

Solar Radiation Modification (SRM)

Research and Development; Benefits and Risks

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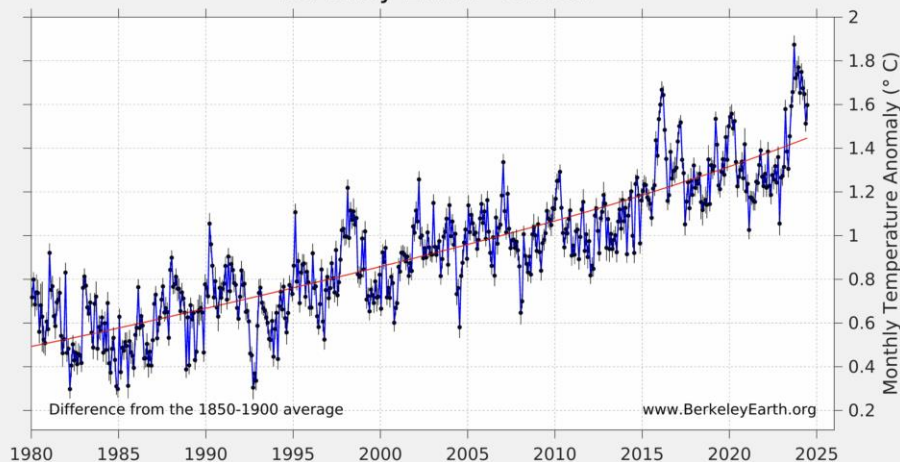
Project Scientist III

11th Annual Meeting: Innovation for Cool Earth Forum
October 9-10.2024

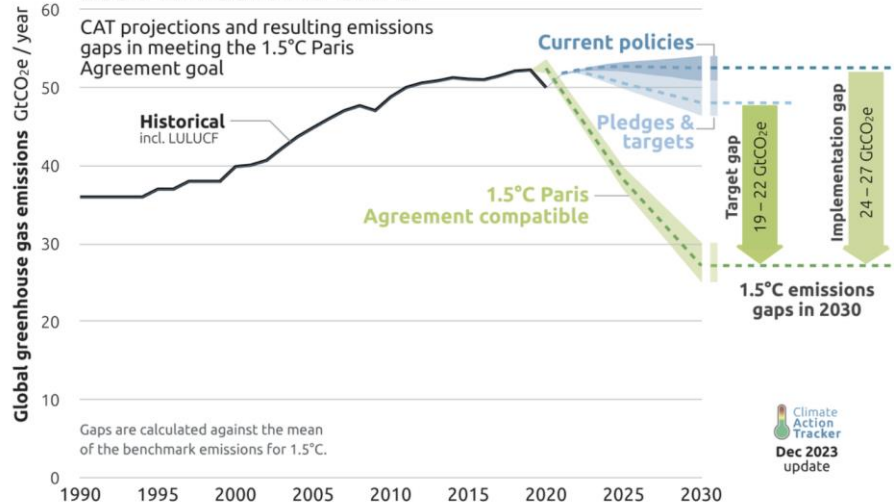


Motivation for Climate Intervention Research

Berkeley Earth - Global



2030 EMISSIONS GAPS



- Continued warming with growing impacts on vulnerable societies and ecosystems until net-zero is reached
- Increasing risks of reaching climatic tipping points

