

How Can Wise Climate Policy Be Informed by Sound Climate Science?

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CO₂ Conference, Kona, Hawaii, 28 - 30 November 2007





Intergovernmental Panel on Climate Change

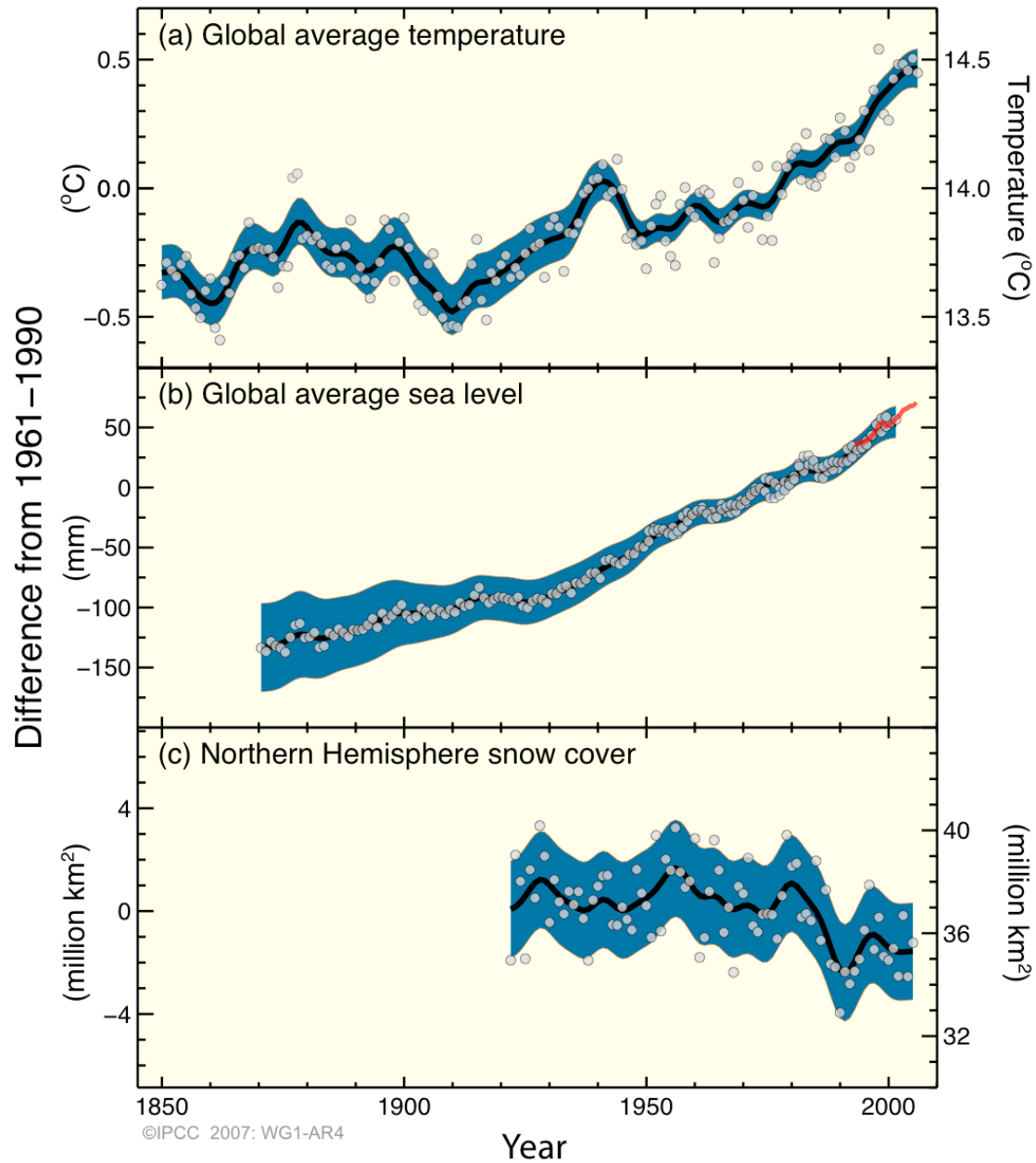
Working Group One Summary for Policymakers, Paris,
January-February 2007.

More than 100 governments unanimously approved it.

IPCC Coordinating Lead Authors were present.

