

# **Overview of Workshop on Scenarios for Integrated IAM-ESM-IAV Research**

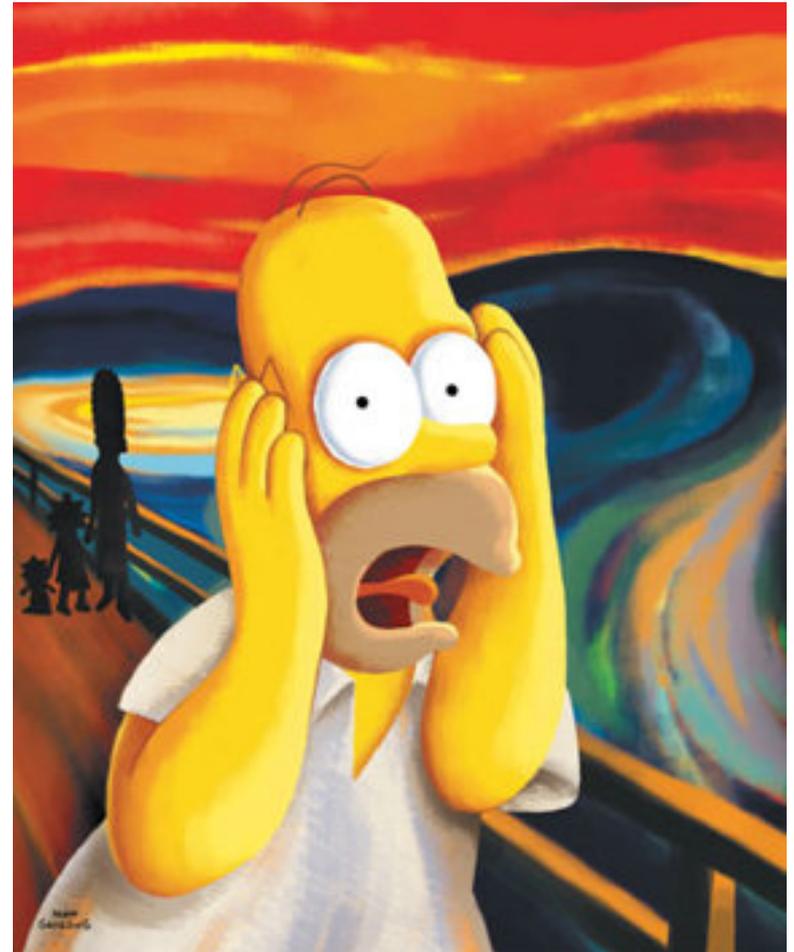
Organizing Committee:

JAE EDMONDS, ELMAR KRIEGLER, JERRY MEEHL, RICHARD MOSS, JOHN WEYANT

**AR5 and NCA are not even finished. And yet, its time to ...**

**...plan scenarios for the next round of research and assessment**

- Are we already behind?
- What have we learned in the first round of the new scenario process?
- What are the policy and science questions that will need to be addressed in the AR6 and other assessments?
- What research design for scenarios is appropriate for these questions?



# Drivers of scenario development

- Method to coordinate synthesis in assessments (IPCC, NCA, ...)
- Inputs to CMIP5: Representative Concentration Pathways (RCPs)
- Inputs to diverse CCIAV research (in conjunction with ESM-based scenarios)
- Context for scenario planning (USFS, many others)



# Scenarios workshop:

## Assessing recent experience and planning next scenarios for research and assessment

- Purpose: Identify potential coordinated experiments and useful scenarios
- Requires a cross-community decision based on joint assessment of research potential
  - Considering the questions that motivated the last round, how has the science progressed?
  - What “works” and what doesn’t?
  - What are the problems we are trying to explore, and what are the implications for models and scenarios?
- Feeds into AGCI workshop on CMIP6 the week following
- Background papers provided:
  - Hibbard et al., 2007
  - Moss et al., 2010
  - van Vuuren et al., 2011

