

Climate Change 2013: The Physical Science Basis

Working Group I contribution to the IPCC Fifth Assessment Report

IPCC 5th Assessment Report: The Physical Science Basis

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Key SPM Messages

19 Headlines

on less than 2 pages

Summary for Policymakers

14,000 Words

14 Chapters & Atlas

1,100,000 Words

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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



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IPCC Assessment Reports since 1990: WGI Contribution



Observations

Understanding

Future

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INTERGOVERNMENTAL PANEL ON climate change

CLIMATE CHANGE 2013

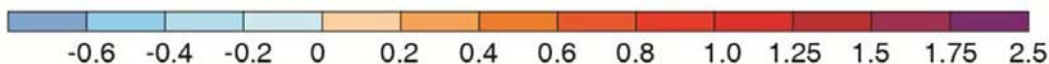
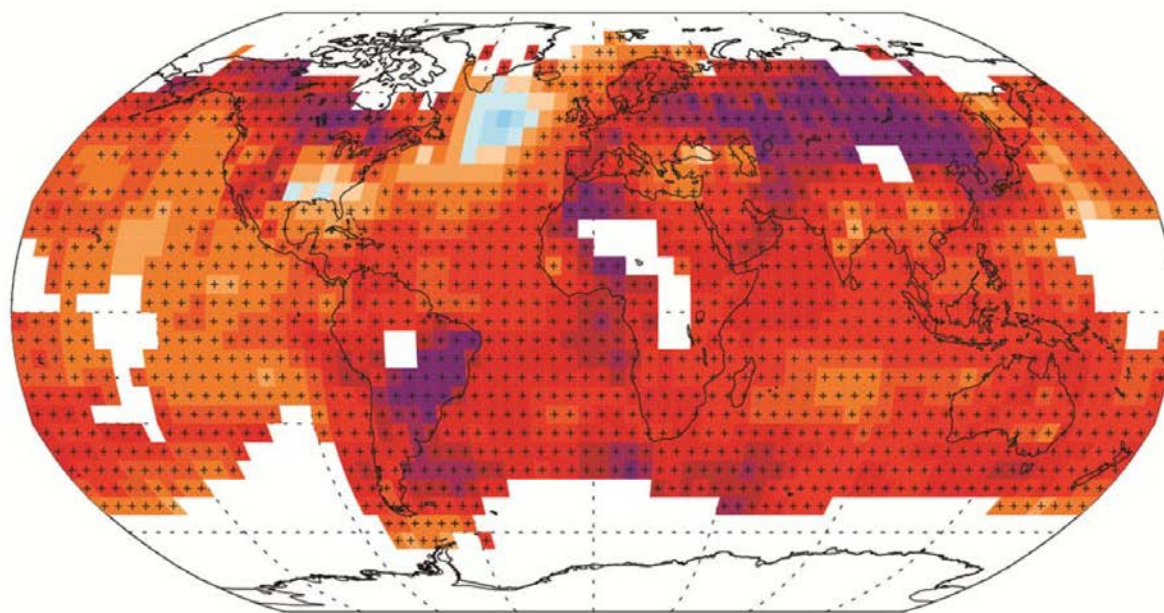
The Physical Science Basis

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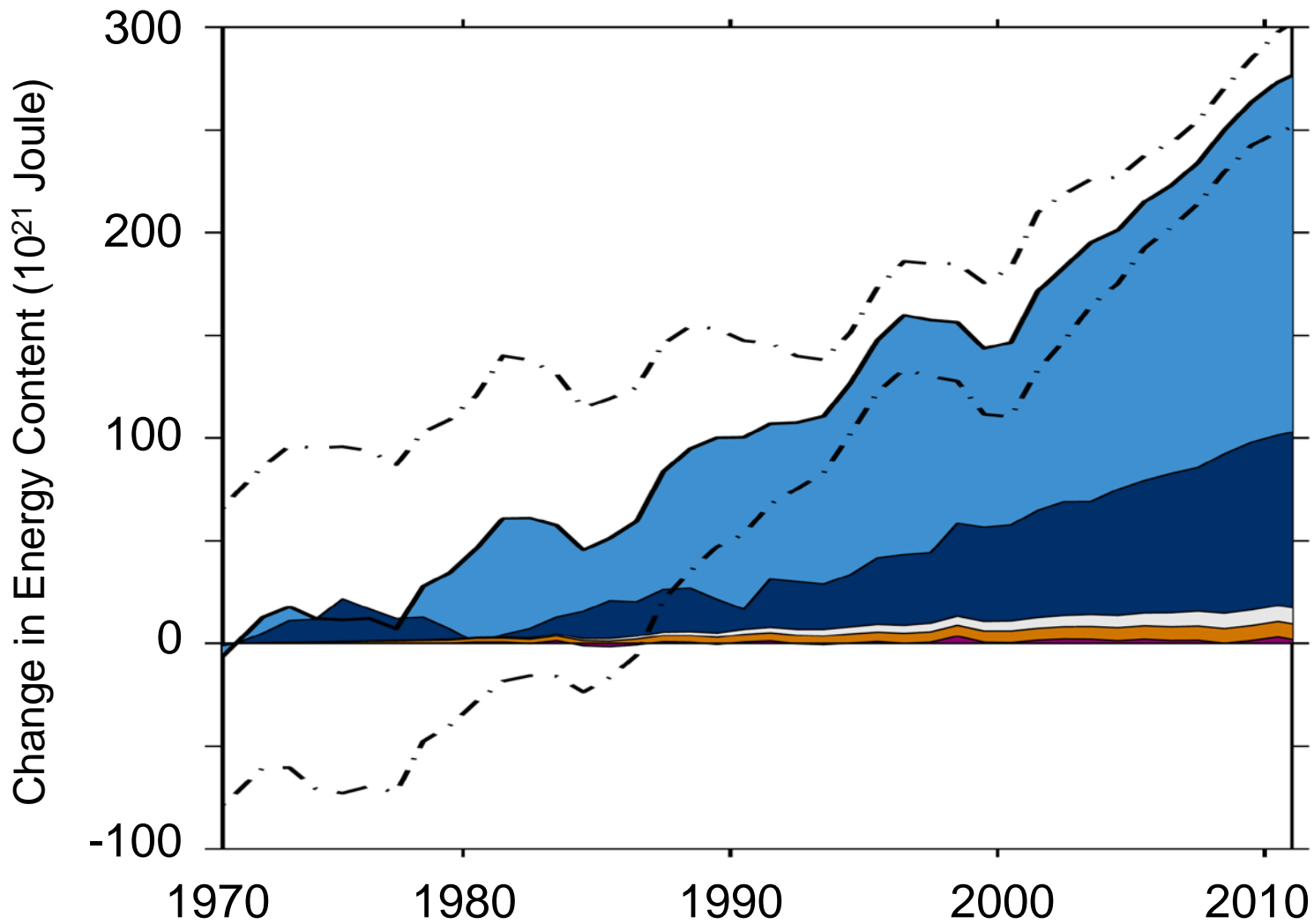


