

Climatic Change :

Science, Policy & Politics

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Plenary Lecture

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<http://jddomingos.ist.utl.pt>

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“In order to manage risk, you must scare people”

Lord Giddens

as quoted by Nigel Lawson in In “The Economics and Politics of Climate Change,an Appeal to Reason”,Centre for Policy Studies, 1 November 2006

SCIENCE

Science is increasingly invoked to:

- formulate and justify policies
- give credibility to political measures
- promote business

Because public perception concerning Science is :

- objectivity
- selfcontrol
- independence

Basic Concepts

In Physical Science:

- Theorie is validated by objective observations and measurements, not by vote or consensus
- Must allow the possibility of being wrong (“falsification on Poper sense”)
- Must have predictive capacity

Common misconceptions

- Covariation and/or correlation imply causal relation
- Scientific consensus (whatever it is !) means validity
- A personality, and specially a nobel prize is a scientific authority in all (scientific) subjects, even if is a Nobel Peace Prize (like Al Gore, IPCC, Arafat, Ramos Horta ...)

Contradictory demands in Science, Policy & Politics

- In SCIENCE, objective proof and validated predictability is a fundamental objective. There is no definitive answer
- In POLICY , uncertainty is confined and in complex situations decisions are proposed based in scenarios
- In POLITICS, objectives are established and pursued with available means

CLIMATIC CHANGE

- No issue has attracted more public attention in last years than Climatic Change (usually cofused with climatic warming)
- The theme is a case study in abusing Science to make policy and justifying politics in the name of common good and future generations.

Past Climate ...

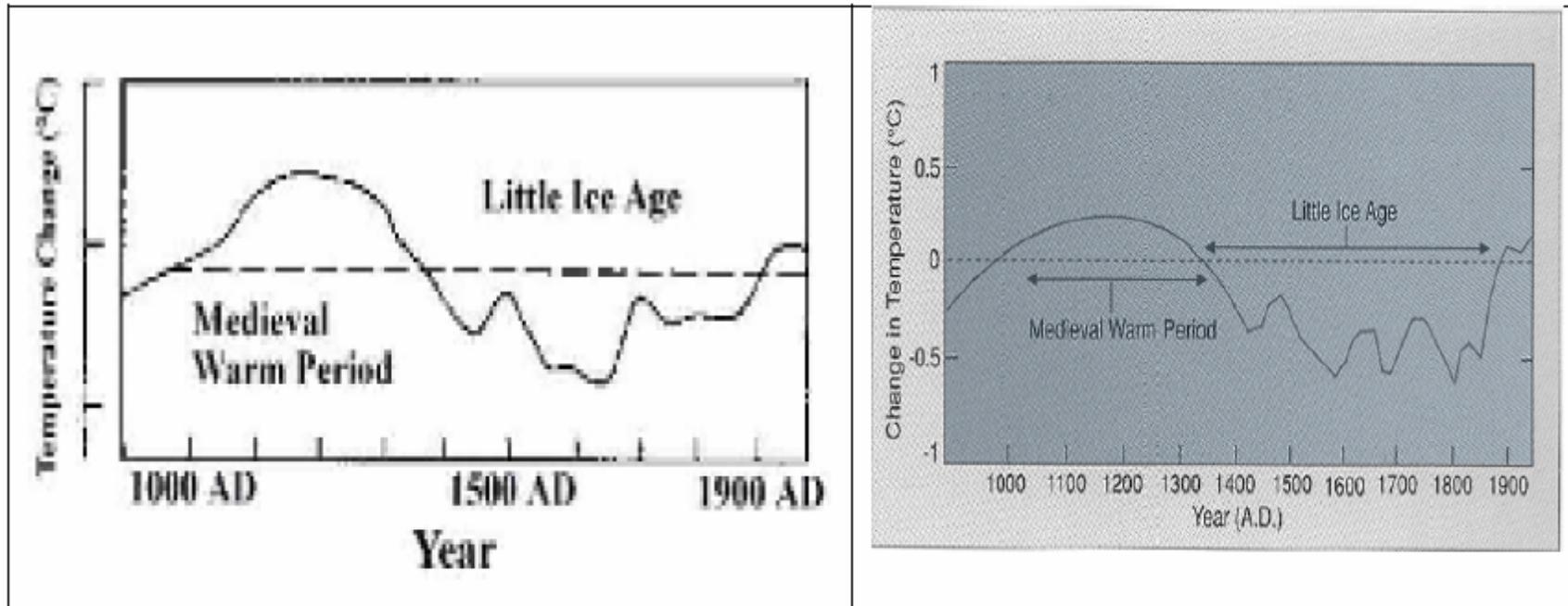


Figure 1. Left - IPCC 1990 Fig 7.1c; Right – From (Crowley 1996). Also see <http://www.climateaudit.org/?p=233>. This was based on (Lamb 1965) , which is criticized in IPCC AR4 (Box 6.4) as not being based on “any formal statistical calibration”.

