Solar Radiation Modification and the Sustainable Development Goals

How does the IPCC approach SRM?

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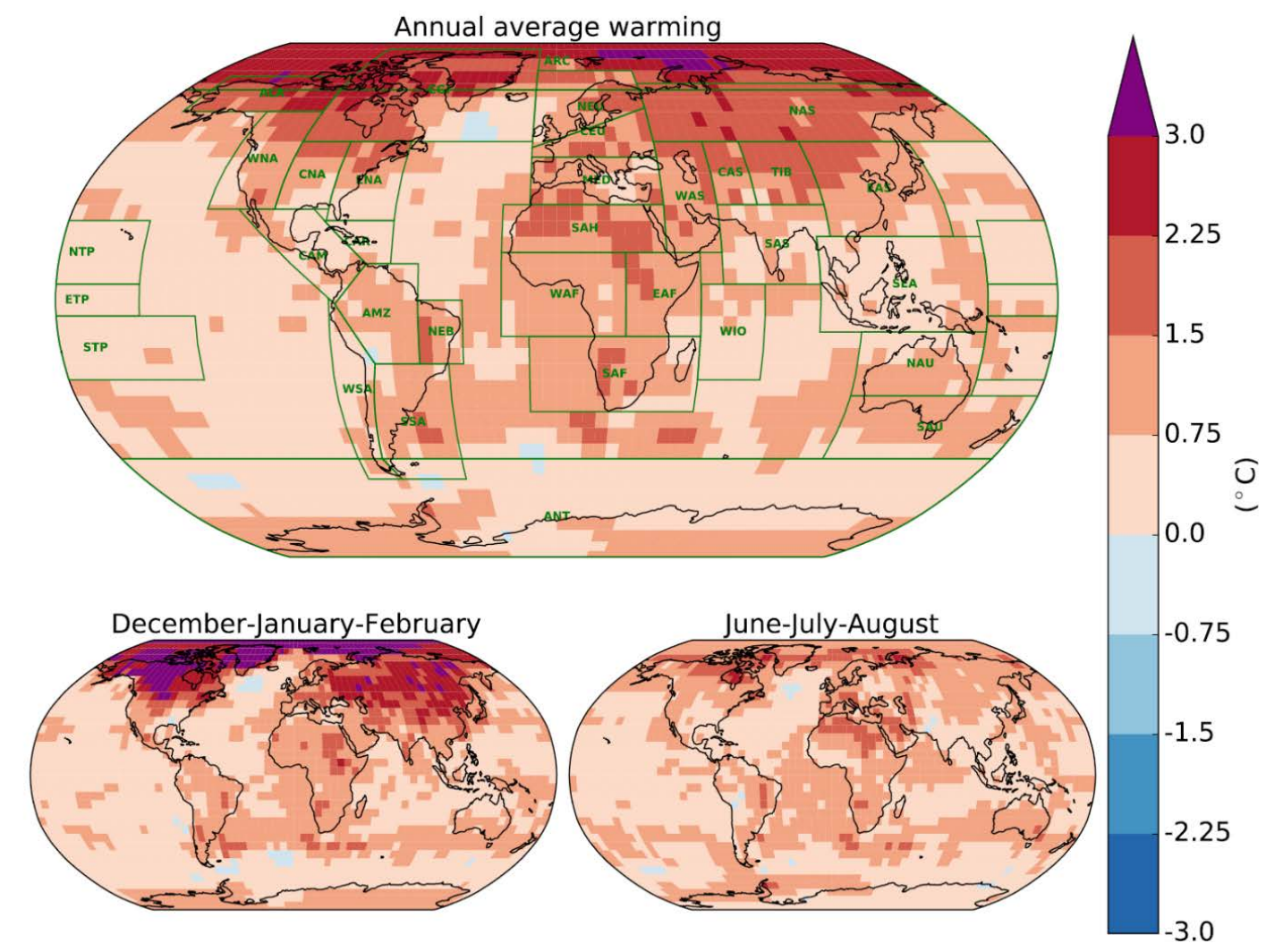
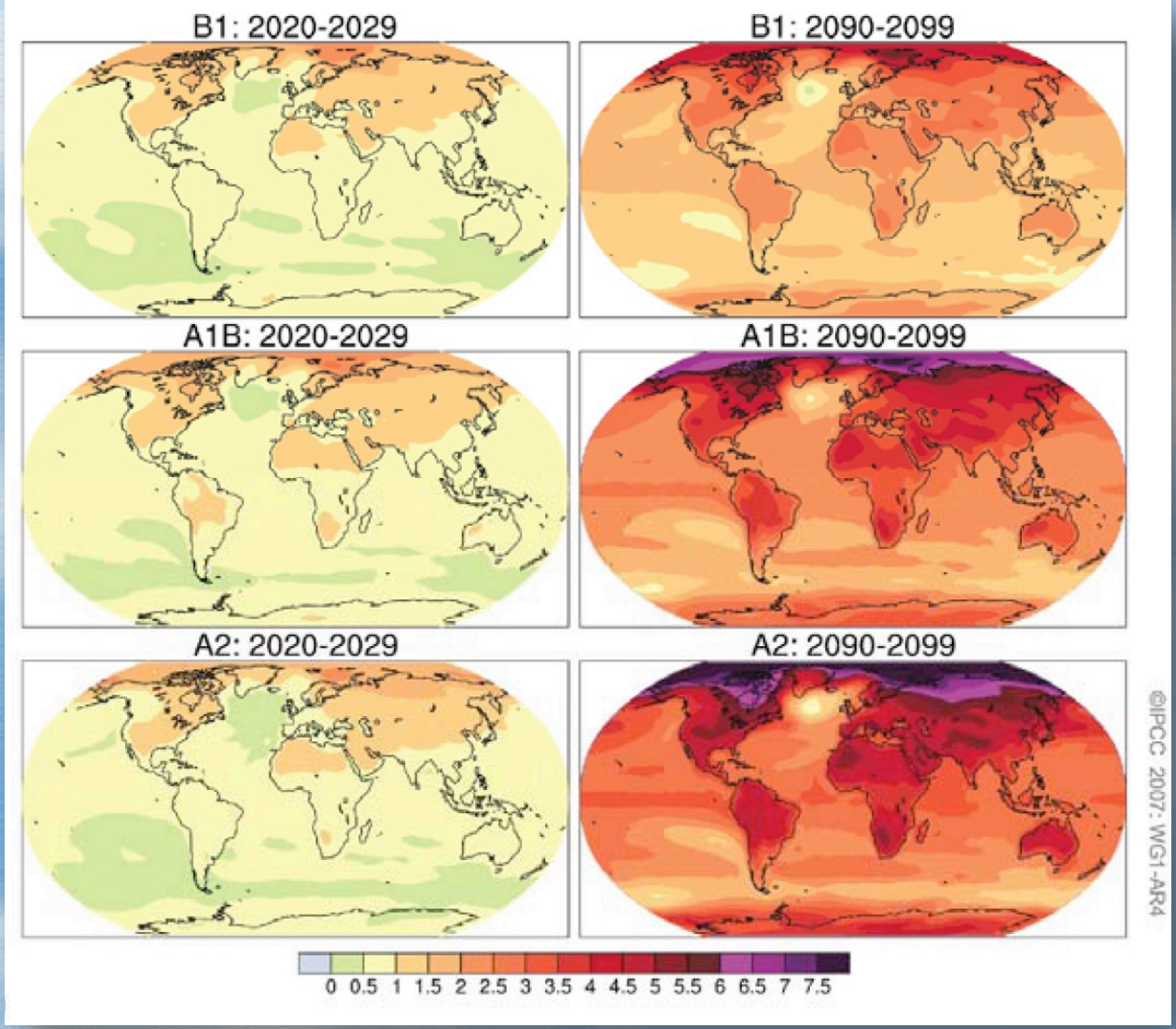
Observed increase in Temperature 1901 to 2012
Spatial distribution not homogeneous



