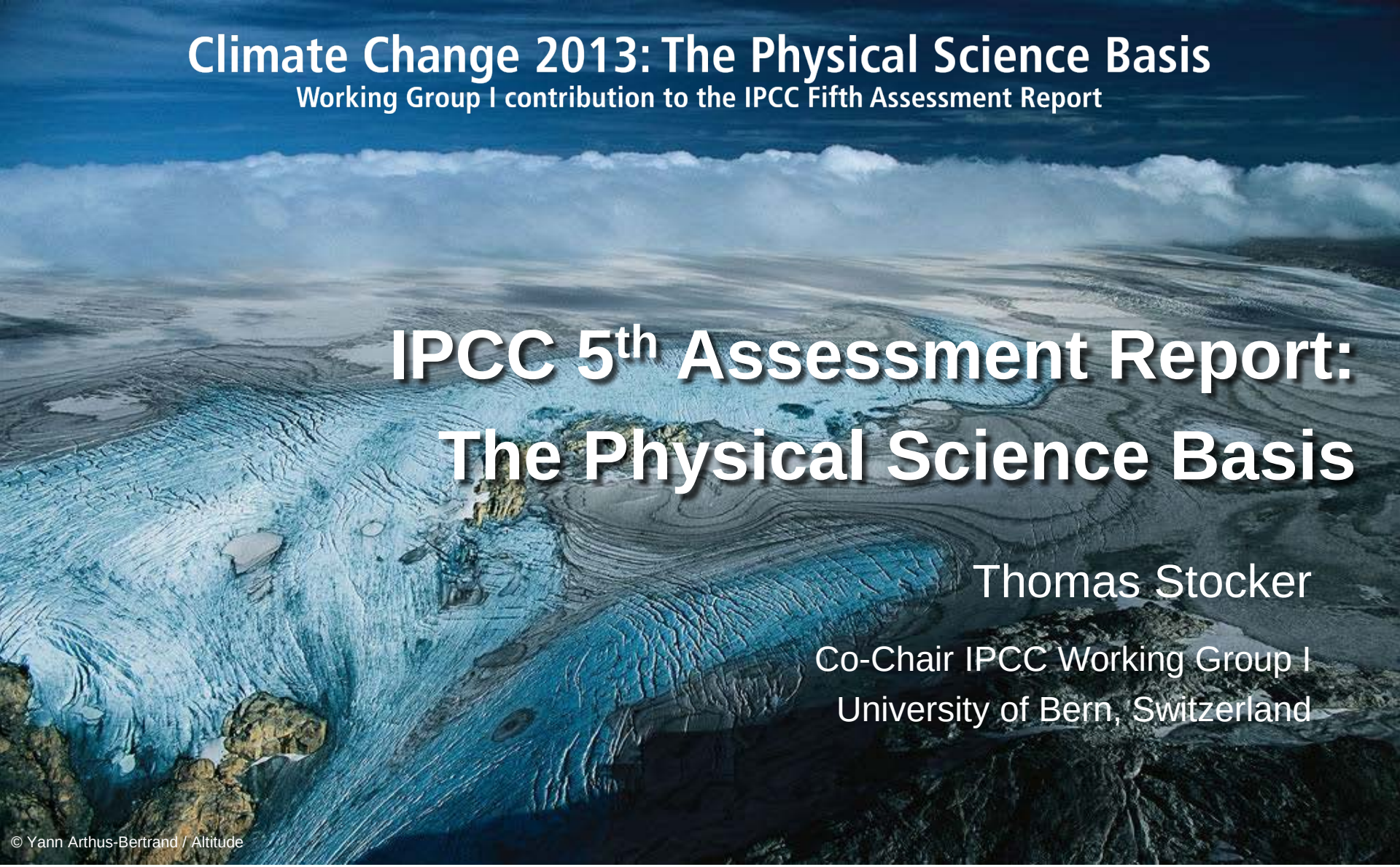

Climate Change 2013: The Physical Science Basis

Working Group I contribution to the IPCC Fifth Assessment Report

IPCC 5th Assessment Report: The Physical Science Basis

