Climate :

yesterday, today, tomorrow

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Key points

19 points

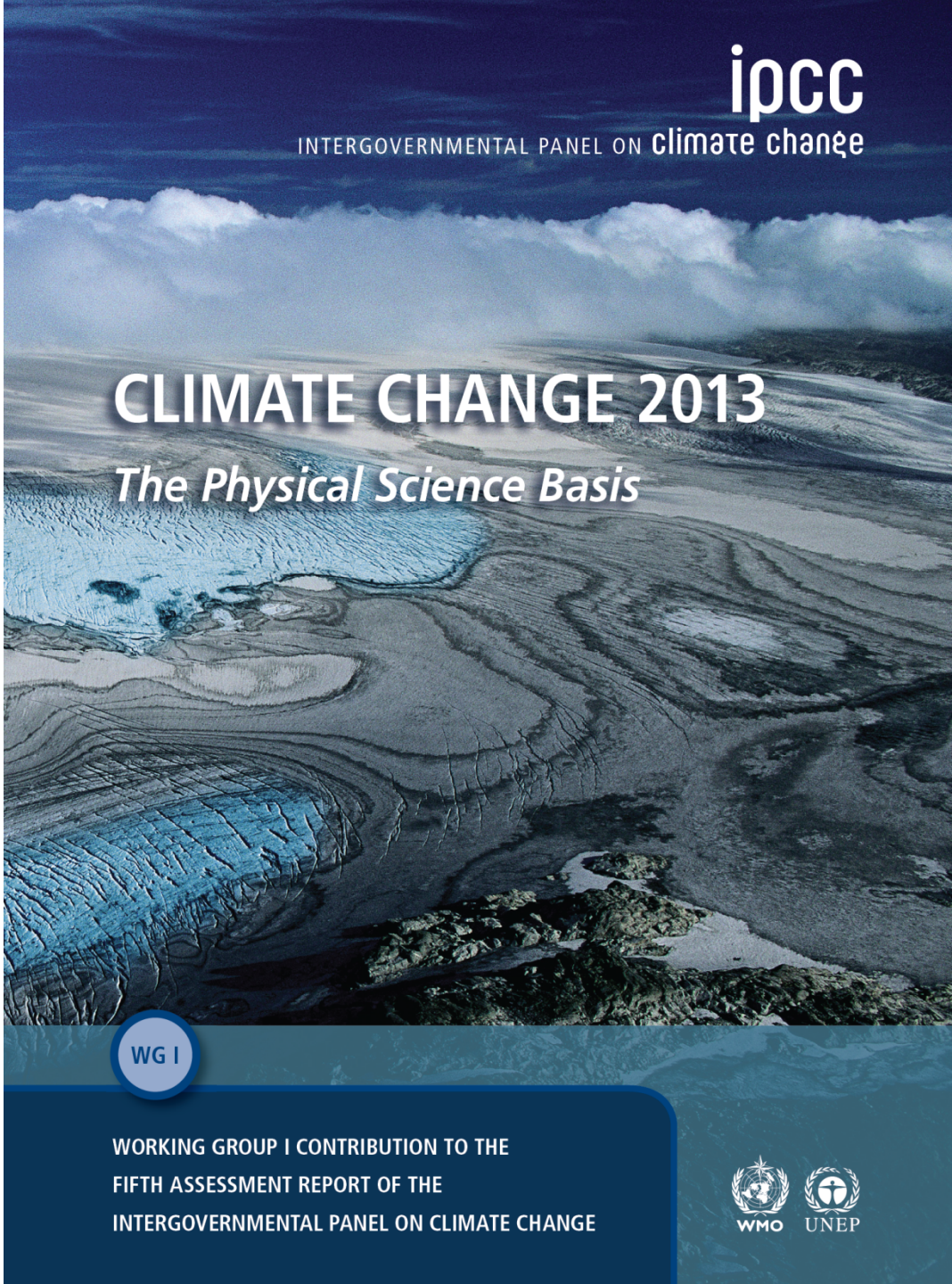
Summary for Policy Makers
~14,000 words

14 Chapters
Atlas of projections

54,677 comments
de 1089 experts

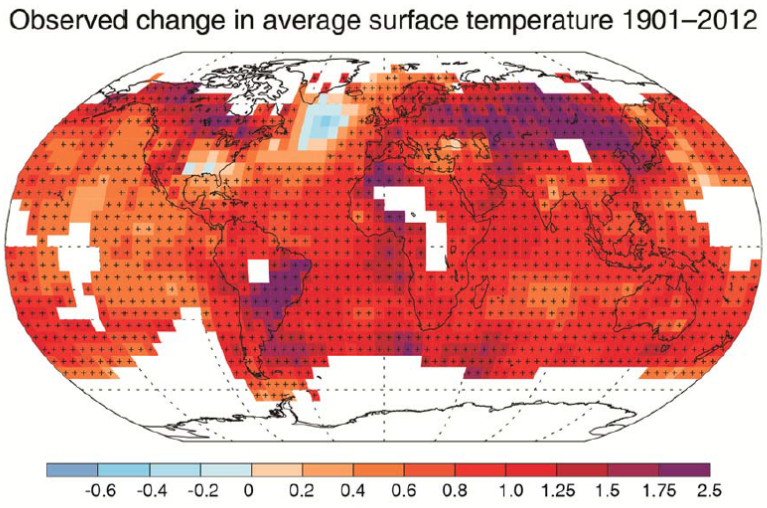
259 authors
et 600 contributors

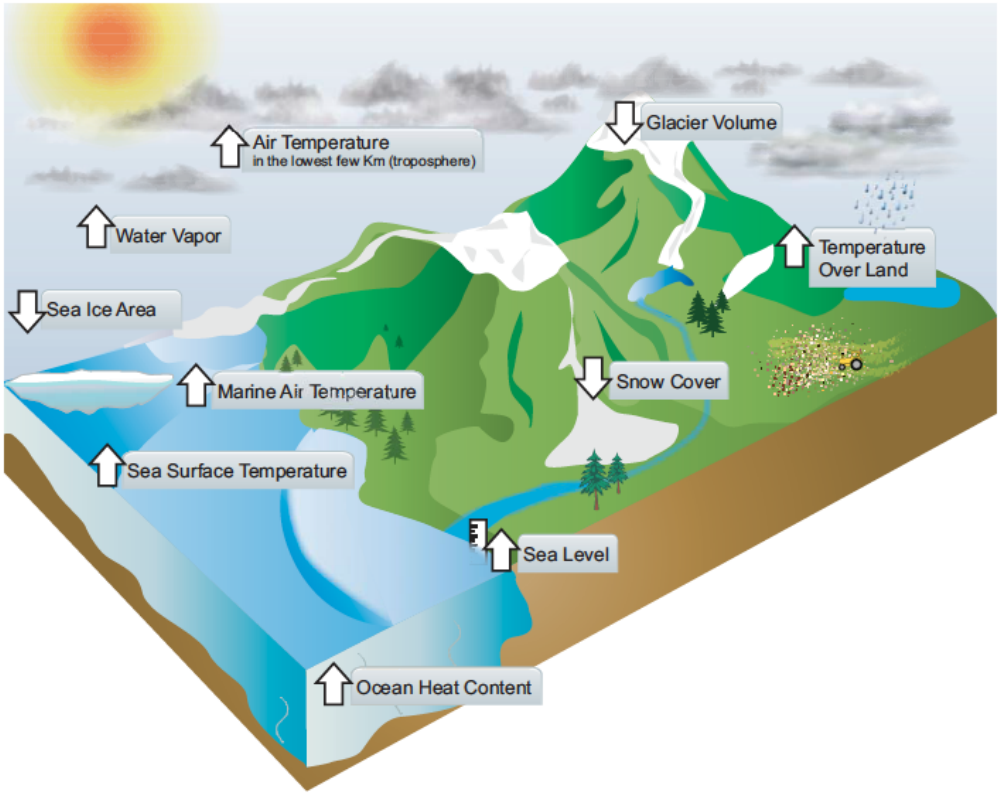
9200 cited publications



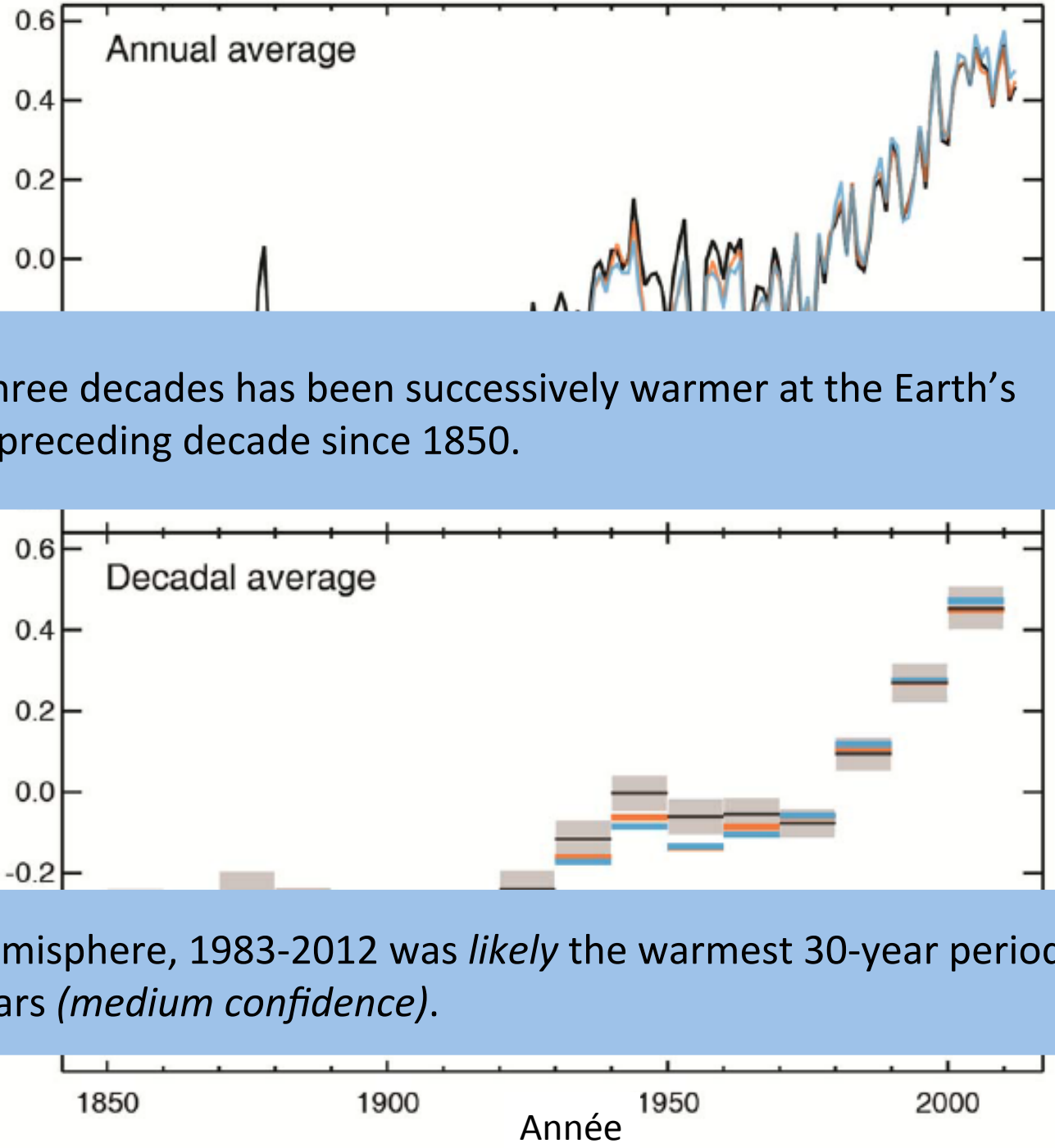
Warming of the climate system is unequivocal.

Since the 1950s, many of the observed changes are unprecedented over decades to millennia.