Source: IPCC 2018 Special Report on Global Warming of 1.5°C

Estimates of temperature increase according to emission pathways



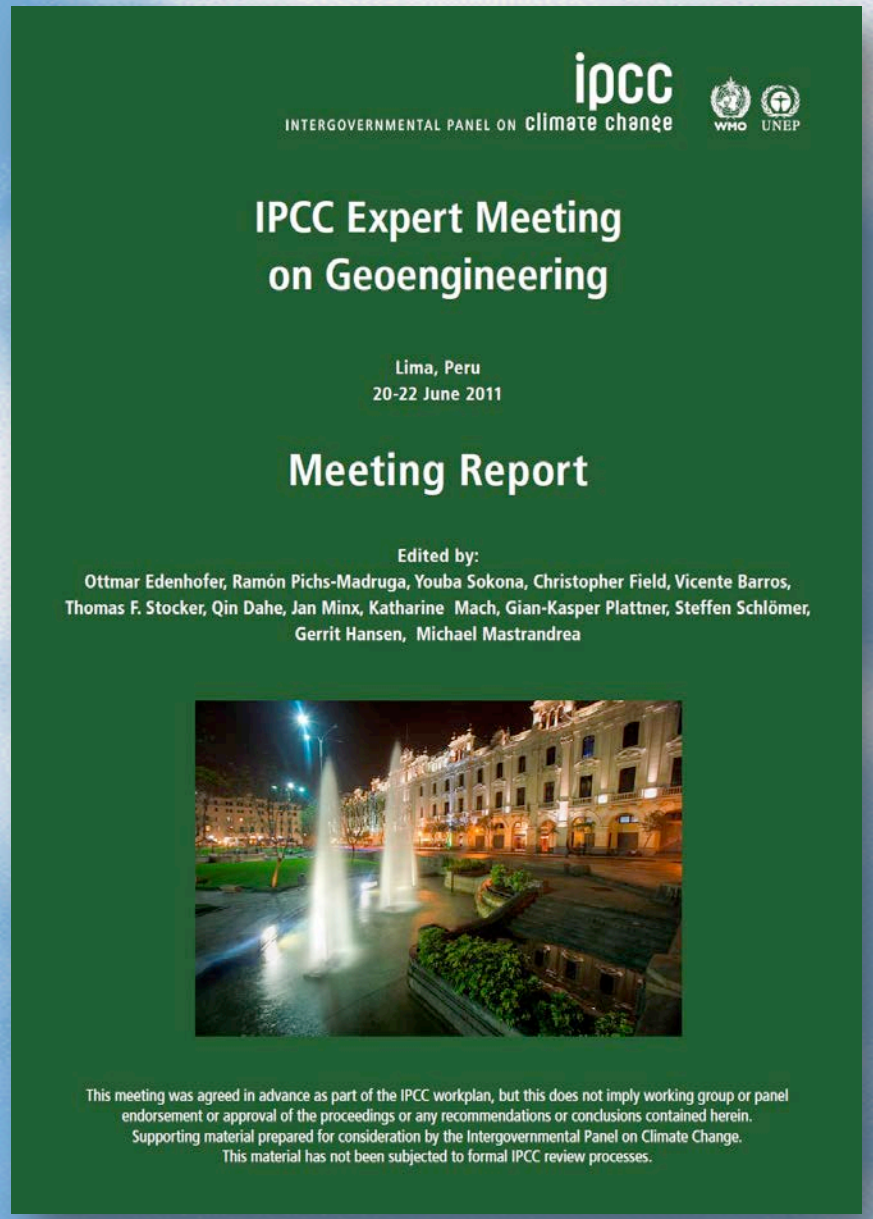
(IPCC 2013)

IPCC Special meeting on Geoengineering

Current discussions that suggest geoengineering as an option to support climate mitigation efforts remain rather abstract and lack comprehensive risk assessments that take into account possible adverse impacts over short and longer time frames. The understanding of the physical science basis of geoengineering is still limited.

Improved scientific understanding of the impacts of geoengineering proposals on human and natural systems have to be assessed.

