SUSTAINABILITY & CLIMATE CHANGE

COMING READY OR NOT!

SSEE Vic AGM, Melbourne

30 October 2012

Professor David A Hood FIEAust CPEng FIPENZ FISEAM MASCE

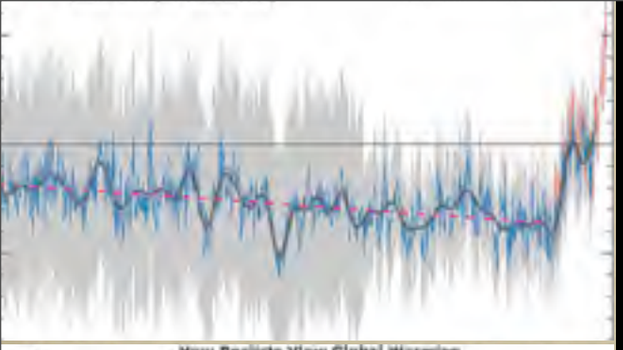
National President, Engineers Australia

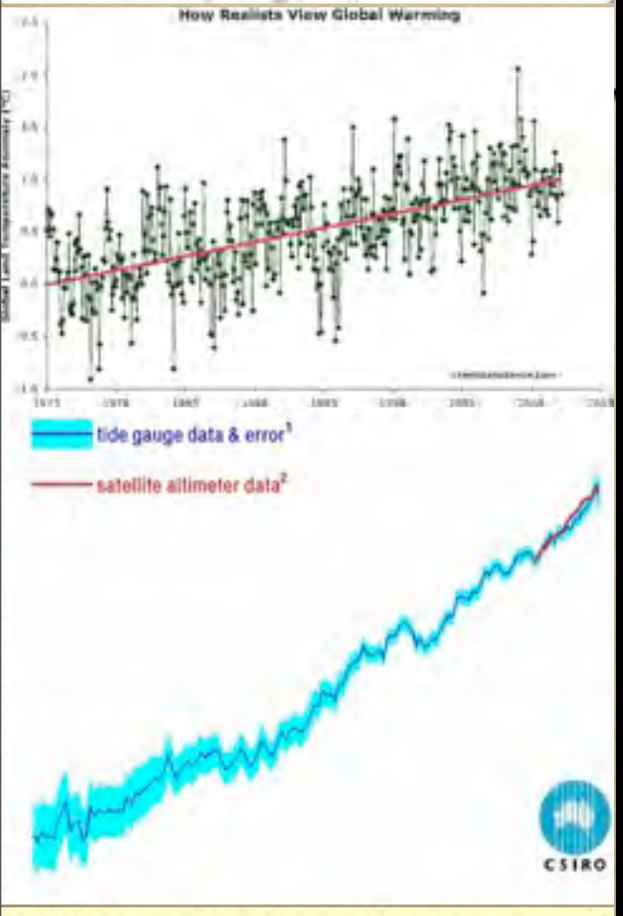
Founding Chairman, Australian Green Infrastructure Council

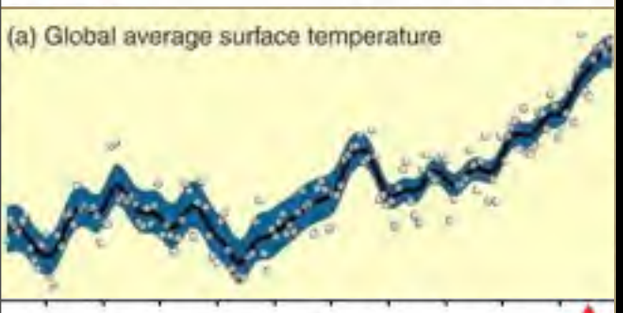
Adjunct Professor, Faculty of Built Environment and Engineering, QUT

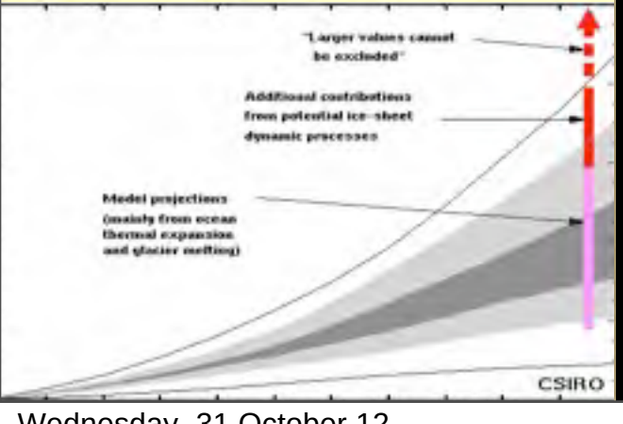
Co-Program Leader, Sustainability and Organisational Performance, CIEAM

David A Hood & Associates Pty Ltd









"Warmest Sept on record for the planet. Planet earth, I mean, the one we live on."

-as tweeted by @billmckibben 12/10/12

CLIMATE SILENCE.

Why the “S” word?

- 1962 - ***Silent Spring*** and the pervasive spread of toxins;
- ***Limits to Growth*** (Club of Rome) in 1972;
- Resource Depletion;
- ***Millennium Development Goals*** agreed in 2000;
- Fossil fuel emissions & Climate Change;
- The greatest mass species extinction that the planet has known;
- Population Explosion;
- Corporate Governance Failure.....; **AND** **for me ....**

"Is this CO_2 thing really serious Grandpa?"

Cameron Hood
(age: ONE week)

Wednesday, 31 October 12

Whose problem is it?

THE SUSTAINABLE BUSINESS BLOG

Previous Blog home

Climate change may force evacuation of vulnerable island states within a decade

Leading climate scientist warns that vulnerable island nations may need to be evacuated within a decade as evidence shows polar ice is shrinking at greater speeds than models predicted

Share 540 Tweet 88 +1 9 Email

"The models have typically predicted that will not happen for decades but the measurements that are coming in tell us it is already happening so once again we are decades ahead of schedule.

"Island nations that have considered the possibility of evacuation at some point, like Tuvalu, may have to be contending those sort of decisions within the matter of a decade or so."

Michael Mann, Penn State Uni

Business as Usual is Simply

NOT

an Option

Al Gore's Climate Reality Project


Source: NASA

"You develop an instant global consciousness, a people orientation, an intense dissatisfaction with the state of the world, and a compulsion to do something about it. From out there on the moon, international politics look so petty. You want to grab a politician by the scruff of the neck and drag him a quarter of a million miles out and say, 'Look at that, you son of a bitch.'"

— Apollo 14 astronaut Edgar Mitchell

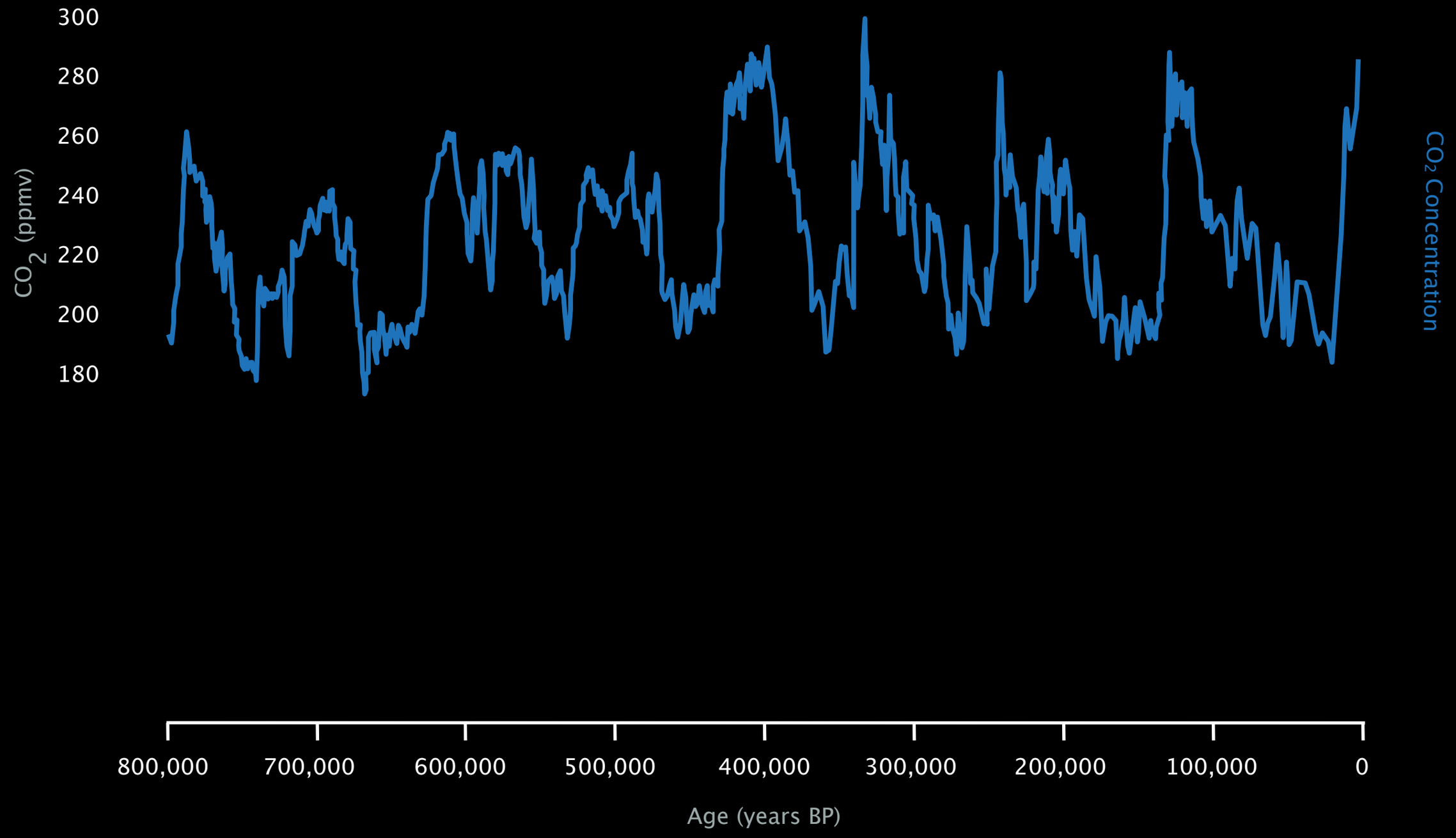
Photo: NASA

Photo: NASA

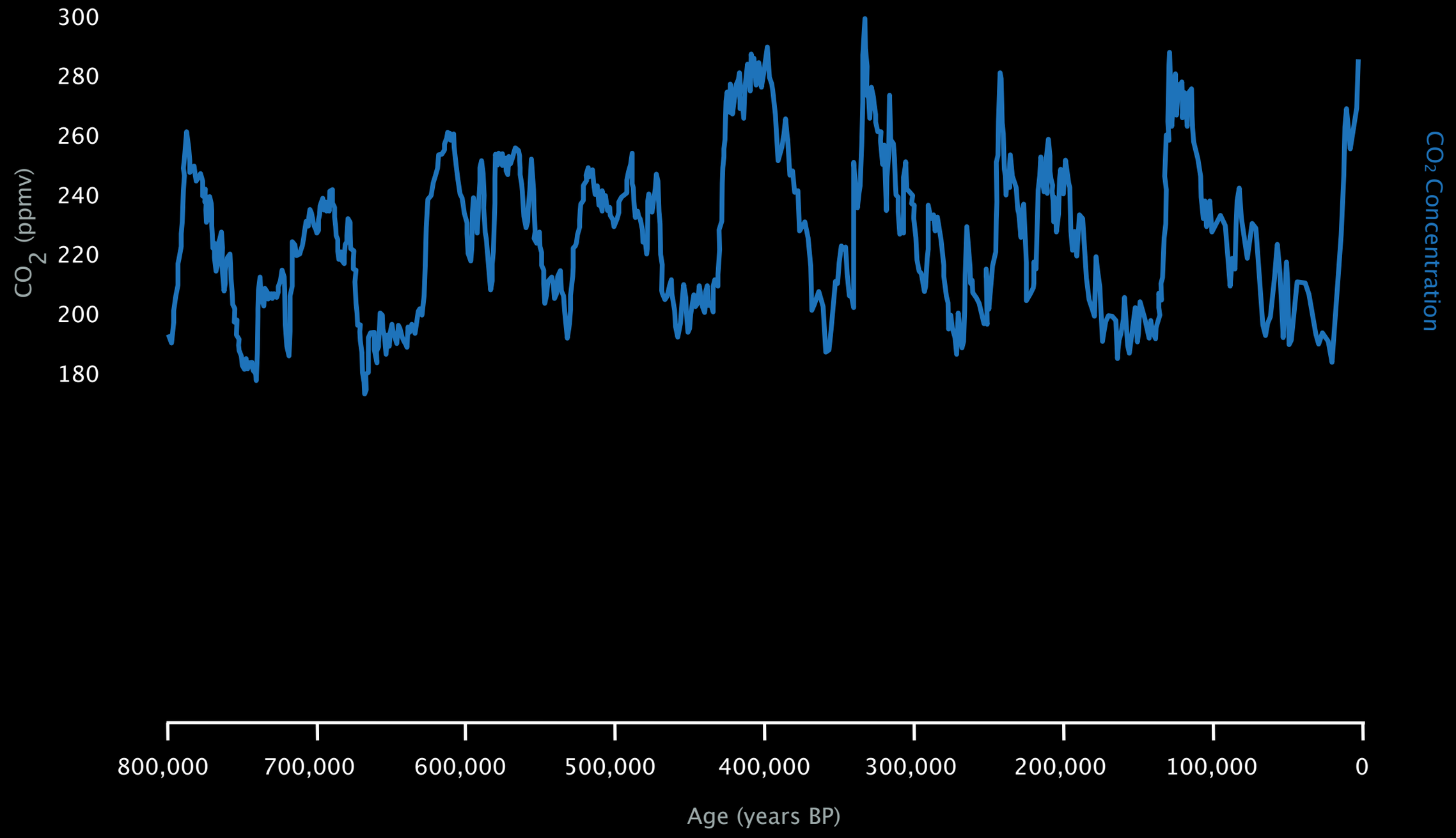
© Getty Images/Steve Cole

Wednesday, 31 October 12

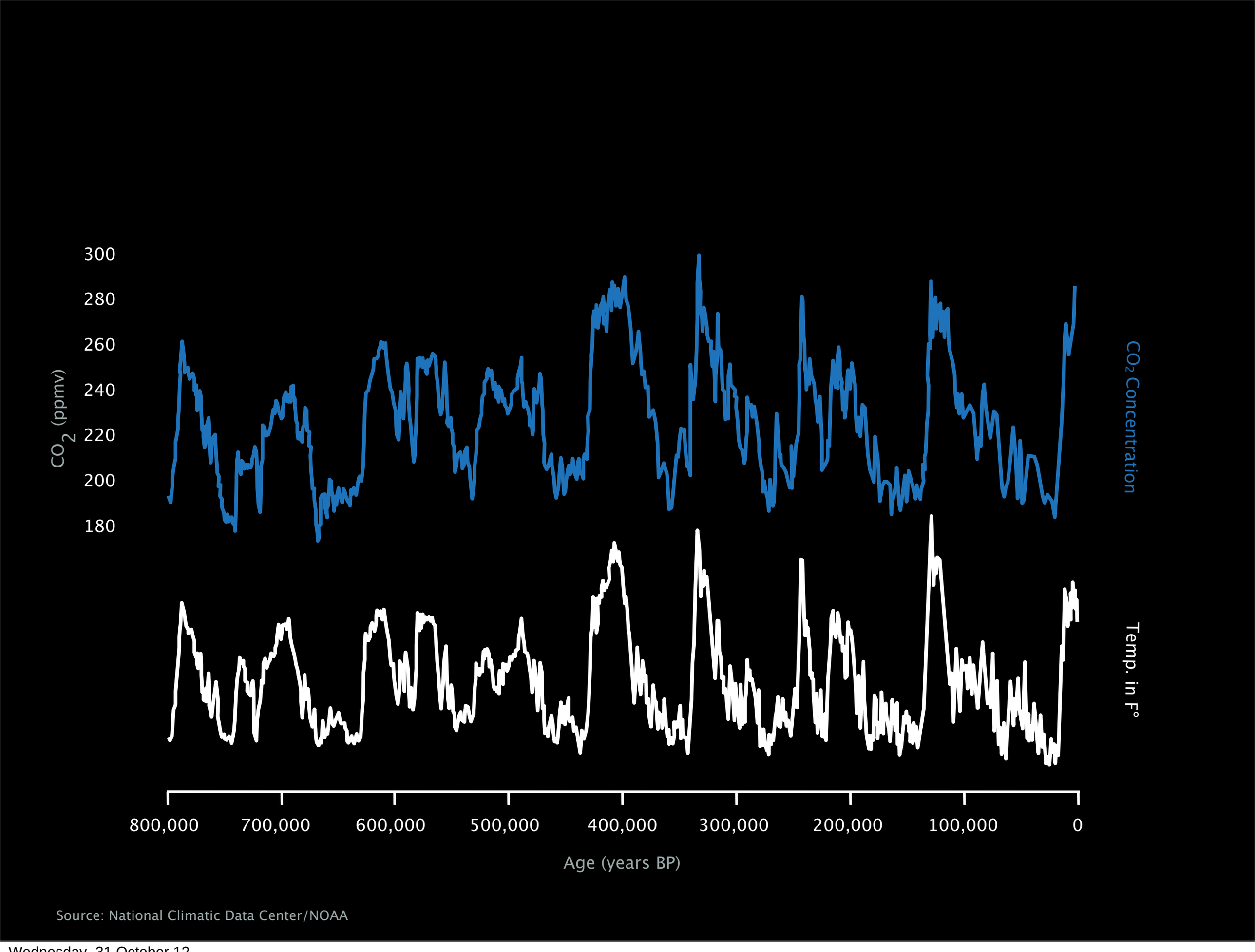
Source: National Climatic Data Center/NOAA



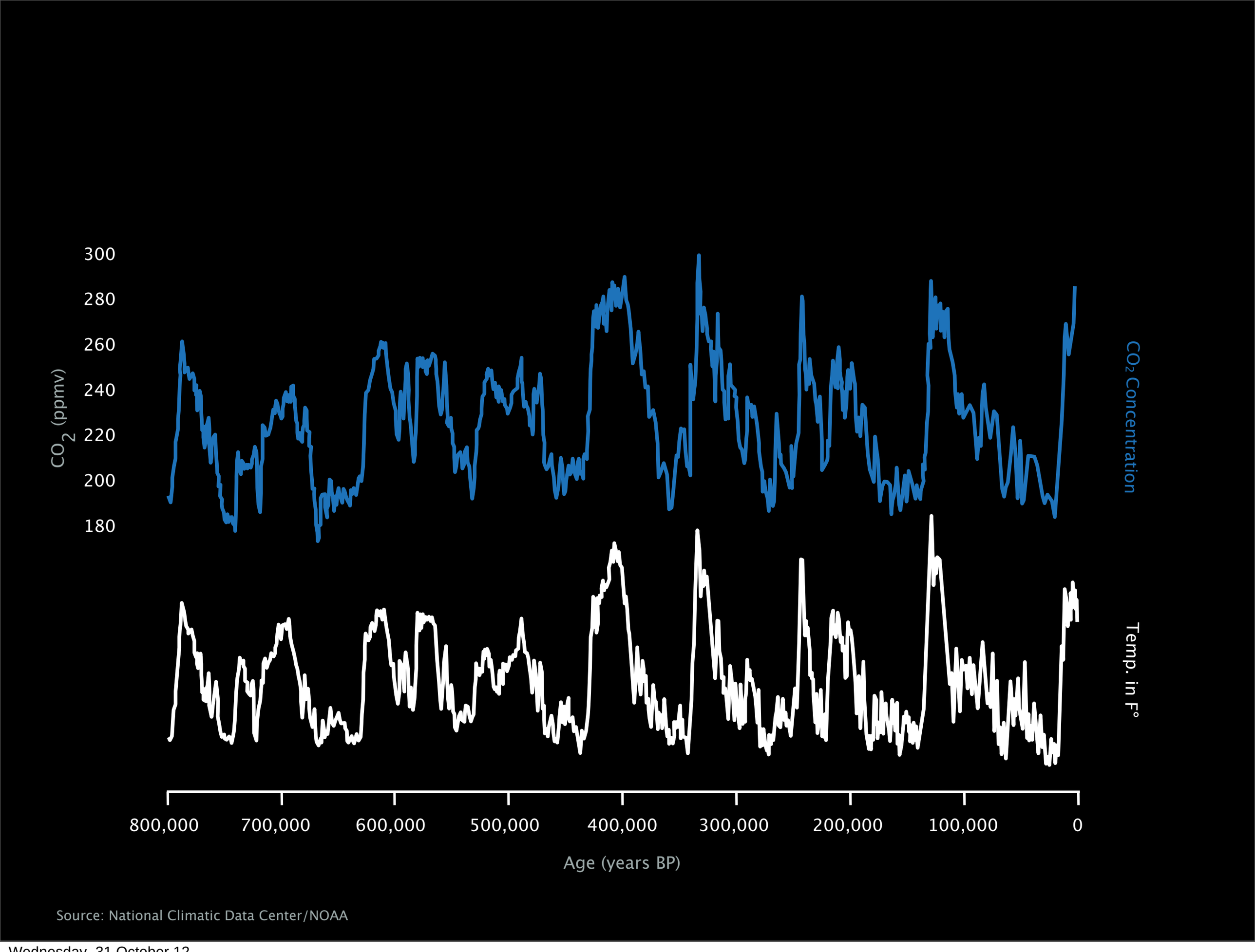
Source: National Climatic Data Center/NOAA



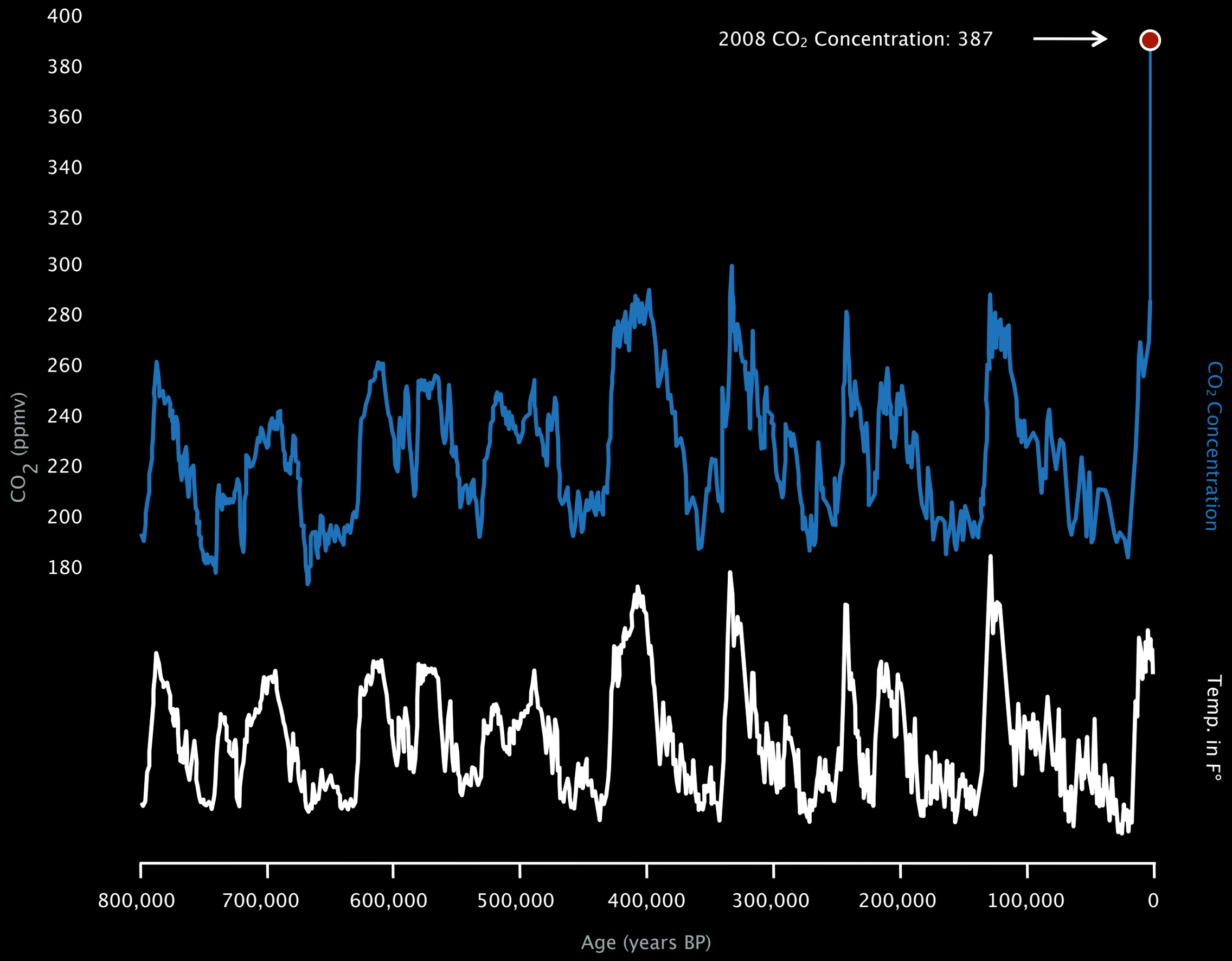
Source: National Climatic Data Center/NOAA



Source: National Climatic Data Center/NOAA



Source: National Climatic Data Center/NOAA



Source: National Climatic Data Center/NOAA

July 2012: 394.5

2008 CO_2 Concentration: 387

CO_2 (ppmv)

