

Climate Change 2013: The Physical Science Basis

Working Group I contribution to the IPCC Fifth Assessment Report

Climate Change: Too late for 2°C?

Thomas Stocker

Co-Chair IPCC Working Group I
University of Bern, Switzerland

© Yann Arthus-Bertrand / Altitude

Key SPM Messages

19 Headlines

on less than 2 pages

Summary for Policymakers

14,000 Words

14 Chapters & Atlas

1,100,000 Words

ipcc

INTERGOVERNMENTAL PANEL ON climate change

CLIMATE CHANGE 2013

The Physical Science Basis

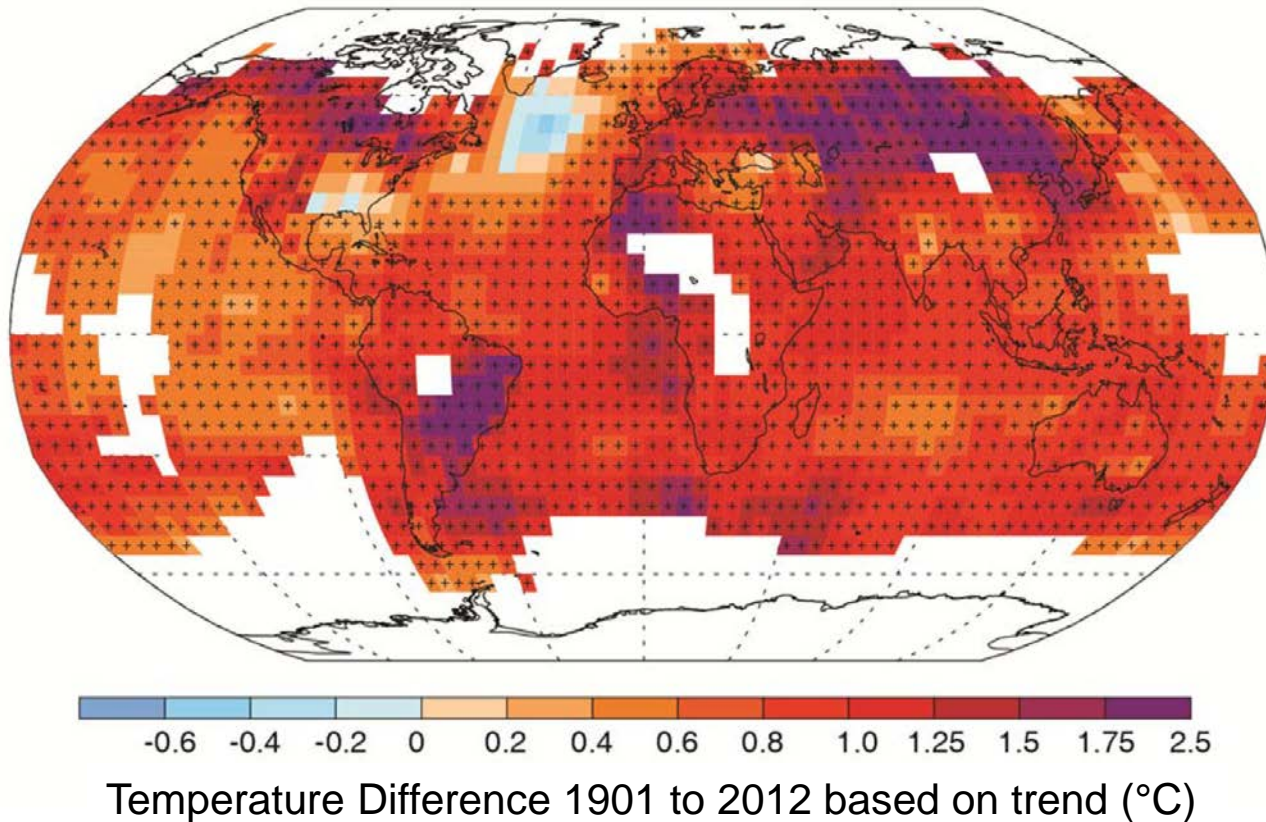
WG I

WORKING GROUP I CONTRIBUTION TO THE
FIFTH ASSESSMENT REPORT OF THE
INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

