Climate Change: Scientific basis and risks for the finance sector

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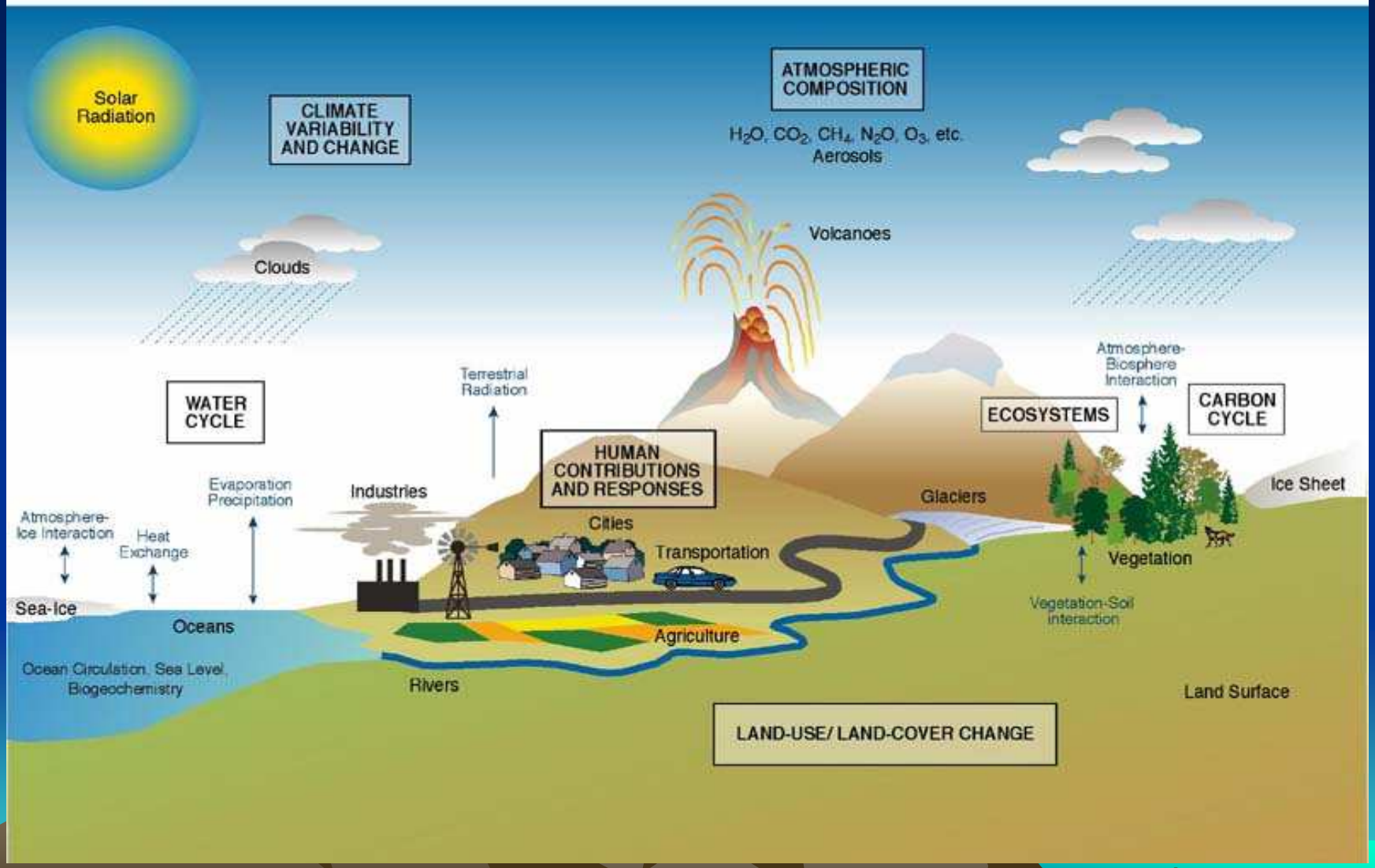
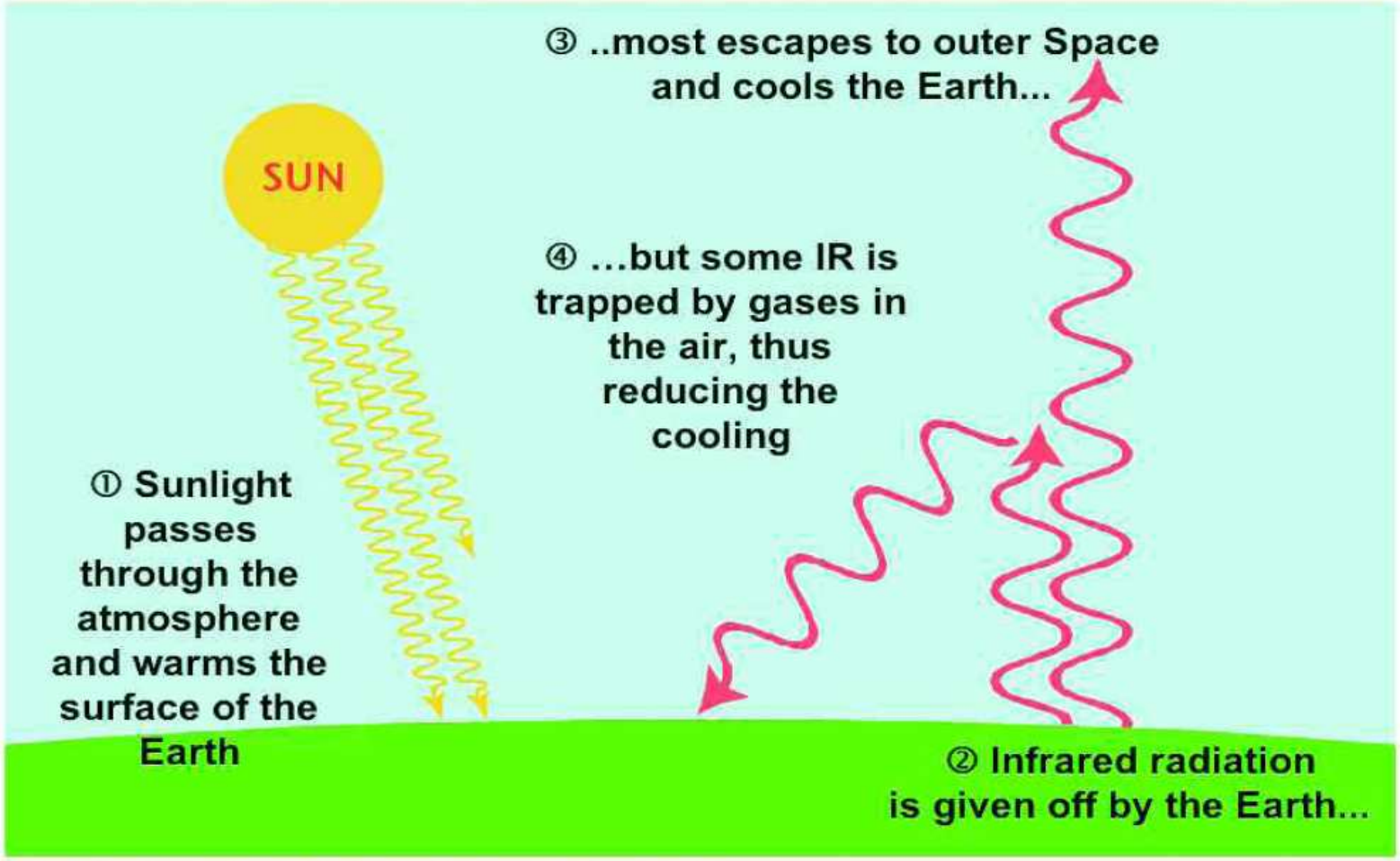
Outline

- Climate basics
- Current state of climate
- Human influence
- Future climate
- Impacts - Finance sector
- Adaptation
- Conclusions

The Climate System

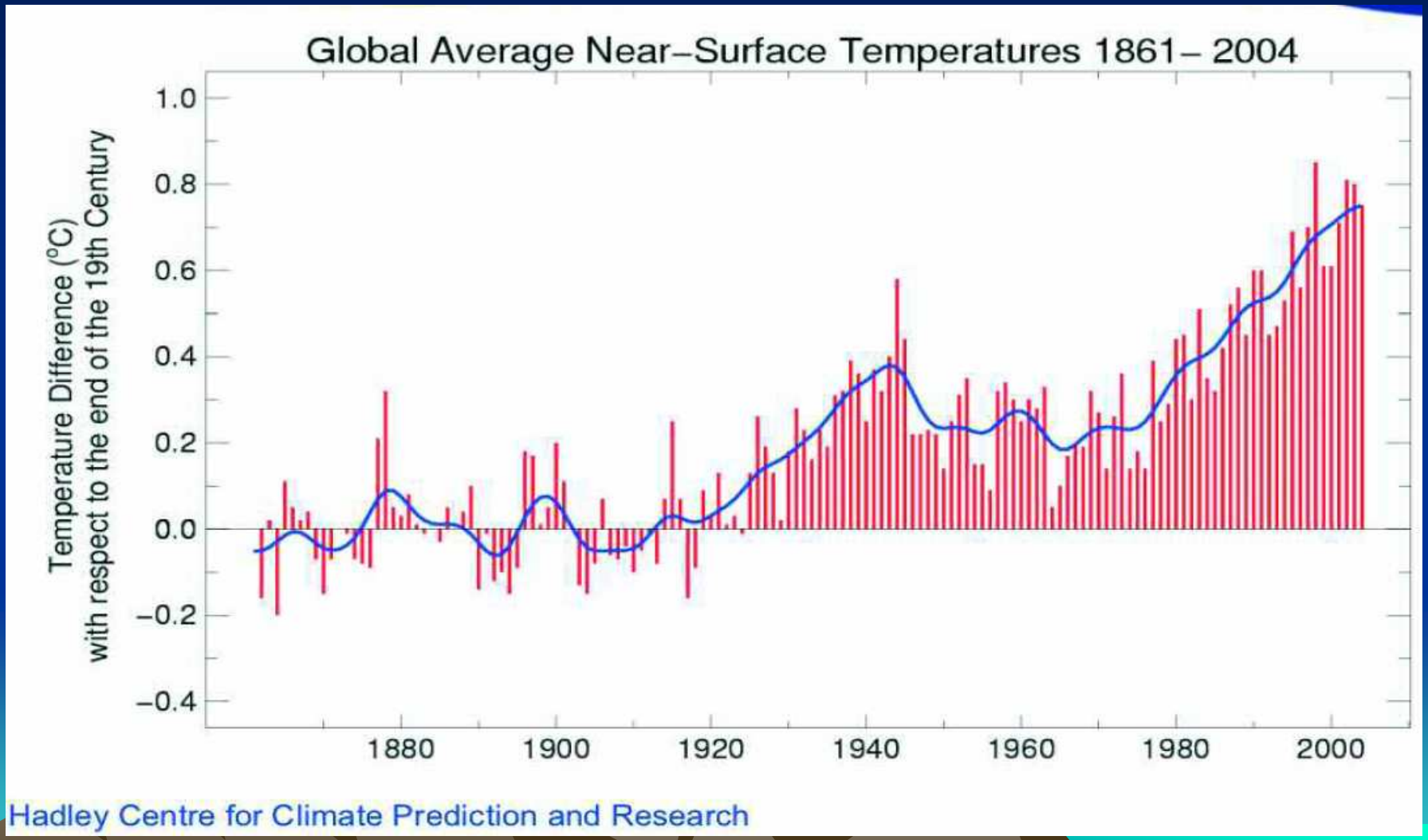


Green-house effect in the atmosphere



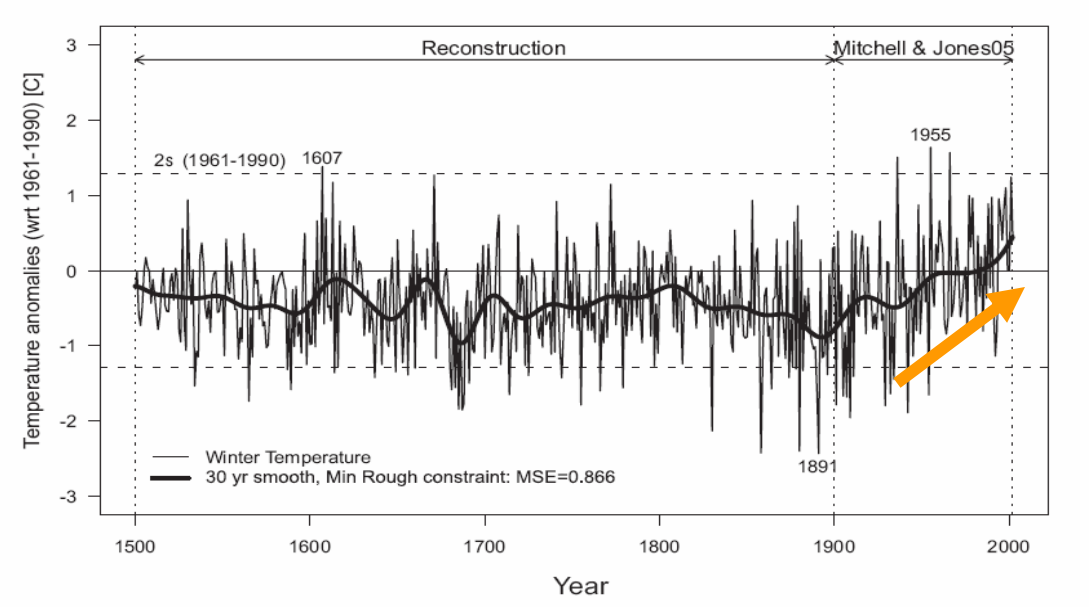
Hadley Centre for Climate Prediction and Research