The science was never compromised.

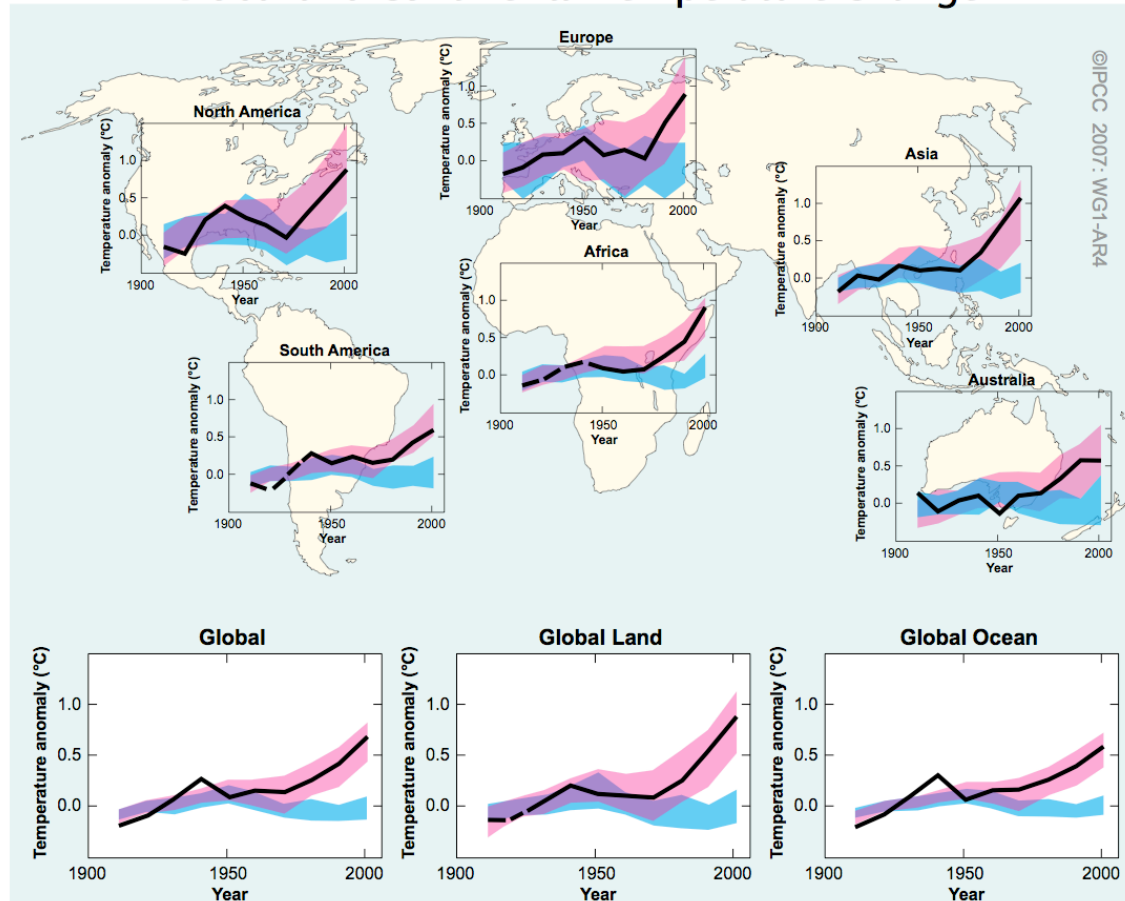
Changes in Temperature, Sea Level and Northern Hemisphere Snow Cover



*Updated:
13 Feb 07*

Figure SPM-3

Global and Continental Temperature Change



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Figure SPM-4

“Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.”