Fig. SPM.1b



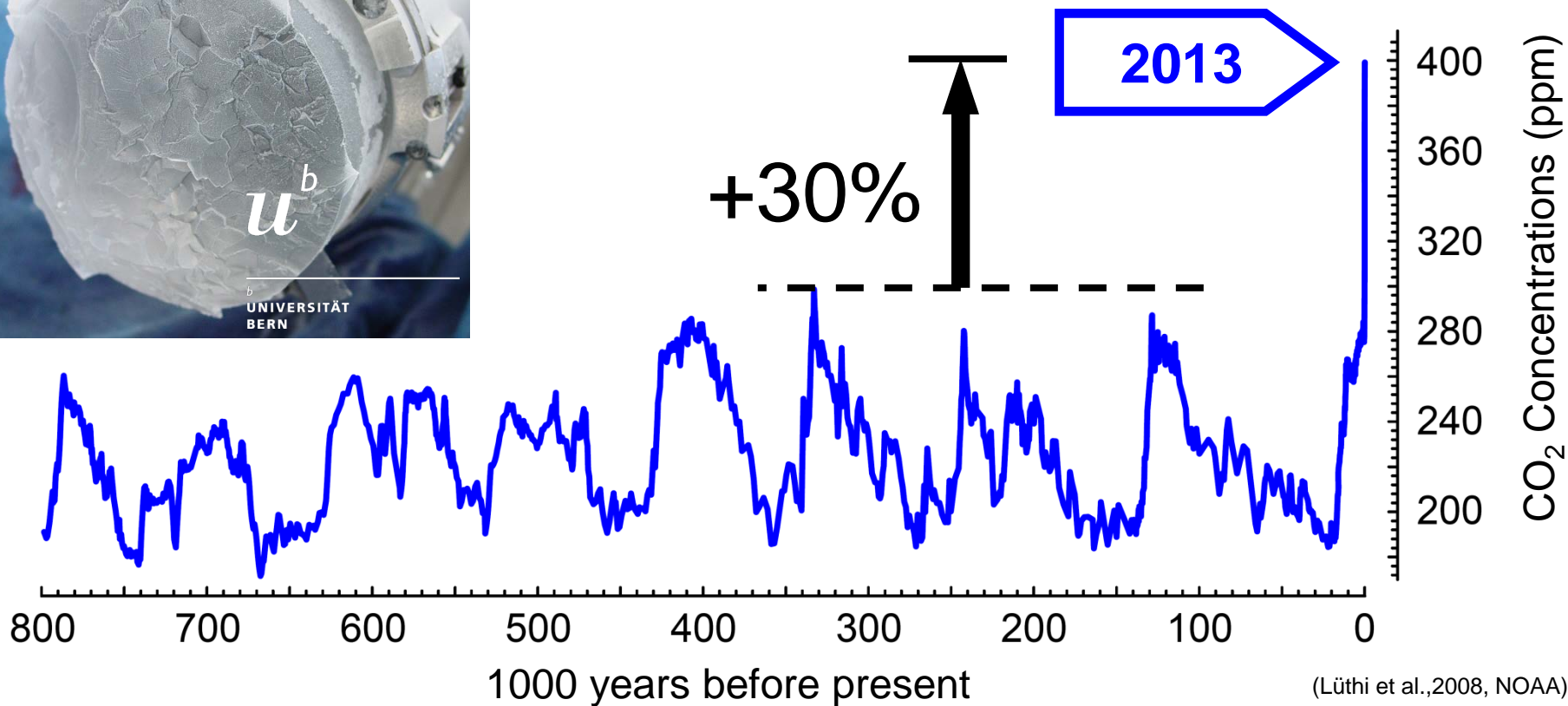
Temperature Difference 1901 to 2012 based on trend (°C)

