The challenge of climate change, or a new Industrial Revolution?

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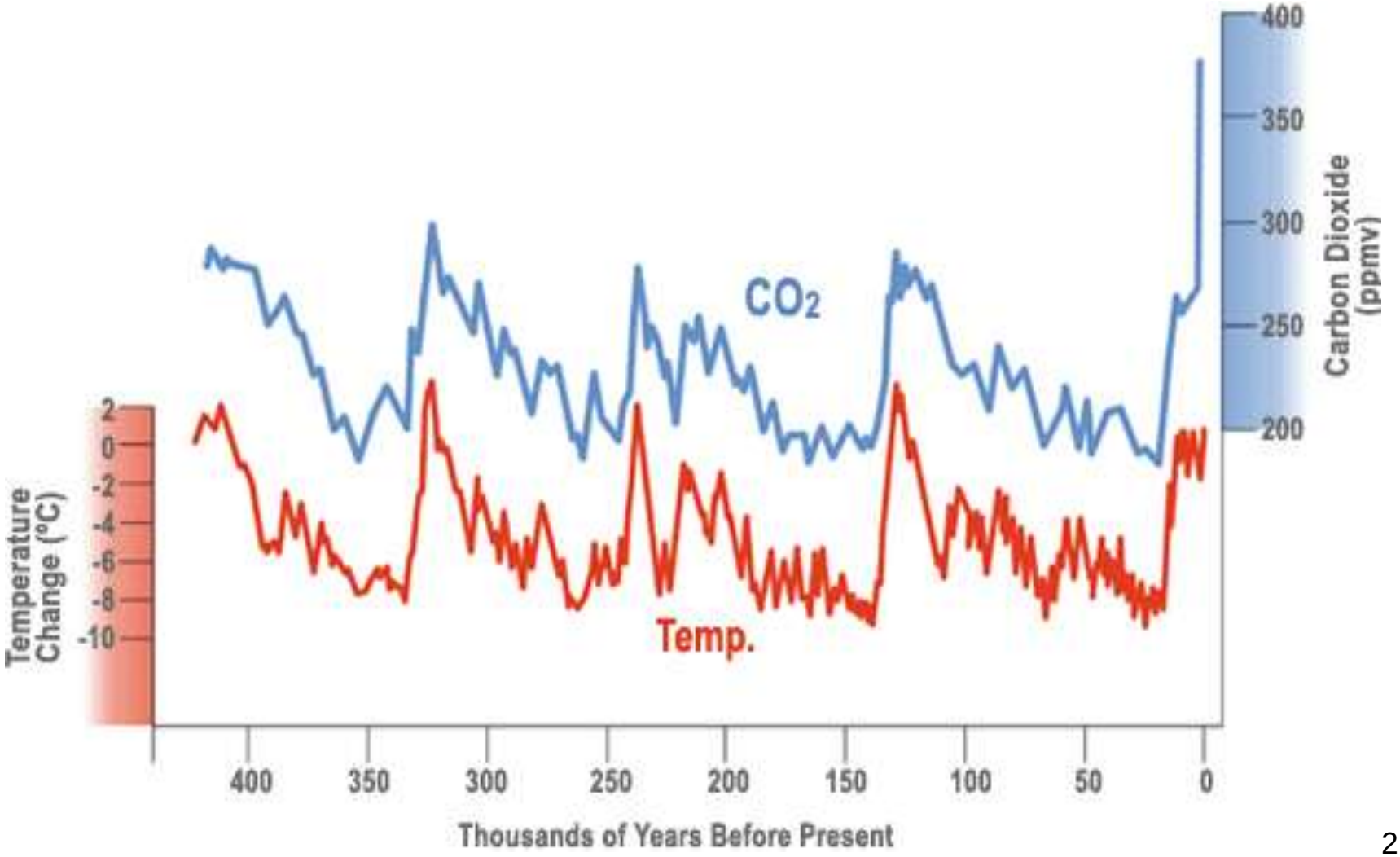
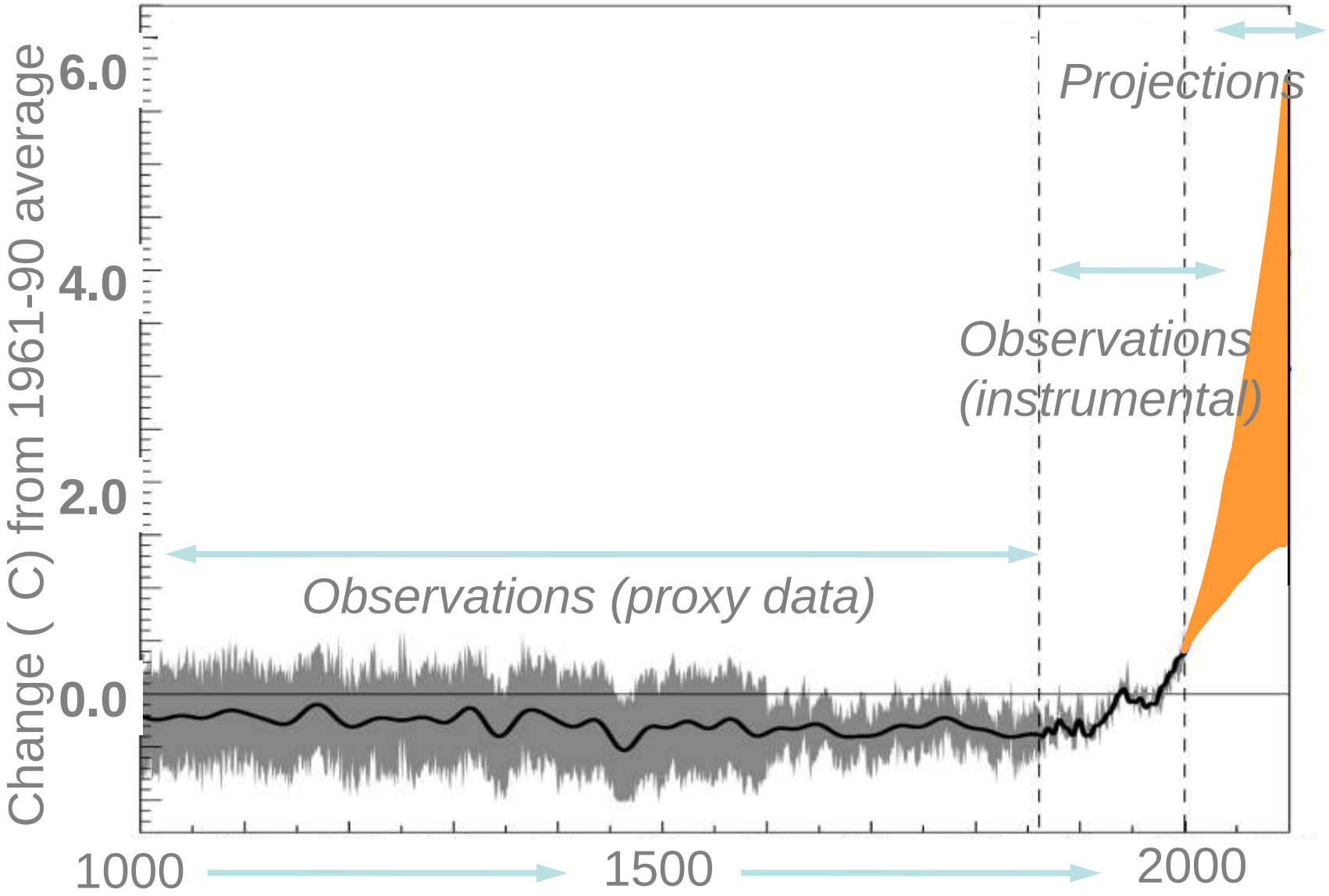
defra