Global warming since 1975



Current state of climate

Temperature

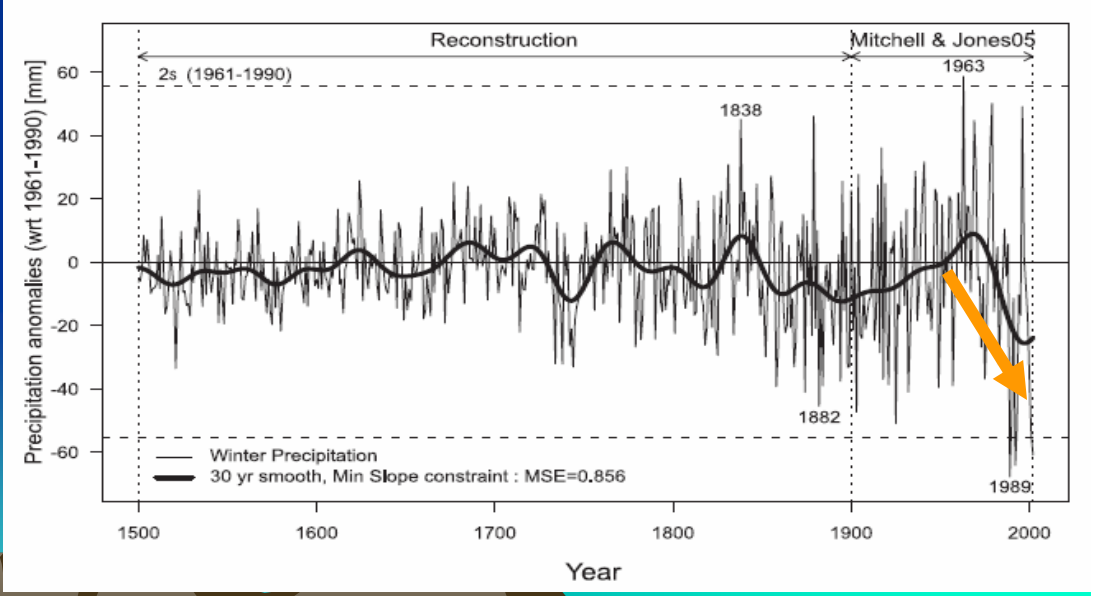


Warmer

Mediterranean winter climate

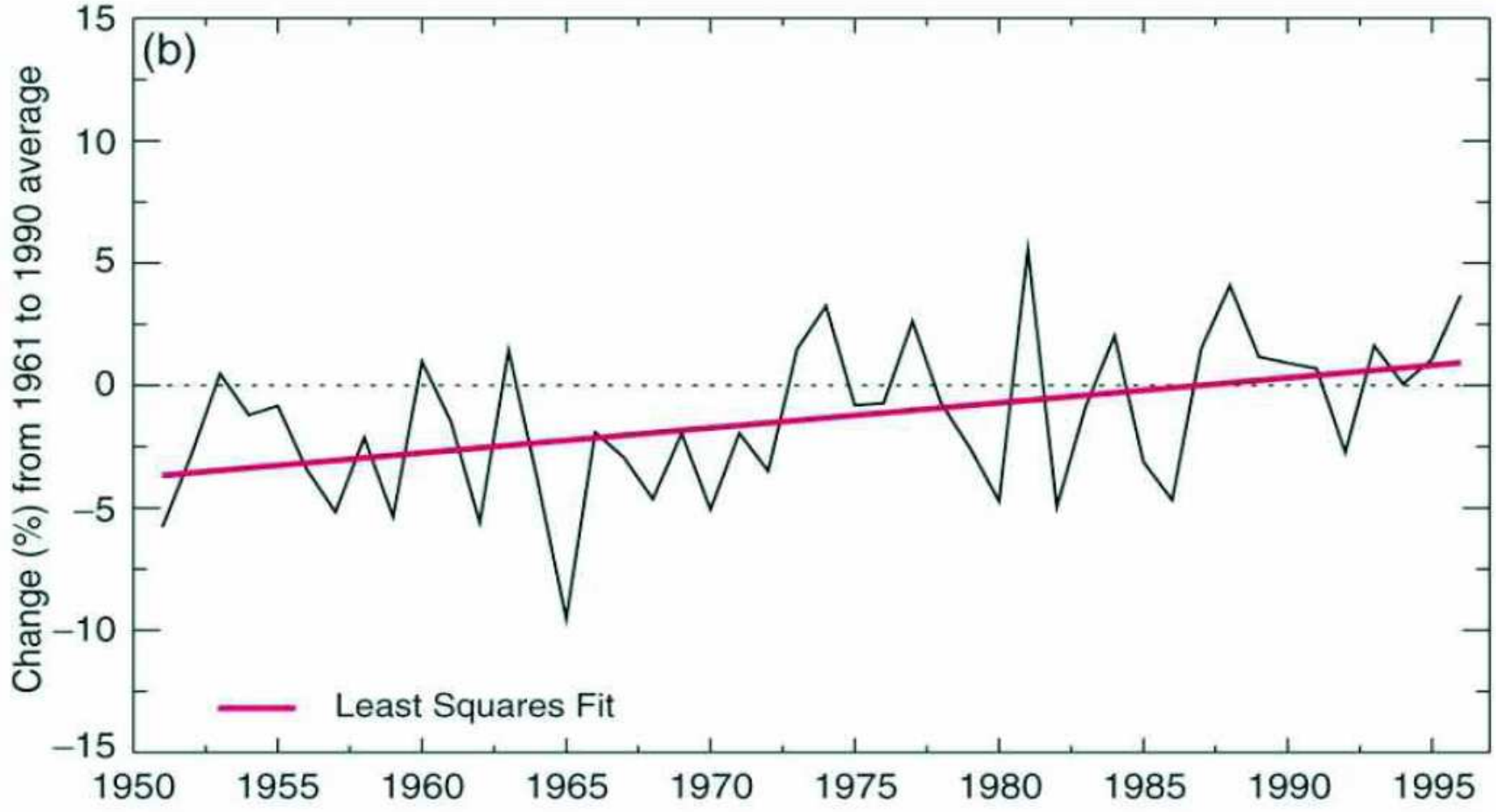
Drier

Precipitation



Luterbacher et al., 2005

Increase of heavy 3-day rainfalls



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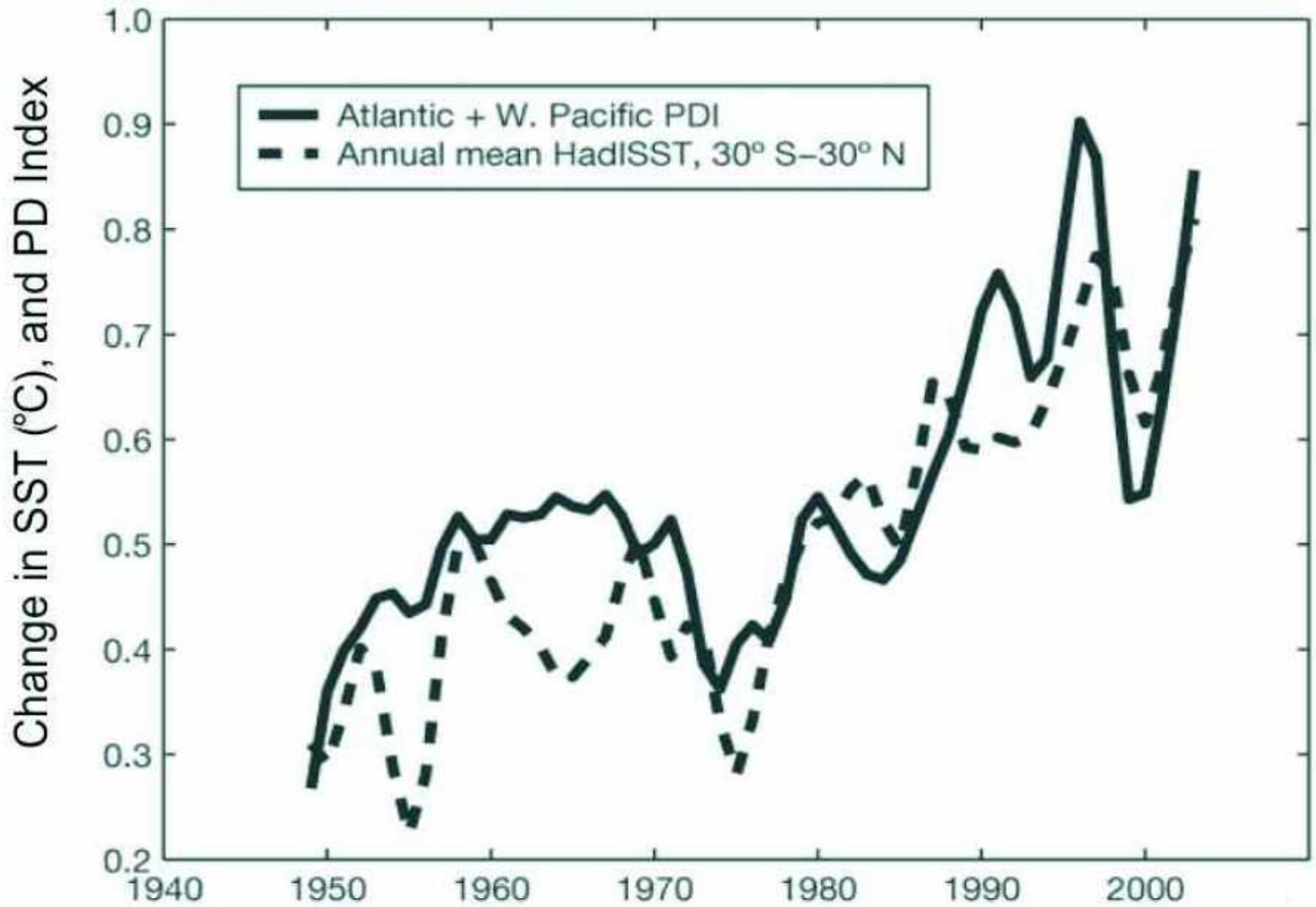
Source: IPCC TAR

Tropical storm energy



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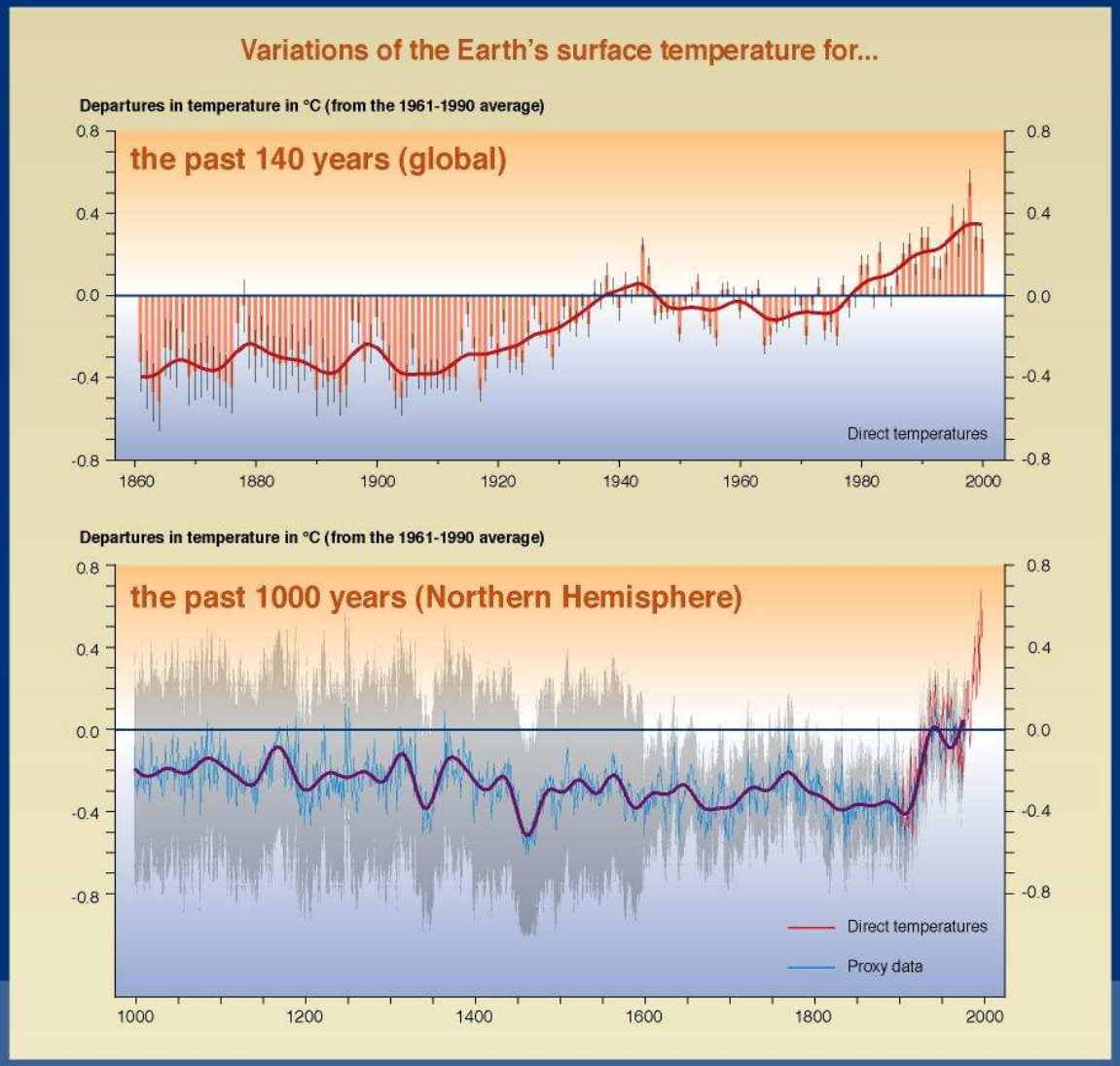
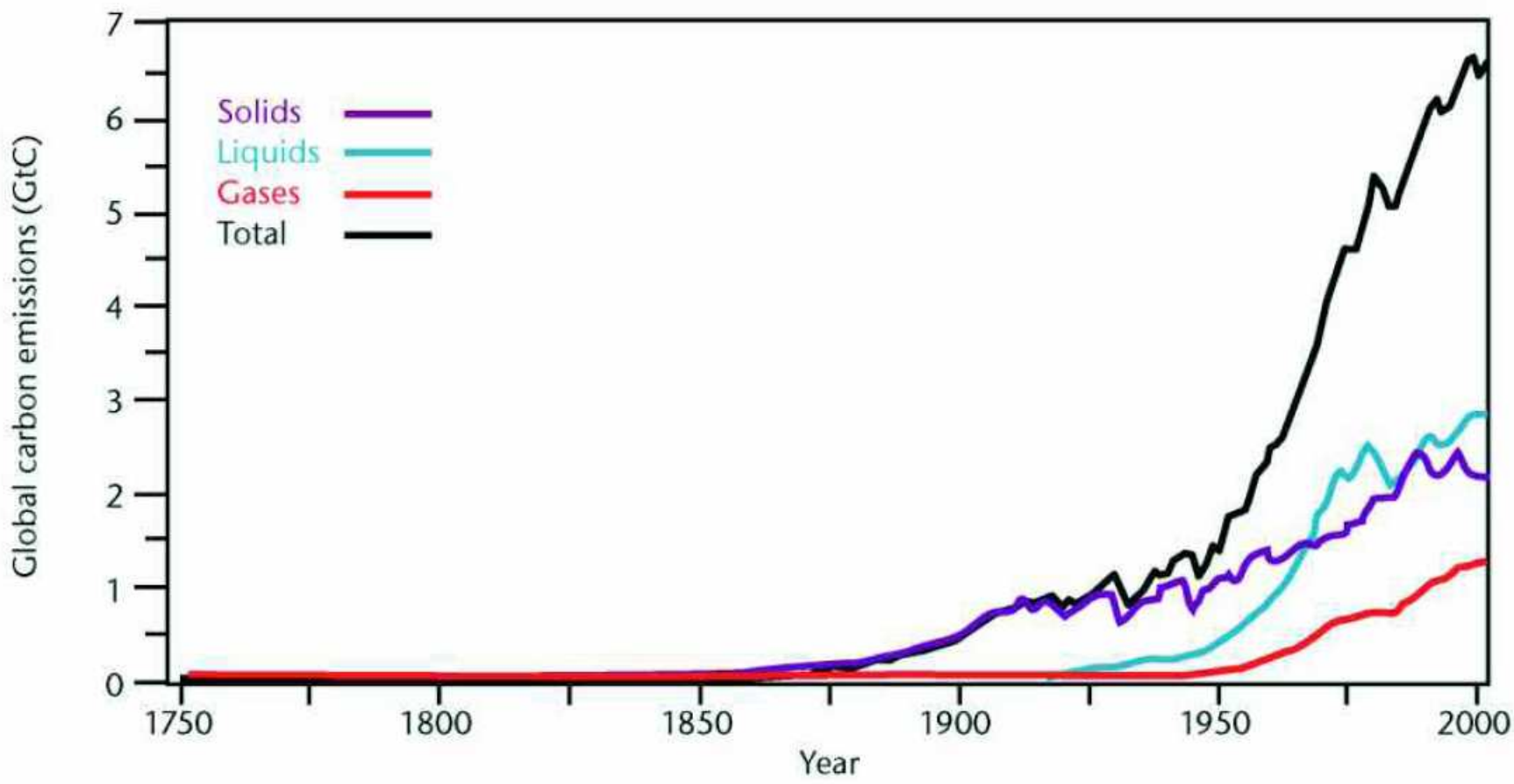
Global Warming



