

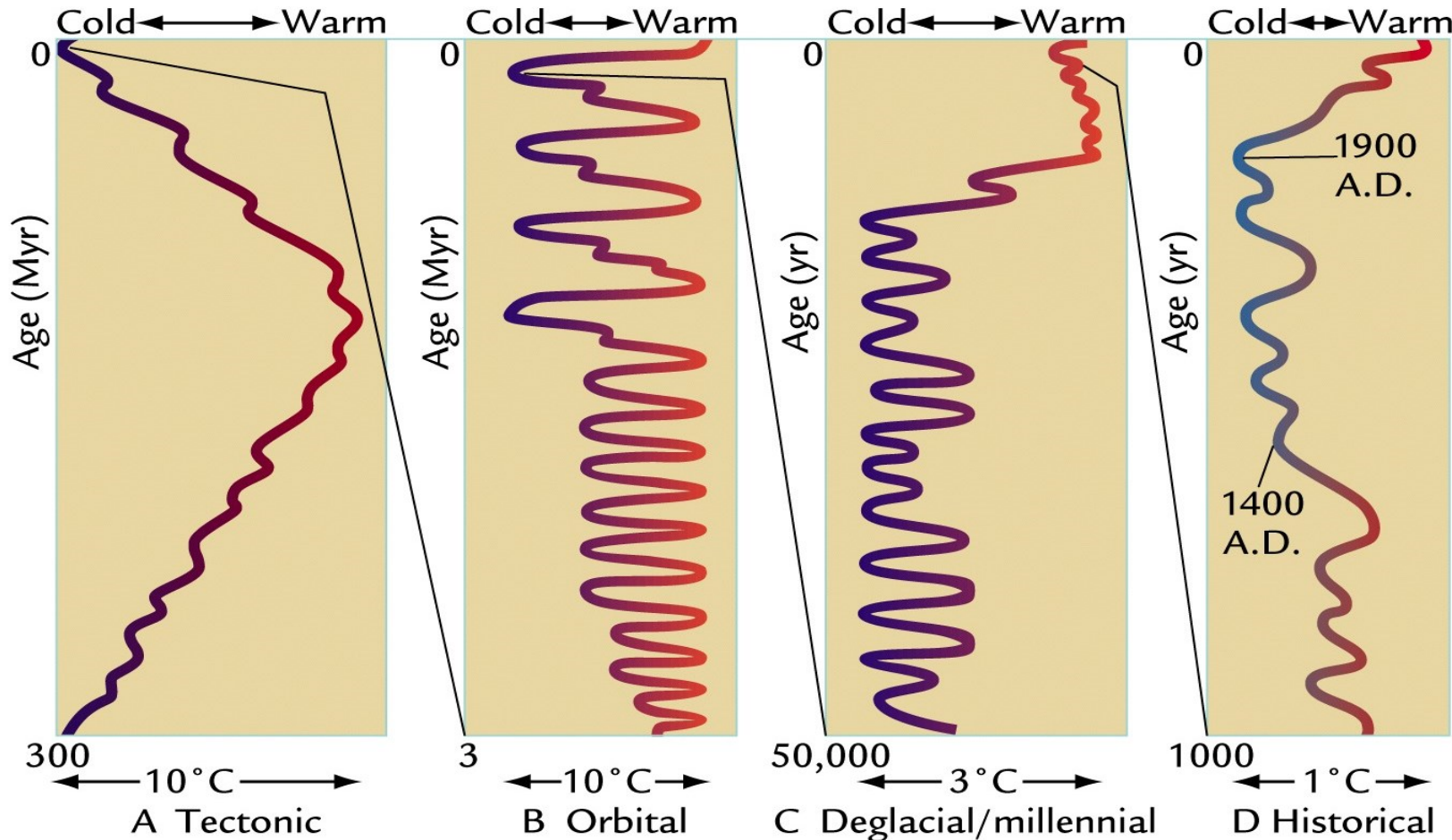
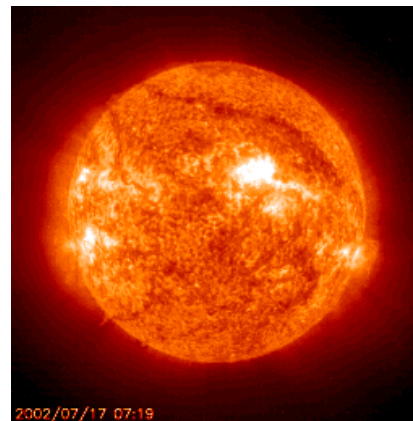
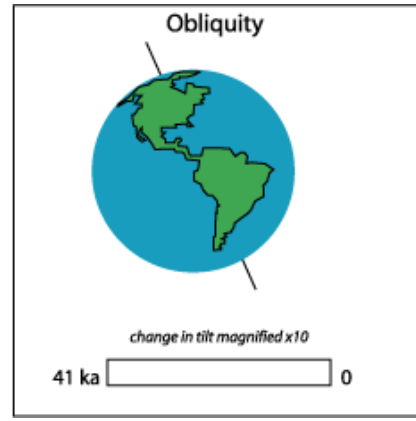
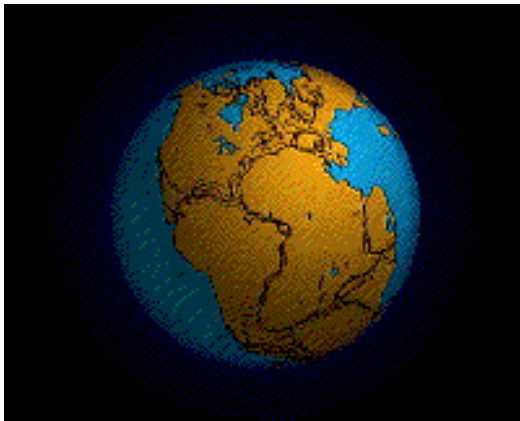
THE CAUSES OF CLIMATE CHANGE

