ScenarioMIP:
The up and coming CMIP6 scenarios

ScenarioMIP

Members

Co-chairs: Brian O'Neill, Claudia Tebaldi, Detlef van Vuuren
SSC Members: Veronika Eyring, Pierre Friedlingstein, George Hurtt, Reto Knutti, Jean-Francois Lamarque, Jason Lowe, Jerry Meehl, Richard Moss, Ben Sanderson

Friends

Additional IAM researchers: Kate Calvin, Shinichiro Fujimori, Elmar Kriegler, Keywan Riahi

IAV Community: ICONICS, TGICA

LUMIP Co-chairs: Dave Lawrence, George Hurtt

AerChemMIP Co-Chairs: Jean-Francois Lamarque, William Collins, Michael Schulz

Other MIPs: C4MIP, GeoMIP

ScenarioMIP
Role and Objectives

Facilitating integrated research across climate science, IAM and IAV communities

- Span wide forcing range and intermediate levels
- Continuity with CMIP5
- Include new forcing pathways of interest

Anchoring targeted experiments to answer questions about specific forcings

- Include scenarios with forcings useful to other MIPs (land use, aerosols, high signal/noise, overshoot, etc.)

Facilitating research on uncertainty/model reliability for future projections
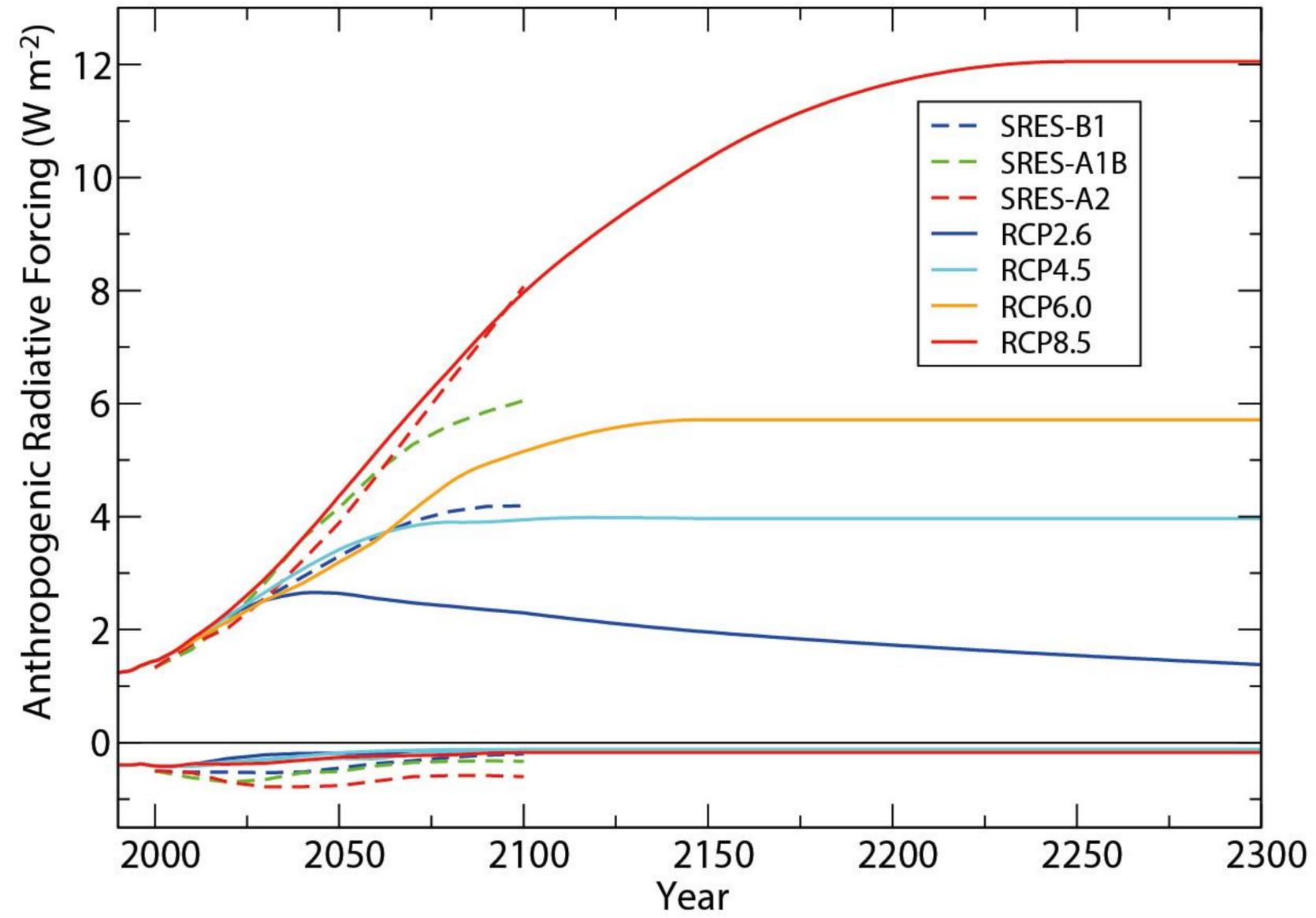
- Multi-model ensembles
- Emergent constraints

