

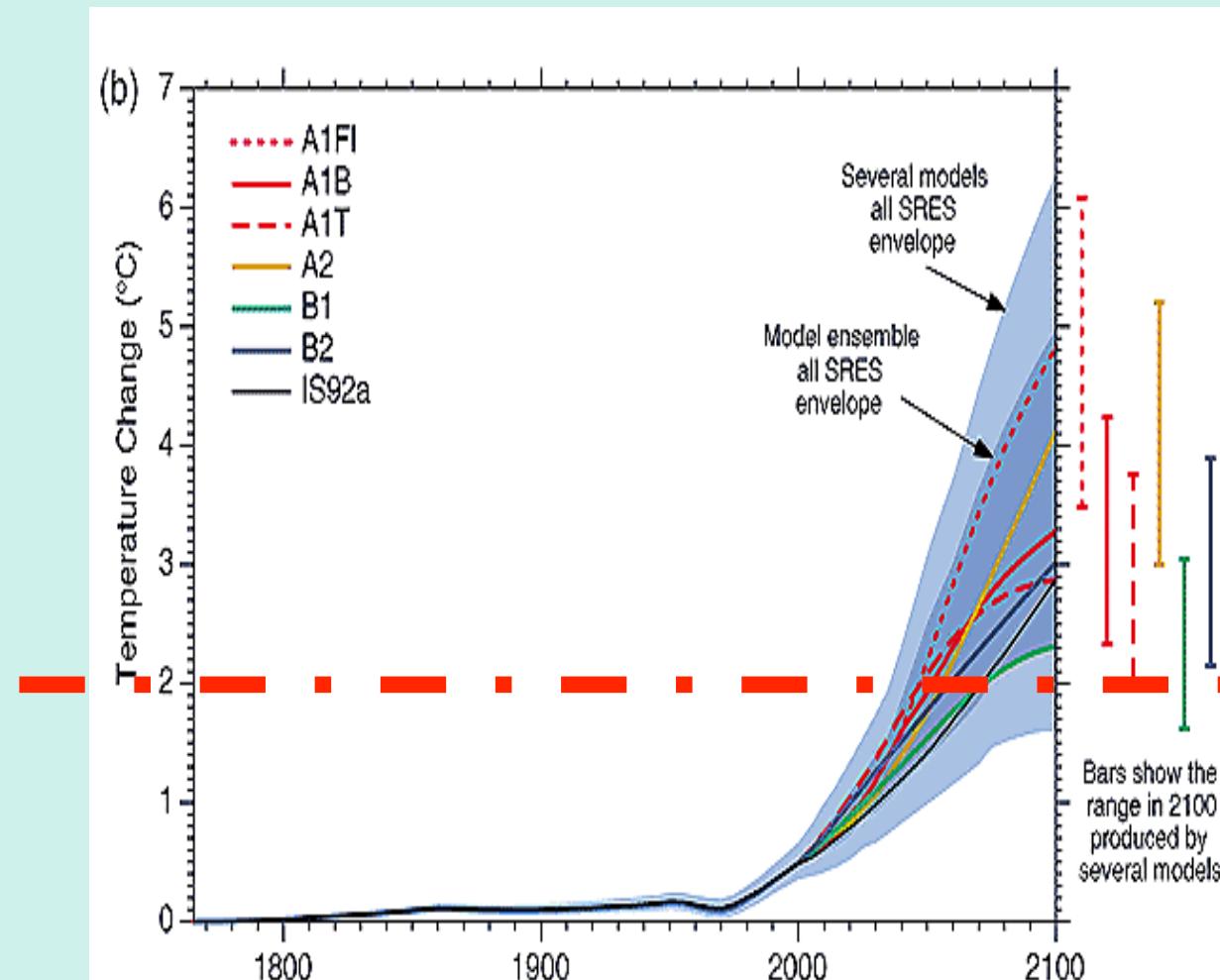


Institut de recherche en sciences de l'environnement

A Climate challenge with specific importance: the estimate of climate sensitivity