Professor Richard Allan

[@rpallanuk](https://twitter.com/rpallanuk)

r.p.allan@reading.ac.uk

Gillotts GCSE Geography, 21st June 2021

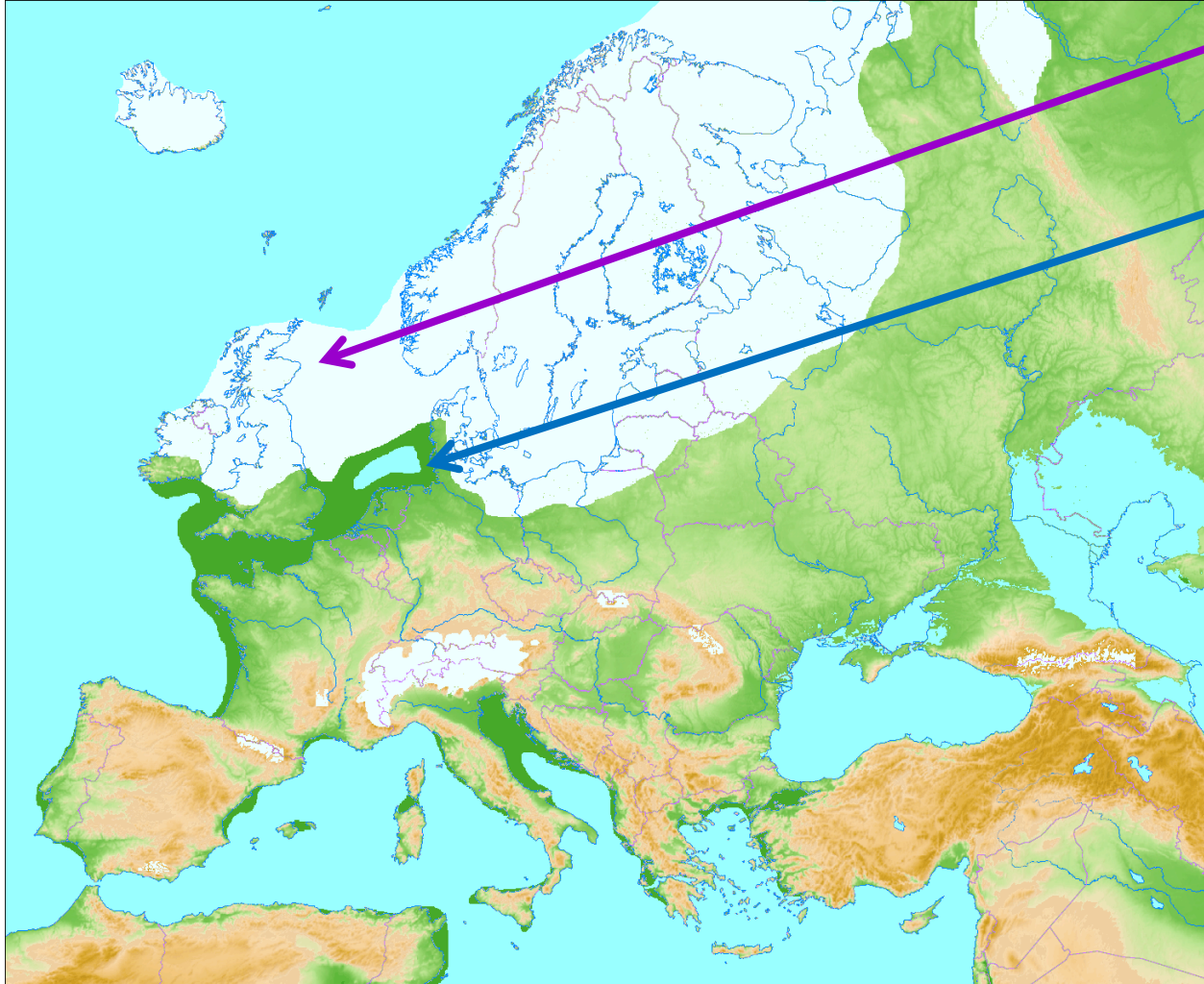


