



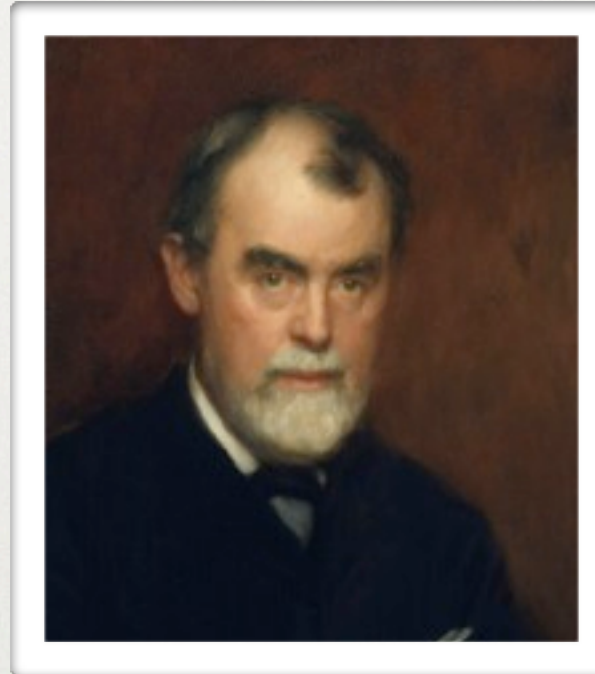
Cabot Institute

Living with global uncertainty

THRILLER

CHRIS RAPLEY
CABOT LECTURE
BRISTOL
1ST MARCH 2013

SAMUEL BUTLER



All progress derives from the ineluctable
desire of every organism to live beyond
its means

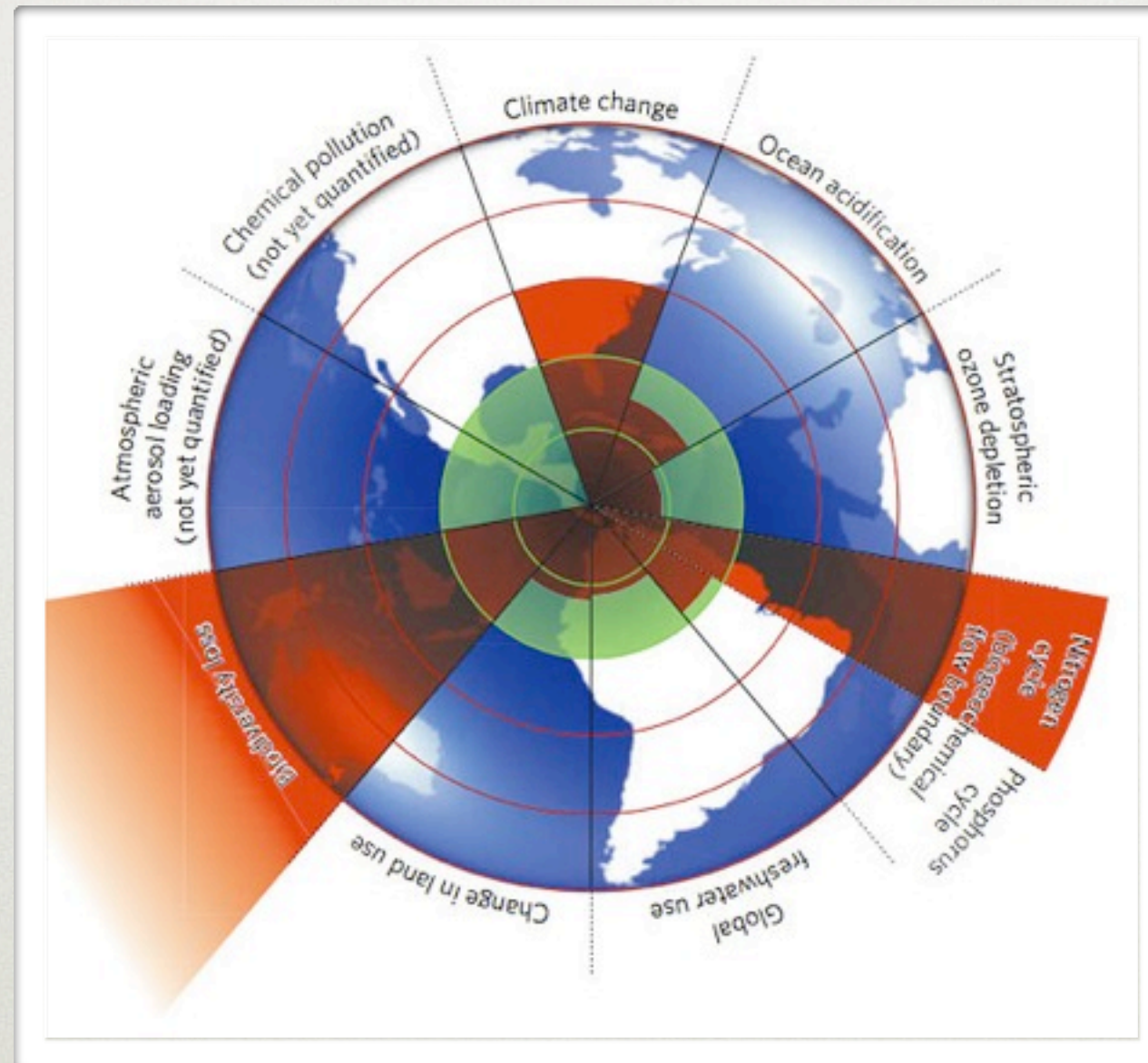
MODERN WORLD BUILT ON

- Science / Ingenuity
- Capitalism / Globalisation
- Fossil energy “Eldorado”
- Unusually stable climate



Doha

PUSHING THE LIMITS



Planetary Boundaries: Exploring the Safe Operating Space for Humanity

Nature 461, 472-475 (24 September 2009)

[Johan Rockström](#)^{1,2}, [Will Steffen](#)^{1,3}, [Kevin Noone](#)^{1,4}, [Åsa Persson](#)^{1,2}, [F. Stuart III Chapin](#)⁵, [Eric Lambin](#)⁶, [Timothy M. Lenton](#)⁷, [Marten Scheffer](#)⁸, [Carl Folke](#)^{1,9}, [Hans Joachim Schellnhuber](#)^{10,11}, [Björn Nykvist](#)^{1,2}, [Cynthia A. de Wit](#)⁴, [Terry Hughes](#)¹², [Sander van der Leeuw](#)¹³, [Henning Rodhe](#)¹⁴, [Sverker Sörlin](#)^{1,15}, [Peter K. Snyder](#)¹⁶, [Robert Costanza](#)^{1,17}, [Uno Svedin](#)¹, [Malin Falkenmark](#)^{1,18}, [Louise Karlberg](#)^{1,2}, [Robert W. Corell](#)¹⁹, [Victoria J. Fabry](#)²⁰, [James Hansen](#)²¹, [Brian Walker](#)^{1,22}, [Diana Liverman](#)^{23,24}, [Katherine Richardson](#)²⁵, [Paul Crutzen](#)²⁶ and [Jonathan Foley](#)²⁷

