Building SSPs for climate policy analysis: a scenario elicitation methodology to map the space of possible future challenges to mitigation and adaptation

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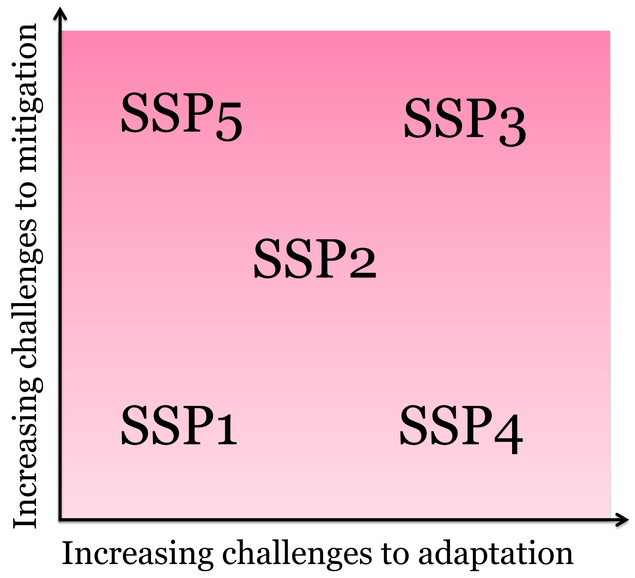
Shared socio-economic pathways are defined along two axes

The scientific community is developing a new set of scenarios, referred to as **Shared Socio-economic Pathways (SSPs)** to replace the SRES scenarios.

To investigate how **various visions of future socio-economic conditions** affect **mitigation efforts**, **adaptation efforts**, and **residual impacts**.

They need to be **contrasted along two axes**: future challenges to adaptation and future challenges to mitigation.



Scenario elicitation methodology: a « backward approach »

Traditional method: groups of experts select a common set of qualitative storylines. Analysts use computer simulation models to develop quantitative projections based on these storylines.

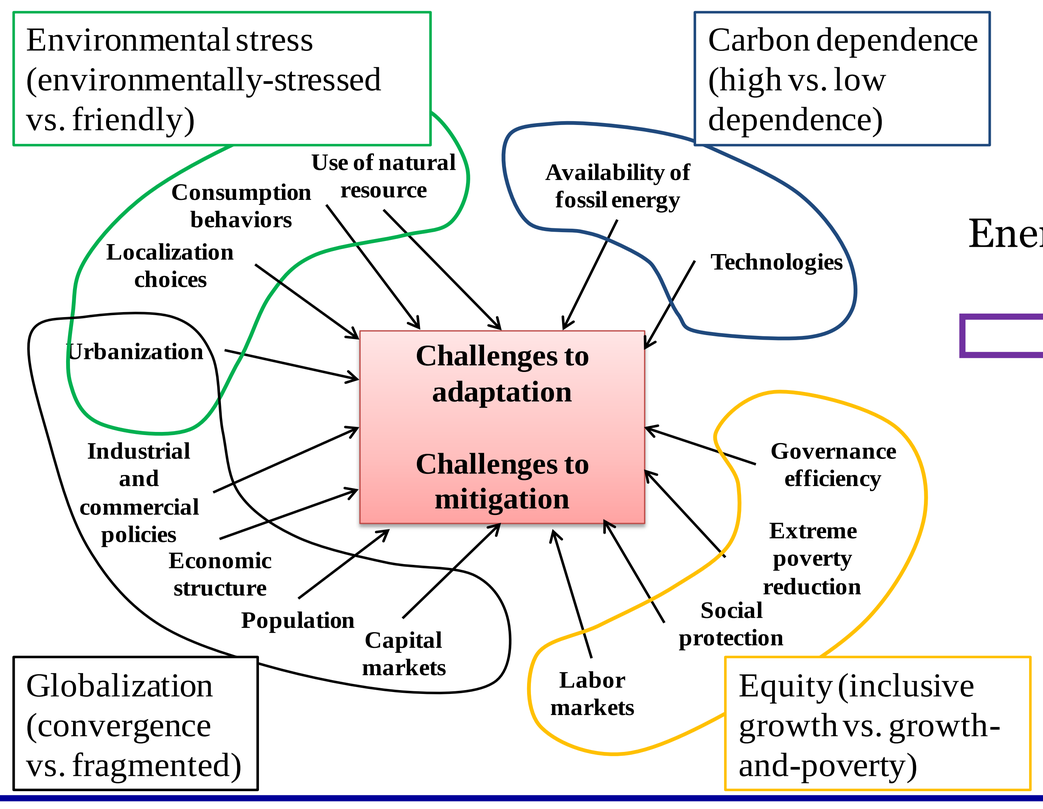
But this process may fail to yield storylines that focus on the most important driving forces for each SSP.

