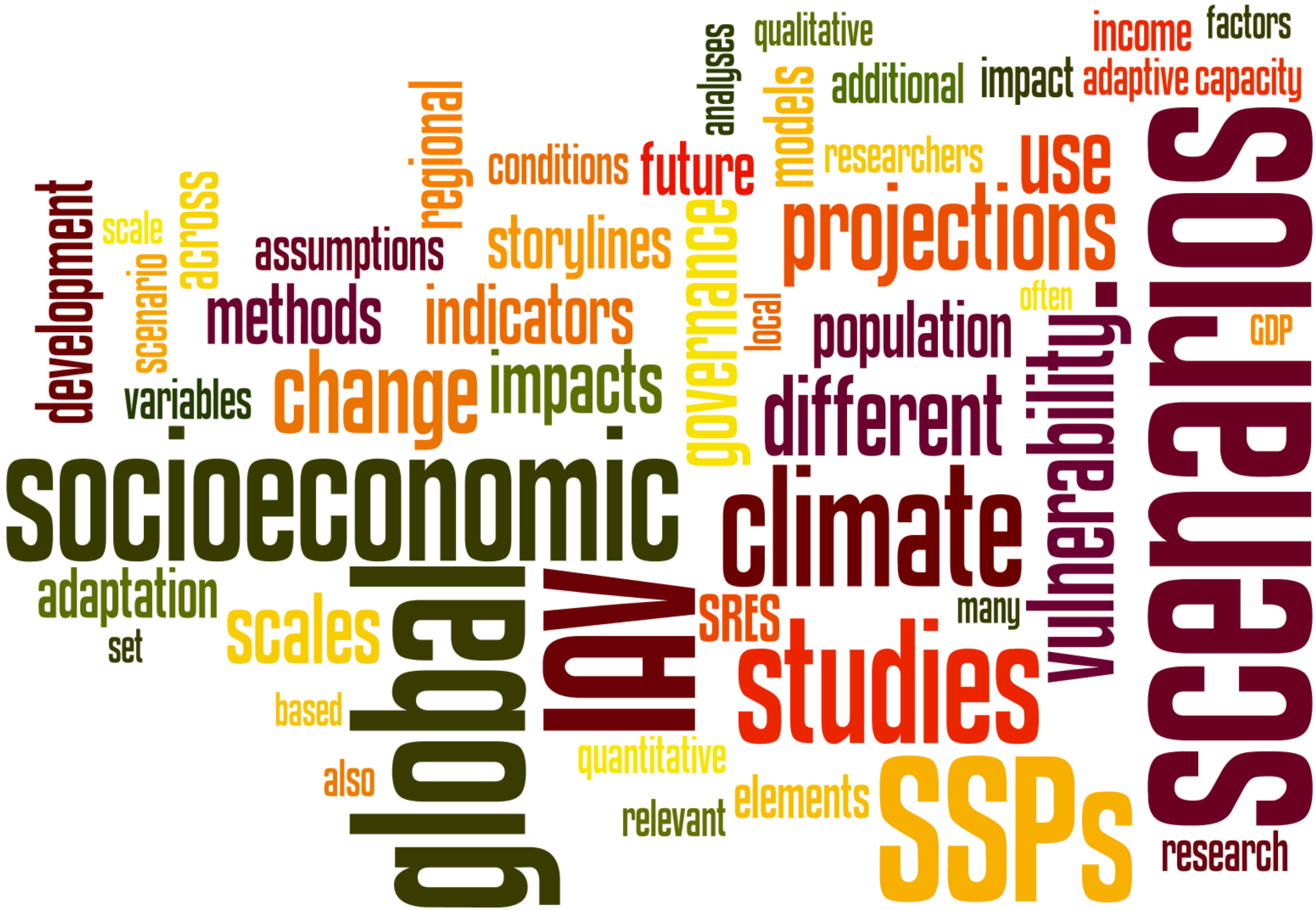

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research

New scenario process

- **Not led by the IPCC**
  - International Committee On New Integrated Climate change assessment Scenarios
  - http://www2.cgd.ucar.edu/research/iconics
- **Emission pathways (Representative Concentration Pathways or RCPs) developed for AR5; resulting climate change assessed in WGI**
  - **RCPs include just forcing/concentration/emissions/land use information and NOT underlying storylines and quantitative drivers**
- **Shared Socioeconomic Pathways (SSPs) developed based on insight that multiple reference socioeconomic pathways can lead to the same emissions pathway**

