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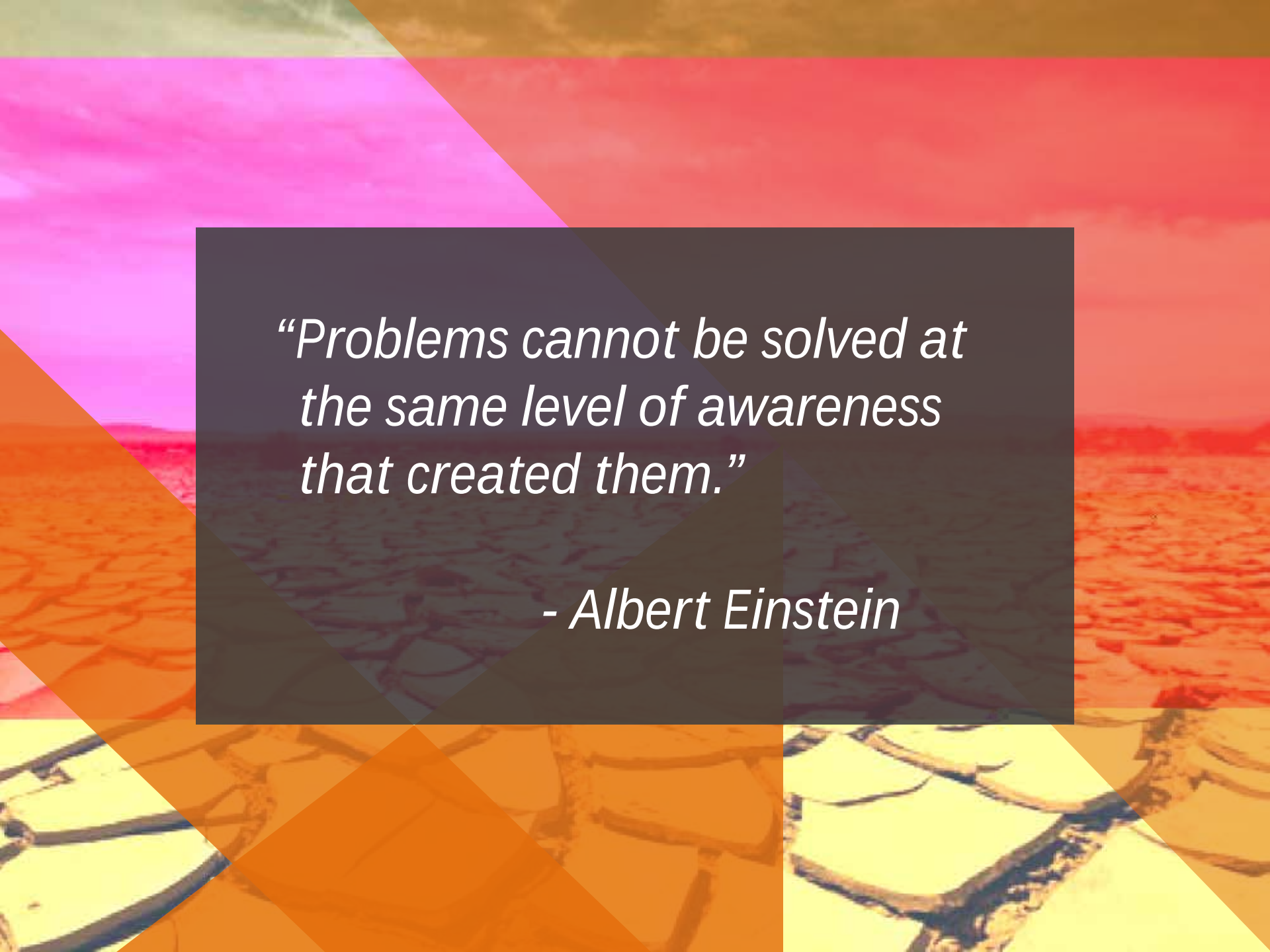
Chairman, Intergovernmental Panel on Climate Change