The influence can be ambiguous *a priori*. Some important mechanisms (feedbacks, rebound effects, etc.) might appear negligible *a priori*.

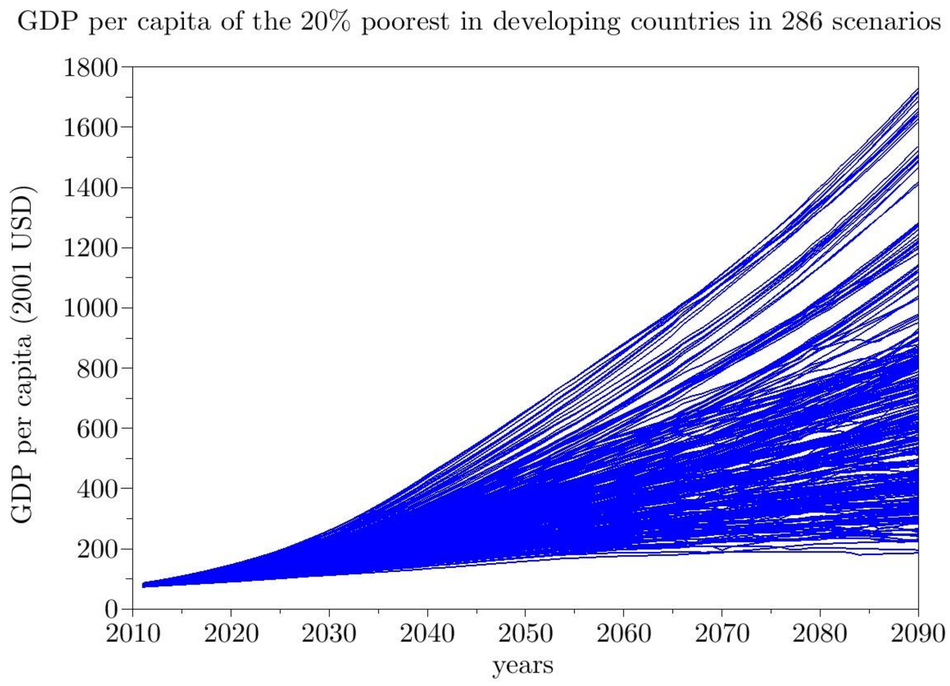
Here, we suggest developing SSPs using a **"backward" approach.**

❶ The a priori drivers of future challenges to adaptation and mitigation are translated into 286 scenarios

We **first identify *a priori* the main driving forces** of the world future challenges to mitigation and adaptation to climate change, based on existing literature.



