Cornell University

The Geoengineering Model Intercomparison Project (GeoMIP): Past, present and future

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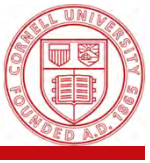
NOAA ERB Science Meeting
Wednesday, November 8

Role and scope of GeoMIP



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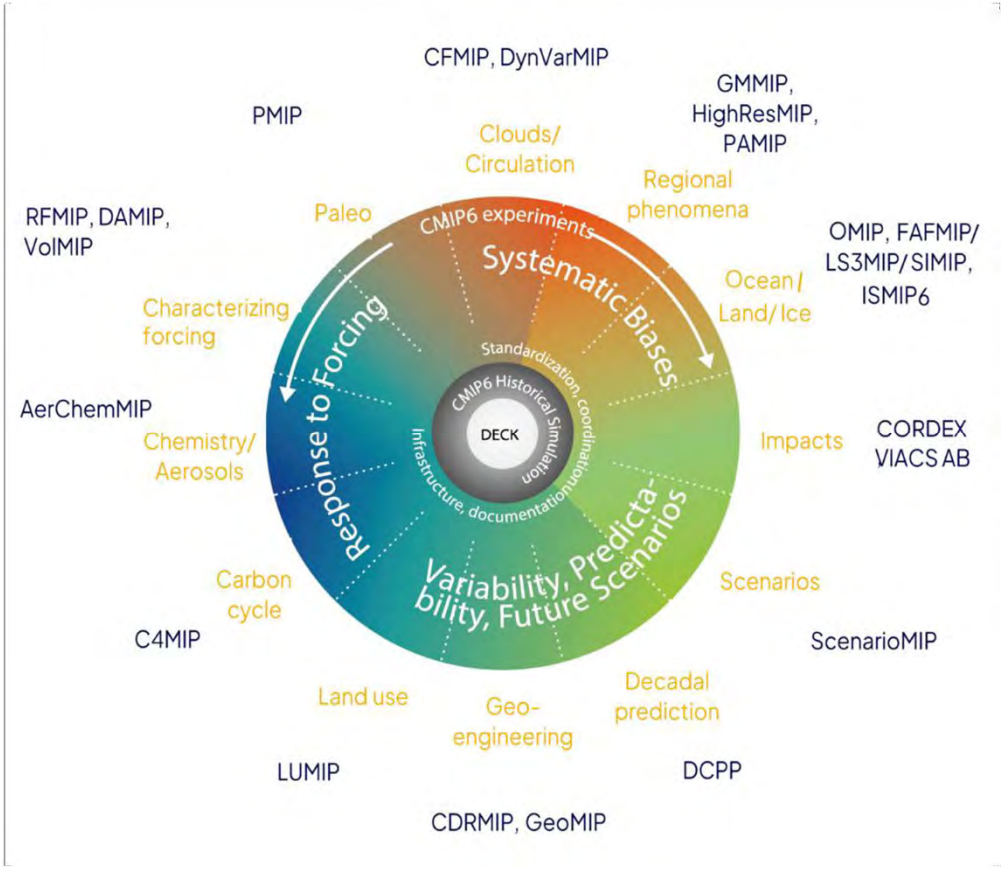

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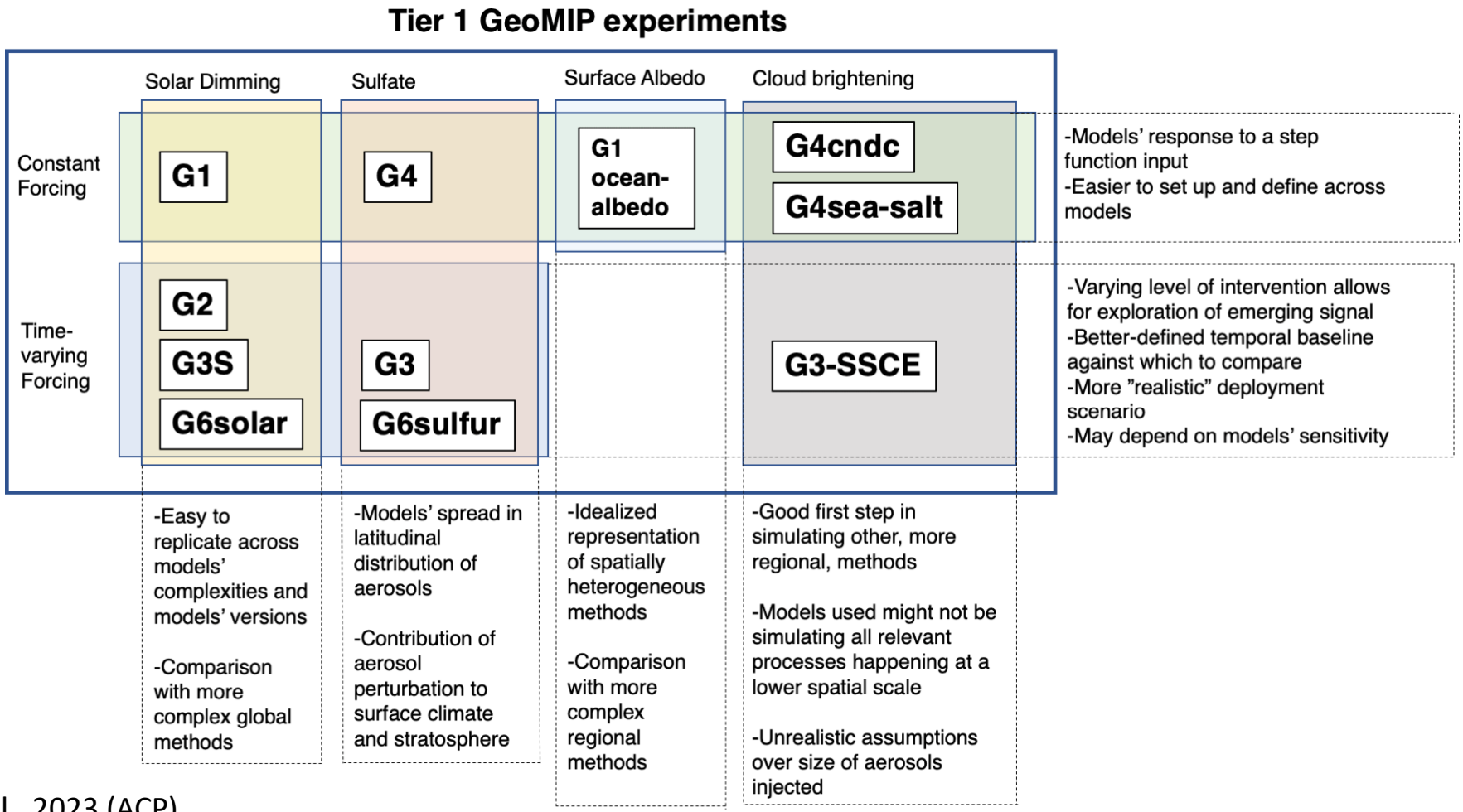
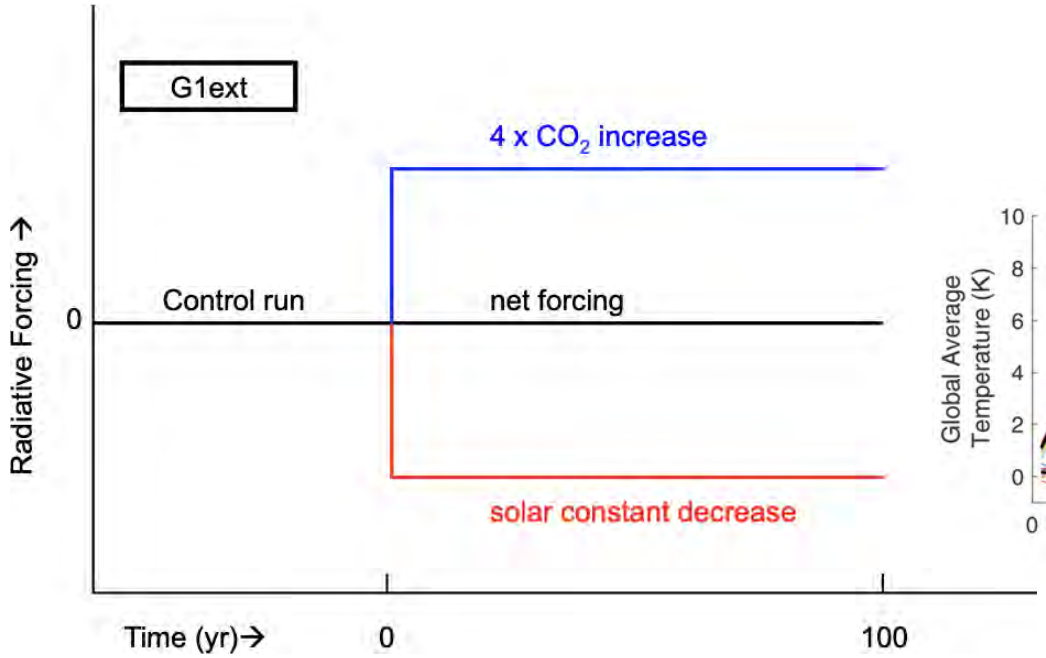
- Understanding sources of inter-model differences
- Offering a standardized framework of simulations for the purpose of SRM assessments
- Supporting a community of downstream users interested to understand impacts not included in climate models