Warming of the climate system
is unequivocal

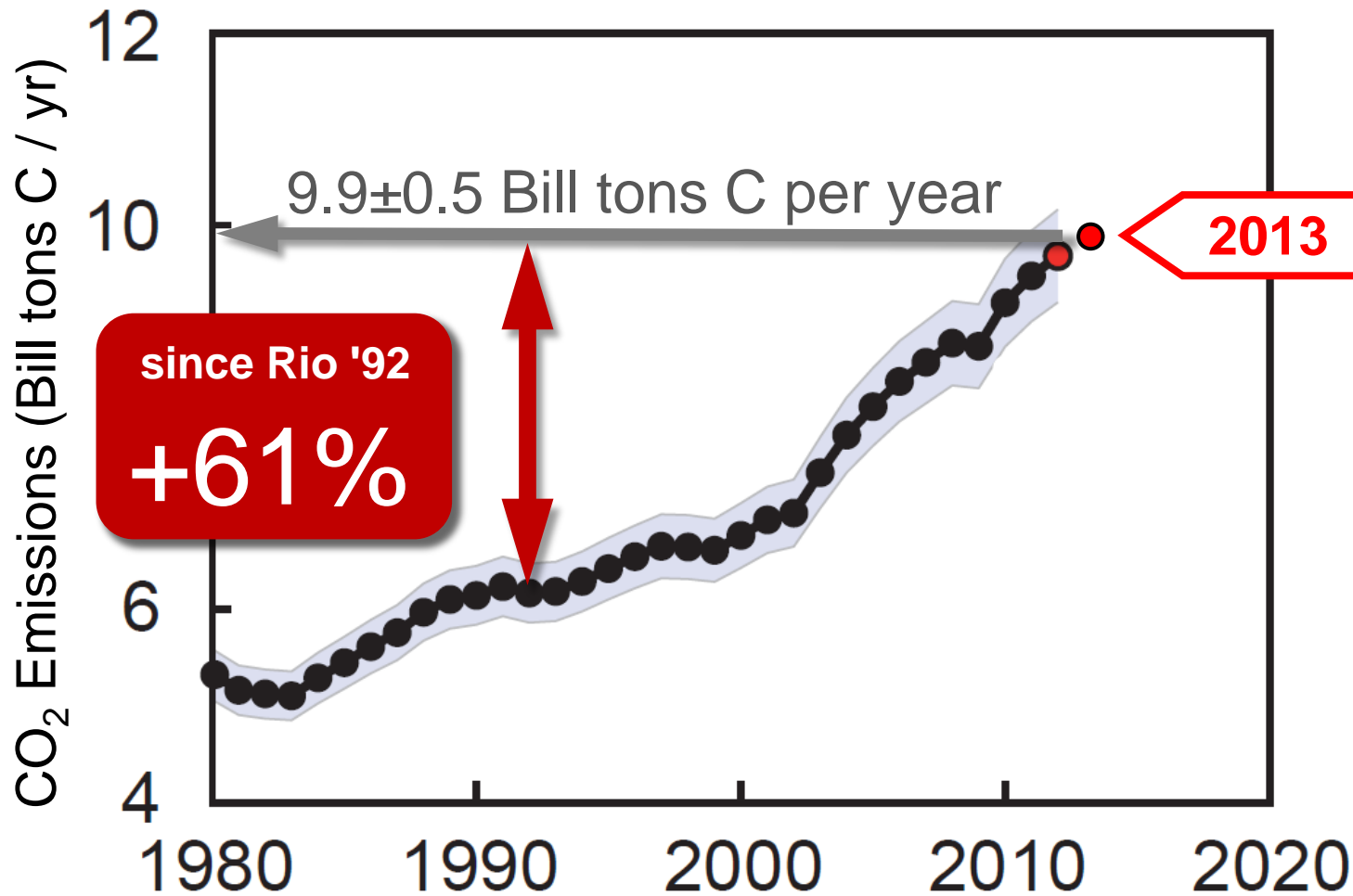


(IPCC 2013, Box 3.1, Fig. 1, modified)

Energy uptake in the world ocean since 1970: 70 Mill. TWh



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)

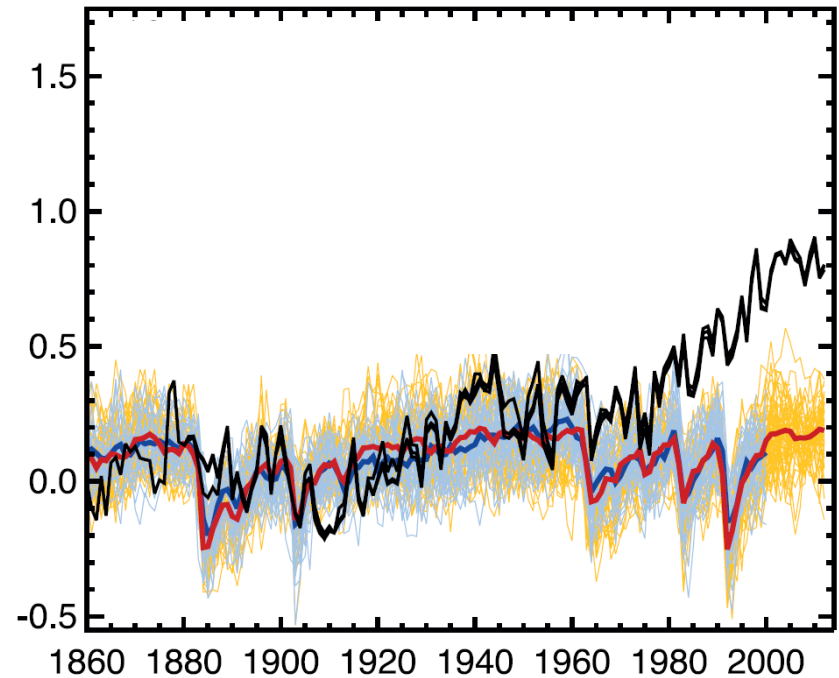
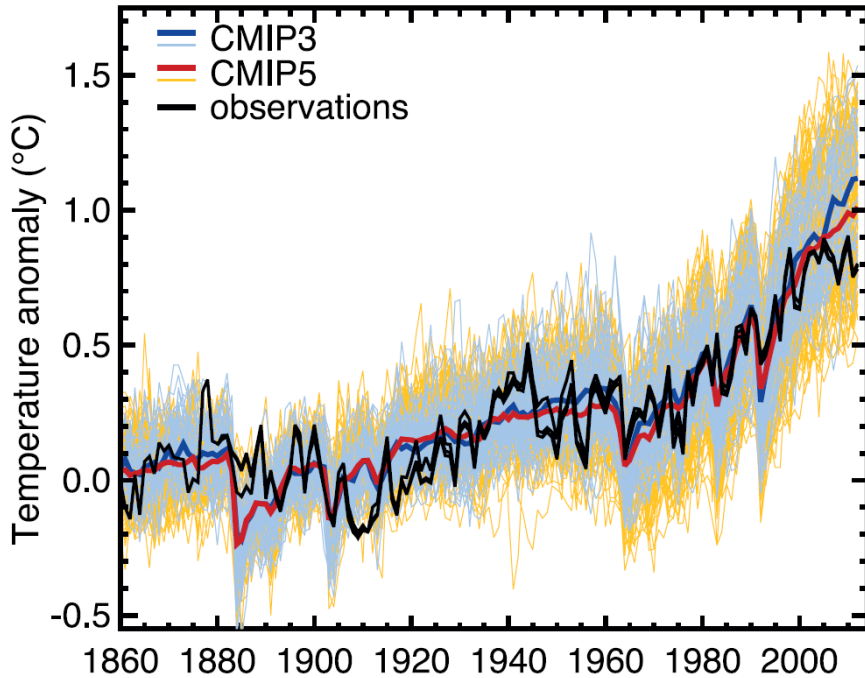
CO₂ emissions by human activity are unprecedented

