Climate Change adaptation: Science & scenarios

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Weather impacts on mining

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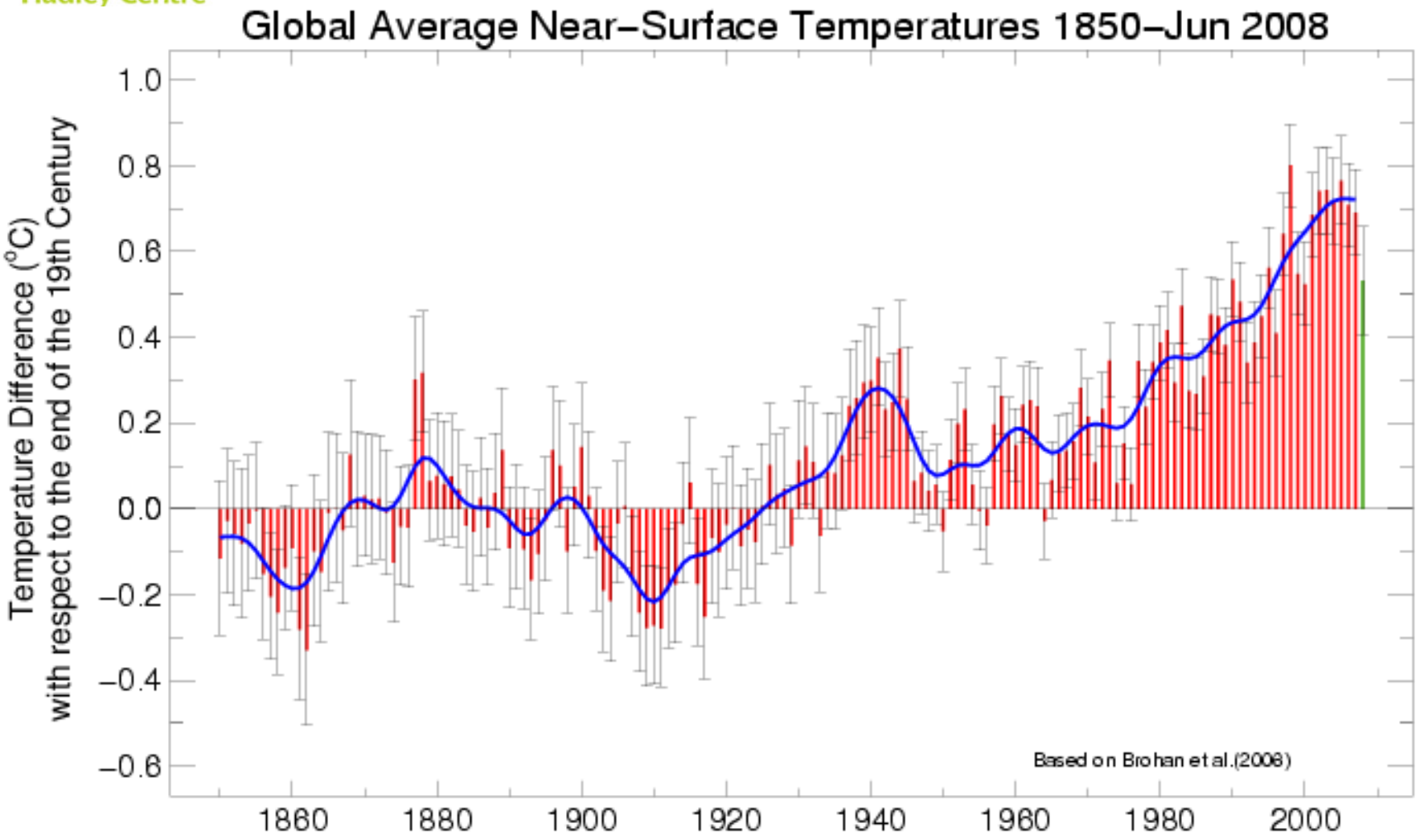
Disruption of Rio Tinto mining operations caused by widespread flooding in the Pilbara region of Western Australia