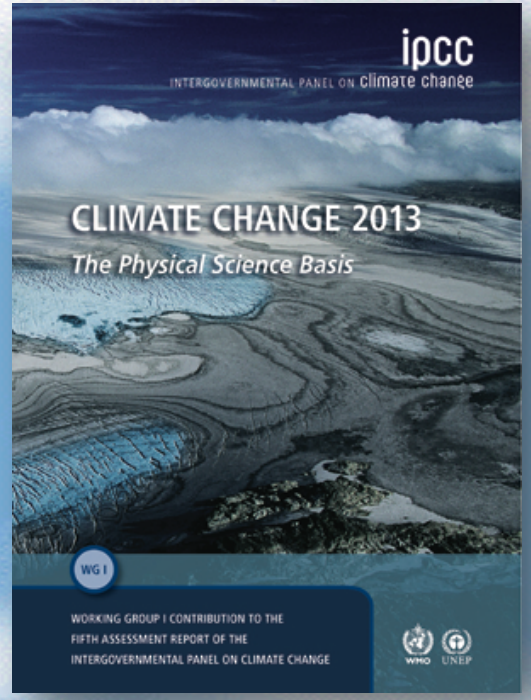
We need to take into account the possible impacts and side effects and their implications for mitigation cost in order to define the role of geoengineering within the portfolio of response options to anthropogenic climate change. Furthermore, this includes an evaluation of options for appropriate governance mechanisms.



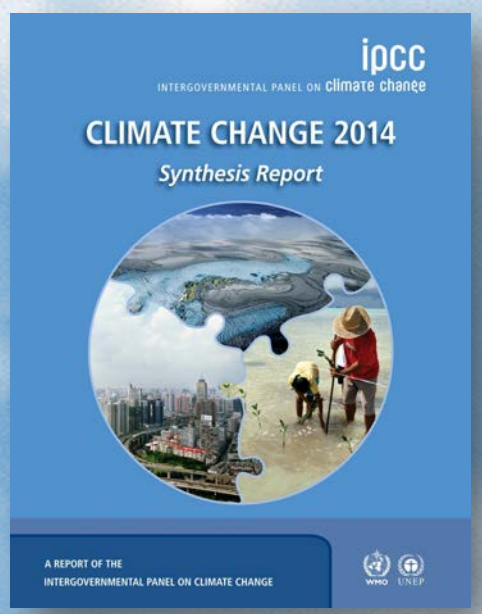
https://archive.ipcc.ch/pdf/supporting-material/EM_GeoE_Meeting_Report_final.pdf

IPCC AR5 2013-2014

The main assessment in the IPCC AR5 on the climate system response to SRM is that the compensation between GHG warming and SRM cooling would be imprecise. SRM would not produce a future climate identical to the present (or pre-industrial) climate.



A climate with SRM and high atmospheric GHG levels would be closer to that of the unperturbed climate than a world with elevated GHG concentrations and no SRM.