Key findings from the IPCC WGIII contribution to the Fifth Assessment Report
The Ny Ålesund Symposium 2014

R. K. Pachauri

26 May 2014


“Problems cannot be solved at the same level of awareness that created them.”
- Albert Einstein

Working Group I: The Physical Science Basis

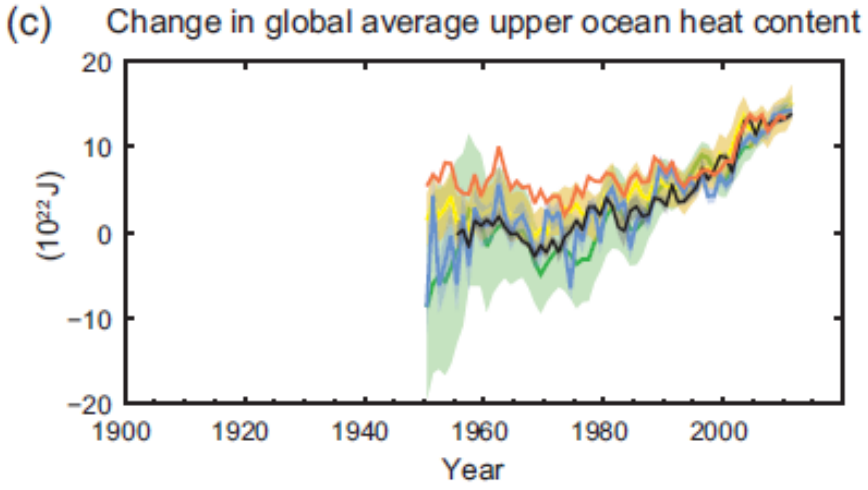
Human influence of the climate system is clear

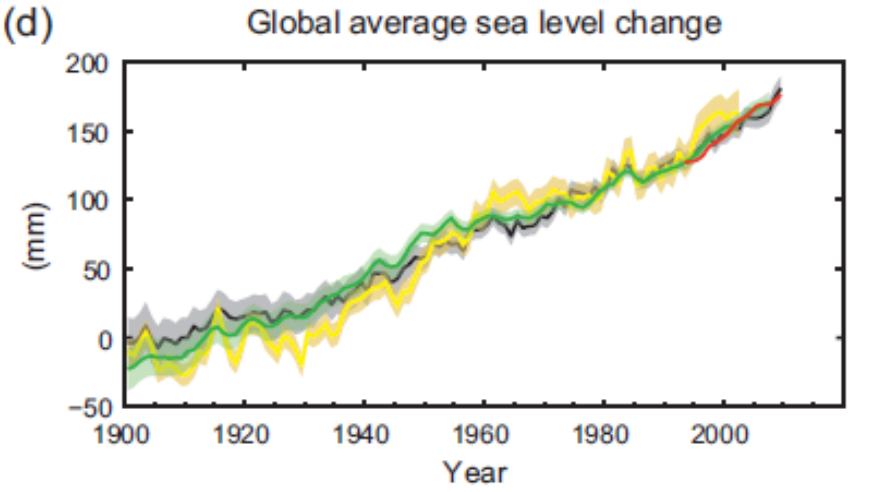
- 95% certainty that human influence has been the dominant cause of the observed warming since the mid-20th century
- Since the 1950s, many of the observed changes are unprecedented over decades to millennia.
- Limiting climate change will require sustained and substantial reductions in greenhouse gas emissions