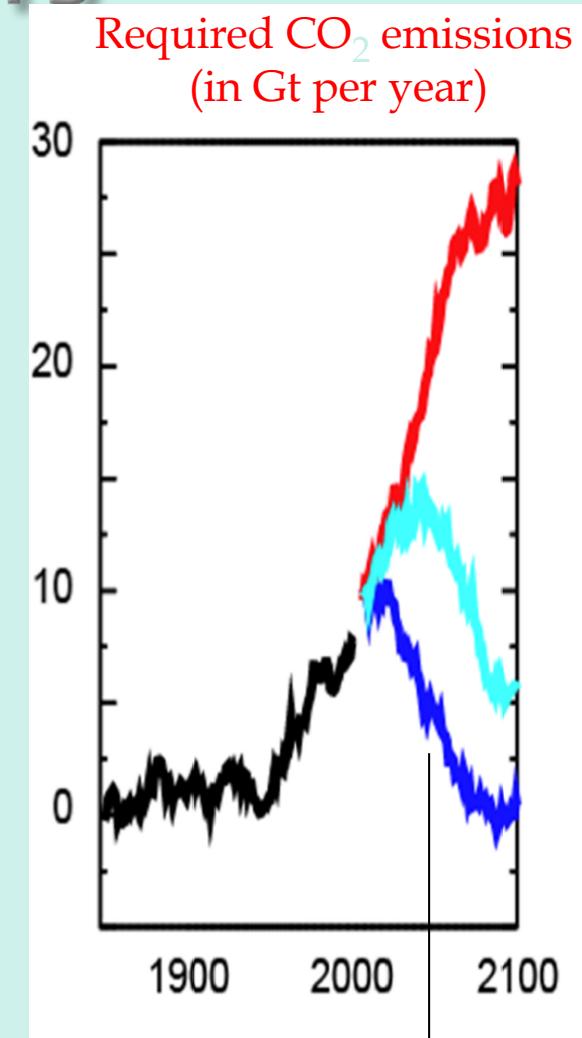
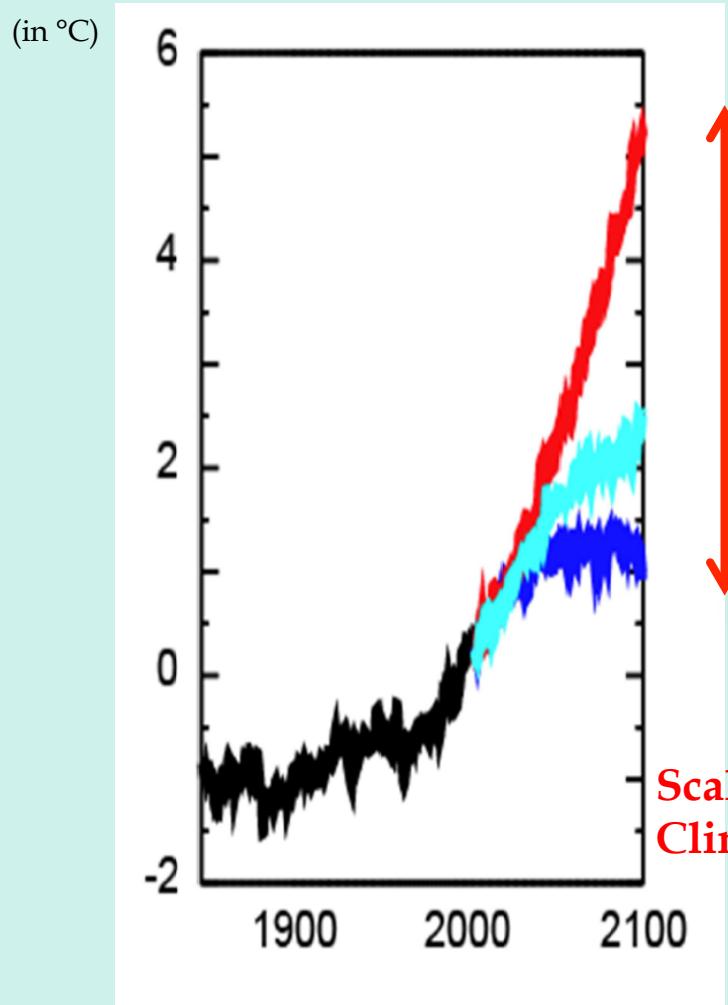
Hervé Le Treut

Policy-free scenarios (SRES)

