

# Current understanding of climate change science

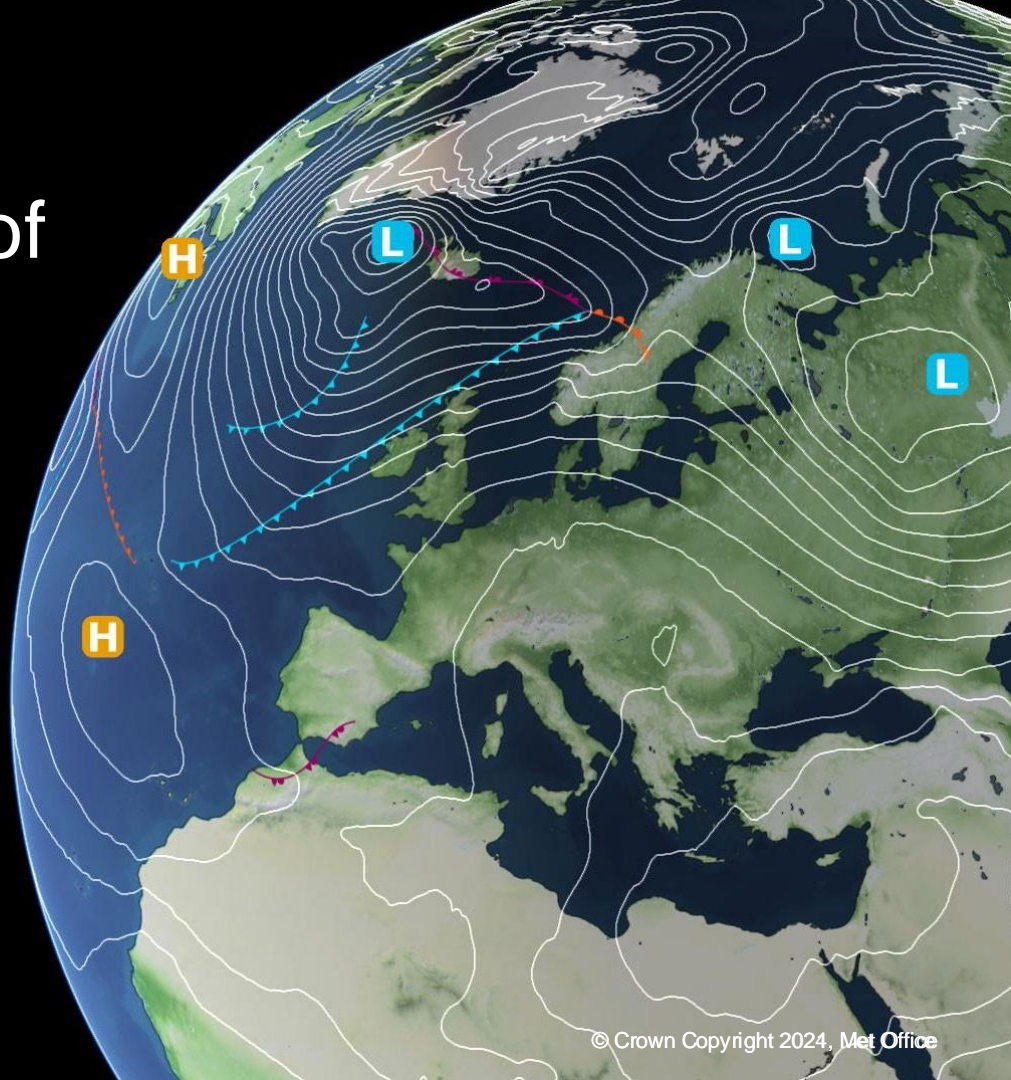
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*Definitions:*

