

IPCC Working Group I: The Physical Science Basis

The Physical Science Basis of Climate Change: Latest Findings to be Assessed by WGI in AR5

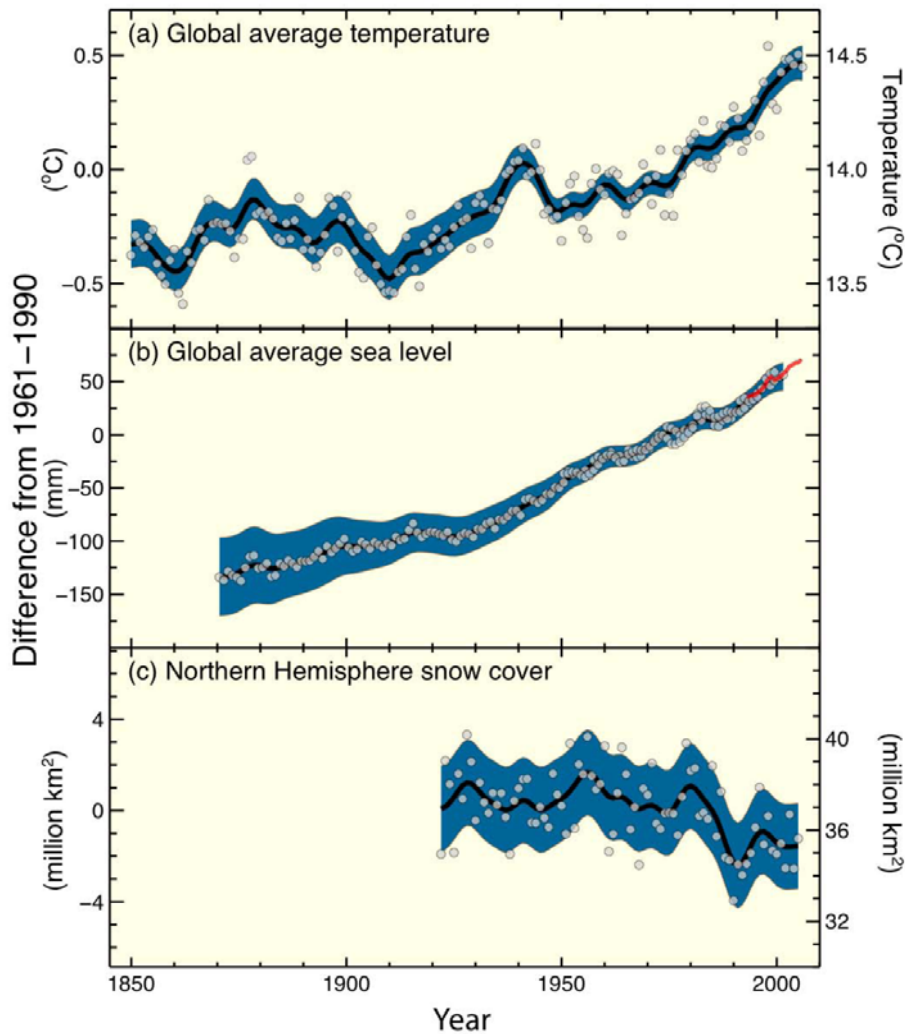
Thomas Stocker

Co-Chair Working Group I
University of Bern, Switzerland

Gian-Kasper Plattner

Deputy Head, Director of Science
TSU WGI, University of Bern

