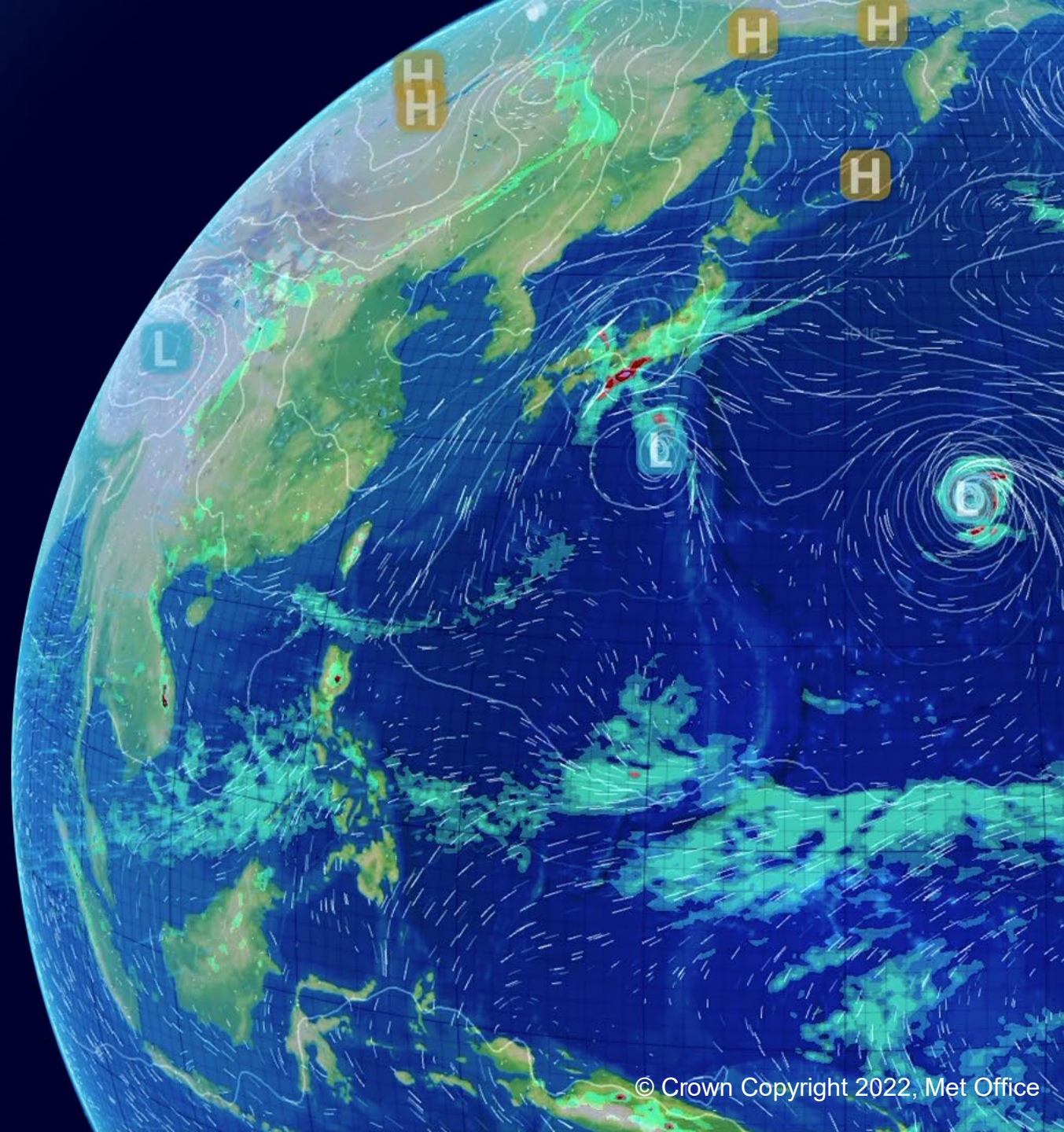


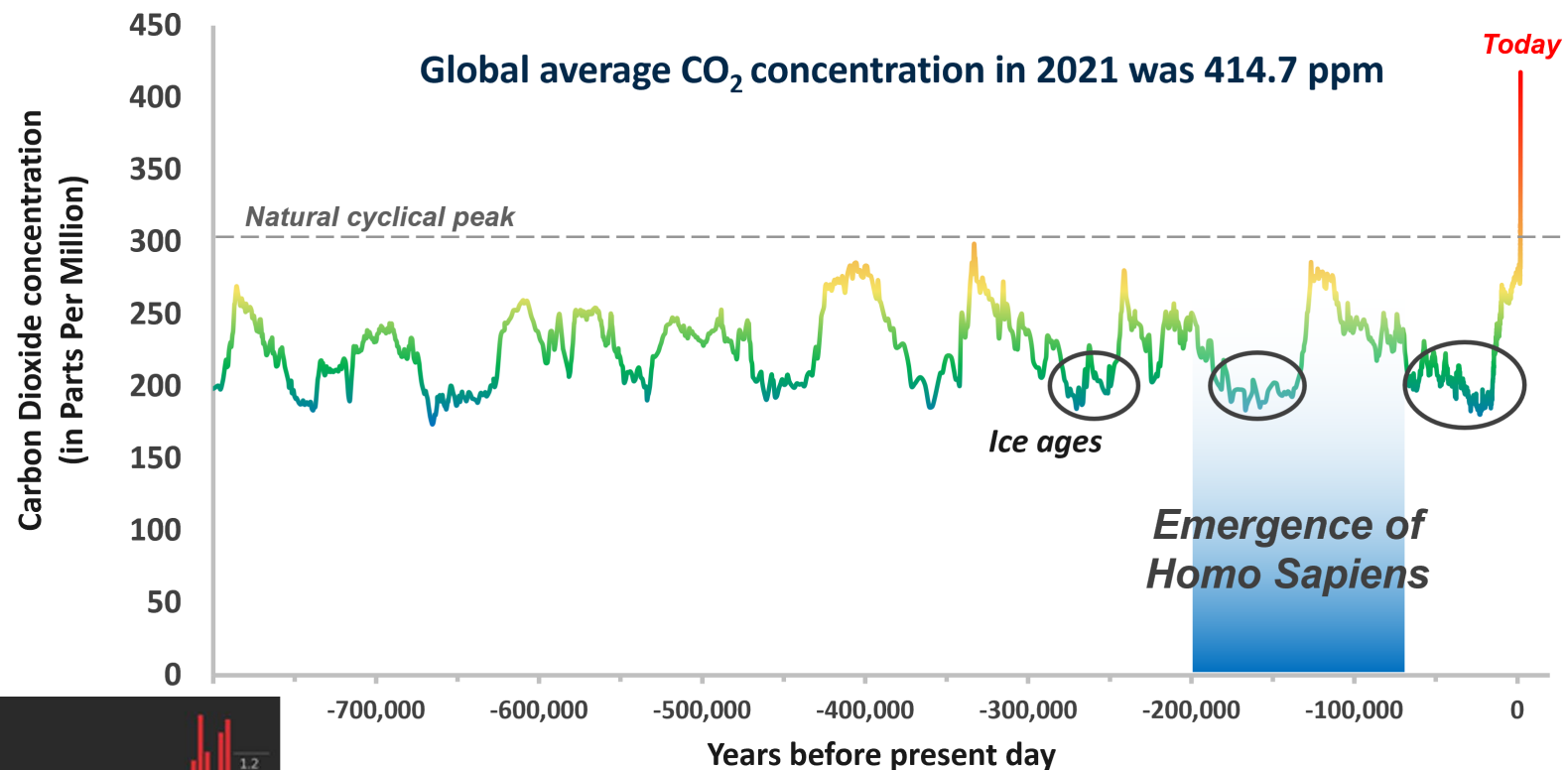
# Climate Science: An Introduction

Professor Stephen Belcher  
Chief of Science and Technology,  
Met Office

11<sup>th</sup> July 2022

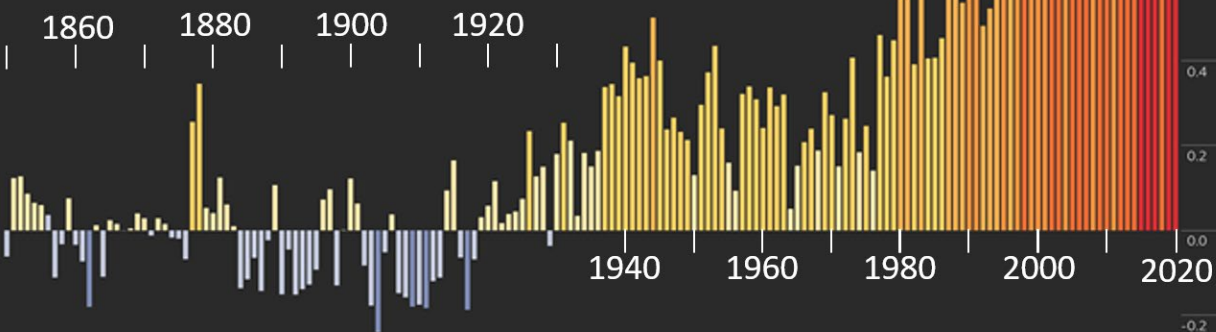


Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred



## Global average temperature difference\* 1850-2020

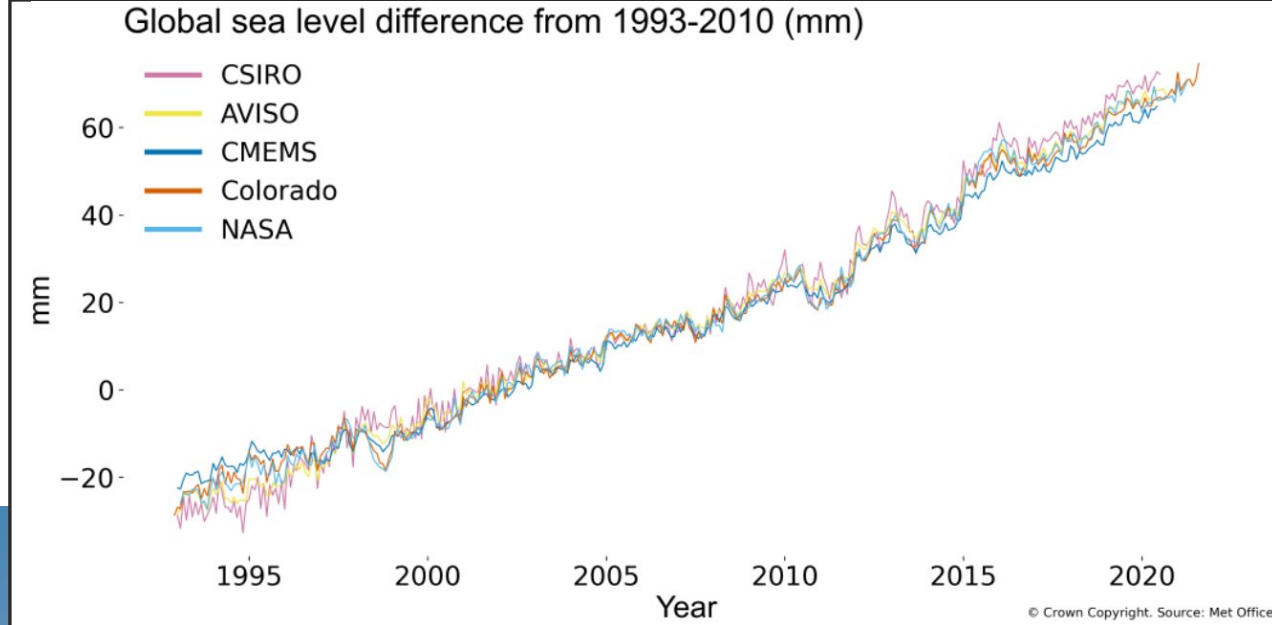
\* Compared to 1850 – 1900 'pre-industrial' levels  
Data source - HadCRUT5







If we can limit warming, we can also limit the risk of rapid ice loss from Antarctica which would otherwise lead to several meters of sea level rise over the coming centuries.



## Arctic Sea Ice Loss

The September minimum Arctic sea ice extent in 2019 was the 2<sup>nd</sup> lowest on record.

Over the last four decades, September Arctic sea ice extent has declined by over 87,000 km<sup>2</sup> per year equating to an average of 12% per decade.\*



### Annual loss



**87,055 km<sup>2</sup>**

An area greater than Scotland.

Surface area of Scotland = 80,226 km<sup>2</sup> (World Bank)

### Decadal loss



**870,550 km<sup>2</sup>**

An area greater than the UK, Ireland and France combined.

