

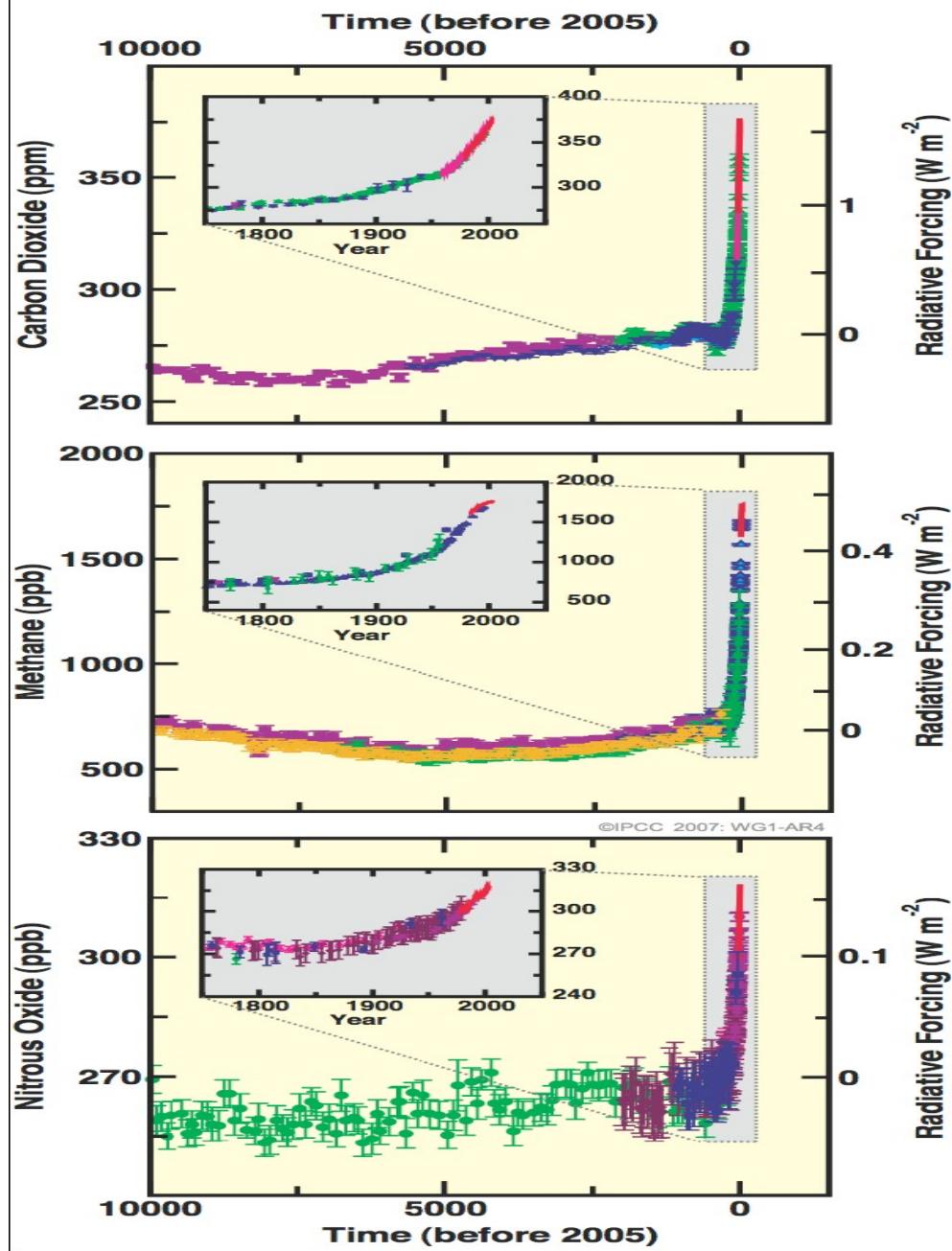
# From the scientific assessment to the design of relevant policies: the constraints of the climate system

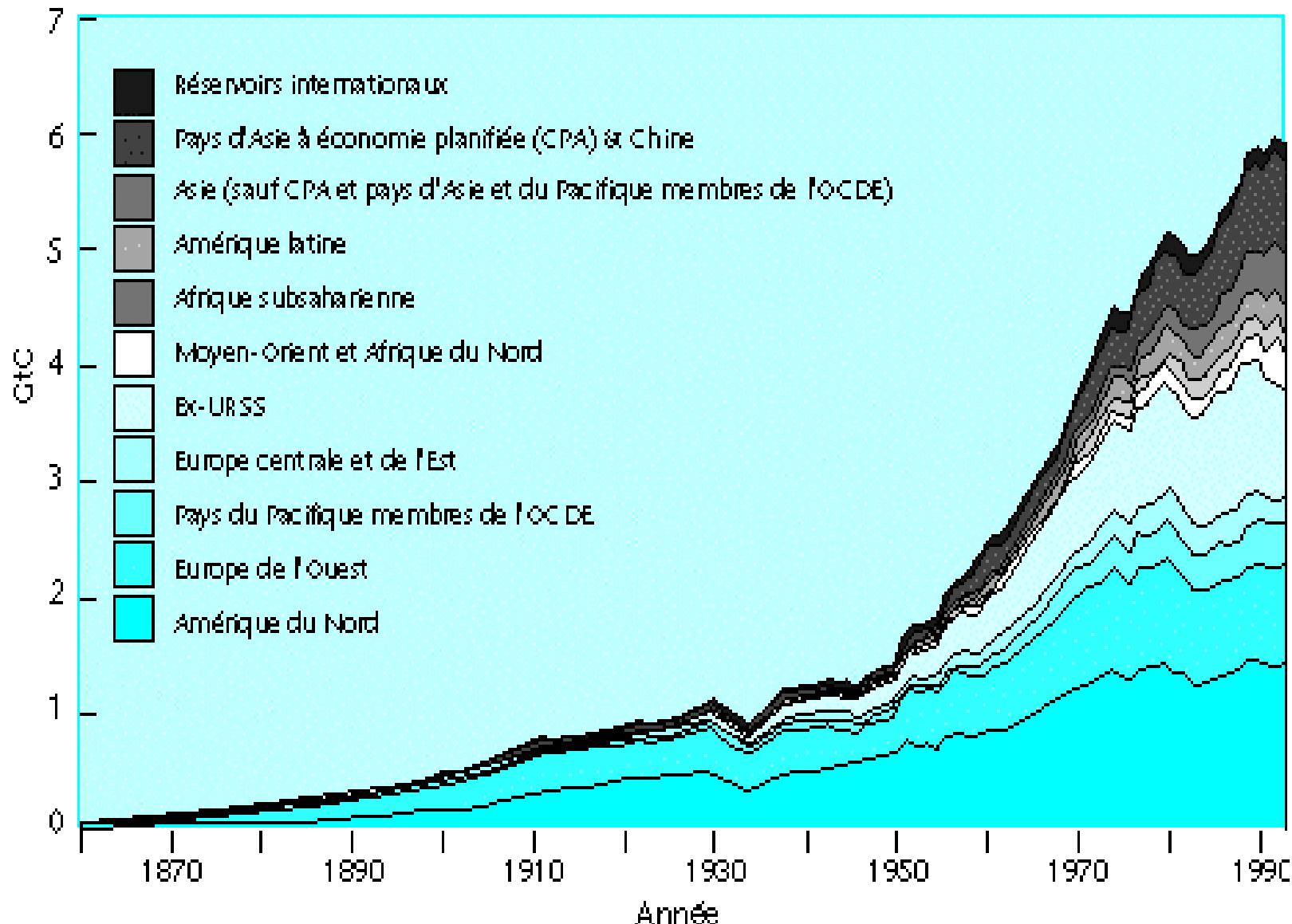
*Hervé Le Treut  
(CNRS / Ecole Polytechnique)  
Institut Pierre-Simon Laplace*

