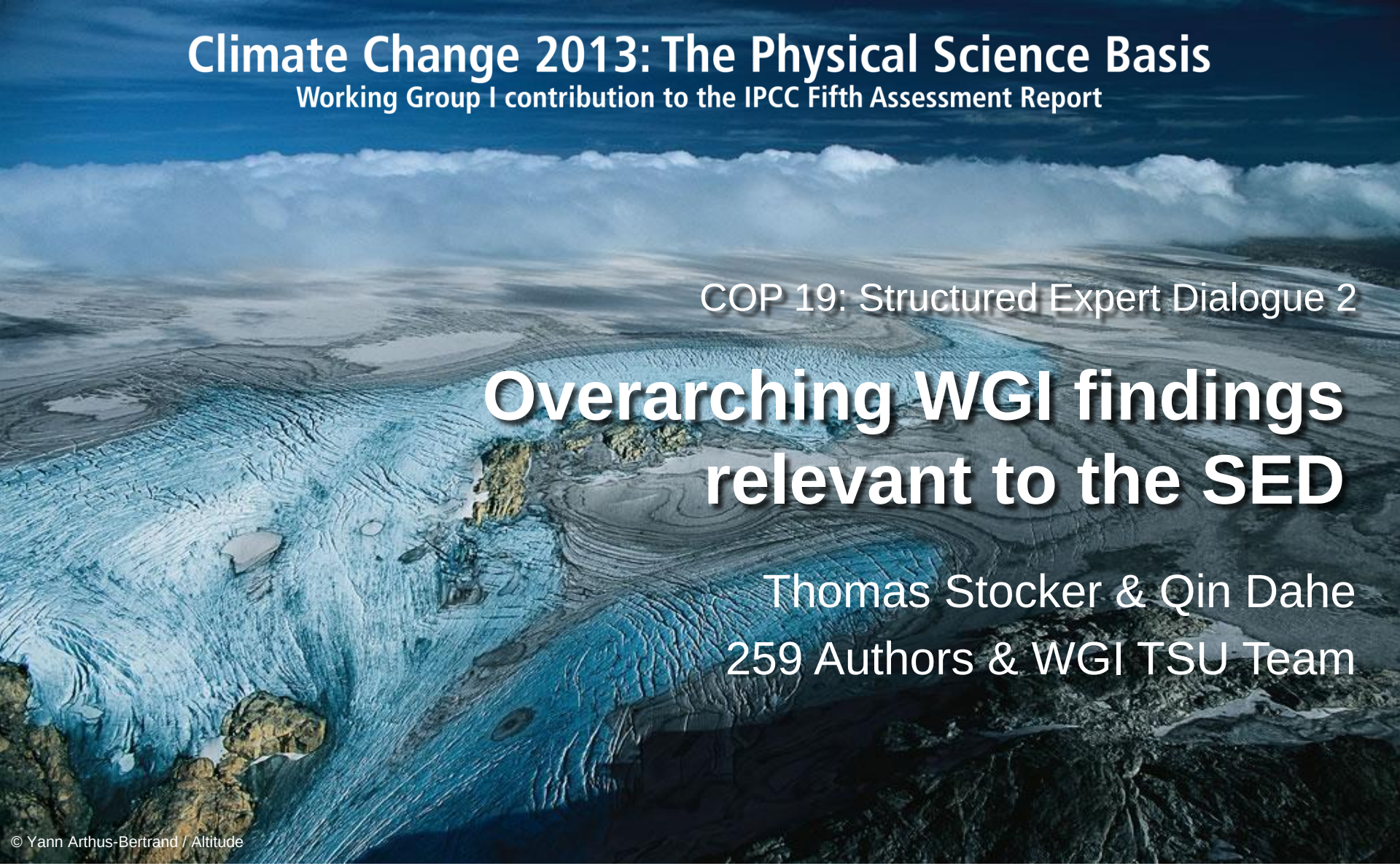
Climate Change 2013: The Physical Science Basis

Working Group I contribution to the IPCC Fifth Assessment Report



COP 19: Structured Expert Dialogue 2

Overarching WGI findings relevant to the SED

Thomas Stocker & Qin Dahe

259 Authors & WGI TSU Team

Questions

- What are the key messages from AR5 WGI relevant for the review?
- What does AR5 WGI tell us about the relationship between GHG emissions, atmospheric concentrations and change in the climate system?
- How reliable are the projections made using climate models (e.g., equilibrium/transient, timeline of 2100-2300)?

