

Climate Change, Adaptation, and IPCC



Prof. Jean-Pascal van Ypersele

**IPCC Vice-Chair,
(Université catholique de Louvain-la-
Neuve, Belgium)**

**www.ipcc.ch & www.climate.be
vanyp@climate.be**

**Climate Change Adaptation Futures
29 June 2010, Australia**

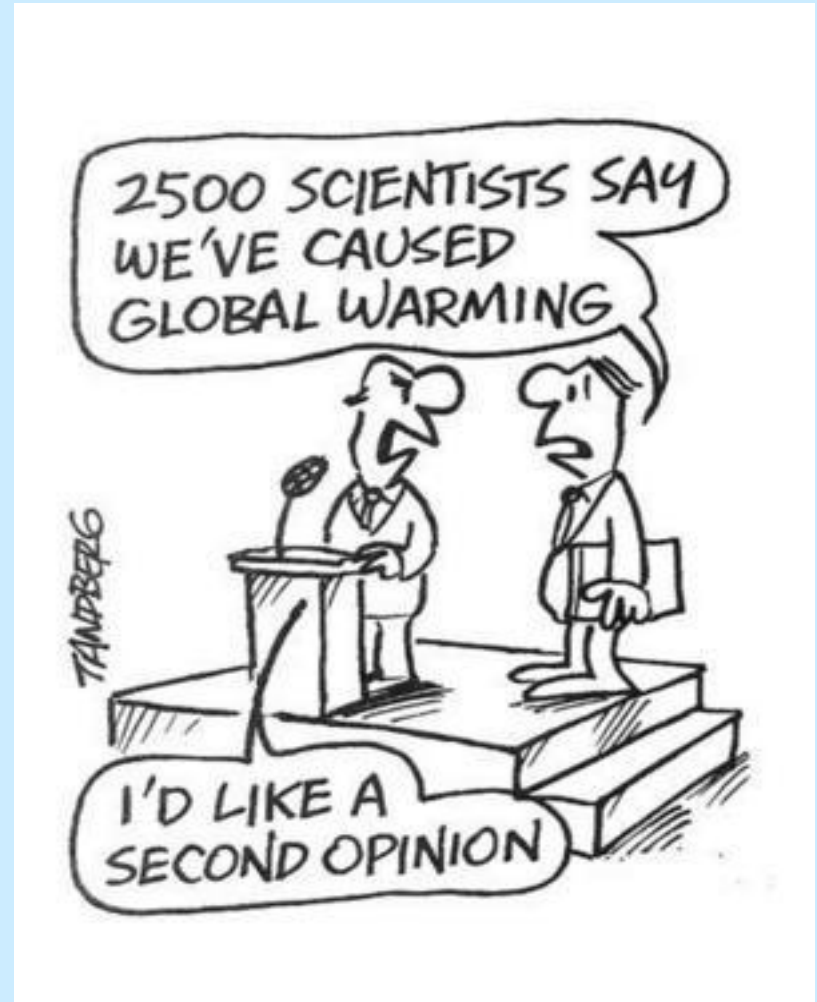
**The support from the Belgian Science Policy
Office is gratefully acknowledged**

Why the IPCC ?

Established by WMO and UNEP in 1988

to provide **policy-makers** with an **objective source of information** about

- causes of climate change,
- potential environmental and socio-economic impacts,
- possible response options.



IPCC Working Groups & Task Force

Working Group I - "The Physical Science Basis"

Working Group II - "Impacts, Adaptation and Vulnerability"

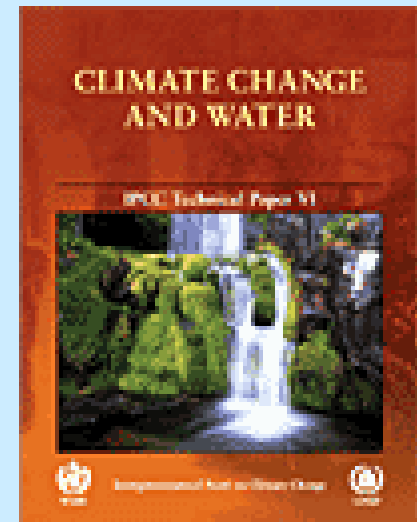
Working Group III - "Mitigation of Climate Change"

Task Force on National Greenhouse Gas Inventories

(source: www.ipcc.ch)

IPCC Products

- **Assessment reports** provide a comprehensive picture of the present state of understanding of climate change (1990 – 1995 – 2001 – 2007).
- **Special reports** address and assess a specific issue (e.g. Ozone layer, Land use, Technology transfer, Renewables, Adaptation & extreme events)
- **Methodology reports** provide guidelines for national greenhouse gas inventories and are used by Parties to the UNFCCC to prepare their national communications
- **Technical papers** focus on a specific topic drawing material from other IPCC reports





z Latest science

Key messages from the IPCC WG1 Report (1)



z **Certain:**

y Emissions resulting from **human activities are substantially increasing** the atmospheric concentrations of the **greenhouse gases**: CO₂, CH₄, CFC, and N₂O

z **Calculated with confidence:**

y Under the business as usual scenario, **temperature will increase by about 3 C by 2100** (uncertainty range: 2 to 5 C), and **sea level will increase by 60 cm** (uncertainty range: 30 to 100 cm)

Key messages from the IPCC WG1 Report (2)



- z With an increase in the mean temperature, **episodes of high temperature** will most likely become **more frequent**
- z Rapid changes in climate will change the composition of ecosystems; **some species** will be unable to adapt fast enough and **will become extinct**.
- z Long-lived gases (**CO₂**, N₂O and CFCs) **would require immediate reduction** in emissions from human activities **of over 60% to stabilise their concentration at today's levels**.