# Agenda topics

- Overview of information needs for policy and updates on what we've learned so far through CMIP5 and SSP processes
- Three issues that are expected to be important to national and international policy formulation:
  - land use
  - emissions of short-lived species, and
  - “overshoot” futures
- Needs for national or subnational assessments which require nesting and integration of different types of scenarios (e.g., climate, socioeconomic, land use, sea level) – several US cases
- Scenario recommendations for CMIP6
- Improvements for coordination across the three research communities
- Other topics or ideas for scenarios: short presentations by participants

# Requests to speakers and participants

- Speakers are allocated 20 minutes but should use less time than that and save a couple of minutes for questions of clarification
- 30-45 minutes are allocated at the end of each session for general discussion that leads to
  - Research questions that require IAM-ESM-IAC participation and coordination
  - Model requirements and linkages
  - Ideas for scenarios needed to explore these questions
  - Suggestions for improving handoffs of information from one community to the next
- Participants should hold general comments and questions for the discussion sessions
- Organizing committee encourages participants to present ideas for questions/scenarios during Friday morning session

# Backup Slides

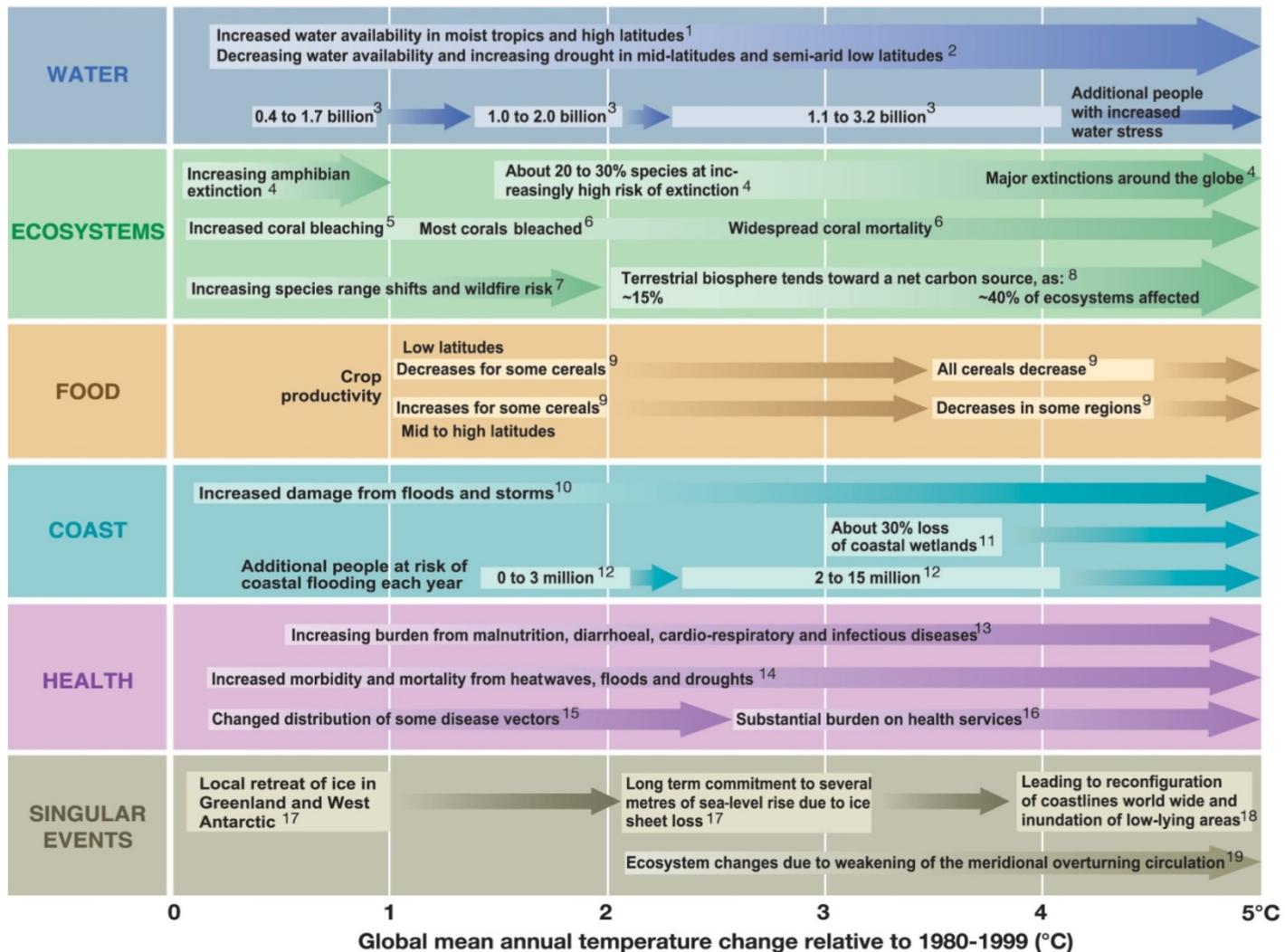
# Research community planning: series of workshops, summer-fall 2013