400
380
360
340
320
300
280
260
240
220
200
180

CO_2 Concentration

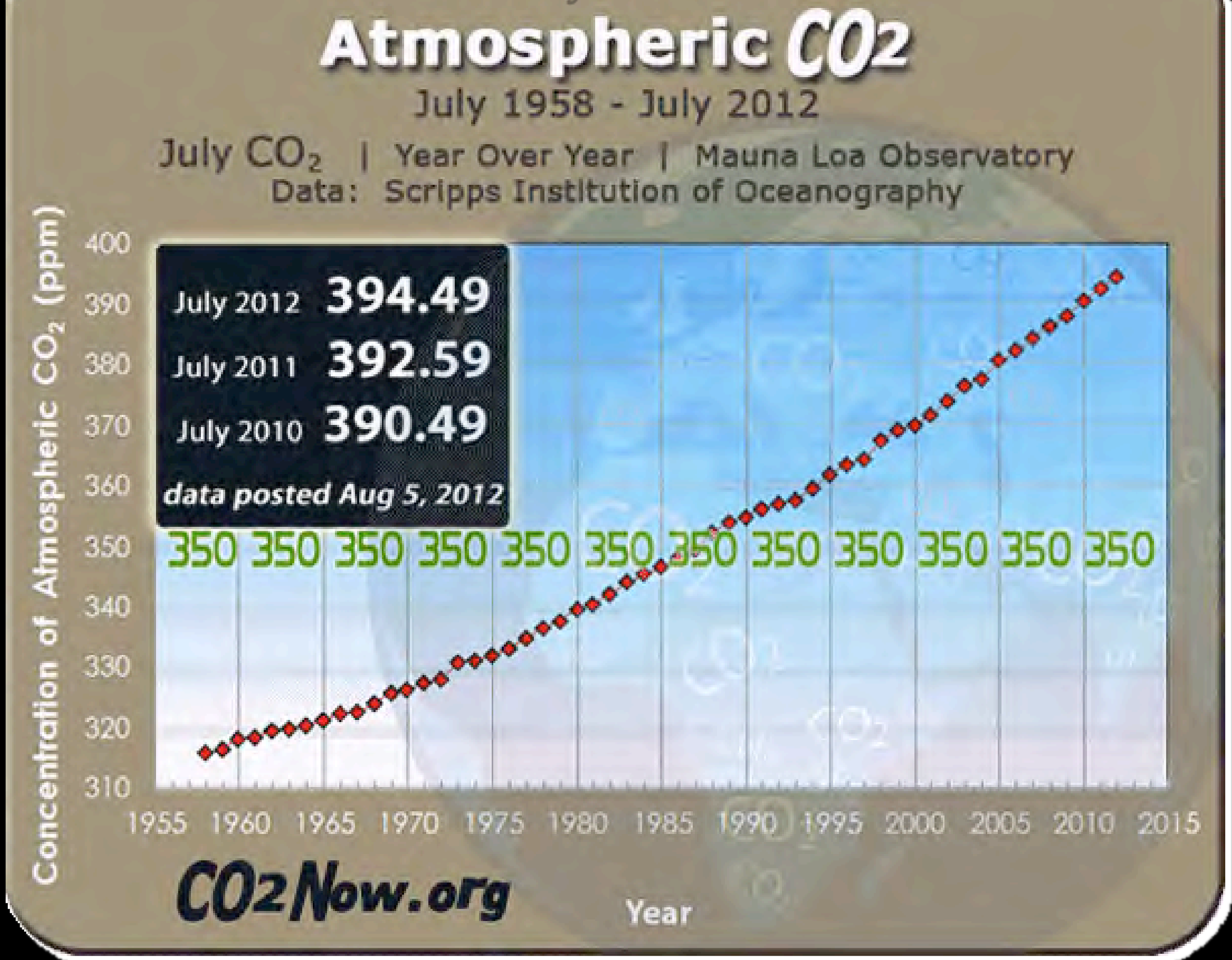
Temp. in F°

800,000 700,000 600,000 500,000 400,000 300,000 200,000 100,000 0

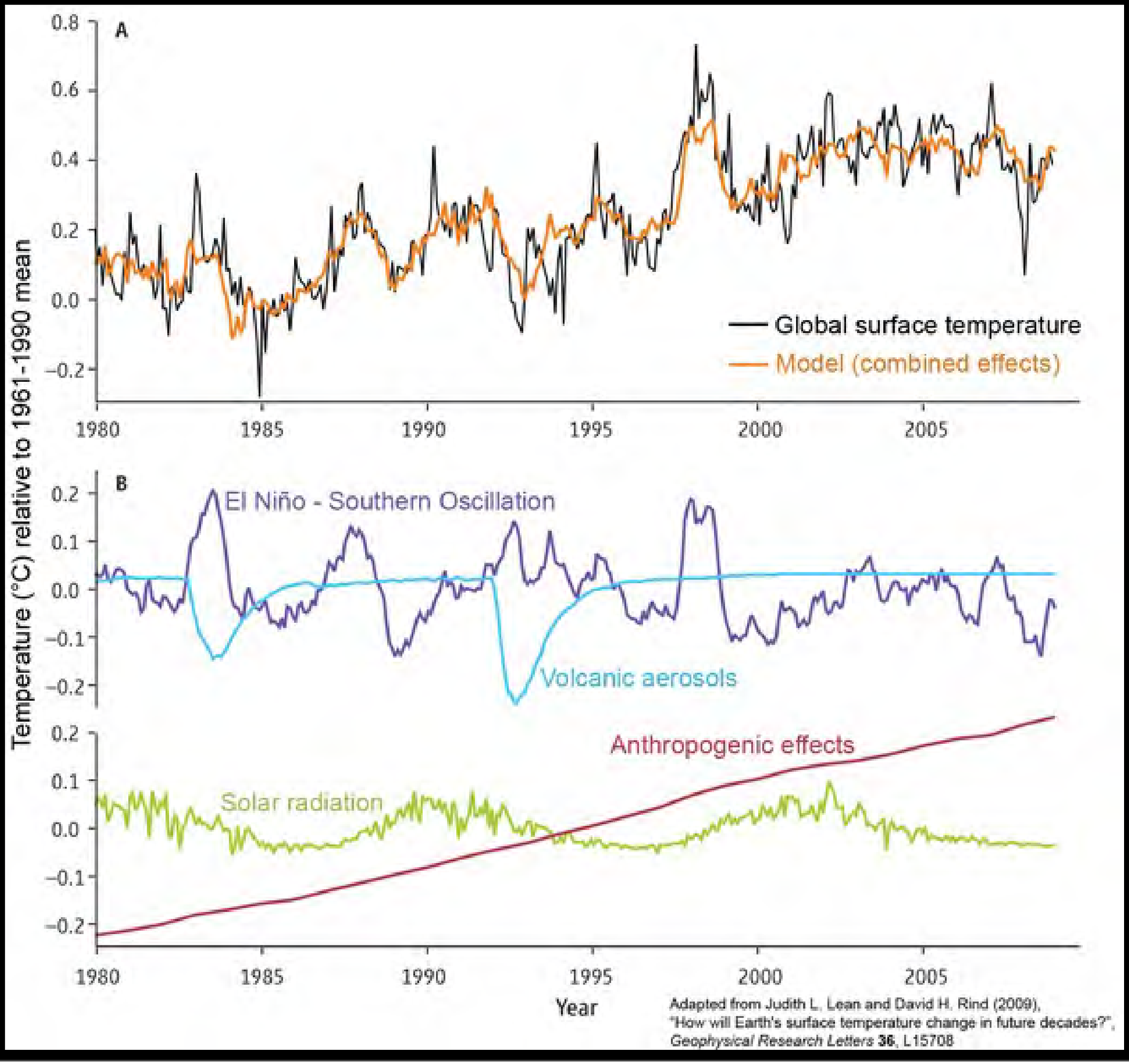
Age (years BP)

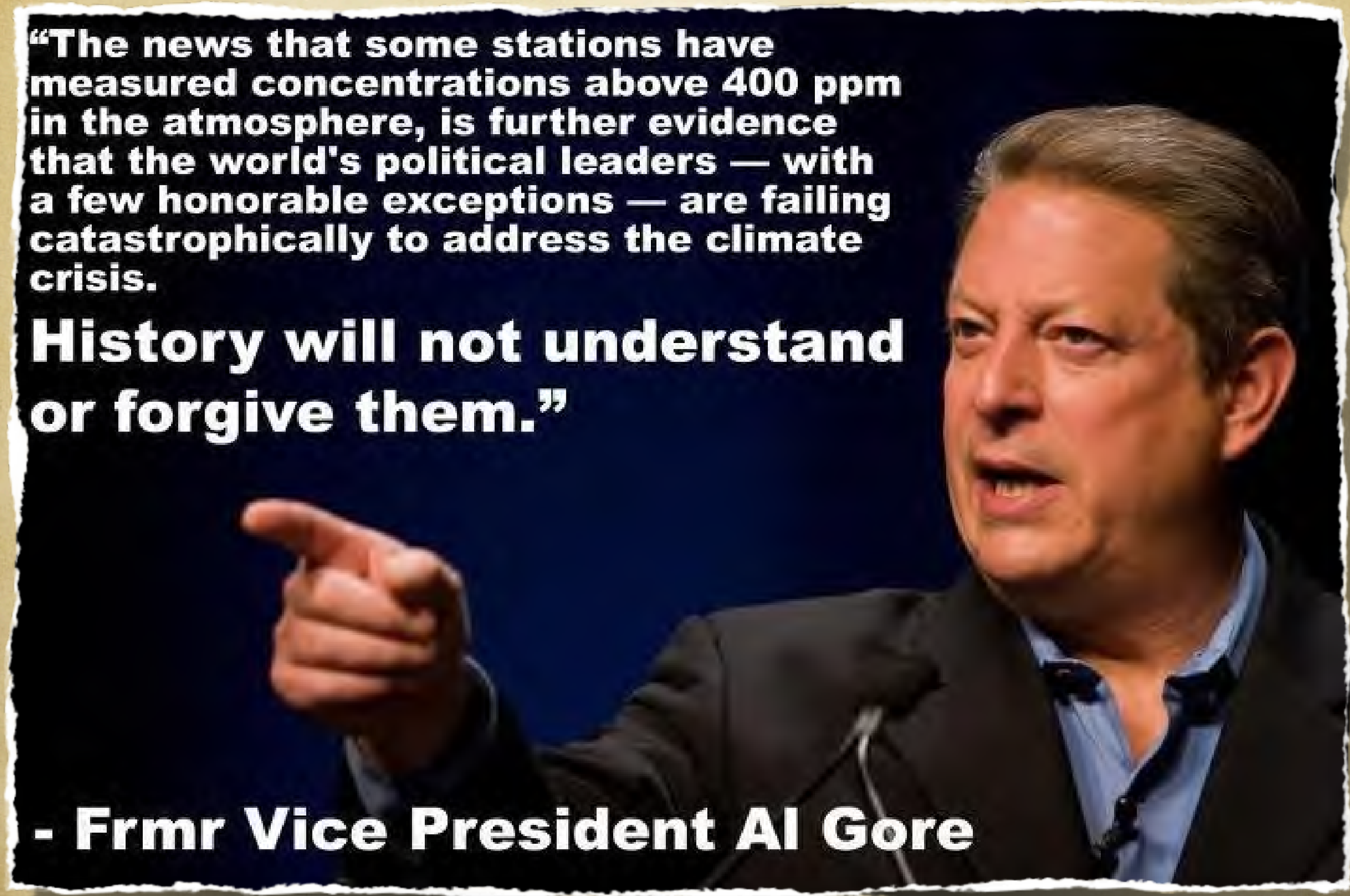
Source: National Climatic Data Center/NOAA

54 years of

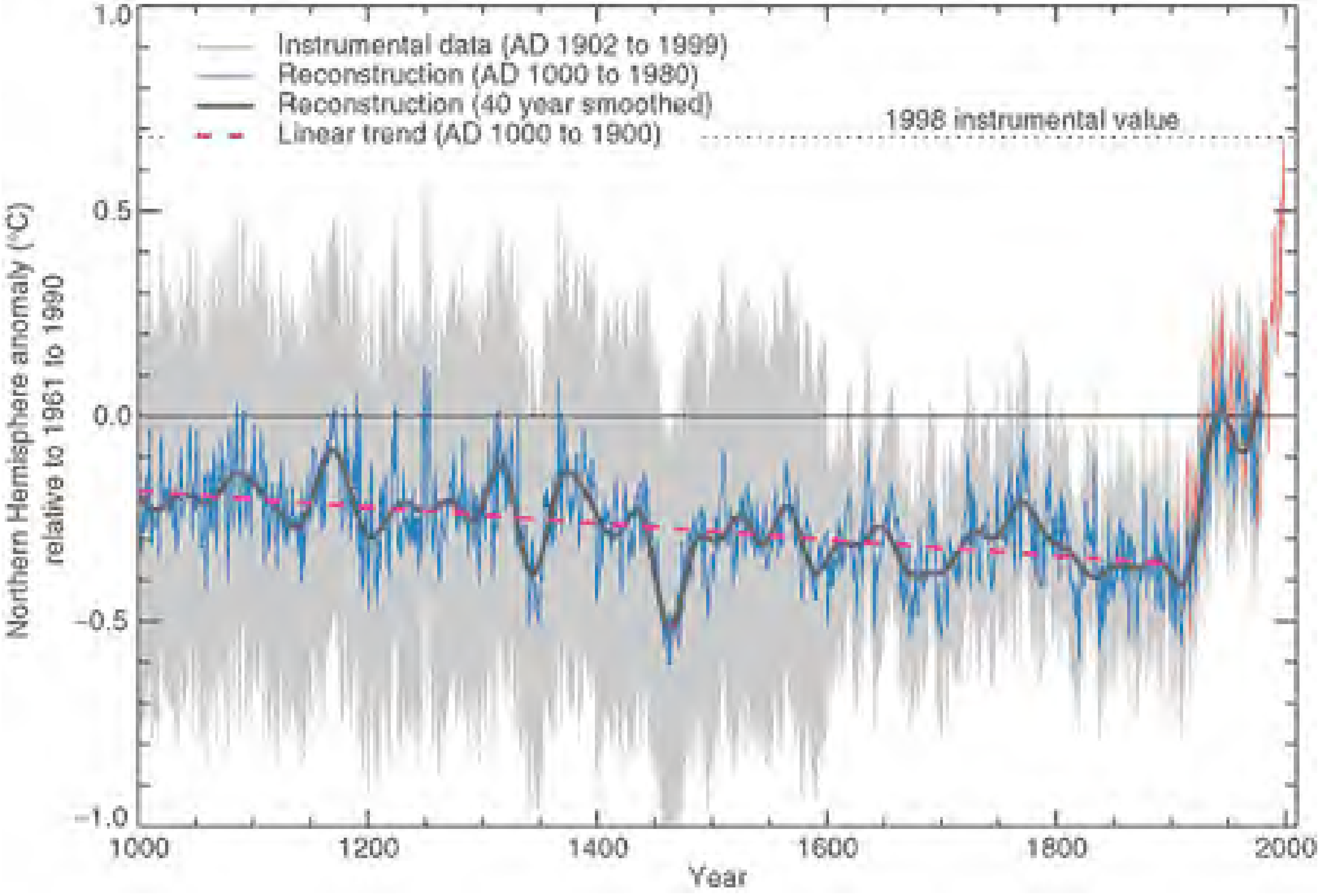

Atmospheric CO2
July 1958 - July 2012
July CO_2 | Year Over Year | Mauna Loa Observatory
Data: Scripps Institution of Oceanography
July 2012 394.49
July 2011 392.59
July 2010 390.49
data posted Aug 5, 2012
Concentration of Atmospheric CO_2 (ppm)
400
390
380
370
360
350
340
330
320
310
350 350 350 350 350 350 350 350 350 350 350 350
1955 1960 1965 1970 1975 1980 1985 1990 1995 2000 2005 2010 2015
CO2Now.org
Year

What is affecting the Earth's Global average temperature




"The news that some stations have measured concentrations above 400 ppm in the atmosphere, is further evidence that the world's political leaders — with a few honorable exceptions — are failing catastrophically to address the climate crisis.
History will not understand or forgive them."
- Frmr Vice President Al Gore

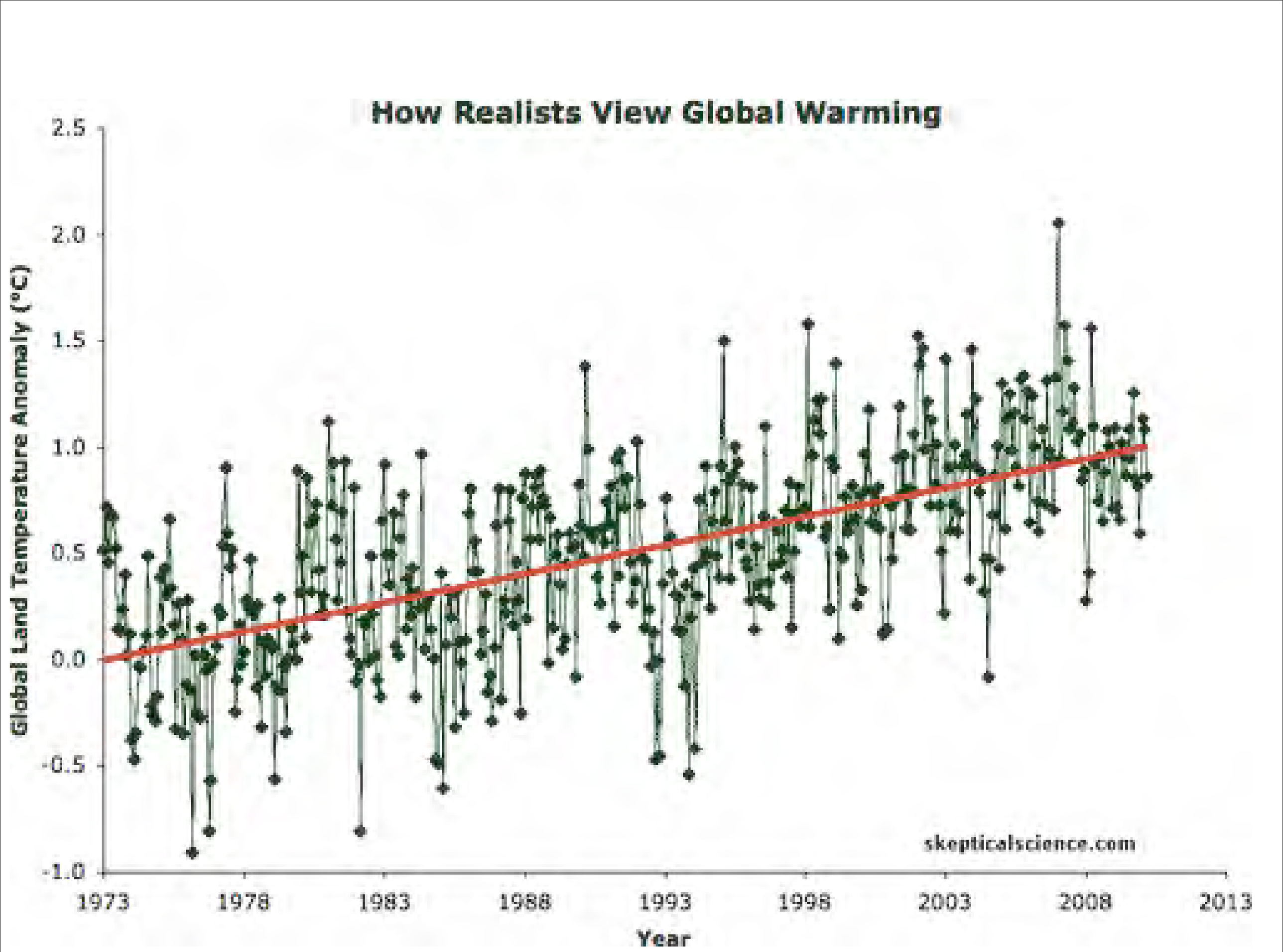
July 2012

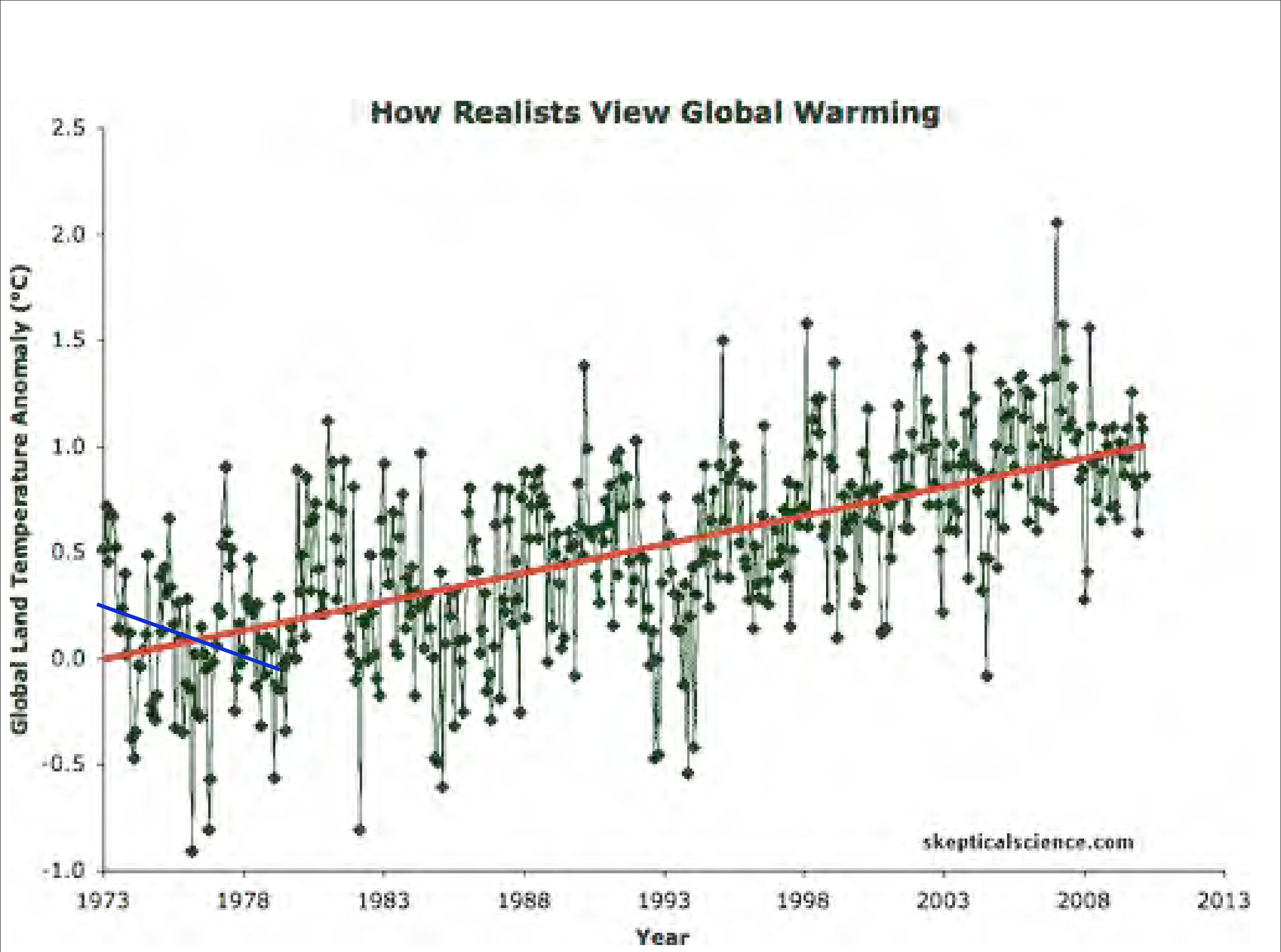


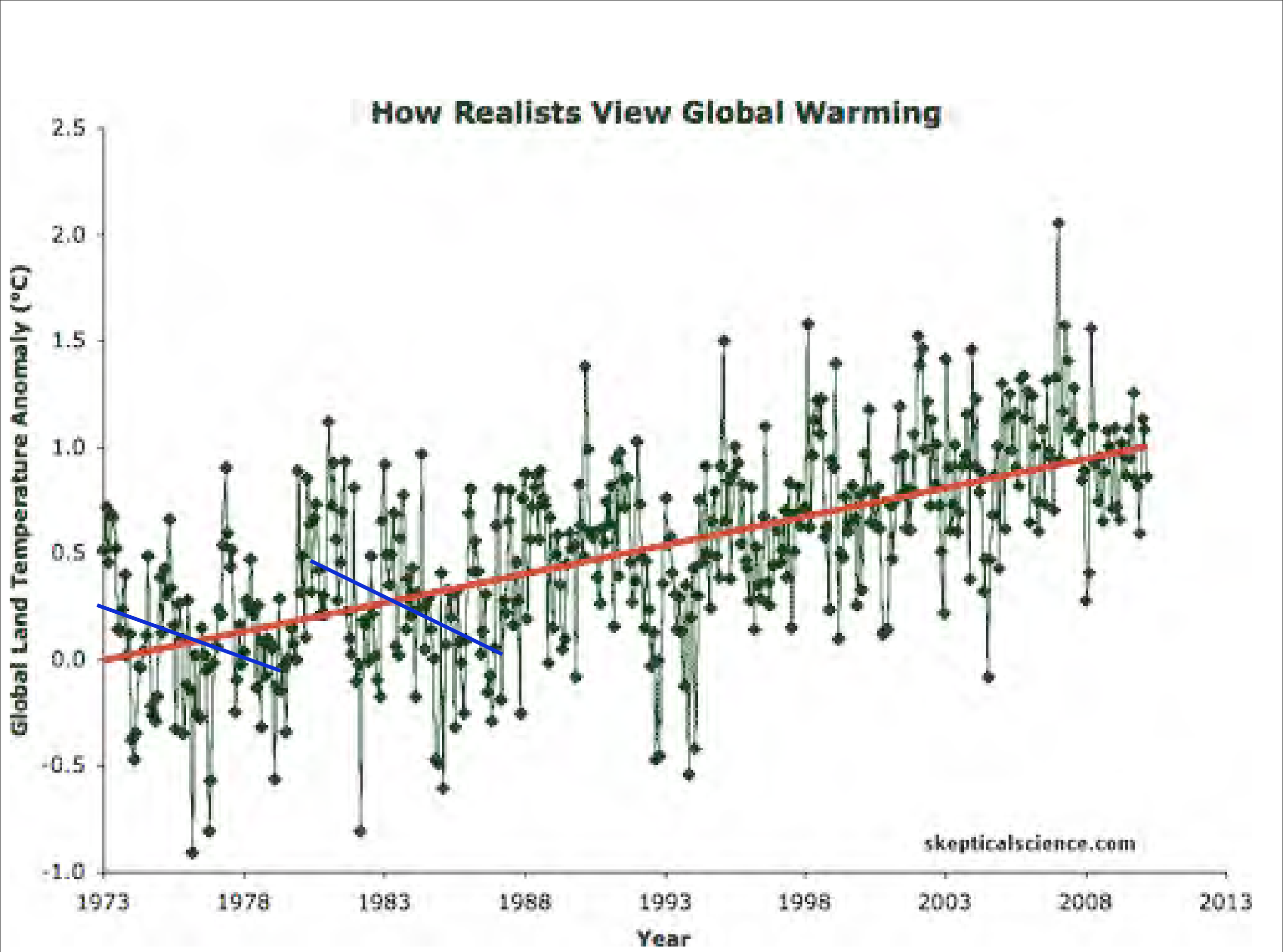
Northern Hemisphere temperature changes estimated from various proxy records shown in blue (Mann 1999). Instrumental data shown in red. Note the large uncertainty (grey area) as you go further back in time.