How do we “know” that 1998 was the warmest year of the millennium? SMcIntyre, <http://www.climateaudit.org>

IPCC ...Hockey Stick

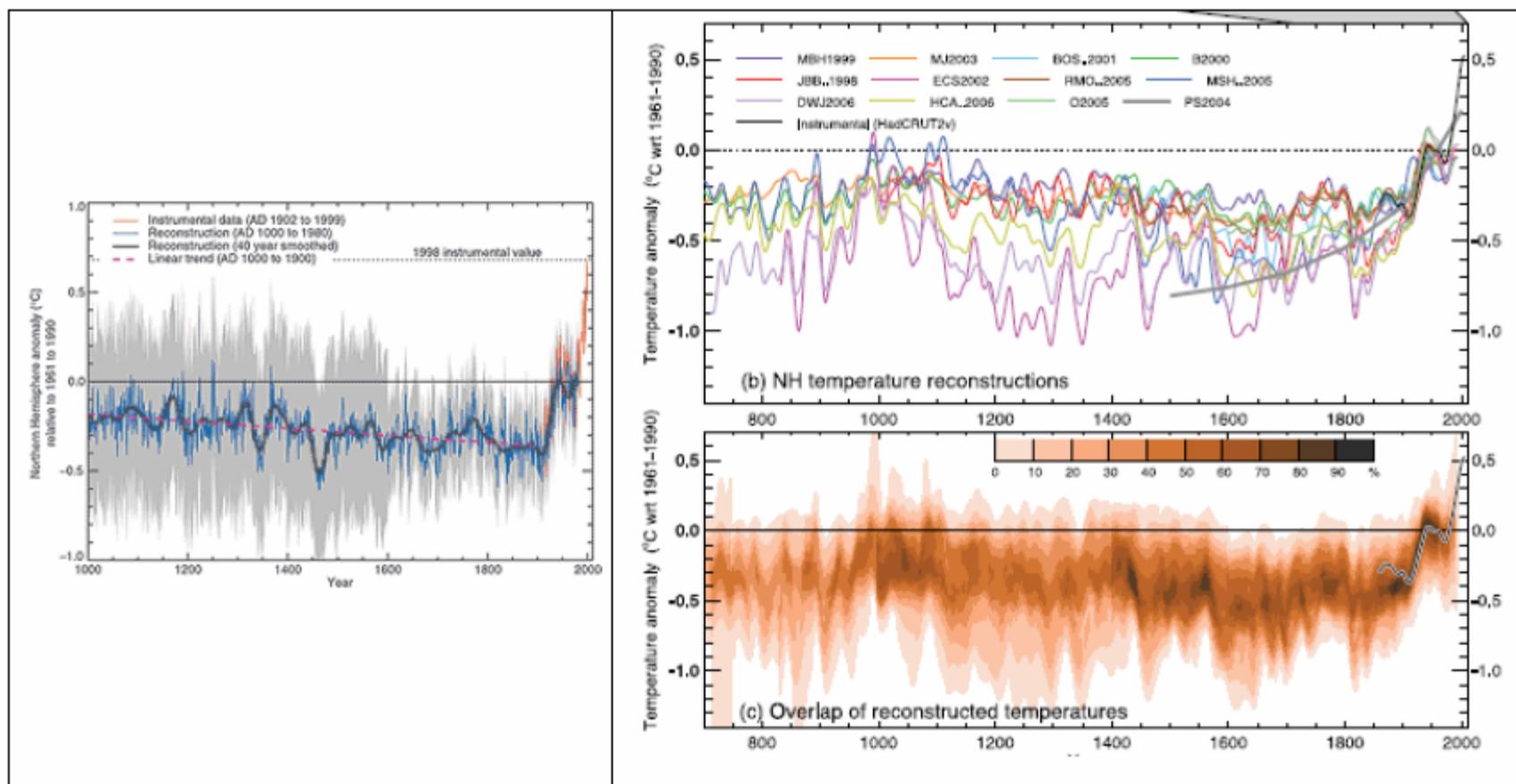


Figure 4. IPCC Northern Hemisphere Temperature History. Left – Fig 2.21, IPCC Third Assessment Report, 2001. Right, IPCC Fourth Assessment Report 2007, Box 6.4