Thomas Stocker

Co-Chair IPCC Working Group I

University of Bern, Switzerland

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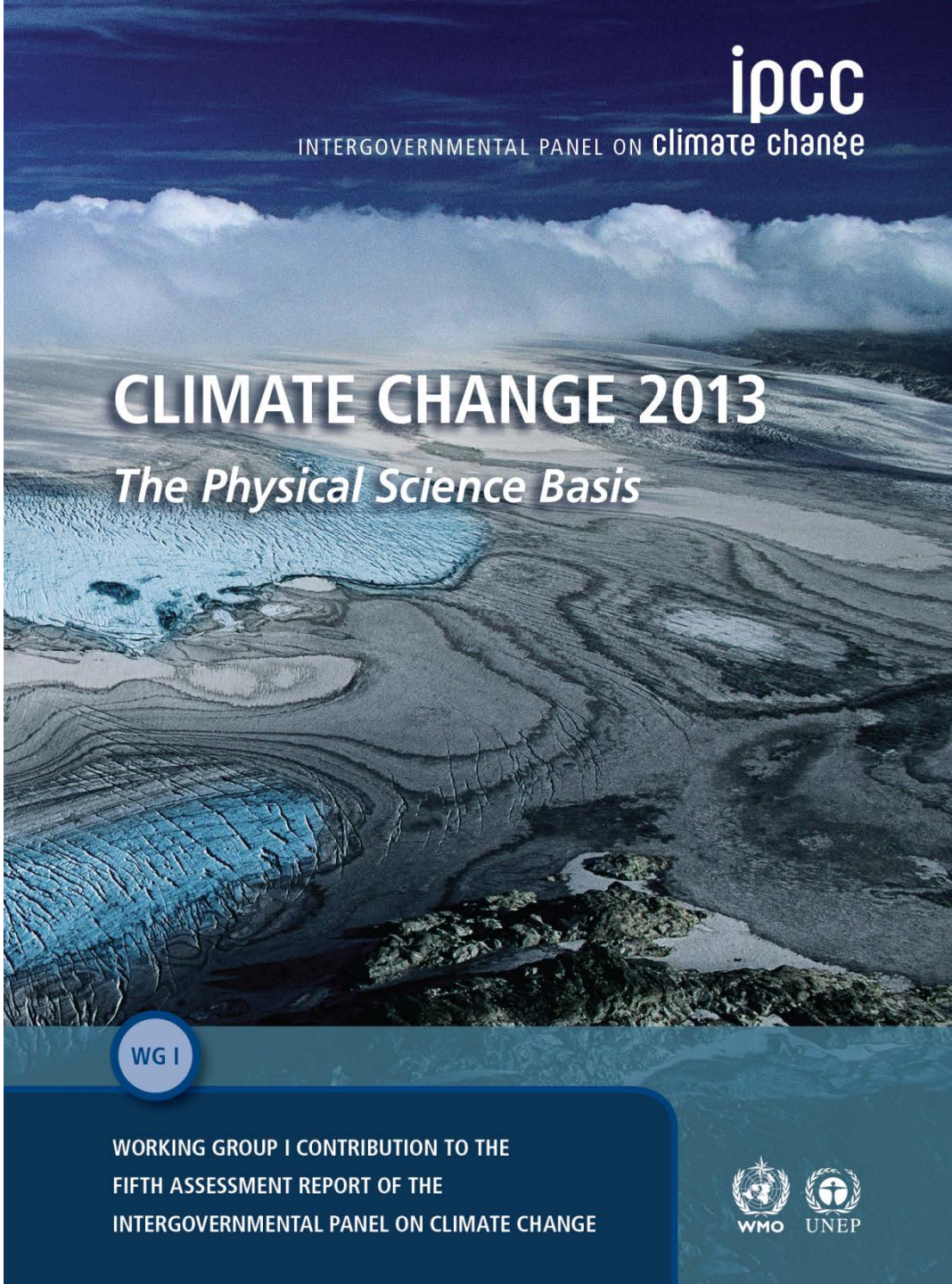
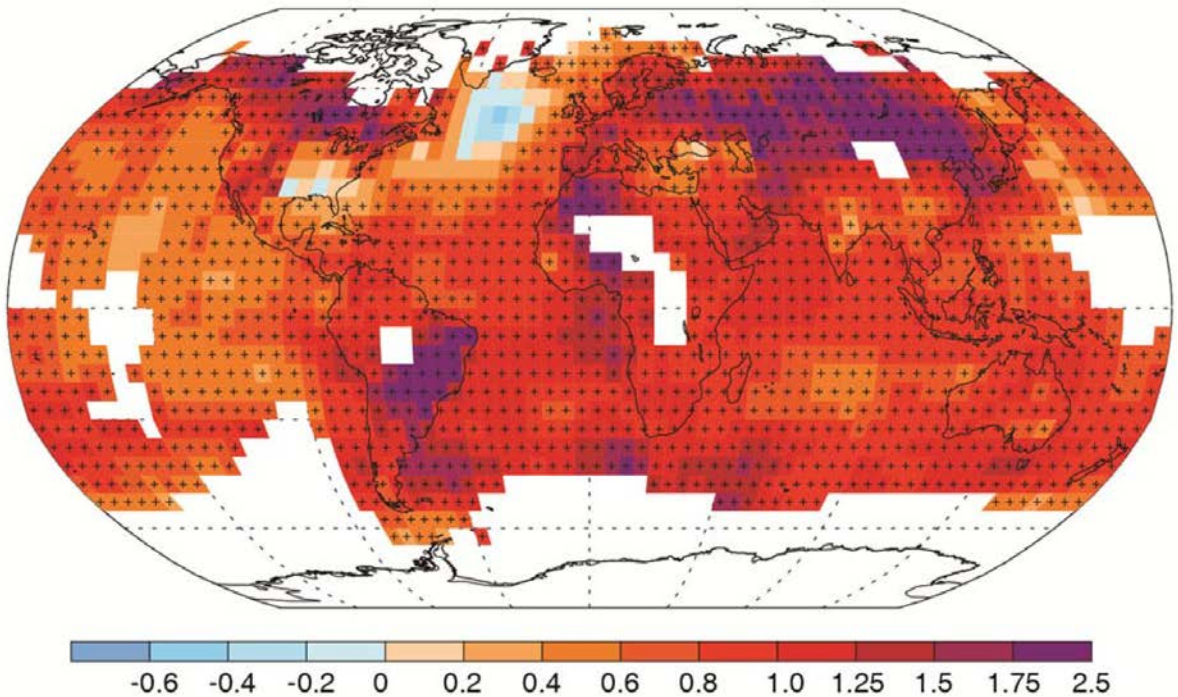
Observations