MOST COMPLEX OBJECT

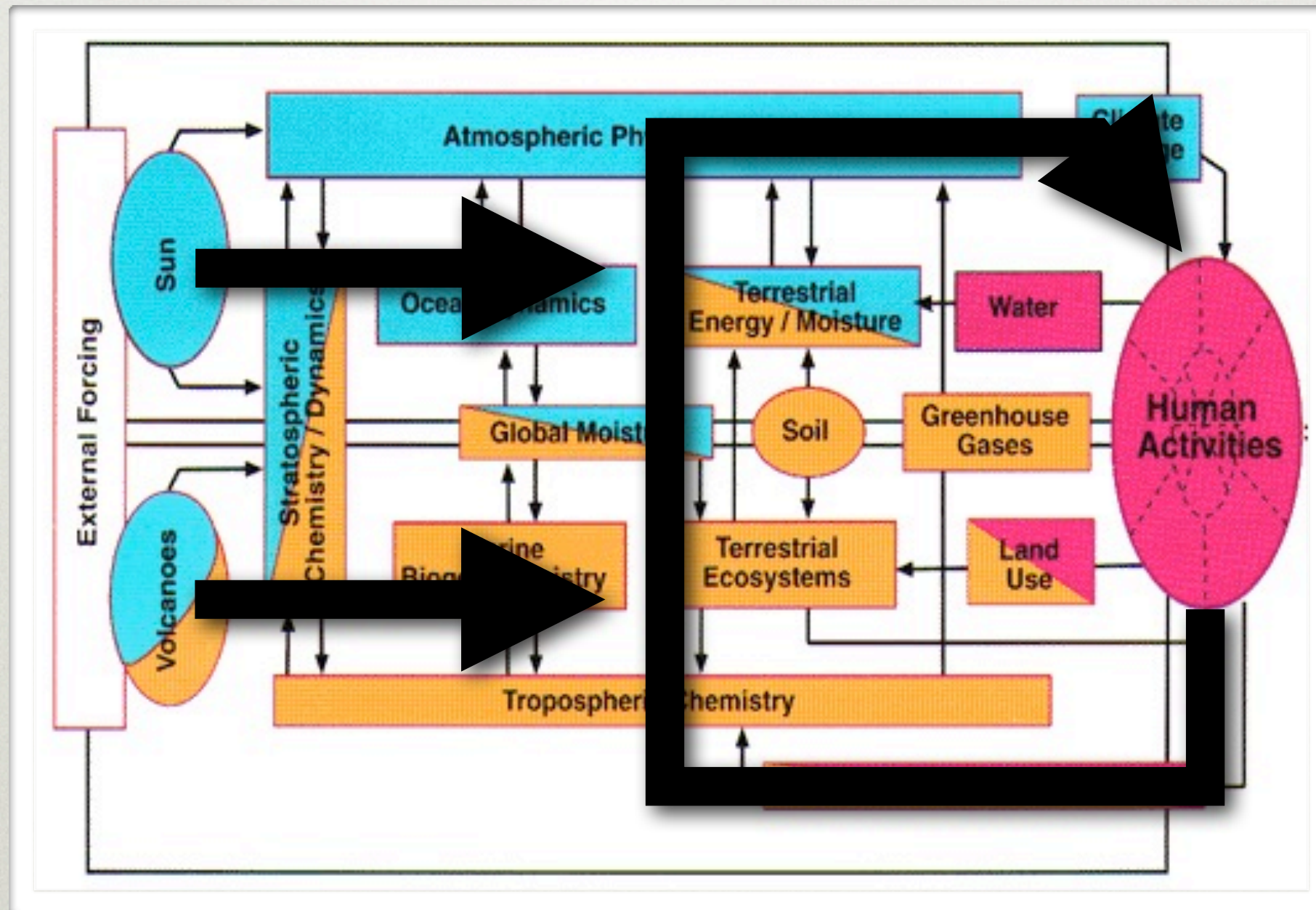


MOST COMPLEX OBJECT

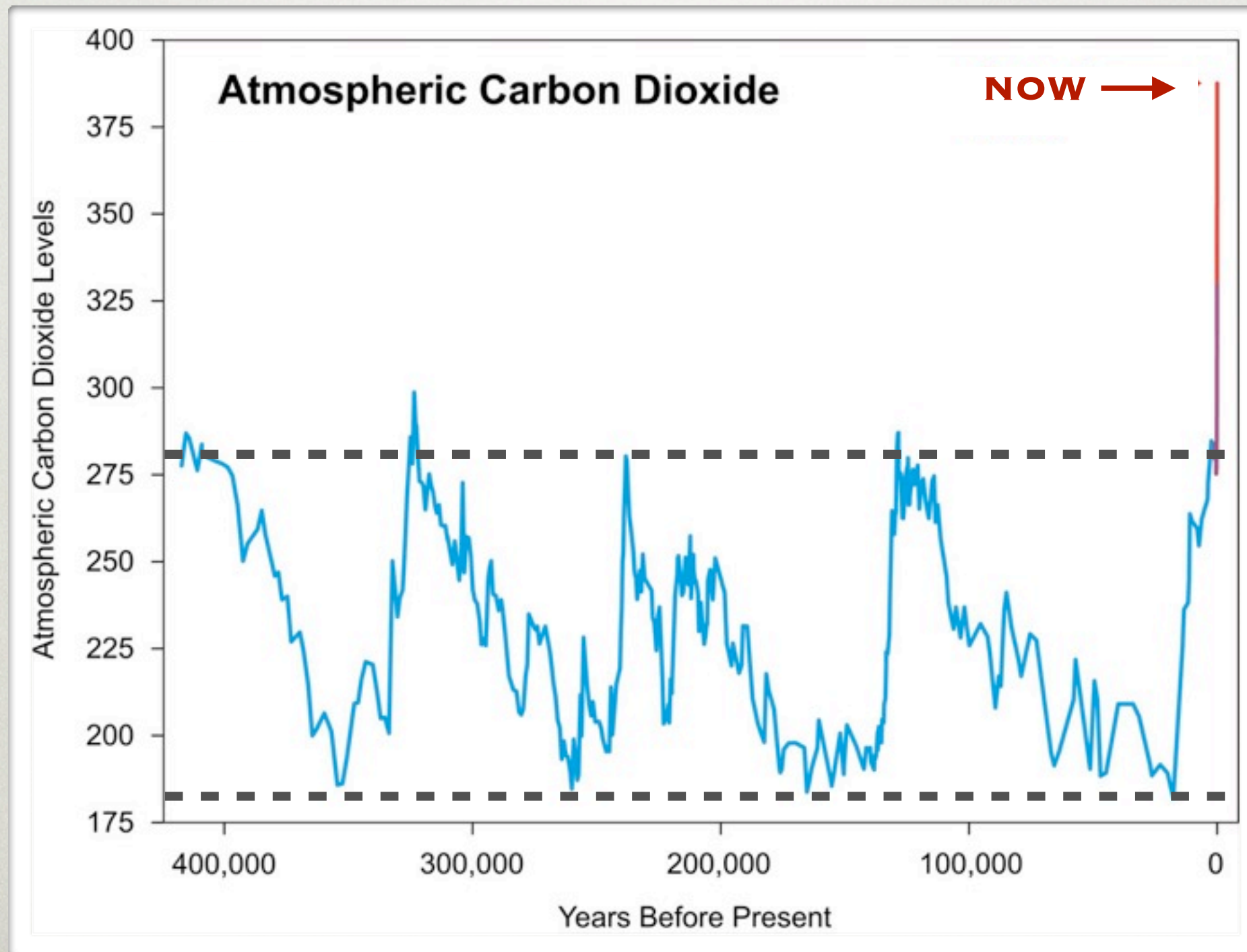


Life Support System

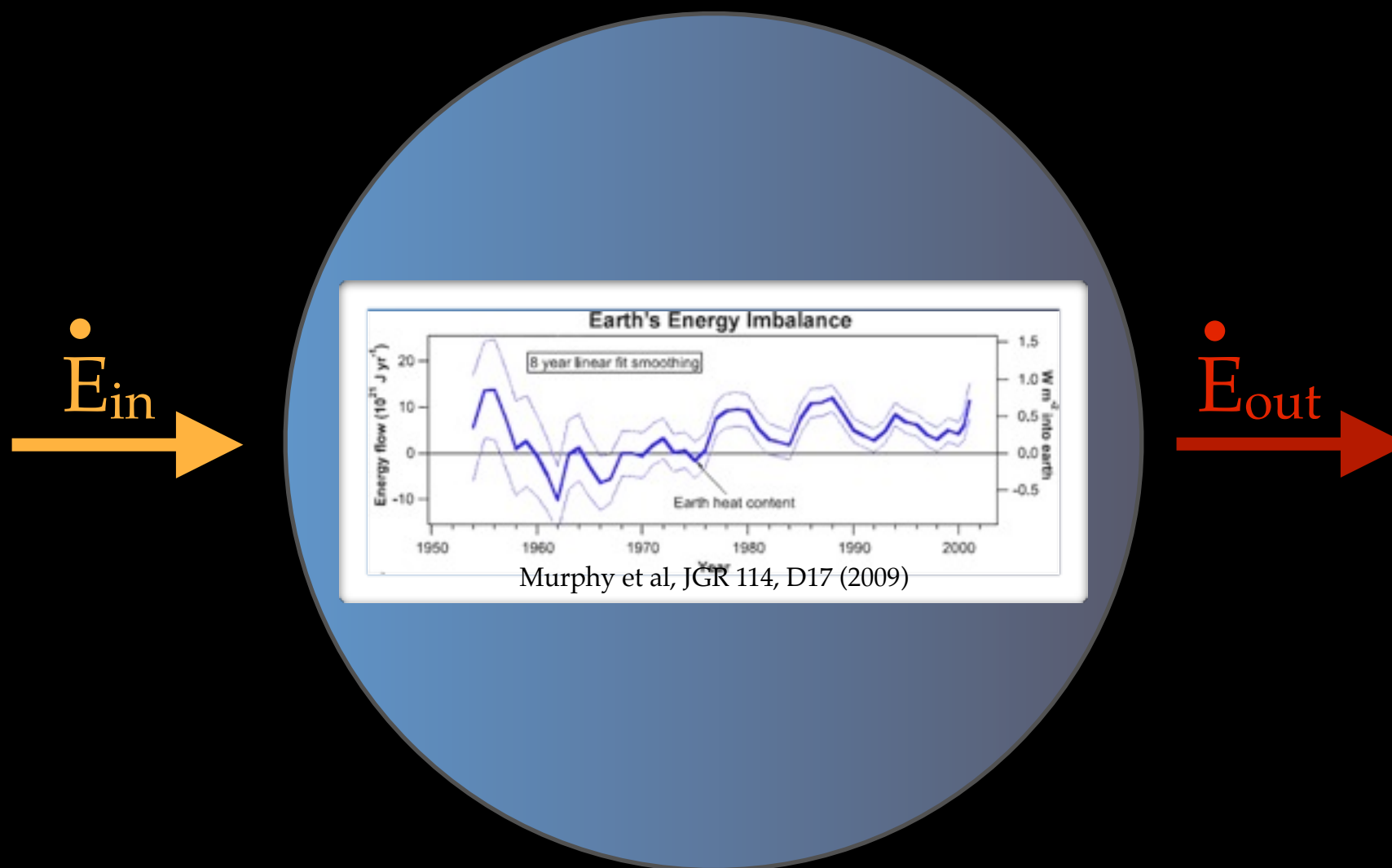
INNER WORKINGS



ATMOSPHERE SHIFTED

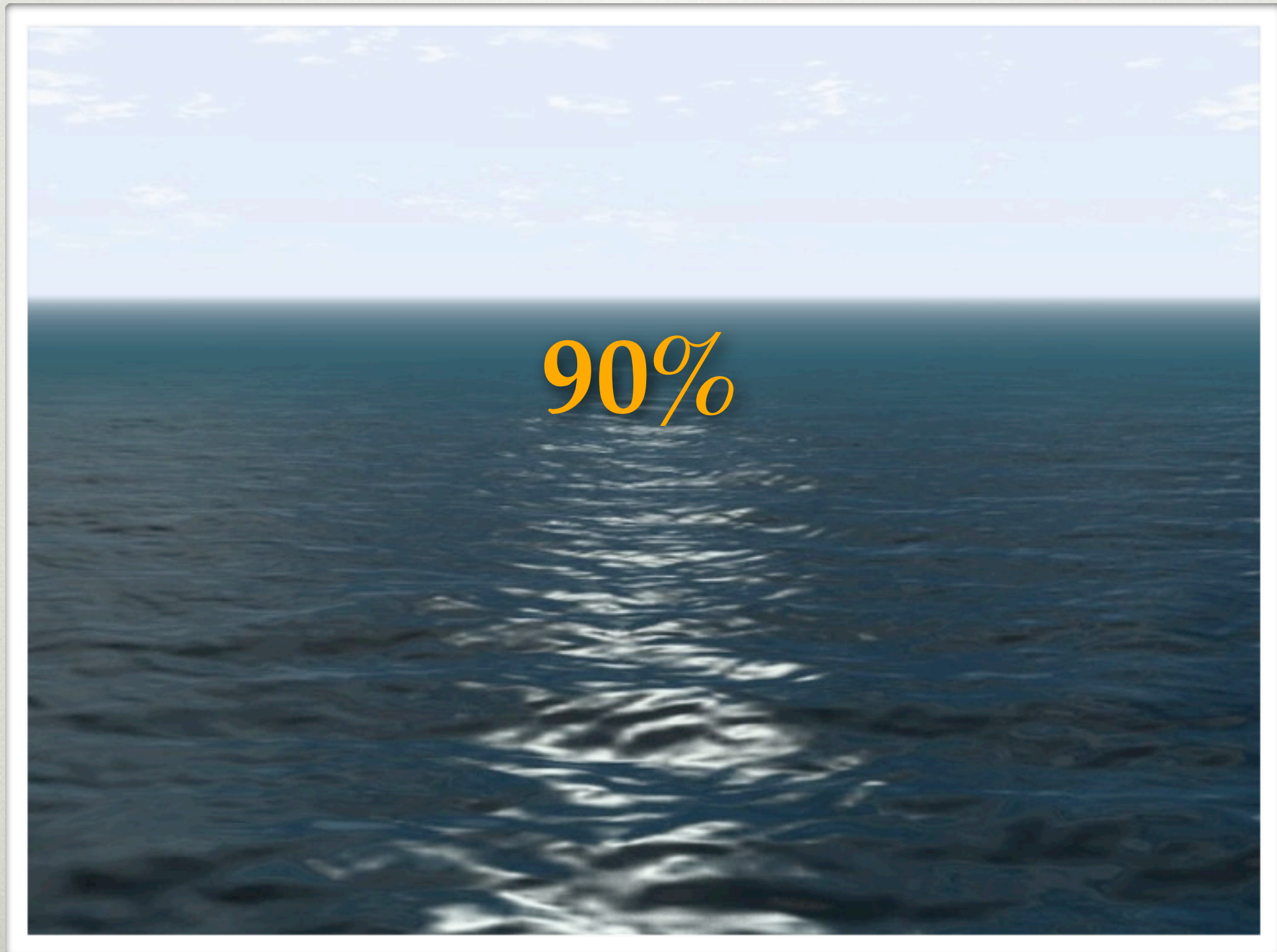


ENERGY IMBALANCE