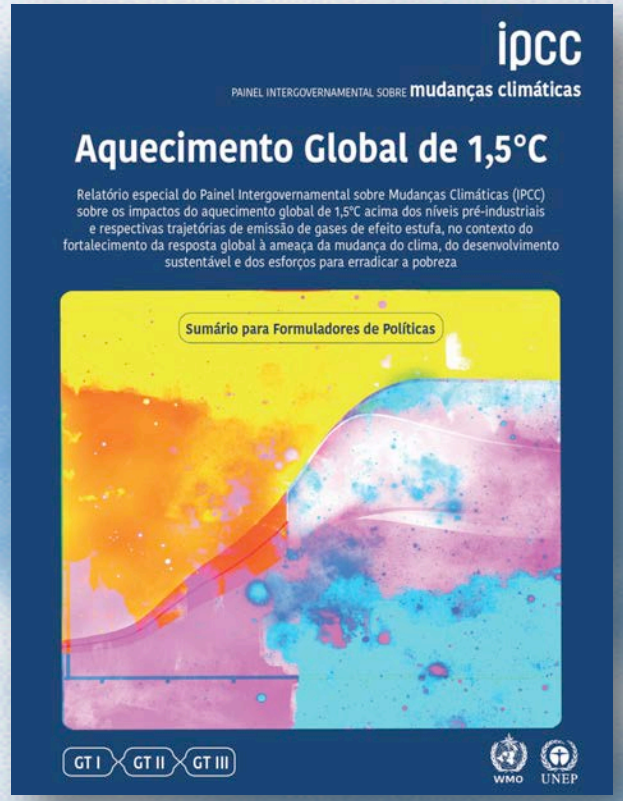


There is also high confidence that SRM will not mitigate the problem of ocean acidification associated with increasing atmospheric CO_2 concentration. A sudden termination of SRM would cause a rapid increase in surface temperatures to values that are consistent with the high GHG forcing.

IPCC Special report on 1.5 degrees - 2018

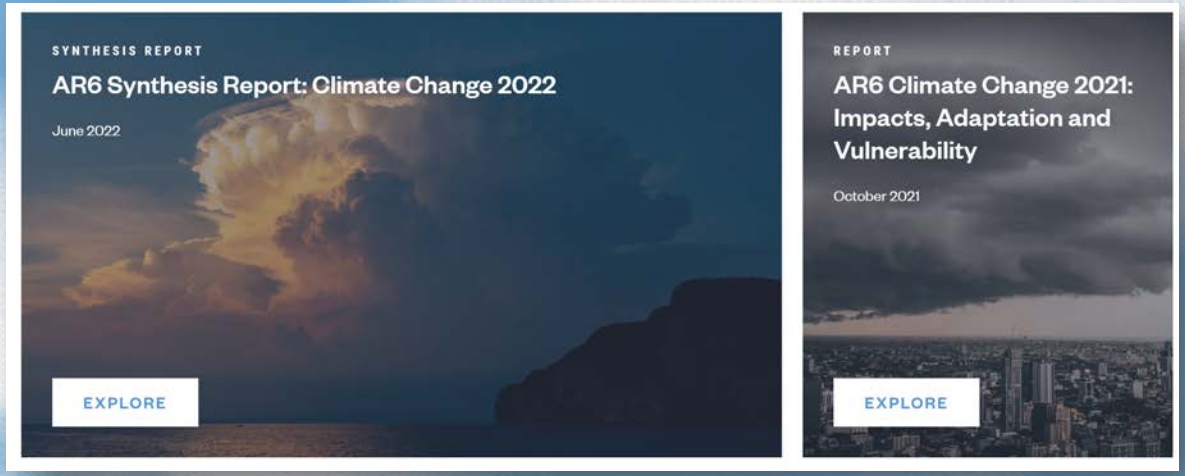
SRM was discussed in the context of short-term action to **complement strong concurrent emissions reductions** and aid staying below short-term global temperature levels

The existing literature only supports SRM as a supplement to deep mitigation, for example in overshoot scenarios to limit global warming below specific thresholds such as 1.5oC warming



The overall assessment was that the combined uncertainties surrounding the various SRM approaches, including technological maturity, physical understanding, potential impacts, challenges of governance, legality, and potential impacts on sustainable development could render **SRM economically, socially and institutionally undesirable.**

Recent positioning of IPCC



There is low confidence that geoengineering techniques would not lead to changes in climatic impact drivers outside the effects of increasing greenhouse gases. Geoengineering measures to enhance the ocean sink of CO2 would clearly increase ocean acidification (high confidence), and measures to enhance the uptake of CO2 by vegetation would lead to changes in catchment land cover (high confidence) with potential effects on downstream hydrological impact drivers.

Relative to a high-CO2 world without SRM, SRM is expected to affect biogeochemical cycles through changes in sunlight, climate (e.g. temperature, precipitation, soil moisture, ocean circulation), and atmospheric chemistry (e.g. ozone).