Source : IPCC AR5

Observed changes in the climate system

Climate change is unequivocal



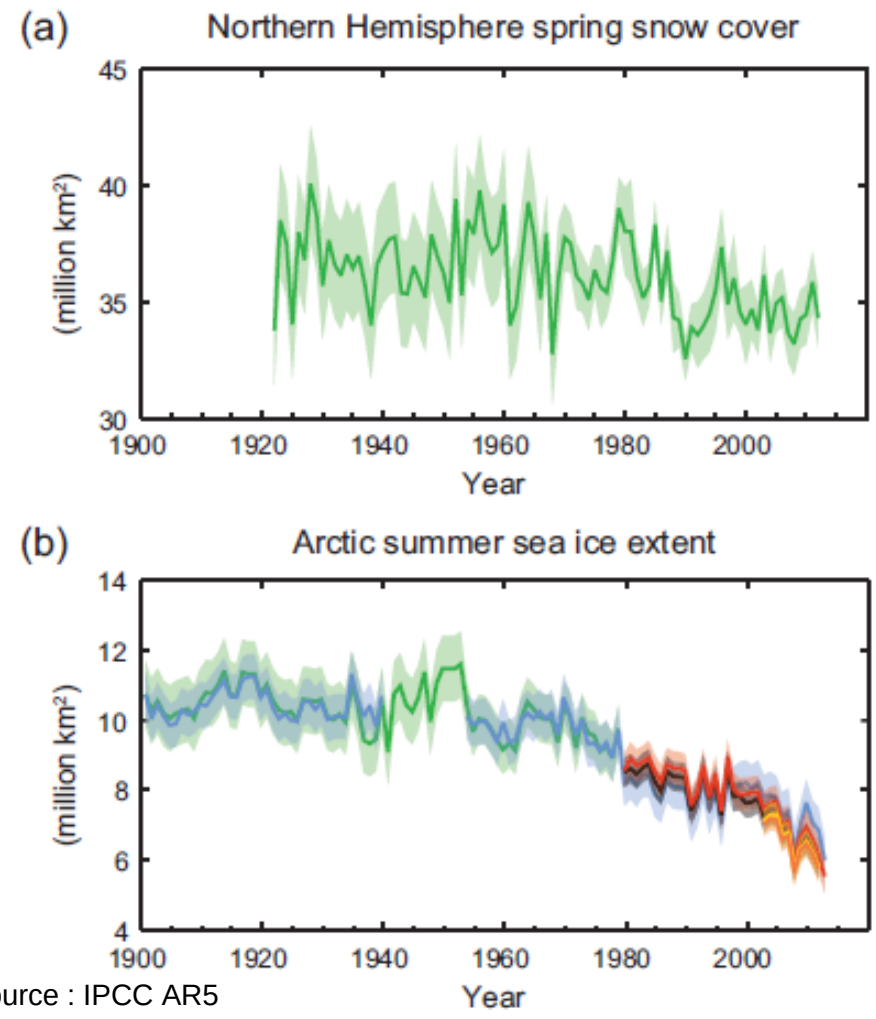


- The oceans have warmed and risen
- The amounts of snow and ice have diminished
- Sea level has risen
- The concentrations of greenhouse gases have increased

Source : IPCC AR5

Observed changes in the climate system

Climate change is unequivocal



Source : IPCC AR5

Over the last two decades:

- The Greenland and Antarctic ice sheets have been losing mass
- Glaciers have continued to shrink almost worldwide
- Arctic sea ice and Northern Hemisphere spring snow cover have continued to decrease in extent
- Observed warming in permafrost temperatures was up to 3°C in parts of Northern Alaska (early 1980s to mid-2000s) and up to 2°C in parts of the Russian European North (1971 to 2010).

