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# Geoengineering

Can we cool the planet?

Should we?

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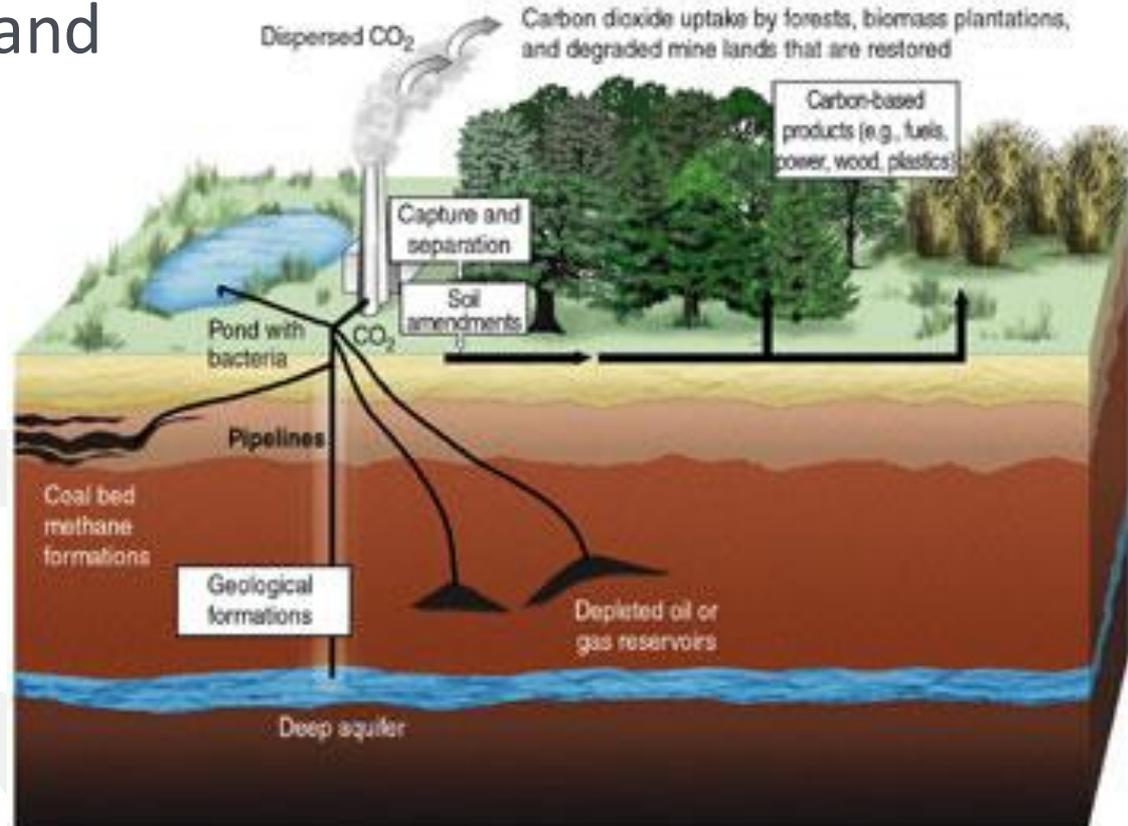
# What is geoengineering?

Large-scale intervention in the climate system of Earth



# Two types of geoengineering

- Carbon capture and storage
- Solar geoengineering



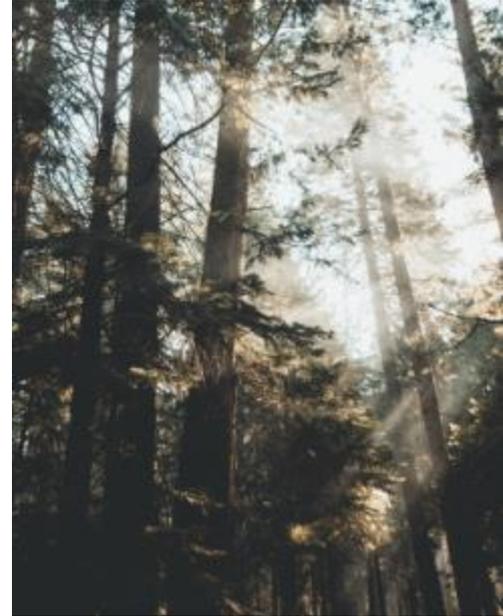
Carbon sequestration  
(LJ Hardin & J Payne  
2009, public domain)

# Carbon capture options: Reforestation

**Idea:** Plant trees to combat climate change

**Scientific Basis:** Trees remove carbon dioxide and store it for medium term in wood

**Problems:** Huge effort that could take a thousand years, slow to work, people may cut down the trees, trees may increase sunlight absorption in some areas