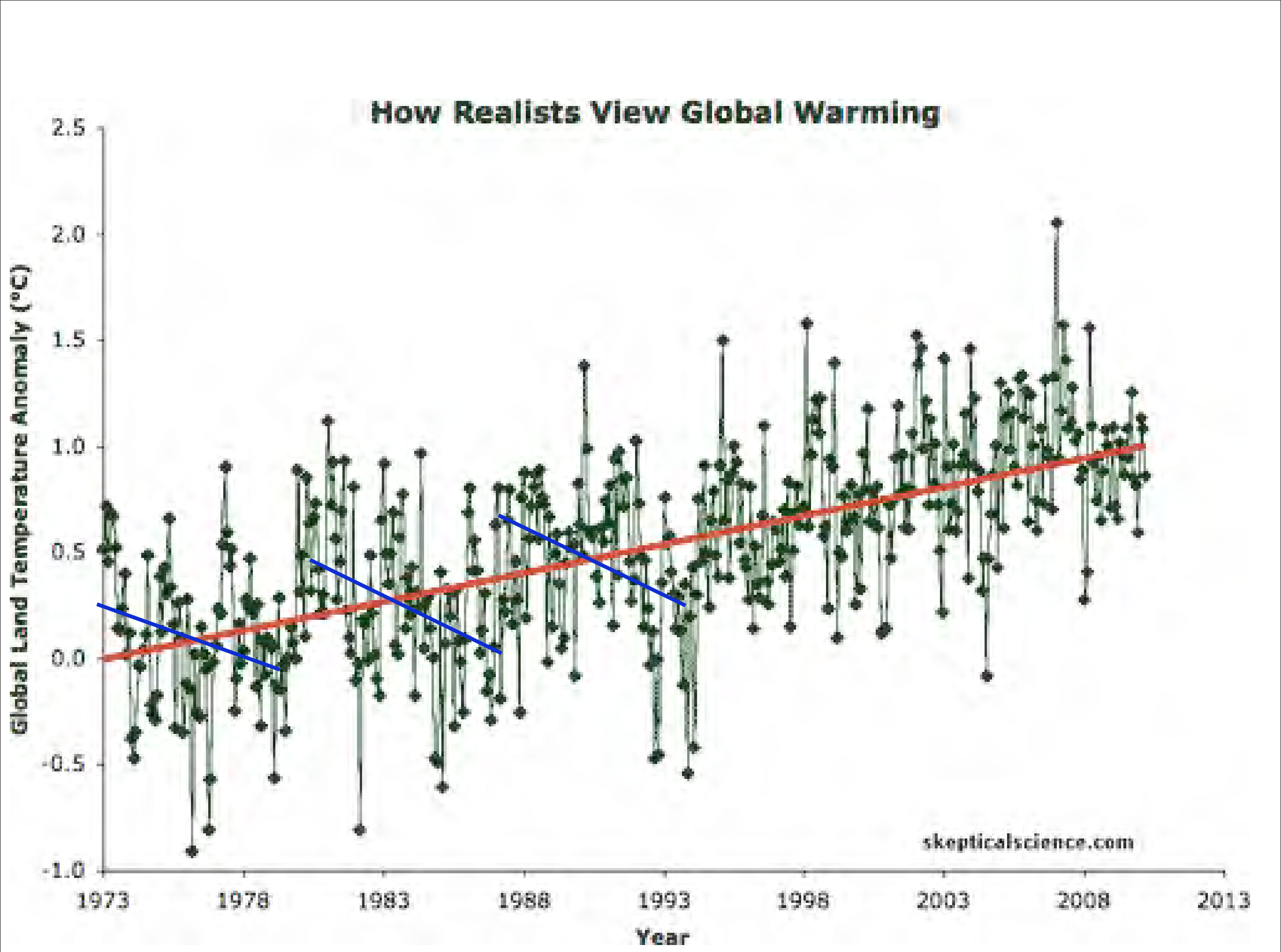
That Hockey Stick....

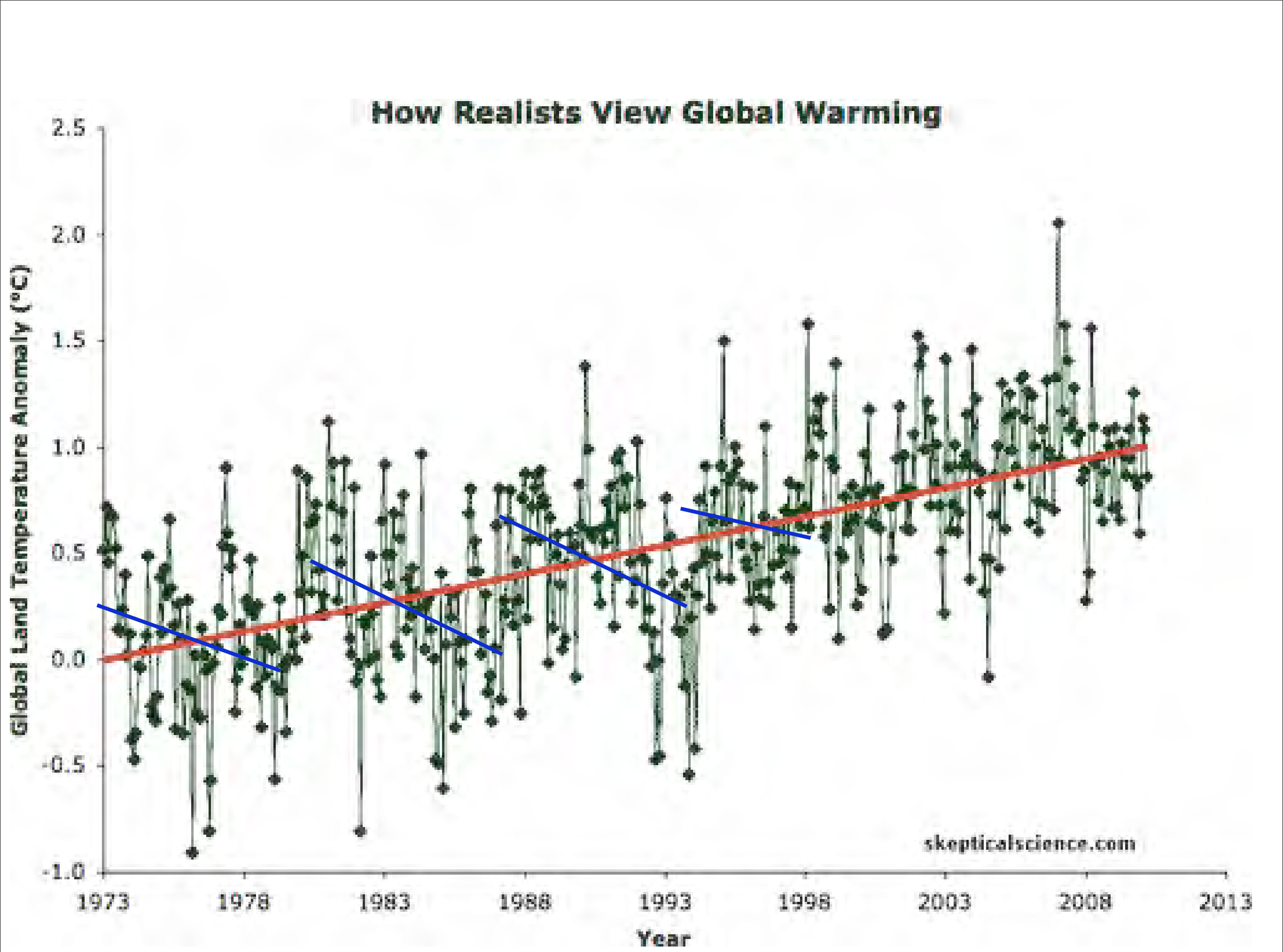
Since the hockey stick paper in 1998, there have been a number of proxy studies analysing a variety of different sources including corals, stalagmites, tree rings, boreholes and ice cores. They all confirm the original hockey stick conclusion: the 20th century is the warmest in the last 1000 years and that warming was most dramatic after 1920.


How Realists View Global Warming
Global Land Temperature Anomaly (°C)
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
1973
1978
1983
1988
1993
1998
2003
2008
2013
Year
skepticalscience.com

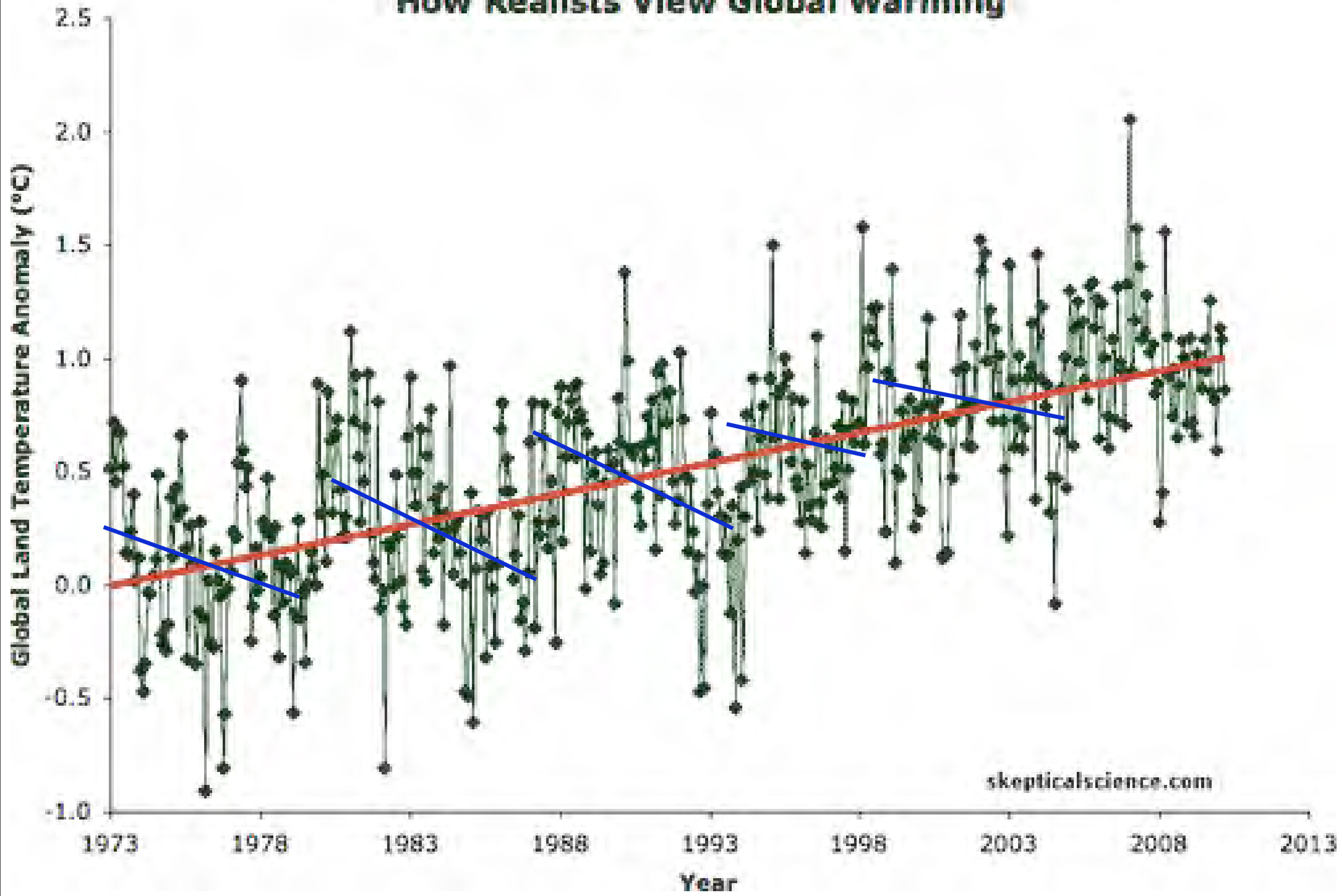

How Realists View Global Warming
Global Land Temperature Anomaly (°C)
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
1973
1978
1983
1988
1993
1998
2003
2008
2013
Year
skepticalscience.com

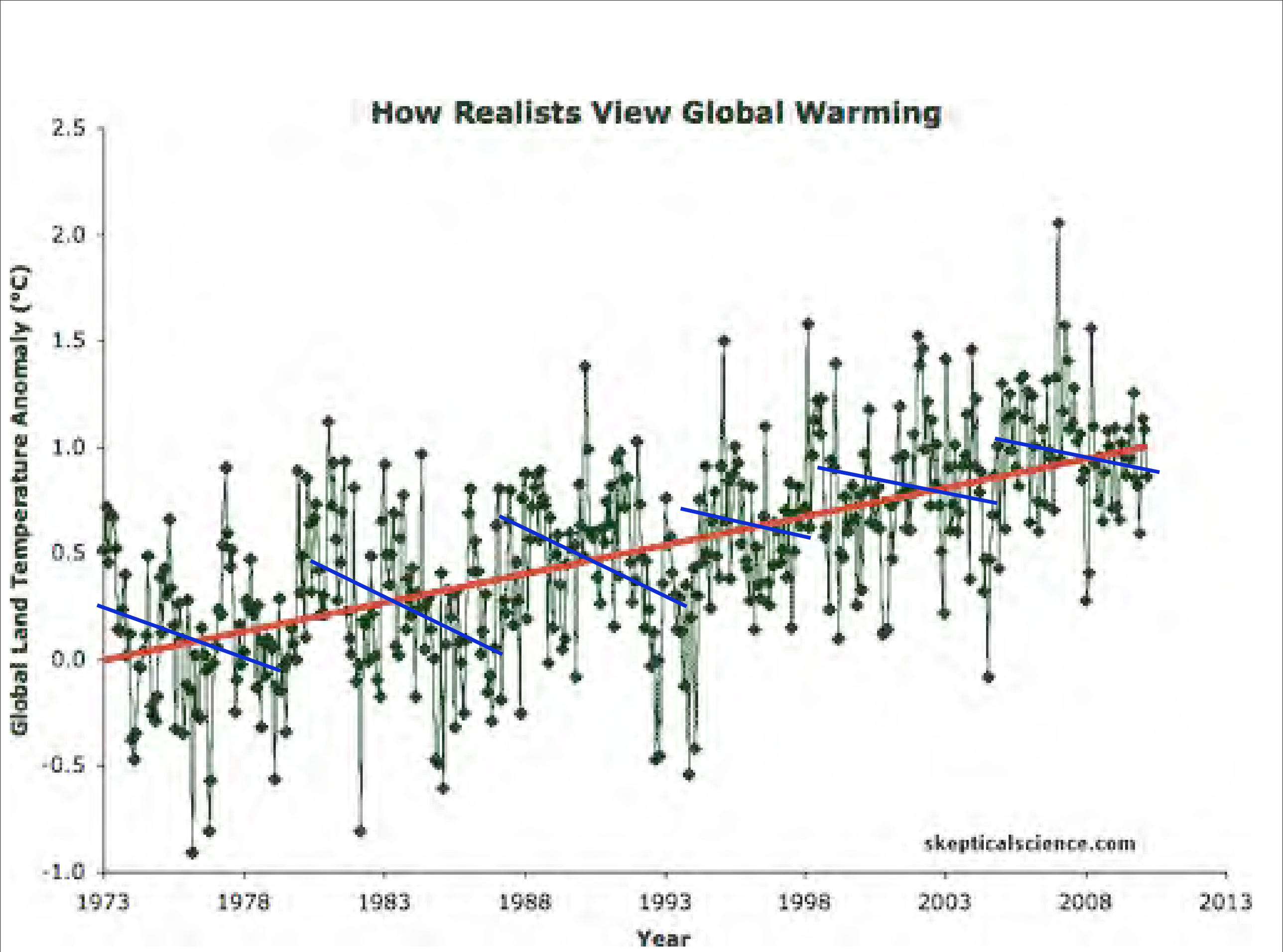

How Realists View Global Warming
Global Land Temperature Anomaly (°C)
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
1973
1978
1983
1988
1993
1998
2003
2008
2013
Year
skepticalscience.com

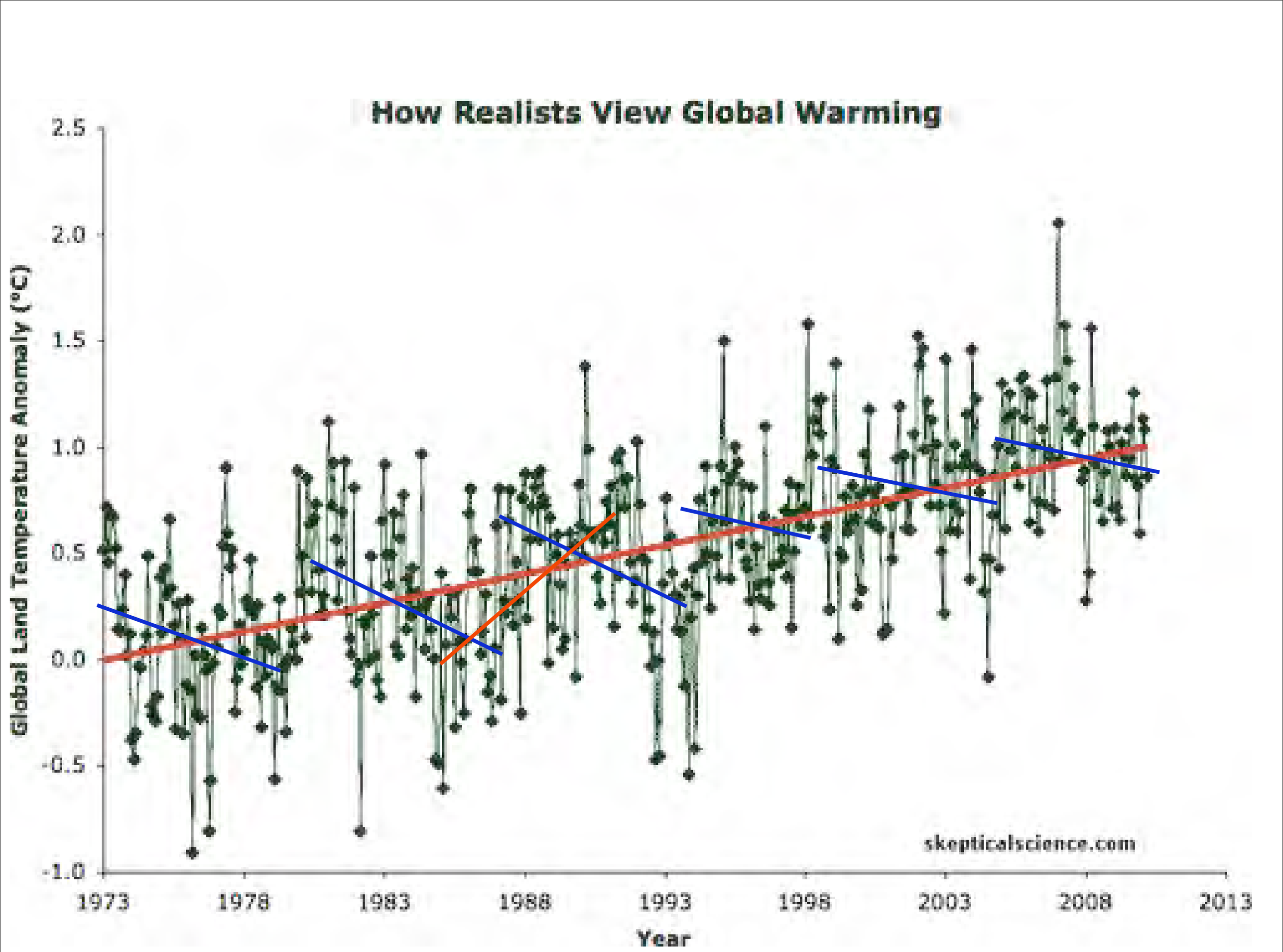

How Realists View Global Warming
Global Land Temperature Anomaly (°C)
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
1973
1978
1983
1988
1993
1998
2003
2008
2013
Year
skepticalscience.com


How Realists View Global Warming
Global Land Temperature Anomaly (°C)
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
1973
1978
1983
1988
1993
1998
2003
2008
2013
Year
skepticalscience.com

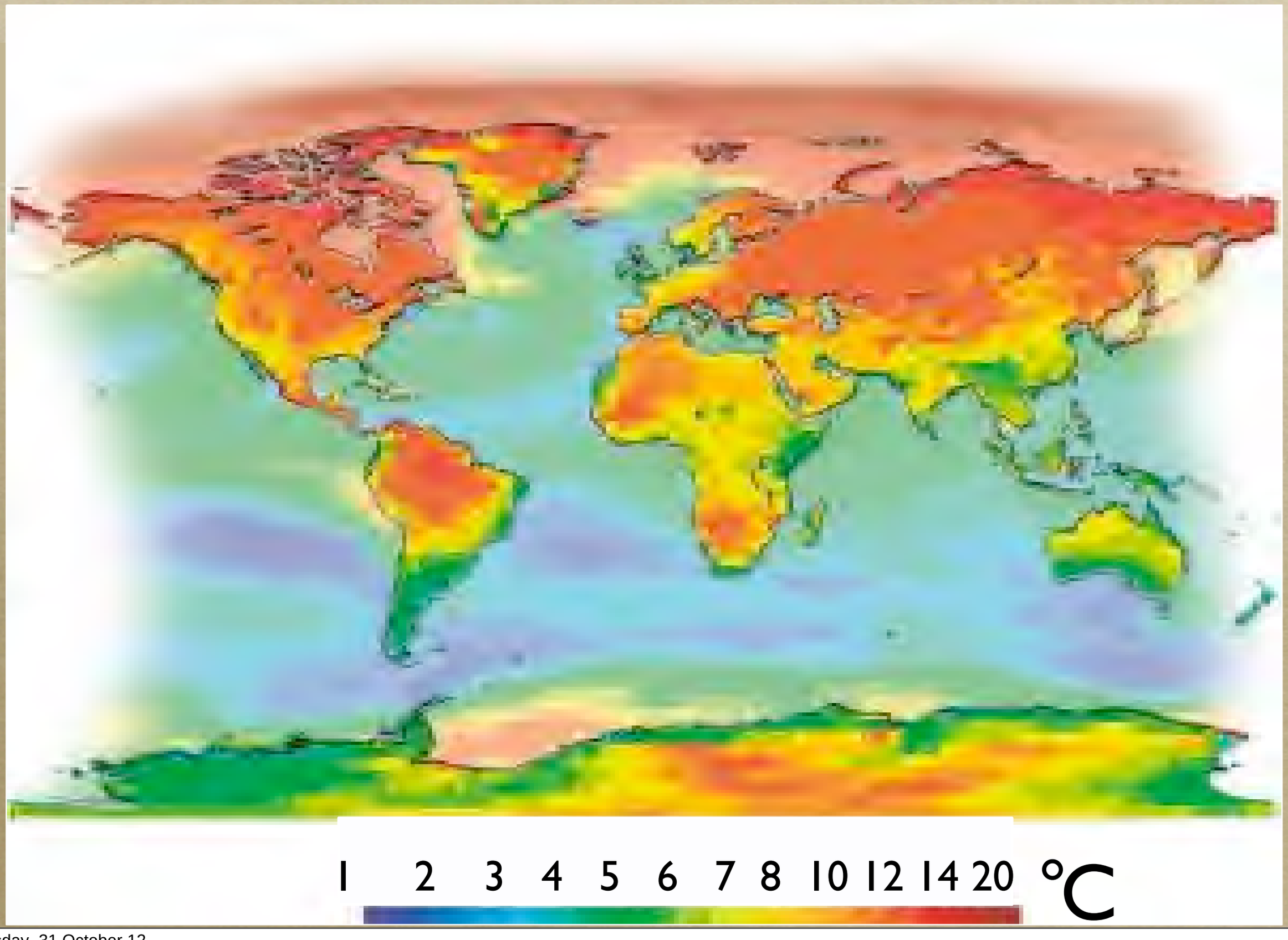
How Realists View Global Warming




How Realists View Global Warming
Global Land Temperature Anomaly (°C)
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
1973
1978
1983
1988
1993
1998
2003
2008
2013
Year
skepticalscience.com