The Physical Science Basis: Latest Findings to be Assessed by WGI in AR5



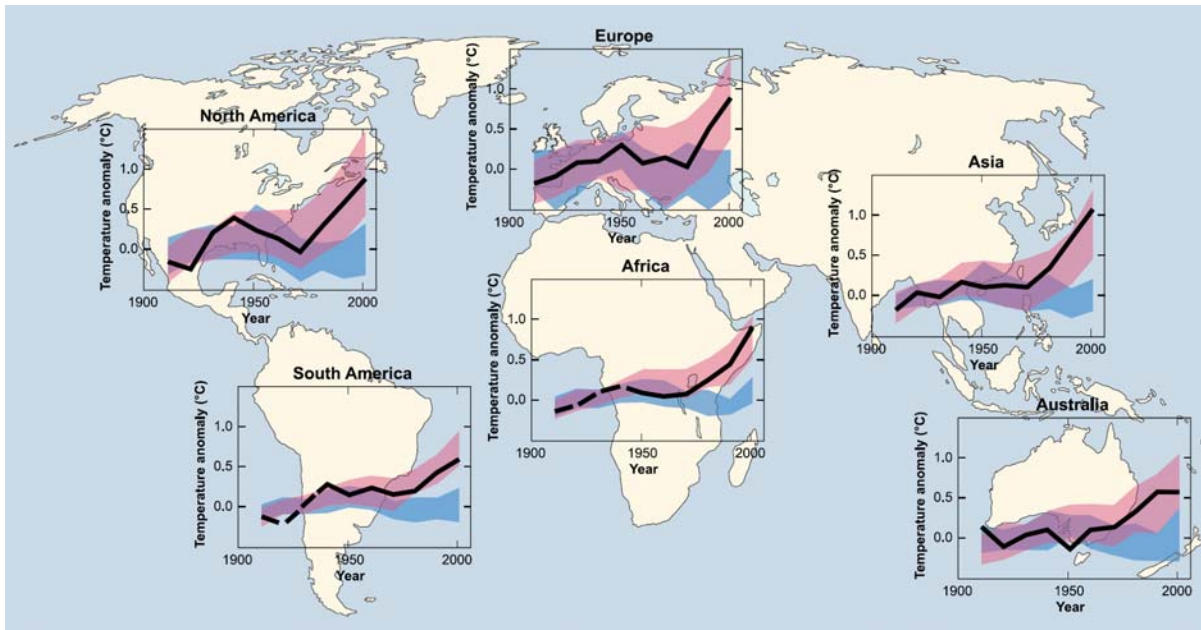
(IPCC, 2007, Fig. SPM-3)

IPCC (2007):

Warming in the climate system is unequivocal...

IPCC (2007):

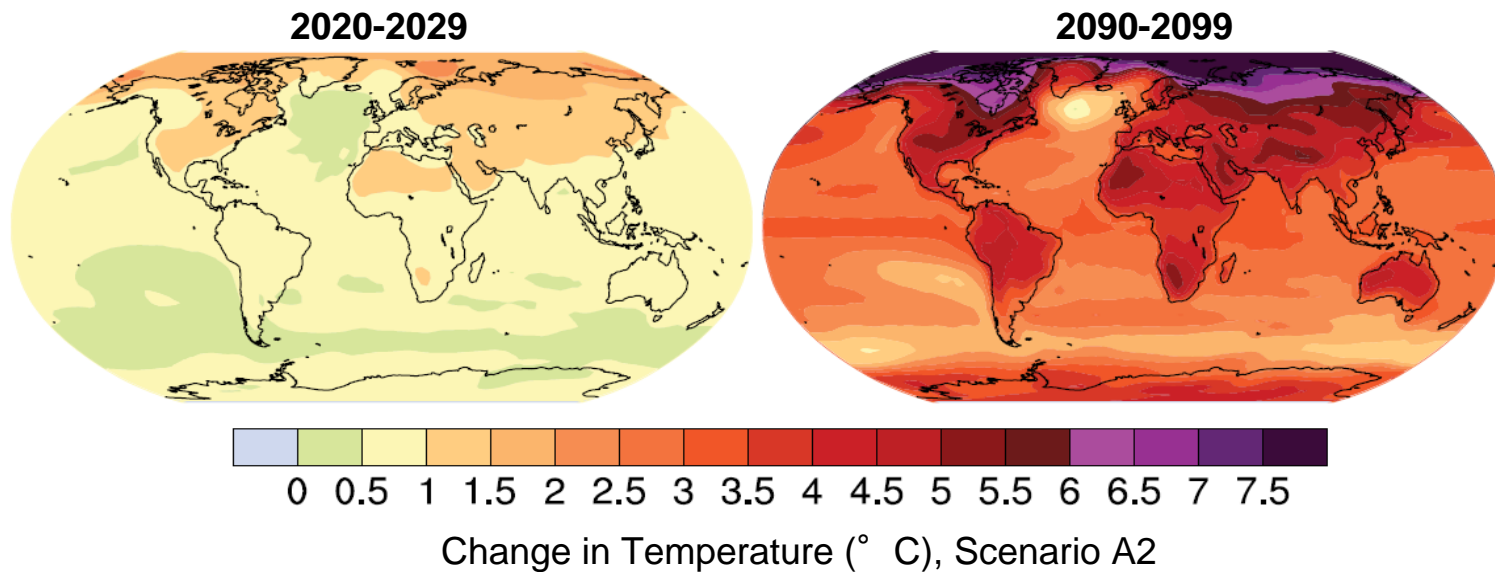
*Most of the observed increase in global averaged temperature ... is **very likely** due to ... increase in GHG concentrations.*