Key SPM Messages

19 Headlines

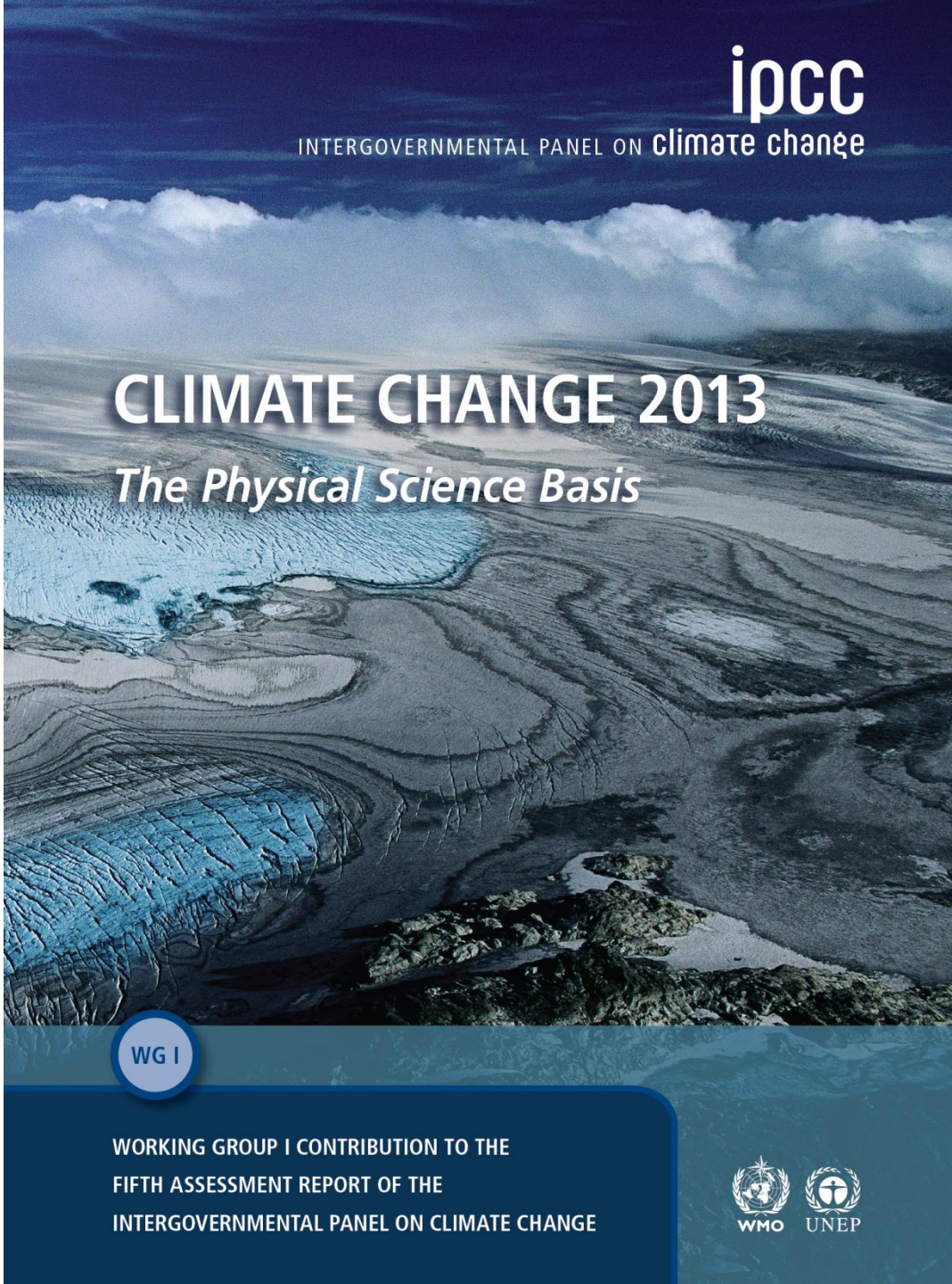
on less than 2 Pages

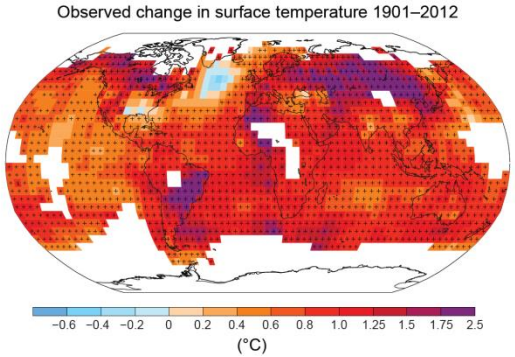
Summary for Policymakers

ca. 14,000 words

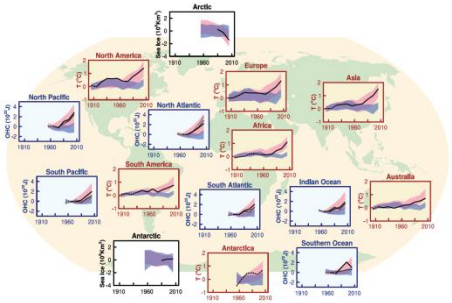
14 Chapters, Atlas

> 1,140,000 words

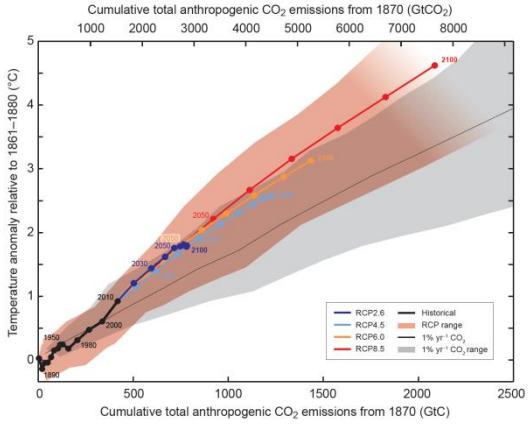




