GeoMIP Update

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Presented by K. E. Taylor
to the WGCM's 17th Session

Victoria, Canada
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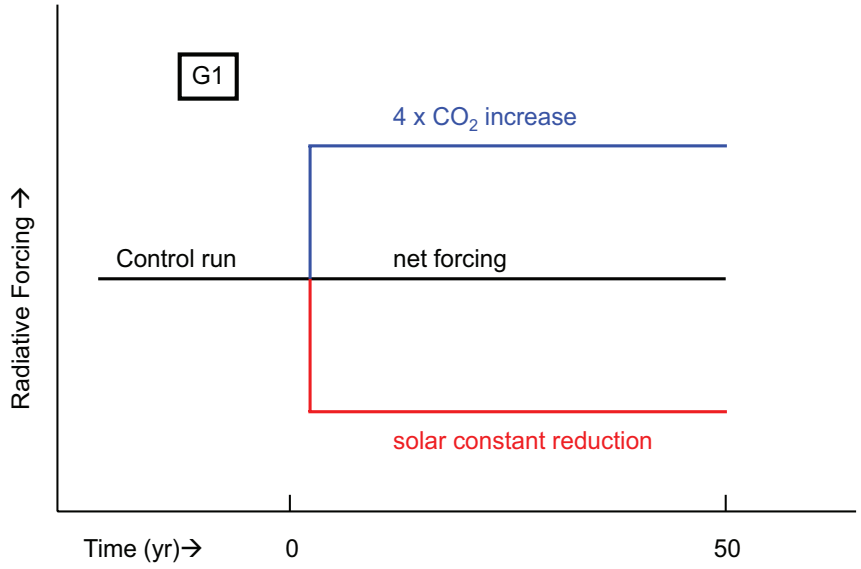
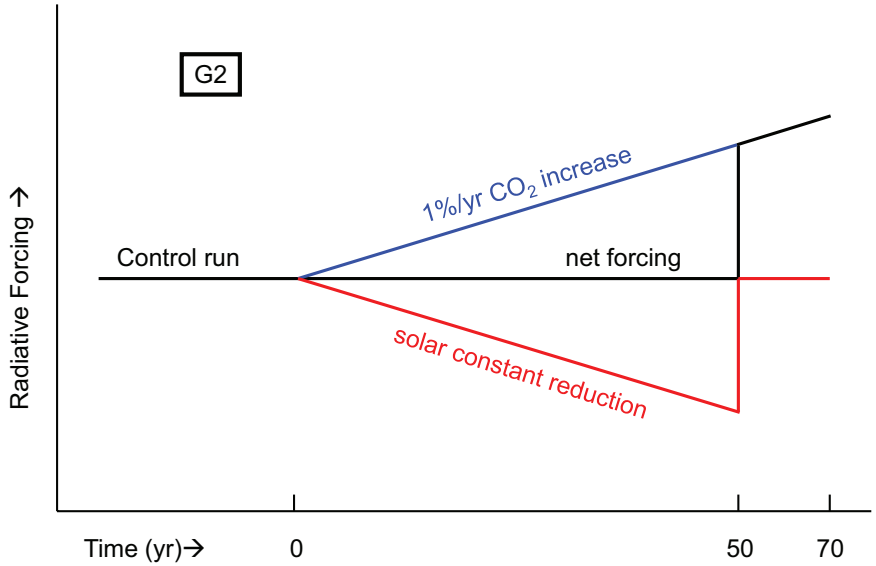
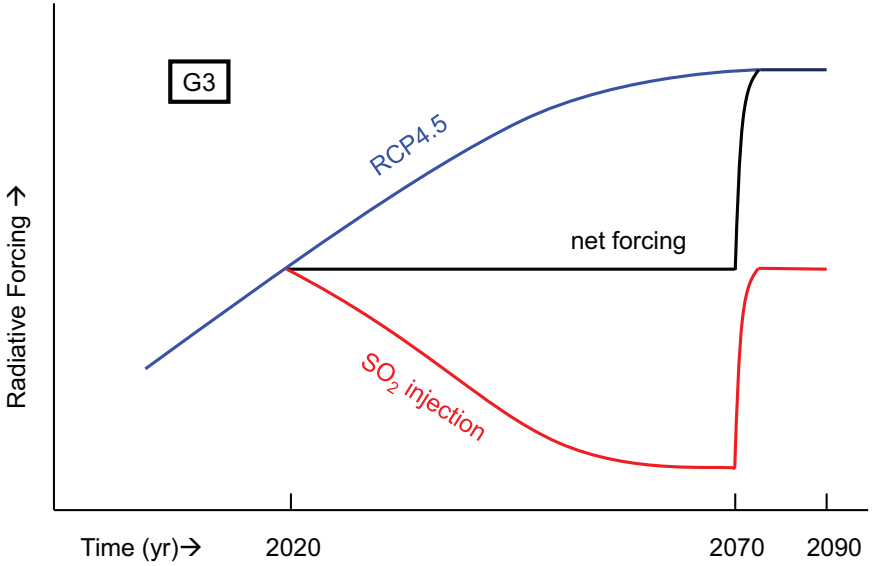
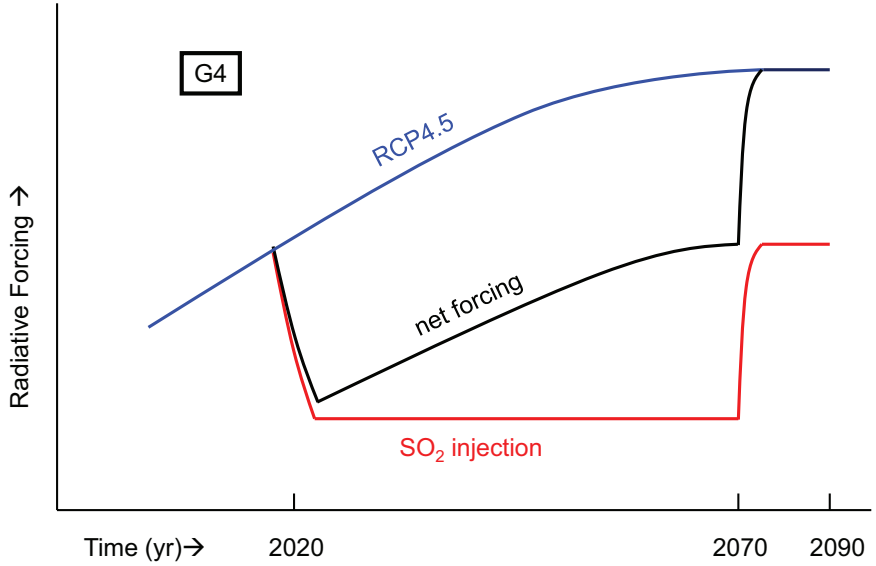
GeoMIP Experiments G1-G4 for SRM with Stratospheric Aerosols