How Realists View Global Warming
Global Land Temperature Anomaly (°C)
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
1973
1978
1983
1988
1993
1998
2003
2008
2013
Year
skepticalscience.com

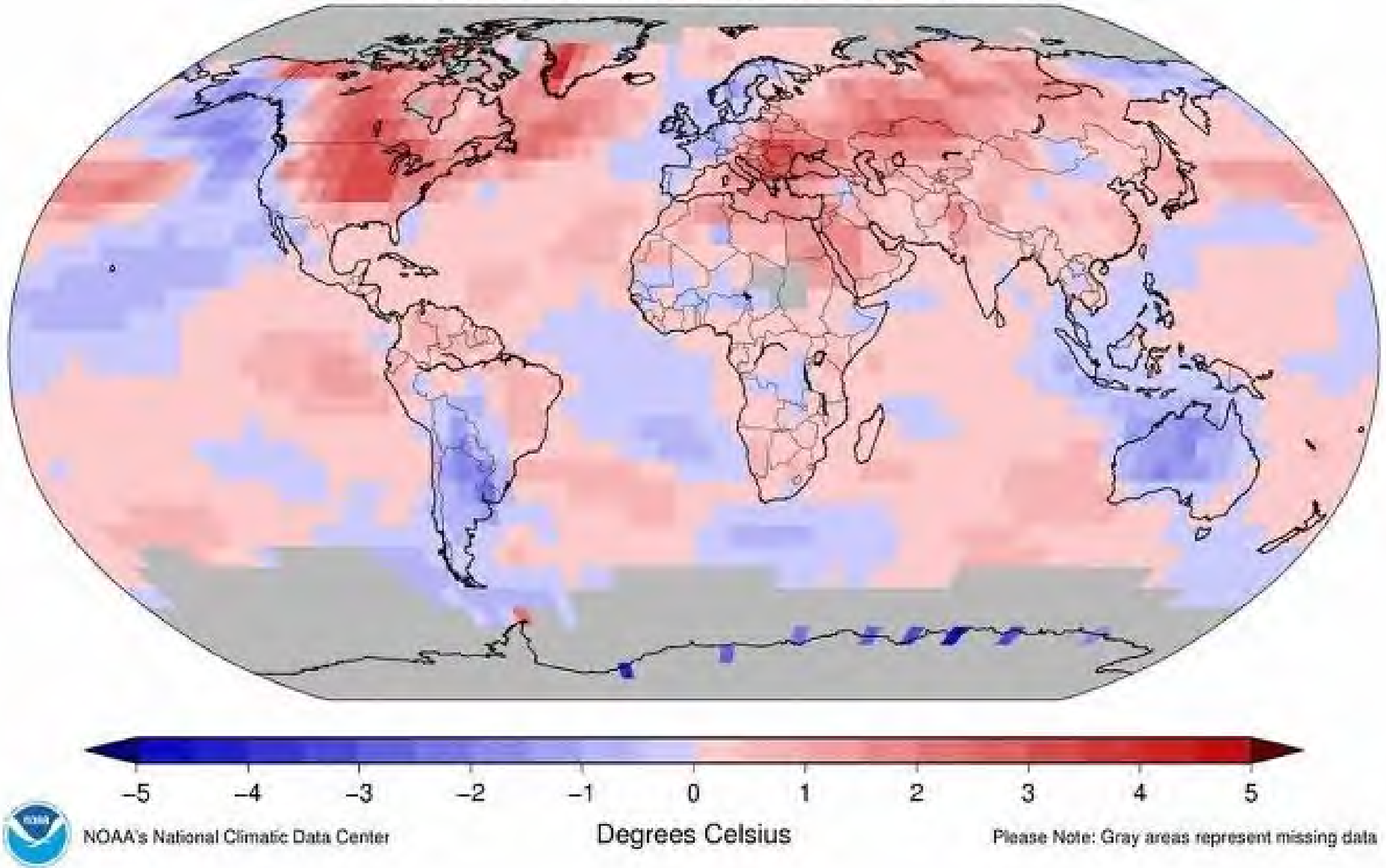
Regional temperature increases for an average 4°C increase relative to 1890.



Land & Ocean Temperature Anomalies Jul 2012

(with respect to a 1981–2010 base period)

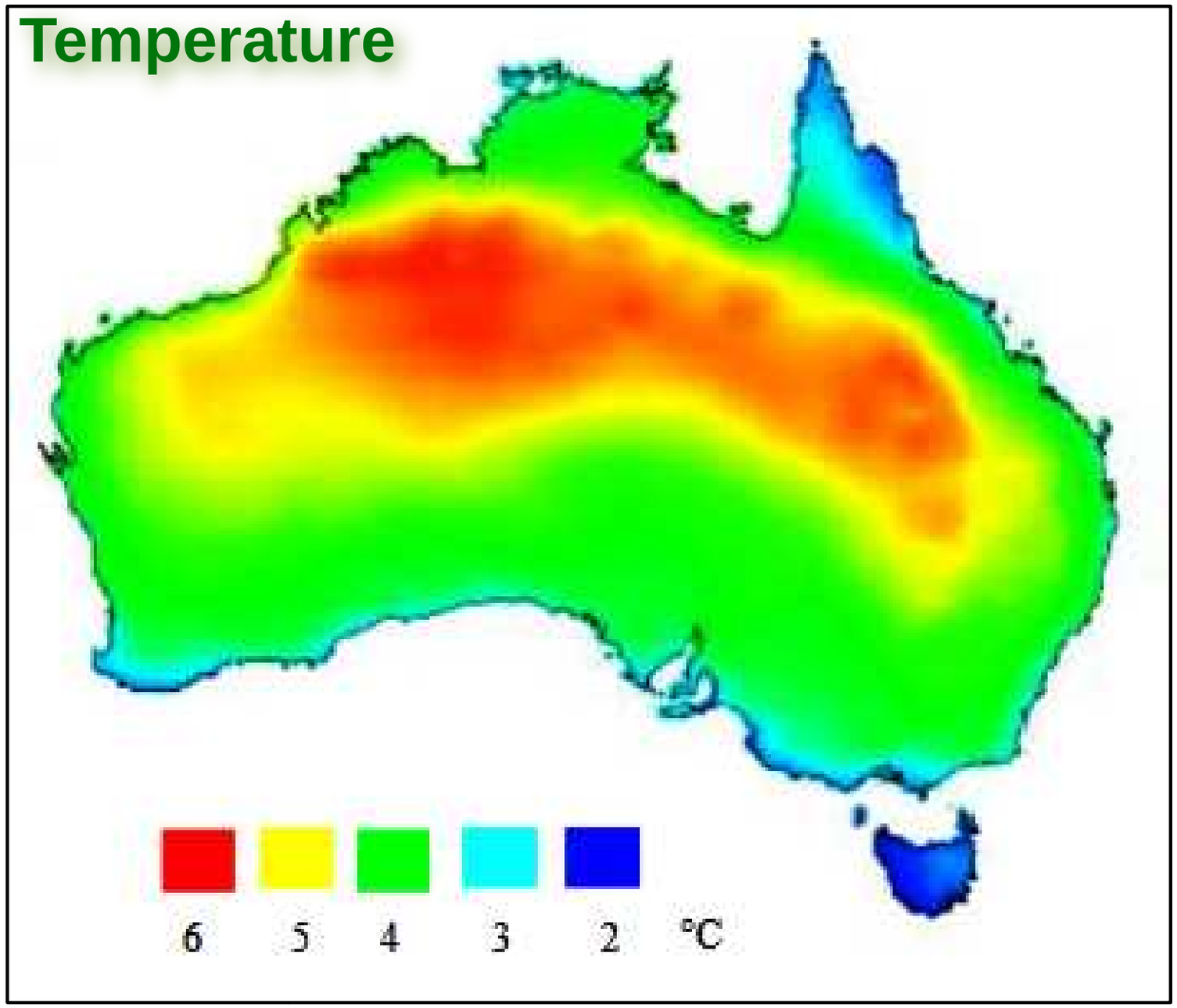
Data Source: GHCN–M version 3.1.0 & ERSST version 3b



NOAA's National Climatic Data Center

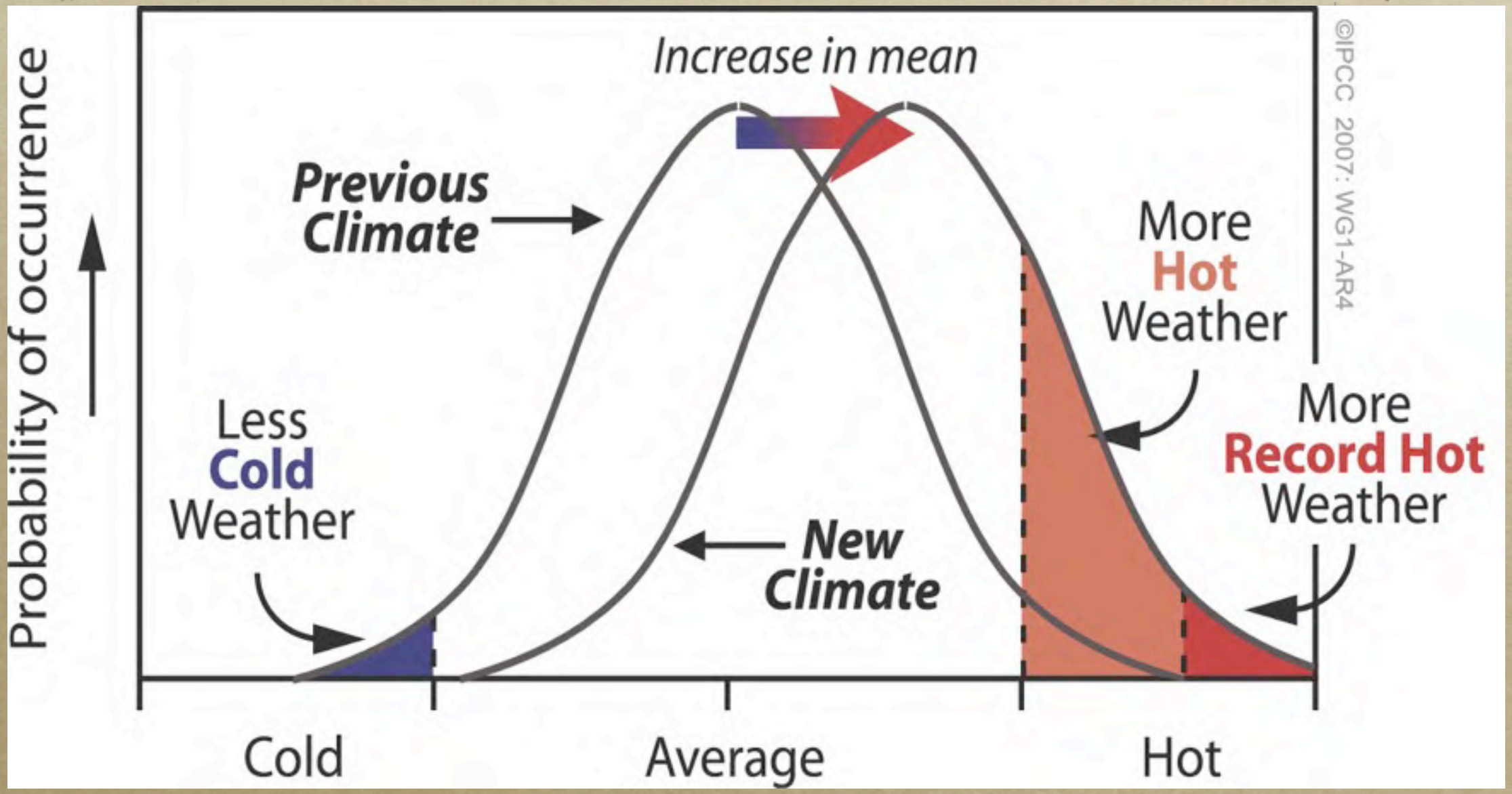
Please Note: Gray areas represent missing data

CSIRO Predictions - 2100



Projected Temperature Changes across Australia by year 2100 relative to 1990.

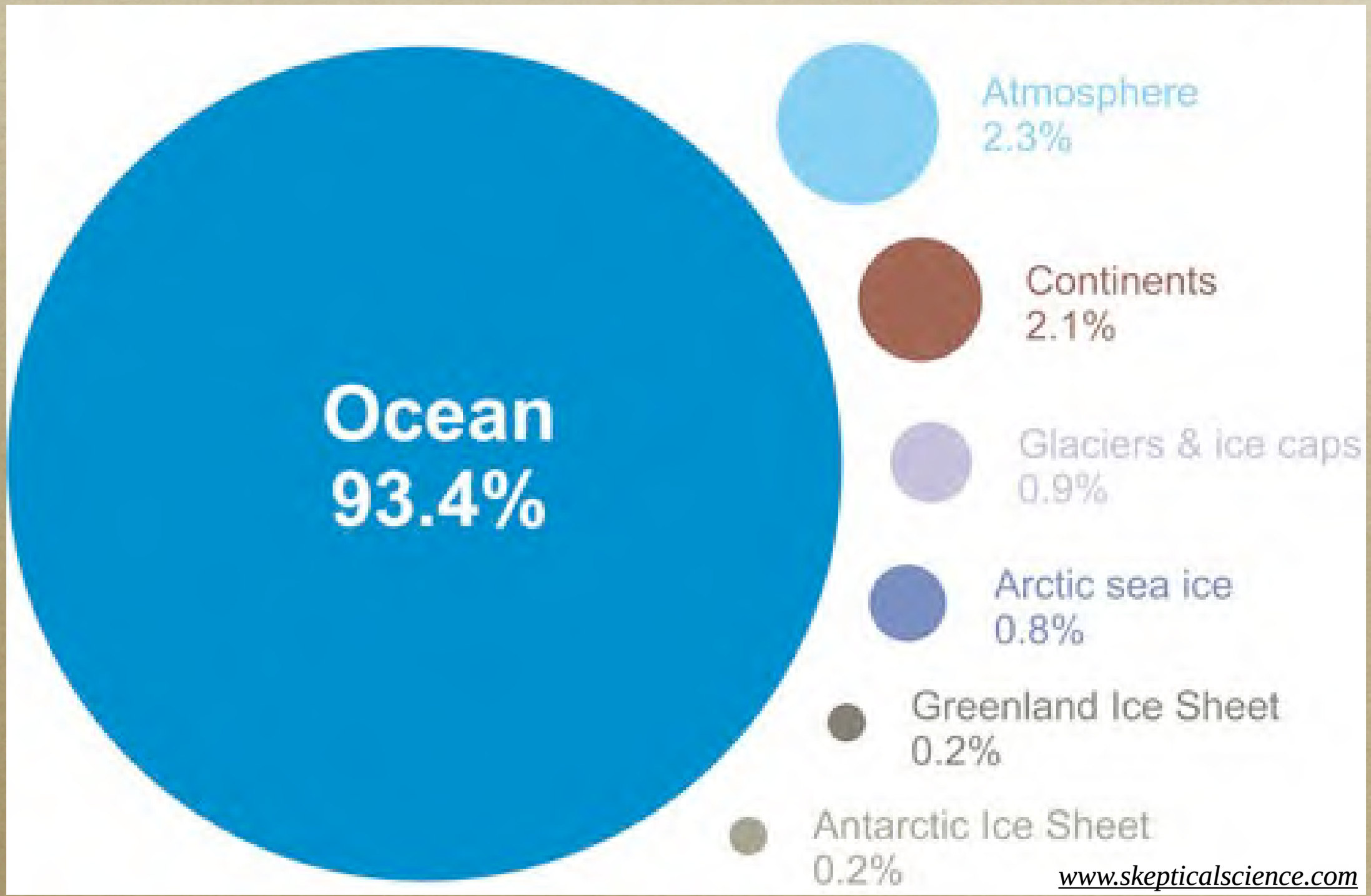
Just how serious is this crisis?



A small change in the average of a variable can have a disproportionate influence on the frequency of extreme events of that variable.

2°C shift results in a 26% increase severe discomfort

Where is all this additional energy going?



Rhone Glacier

Rhone Glacier

Victoria, Australia

February 9, 2009

Source: NASA/GSFC/MODIS Rapid Response Team

Victoria, Australia

February 9, 2009

Source: NASA/GSFC/MODIS Rapid Response Team

Marysville, Australia

February 9, 2009

Photo: William West/AFP/Getty Images

Hurricane Katrina

August 29, 2005

Source: NOAA

Rockhampton

January 2, 2011

Rockhampton Airport

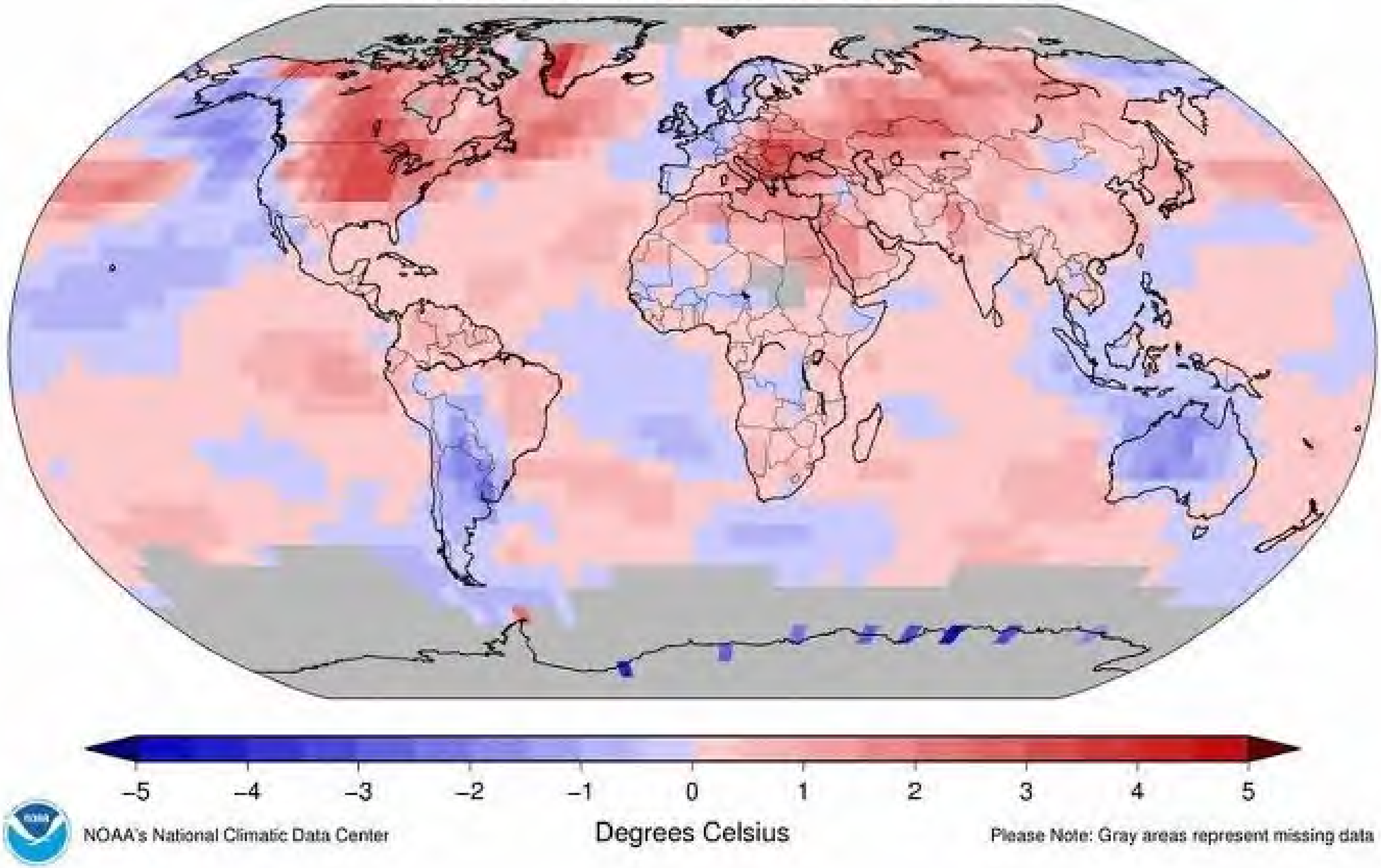
January 3, 2010


Central Western Region (Barcaldine)
QLD, January 2011

Land & Ocean Temperature Anomalies Jul 2012

(with respect to a 1981–2010 base period)

Data Source: GHCN–M version 3.1.0 & ERSST version 3b



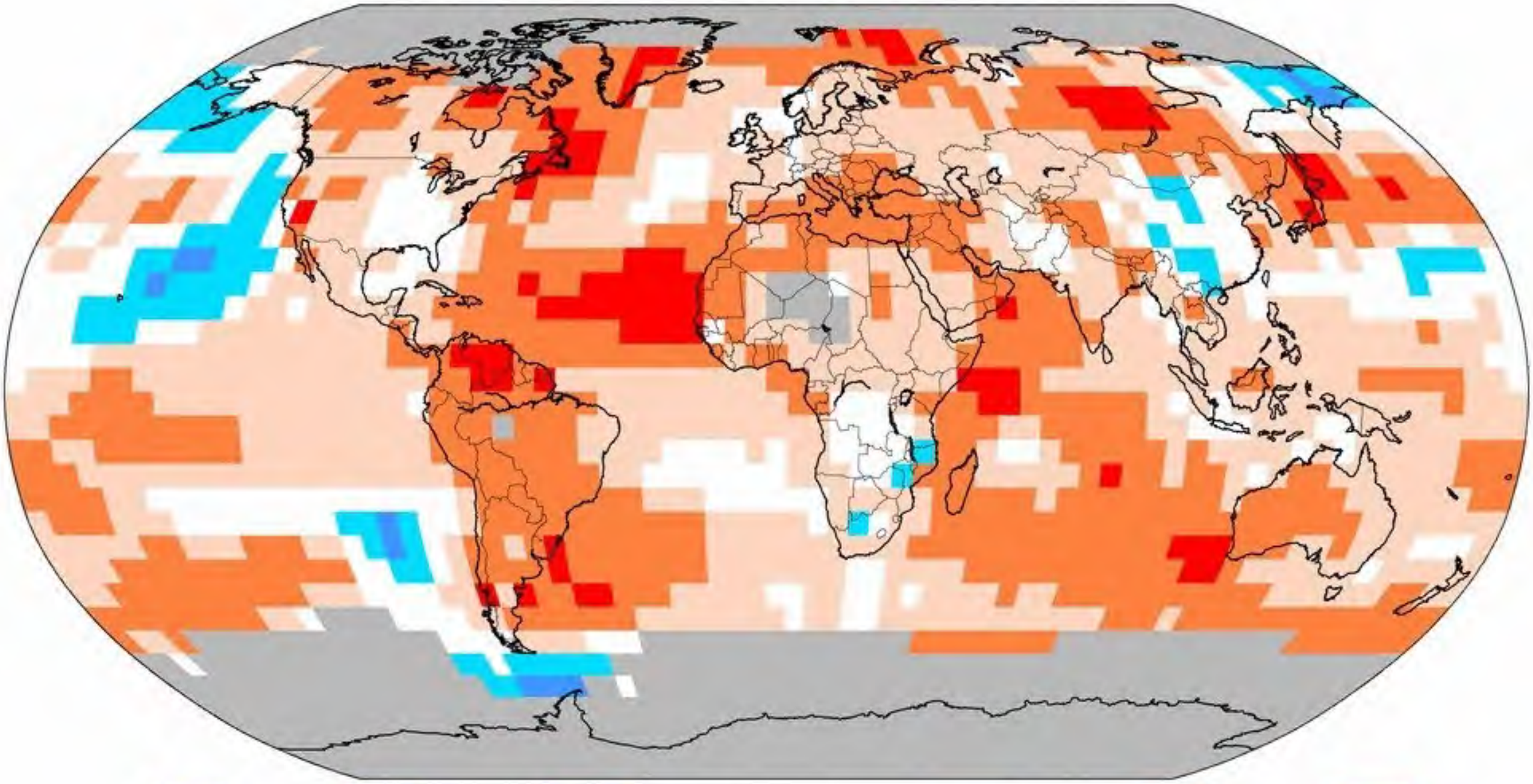
NOAA's National Climatic Data Center

Please Note: Gray areas represent missing data

Land & Ocean Temperature Percentiles Sep 2012

NOAA's National Climatic Data Center

Data Source: GHCN–M version 3.2.0 & ERSST version 3b



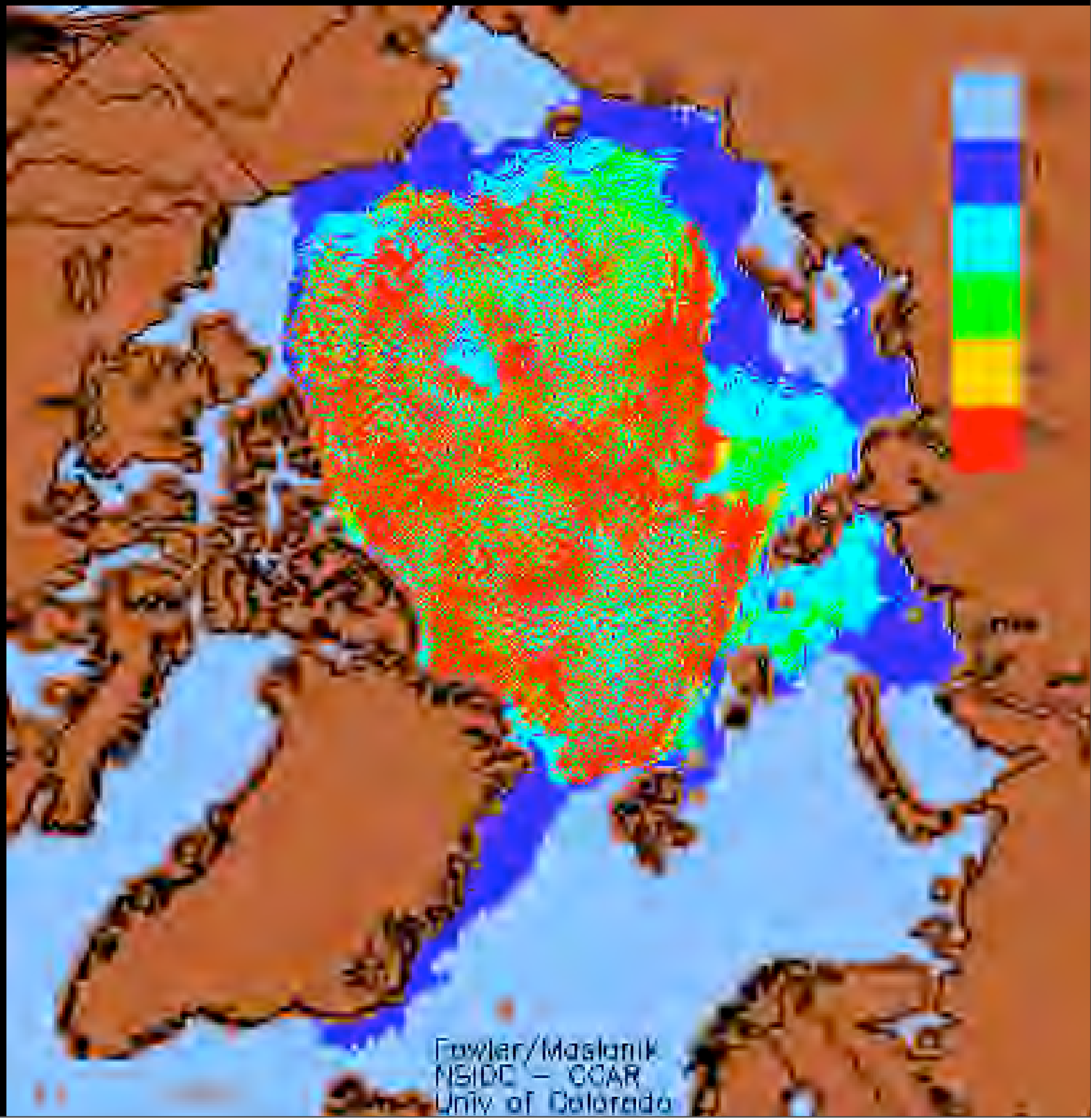
Record Coldest | Much Cooler than Average | Cooler than Average | Near Average | Warmer than Average | Much Warmer than Average | Record Warmest