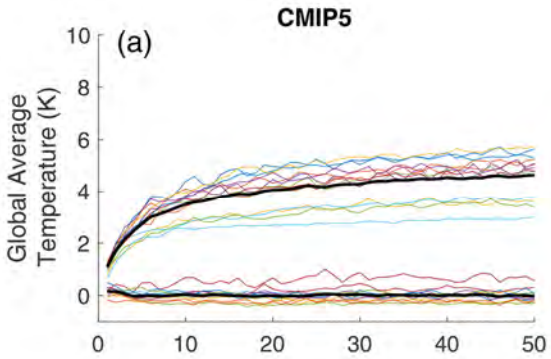
GeoMIP experiments until now

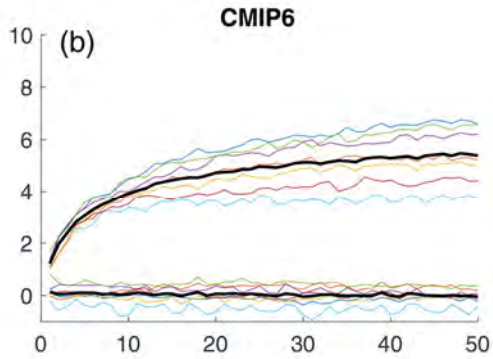


Visioni et al., 2023 (ACP)

Example 1: the G1 experiment



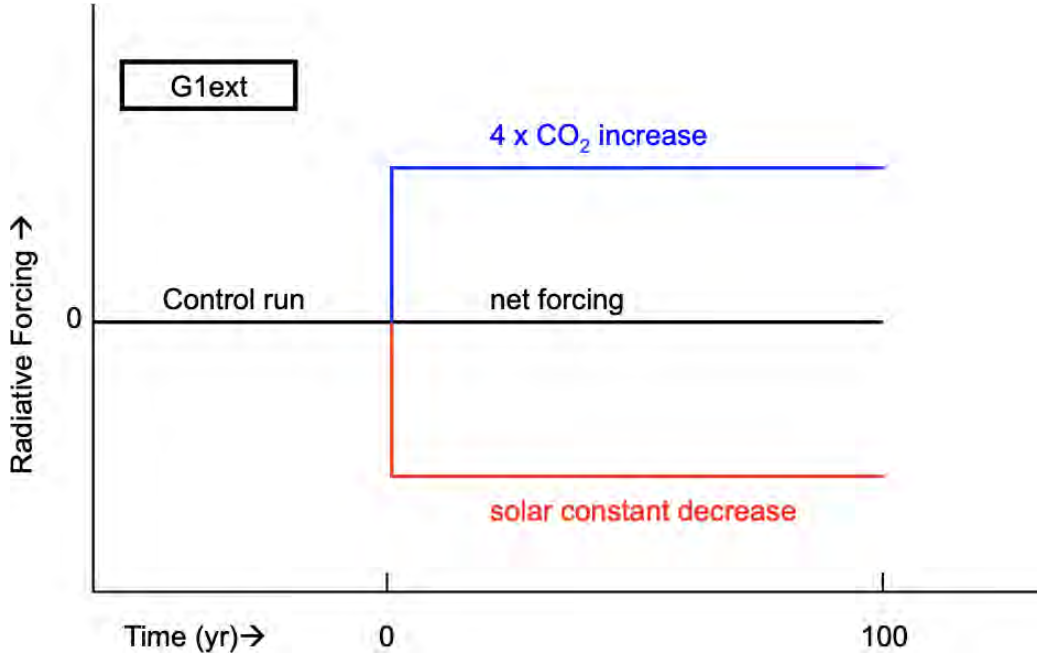




Kravitz et al., 2021 (ACP)

Example 1: the G1 experiment

- High signal-to-noise ratio



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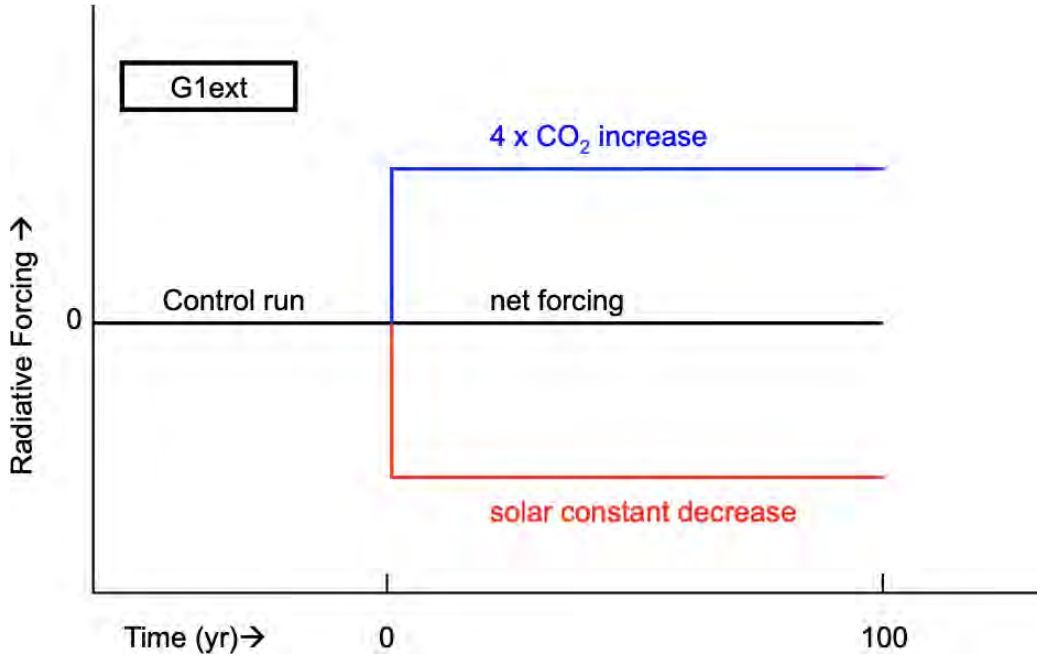

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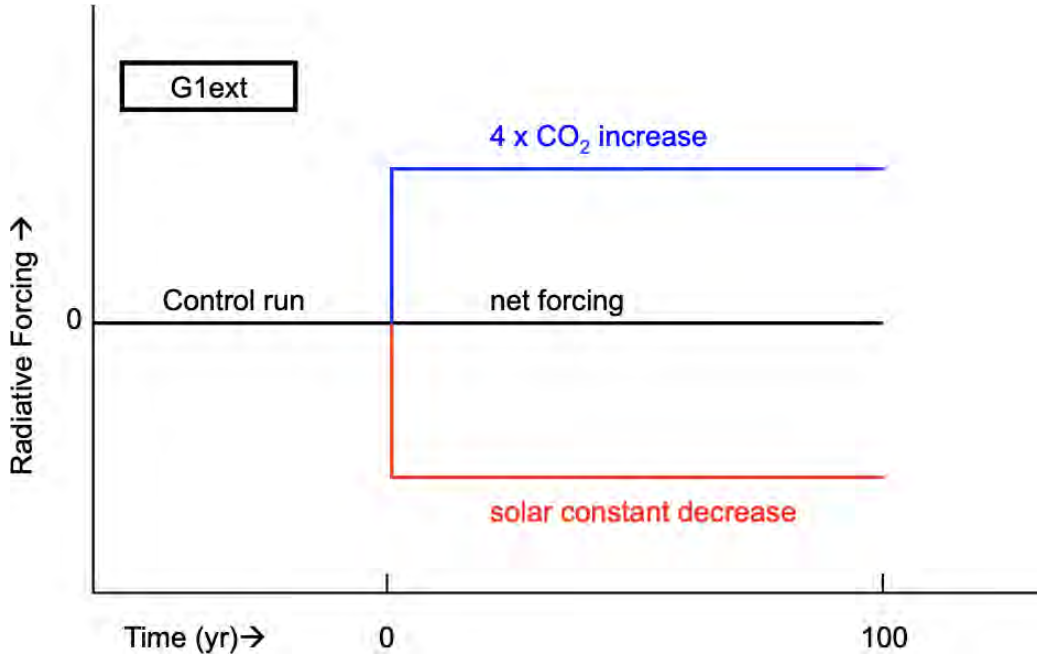

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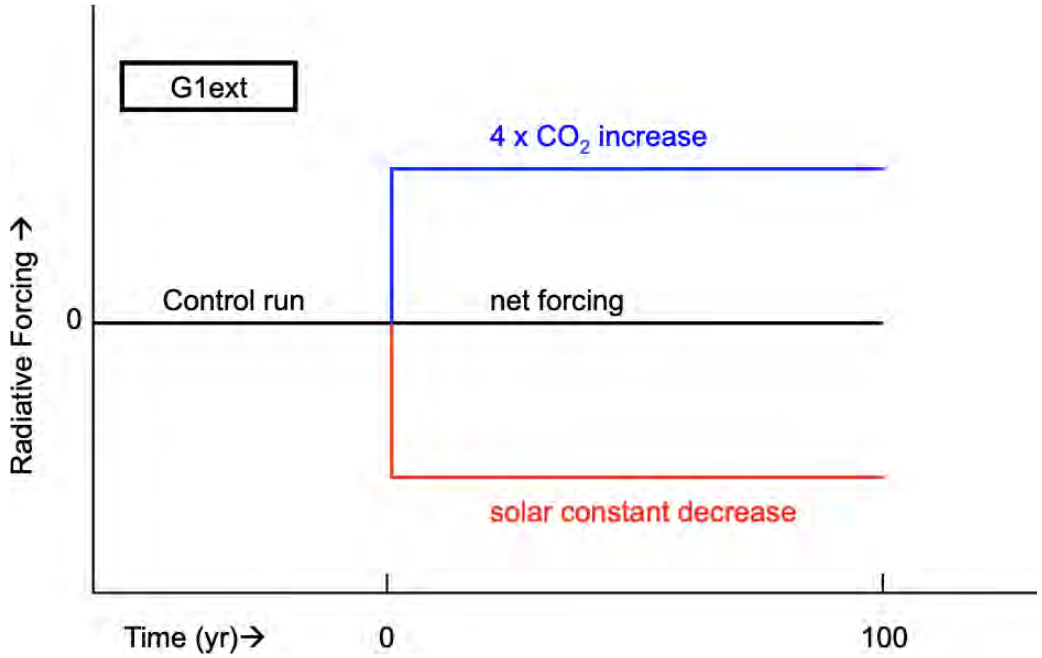

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- Not directly useful for impacts assessment (but maybe for emulators?)