CMIP6 and ScenarioMIP

Integrated research:
Climate
science
IAV
IAM
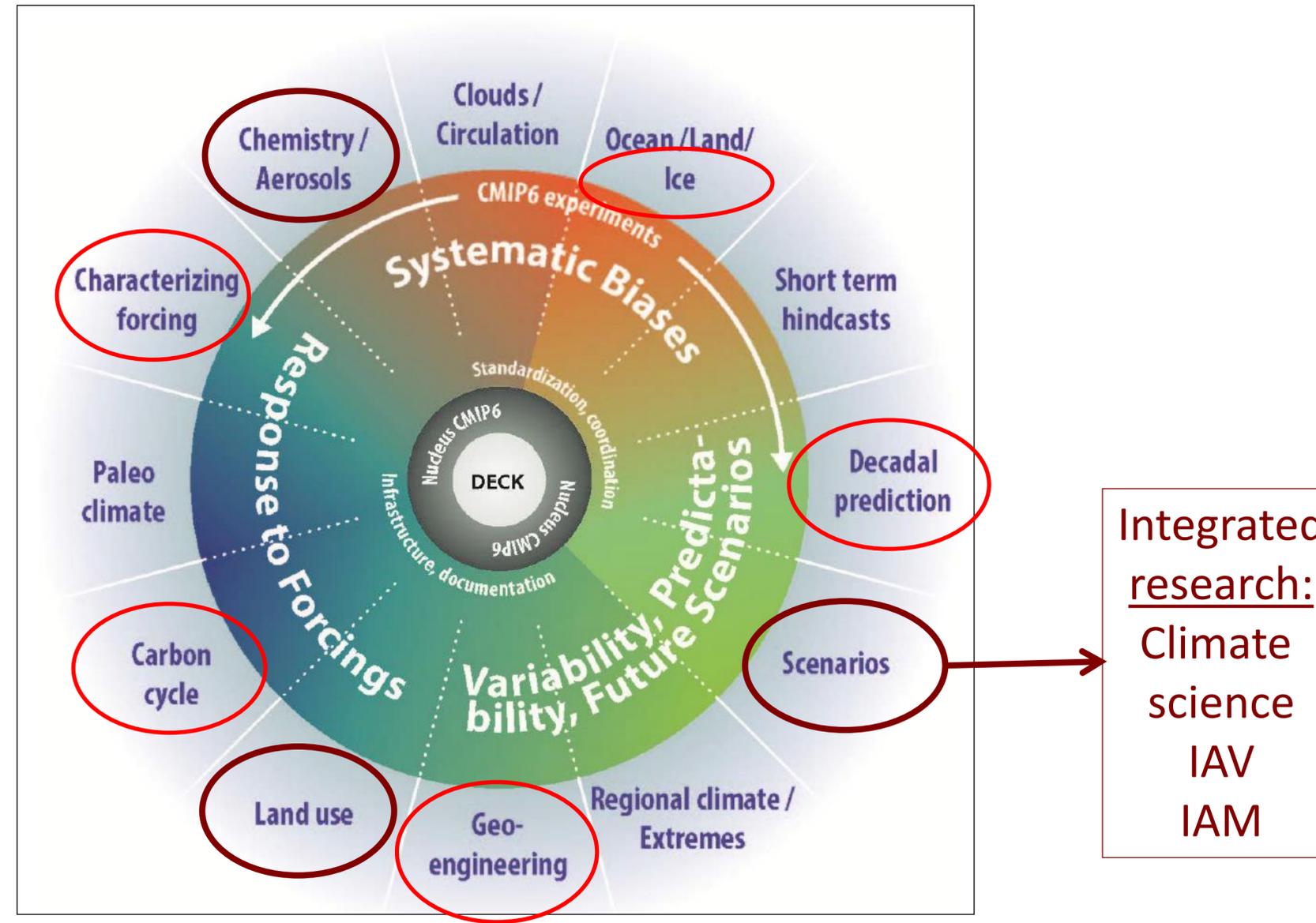
The Past