Headline: world ore shipping hire drops by 9.8% - Mining Journal

The climate has warmed over the 20th Century – but with year-to-year variability



The warming is unusual compared to the last millennium

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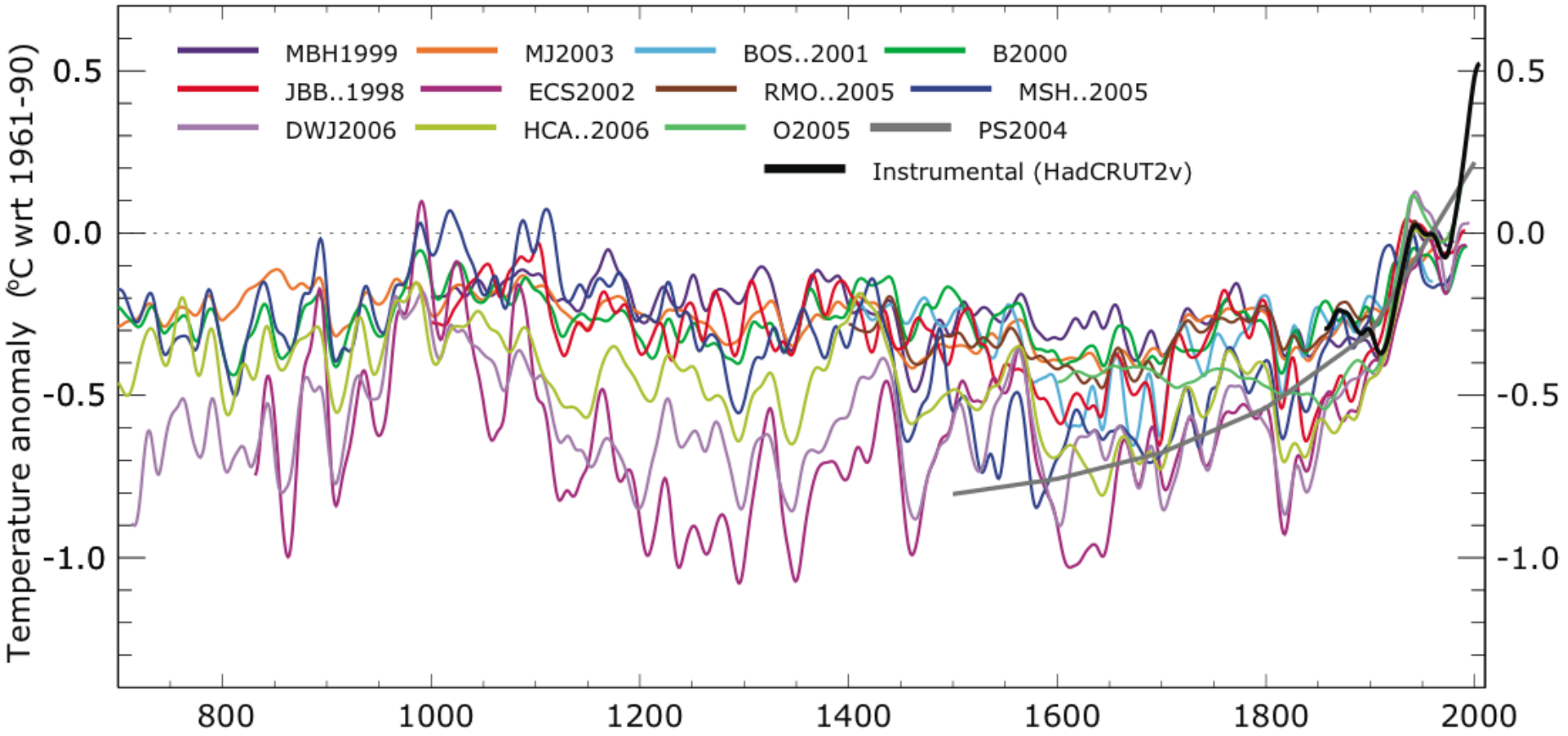
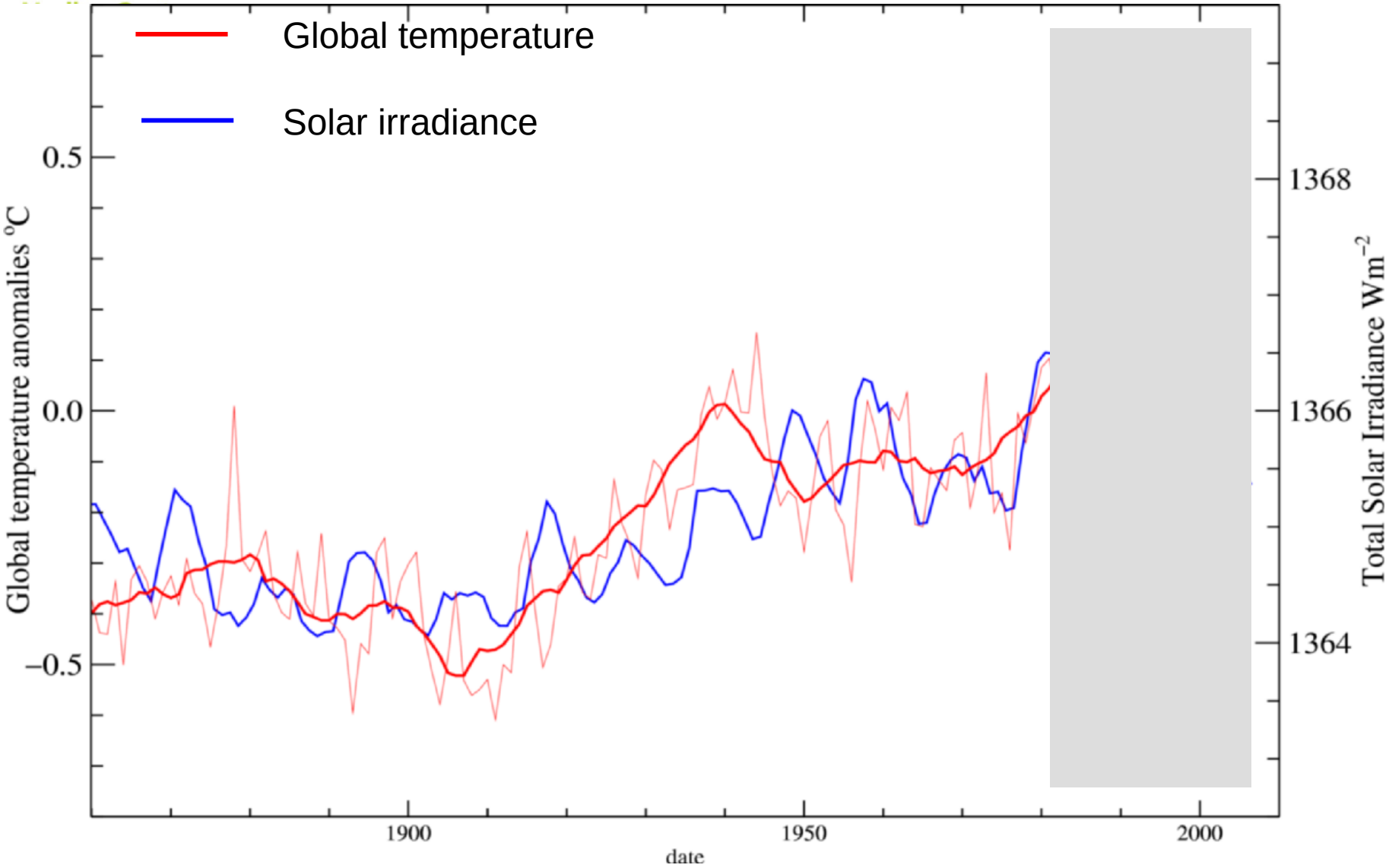
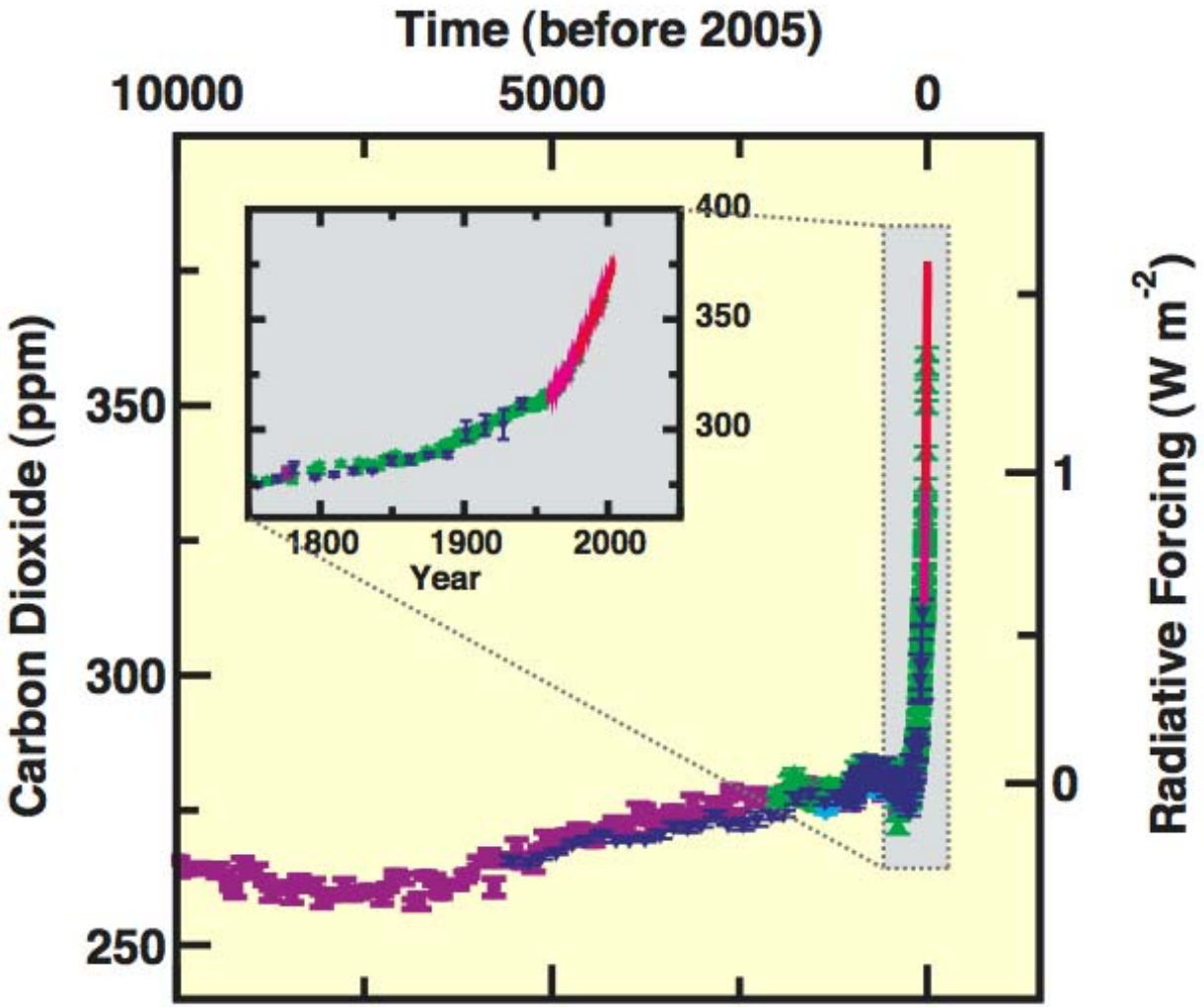