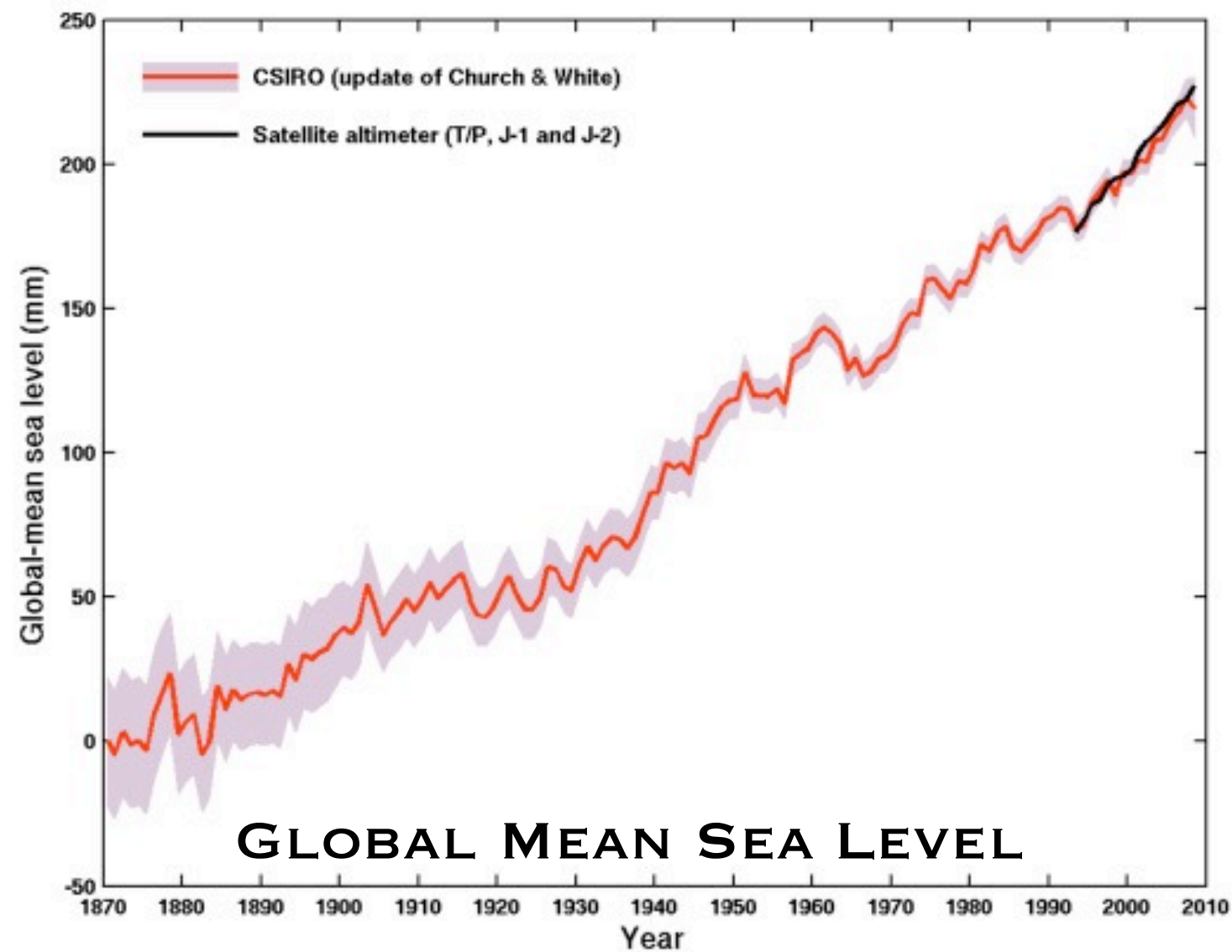


Thermal, Kinetic, Potential, Latent, Biochemical

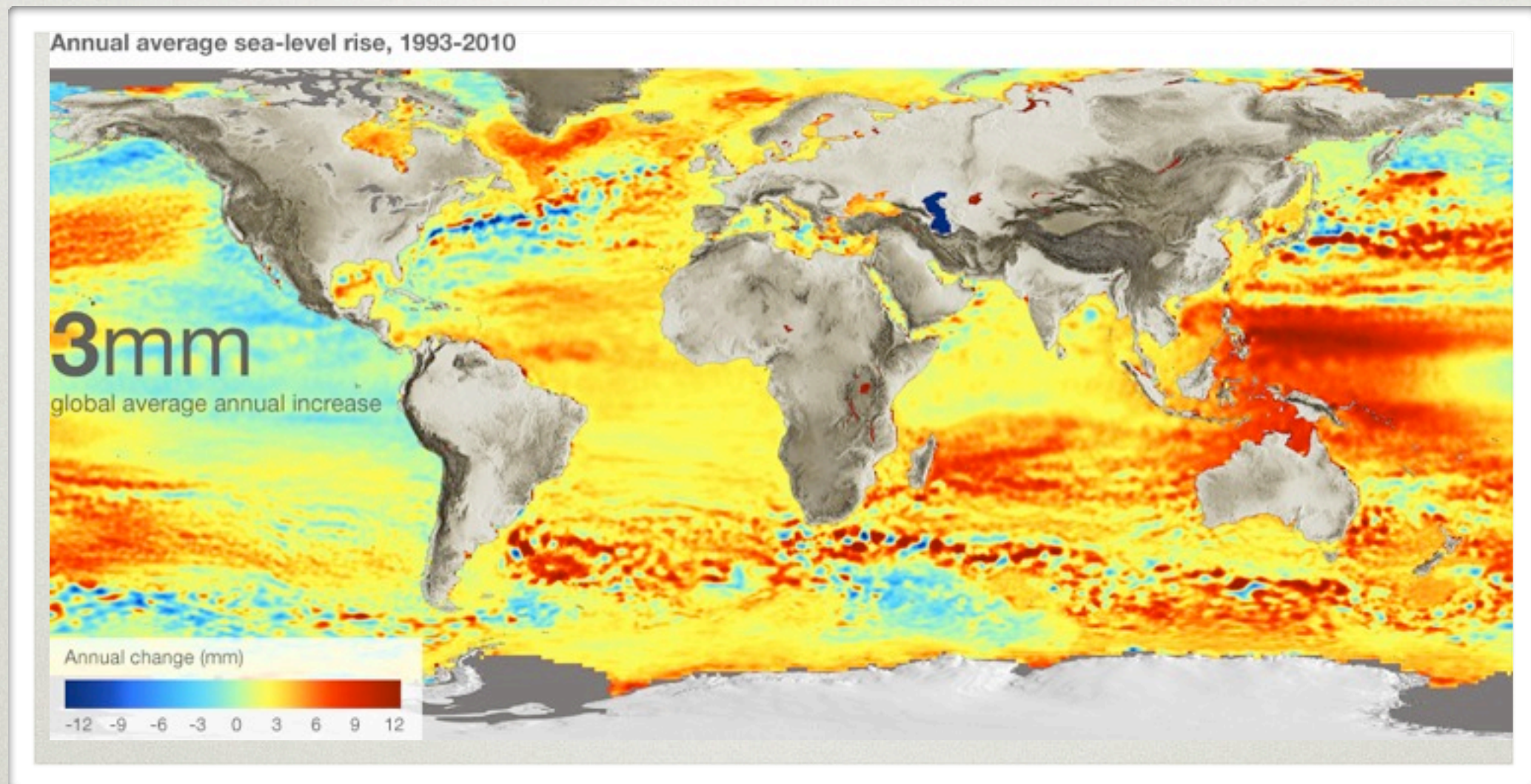
ENERGY ACCUMULATION



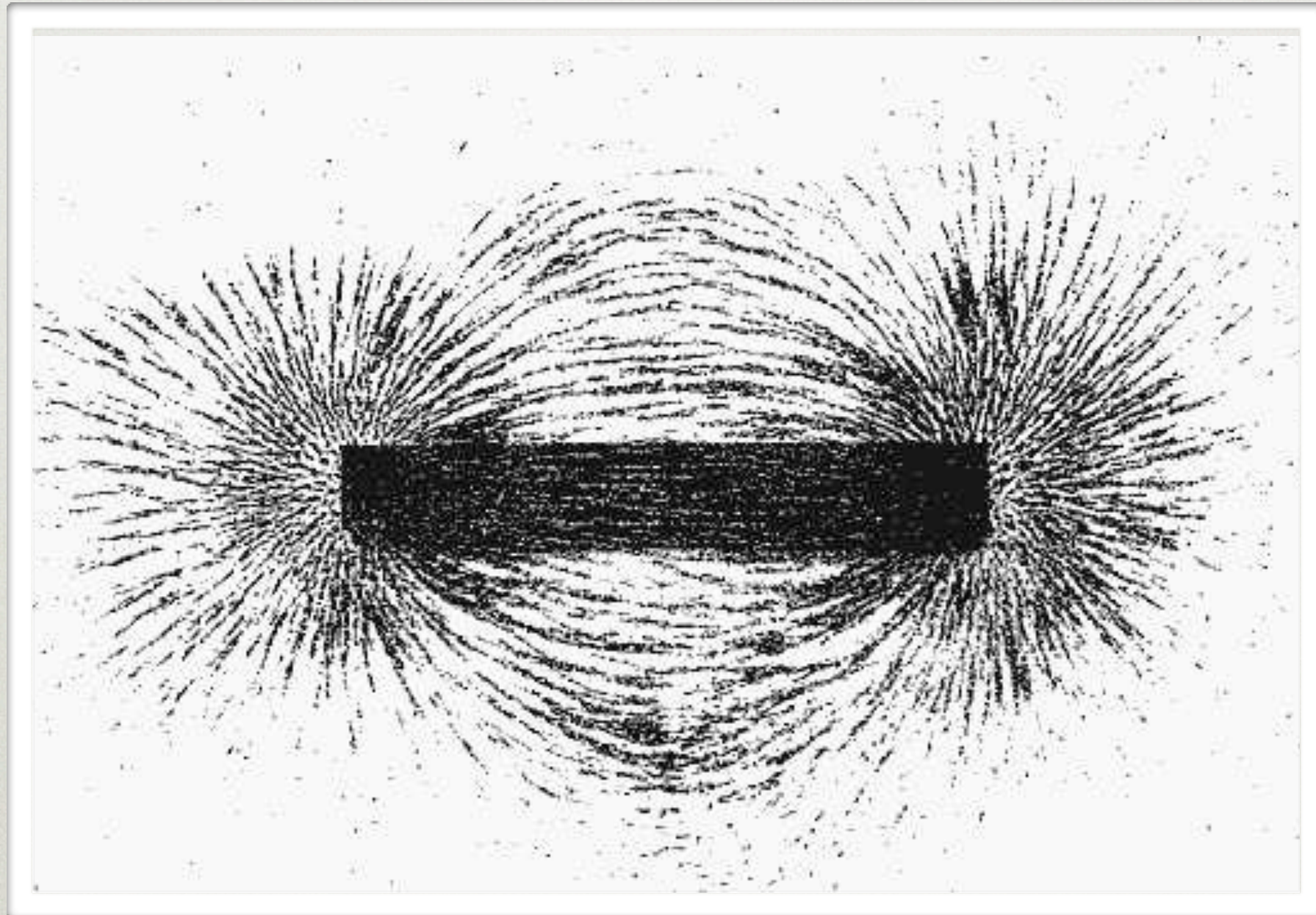
PLANETARY “THERMOMETER”



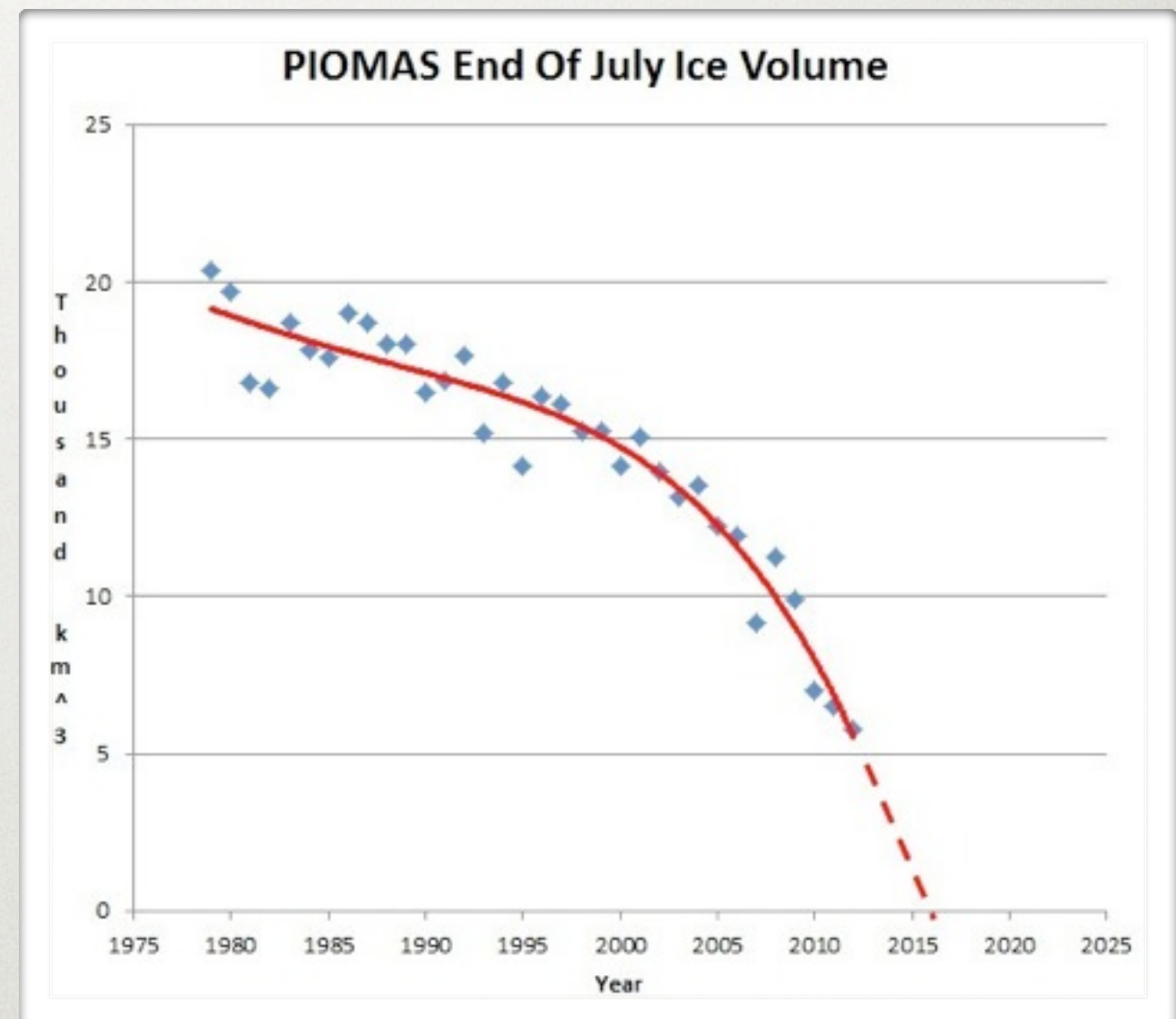
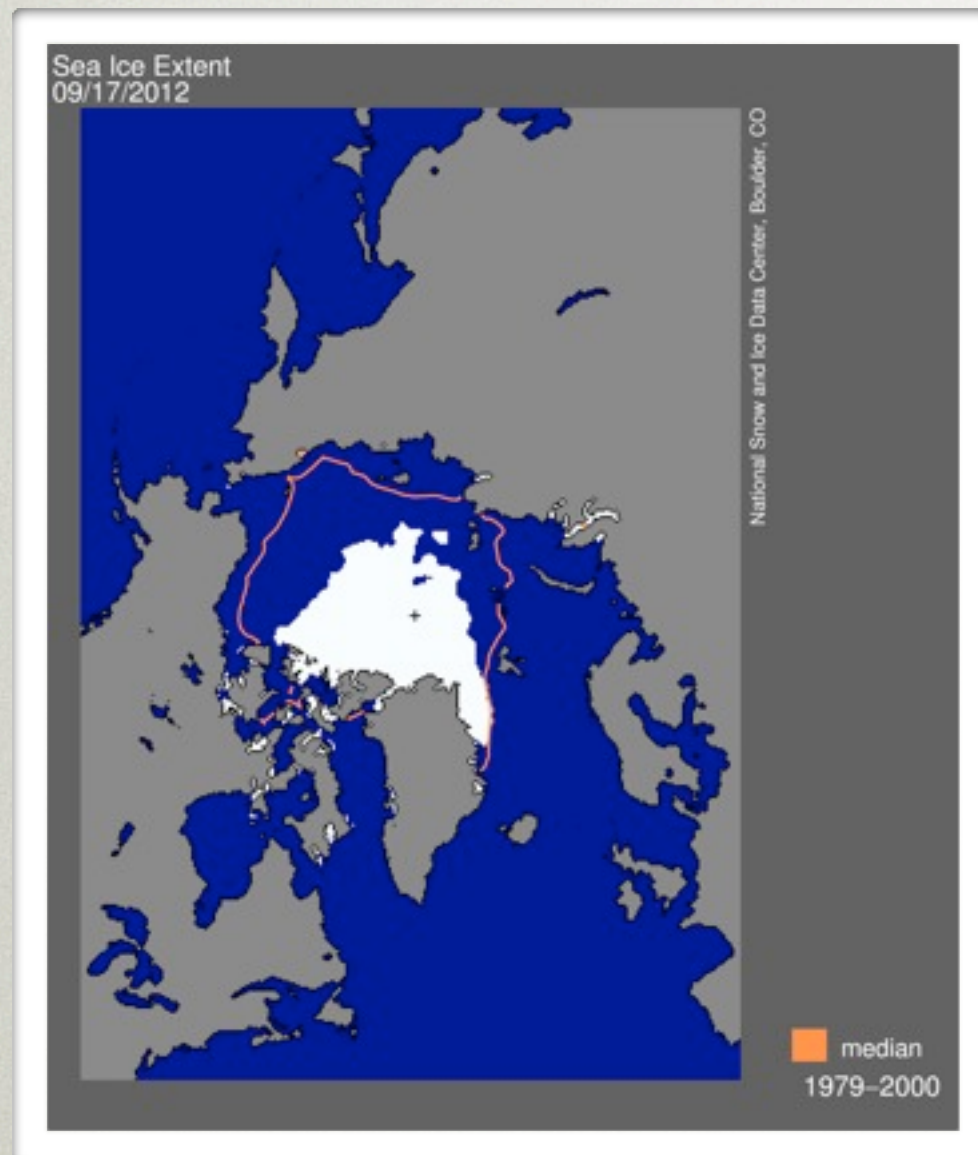
SEA LEVEL IS COMPLEX