## Three main issues:

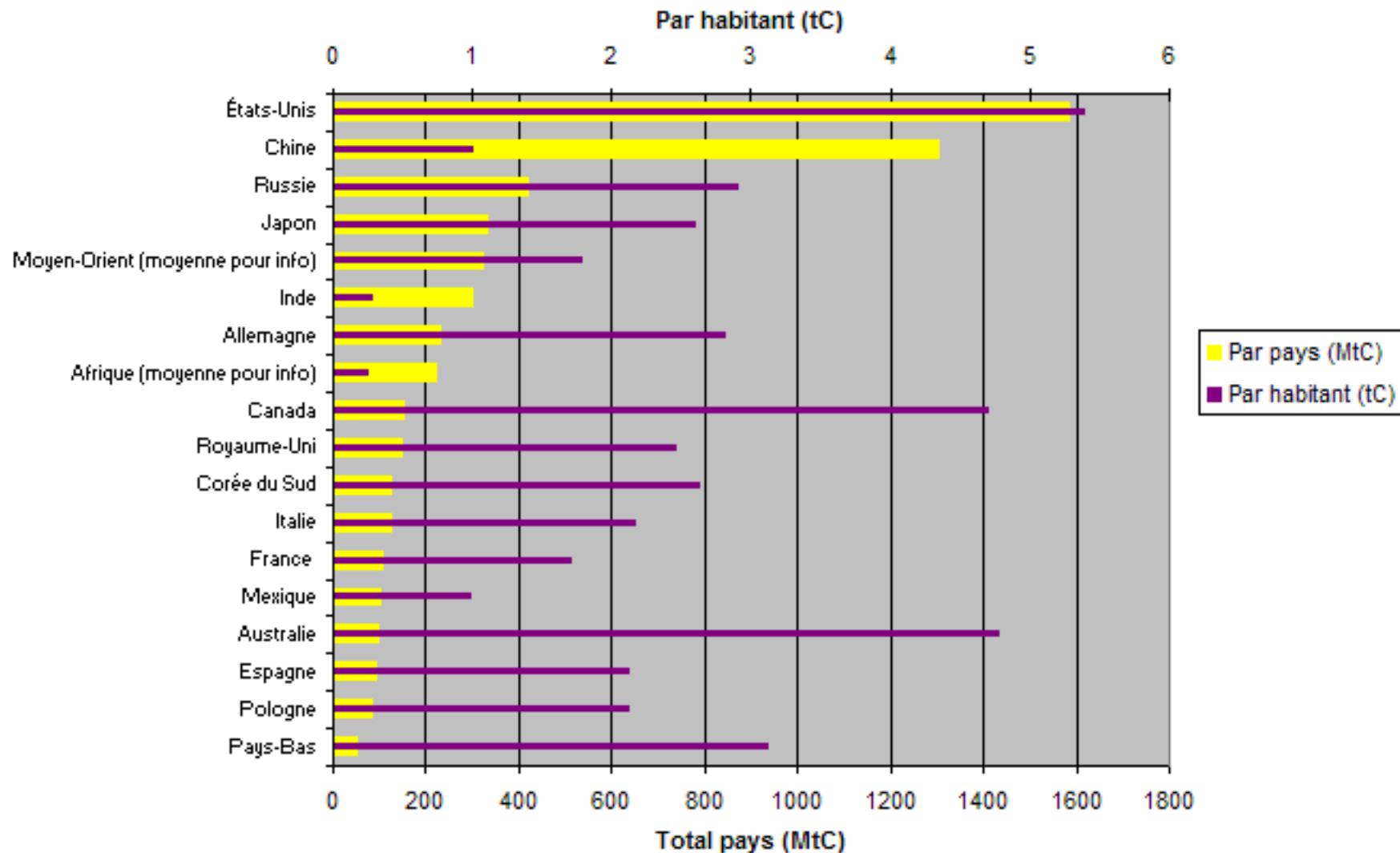
- We are facing threats which are very new and rapidly developing
- The « danger level » of 2°C warming is approaching quickly
- We still have a large difficulty to project climate changes at a local or regional scale