Is global warming caused by the sun?



Carbon dioxide has been rising quickly over the last 200 years

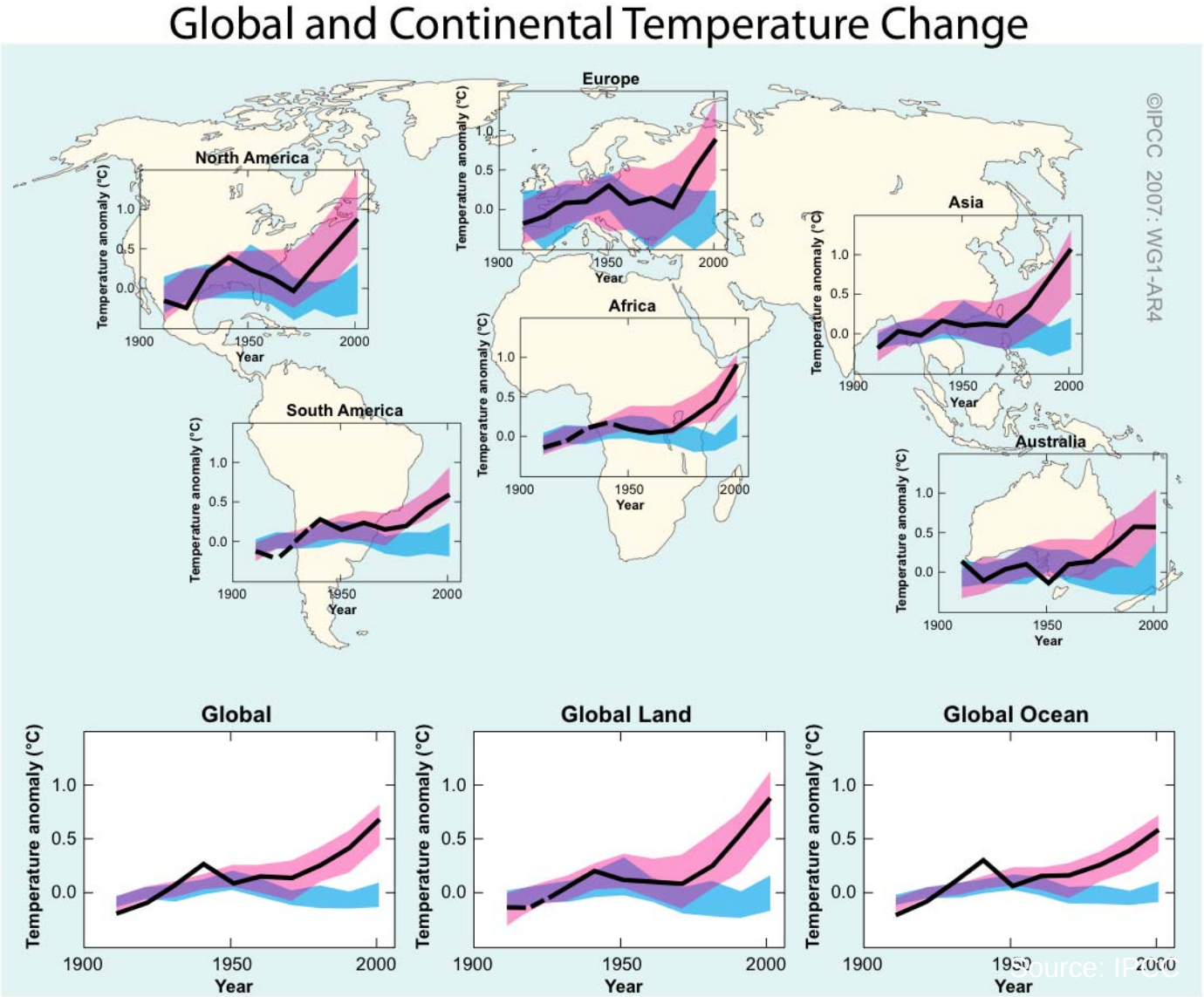


Explaining the causes of climate change using computer models