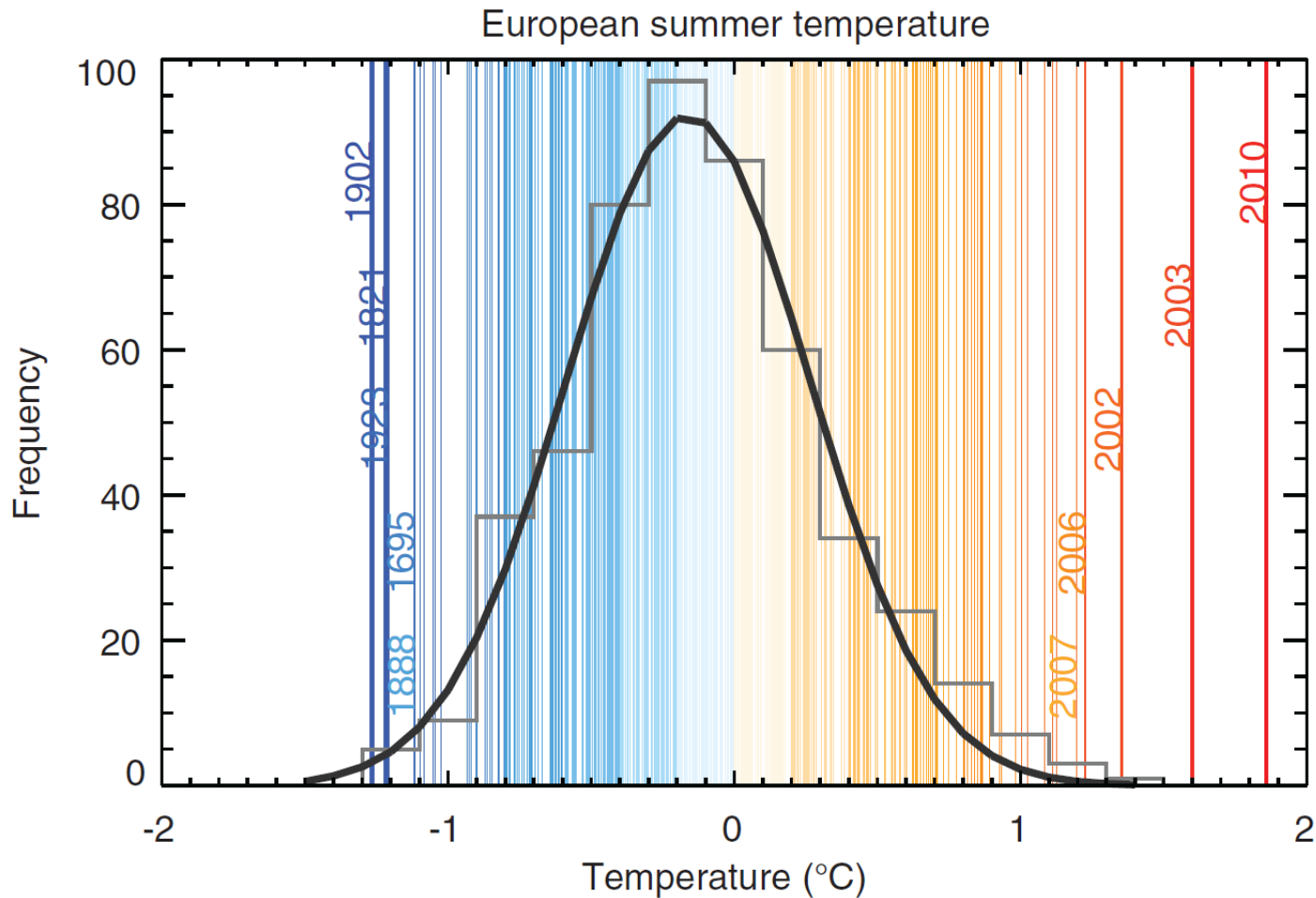


IPCC Assessment Reports (2008–2014)