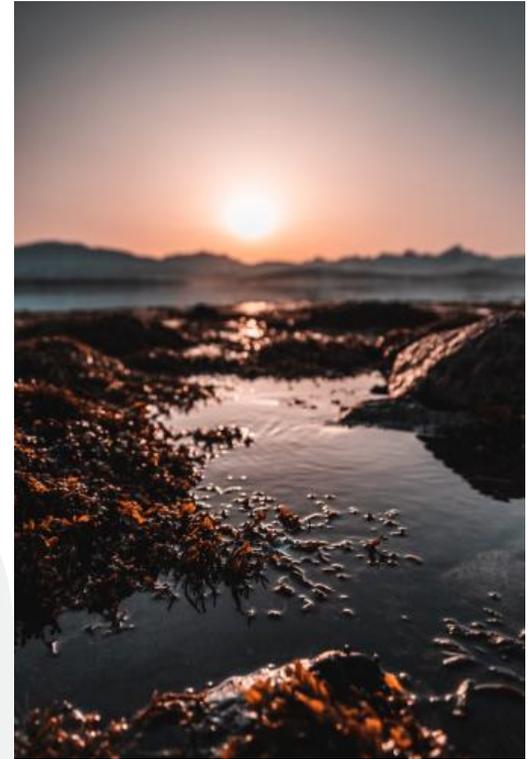


# Carbon capture options: Fertilise the oceans

**Idea:** Fertilise the oceans with iron

**Scientific Basis:** Iron is a limiting micronutrient for algal growth

**Problems:** Limited evidence of long-term storage, may cause blooms of toxic algae, effective range is narrow

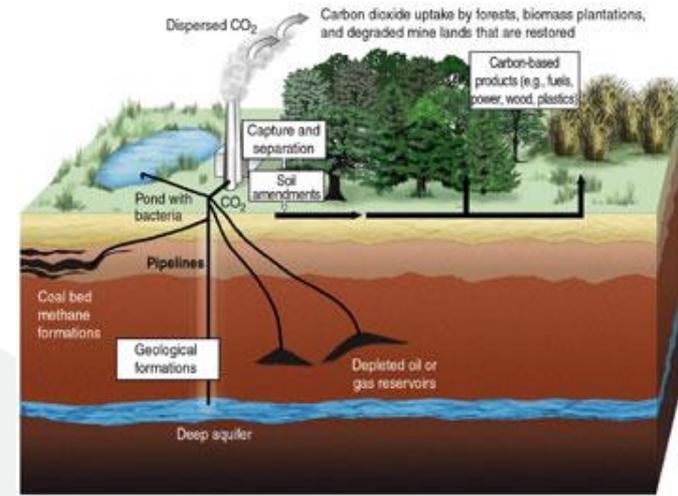


# Carbon capture options: Technologies

**Idea:** Use technologies that can capture carbon and store it

**Scientific Basis:** A variety of technologies have been trialled

**Problems:** Technologies trialled are expensive and limited in their application



Carbon sequestration  
(LJ Hardin & J Payne 2009,  
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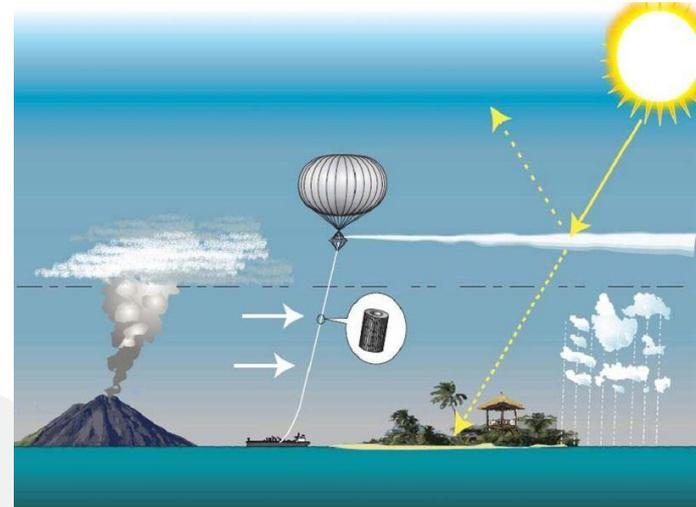


# Solar geoengineering options: Sulfur aerosols

**Idea:** Use stratospheric sulfur aerosols to reflect sunlight

**Scientific Basis:** Happens naturally after volcanic eruptions when aerosols reflect sunlight

**Problems:** Lasts only a couple of years; leads to acid rain, ozone destruction, drought and famine



SPICE project (Hughhant  
2011, Creative Commons)



# Solar geoengineering options: Cloud brightening

**Idea:** Use ships to spray salt water into the air and brighten clouds (can target specific areas)

**Scientific Basis:** Salt particles cause water to condense, making larger, brighter clouds

**Problems:** Could have effects far from the areas sprayed, unknown efficacy



# Solar geoengineering options: White buildings and light crops

**Idea:** Increase albedo of buildings and crops

**Scientific Basis:** Light colours reflect more sunlight

**Problems:** Unlikely to make a large difference, crops may not be as productive as normal varieties



# Why we should us geoengineering

Warming is accelerating and Earth may be nearing a tipping point to runaway warming. Solar geoengineering can buy time to develop effective carbon capture solutions and reduce emissions.



# Why we should not use geoengineering

Geoengineering is a short-term solution that does not address the problem of carbon emissions. Proposed methods are often ineffective or dangerous. Rich countries can afford to mitigate the effects of geoengineering, but poor countries may be badly affected.



# What do you think?





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