Department for Environment, Food and Rural Affairs

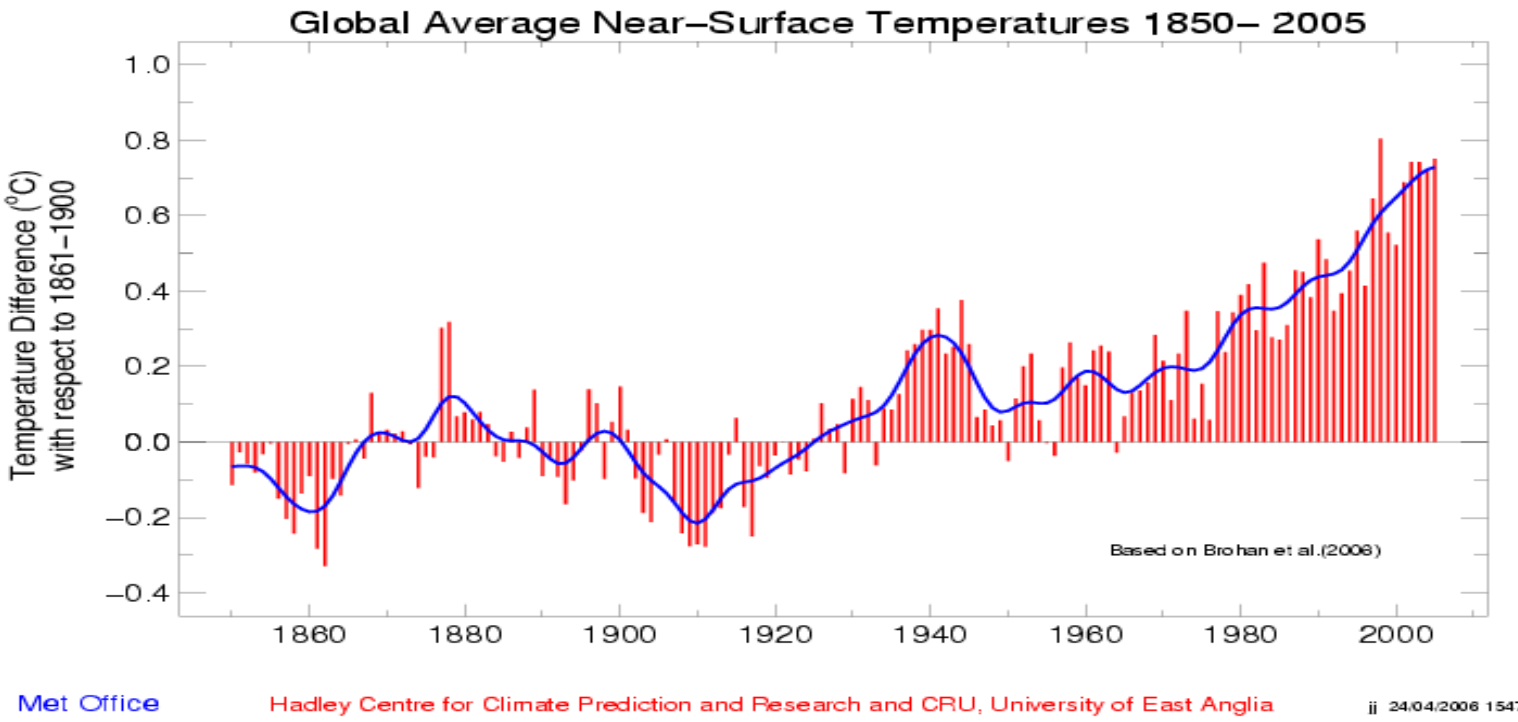
Carbon Dioxide concentrations & temperature: last **400,000** years…



