Overview of GHG stabilization level

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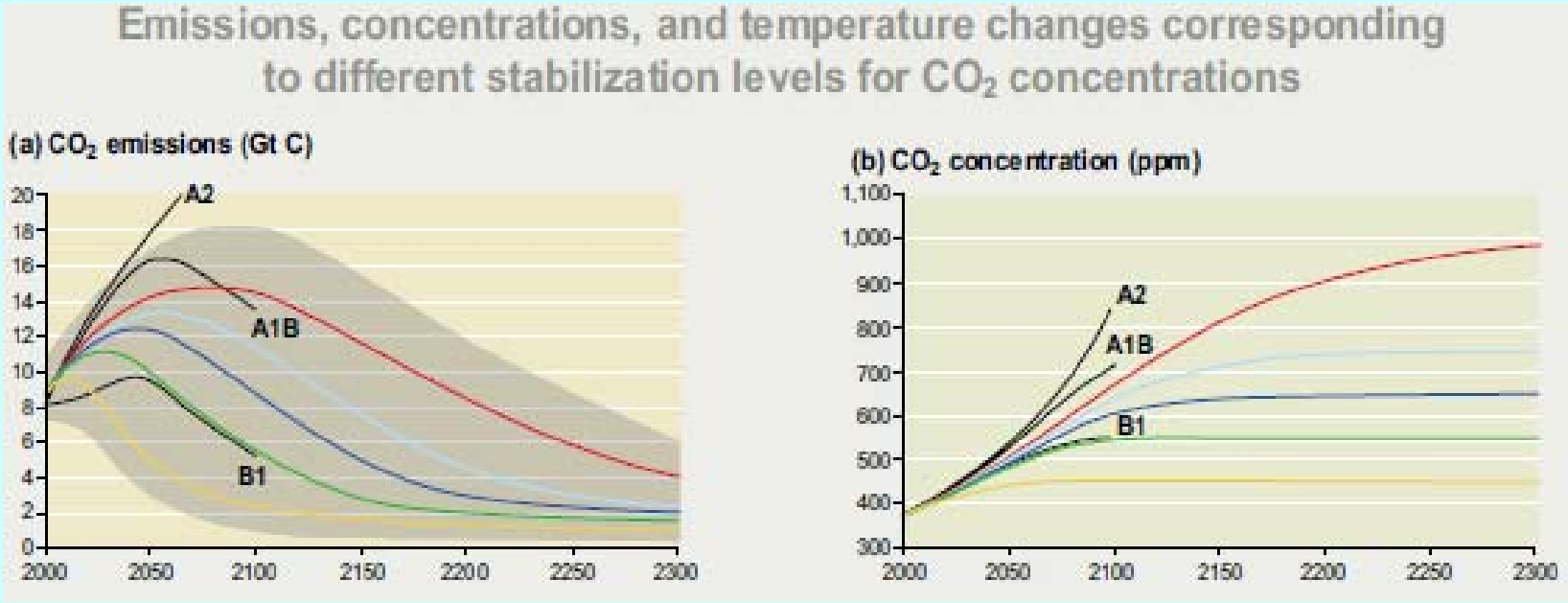
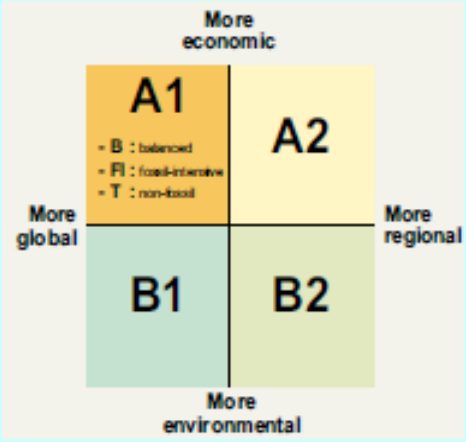
Characteristics of Climate Change

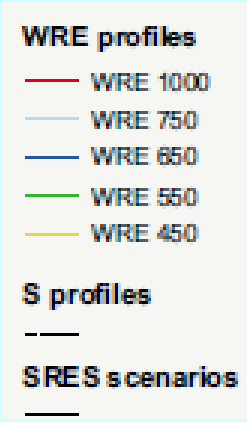
- Need substantial reductions for next 100 years if we are to stabilize GHG concentration at any level
- On the other hand, no scientific/political agreements exist on stabilization level
- Enormous uncertainty, especially on climate sensitivity

- What should we do?