EARTH'S CLIMATE HAS ALWAYS BEEN CHANGING

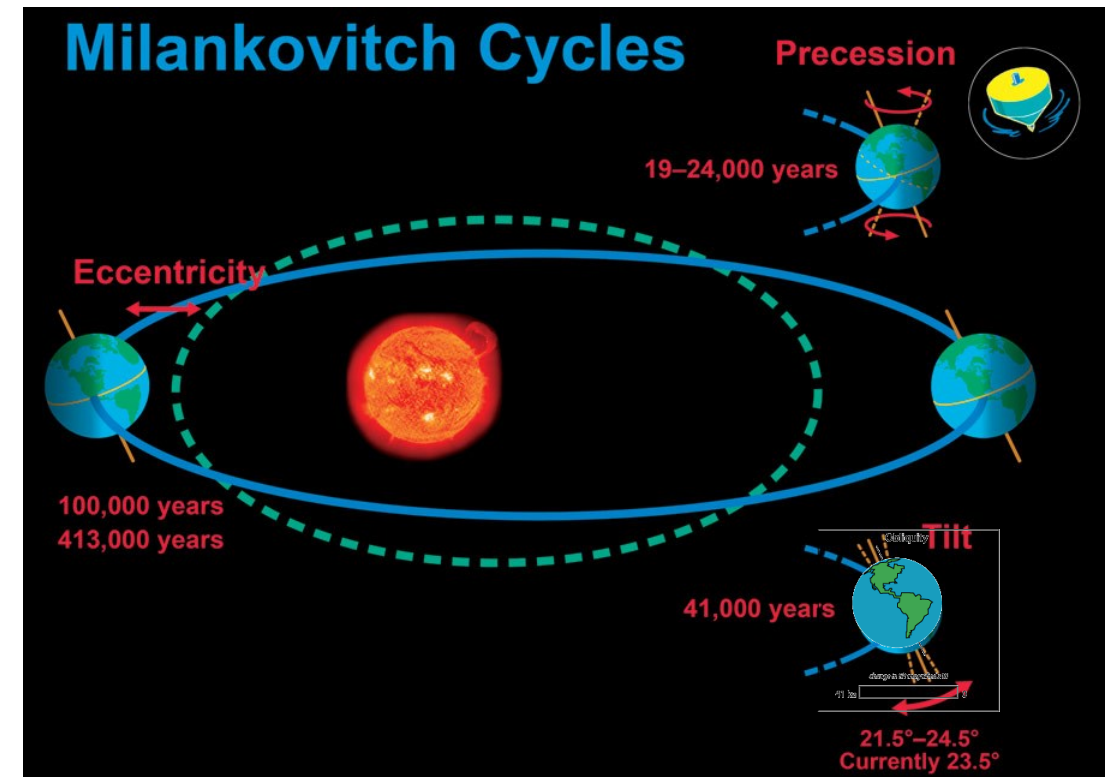
- Plate tectonics
- Orbital cycles
- The Sun
- Volcanoes

