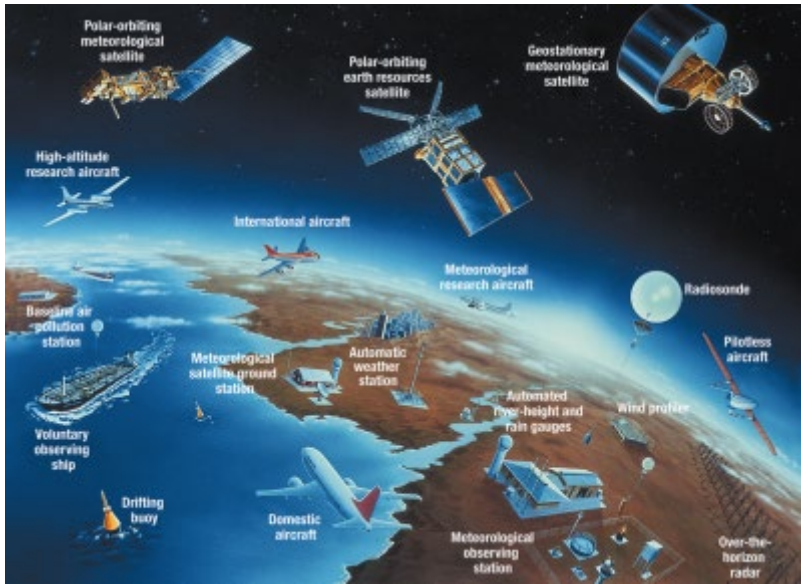
Where are we with climate change?

Prof. Petteri Taalas
Secretary-General

WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

WMO OMM
World Meteorological Organization
Organisation météorologique mondiale

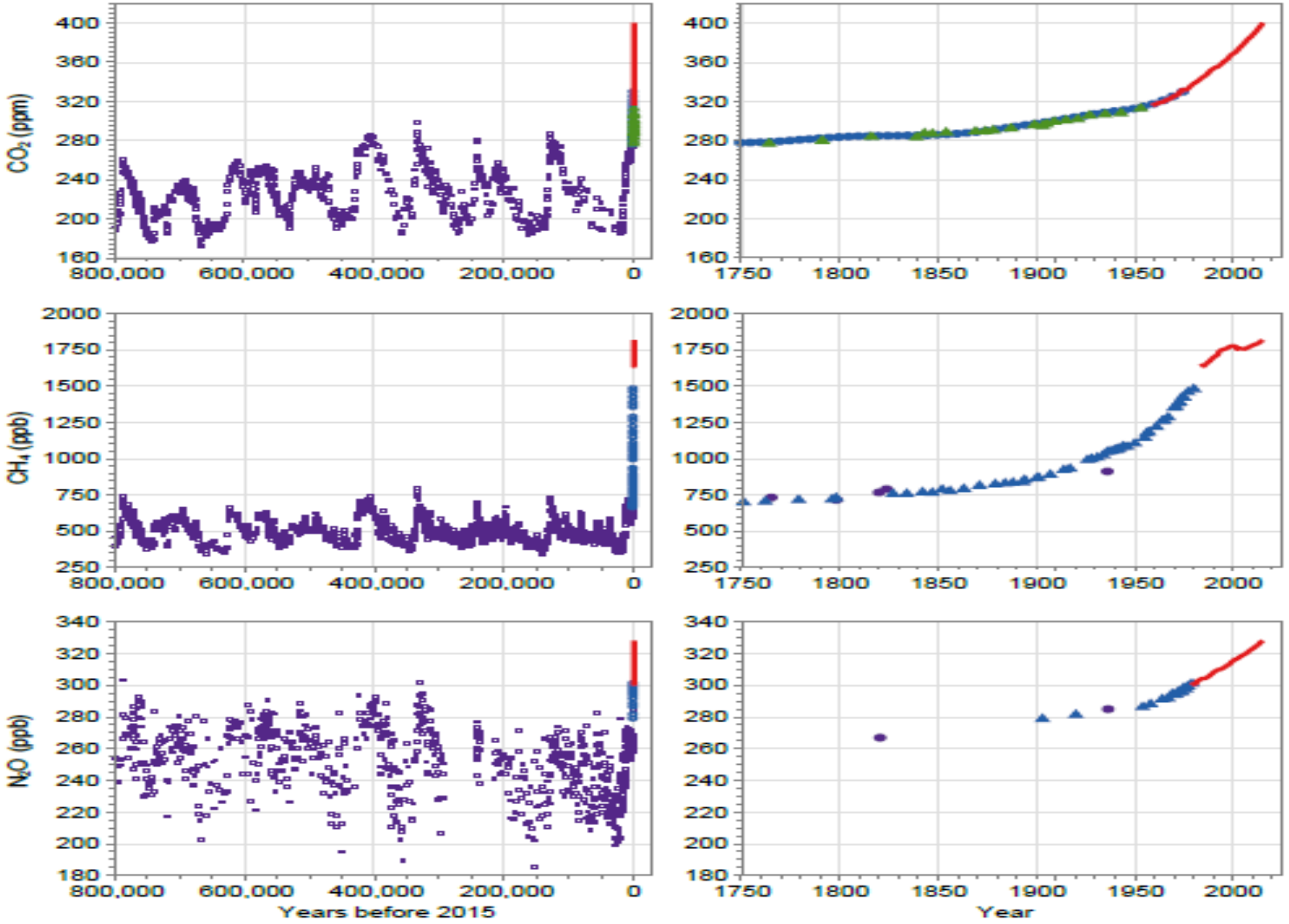
World Meteorological Organization



- UN Specialized Agency on weather, climate & water
- 193 Members, HQ in Geneva
- 2nd oldest UN Agency, 1873-
- Coordinates work of > 200 000 national experts from meteorol-ogical & hydrological services, academia & private sector
- Co-Founder and host agency of IPCC (1st World Climate Conference)
- Co-Founder of UNFCCC (2nd World Climate Conference)
- WMO SG UN Climate Principal (1/3)

WMO OMM

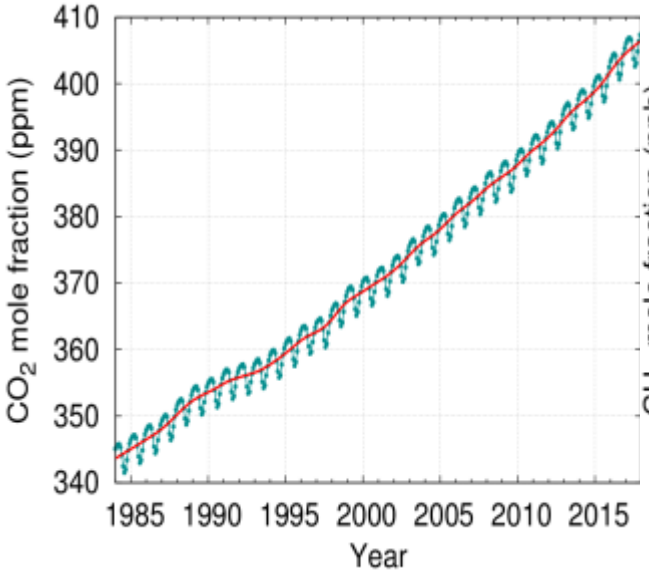
CO_2, CH_4 & N_2O 800 000 BC-2016 AD



WMO OMM

Carbon dioxide level highest in 3 million years

CO_2

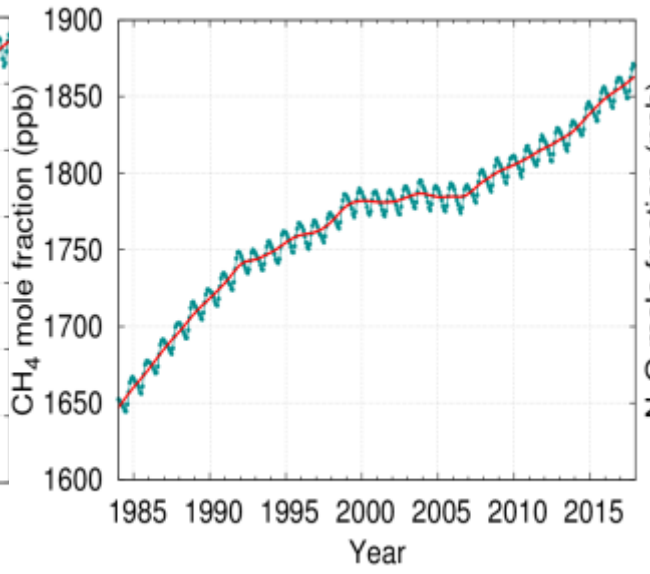


Increase 146 %
(since 18th century)