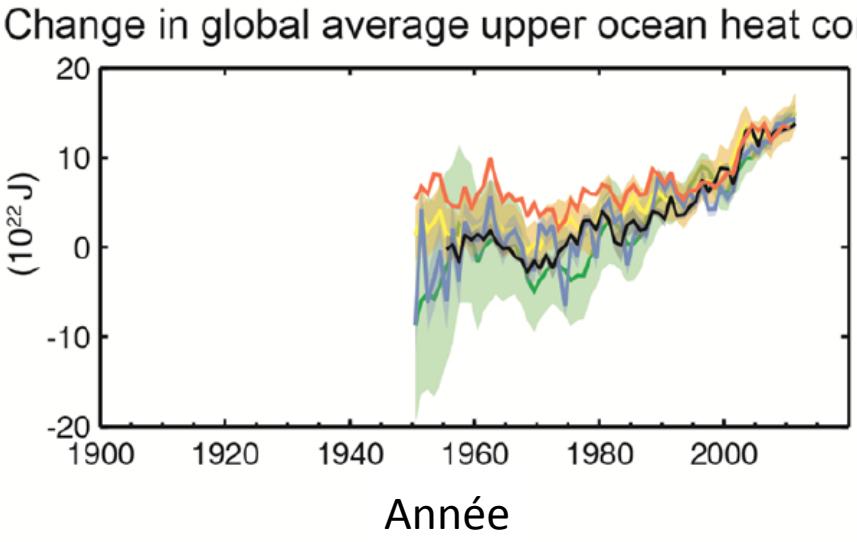


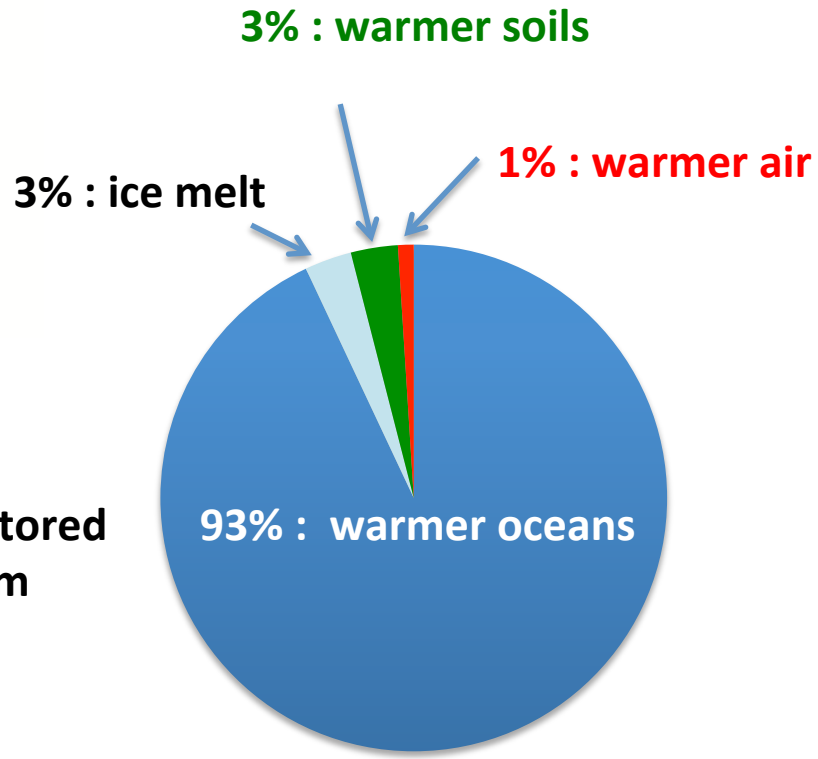
Land-ocean surface temperature anomaly (°C) relative to 1961-1990



Each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850.

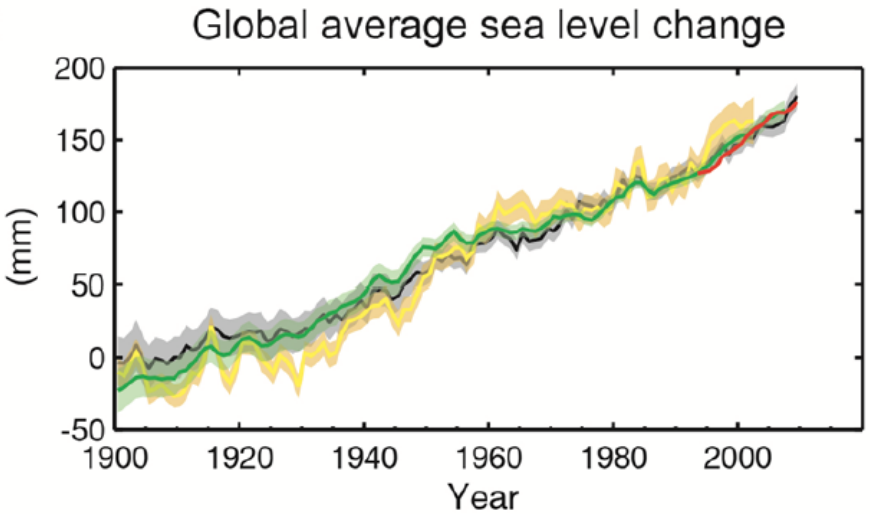
In the Northern Hemisphere, 1983-2012 was *likely* the warmest 30-year period of the last 1400 years *(medium confidence)*.

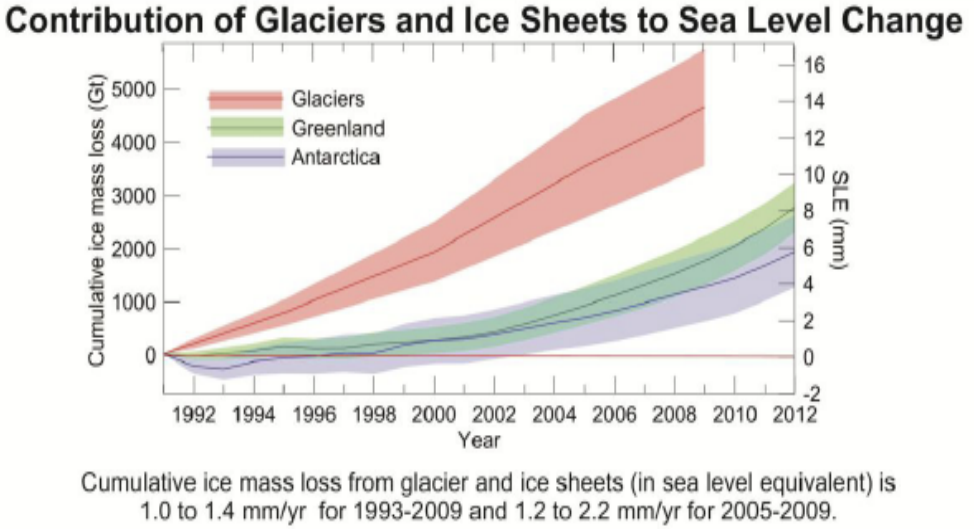




Increase in energy stored in the climate system

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.

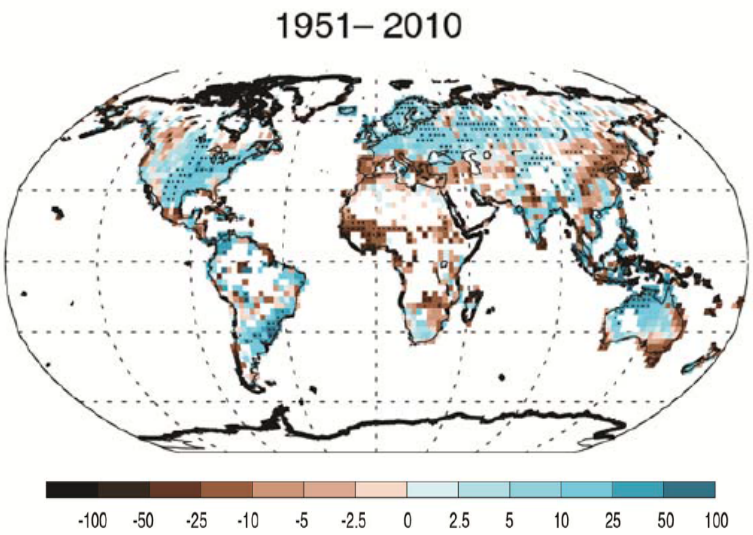




Cumulative ice mass loss from glacier and ice sheets (in sea level equivalent) is 1.0 to 1.4 mm/yr for 1993-2009 and 1.2 to 2.2 mm/yr for 2005-2009.

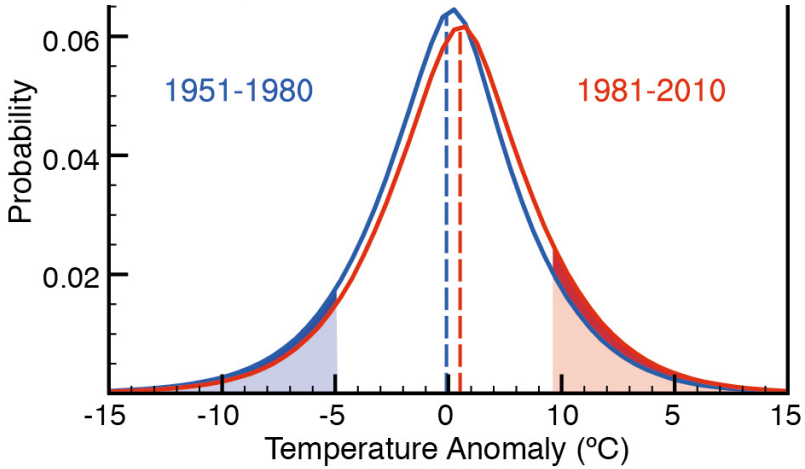
Over the period 1901-2010, global mean sea level rose by 0.19 (0.17-0.21) m.

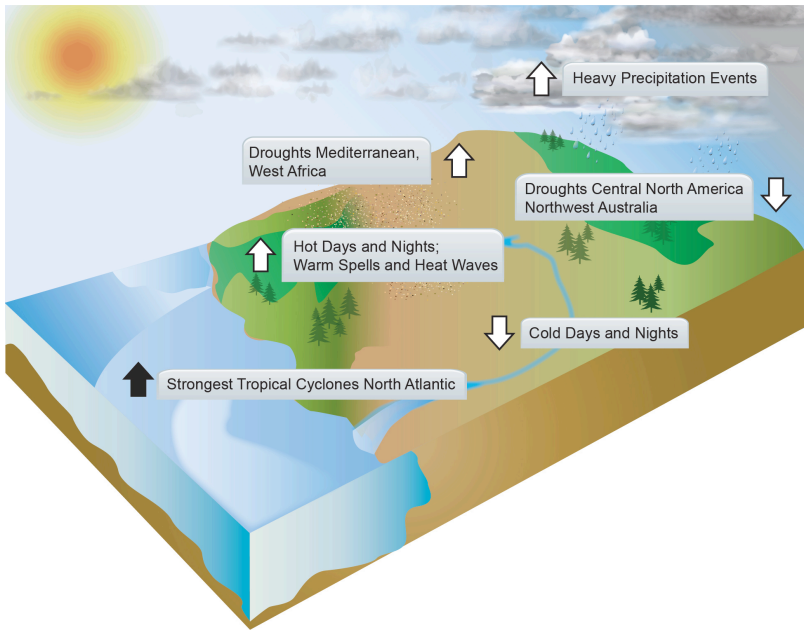
Trend in annual precipitation (mm/yr)



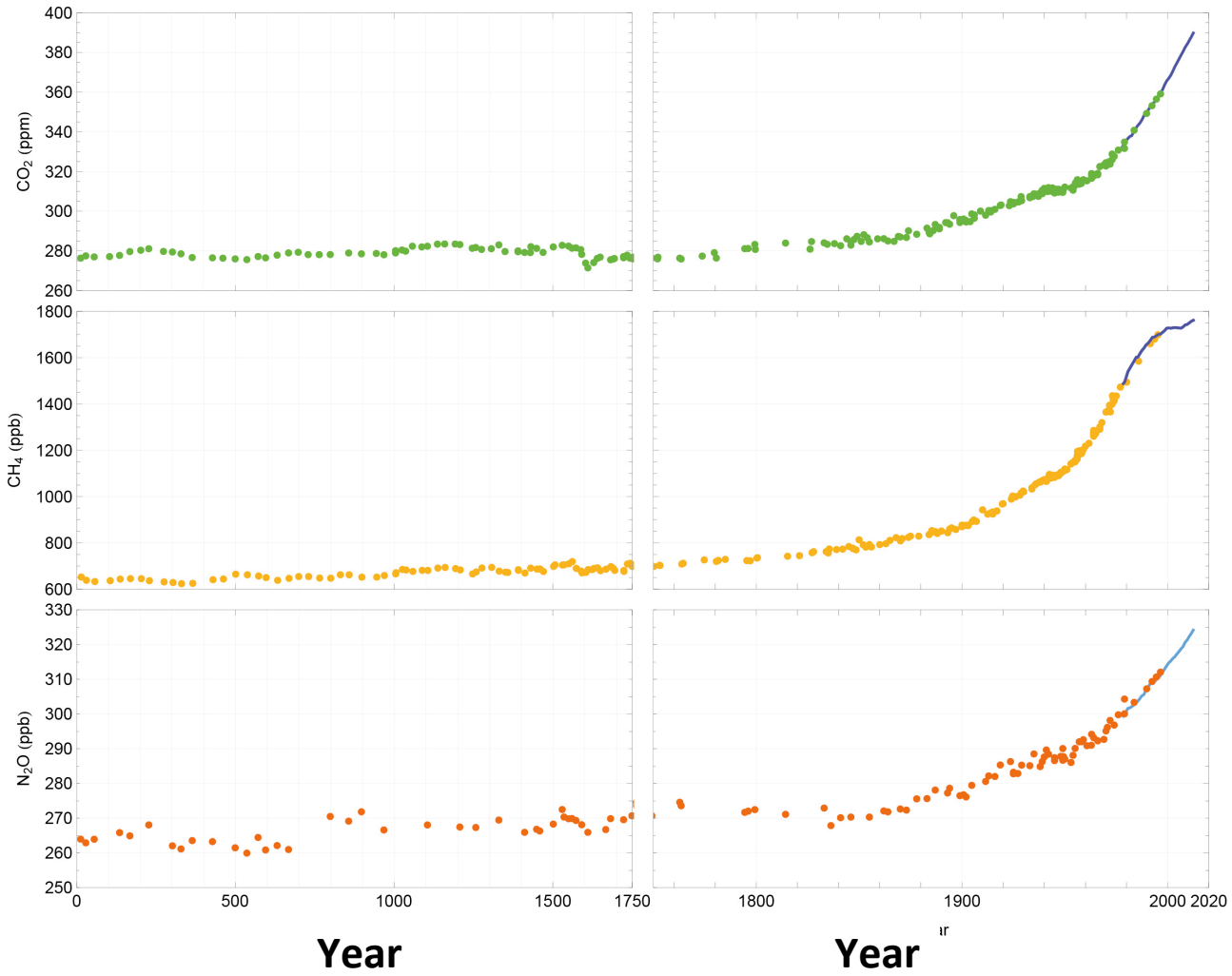
Changes in many extreme weather and climate events have been observed since about 1950.