# Changes in Greenhouse Gases from ice-Core and Modern Data

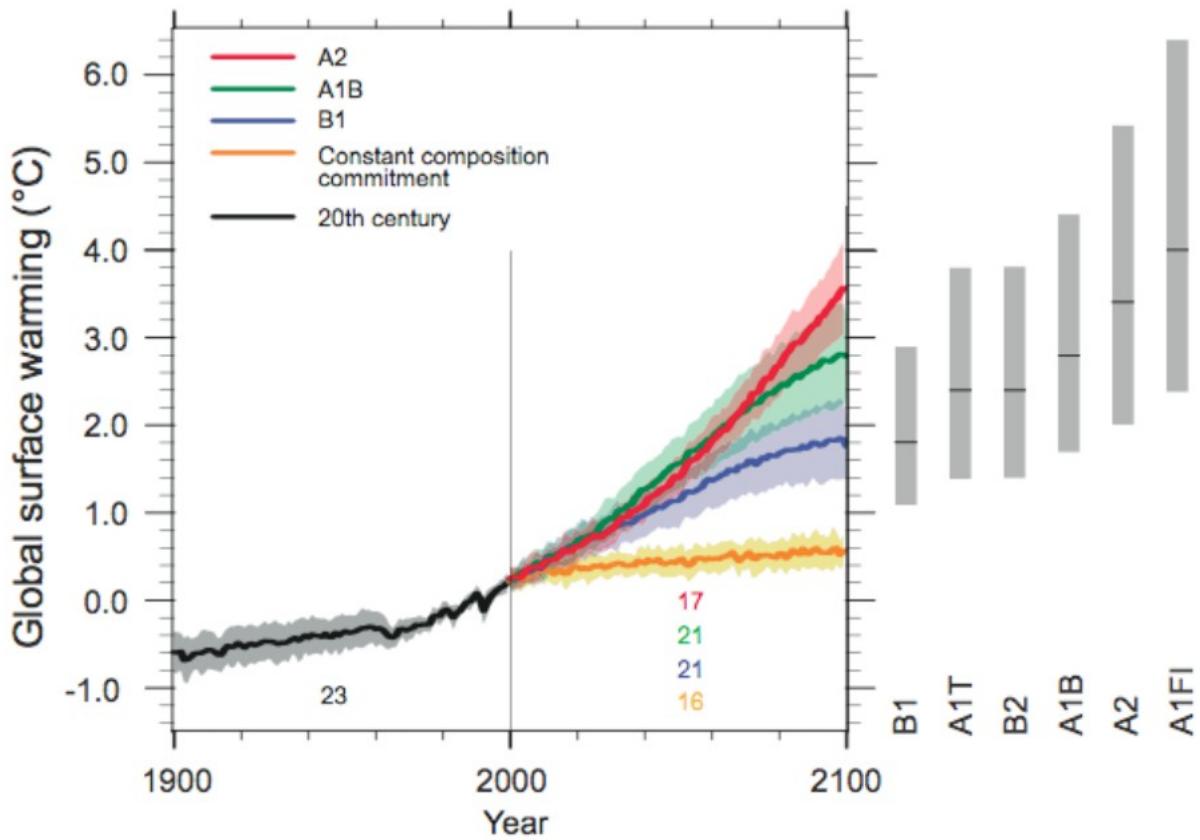




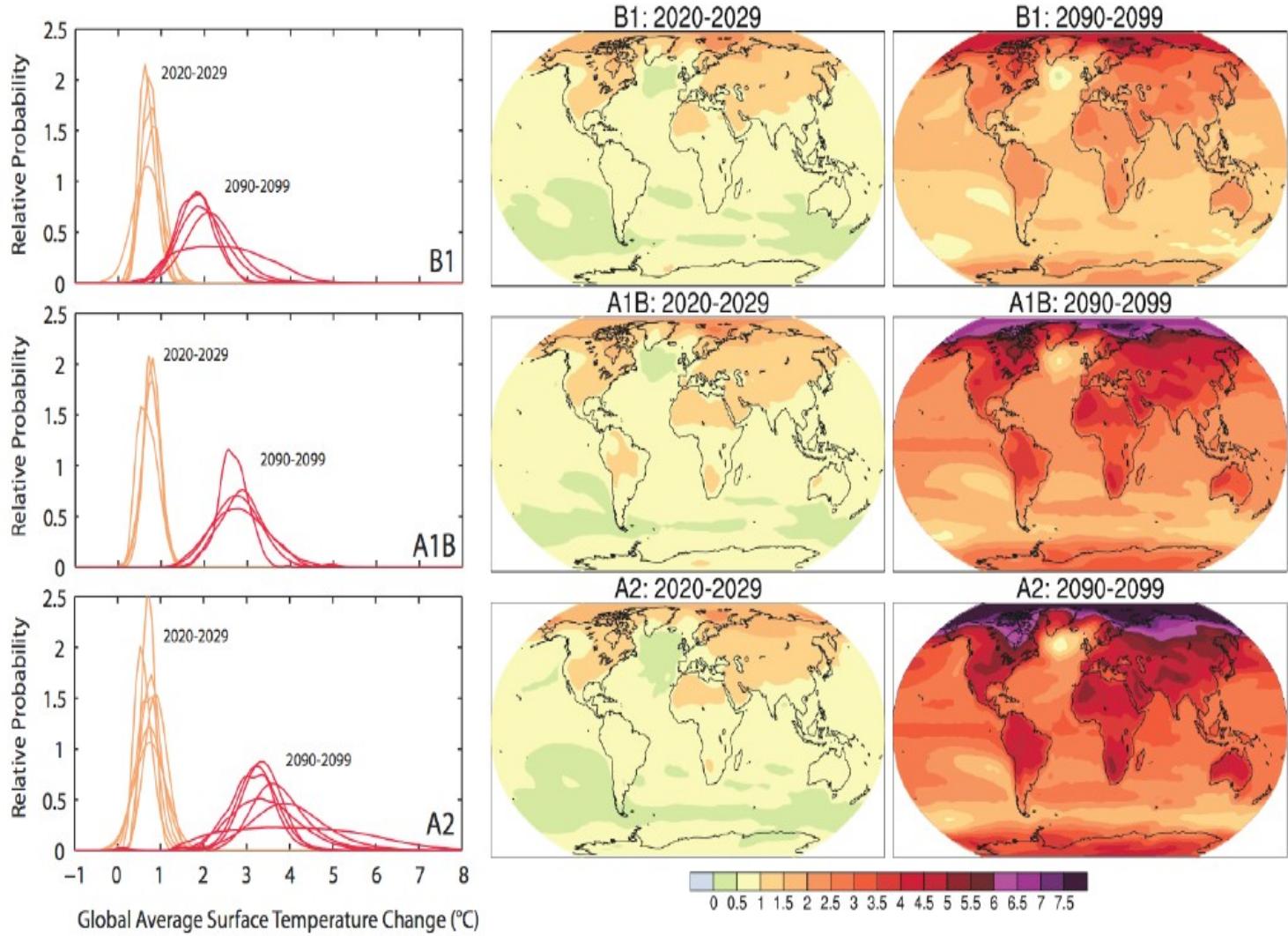
Emission de CO<sub>2</sub> en 2004. Source AIE-OCDE. Disponibilité DGEMP