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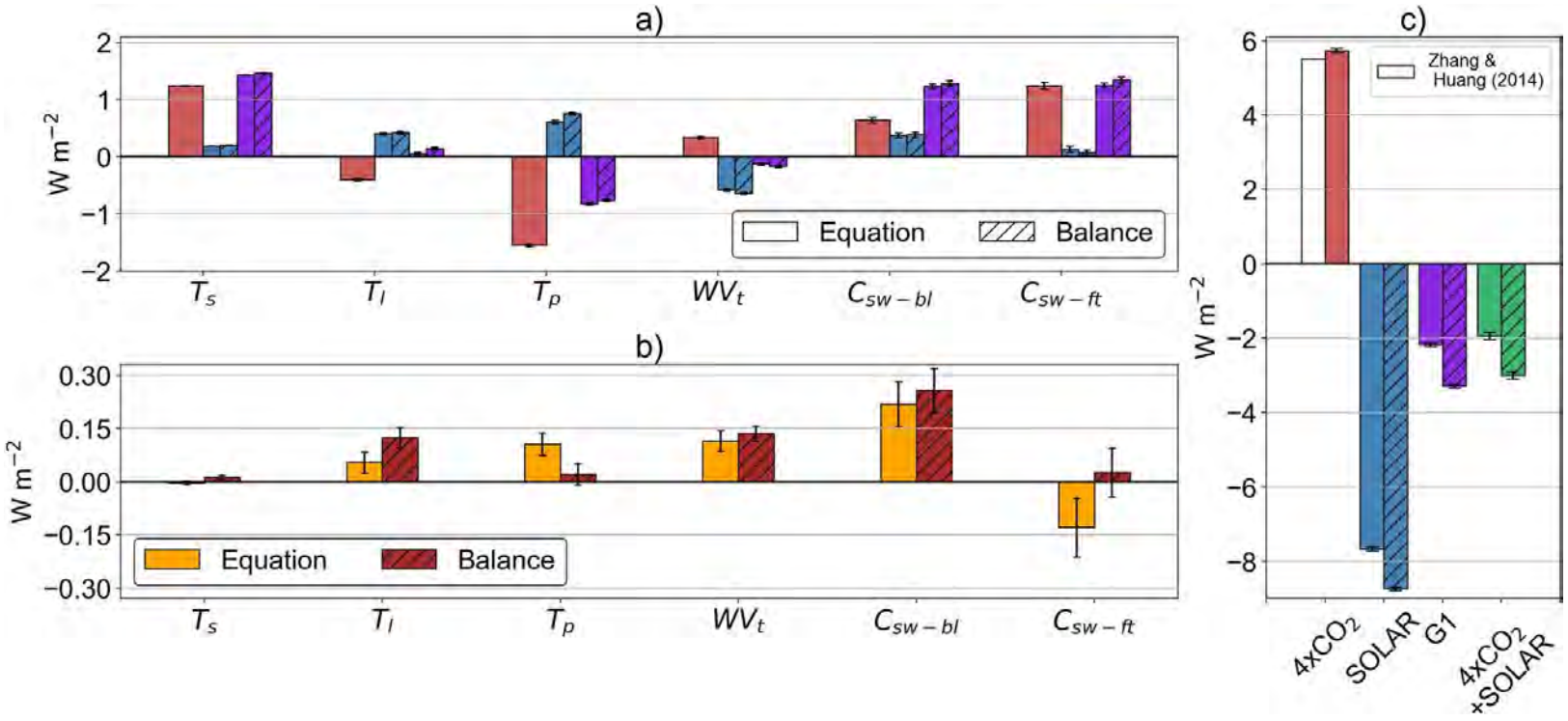

- Example of use: breaking down the radiative adjustments of G1 simulations using the International Satellite Cloud Climatology Project (ISCCP) diagnostics

Virgin and Fletcher, 2022

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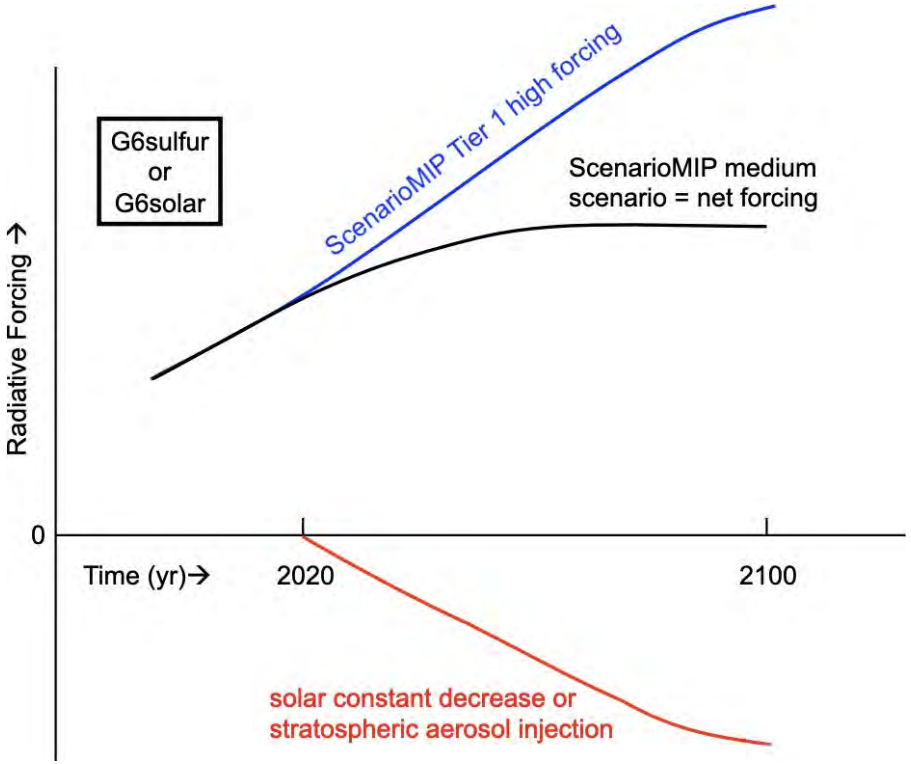

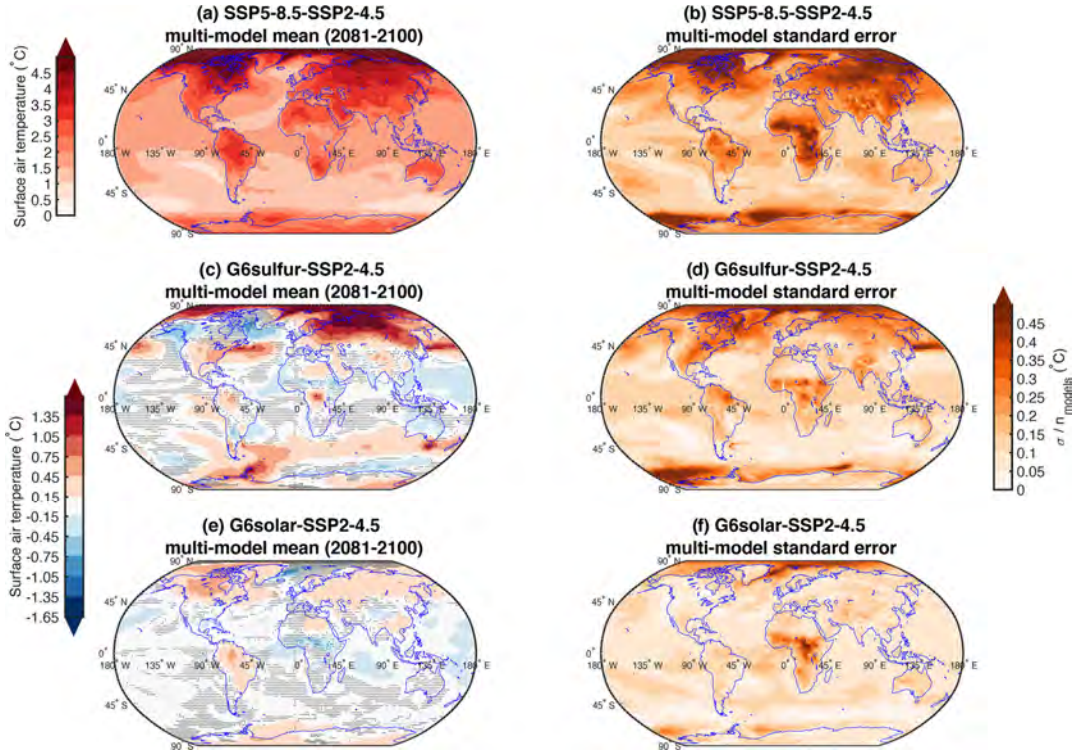

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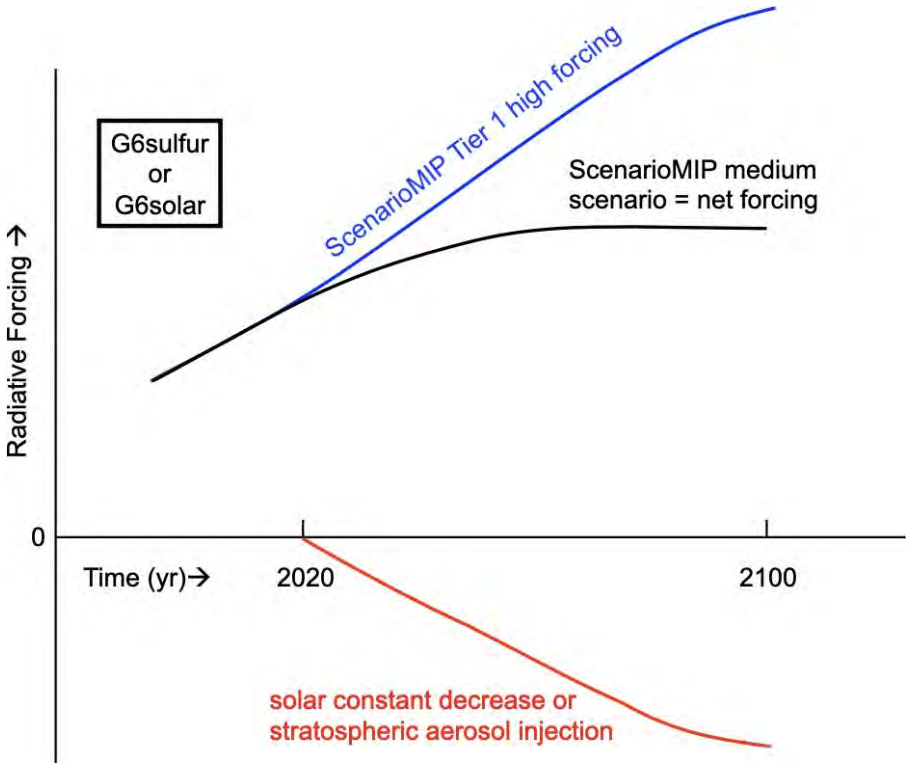