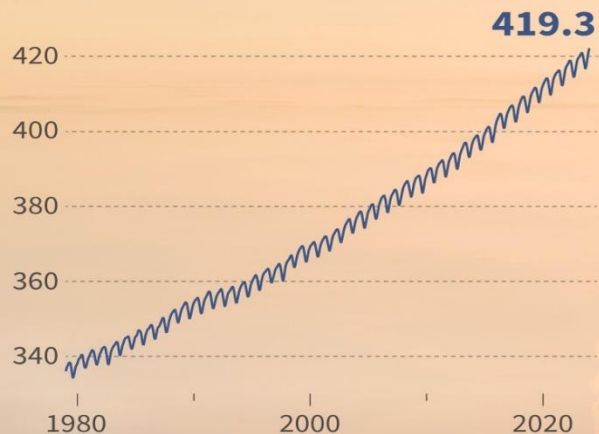
**Climate** refers to all meteorological time scales  
e.g., from weather events to multi-decadal climate trends.



# State of the Climate in 2023: All 3 dominant greenhouse gases hit new record highs

## Carbon dioxide

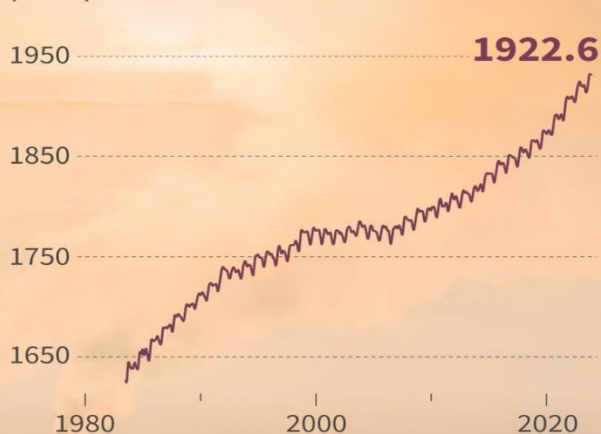
parts per million



↑ **50% higher**  
than pre-industrial level

## Methane

parts per billion



↑ **166% higher**  
than pre-industrial level

