

Can we „fix“ the climate problem?

Jos Lelieveld

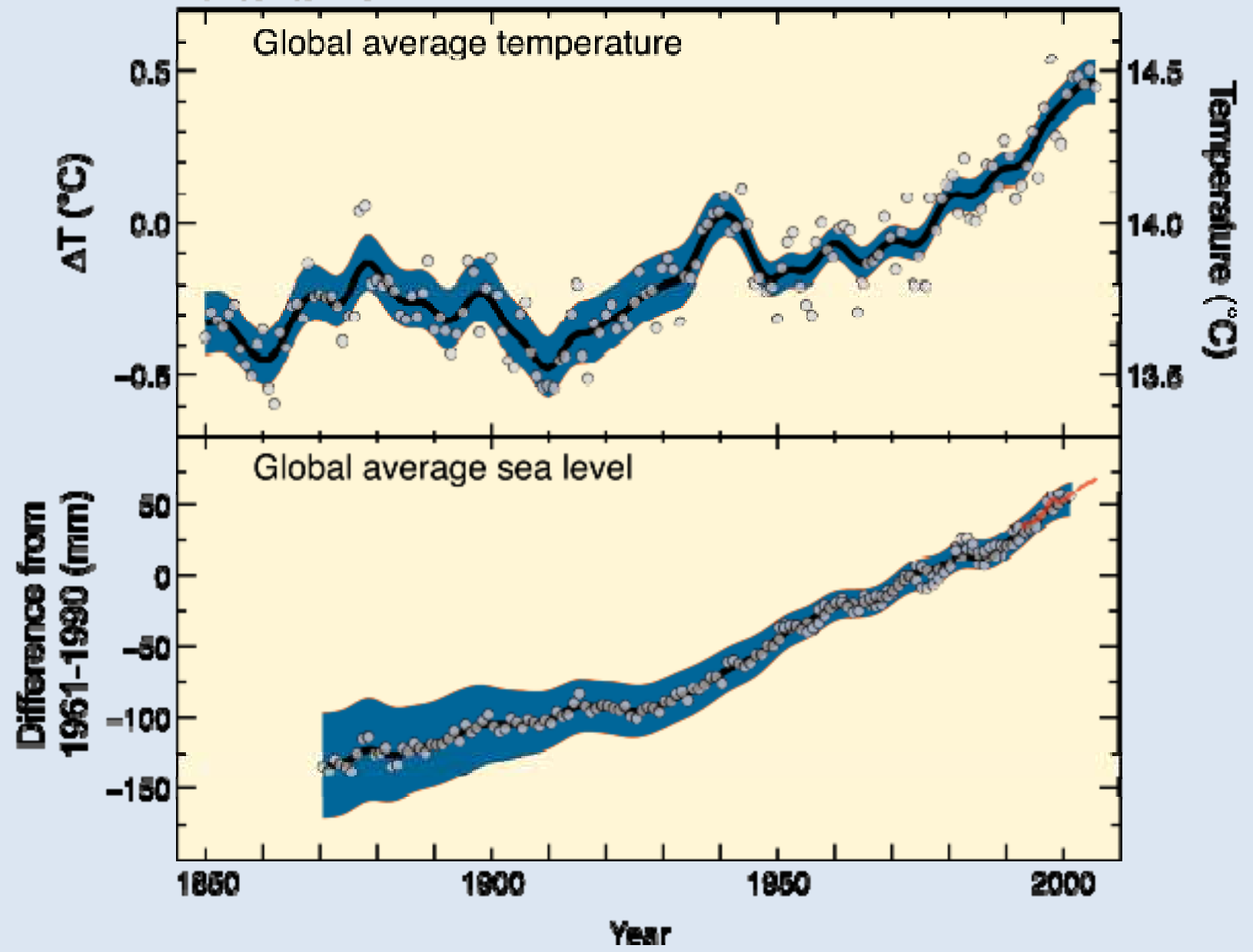
Energy, Water and Climate Change in
the Mediterranean and Middle East