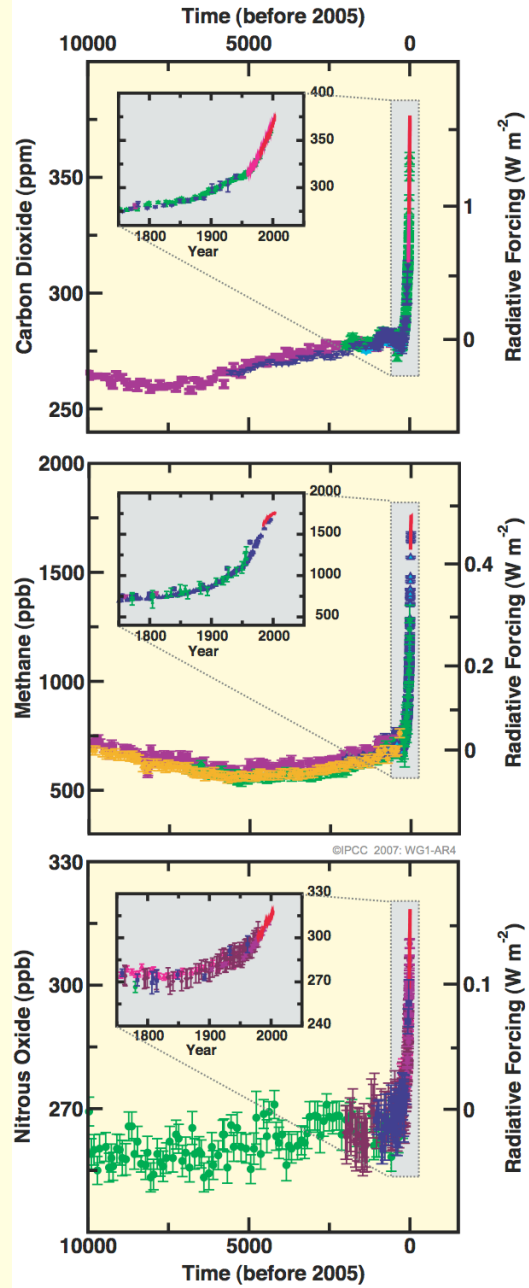
- IPCC, Paris, 2 February 2007.

“Most of the observed increase in globally averaged temperatures since the mid-20th century is *very likely* due to the observed increase in anthropogenic greenhouse gas concentrations.”

- IPCC, Paris, 2 February 2007.

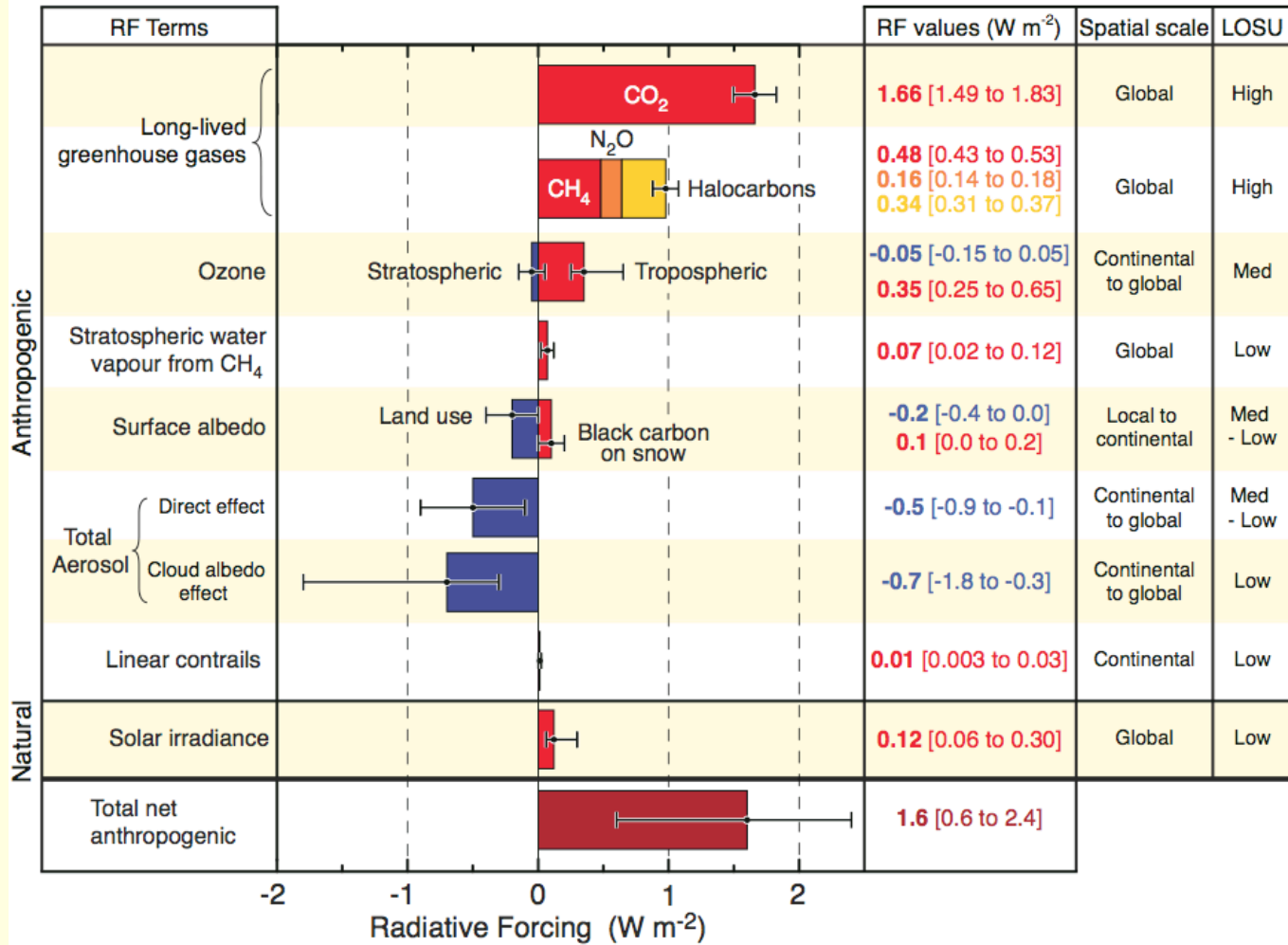
(‘*very likely*’ means at least 90% probable)