Results from Experiment G1

12 climate models

Experiment is designed to give a large forcing to aid in analyzing the climate response

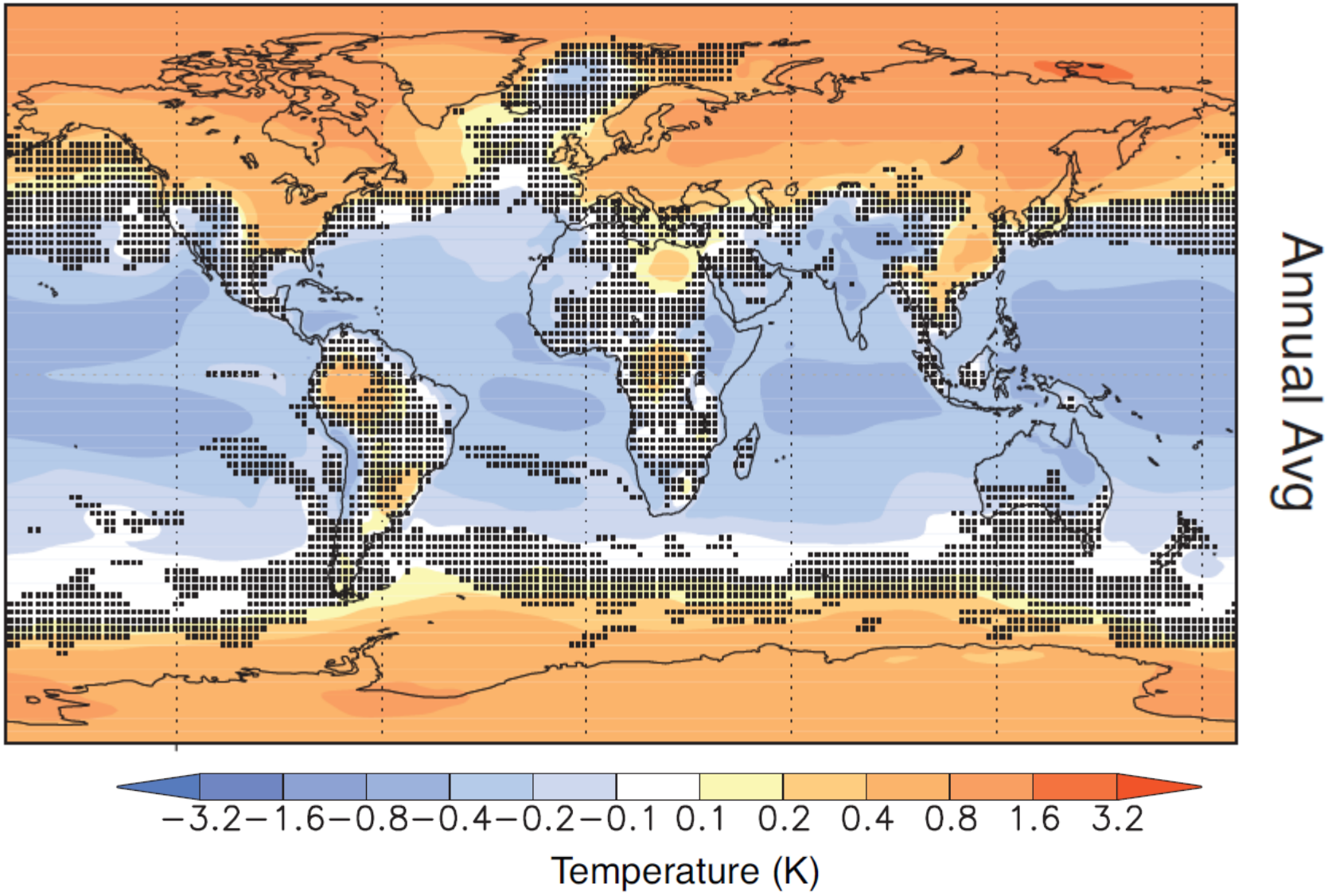
Values shown are averages from years 11-50 of the simulations, balancing 4xCO_2 with solar irradiance reduction to achieve global average radiative flux balance.

Results that follow are from