Warming of the climate system is unequivocal, [...]



Human influence on the climate system is clear.



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

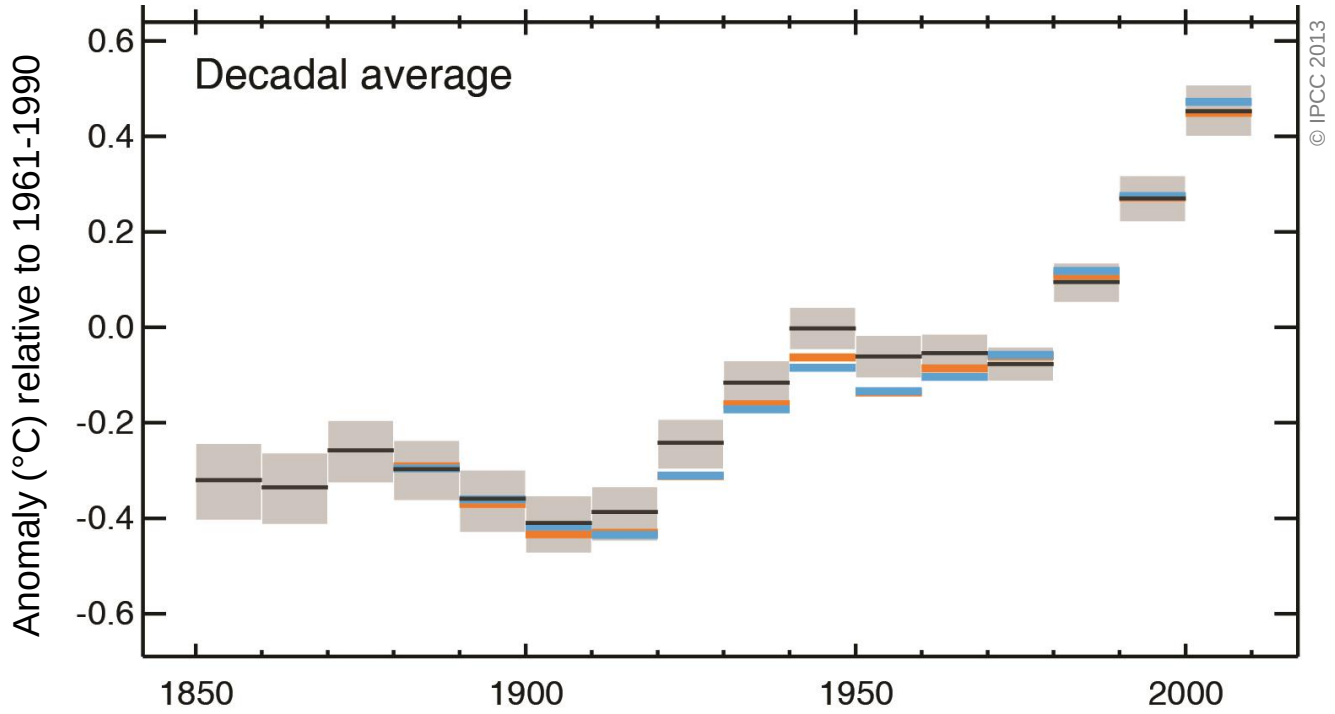


Fig. SPM.1a

The globally averaged, [..] surface temperature data [..] show a warming of 0.85 [0.65 to 1.06] °C over the period 1880–2012.