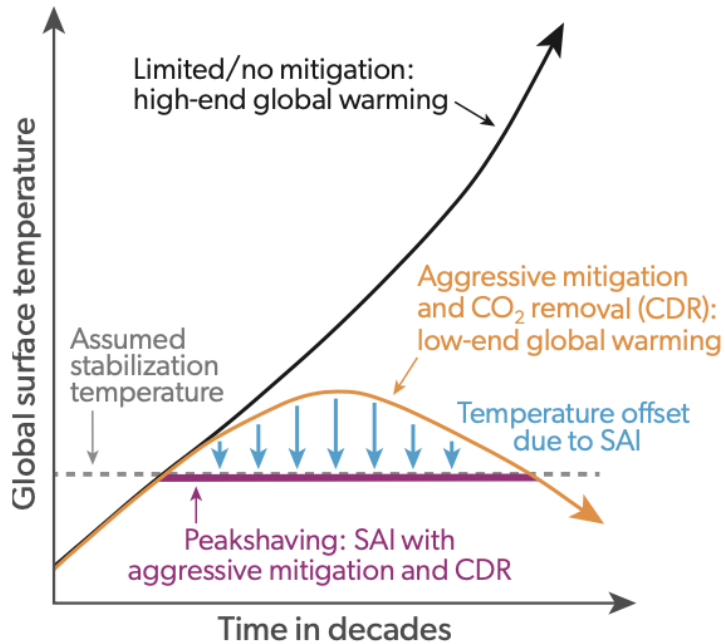
Should we consider Solar Radiation Modification as one of the Climate Responses to help reduce some of the projected future climate impacts?



Peakshaving using Solar Radiation Modification

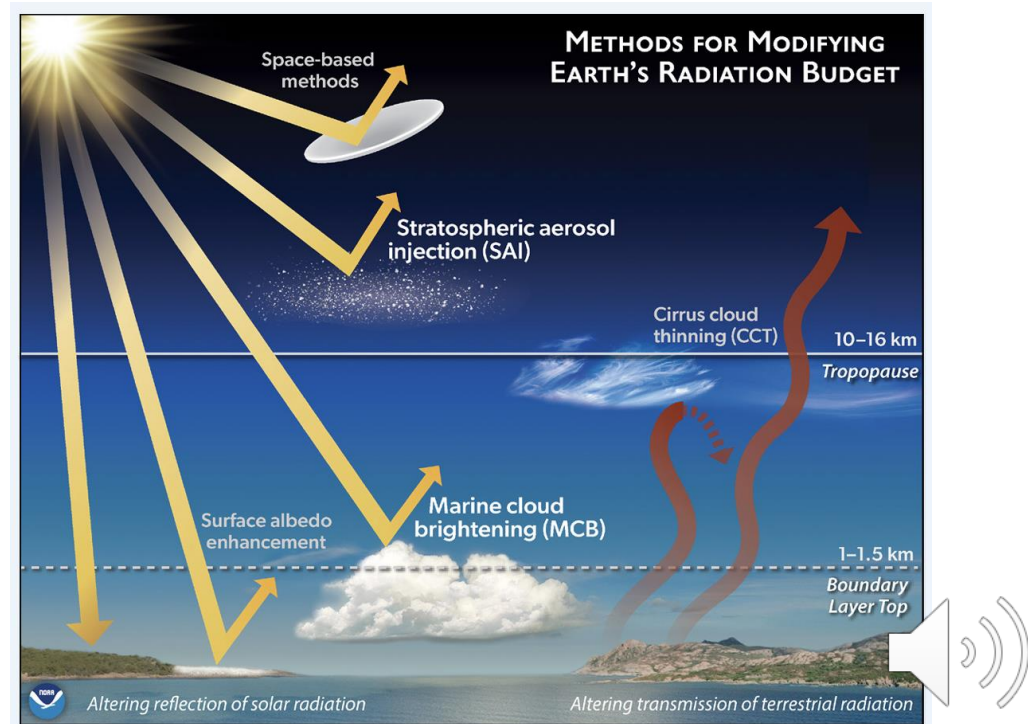
A) Peakshaving:

Aggressive mitigation and CO₂ removal (CDR) plus SAI to prevent target temperature overshoot