Oops...



- z ... this was from the IPCC **first** assessment report, published 20 years ago (1990)
- z Was anybody really listening?



**z Some Highlights of the IPCC AR4
(2007) Working Group I, II, and III**

A Progression of Understanding: Greater and Greater Certainty in Attribution

FAR (1990):
“unequivocal detection
not likely for a decade”

SAR (1995): “balance
of evidence suggests
discernible human
influence”

TAR (2001): “most of
the warming of the
past 50 years is likely
(odds 2 out of 3) due
to human activities”

AR4 (2007): “most of
the warming is very
likely (odds 9 out of 10)
due to greenhouse
gases”

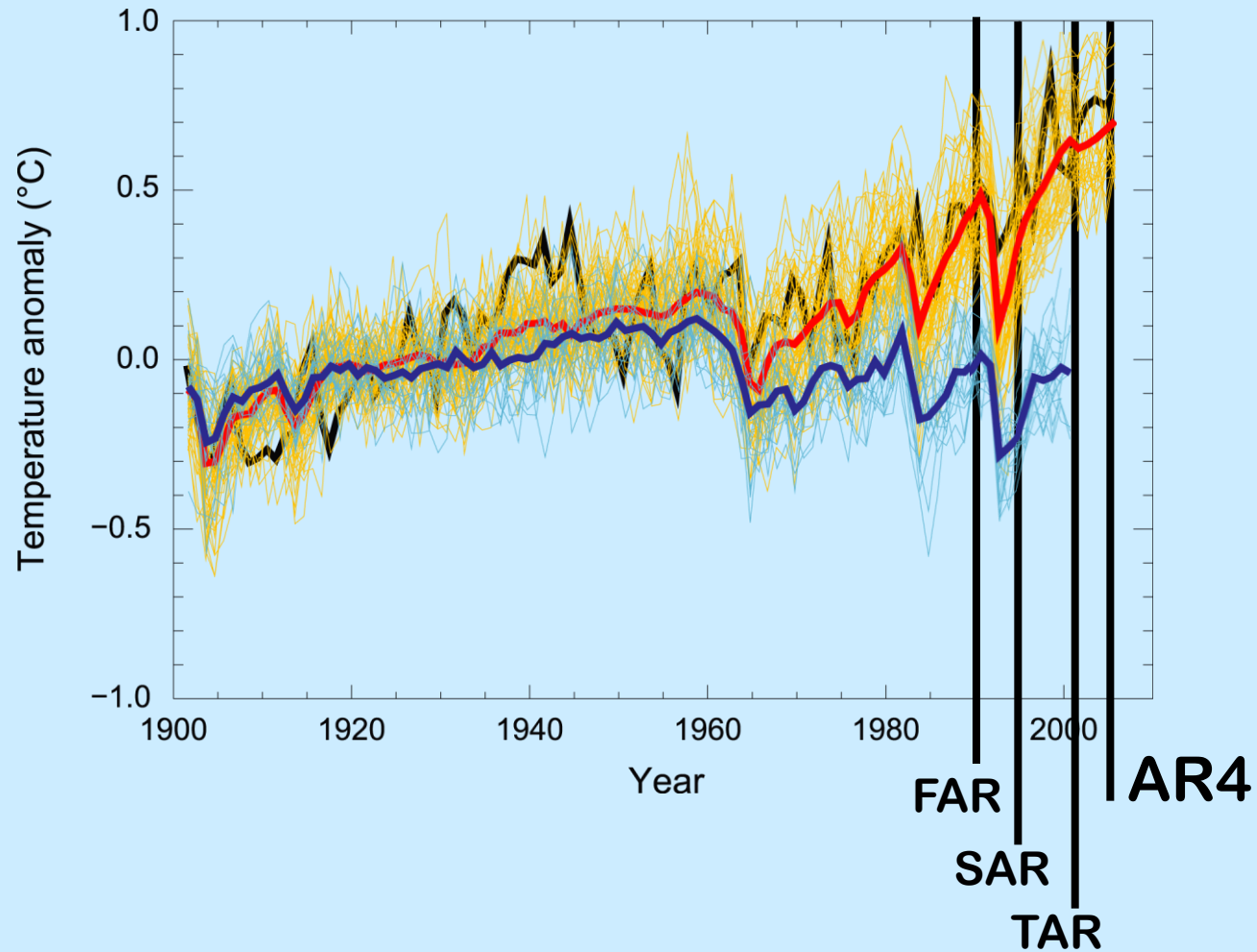
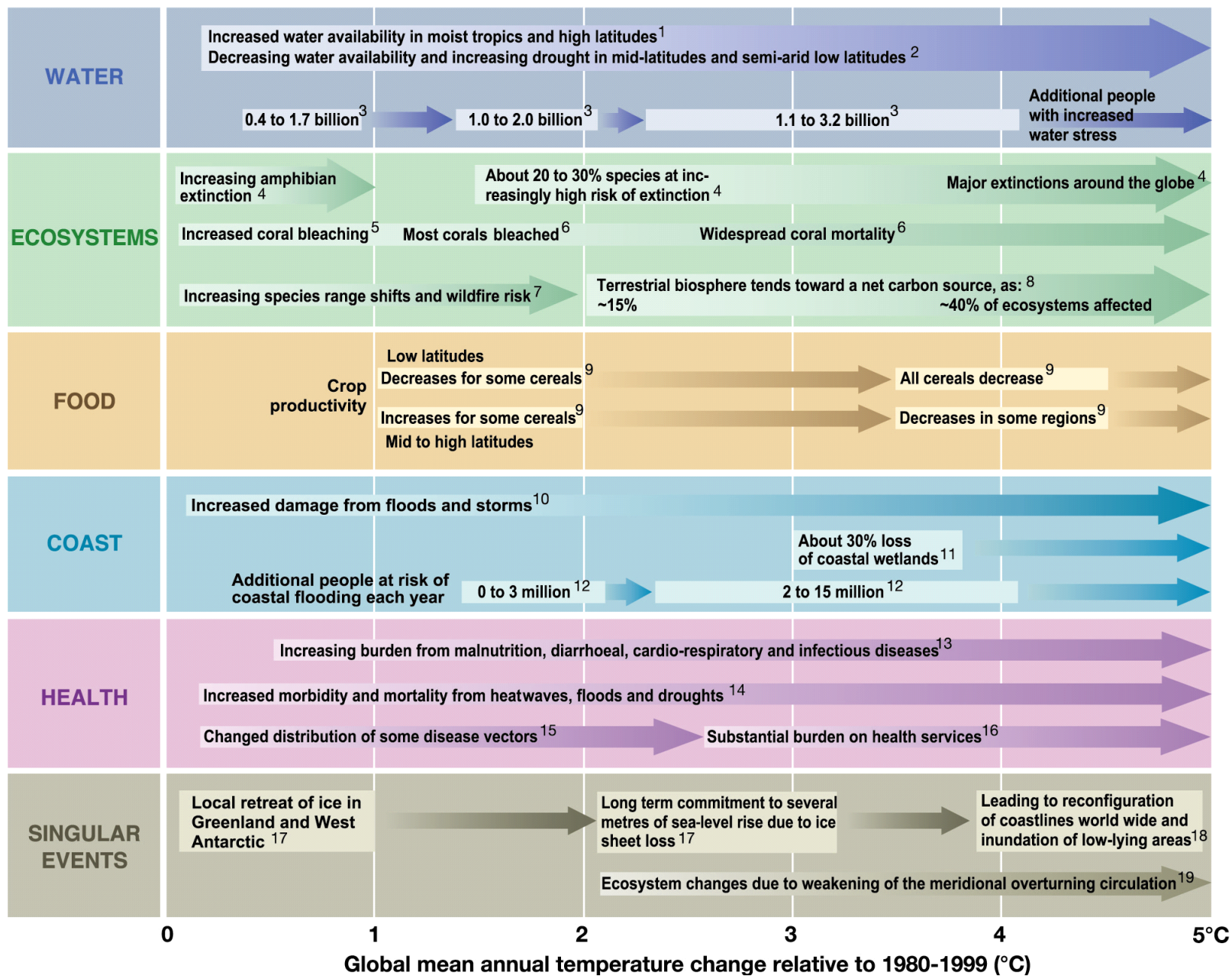