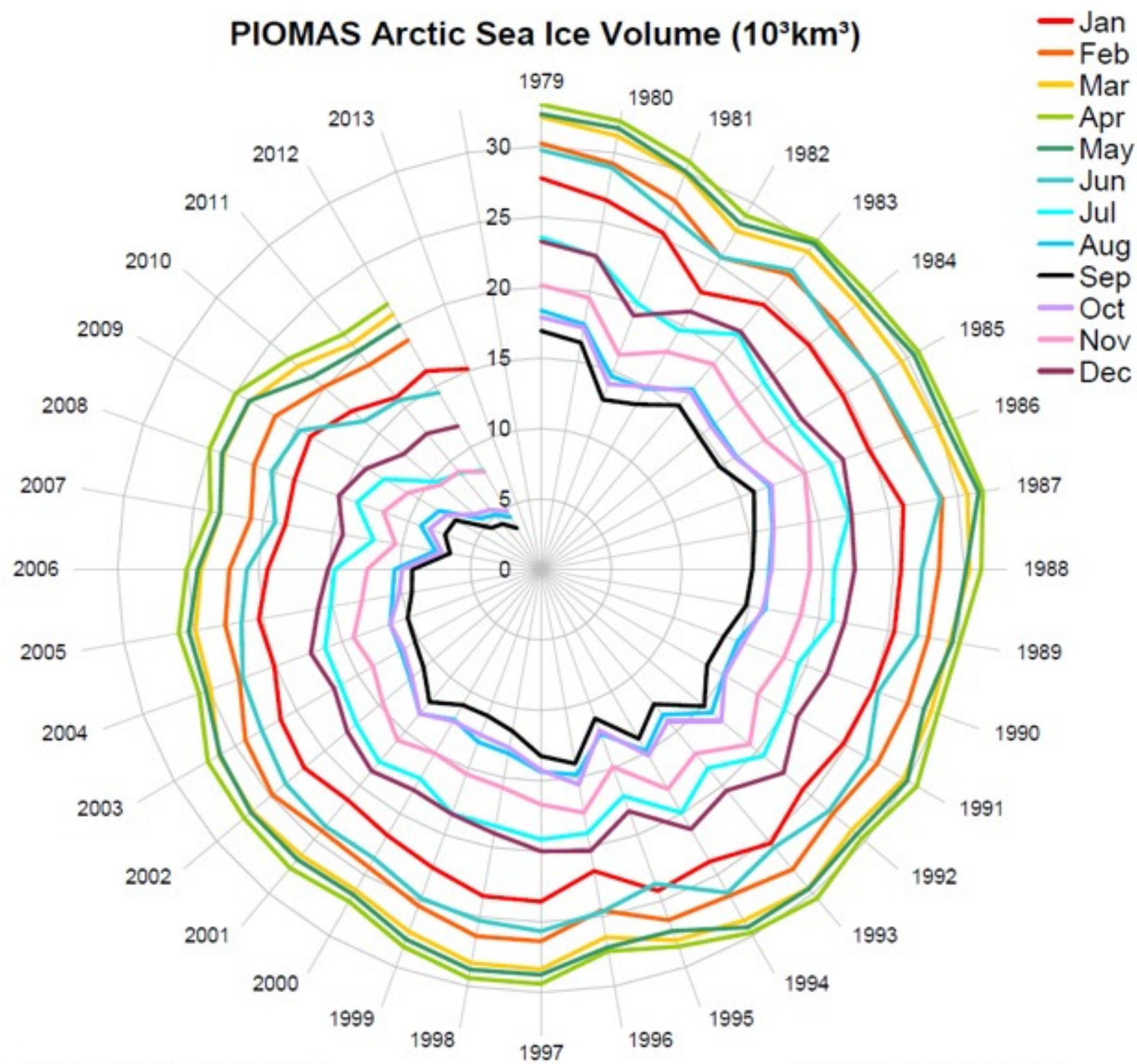
PATTERNS OF EVIDENCE



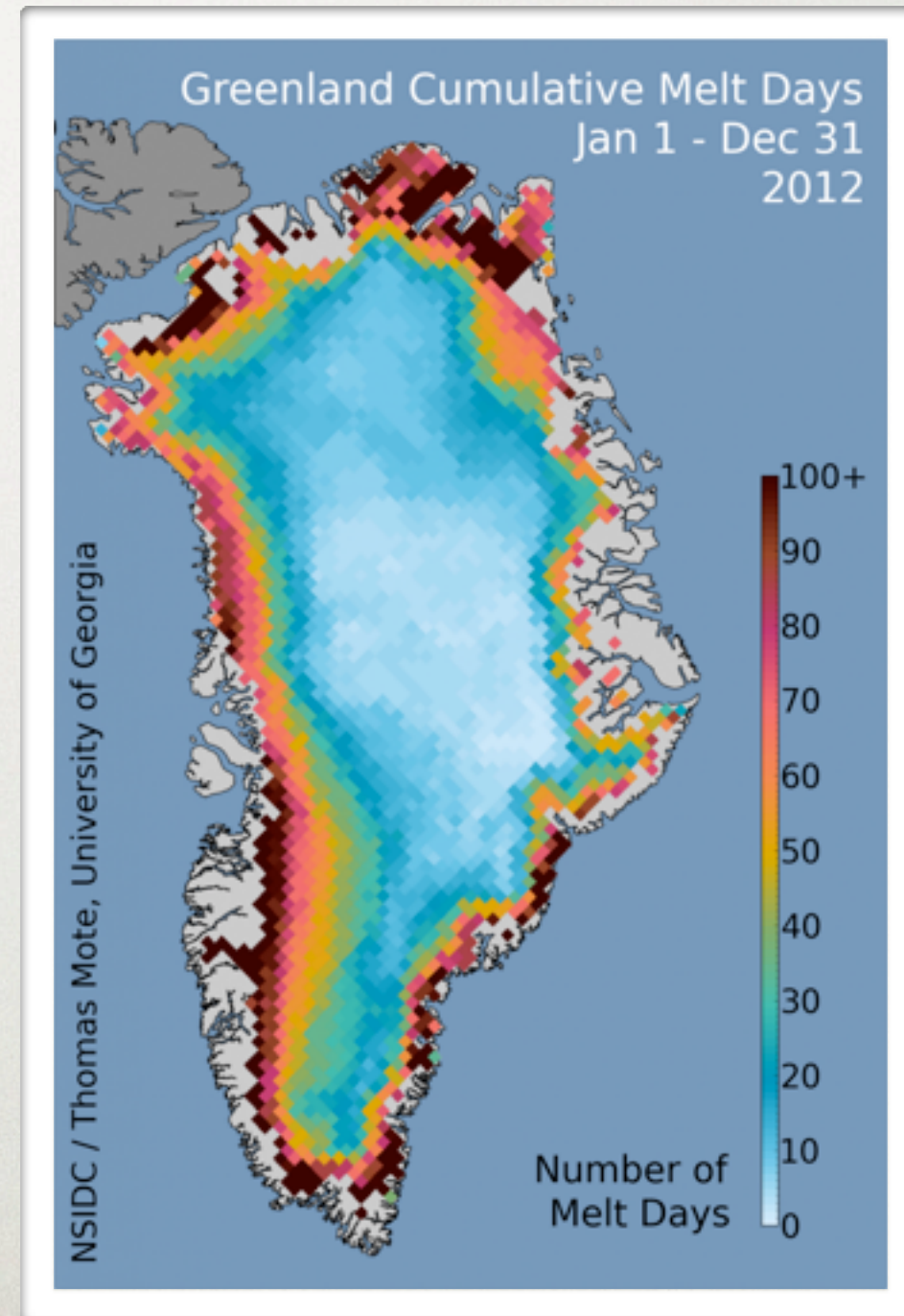
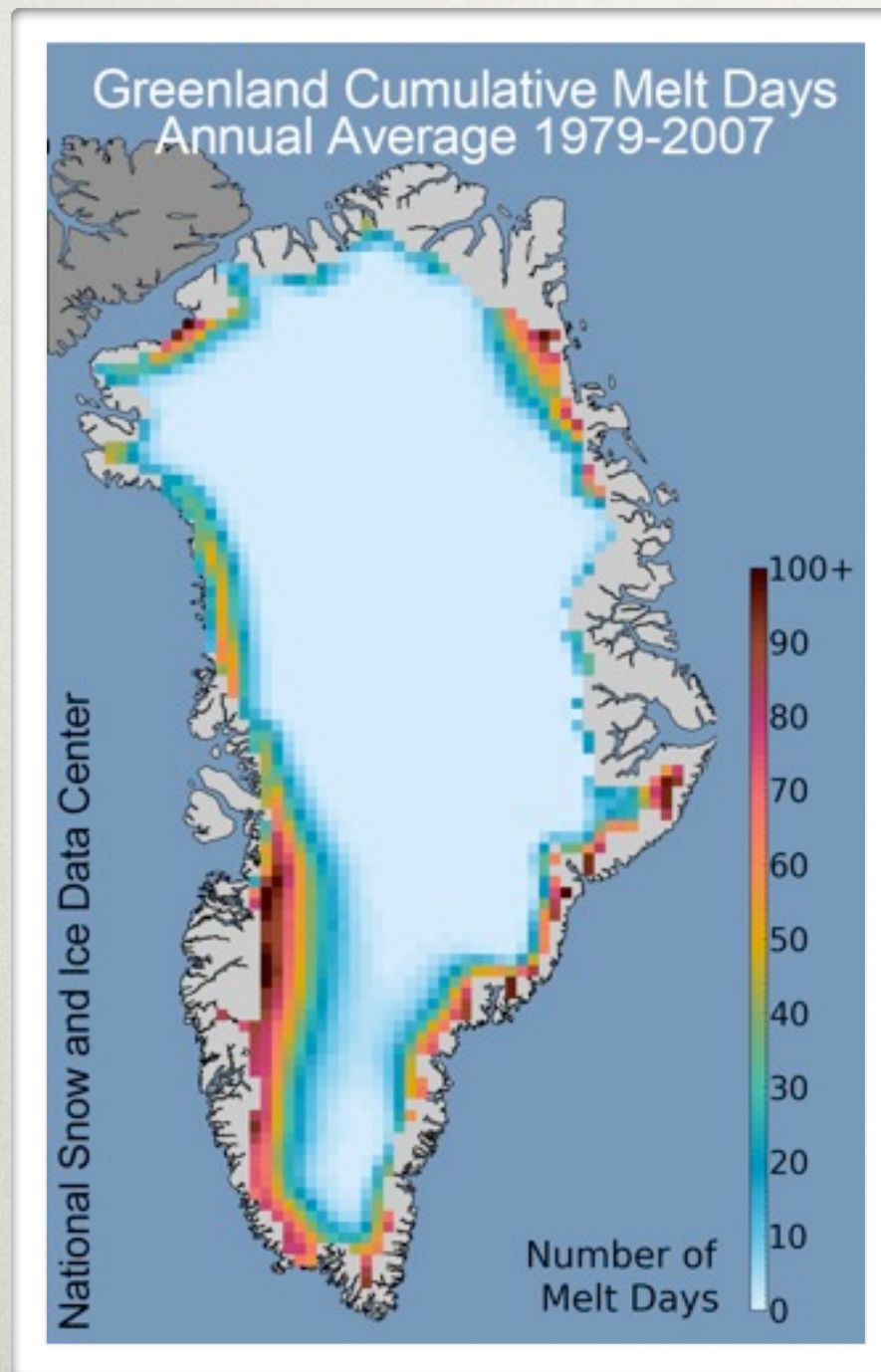
ARCTIC SEA ICE



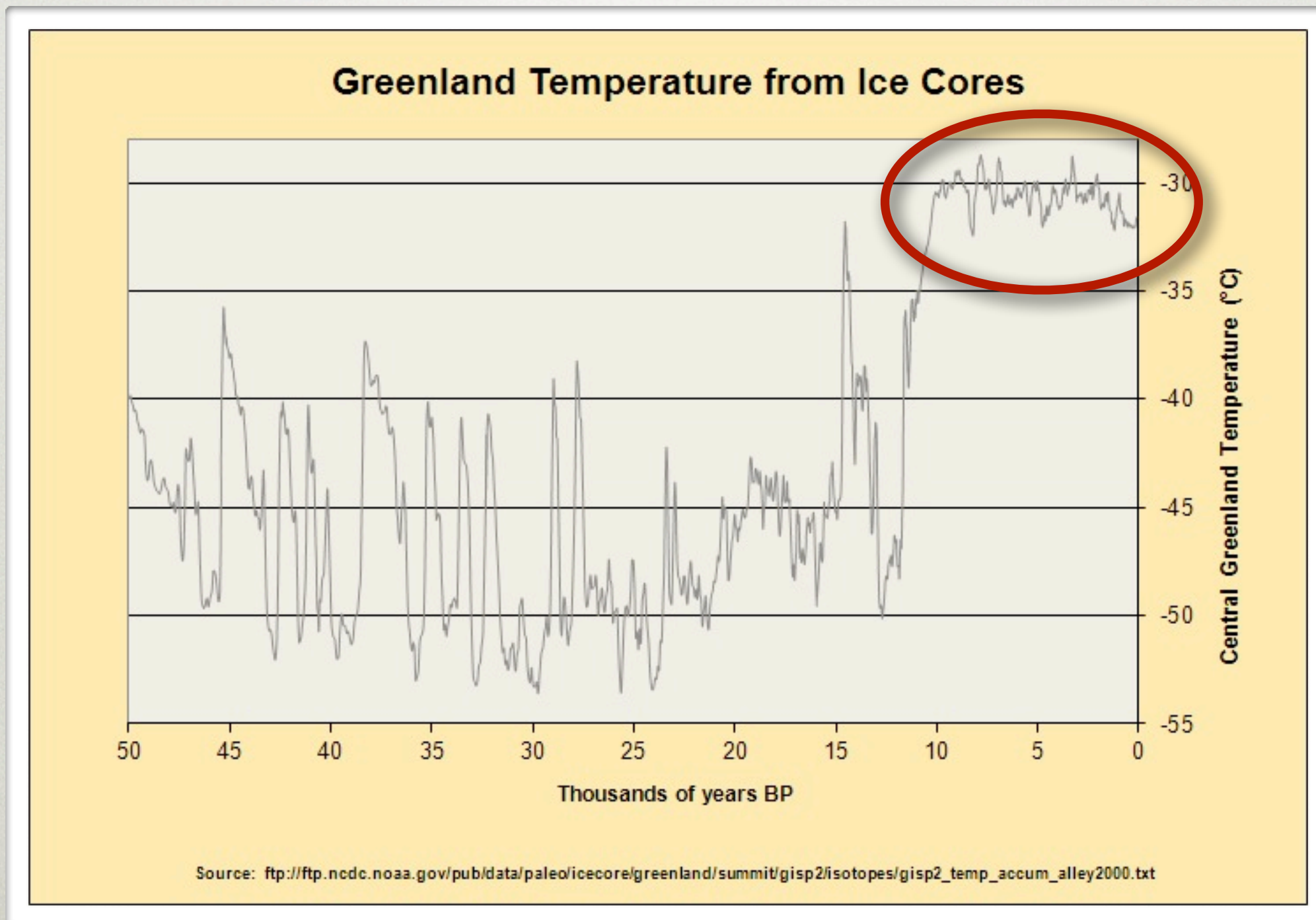
PIOMAS Arctic Sea Ice Volume (10^3km^3)