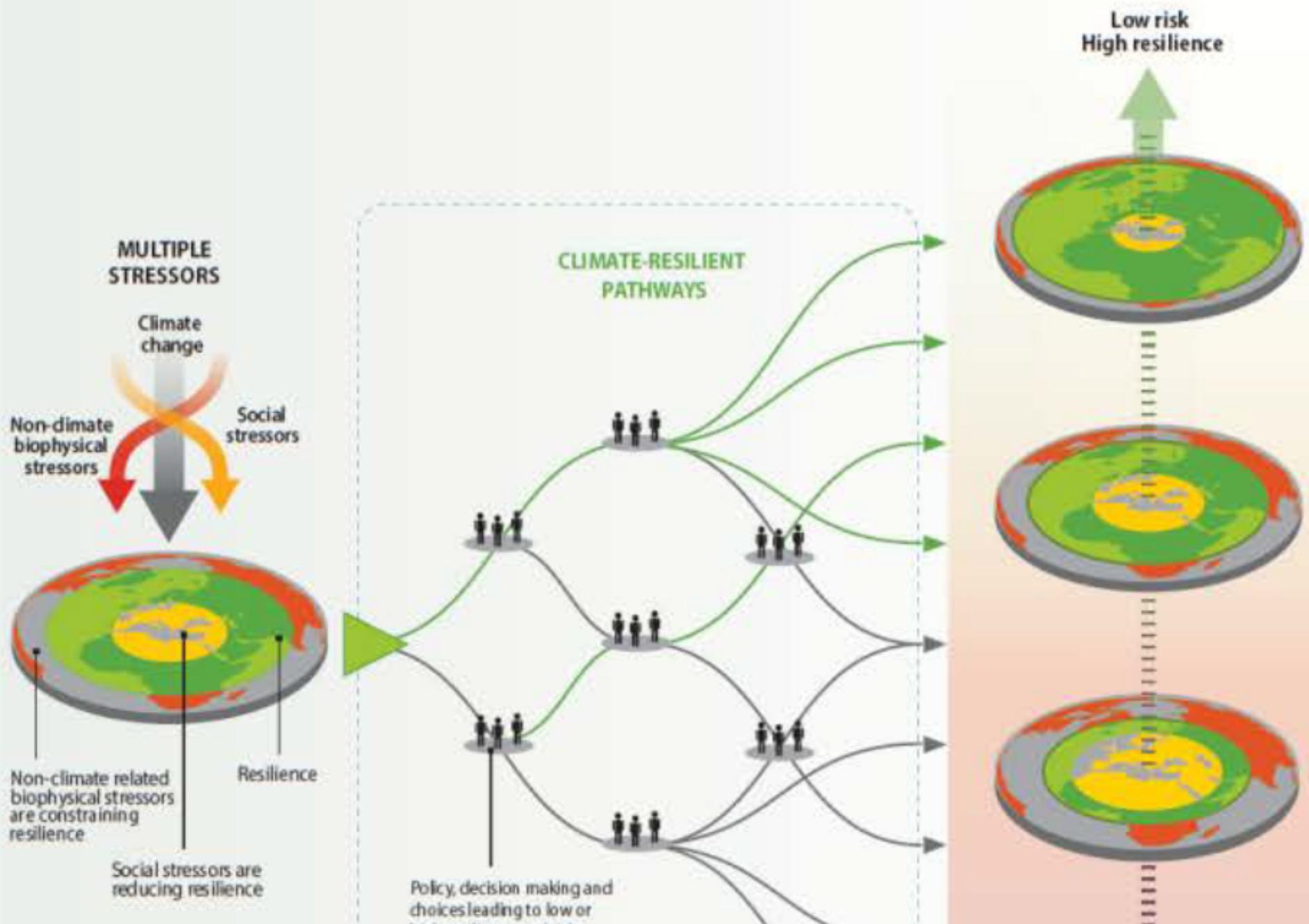


Future Climate Trajectories

Targeted Earth Surface
Temperature Changes
IPSL / IPCC 2013



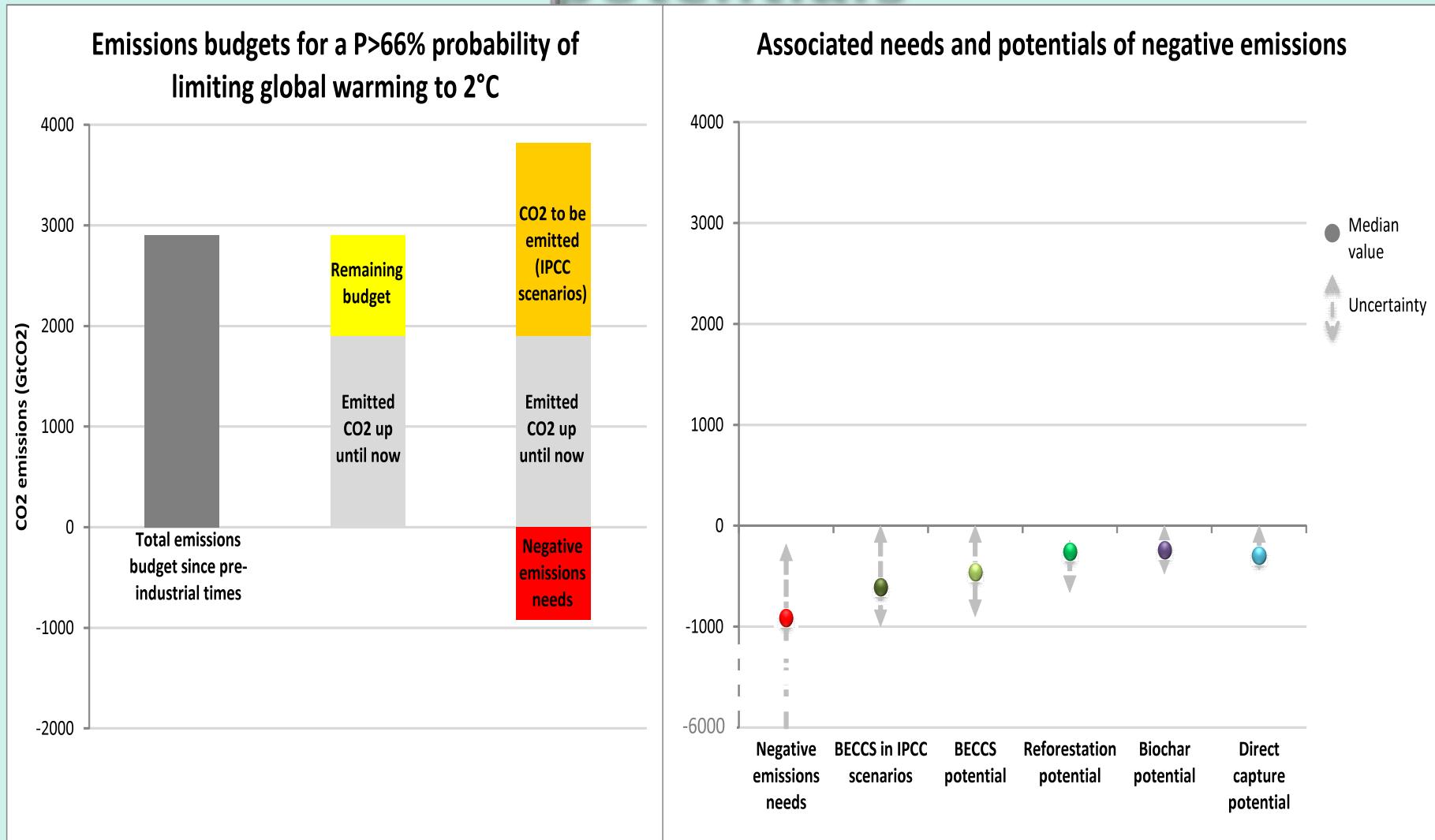
Multiple stressors and Climate-resilient development pathways



The Interdisciplinary Group on National Contributions (GICN)