Understanding

Future

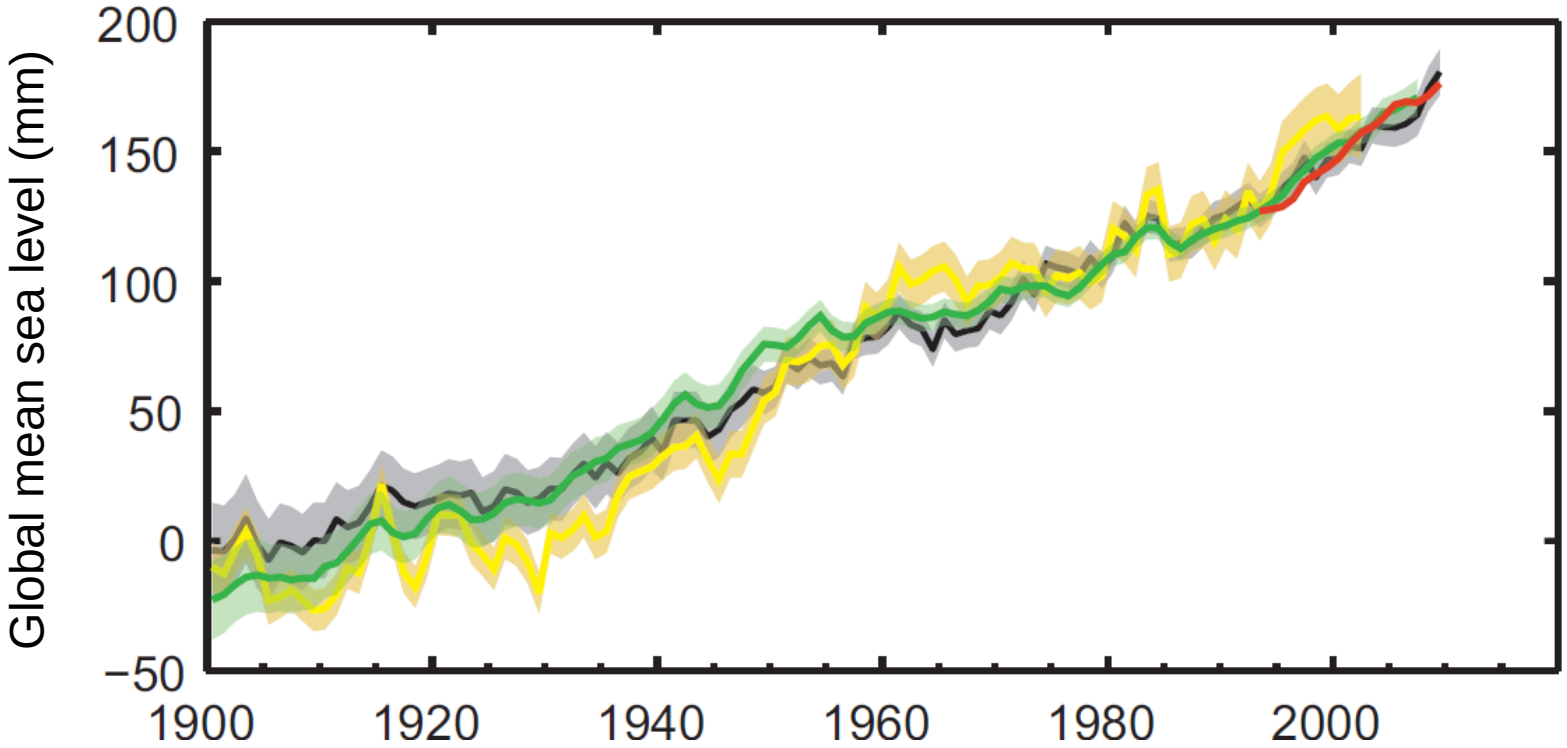


IPCC 2013, Fig. SPM.1b



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

Warming of the climate system is unequivocal



IPCC 2013, Fig. SPM.3d

Over the period 1901 to 2010, global mean sea level rose by 190 mm.

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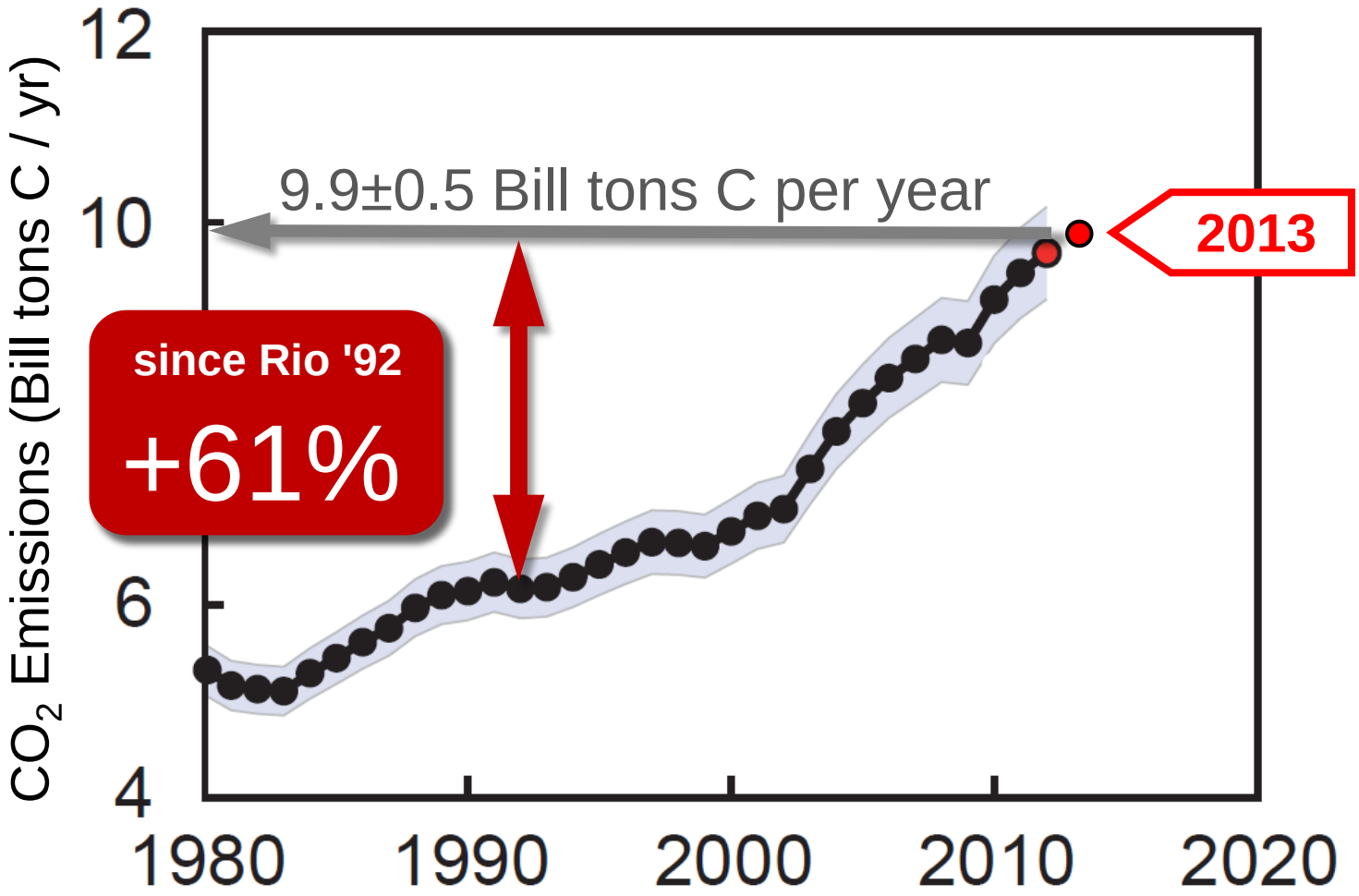
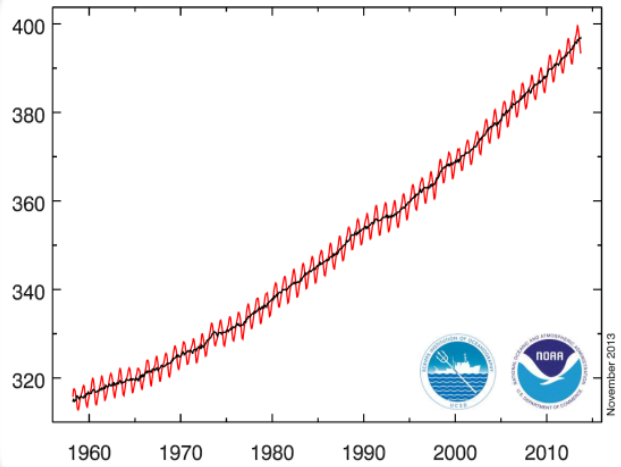