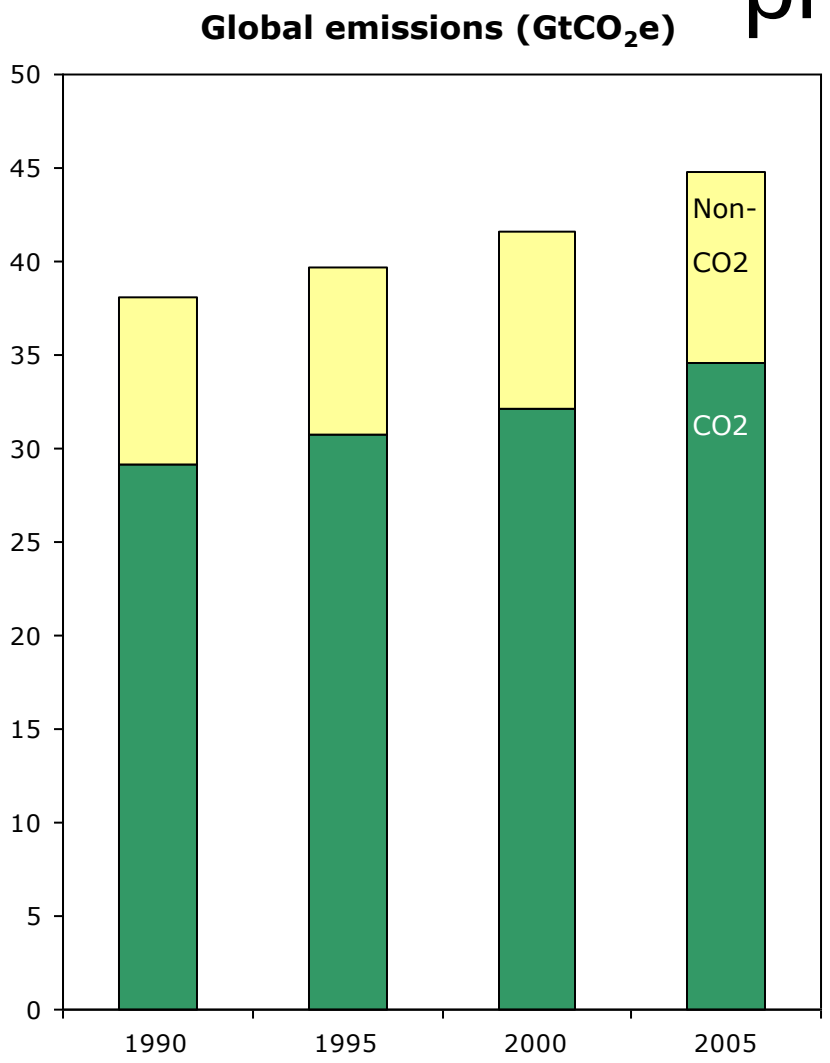
Global Temperature 1000 – 2100 AD

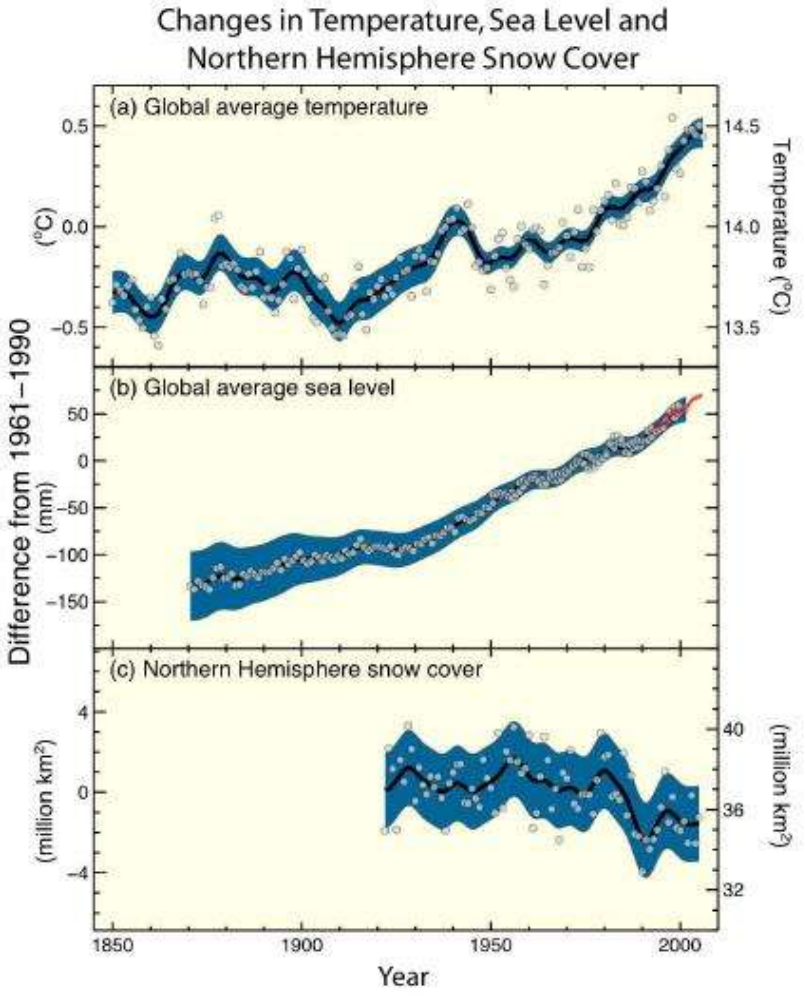


Observed Global Temperature Change 1850-2005 (Hadley Centre)