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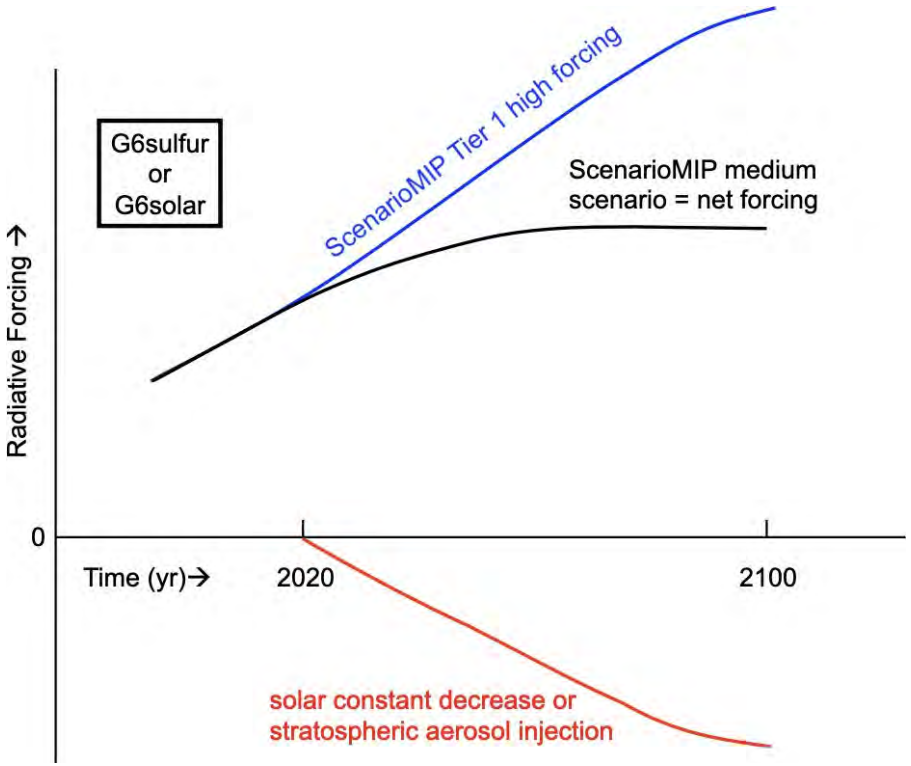

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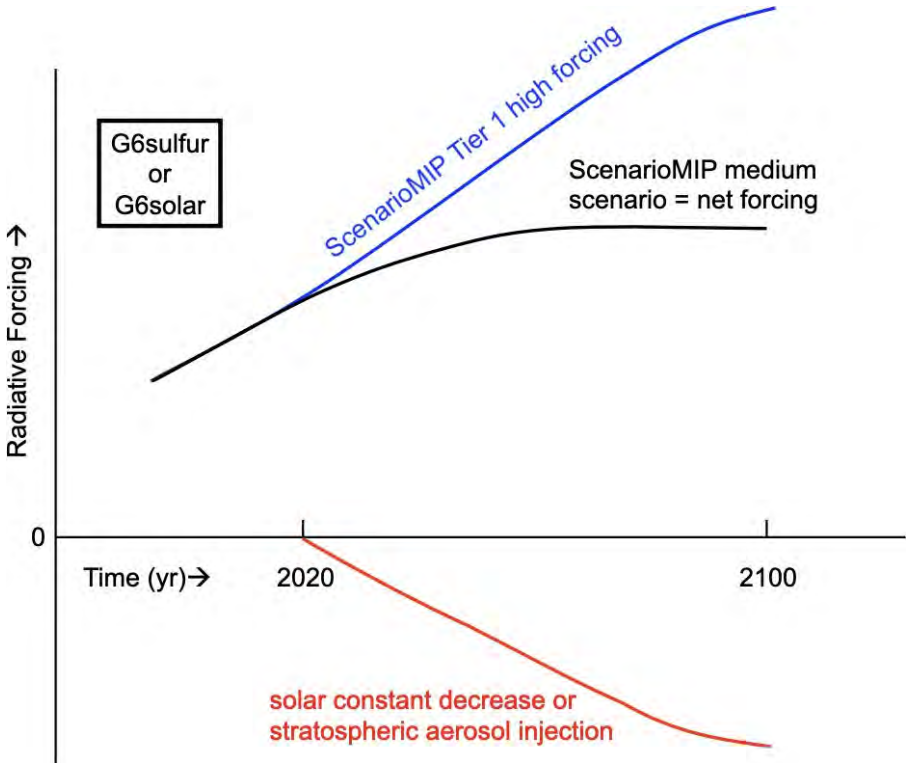

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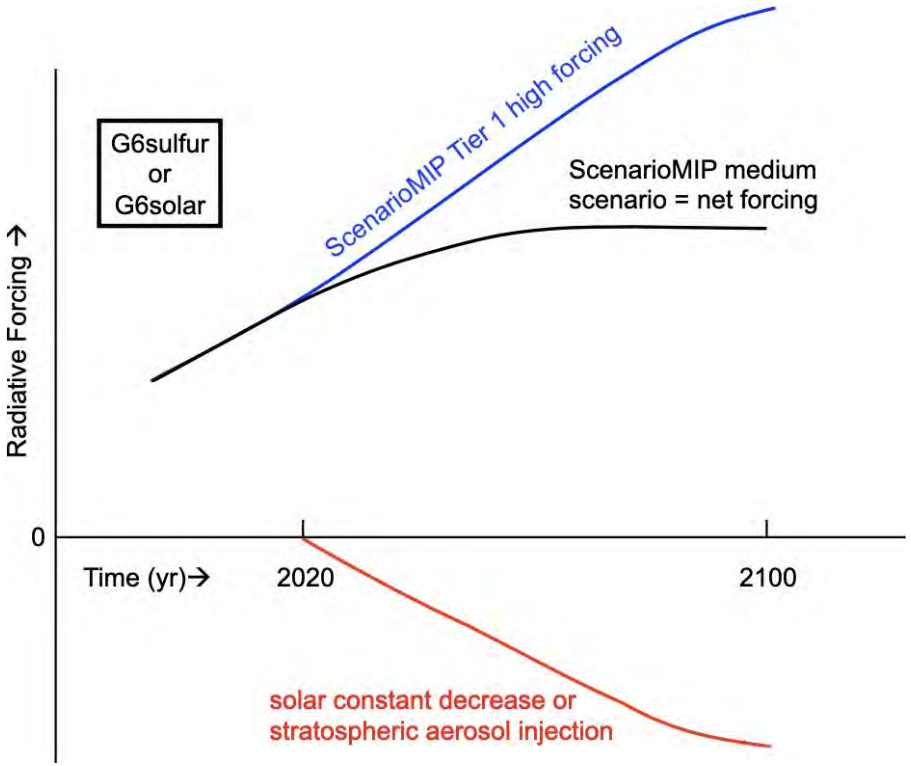

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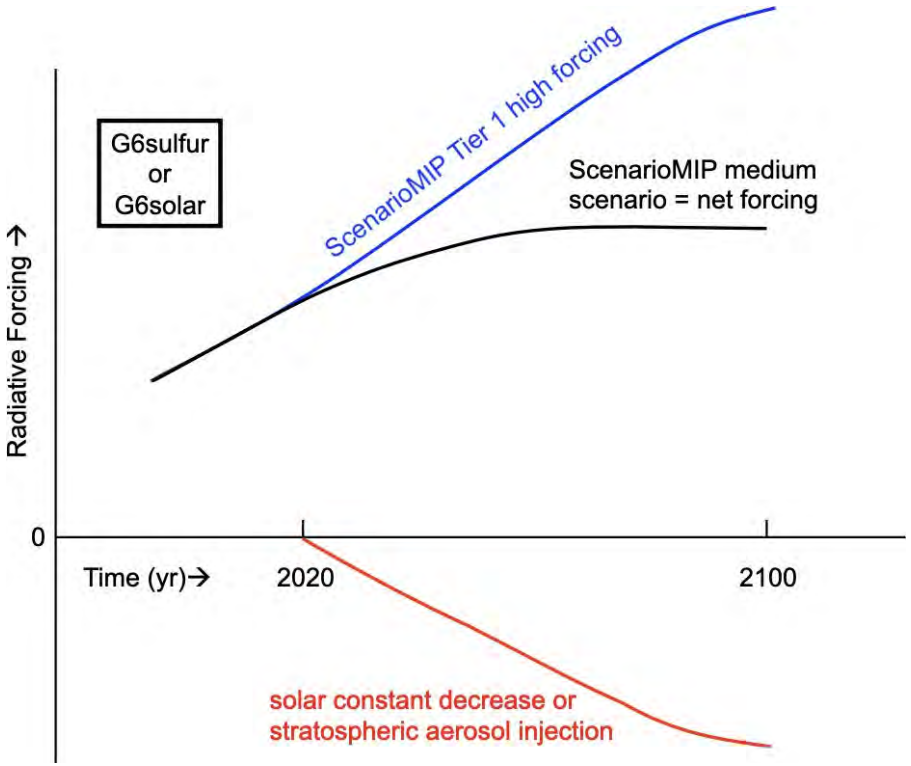

