

*Introduction to the governance of Solar  
Radiation Modification: What is it and why is it  
important*

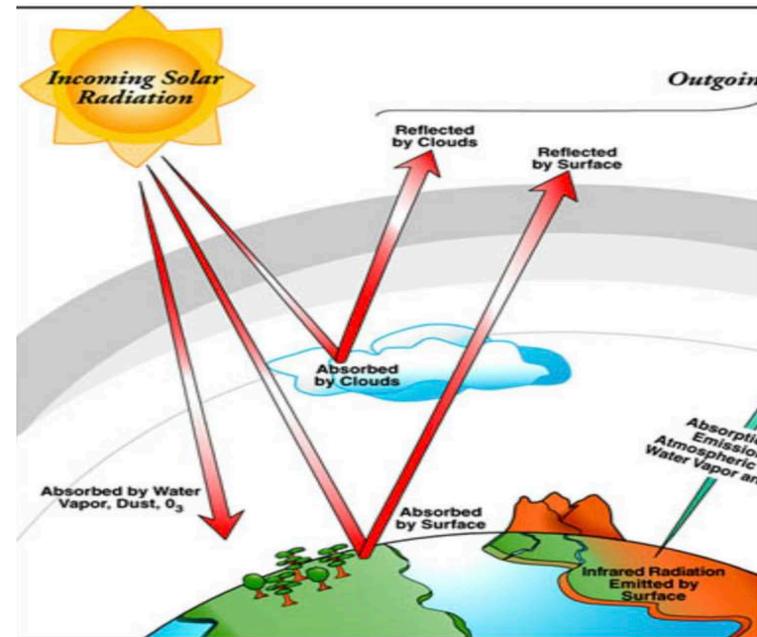
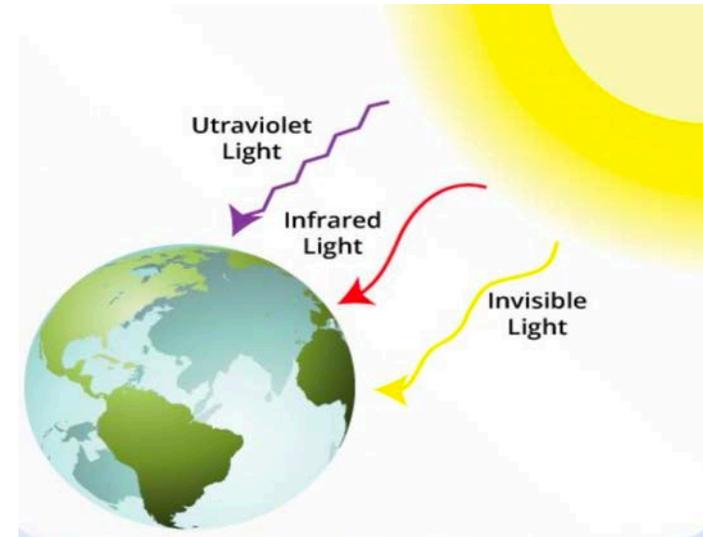
*Thelma Krug  
IPCC Vice-Chair*

C2G Webinar Series 2020

## *Some background to SRM introduction*

- All findings presented in this introduction are from the assessed literature by the Intergovernmental Panel on Climate Change (IPCC) in the following reports:
  - the Fifth Assessment Report (AR5) of 2013/2014
  - the Special Report on Global Warming of 1.5°C (2018)
- Additional scientific findings will be made available in the *Sixth Assessment Report* of the IPCC (AR6) (2021/2022)

- **Solar Radiation** is the electromagnetic radiation emitted by the Sun and has a distinctive range of wavelengths determined by the temperature of the Sun
- About 30% of the sunlight that reaches the top of the atmosphere is reflected back to space
  - 2/3 due to clouds and small particles in the atmosphere (aerosols)
  - 1/3 reflected back by light-coloured areas on Earth's surface
    - mainly snow, ice and deserts