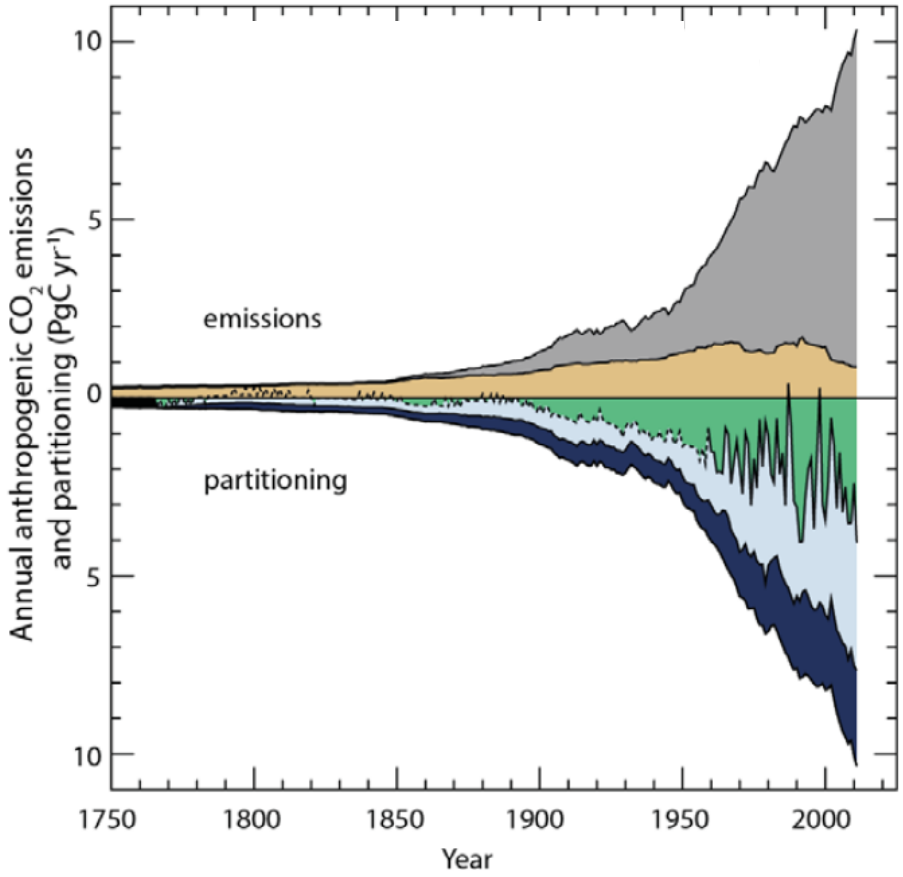
Climate change already has impacts on the water cycle, crops, natural systems and human activities.





The atmospheric concentrations of CO_2, CH_4 and N_2O have increased to levels unprecedented in at least the last 800,000 years.





Fossil fuels and cement

Land use change

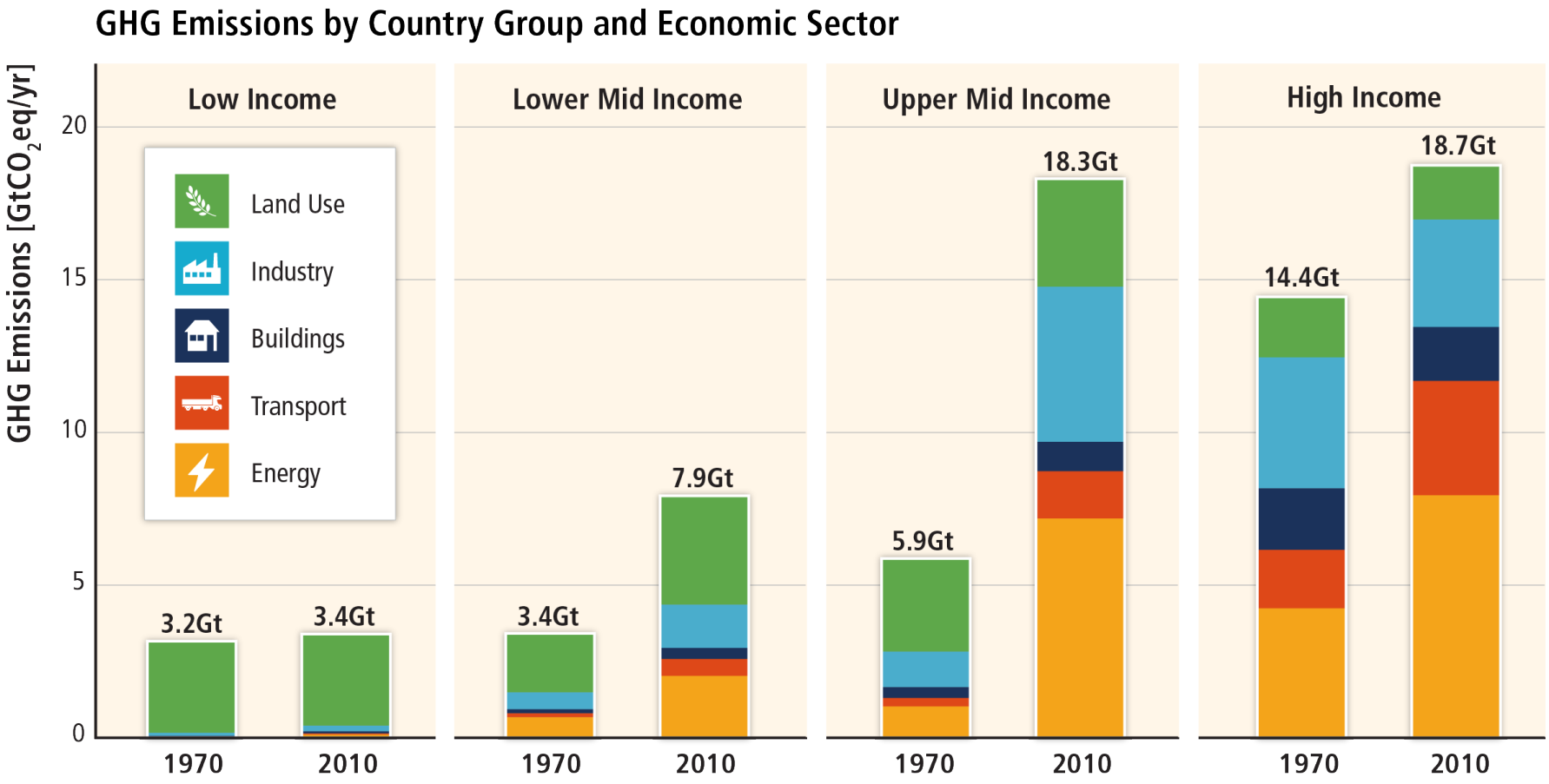
Soils and vegetation

Atmosphere

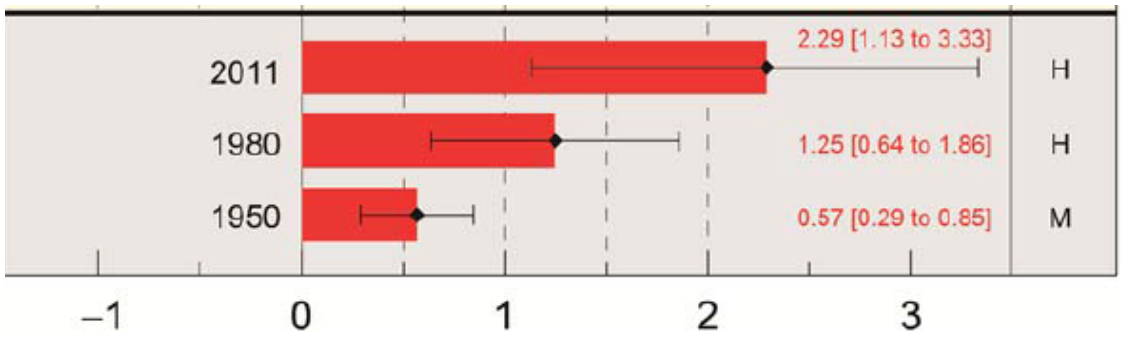
Ocean

CO_2 concentrations have increased by 40% since pre-industrial times, primarily from fossil fuel emissions and secondarily from net land use change emissions. The ocean has absorbed 30% of the emitted anthropogenic carbon dioxyde, causing ocean acidification.

The structure of greenhouse gas emissions per country has shifted with world economical changes