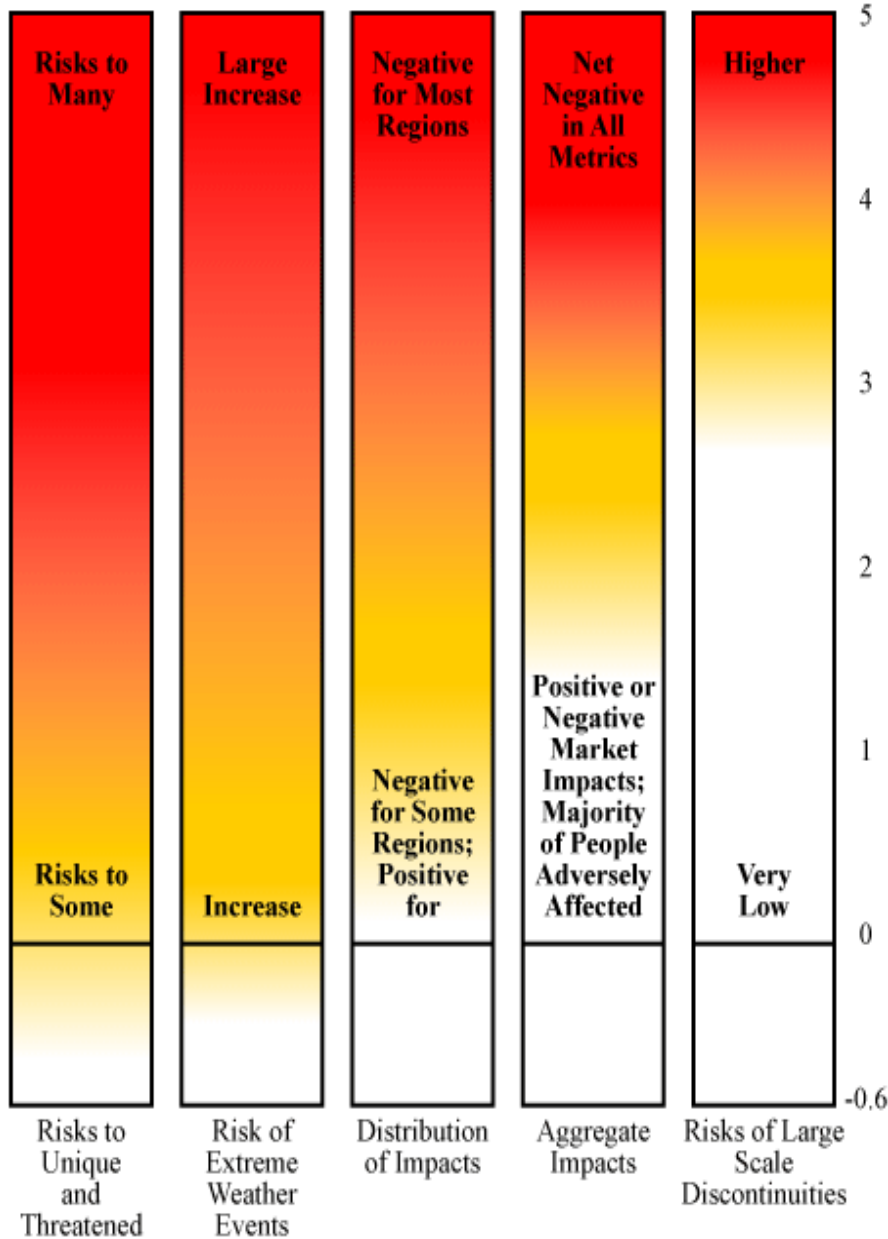
Table TS.3. (lower) Examples of global impacts projected for changes in climate (and sea level and atmospheric CO₂ where relevant)



