

# What We Know (and Don't Know) About Solar Geoengineering

## What We Know



**1. Global Cooling:** [Solar geoengineering](#) (also known as solar radiation modification, or SRM) can reduce global average temperatures by reflecting sunlight back into space. This cooling effect could lessen many climate impacts and risks, such as heatwaves, ice loss, and extreme weather events.



**2. Regional Differences:** The effects of SRM would not be uniform. Some regions may experience cooling and fewer climate risks, while others could face unintended consequences, such as changes in rainfall or droughts.



**3. Health and Safety:** [SRM](#) might reduce heat-related illnesses and deaths and could potentially limit extreme weather damage. However, changes in temperature and precipitation could affect agriculture, water resources, and disease patterns.



**4. Methods Vary:** Different SRM strategies, such as stratospheric aerosol injection (SAI) and marine cloud brightening (MCB), work differently and would have different impacts. SAI has been studied more extensively, while the impacts of MCB remain less understood (though research is growing).

## What We Don't Know



**1. Uneven Impacts:** How SRM would affect specific regions, particularly vulnerable areas, remains uncertain. While some impacts might be beneficial, others may cause harm.



**2. Abrupt Termination Risks:** If SRM were stopped suddenly, it could lead to a rapid temperature increase (known as "[termination shock](#)"), which might cause severe, unforeseen climate impacts.



**3. Precipitation and Ecosystems:** The precise effects on rainfall patterns and ecosystems, especially in regions reliant on stable weather for agriculture and biodiversity, are not well understood.

# Key Considerations for Research



**Benefits and Risks:** SRM may help reduce some climate impacts, such as heat stress or extreme weather, but the risks, including regional inequalities and unintended consequences, require further study.



**Knowledge Gaps:** MCB needs more research to understand its potential effects, while the risks and benefits of SAI require validation through real-world experiments and simulations.



**Climate Strategy Context:** SRM should not replace emissions reductions or carbon removal. Its potential role, if any, would be as a temporary tool to reduce climate risks while other solutions are scaled up.

Solar geoengineering has the potential to address some climate risks, but it is not a solution to the root causes of climate change. While we know it can cool the planet and reduce certain impacts, its uneven effects, unknown risks, and ethical concerns highlight the need for more research before any decisions are made about its use.