Wednesday, 31 October 12

Blue is ice less than 1m thick

Red is ice 5m thick or more

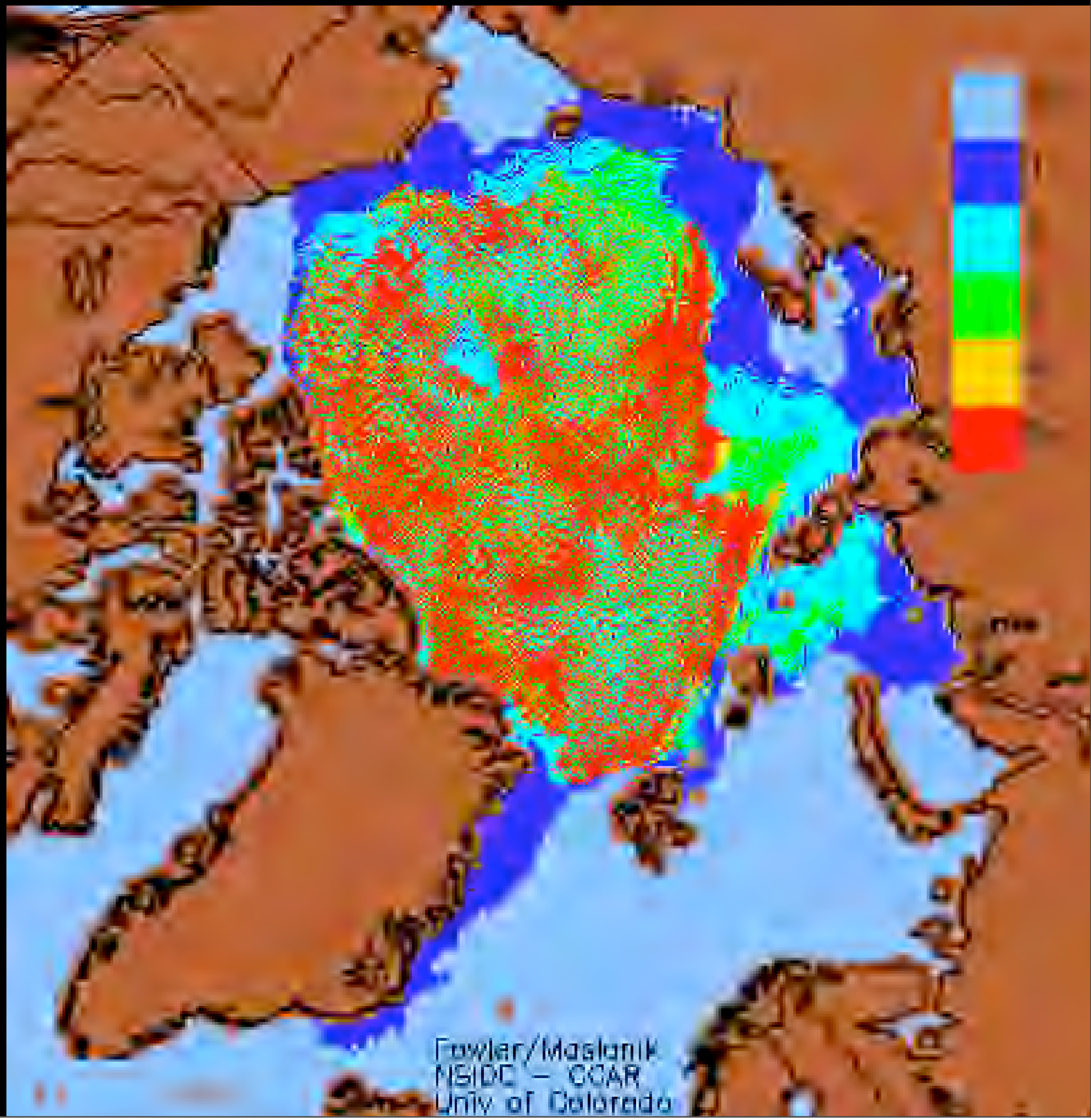
1981 to 2007



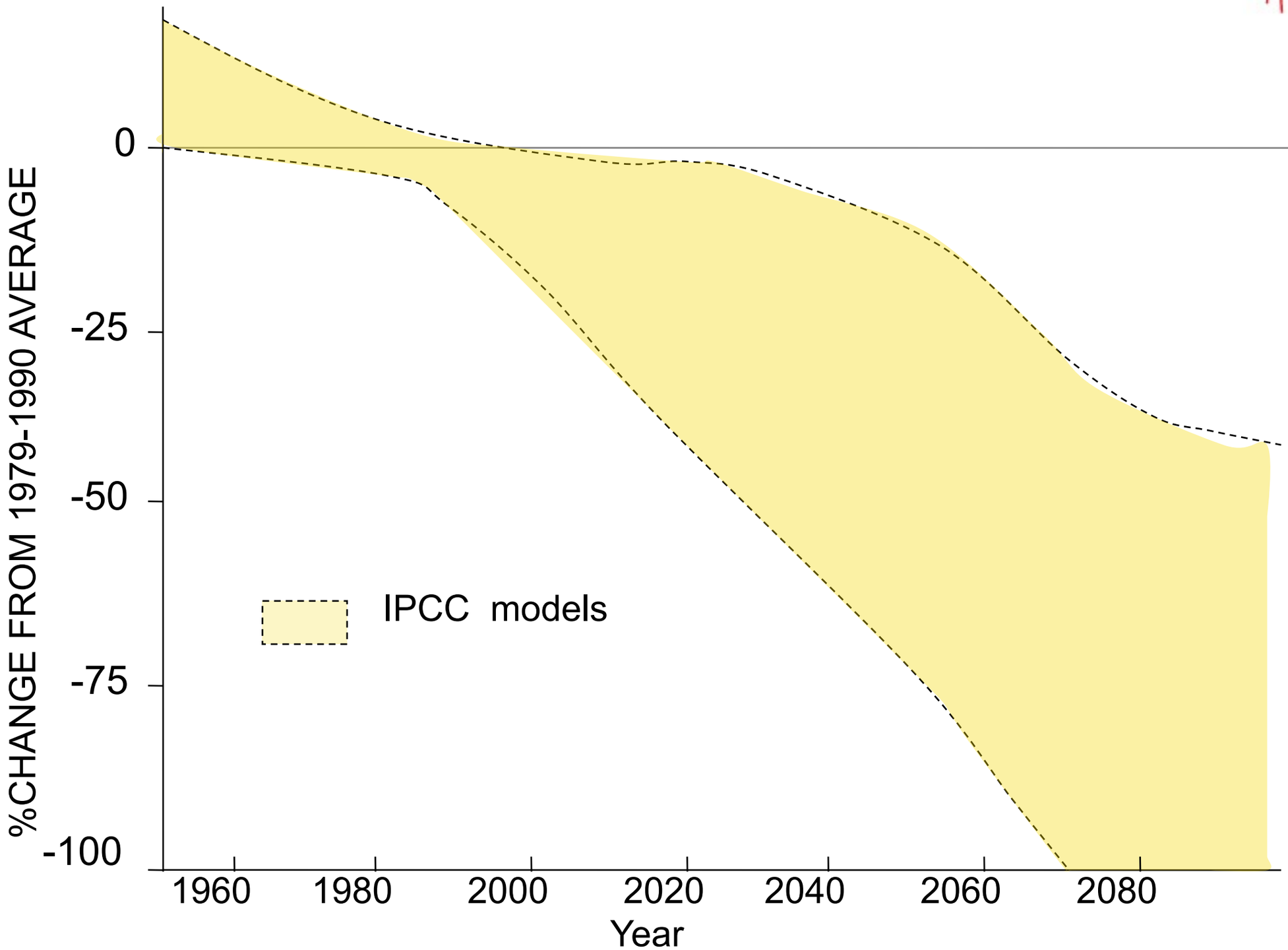
Blue is ice less than 1m thick

Red is ice 5m thick or more

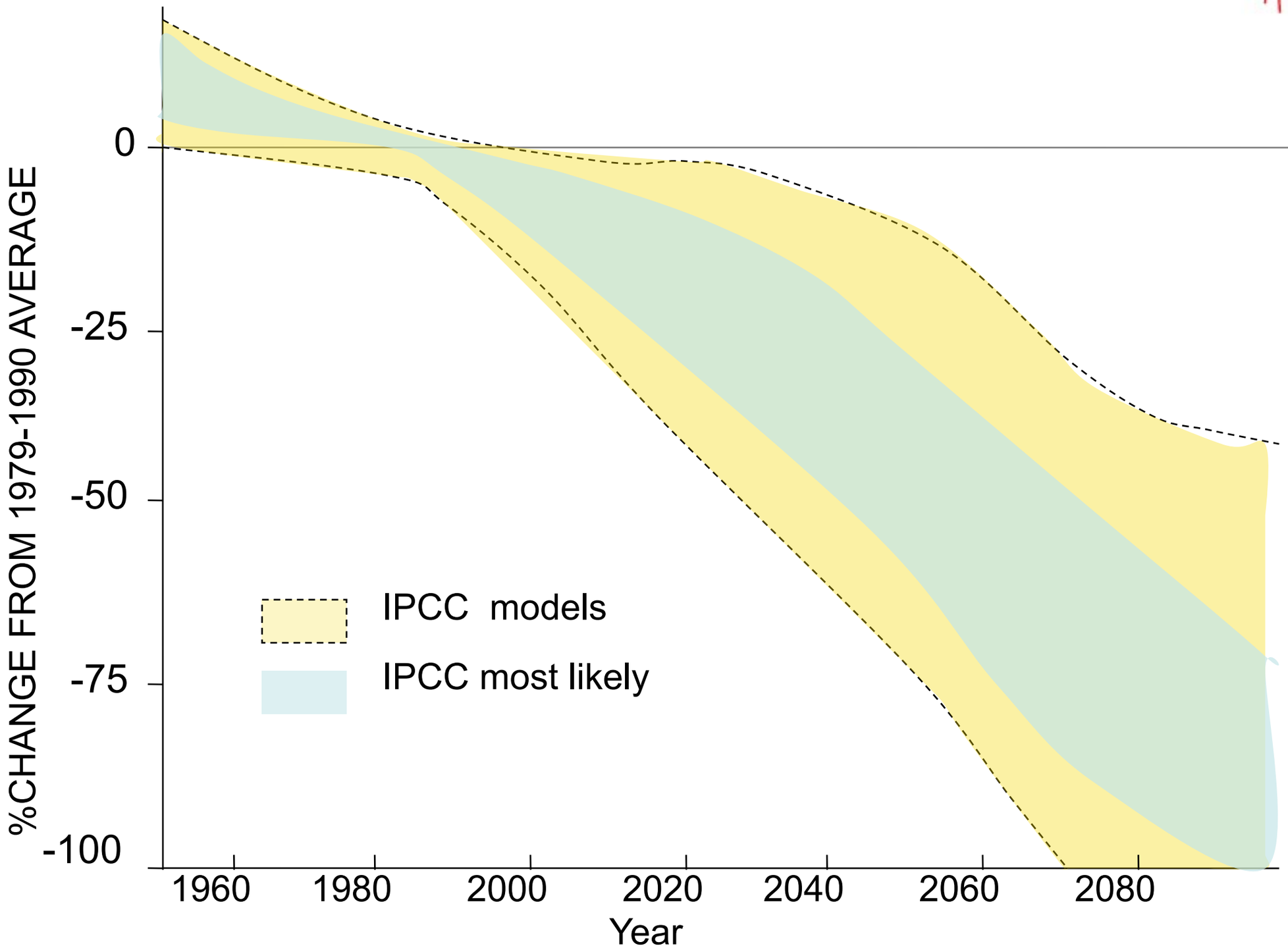
1981 to 2007



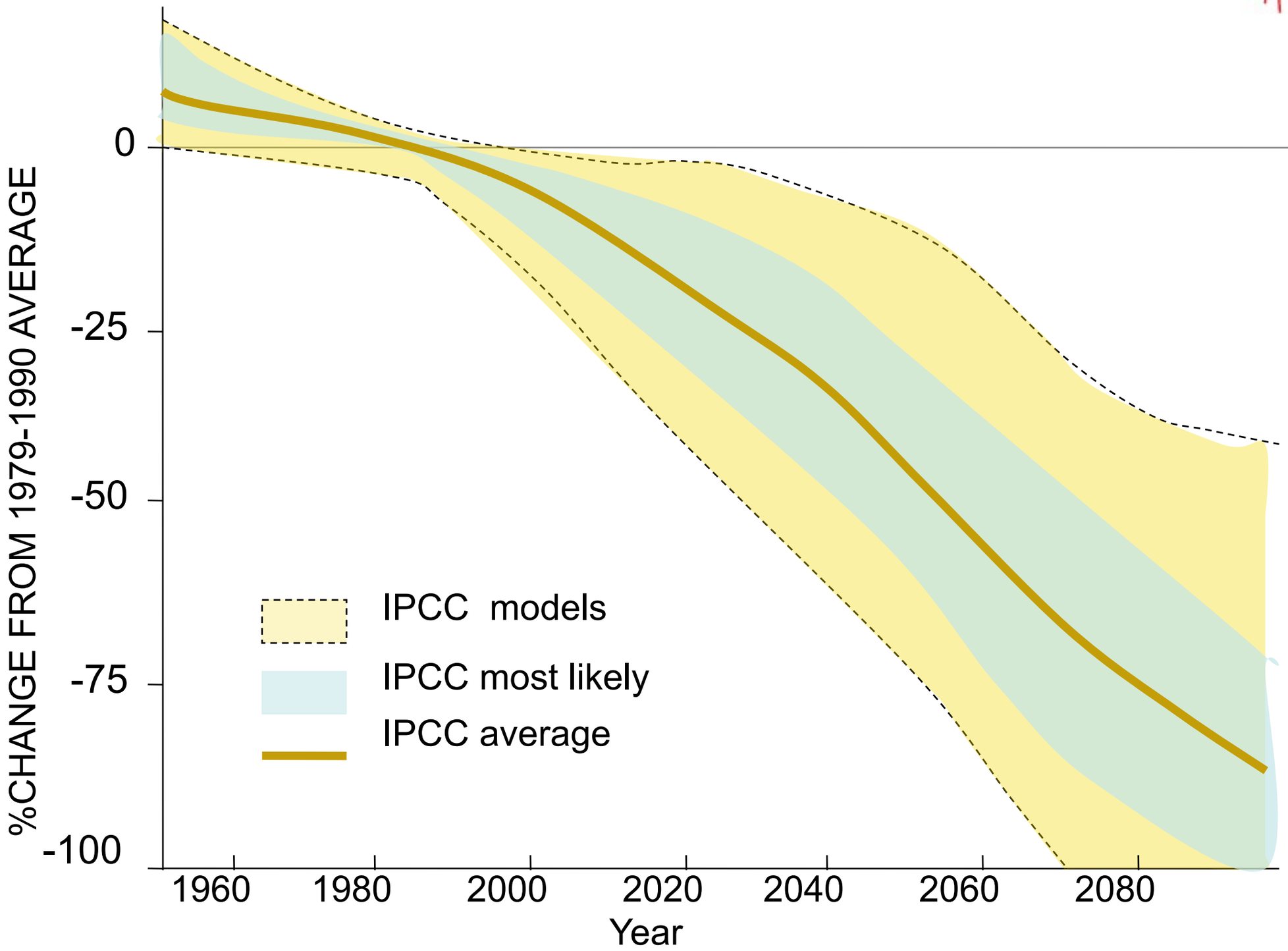
Arctic Sea Ice (2009)



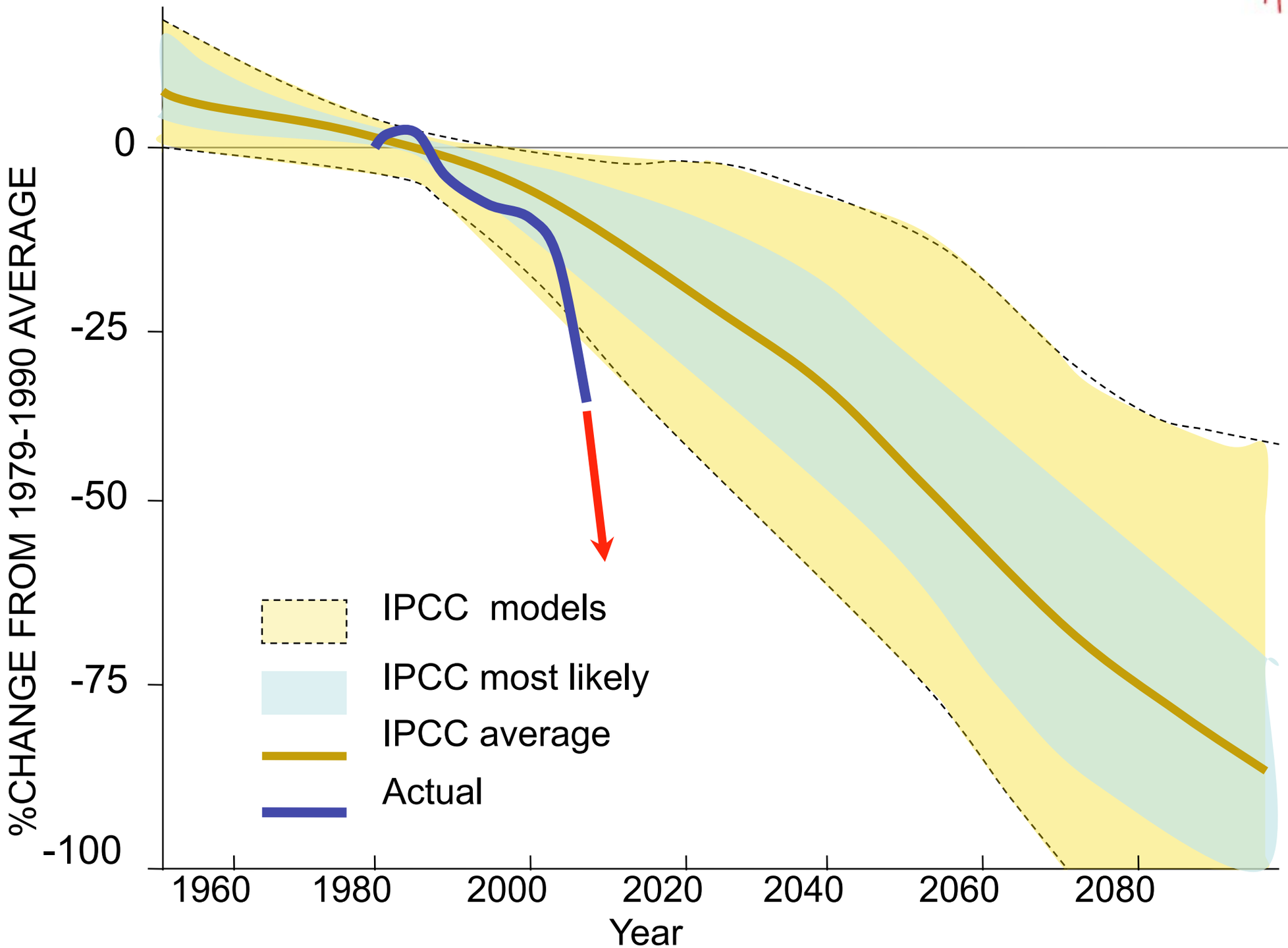
Arctic Sea Ice (2009)



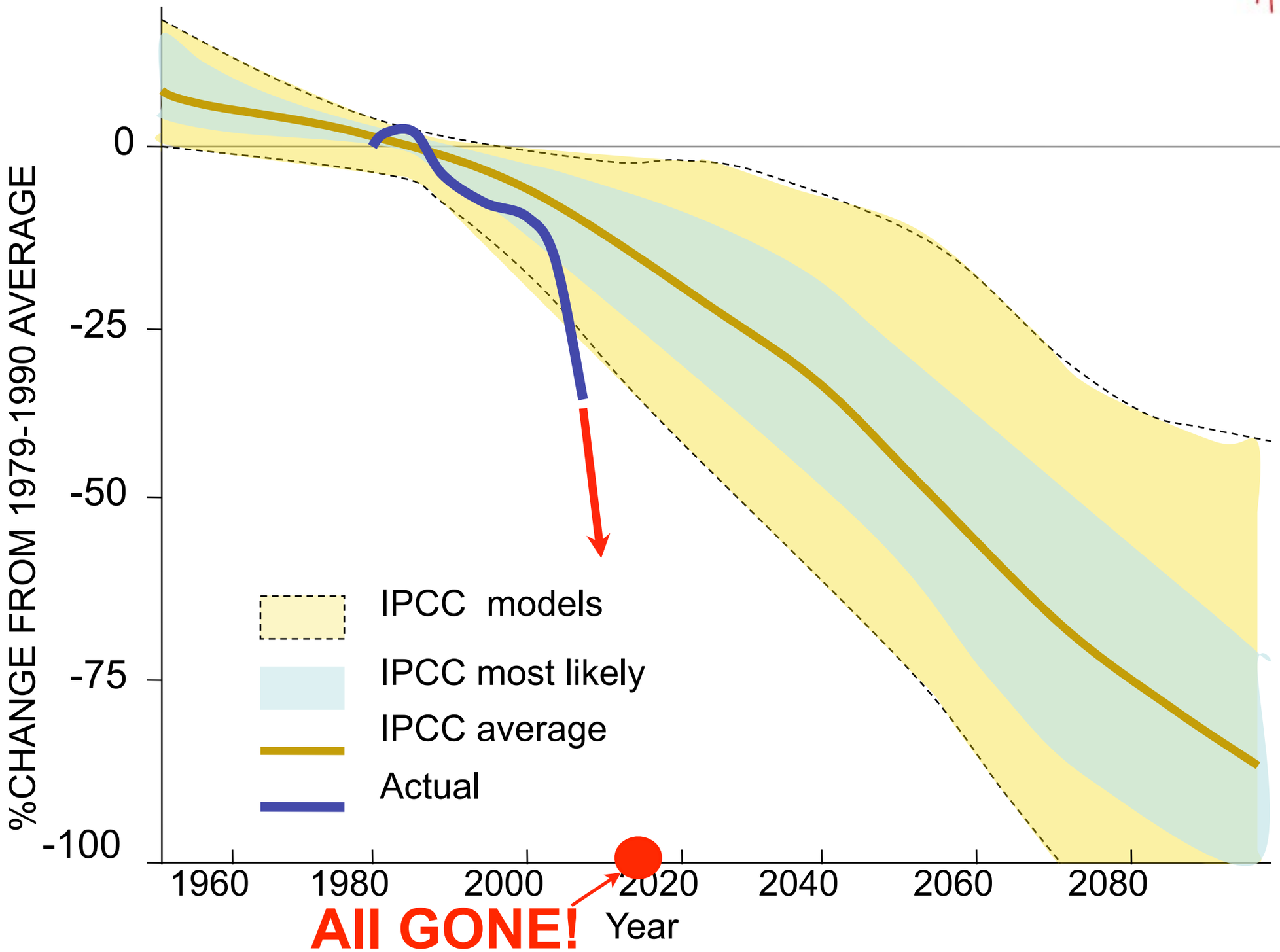
Arctic Sea Ice (2009)