Huge reductions are needed to stabilize at any level







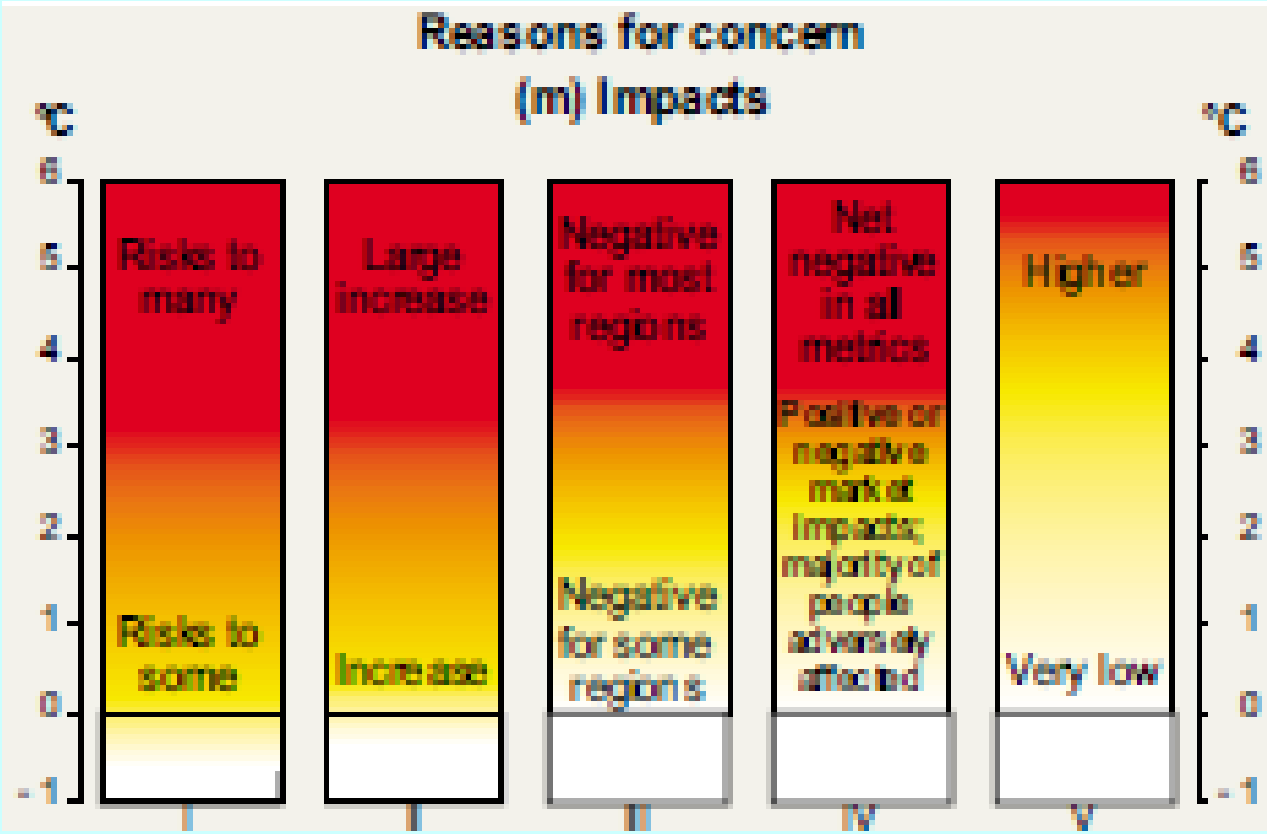
But no scientific/political agreement on the stabilization level

stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference (DAI) with the climate system

within a time frame sufficient to allow ecosystems to adapt, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner

(Article 2 UNFCCC)

What is DAI



I Risks to unique and threatened systems
II Risks from extreme climate events
III Distribution of impacts
IV Aggregate impacts
V Risks from future large-scale discontinuities

Type Ⅰ (2-4), Type Ⅱ (1, 5)

IPCC TAR

How to define DAI

- Tolerable Windows Approach

  1) Millions at risk (ex. Parry et al 2000), Type Ⅰ

  Water shortage, malaria, hunger, coastal flooding

  What level is dangerous? Weighting of risks?