(modified from Peters et al., 2013, Global Carbon Project)

CO_2 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.

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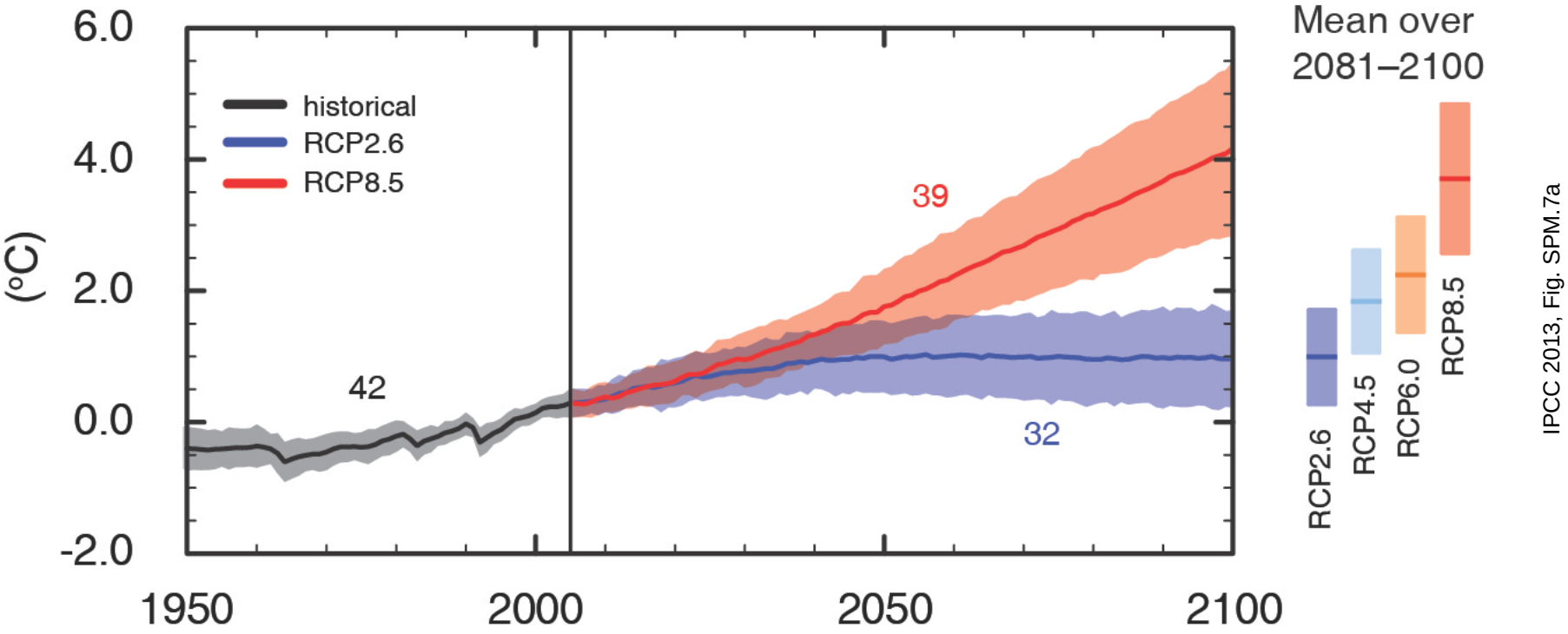
Global mean surface temperature change from 1986-2005