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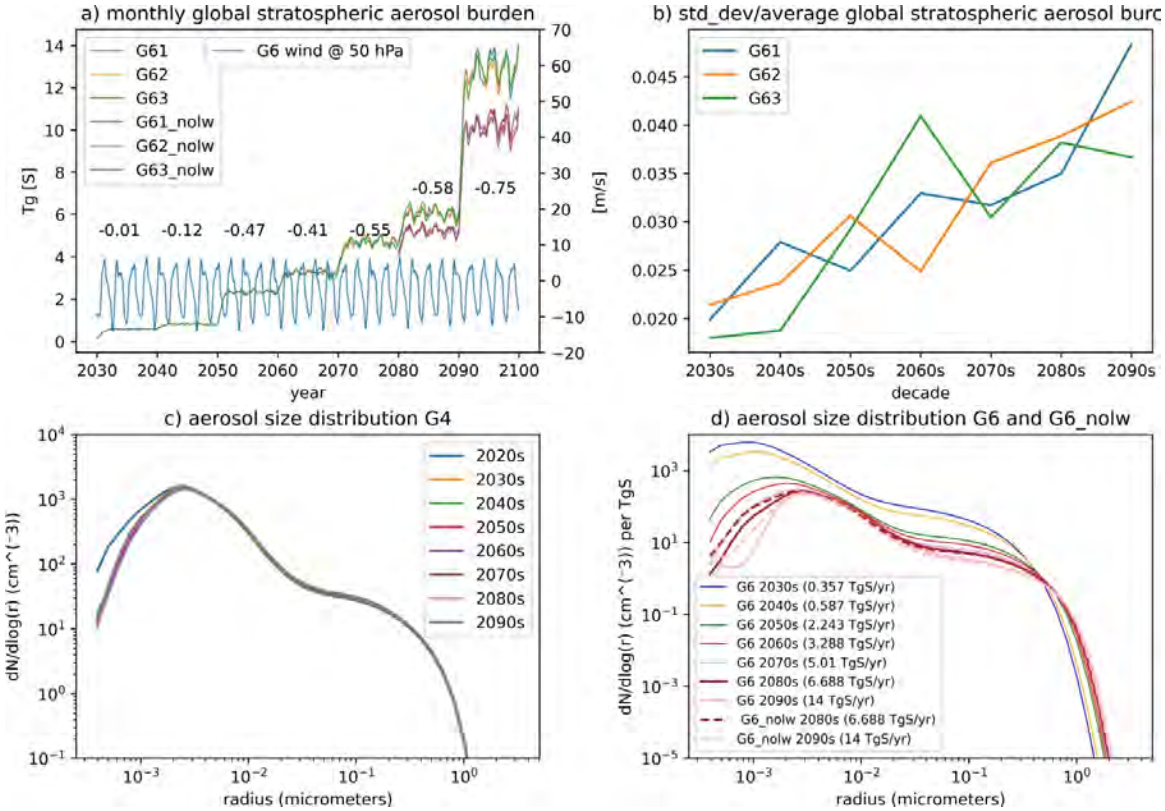
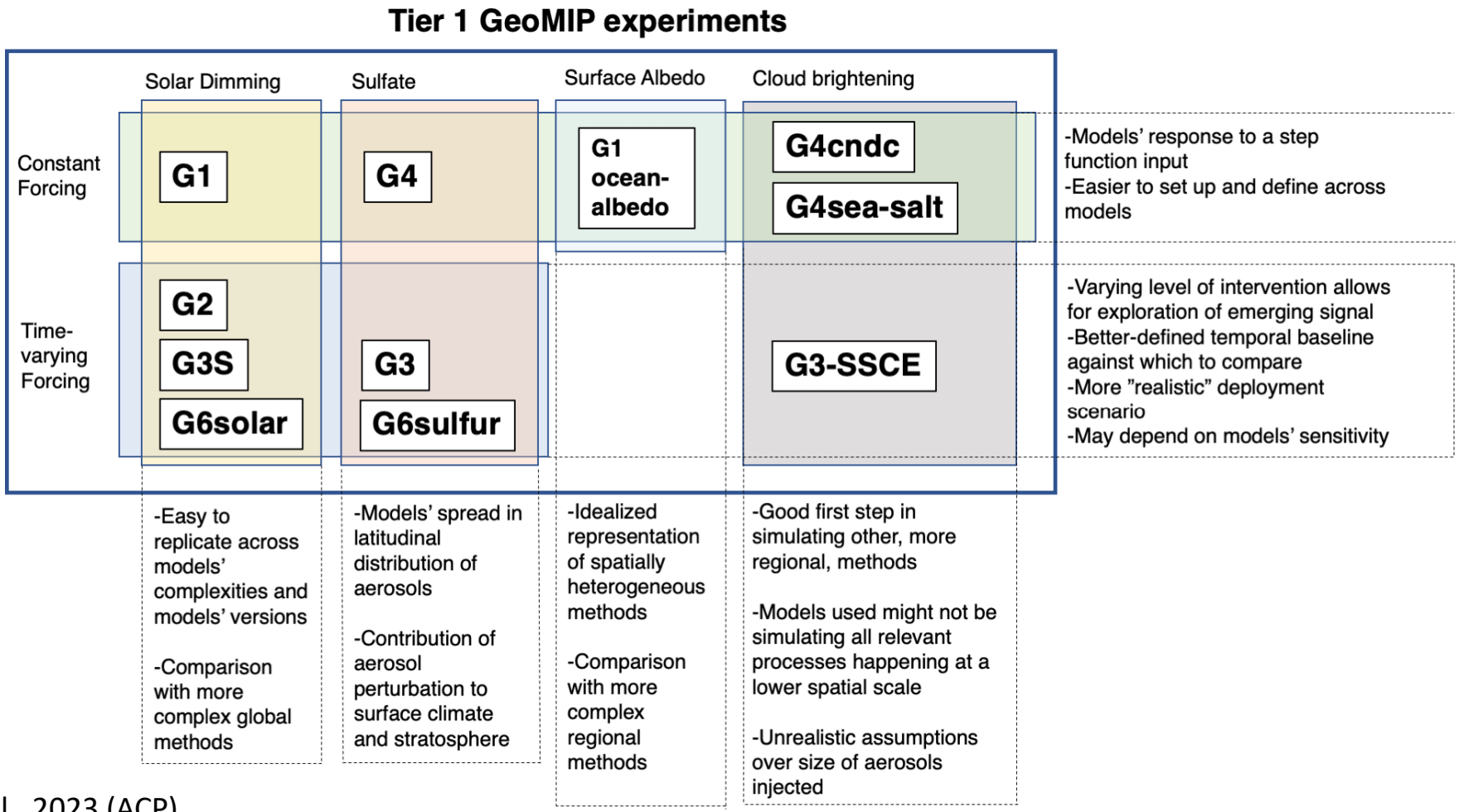


- Comparing a new model (here, SOCOL) with different aerosol microphysics to the old one, understanding aerosol response to changing injection rates,

Wunderlin et al. (2023), in prep

But wait – there's more!



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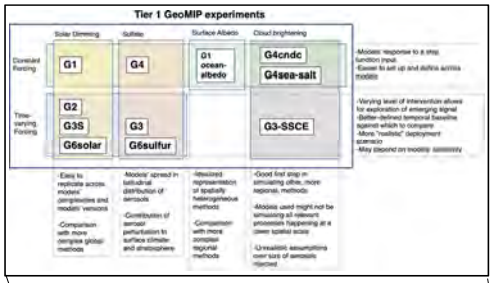

Tier 1 experiments are only some of the experiments…

The community runs so many more!

Community Experiments

Visioni et al., 2023 (ACP)

Investing single processes and uncertainties

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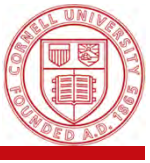
- Isolating the role of stratospheric heating on surface climate and atmospheric dynamics (with QBOi)
- Single forcing locations for MCB experiments?

Visioni et al., 2023 (ACP)

What's our endgame?



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Multi-model projections (Tier 1 GeoMIP scenarios)

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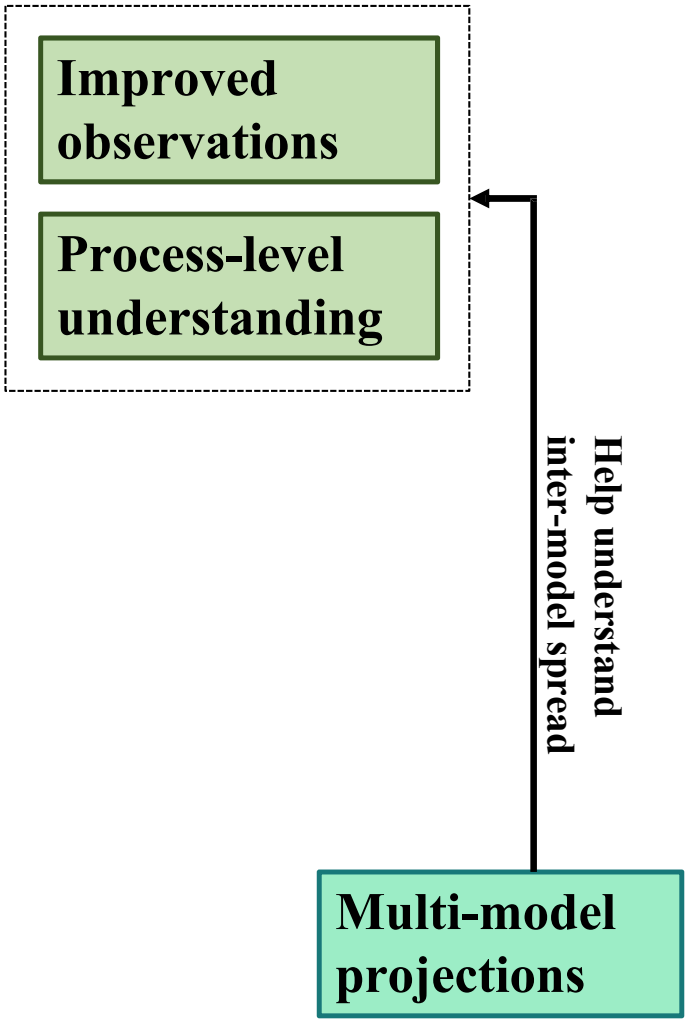