- Sustainable Global Climate Mitigation Scenarios Workshop (May 29-31, National Center for Socio-Environmental Synthesis (SESYNC, Annapolis, MD)
- Societal Dimensions Working Group Meeting, CESM Workshop (June 20, 8:30-12 noon, Breckenridge, CO)
- Feedbacks and Uncertainties in Integrated Assessment Models and Scenarios, Energy Modeling Forum, Climate Change Impacts and Integrated Assessment, July 31-August 2, Snowmass CO)
- Next Generation Climate Change Experiments Needed to Advance Knowledge and for Assessment of CMIP6 (August 4-9, Aspen Global Change Institute)
- NRC BASC-BECS Joint Roundtable (

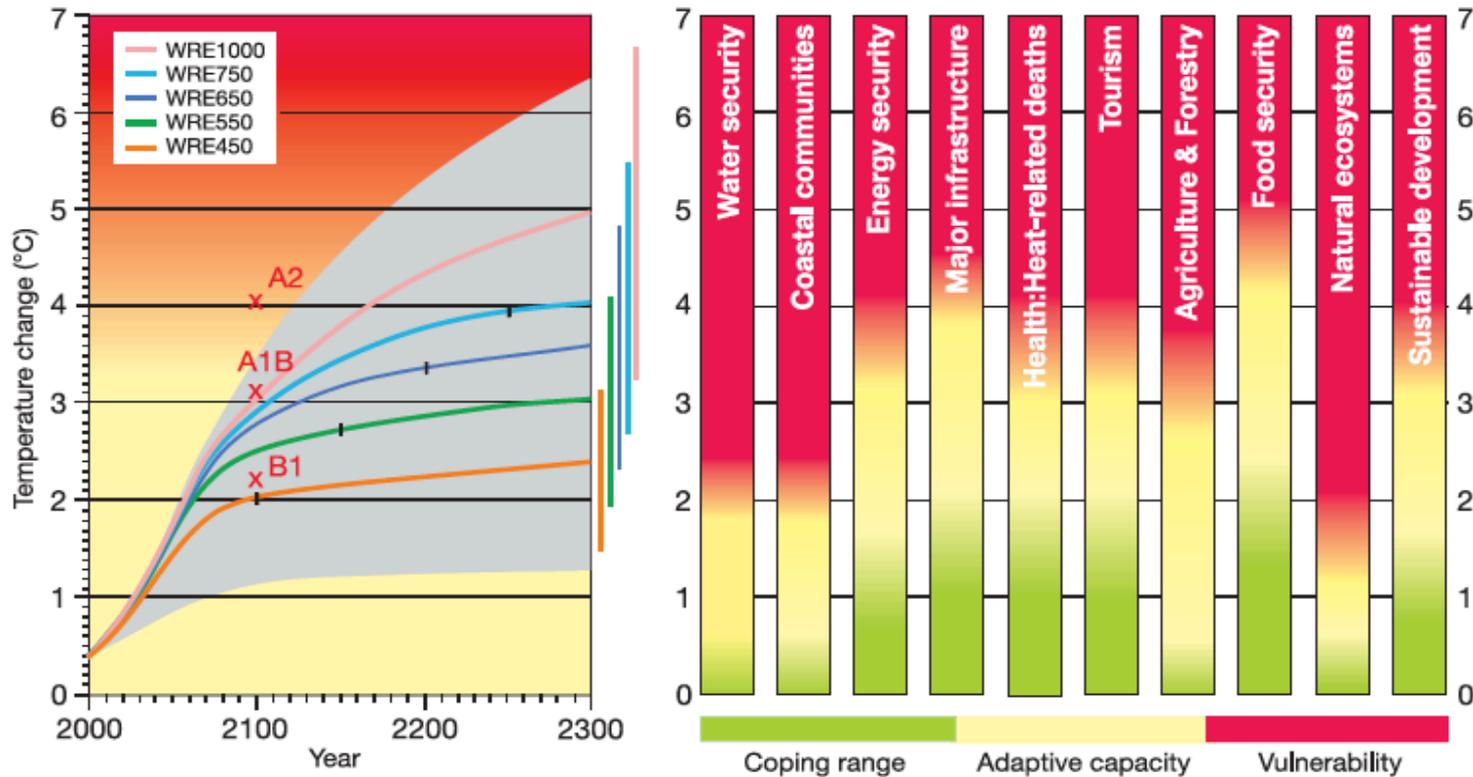
# Drivers of RCP process (from Hibbard et al. 2007)

- Explore stabilization cases
- Decadal prediction, higher resolution ( $0.5^{\circ}$ – $1^{\circ}$ )
  - Scenario variations of pollutants to assess weather impacts
- Centennial runs, lower resolution ( $\sim 2^{\circ}$ )
  - Quantify carbon cycle feedbacks in the Earth system