Kravitz et al., (2013), Climate model response from the Geoengineering Model Intercomparison Project (GeoMIP)., *J. Geophys. Res. Atmos.*, *118*, 1-13, doi:10.1002/jgrd.50646.

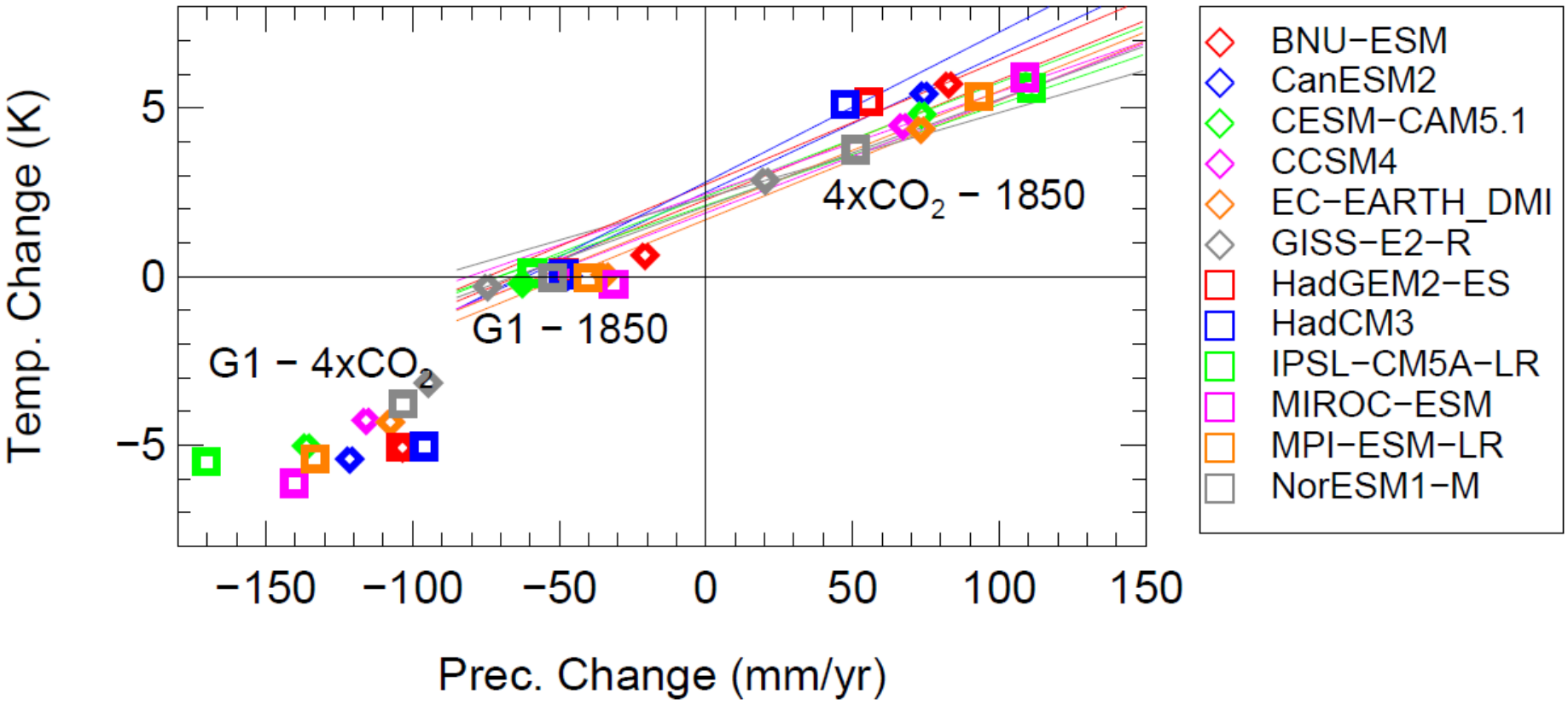
Tilmes et al. (2013), The hydrological impact of geoengineering in the Geoengineering Model Intercomparison Project (GeoMIP), *J. Geophys. Res. Atmos.*, submitted.