Changes in Greenhouse Gases from ice-Core and Modern Data



Updated:
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Figure SPM-1

Radiative Forcing Components



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*Updated:
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Figure SPM-2

Some observational evidence of climate change

The largest CO₂ growth rate is in the most recent decade.

Earth is now 0.76 degrees Celsius warmer than in 1860.

North Atlantic hurricanes have intensified since 1970.

Arctic temperatures increased at twice the global rate.

Arctic sea ice has shrunk by 2.7% per decade.

11 of the last 12 years are in the 12 warmest since 1850.

The ocean is warming to depths of at least 3,000 meters.

Some projections of future climate change

Sea level will rise 0.2 to 0.6 meters in the 21st century - with caveats.

Larger values cannot be excluded.

Over the next 20 years, expect 0.2 degrees C per decade further warming.

More projections of future climate change

Ocean acidity will increase 0.14 to 0.35 pH units by 2100.

Snow cover and sea ice will contract.

Heat waves and heavy precipitation will be more frequent.

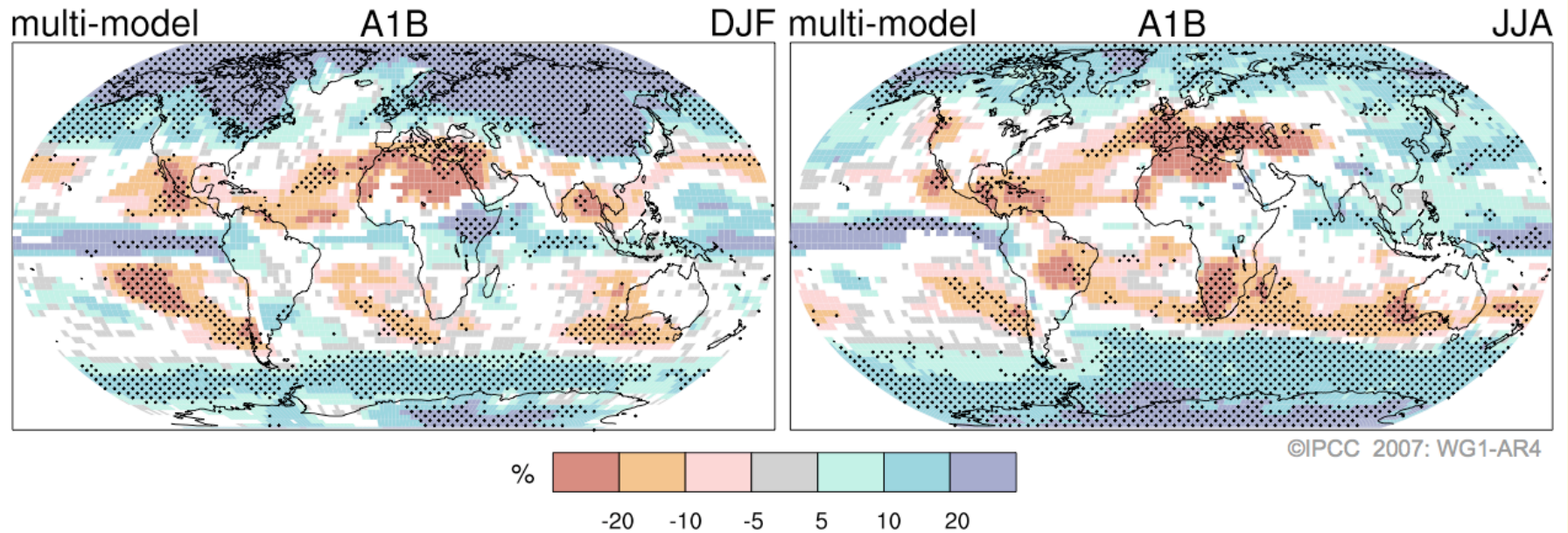
Future tropical cyclones will become more intense.