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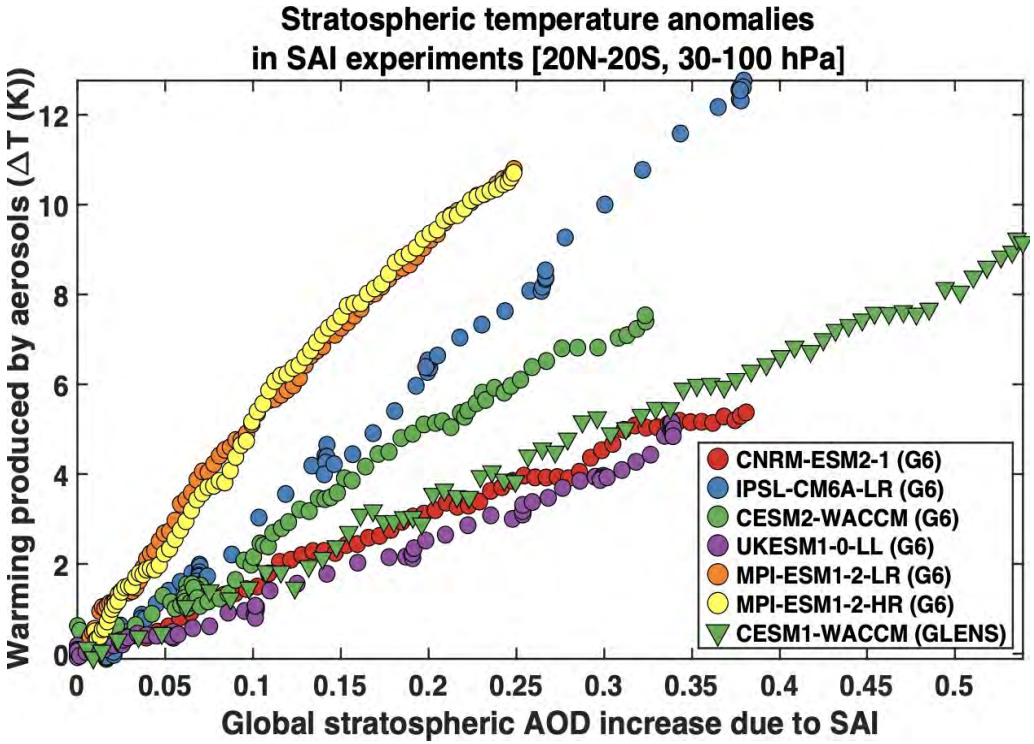
Improved observations

Process-level understanding

Help understand inter-model spread

Multi-model projections



Tilmes, Visioni et al., 2021 ACP

and WMO Assessment, 2022

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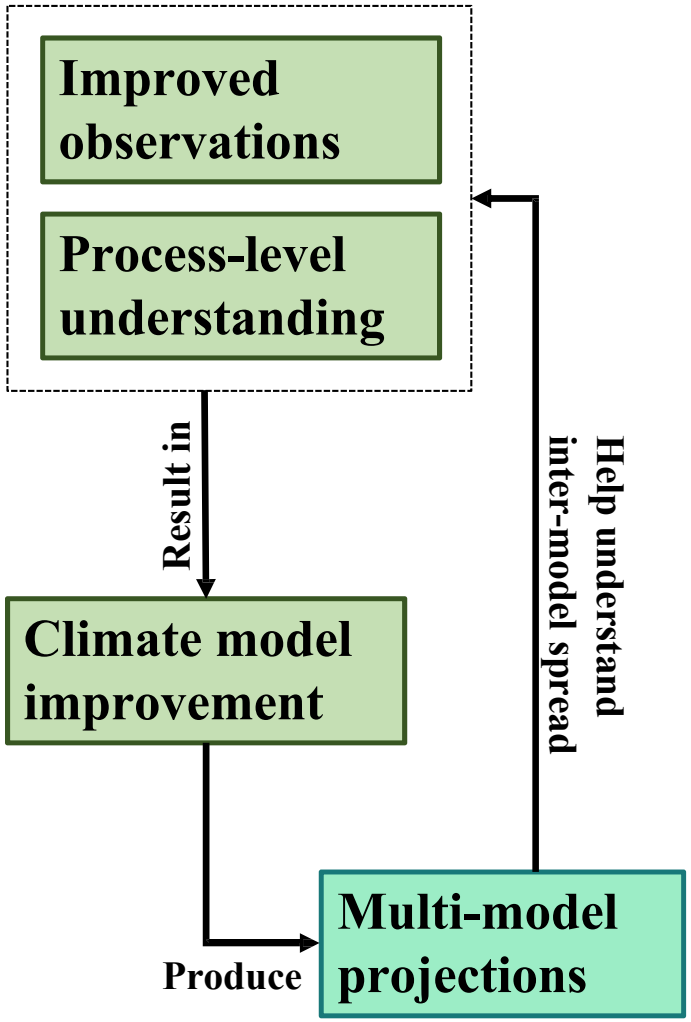

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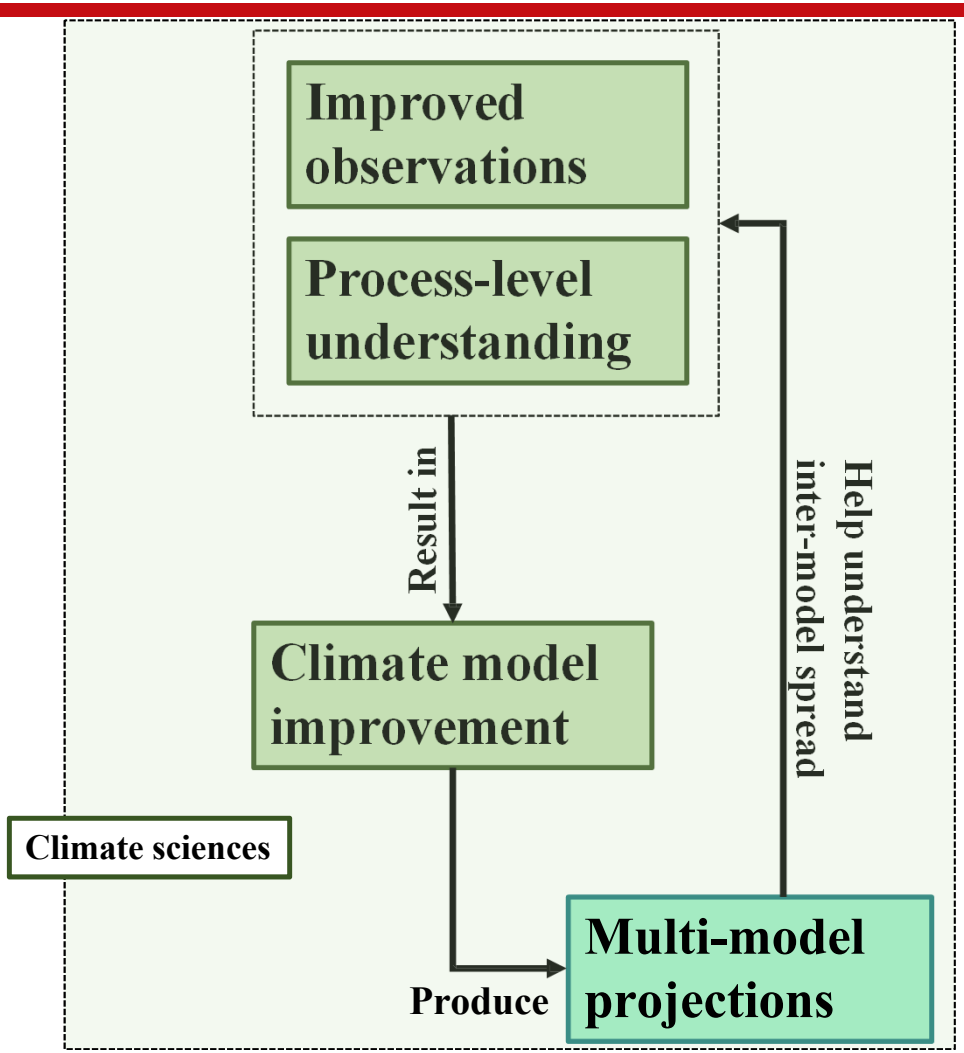