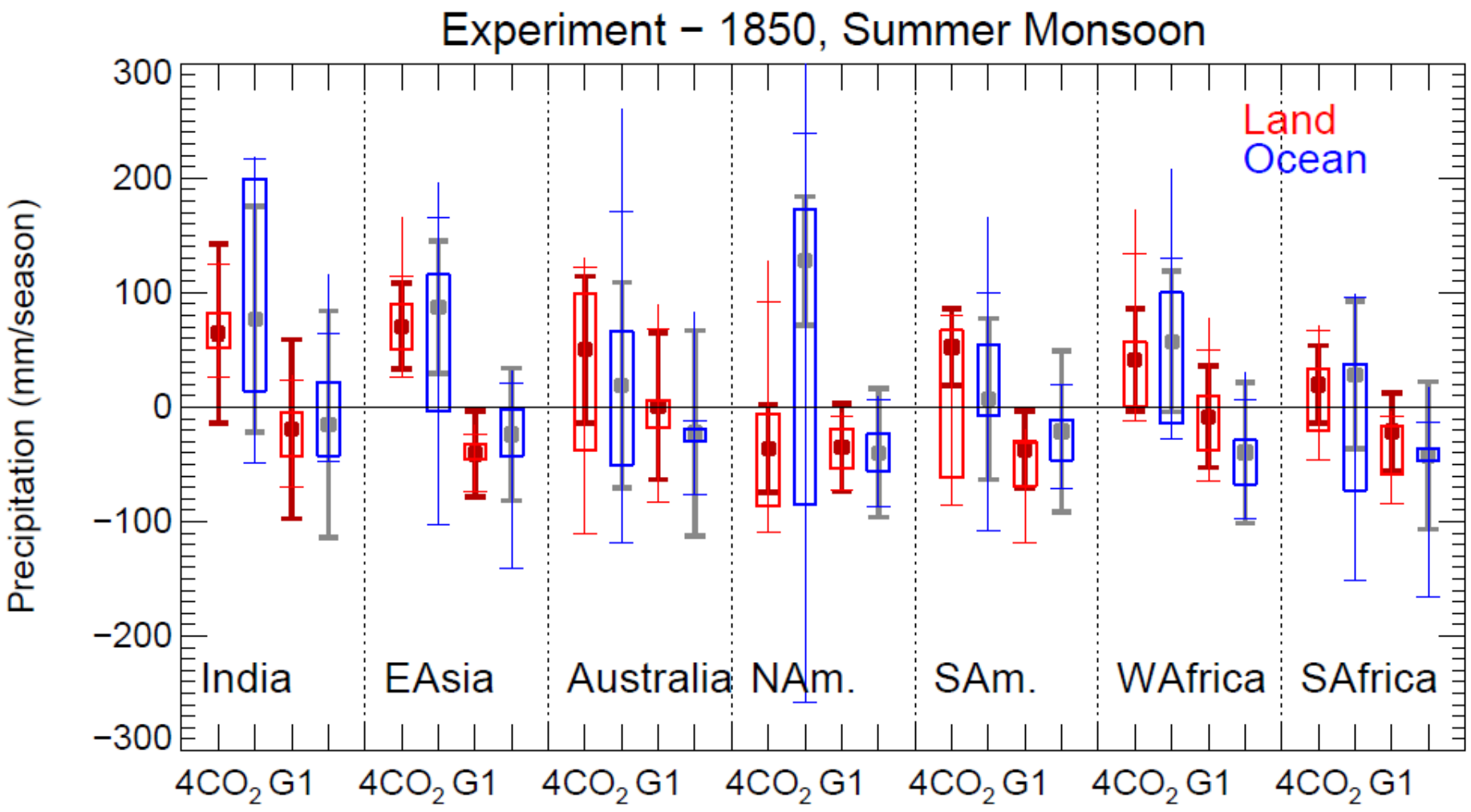
Surface air temperature differences (*G1–piControl*), averaged over years 11-50 of the simulation.