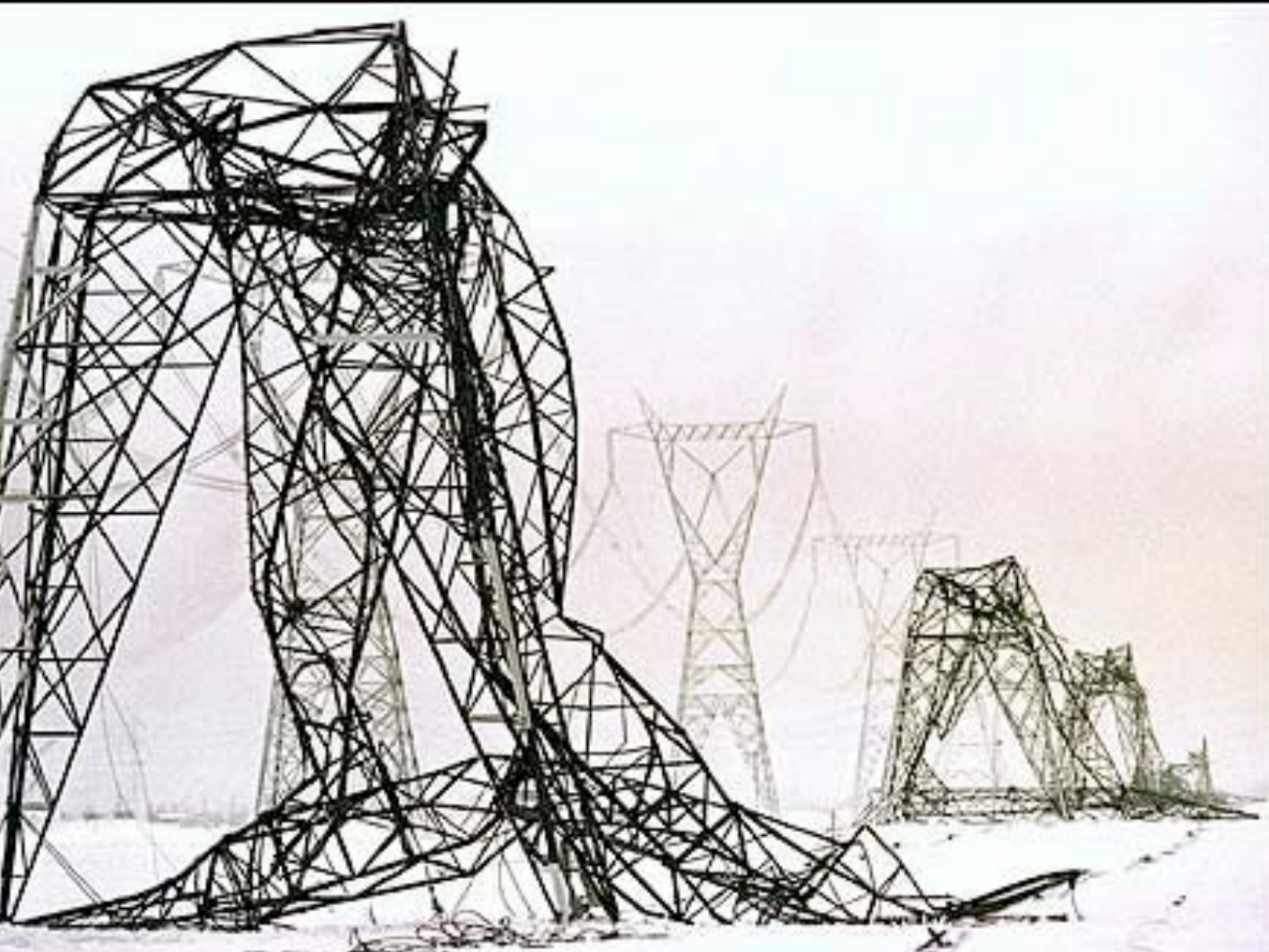


GREENLAND ICE SHEET



UNUSUALLY STABLE CLIMATE





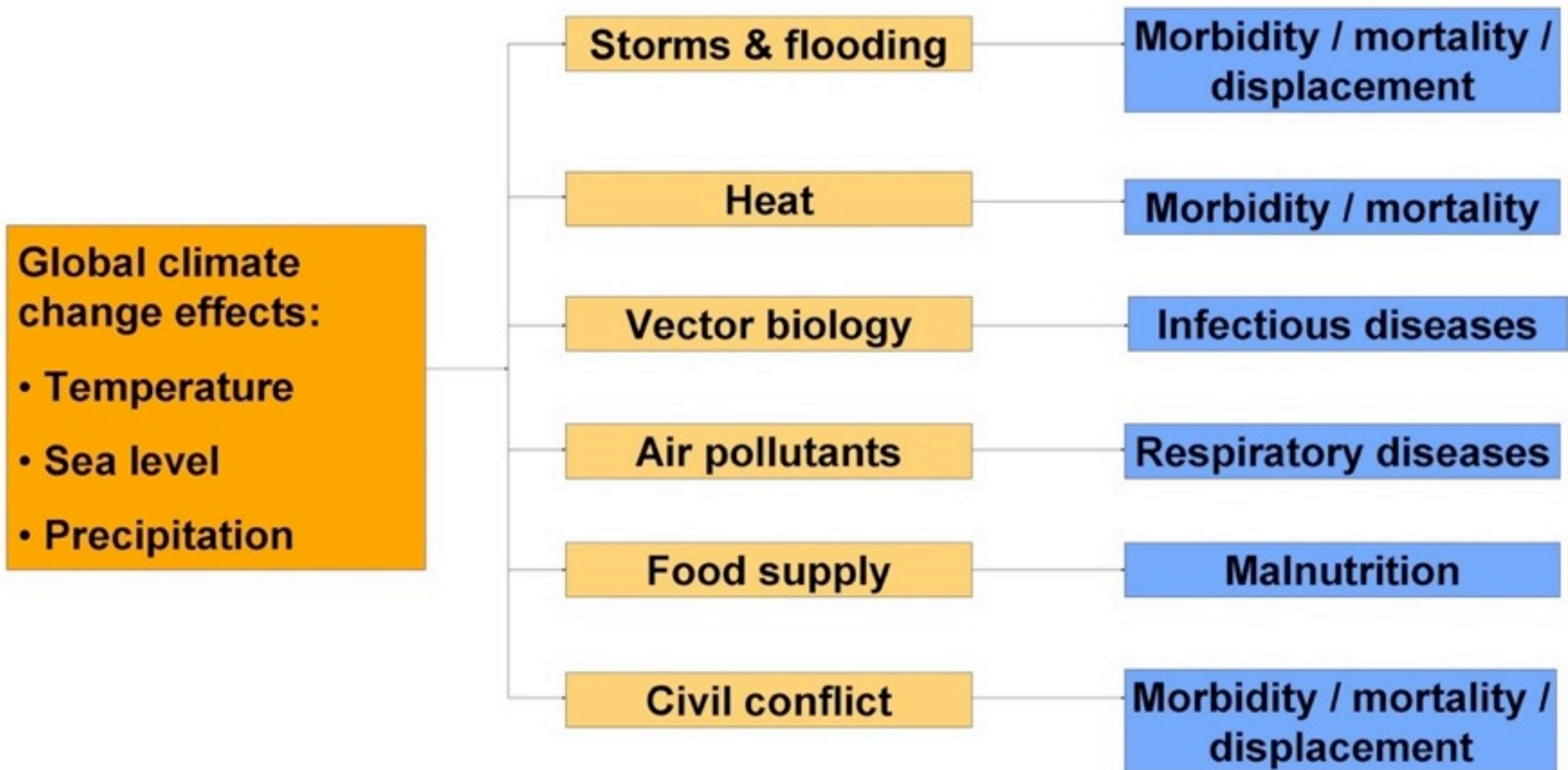
IMPERFECTLY ADAPTED



WHAT'S THE PROBLEM?

- Availability of water
- Productivity of farms, forests, fisheries
- Geography of human and animal diseases
- Prevalence of oppressive heat & humidity
- Extreme weather
- Running costs of engineered environments
- Damages from sea-level rise

HEALTH IMPACTS



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[Science Home](#) | [Pictures](#) | [Gadgets](#) | [Gifts](#) | [Toys](#) | [Store](#)

Study of Siberian permafrost caves shows global warming of just 1.5C 'would pump out a TRILLION tonnes of methane and CO2'



REAL

Us

PROBLEMATIC

PERIOD OF CONSEQUENCES

The era of procrastination, of half-measures, of soothing and baffling expedients, of delays is coming to its close. In its place we are entering a period of consequences

Winston Churchill



COLLECTIVE ACTION



MANY INITIATIVES



United Nations
Framework Convention on
Climate Change

people:power

Climate Week
4-10 March 2013

The UK Low Carbon Transition Plan

National strategy for climate and energy



Carbon Footprint Calculator

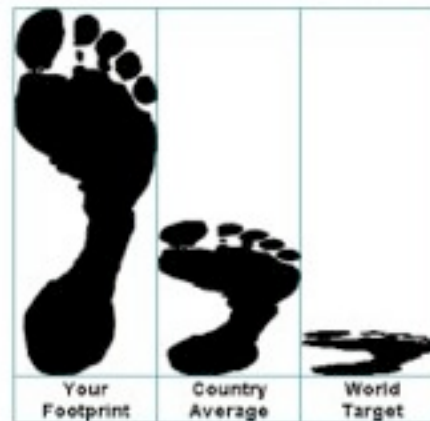
Welcome House Flights Car Motorbike Bus & Rail Secondary Results

Your Carbon Footprint:

tonnes of CO₂

<input checked="" type="checkbox"/> House	0.032
<input checked="" type="checkbox"/> Flights	8.177
<input checked="" type="checkbox"/> Car	2.363
<input checked="" type="checkbox"/> Motorbike	0.000
<input checked="" type="checkbox"/> Bus & Rail	0.000
<input checked="" type="checkbox"/> Secondary	5.969

Total 16.541



- The average footprint for people in Malaysia is 7 tonnes.
- The average for the industrial nations is about 11 tonnes.
- The average worldwide carbon footprint is about 4 tonnes.
- To combat climate change the worldwide average needs to reduce to 2 tonnes.



To offset some or all of your carbon footprint, tick the sections you would like to offset in the list above, and click on the link below.

[Offset 16.541 tonnes](#)

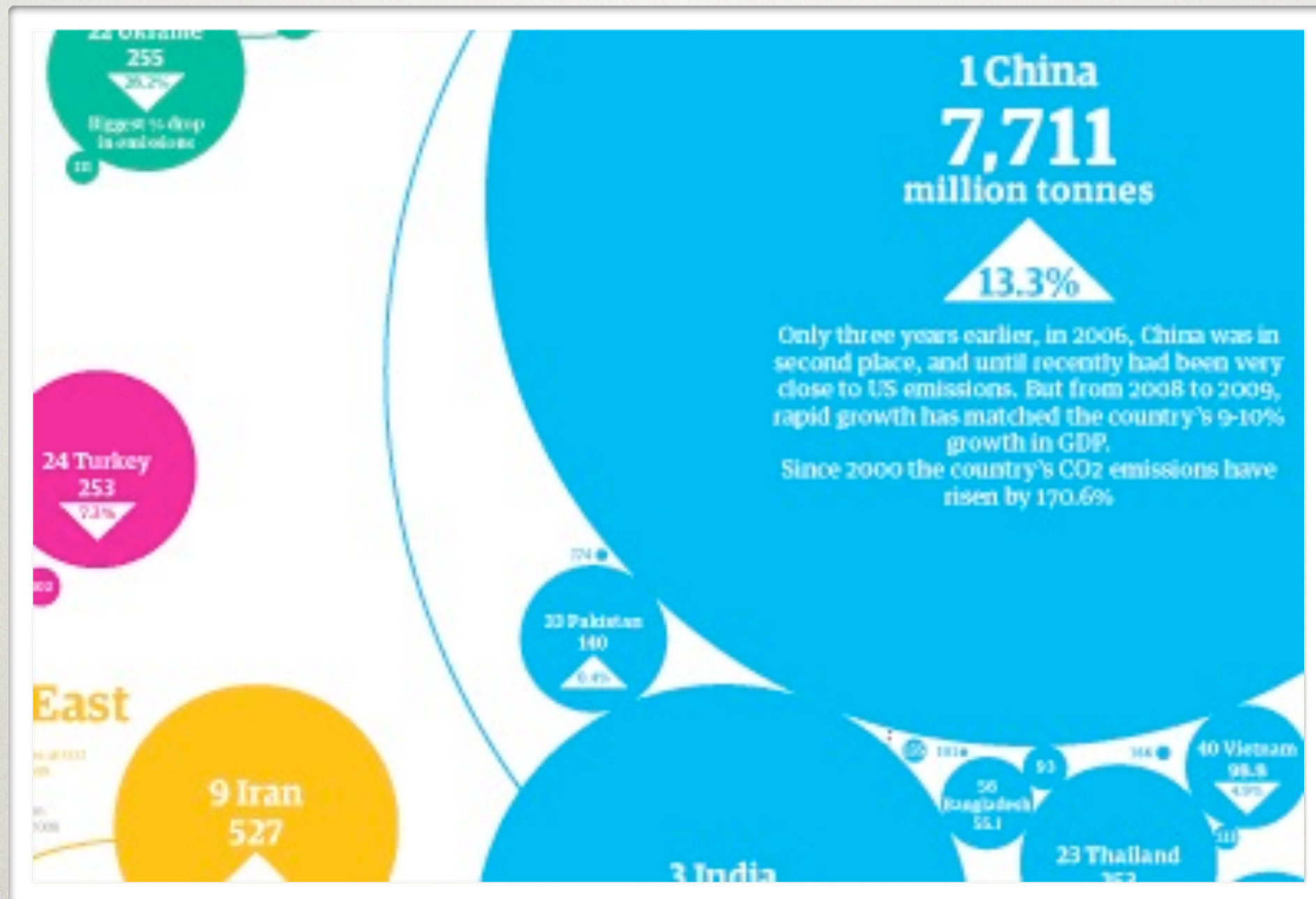
Climate Action in Megacities:

C40 Cities Baseline and Opportunities

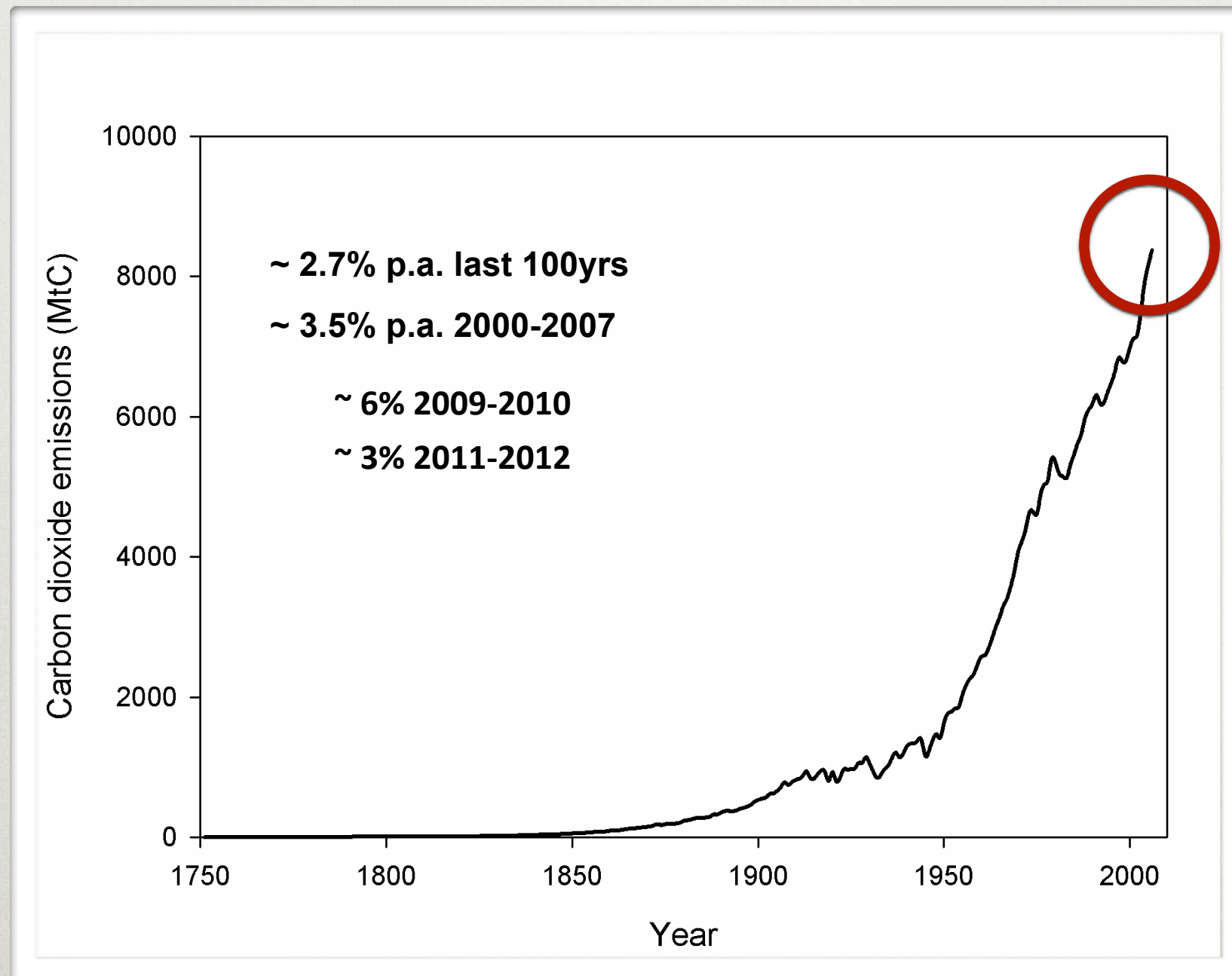
Version 1.0 June 2011



OVERWHELMED



CARBON EMISSIONS



ALARMED!