.. the observed warming to the reference period 1986–2005 is 0.61 [0.55 to 0.67] °C for 1850–1900 ...

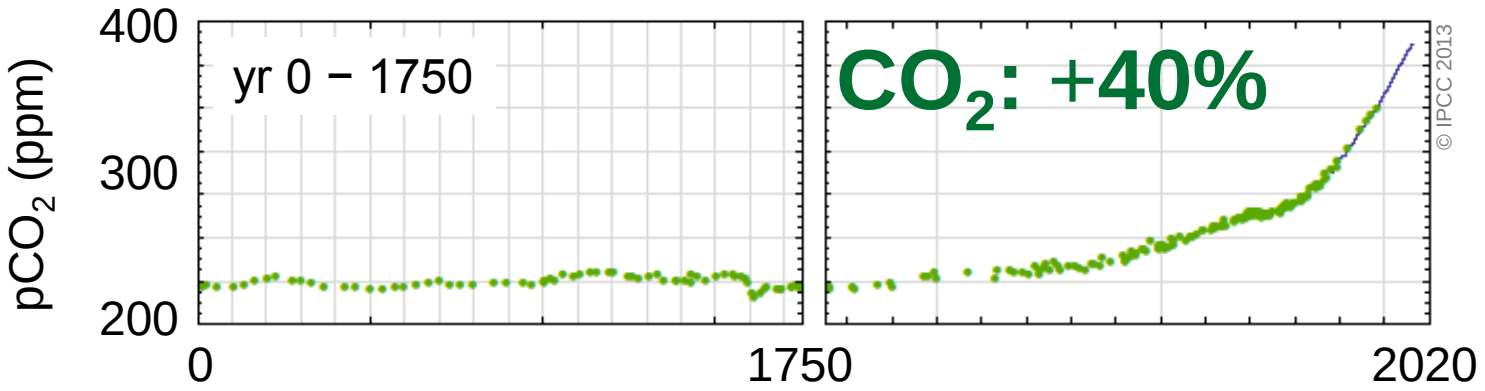


Fig. 6.11

From 1750 to 2011, CO_2 emissions from fossil fuels have released 375 GtC to the atmosphere, while deforestation [...] have released 180 GtC.

This results in cumulative anthropogenic emissions of 555 [470 to 640] GtC.

Since 1870, an amount of 515 [445 to 585] GtC was already emitted by 2011.