# IPCC (2007)

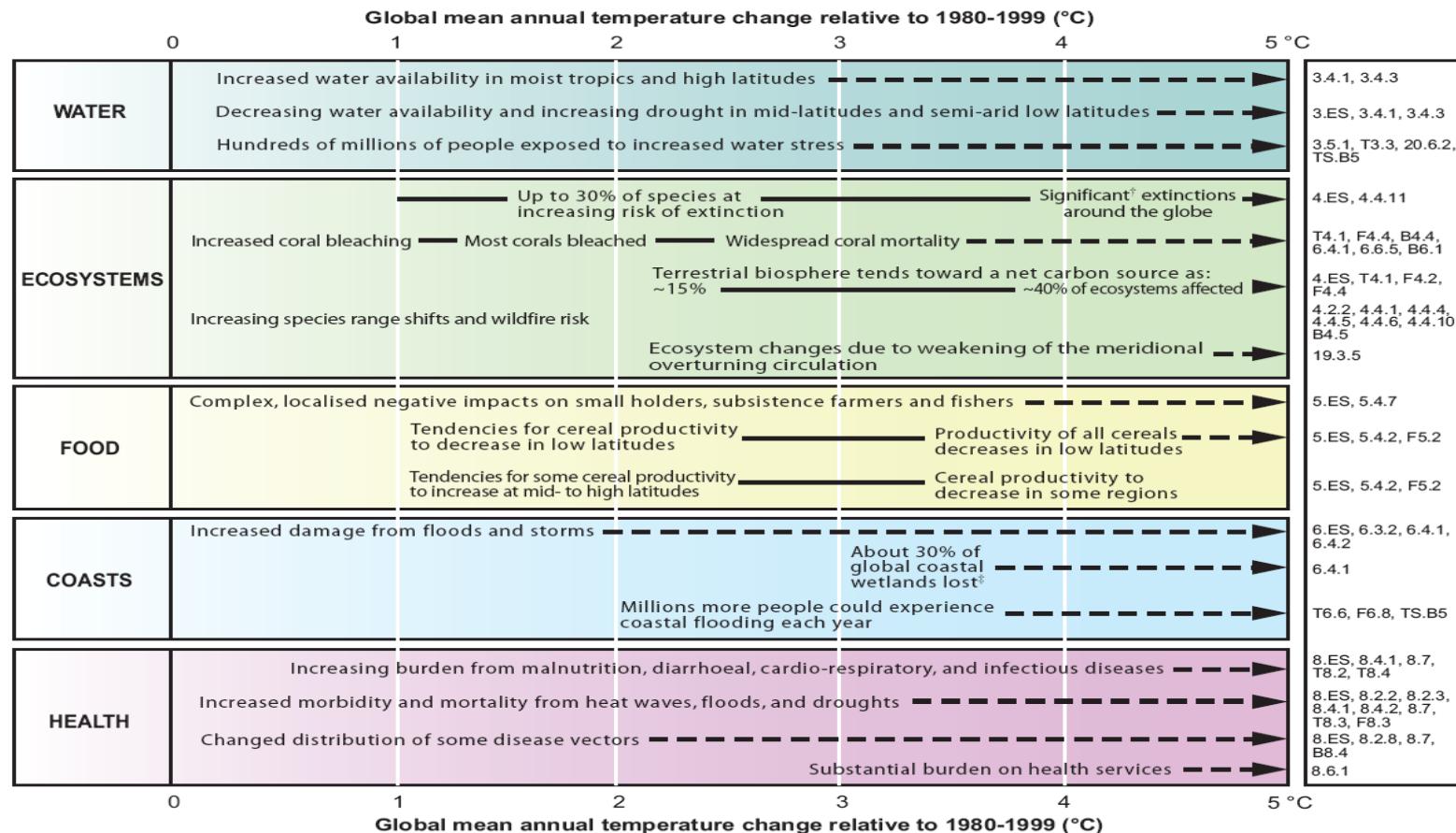


## AOGCM Projections of Surface Temperatures



## Key impacts as a function of increasing global average temperature change

(Impacts will vary by extent of adaptation, rate of temperature change, and socio-economic pathway)



<sup>†</sup> Significant is defined here as more than 40%.

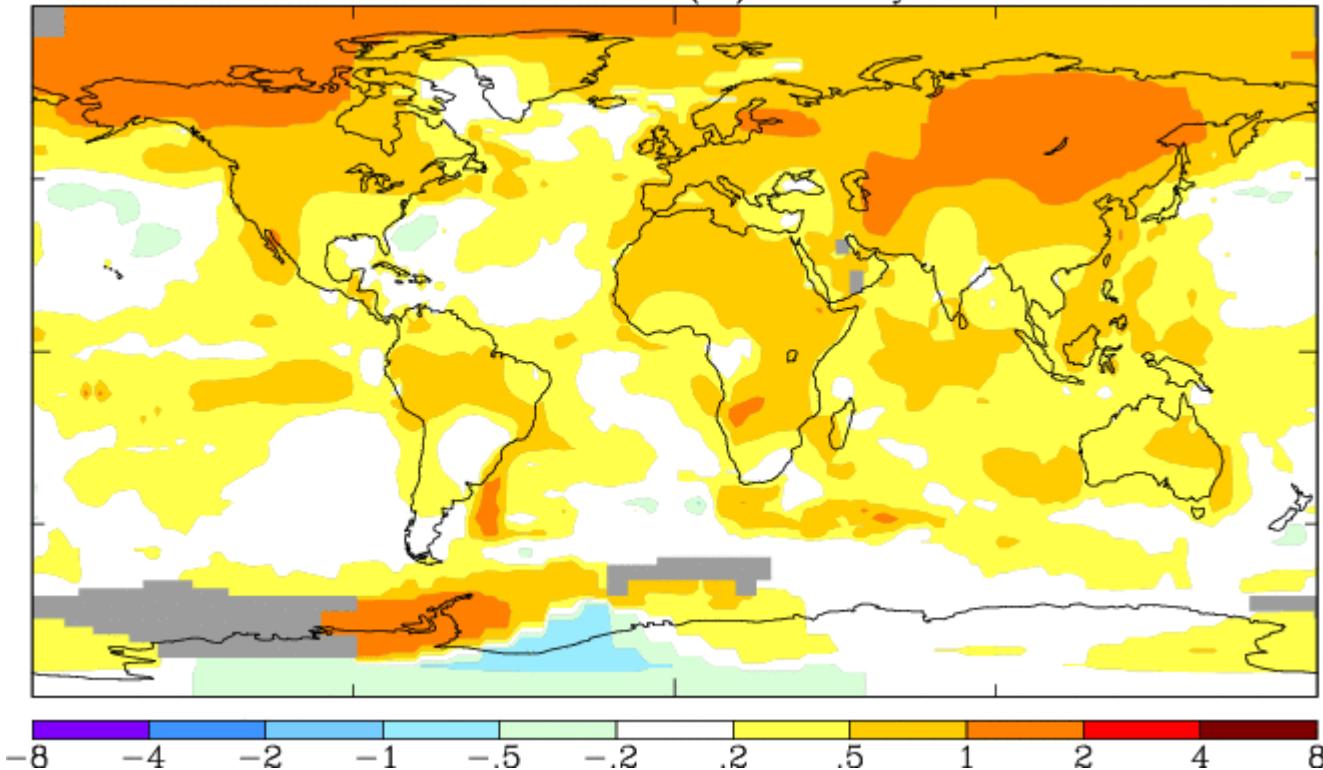
<sup>‡</sup> Based on average rate of sea level rise of 4.2 mm/year from 2000 to 2080.