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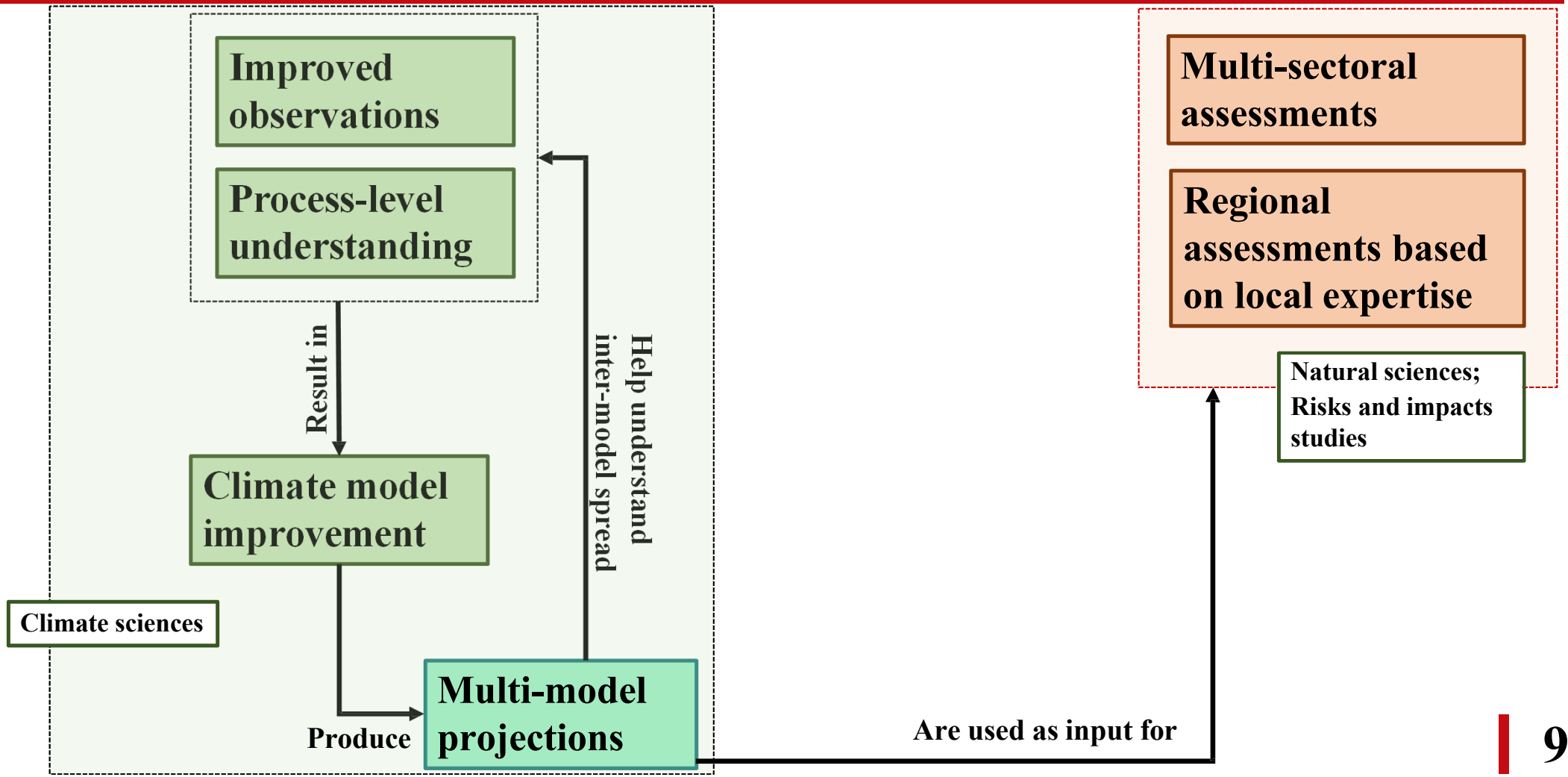

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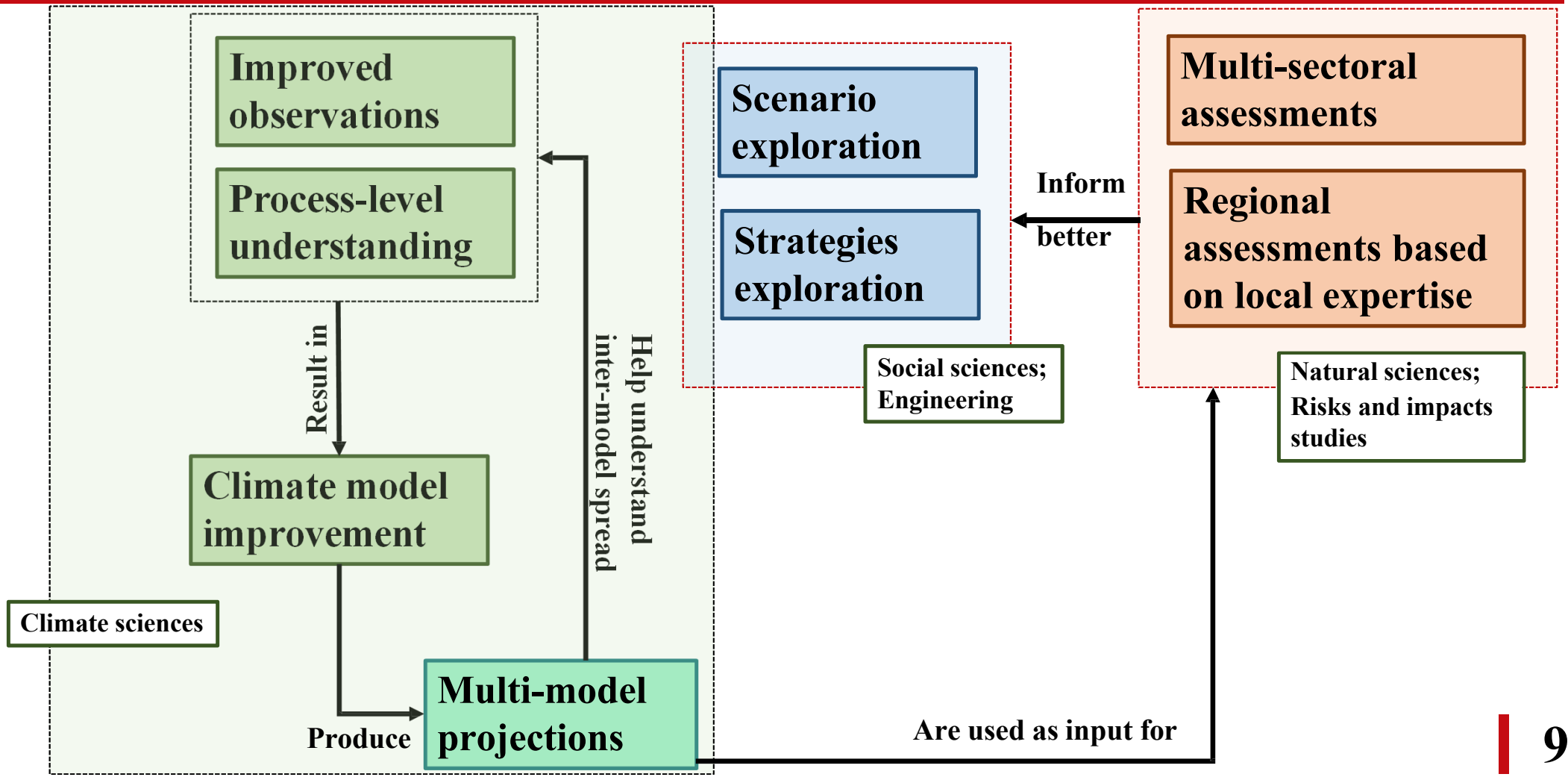

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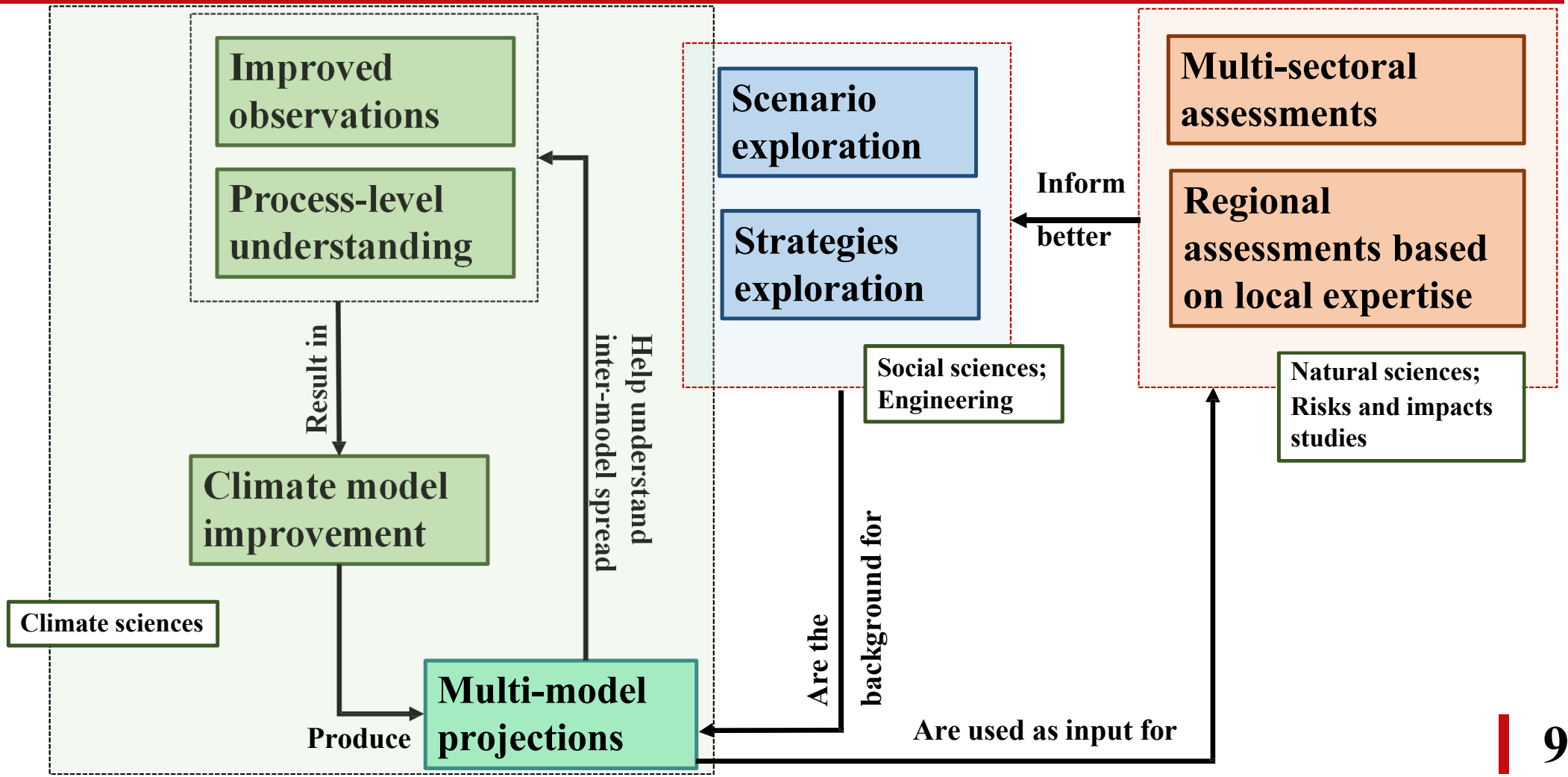