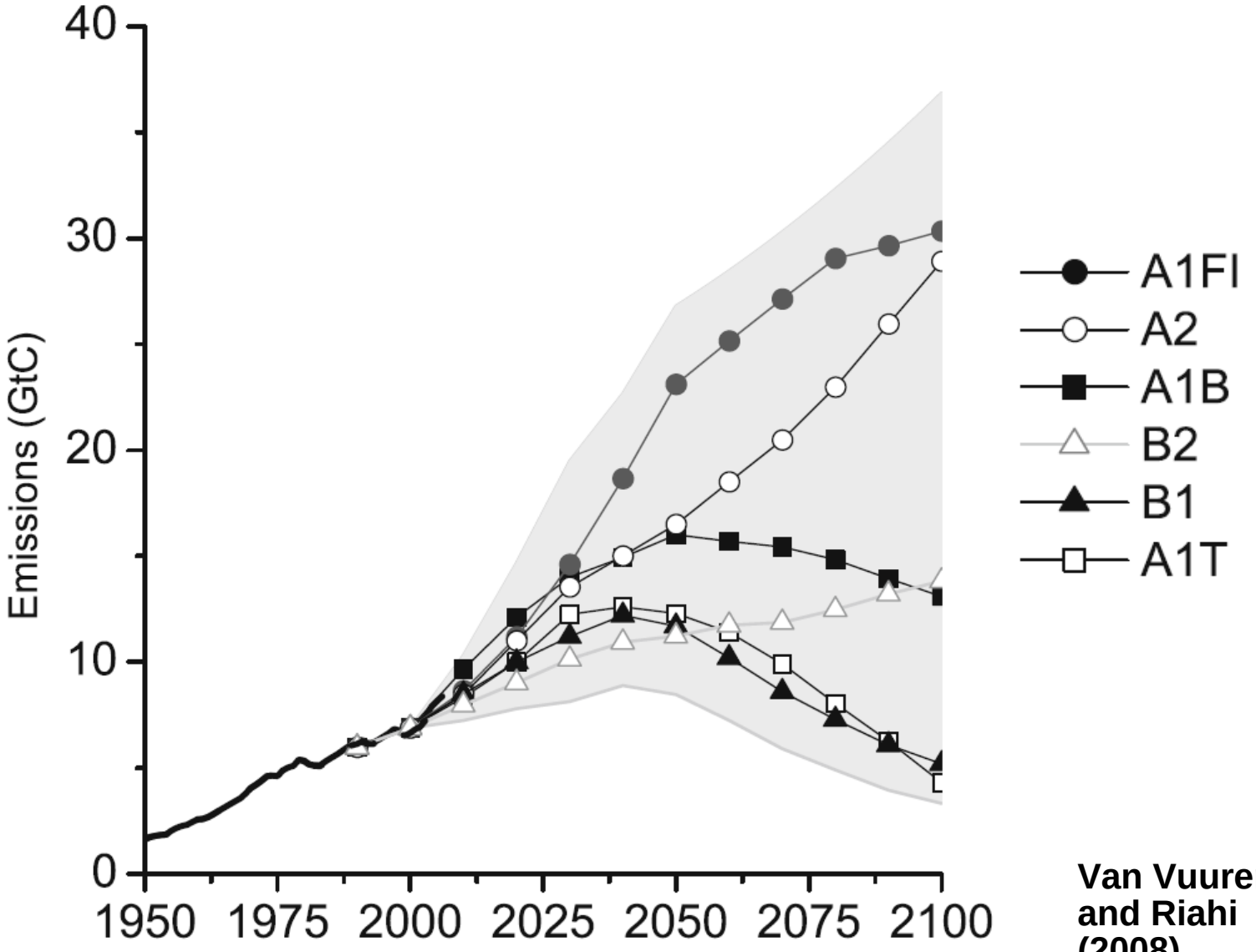
Black lines: observations

Blue bands: model simulations with natural factors only

Pink bands: model simulations with both natural and human factors

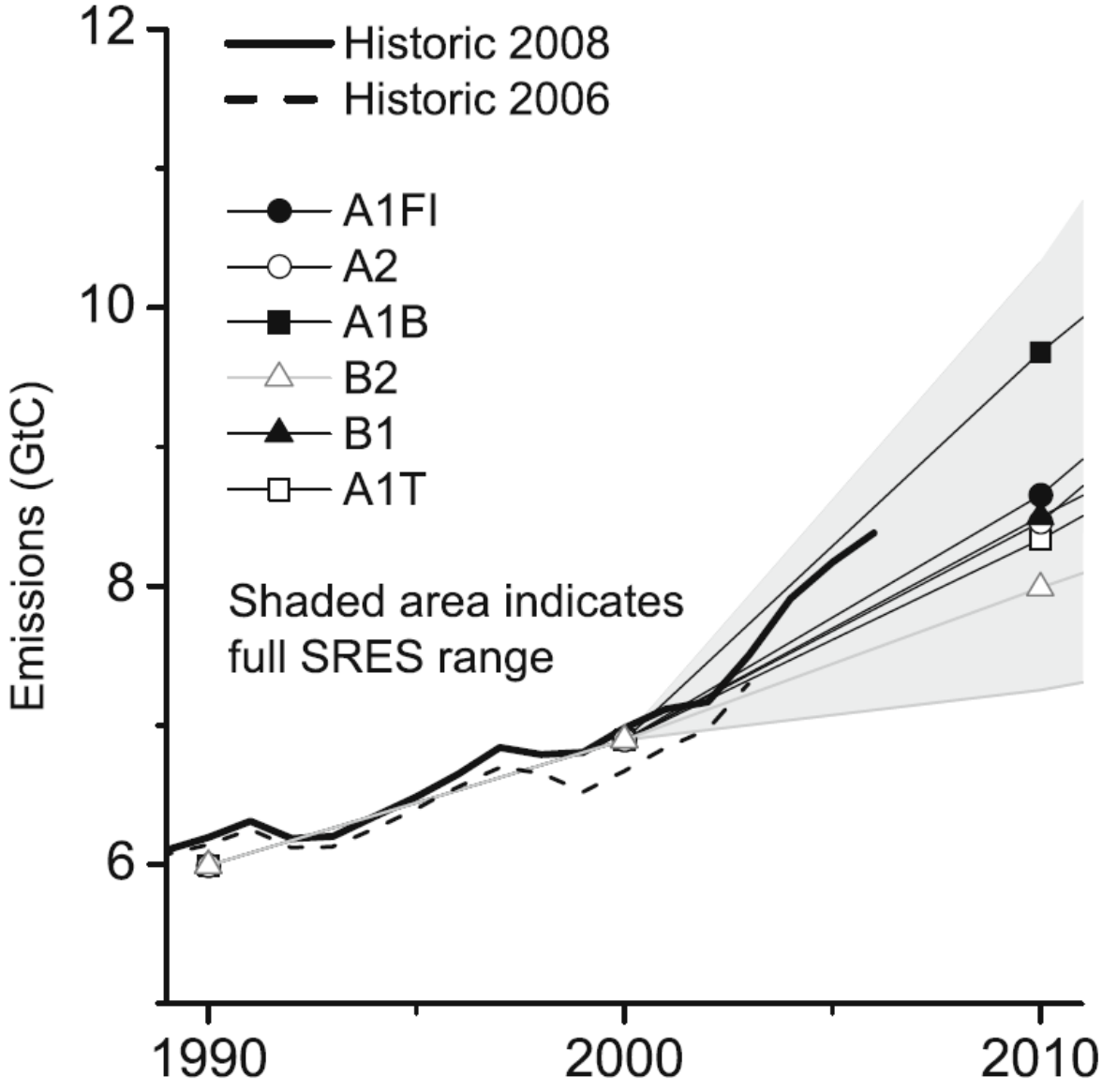