Understanding

Causes of the observed changes

including CO₂

excluding CO₂

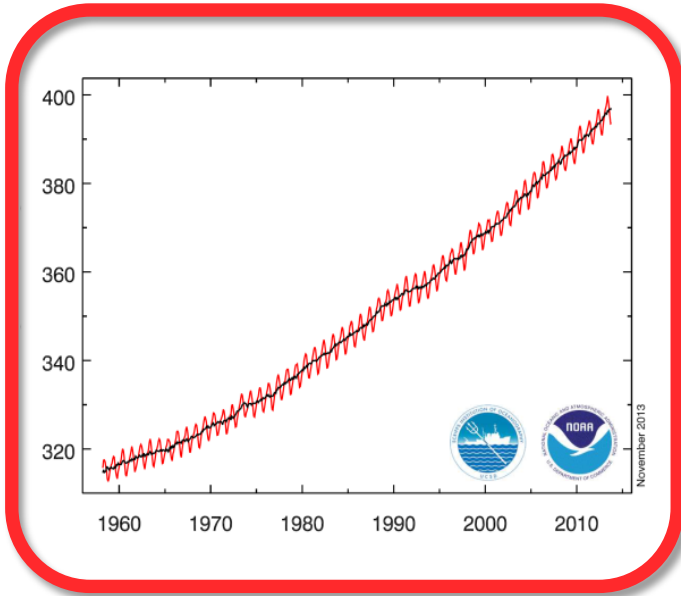


(IPCC 2013, Fig. TS.9)

It is *extremely likely* that human influence has been the dominant cause of the observed warming since the mid-20th century.

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.

Future

Projections of many future
climates

Global mean surface temperature change from 1986-2005

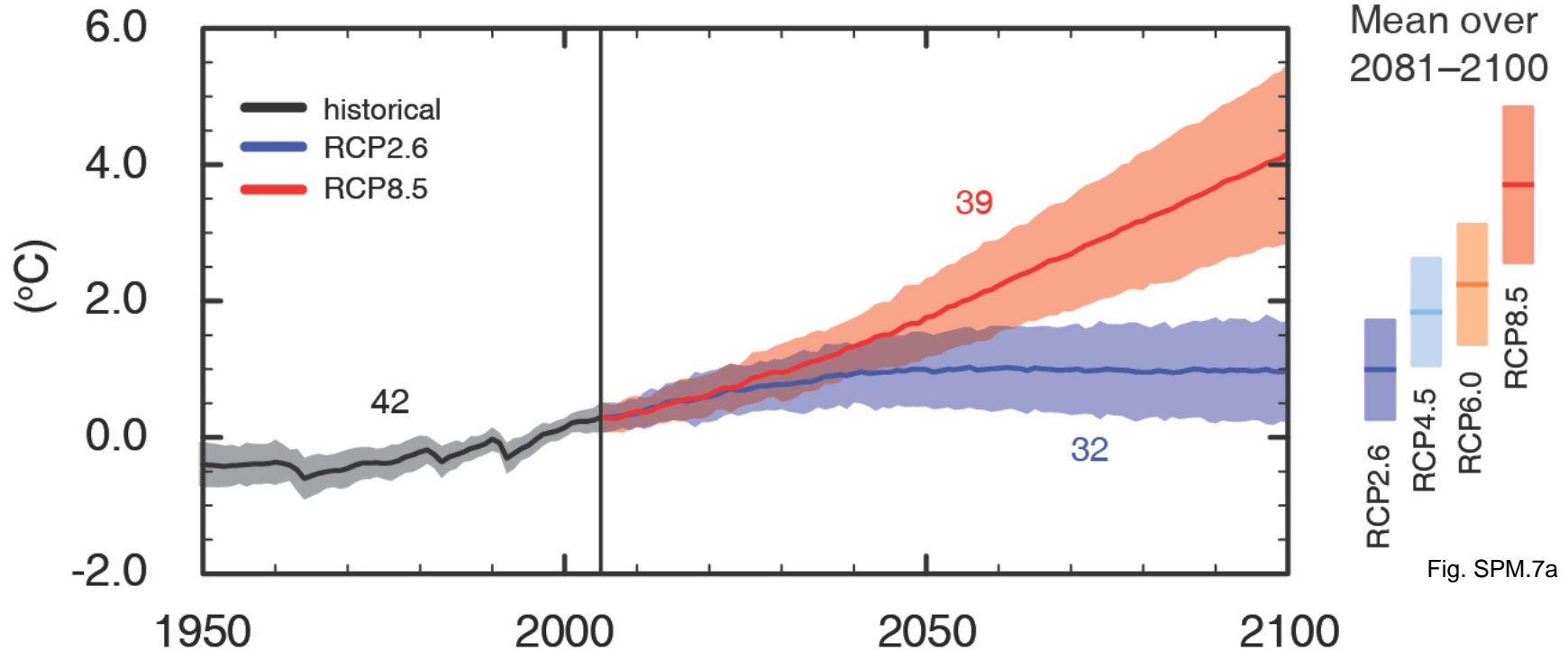


Fig. SPM.7a

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)