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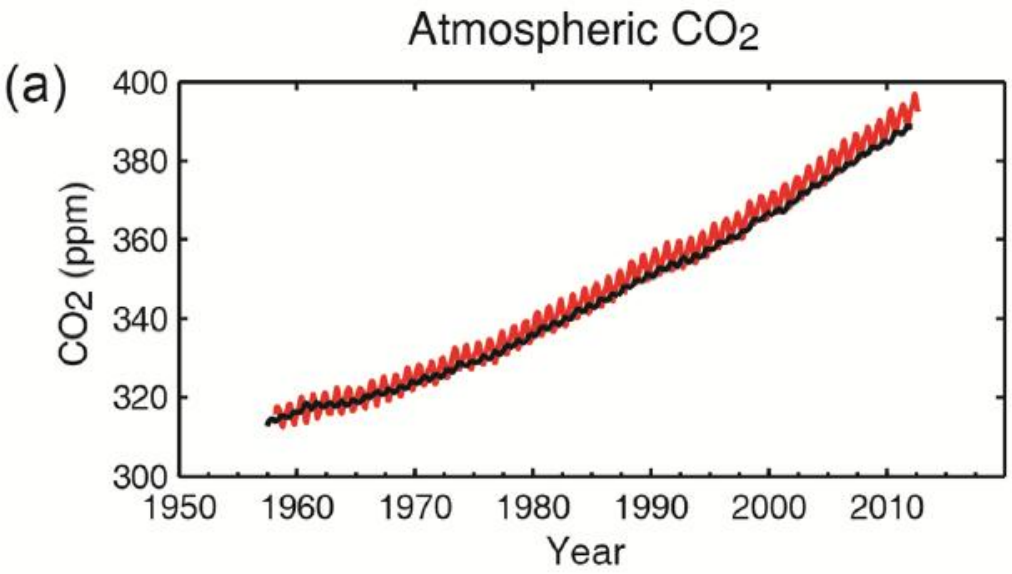
Warming of the climate system is unequivocal

The concentrations of greenhouse gases have increased



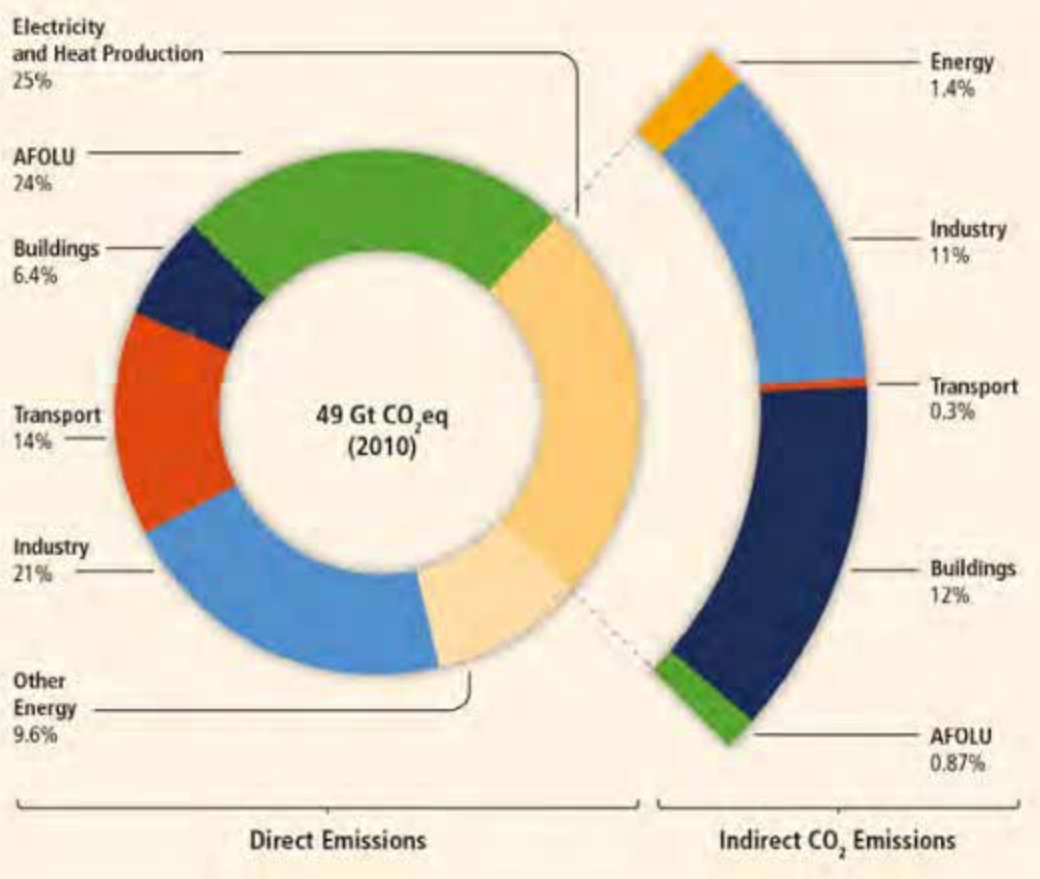
- The atmospheric concentrations of CO2, methane, and nitrous oxide have increased to levels unprecedented in at least the past 800,000 years.
- The ocean has absorbed ~30% of the emitted anthropogenic carbon dioxide, causing ocean acidification.
- CO2 emissions from fossil fuels combustion and industrial processes contributed about 78% of the total GHG emissions increase from 1970 to 2010