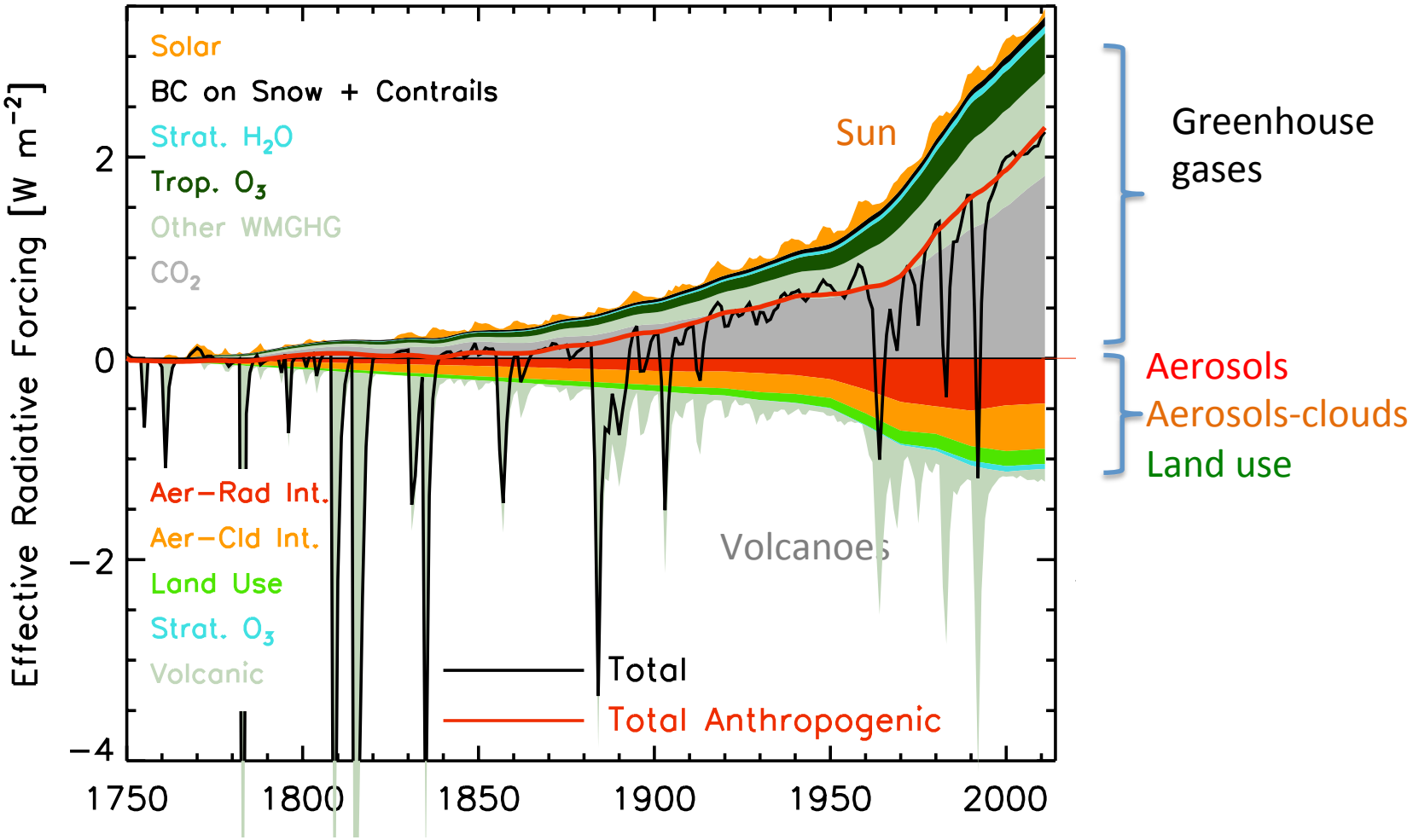


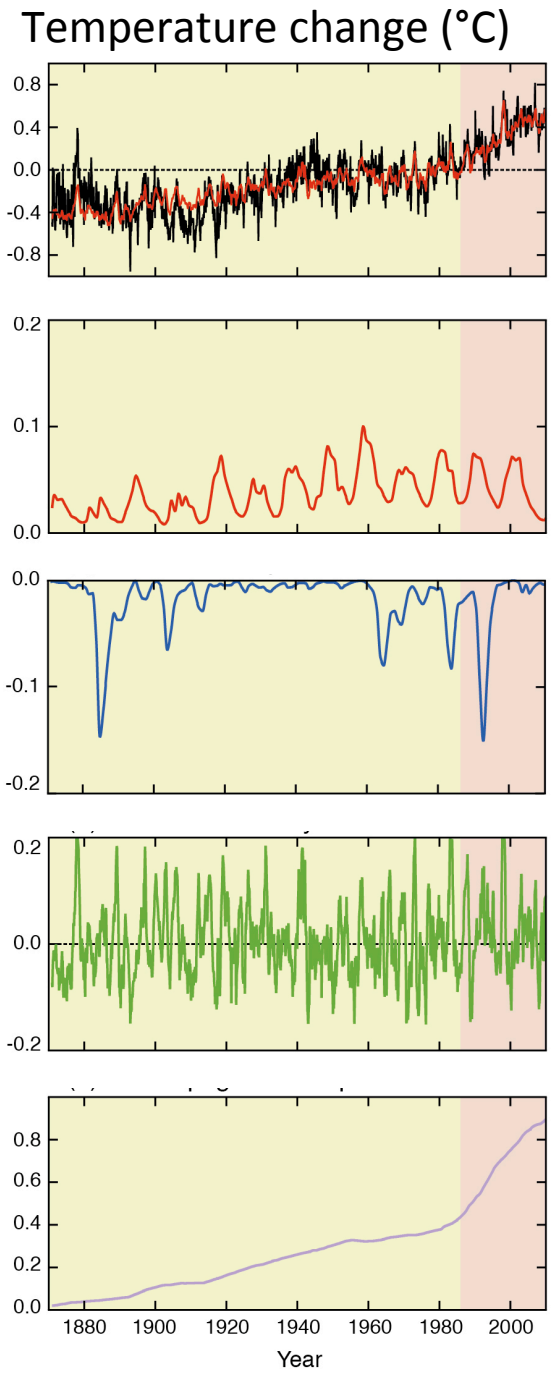
Total radiative forcing is positive, and has led to an uptake of energy by the climate system.



Net radiative impact of human activities (W/m^2)

Human influence on the climate system is clear. The largest contribution to total radiative forcing is caused by the increase in the atmospheric concentration of CO_2 since 1750.





Global mean surface temperature

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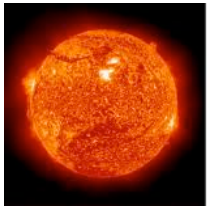
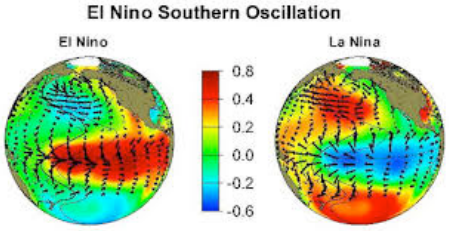


solar activity

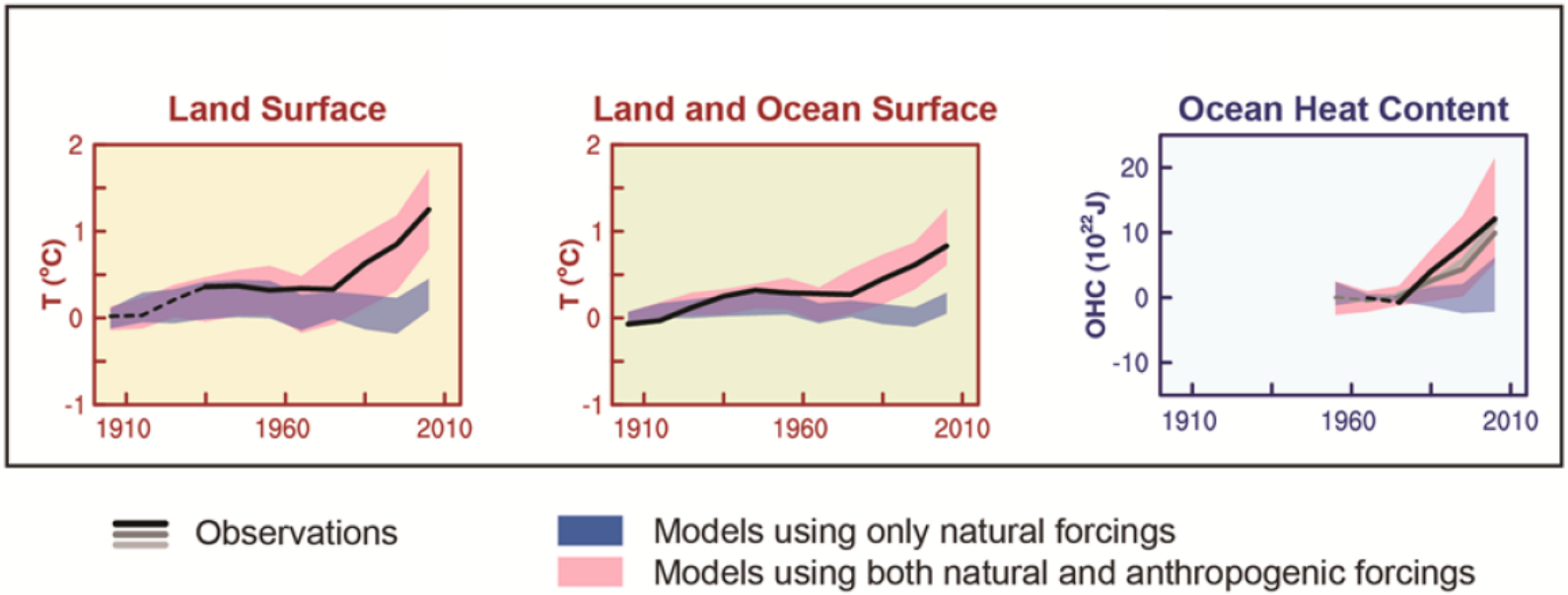
volcanic activity



El Niño

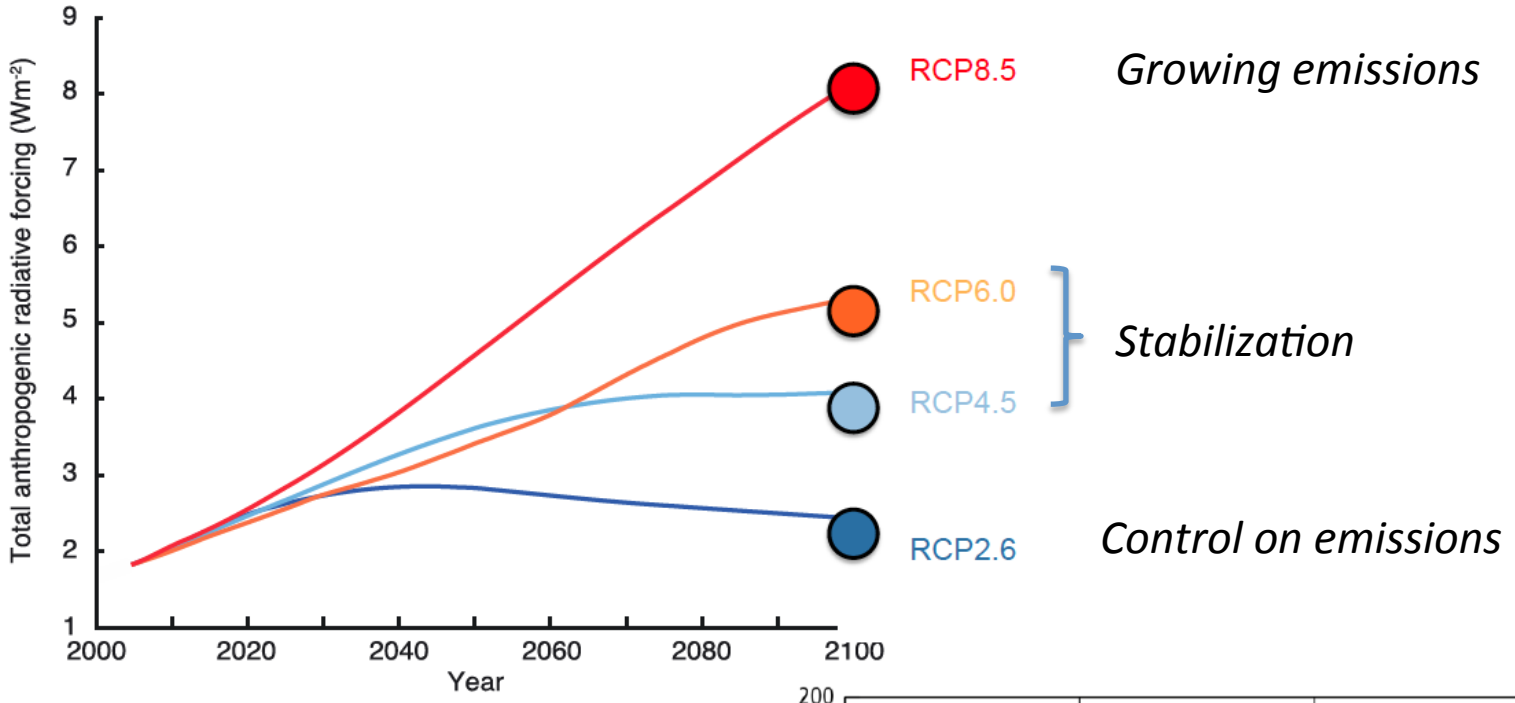
human activities

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

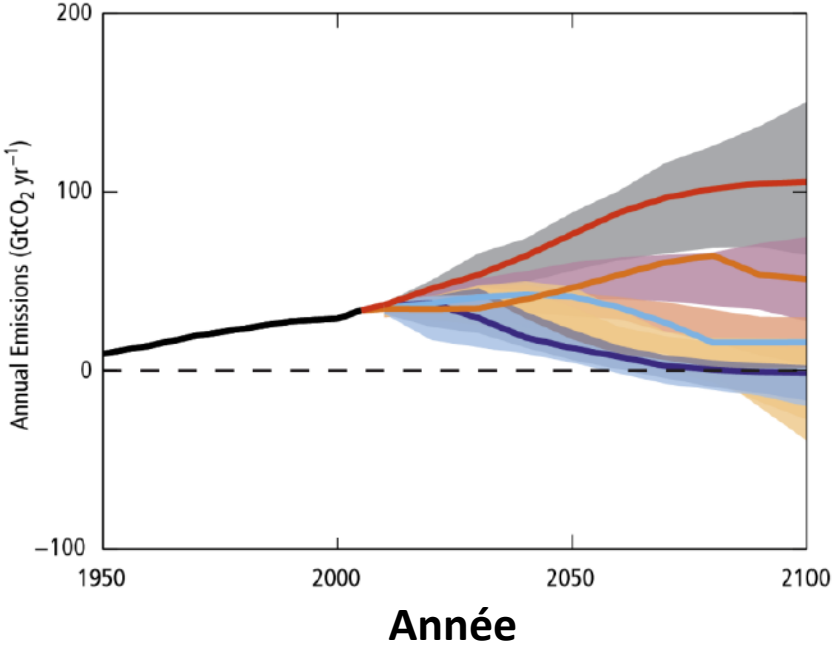


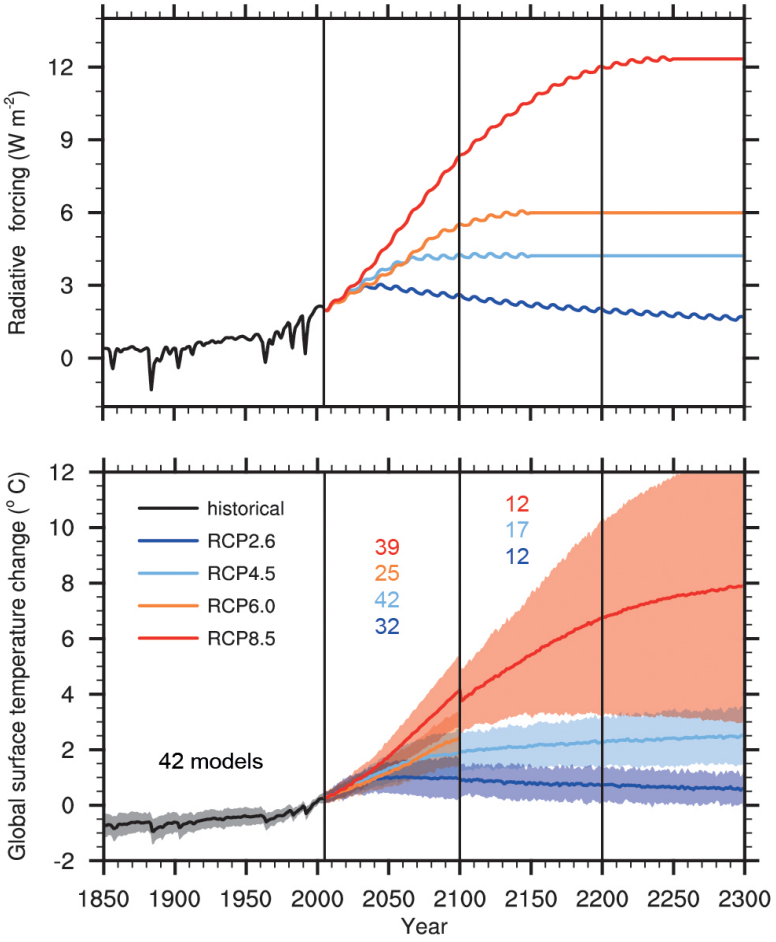
Human influence has been detected in warming of the atmosphere and ocean, changes in the global water cycle, reductions in snow and ice, global mean sea level rise, and changes in some climate extremes.