Scenarios of future CO_2 emissions



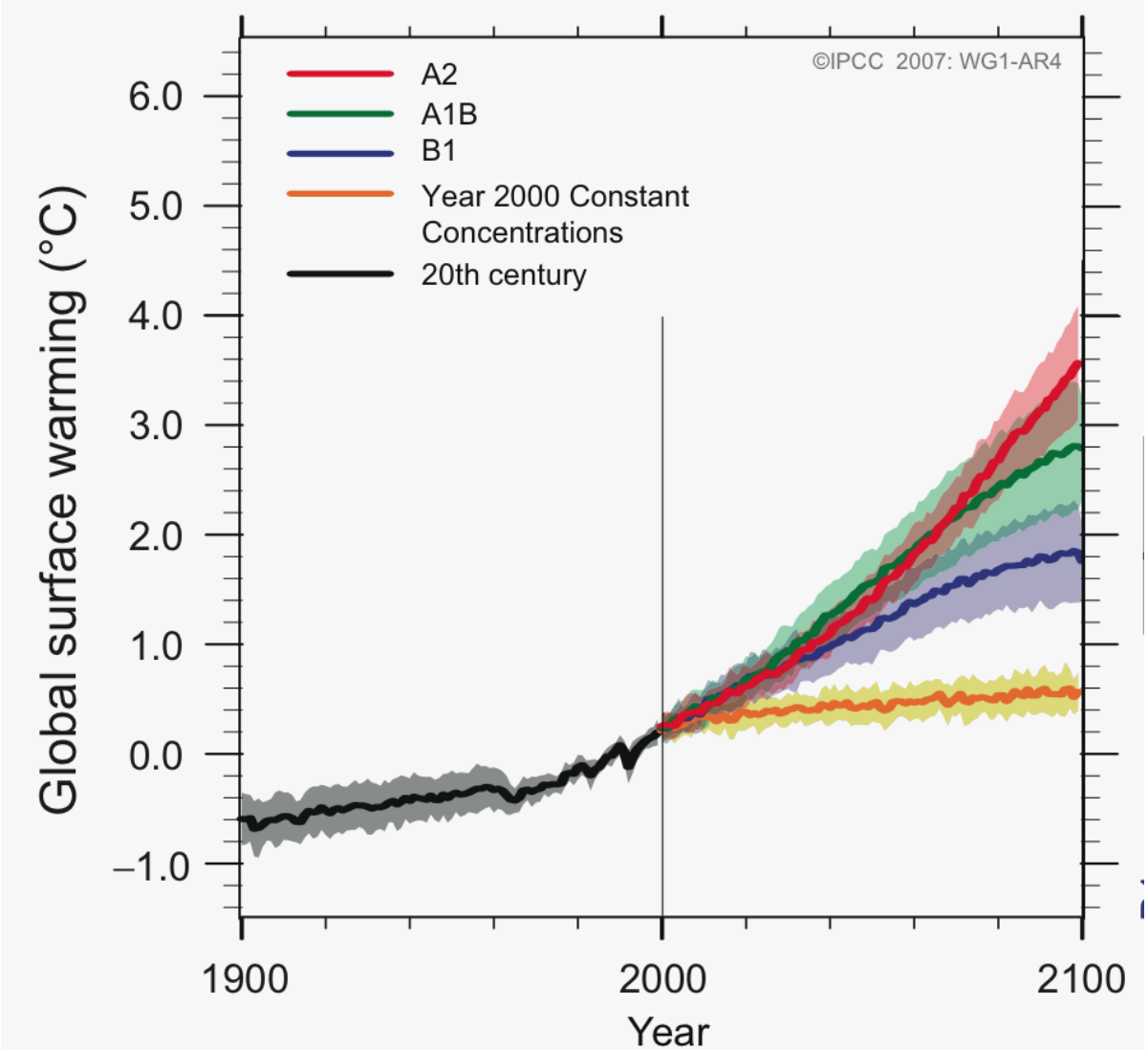
Van Vuuren and Riahi (2008)

Comparison of scenarios with actual emissions



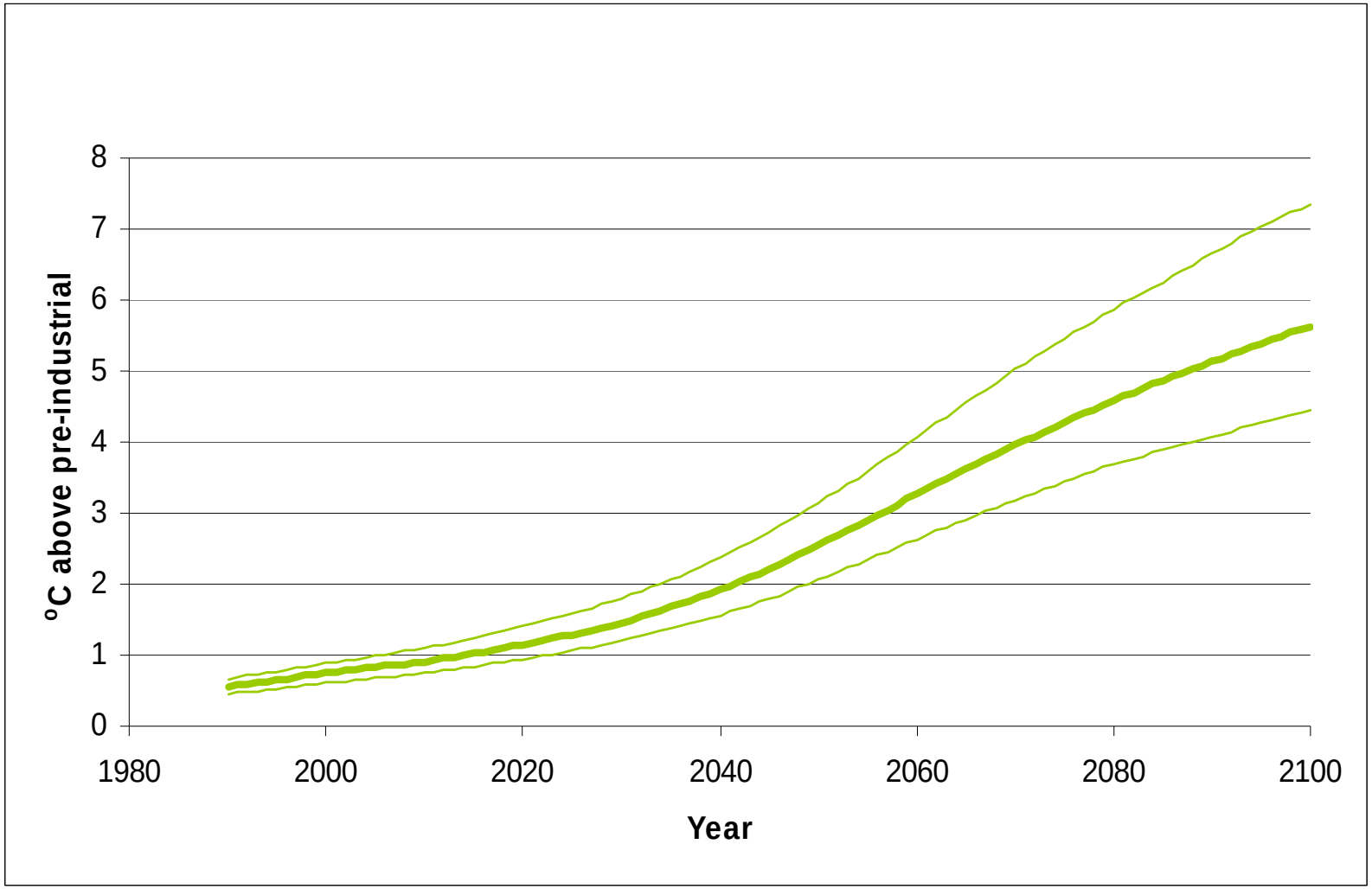
Van Vuuren and Riahi (2008)