## Nitrous oxide

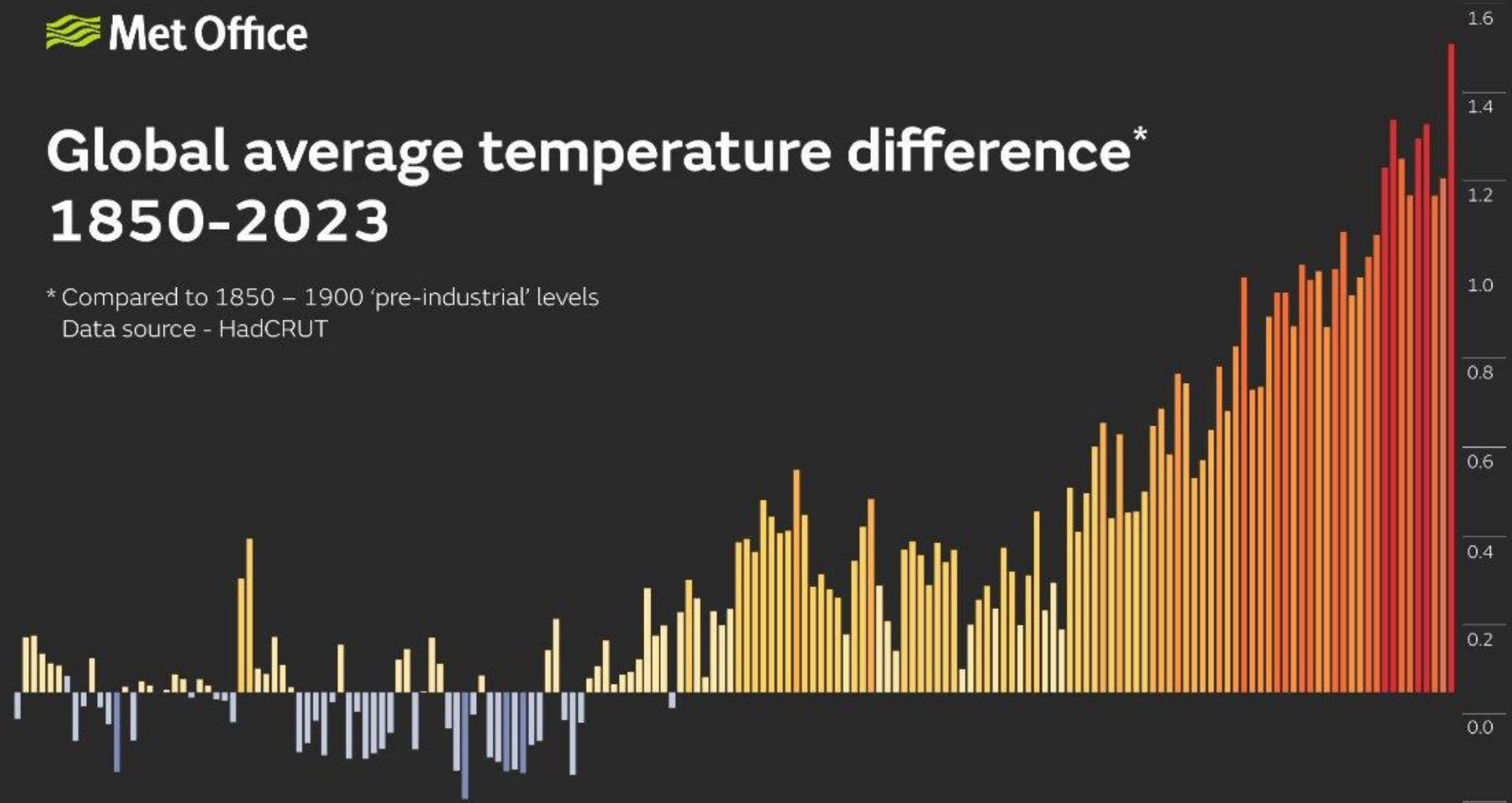
parts per billion



↑ **25% higher**  
than pre-industrial level

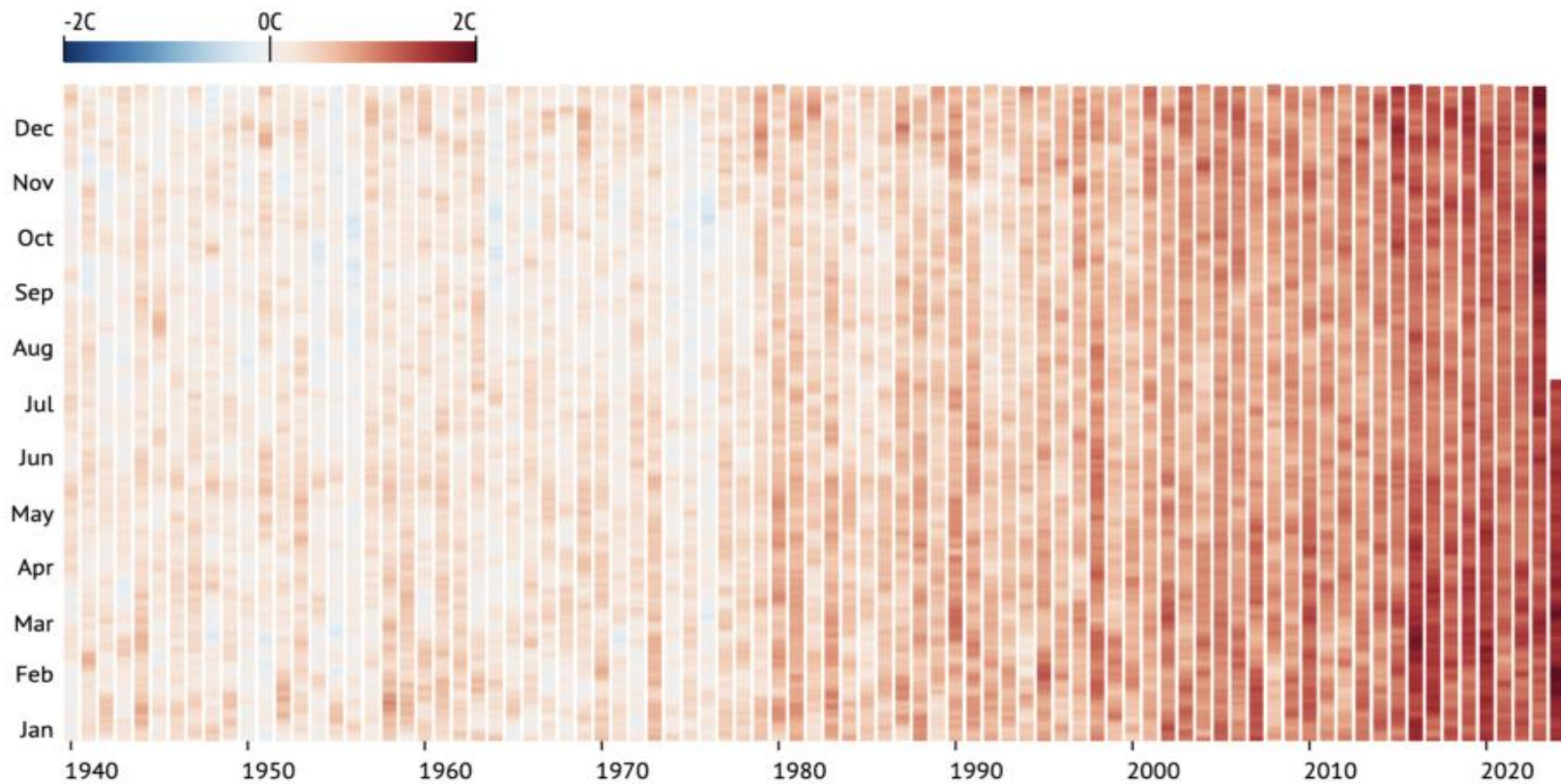
# Global average temperature difference\* 1850-2023