Surface area of UK, Ireland & France = 862,977 km<sup>2</sup> (World Bank)

### 40 year loss

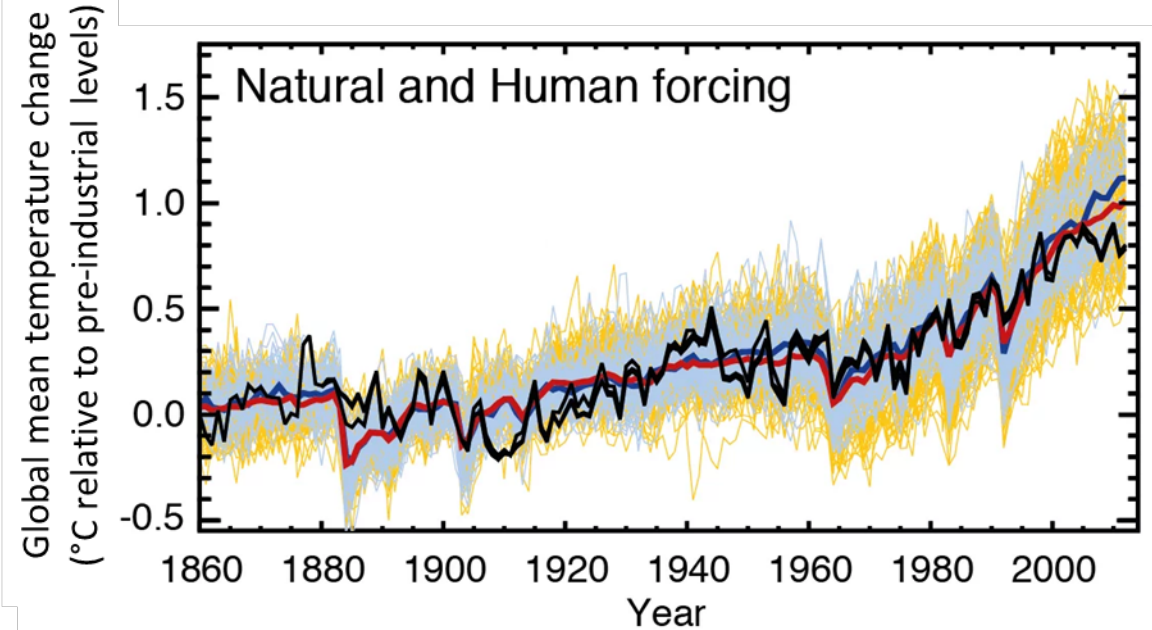
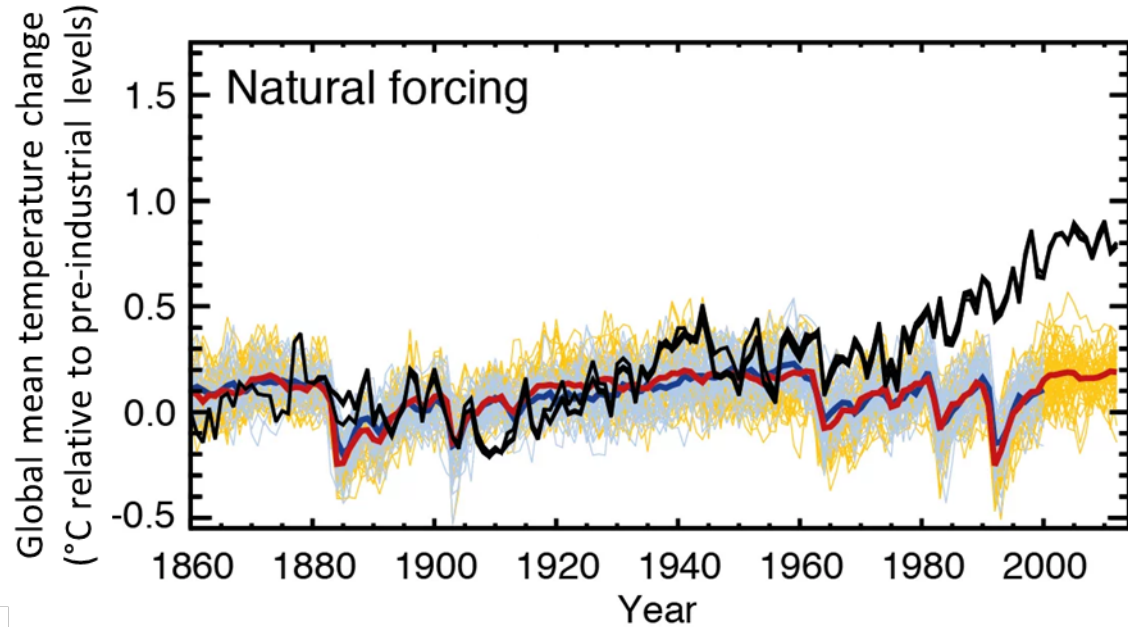