- **Hervé Le Treut** (IPSL, UPMC) : coordinator
- Olivier Boucher (LMD, IPSL, CNRS) : co-coordinator
- Hélène Benveniste (IPSL) : scientific secretary
- Philippe Ciais (LSCE, IPSL, CEA)
- François-Marie Bréon (LSCE, IPSL, CEA)
- Franck Lecocq (CIRED, AgroParistech)
- Céline Guivarch (CIRED, ENPC)
- Thomas Gasser (LSCE, IPSL, CIRED)
- Patrick Criqui (EDDEN, CNRS-UGA)
- Sandrine Mathy (EDDEN, CNRS-UGA)
- **Emmanuel Prados** (INRIA-Grenoble)
- David Salas (Météo-France)
- Roland Séférian (Météo-France)
- Valentin Bellassen (INRA, Dijon)

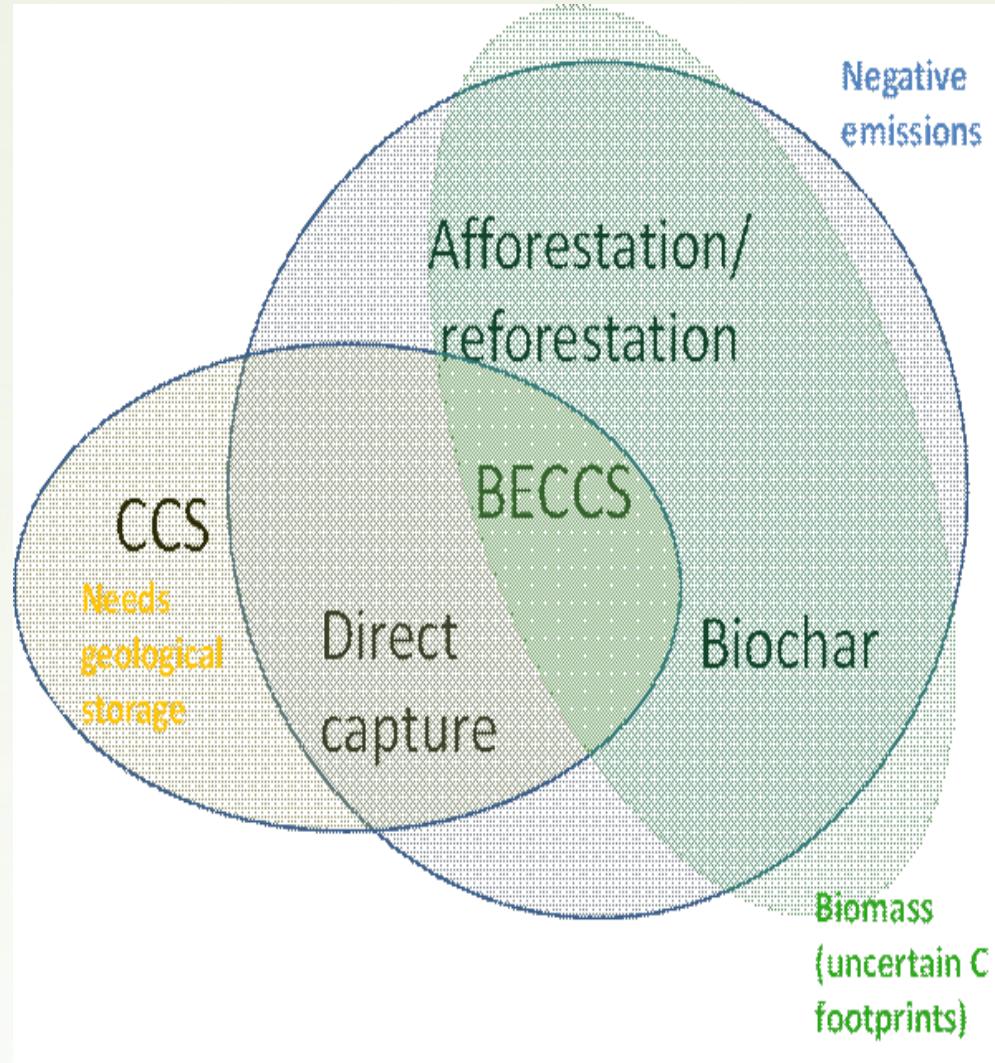
Negative emissions: uncertain potentials