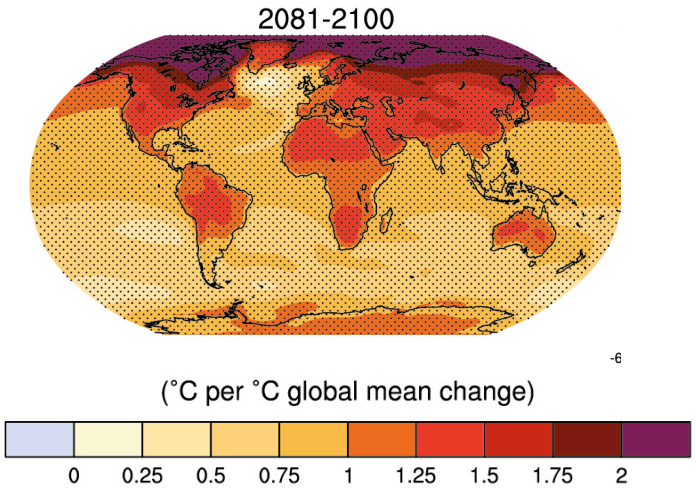
RCP : « Representative concentration pathways » (en W/m^2)



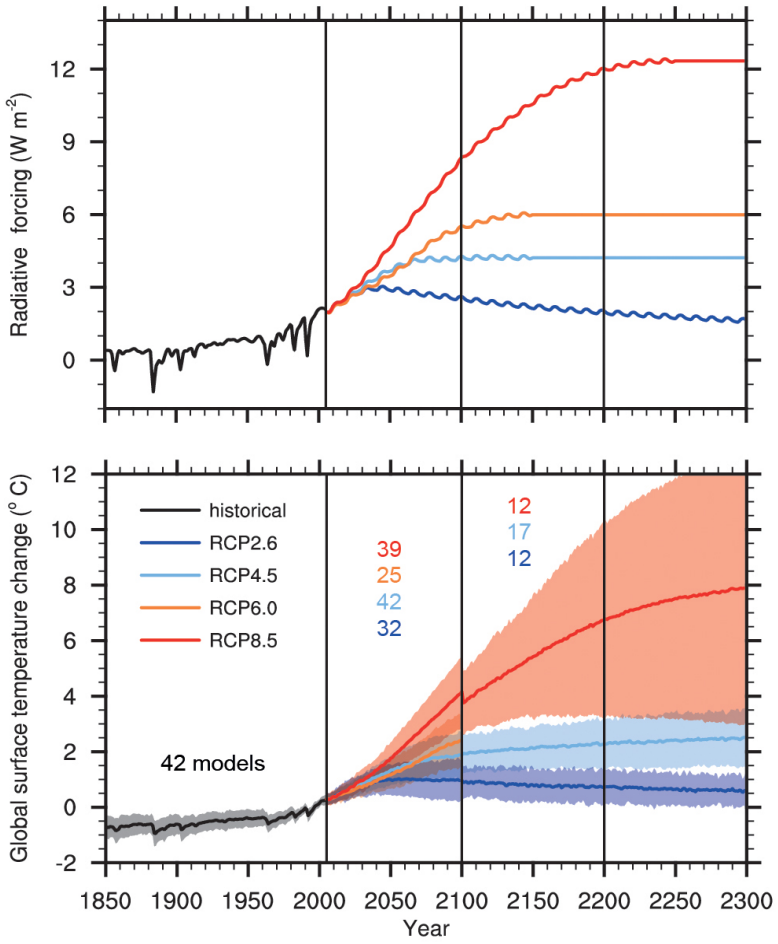
It is *very likely* that more than 20% of the CO_2 emitted by human activities will stay in the atmosphere for more than 1000 years after the end of emissions.

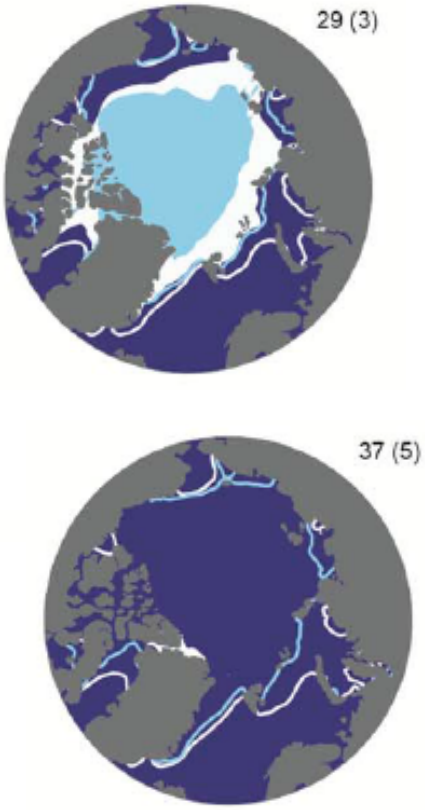






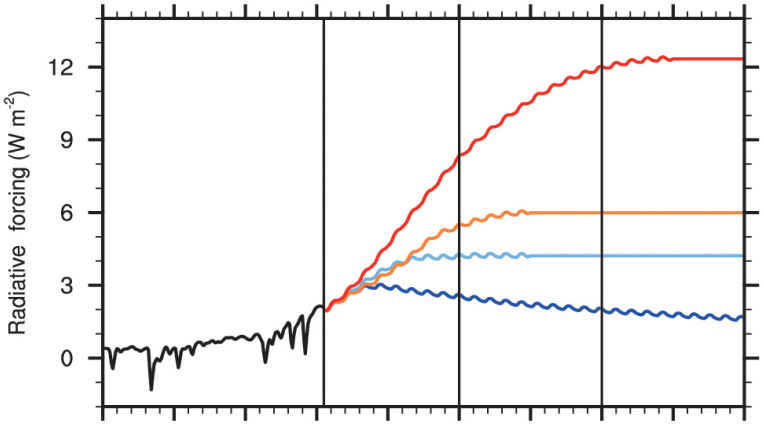
Most aspects of climate change will persist for many centuries. Warming will continue to exhibit interannual to decadal variability.

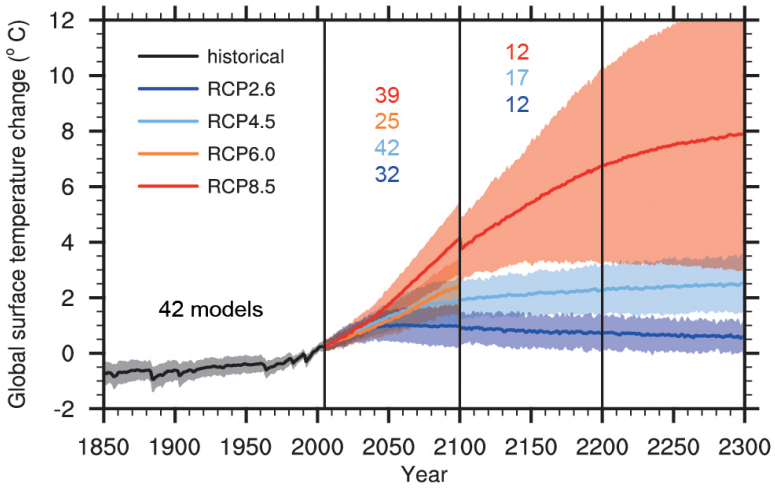


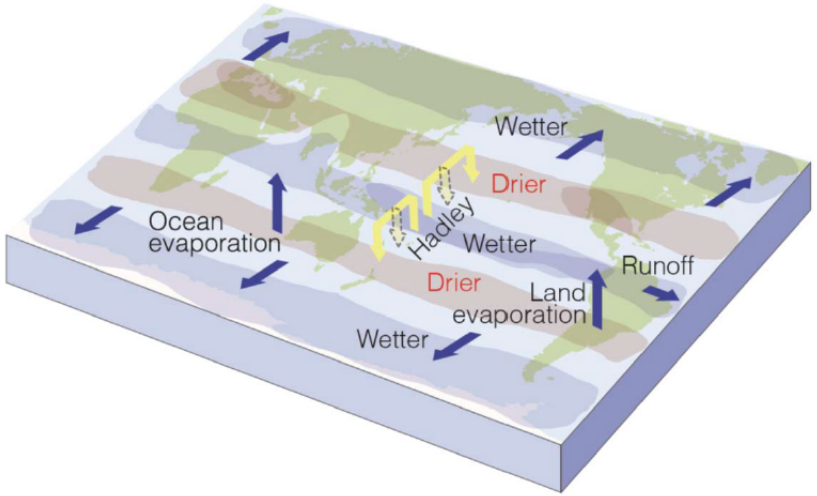


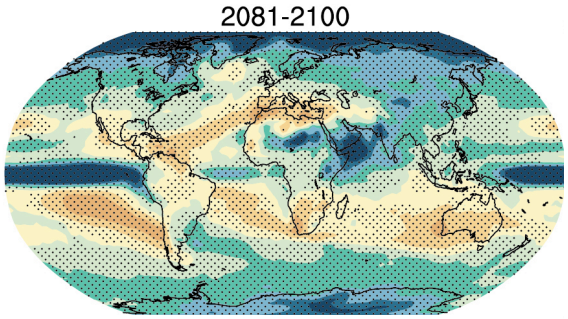
The global ocean will continue to warm. Heat will penetrate from the surface to the deep ocean and affect ocean circulation.

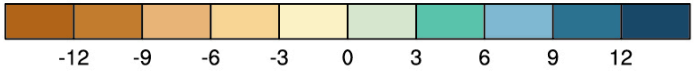
A nearly ice-free Arctic ocean in September is *likely* before mid-century for RCP8.5







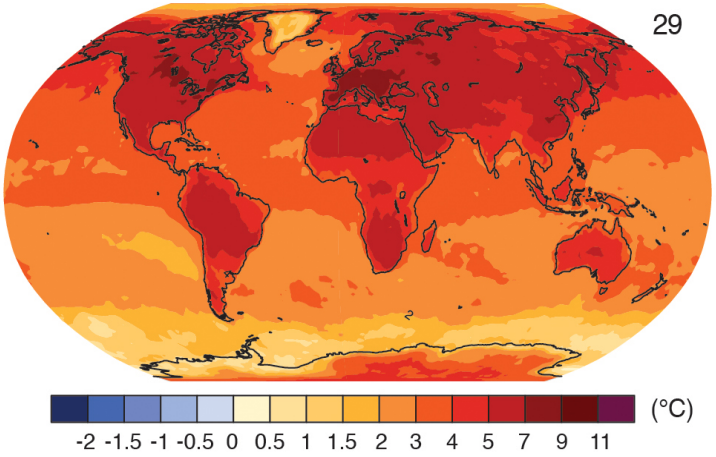




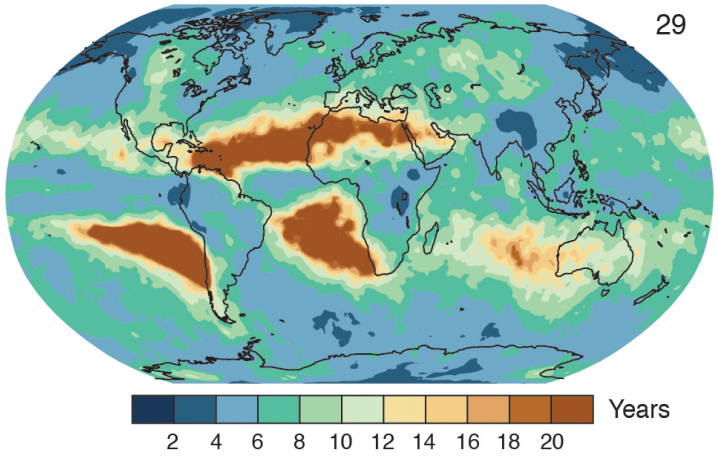
The contrast between wet and dry regions, and wet and dry seasons will increase.