# *Solar Radiation*

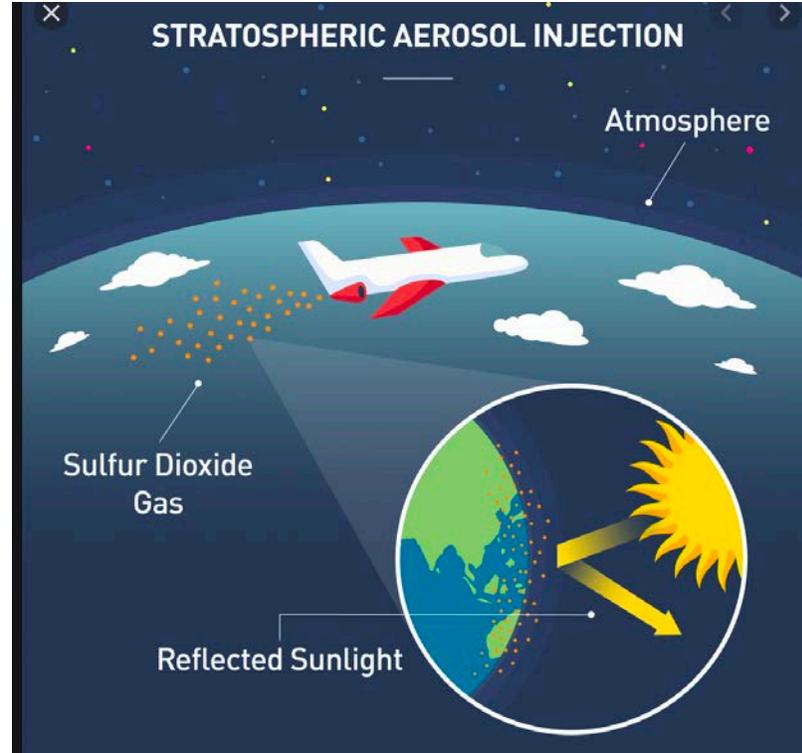
- The energy not reflected back to space is absorbed by the Earth's surface and atmosphere
- To balance the incoming energy, the Earth must radiate, on average, the same amount of energy back to space.
  - Earth emits outgoing longwave radiation
- If less incoming sunlight is absorbed because the planet has been made more reflective, or if energy can be emitted to space more effectively because the GHG effect is reduced, the average global surface temperature will be reduced

## *What is Solar Radiation Modification?*

- Solar radiation modification (SRM)
  - range of radiation modification measures that seek to limit global warming
    - most methods involve reducing the amount of incoming solar radiation reaching the surface
    - others also act on the longwave radiation budget by reducing optical thickness and cloud lifetime
- In the 1.5°C Special Report, SRM is assessed in terms of its potential to limit warming below 1.5°C in temporary *overshoot* scenarios to reduce elevated temperatures and associated impacts

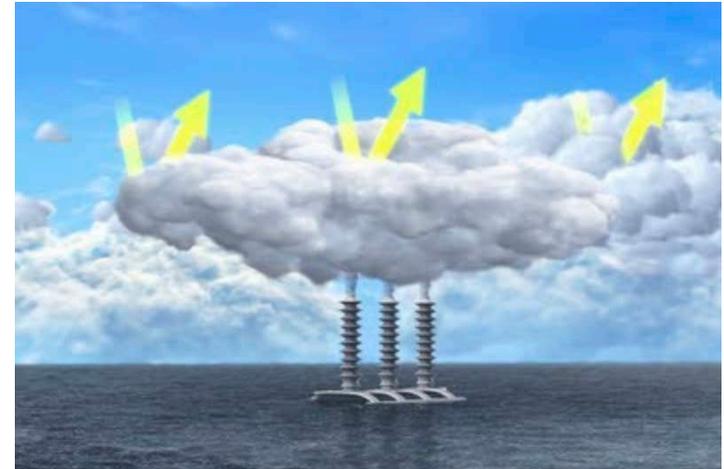
# Some SRM Methods

- Stratospheric aerosols injection
  - injection of a gas in the stratosphere, which then converts to aerosols
    - most-researched SRM method
      - high agreement that it could limit warming to below 1.5°C