Lifetime several hundreds years

Contribution to warming 66 %

CH_4

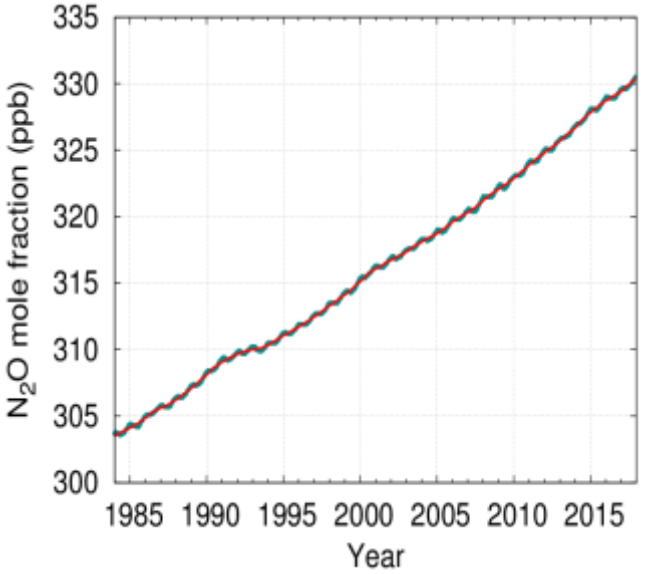


Increase 257 %

Lifetime 12 years

Contribution to warming 17 %

N_2O



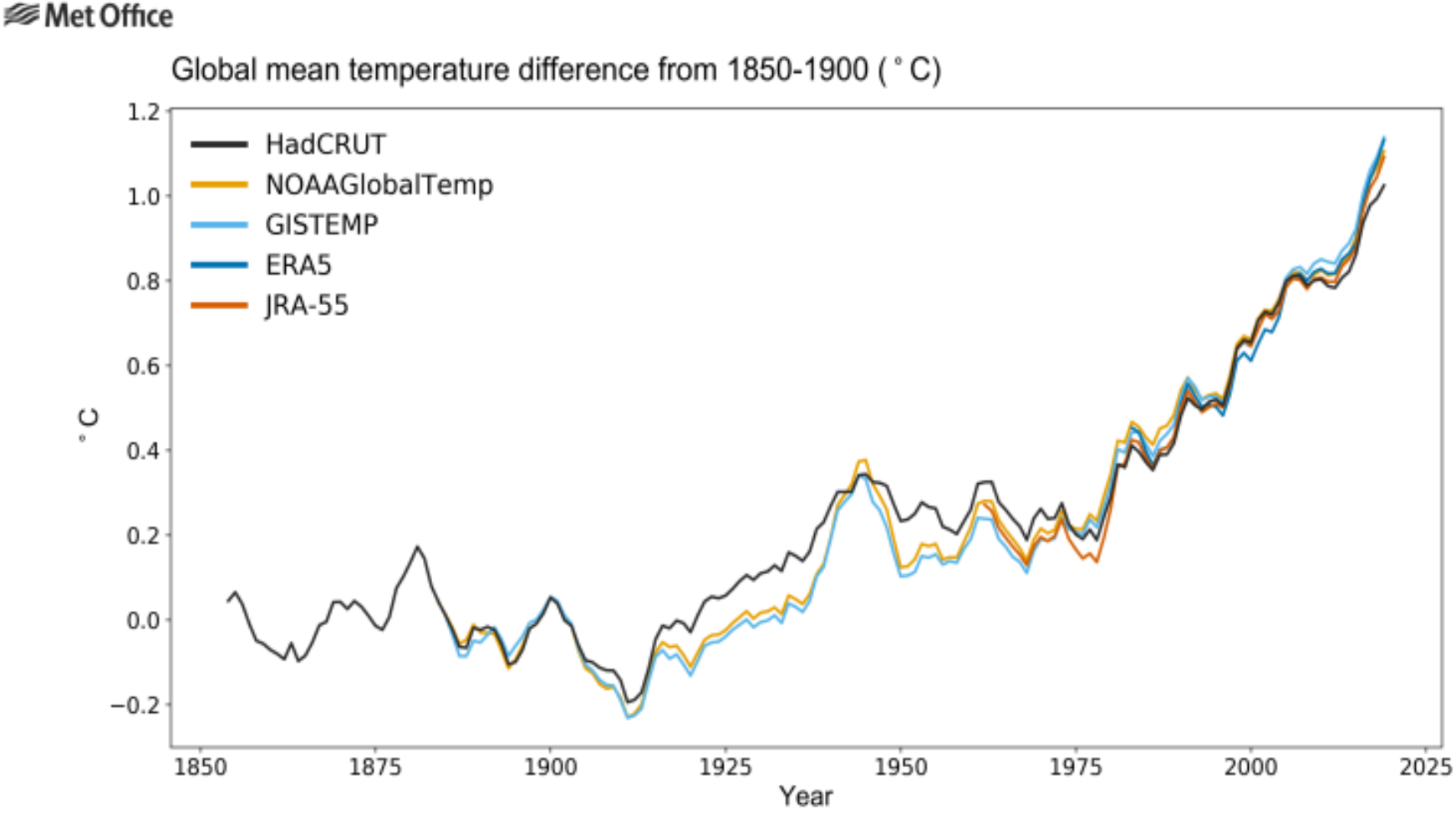
Increase 122%

Lifetime 114 years

Contribution to warming 6 %

WMO OMM

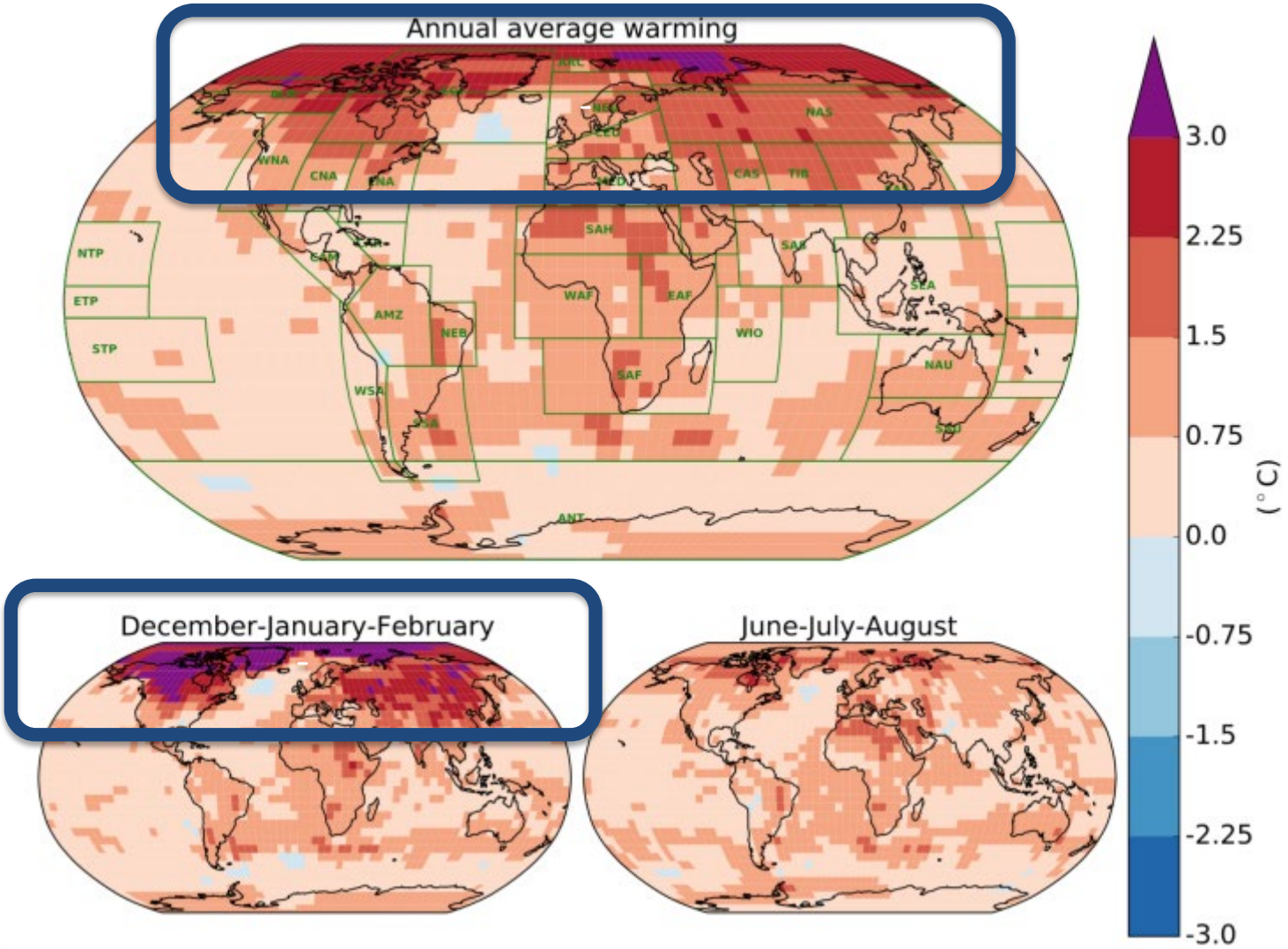
Global temperature 1850-2019, +1.1 ◦C



WMO OMM

Warming so far

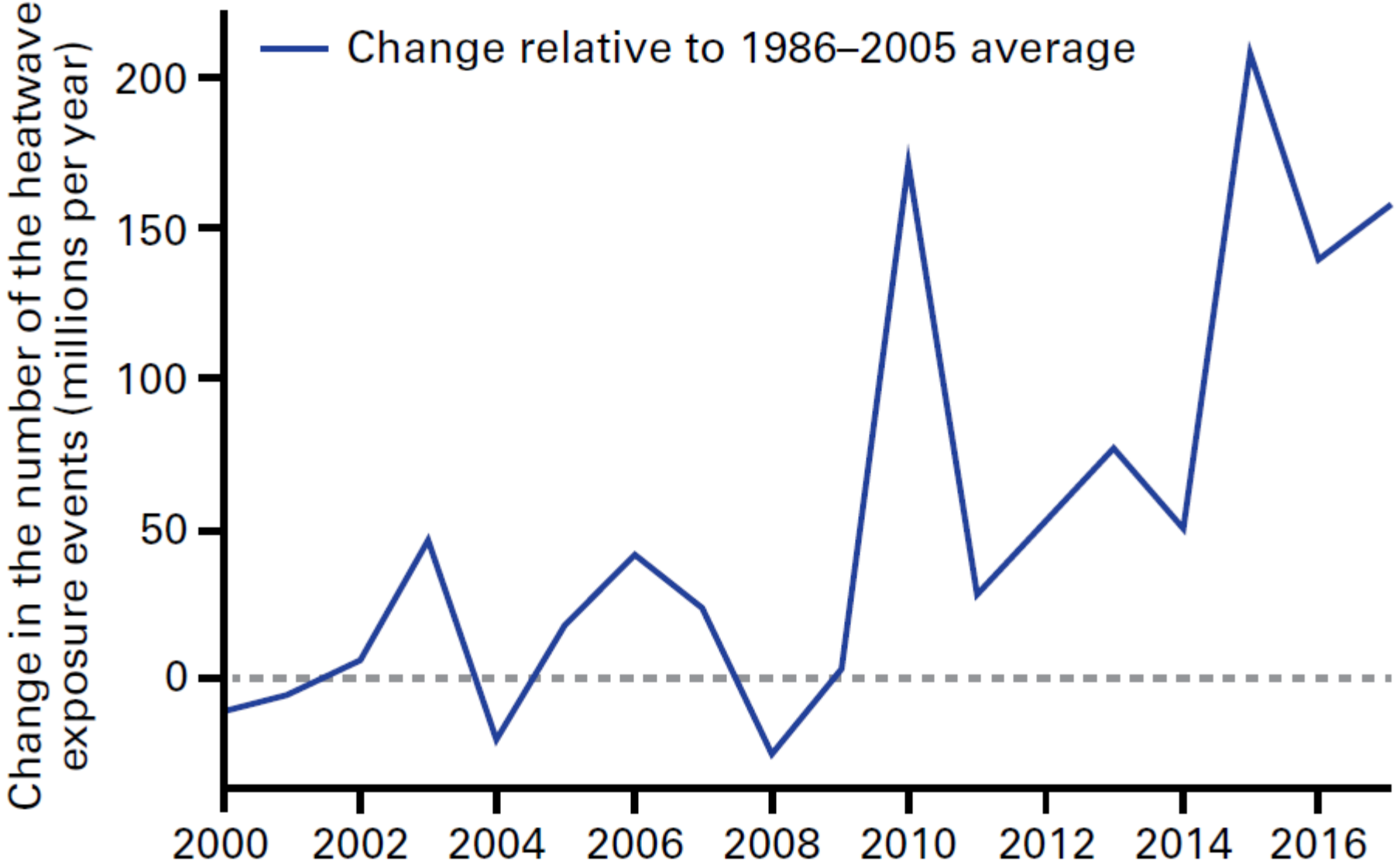
Regional warming in the decade 2006-2015 relative to preindustrial



WMO OMM

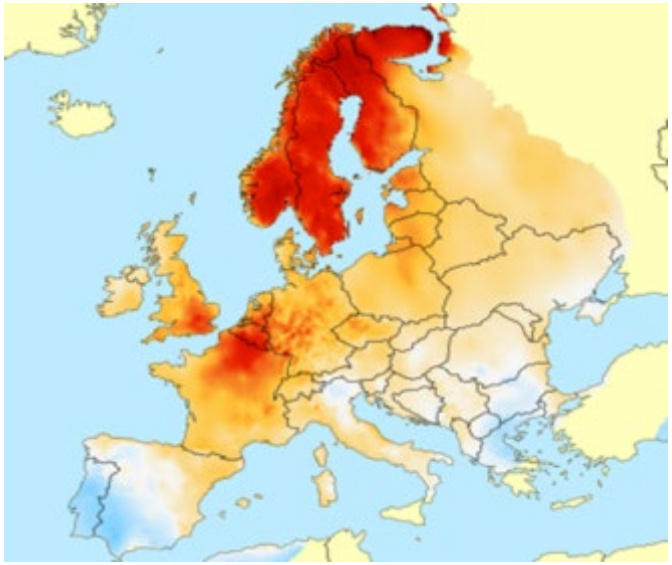
Source: IPCC Special Report on Global Warming of 1.5°C

