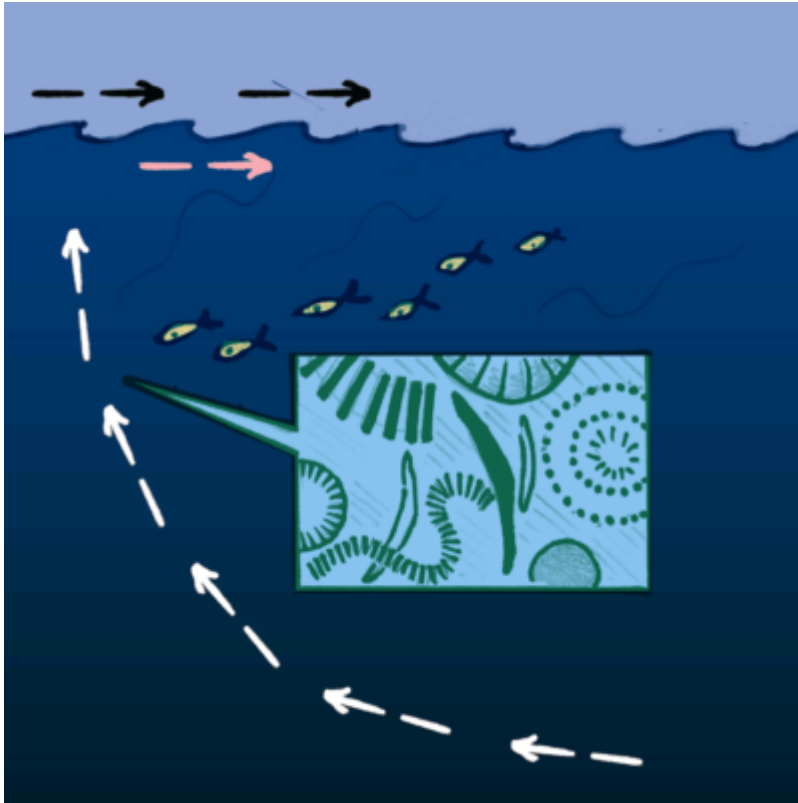
Types of Carbon Dioxide Removal:
1. **Enhanced Photosynthesis**
2. **Algal Biofuels**
3. **Direct Air Capture**
4. **Ocean Alkalinity Enhancement**
5. **Mineral Carbonation**
6. **Power-to-Liquid**
7. **Enhanced Oil Recovery**
8. **Geological Storage**
9. **Carbon Capture and Storage**
10. **Carbon Capture and Utilization**

Enhanced photosynthesis proposes to genetically manipulate plants and algae, especially crops like rice, wheat, cotton and trees, so that they would supposedly metabolize more CO₂.

This way of “forcing nature” is presented as a form of Carbon Dioxide Removal, with the assumption that is possible for the plants to store additional carbon in the ground.

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Artificial Upwelling



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Theoretically artificial upwelling proposes to artificially transport nutrient-rich deep ocean water to the surface, the hypothesis is

that once transported to the surface, new phytoplankton would absorb atmospheric CO₂ and store carbon when the dead phytoplankton biomass sinks to the ocean floor.

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