Warming and sea level rise will continue for centuries.

Atlantic meridional overturning circulation will slow.

Precipitation will increase in high latitudes, decrease in low.

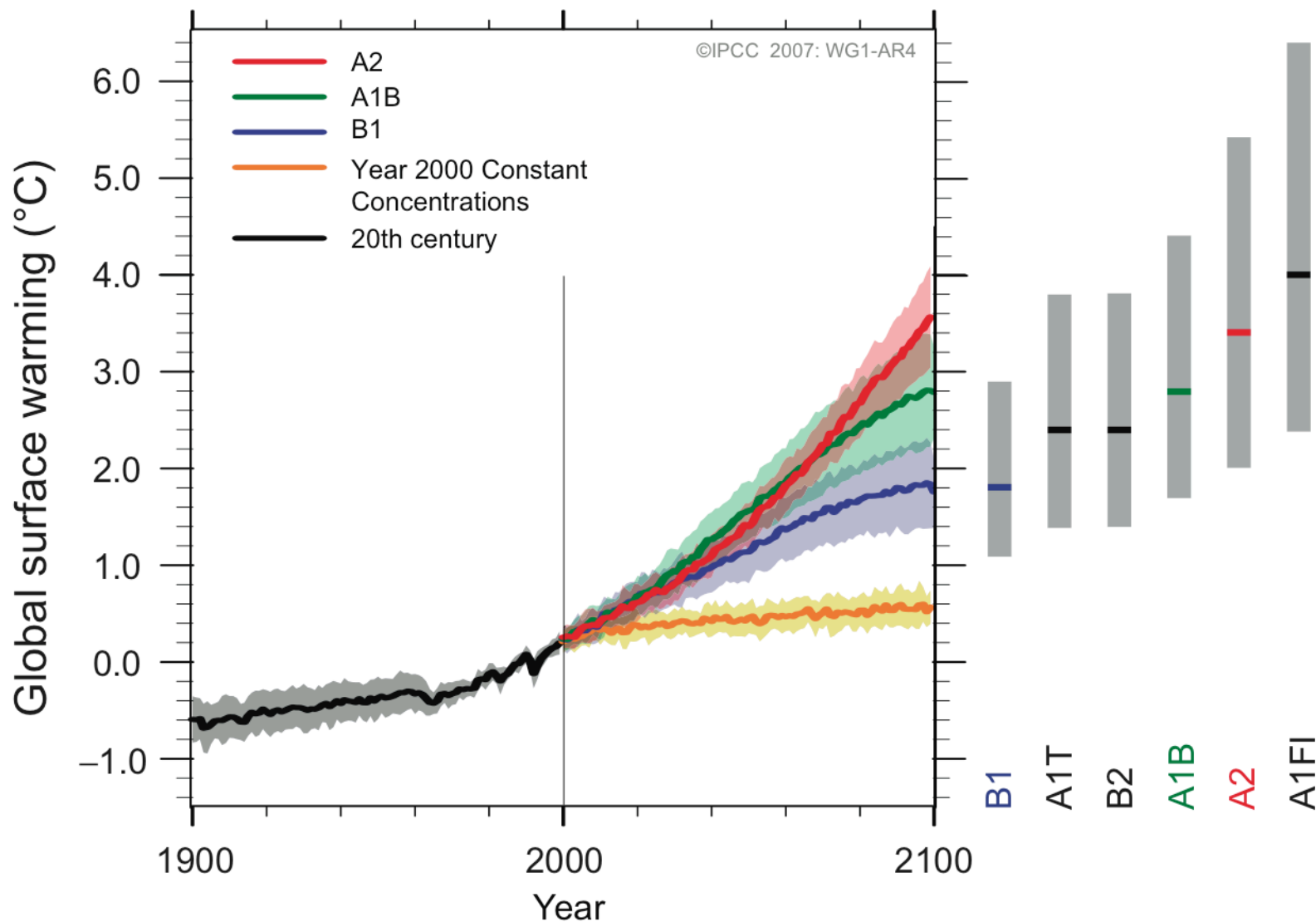
Projected Patterns of Precipitation Changes