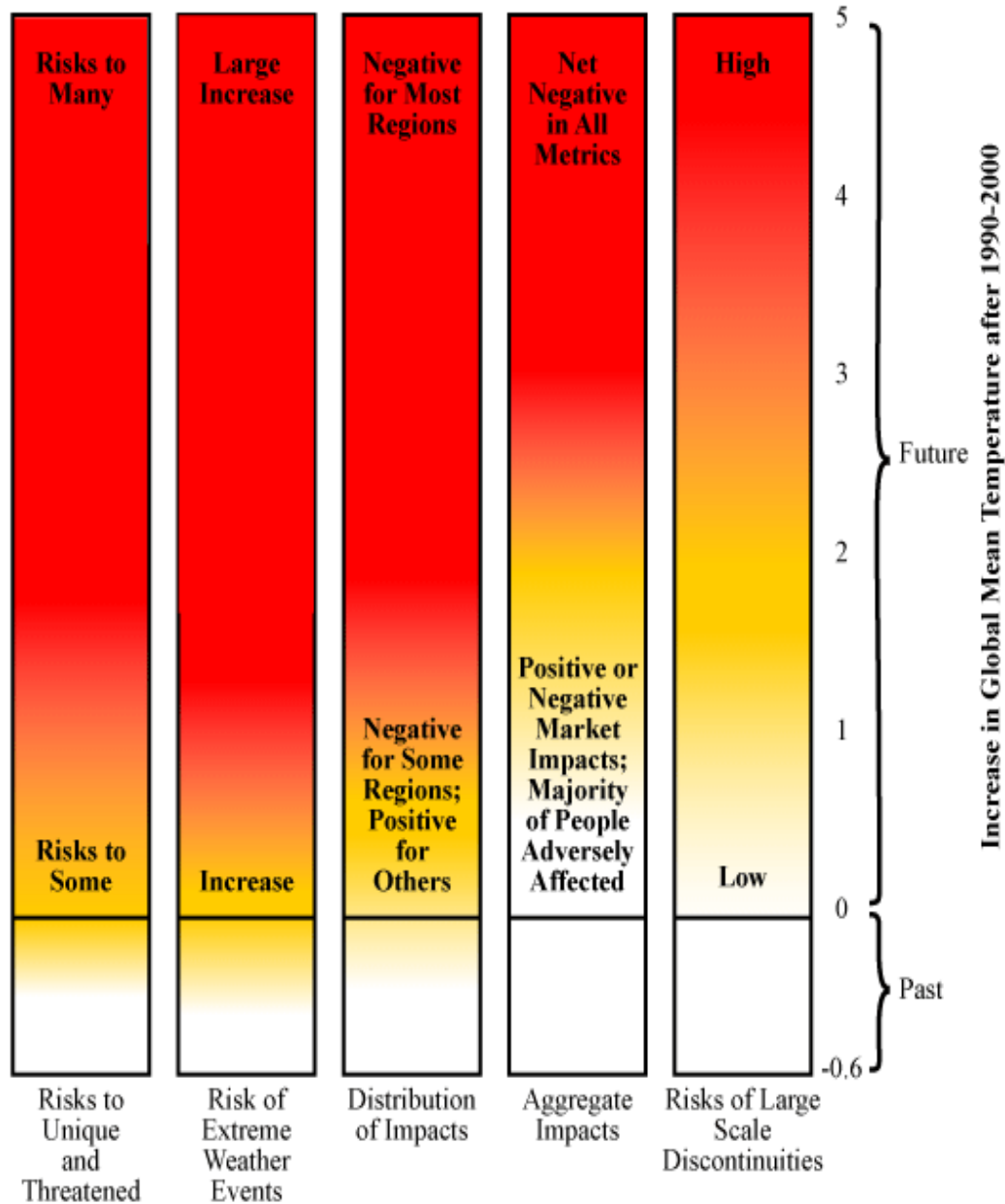
Source: IPCC WGII AR4

Reasons for concern (TAR-2001)