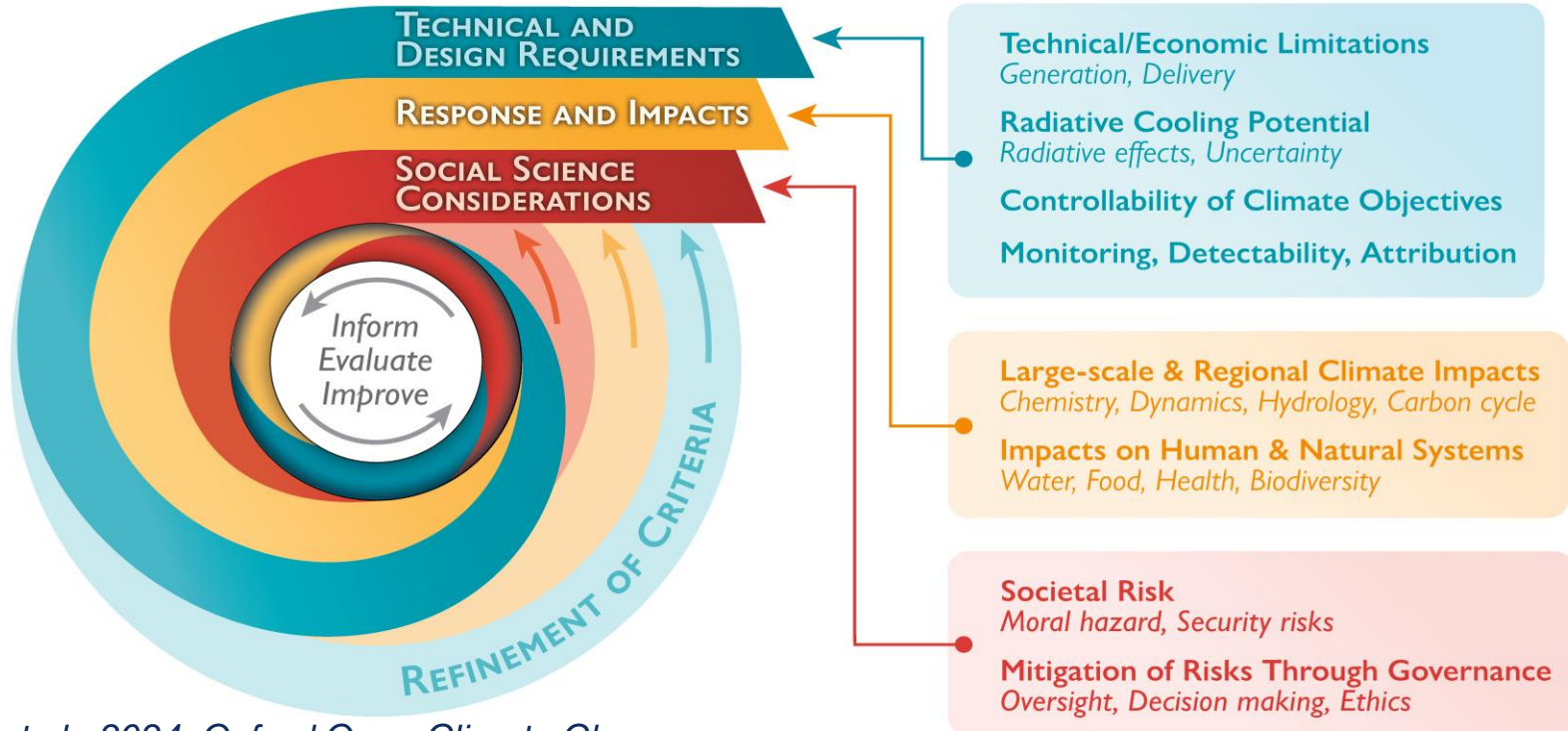
Decades or Centuries

Peakshaving Scenario: Uses SRM as stop-gap measure and as little as possible (in magnitude and time) to prevent side effects. Goal is to reduce impacts of climate change.