**3.48 million km<sup>2</sup>**

An area greater than India, Bangladesh and Bhutan combined.

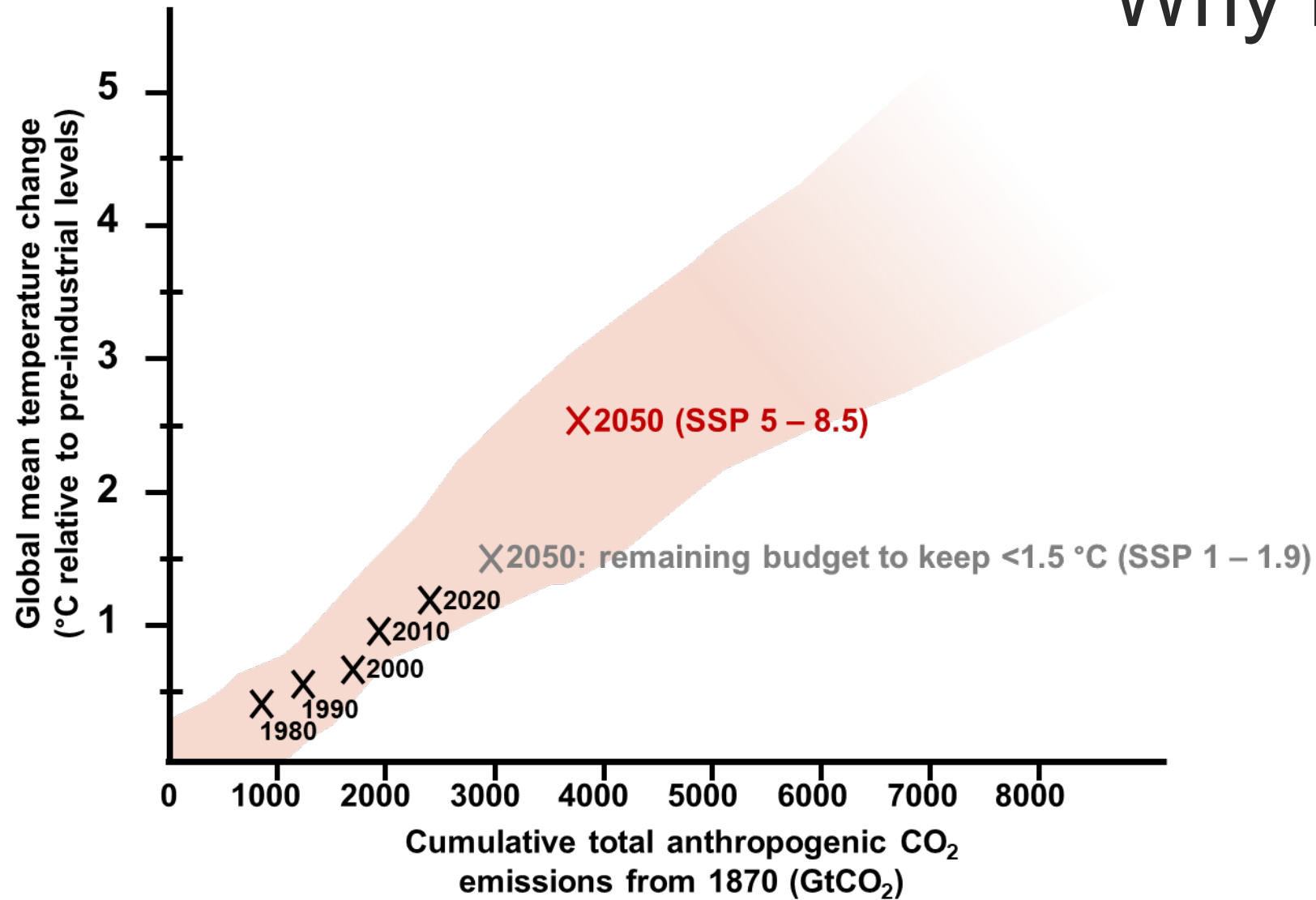
Surface area of India, Bangladesh & Bhutan = 3,473,283 km<sup>2</sup> (World Bank)