Nicosia, 11 January 2010

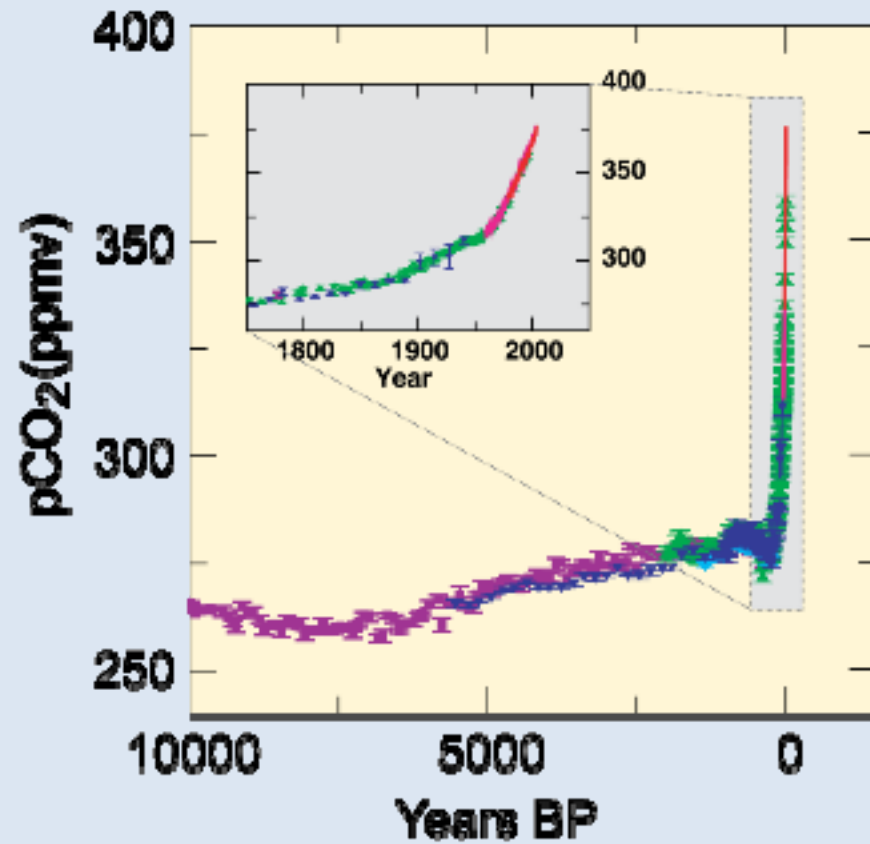


**THE CYPRUS
INSTITUTE**

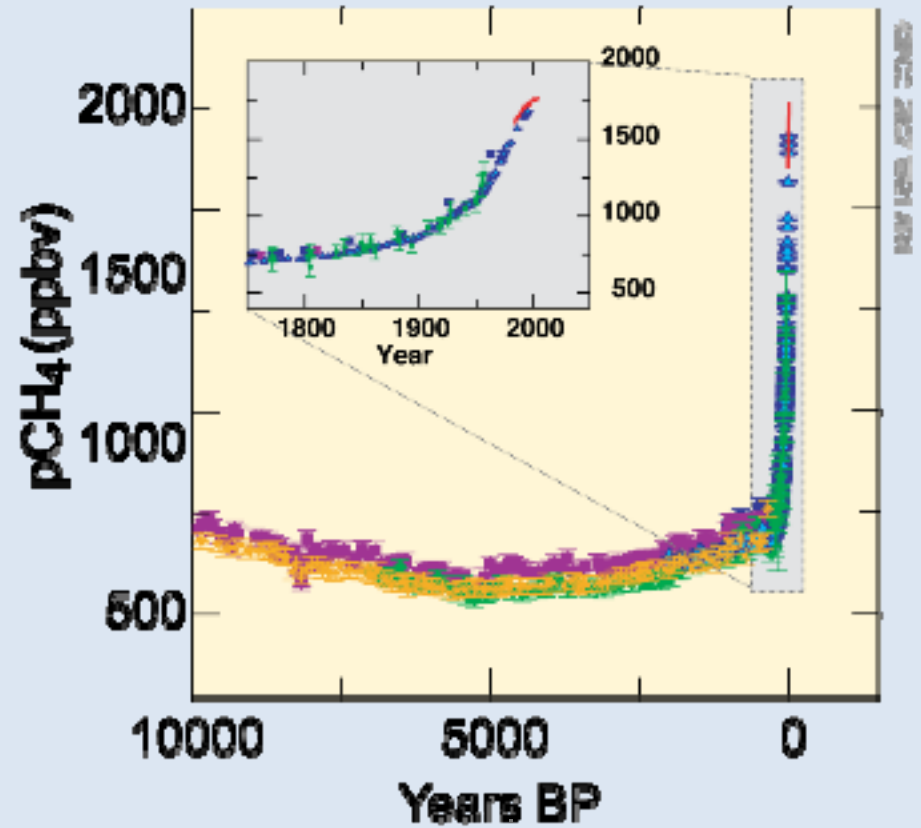
GIPCG 2007: W01-AR4



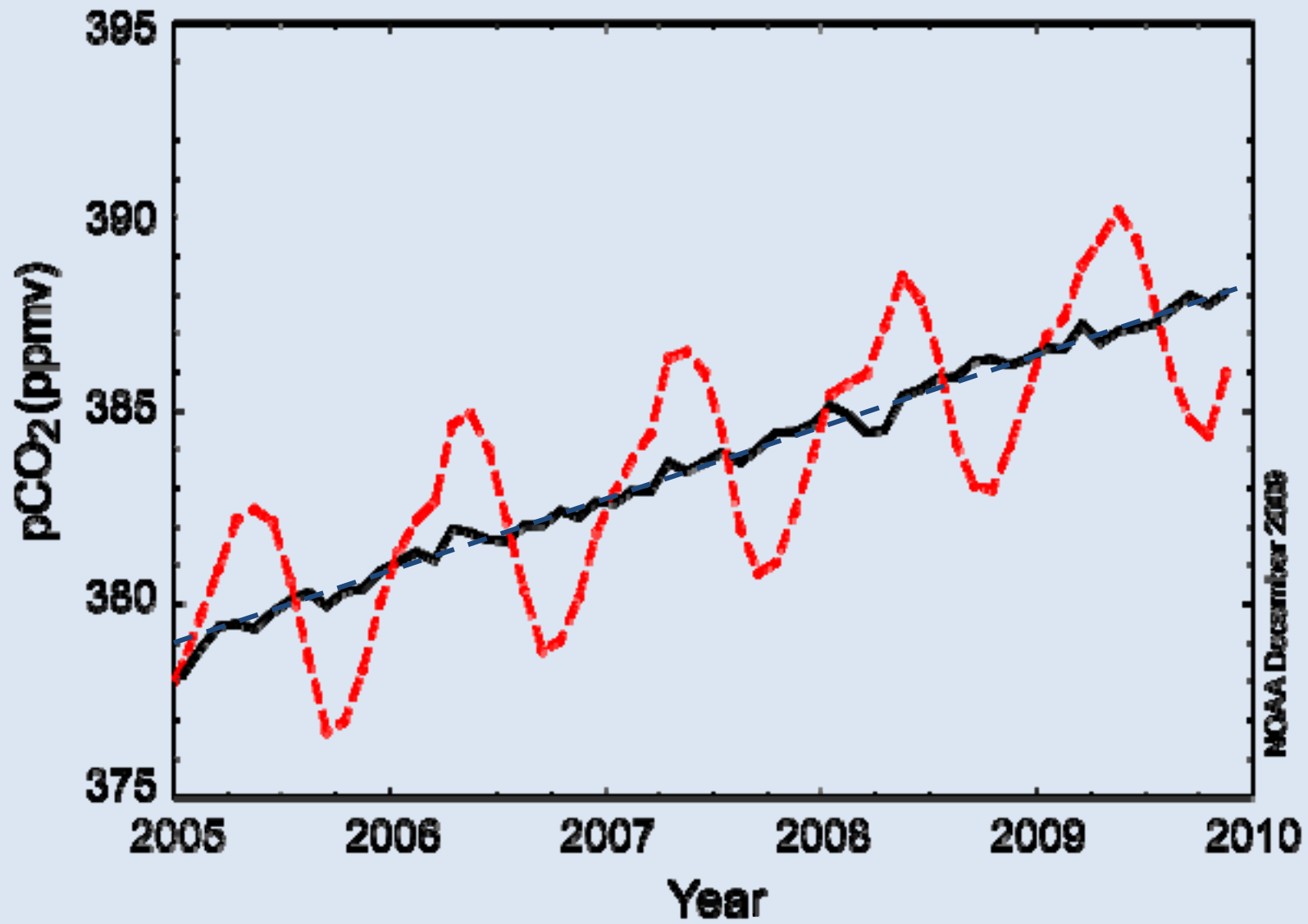
Carbon dioxide

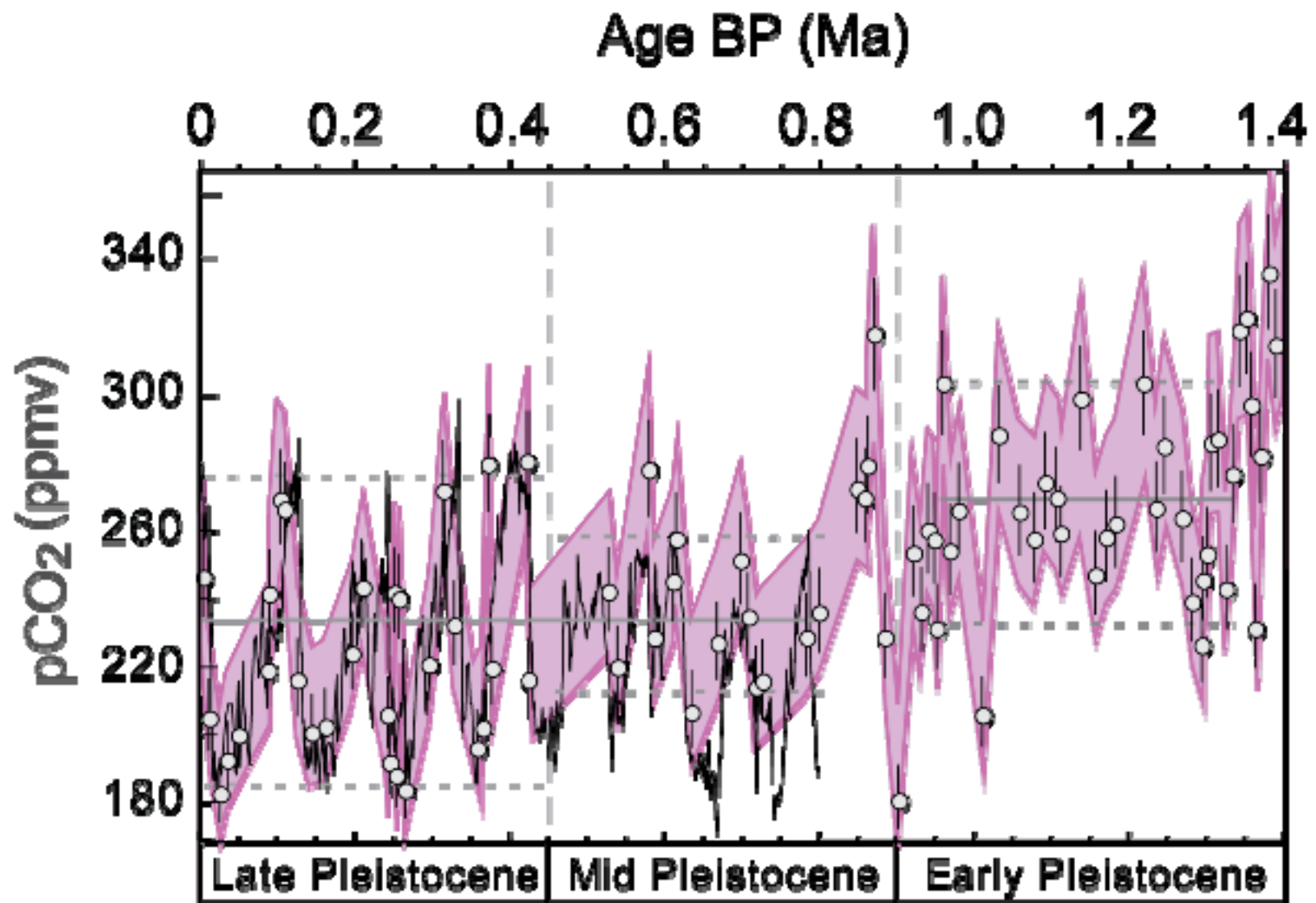