IPCC 2013, Fig. SPM.7a

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

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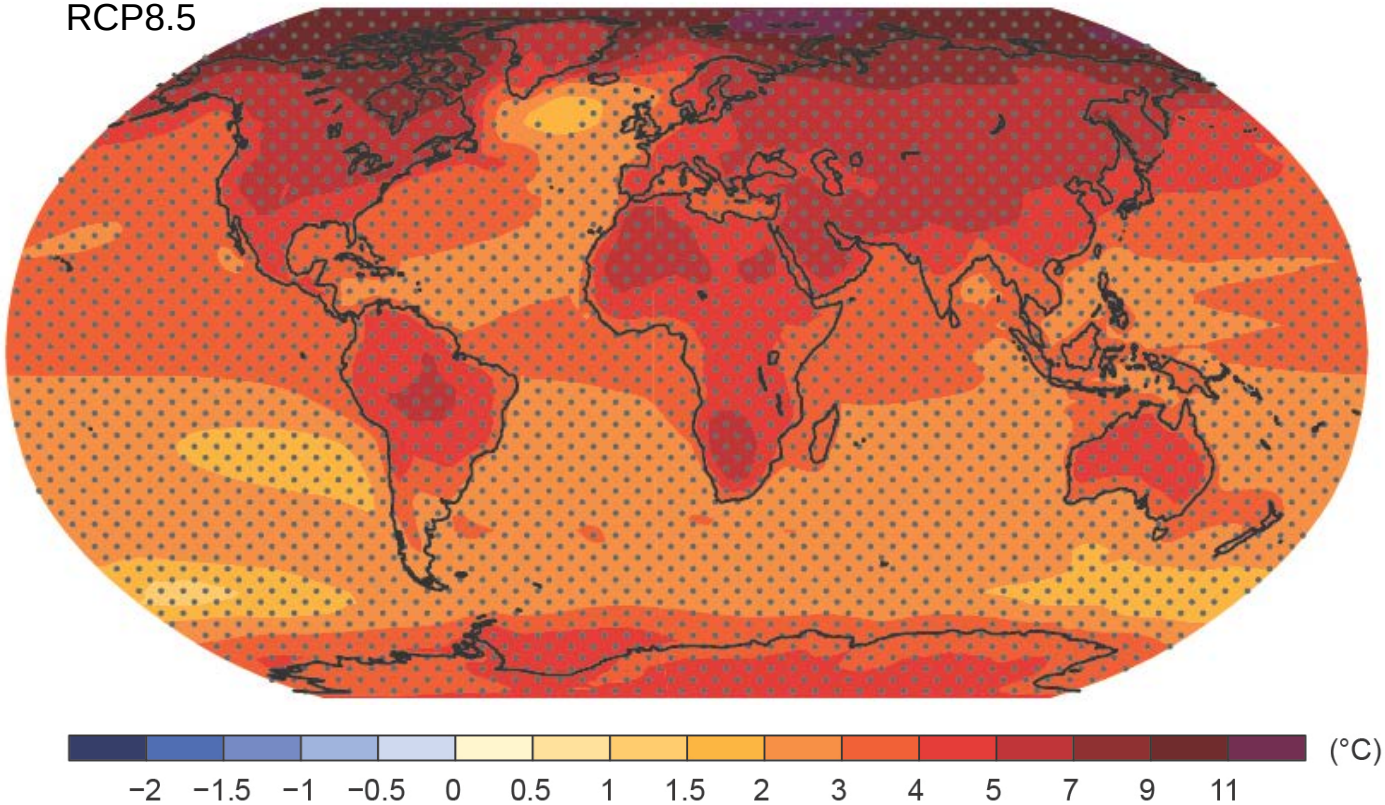
Change in average surface temperature (1986-2005 to 2081-2100)

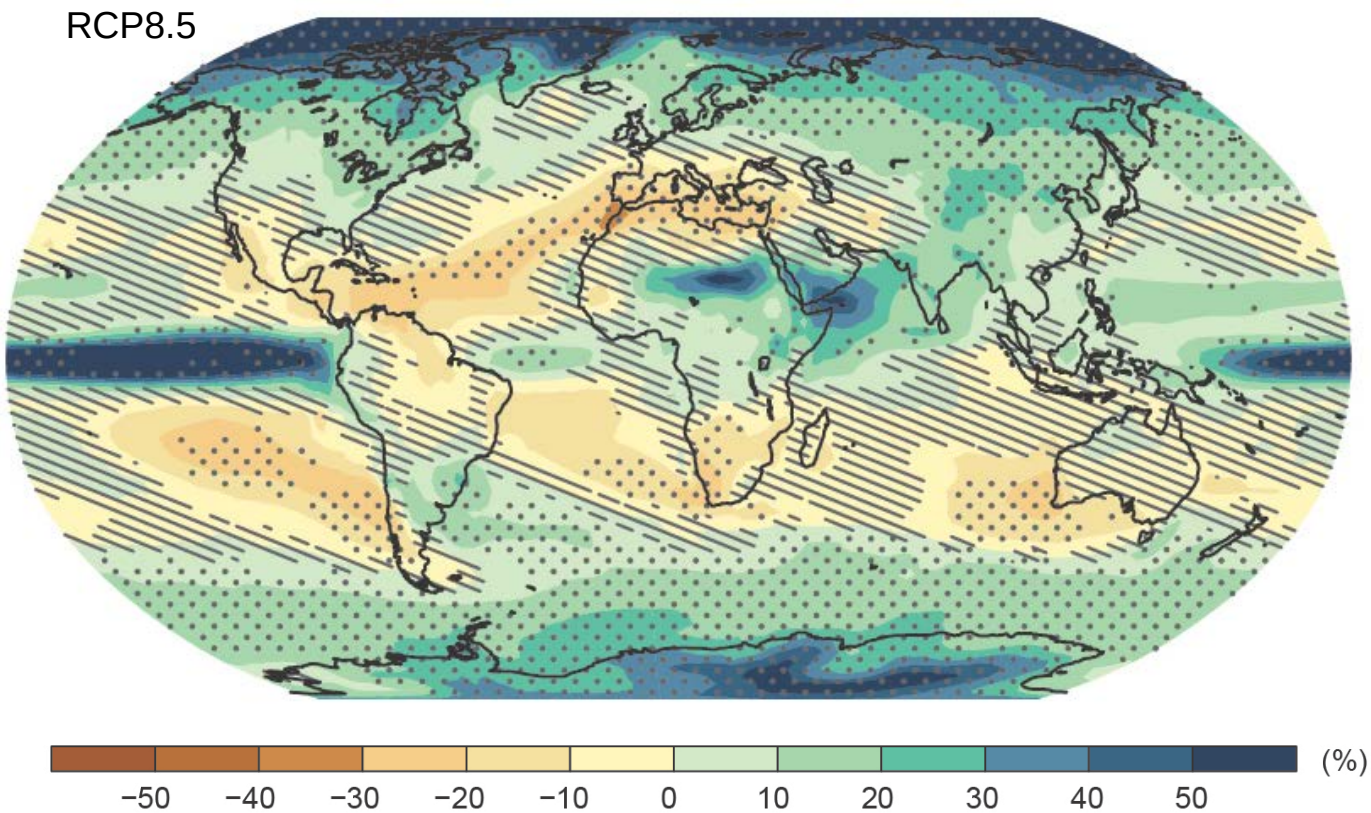
RCP8.5



IPCC 2013, 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)