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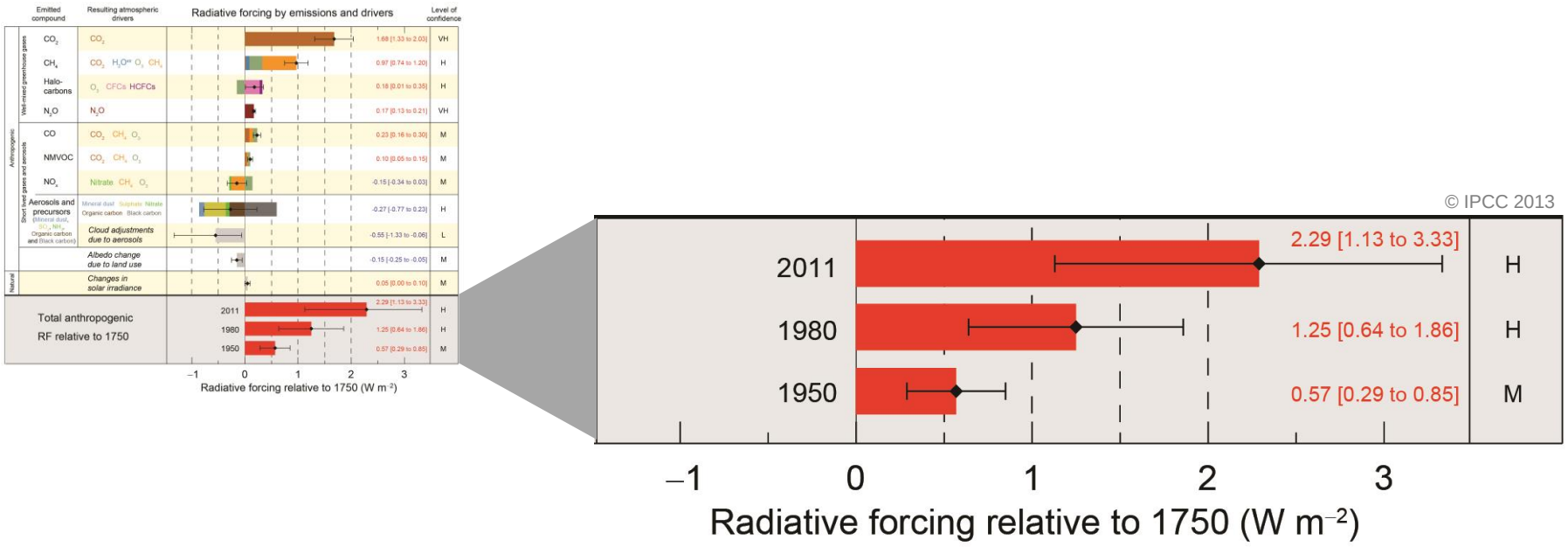
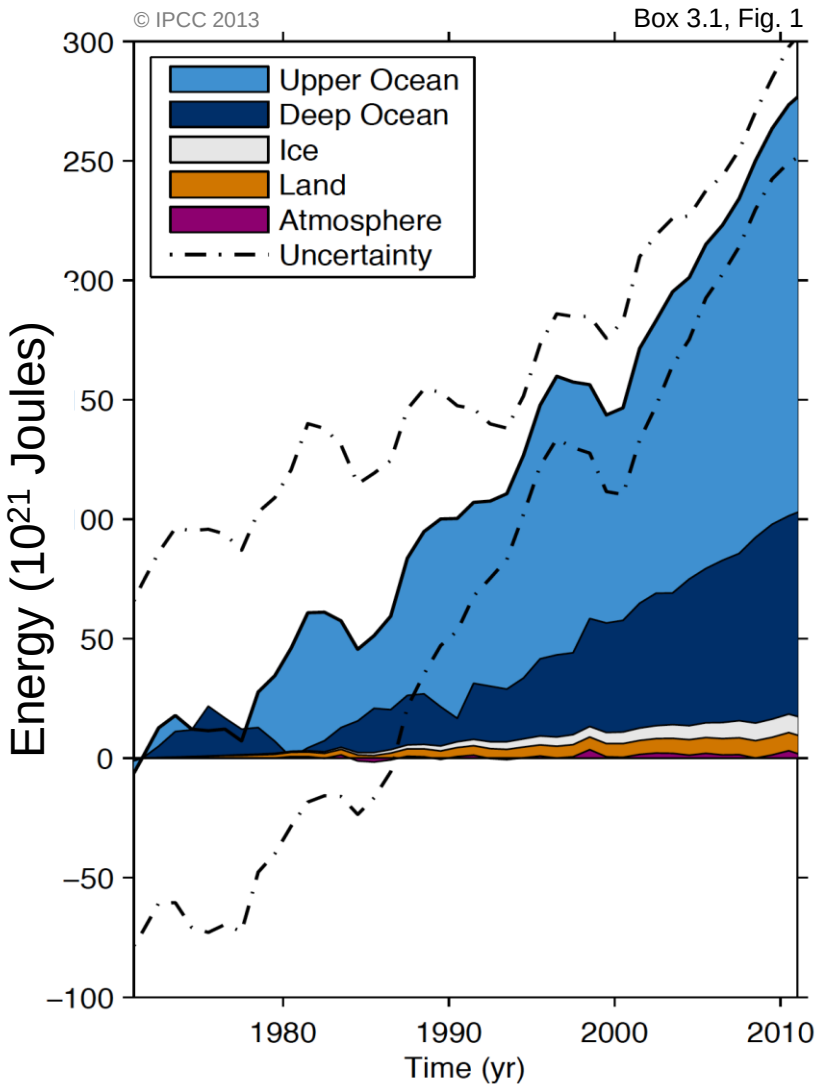


Fig. SPM.5

Total radiative forcing is positive, and has led to an uptake of energy in the climate system. The largest contribution [...] is caused by the increase in the atmospheric concentration of CO_2 since 1750.



Ocean warming dominates the increase in energy stored in the climate system, accounting for more than 90% of the energy accumulated between 1971 and 2010 (*high confidence*).