RCP8.5

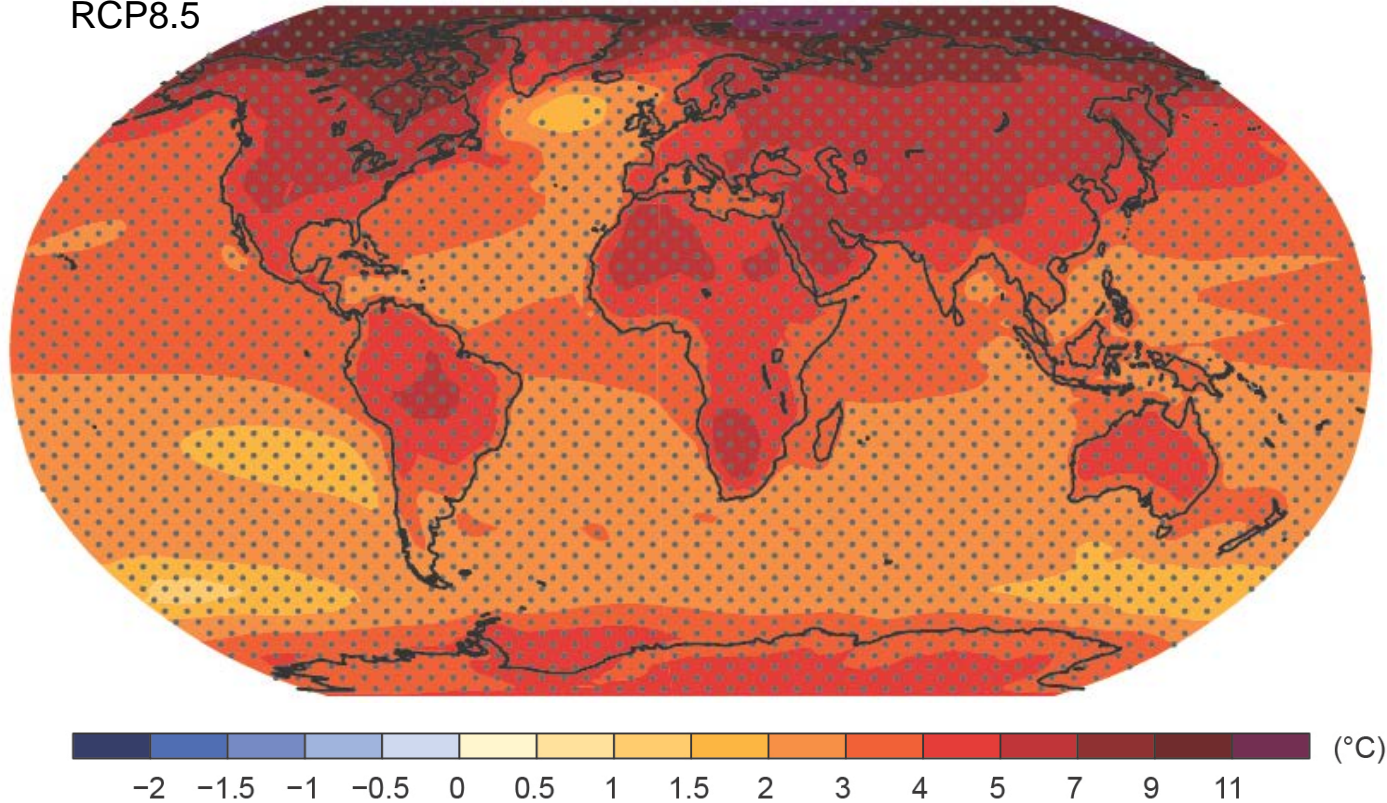


Fig. SPM.8a

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

Change in average precipitation (1986-2005 to 2081-2100)