Model projections of global warming with different emissions scenarios

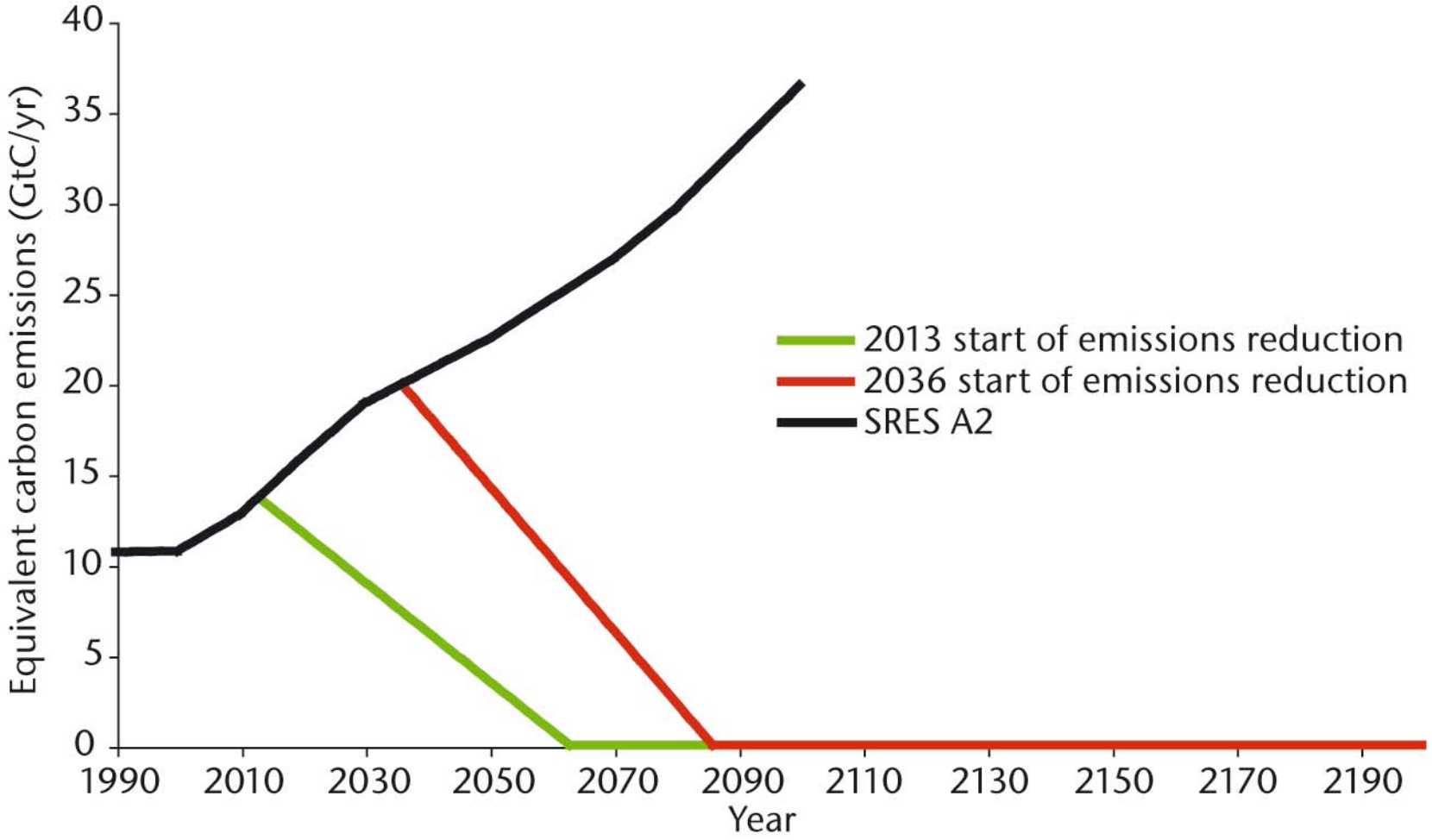


IPCC (2007)