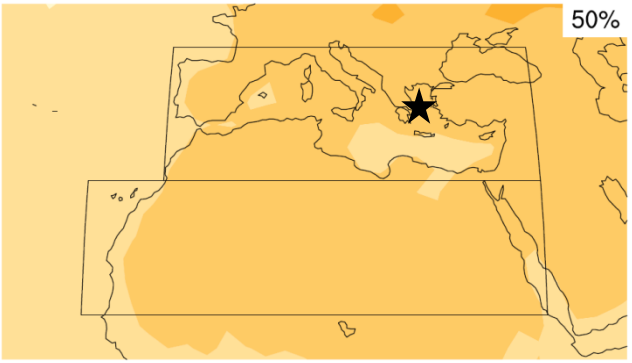
IPCC 2013, Fig. SPM.8b

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

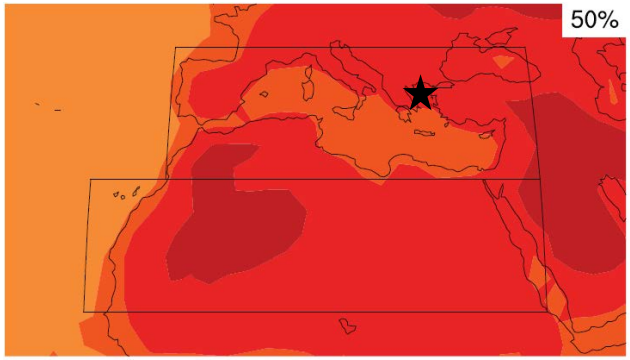
IPCC 2013: Atlas of Global and Regional Climate Projections

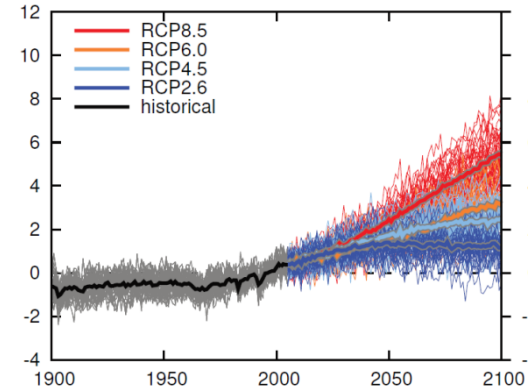
Changes in Southern Europe and Sahara (2081-2100)

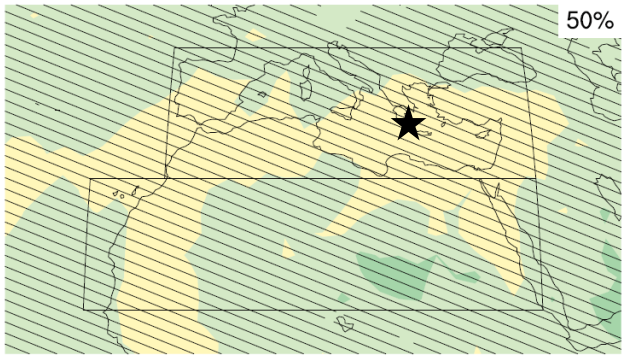
RCP 2.6 (annual)

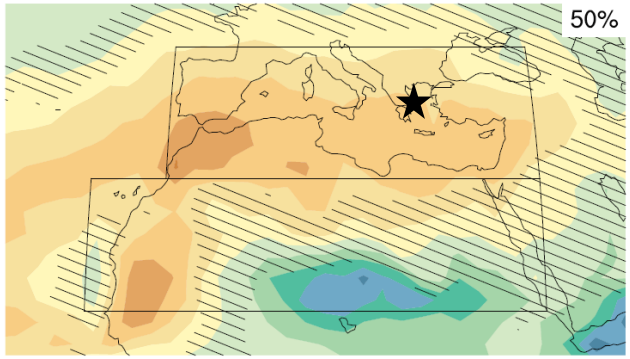


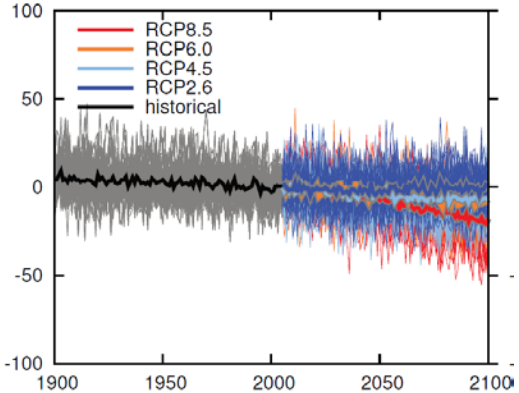
RCP 8.5 (annual)