Heatwave exposure increase 2000-2018

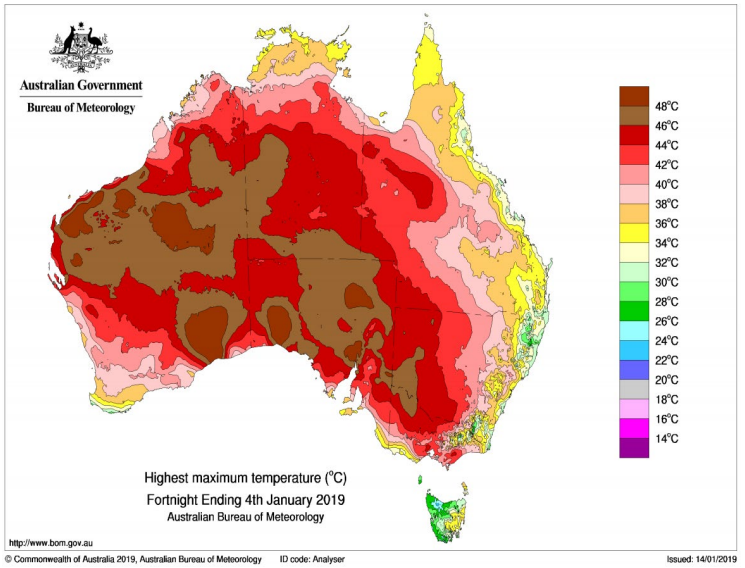


WMO OMM

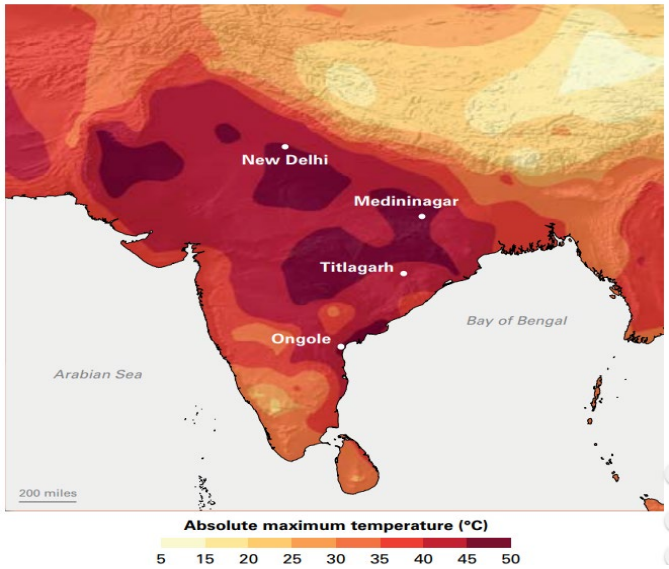
Some heatwave examples



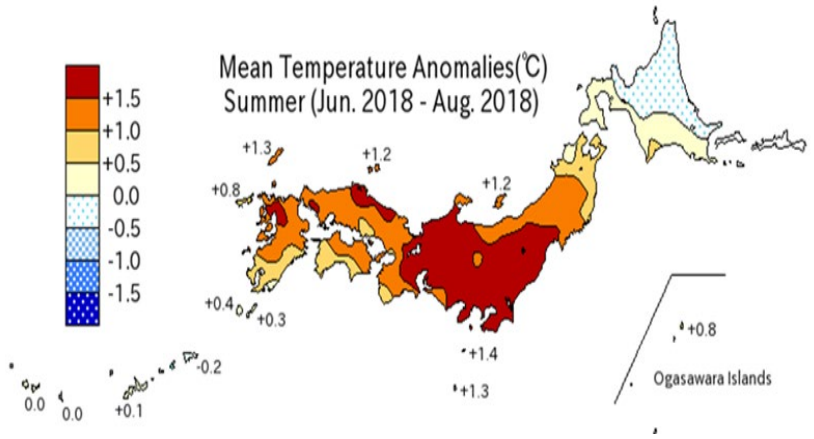
Europe, Summer 2018 & 2019



Australia, 2018/2019



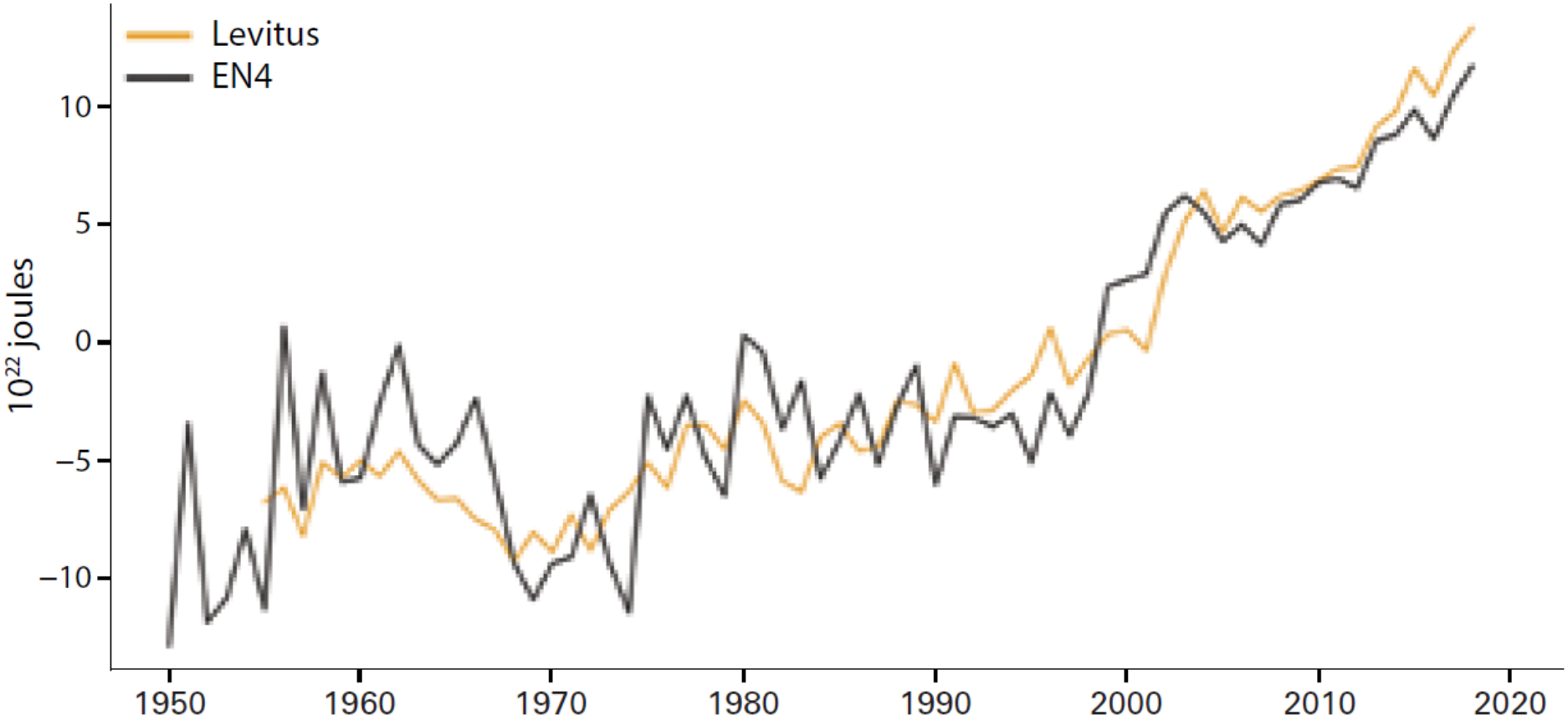
India and Pakistan, Summer 2015



Japan, July 2018

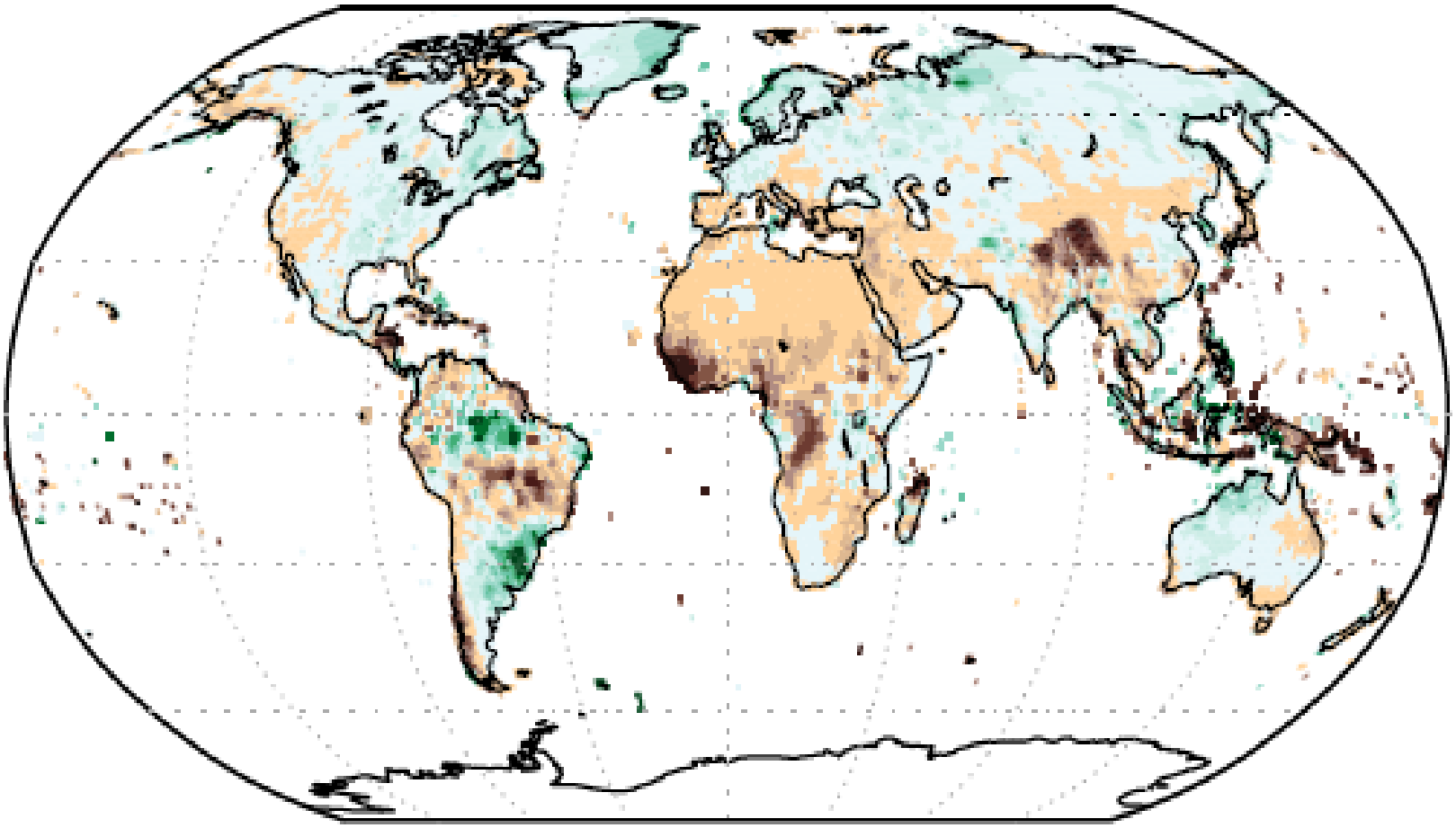
WMO OMM

Heat content of the oceans 0-700 m vs. 1981-2010 mean