No stippling denotes agreement on the sign of the response in at least 75% of models.

Global average results for all years for G1 and for years 11-50 of simulation for 4xCO_2





Average over Years 11-50

Proposed GeoMIP Cloud Brightening Experiments

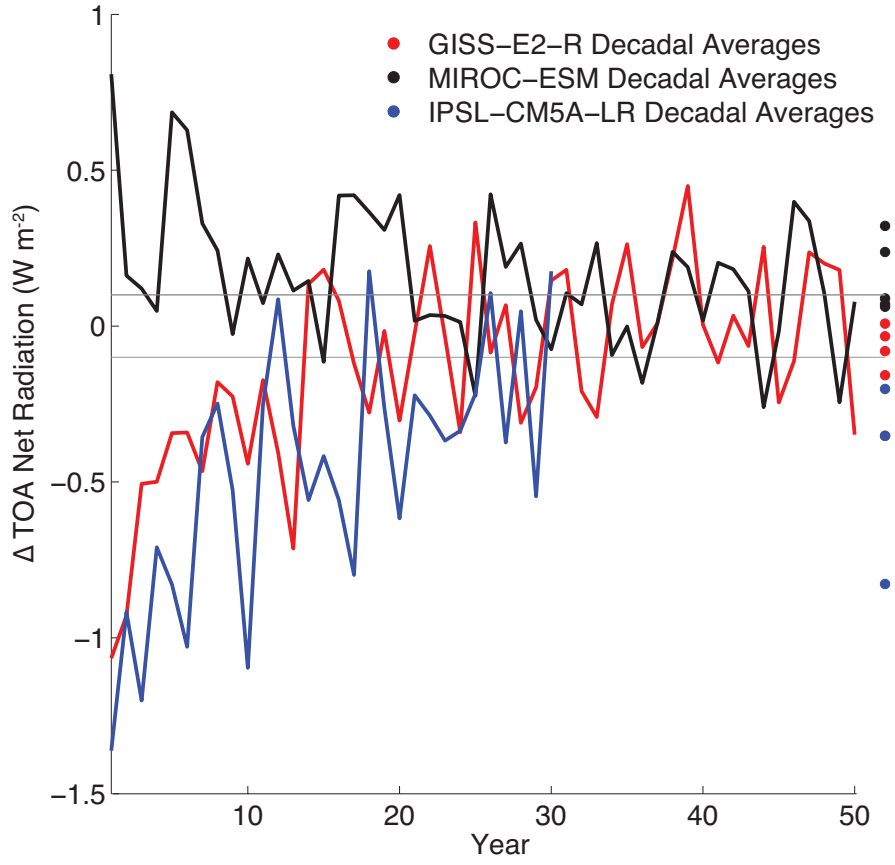
to be run for 50 years with solar geoengineering
followed by 20 years after geoengineering is terminated