THE LAST GLACIAL MAXIMUM

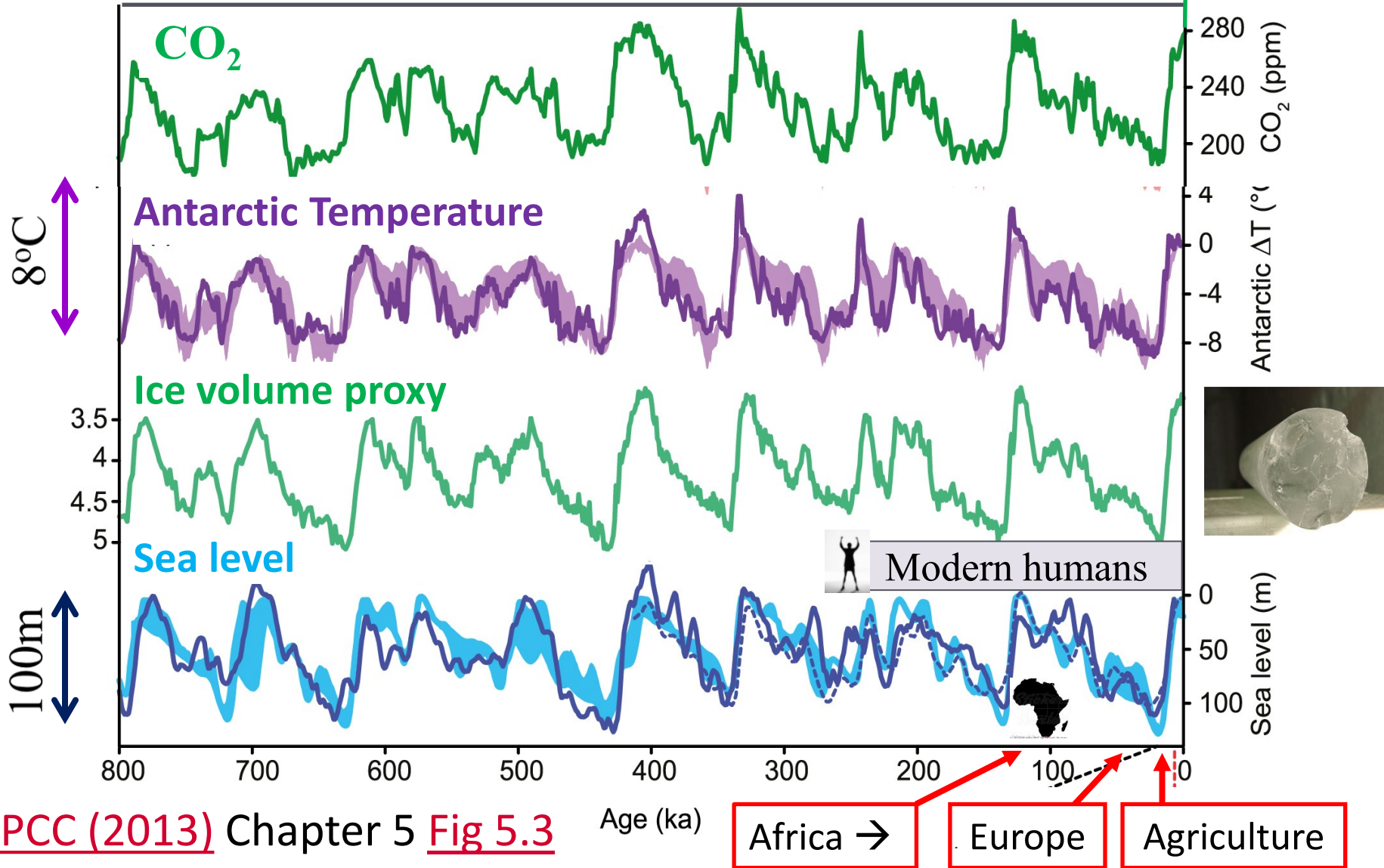
About 20,000 years ago...