(IPCC, 2007, Fig. WGI-SPM-4)

IPCC (2007):

*Continued GHG emissions ... would induce many changes ... that would **very likely** be larger than those observed ...*



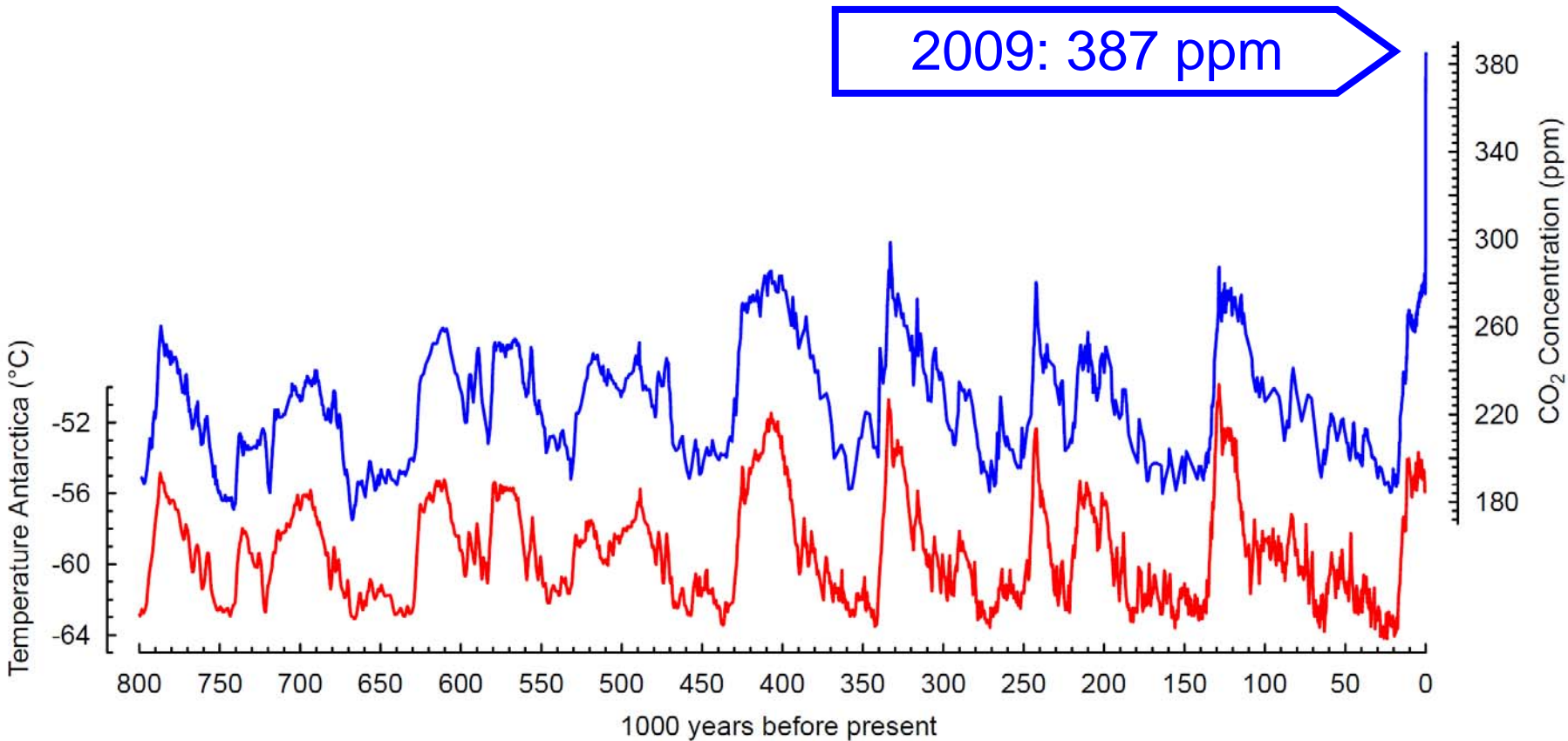
(IPCC, 2007, Fig. WGI-SPM-6)