SRES and CMIP5 RCPs

What's new?
The new scenario framework

- Since SRES, a new set of alternative ways in which society could evolve in the future has been developed.

- **Shared Socioeconomic Pathways (SSPs)** describing these alternative futures in terms of **qualitative narratives** and **quantitative elements** (population, GDP, etc.) have been produced, together with

- corresponding **scenarios of emissions** and land-use (through IAMs), both for these futures in the absence of mitigation policies (baseline scenarios) and for the same futures but assuming several degrees of mitigation action.

Design Space
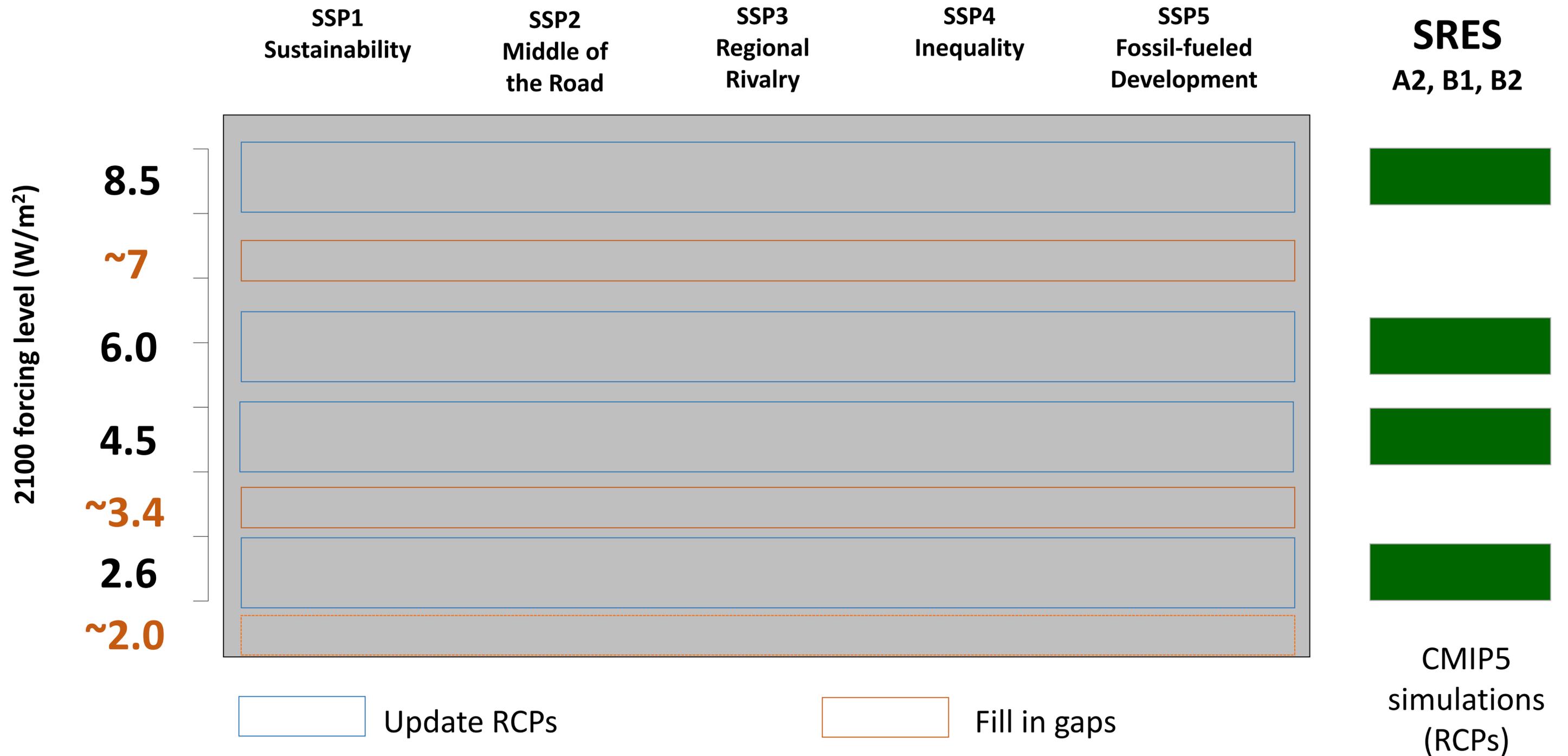
ScenarioMIP
Questions for the experimental design