**Figure SPM.2.** Illustrative examples of global impacts projected for climate changes (and sea level and atmospheric carbon dioxide where relevant) associated with different amounts of increase in global average surface temperature in the 21st century [T20.8]. The black lines link impacts, dotted arrows indicate impacts continuing with increasing temperature. Entries are placed so that the left-hand side of the text indicates the approximate onset of a given impact. Quantitative entries for water stress and flooding represent the additional impacts of climate change relative to the conditions projected across the range of Special Report on Emissions Scenarios (SRES) scenarios A1FI, A2, B1 and B2 (see Endbox 3). Adaptation to climate change is not included in these estimations. All entries are from published studies recorded in the chapters of the Assessment. Sources are given in the right-hand column of the Table. Confidence levels for all statements are high.

Nov–Oct 1991–2006

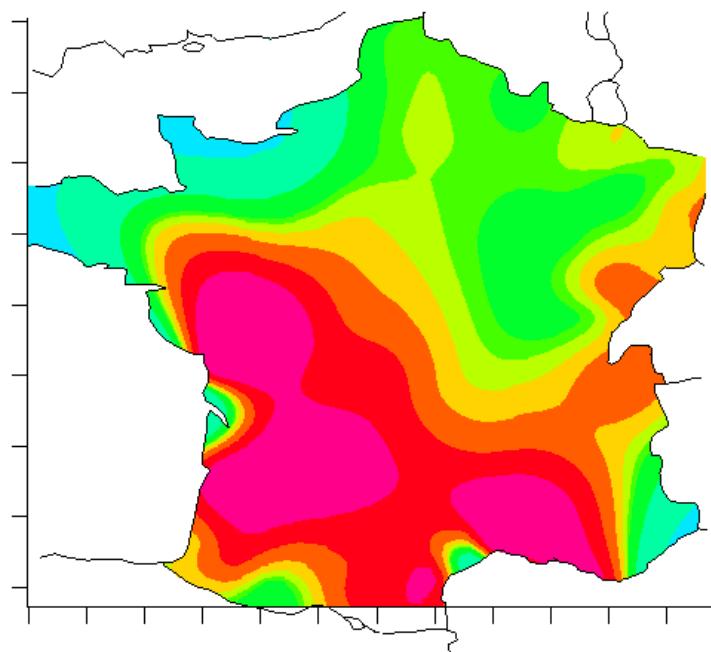
L-OTI( $^{\circ}$ C) Anomaly vs 1951–1980