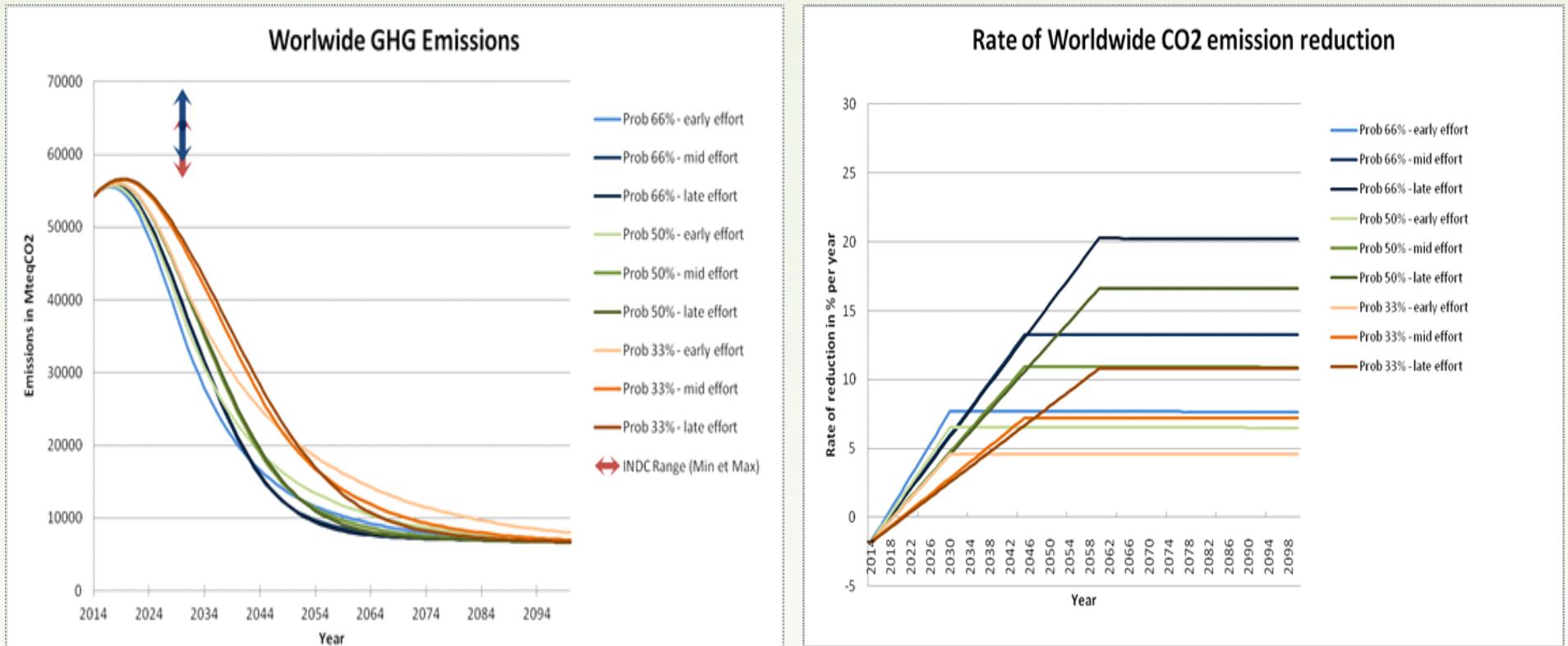
H. Le Treut, P. Criqui, O. Boucher, H. Benveniste
(GICN)

Source: GICN, 2015

Negative emissions: different techniques

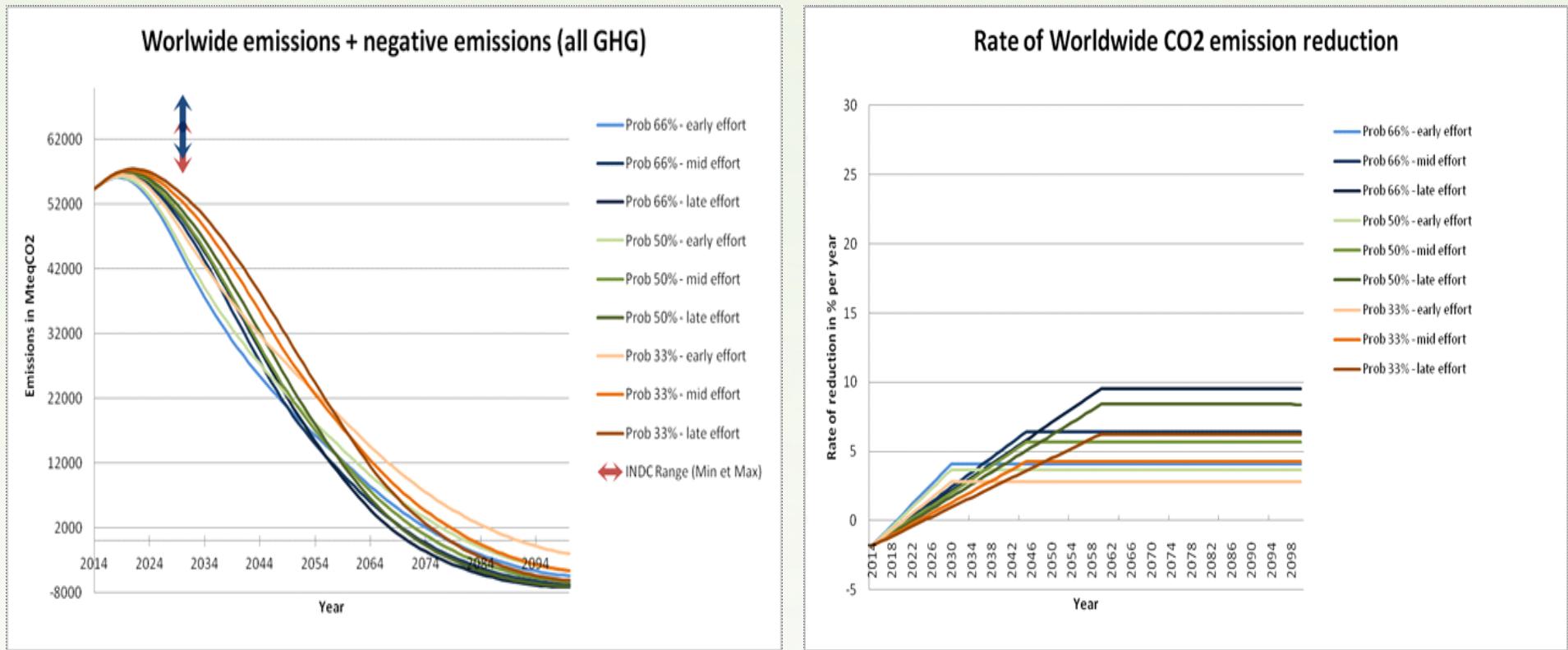


INDCs compared to REDEM 2°C pathways (1) without negative emissions



Trajectories **without negative CO₂ emissions** for different probabilities of reaching the 2°C target and different maximum effort dates, against aggregated INDCs.