Methane

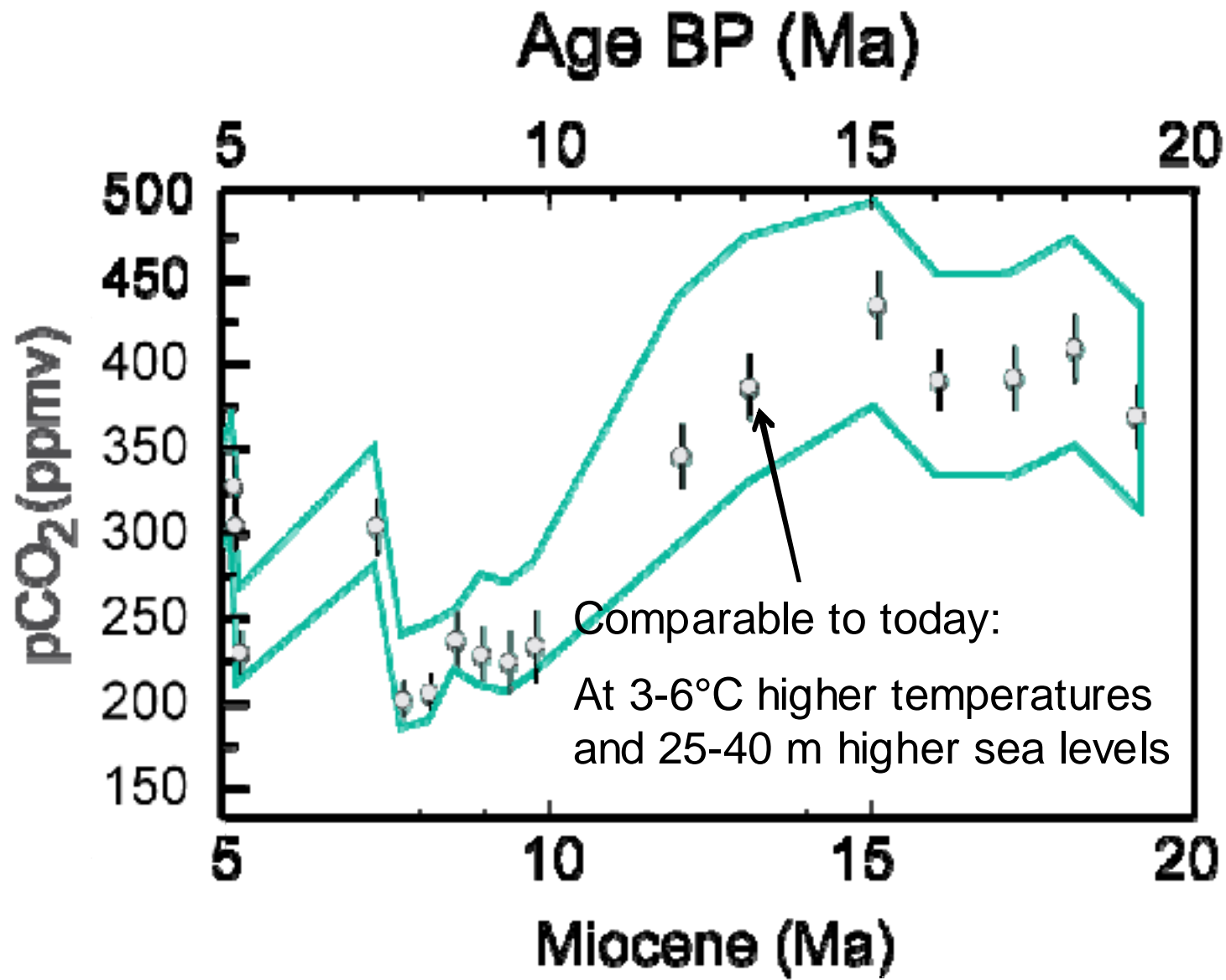


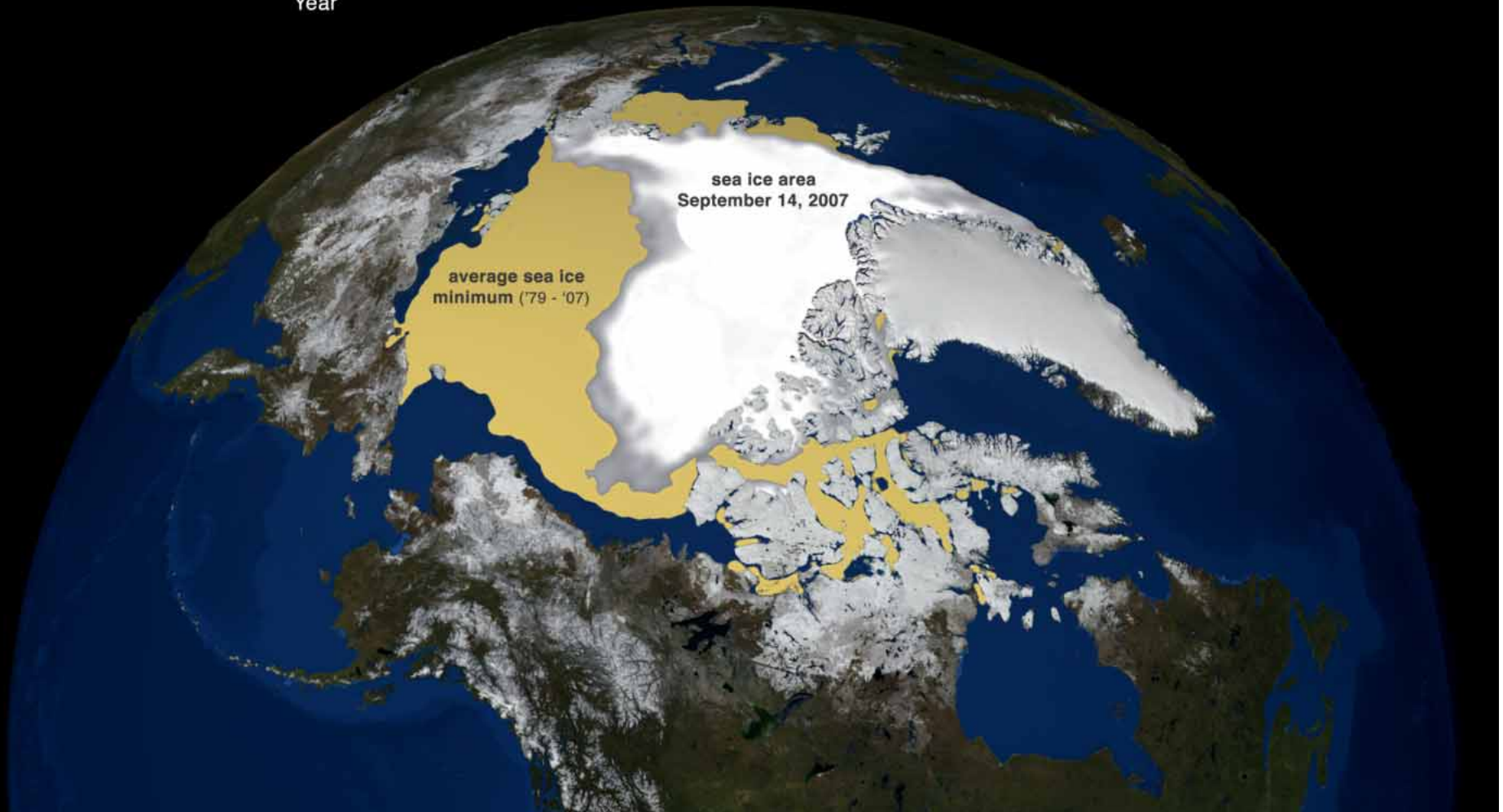
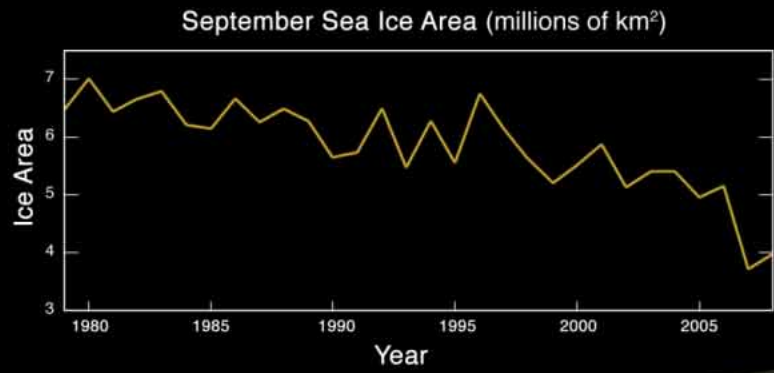
Recent global mean CO₂





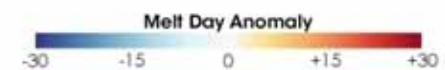
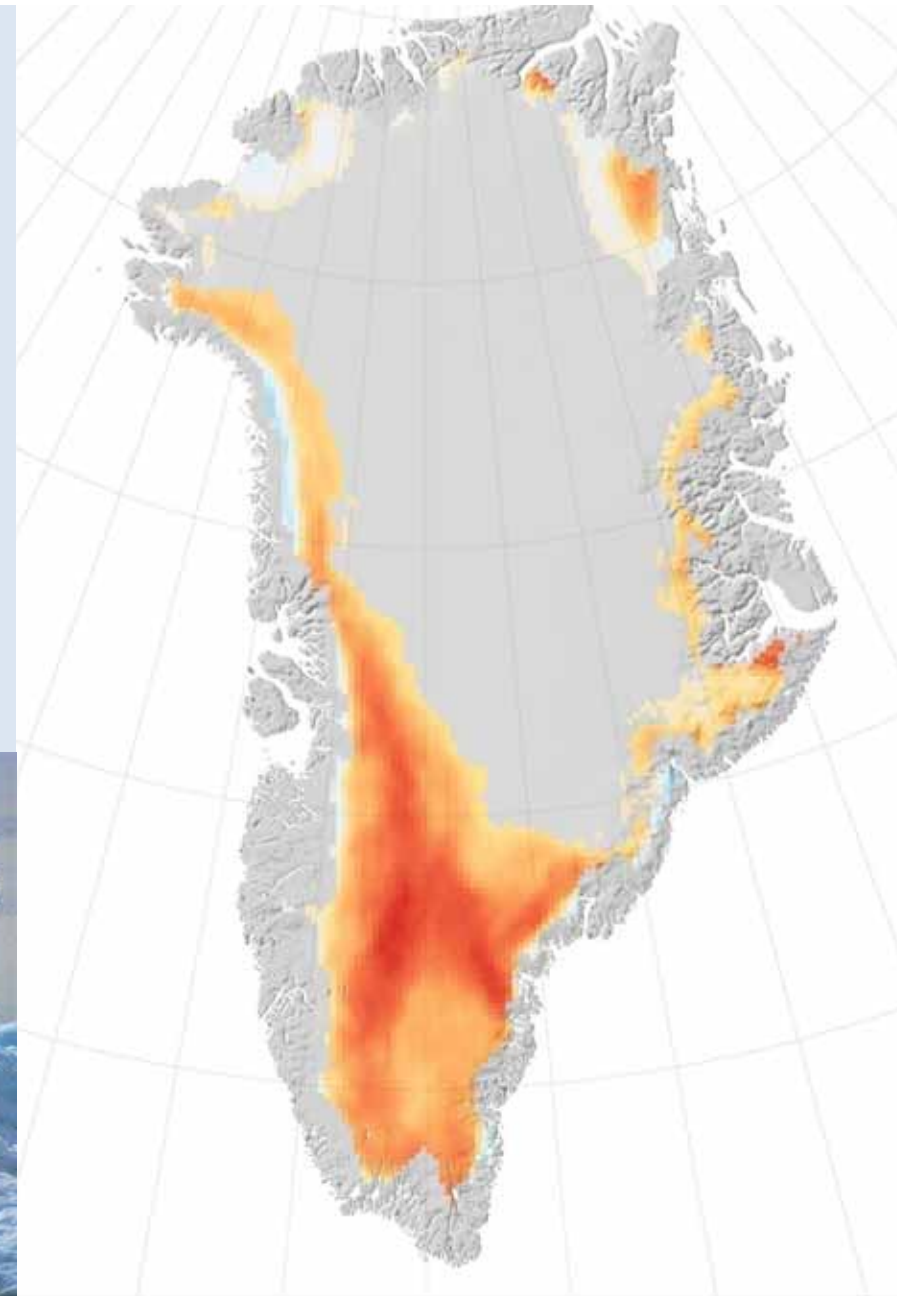
Tripati et al., 2009