Source : IPCC AR5

Trends in GHGs and their drivers

Total anthropogenic GHG emissions were the highest in human history from 2000 to 2010

Greenhouse gas emissions by economic sectors



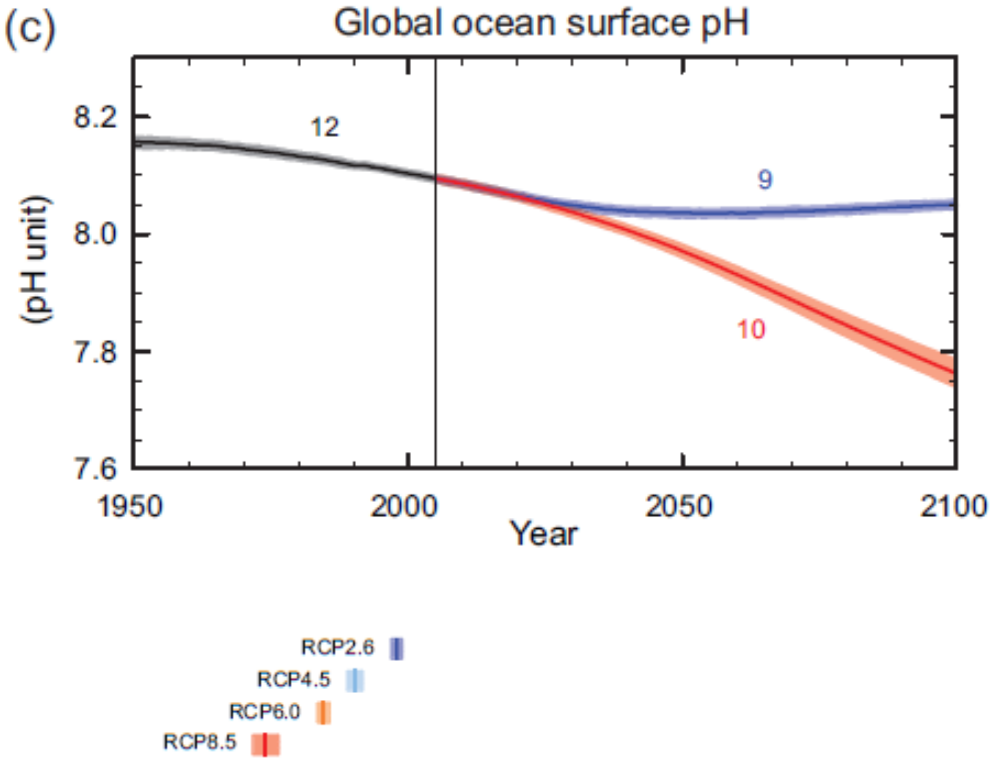
- Globally, economic and population growth continue to be the most important drivers of increases in CO2 emissions from fossil fuel combustions

- These are expected to continue to drive emissions growth without additional efforts to reduce GHG emissions.