WMO OMM

Global precipitation 1986–2015 vs. 1901–1960



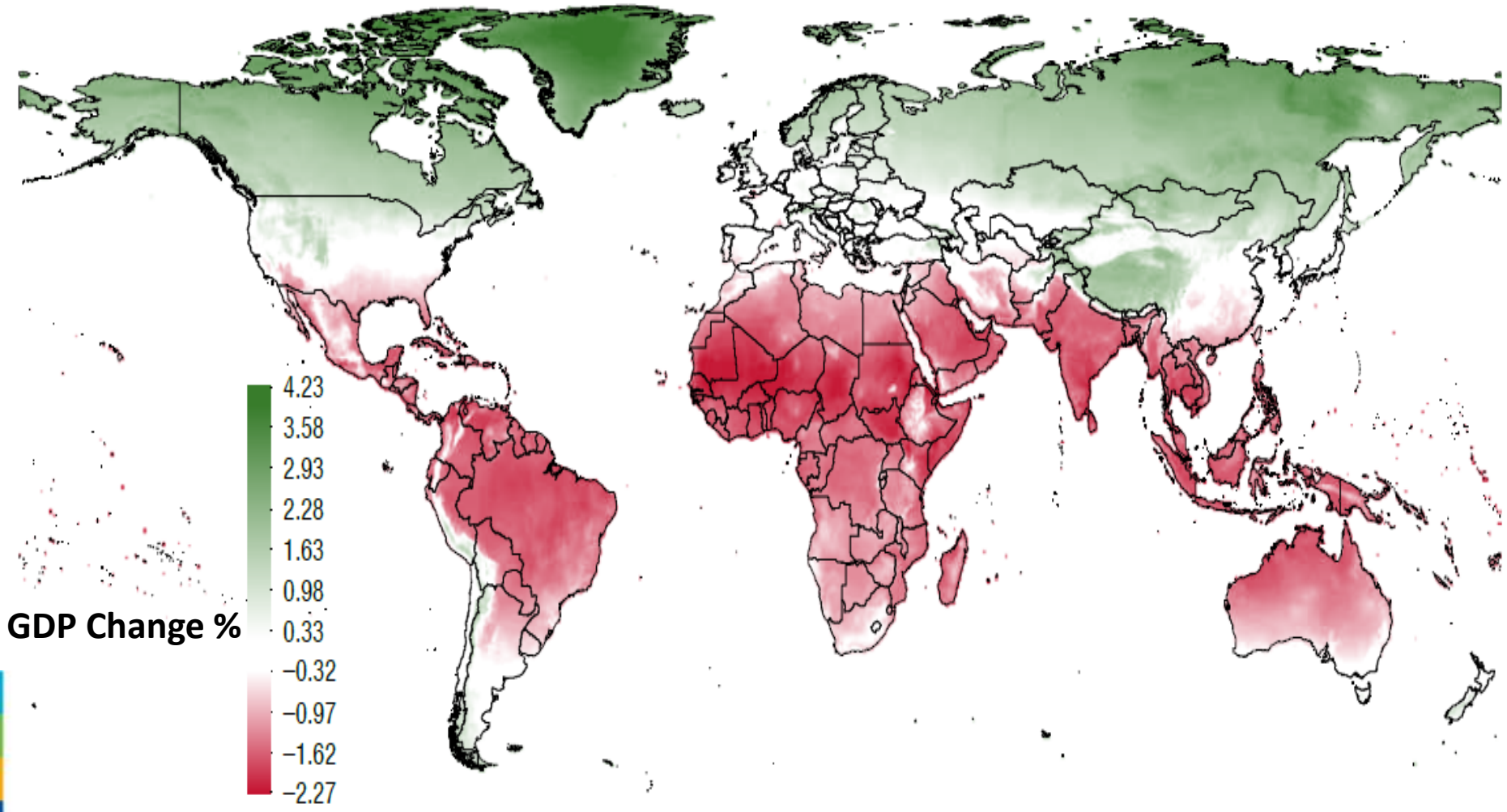
Change in Precipitation (inches)

−12 −10 −8 −6 −4 −2 0 2 4 6 8 10 12

WMO OMM

Uneven economic impact of current warming

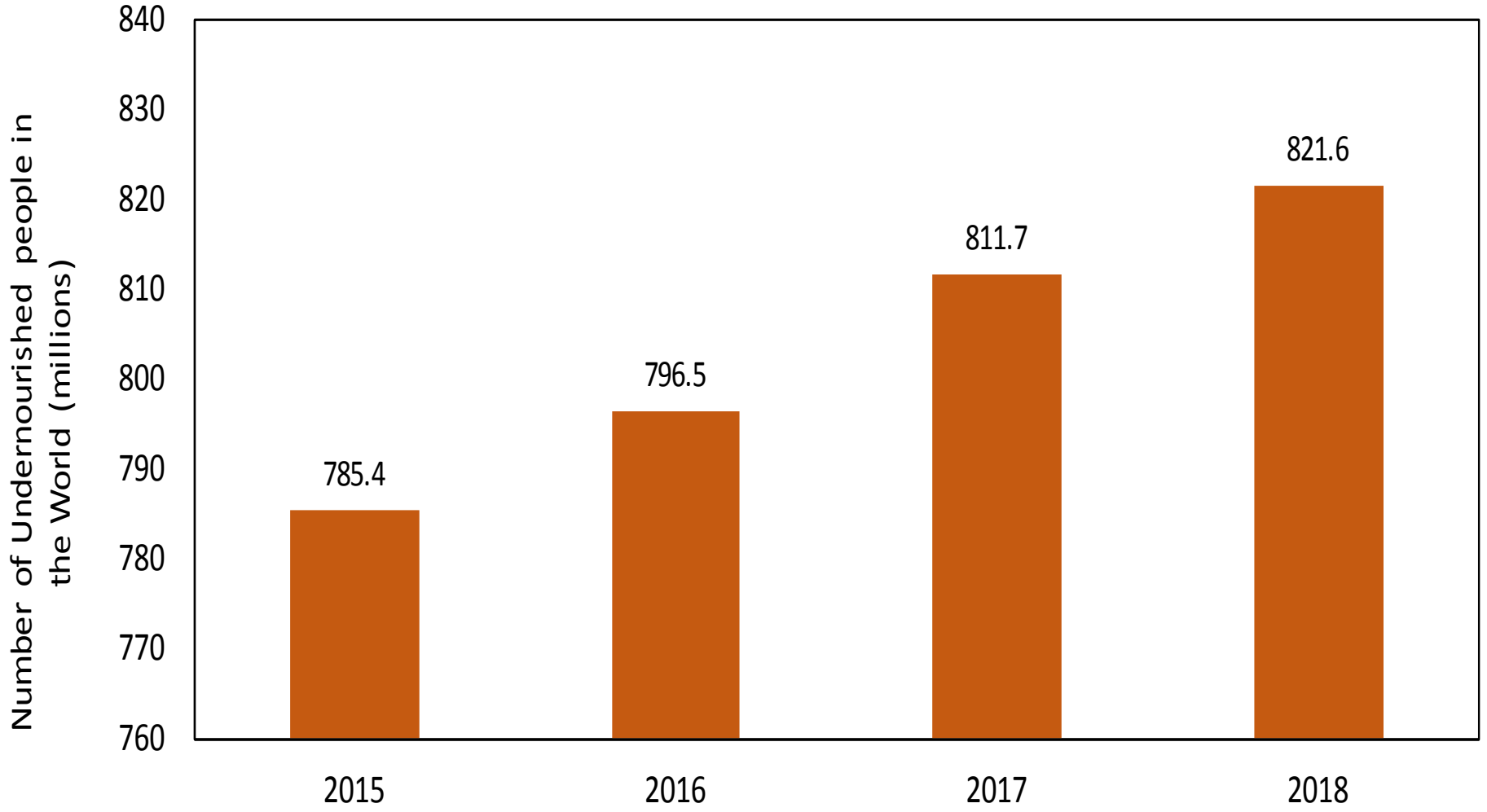
Effect of 1°C temperature increase on per capita output



WMO OMM

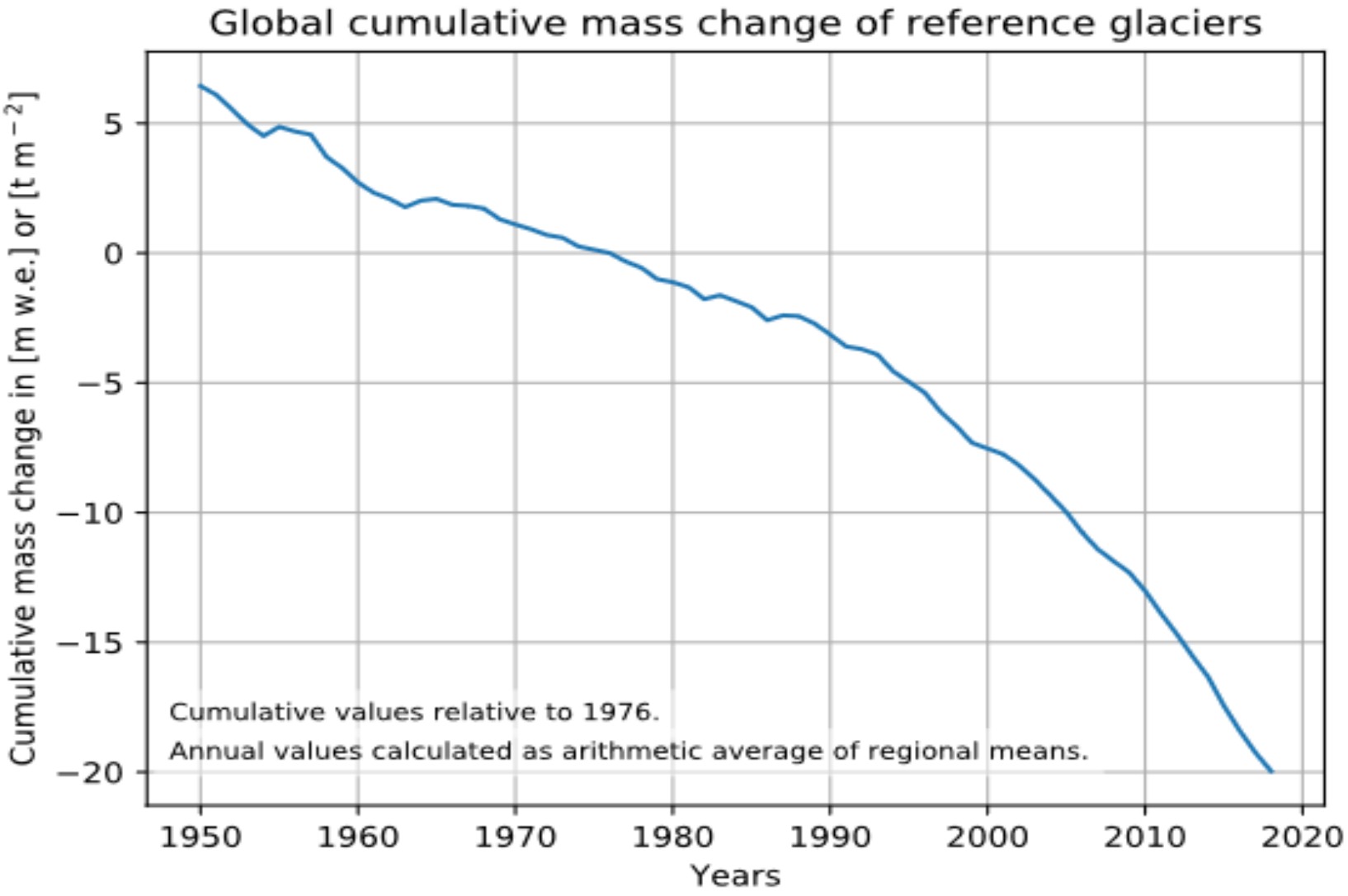
Source: International Monetary Fund (IMF) World Economic Outlook