SYR - FIGURE 2-3

Rapid rise of CO_2 emissions



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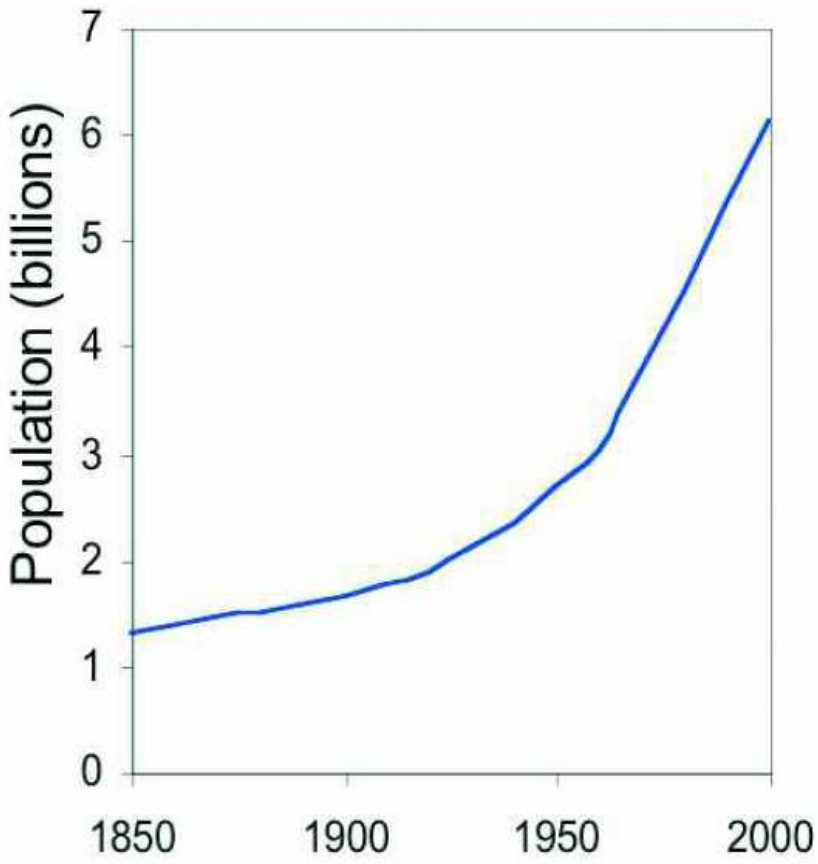
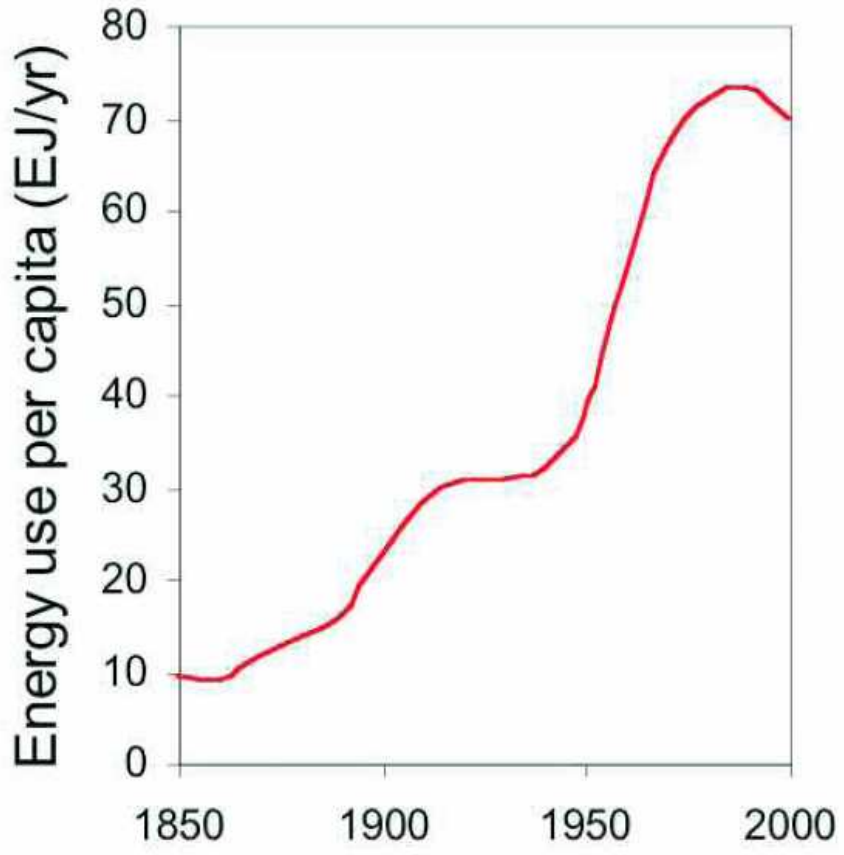
Source: CDIAC, ORNL

Drivers of CO2 emissions





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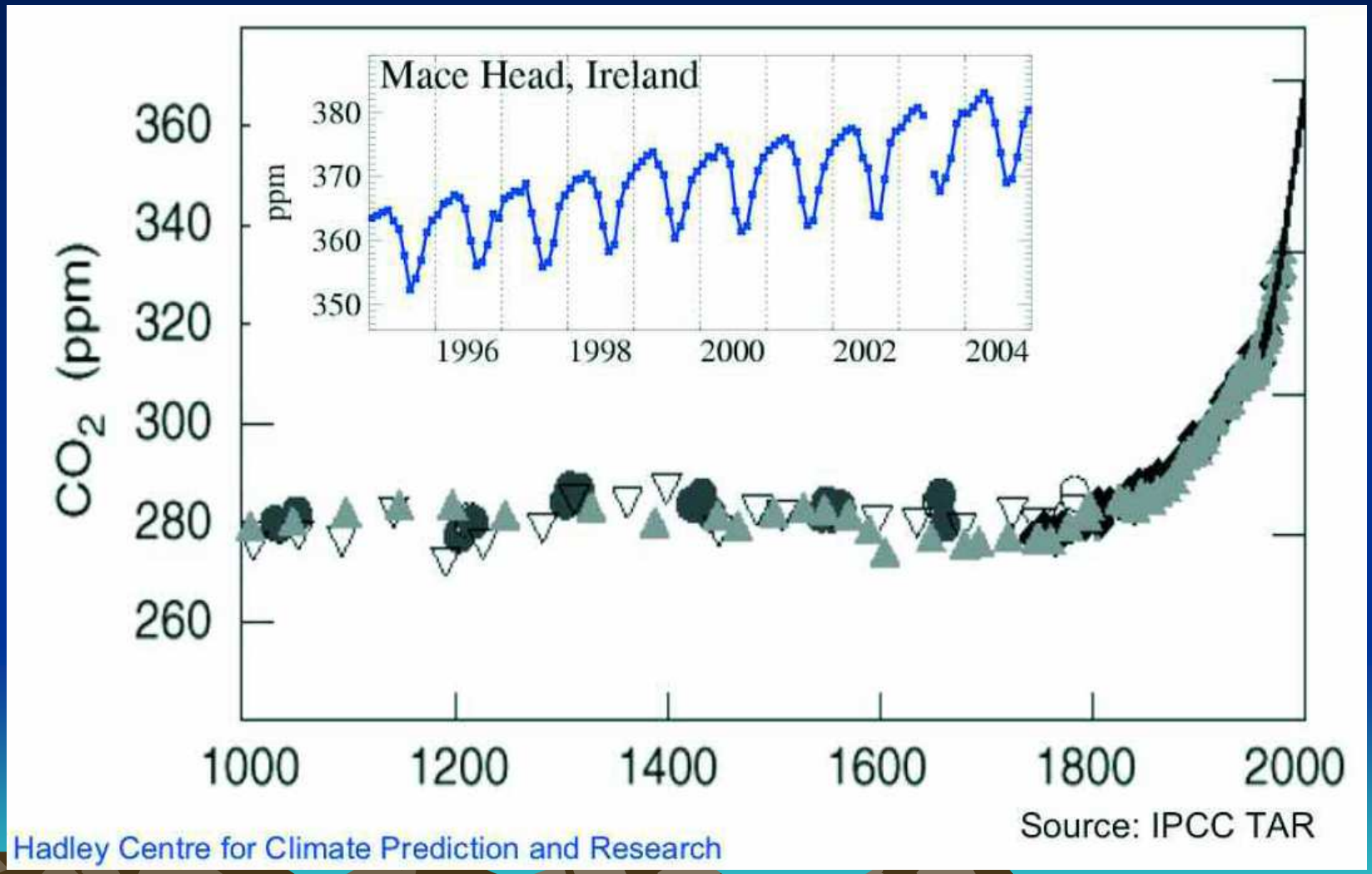
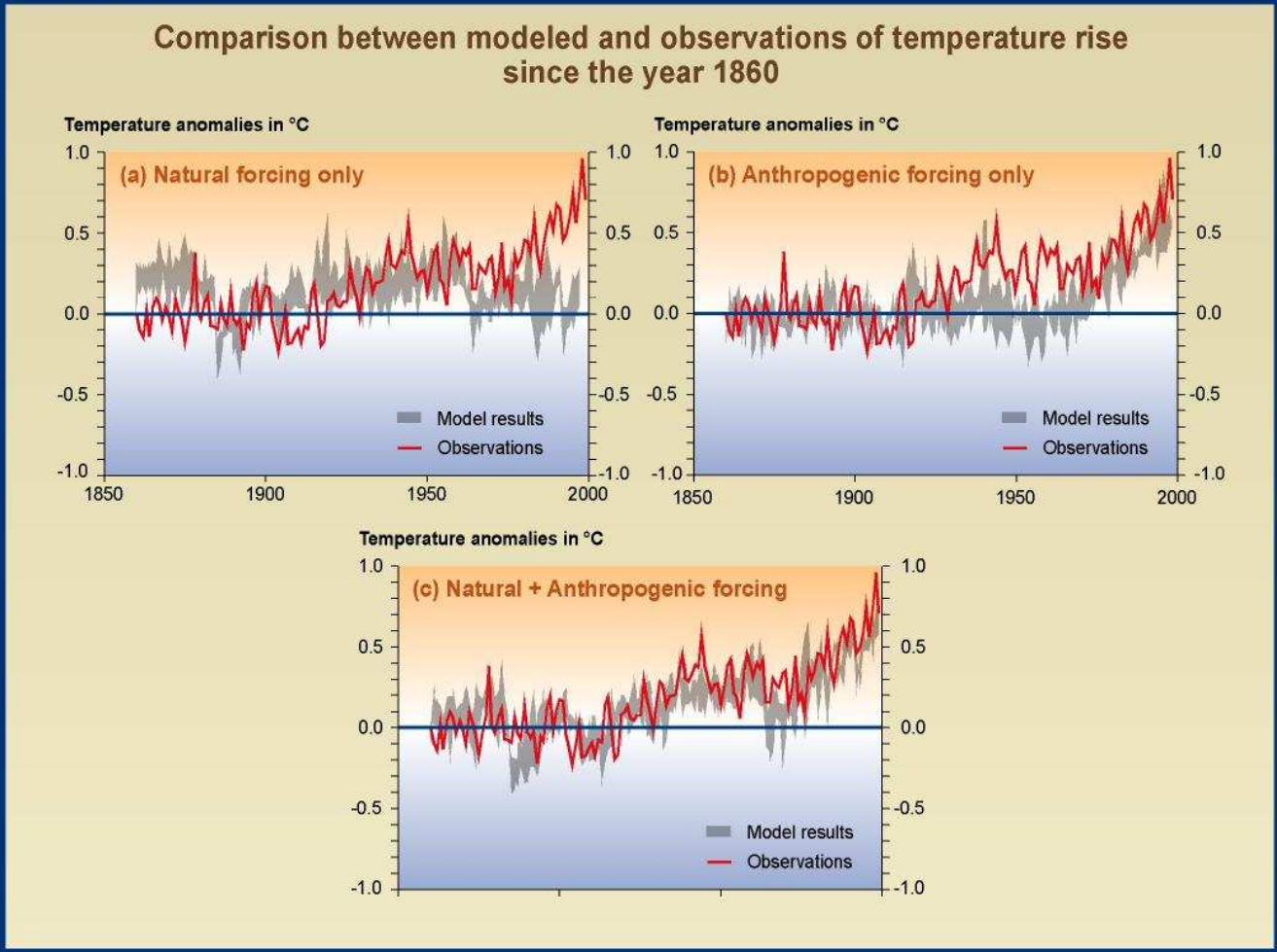
Source of data: Open University