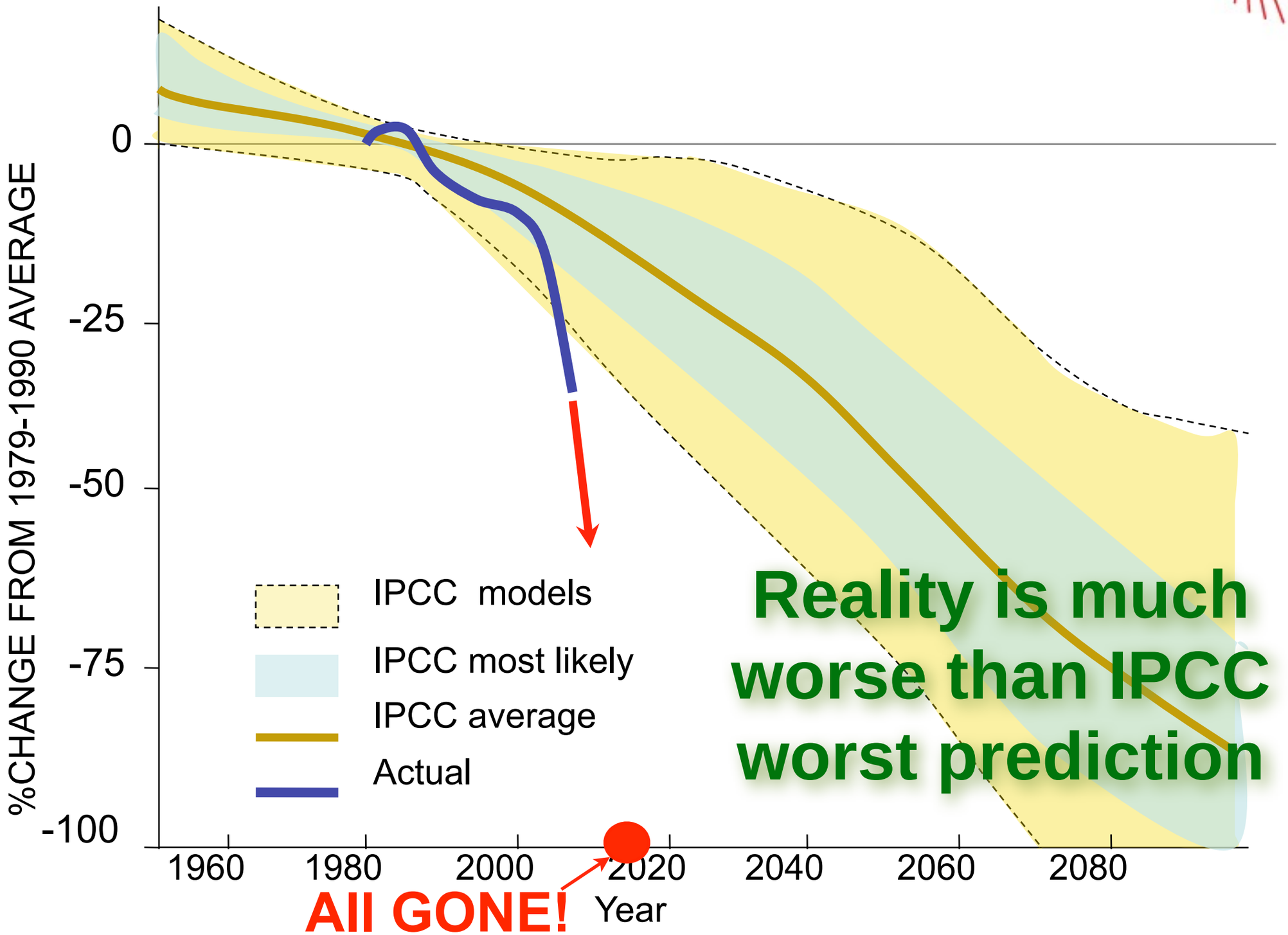
Arctic Sea Ice (2009)



Arctic Sea Ice (2009)

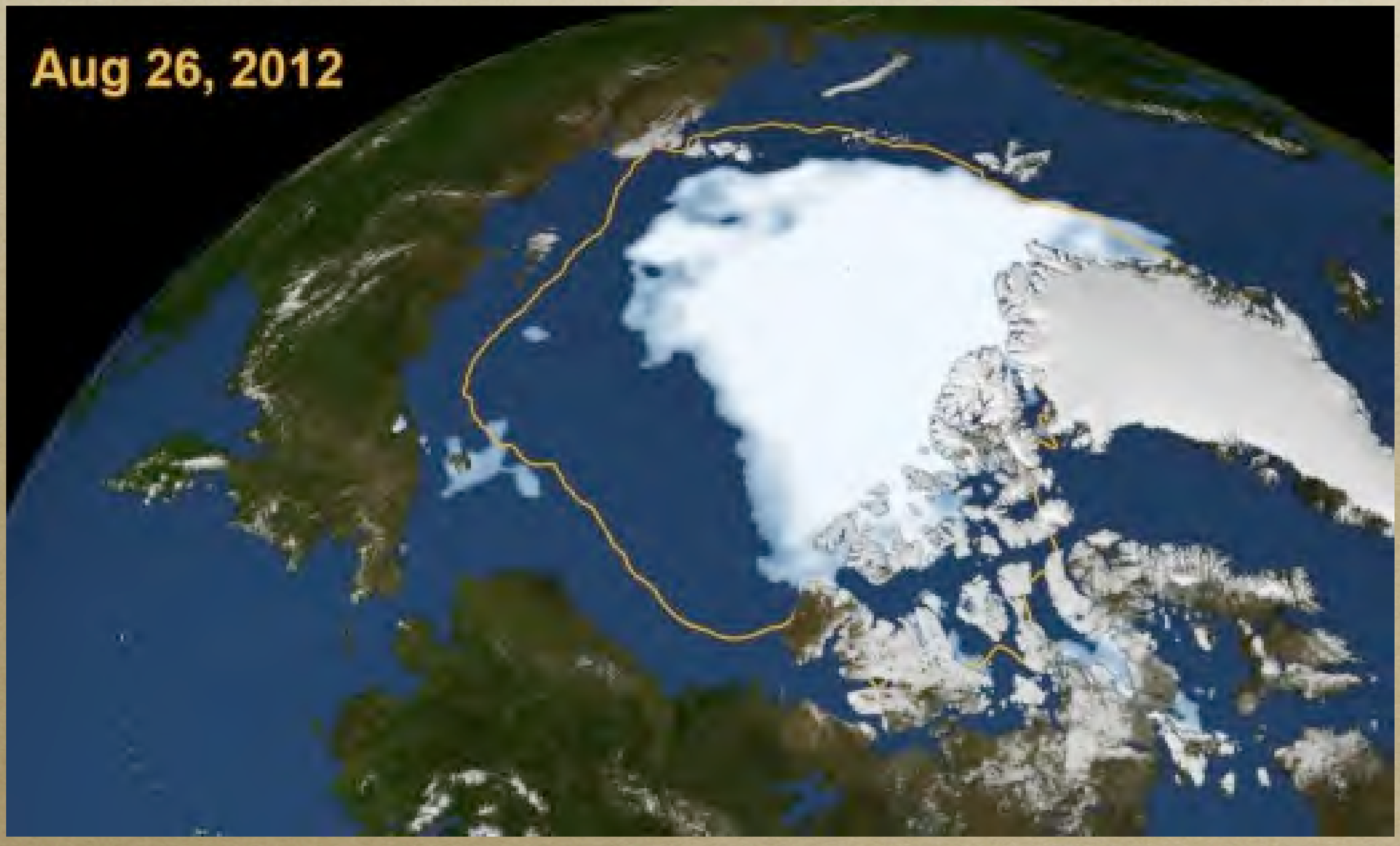


Arctic Sea Ice (2009)

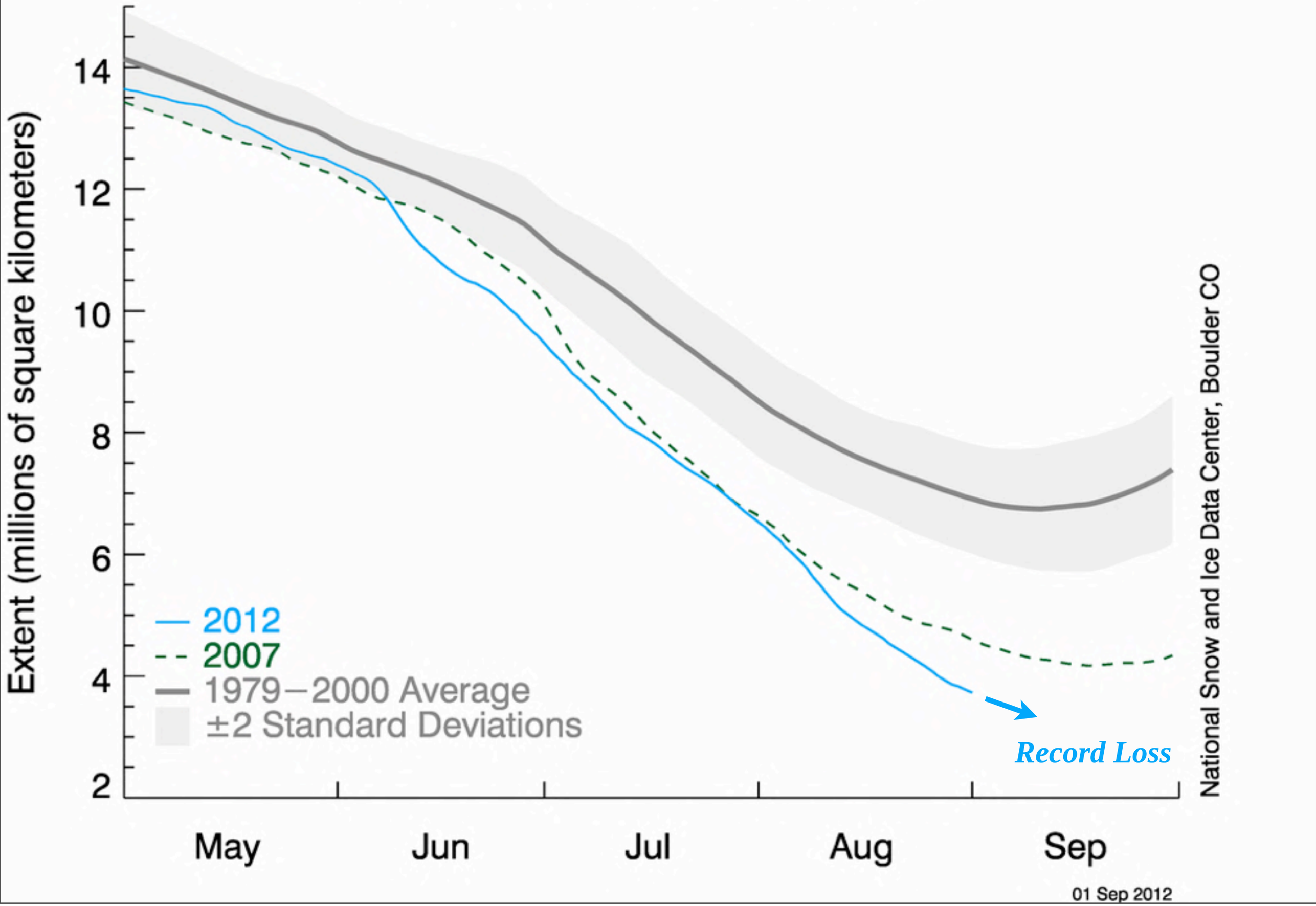


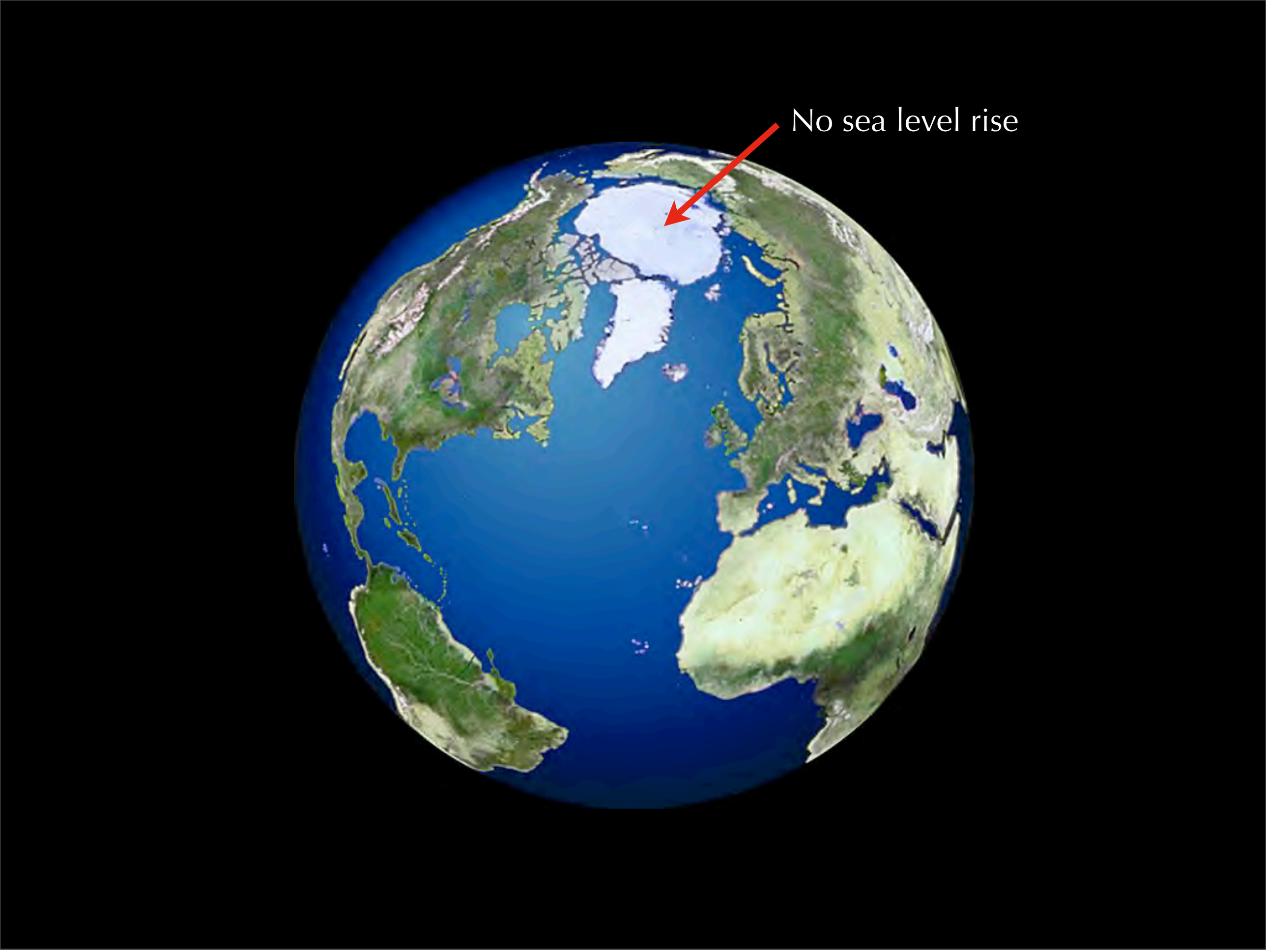
Arctic Sea Ice Melt

2012 summer hits record loss.



Arctic Sea Ice Extent
(Area of ocean with at least 15% sea ice)

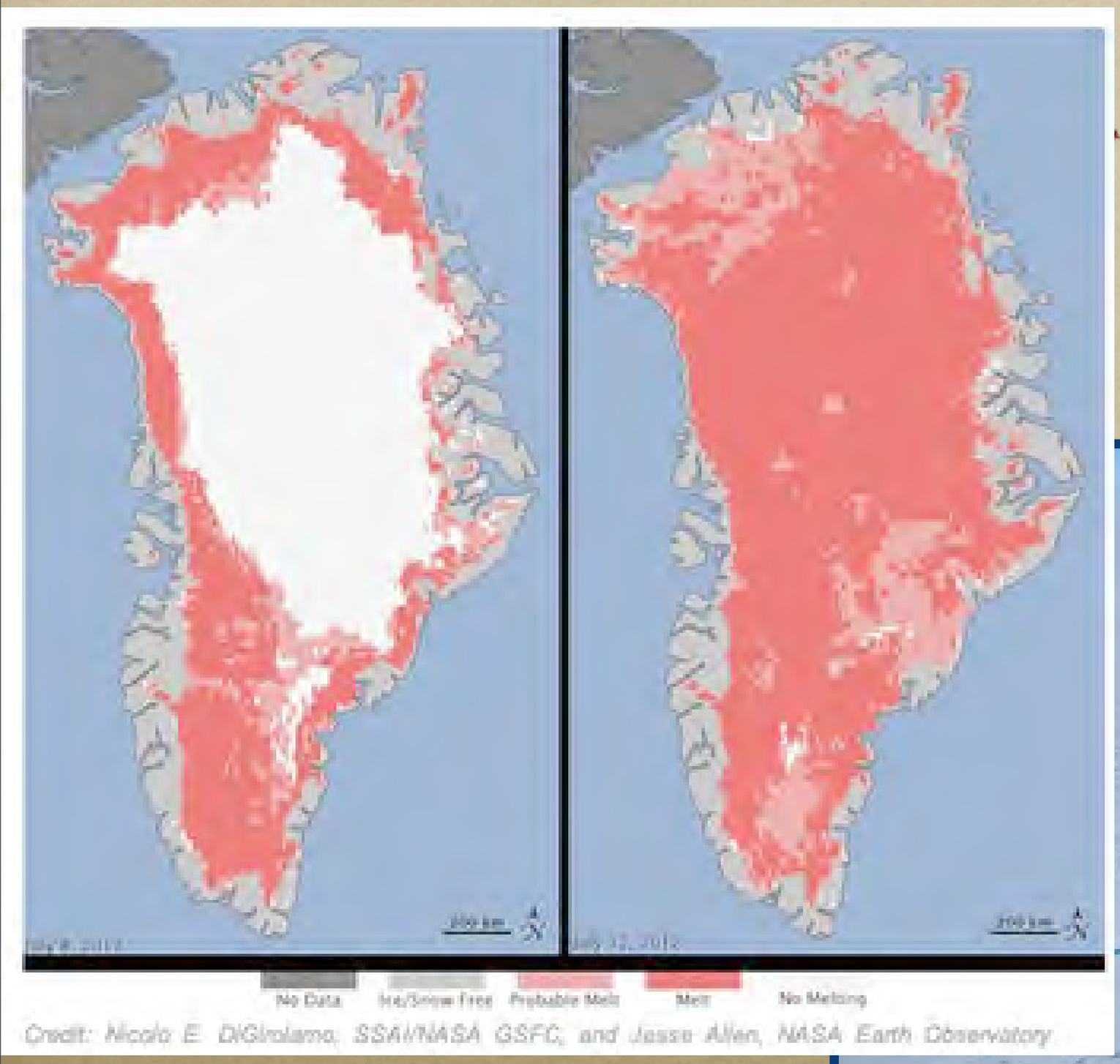



No sea level rise

7 m average WORLD WIDE
sea level rise

No sea level rise

Greenland Ice Cap Melt



Credit: Nicolo E. DiGirolamo, SSAI/NASA GSFC, and Jesse Allen, NASA Earth Observatory

July this year!

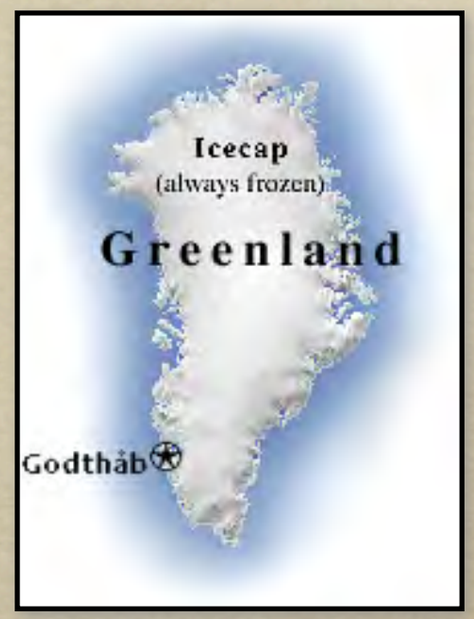
4 days

The Greenland ice cap

- Land ice on Greenland

= 1,833,900 sq.km

- or 85% of Greenland.



- 3 km thick = 4,587,750 cubic kms of ice currently out of water

✳ (= 8% of the world's fresh-water).

- As it melts water shrinks by 8%, so volume of water going into the oceans would be 4,220,730 cubic kms.

The Greenland ice cap

- Surface area of the earth = 510,065,600 sqkm
- 70% is sea = 361,126,400 sqkm.
- Simple formula:

361,126,400 * x = 4,220,730

- giving x = 0.0116876 Km, or 11.687m of sea level rise (with no inundation).

As much of this rise would flood land and increase the earth's surface water area expect the sea level rise to be somewhat less,

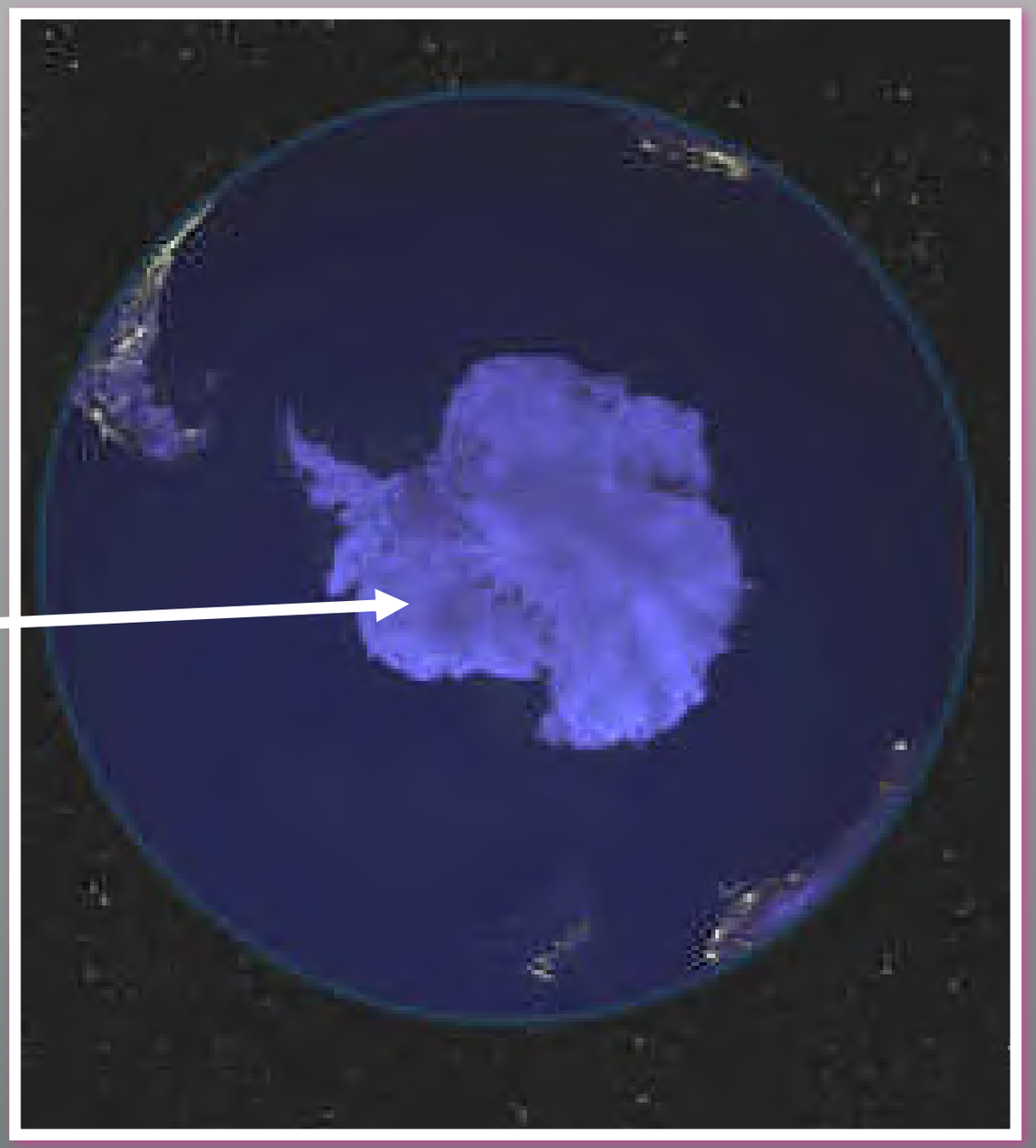
scientists say about 7m rise from a total Greenland ice melt.