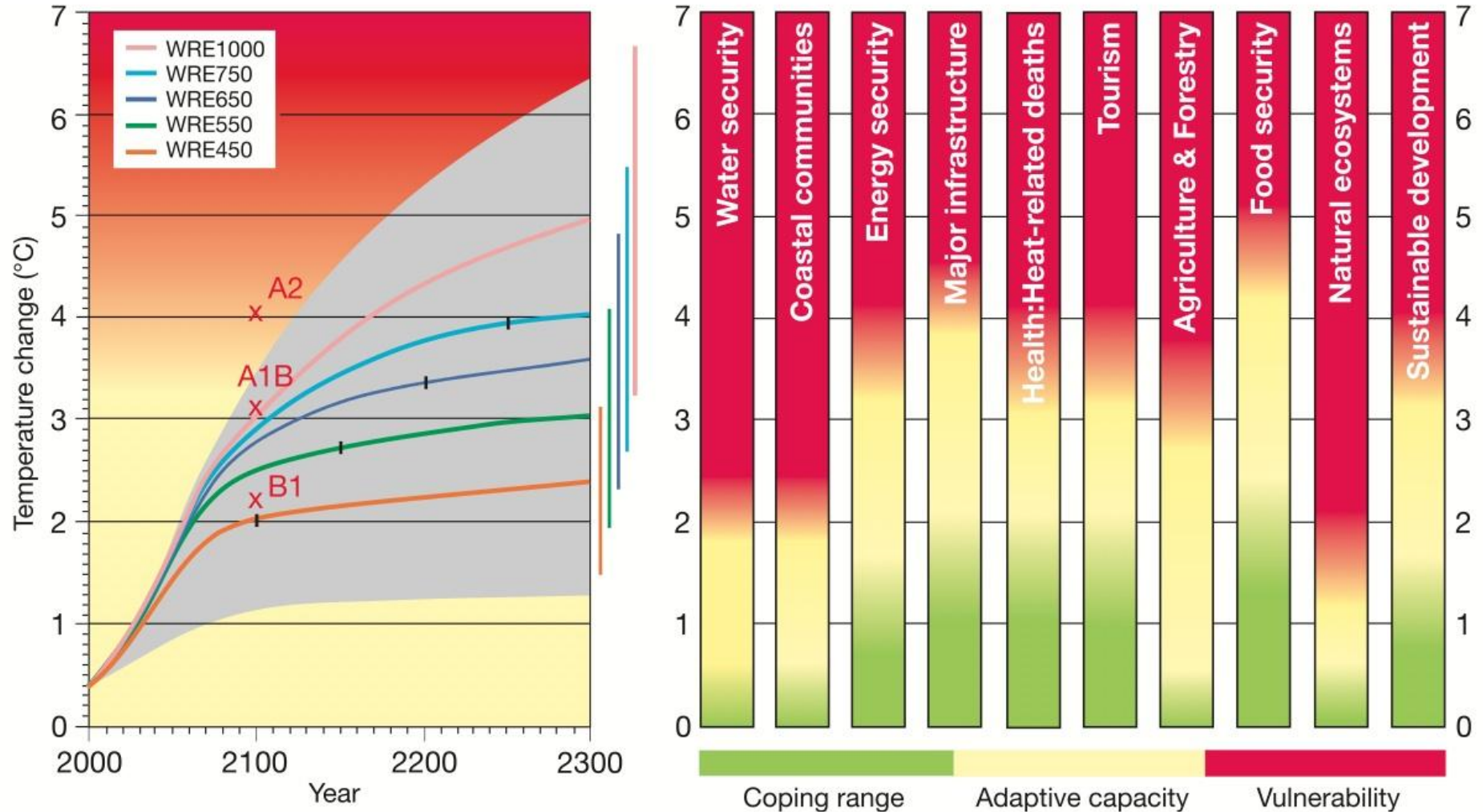
TAR Reasons For Concern



Reasons for concern (Smith et al, 2009, PNAS, based on AR4-2007)



Vulnerability to climate change aggregated for key sectors in the Australia and New Zealand region