Some policy-relevant findings to be assessed in AR5:

Observations (3 examples)

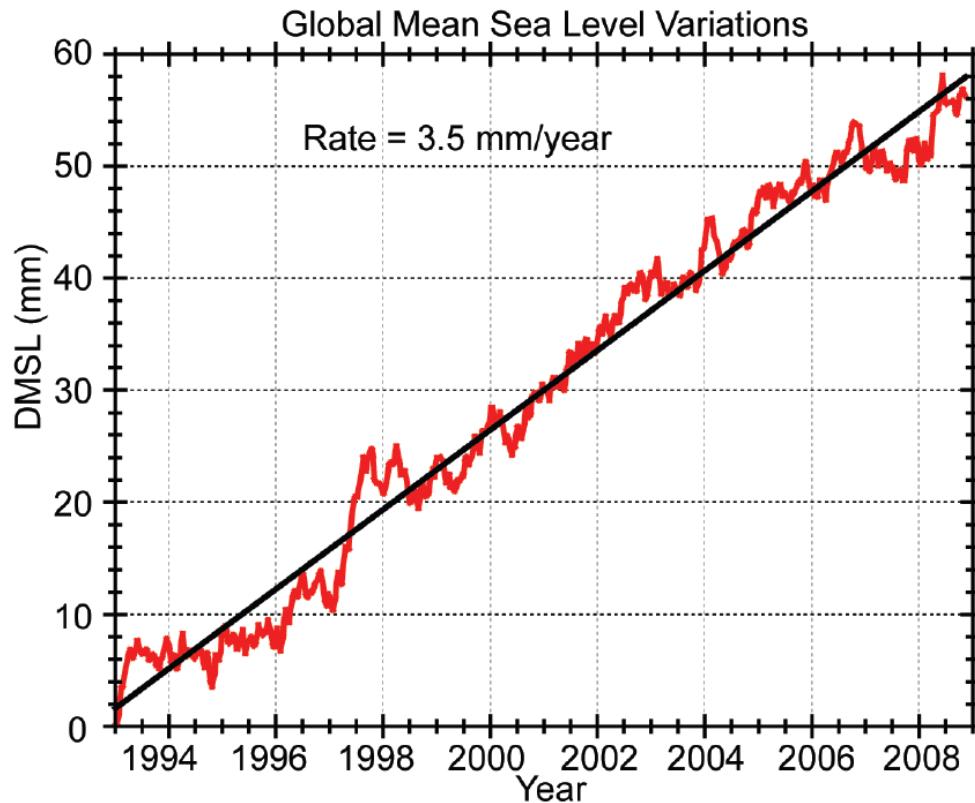
Projections (3 examples)