# 1. Scenarios as method to coordinate synthesis

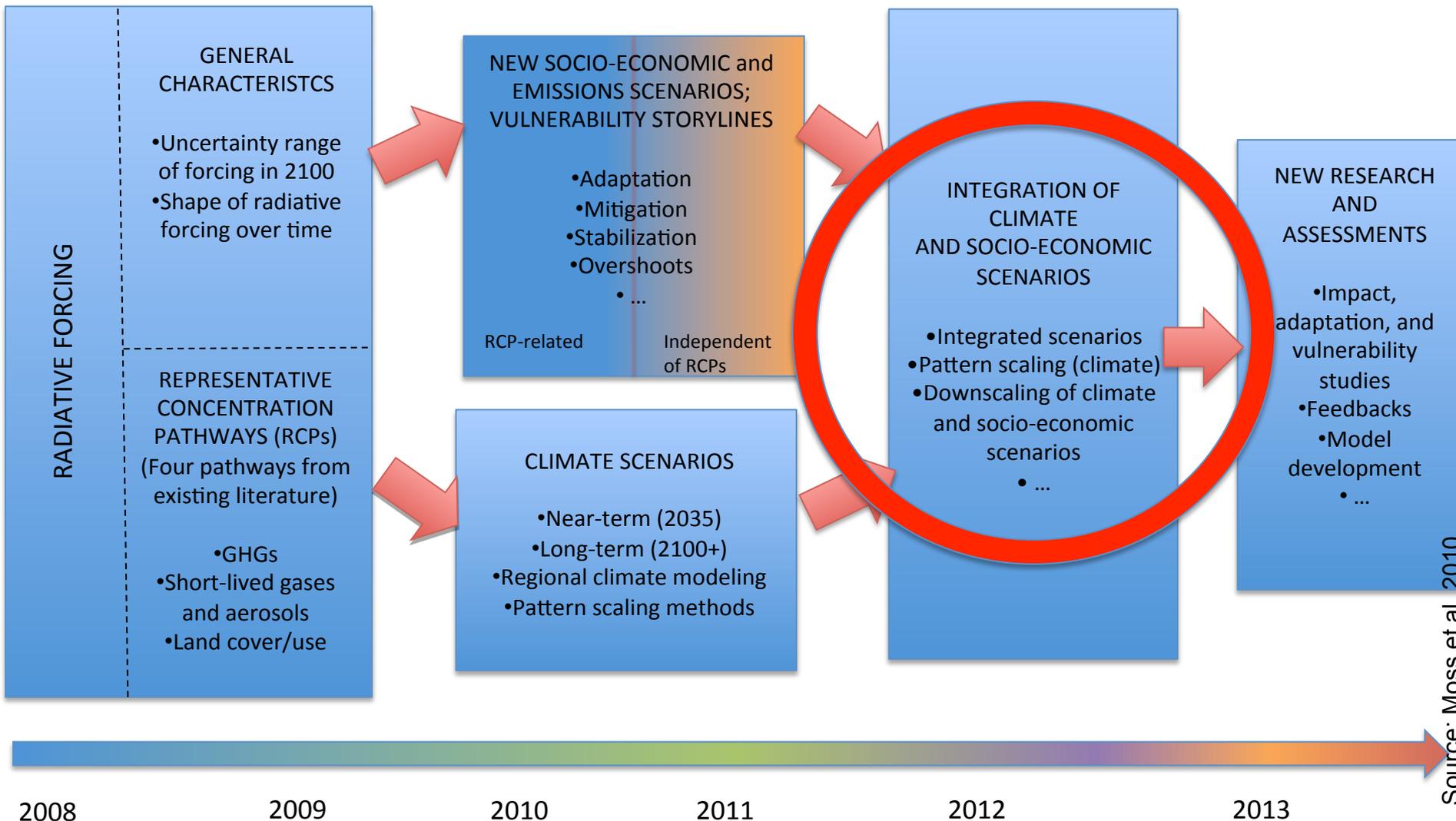


# Synthesis, IPCC Australia/New