Mitigation & adaptation

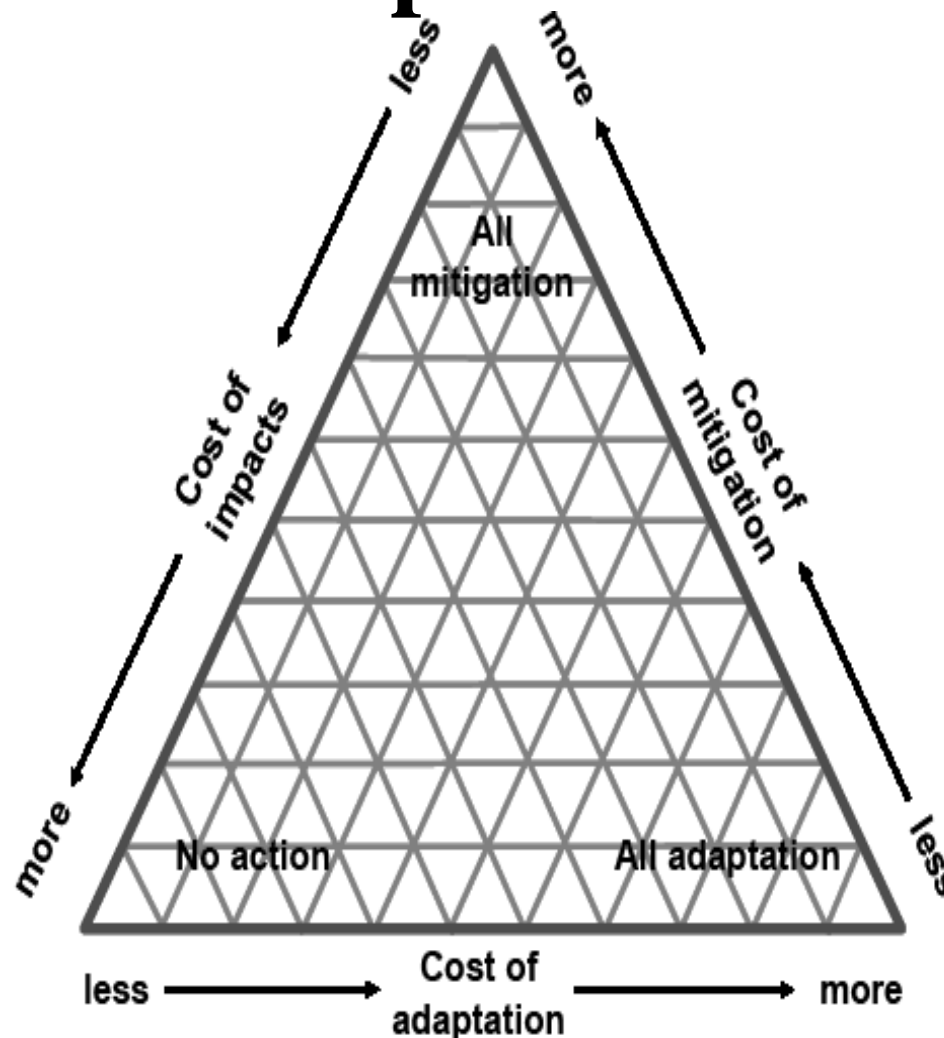
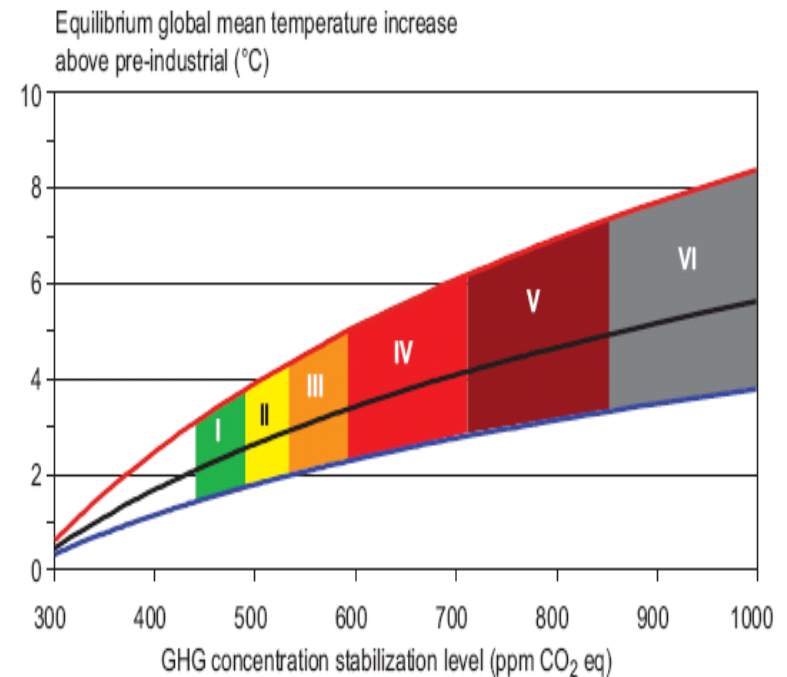
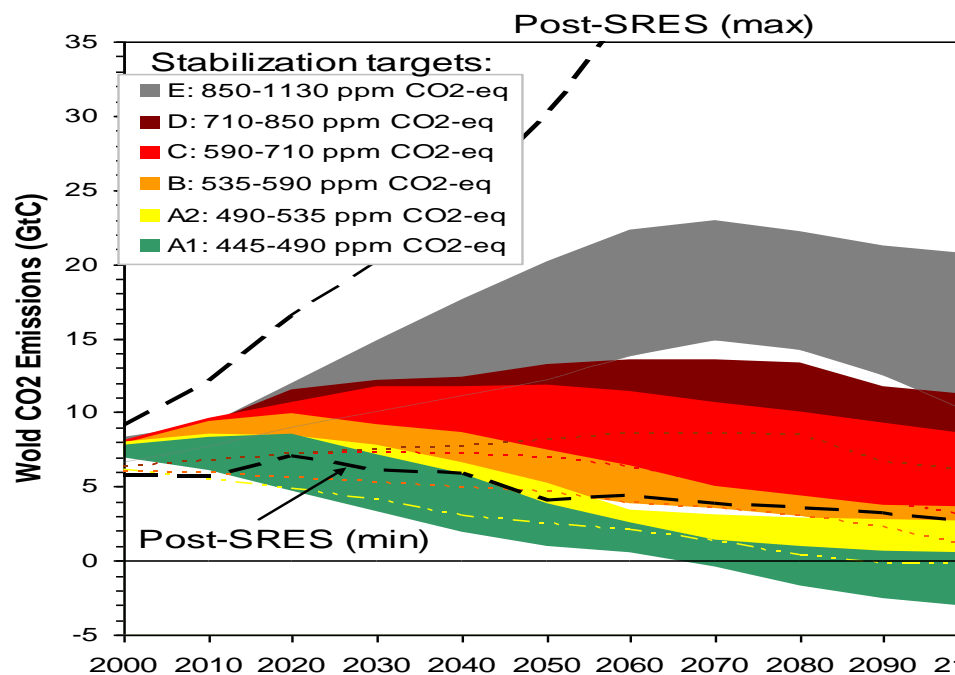


Figure 18.1: A schematic overview of inter-relationships between adaptation, mitigation and impacts, based on Holdridge's life-zone classification scheme (Holdridge, 1947, 1967).