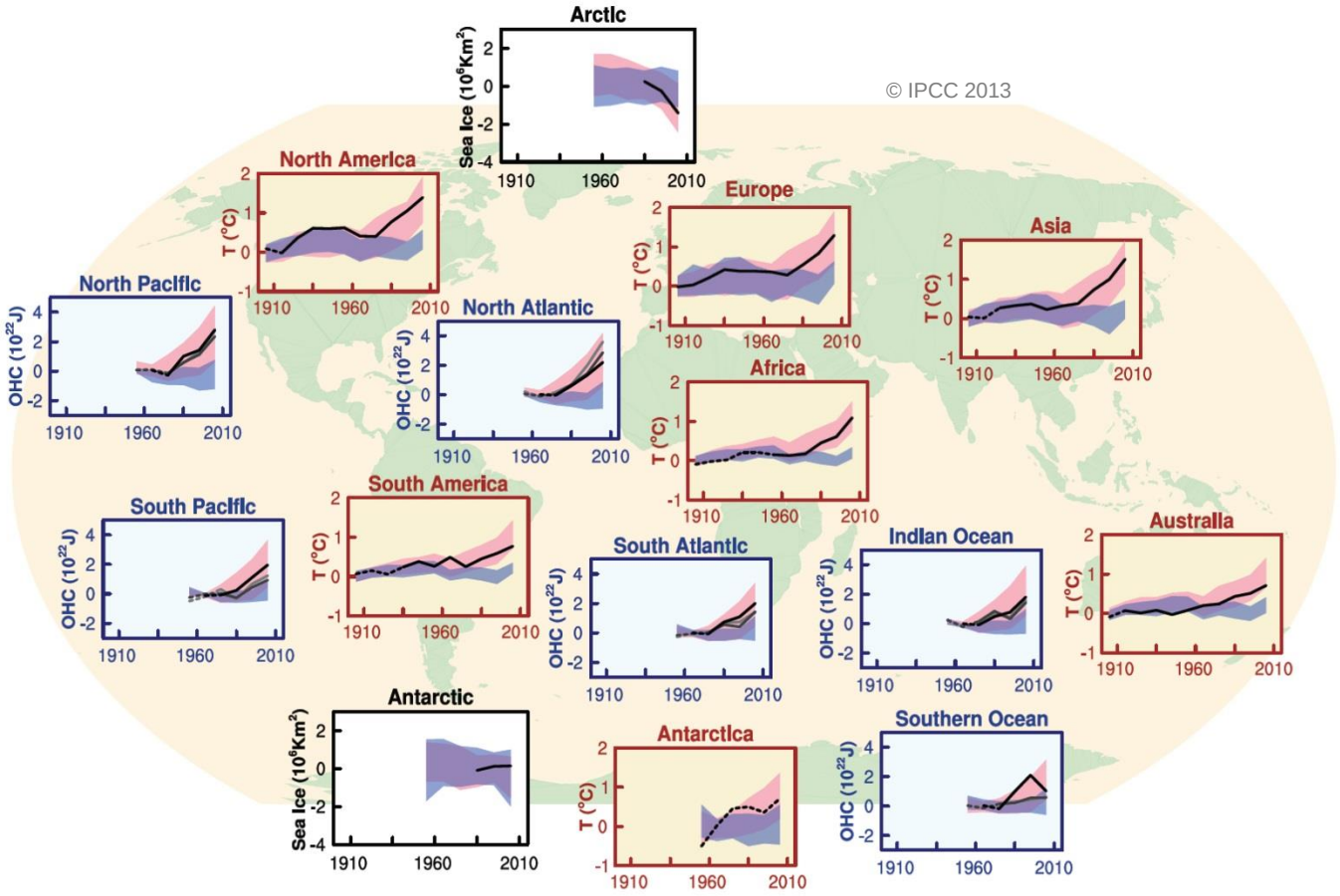


Fig. SPM.6

Human influence on the climate system is clear.

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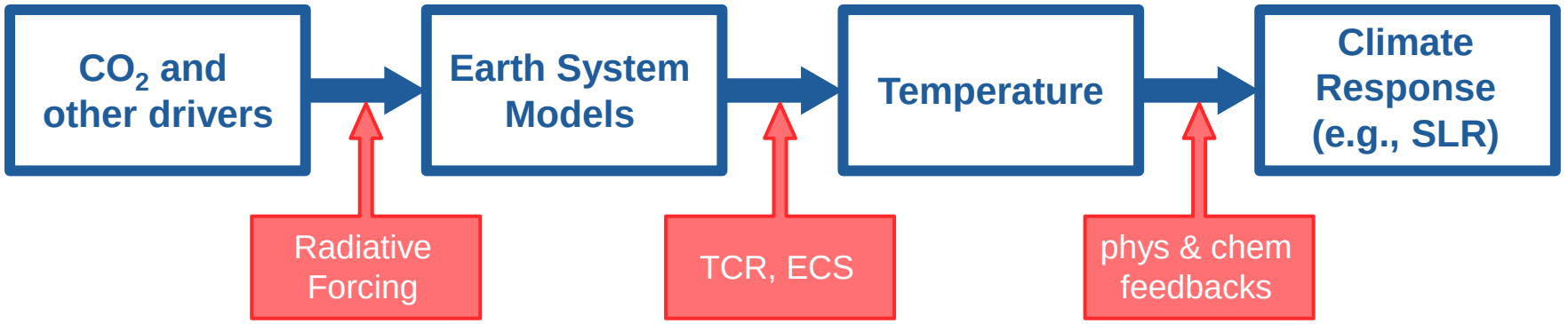