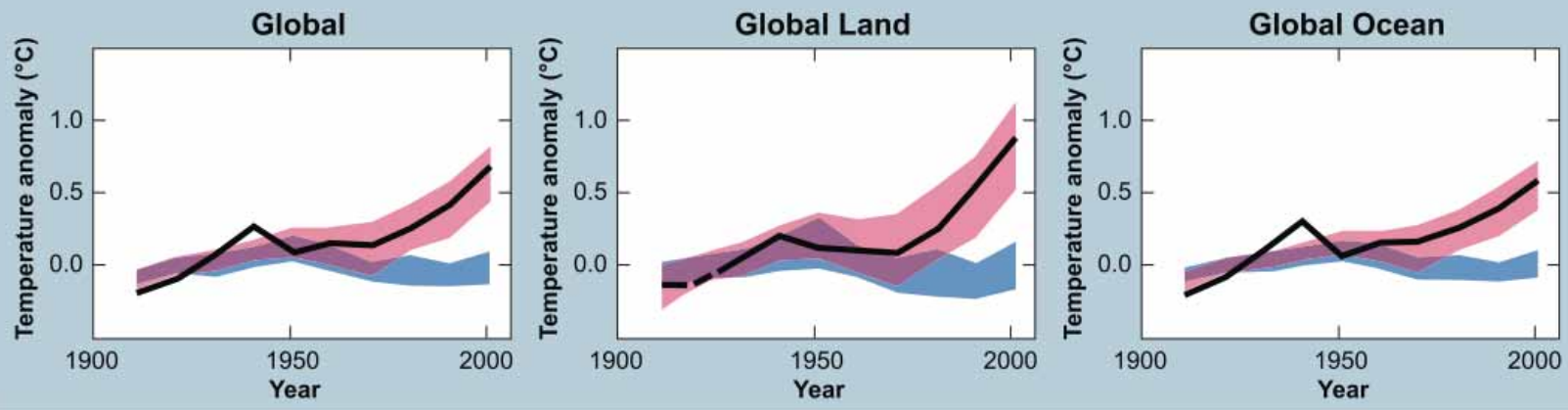
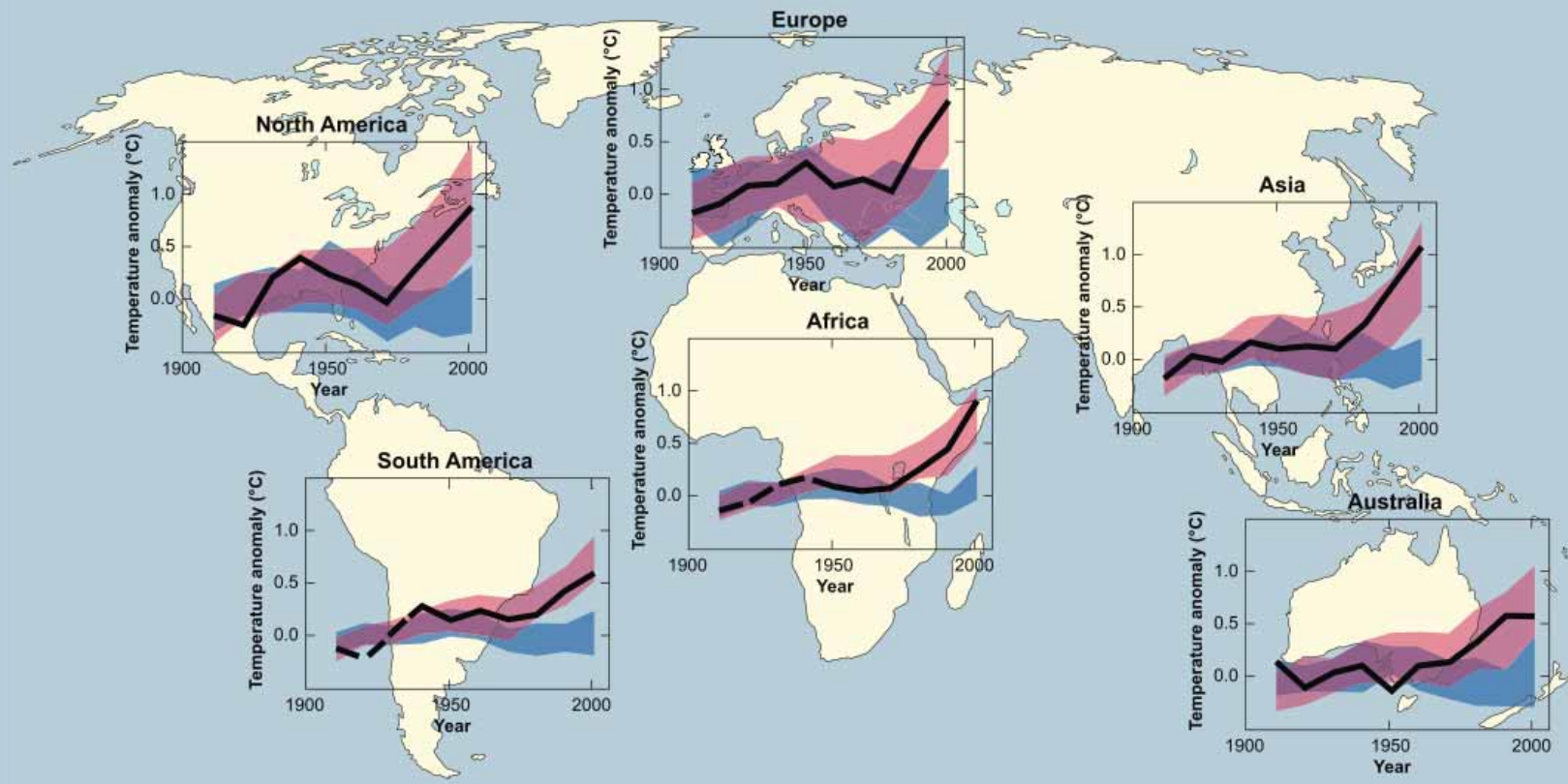




Greenland glaciers:

250-300 cubic kilometers of land ice is melting per year

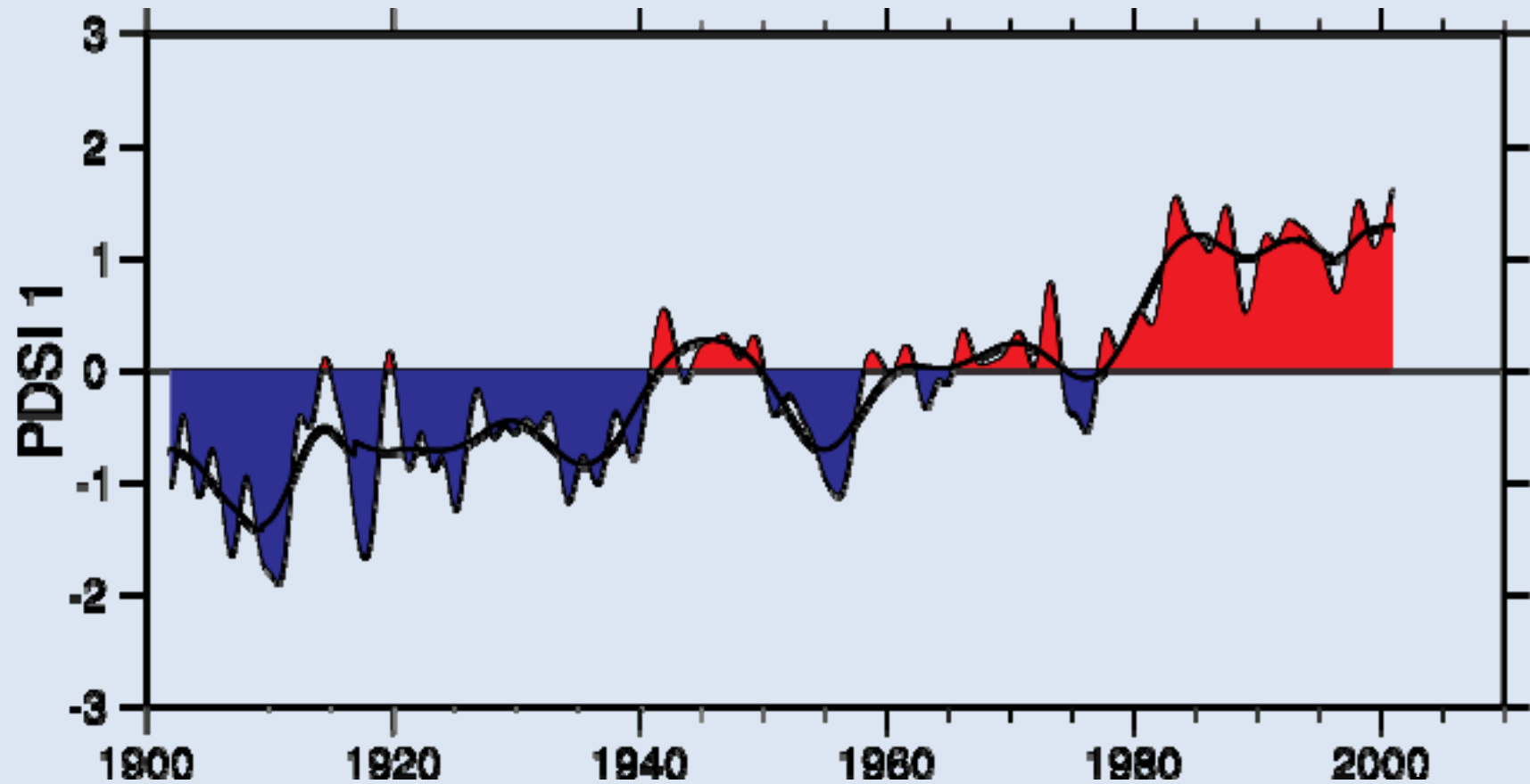




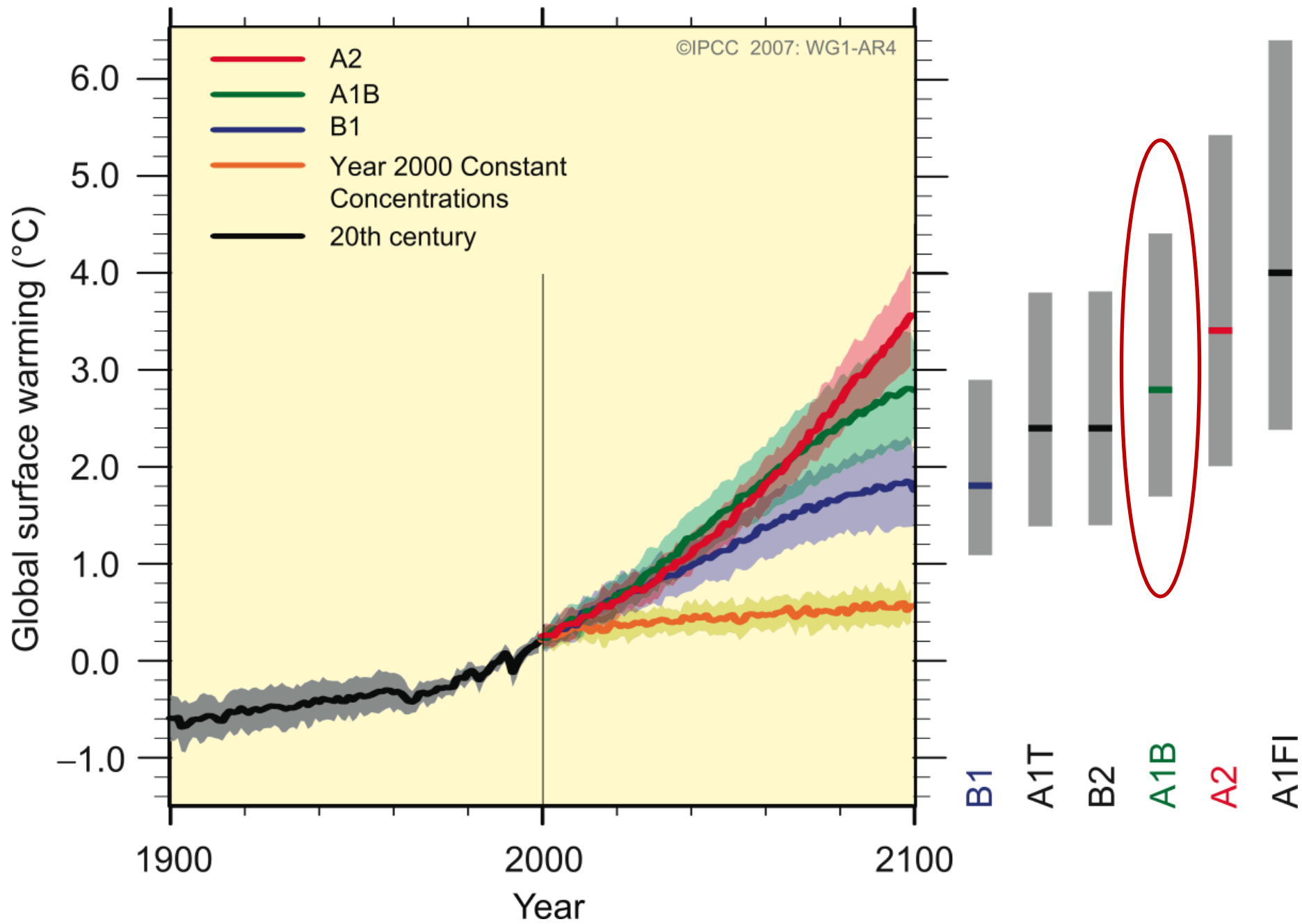
models using only natural forcings
 models using both natural and anthropogenic forcings
 observations