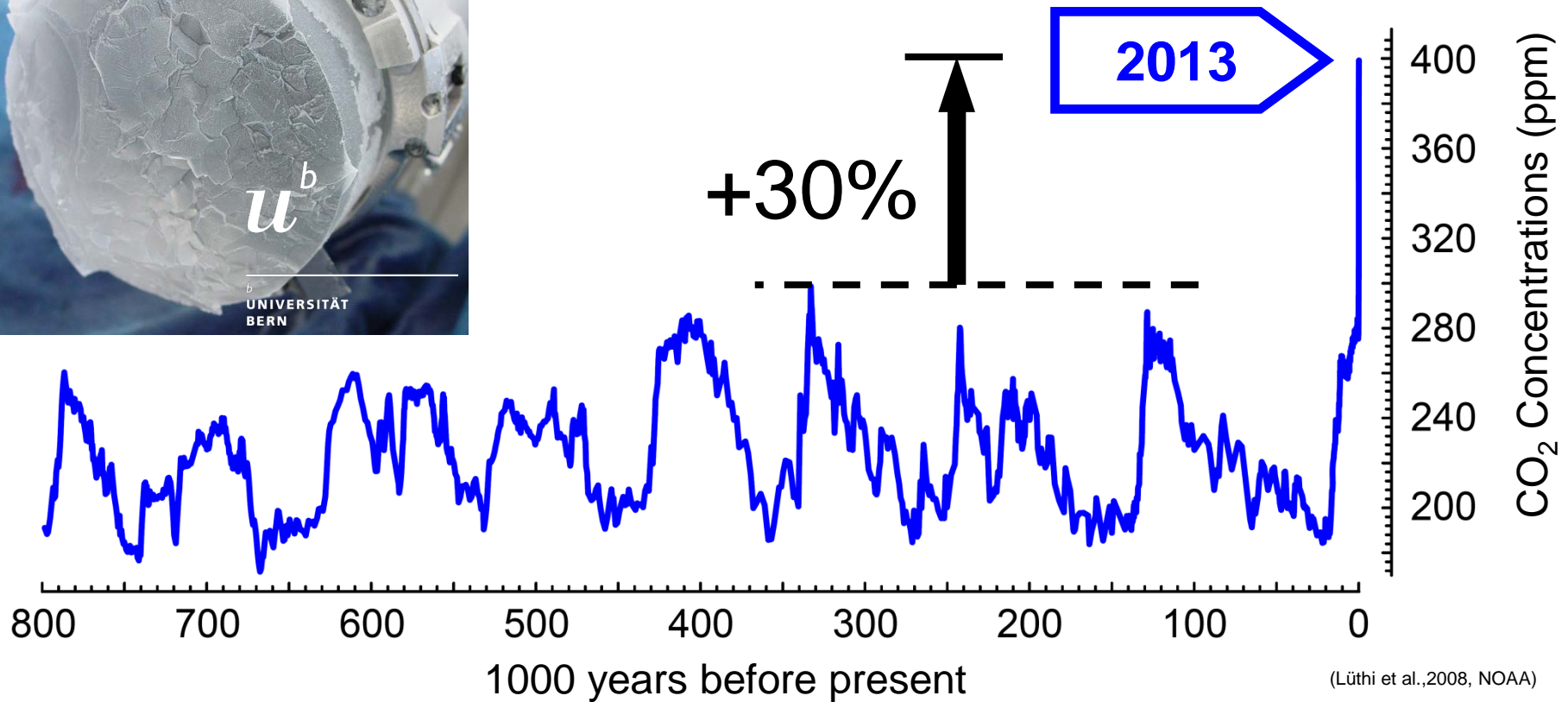




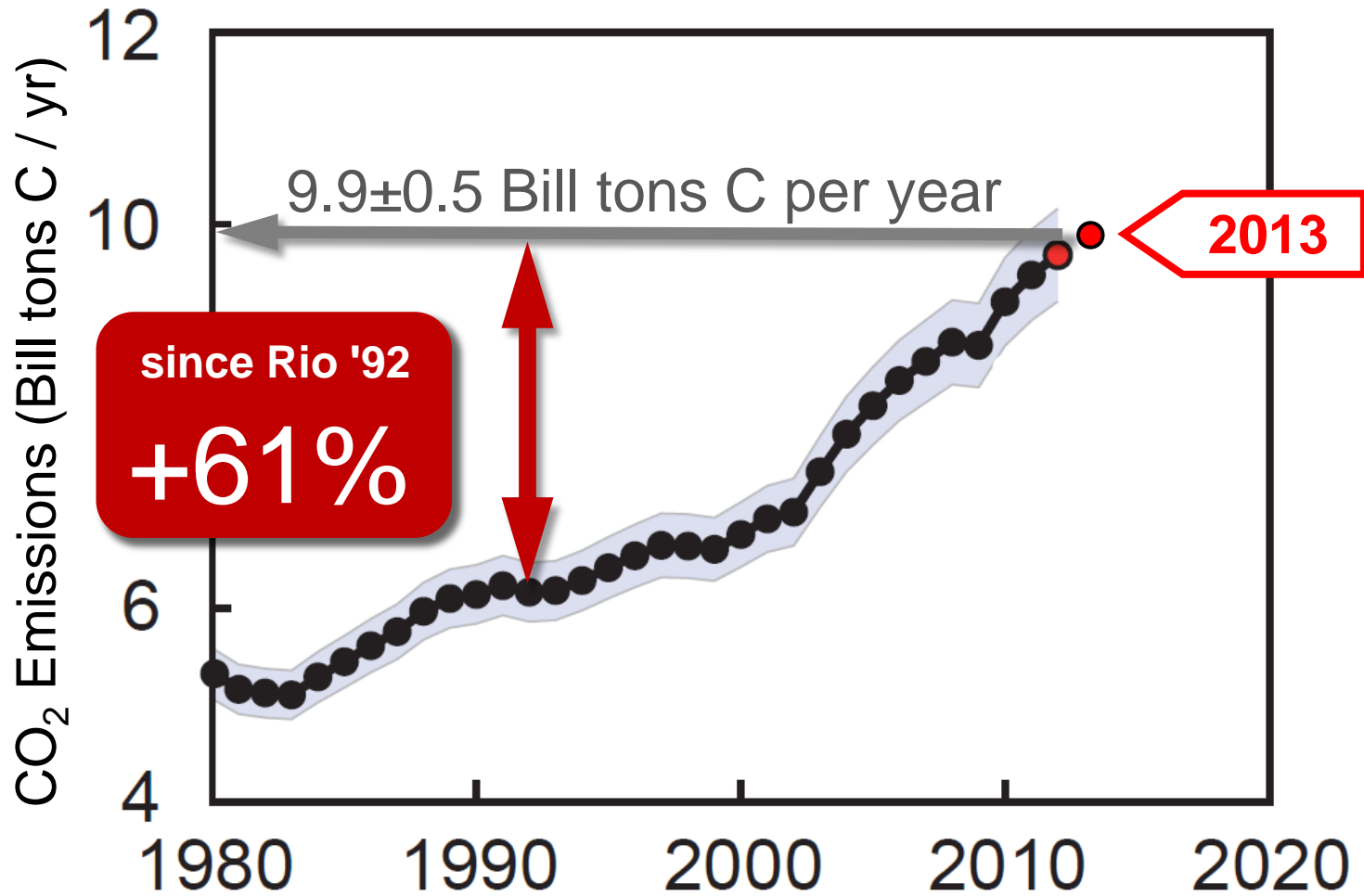
Warming of the climate system
is unequivocal



The five hottest summers in Europe occurred after 2001, the five coldest before 1924.



The concentrations of CO₂ have increased to levels unprecedented in at least the last 800,000 years.

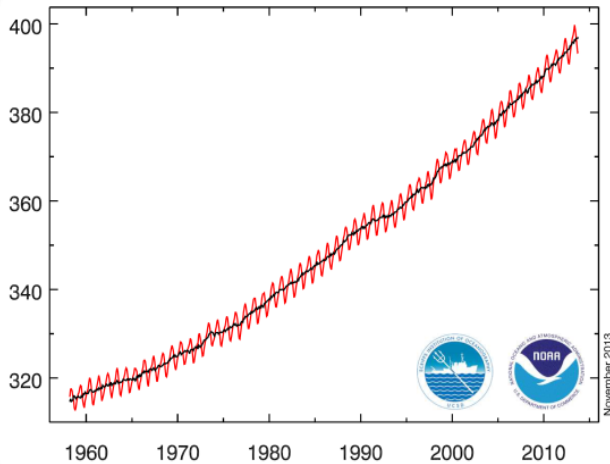


(modified from Peters et al., 2013, Global Carbon Project)