Reduced sunlight would have a substantial effect on local ocean NPP where light availability is the main limiting factor for phytoplankton growth

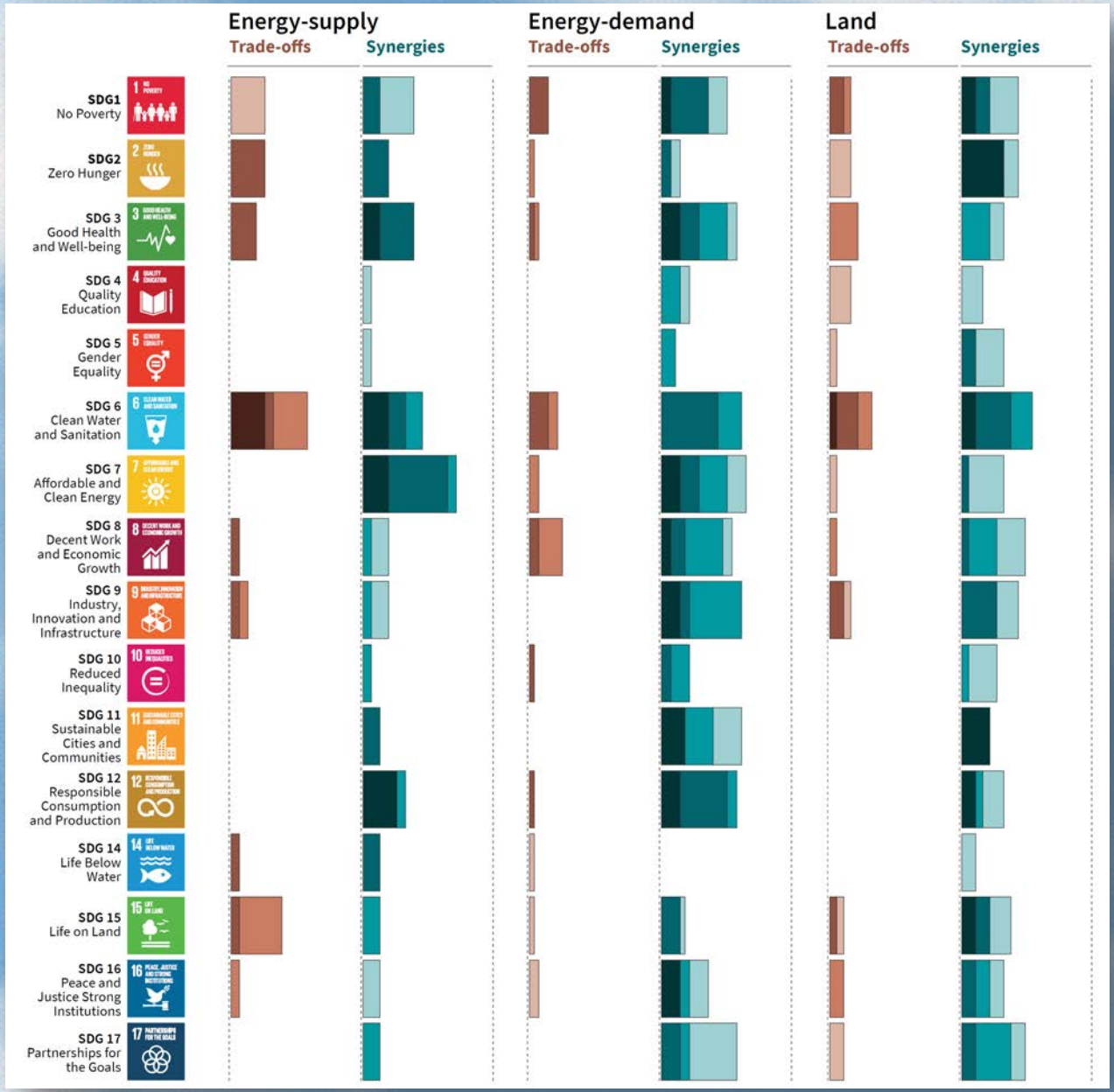
Since SRM alters the planetary energy balance, changes in the hydrological cycle are expected

UN 17 goals to transform our world

Mitigation options and sustainable development using SDGs

Potential positive effects (synergies)
Negative effects (trade-offs)

IPCC SR1.5, 2018



SRM is taken very cautiously by IPCC, with key issues being science as well as governance

Thanks for the attention!!!