- Northern Britain was covered by an **ice sheet**
- **Sea level** was 120 metres lower



CLIMATE CHANGE OVER LAST 800,000 YEARS



- Ice cores & ocean sediments show swings between **inter-glacial** & **glacial** climates
- Explained by known **cycles in Earth's orbit**
- 10 to 100 thousand year natural cycles in temperature & sea level - amplified by ice cover & CO₂ changes
- Natural swings in CO₂... until now



IPCC (2013) Chapter 5 Fig 5.3

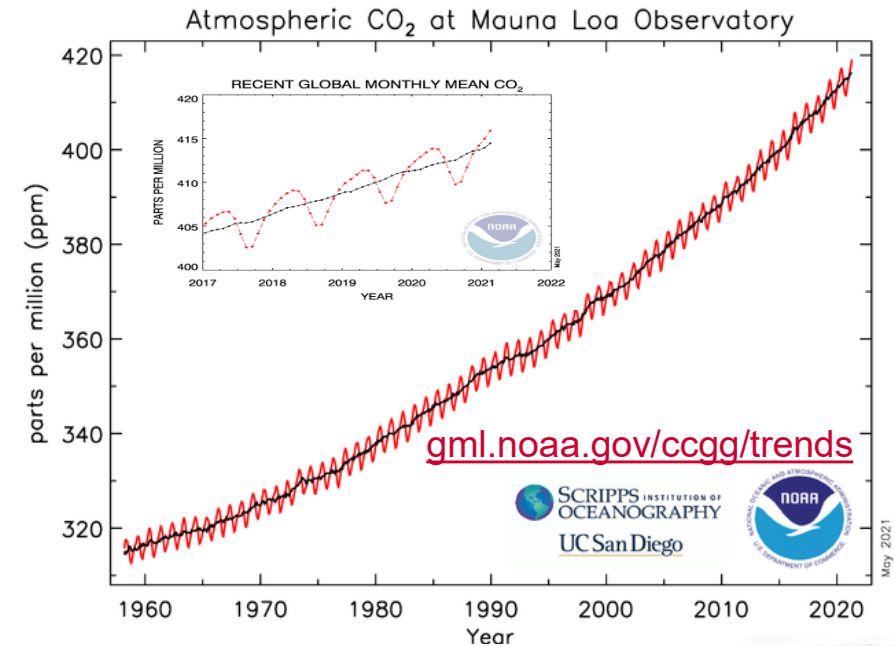
OUR CO₂ EMISSIONS ARE HEATING PLANET

- Greenhouse gases reduce infrared heat loss to space
- Greenhouse gas increases intensify greenhouse effect and heat planet (more energy arriving than leaving)
- Pollutant “aerosol” particles reduce heating by reflecting sunlight
- Global mean warming
- Melting ice
- Rising sea level
- More intense rainfall, heatwaves & droughts

Evidence: www.ipcc.ch reports
Observations, physics, [simulations](#)
See also: climate.nasa.gov