\* Compared to 1850 – 1900 'pre-industrial' levels  
Data source - HadCRUT



# How daily average global temperatures have warmed since 1940

Compared to 1850-1900 average

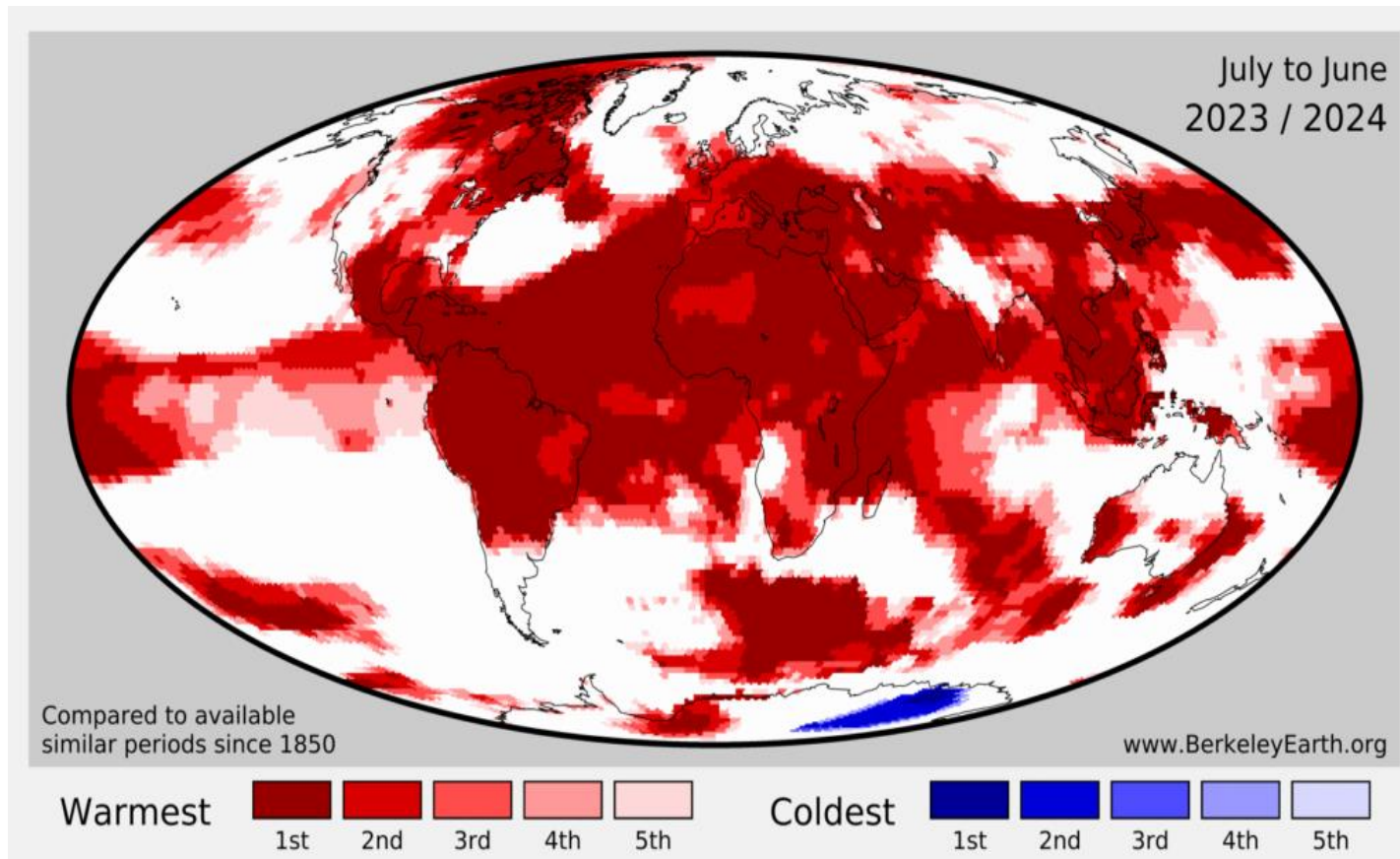


Source: ERA5



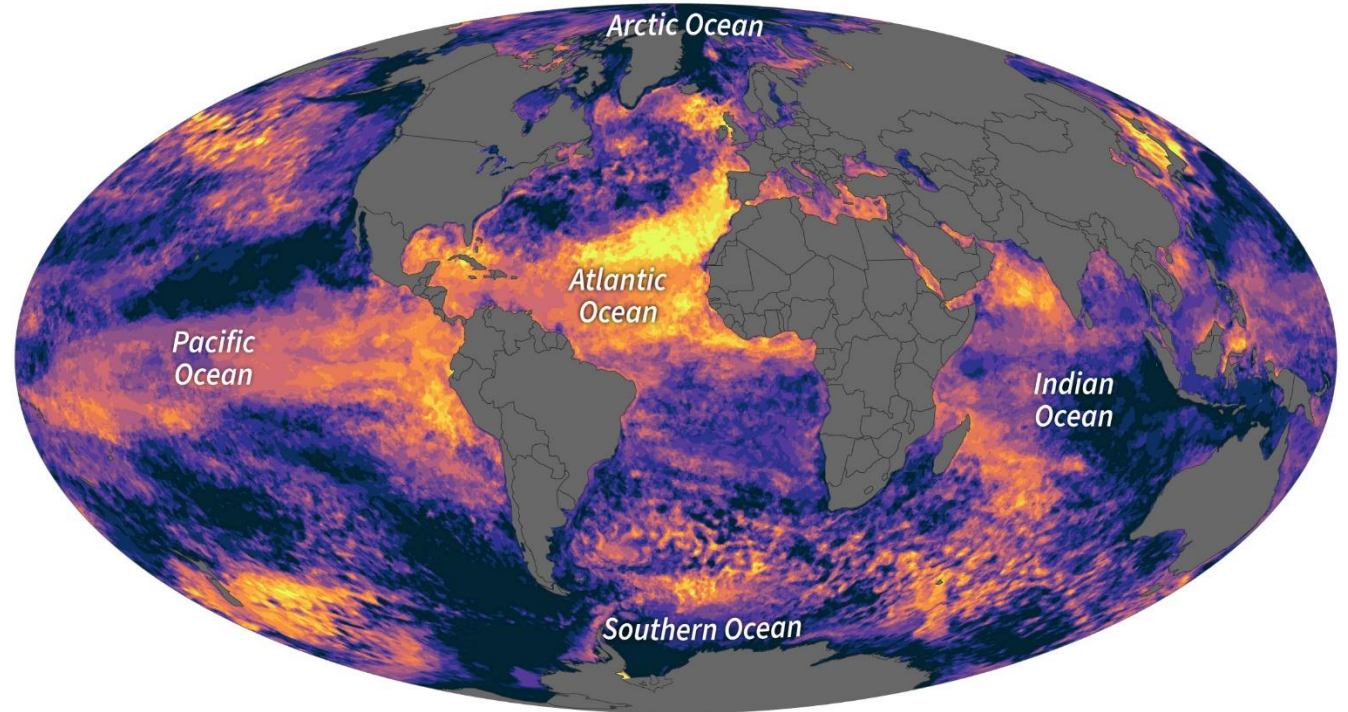
2023-2024 - Many areas experienced the warmest year on record.

Boosted by the start of an *El Nino* event in 2023.

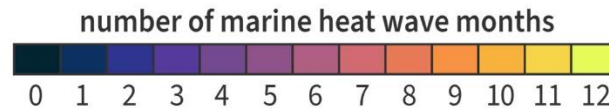


Relatively large swaths of the eastern North Atlantic & Pacific experienced heat wave conditions virtually all year (bright yellow).

Boosted by the start of an *El Nino* event in 2023.