Source : IPCC AR5

Future changes in the climate system

Continued emissions of greenhouse gases will cause further warming and changes in the climate system

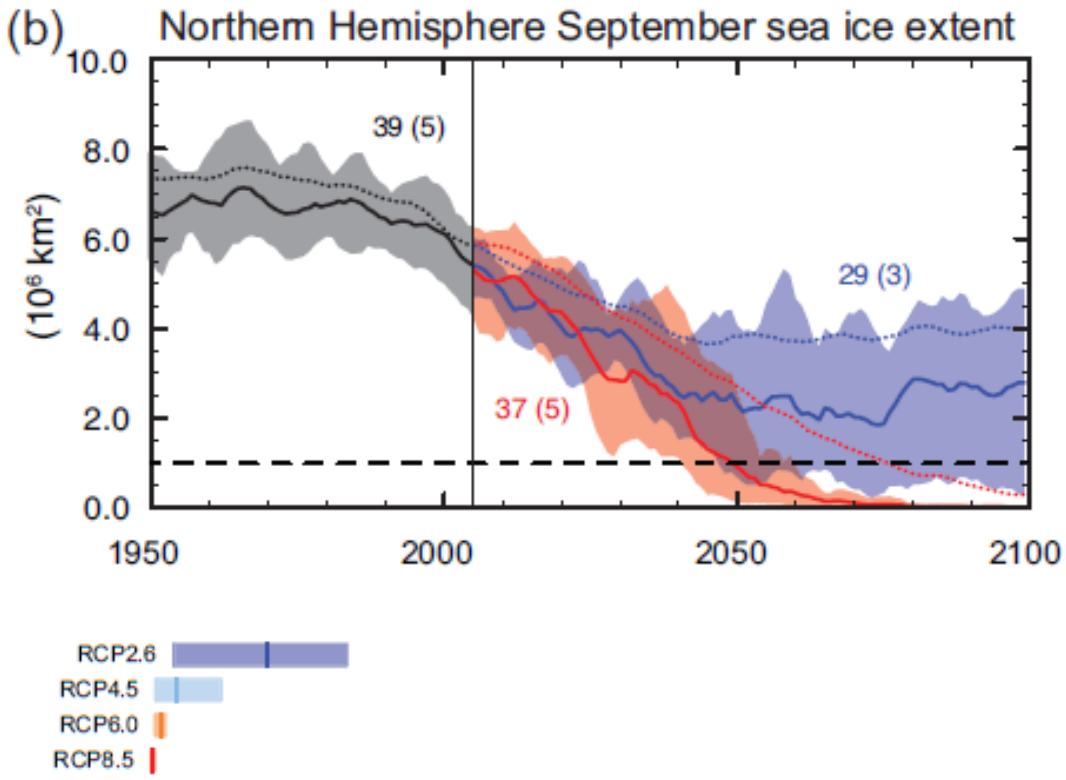


- Oceans will continue to warm during the 21st century.
- Global mean sea level will continue to rise during the 21st century
- Global surface temperature change for the end of the 21st century is *likely* to exceed 1.5°C relative to 1850 to 1900 for all RCP scenarios except RCP2.6.

Source : IPCC AR5

Future changes in the climate system

The Cryosphere



- The Arctic sea ice cover will continue to shrink and thin
- Northern Hemisphere spring snow cover will decrease during the 21st century as global mean surface temperature rises
- Global glacier volume will further decrease.
- Some models project that a nearly ice-free Arctic Ocean in September before mid-century is likely for RCP8.5

Source : IPCC AR5

Abrupt and irreversible impacts

Most aspects of climate change will persist for many centuries even if emissions of CO2 are stopped.

- Sustained mass loss by ice sheets (some of which irreversible) would cause larger sea level rise.

- Sustained warming greater than some threshold (greater than about 1°C but less than about 4°C global mean warming with respect to pre-industrial) would lead to the near-complete loss of the Greenland ice sheet over a millennium or more, causing a global mean sea level rise of up to 7 m.

Source : IPCC AR5

Impacts of climate change on Arctic communities

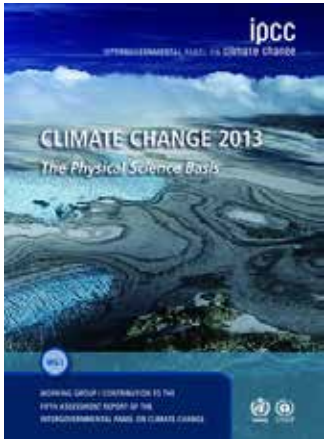
Climate change will have large effects on Arctic communities, especially where narrowly based economies leave a smaller range of adaptive choices.