Stratospheric Aerosol Intervention Research Criteria

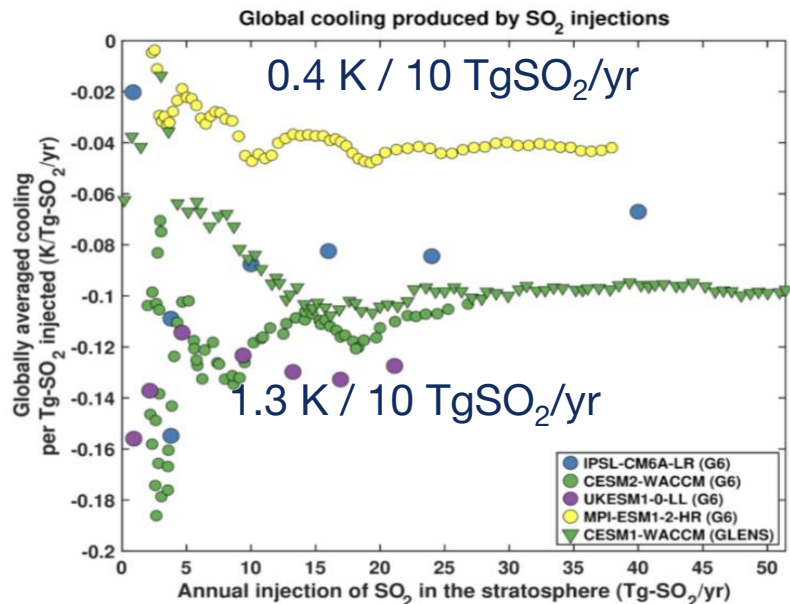
ASSESSMENT CRITERIA FOR SAI SCENARIOS AND STRATEGIES



Technical and Design Requirement

Radiative Cooling Potential: Radiative effects, Uncertainty

Global Cooling per TgSO₂/yr



Technical/Economic Limitations

Generation, Delivery

Radiative Cooling Potential

Radiative effects, Uncertainty

Controllability of Climate Objectives

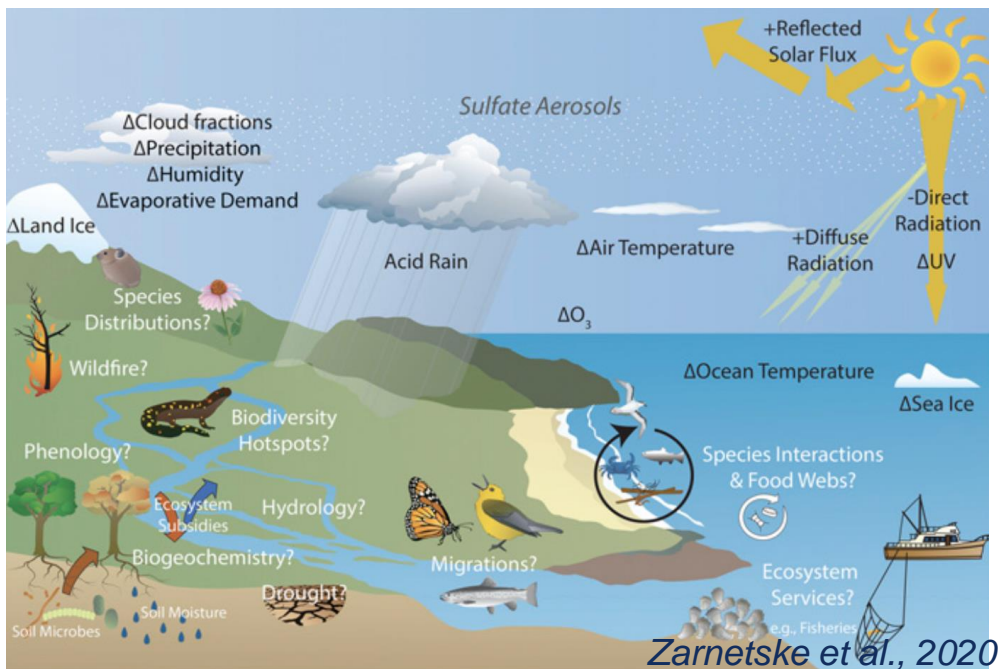
Monitoring, Detectability, Attribution

- How much cooling can be achieved with a certain injection amount?
- How much cooling will be needed, considering uncertainty in climate sensitivity?
- How do these **uncertainties** translate to other criteria, impacts and response, social research?