*Updated:
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Figure SPM-7

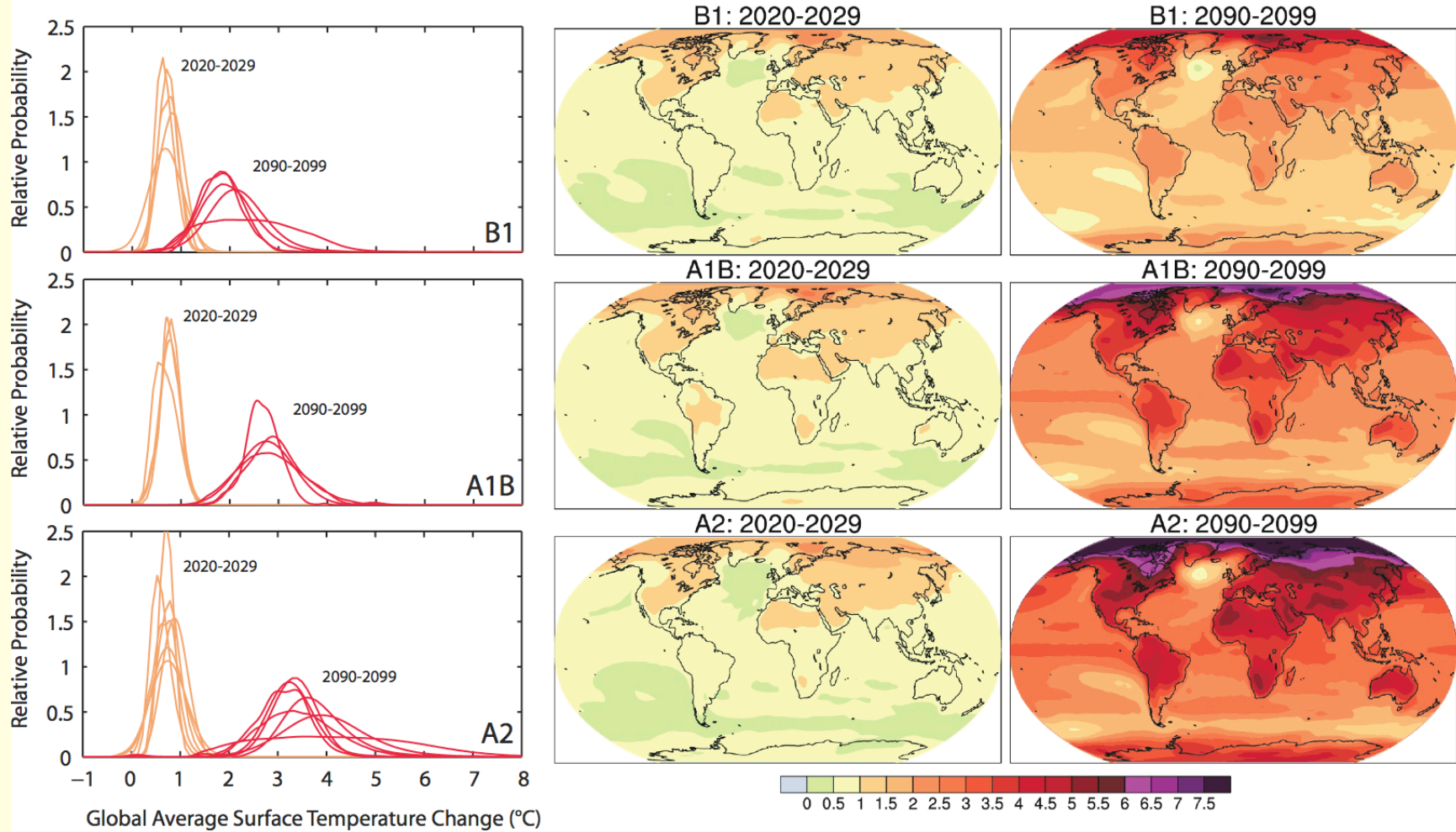
Multi-model Averages and Assessed Ranges for Surface Warming