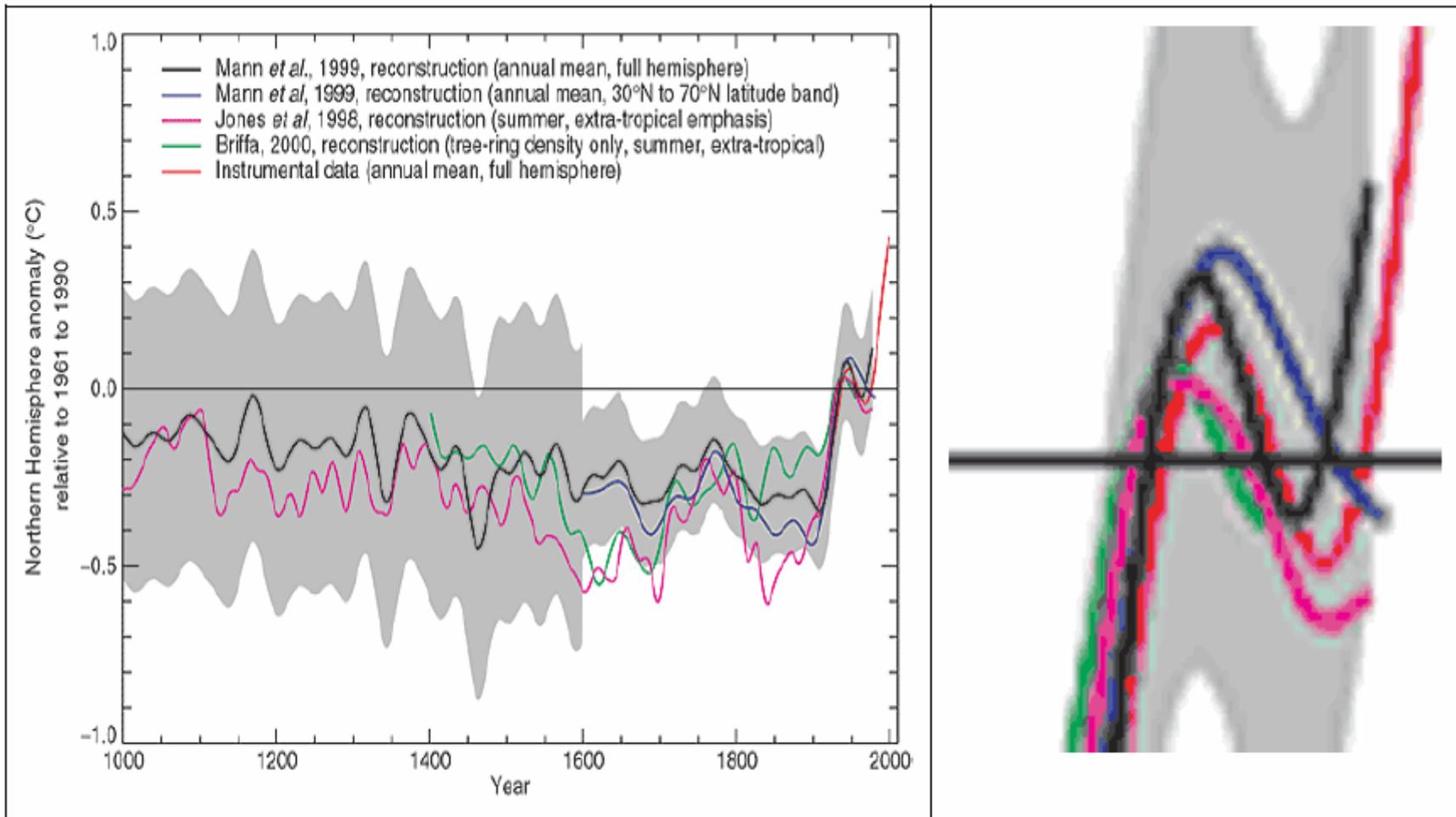


Figure 28. Left – IPCC TAR Spaghetti Graph. Right- blow-up of right hand portion. The divergent portion (after 1960) of the Briffa reconstruction (green) was deleted in IPCC TAR (green) 1960 and thus no visible “divergence”. Similar truncation in AR4.

Glaciers - Alps

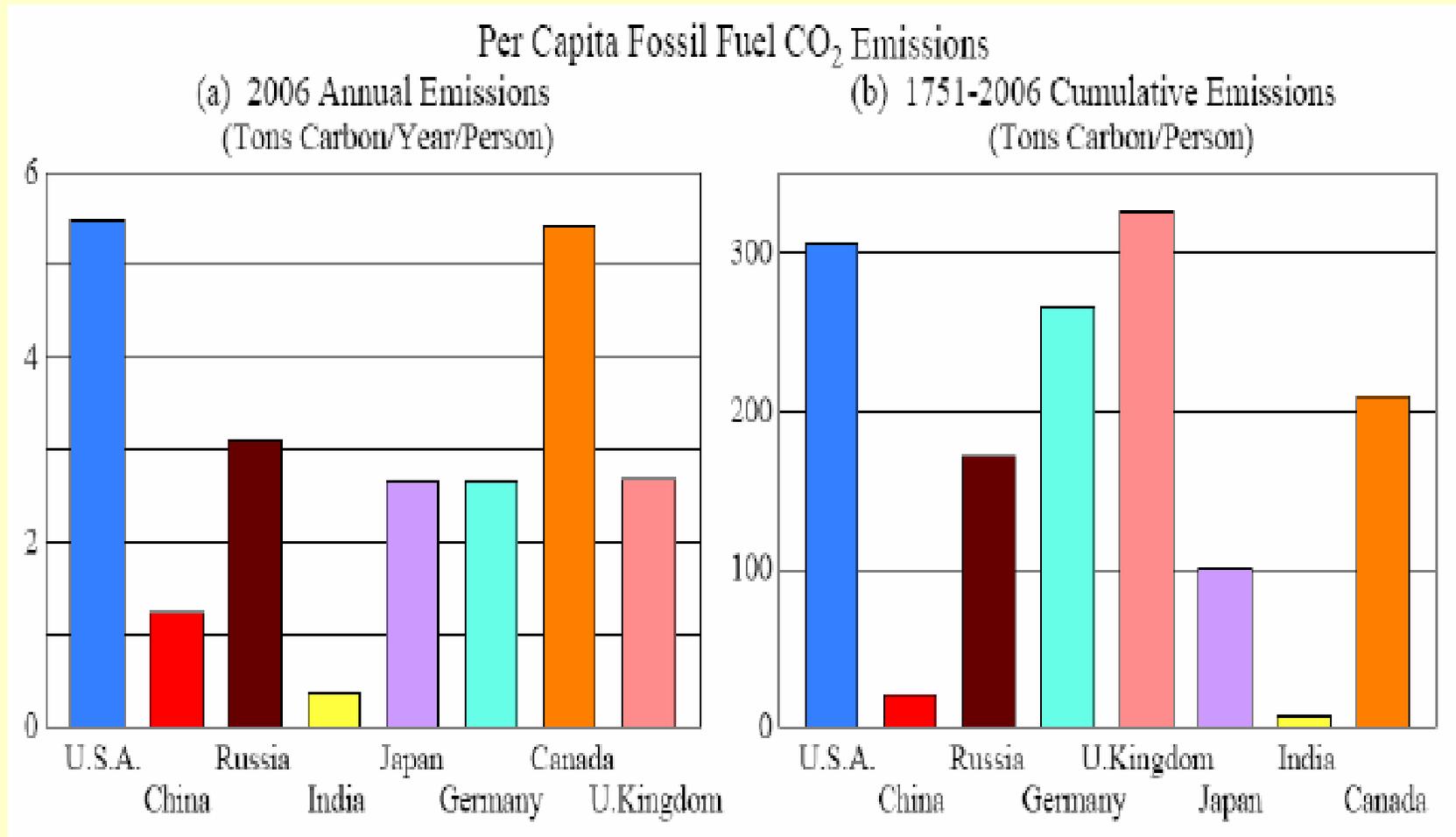


Figure 34. Left - modern view of a pass in the Alps (with glacier lines of 1922 and 1856); right - reconstructed view in Roman times of 2000 years ago Schlüchter and Jörin (2004), Also see <http://www.climateaudit.org/?p=772>

Implications

- The hockey stick had a proeminent role in ringing the alarms of disastrous climate warming if CO2 emissions where not curbed (AlGore ...), and was a flagship in the TAR (Third Assessmen Report-IPCC).
- When submitted to confirmation and scrutiny, it did not pass fundamental tests of scientific valitivity (and credibility...)