Zealand



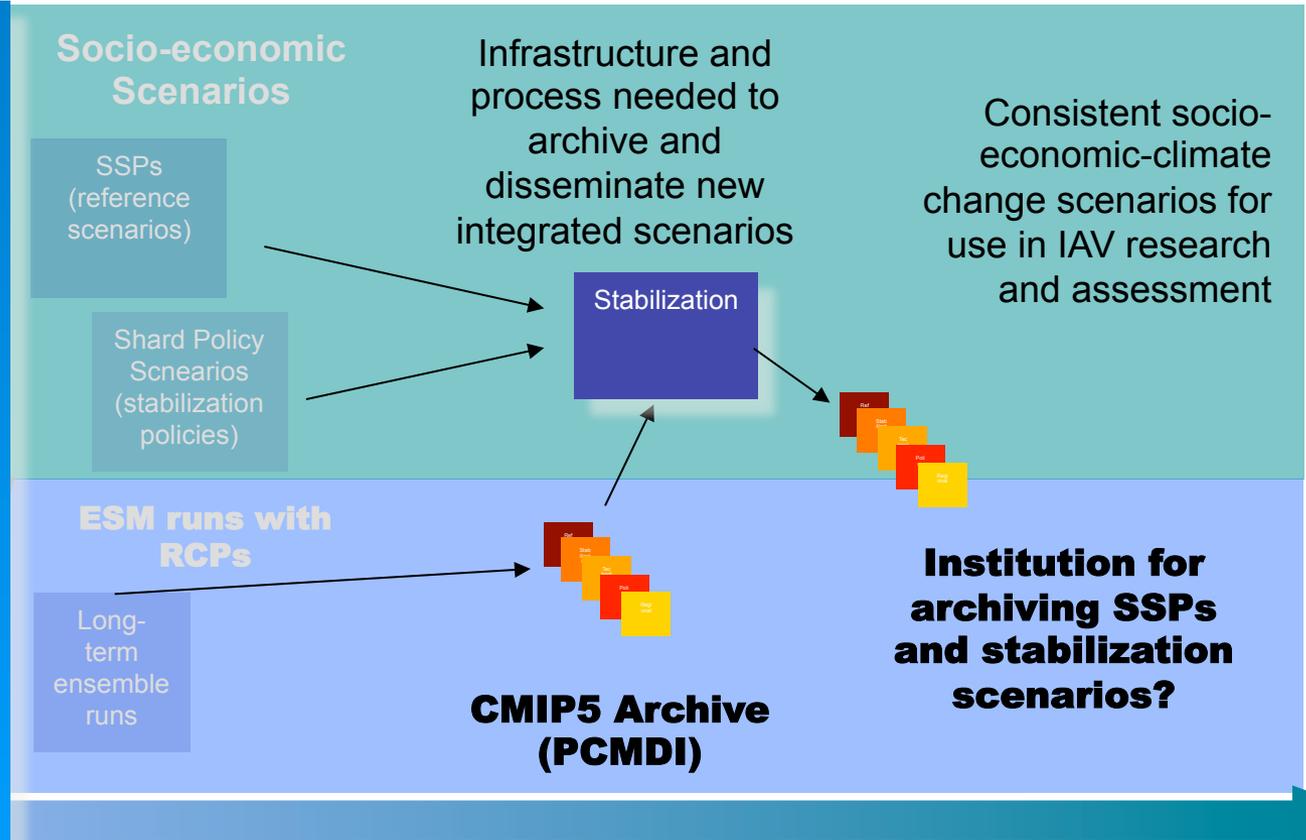
Source: IPCC AR4 WG II Ch 11, Fig 11.4

# Improve integration and data