Growth of undernourishment



WMO OMM

Melting of global 31 glaciers 1950-2018

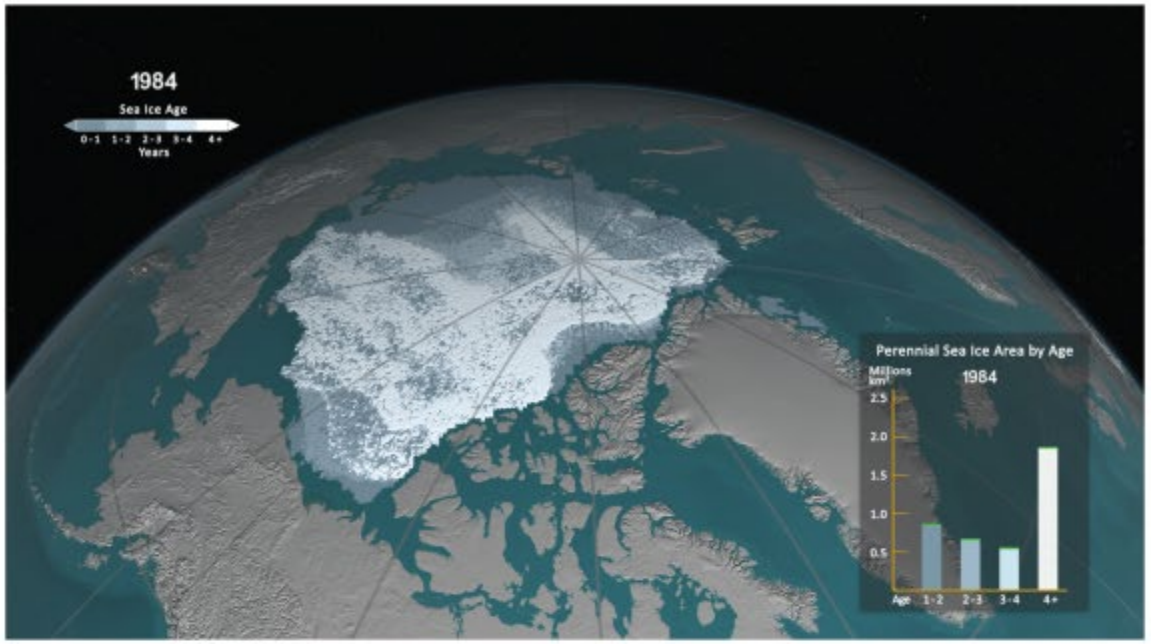


WMO OMM

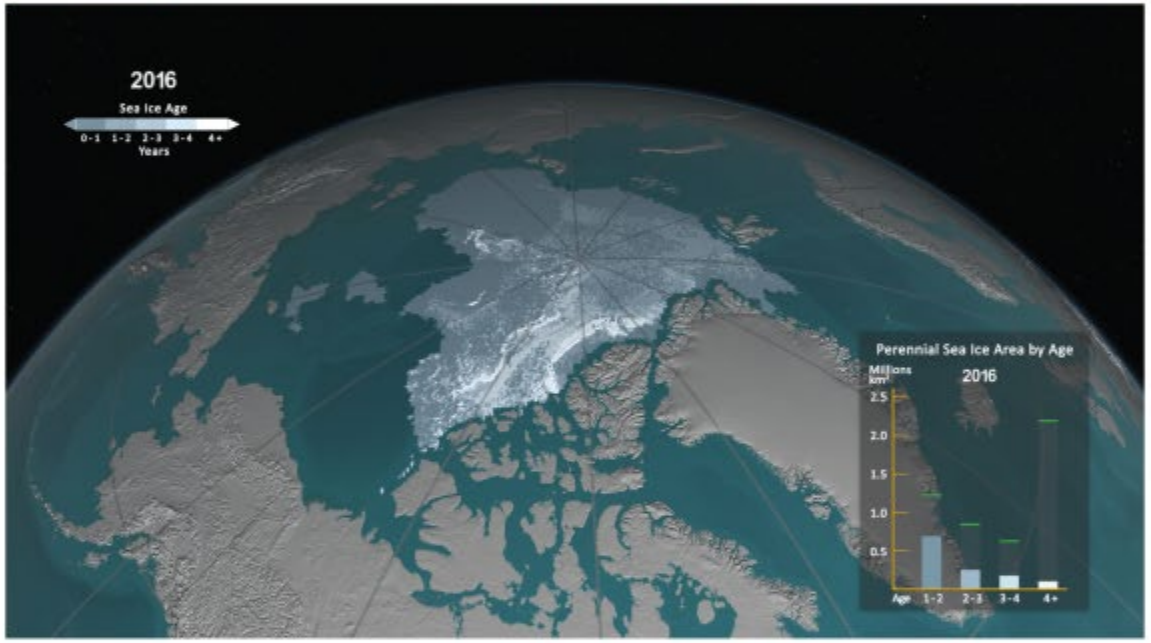
Largest changes in the Arctic

Multi-year ice

1984

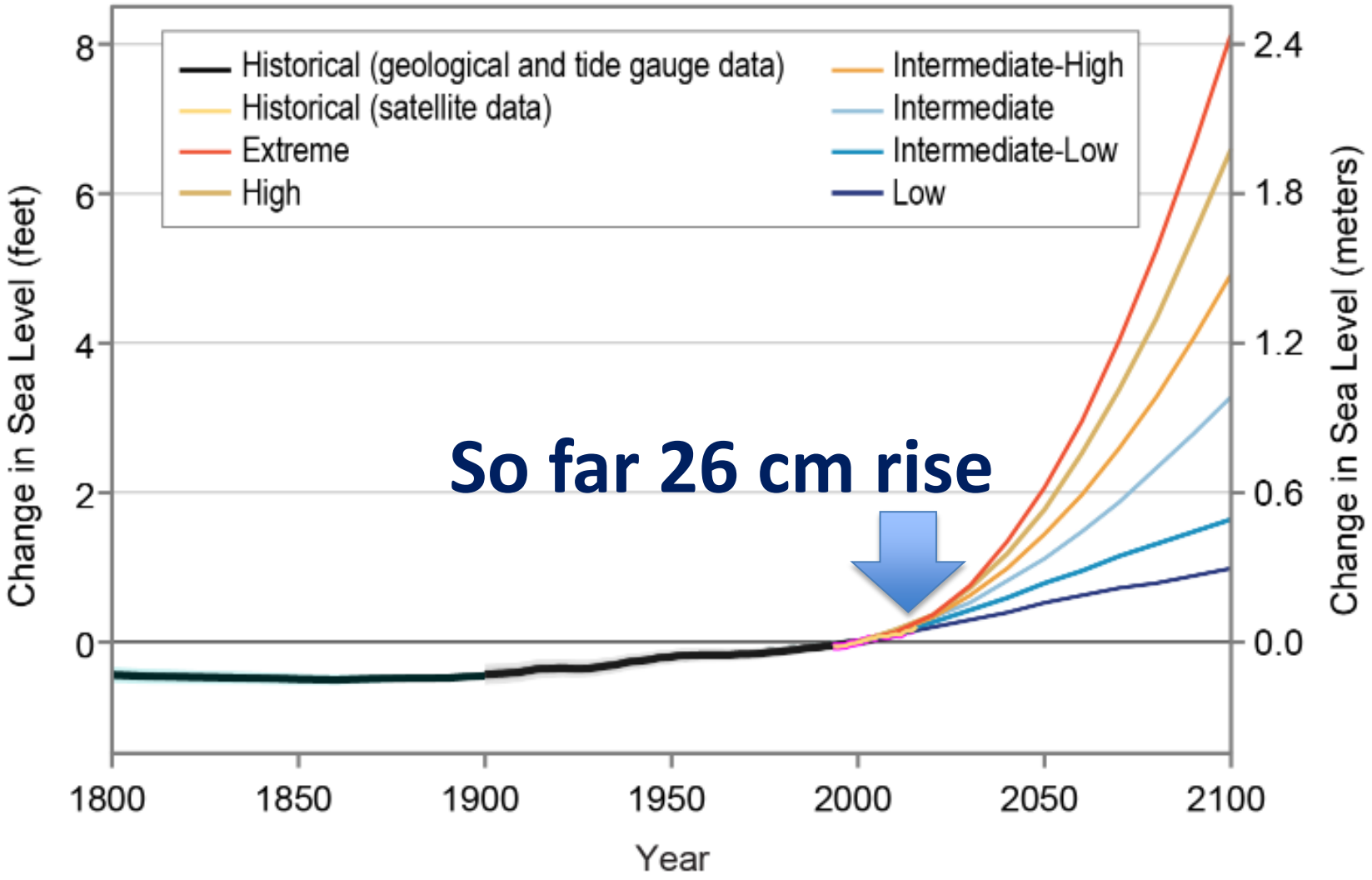