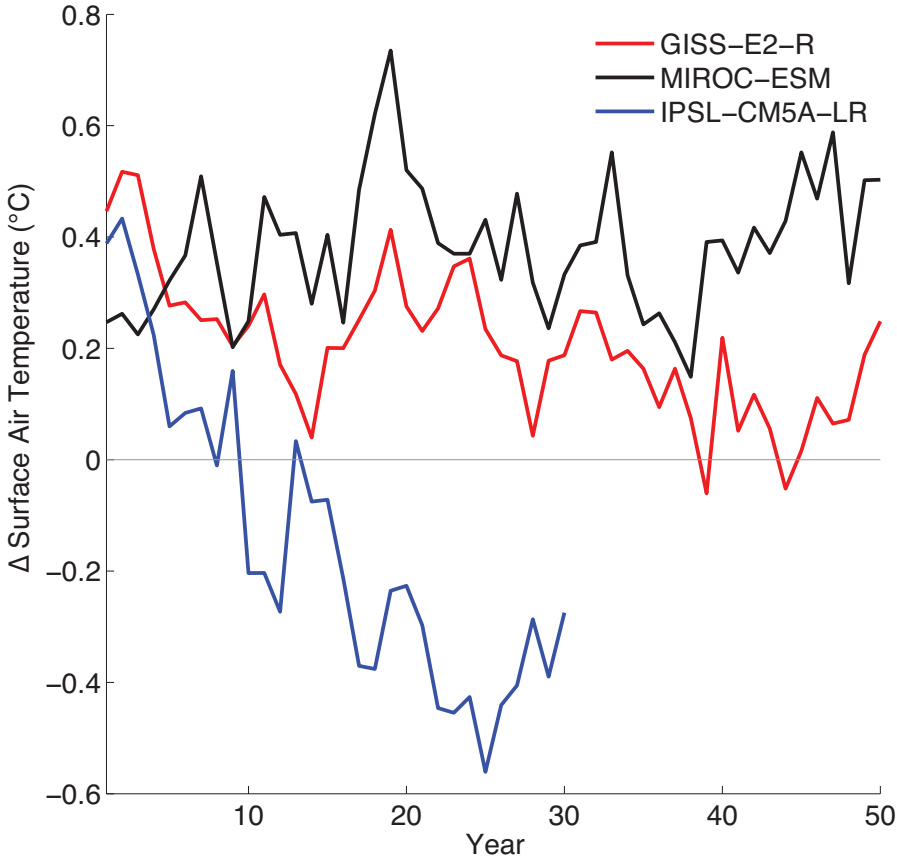
Experiment	***Description***
G1ocean-albedo	Instantaneously quadruple the preindustrial CO_2 concentration while simultaneously increasing ocean albedo to counteract this forcing.
G4cdnc	In combination with RCP4.5 forcing, starting in 2020, increase cloud droplet number concentration by 50% over the ocean.
G4sea-salt	In combination with RCP4.5 forcing, starting in 2020, increase sea salt emissions in the marine boundary layer between 30°S and 30°N by a uniform amount to obtain an effective radiative forcing of -2.0 W m^{-2}.

Kravitz et al. (2013), Sea spray geoengineering experiments in the Geoengineering Model Intercomparison Project (GeoMIP): Experimental design and preliminary results, *J. Geophys. Res. Atmos.*, accepted.

Preliminary Results from G1ocean-albedo (3 models)

Results are accepted for publication, but please do not cite or distribute without permission from Ben Kravitz.





Status updates

- Special issue of *J. Geophys. Res. Atmos.* (approximately 15 submissions, 1 published, 1 accepted for publication). Papers should be coming out over the next few months.
- A new suite of experiments proposed to examine sea spray geoengineering (also called marine cloud brightening).
- Ongoing discussion of additional experiments looking at solar reduction (e.g., non-uniform reductions, modulation by season, etc.).
- Next meeting is planned to discuss results from sea spray geoengineering experiments (in Paris, provisionally April 24-25)
- Beginning discussions with the impacts assessment community to better assess the effects of geoengineering.

Future of GeoMIP and interaction with CMIP

- GeoMIP has been successful and has enthusiastic support from the climate modeling community. We expect (hope!) it will continue for quite some time.
- Organization of GeoMIP will likely continue as it has been. Most of the progress has been via email or at (roughly) annual meetings.
- At any given time, the number of new experiments will be kept small to maximize participation.
- All simulations will be based on CMIP simulations. Because the CMIP6 experiments are not yet available, the marine cloud brightening experiments are based on the RCP4.5 experiments from CMIP5.
- There is potential to redo all past simulations with updated model versions or updated scenarios.
- New experiments can be proposed by members of the modeling community.

Thanks!

For additional questions, please visit the GeoMIP website

http://climate.envsci.rutgers.edu/GeoMIP/

or email Ben Kravitz

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