Global warming is a real and urgent problem

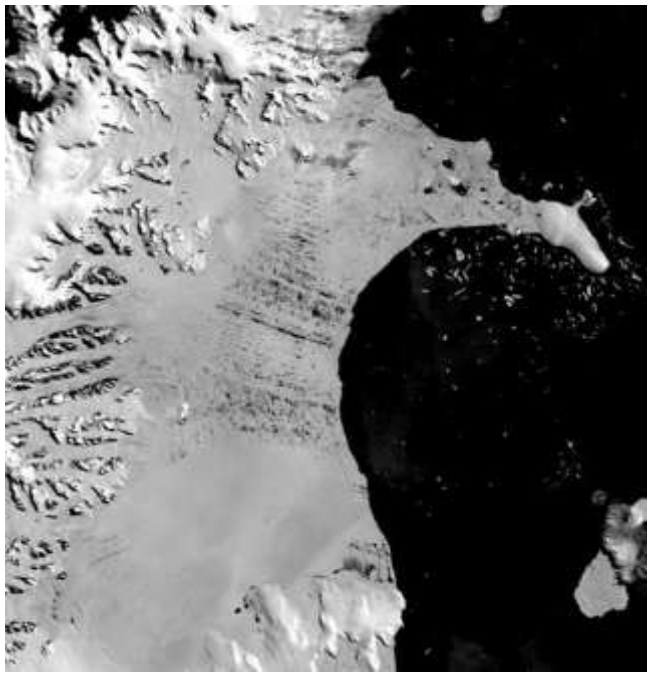




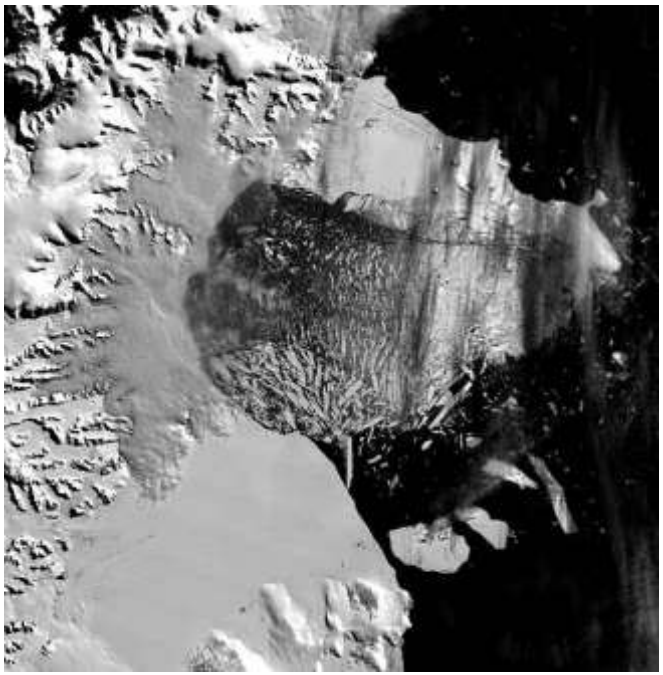
Stern Review (2006). IPCC Fourth Assessment Report (2006).