Let us assume CO₂ is the real culprit...



Notes

- CO2 emissions per country are defined as CO2 emissions inside the boundaries of that country.
- If we want to be fair, CO2 emissions should be based on CO2 emitted to produce the goods consumed in each country.
- Delocalising industries, and maintaining consumption ... changes nothing as global climate is concerned, apart from transferring the guilt without the benefit...

Is CO₂ (and equivalent GHGs) really important ?

- CO₂ is like fever -> a very important sintom of illness
- Before modern medicine, doctors bleed the patient to reduce fever... and the weakened patient frequently died !
- Climate change is obvious but is CO₂ and GHGs the real culprits ?

For the common people the opinion polls show ->

Eurobarómetro-March 2008

QF2 When people talk about "the environment", which of the following do you think of first? - % EU27

- Pollution in towns and cities **22%** **27%** Portugal
- Climate change **19%** **13%**
- Green and pleasant landscapes **13%** **9%**
- Protecting nature **12%** **18 %**

- EB62.1 QD1(2004) “Pollution in towns and cities” 25%

Local and Regional microclimate

Local pollution, and local climate are strongly dependent of:

- Fossil fuel burning
- Land cover change
- Urban design

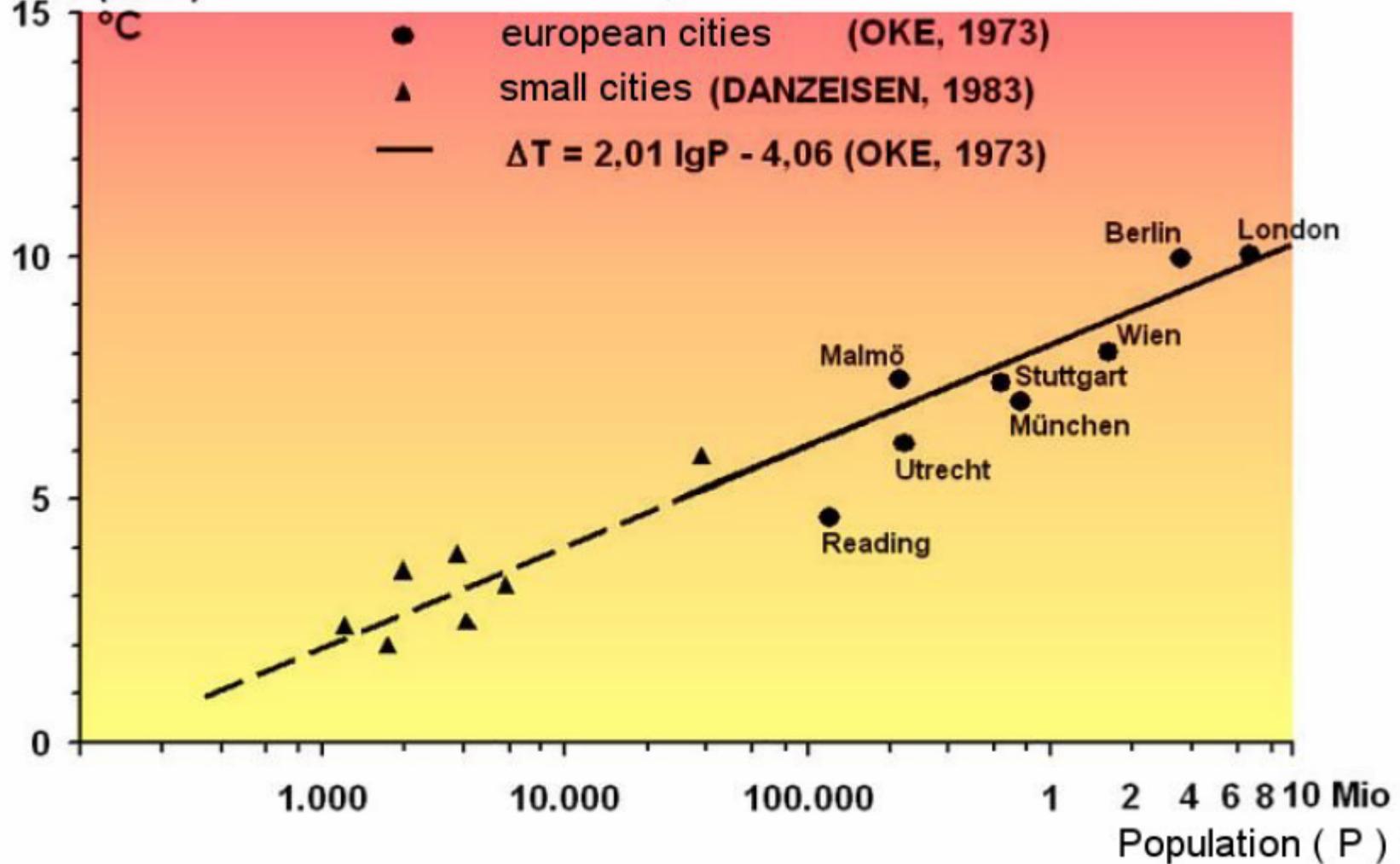
ΔT (max)
°C

ΔT max. temperature differences urban - rural

● european cities (OKE, 1973)

▲ small cities (DANZEISEN, 1983)

— $\Delta T = 2,01 \lg P - 4,06$ (OKE, 1973)



Climate Change 2007: The Physical Science Basis

Summary for Policymakers

Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change

This Summary for Policymakers was formally approved at the 10th Session of Working Group I of the IPCC, Paris, February 2007.