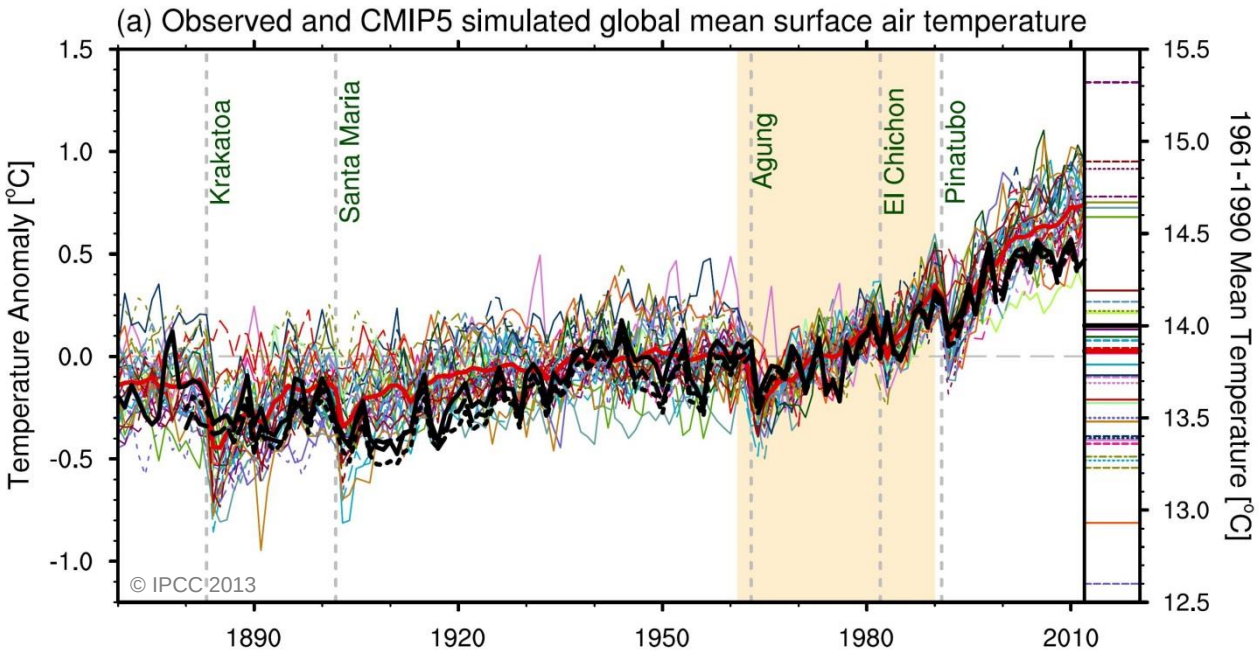
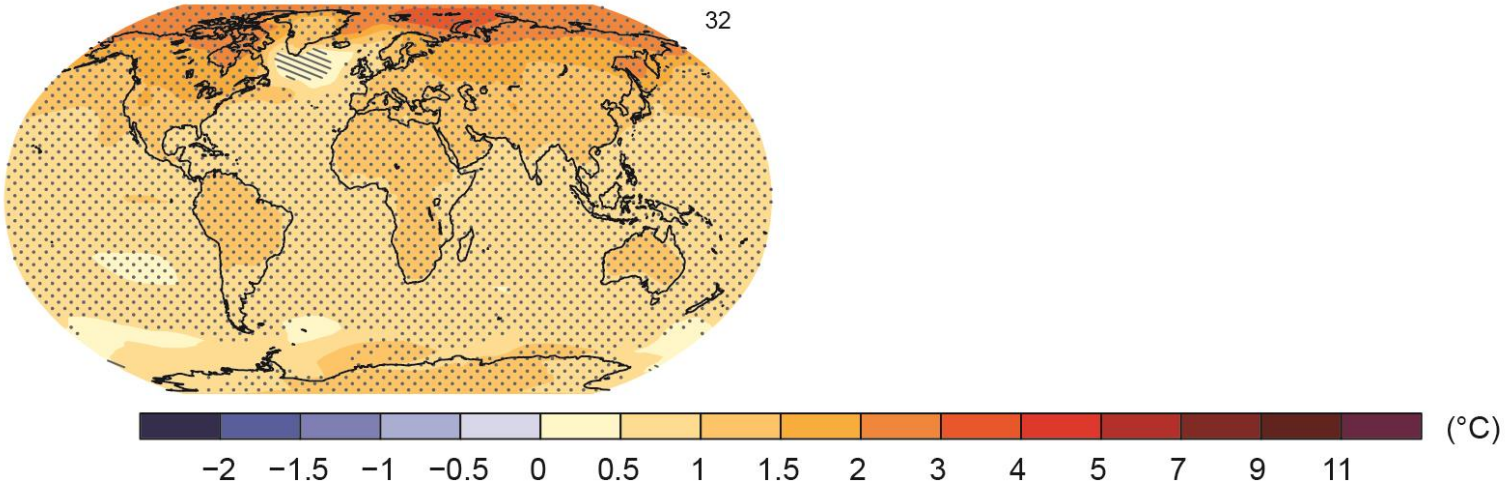