1. CO₂: Higher levels and more rapid increase



(Siegenthaler et al., 2005; Lüthi et al., 2008, NOAA)

3. Persistent sea-level rise consistent with earlier estimates



(Merrifield et al., 2009, in BAMS)

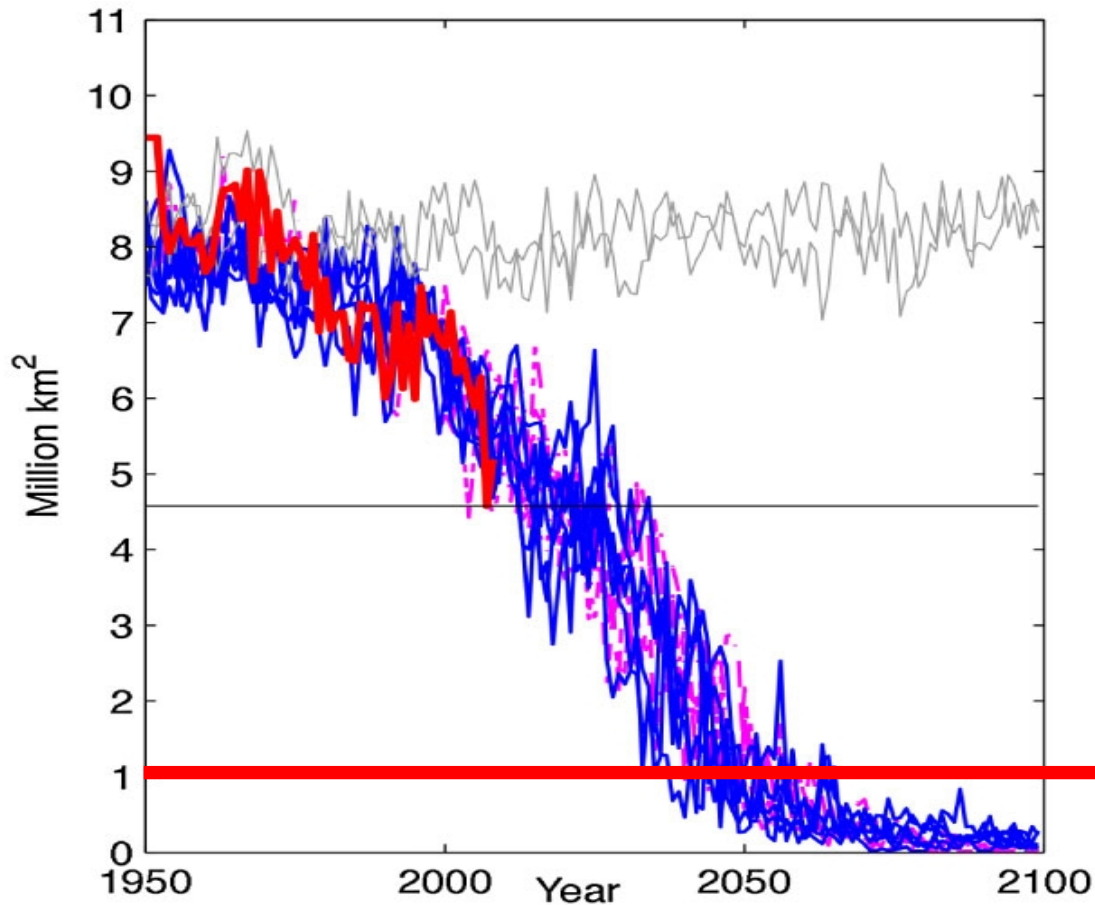
Merrifield et al., 2009:

[1993–2008] (3.5 ± 0.4) mm/yr

IPCC 2007:

[1993–2003] (3.1 ± 0.7) mm/yr

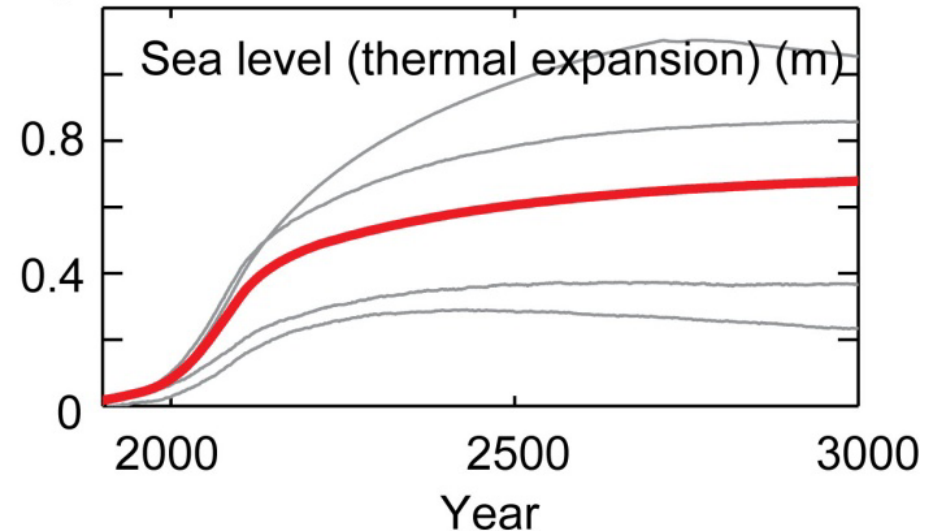
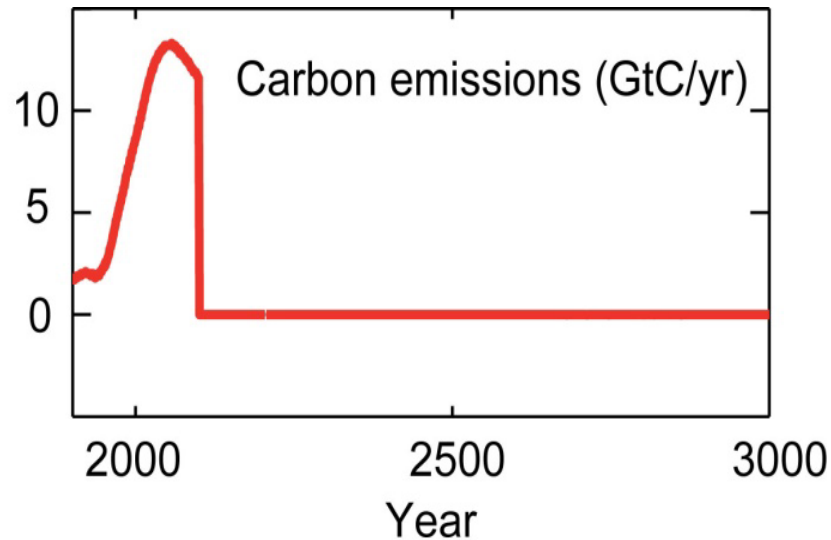
4. Rapid loss of Arctic sea ice



(Wang and Overland, 2009)