Note:

Text, tables and figures given here are final but subject to copy-editing.

Corrections made as of February 5th, 2007

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DEFINITIONS

Intergovernmental Panel on Climate Change
Climate Change 2007: The Physical Science Basis,
Summary for Policy Makers, note 1

“Climate change in IPCC usage refers to any change in climate over time, whether due to natural variability or as a result of human activity.

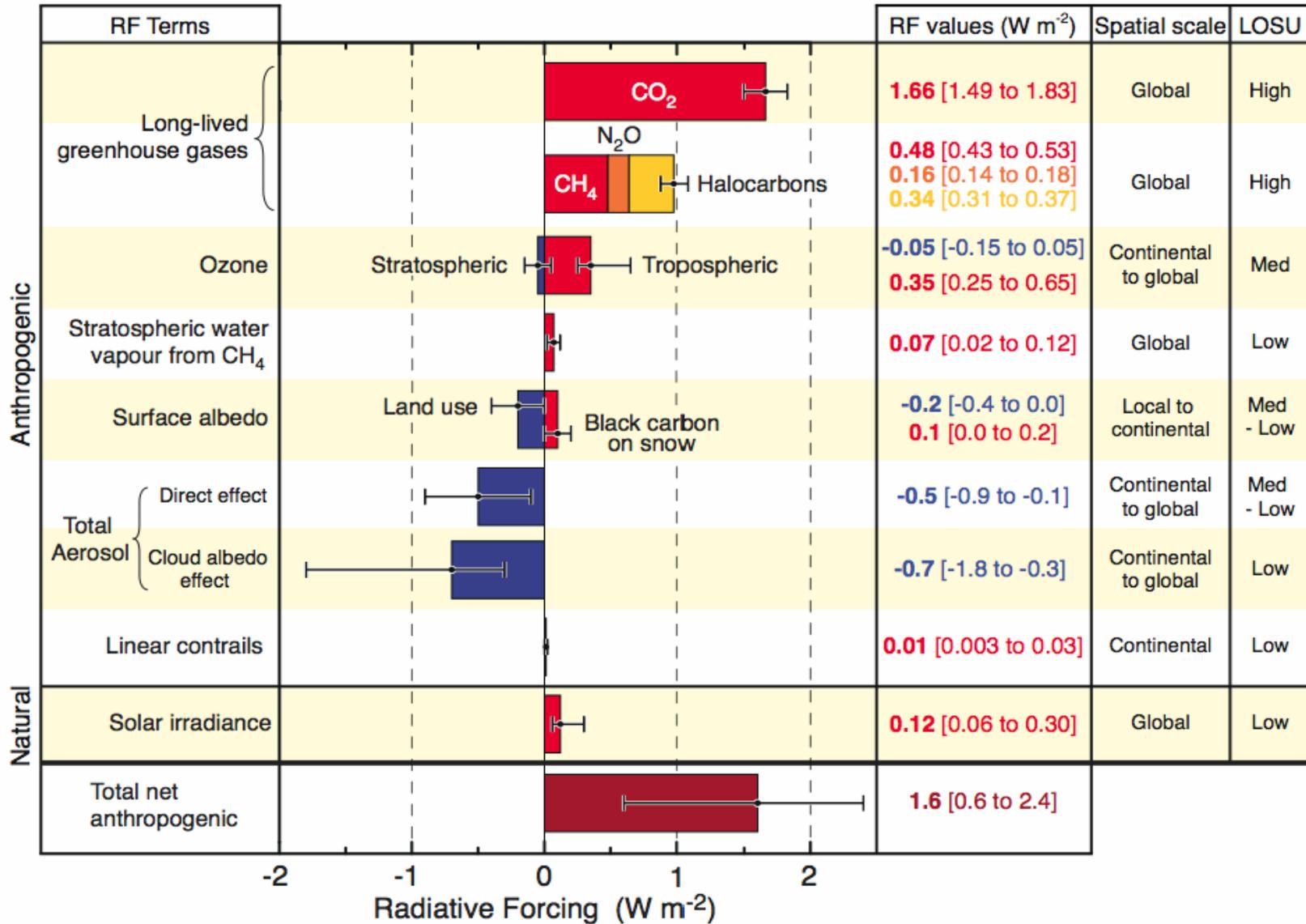
This usage differs from that in the **United Nations Framework Convention on Climate Change**, where climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods”

Radiative Forcing

“*Radiative forcing* is a measure of the influence that a factor has in altering the balance of incoming and outgoing energy in the Earth-atmosphere system and is an index of the importance of the factor as a potential climate change mechanism. Positive forcing tends to warm the surface while negative forcing tends to cool it”.

SPM-nota 2.

Radiative Forcing Components



Radiative Forcing

Summary Policy Makers

Radiative forcing values are for 2005 relative to pre-industrial conditions defined at 1750 and are expressed in watts per square metre (W m^{-2}).

- note 2 (p. 2) referring to Fig SPM-2 (p.4)

Climate sensitivity

(Summary for Policy Makers (SPM) p.12)

“ The equilibrium climate sensitivity is a measure of the climate system response to sustained radiative forcing. It is (...) defined as the global average surface warming following a doubling of carbon dioxide concentrations. It is *likely* to be in the range 2°C to 4.5°C with a best estimate of about 3°C, and is *very unlikely* to be less than 1.5°C”.