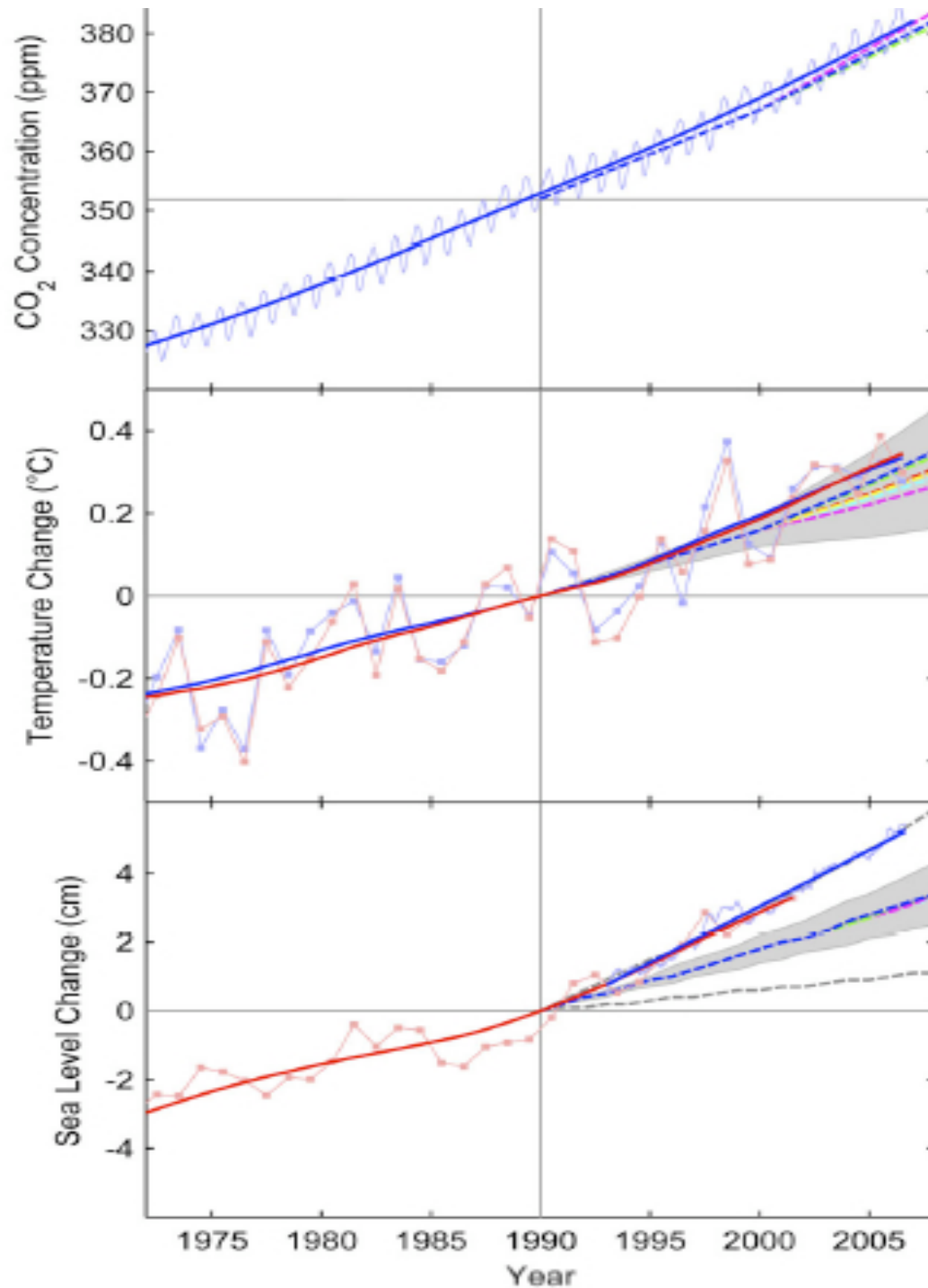
Updated: 13 Feb 2007

Figure SPM-5

AOGCM Projections of Surface Temperatures



Updated:
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Figure SPM-6



Recent Climate Observations Compared to Projections

Stefan Rahmstorf, Anny Cazenave, John A. Church, James E. Hansen, Ralph F. Keeling, David E. Parker, Richard C. J. Somerville

Science, 4 May 2007

Assessing earlier IPCC projections

“Overall, these observational data underscore the concerns about global climate change.

Previous projections, as summarized by IPCC, have not exaggerated but may in some respects even have underestimated the change, in particular for sea level.”

Sound science can inform wise policy

IPCC is policy-neutral. Individual scientists (like me) are free to advocate policy. Several of us think as follows :