CO₂ emissions by human activity are unprecedented

Worldwide Effects

Cause



atmosphere, land, ocean

extreme events

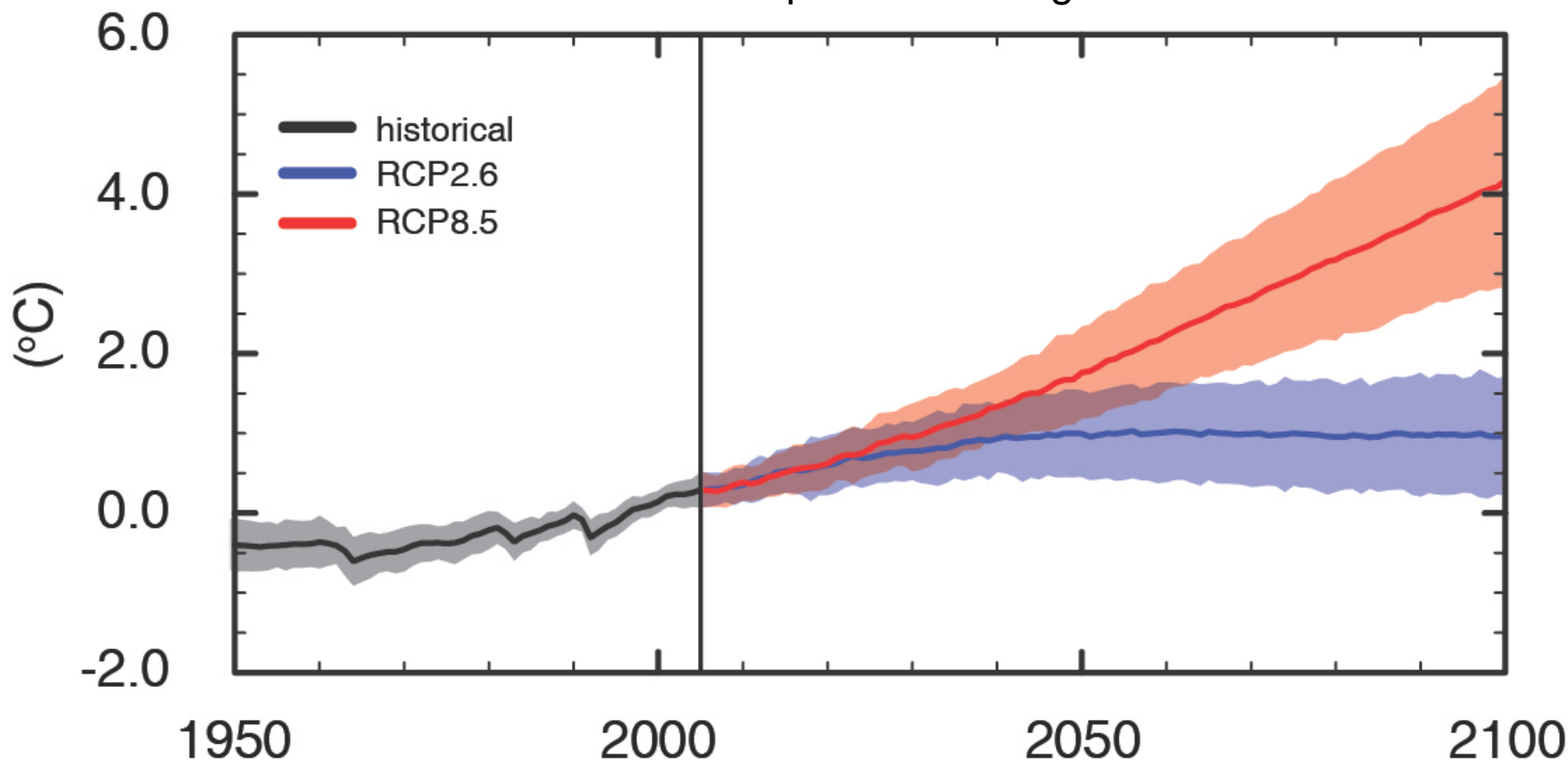
water cycle

sea ice, glaciers, ice sheets

global mean sea level

Human influence on the climate system is clear.

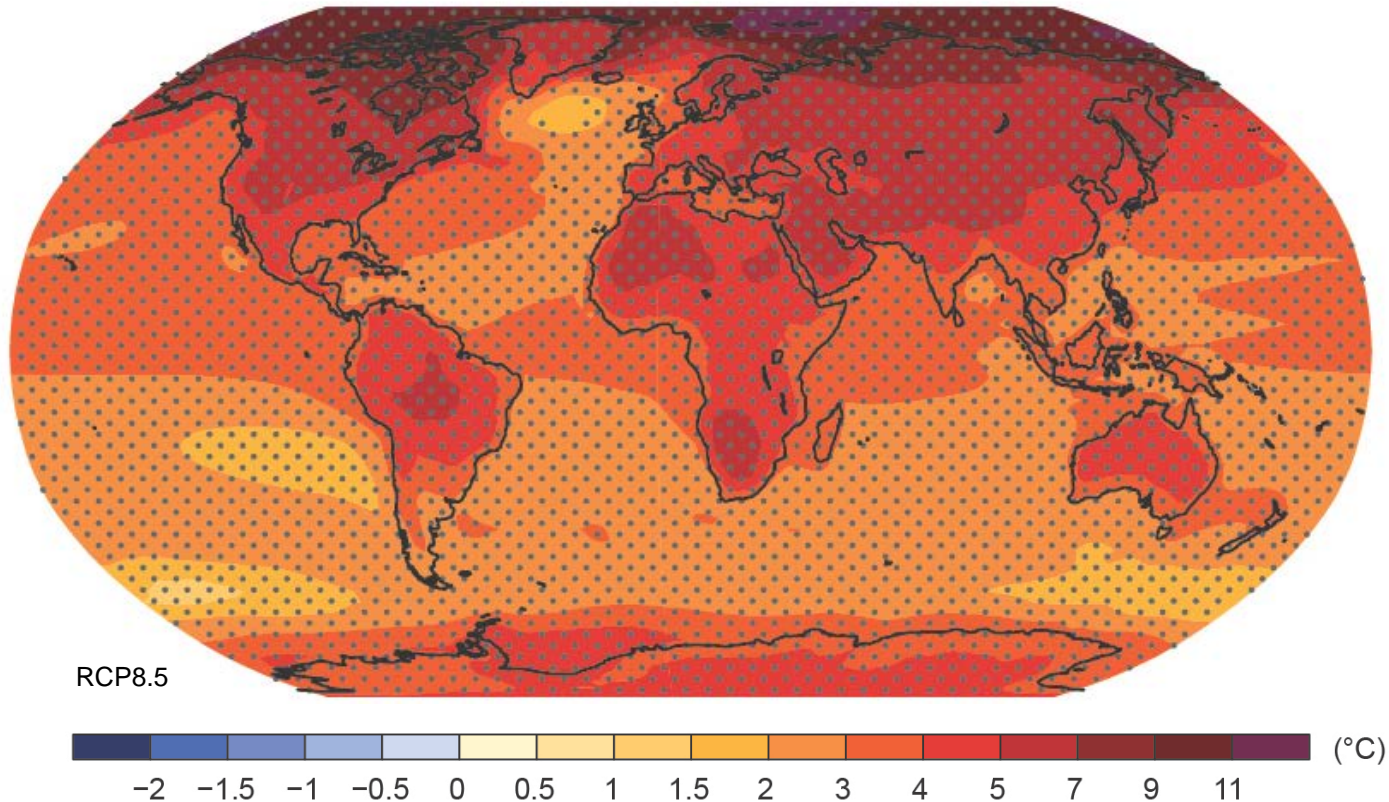
Global mean surface temperature change from 1986-2005