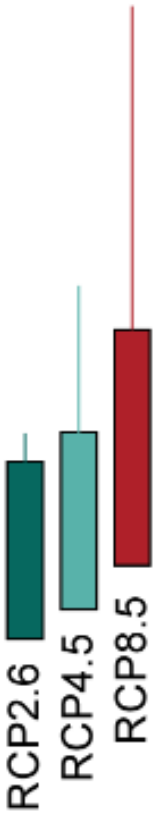
2016



WMO OMM

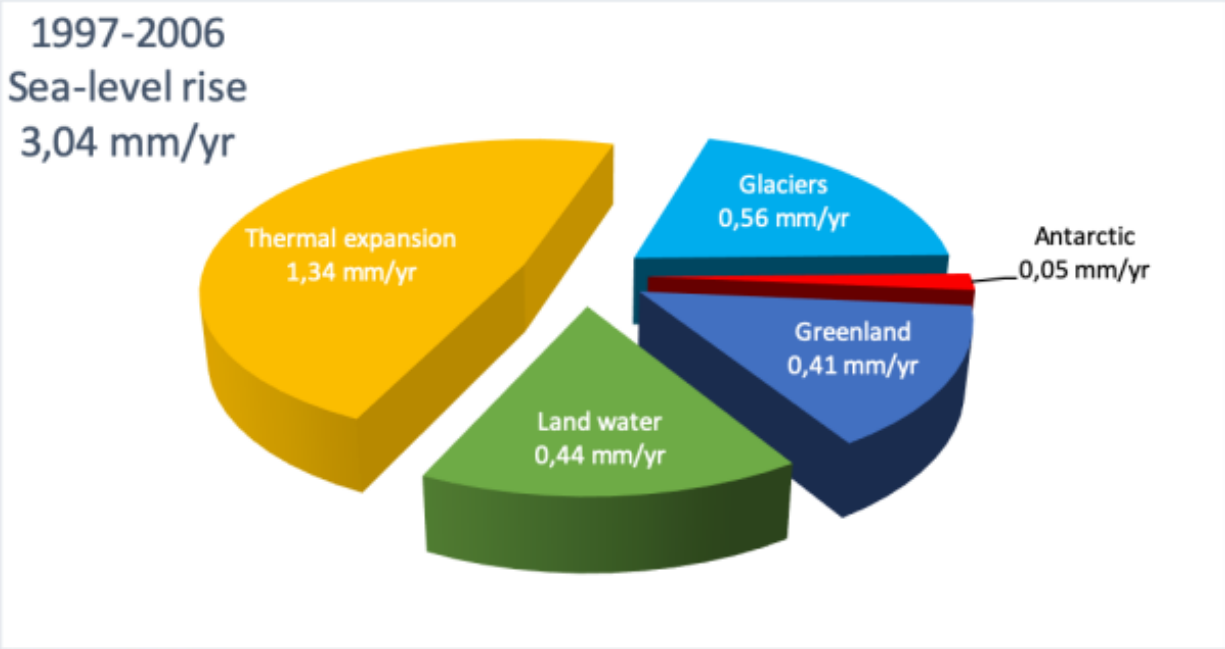
Emissions-sea level rise 1800-2100

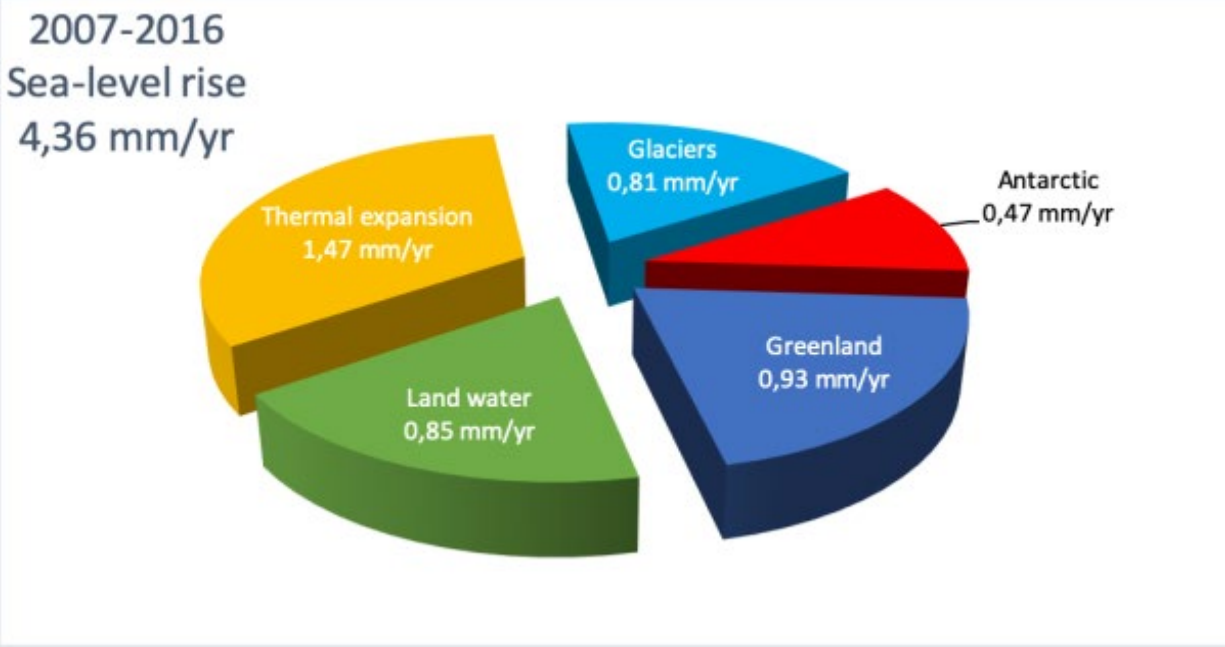




WMO OMM

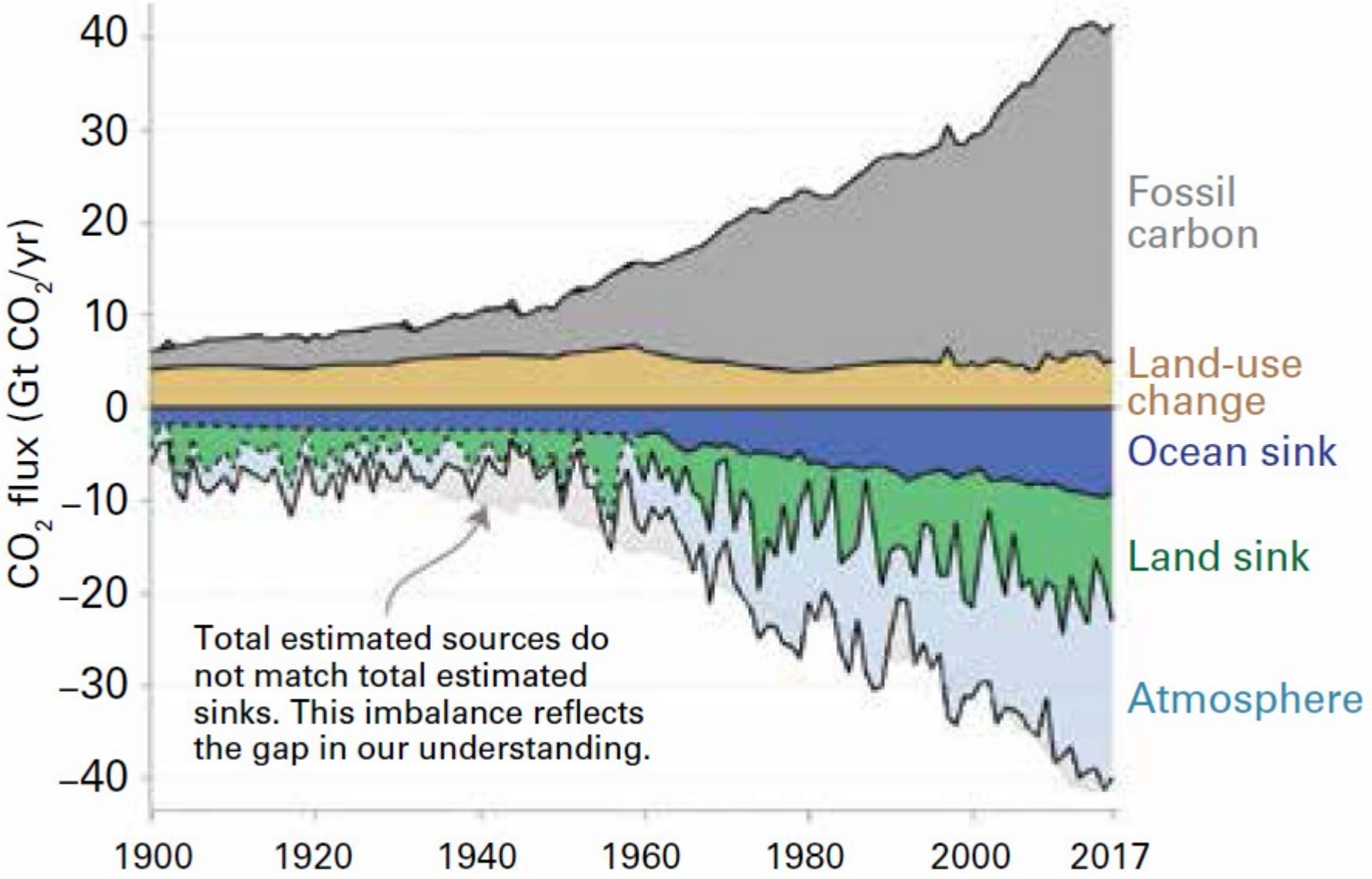
Factors behind sea level rise





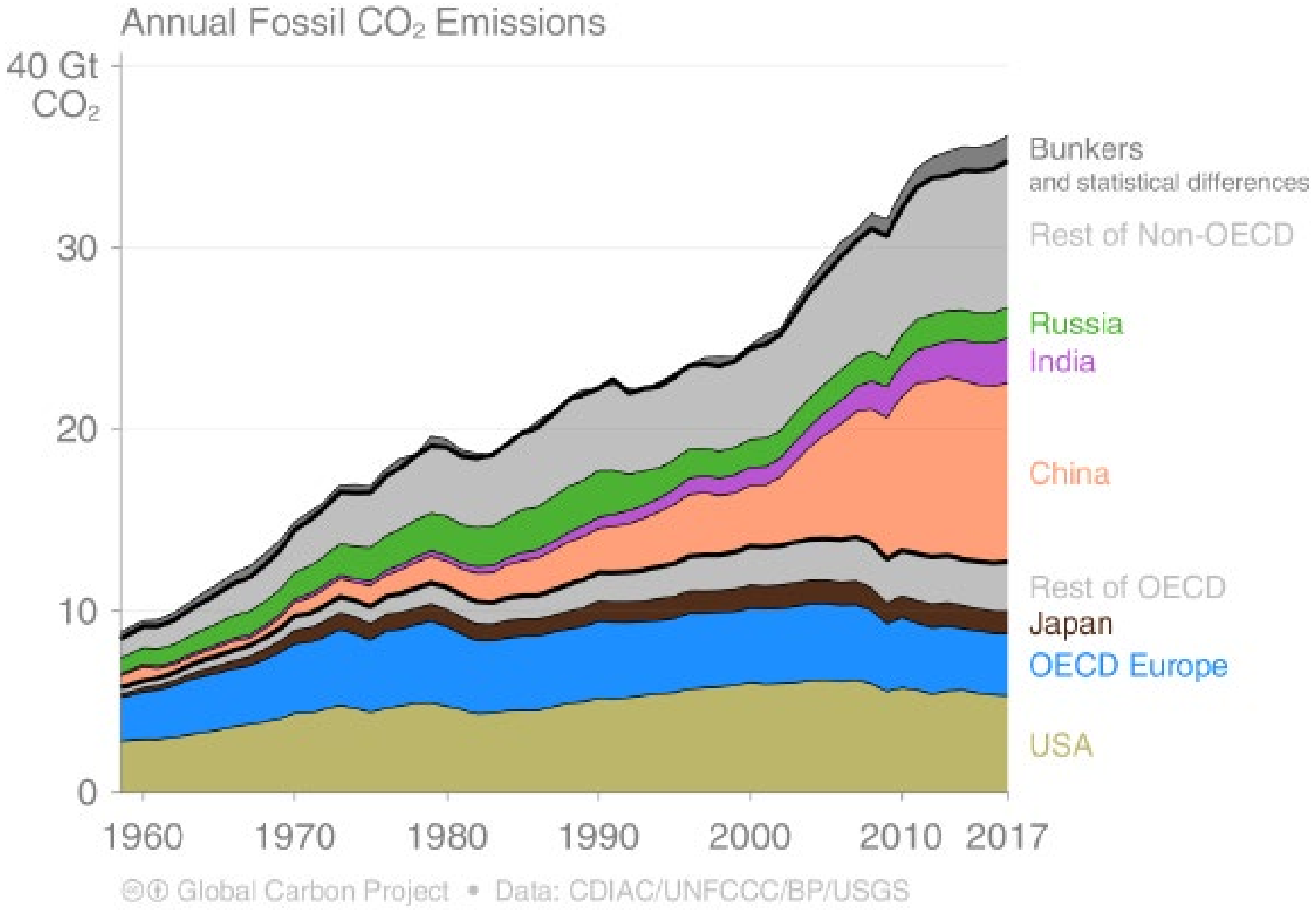