RCP8.5

Change in value of today's 20 year warmest day

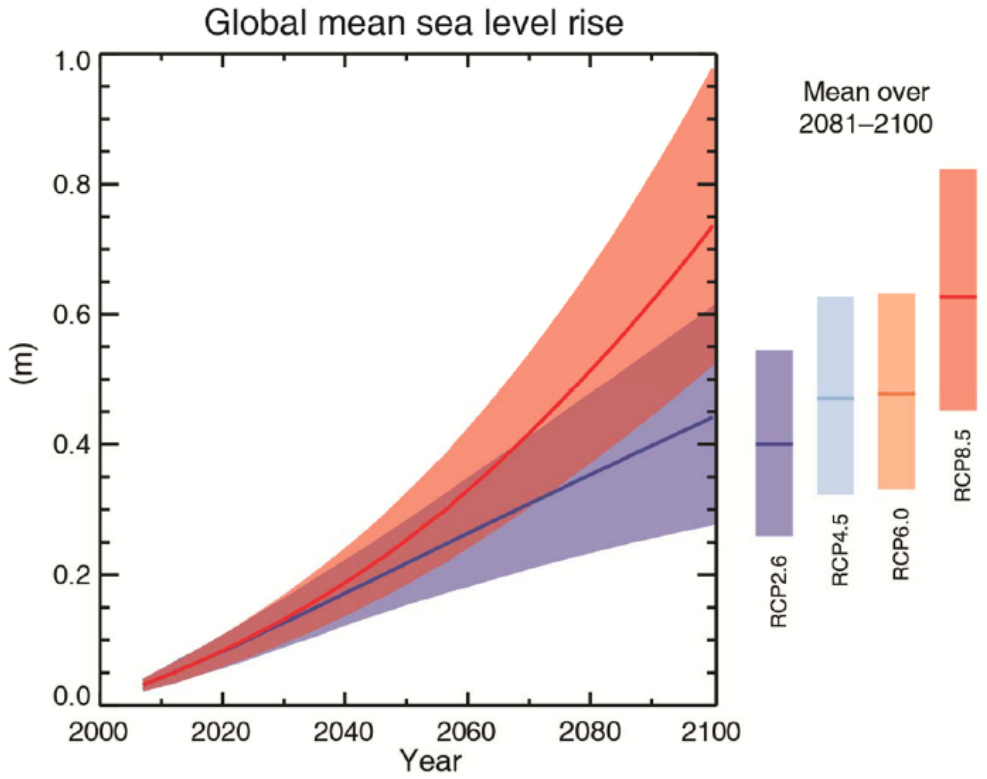


Return time of today's 20 year wettest day



It is *very likely* that heat waves will be more frequent and last longer

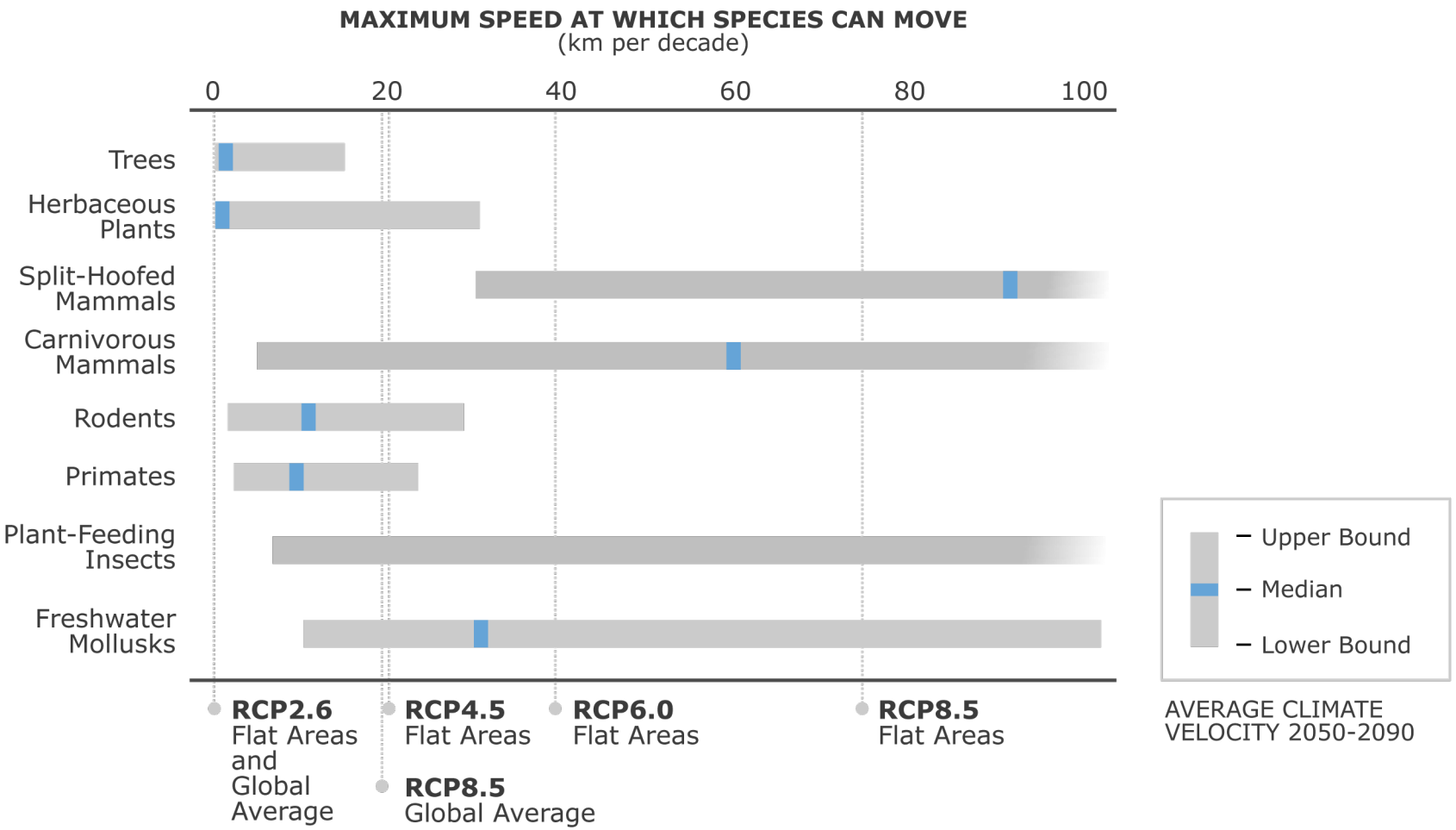
Heavy precipitation events will *likely* be more intense and frequent in wet tropical regions and mid latitudes



Global mean sea level will continue to rise during the 21st century due to increased ocean warming and increased loss of mass from glaciers and ice sheets.

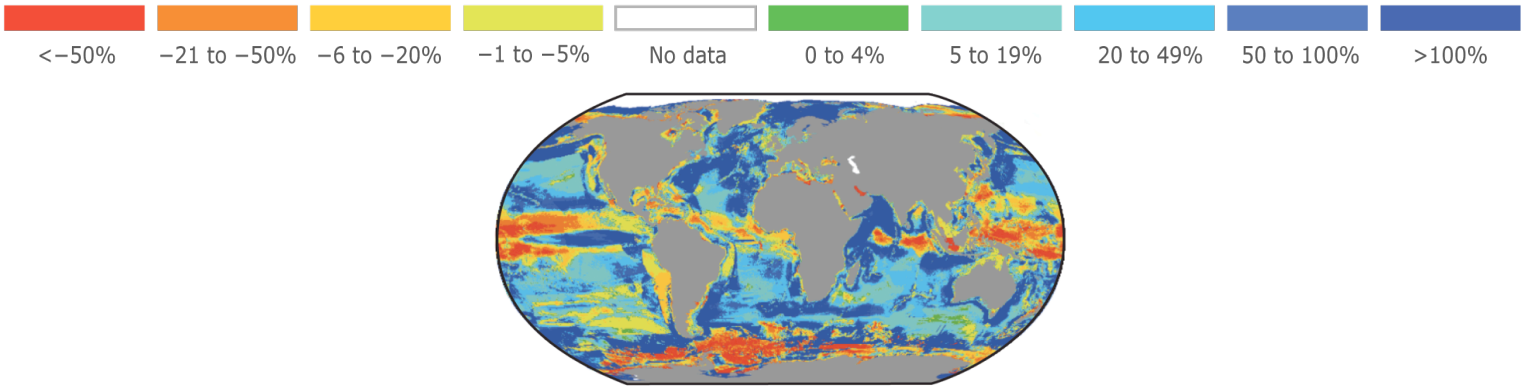
There is a warming threshold leading on thousands of years to deglaciation of the Greenland ice sheet.

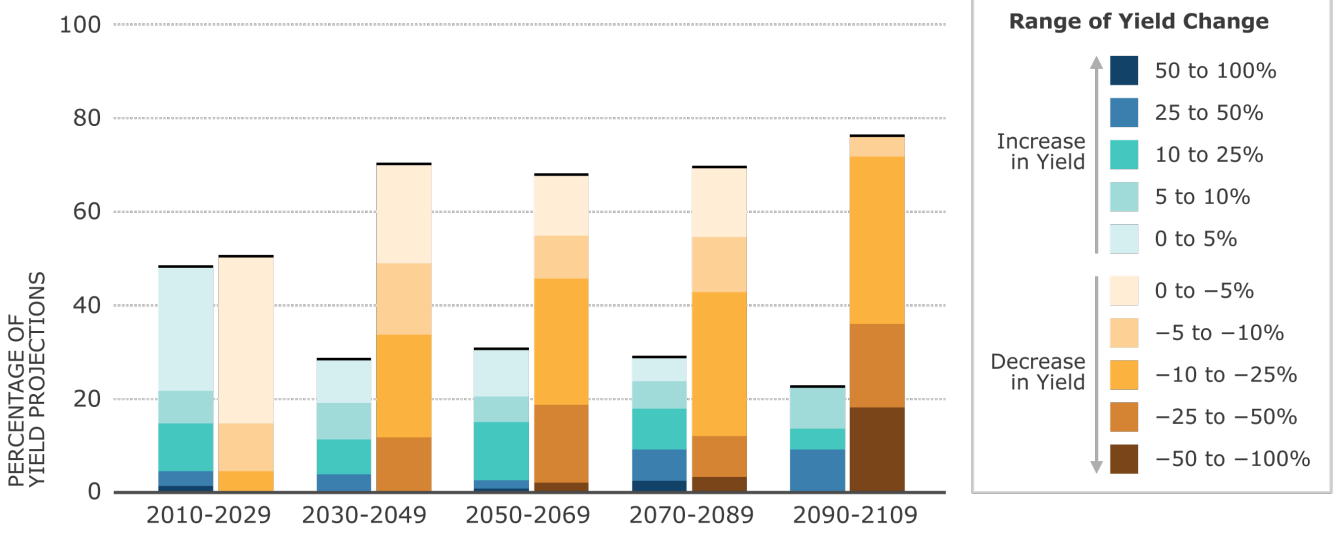
Climate change will affect ecosystems and biodiversity