Scenario matrix architecture

		SSP 1	SSP 2	SSP 3	SSP4	SSP5
	Reference	X	X	X	X	X
RCP Replication	8.5 Wm^{-2}			X		
	6.0 Wm^{-2}		X	X	X	X
	4.5 Wm^{-2}	X	X	X	X	X
	2.6 Wm^{-2}	X	X		X	

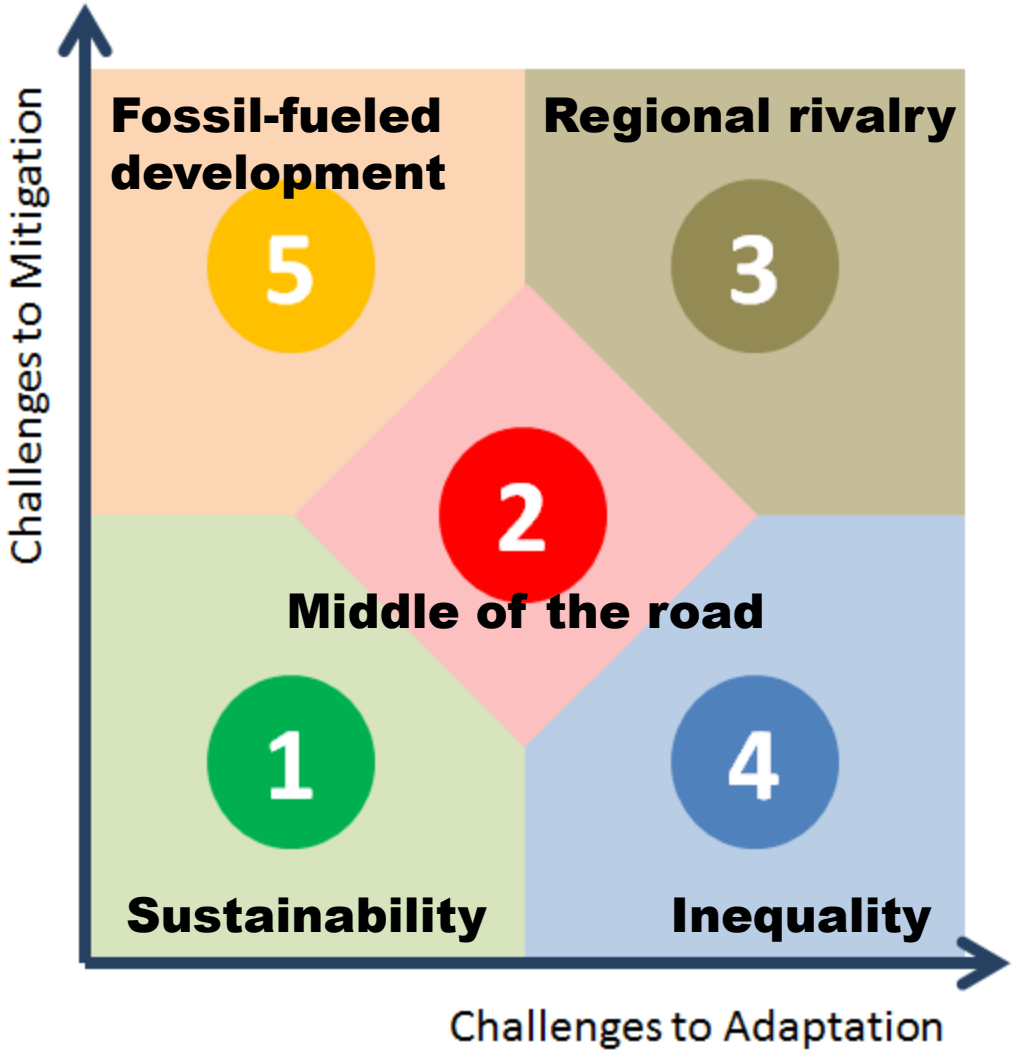
SPAs

Van Vuuren et al. 2013

Questions new scenarios can address

- **Given the world is on a particular development pathway, what are the potential impacts of climate change under different rates and magnitude of change?**
  - **For example, if the world is making progress towards sustainable development, then what might be the climate change attributable burden of malaria under different RCPs?**
- **Given the world is on a particular trajectory of climate change, what are the potential impacts under different development pathways?**
  - **For example, if the world is on track for 4.5 w/M^2 by 2100, then what might be the climate change attributable burden of malaria under different development pathways?**