RCP8.5

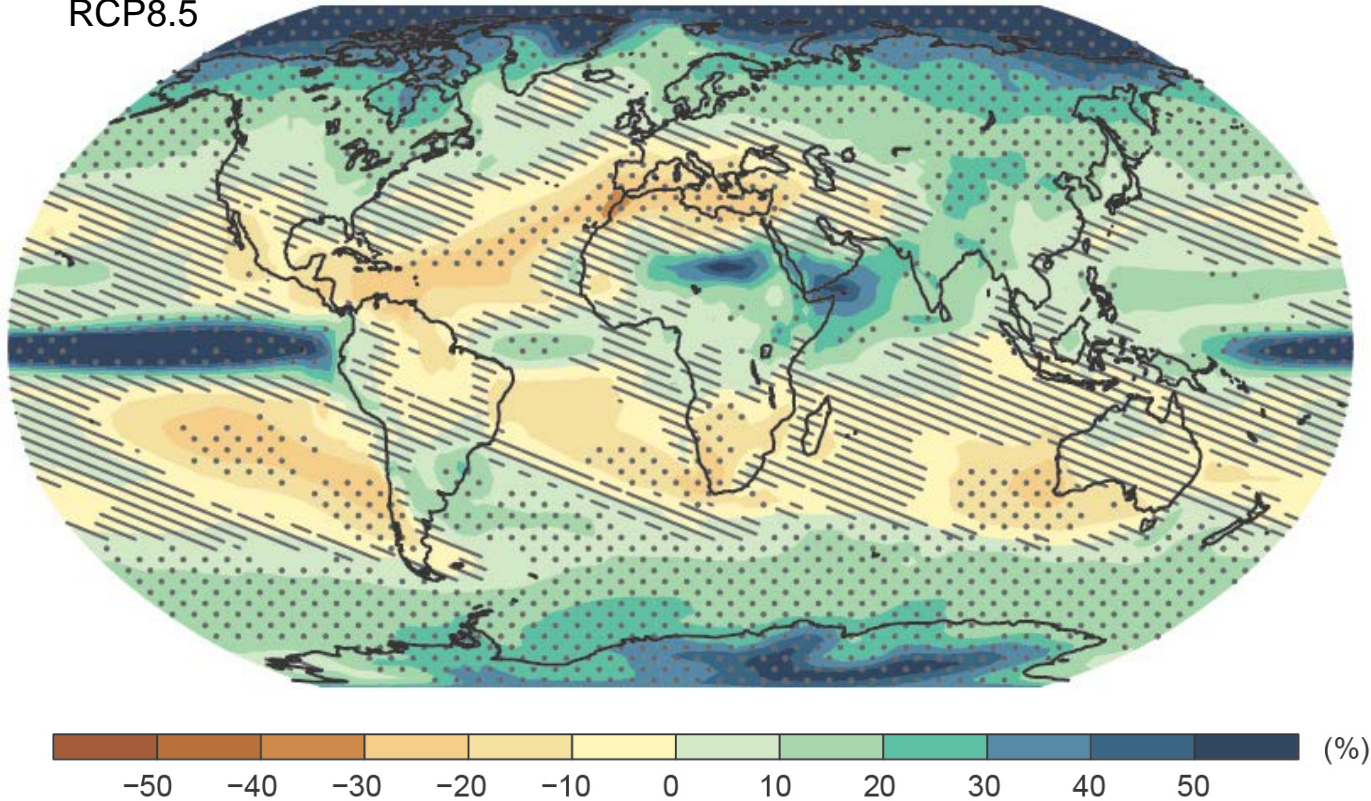


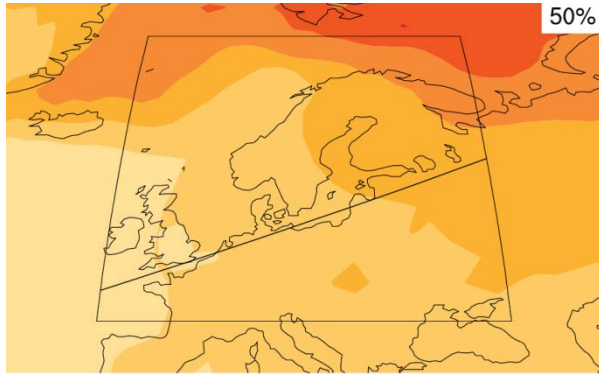
Fig. SPM.8b

The contrast in precipitation between wet and dry regions and between wet and dry seasons will increase, [...]

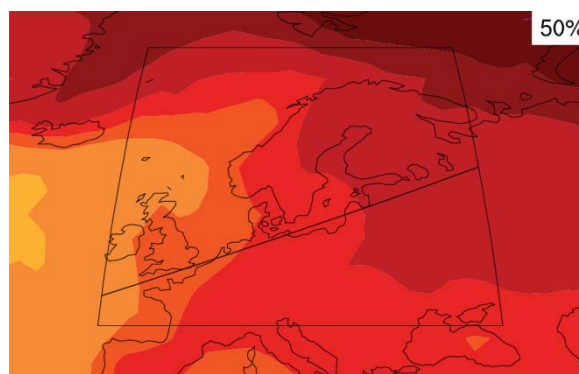
IPCC 2013: Atlas of Global and Regional Climate Projections

Regional Changes in North and Central Europe (2085-2100)

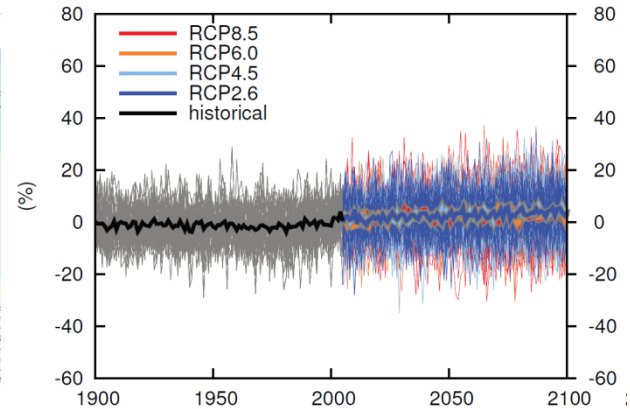
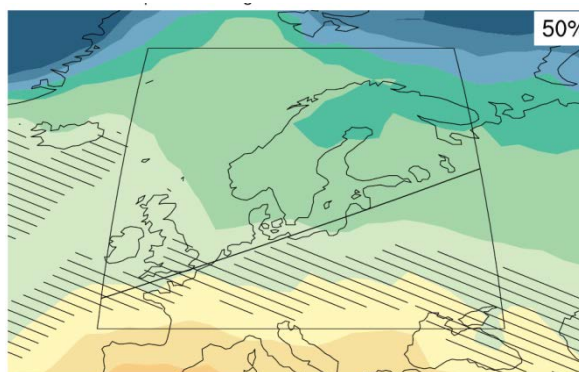
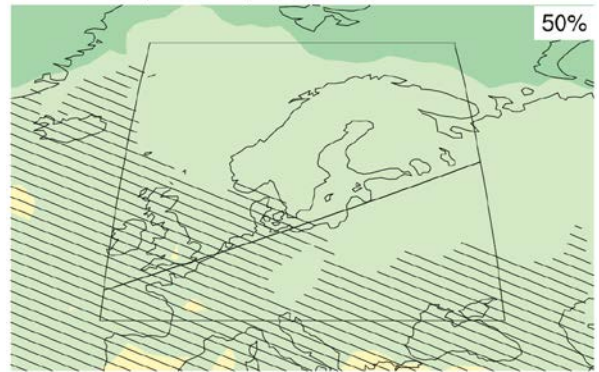
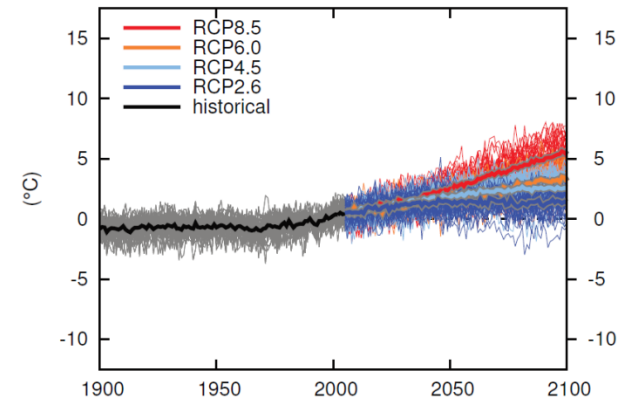
RCP 2.6 (annual)