Larsen B ice shelf collapse

31 January 2002



05 March 2002



Qori Kalis


1978
PHOTO CREDIT: LONNIE THOMPSON, OSU


2004
PHOTO CREDIT: LONNIE THOMPSON, OSU

Himalayan Glaciers

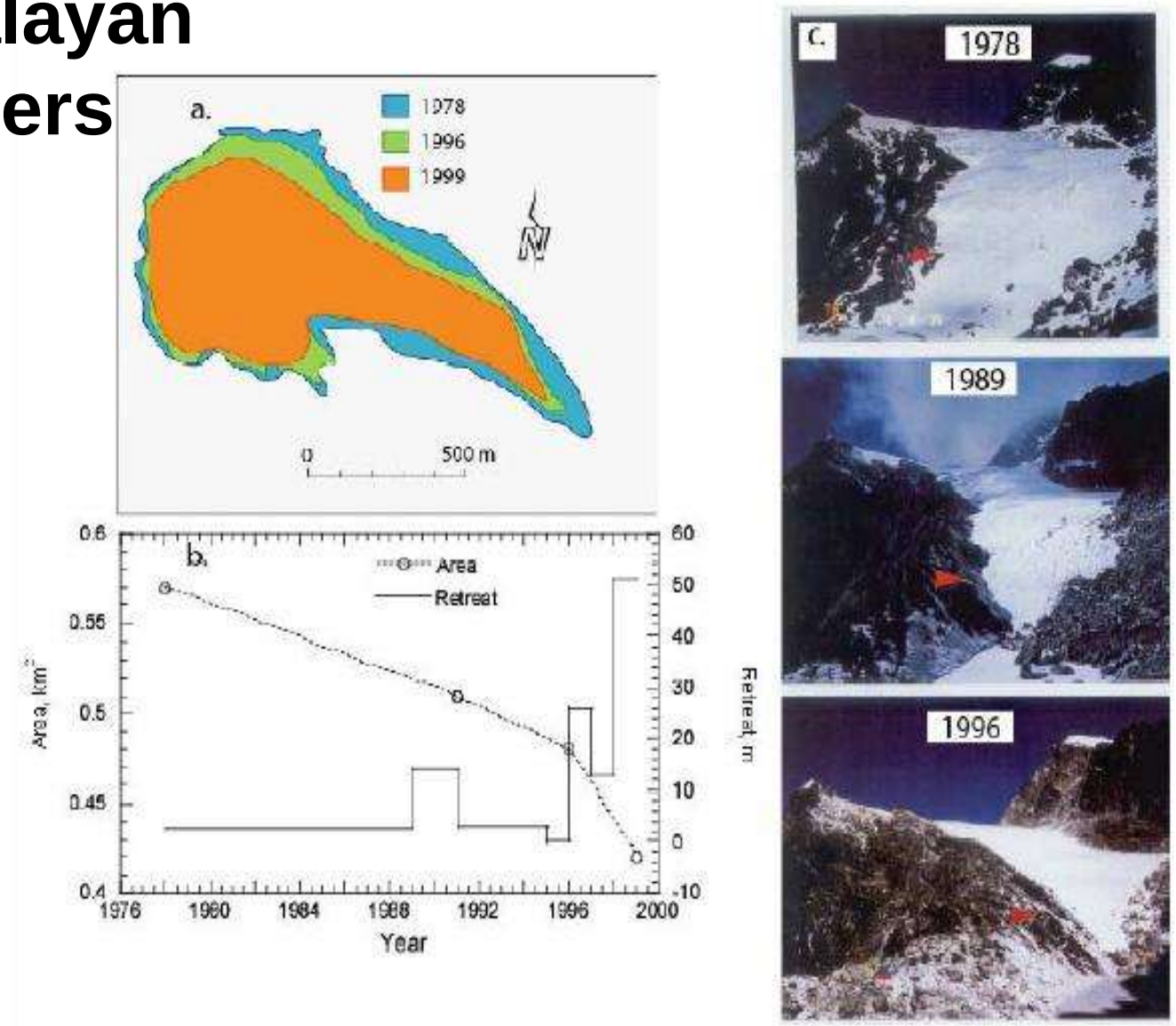


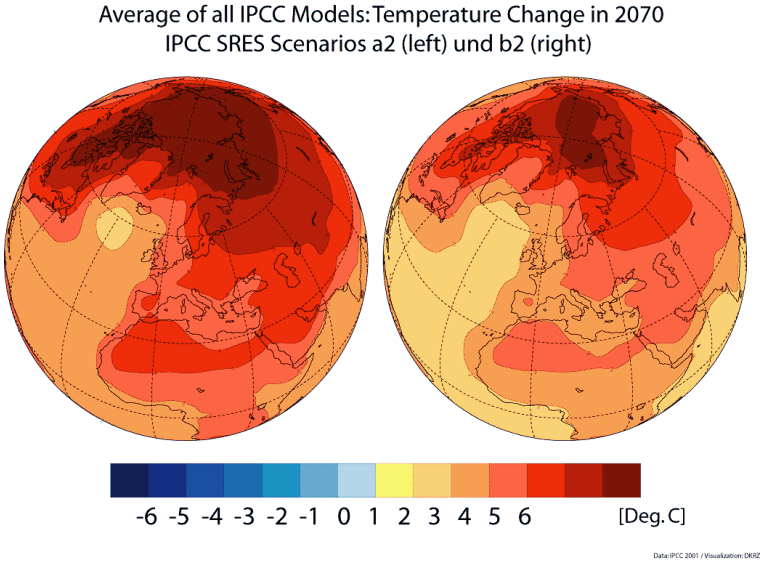
Figure 9: Retreat of AX010 glacier: a. Map showing the changes in the glacier area b. Changes in the glacier and the rate of terminus retreat c. Photographs of glacier terminus between 1978-1996

Intergovernmental Panel on Climate Change

- 4th Assessment report in February 2007
- Over 2500 leading scientists
- >90% certainty that global warming is a result of human activities.