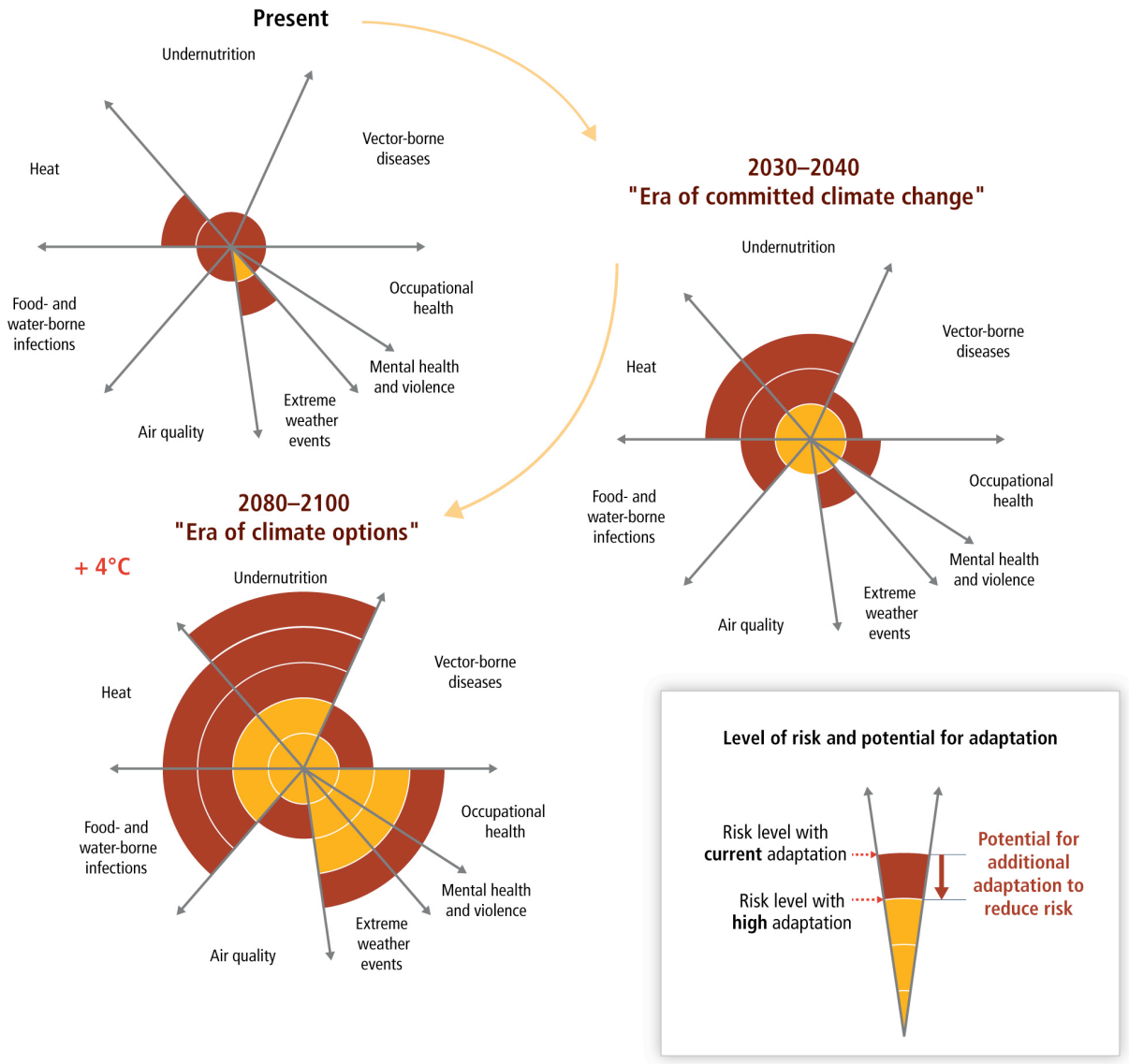
Climate change will affect food production

CHANGE IN MAXIMUM CATCH POTENTIAL (2051-2060 COMPARED TO 2001-2010, SRES A1B)

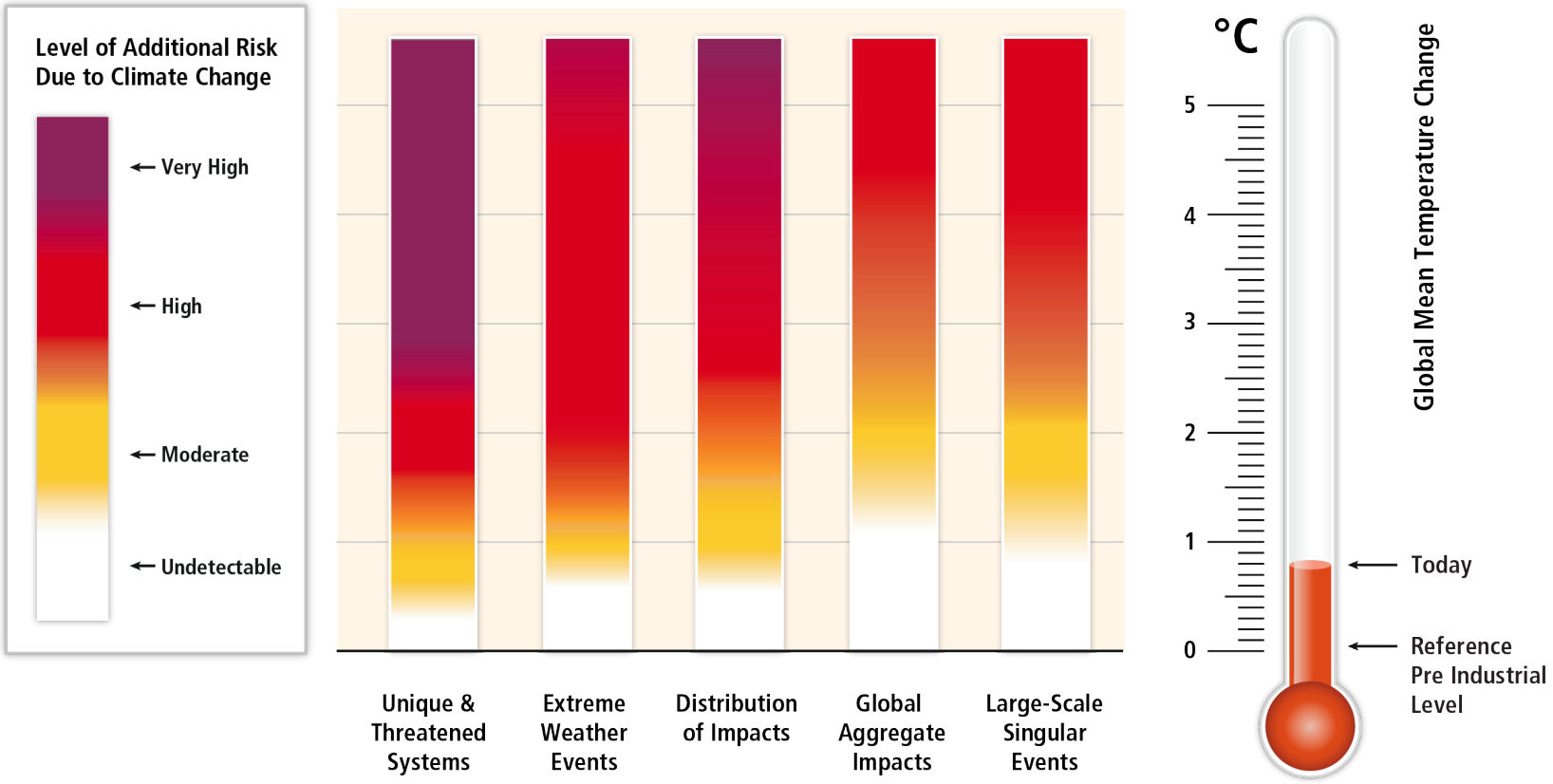




Climate change will affect human health

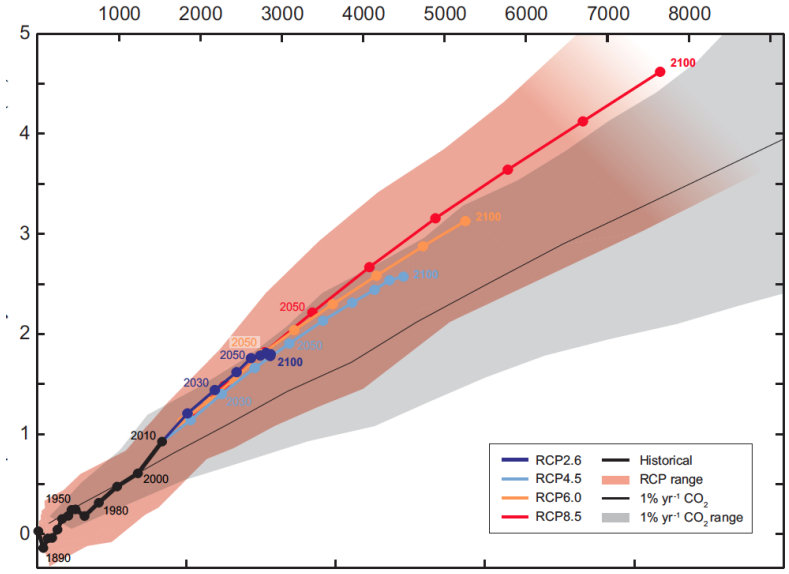


Climate change will create new risks for natural and human systems, and amplify existing risks. The likelihood of surpassing adaptation limits increases with the magnitude and rate of climate change.



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

Change in surface temperature with respect to 1861-1880



Cumulative CO_2 emissions (Gt CO_2)

To limit global warming < 2°C :

3200 Gt CO_2 *(66% probability)*

-

2000 Gt CO_2 (emissions *1870-2014)*

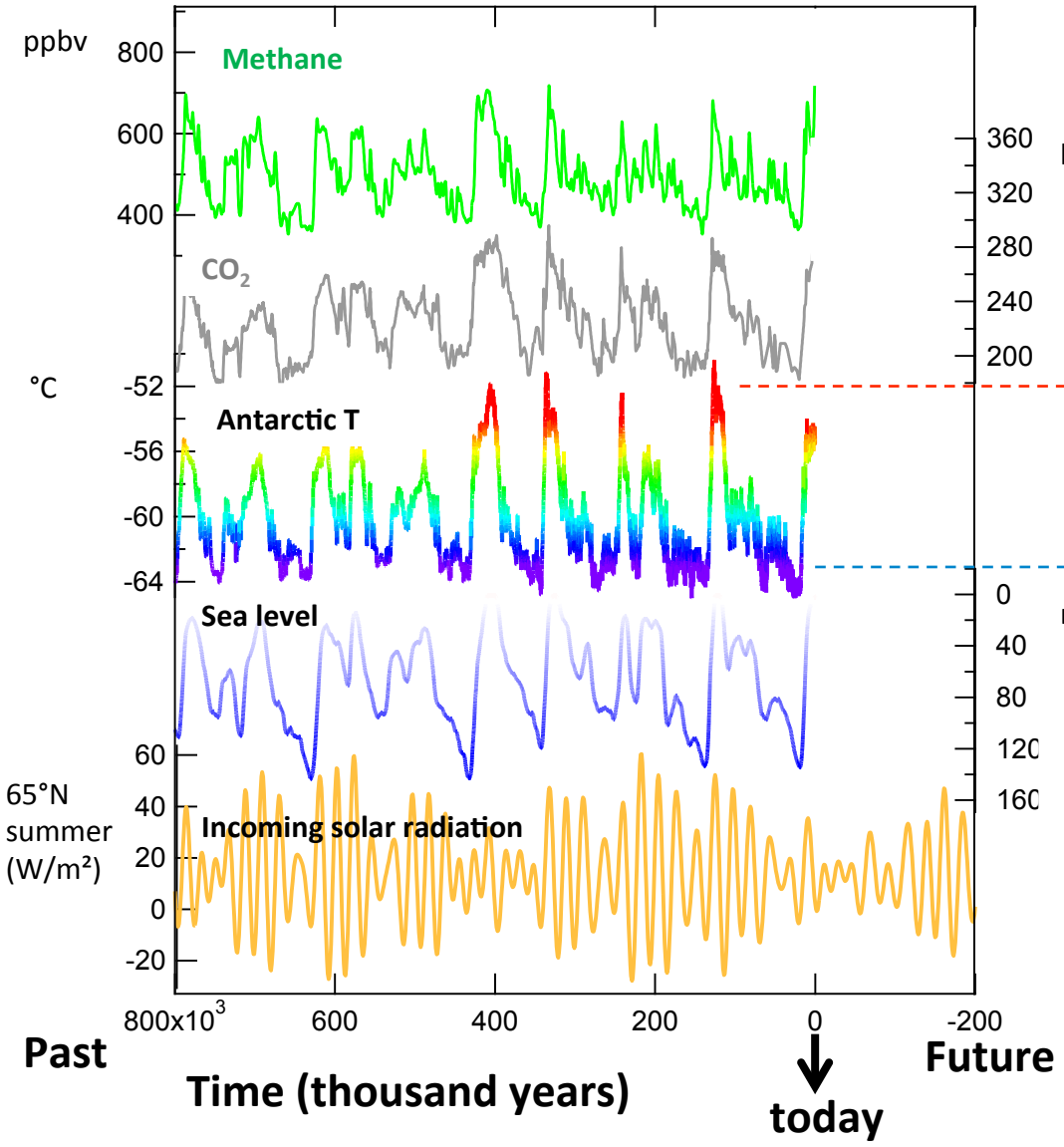
=

Remaining: 1200 Gt CO_2

This would be reached in 20-30 years at current pace (37 Gt CO_2 in 2014, +2-3% per year)

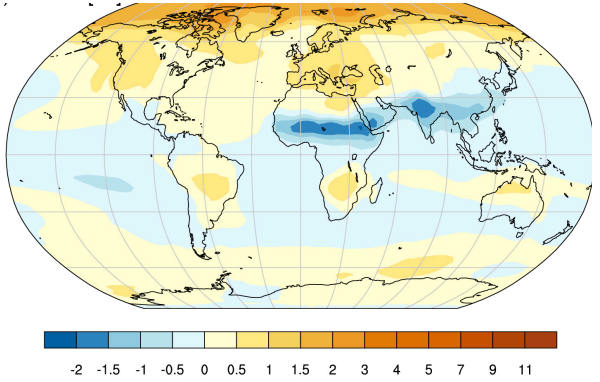
IPCC AR5 updated from Global Carbon Project, 2014