Wednesday, 31 October 12

Greenland is tiny, what about this ice cap!

90% of Earth’s fresh water is solid on top of Antarctica

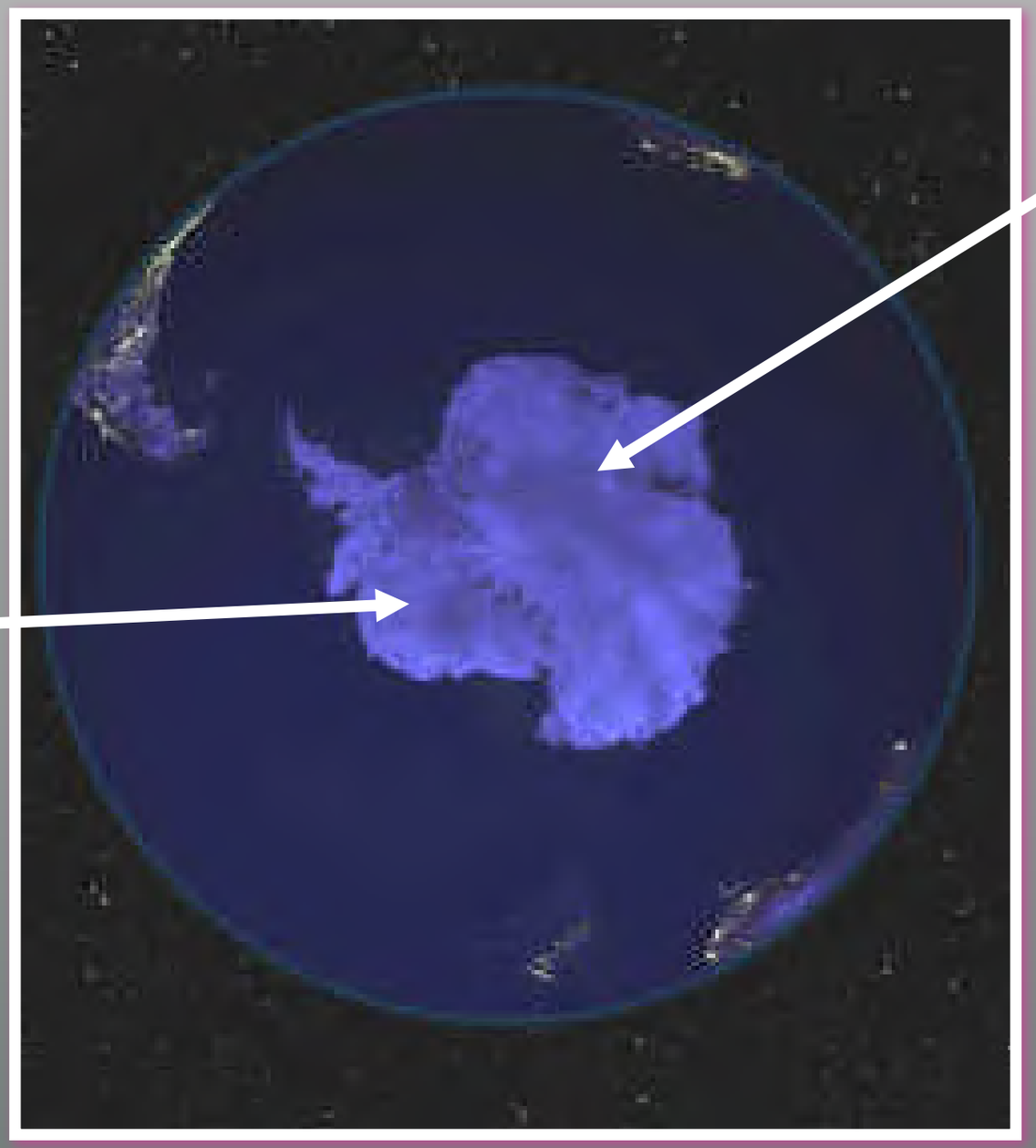
Greenland is tiny, what about this ice cap!



West Antarctica: 30m rise

90% of Earth's fresh water is solid on top of Antarctica

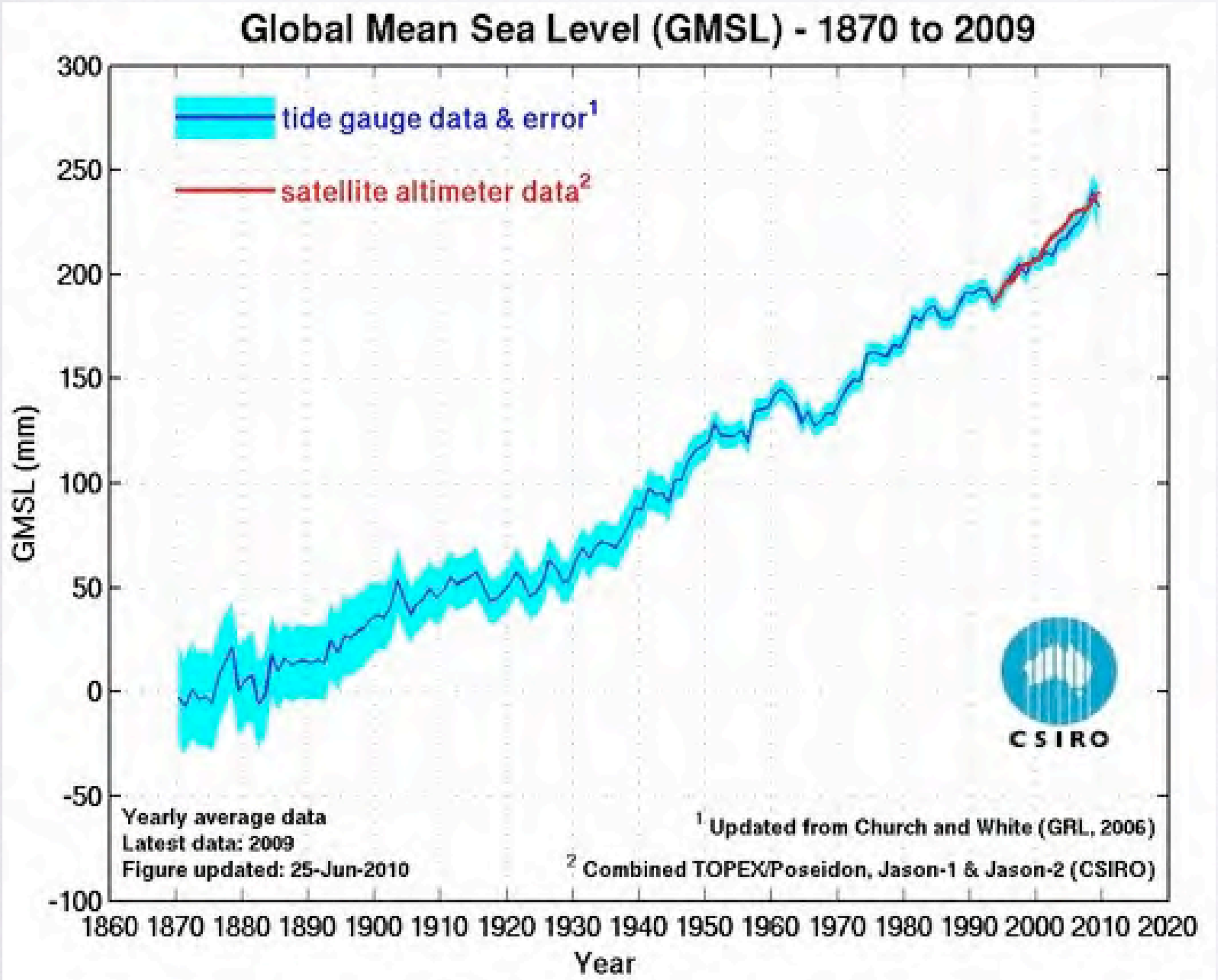
Greenland is tiny, what about this ice cap!



East Antarctica: 40m + rise

West Antarctica: 30m rise

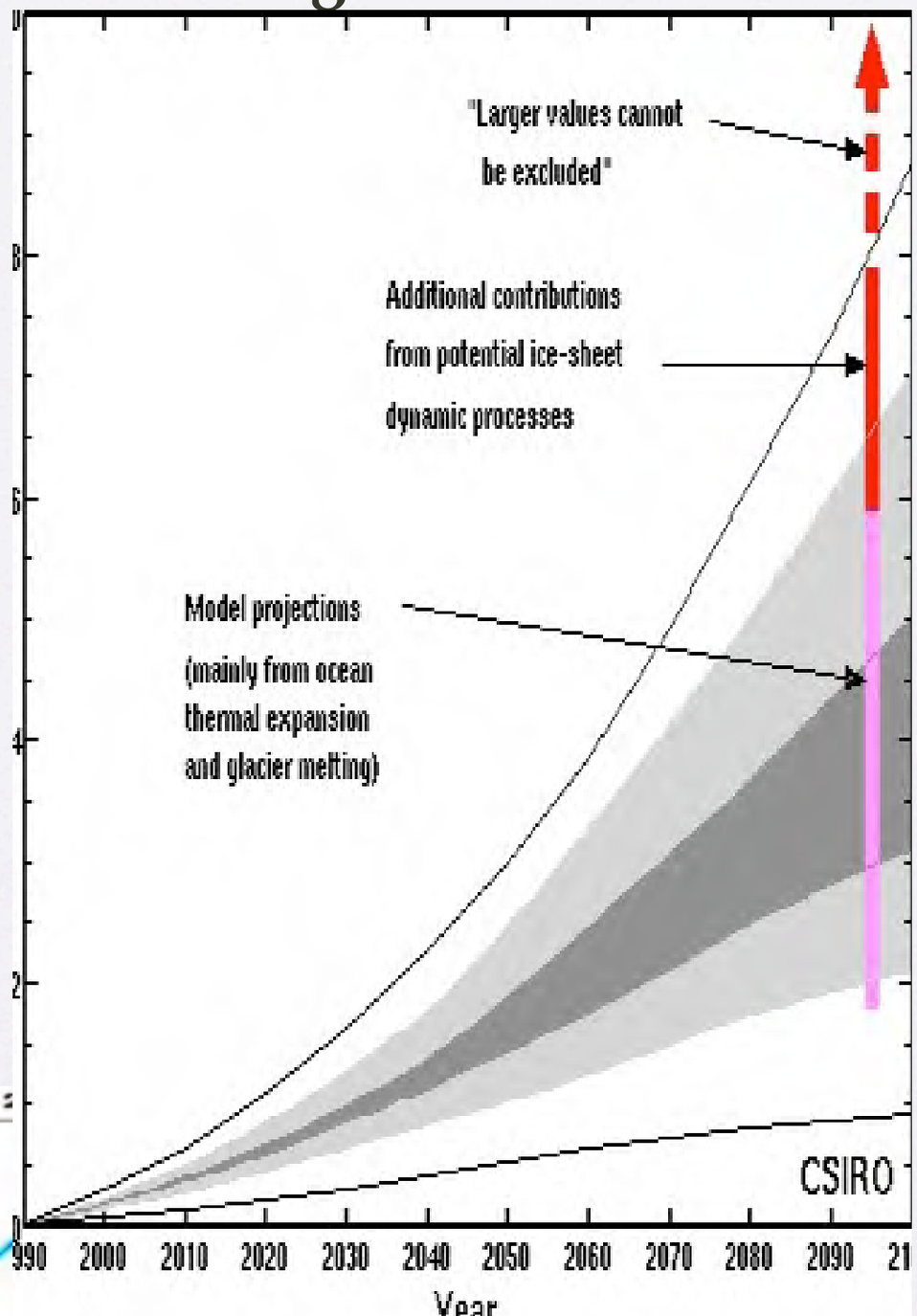
90% of Earth's fresh water is solid on top of Antarctica

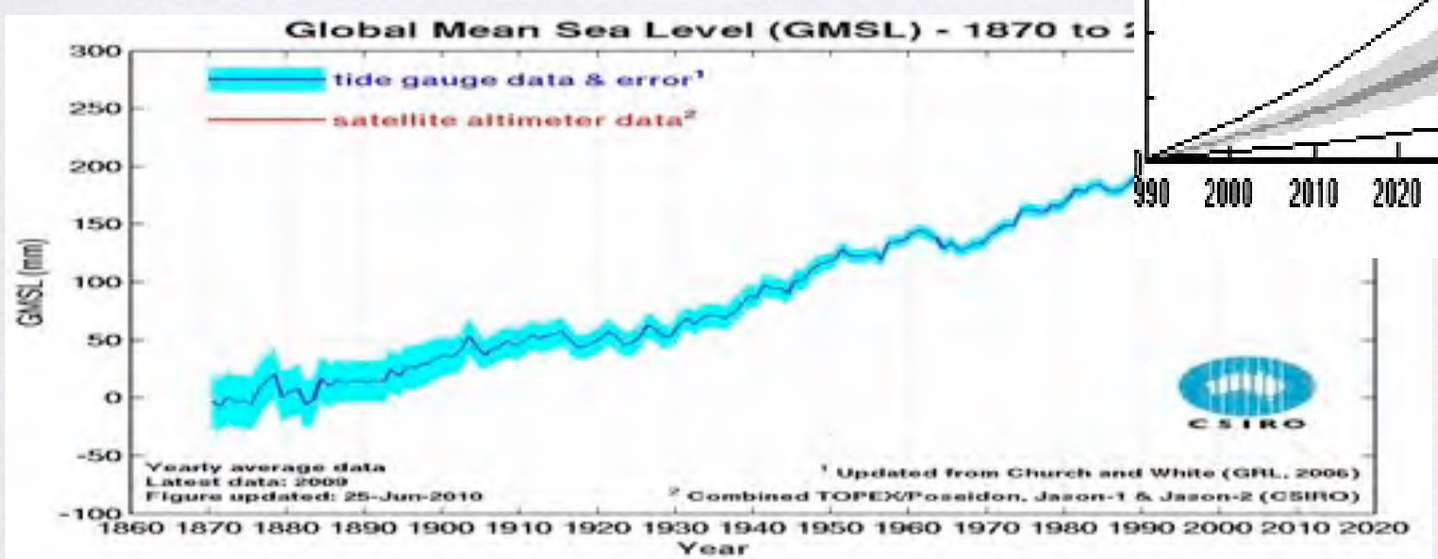

Global Mean Sea Level (GMSL) - 1870 to 2009
tide gauge data & error[1]
satellite altimeter data[2]
GMSL (mm)
300
250
200
150
100
50
0
-50
-100
1860 1870 1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010 2020
Year
CSIRO
Yearly average data
Latest data: 2009
Figure updated: 25-Jun-2010
[1] Updated from Church and White (GRL, 2006)
[2] Combined TOPEX/Poseidon, Jason-1 & Jason-2 (CSIRO)

By 2100, we could well be experiencing greater than 1.2m sea level rise on 1870 levels.

An average of 0.95m higher than 2012 levels

IPCC 2007 Forecasts of global average sea level rise





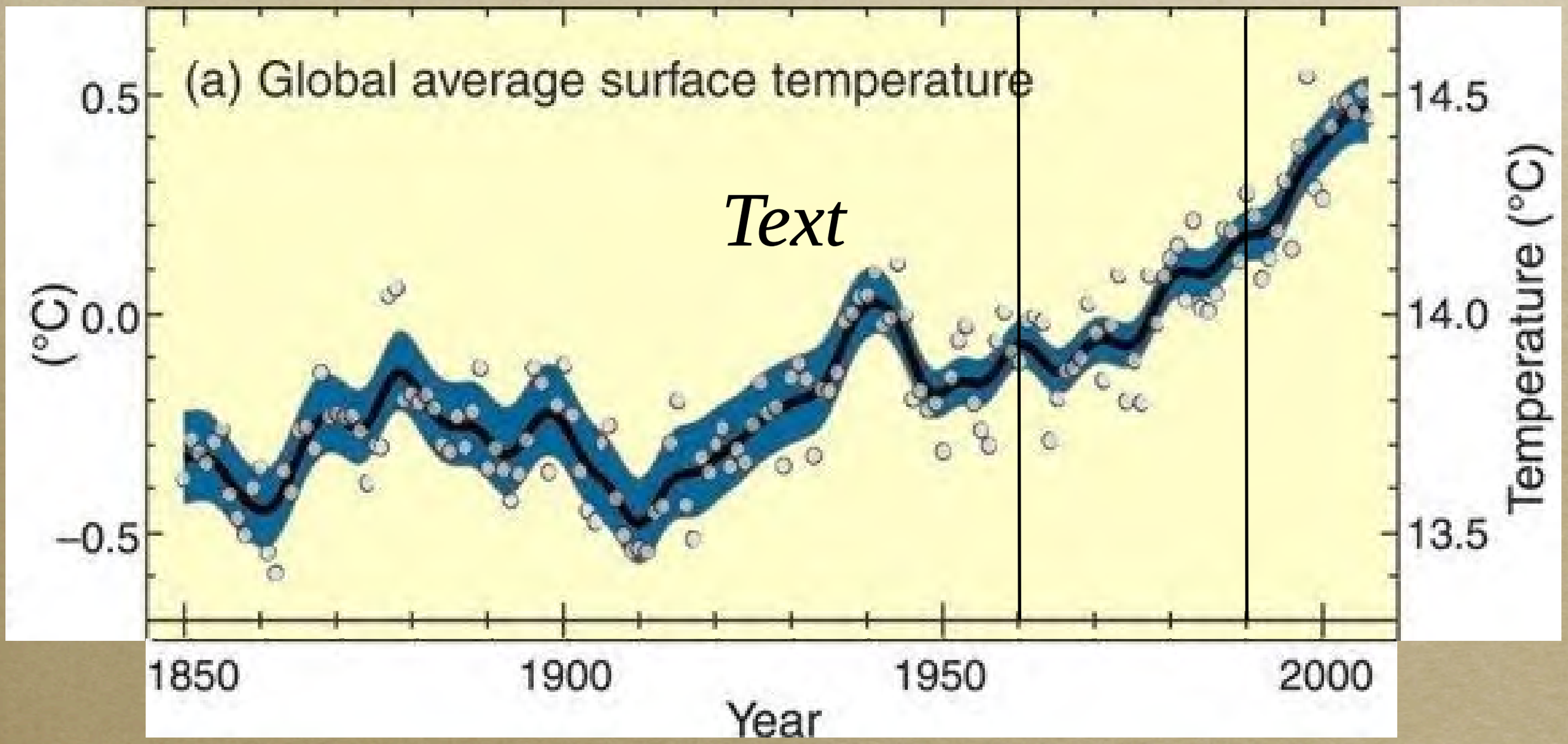
“The maps of the world will have to be redrawn.”

Sir David King

UK Science Advisor, in regard to what is happening in Greenland.

Temperature

Variance from 1961 -1990 average

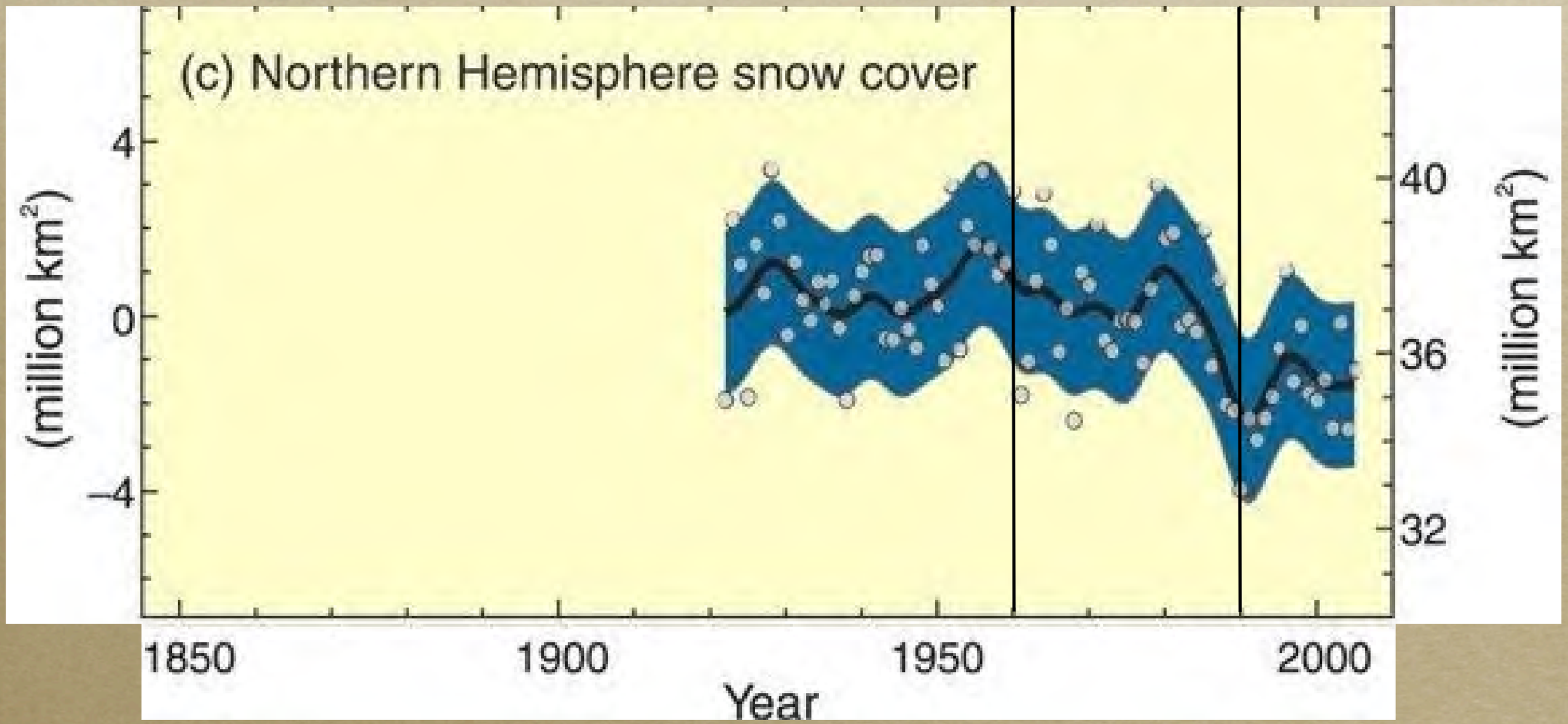


Text

www.skepticalscience.com

Snow cover (N. hemisphere)