RCP 8.5 (annual)



Temperature change Central Europe annual



Global mean temperature increase



***Earth
System***



All CO₂ emissions since 1750

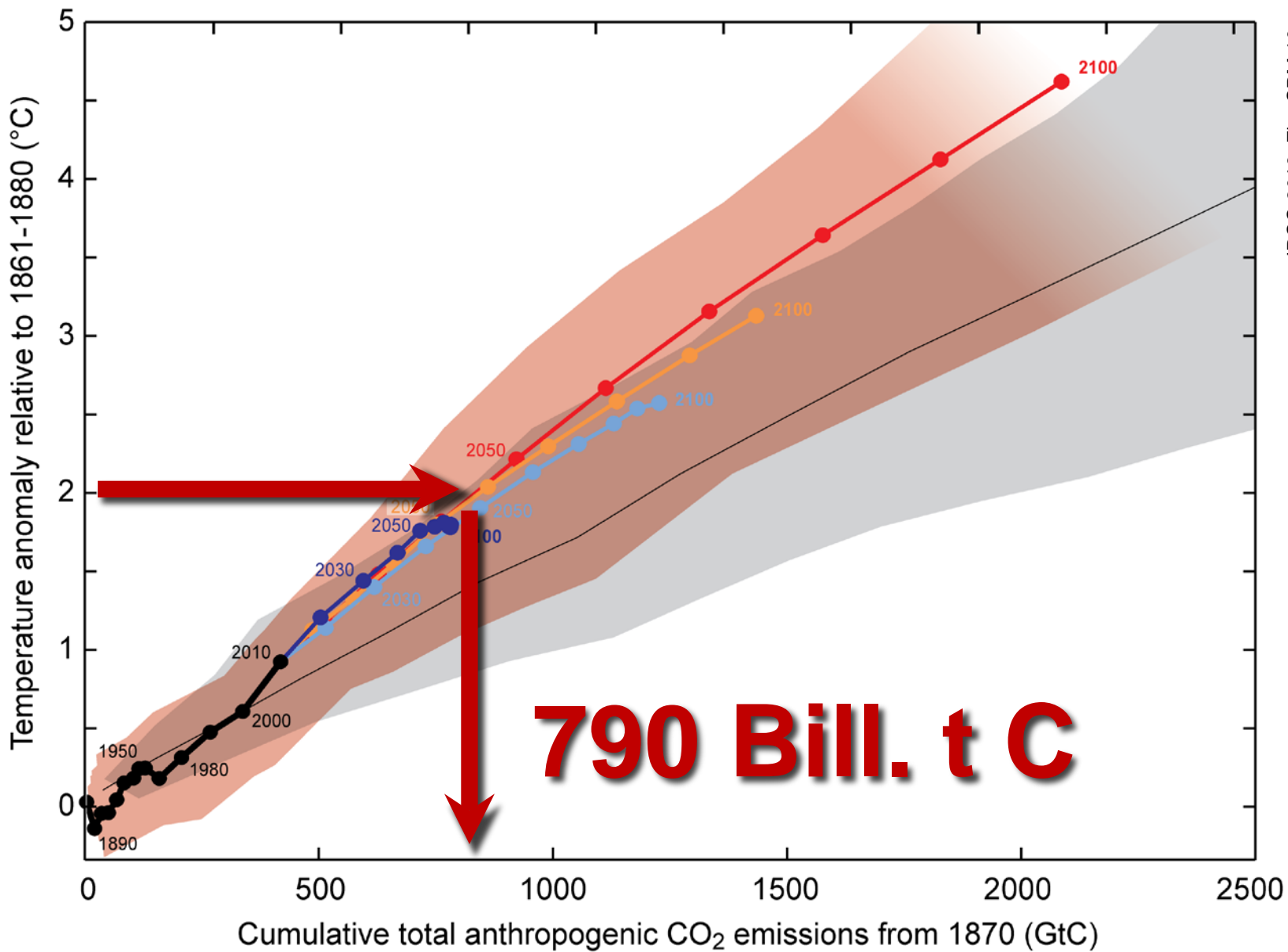
Warming of 0.8 to 2.5°C



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



1000 billion tons of carbon



IPCC 2013, Fig. SPM.10

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

Budget for 2°C target: 790 bill t C

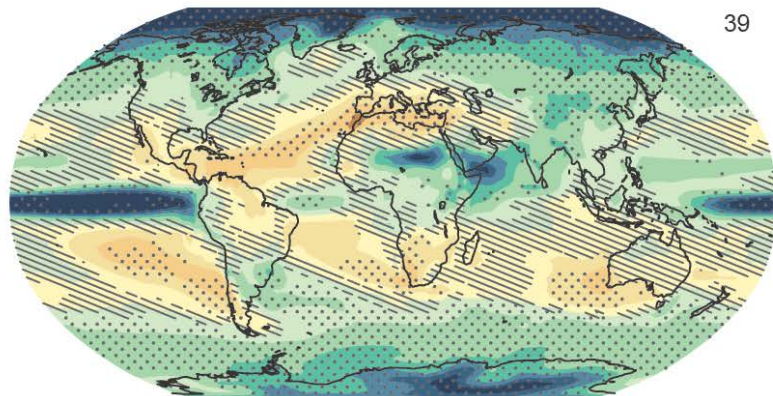
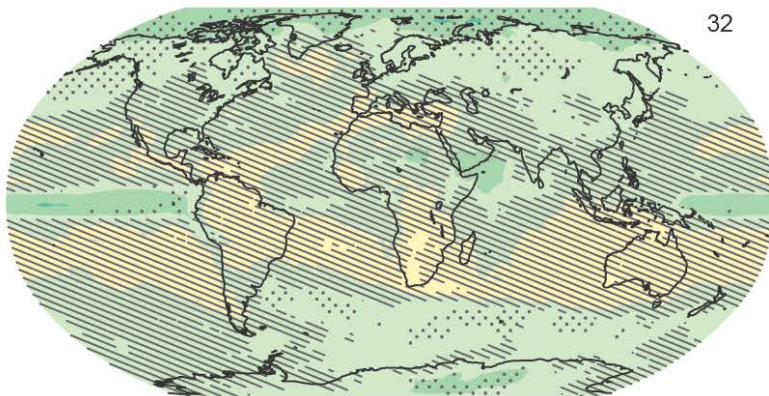
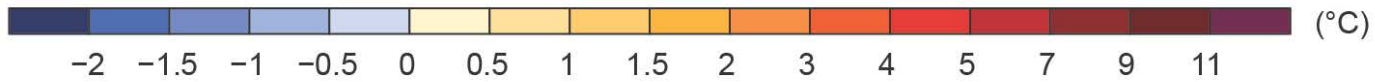