  2) Sustainability approach

  Loss of coral reef, collapse of THC etc., Type Ⅱ

- Cost Benefit Approach

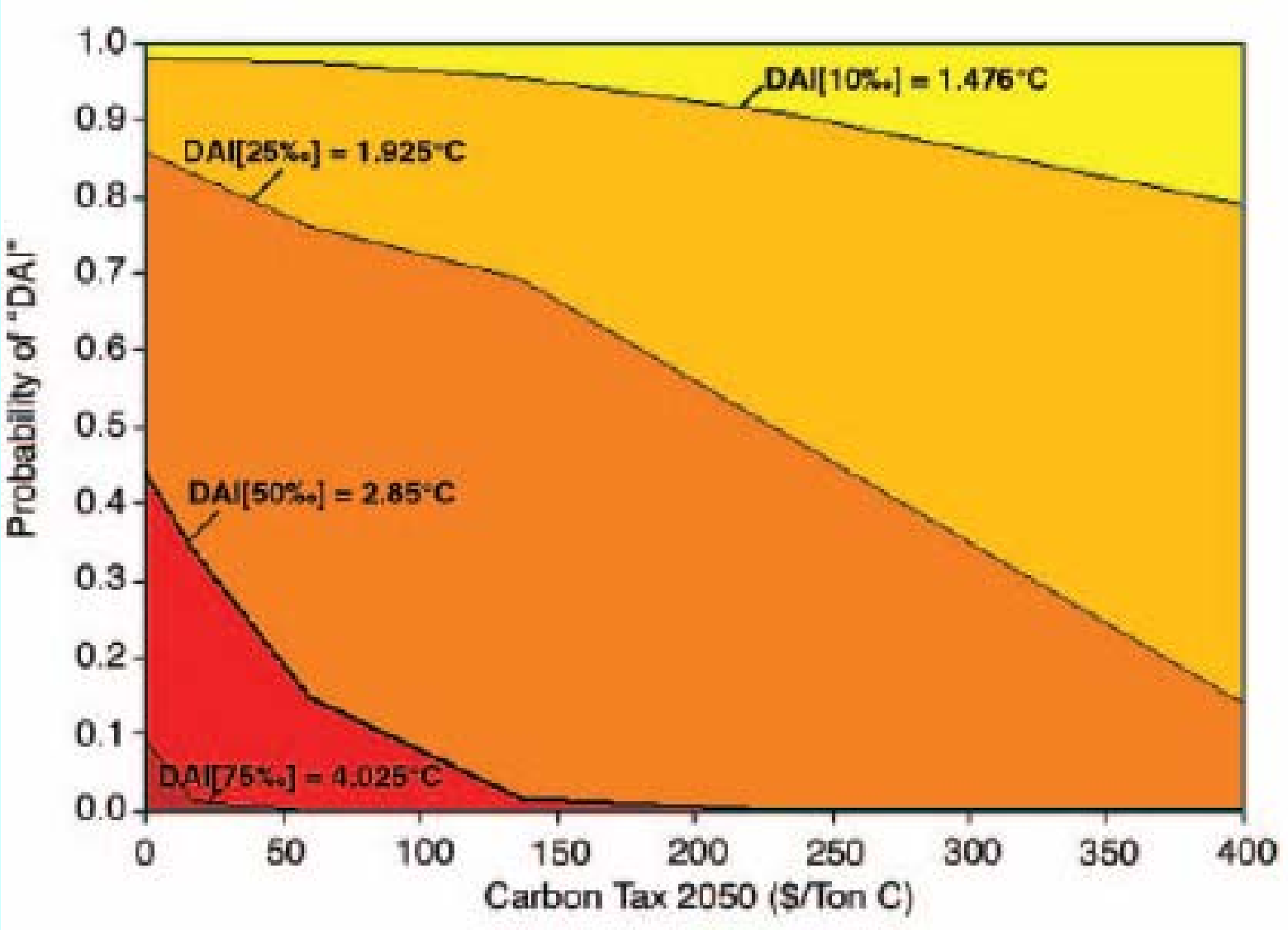
Illustrations of DAI, Are these values based on science?

Proposed numerical values of "Dangerous Anthropogenic Interference"

Vulnerability	Global mean limit	Reference
Shutdown of thermohaline circulation	3 °C in 100 years 700 ppm CO_2	O'Neill and Oppenheimer (2002) Keller et al. (in press)
Disintegration of West Antarctic ice sheet	2 °C, 450 ppm CO_2 2–4 °C, <550 ppm CO_2	O'Neill and Oppenheimer (2002) Oppenheimer and Alley (2005)
Disintegration of Greenland ice sheet	1 °C	Hansen (2005)
Widespread bleaching of coral reefs	>1 °C	Smith et al. (2001) O'Neill and Oppenheimer (2002)
Broad ecosystem impacts with limited adaptive capacity (many examples)	1–2 °C	Leemans and Eickhout (2004), Hare (2003), Smith et al. (2001)
Large increase of persons-at-risk of water shortage in vulnerable regions	450–650 ppm CO_2	Parry et al. (2001)
Increasingly adverse impacts, most economic sectors	>3–4 °C	Hitz and Smith (2004)

Oppenheimer and Petsonk (2005)

Probability of DAI, taking climate policy into consideration



Mastrandrea and Schneider (2004)

Climate policy under uncertainty

- Risks of climate policy

  Too much → no regret policy

  Too little → precautionary principle
- Must explore technological and economic feasibility of stabilizing at certain level.
- ‘The challenge is not to find the best policy today for the next 100 years, but to select a prudent strategy and to adjust it over time in the light of new information’（IPCC 1996, p. 45）.