Rapid rise of CO_2

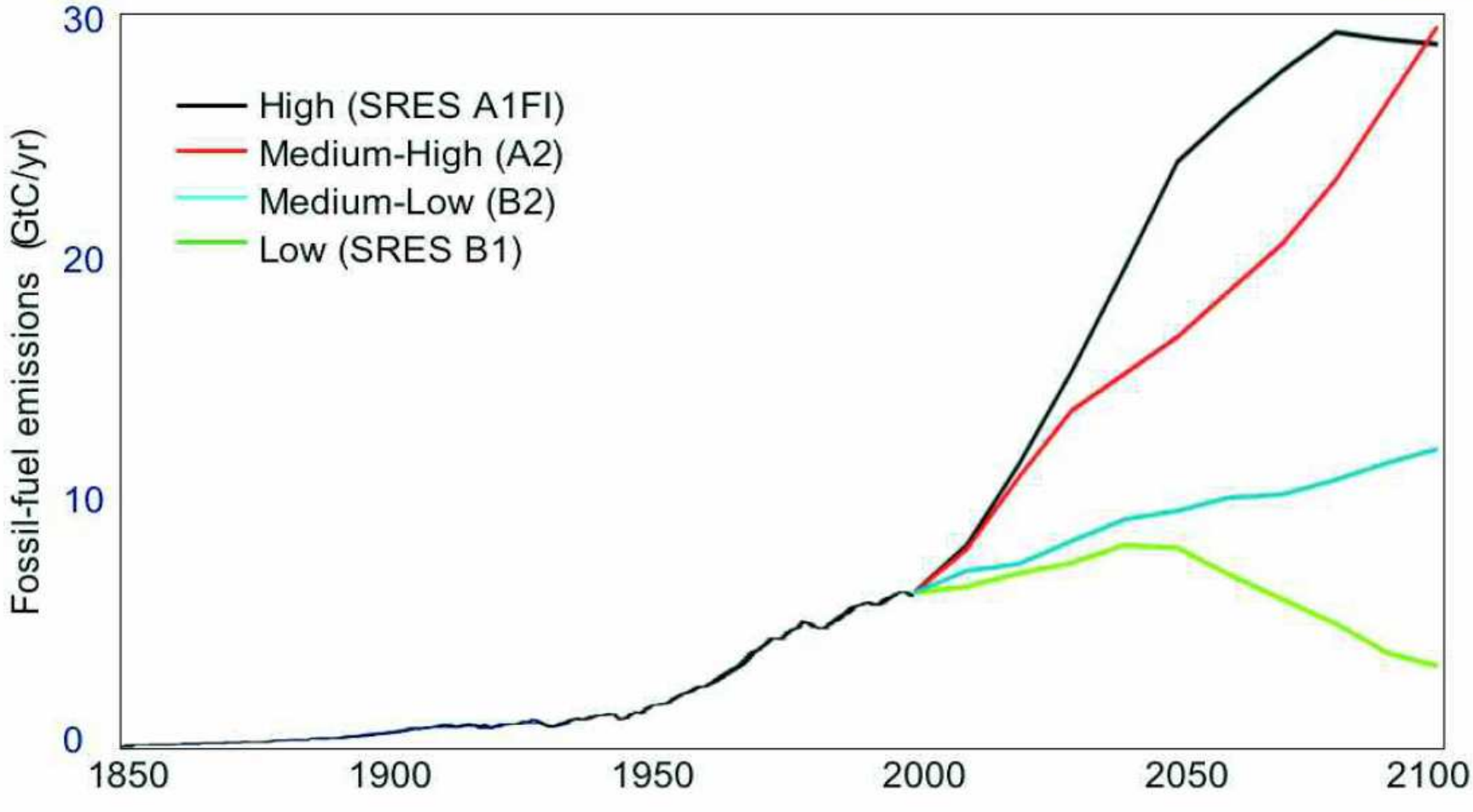


Climate change causes



SYR - FIGURE 2-4

Emissions projections



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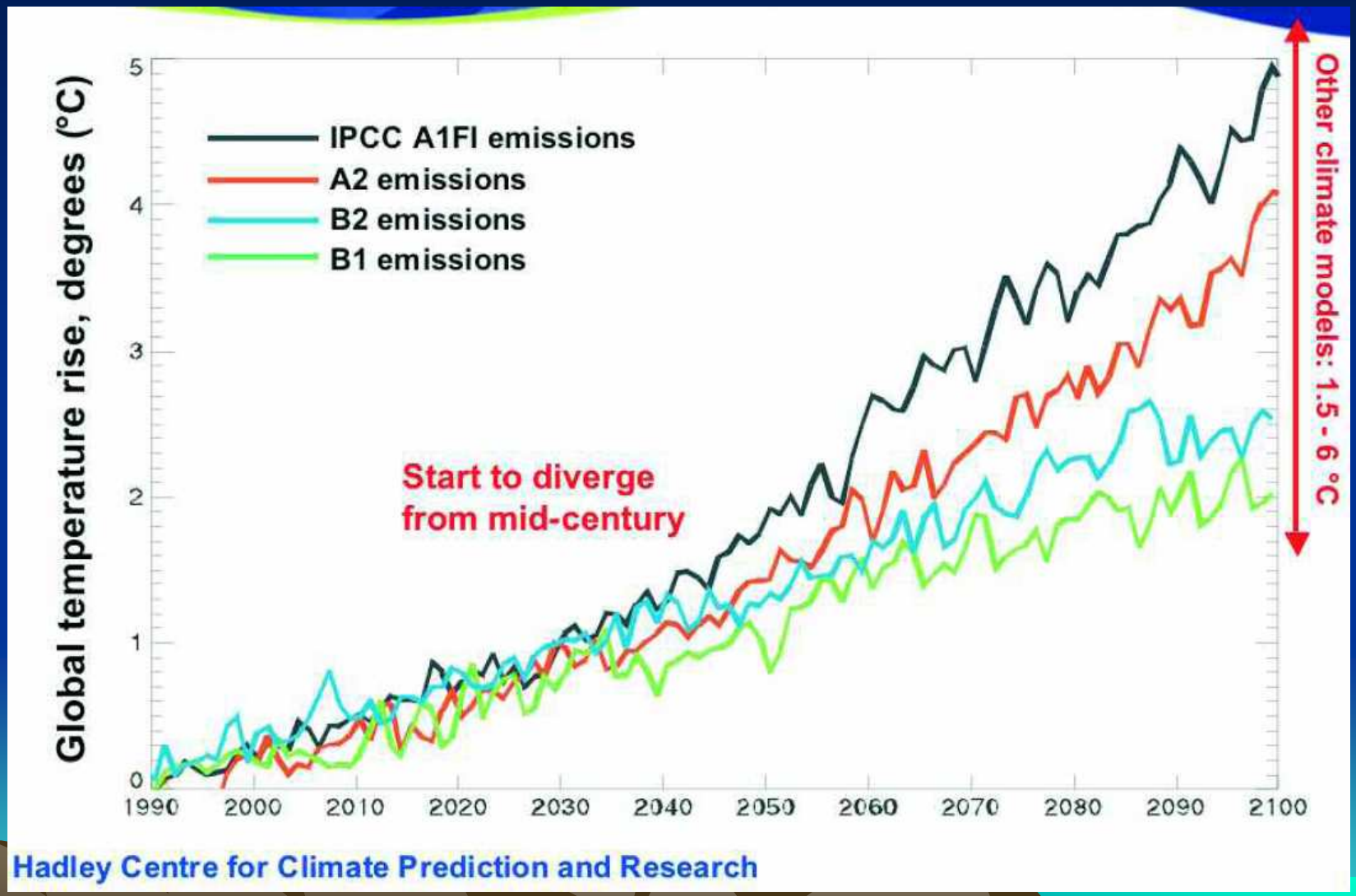
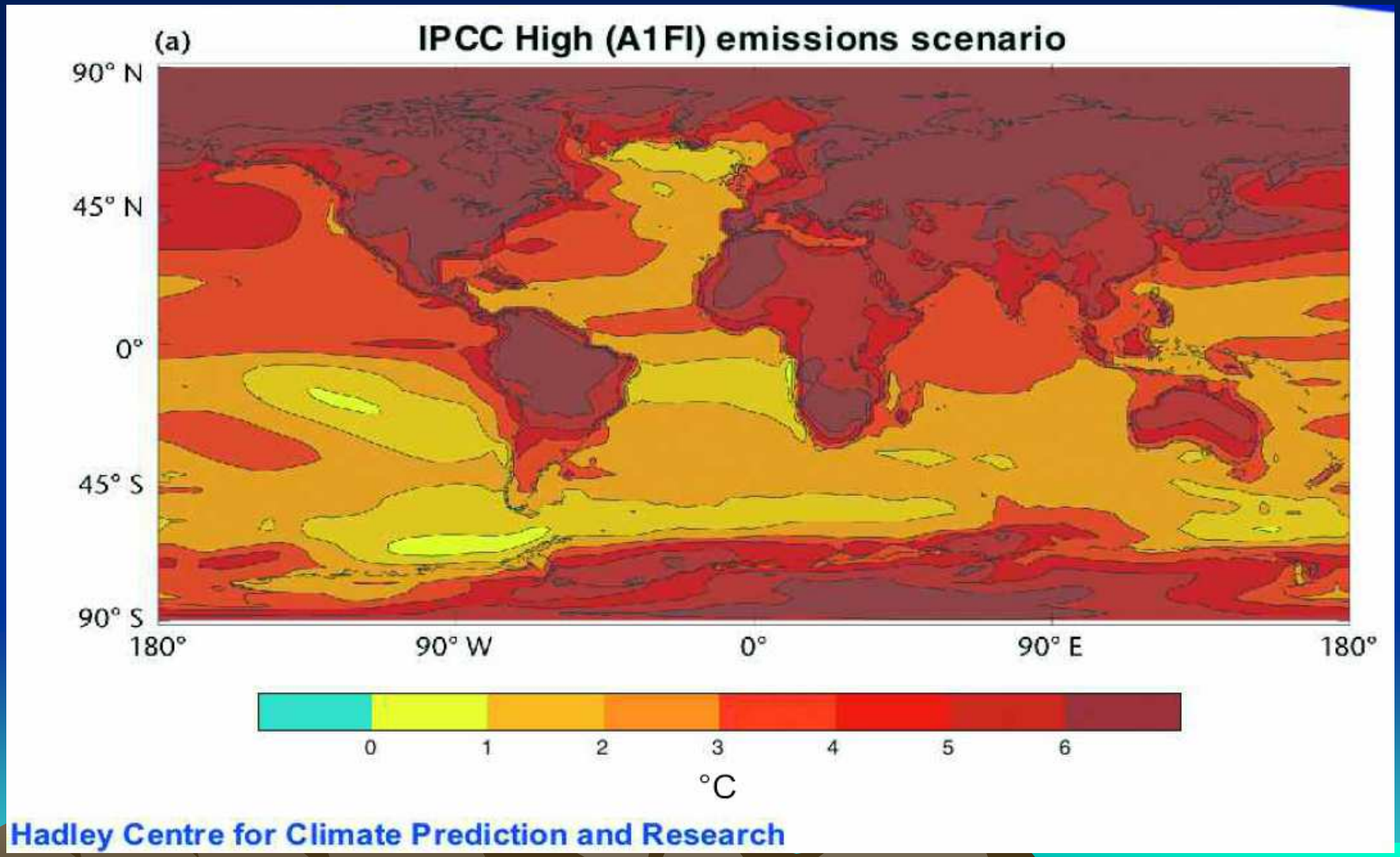
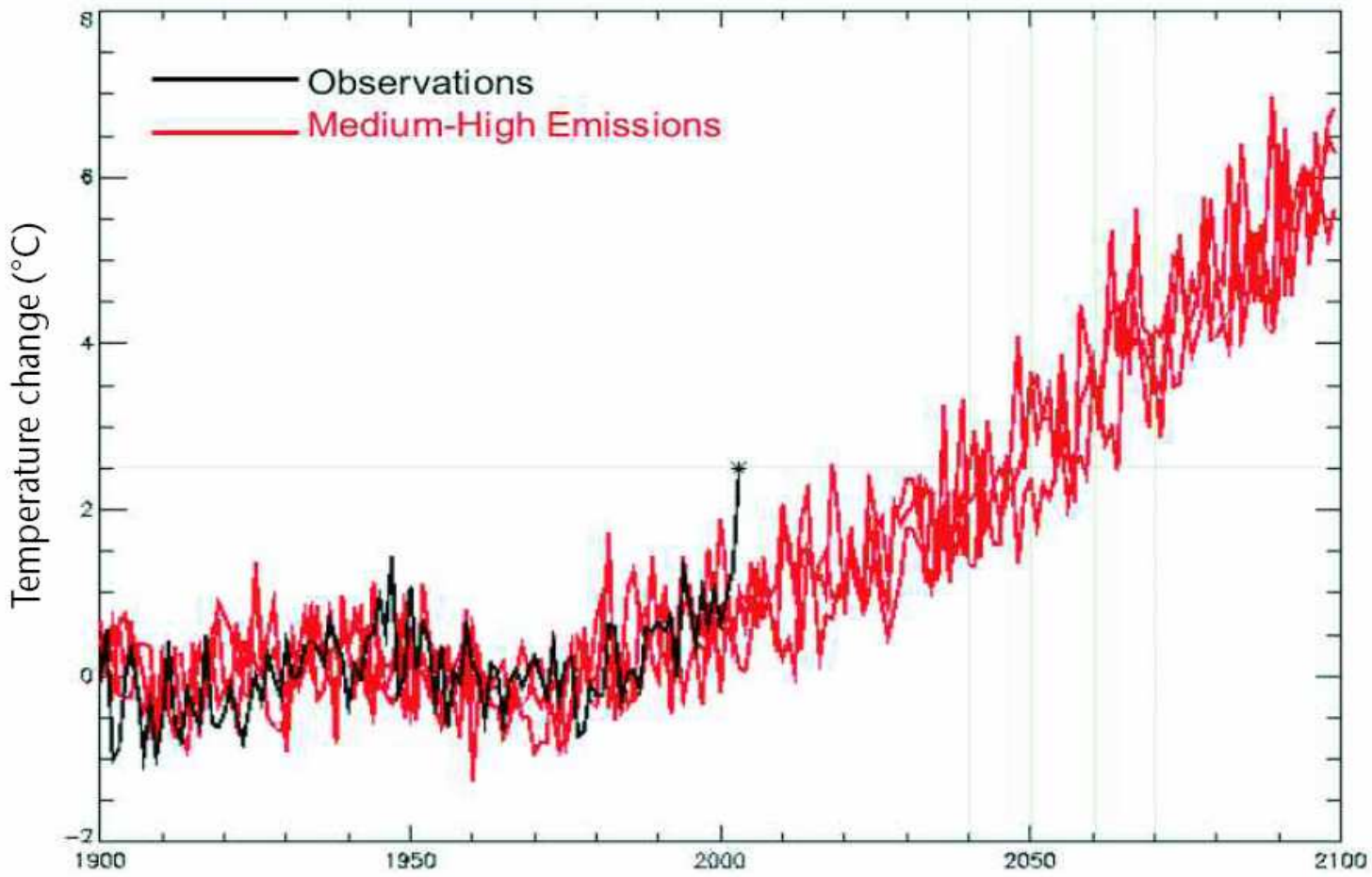
Warming due to future emissions