Energy-economy model



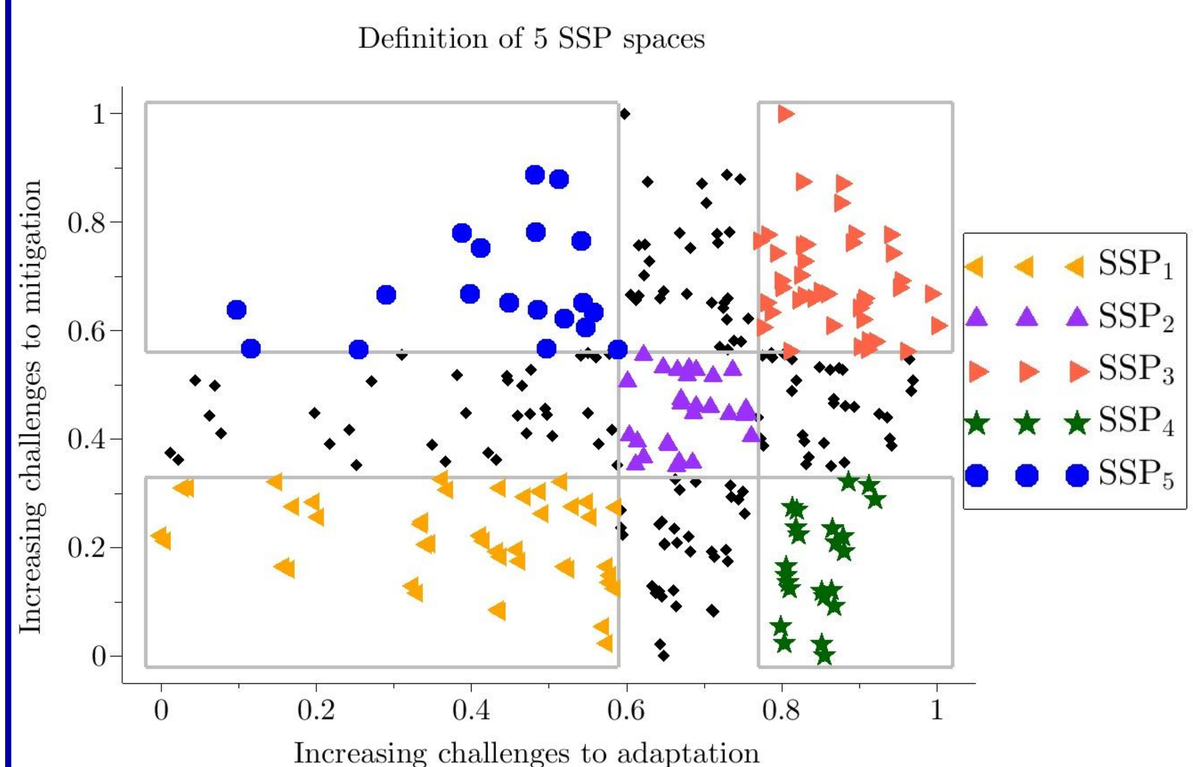
For each driver that can be translated into parameters of the IMACLIM-R model, **we build two or three options and combine them** to run 286 different scenarios.

❷ Scenarios are mapped in the SSP space

Definition of two relevant indicators for the axes:

- **Challenges to adaptation**: GDP per capita of the 20% poorest in low income countries
- **Challenges to mitigation**: CO2 emissions

SSP spaces are defined with two thresholds for each indicator.



❸ Drivers that best define SSPs are determined *a posteriori*

	Equity (2 options)	Convergence (3 options)	Energy sobriety (2 options)	Low carbon technologies (2 options)	Fossil fuels (2 options)	Population (3 options)	Capital markets (2 options)	Covergage/ Density (%)
SSP1	Improved	Fast or medium	High	High availability		Medium or low		50/80
SSP2	Improved	Medium or slow	Low			Low		30/60
SSP3	Worsen		Low	Low availability		High or medium		55/90
SSP4	Worsen	Slow	High					90/85
SSP5	Improved	Fast	Low				Reduced imbalances	60/45

We use a **"scenario discovery" cluster analysis**, which provides a computer-assisted method of scenario development to **identify *a posteriori* the main drivers of each scenario group**.

We select five contrasting combinations of drivers to cover the range of possible challenges to adaptation and mitigation.

We propose these five driver combinations as SSPs.