.40

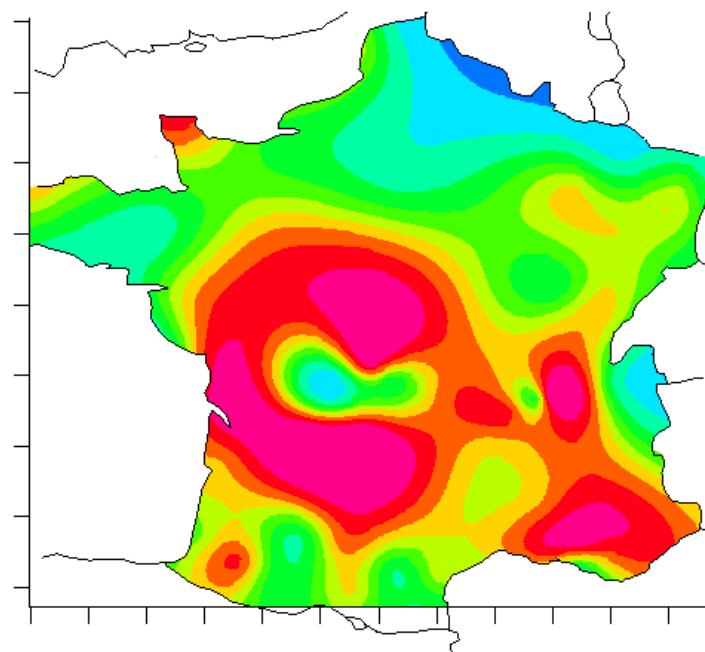


# Températures minimales journalières estivales

Changement simulé

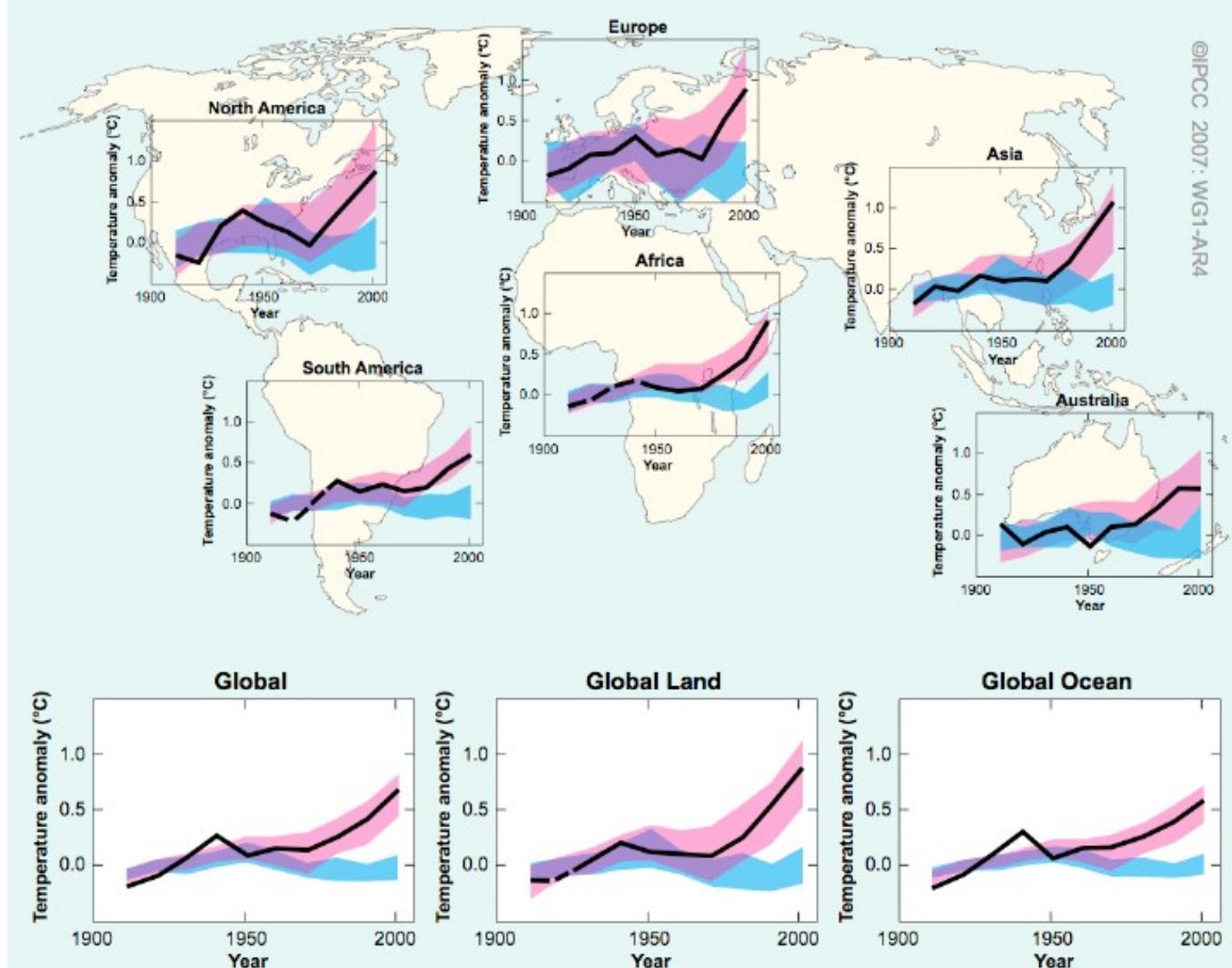


Tendances observées  
1971-2000

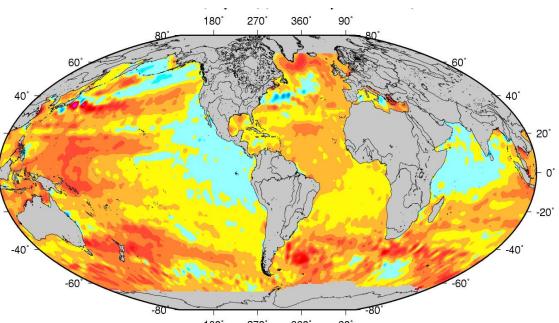
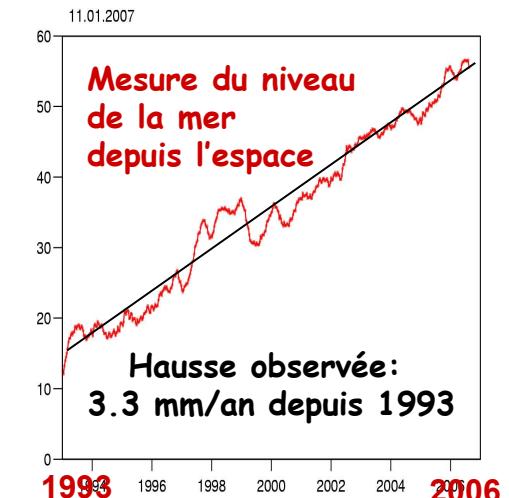
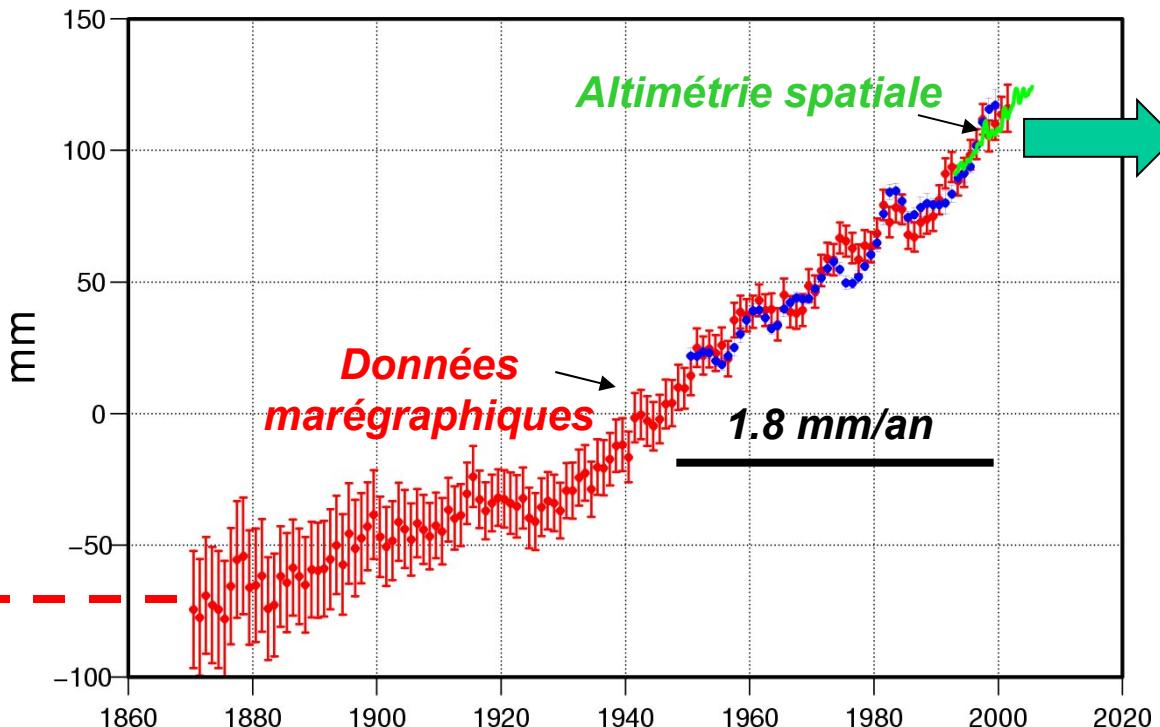