The next round of focused negotiations for a new global climate treaty begins in December 2007 in Bali.

The goal should be to limit warming to 2 °C above the pre-industrial temperature.

This limit has already been formally adopted by the European Union.

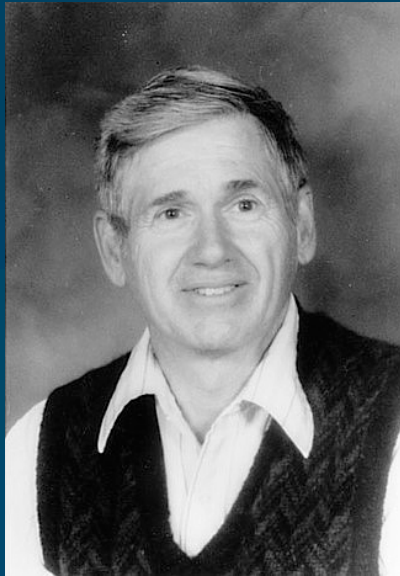
What policy would be wise?

This 2 °C goal requires reducing global greenhouse gas emissions by at least 50% below their 1990 levels by the year 2050.

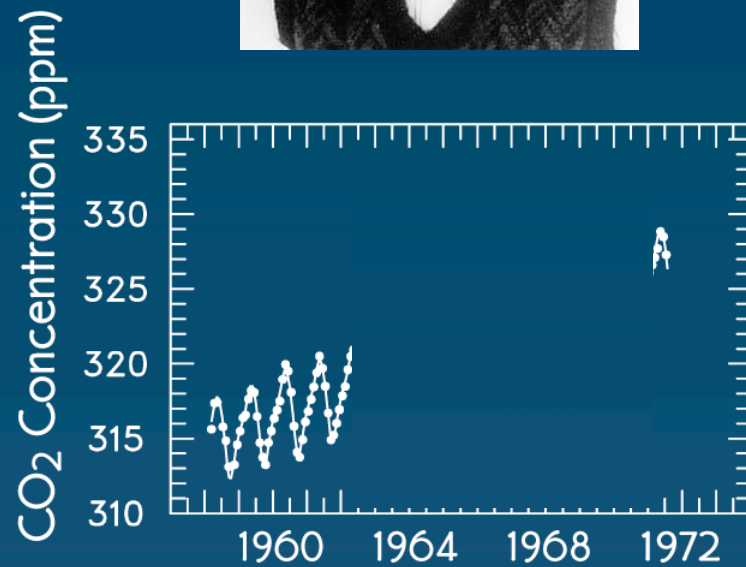
Greenhouse gas concentrations must be stabilized well below 450 ppm, in CO₂-equivalent units.

To stay below 2 °C, global emissions must peak and decline in the next 10 to 15 years.

Thus, this is urgent.



Charles D. Keeling (1928-2005)



*Image credit: Publication of the National Oceanic & Atmospheric Administration (NOAA), NOAA Central Library;
Photo Date: 1982 February; Photographer: Commander John Bortniak, NOAA Corps (ret.)*