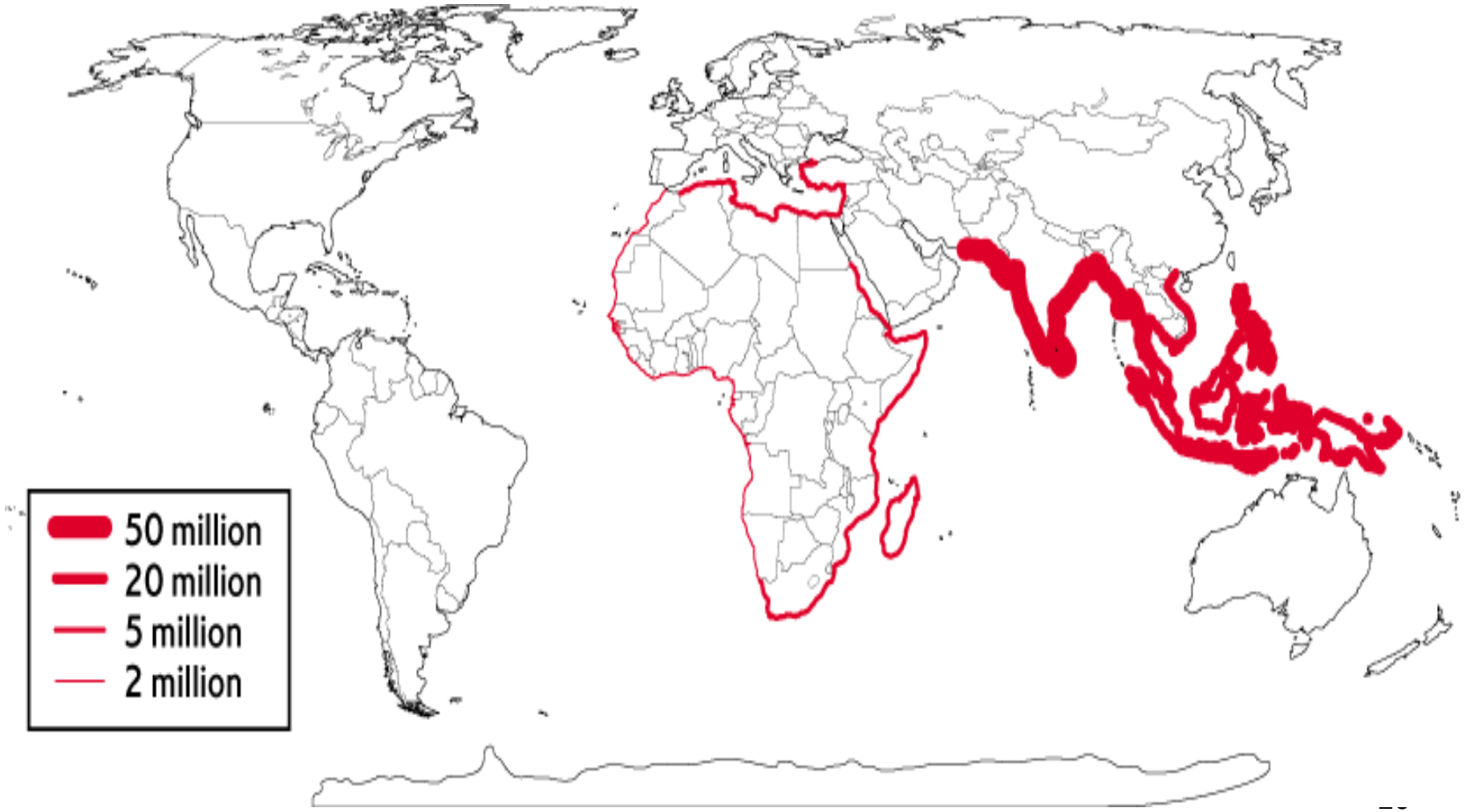
Eleven of the last twelve years rank among the twelve warmest years since records commenced (in 1850);

Global temperatures will rise, possibly by up to 6.4C by 2100



Millions at risk of coastal flooding

- change from present day to 2080s under an unmitigated emissions scenario



It will hit the poorest hardest

Sources: Anna Ballance, 2002.