At the global scale, transitions between glacial and interglacial climate occurred at a pace of 1°C per 1000 years



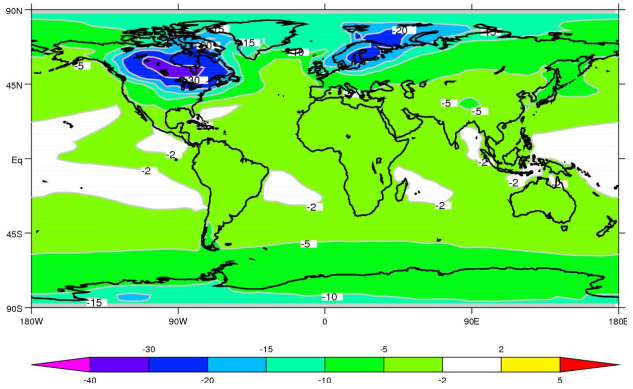
+2°C

interglacial (125 000 years ago)



-5°C

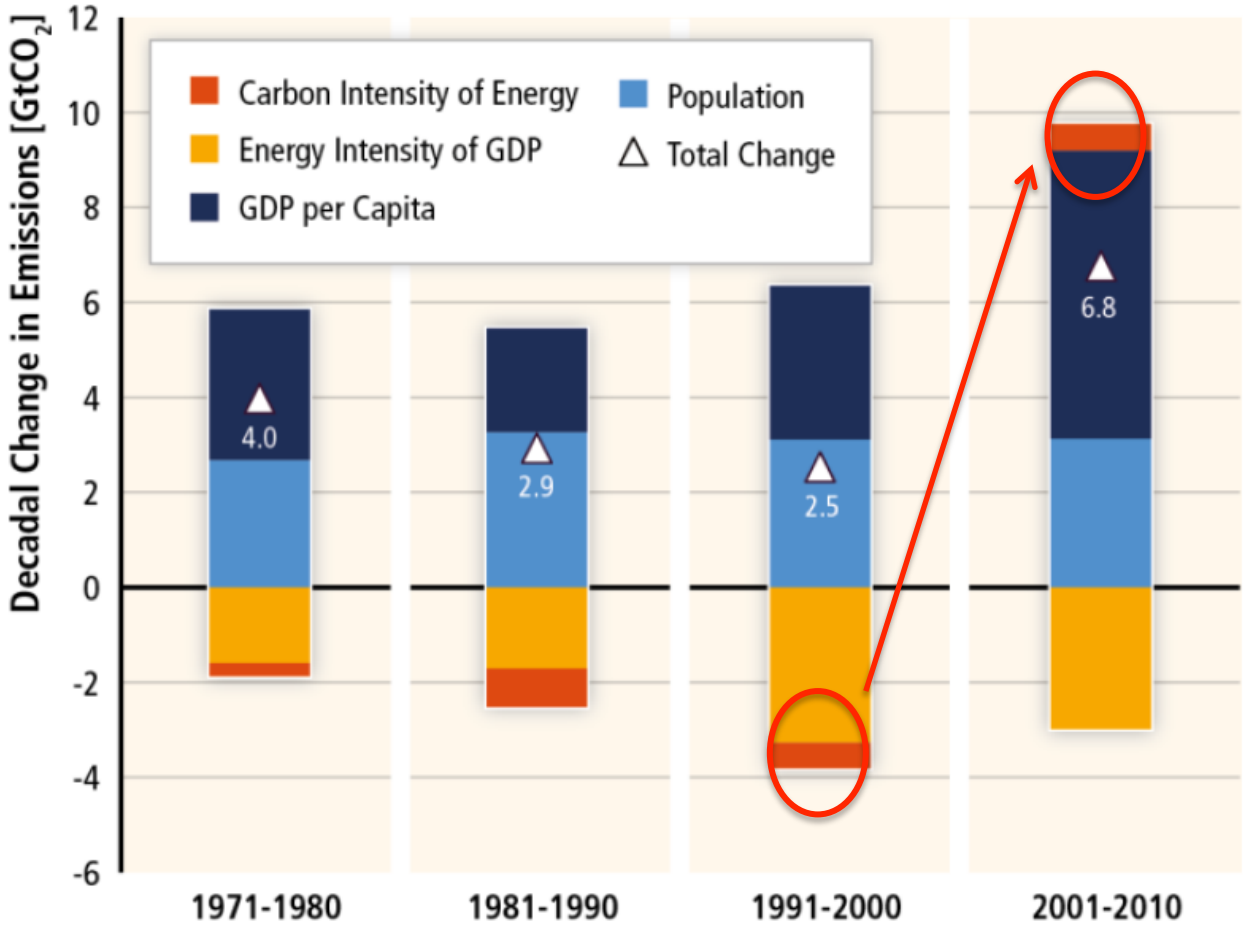
glacial (20 000 years ago)



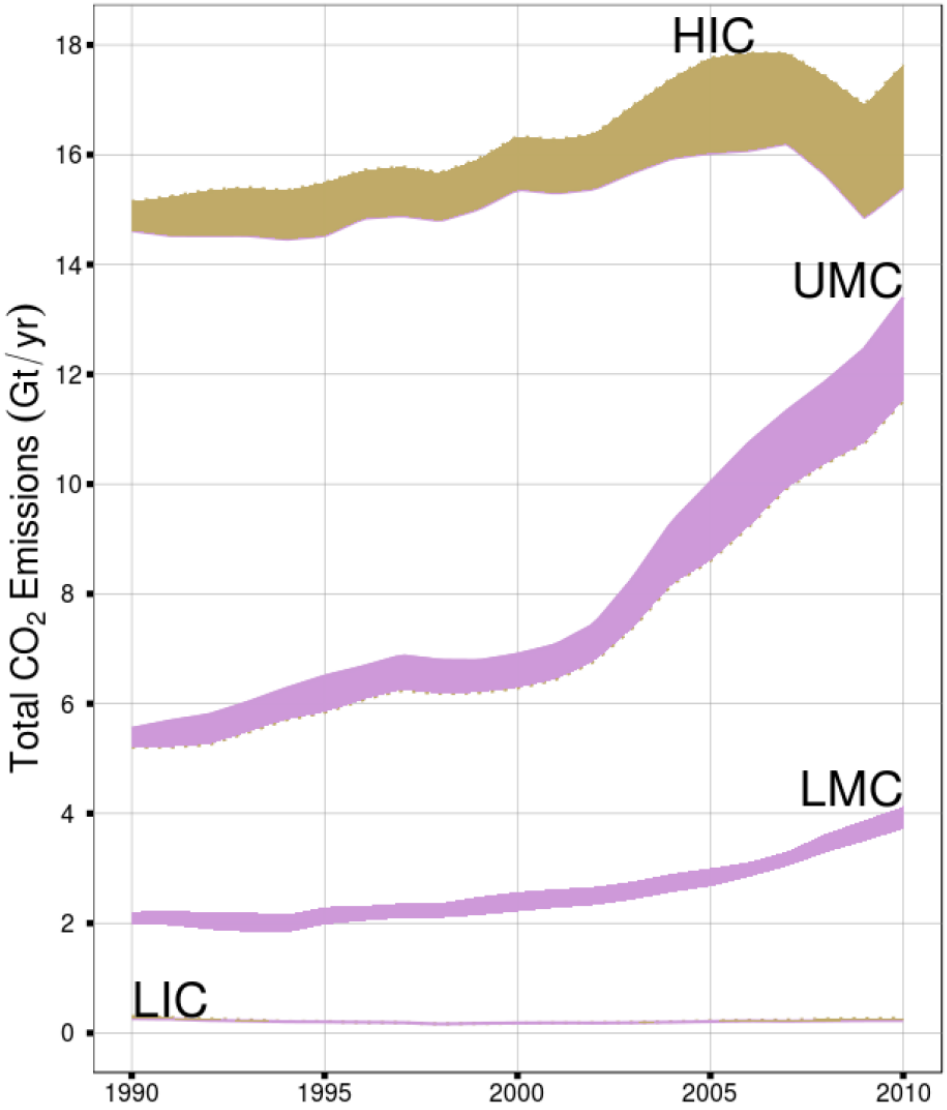
Full report:

www.climatechange2013.org

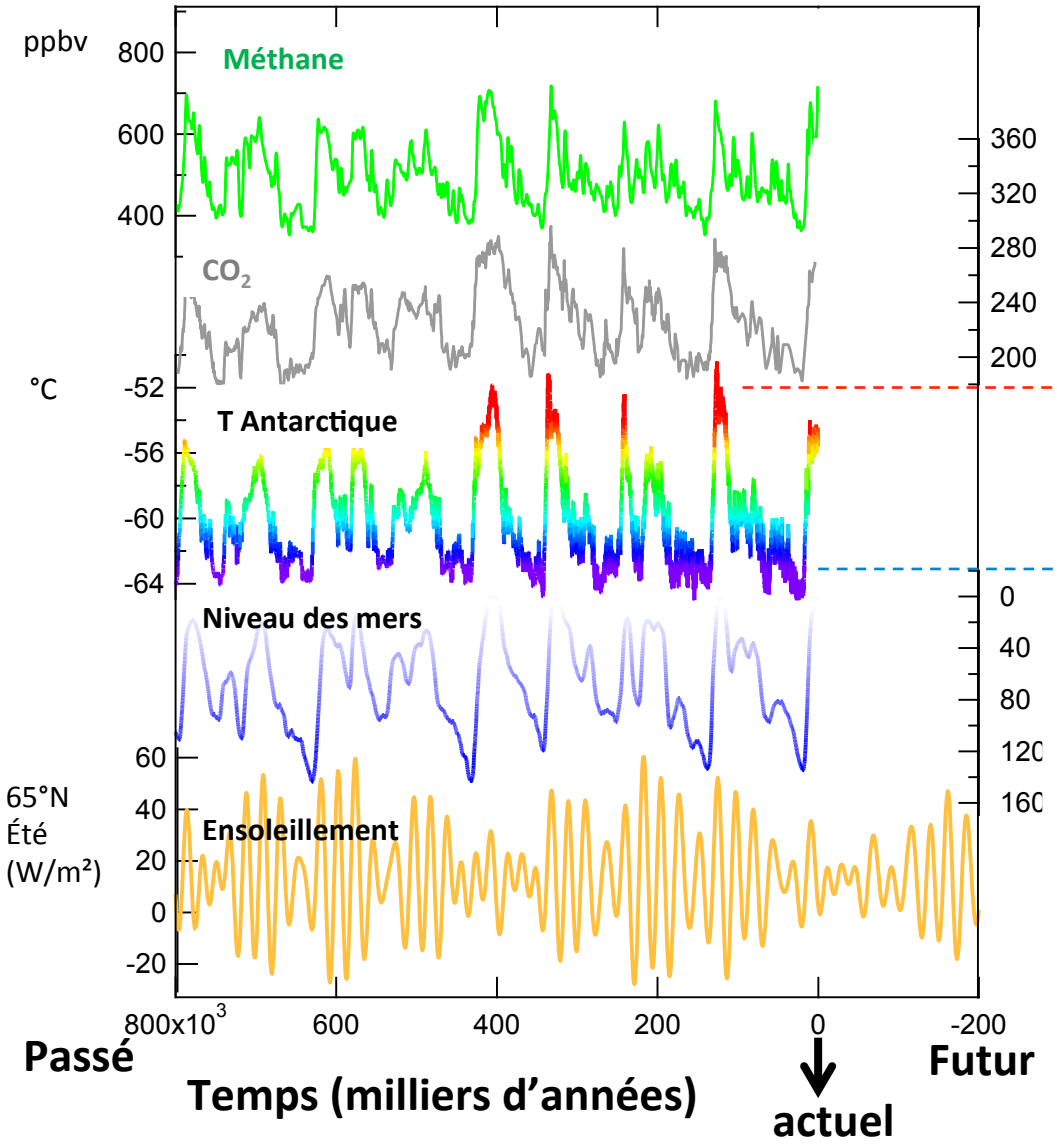
Decadal changes in CO_2 emissions



Contrasts between countries

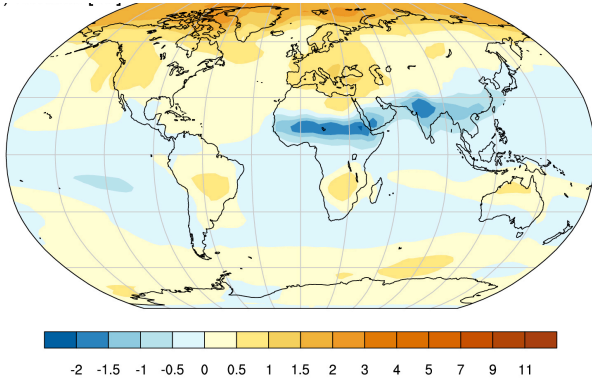


Climats du passé



+1°C

interglaciaire (125 000 ans)



-5°C

glaciaire (20 000 ans)