WMO

Carbon sinks and sources 1900-2017



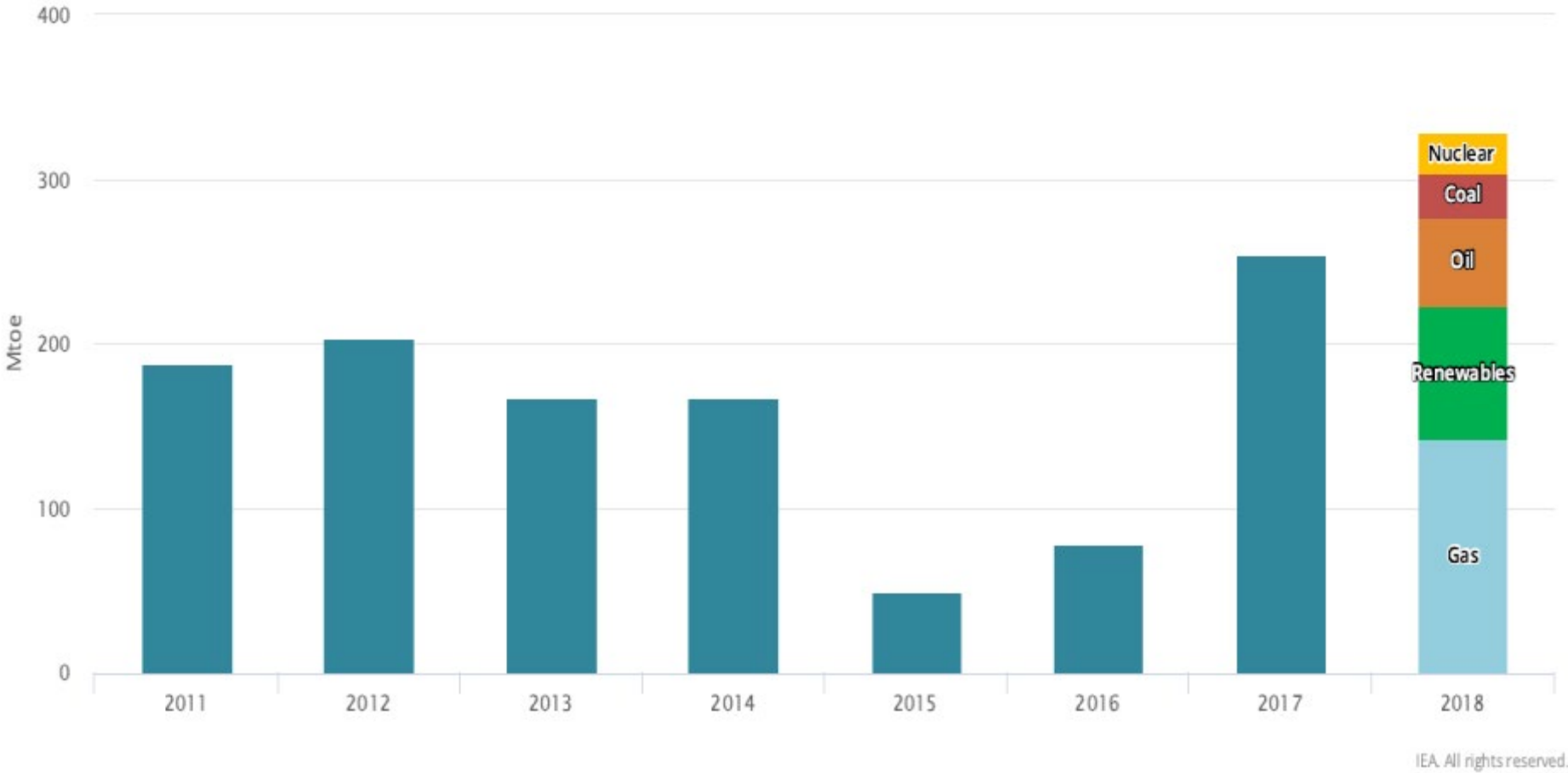
WMO OMM

CO_2 emissions 1960-2017



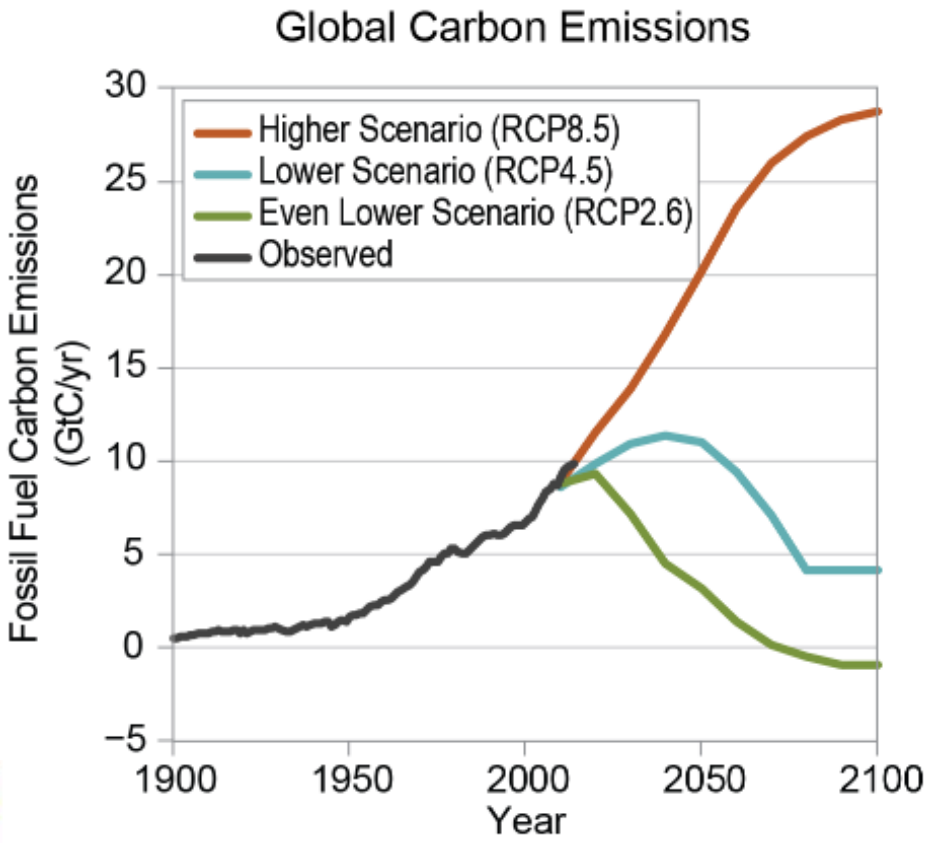
WMO OMM

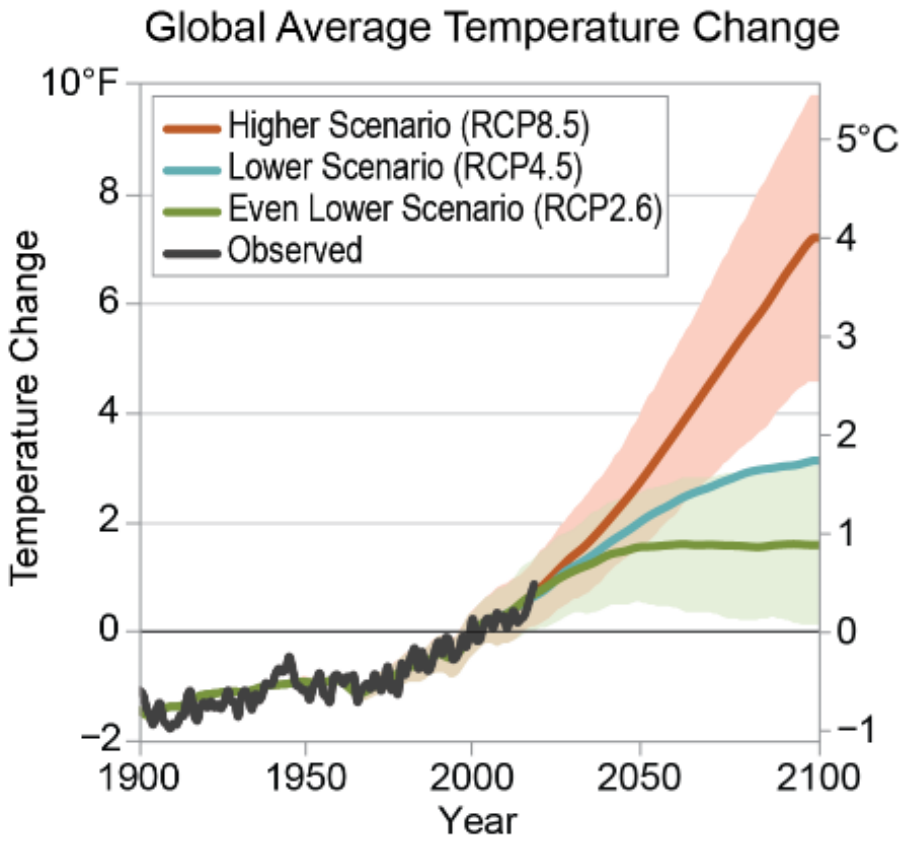
Change in annual global energy demand 2011-18