It is unequivocal that human influence has warmed the atmosphere, ocean and land





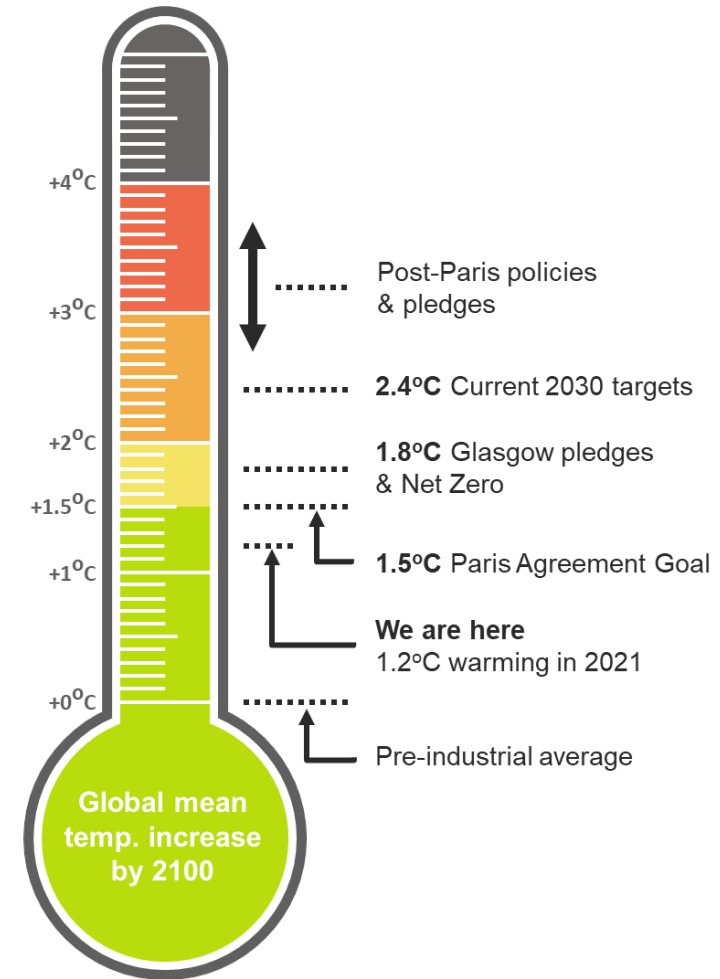
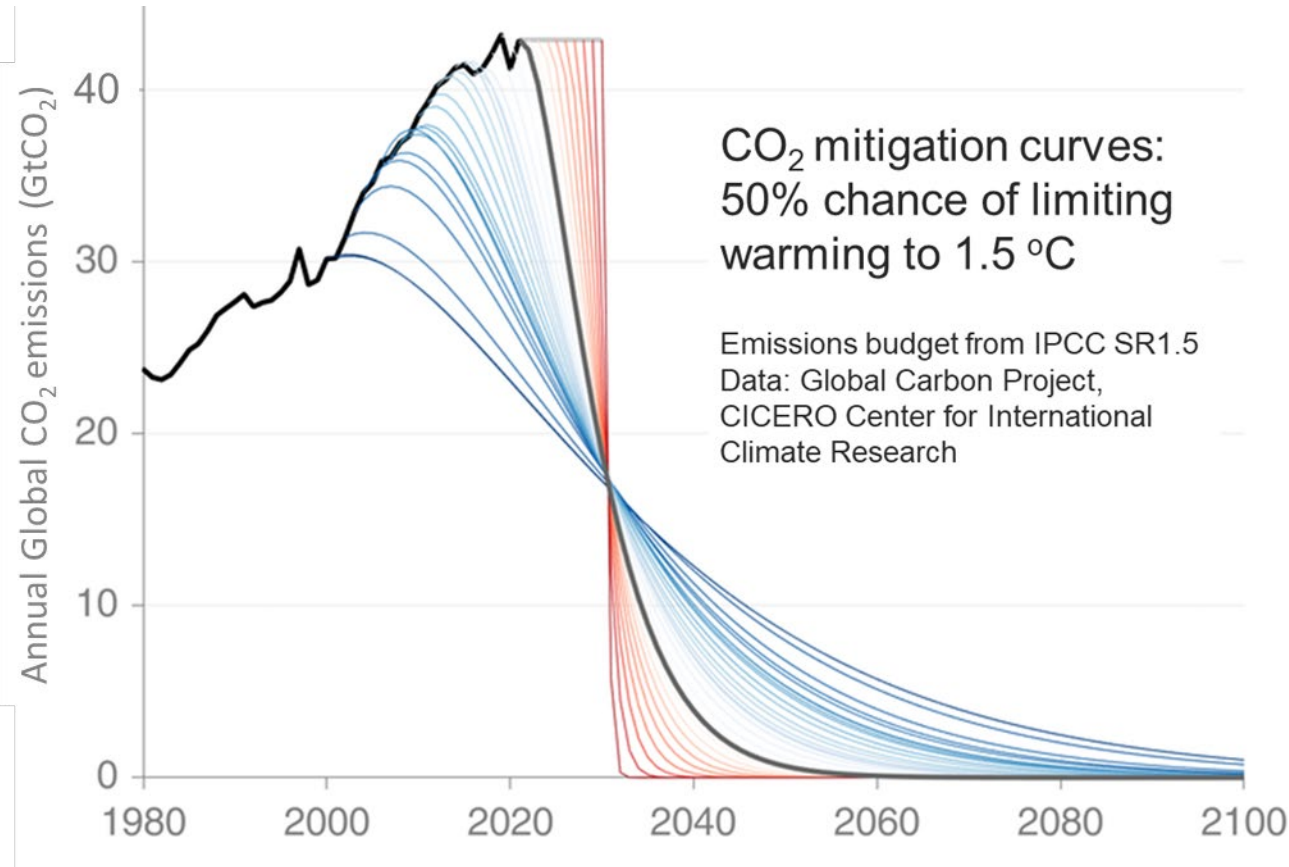
# Why Net Zero?