# Global and Continental Temperature Change

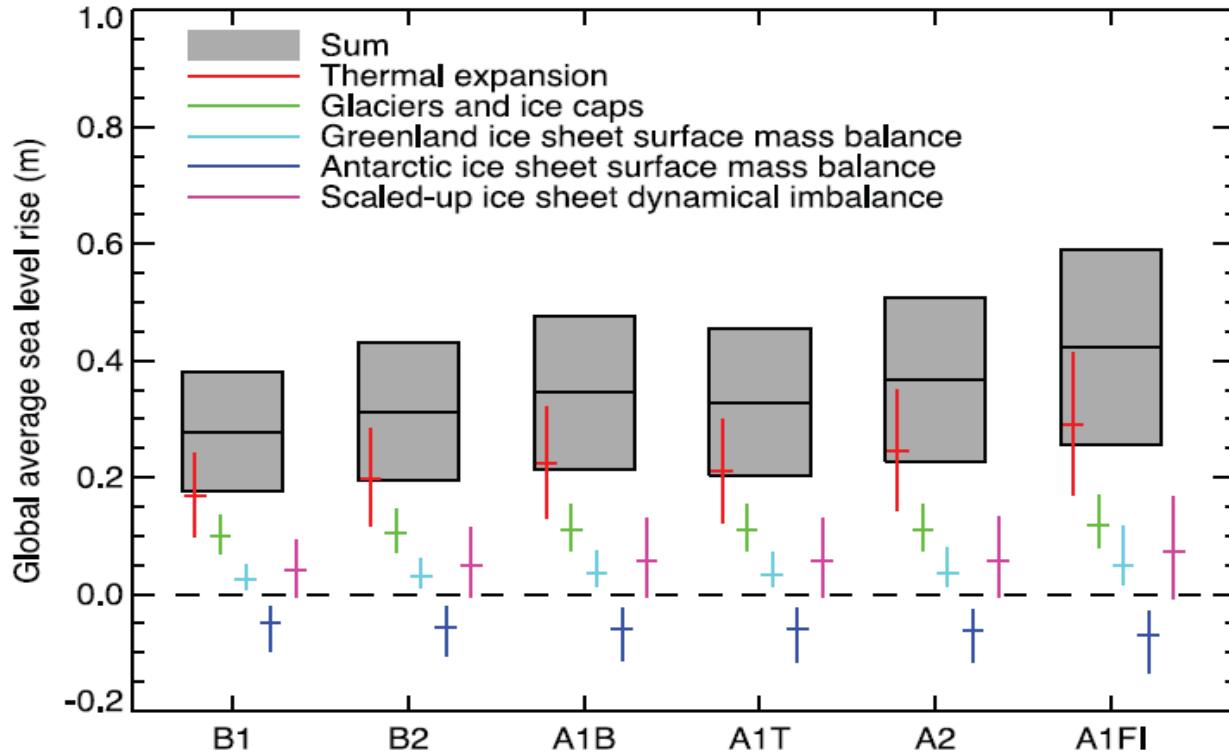
©IPCC 2007: WG1-AR4



## Hausse du niveau de la mer au cours du 20<sup>e</sup> siècle

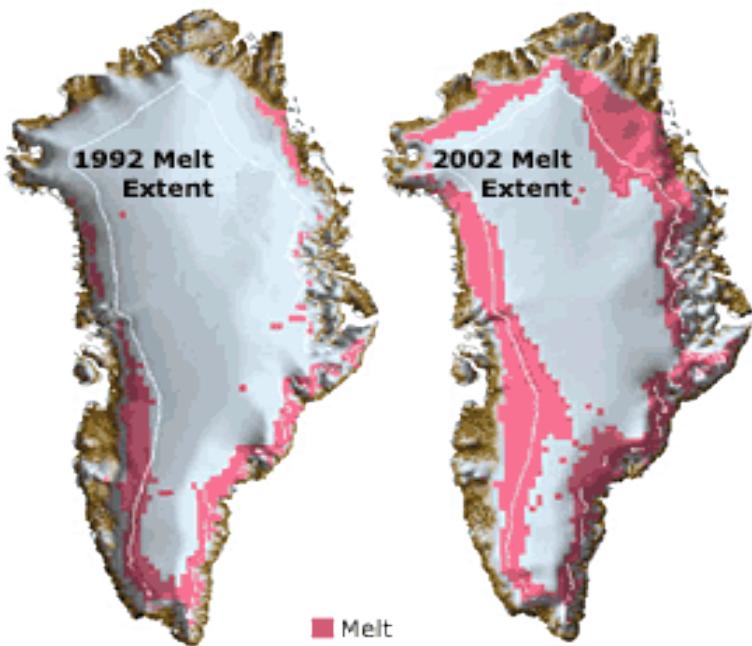


**Mais la hausse n'est pas uniforme!**  
Jaune/rouge ↗  
bleu ↘

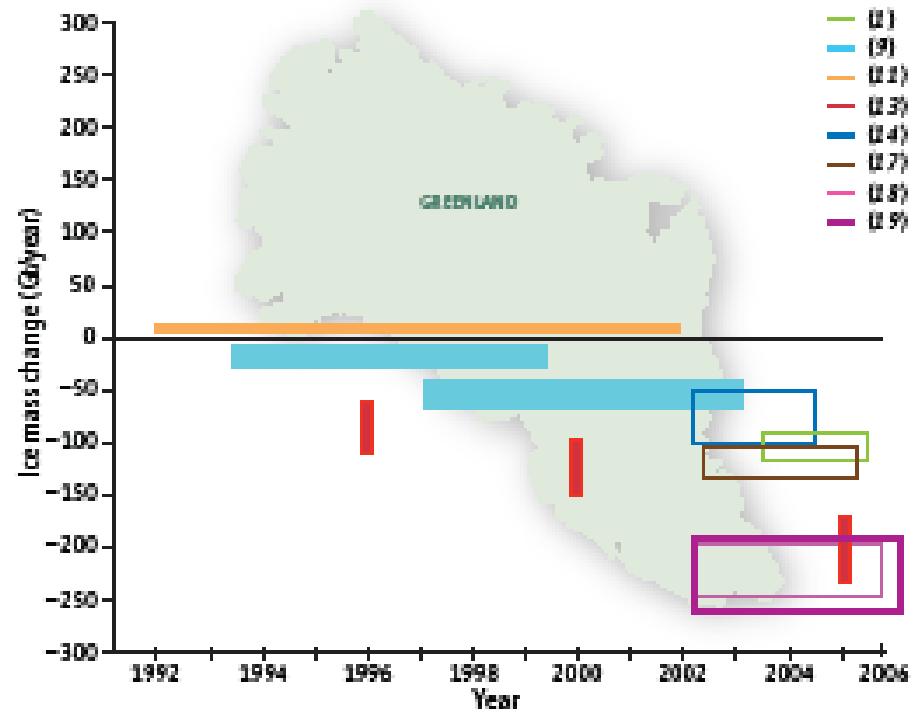


**Figure 10.33.** Projections and uncertainties (5 to 95% ranges) of global average sea level rise and its components in 2090 to 2099 (relative to 1980 to 1999) for the six SRES marker scenarios. The projected sea level rise assumes that the part of the present-day ice sheet mass imbalance that is due to recent ice flow acceleration will persist unchanged. It does not include the contribution shown from scaled-up ice sheet discharge, which is an alternative possibility. It is also possible that the present imbalance might be transient, in which case the projected sea level rise is reduced by 0.02 m. It must be emphasized that we cannot assess the likelihood of any of these three alternatives, which are presented as illustrative. The state of understanding prevents a best estimate from being made.