Scientists shocked by record rise in carbon emissions

AM By environment reporter Conor Duffy

Updated December 05, 2011 15:08:43

New research has found global carbon emissions surged by a record amount in 2010 after falling during the international financial crisis.

The Global Carbon Project published its yearly analysis of carbon dioxide emissions in the journal *Nature Climate Change* today.

It found global carbon dioxide emissions increased by a record 5.9 per cent in 2010.

The report says the overall atmospheric concentration of carbon dioxide is now at its highest level in 800,000 years.

Mike Raupach from the CSIRO helped write this year's report and says he and other scientists were shocked by the findings.



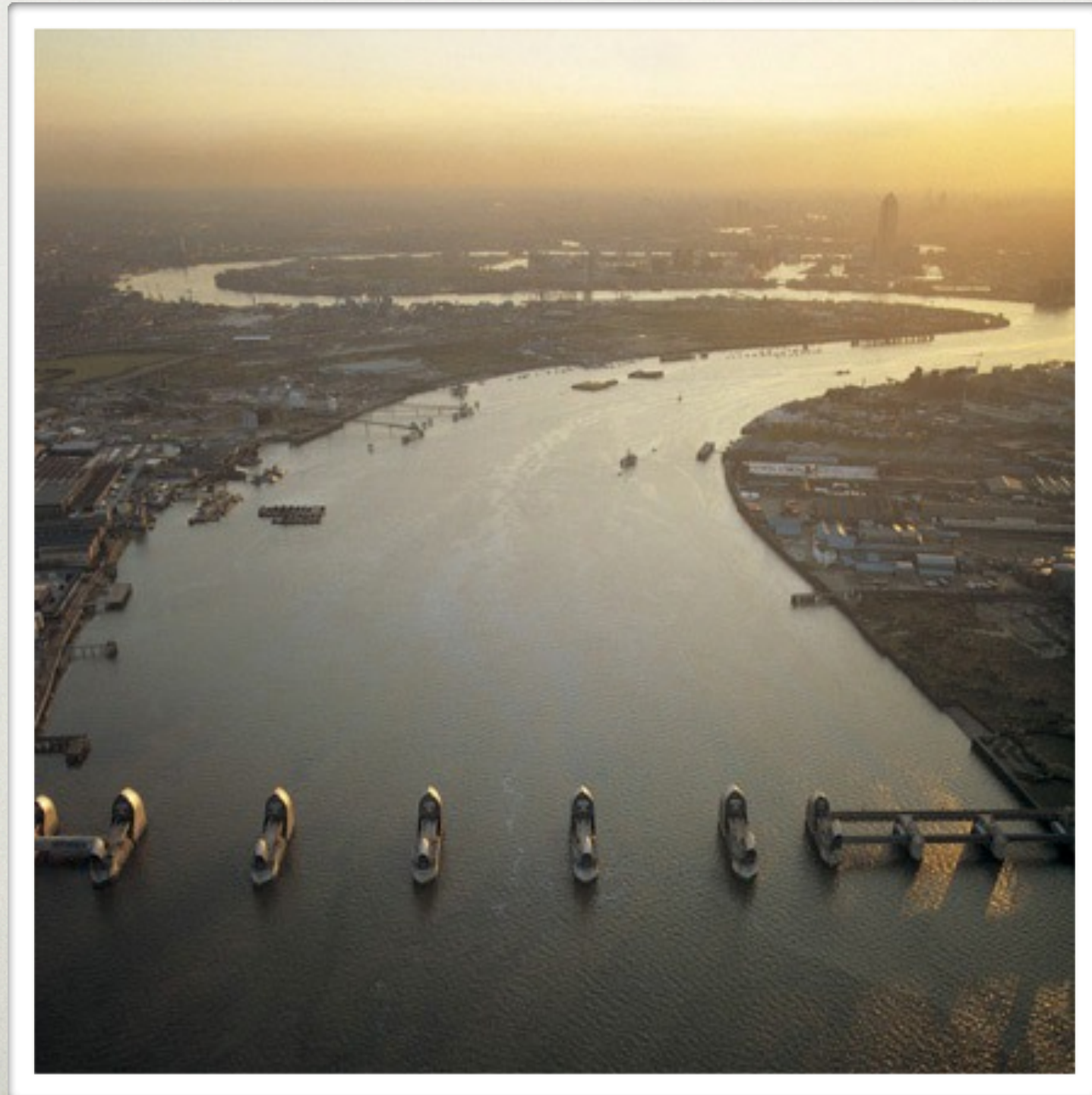
PHOTO: The report found global carbon dioxide emissions increased by 5.9 per cent in 2010.

(ABC News: Giulio Saggin, file photo)

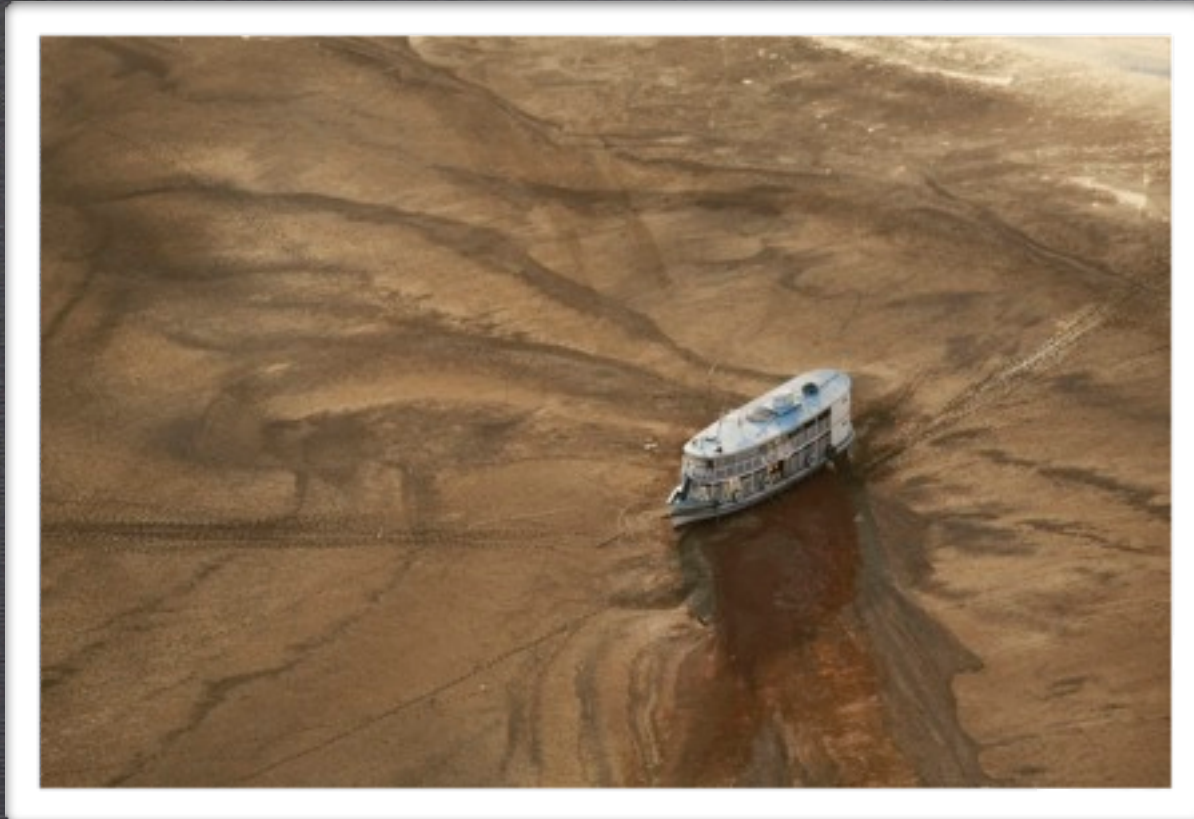
MAP: [Australia](#)