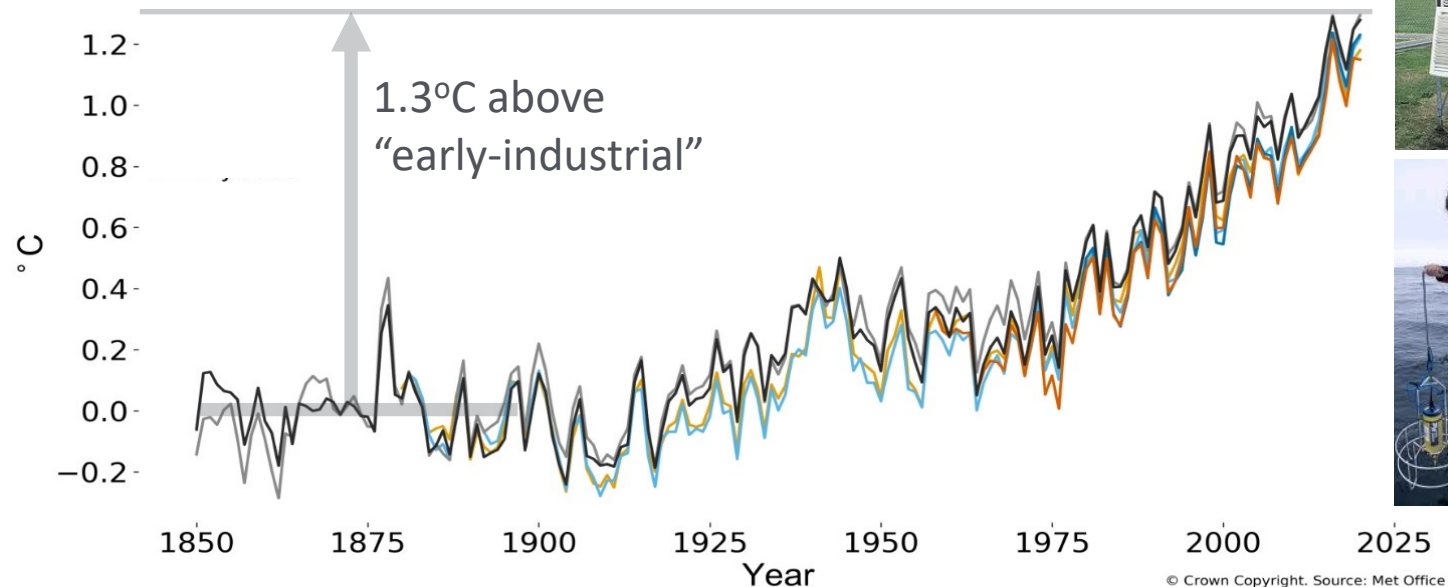
Annual
415.3 ppm
Annual growth rate
2.4 ppm/yr
Pre-industrial rise
48%