Source: IPCC AR4 WG2 Chap 18

The lower the stabilisation level the earlier global emissions have to go down

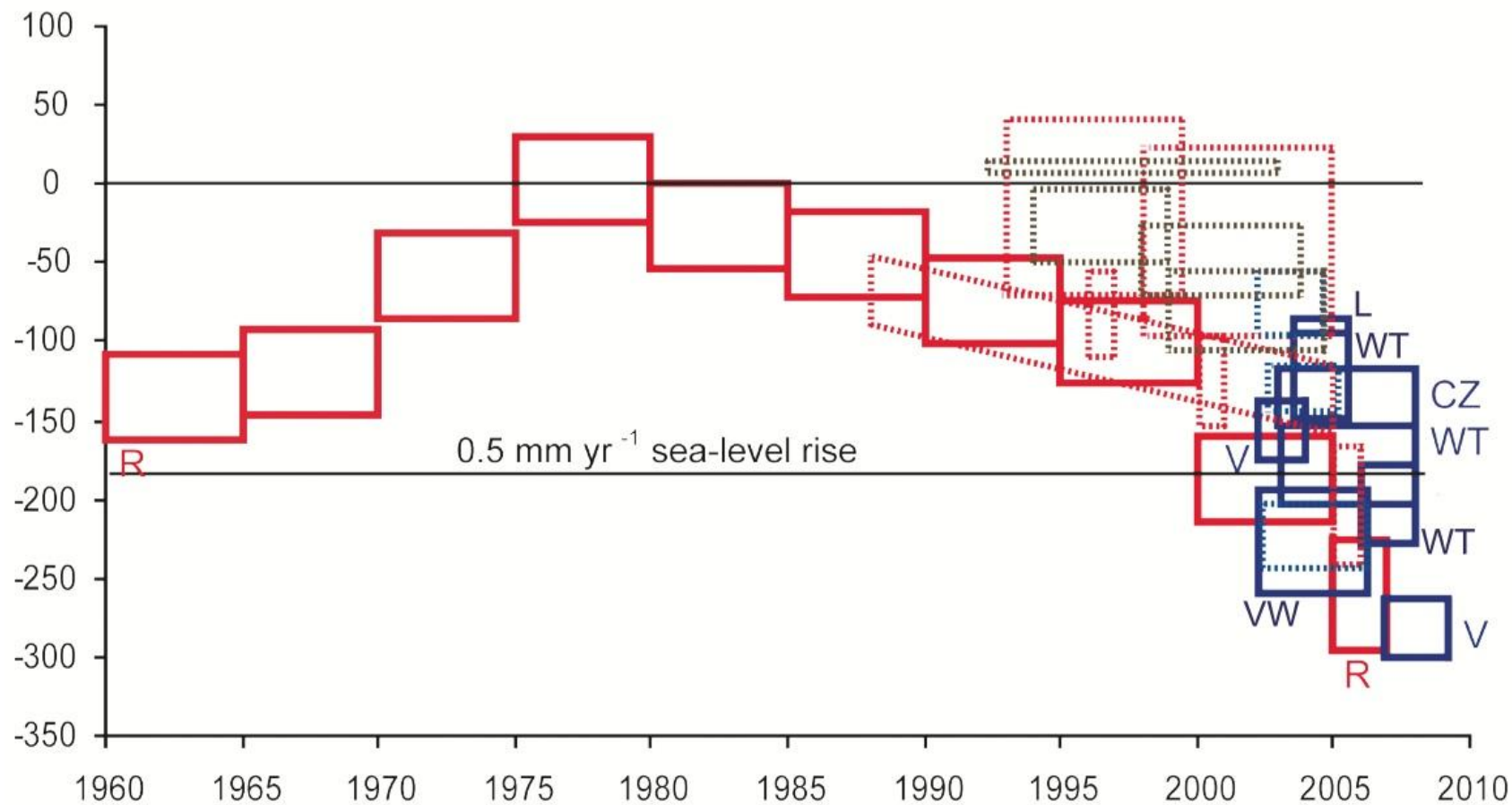


Multigas and CO₂ only studies combined

WG I Science Gaps and Questions for AR5

- Trends and rates of observed climate change
Has climate change accelerated?
- Large ice sheets in polar regions
Is the Greenland ice sheet stable?
- Irreversibilities and abrupt change in the climate system
How robust and accurate is our understanding?
- Clouds and aerosols and their feedbacks
What is the forcing uncertainty associated with cloud and aerosol processes?
- Carbon and other biogeochemical cycles
Which carbon cycle feedbacks become relevant in the coming decades?
- Near-term and long-term climate projections
How reliable is decadal prediction, what are the uncertainties beyond 2100?
- Climate phenomena across regions
How do frequencies and amplitudes of monsoon, ENSO, and others change?

Estimates of the net mass budget of the Greenland Ice Sheet since 1960



AR5 WG II Major Themes

- Framing to support good decisions, including information on risk
- Better integration of climate science with climate impacts
- Broader range of assessed impacts.
- Climate change in the context of other stresses
- Better treatment of extremes and disasters
- Expanded treatment of adaptation
- Better integration of adaptation, mitigation, and development at different regional scales
- Human settlements, industry, and infrastructure

AR5 WGII Major Sections or “Superchapters”

- Part A: GLOBAL & SECTORAL ASPECTS
 - Context for the AR5
 - Natural and managed resources and systems, and their uses
 - Human settlements, industry, and infrastructure
 - Human health, well-being, and security
 - Adaptation
 - Multi-sector impacts, risks, vulnerabilities, and opportunities
- Part B: REGIONAL ASPECTS
 - With WG I and WG III input and collaboration