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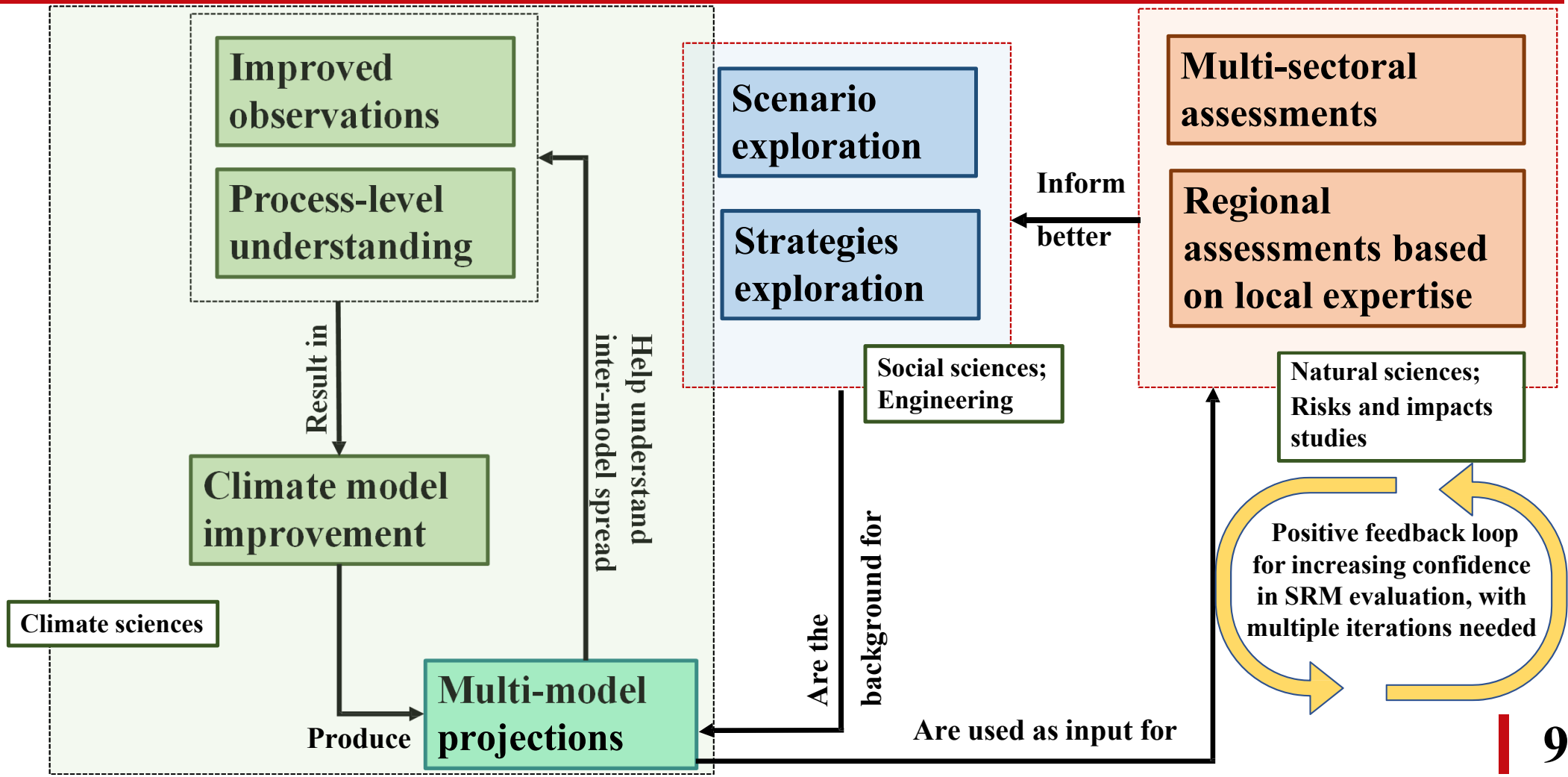

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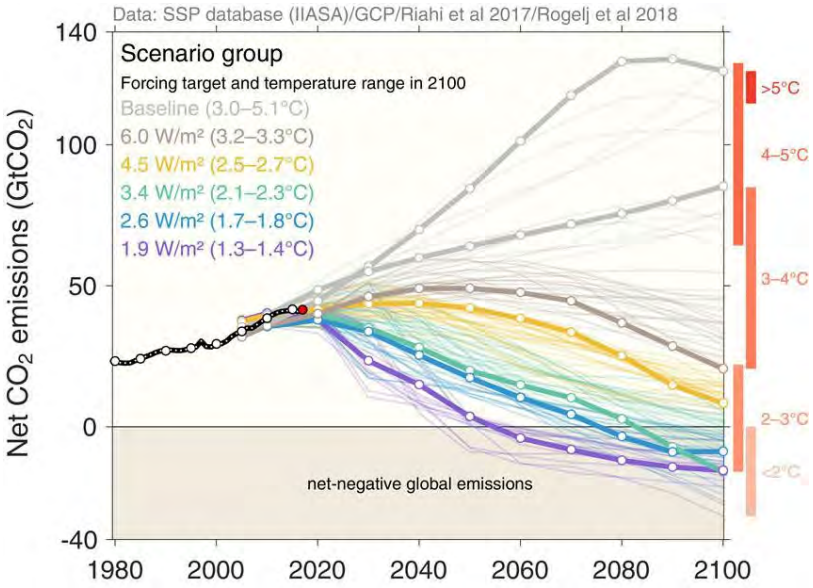

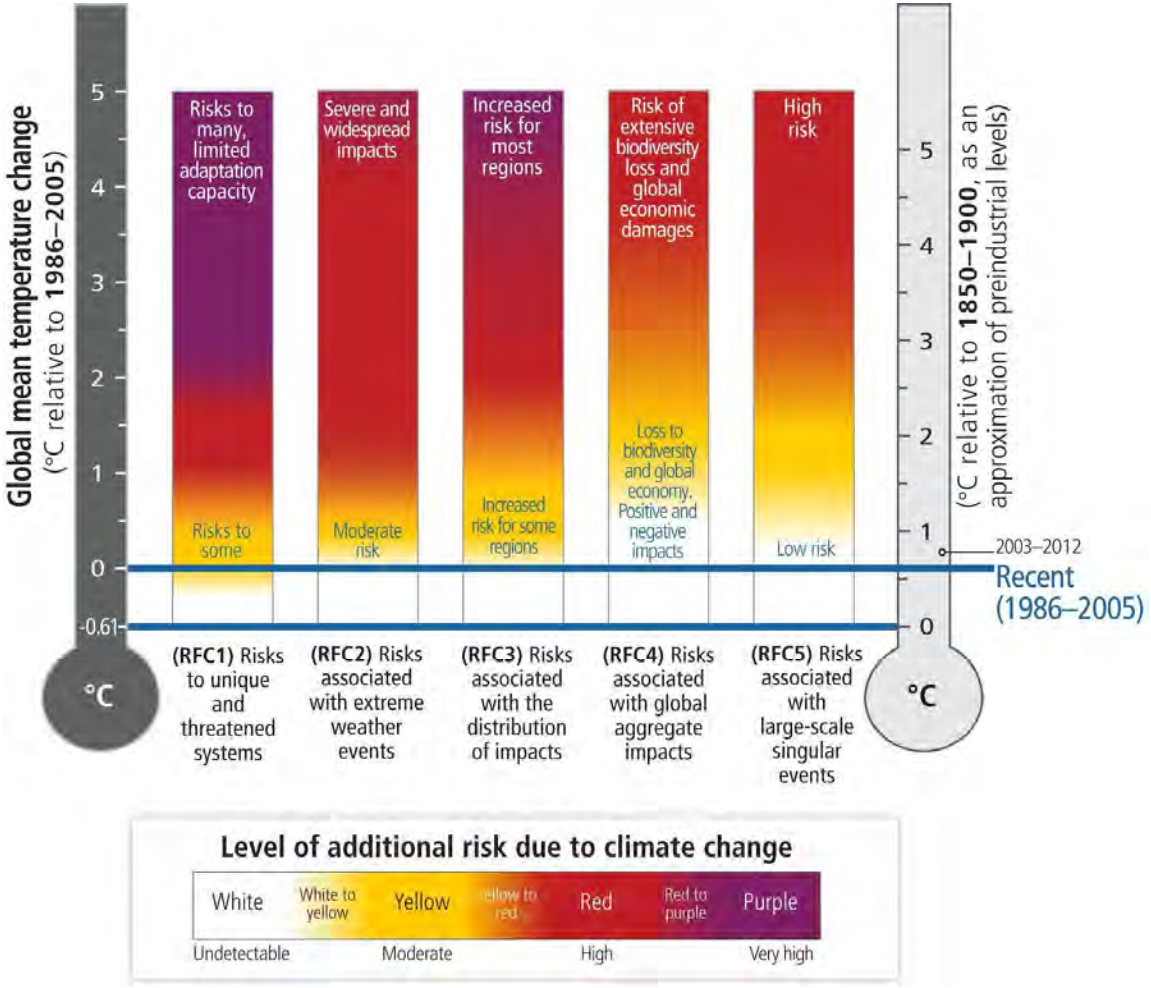

The road so far

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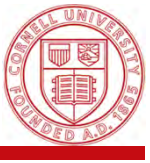

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- A growing community: last meeting in Exeter had over 100 participants – 70+ in person