Patterns of temperature change



European 2003 temperatures could be cool by 2080s



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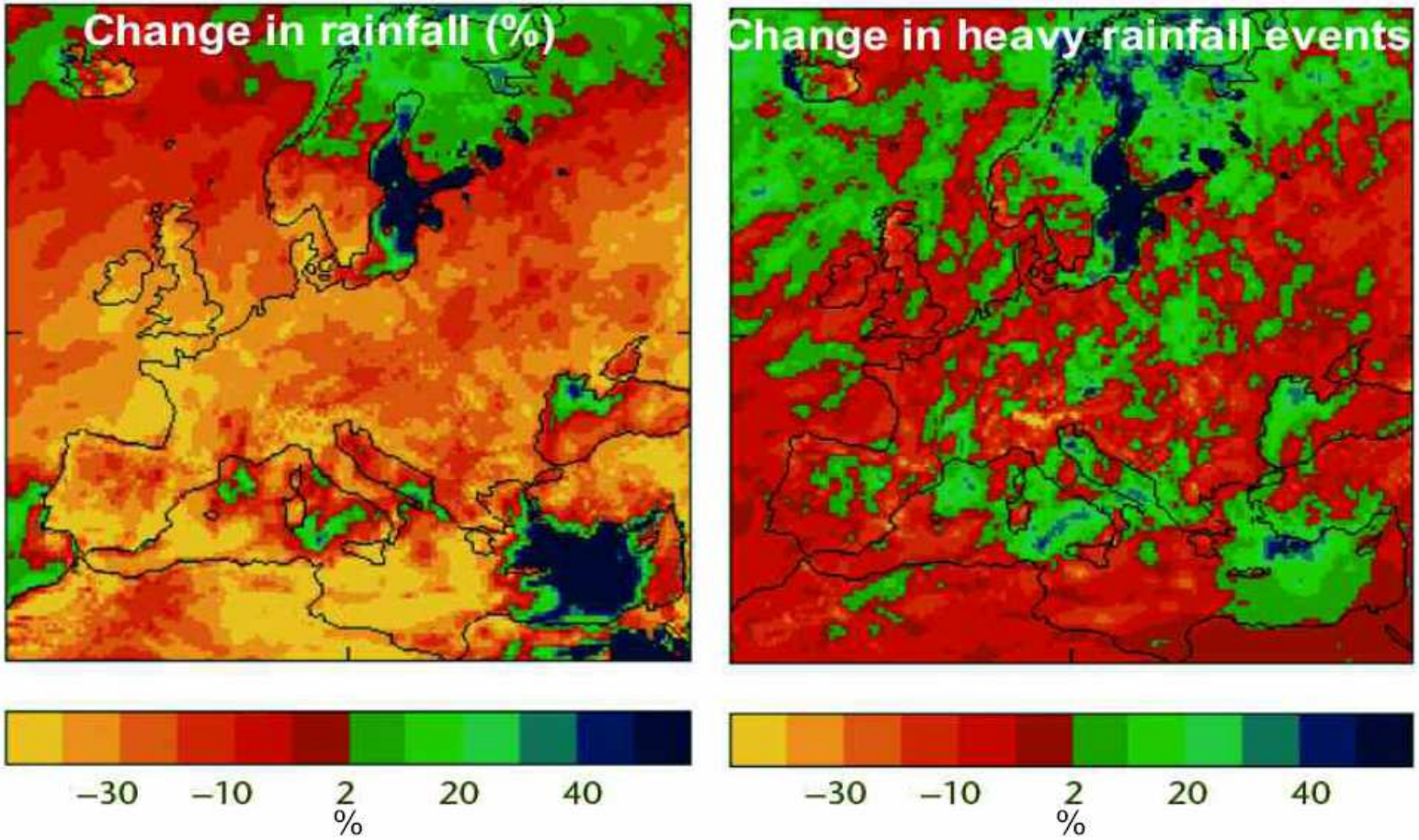
Change in European summer rainfall



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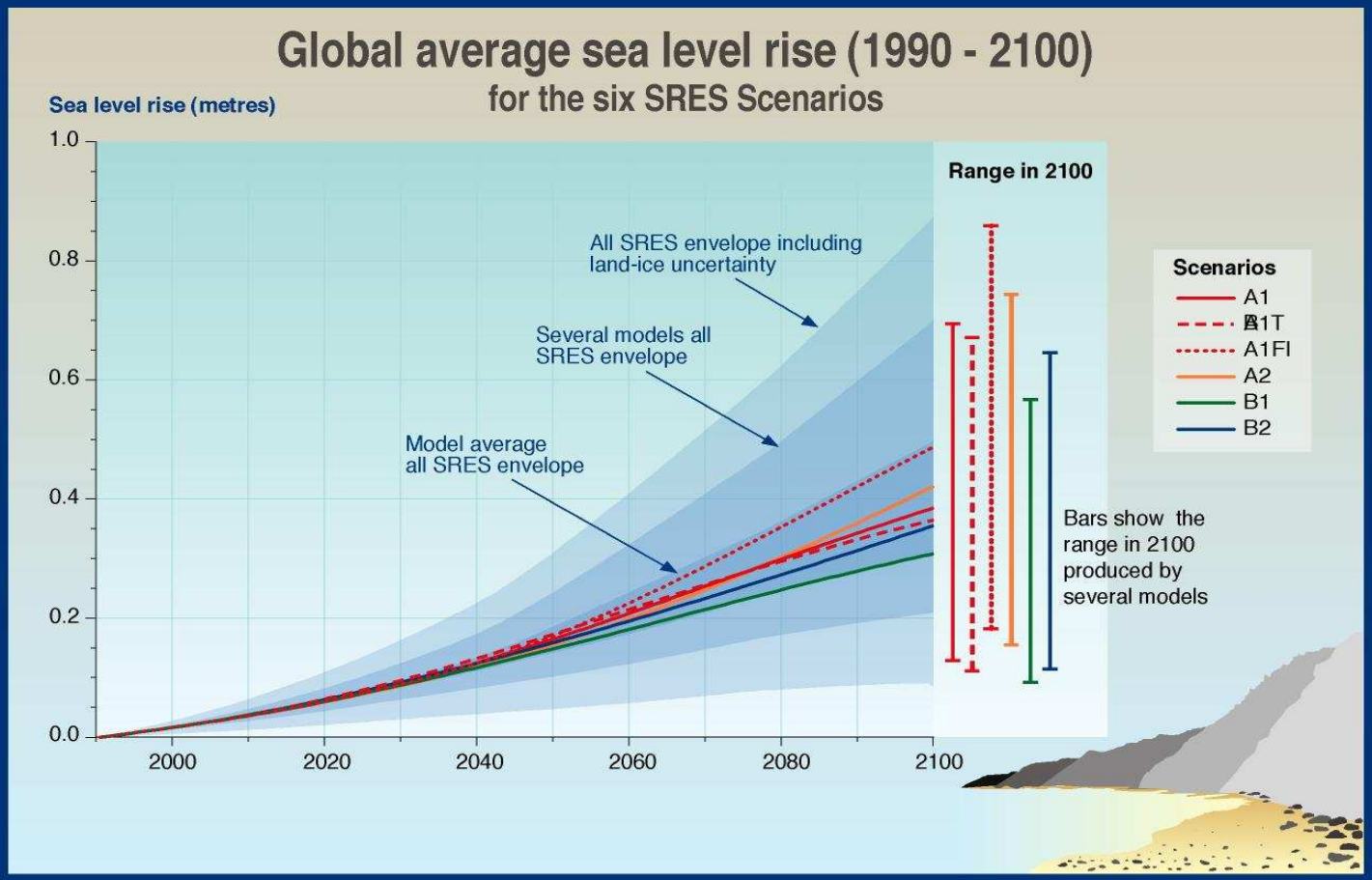
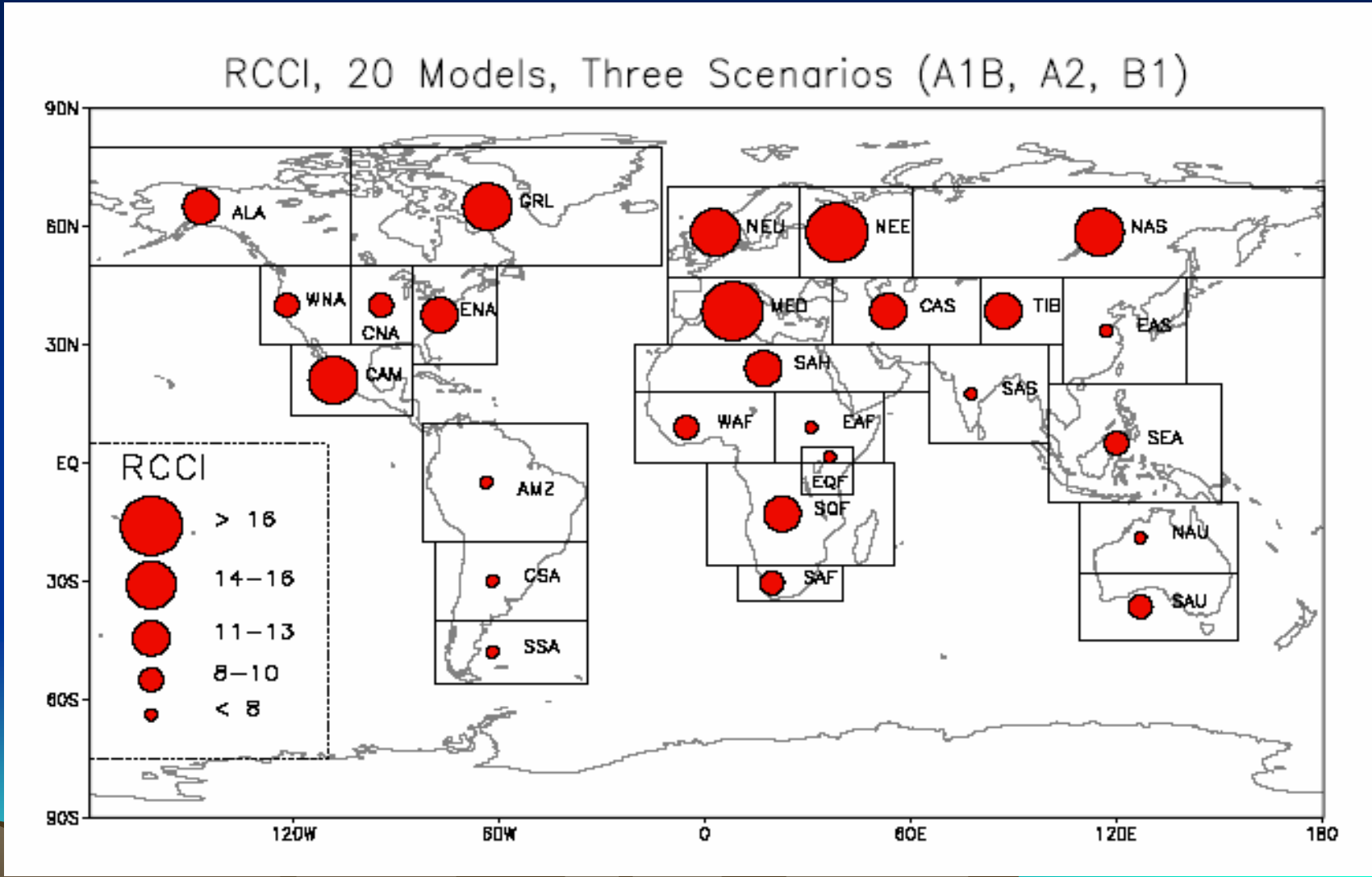
Future Sea Level