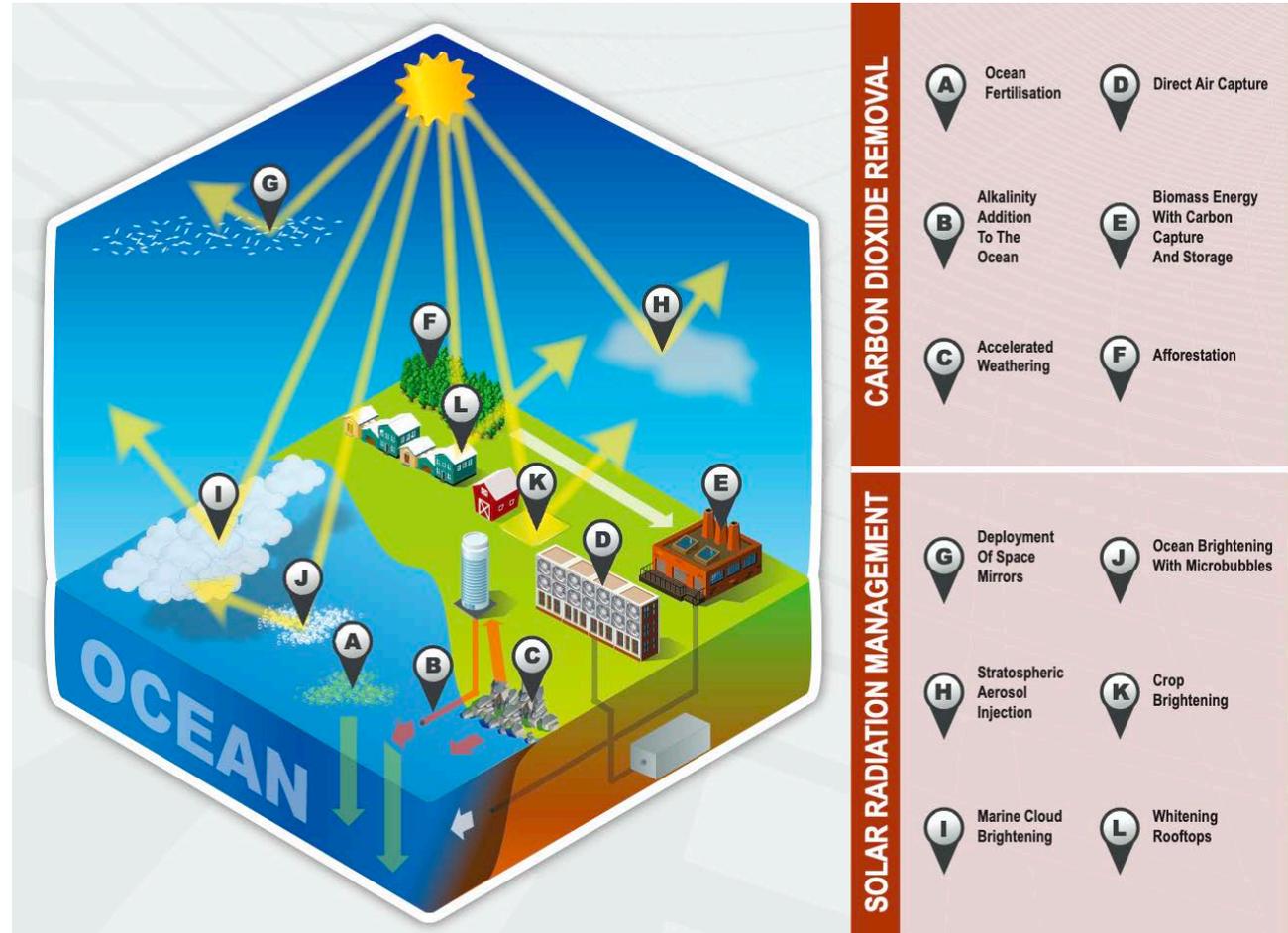
# Other SRM Approaches

- Other approaches are less well researched
  - ground-based albedo modification
    - whitening roofs, changes in land-use management, covering deserts with reflecting sheeting
  - marine cloud brightening
    - spraying sea salt or other particles into marine clouds, making them more reflective
  - cirrus cloud thinning
    - Reducing optical thickness and cloud lifetime to allow more output longwave radiation to escape into space



# Overview of some proposed SRM (and CDR) methods

Source: IPCC AR5 page 632



## *Importance of Solar Radiation Modification*

- Some aggressive climate stabilization targets ***cannot be achieved through mitigation measures alone*** and thus must be complemented by either CDR or SRM
- As a supplement to mitigation
  - may reduce increases in global temperature-related extremes and rainfall intensity
  - would not address negative effects from continued ocean acidification
- May help avert potentially catastrophic temperature increases **but** may have ***negative impacts*** with respect to global and regional climate conditions