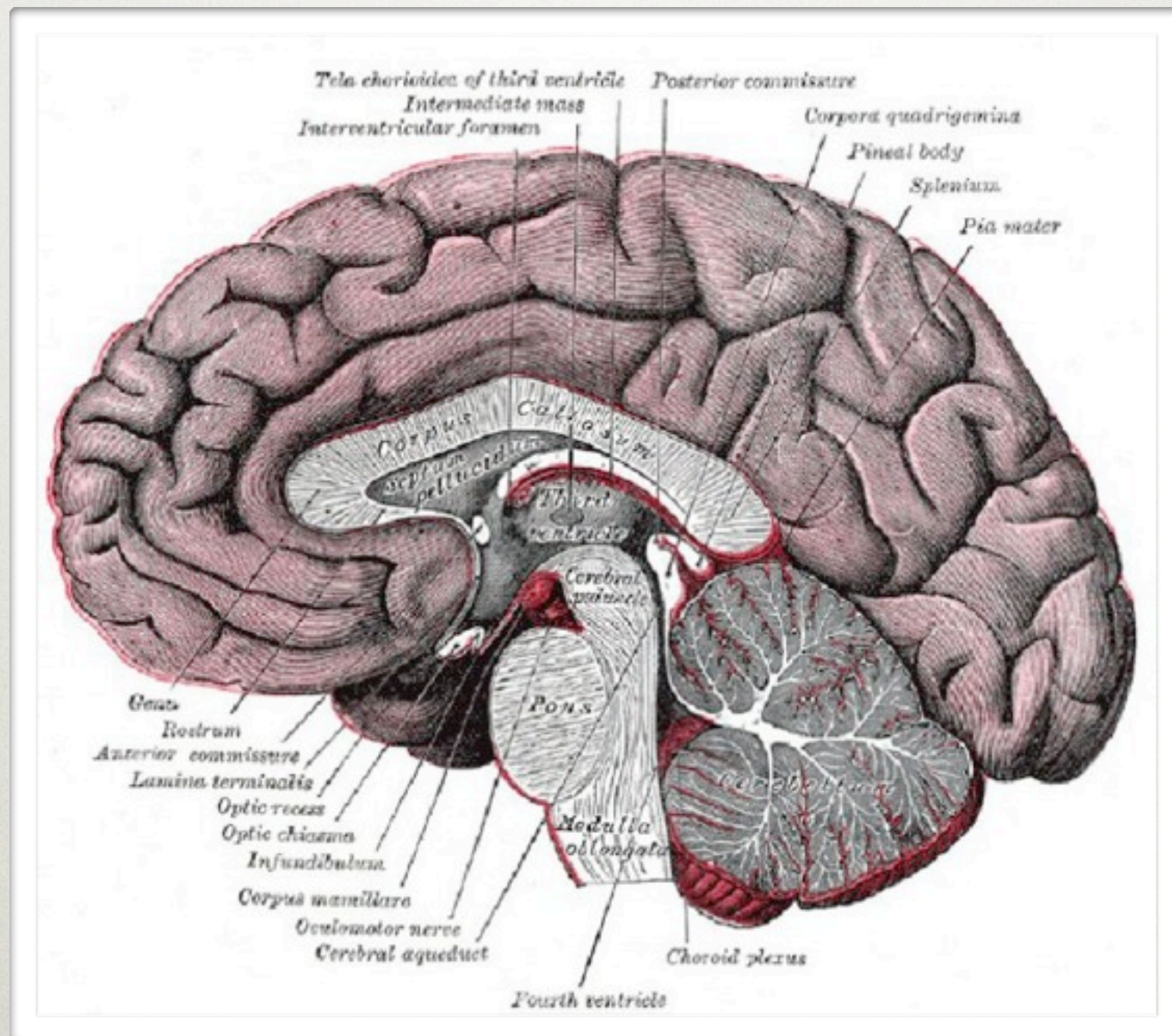
ADAPTATION



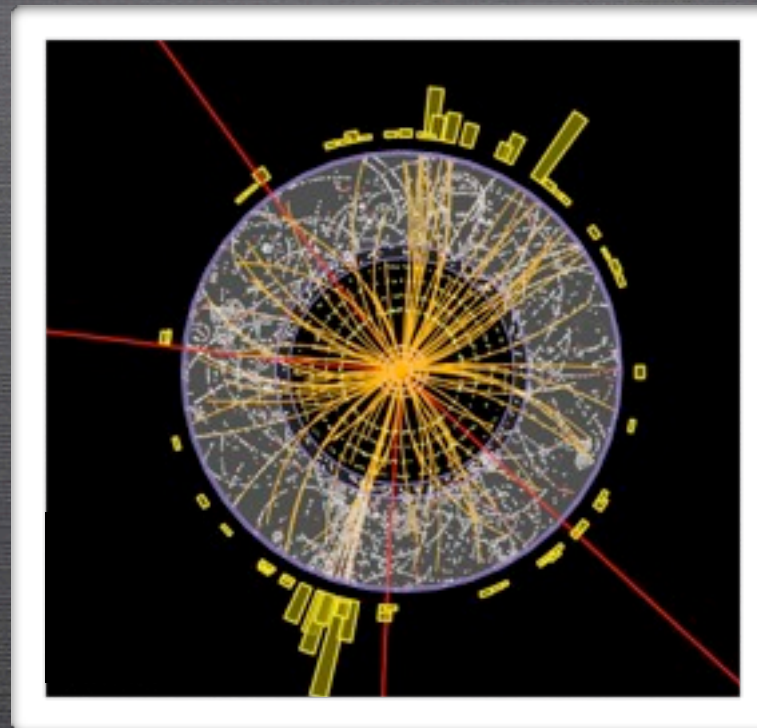
LIMITS TO ADAPTATION

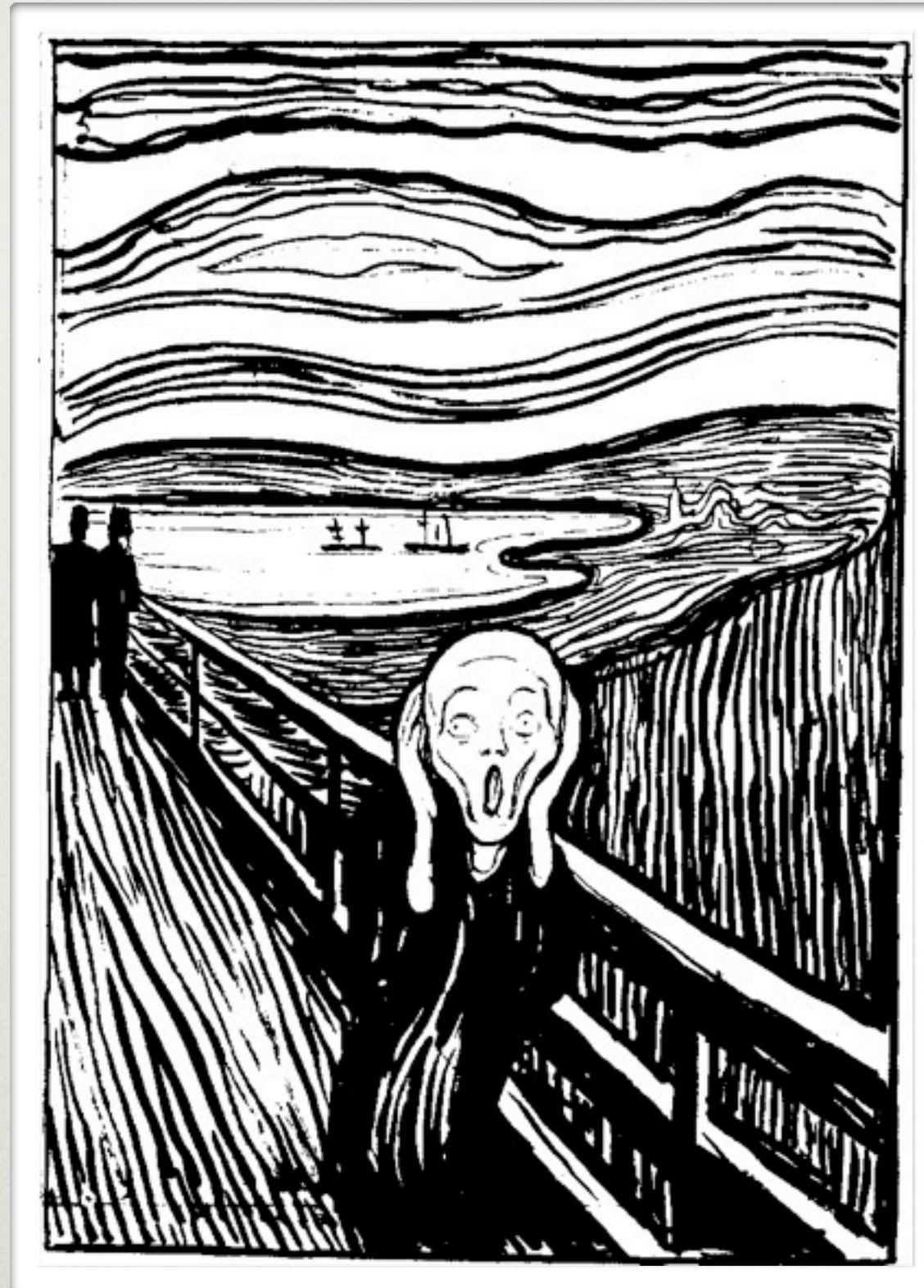


KEY BARRIER



NOT THE HIGGS





ANXIETY, FEAR, GRIEF, GUILT, ANGER

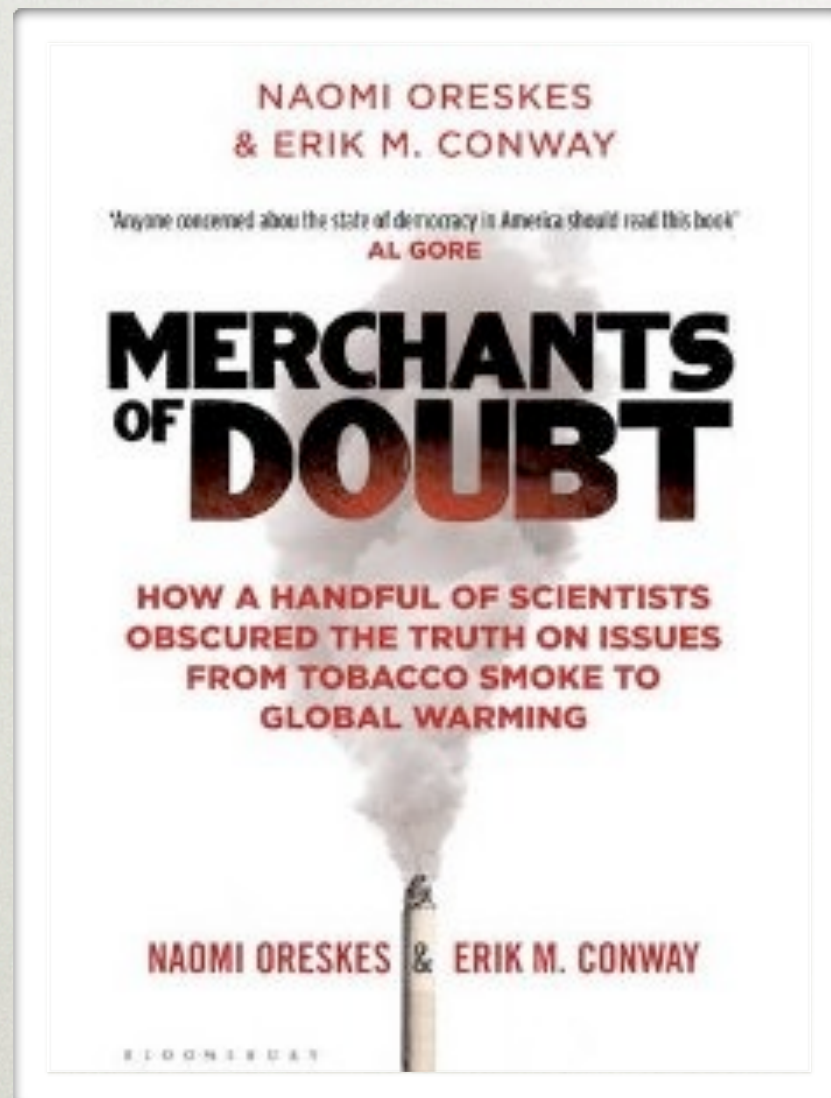
NATURAL REACTION

- Defenses are raised
- Feelings are suppressed
- Arguments are sought to justify rejection
- Anger often emerges
- Messenger is often blamed

RESULTING IN ...

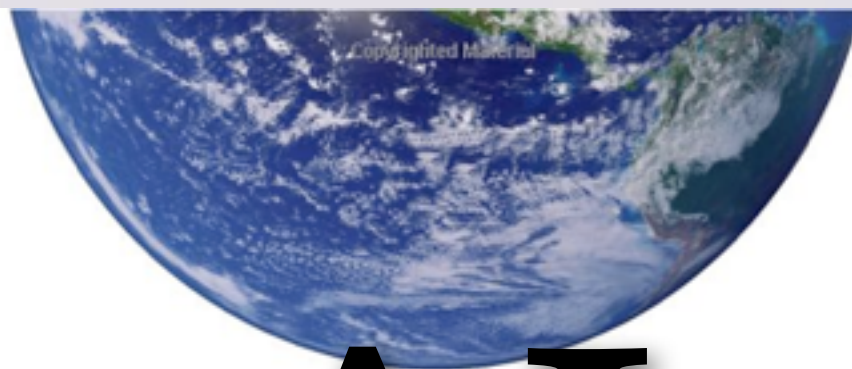
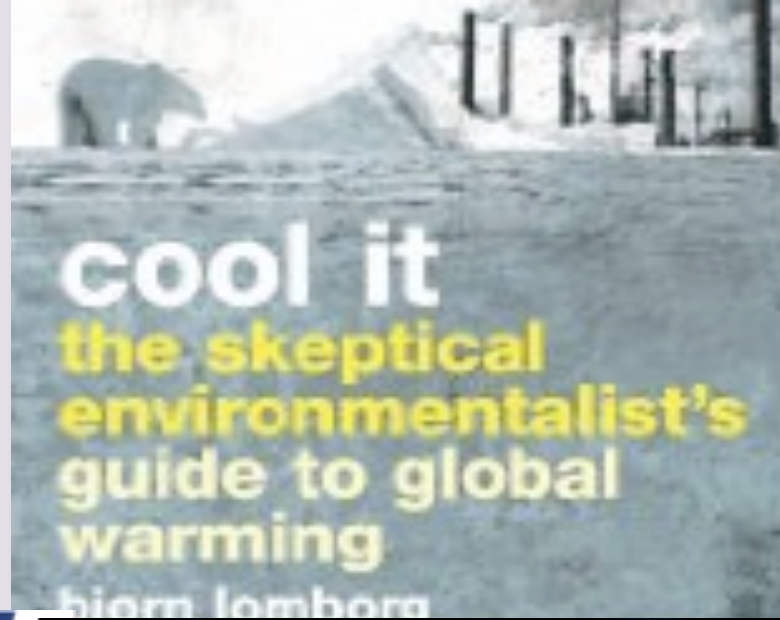
- Dismissal
- Disavowal
- Discounting

VESTED INTERESTS OFFER DOUBT



This was the tobacco industry's key insight: that you could use normal scientific uncertainty to undermine the status of actual scientific knowledge. As in jujitsu, you could use science against itself. **"Doubt is our product"** ran the infamous memo written by one tobacco industry executive in 1969, "since it is the best means of competing with the 'body of fact' that exists in the minds of the general public.

AN APPEAL
TO REASON
A COOL LOOK
AT GLOBAL
WARMING
WITH A NEW AFTERWORD



The Really Inconvenient Truths

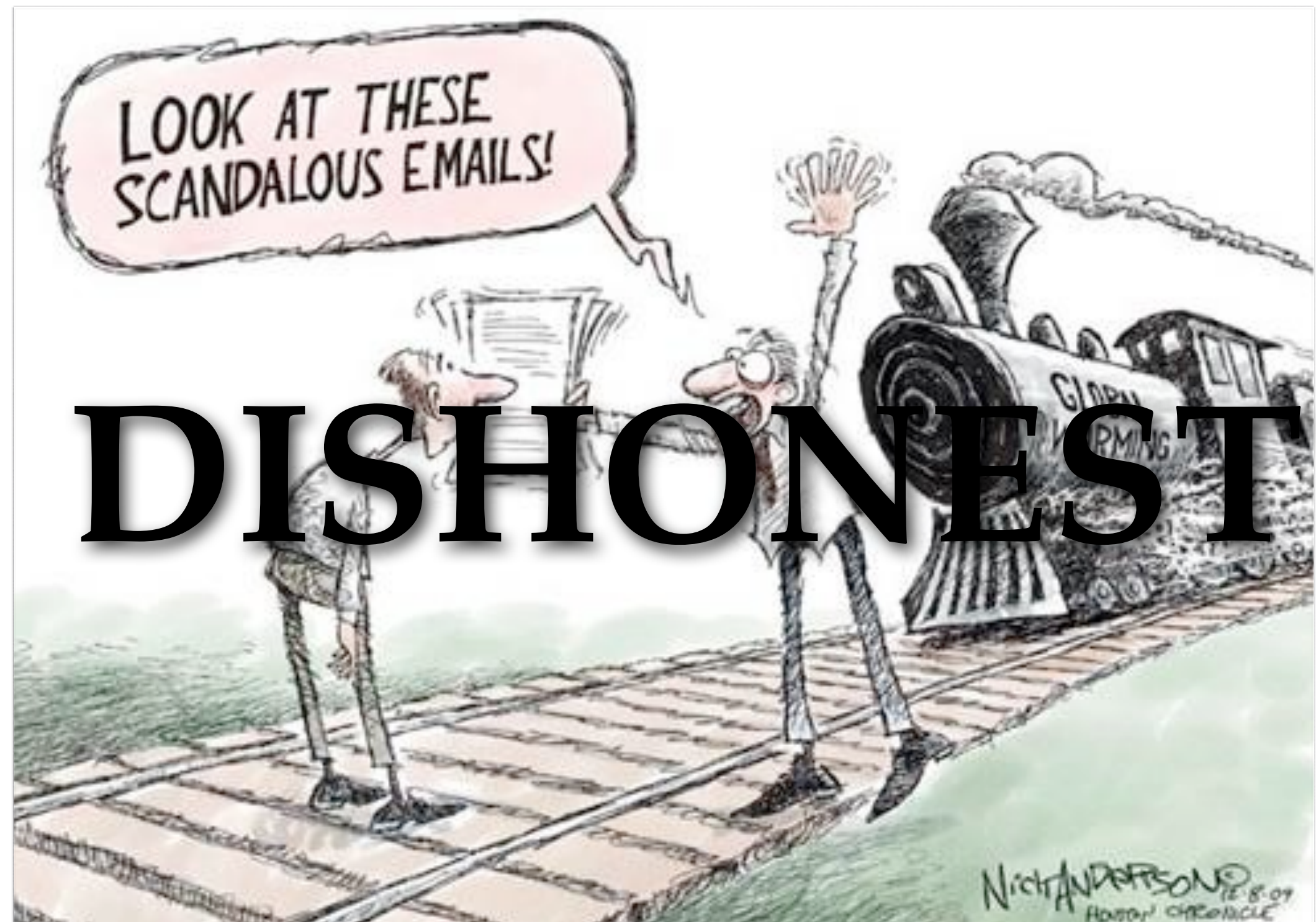
Seven Environmental Catastrophes
Liberals Don't Want You
To Know About—
Because They Helped
Cause Them