IPCC 2013, Fig. SPM.7a, modified

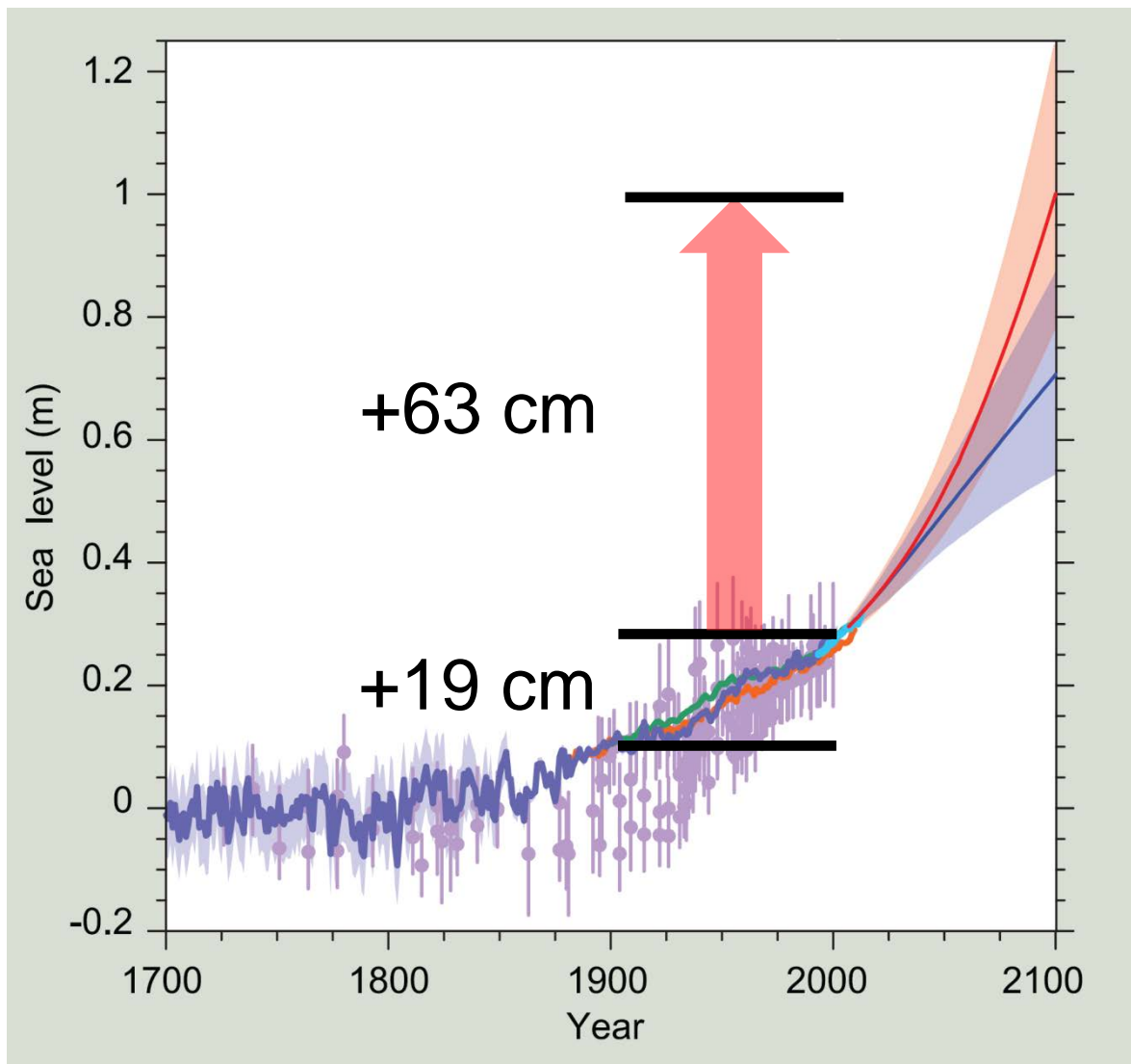
Continued emissions will cause further warming and changes in all components of the climate system.

Change in average surface temperature (1986-2005 to 2081-2100)



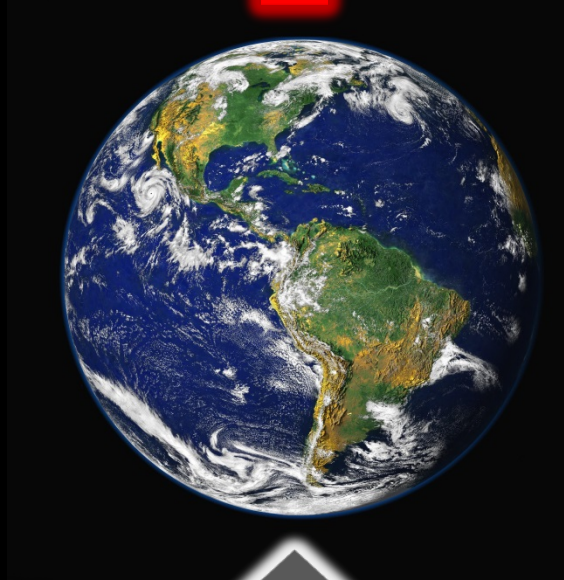
IPCC 2013, Fig. SPM.8a

Continued emissions will cause further warming and changes in all components of the climate system.