“ Water vapour changes represent the largest feedback affecting climate sensitivity (...). Cloud feedbacks remain the largest source of uncertainty”.

This is the only reference to water vapour in the Summary

Water vapour

“Water vapour is a key climate variable. (...), Water vapour is also the most important gaseous source of infrared opacity in the atmosphere, accounting for about 60% of the natural greenhouse effect for clear skies (...), and provides the largest positive feedback in model projections of climate change”

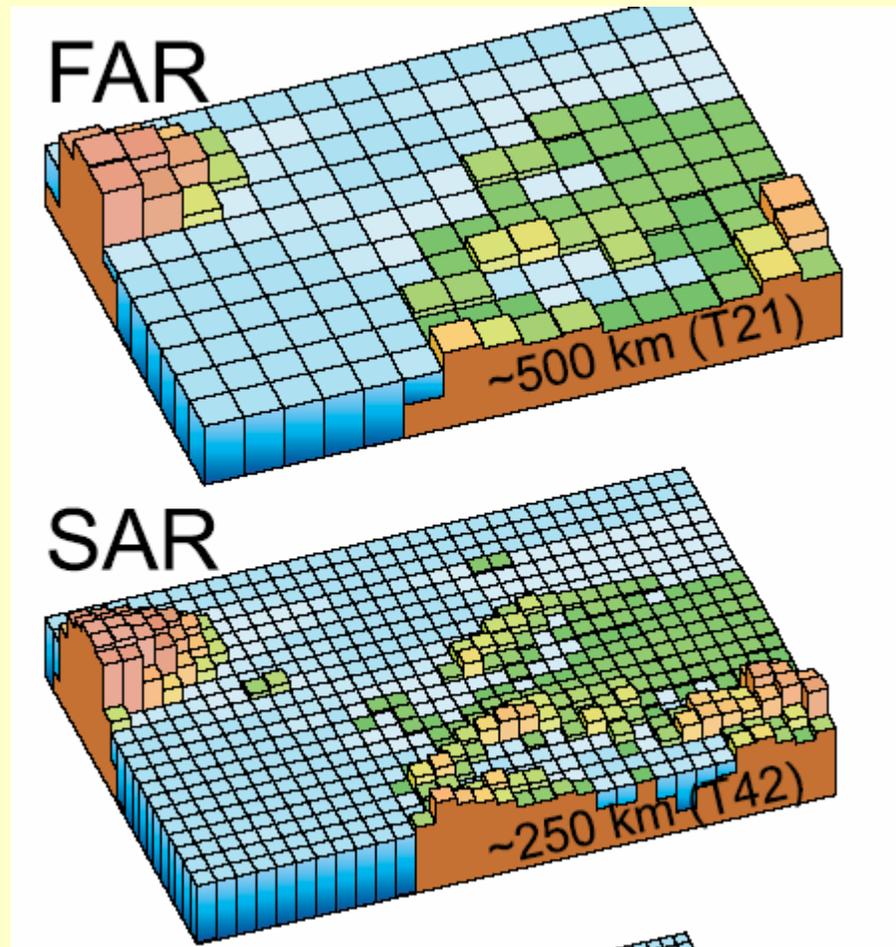
- [The Physical Scientific Basis p271](#)

Models

“ ... many of the key processes that control climate sensitivity or abrupt climate changes (e.g., clouds, vegetation, oceanic convection) **depend on very small spatial scales**. They cannot be represented in full detail in the context of global models, **and scientific understanding of them is still notably incomplete**”.