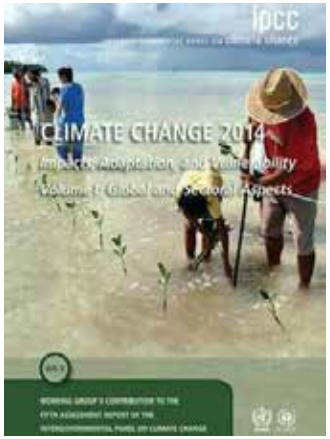
- Some commercial activities will become more profitable while others will decline
- Increased economic opportunities are expected with increased navigability in the Arctic Ocean
- The informal, subsistence-based economy will be impacted
- Changing sea-ice conditions will result in more difficult access for hunting marine mammals.
- Impacts on the health and well-being of Arctic residents are significant and projected to increase – especially for many indigenous peoples.

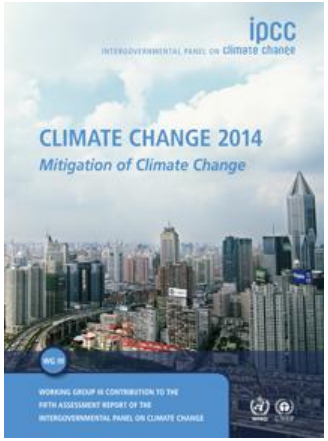
Source : IPCC AR5

Adaptation and Mitigation

IPCC Fifth Assessment Report







"Climate-resilient pathways combine adaptation and mitigation to reduce climate change and its impacts. Since mitigation reduces the rate and magnitude of warming, it also increases the time available for adaptation to a particular level of climate change, potentially by several decades."

Source : IPCC AR5

Adaptation in the Arctic Region

The complex inter-linkages between societal, economic, and political factors and climatic stresses represent unprecedented challenges for northern communities, particularly as the rate of change will be faster than the social systems can adapt.

Source : IPCC AR5

Arctic indigenous peoples are already implementing creative ways of adapting:

- Changing resource bases
- Shifting land use and/or settlement areas
- Combining technologies with traditional knowledge
- Changing timing and location of hunting, gathering, herding, and fishing areas
- Improving communications and education
- Protection of grazing land will be the most important adaptive strategy for reindeer herders under climate change

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Stringent mitigation scenarios

Characteristics of scenarios reaching levels of about 450 ppm CO2eq by 2100 (likely chance to keep temperature change below 2C relative to preindustrial levels):

- Lower global GHGs in 2050 than in 2010 (40% to 70% lower globally)
- Emissions levels near zero GtCO2eq or below in 2100
- More rapid improvements in energy efficiency
- A tripling to nearly a quadrupling of the share of zero- and low-carbon energy supply from renewables by 2050
- Nuclear energy, biomass and fossil energy with CCS, and BECCS by the year 2050