IPCC 2013, TFE.2, Fig. 2

Global mean warming

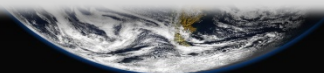


All CO₂ emissions since 1750

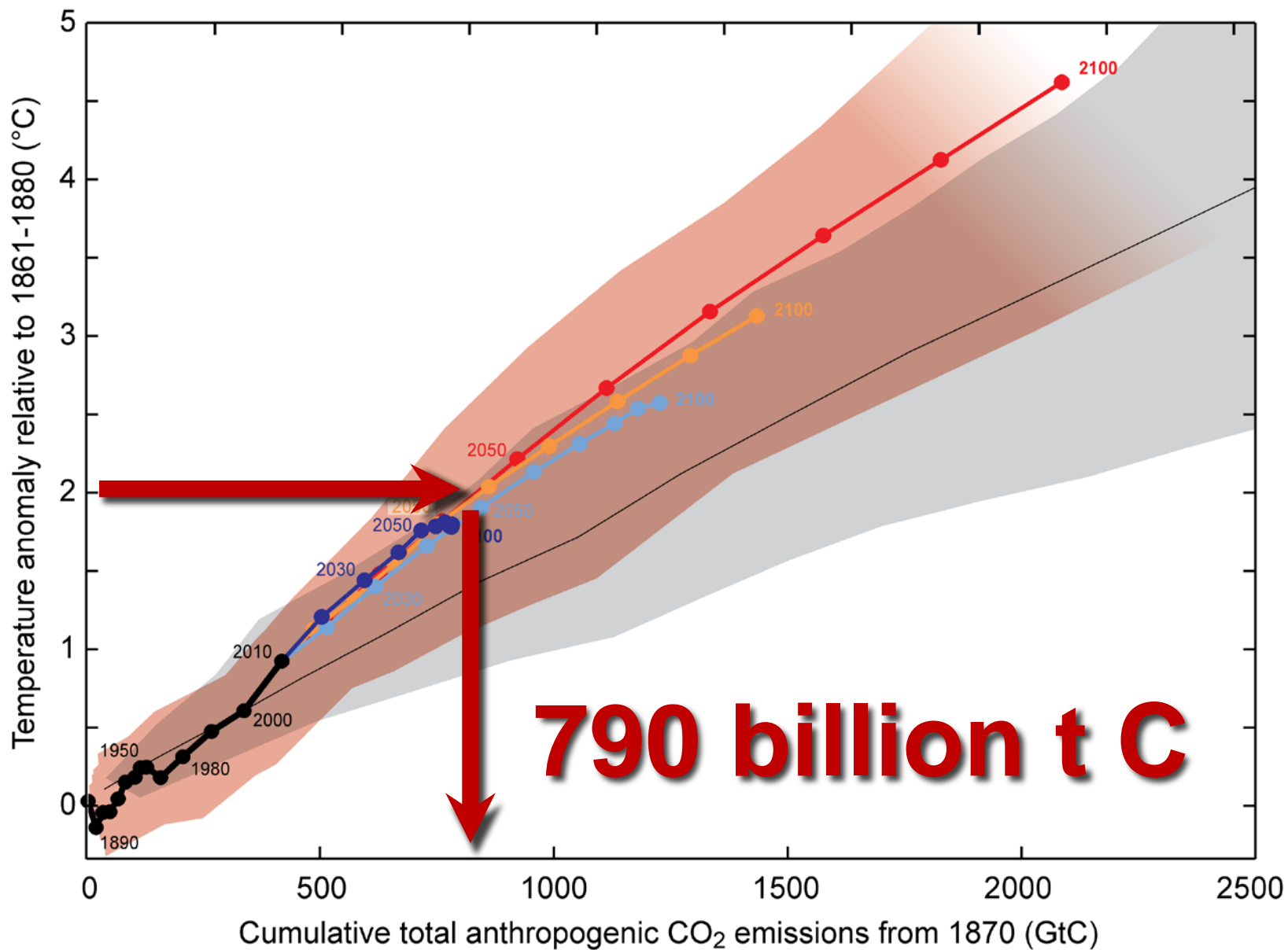
Warming of 0.8 to 2.5°C



**Any climate target implies
a limited carbon budget**



1000 billion tons of carbon



Budget for the 2°C target: 790 bill t C

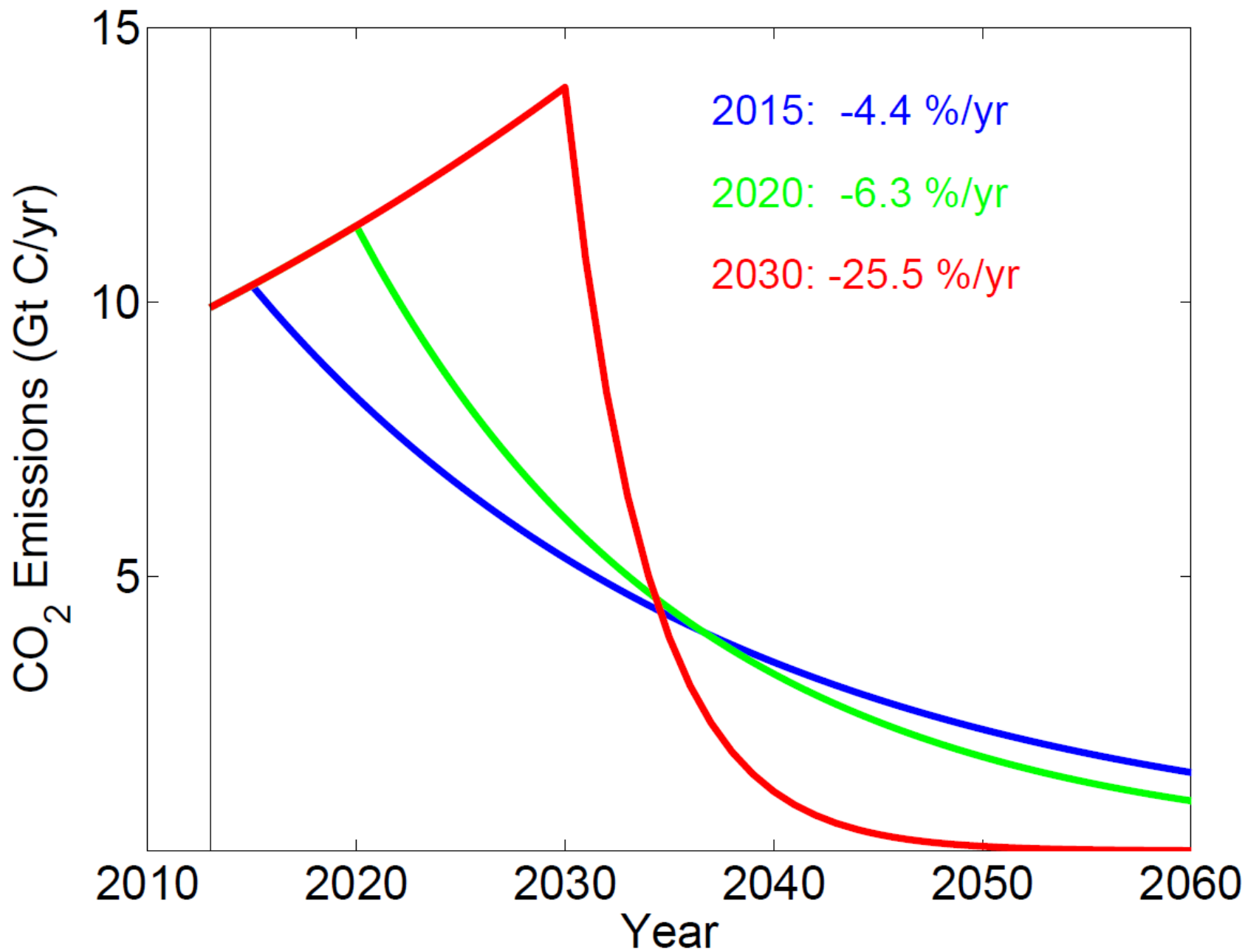
CO₂ emissions until 2013*: –535 bill t C