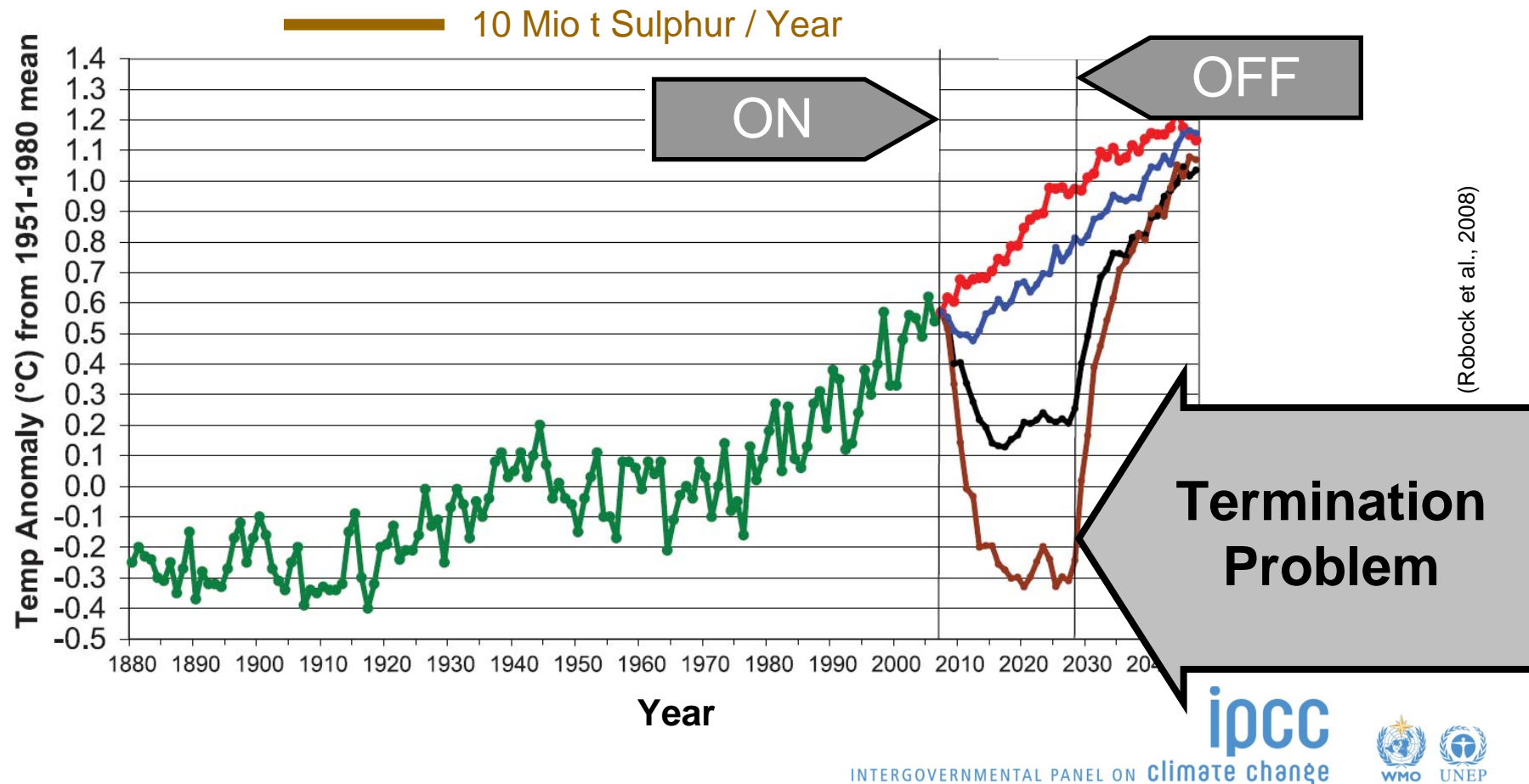
ice-free

5. Long-term commitment and irreversibility of CO₂ perturbation



(IPCC, 2007, Chapter 10, simplified, Plattner et al. 2008)

6. Abrupt climate changes caused by geoengineering



Conclusions:

- ❖ IPCC WGI **firmly stands behind the conclusions of AR4**, the community of researchers and its individuals providing the scientific basis, and the procedures of IPCC Assessments;
- ❖ The combination of observations and paleoclimate information shows **unprecedented changes in the climate system**, both in amplitude and rate for 100's to many 1000's of years;
- ❖ **Wide-spread melting of ice margins** is observed in Greenland and Antarctica with implications for sea level rise;
- ❖ Emitted CO₂ remains in the atmosphere for 1000's of years causing **irreversible changes in the climate and in ocean chemistry**;
- ❖ Geoengineering methods have an **inherent termination problem** and do not mitigate the direct effects of CO₂ increase.