sharing



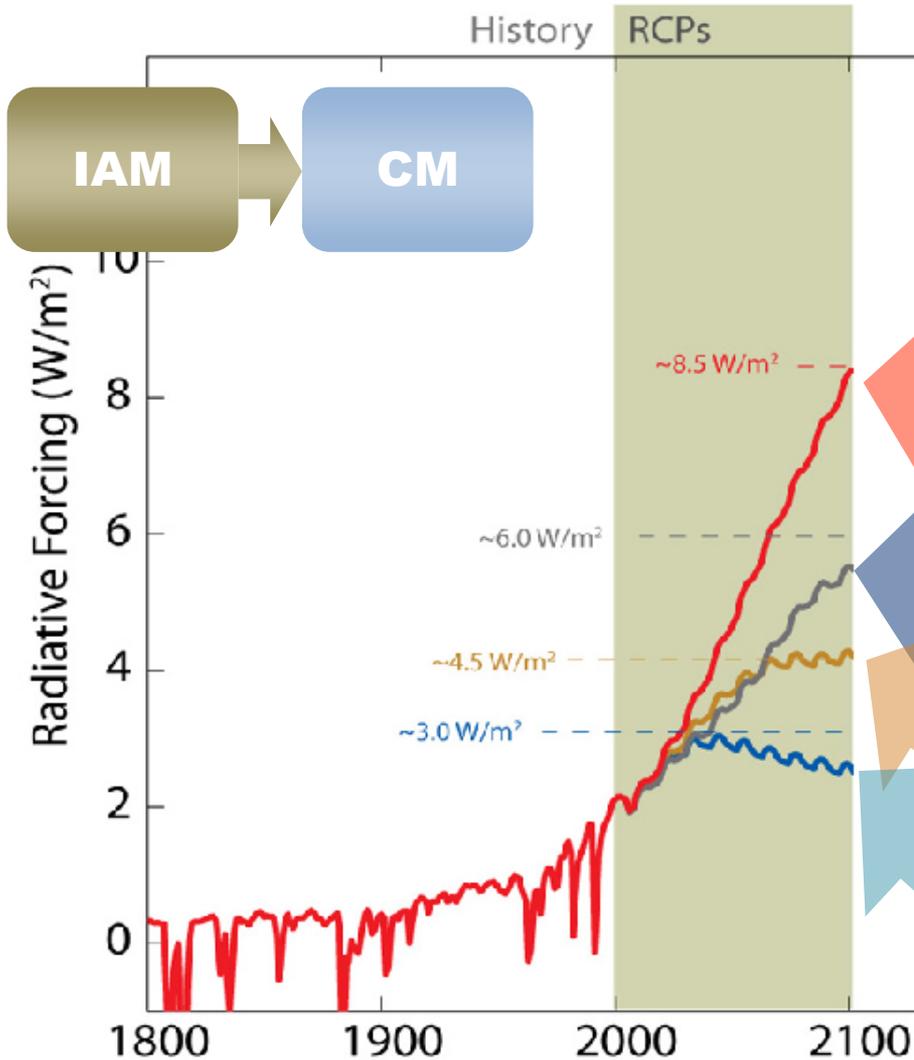
# Improve framework for linking socio-economic and climate scenarios