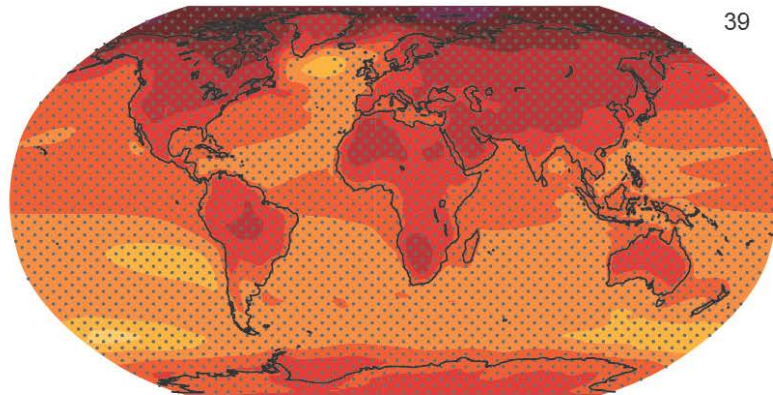
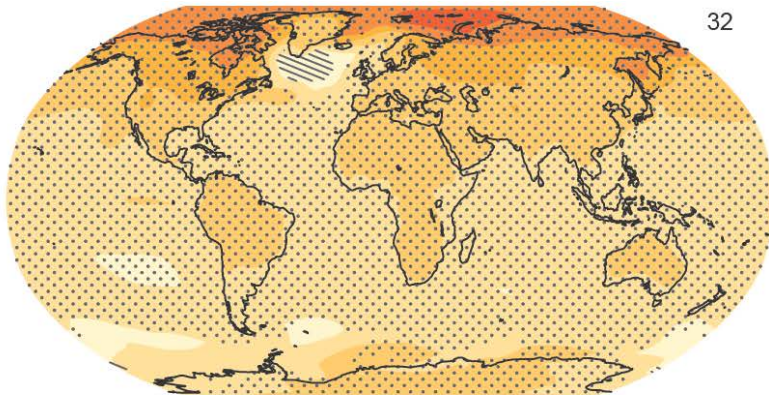
CO₂ emissions until 2013: -535 bill t C

Remaining emissions: 255 bill t C

CO₂ emissions in 2013: 9.9 bill t C

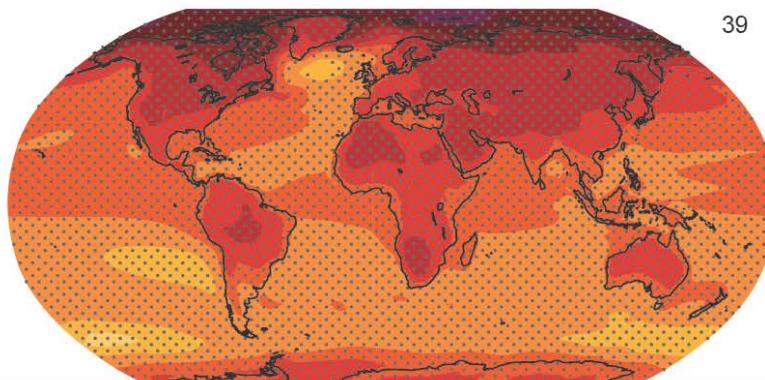
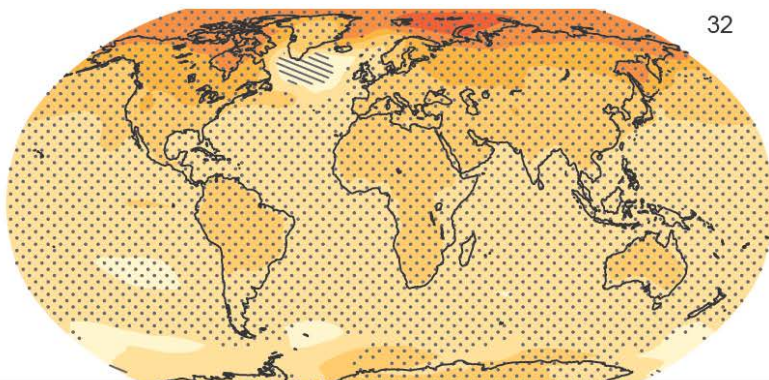
2°C world

4.5°C world

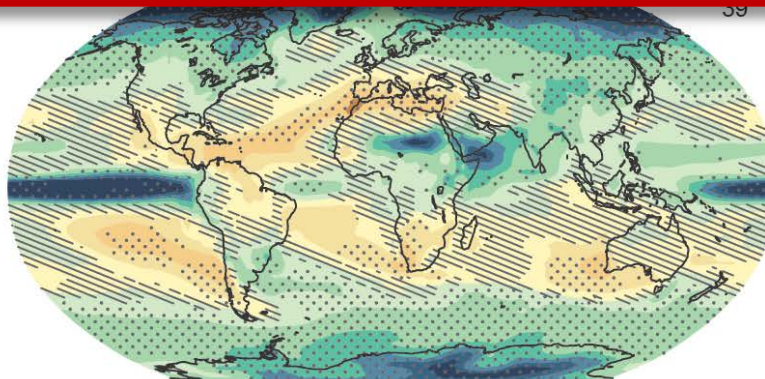


2°C world

4.5°C world



Today we have a choice.



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Full report and further information

www.climatechange2013.org

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