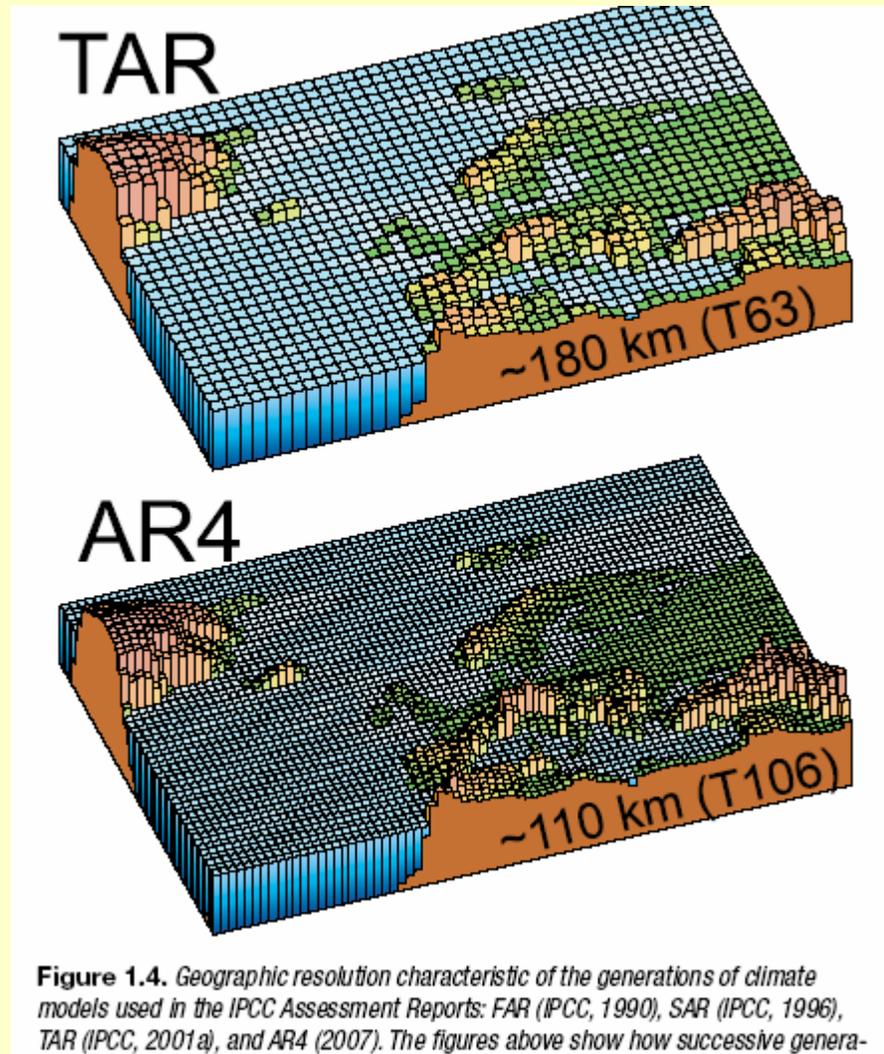
- PSBasis- p113

Spatial scales : 1990 e 1996



Spatial scales :2001 and 2007

SPB-p113



Clouds -1

“ Clouds, which cover about 60% of the Earth’s surface, are responsible for up to two thirds of the planetary albedo, which is about 30%.

An albedo decrease of only 1%, (...) would cause an increase in the radiative equilibrium temperature of about 1°C,(...) **roughly equivalent to the direct radiative effect of a doubling of the atmospheric CO2 concentration.**

”

PSB p114

Clouds -2

“The strong effect of cloud processes on climate model sensitivities to greenhouse gases(...) **show global average surface temperature changes (due to doubled atmospheric CO₂ concentration) ranging from 1.9°C to 5.4°C, simply by altering the way that cloud radiative properties were treated in the model**”.

“The scientific community realised long ago that using adequate data to **constrain models** was the only way to solve this problem”.

Clouds -3

“

It is somewhat unsettling that the results of a complex climate model can be **so drastically altered by substituting one reasonable cloud parametrization for another** “

PSB-p114

Chap 6 – Physical And Scientific Basis
6.4.1 Climate Forcings and Responses Over
Glacial-Interglacial Cycles
I

High-resolution ice core records of temperature proxies and CO₂ during deglaciation indicates that antarctic temperature starts to rise several hundred years before CO₂

(Monnin et al., 2001; Caillon et al., 2003)

6.4.1 Climate Forcings and Responses Over Glacial-Interglacial Cycles

II

“Ice core records show that atmospheric CO₂ varied in the range of 180 to 300 ppm over the glacial-interglacial cycles of the last 650 kyr.

The quantitative and mechanistic explanation of these CO₂ variations remains one of the major unsolved questions in climate research.”

Working Group II

(Climate Change Impacts, Adaptation and Vulnerability)

- Published its Summary for Policy Makers in April 2007.
- In this SPM there are no doubts.

The Stern Report

- Published in October 30, 2006 refers as scientific bases the IPCC Report of 2001, updated with graphs which appeared later in the SPM 2007 namely the one disguising the hockey stick blunder.

From Science to Politics : Stern Report in the media

“RARELY has a report(...) caused such a stir.
Sir Nicholas Stern's review of the economics of
climate change (...) was all over the local media
and much of the foreign press too. But (...) the
report was more about politics than about
economics(...)”.

The Economist, Nov 2nd 2006

From Science to Politics :

The Stern Report in the media-II

- “Tony Blair said the 700-page document was the **"most important report on the future"** published by his Government”.
- “Gordon Brown (...) assumed the task of leading the world in persuading the sceptics (...) of a global catastrophe. He has enlisted Al Gore (...), turned green evangelist, to sell the message in the United States, with Sir Nicholas”.

INDEPENDENT, 1 November 2006, **The day that changed the climate**

Nigel Lawson (former Chancellor of the exchequer)

“On a very brief comment on Stern.(...), I should point out that, as a good civil servant, he was simply doing his masters’ bidding. As Mr Blair’s guru, Lord Giddens (the inventor of the so-called thirdway), laid down in this context in a speech last year,
“In order to manage risk, you must scare people” “.

“This is clearly no basis for policy decisions which could have the most profound adverse effect on people’s lives, and at a cost which Stern almost certainly underestimates.

It is, in a very real sense, the story of the Iraq war, writ large.

In “The Economics and Politics of Climate Change,an Appeal to Reason”,Centre for Policy Studies, 1 November 2006

From Science to Politics : Stern Report

In Stern, Part I, p2:

“The earth's" climate is rapidly changing, mainly as a result of increases in greenhouse gases caused by human activity”

However, in the quoted IPCC report ("Climate Change 2001 page 10) the wording is:

"most of the warming over the last 50 years is likely to have been due to the increase in greenhouse gas concentrations“

Stern forgot the *likely* and added “*human activity*” and “*rapidly*”

From Science to Politics

STERN, p5:

"The IPCC concluded in 2001 that there is new and stronger evidence that most of the warming observed over at least the past 50 years is attributable to human activities"

The IPCC("Climate Change 2001" page 10) says.

"There is new and stronger evidence that most of the warming observed over the past 50 years is attributable to human activities"

Stern has inserted the words "at least".

Between 1950 and 1975 the world was cooling. It has also been cooling since 1998 (~0.4°C/decade, HadCRUt3)

From Science to Politics : Stern Report

“The key conclusion, that the build-up of greenhousegases in the atmosphere will lead to several degrees of warming, rests on the laws of physics and chemistry and a broad range of evidence beyond one particular graph.” (p.6)

Climate Change 2007 The Physical Science Basis

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Contribution of Working Group I
to the Fourth Assessment Report of the
Intergovernmental Panel on Climate Change

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UNIVERSITY PRESS

Kevin E. Trenberth

Lead Author and contributor: Intergovernmental Panel on Climate Change (IPCC), *Scientific Assessment of Climate Change*, WMO/UNEP, 1990, 1992, 1995 (Convening Lead Author Chapter 1, Lead Author Technical Summary); 2001 (Lead Author Chapter 7, Lead Author Technical Summary, and Lead Author Policy Makers Summary); 2001 Synthesis Report (Lead Author); 2007 (Coordinating Lead Author Chapter 3).