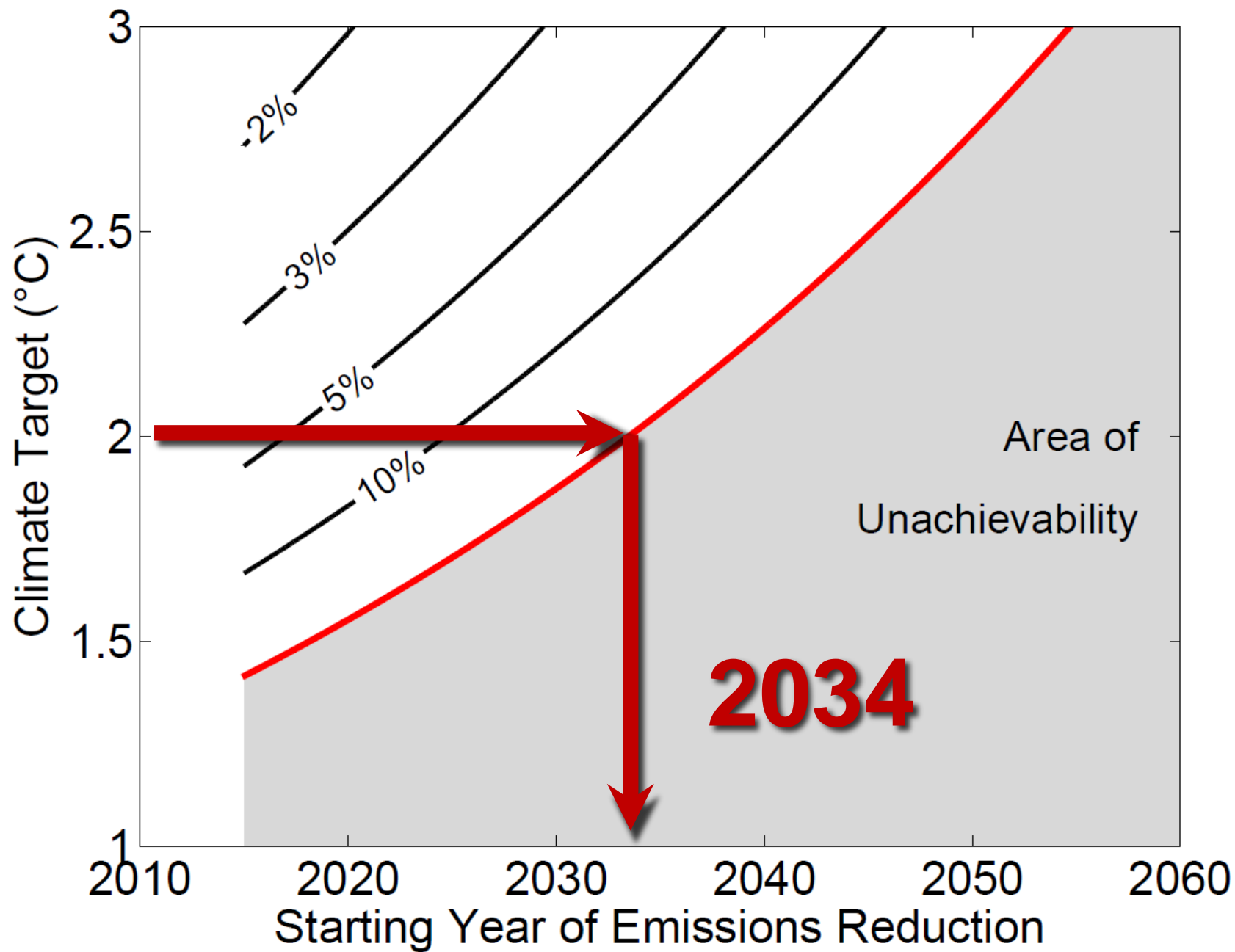
Remaining emissions: 255 bill t C

CO₂ emissions in 2013*: 9.9 bill t C

Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions.