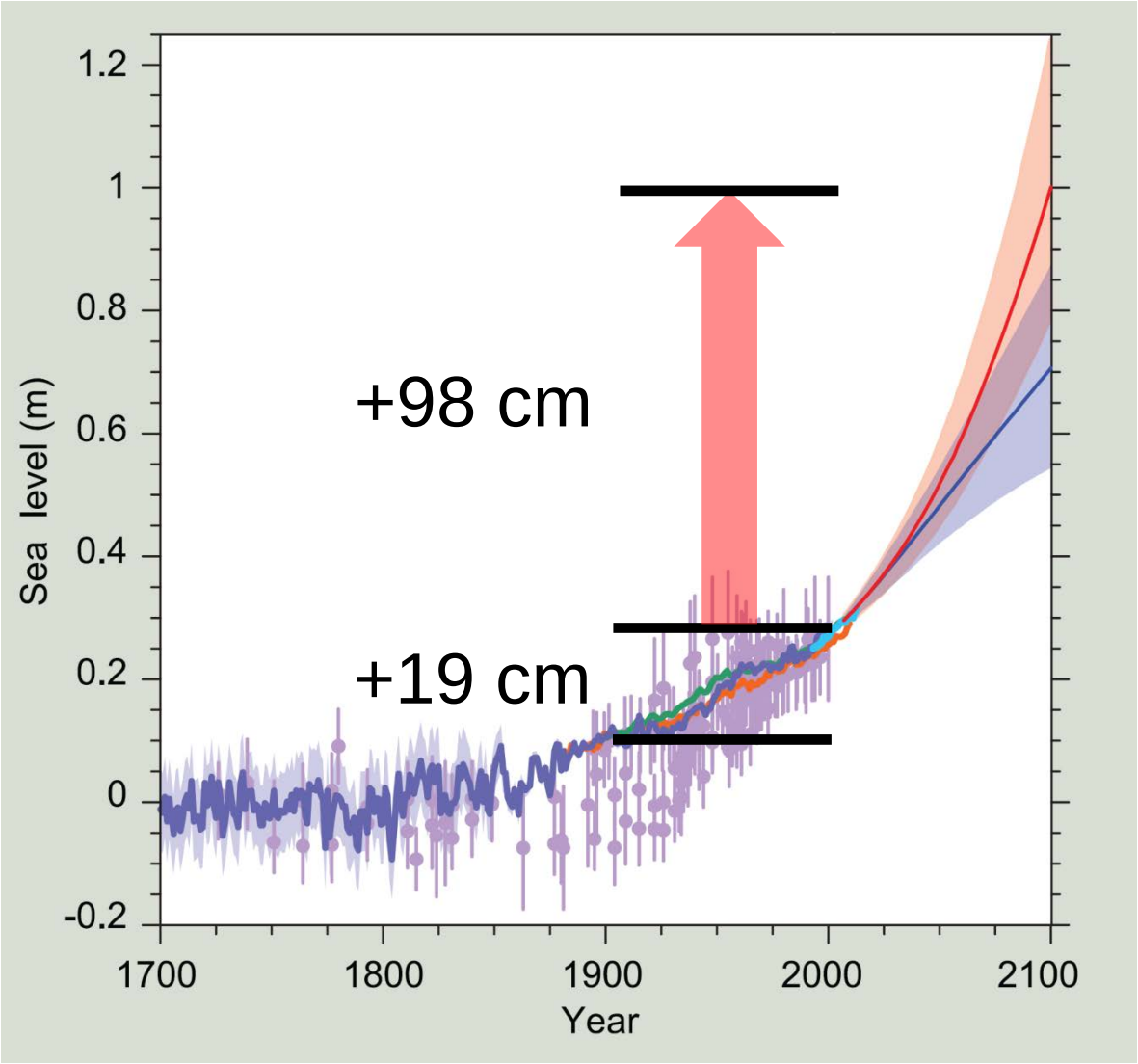












IPCC 2013, TFE.2, Fig. 2

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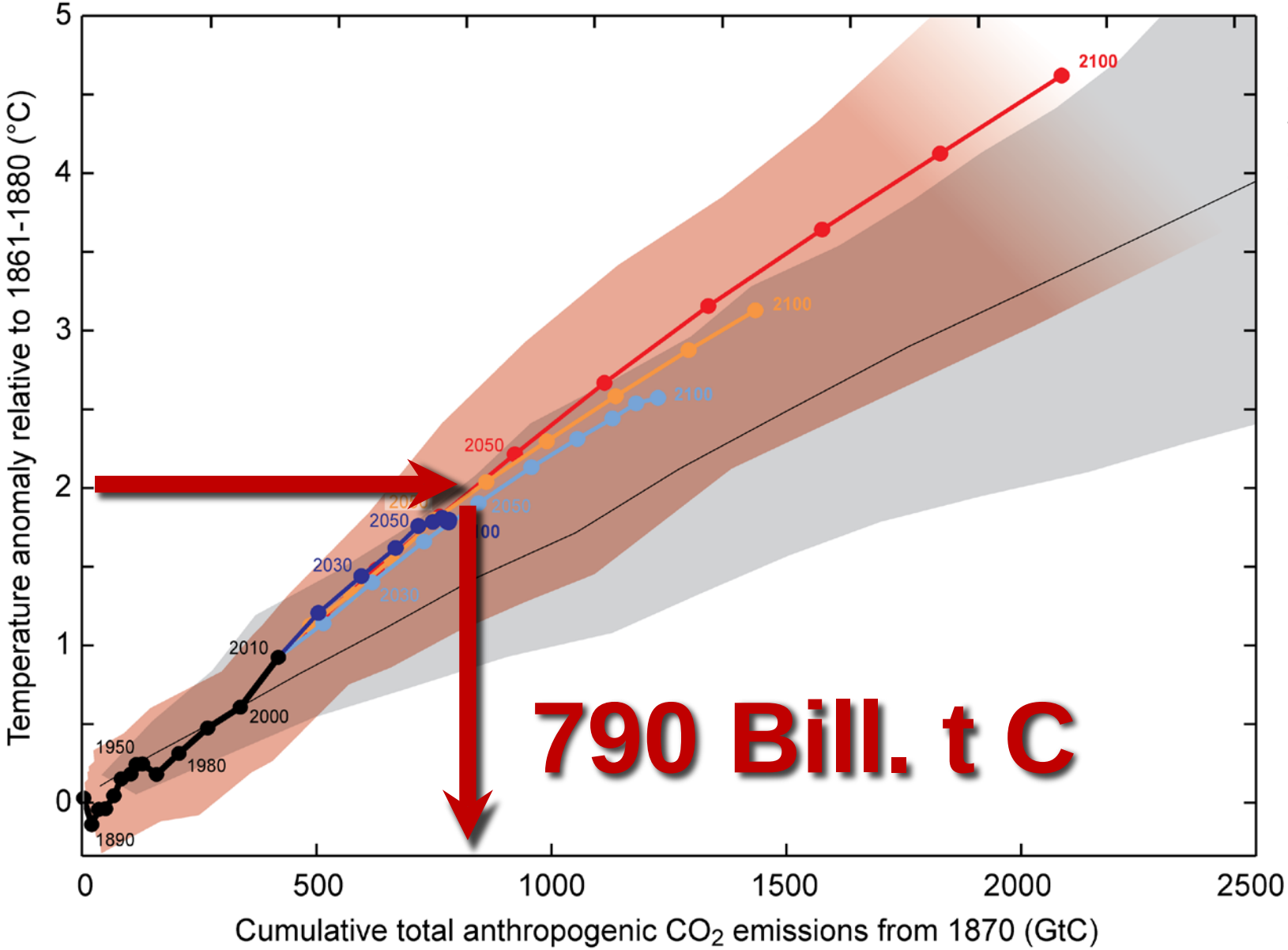
Warming of 0.8 to 2.5°C