AR5 WG III Outline

I: Introduction

1. Introductory Chapter

II: Framing Issues

2. Integrated Risk and Uncertainty Assessment of Climate Change Response Policies

3. Social, Economic and Ethical Concepts and Methods

4. Sustainable Development and Equity

III: Pathways for Mitigating Climate Change

5. Drivers, Trends and Mitigation

6. Assessing Transformation Pathways

7. Energy Systems

8. Transport

9. Buildings

10. Industry

11. Agriculture, Forestry and Other Land Use (AFOLU)

12. Human Settlements, Infrastructure and Spatial Planning

IV: Assessment of Policies, Institutions and Finance

13. International Cooperation: Agreements and Instruments

14. Regional Development and Cooperation

15. National and Sub-national Policies and Institutions

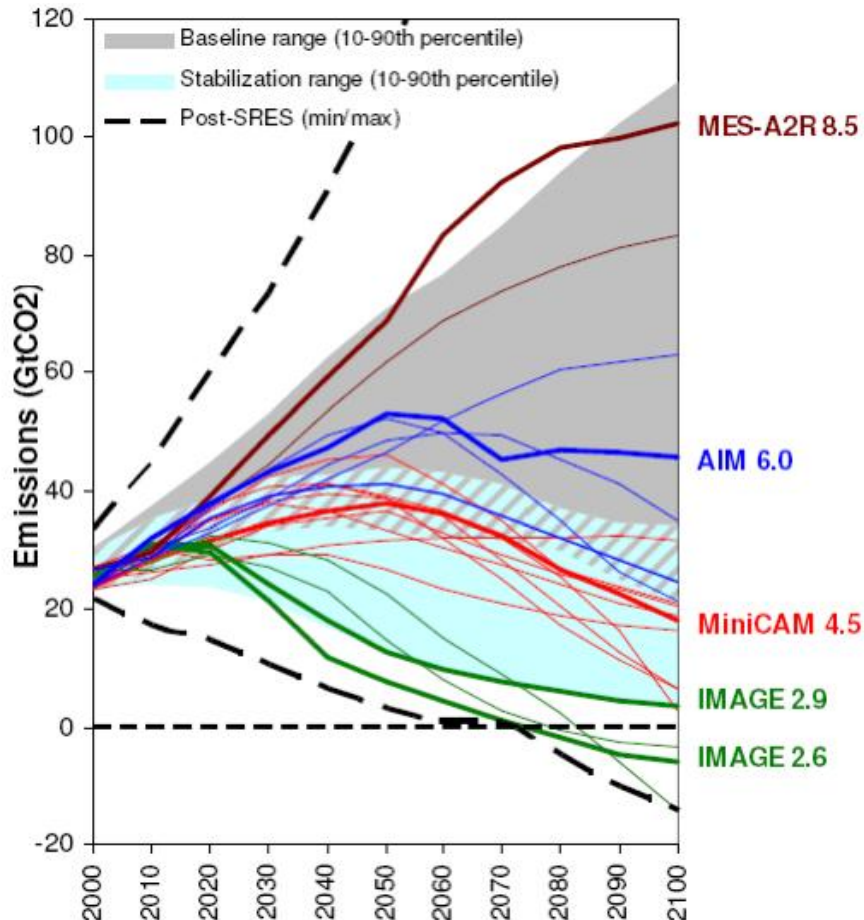
16. Cross-cutting Investment and Finance Issues

New scenarios:

Representative concentration pathways

All selected from existing literature (but slightly updated)

Wide range of possible futures, including mitigation



RCP8.5 : 8.5 W/m² in 2100,
continue to increase
(proposed :
constant emissions until 2300)

RCP6 : 6 W/m² in 2100,
then stabilisation

RCP4.5 : 4.5 W/m² in 2100,
then stabilisation

RCP3-PD : peak in RF ~3 W/m²,
then decline

Some of the Challenges



- z Restore confidence in climate science**
- z Improve policy-relevance, without becoming policy-prescriptive**
- z Innovate to allow easier « updating »**
- z Improve quality and readability**
- z Provide elements of answer to difficult/new questions**
- z Improve collaboration between WG**
- z Improve developing countries participation**

Jointly Organized Meetings/Workshops

- Joint WGI / WGII Expert Meeting on Detection and Attribution related to Anthropogenic Climate Change (09/09)
- Joint WGI / WGII Expert Meeting on Assessing and Combining Multi-Model Climate Projections (01/10)
- Joint WG II / WG III Expert Meeting on Human Settlement and Infrastructure (postponed to early 2011)
- Joint WG II / WG III Workshop on Socioeconomic Scenarios for Climate Change Impact and Response Assessments (11/10)
- Joint WGI / WGII Expert Meeting on Impacts of Ocean Acidification on Marine Biology and Ecosystems (01/11)
- Joint WGII / WGIII Expert Meeting on Economic Analysis, Costing Methods, and Ethics (03/11)

Measures taken



- z Responses (cfr IPCC web site)***
- z Errata: done or in process of being done***
- z Corrections: TBD at Bureau/Plenary (October)***
- z Internal review of procedures + strict implementation for the two Special Reports due in 2011 (Disasters & extreme events; Renewable energy)***
- z Review by Inter Academy Council (due: 30/8, for discussion at October plenary)***

Independent Review: Set Up

- On the request of IPCC Chairman Rajendra Pachauri and UN Secretary-General Ban Ki-moon.
- Executed by InterAcademy Council (IAC).
- Review of IPCC principles, procedures, management structures and the IPCC scenario process (“honest broker“ role).
- The report will be published Aug. 30 and considered by the IPCC Plenary in October 2010.

It is not the strongest or most intelligent that survives. It's those most adaptable to change (Darwin)



Useful links:



- z www.ipcc.ch : IPCC
- z www.climate.be/vanyp : most of my slides and other documents
- z My e-mail: vanyp@climate.be