Data: IPCC SR1.5 & SPM.10



# While challenging, limiting global warming to 1.5°C remains possible





# Human-induced climate change is already affecting many weather and climate extremes in every region across the globe



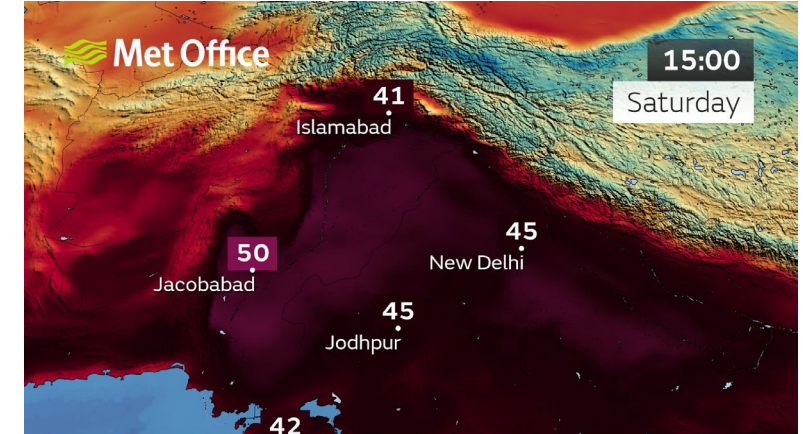
## European flooding

- July 2021 resulting in extreme impacts and over 200 deaths
- Event was 1.2 to 9 times more likely and rainfall intensity 3-19% higher due to climate change



## North America Heatwave

- June 2021: record-breaking temperatures, 49.6C in Lytton, Canada
- Almost impossible to hit such record-breaking temperatures in the Western United States



## India & Pakistan heatwave

- In May 2022, temperatures exceeded 50C, resulting in 90 deaths across India and Pakistan
- Event was 100 times more likely due to climate change