Range of global warming projections for high emissions scenario



What will be the effect of emissions reductions? 2 illustrative case studies



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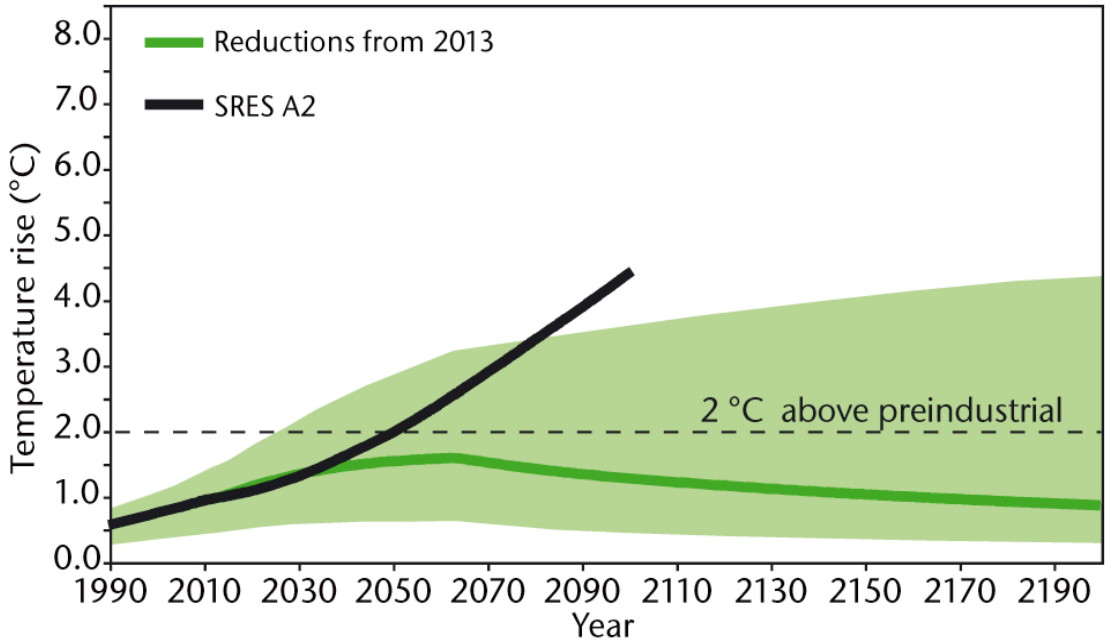
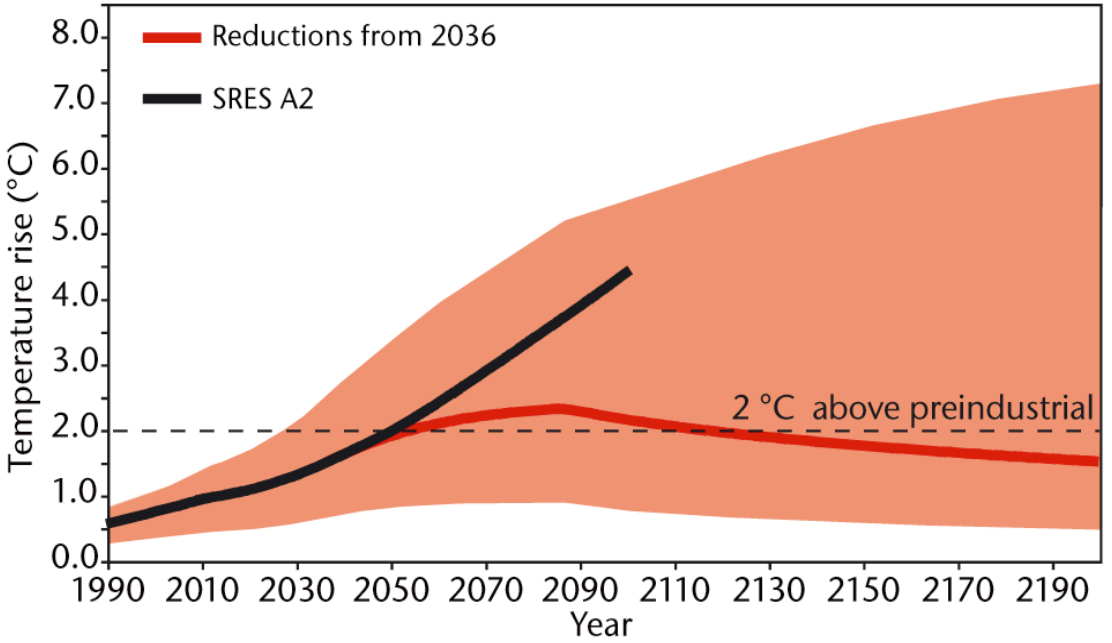
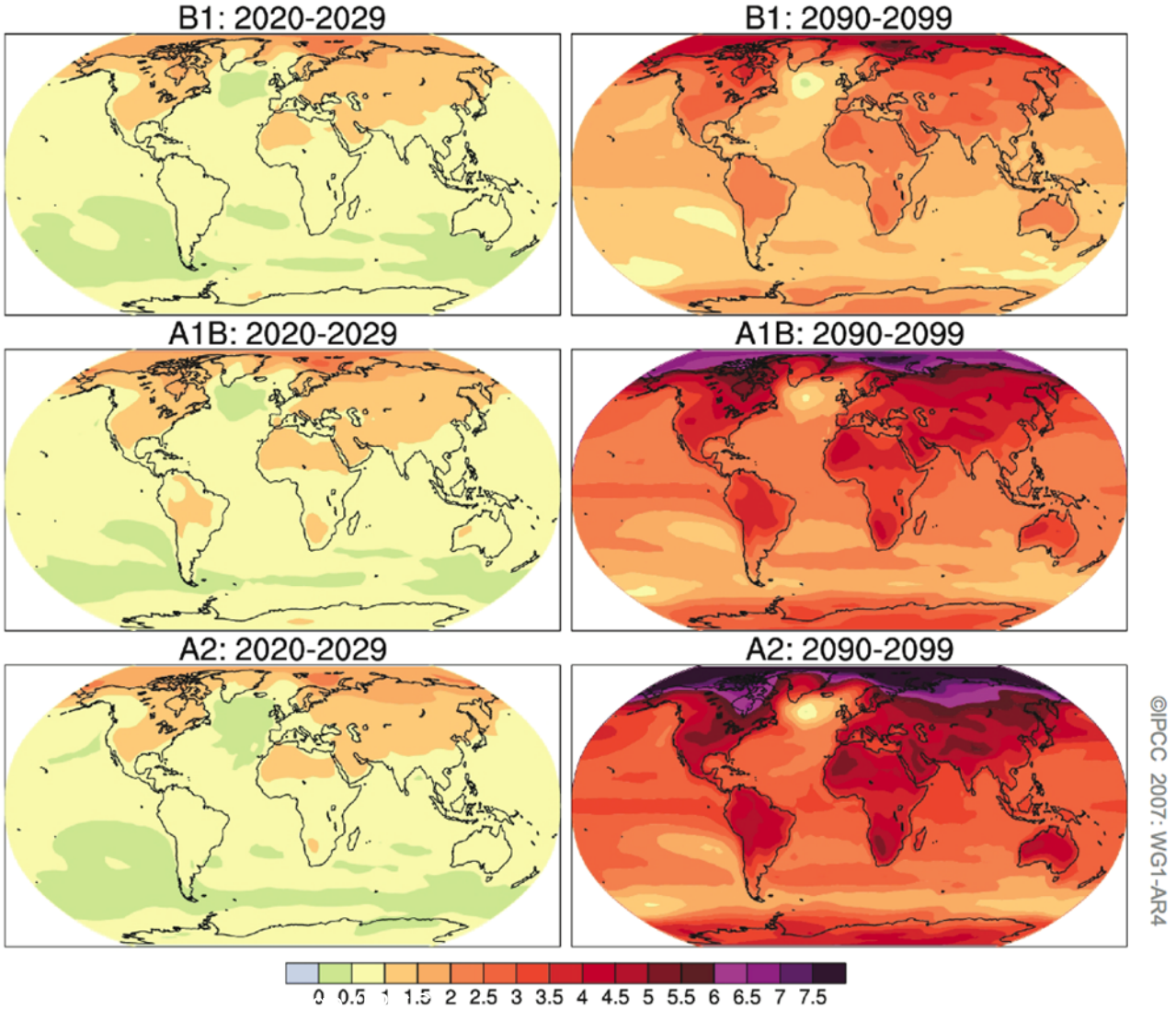
Effect of emissions reductions on global mean temperatures