WG1 TS FIGURE 24

Climate change hot-spots

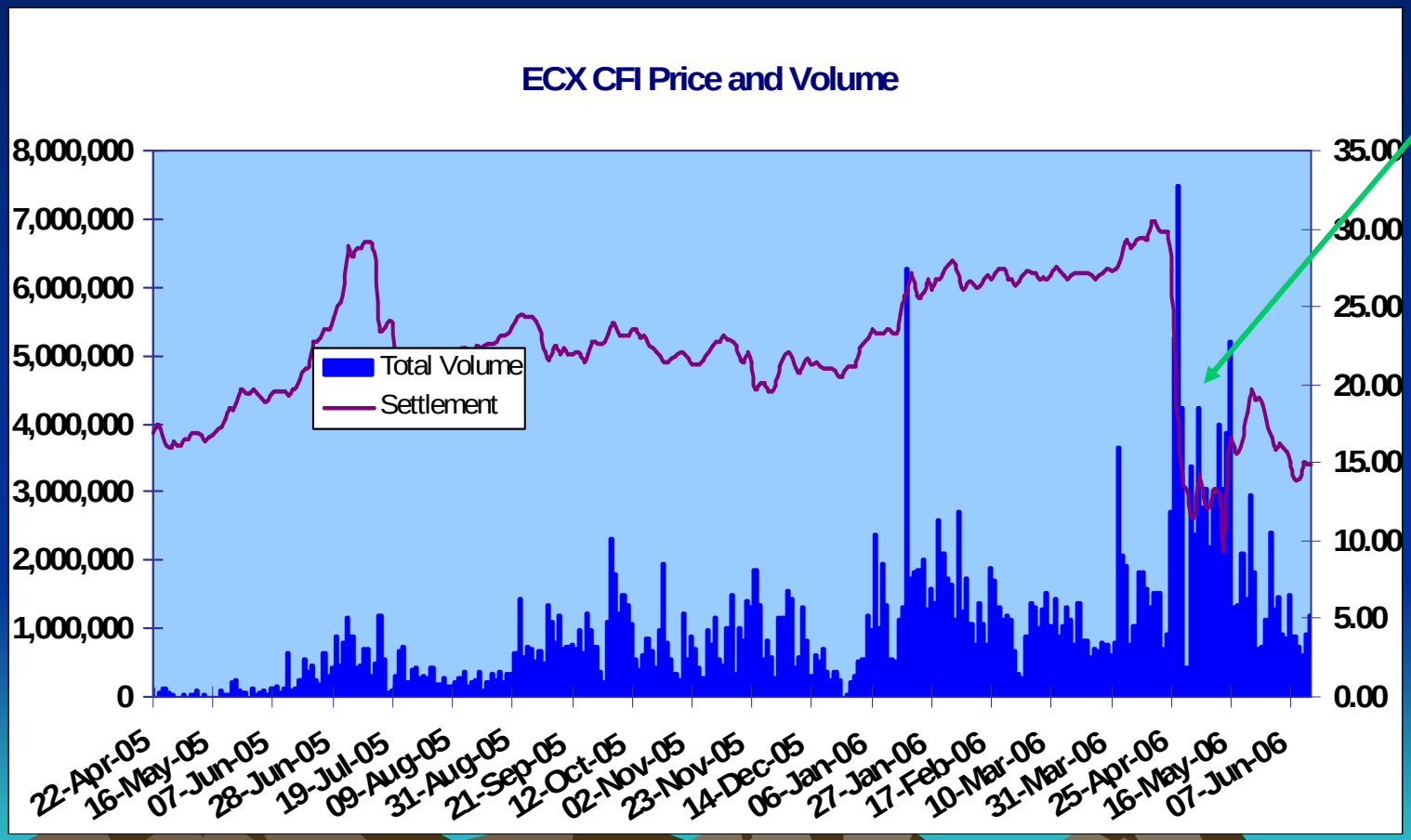


Giorgi, 2006

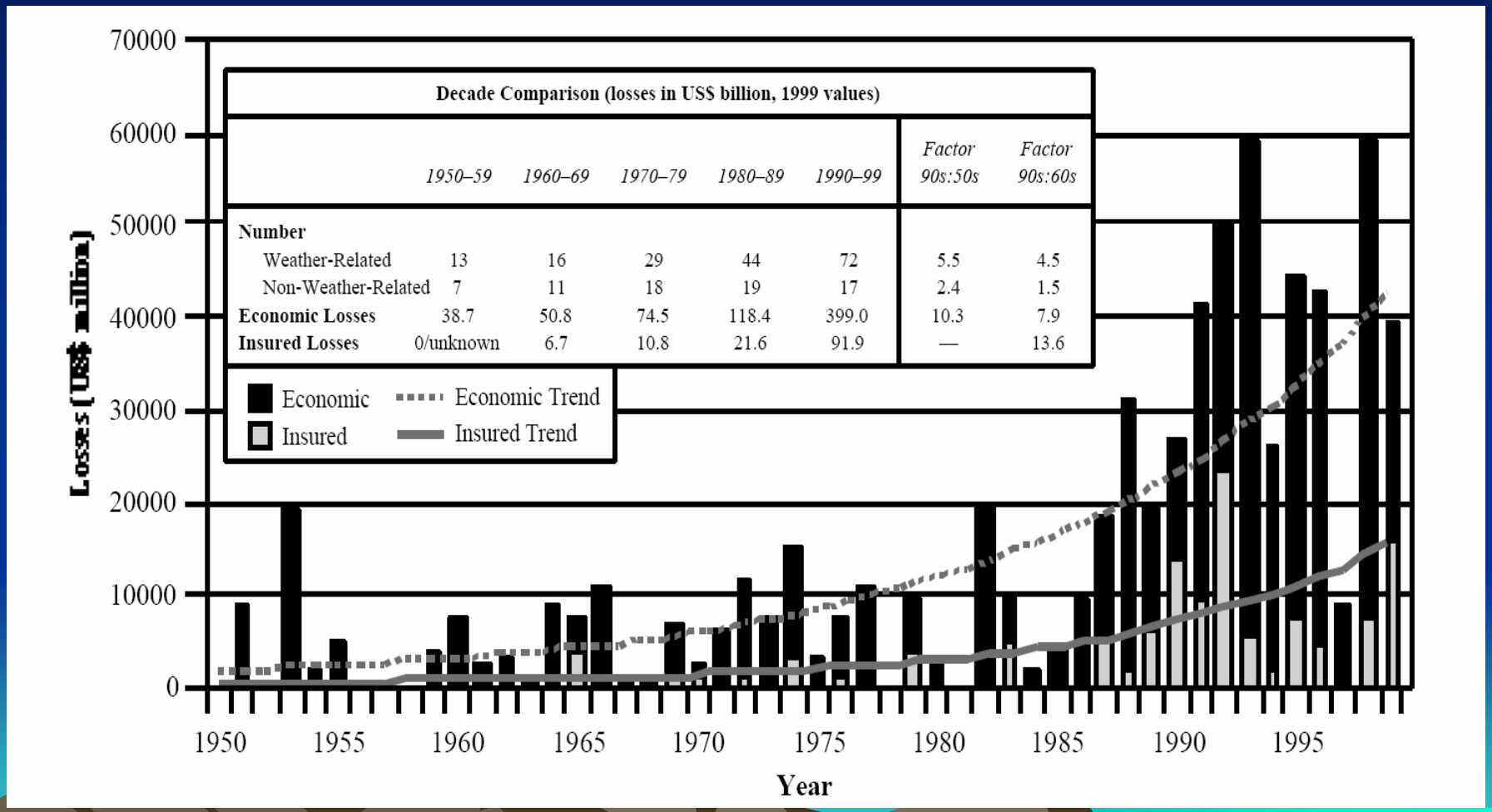
Carbon emissions trading

New market, opportunities

Risks

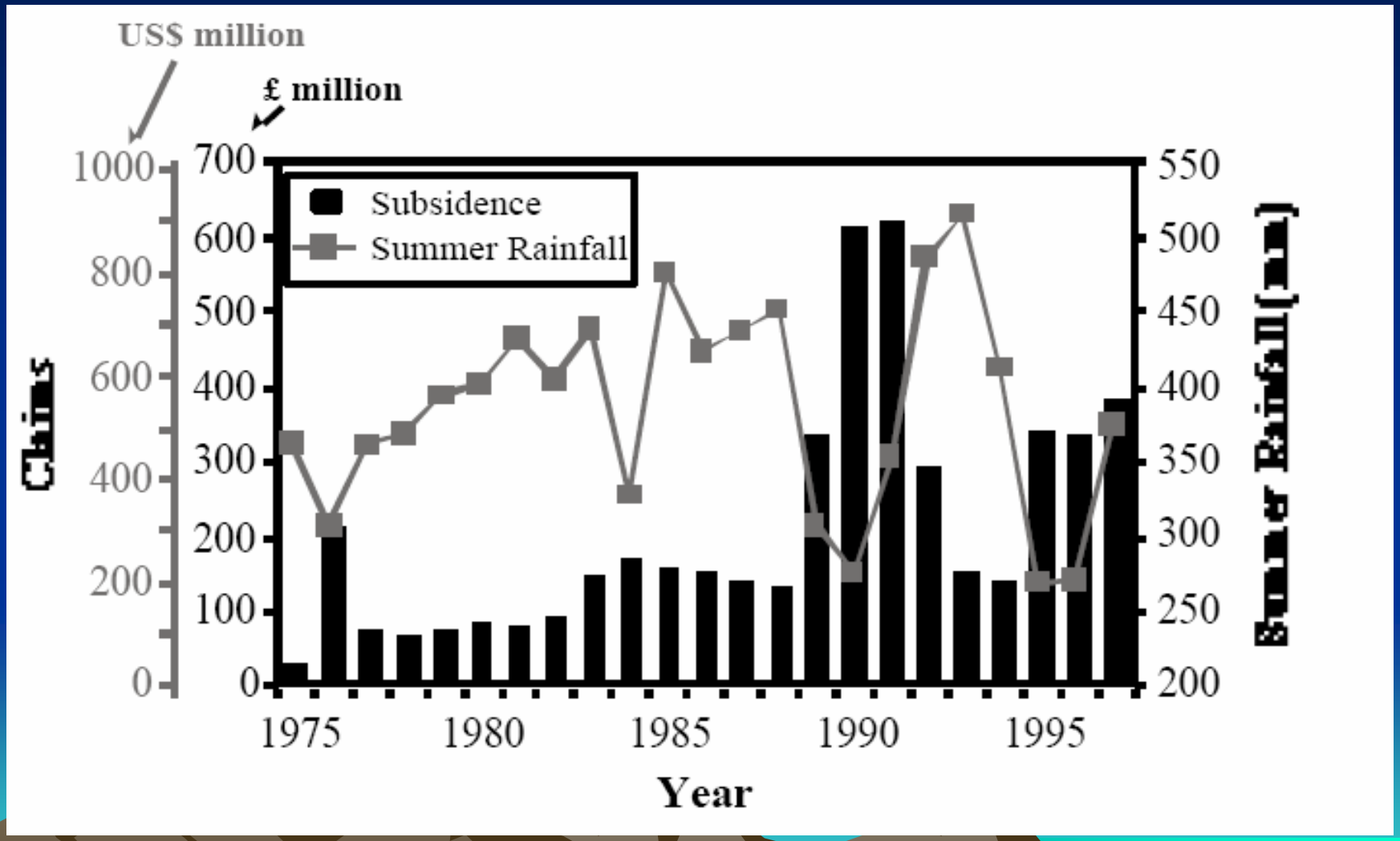


Costs of catastrophic weather events, US



WG II, IPCC 2001

Summer rainfall and subsidence claims, UK



WG II, IPCC 2001

Impacts - Finance sector

Climate Change and Finance Sector

Climate parameter	Relevant event	Time-scale	Sensitive sector	Sensitive Insurance/Finance branch
Higher Temperature, occurrence and duration	Heat-waves Droughts Fires	Daily/Weekly Monthly/Seasonal Daily/Weekly	Electric reliability, human settlements Natural/water resources, electricity demand, health, tourism Forest resources, health	Health, life, property, crop, business interruption
Intense precipitation	Flash flood Flood, Inundation Mudslide	Hourly/Daily Weekly/Monthly	Human settlements Agriculture, forest, transport, human settlements, tourism	Property, flood, vehicle, business interruption, life, health Property, flood, crop, marine, business interruption
Increased storm intensity	Snowstorm, ice storm, avalanche, hailstorm, Windstorm	Hourly, Daily, Weekly	Forests, agriculture, energy distribution and reliability, human settlements, mortality, Tourism, agriculture, property	Property, crop, vehicle, aviation, marine, life, business interruption

WG II, IPCC 2001

Climate change impact on banks

Direct

- Global economic environment:

a. Exposure to commodities markets
b. Private/Corporate loans secured by property
c. Investments on sensitive sectors

Indirect

- Clients exposure:

a. Operations/Consumption
b. Financial circumstances

Example: Warm winters in Europe already have negatively impacted the performance of skiing resorts in the Alps and have led some banks to review their credit applications in view of possible impacts of climate change

WG II, IPCC 2001

Adaptation

Adapting to Climate Change

- Promote technologies, practices and policies that reduce vulnerability of the water, agriculture, forestry, health sectors to natural climate variability and which increase resilience of long-lived infrastructure to climate change
- Incorporate climate-based risks into sector management decisions

A. Mathur, The World bank, 2002

Disaster Management Facility

- Risk Identification:
  Hazard maps; GIS systems, vulnerability analysis;
  understanding direct, indirect, and secondary effects of disasters;
  include disaster risk analysis as part of project design
- Risk Reduction:
  land use planning, structural design and construction practices, building codes, early warning systems, preparedness and response plans
- Risk Transfer and Financing:
  insurance/re-insurance, calamity bonds, weather derivatives, safety nets, calamity funds, micro-insurance, community networks.

Research needs

- Improve the transfer of knowledge from the scientific community studying climate change and weather forecasting to the financial services community
- Advance the understanding of the relative global and regional vulnerability and adaptability of insurance and other financial services to climate change
- Explore the role of the financial services sector in dealing with risks to society from climate change
- Explore the range of possible financing arrangements to cover the cost of adapting to climate change

WG II, IPCC 2001

Conclusions

Climate:

- Mean conditions and extremes predicted to change dramatically
- Signs that this change is already happening

Finance sector:

- Direct and indirect impacts
- Risks and opportunities
- Inter-disciplinary approach and co-operation

Acknowledgements

- European Social Fund and National Resources – (EPEAEK II) PYTHAGORAS II, Greece
- Experienced Expatriate Programme, Research Promotion Foundation, Cyprus
- PRECIS team at the Hadley Centre, UK and especially David Hein, David Hussel and Wilfran Moufouma-Okia
- Working Group II of the Intergovernmental Panel on Climate Change (IPCC), Third Assessment Report (TAR)
- Stella Kovlaka, Emporiki Bank, Greece

Human influence

Technological progress

Economic development

Energy Consumption

Fossil Fuel Combustion

GHGs Emissions

Global Warming /
Extreme Phenomena

Mitigation/Regulation
Adaptation
Technological Innovation

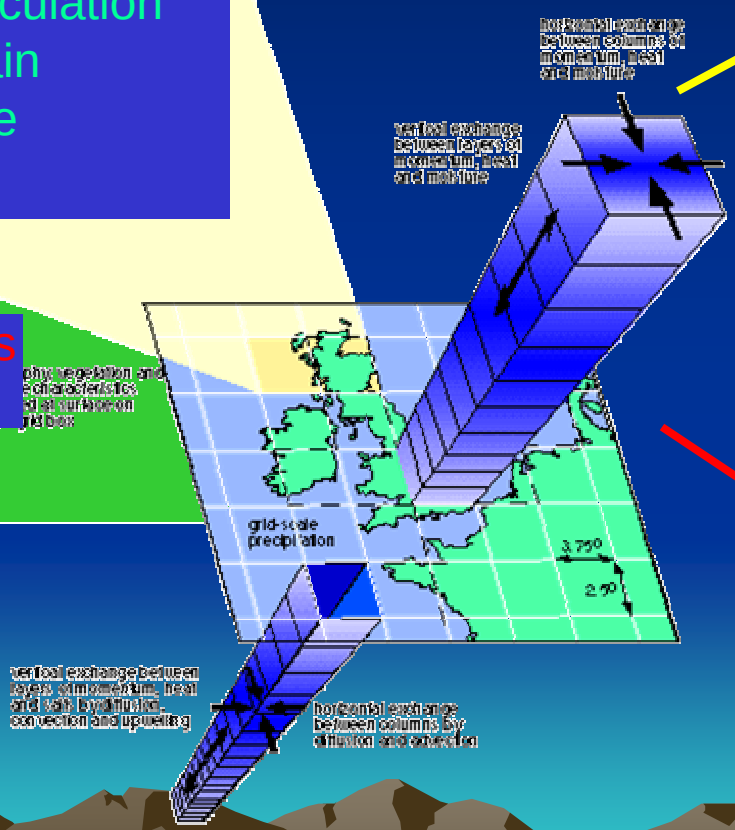
Climate Modelling

Observations

Solar Radiation
Atmospheric Circulation
Clouds/Rain
Biosphere
Oceans

Emission Scenarios
(CO_2, CH_4)