IAIN MURRAY



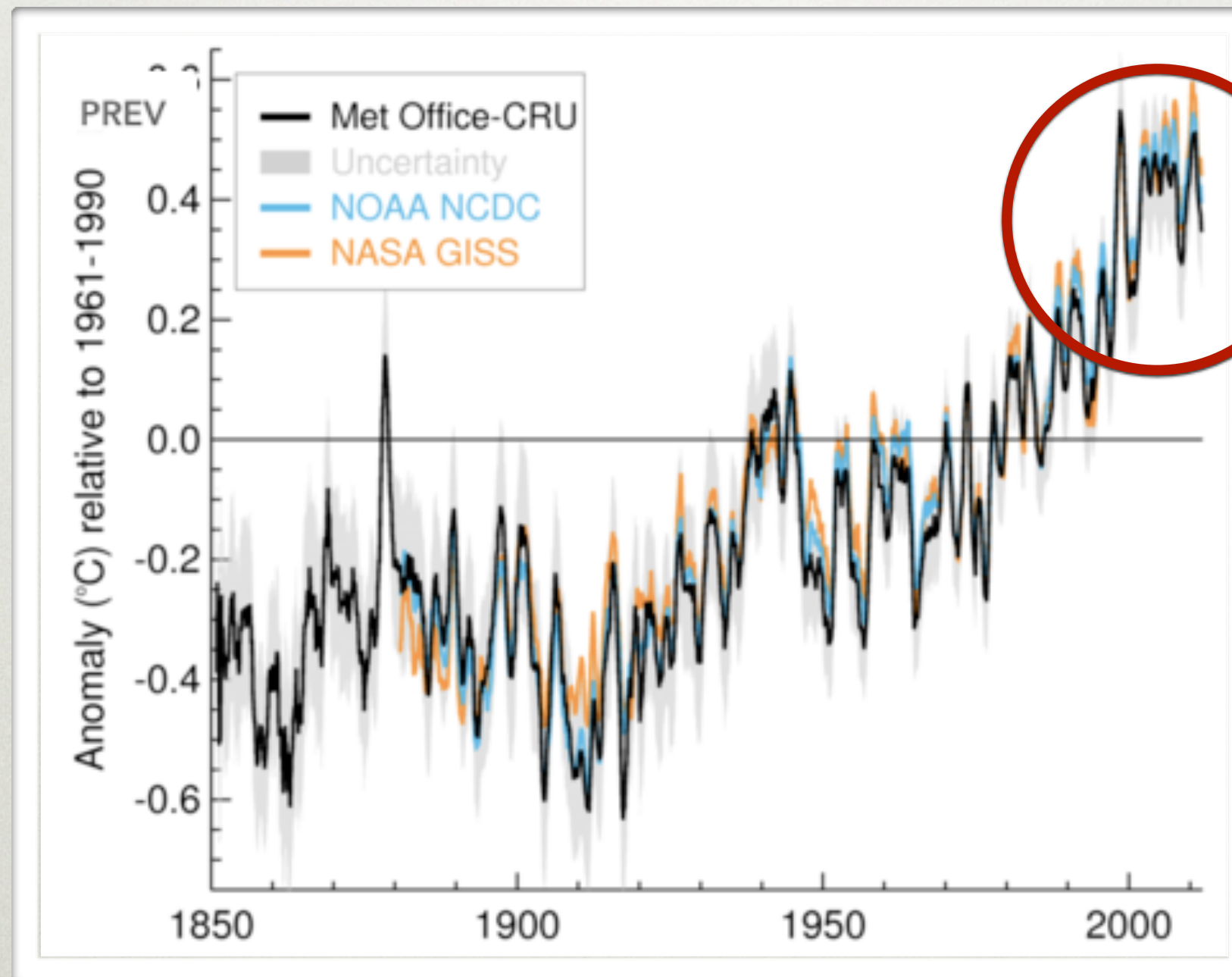
From BSE to Global Warming:
Why Scares Are Costing Us the Earth





DISHONEST

GLOBAL MEAN TEMPERATURE



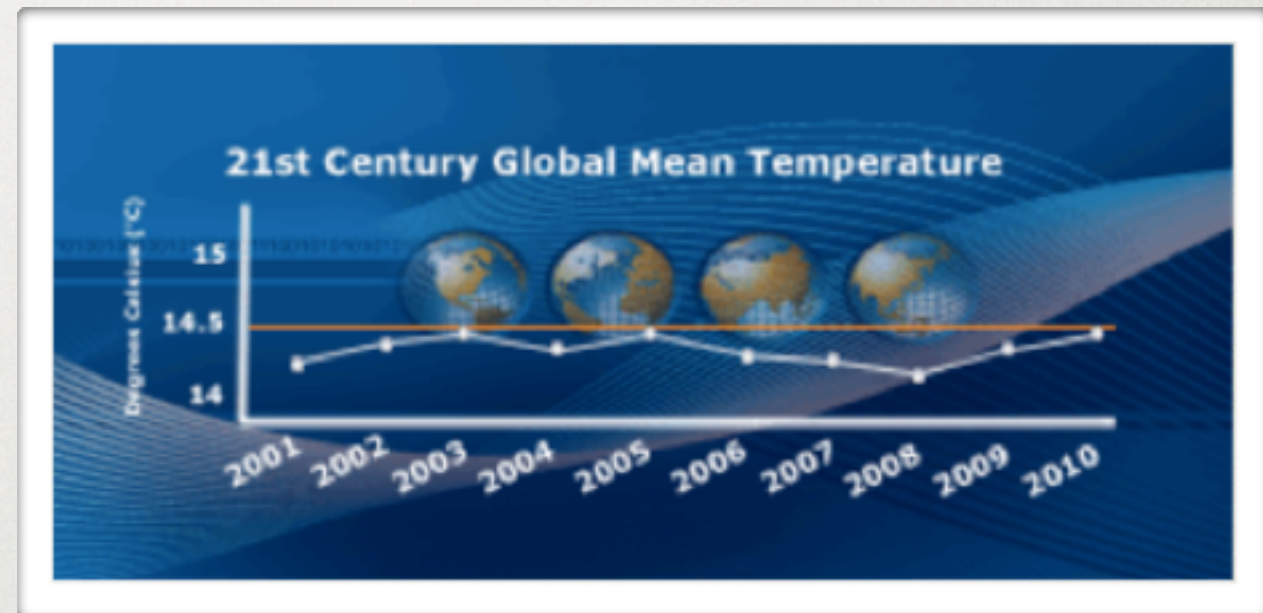
Global warming stopped 16 years ago, Met Office report reveals

Graph showing tenths of a degree above and below 14C world average

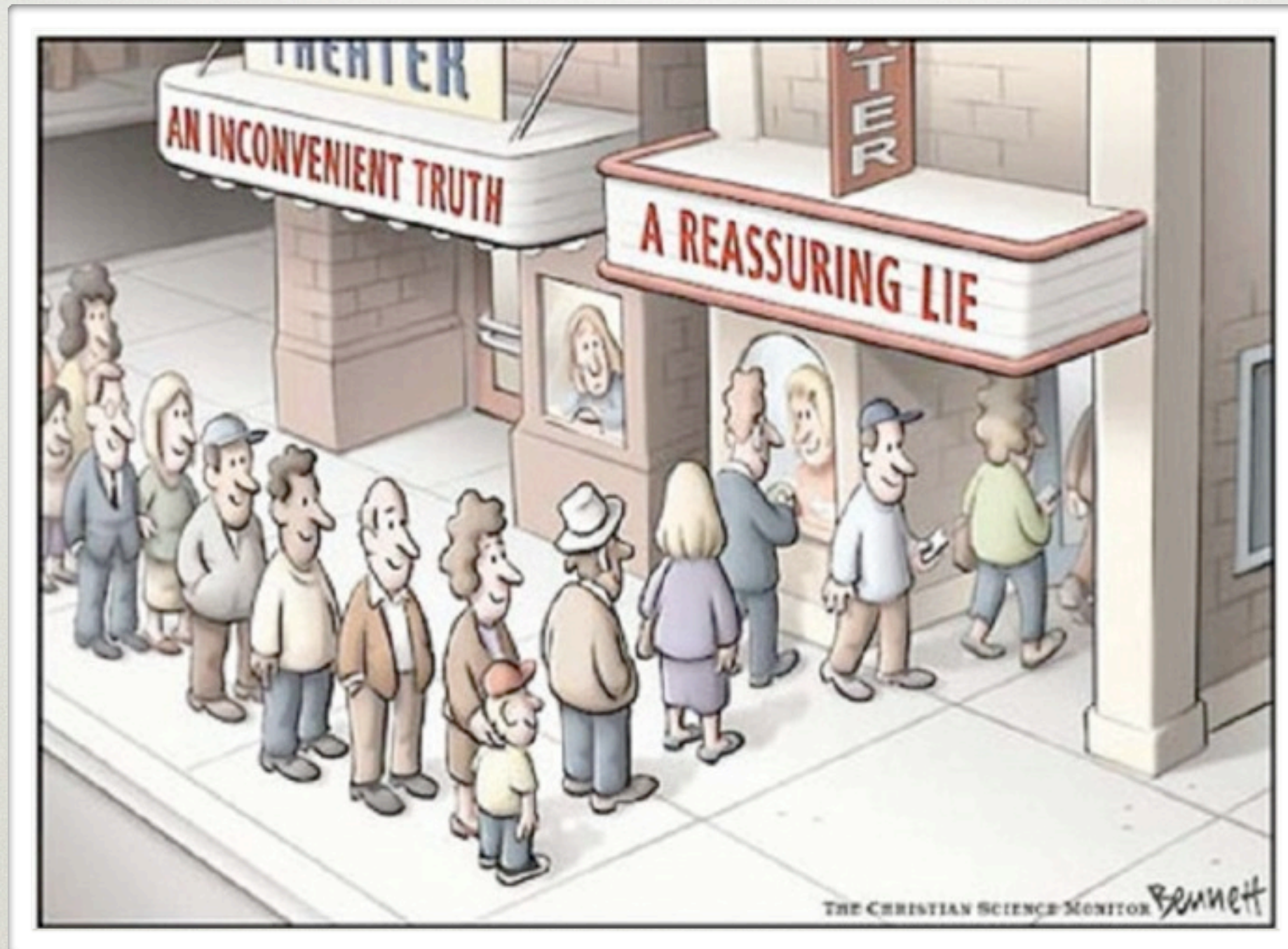


by the Met Office's Hadley Centre and Prof Jones's Climatic Research Unit. Since 1980, when worldwide cuts to carbon-dioxide emissions, predicting a catastrophic increase of up to a further five degrees by the end of the century. Energy Minister, John Hayes, promised that 'the high-flown theories of bourgeois Left-wing academics will not override the interests of ordinary people'.

GLOBAL WARMING POLICY FOUNDATION







RISK

HELPLESSNESS

WE ARE ALL
EMBEDDED IN A
CARBON-BASED
WORLD

—

WHAT SCOPE DO WE
HAVE TO ACT ?

PERSONAL
PROFESSIONAL
POLITICAL

INDIVIDUAL CARBON FOOTPRINT

Your estimated carbon footprint is 8.61 tonnes CO2 per year

Breakdown of your footprint	Your CO2 (tonnes per year)	UK average
Space heating	0.85	1.2
Water heating	0.46	0.5
Domestic lighting, appliances & cooking	0.45	0.8
Car travel	0.53	1.1
Other surface travel	0.10	0.2
Air travel	0.00	0.6
Food & drink	1.66	2.9
Household goods	2.87	2.9
Infrastructure allowance	1.70	1.7

UK average=12 tonnes, UK 2050 target=2 tonnes, USA average=20 tonnes, Tanzania average=0.1 tonnes, world average=4.5 tonnes

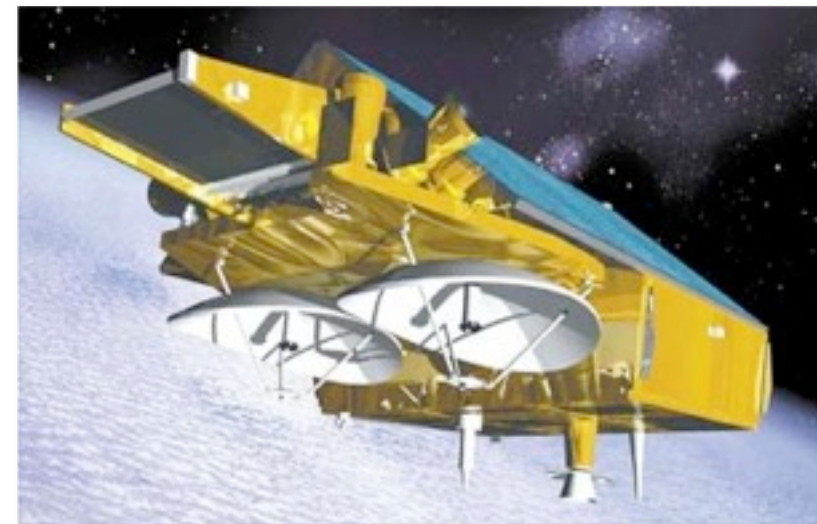




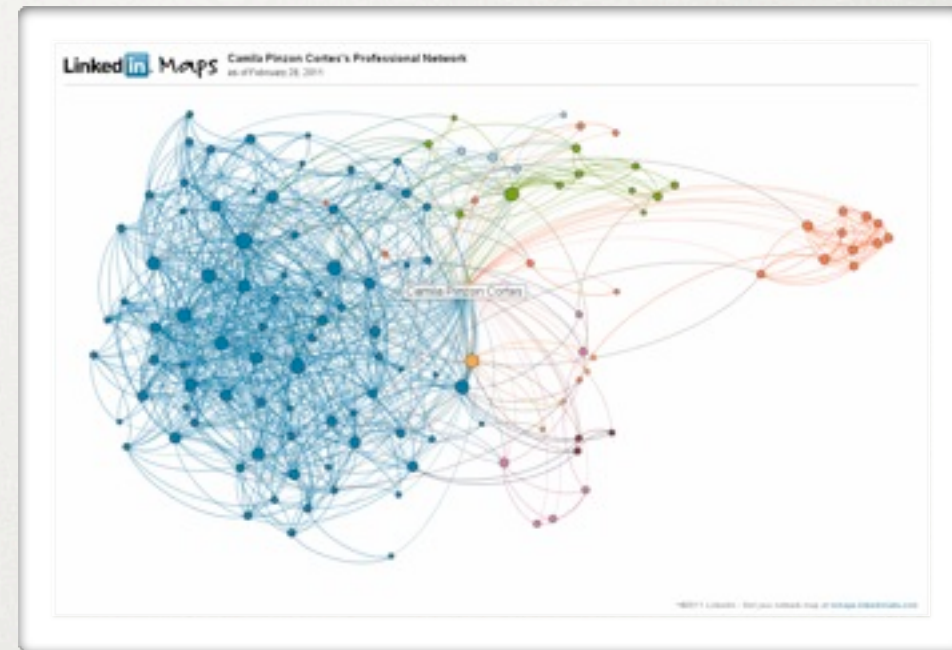
538,107

CLIMATE TO PROSPER





HUMAN INGENUITY UNBOUNDED



EXPLOIT NEW POSSIBILITIES



HOW WILL IT TURN OUT?

	H-I CLIMATE CHANGE NOT REAL	H-I CLIMATE CHANGE REAL
TAKE ACTION		
DON'T TAKE ACTION		

UNSTOPPABLE FORCE OF NATURE

ULTIMATE SMART SPECIES

20y

INTERESTING READING

- Thinking fast and slow - Daniel Kahneman
- Mistakes were made - but not by me - Carol Tavris & Elliot Aronson
- The political brain - Drew Westen
- The master and his emissary - Iain McGilchrist
- The happiness hypothesis - Jonathan Haidt
- The righteous mind - Jonathan Haidt
- Wilful Blindness - Margaret Heffernan