Impact on Millennium Development goals:

Eradicate extreme poverty and hunger

- At 2ºC: crop yields will fall by 5–10% in Africa

Reduce child mortality

- At 3ºC: 1–3 million more die from malnutrition

Combat HIV, malaria, and other diseases

- At 2ºC: 40-60 million more malaria cases in Africa

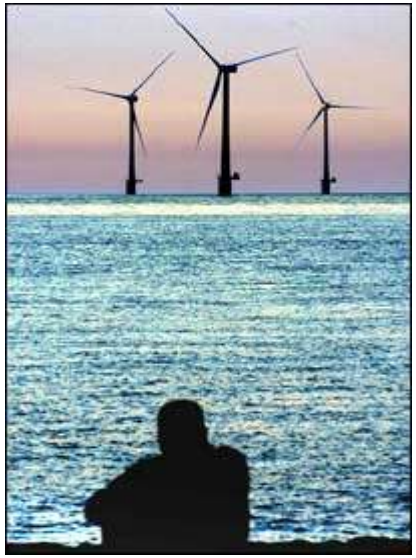
Ensure environmental sustainability

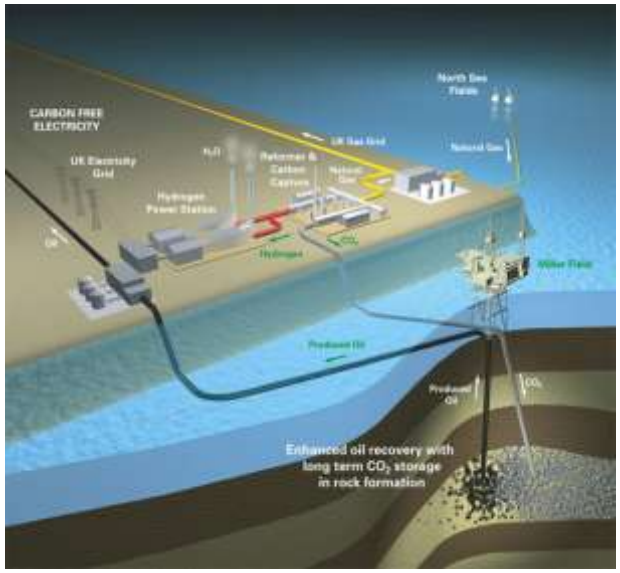
- At 3ºC: 20-50% of species will face extinction

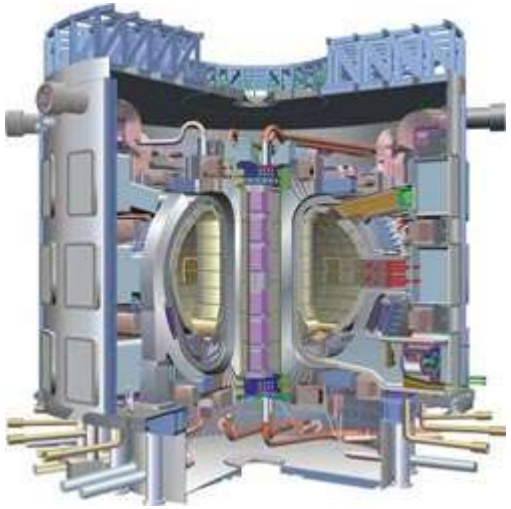
Graphic: IPCC Fourth Assessment Report (2006). Examples: Stern Review (2006) – these are illustrative impacts only, drawn from a range of studies – there are unavoidable uncertainties about the exact impacts.

Low carbon electricity is already possible

Current → **Emerging** → **Future**







Renewables & Nuclear

Carbon capture and storage (CCS)

Nuclear fusion

'Even with very strong expansion of the use of renewable energy …extensive carbon capture and storage will be necessary'*

* Stern Review (2006). This is not an exhaustive list of current or future technologies.

For heating, decentralised power generation and energy efficiency will drive decarbonisation

Current → **Emerging** → **Future**

Traditional insulation

Community Combined Heat and Power (CHP)

Zero carbon buildings

Demand and supply of win-win energy efficiency measures could be improved through regulation and better take-up incentives

* This is not an exhaustive list of current or future technologies.

In transport, we will need a transition to technologies that are just emerging now

Current → **Emerging** → **Future**

Petrol hybrids & bio-fuels

Electric/ hydrogen

?

Decarbonised fuel supply

< 2050: Hybrids, bio-fuels, fuel efficiency of conventional vehicles and some electric/hydrogen

> 2050: Totally decarbonised through electric/hydrogen?

Innovation is required to deliver low-carbon alternatives – especially in aviation where global emissions are estimated to grow by over 50% by 2050*

* Stern Review (2006). This is not an exhaustive list of current or future technologies.