Source : IPCC AR5

CDR technologies

Many scenarios reaching 450, 500 and 550 ppm CO2eq by 2100

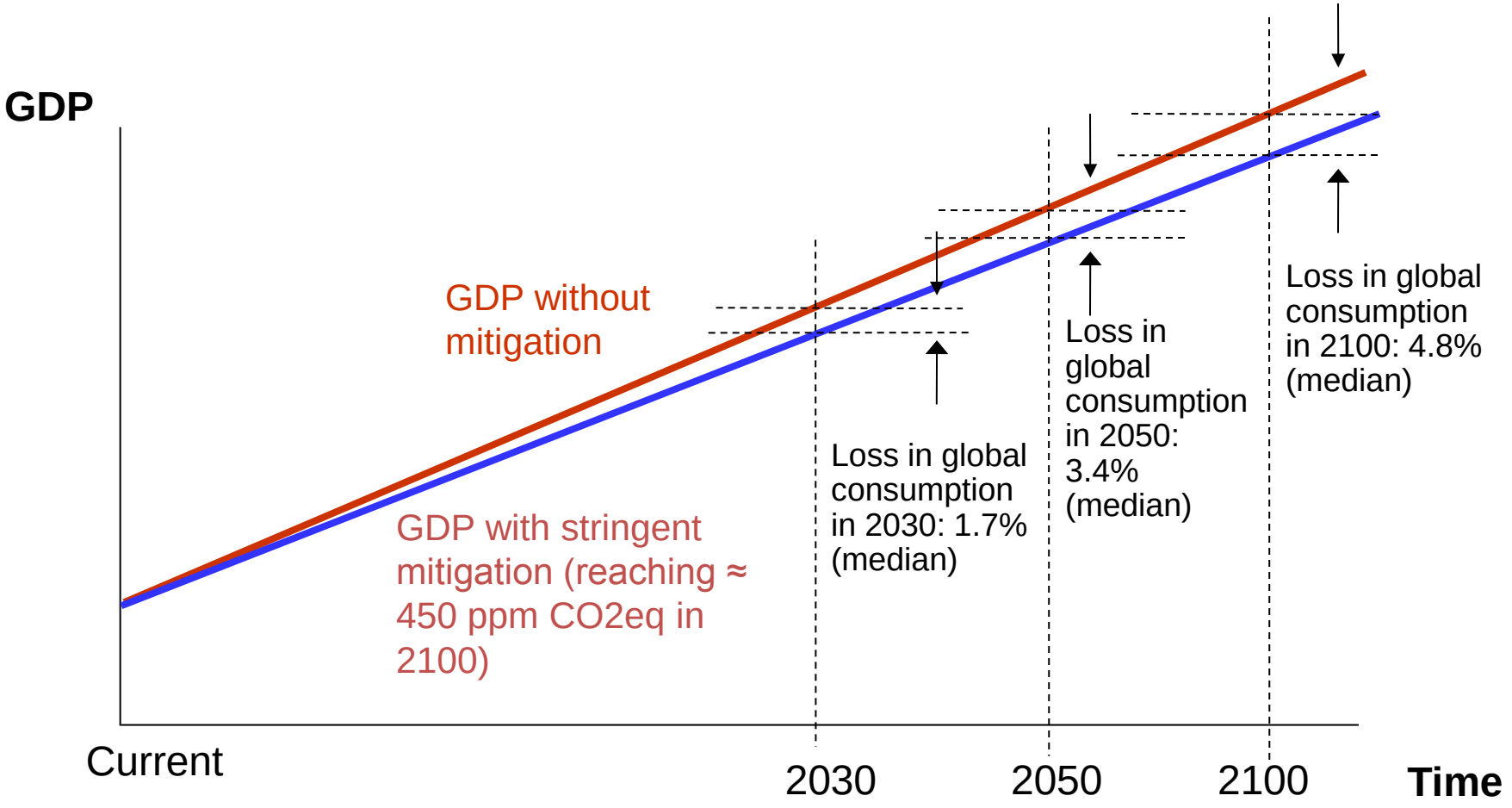
Require availability and widespread deployment of BECCS and afforestation post 2050

- But the availability and scale of these and other CDR technologies are uncertain and associated with challenges and risks.

Source : IPCC AR5

Impacts of mitigation on GDP growth

Delaying additional mitigation further increases mitigation costs in the medium to long term



Source : IPCC AR5

Co-benefits and adverse side effects

There is an increased focus on policies designed to integrate multiple objectives, increase co-benefits and reduce adverse side-effects.

The intersections of mitigation and adaptation with other societal goals, if well managed, can strengthen the basis for undertaking climate action:

- Improved energy efficiency and security
- Cleaner energy sources
- Air quality and human health
- Reduced energy and water consumption in urban areas
- Sustainable agriculture and forestry
- Protection of ecosystems for carbon storage

Source : IPCC AR5

“A technological society has two choices. First it can wait until catastrophic failures expose systemic deficiencies, distortion and self-deceptions…
Secondly, a culture can provide social checks and balances to correct for systemic distortion prior to catastrophic failures.”

- Mahatma Gandhi

“Speed is irrelevant if you are going in the wrong direction”
- Mahatma Gandhi