INDCs compared to REDEM 2°C pathways (2) with negative emissions

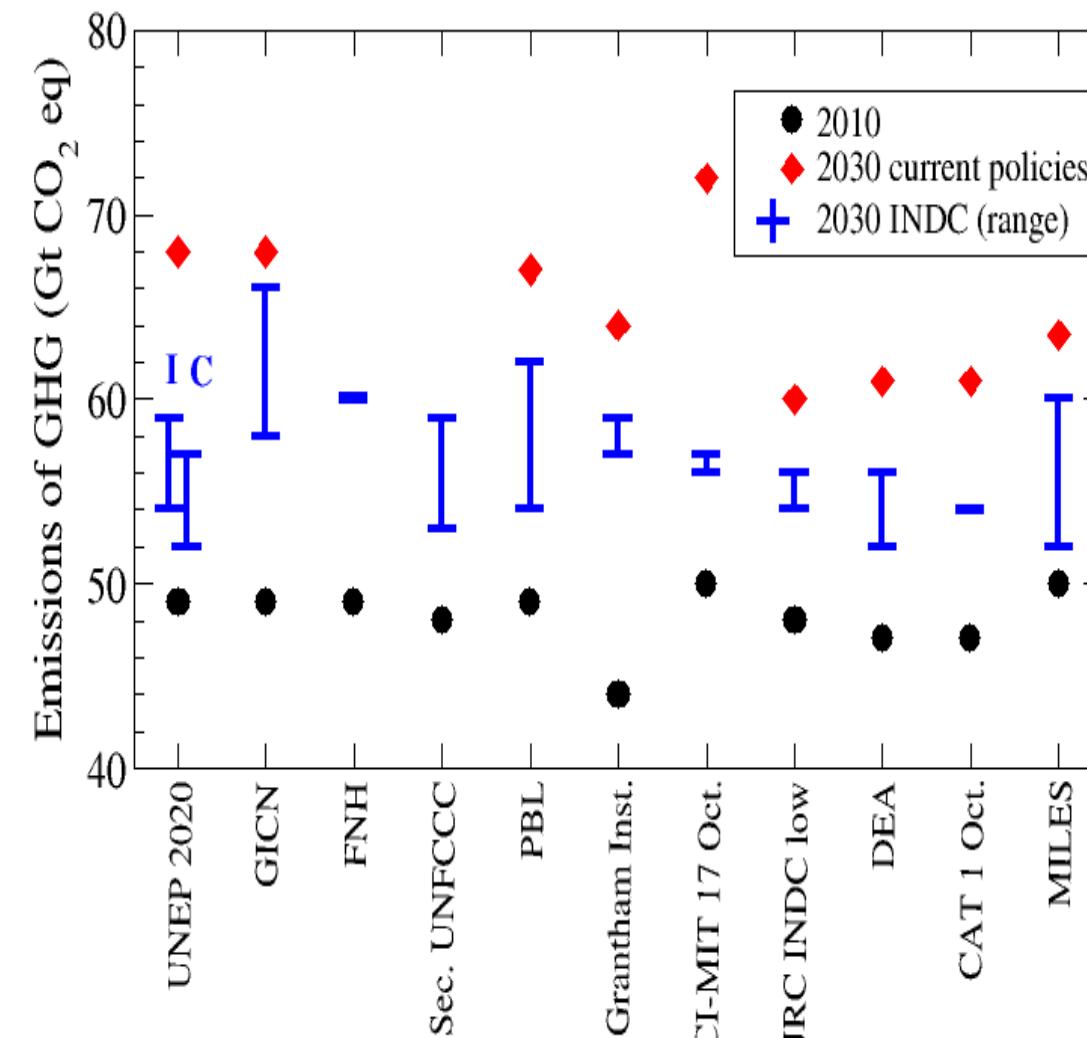


Trajectories **with negative CO₂ emissions (500 GtCO₂eq)** for different probabilities of reaching the 2°C target and different maximum effort dates, against aggregated INDCs.

Summing up INDC assessment studies

Differences in treatment of
-baseline 2010 emissions
-land use emissions
-C intensity targets
-aviation & shipping
-small countries