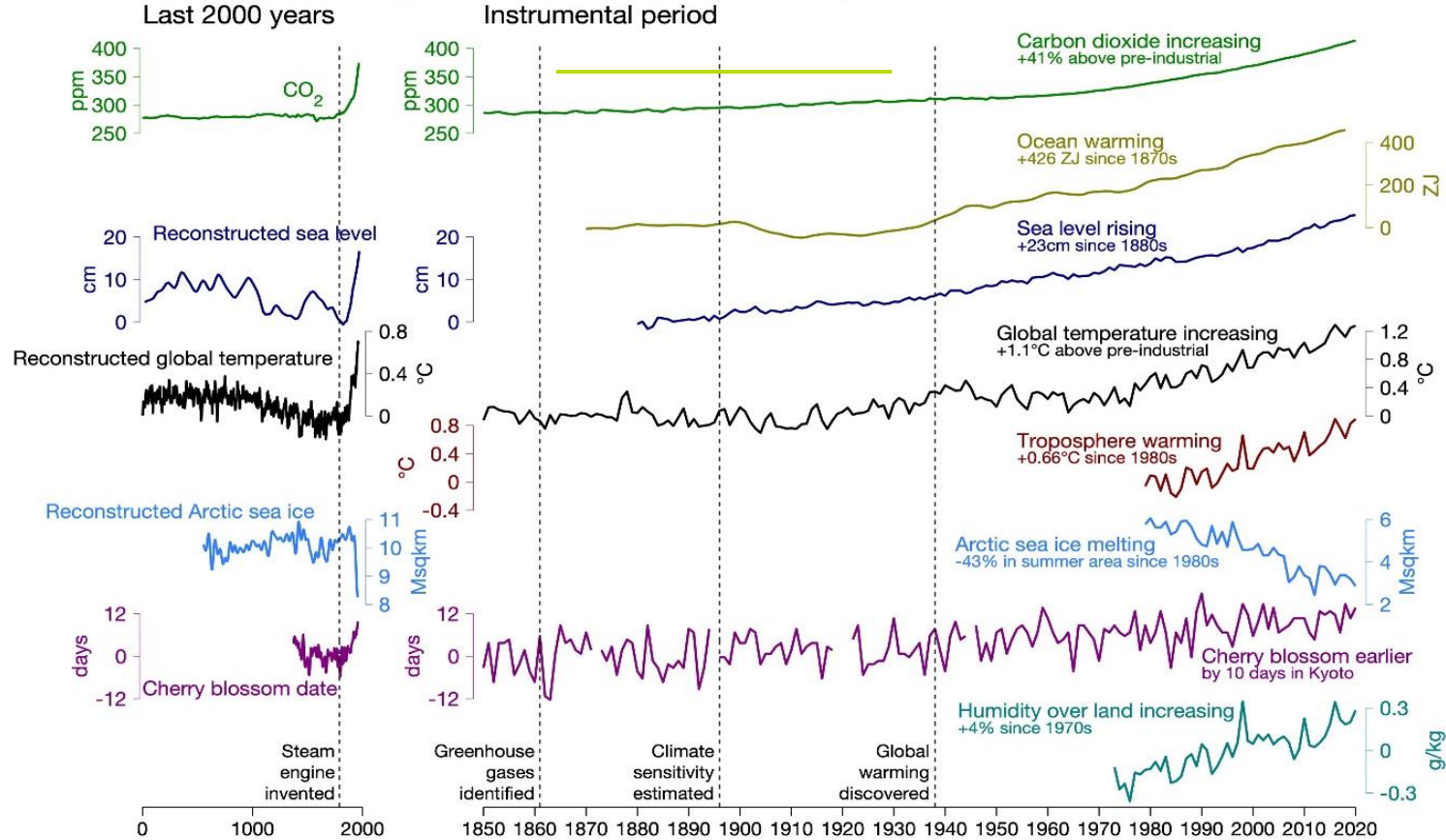


2023



NOAA Climate.gov  
Data: SOTC 2023

# Met Office Changes emerging across the natural environment







### Siberian heatwave

- Widespread, prolonged event over the first 6 months of 2020 resulting in **wildfires** and **loss of permafrost**
- Event was **600 times more likely** due to climate change

### European flooding and heatwave

- July 2021 **heavy rainfall event** resulted in extreme impacts, and led to over **200 deaths**
- Event was **1.2 to 9 times more likely** and **rainfall intensity 3-19% higher** due to climate change

### West African drought leads to record global cocoa prices

- 2024 Global cocoa prices hit new high due to **droughts causing poor harvests in W Africa** which is main global supply.
- **Cocoa price has doubled** from 2023-2024.



## 2015 Paris agreement targets

Keep well below

+2.0 °C

Limit to

+1.5 °C

Already surpassed

+1.0 °C

+0.5 °C

+0 °C

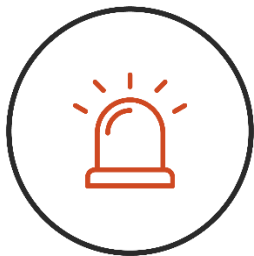
Temperatures compared to pre-industrial levels, taken here as the 1850-1900 average.

1870 1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010

Long term aim to reach zero net emissions by 2050

Aim for greenhouse emissions to peak as soon as possible

**High-Impact, Low-Likelihood (HILL) events, such as ice sheet collapse and abrupt ocean circulation changes cannot be ruled out and are part of risk assessment**





# Questions?