# Perte de masse de glace (gigatonnes/an) au Groenland depuis 1992



Contribution  
au niveau de la mer  
(1993-2006) :  
~ 0.3 mm/an



Mesures par techniques spatiales

## « Extreme events »

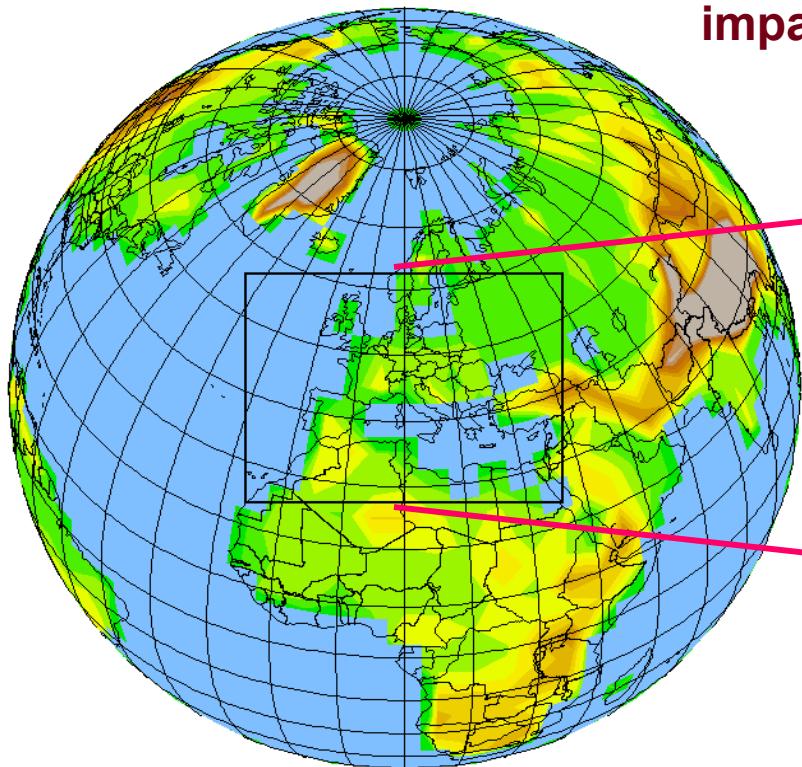
= events have a « small probability » + large consequences

- Very different events:

- lasting droughts
- more powerful tropical cyclones
- floods
- early or late frost conditions

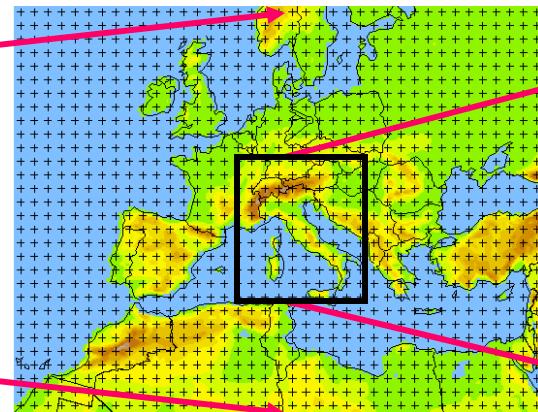
# Climate projections on regional and local scales

Global

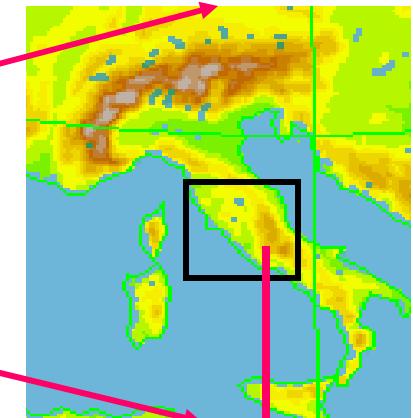


Performance of current AOGCMs (like those from CMIP3) deteriorate when looking at finer temporal and spatial scales which are needed for many impact assessment studies.

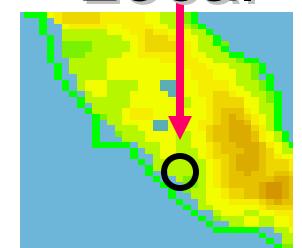
Continental



Regional

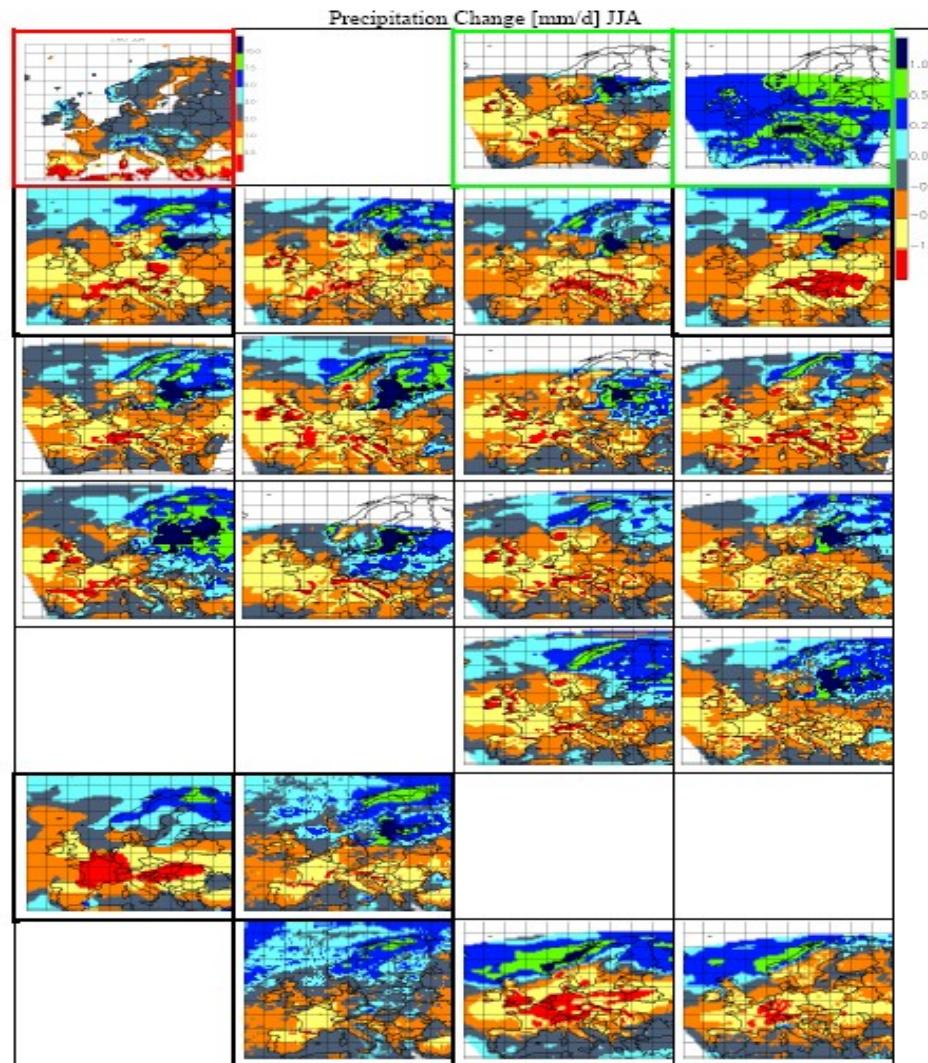


Local



Giorgi 2007

# Approches régionales: résultats de PRUDENCE



(Prudence est un projet financé par la Commission Européenne)