- Which **global average forcing pathways** (range, spacing, shape*, time horizon**)?

- Which **socioeconomic scenarios** driving forcing pathways?

- Which pathways for **specific forcers** (land use, aerosols)?.

- **Emissions** driven or **concentration** driven?

- **How many** scenarios?
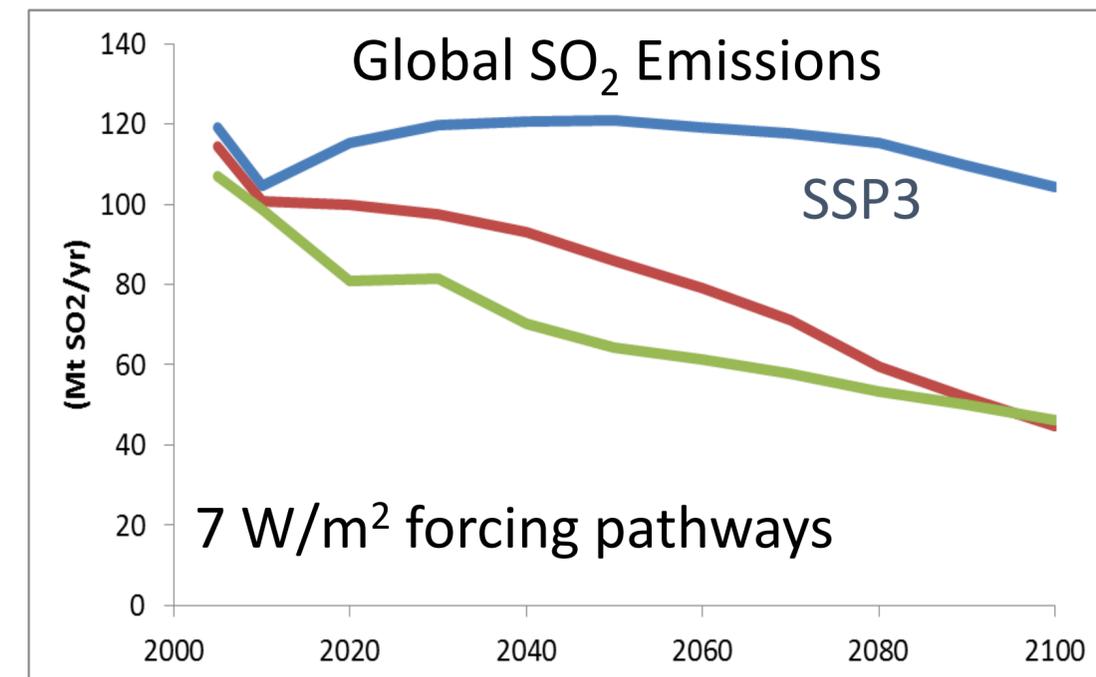
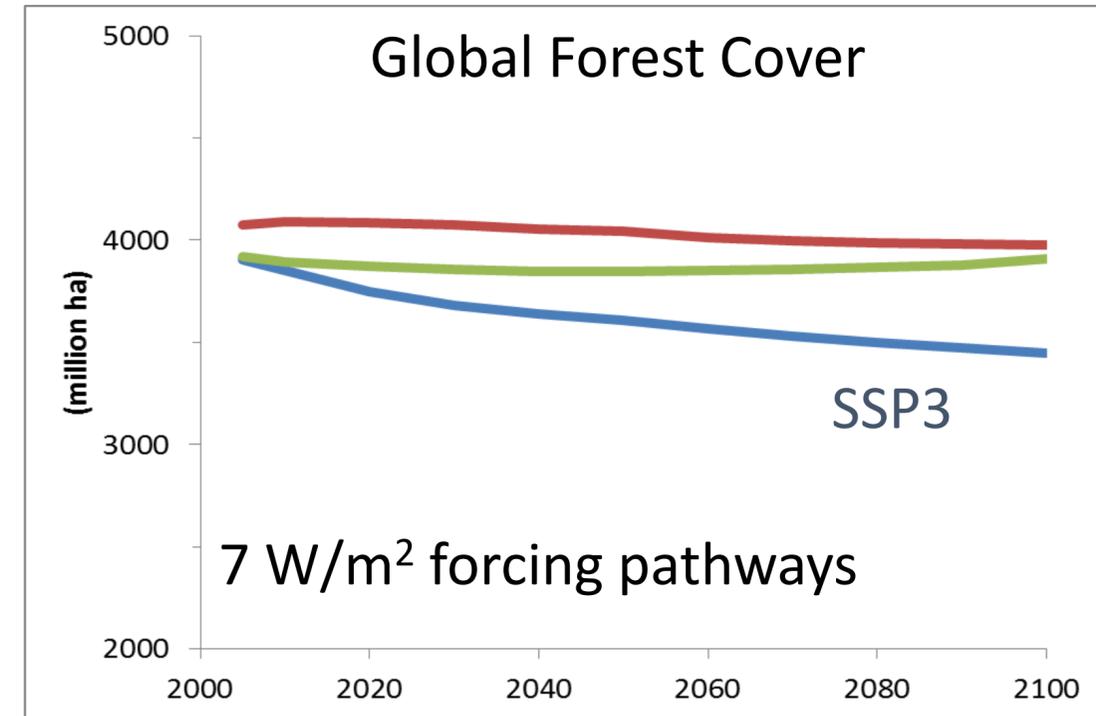- **How many ensemble members**?