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

1000 billion tons of carbon



IPCC 2013, Fig. SPM.10

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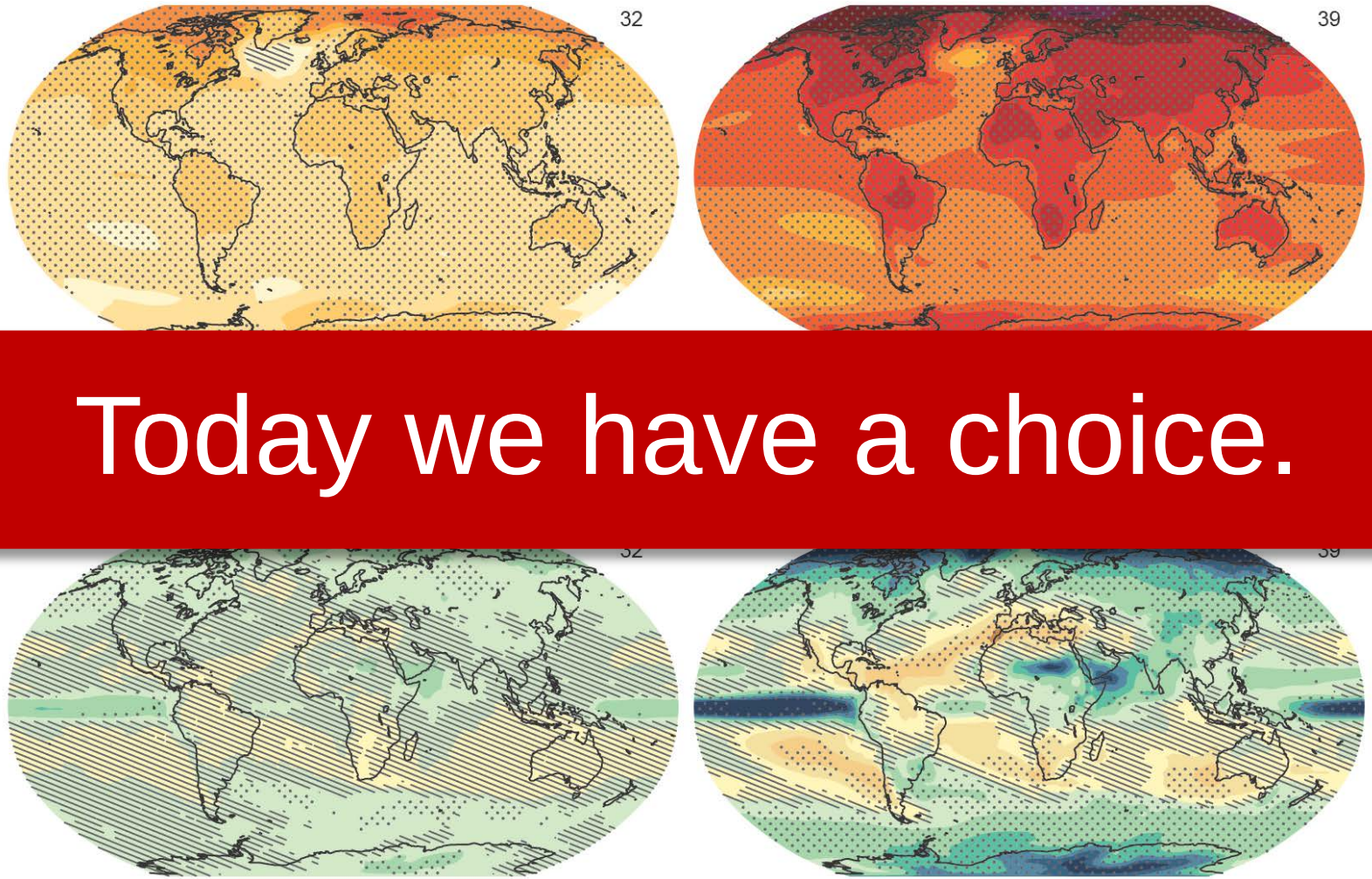
Budget for 2°C target:	790 bill t C
CO_2 emissions until 2013:	−535 bill t C
Remaining emissions:	**255 bill t C**
CO_2 emissions in 2013:	***9.9 bill t C***

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

2°C world

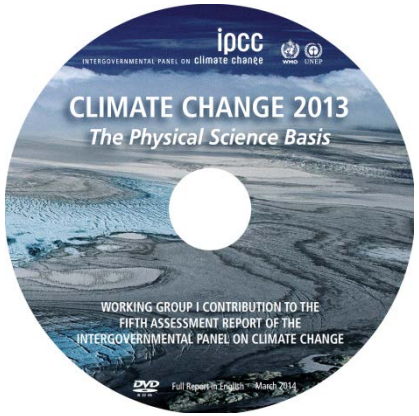
4.5°C world

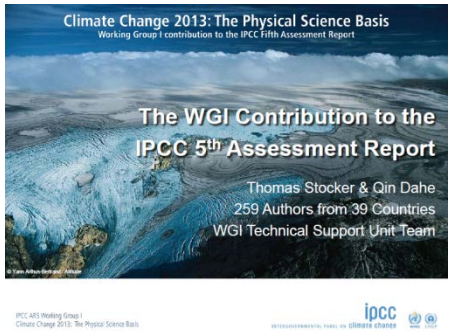


Today we have a choice.

IPCC 2013, Fig. SPM.8

www.climatechange2013.org





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