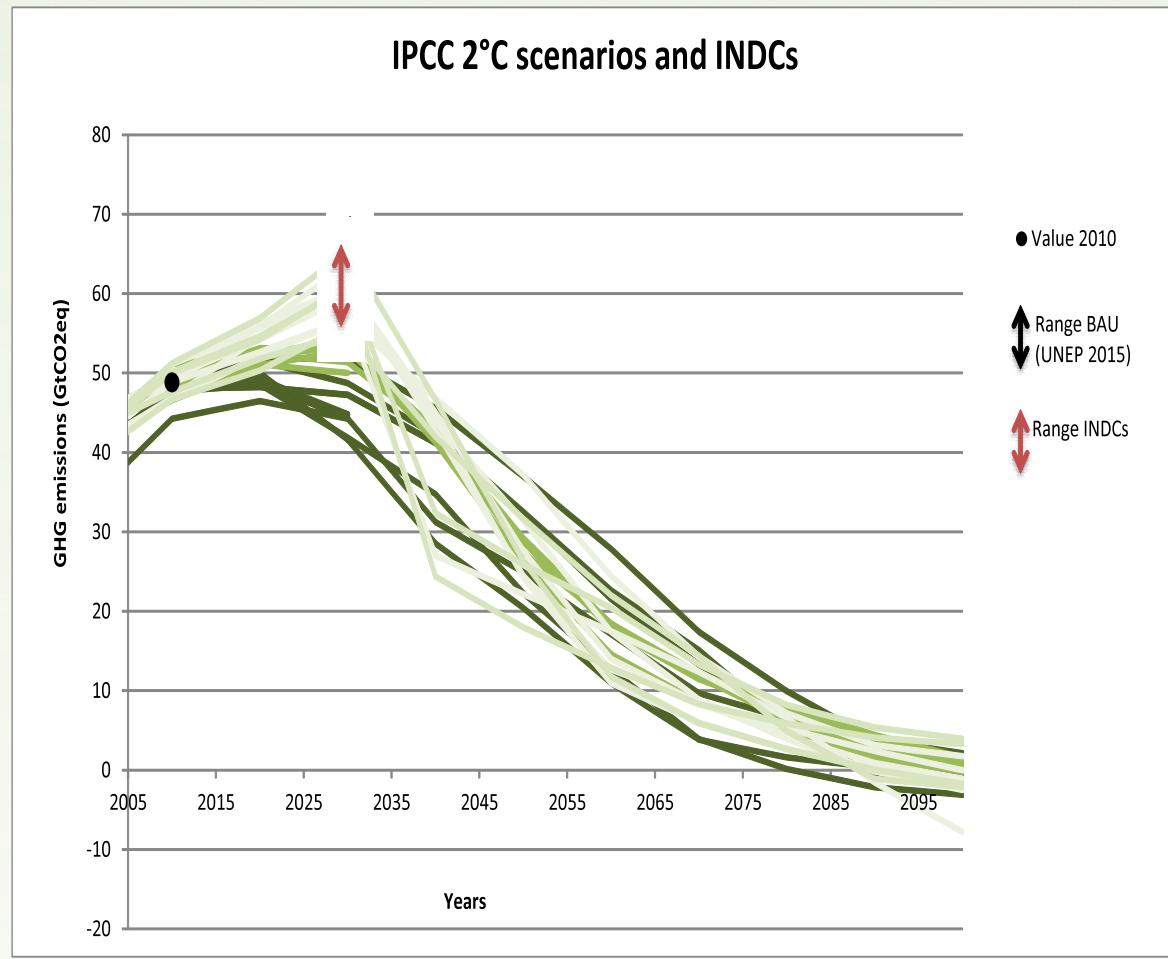
⇒MRV paramount
⇒Land use & sectors
⇒Contributions from
RoW is uncertain