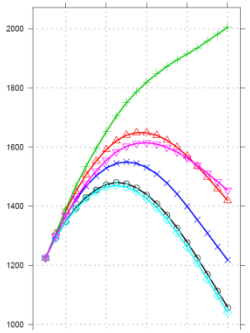
Shared socioeconomic pathways



O'Neill et al. 2014

SSP components

Narrative



Quantitative elements

Population
Urbanization
Rates of technological change
Income
Human Development Index
Income distribution
Etc.

Does not include:

- typical model output such as emissions, land use, climate change
- climate policy (mitigation or adaptation)
- not influenced by climate change

SSP elements

Expert elicitation of key determinants of adaptation challenges:

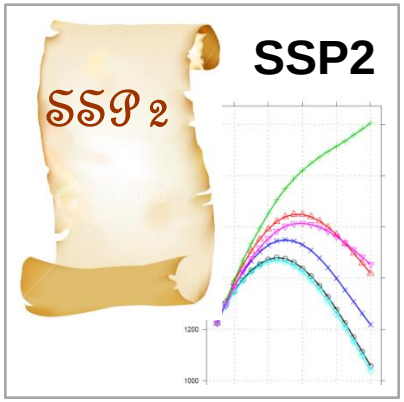
Determinant:	SSP variable:
Average wealth	GDP projection
Poverty	Income distribution
Quality of governance	Governance
People in coastal zones	Spatial population projection
Urbanization	Urbanization
Education	Education
Innovation	Innovation
Quality of healthcare	Health projections