Input



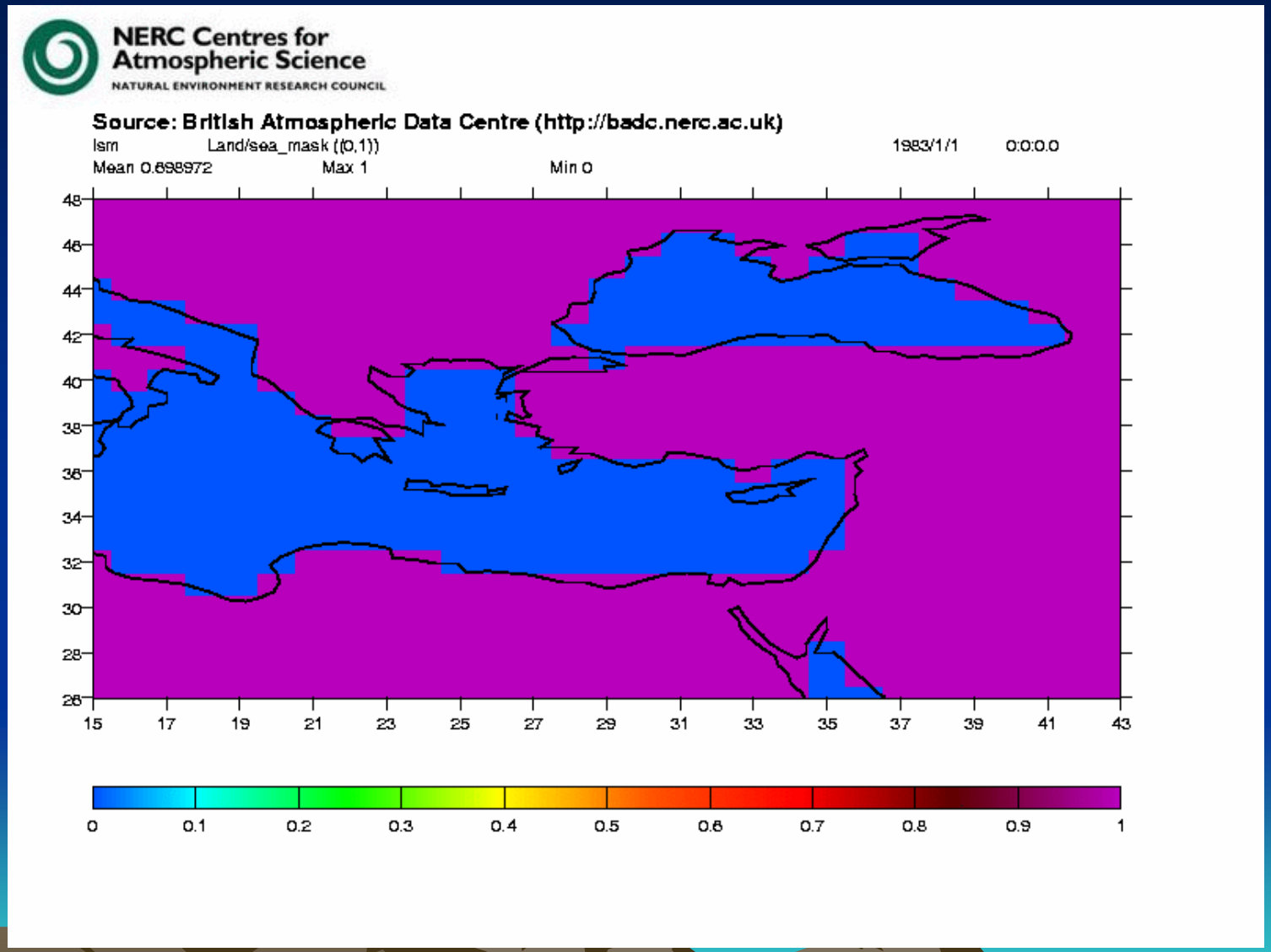
Output

Past/present

Meteorological Parameters

Future

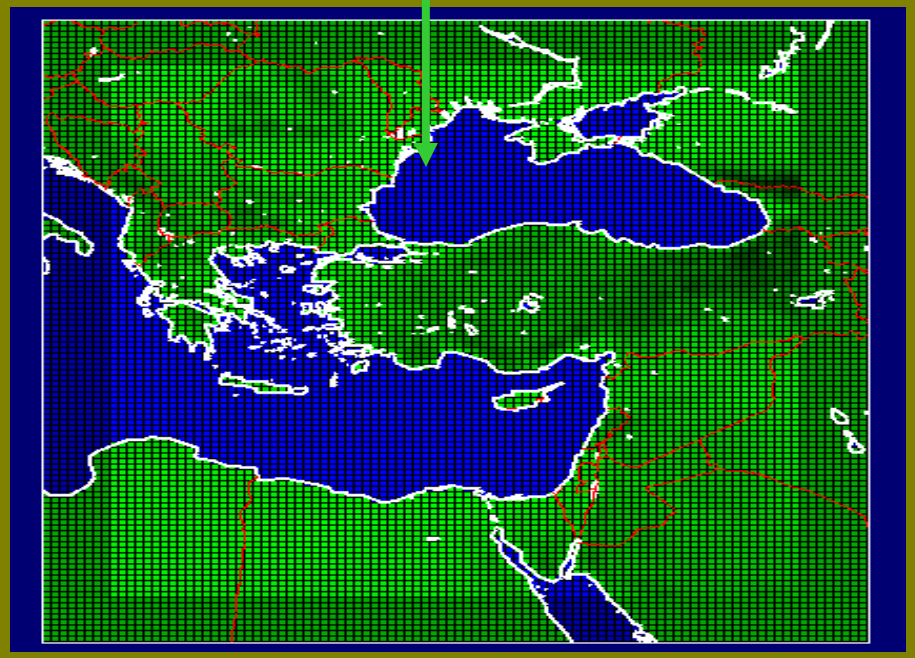
Global Climate Models



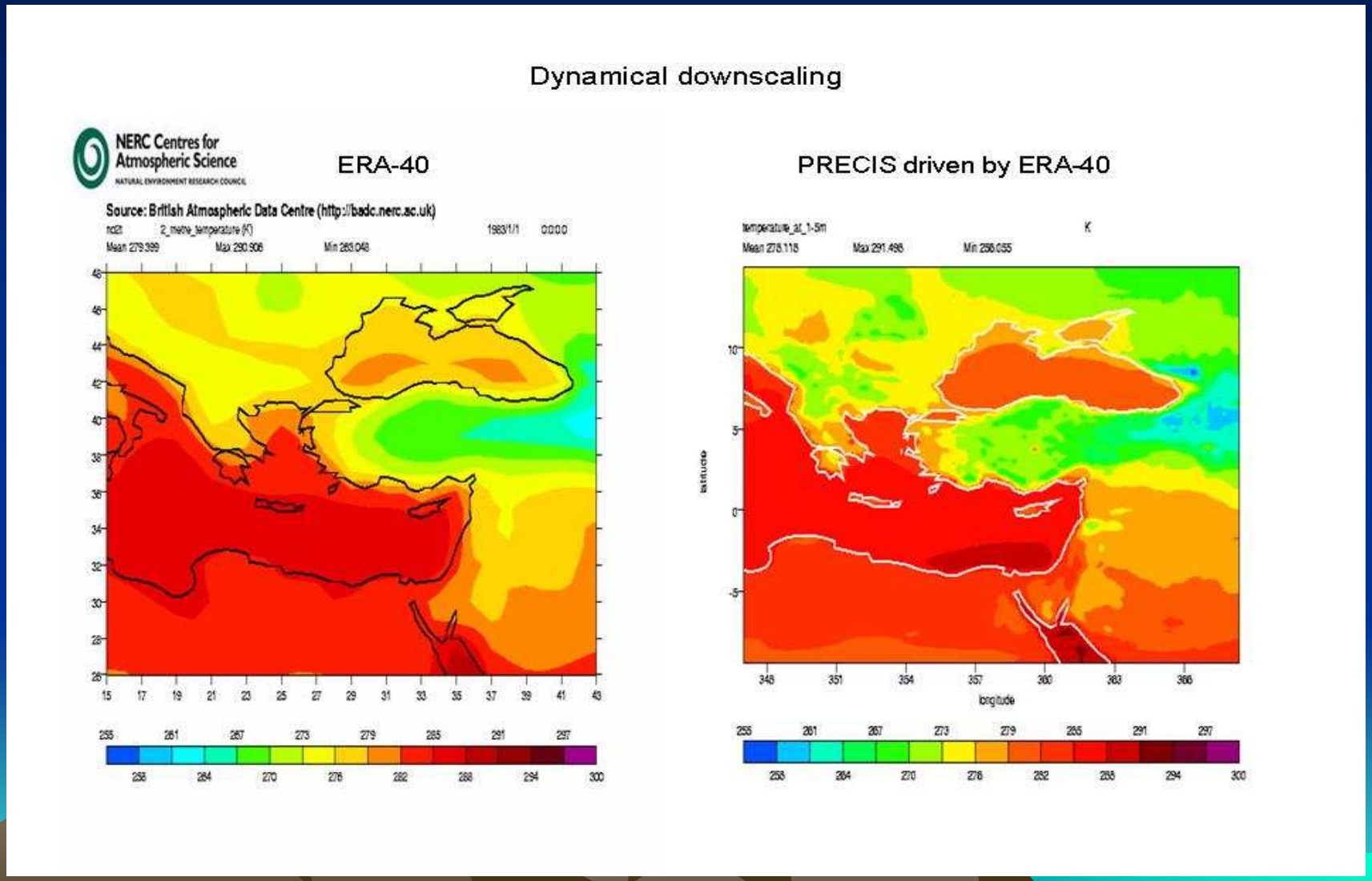
Regional Climate Models

Global Model

Dynamical Downscaling

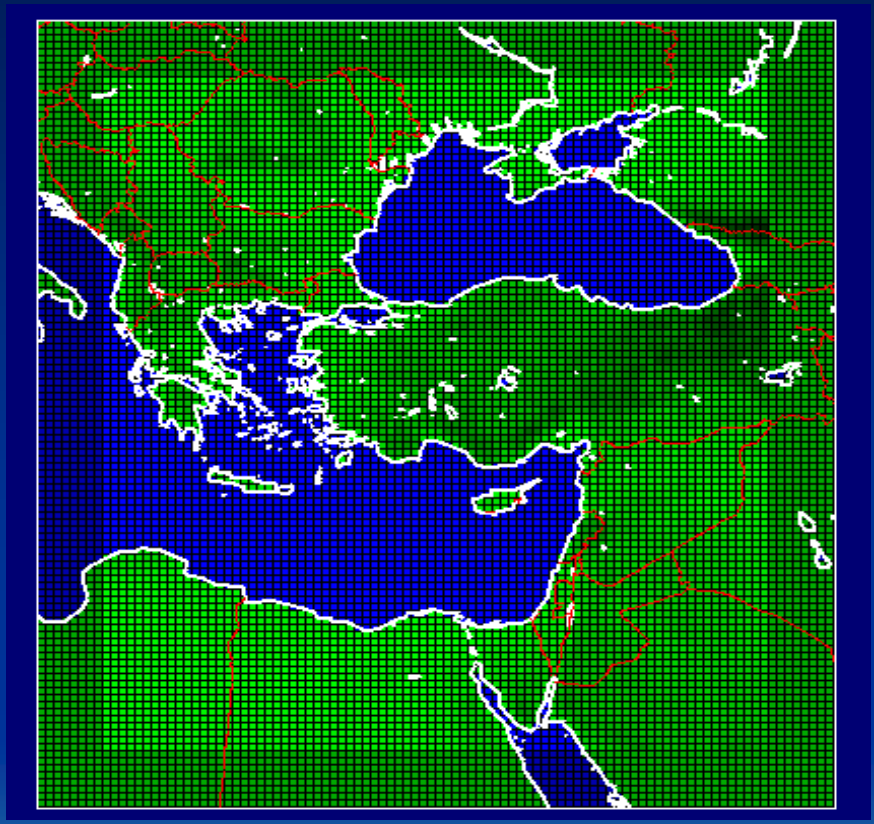


Dynamical Downscaling: GCM -> RCM



Model Domain

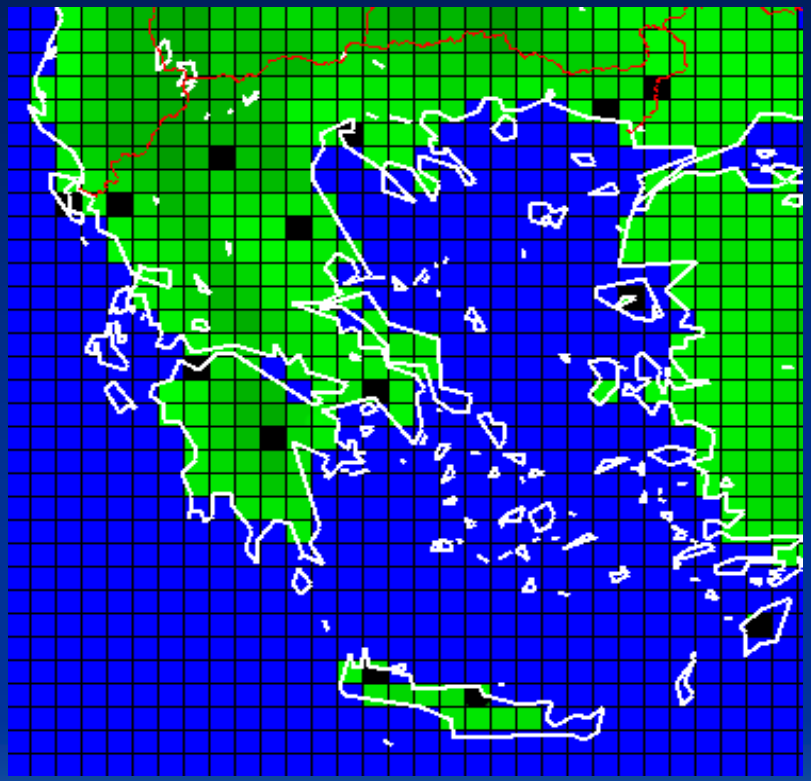