WMO OMM

Carbon emissions-temperature

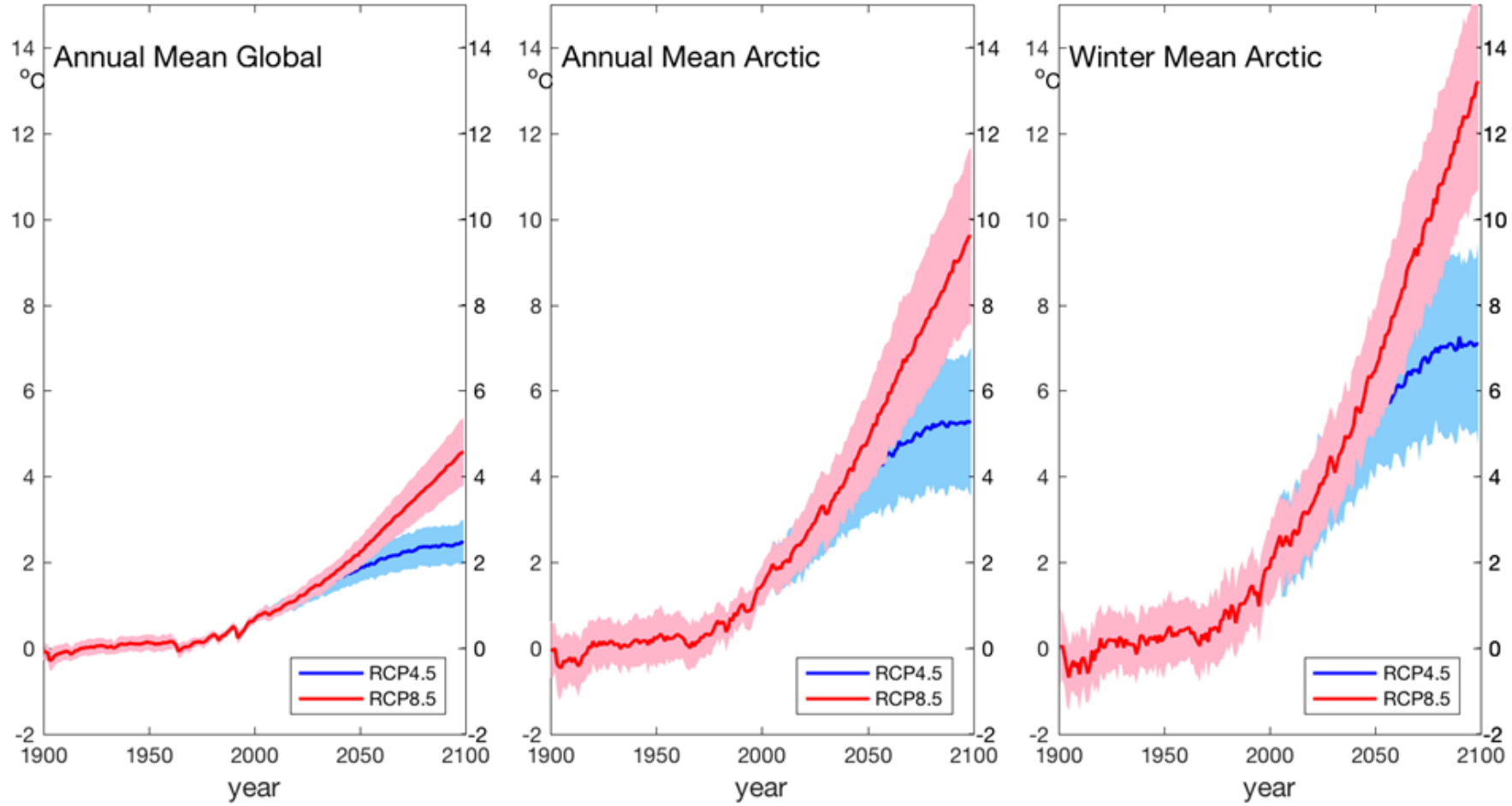




WMO OMM

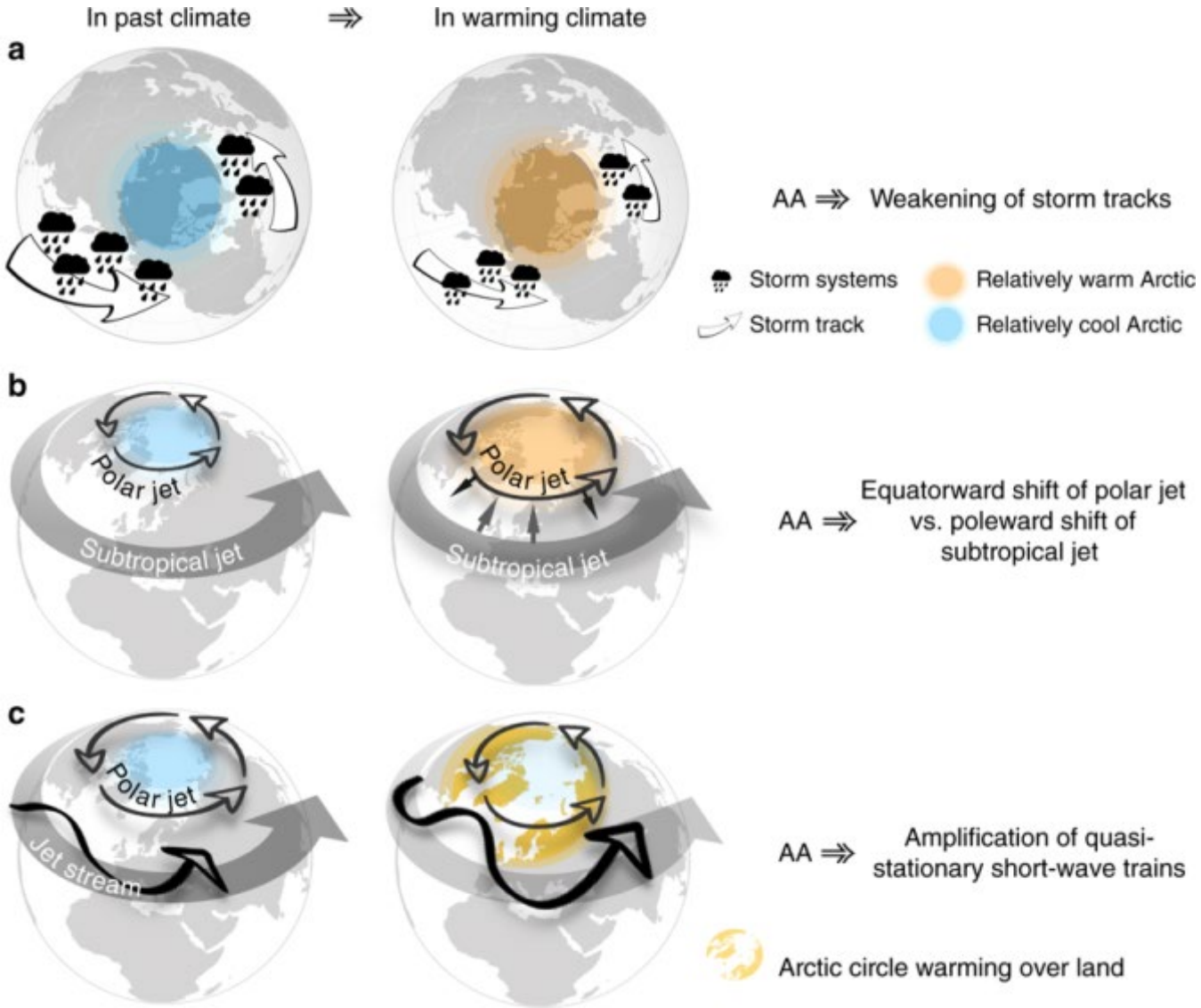
Arctic and global temperatures 1900-2100

Averaged over 36 global climate models
RCP 4.5 (blue)= upper end of Paris COP21 Agreement , RCP 8.5 (red)= business as usual



(modified from AMAP/SWIPA2017)

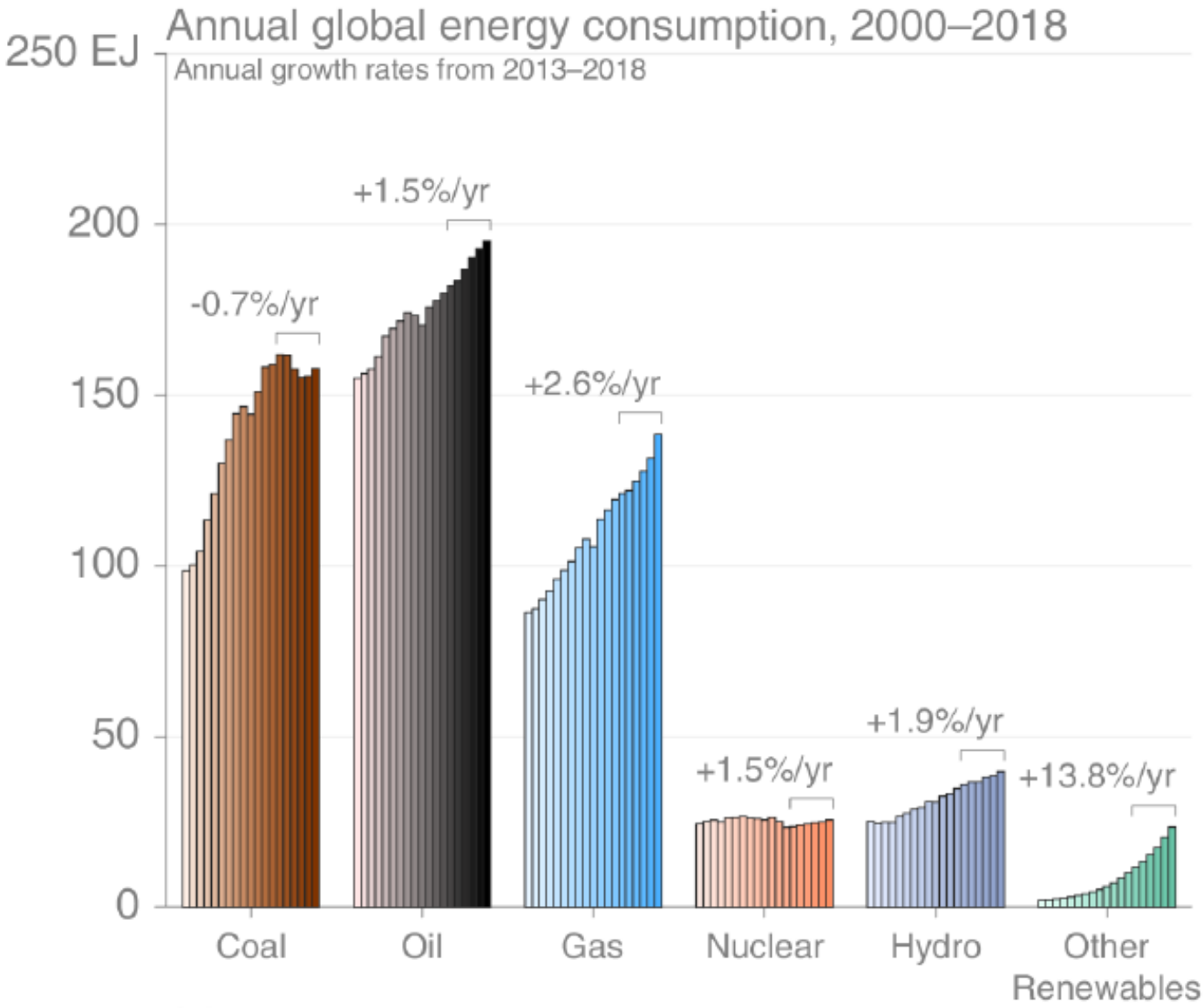
Influence of Arctic on mid-latitude weather



WMO OMM

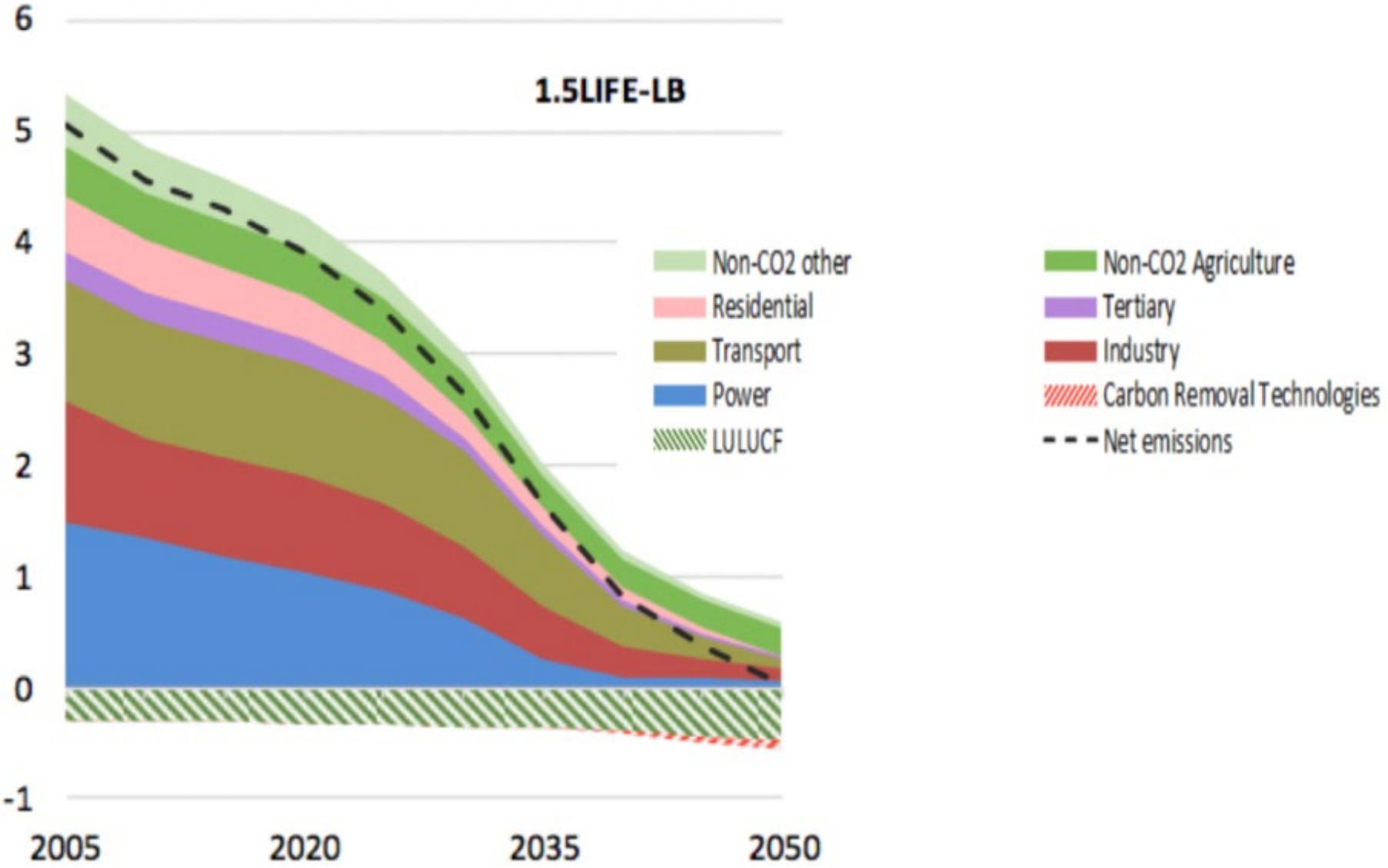
*Coumou et al, Nature Communications***volume 9**, Article number: 2959 (2018)

Energy consumption 2000-2018



WMO OMM

How to be carbon neutral by 2050?



WMO OMM

ƒ3#

Thank you

Gracias

Merci

Спасибо

谢谢

WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

WMO OMM

World Meteorological Organization
Organisation météorologique mondiale