Needed for impact and regional mitigation assessments: integrated socioeconomic and climate scenarios in an accessible format from a distributed scenario archive



		SSP 1	SSP 2	SSP 3	SSP 4	SSP 5
SPAs RCP Replication	Reference	X	X	X	X	X
	8.5 Wm <sup>-2</sup>			X		
	6.0 Wm <sup>-2</sup>		X	X	X	X
	4.5 Wm <sup>-2</sup>	X	X	X	X	X
	2.6 Wm <sup>-2</sup>	X	X		X	

## 2. Scenarios as inputs to ESMs: Representative Concentration Pathways (RCPs)



- The climate modeling community wanted 4 levels of radiative forcing that would span the emissions literature.

–  $8.5 \text{ Wm}^{-2}$  (RCP 8.5,  $1350 \text{ ppm CO}_2\text{-e}$ )

–  $6.0 \text{ Wm}^{-2}$  (RCP 6.0,  $850 \text{ ppm CO}_2\text{-e}$ )

–  $4.5 \text{ Wm}^{-2}$  (RCP 4.5,  $650 \text{ ppm CO}_2\text{-e}$ )

–  $2.6 \text{ Wm}^{-2}$  (RCP 2.6,  $450 \text{ ppm CO}_2\text{-e}$ )

[CLIMATIC CHANGE](#)

[Volume 109, Numbers 1-2 \(2011\), 5-31.](#)

[DOI: 10.1007/s10584-011-0148-z](#)

# Content of RCP database

- Data for climate modelers or atmospheric chemists  
<http://www.iiasa.ac.at/web-apps/tnt/RcpDb/>

## **FORCING AGENTS**

### **GHG Emissions and Concentrations from IAMs**

- Greenhouse gases: CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, CFCs, HFC's, PFC's, SF<sub>6</sub>
- Emissions of chemically active gases: CO, NO<sub>x</sub>, NH<sub>4</sub>, VOCs
- Derived GHG's: tropospheric O<sub>3</sub>
- Emissions of aerosols: SO<sub>2</sub>, BC, OC
- **Land use and land cover [NEW]**

## **EXTENSIONS**

- Extension of scenarios to 2300—ECPs.

## **WHAT YOU WON'T FIND**

- You will not find an integrated set of detailed socioeconomic storylines and scenarios (e.g., no common reference scenario)