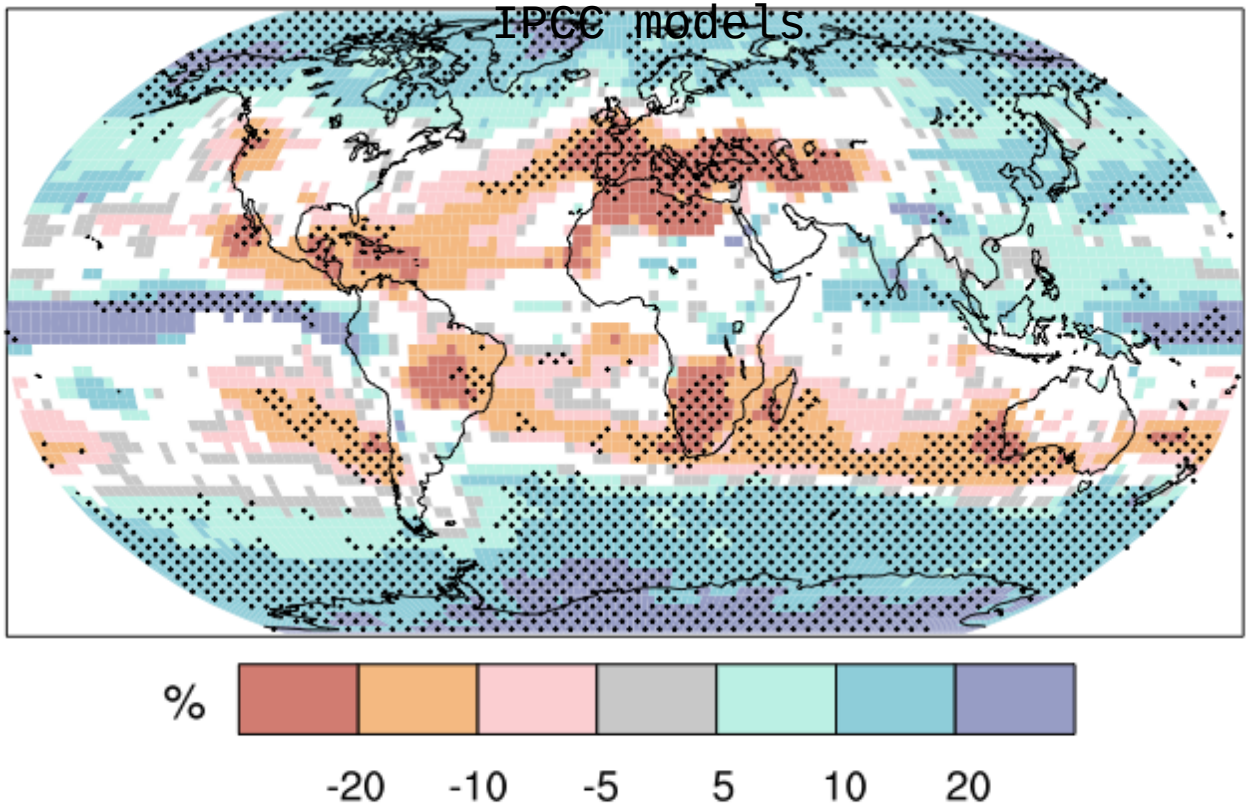


Warming varies from place to place



Precipitation change: how well do the models agree?

Change in JJA precipitation (mm day^{-1}), 3°C warming: average of all IPCC models



2090s relative t
present-day,
A1B scenario:
June-July-August

White: less than 66% agreement. Colours: 66% or more agreement. Black dots: 90% or more agreement

Source: Intergovernmental Panel on Climate Change (IPCC)

Probabilistic regional climate projections

Old method

("UKCIP02")

Single projection

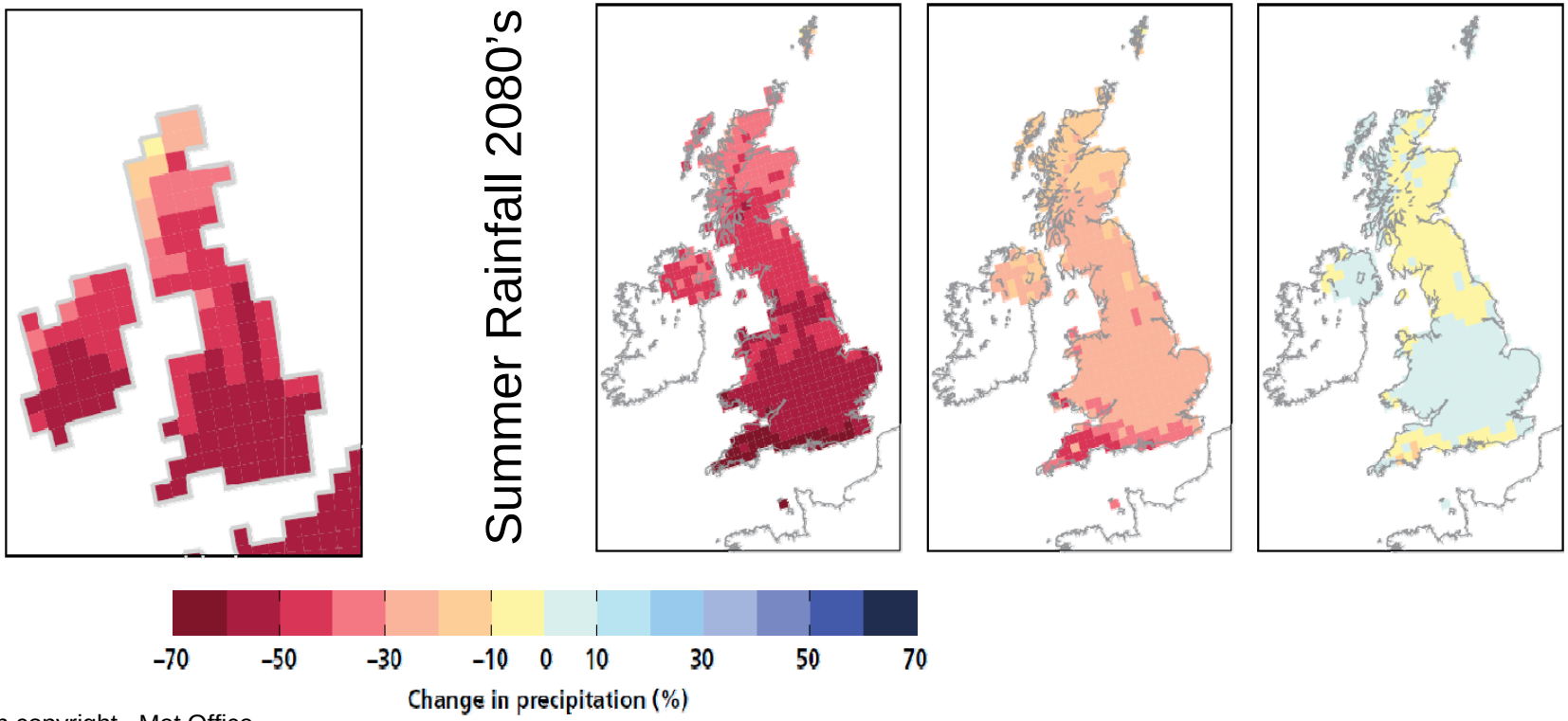
New method ("UKCP09"): many projections

Lowest 10%

Central estimate

Highest 10%

Summer Rainfall 2080's



Simulation of pre and post mining impacts

Example –

Mountain top modelling provides:

- Insight into the impact of an excavation on changes to rainfall
- And the biodiversity consequences on vegetation, human and animal life

Benefits of understanding weather, climate variability and climate change

- Climate change is already happening
- Some further climate change is inevitable
- Climate also varies naturally
- Forecasting these changes can provide support to:
  - Respond to increased scrutiny of sustainable investments by shareholders and environmental compliance organisations
  - Control cost of projects – especially those in hazardous and exposed climates
  - Understand the impact of climate change on return on investment over the life cycle of the mine