©IPCC 2007: WG1-AR

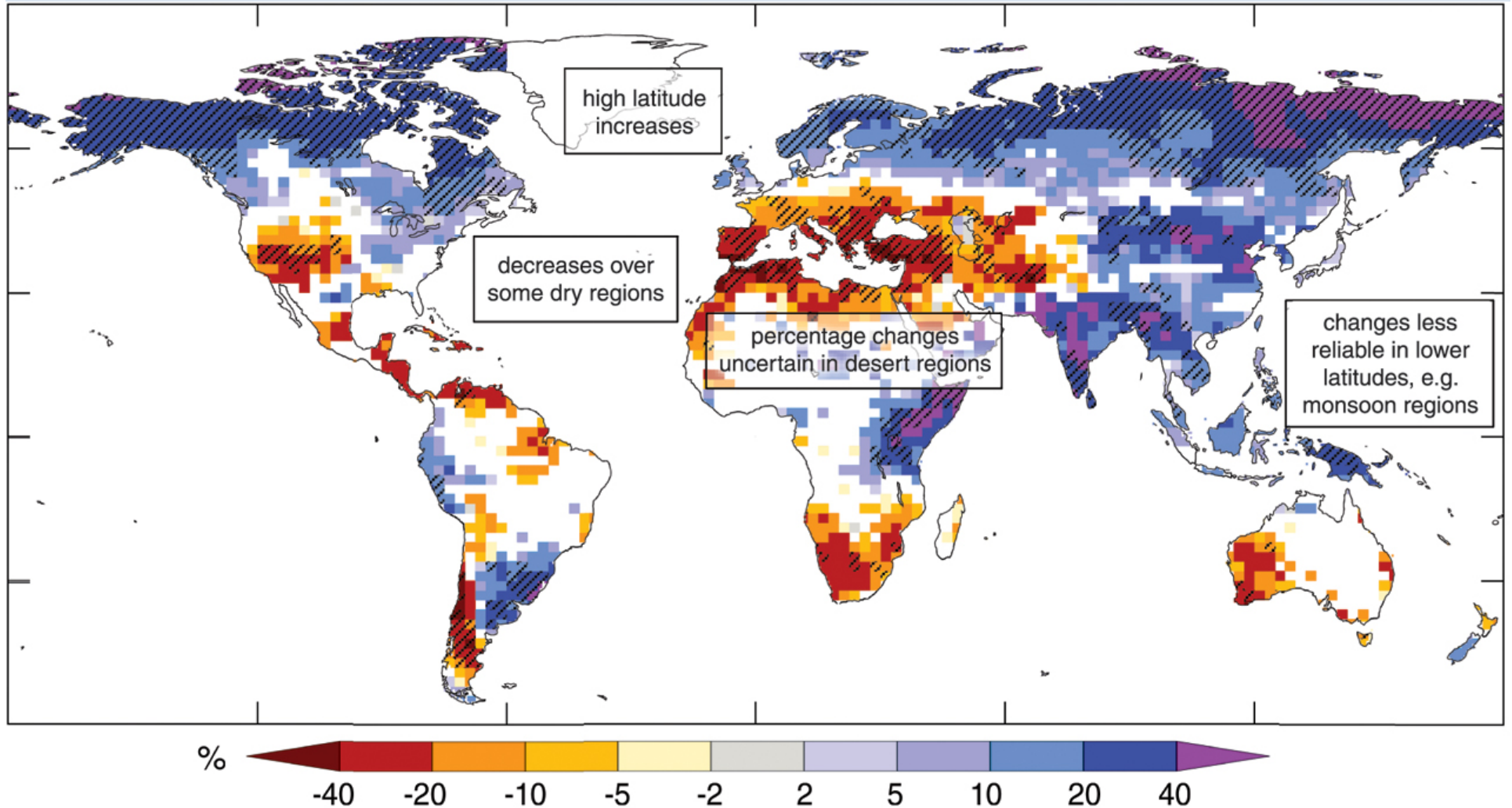
Drought index over the global land area

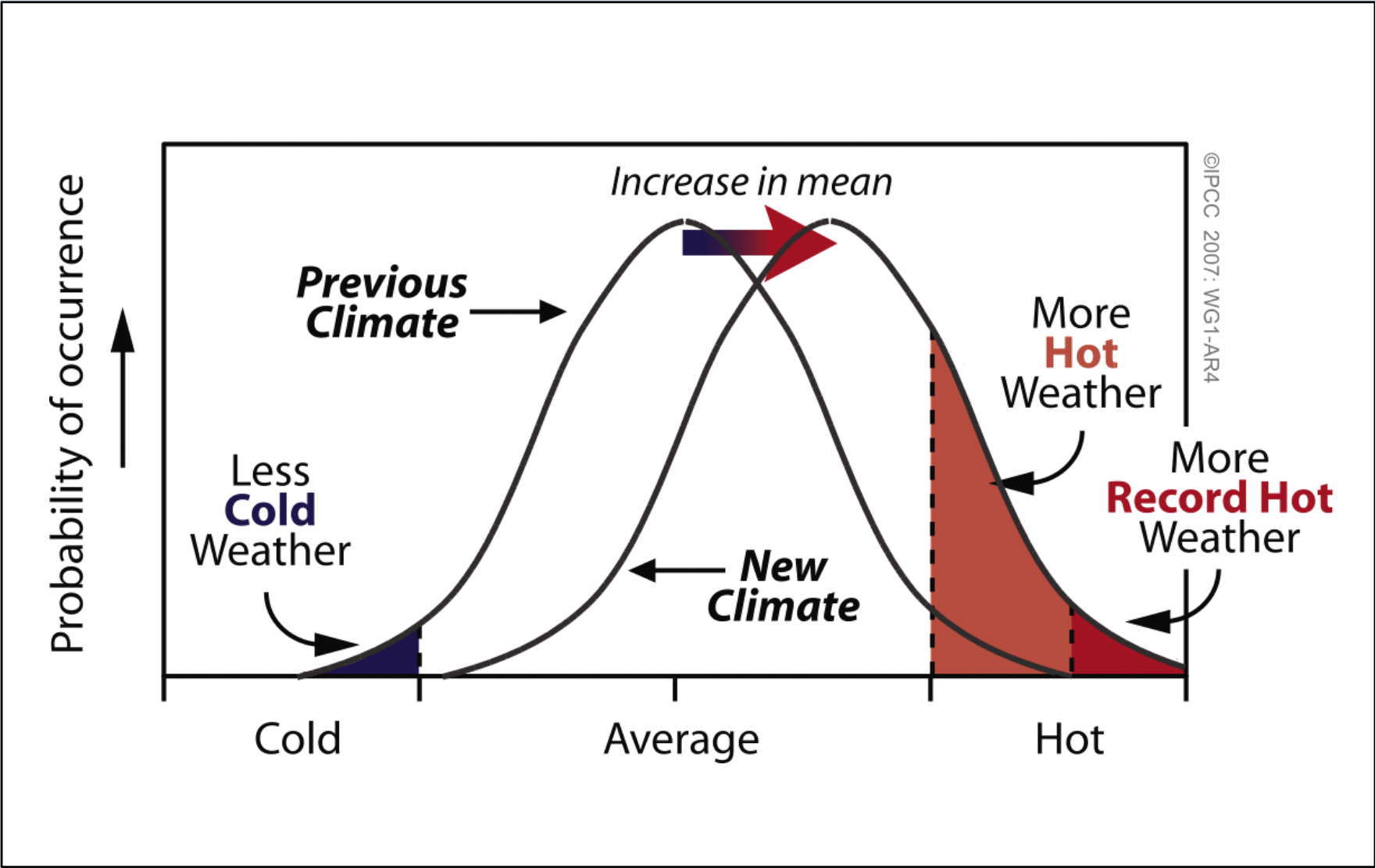


Increasing droughts in the Sahel, southern Africa, Mediterranean, southern Asia