98 x 112 grid boxes



Overall

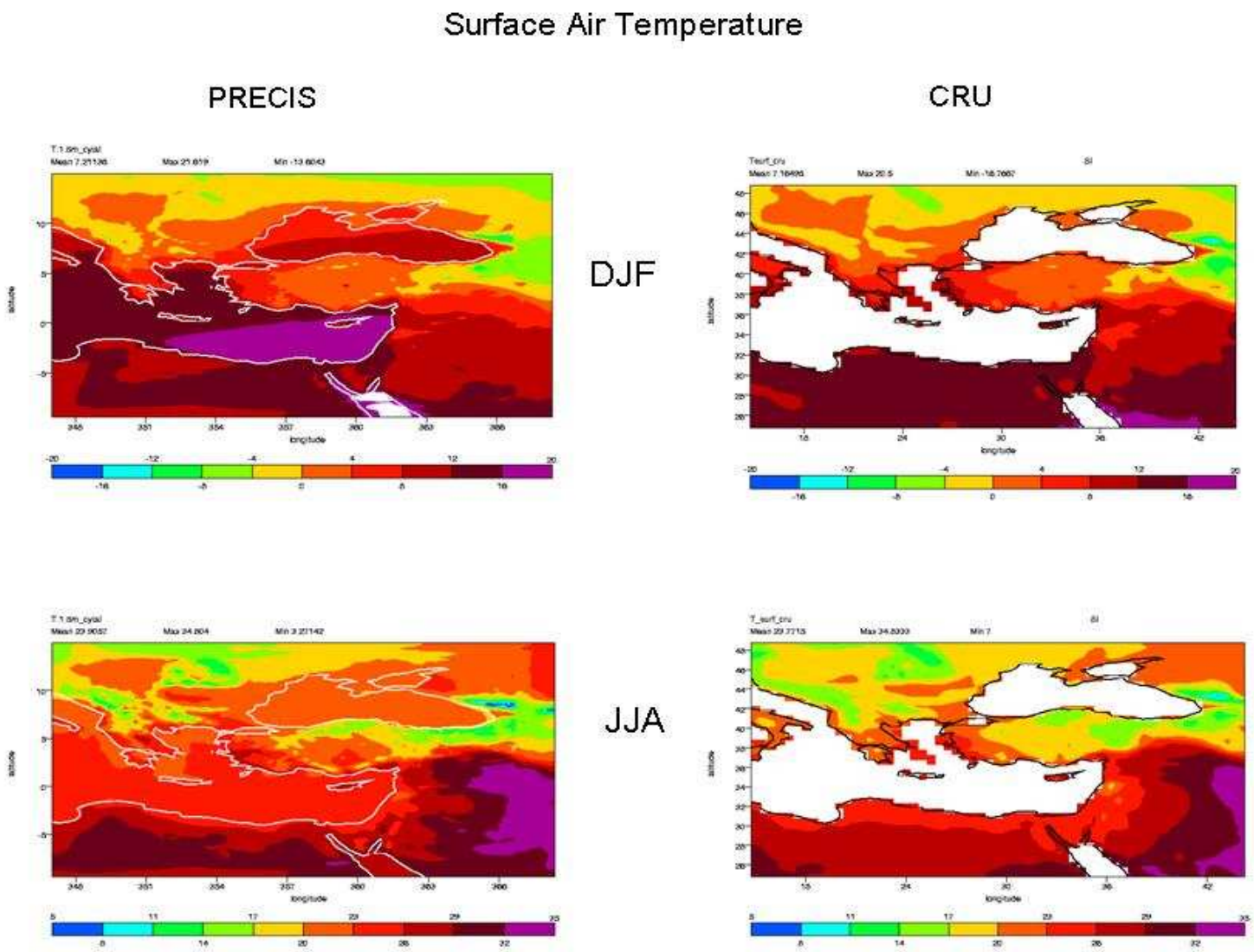
more detail

25 x 25 km

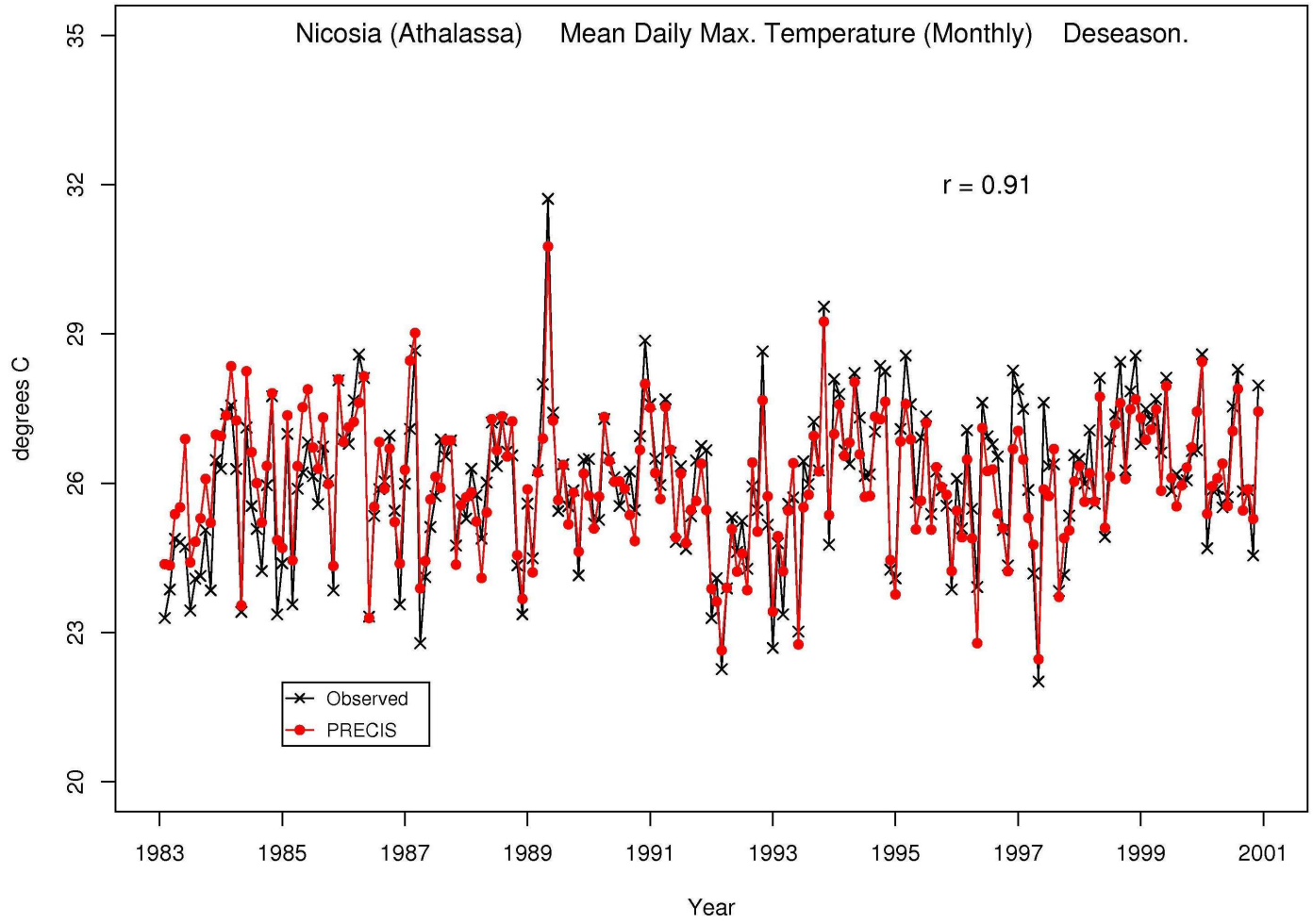


Greece

Realistic simulation of regional climate

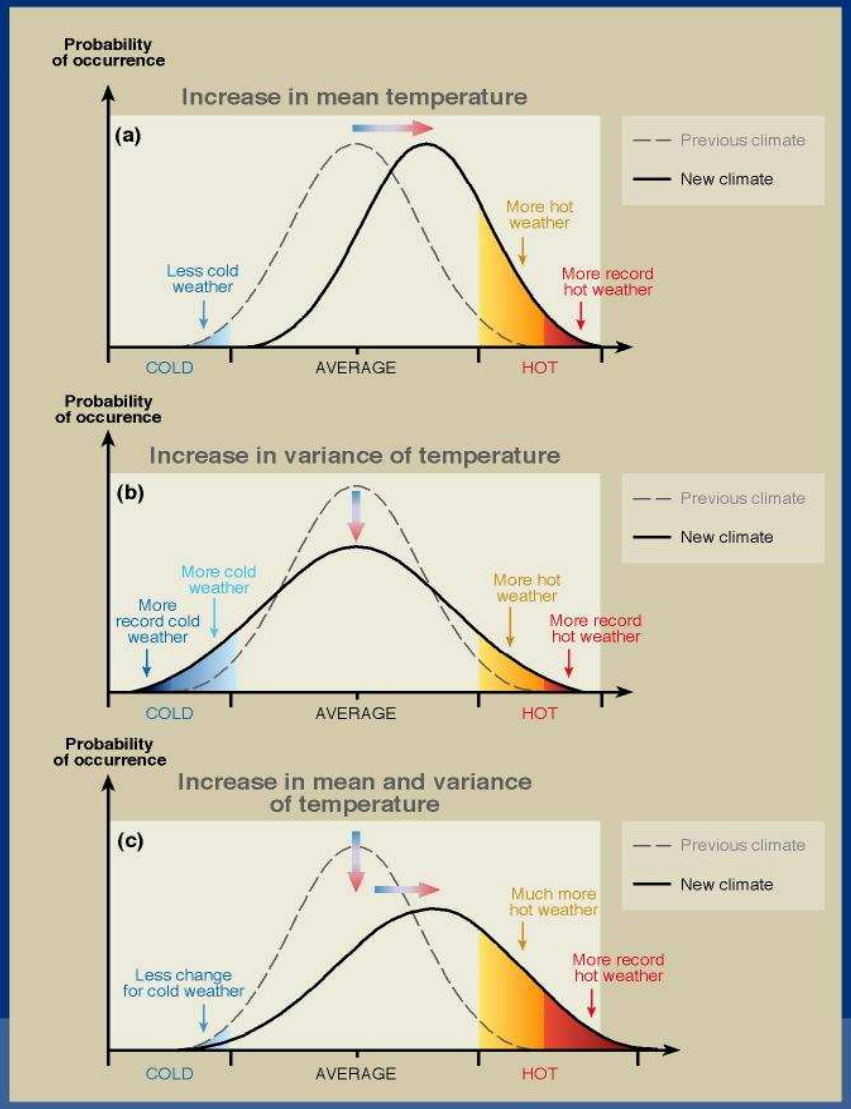


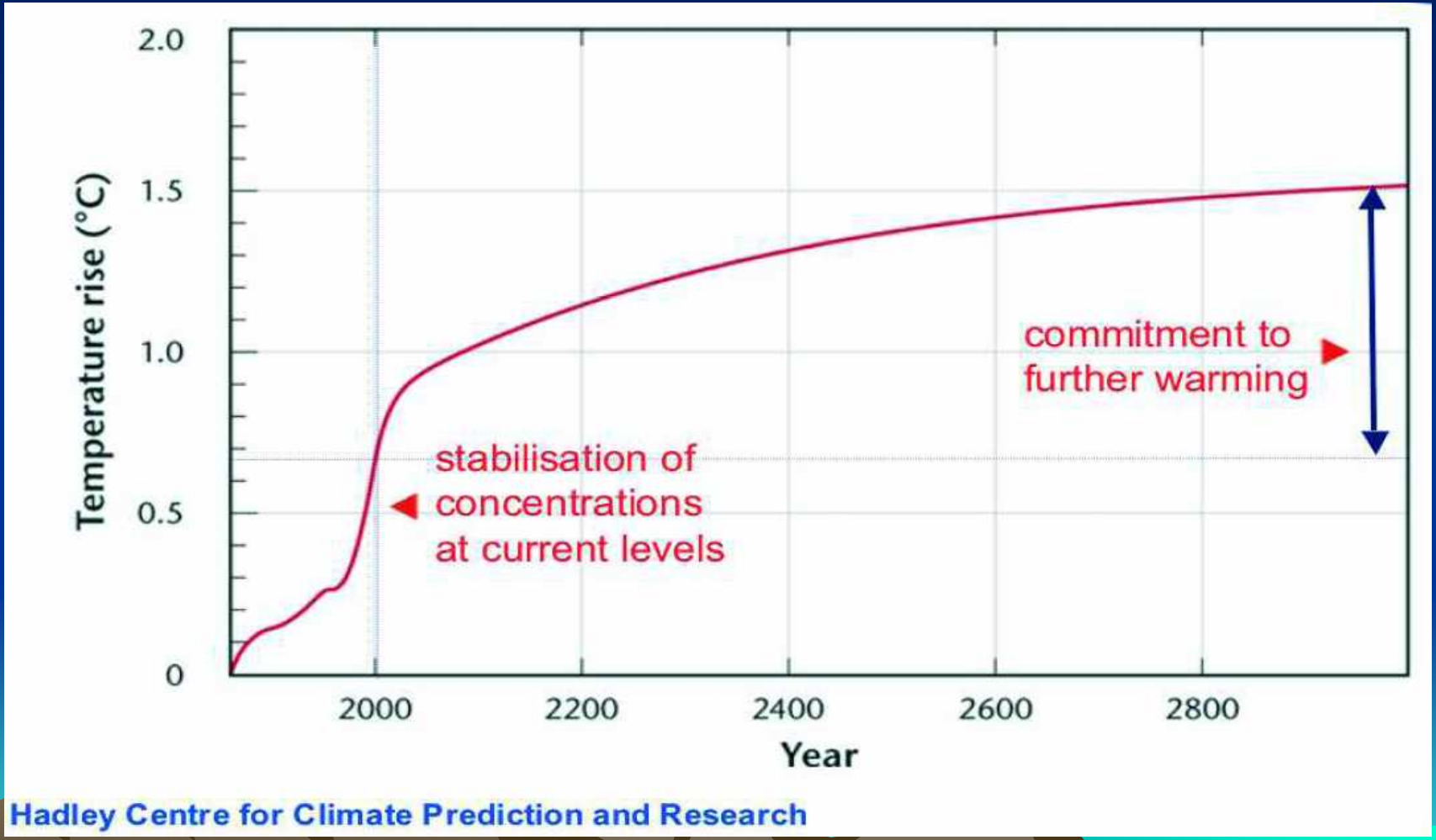
Realistic simulation of present climate



Climate extremes

Effects on extreme temperatures



SYR - FIGURE 4-1

Commitment to further warming