Storyline
IAM elements
IAV elements

Schweizer and O'Neill 2014

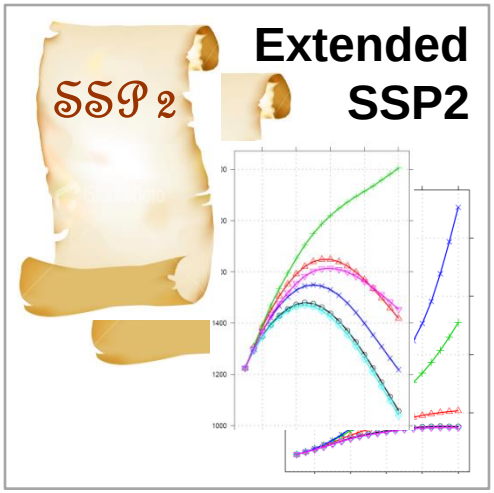
Basic vs Extended SSPs

Basic

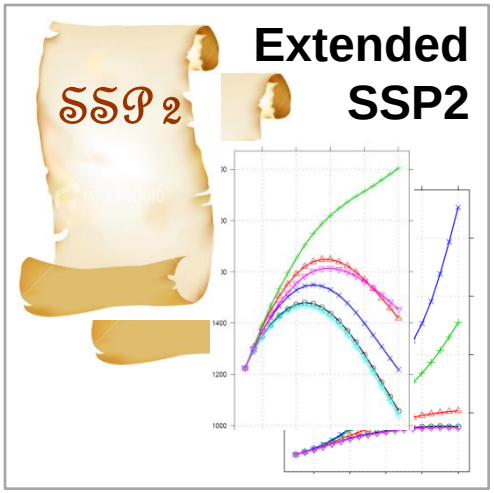


Information sufficient to locate SSP in Domain 2 of the challenges space

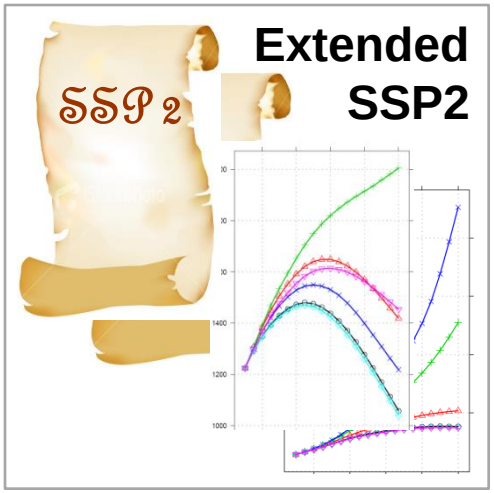
Regional Extension



Sectoral Extension



Global Extension



Representative Concentration Pathways (RCPs)

- **IAM-Climate Modeling community product**
- **Designed to span the full scenario space**
- **Be based on already published literature**
- **Be far enough apart from each other to be distinguishable in the climate models**

	Description	Publication - IA Model
RCP8.5	Rising radiative forcing pathway leading to 8.5 W/m^2 (~1370 ppm CO_2 eq) by 2100.	(Riahi et al., 2007) MESSAGE
RCP6.0	Stabilization without overshoot pathway to 6 W/m^2 (~850 ppm CO_2 eq) at stabilization after 2100	(Fujino et al., 2006; Hijioka et al., 2008) AIM
RCP4.5	Stabilization without overshoot pathway to 4.5 W/m^2 (~650 ppm CO_2 eq) at stabilization after 2100	(Clarke et al., 2007; Smith and Wigley, 2006; Wise et al., 2009) GCAM
RCP2.6	Peak in radiative forcing at ~ 3 W/m^2 (~490 ppm CO_2 eq) before 2100 and then decline (the selected pathway declines to 2.6 W/m^2 by 2100).	(Van Vuuren et al., 2007a; van Vuuren et al., 2006) IMAGE

Adaptation challenges

SSP5 **Meet development goals, high economic growth, highly engineered infrastructure**	**SSP3** **Delayed development; low human capital; high inequality; weak institutions; barriers to trade**
SSP1 **Meet development goals; reduced inequality; high education; improved health**	**SSP4** **High inequality; large fraction of poor with low human capital; institutions ineffective for most**

Mitigation challenges

SSP5 **High demand; fossil-dominated supply**	**SSP3** **Slow reduction in fossil dependency; slow tech change**
SSP1 **Reduced fossil dependency, low resource intensity; environmental awareness; effective institutions; high tech development**	**SSP4** **Actual or potential low-C tech development driven by scarcity or policy concerns; few high income emitters; institutions effective for elite**

Shared Climate Policy Assumptions

- RCPs do not characterize the nature of climate policy interventions
- Climate policy assumptions may alter the challenges to adaptation and to mitigation
- Each RCP-replication would be undertaken with a particular set of policy assumptions
  - Consistent with the SSP with which it is associated
  - Each SSP could have a different set of assumptions about how emissions were mitigated

SPA Storyline: Like SSPs, SPAs have a narrative component

Quantitative Assumptions: SPAs have a quantitative set of assumptions, e.g. level of radiative forcing, rising or falling, timing of participation, policy instrument choice.

Kriegler et al. 2013

ICONICS

International Committee On New Integrated Climate change assessment Scenarios

http://www.isp.ucar.edu/iconics

Chairs: Kristie Ebi, Tom Kram

- Narratives
  - Brian O'Neill, Elmar Kriegler
- IAM quantitative drivers and IAM scenarios
  - Detlef van Vuuren, Keywan Riahi
- IAV quantitative elements and evaluation metrics
  - Marc Levi, Bas van Ruijven
- Nested scenarios across geography and time
  - Kasper Kok, Ben Preston
- IAV-IAM handshake
  - Jae Edmonds
- Roadmap for future IAV-IAM collaboration on scenarios
  - Stephane Hallegatte