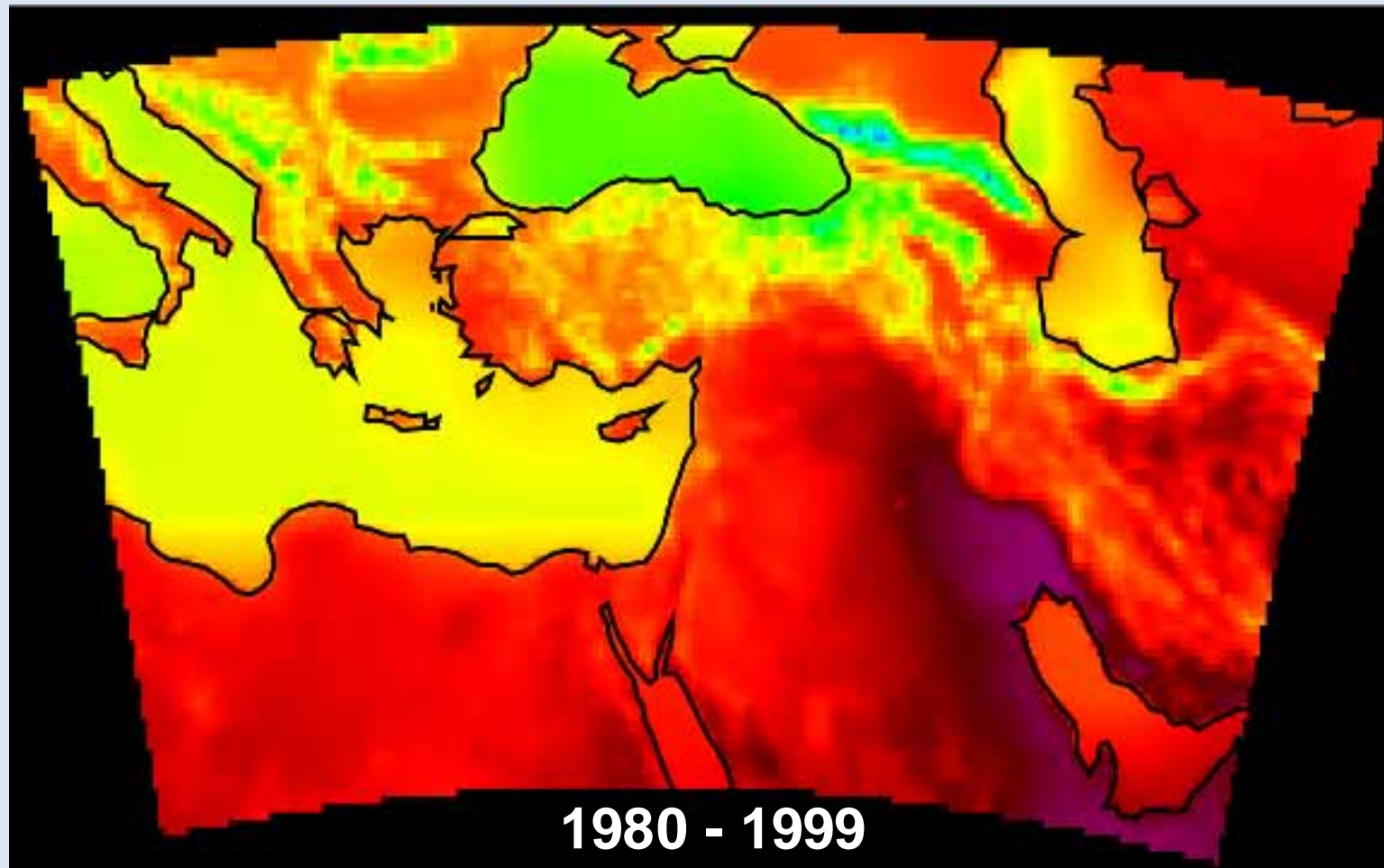


Changes in precipitation (%) in the 21st century

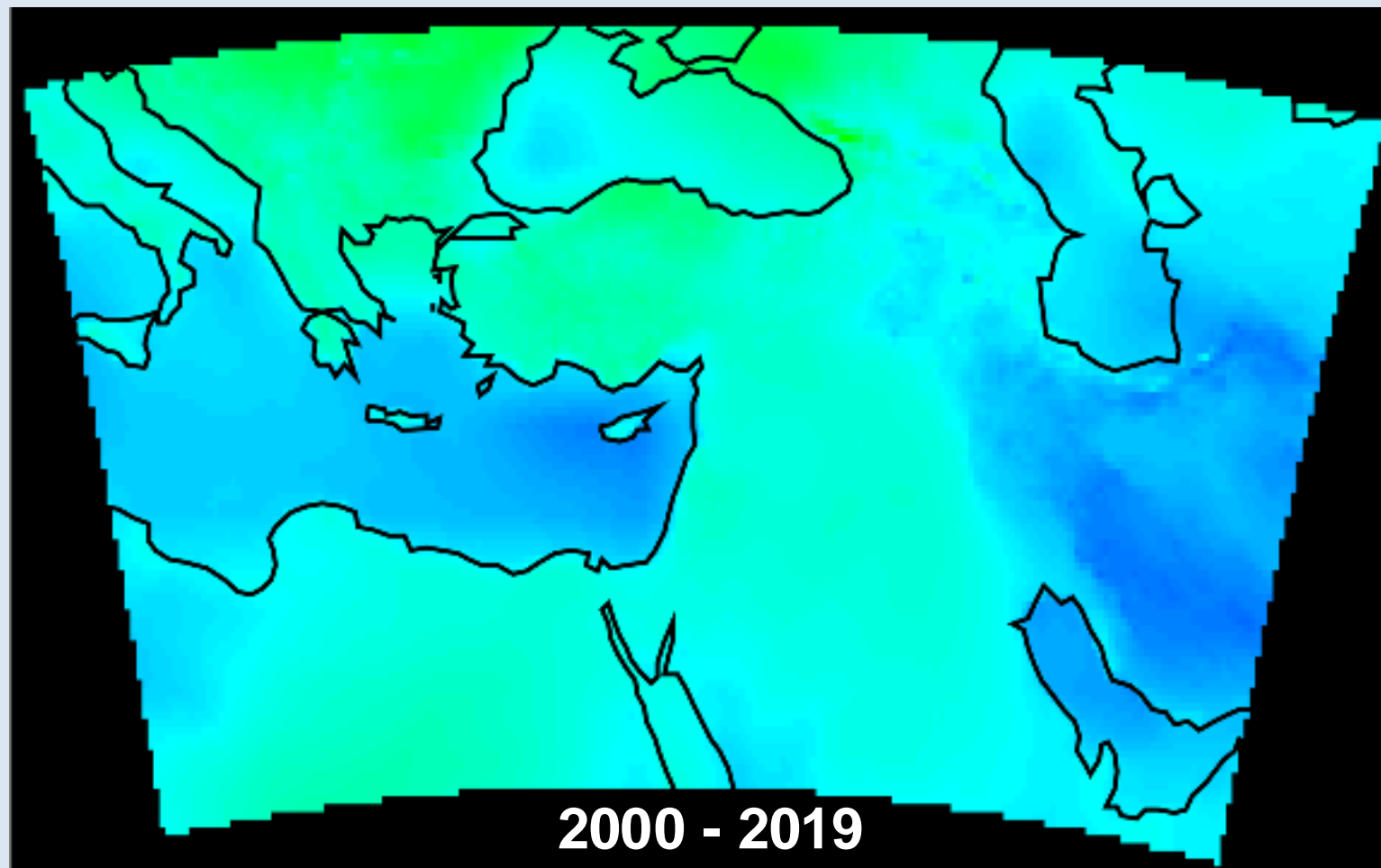




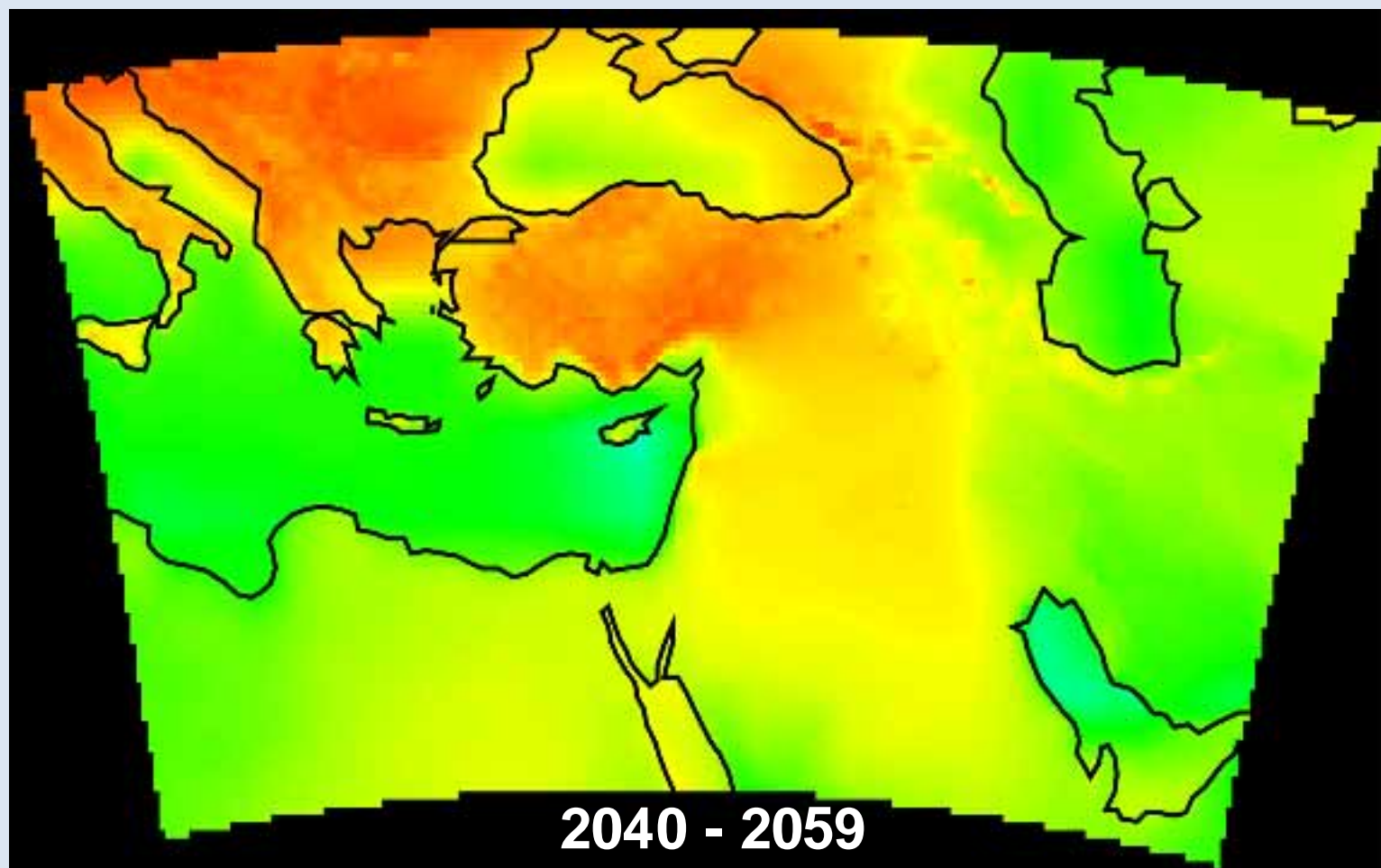
Maximum temperature in summer (JJA)