- Among the top 20 in highest citations in all of geophysics. Over 9,200 citations and a Power Index (also known as H index) of 52 (signifying that 52 publications have 52 or more citations).

(Mais de 100 citações no WGI-2007)

Kevin E. Trenberth

“since the last IPCC report it is often stated that the science is settled or done and now is the time for action.

In fact there are no predictions by IPCC at all. And there never have been

(...)

None of the models used by IPCC are initialized to the observed state and none of the climate states in the models correspond even remotely to the current observed climate”.

In Nature.com, Climate Feedback, 4.06.2007

“... the state of the oceans, sea ice, and soil moisture has no relationship to the observed state at any recent time in any of the IPCC models. There is neither an El Niño sequence nor any Pacific Decadal Oscillation that replicates the recent past;

The Atlantic Multidecadal Oscillation (...) is not set up to match today's state, but it is a critical component of the Atlantic hurricanes and it undoubtedly affects forecasts for the next decade from Brazil to Europe.

Moreover, the starting climate state in several of the models may depart significantly from the real climate owing to model errors

...regional climate change is impossible to deal with properly unless the models are initialized.”

- Trenberth-2

“The current projection method works to the extent it does because it utilizes differences from one time to another and the main model bias and systematic errors are thereby subtracted out. This assumes linearity.

It works for global forced variations,

but it can not work for many aspects of climate, especially those related to the water cycle.

.

.

Trenberth-3

“ Therefore the problem of overcoming this shortcoming, and facing up to initializing climate models means not only obtaining sufficient reliable observations of all aspects of the climate system, **but also overcoming model biases.**

So this is a major challenge”

Trenberth-4

The science is not done because we do not have reliable or regional predictions of climate.

But we need them.

Indeed it is an imperative!

So the science is just beginning.

Trenberth-4

Conclusions-1

The fundamental report of IPCC is :

”The Physical Science Basis “ .

Published November 2007

All in the other reports refer to this one. However, it was not yet published .

So the Summary for Policy Makers was used ...

And the Summary, elaborated by a few and voted , stressed the fears and avoided uncertainties

Conclusion-2

The reports of Working Groups II and III are based in scenarios, which are subjective projections considered plausible to his authors and those who voted them.

The scenarios are of two types:

1-Temperature increase due to CO₂ and GHGs increasee relative to doubling CO₂:

$$dT = S_c * \log(C/C_0) \quad ^\circ K$$

S_c is the climate sensitivity

Conclusões-4

Como o Relatório Stern veio demonstrar e as intervenções de Al Gore confirmam, **o que não passava de cenário passou a ser tomado como realidade e instrumento de controlo social e decisão política.**

Alterar a percepção da realidade , cria uma nova realidade e um novo e lucrativo mercado para investir (e até uma nova bolsa) como Al Gore explicita nas suas intervenções para os mercados financeiros onde actua a bem sucedida empresa que fundou e dirige desde 2004 (Generation Investment Management, com escritórios em Londres e Washignton DC, v. <http://www.generationim.com> e os respectivos links)

Conclusões-5

Como o próprio Summary for Policy Makers explicita (fig SPM-2, p4), apenas o forçamento radiativo dos gases com efeito de estufa possui um elevado nível de conhecimento científico, (o que já se sabe há décadas !).

Para todos os outros factores, o conhecimento científico é baixo ou médio-baixo.

Conclusões-6

Como o aumento do CO₂ tem sobretudo origem na queima de combustíveis fósseis, e como os problemas ambientais decorrentes da sua utilização e escassez são, esses sim, incontroversos e bem documentados, **TODAS as medidas que promovam a eficiência na utilização da energia e a redução da dependência dos combustíveis fósseis são fundamentais e devem ser prioritárias.**

Conclusões-7

Em contrapartida, o combate às emissões, só por si, a pretexto de alterações climáticas é socialmente grave e manipulatório, **não só porque o CO2 não é o principal gás com efeito de estufa** mas também porque faz esquecer um importantíssimo conjunto de outros factores de alteração climática, de que são exemplo as alterações no uso do solo.

Legítima também o financiamento público de miragens tecnológicas como sejam a captura, e armazenamento do CO2 (CCS), ou a energia nuclear

Conclusões-8

A fixação pública na ideia de que as alterações climáticas são fundamentalmente devidas às emissões CO₂ e GEE, **leva à convicção de que sem tais emissões não haverá desastres climáticos** tais como cheias, secas, ondas de calor, furacões, subida das águas do mar etc, quando a evidencia científica é a de que tais variações naturais do clima sempre existiram e continuarão a existir, **e que as suas consequências serão tanto mais graves quanto mais urbanizarmos em leitos de cheia, mais impedirmos a infiltração da água no solo, mais construimos sobre dunas e arribas ,etc.**

Energia Nuclear e CO2

- The Guardian, Monday January 7 2008

Energy secretary John Hutton is to announce the government's decision on the proposed nuclear programme this week.

The companies have also demanded a government guarantee on a minimum price of carbon over the lifetime of the stations - possibly up to 50 years.

With the cost of carbon high, nuclear energy has an edge over fossil fuels under the nascent EU emissions trading scheme, but were it to collapse, the long term viability of nuclear would be threatened.