* Overshoot
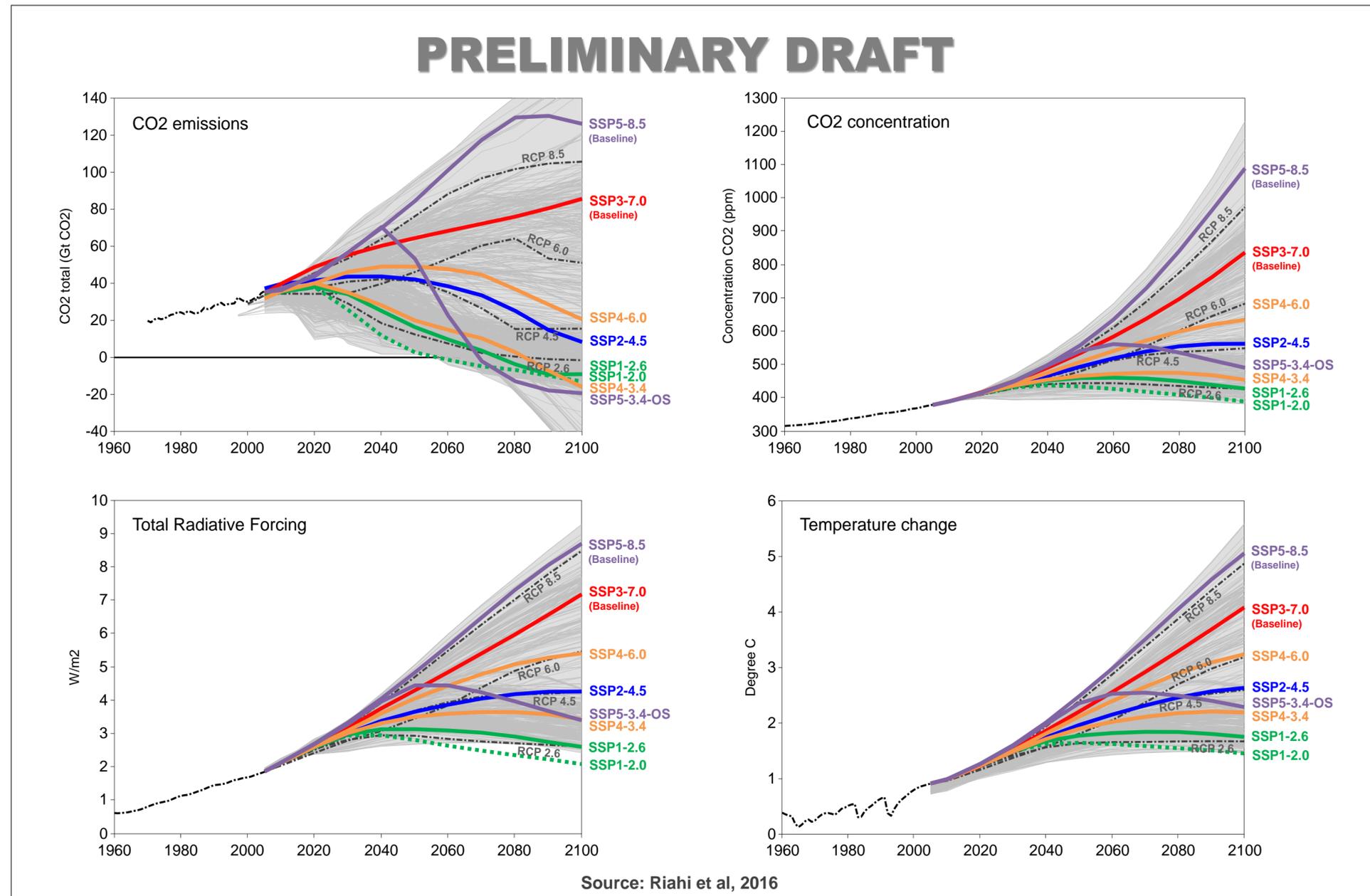** Extensions

Actual Design
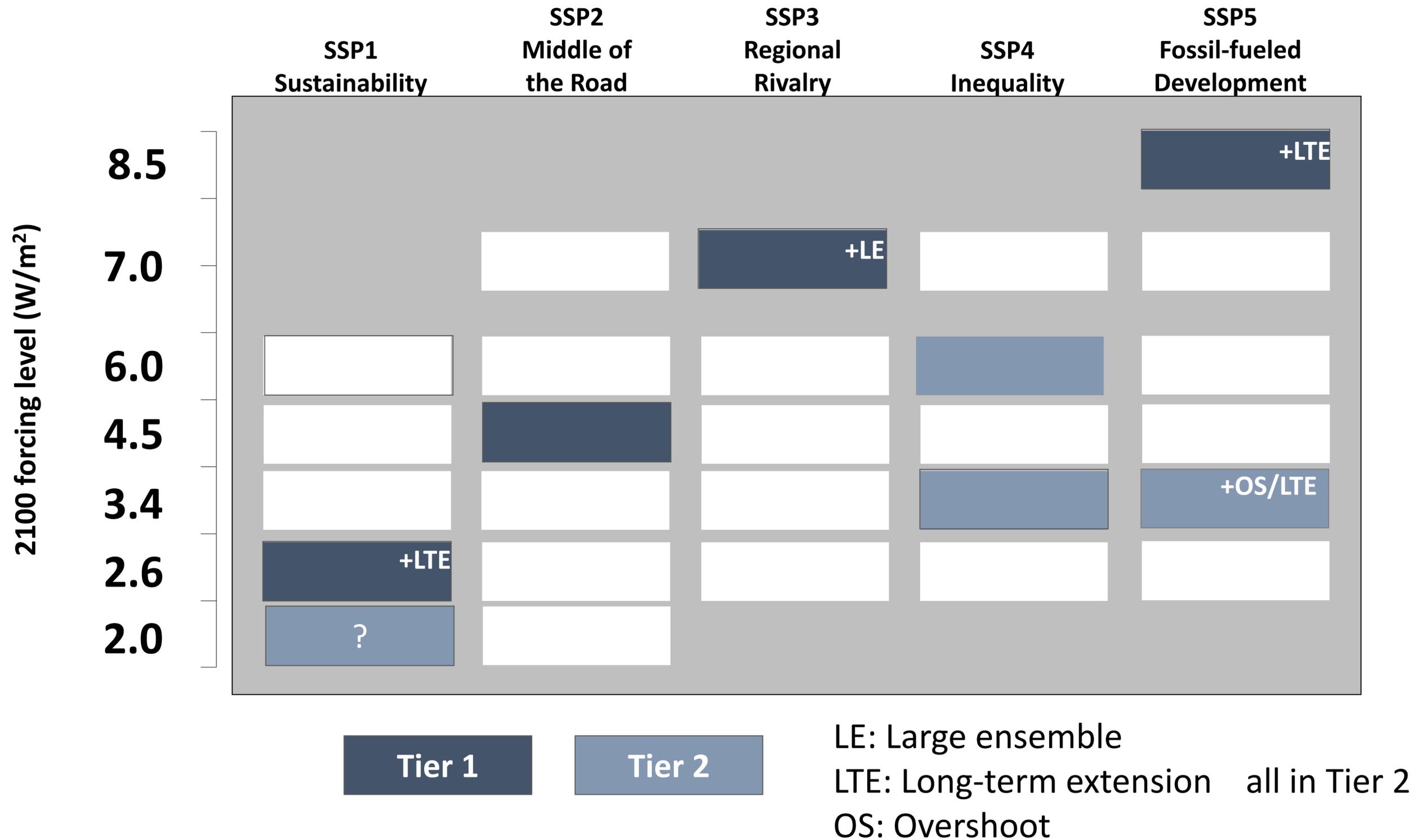
What drove
the choice of SSPs?

- Facilitate climate research (interesting land use, and or aerosols)

- Scenarios that are most relevant to the IAM/IAV community

Global Forest Cover

SSP3

7 W/m² forcing pathways

Global SO₂ Emissions

SSP3

7 W/m² forcing pathways

The Future

CMIP6 RCPs

Source: Riahi et al, 2016

Courtesy of K.Riahi

Design Summary

Tier 1

SSP5-8.5
SSP3-7.0
SSP2-4.5
SSP1-2.6

One run per scenario
2016-2100

Tier 2

SSP1?-2.0?
SSP4-6.0
SSP4-3.7
9 more IC ensemble members
for SSP3-7.0
Overshoot
Long-term extensions

LUMIP

CONNECTION

LUMIP will run variants of our 2.6, 7.0 and 8.5 with complementary land use specifications.

AerChemMIP

CONNECTION

AerchemMIP will run a variant of our 7.0 with reduced near-term climate forcers.

ScenarioMIP
Next Steps

- Paper describing goals and design in CMIP6 special issue of Geoscientific Model Development (O'Neill et al., in revision.)

- Provide future forcings to GCMs, including base-year (2016) harmonization

- Coordinate GCM simulations (~2017/2018)

- Facilitate provision of model output to the wide research community

- Analyze results

QUESTIONS?