Impacts on Human and Natural Systems

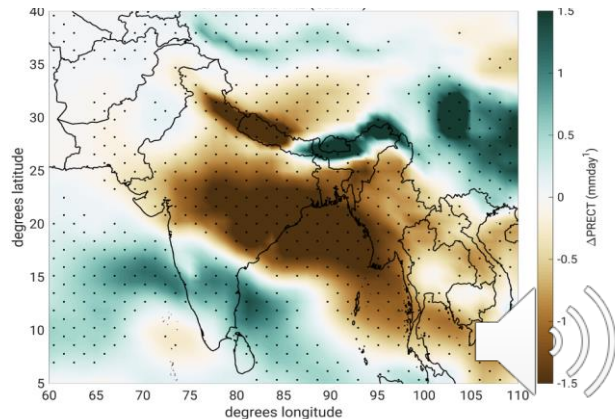
Impacts on Human and Natural Systems Water, Food, Health, Biodiversity



Large-scale & Regional Climate Impacts
Chemistry, Dynamics, Hydrology, Carbon cycle

Impacts on Human & Natural Systems
Water, Food, Health, Biodiversity

Uncertain Regional Changes Rainfall Changes over India (JJA)



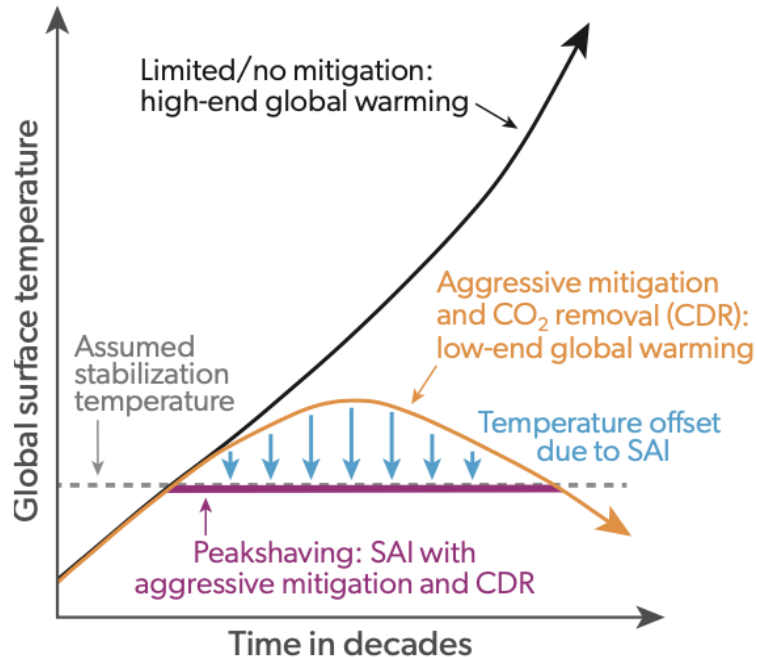
What are the effects on Biodiversity?

- Interdisciplinary research needs
- Need for theoretical and experimental understanding

Social Risks and Benefits, Governance

A) Peakshaving:

Aggressive mitigation and CO₂ removal (CDR) plus SAI to prevent target temperature overshoot



Societal Risk

Moral hazard, Security risks

Mitigation of Risks Through Governance

Oversight, Decision making, Ethics

Does SRM deployment require a global commitment to the phase-out of fossil fuels

- How can commitments be kept to continue aggressive decarbonization?
- What are the security risks depending on specific scenarios with input from the natural sciences?

Mitigation of Risks

- How to setup effective governance?
- Who needs to be included?
- What are the required criteria?