Fig. 9.8

Climate models reproduce observed continental-scale surface temperature patterns and trends over many decades, [...]

RCP2.6
CO_{2eq} = 475 ppm

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



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

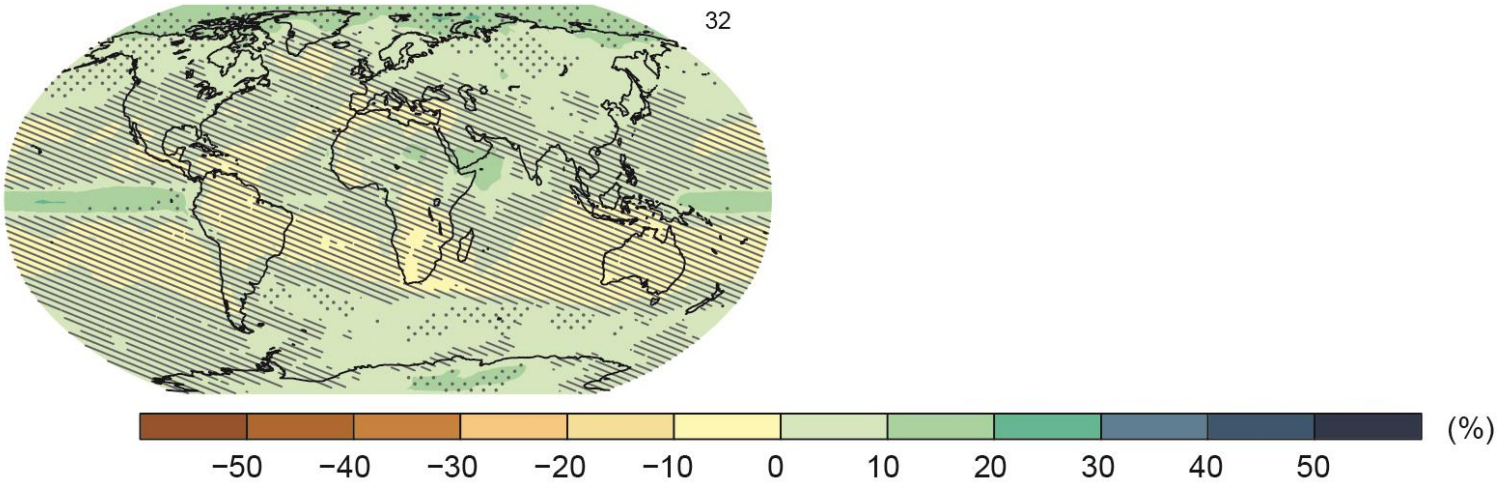


Fig. SPM.8

Transient climate response to cumulative carbon emissions:

TCRE = 0.8 to 2.5°C per 1000 GtC.

Cumulative emissions of CO_2 largely determine global mean surface warming by the late 21st century and beyond.

Cumulative total emissions of CO_2 and global mean surface temperature response are approximately linearly related.

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

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Further Information

www.climatechange2013.org

ipcc
INTERGOVERNMENTAL PANEL ON climate change
WMO UNEP