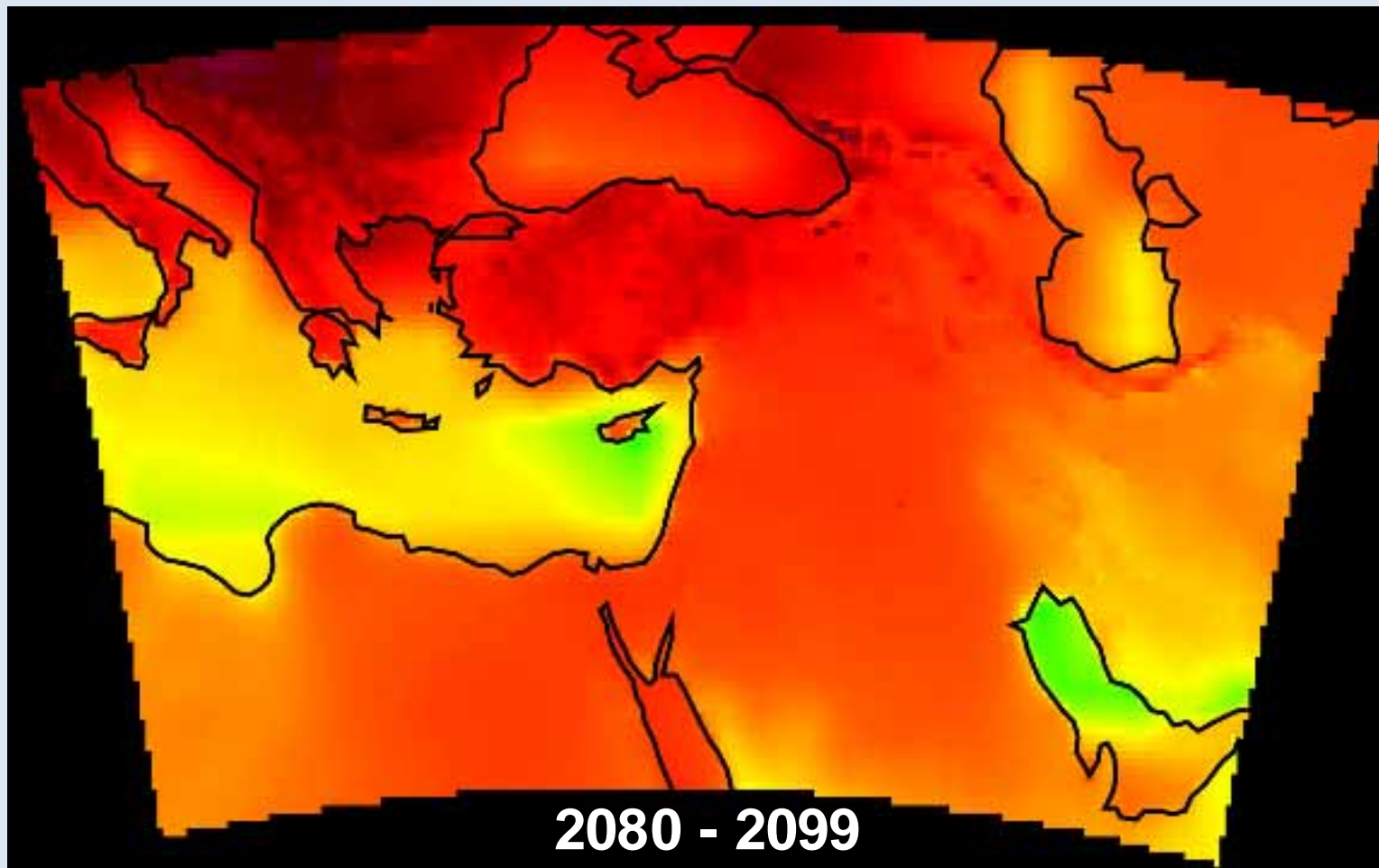
Increase in Tmax in summer (cf. 1980-1999)



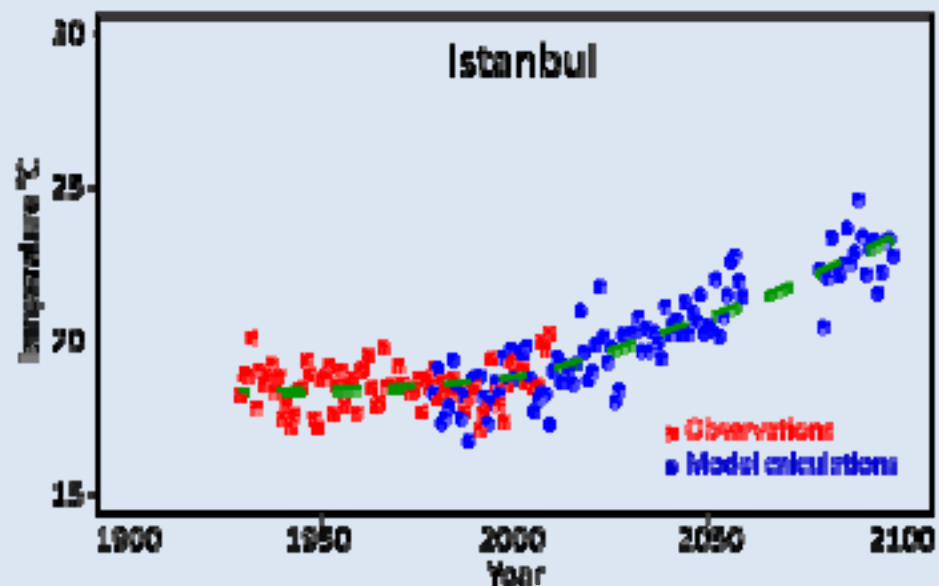
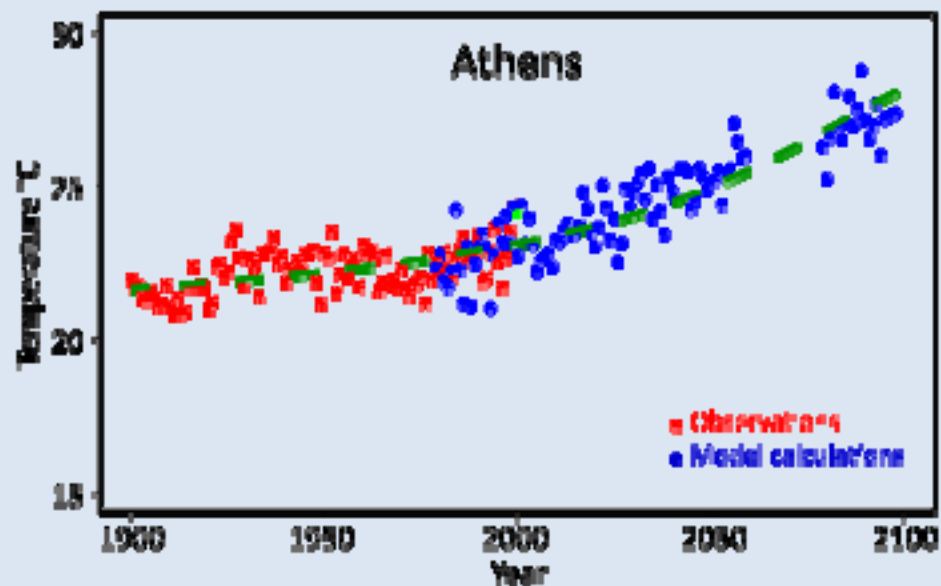
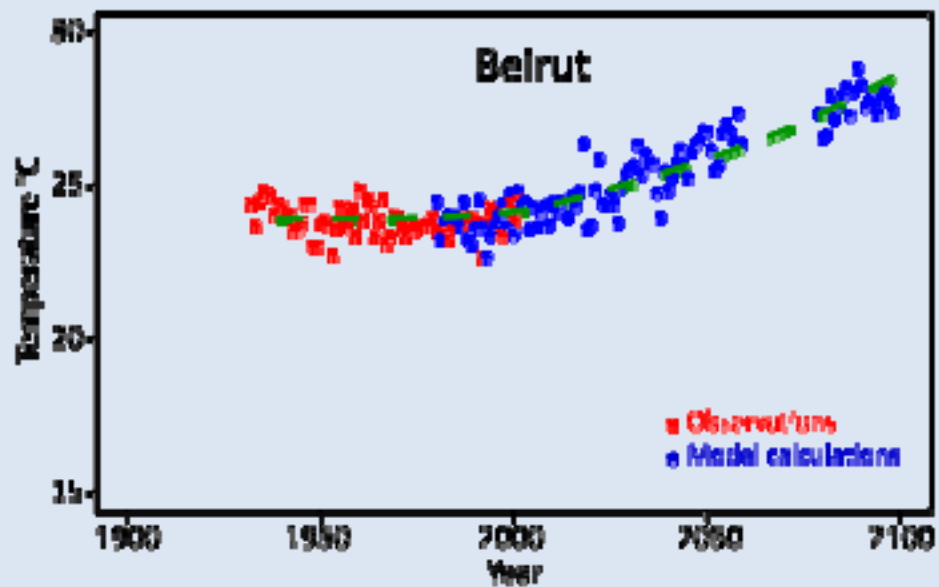
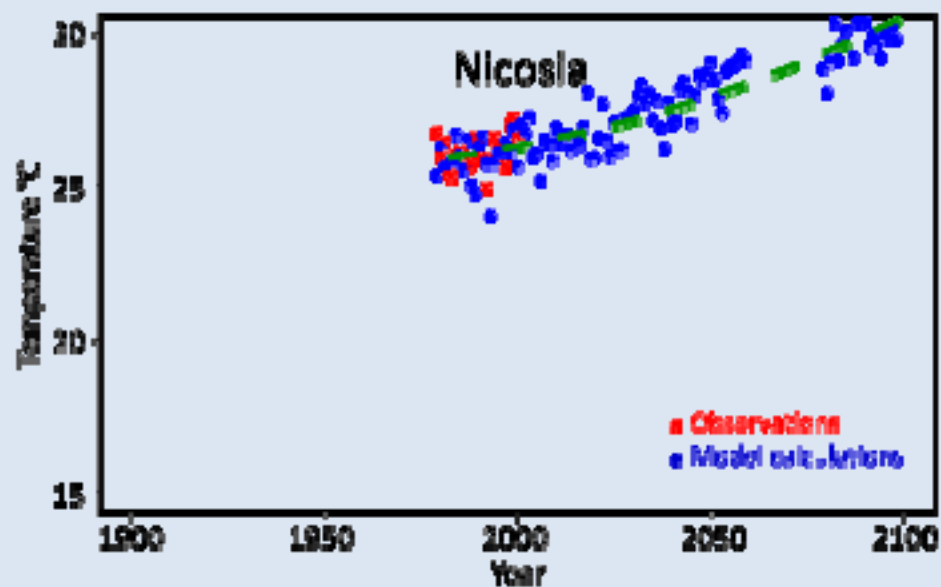
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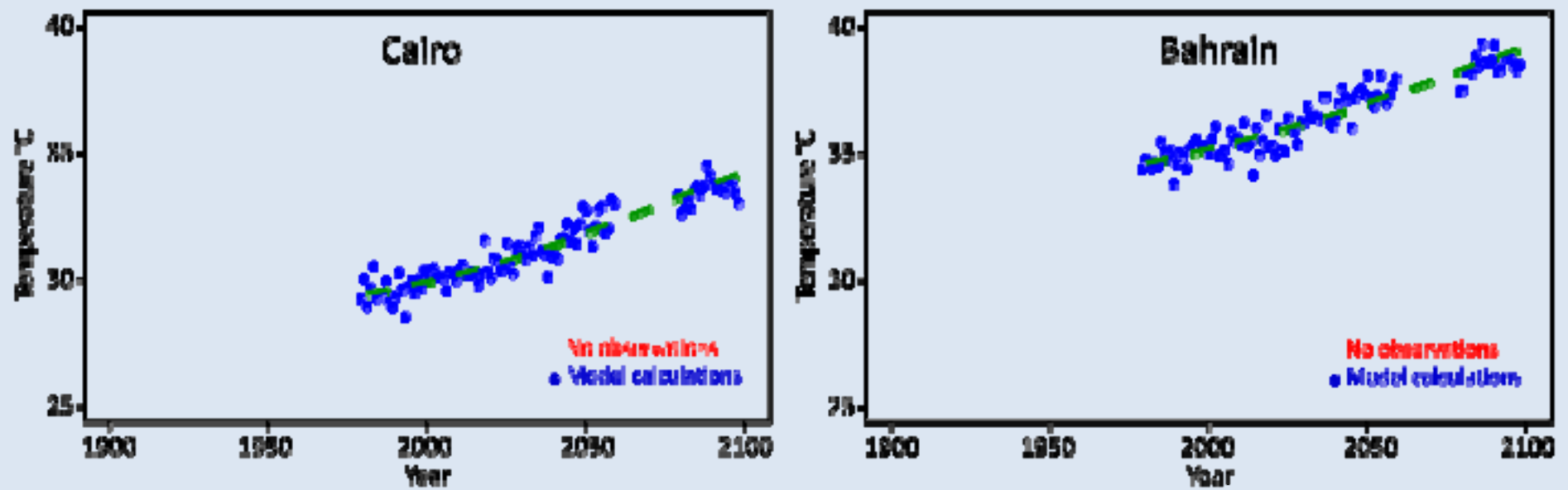
Increase in Tmax in summer (cf. 1980-1999)