NOAA Mauna Loa CO₂ 2021/6/6



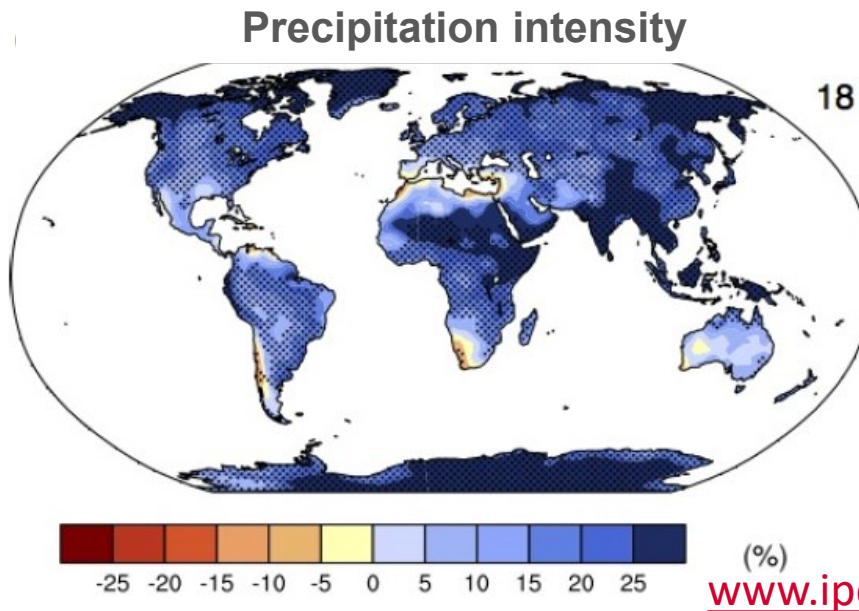
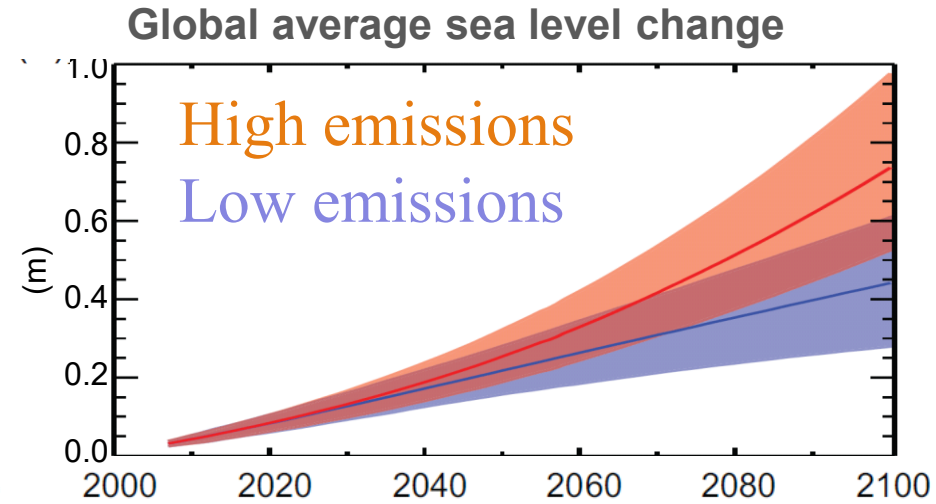
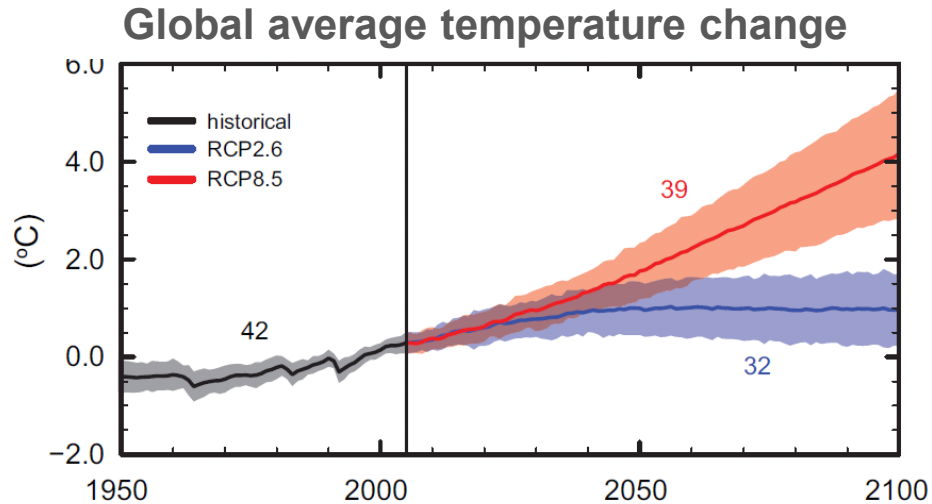
Met Office

Global mean temperature difference from 1850-1900 (°C)



www.metoffice.gov.uk/hadobs/monitoring/dashboard.html

REDUCE CO₂ EMISSIONS TO LIMIT CLIMATE CHANGE



“Continued emissions of greenhouse gases will cause further warming and changes in all components of the climate system. Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions.”

Impacts:

- More intense heatwaves, droughts, floods
- Coastal inundation
- Ocean acidification

Solutions: COP26

- Greenhouse gas emission cuts across all sectors
- Capture CO₂
- Adapt