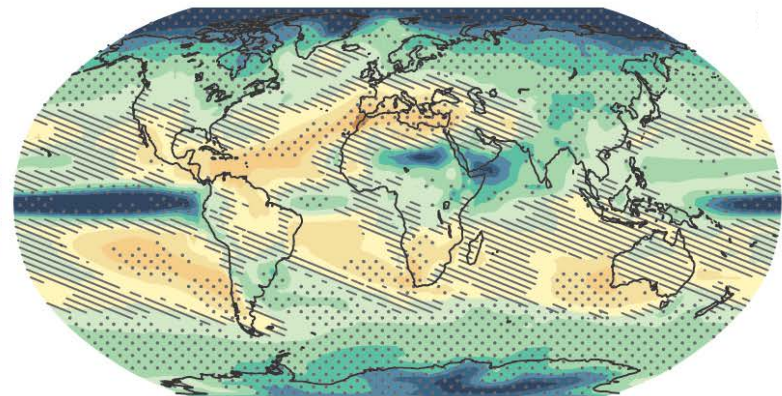
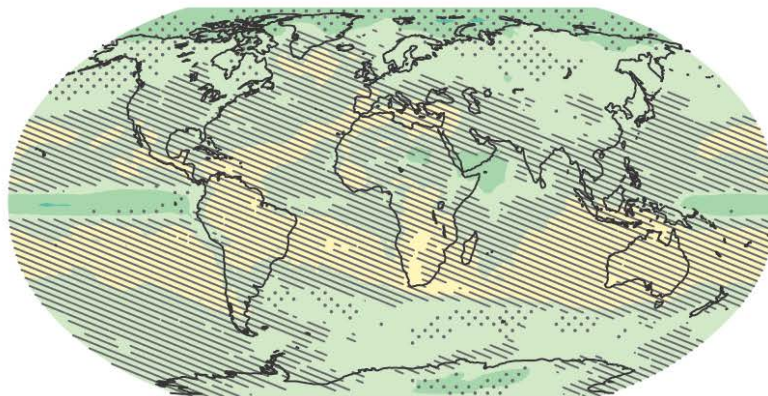
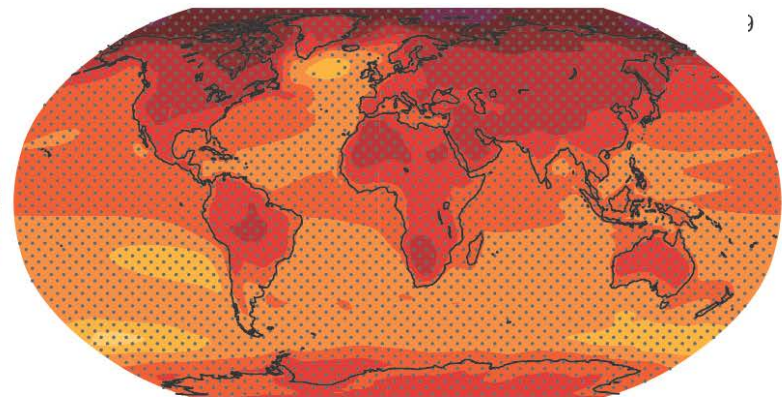
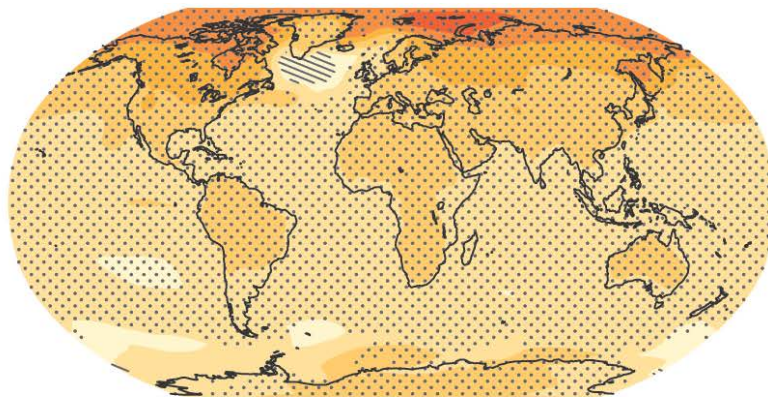
* updated from IPCC 2013, WGI SPM





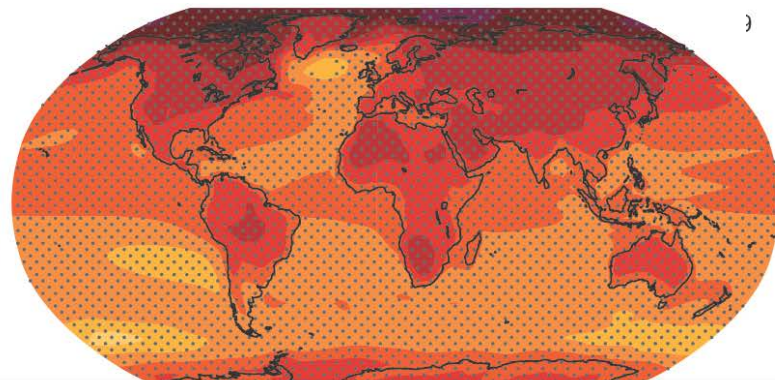
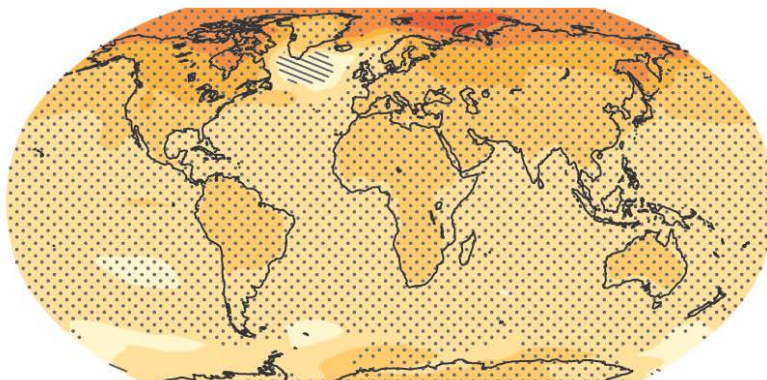
2°C world

4.5°C world



2°C world

4.5°C world



Today we have a choice.