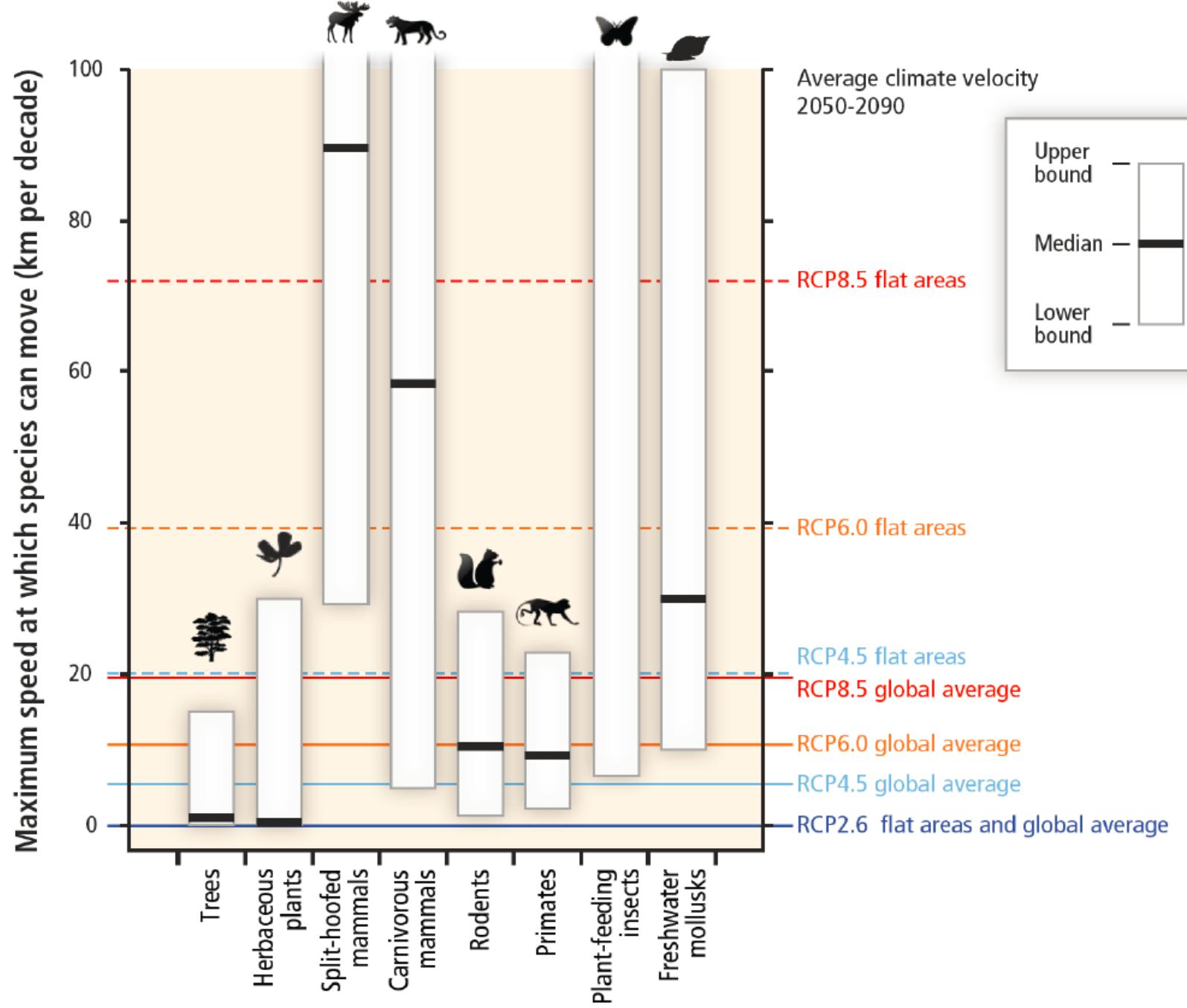


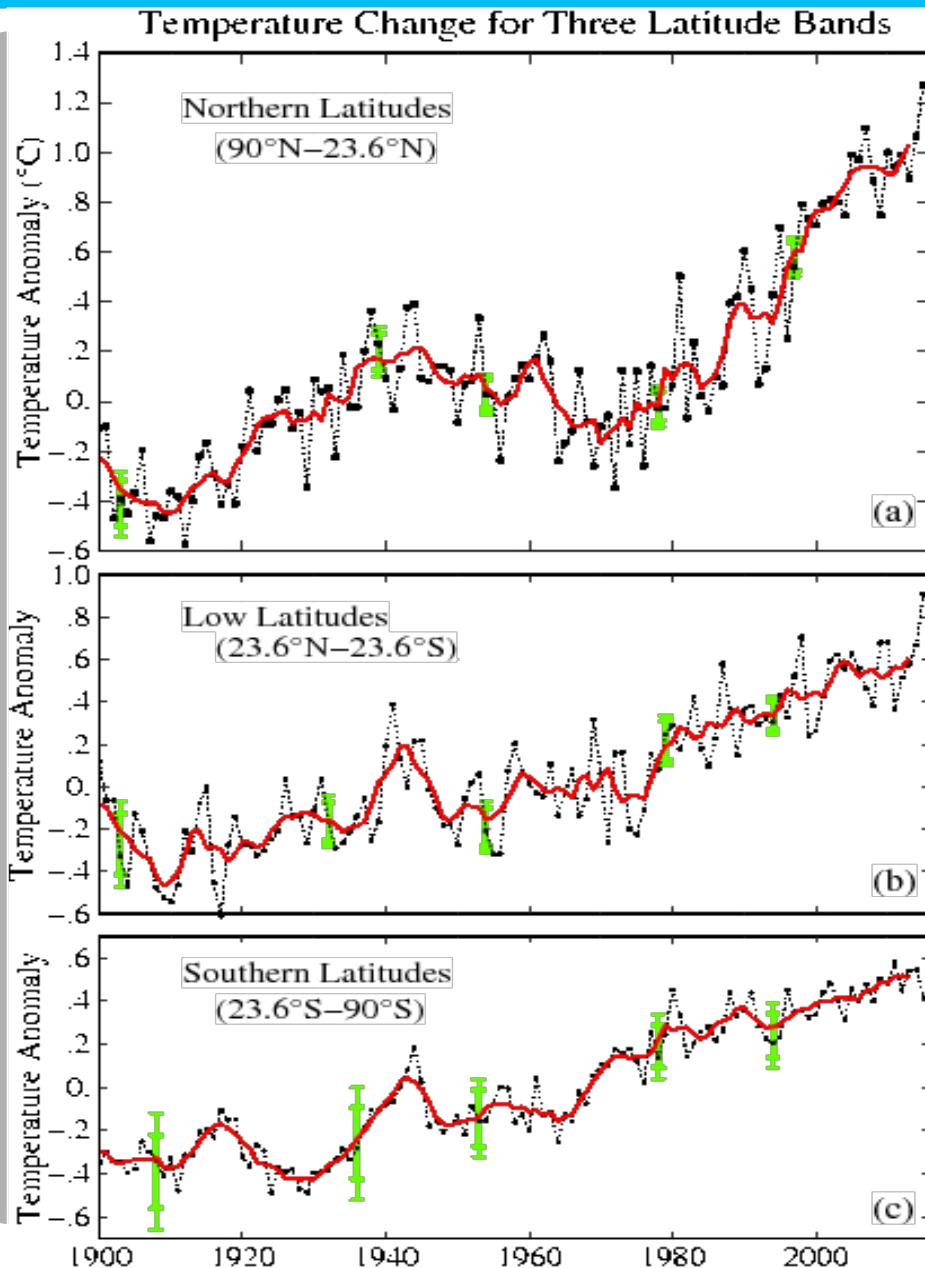
INDCs compared to IPCC 2°C pathways

The range of consolidated INDCs as computed by GICN is compatible only with those IPCC AR5 trajectories that correspond to:

- a delayed action
- a sharp downturn in 2030
- negative emissions by the end of the century







**Recent warming:
unable to constrain
climate sensitivity?
(NASA, GISS)**

Integrated approaches (top down approaches)	
Climate sensitivity	Sorting out the role of aerosols
<p><i>Few cases where radiative forcings is clearly known (possible exception of short time scales)</i></p> <p><i>Feedbacks possibly different</i></p>	<p><i>Requires better differentiation of GES and aerosol impacts</i></p> <p><i>Considers both direct and indirect aerosol effects</i></p> <p><i>Expected gain in using more data than surface temperatures only</i></p>
<p><i>Slow progress over the last decades</i></p> <p><i>Complex processes</i></p> <p><i>New data and methodologies coming in.</i></p>	<p><i>A large increase in available data</i></p> <p><i>Still far from providing reliable estimates over a sufficient amount of time</i></p>
Process-studies (bottom-up approaches)	

The only way forward: multi-parameter process-oriented studies. Huge progress through CALIPSO. More is needed