Annual mean daytime maximum temperature



Annual mean daytime maximum temperature



Number of hot days per year ($T_{max} > 35^{\circ}\text{C}$)

	1981 - 2000	2081 - 2100	Change
Ankara	10	50	x 5
Athens	29	52	+ 80%
Bahrain	105	161	+ 50%
Beirut	7	57	x 8
Cairo	116	163	+ 40%
Istanbul	8	56	x 6
Nicosia	57	110	x 2

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Number of hot nights per year (Tmin > 25°C)

	1981 - 2000	2081 - 2100	Change
Ankara	0.2	18	x10
Athens	21	59	x 2
Bahrain	211	251	+ 20%
Beirut	1	34	x 30
Cairo	2	80	x 40
Istanbul	0.3	34	x 10
Nicosia	15	83	x 5

Copenhagen Accord

- Climate change is one of the greatest challenges of our time
- Global mean temperature change should remain below 2°C
- Deep cuts in global GHG emissions are required
- Enhance cooperative action to combat climate change
- Recognize critical impacts on particularly vulnerable countries
- Developed countries shall provide financial resources, technology and capacity-building to developing countries

A global 2°C increase may be too much for certain regions
(Small island states, Arctic, Mediterranean & Middle East)

Martin Parry (IPCC):

- Even the toughest and most robust measures will not achieve 2°C
- We should hope for 2°C but realistically expect 3-3.5 °C
- And then plan for 4°C

Sir David King:

Fully global cap-and-trade scheme
with single high price on carbon's head

- Aim for upper limit (e.g. 450 ppmv CO₂)
- Bring down CO₂ emission from 30 Gt/a to 18 Gt/a by 2050
(per capita allowance of 2 tonnes CO₂/a)
- Developing countries could temporarily increase emissions
or benefit by selling emission credits

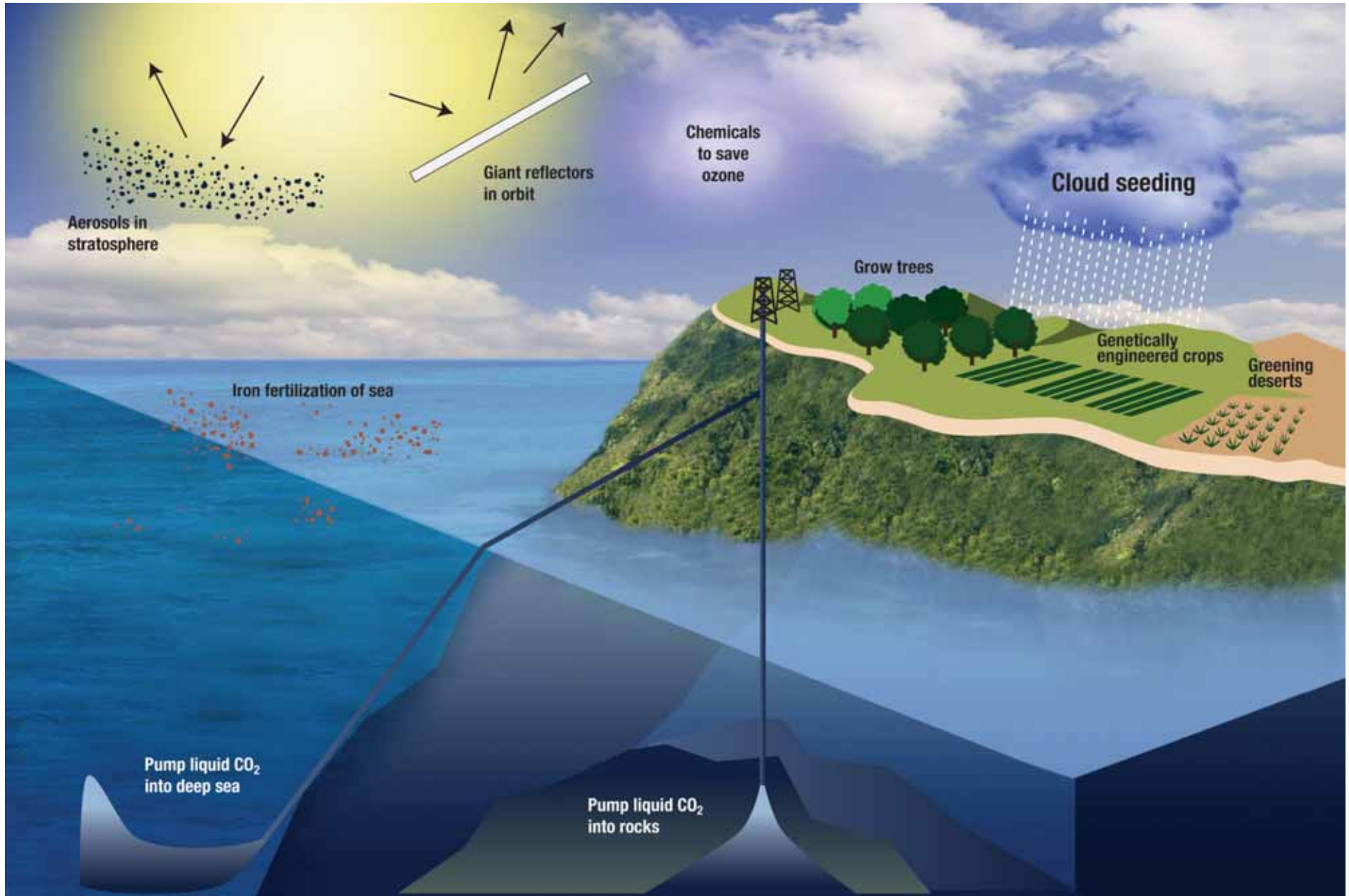
Paul Crutzen:

Geoengineering by introducing pollution particles into the stratosphere to reflect sunlight

Create a possibility to combat potentially drastic climate heating

Ralph Cicerone (US-NAS):

Research on geoengineering should be considered, separately from actual implementation



Proposed geoengineering options

Stratospheric geoengineering

Royal Society: „solar radiation management“

- Reduce the most severe impacts of global warming
- Will need to continue for decades
- International governance mechanisms lacking
- Whose hand is on the thermostat?
- Increasing ozone depletion
- Unexpected consequences
- Astronomers won't like it
- Ethics: do we have the right to do it?

Thank you for your attention

A fruitful conference!