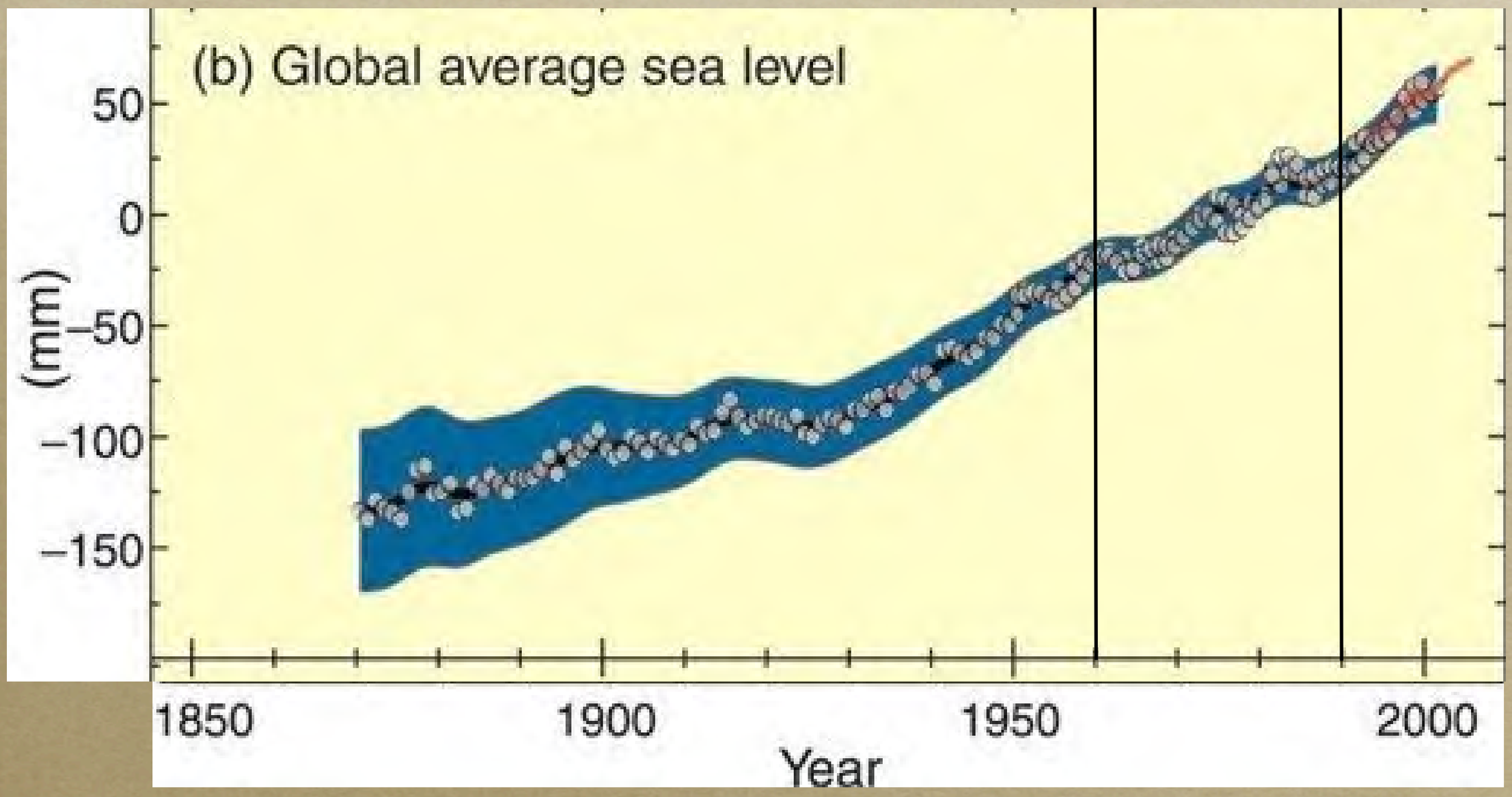
Variance from 1961 -1990 average



www.skepticalscience.com

Sea Level

Variance from 1961 -1990 average



www.skepticalscience.com

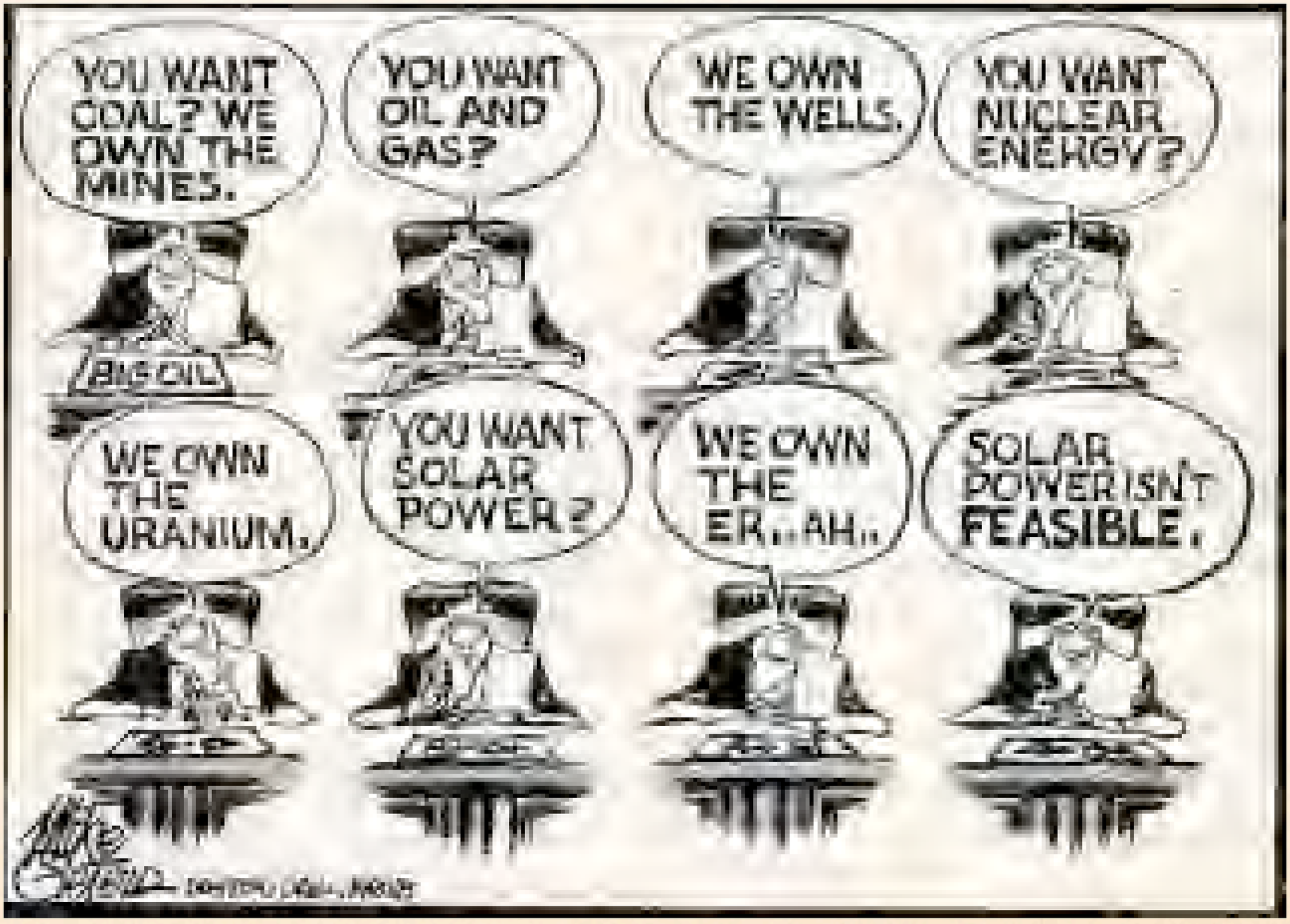
Melbourne CBD with 7m sea level rise

We are TRASHING our planet

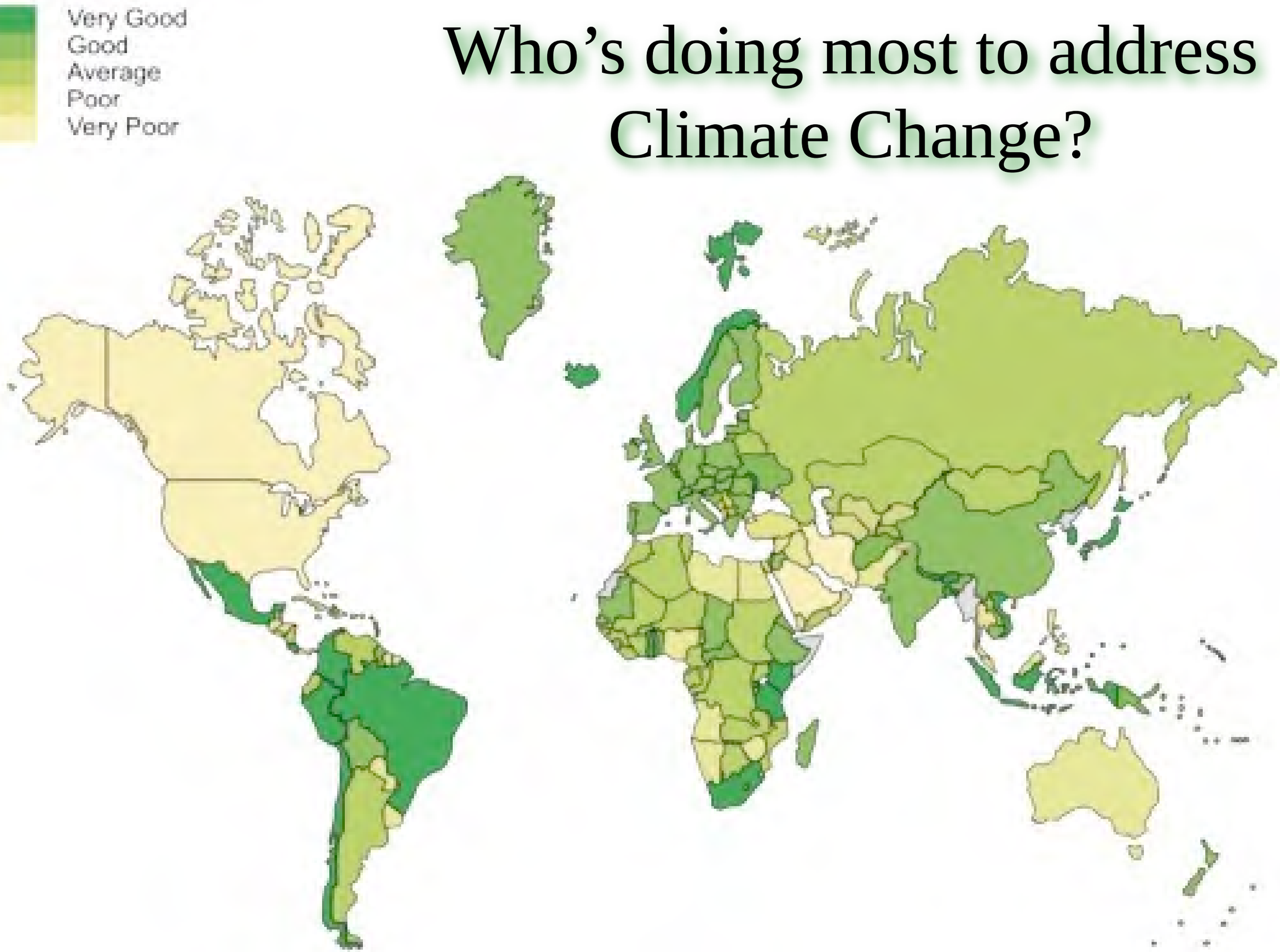
We are TRASHING our planet

Climate change, resource scarcity, and the loss of ecosystem services is now seriously threatening to trash our economy

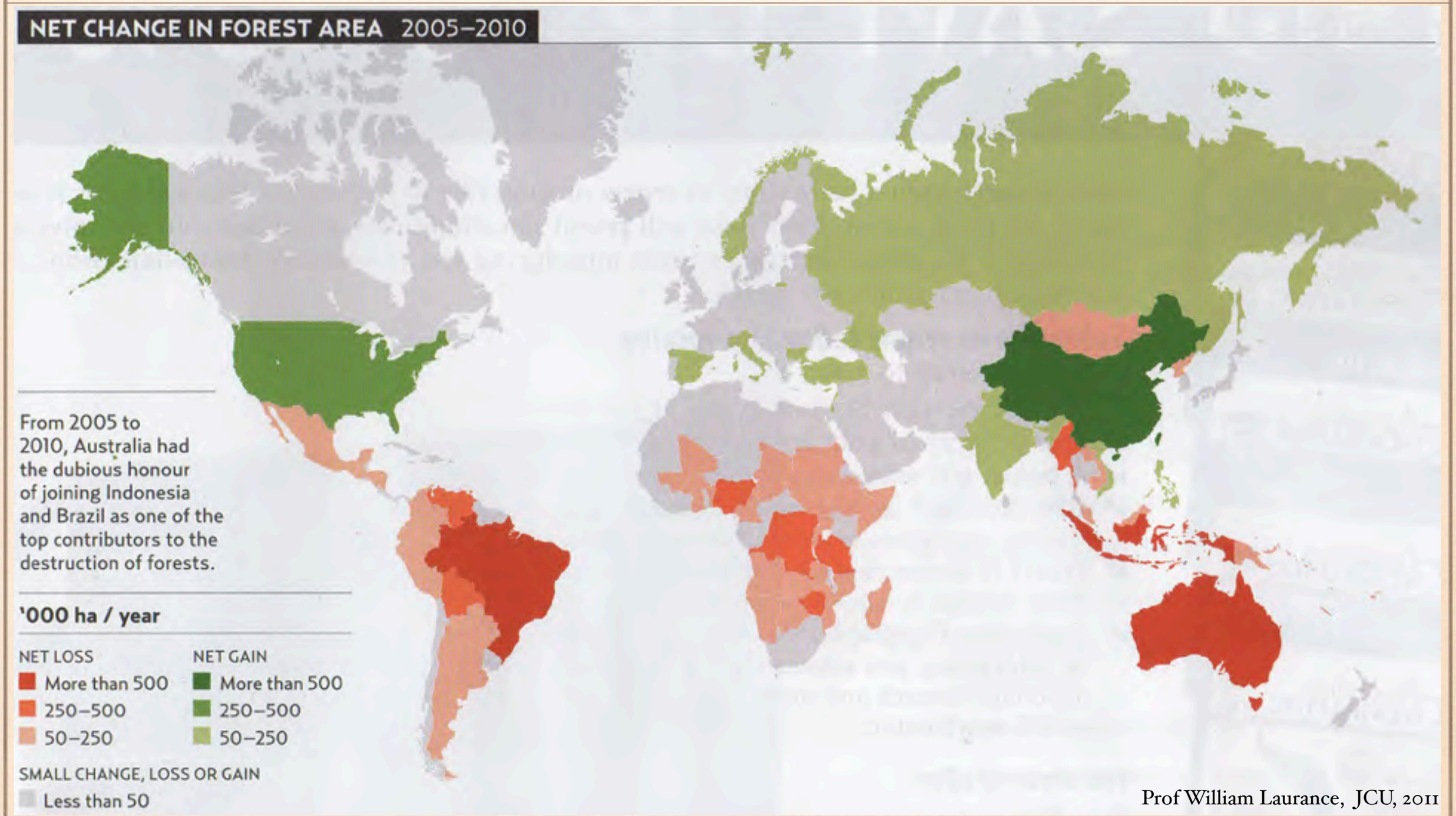
So, why is nothing much happening?



Who's doing most to address Climate Change?



Who's doing least to address Climate Change?



Prof William Laurance, JCU, 2011

Who's doing least to address Climate Change?

Prof William Laurance, JCU, 2011

Do we need to change?

“The definition of madness is doing the same thing over and over again, and expecting to achieve different results.”

Albert Einstein

Is this delivering sustainability?

Is this delivering sustainability?

What do we do now?

“You cannot solve a problem with the same thinking that created that problem.”

Albert Einstein

What do we do now?

Australia has abundant Solar Energy

beyond ZERO emissions

BZE

BZE Stationary Energy Plan for Australia

beyond ZERO emissions

Next BZE projects:
Buildings, Transport, Agriculture, Repower Port Augusta

We can do it.....

970 kW solar array near Alice Springs

Currently largest tracking array in Southern Hemisphere

Welcome to the
Australian Green Infrastructure Council

<www.agic.net.au>

Infrastructure Sustainability Rating Scheme

Creating a nationally consistent approach to project sustainability across the asset lifecycle

Introduction - AGIC IS:

- Member based, not for profit industry council
- Mission:
  - “to be the principal industry catalyst for advancing sustainability in the design, construction and operation of Australia’s infrastructure”
- More than 85 member organisations, employing more than 70,000 people.

AGIC Foundation Members

GHD
CLIENTS | PEOPLE | PERFORMANCE

WINSLOW

THIESS

ACTEW
CORPORATION

LGIS
LOCAL GOVERNMENT INFRASTRUCTURE SERVICES

Bovis
Lend Lease

PB 100 YEARS
PARSONS BRINCKERHOFF

CCF
CIVIL CONTRACTORS FEDERATION

ARUP

Manidis Roberts

Queensland Government
Environmental Protection Agency

Department of Environment & Climate Change NSW

BRISBANE CITY
Dedicated to a better Brisbane

MWH
BUILDING A BETTER WORLD

AECOM

Organisational Members

Global Trend

Buildings:

- GBCA – Green Star
  - Started 2003
  - 400 Rated + 800 registered
- NABERS
- LEED (US)
- BREEAM (UK)

Infrastructure:

- CEEQUAL (UK)
  - Started 2003
  - Rated A$29b
- ISI - Envision (US)
  - Started 2012
- PEARL (Abu Dhabi)

IS Benefits

- Common national language for sustainability in infrastructure
- Consistent application and evaluation of sustainability in tendering processes
- Scoping whole-of-life sustainability risks for projects and assets, enabling smarter solutions that reduce risks and costs
- Fosters resource efficiency and waste reduction, reducing costs
- Fosters innovation and continuous improvement
- Builds an organisation’s credentials and reputation in its approach to sustainability in infrastructure

Infrastructure Types

Transport:

- Roads & bridges
- Railways
- Bus & cycleways
- Footpaths
- Ports & harbours
- Airports

Water:

- Water storage & supply
- Sewerage & drainage

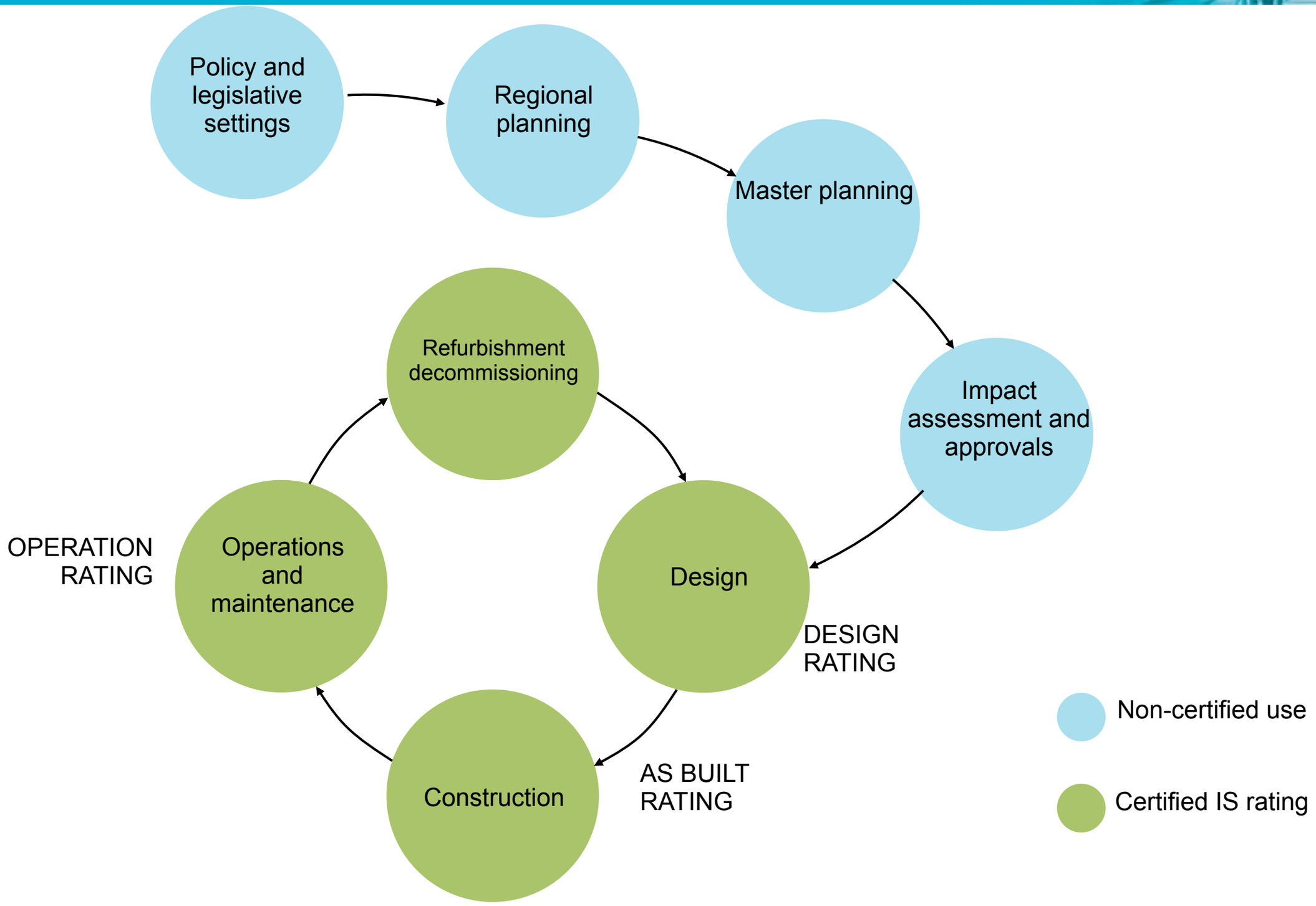
Energy:

- Electricity transmission & distribution

Communication:

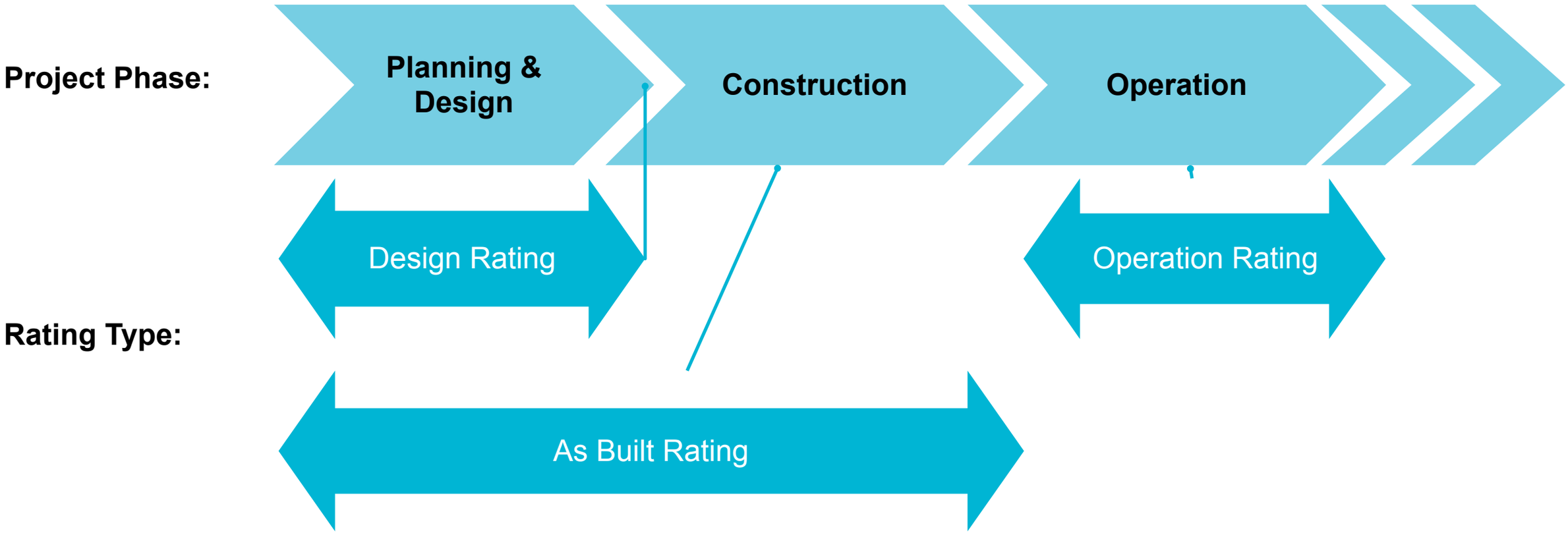
- Communication transmission & distribution

Scheme Coverage



Rating Types

Design – As Built - Operation



Tool Highlights

Theme	Category
Management and Governance	Management Systems
	Procurement and Purchasing
	Climate Change Adaptation
Using Resources	Energy and Carbon
	Water
	Materials
Emissions, Pollution and Waste	Discharges to Air, Land and Water
	Land
	Waste
Ecology	Ecology
People and Place	Community Health, Well-being and Safety
	Heritage
	Stakeholder Participation
	Urban and Landscape Design
Innovation	Innovation

Tool Highlights

Theme	Category
	Management Systems
	Procurement and Purchasing
	Climate Change Adaptation
	Energy and Carbon
	Water
	Materials
Emissions, Pollution and Waste	Discharges to Air, Land and Water
	Land
	Waste
Ecology	Ecology
People and Place	Community Health, Well-being and Safety
	Heritage
	Stakeholder Participation
	Urban and Landscape Design
Innovation	Innovation

BS 8903:2010 - world's best practice in sustainable procurement

Tool Highlights

Theme	Category
	Management Systems
	Procurement and Purchasing
	Climate Change Adaptation
	Energy and Carbon
	Water
	Materials
Emissions, Pollution and Waste	Discharges to Air, Land and Water
	Land
	Waste
Ecology	Ecology
People and Place	Community Health, Well-being and Safety
	Heritage
	Stakeholder Participation
	Urban and Landscape Design
Innovation	Innovation

BS 8903:2010 - world's best practice in sustainable procurement

Own category – important due to inherent longevity

Tool Highlights

Theme	Category
	Management Systems
	Procurement and Purchasing
	Climate Change Adaptation
	Energy and Carbon
	Water
	Materials
	Discharges to Air, Land and Water
	Land
	Waste
Ecology	Ecology
People and Place	Community Health, Well-being and Safety
	Heritage
	Stakeholder Participation
	Urban and Landscape Design
Innovation	Innovation

BS 8903:2010 - world's best practice in sustainable procurement

Aligns with EEO and NGERS

Own category – important due to inherent longevity

Tool Highlights

Theme	Category
	Management Systems
	Procurement and Purchasing
	Climate Change Adaptation
	Energy and Carbon
	Water
	Materials
	Discharges to Air, Land and Water
	Land
	Waste
Ecology	Ecology
People and Place	Community Health, Well-being and Safety
	Heritage
	Stakeholder Participation
	Urban and Landscape Design
Innovation	Innovation

BS 8903:2010 - world's best practice in sustainable procurement

Aligns with EEO and NGERS

Lifecycle analysis based Materials calculator

Tool Highlights

Theme	Category
	Management Systems
	Procurement and Purchasing
	Climate Change Adaptation
	Energy and Carbon
	Water
	Materials
	Discharges to Air, Land and Water
	Land
	Waste
	Ecology
	Community Health, Well-being and Safety
People and Place	Heritage
	Stakeholder Participation
	Urban and Landscape Design
Innovation	Innovation

BS 8903:2010 - world's best practice in sustainable procurement

Aligns with EEO and NGERS

Aligned with Green Star Communities

Lifecycle analysis based Materials calculator

Tool Highlights

Theme	Category
	Management Systems
	Procurement and Purchasing
	Climate Change Adaptation
	Energy and Carbon
	Water
	Materials
	Discharges to Air, Land and Water
	Land
	Waste
	Ecology
	Community Health
People and Place	Heritage
	Stakeholder Participation
	Urban and Landscape Design
Innovation	Innovation

BS 8903:2010 - world's best practice in sustainable procurement

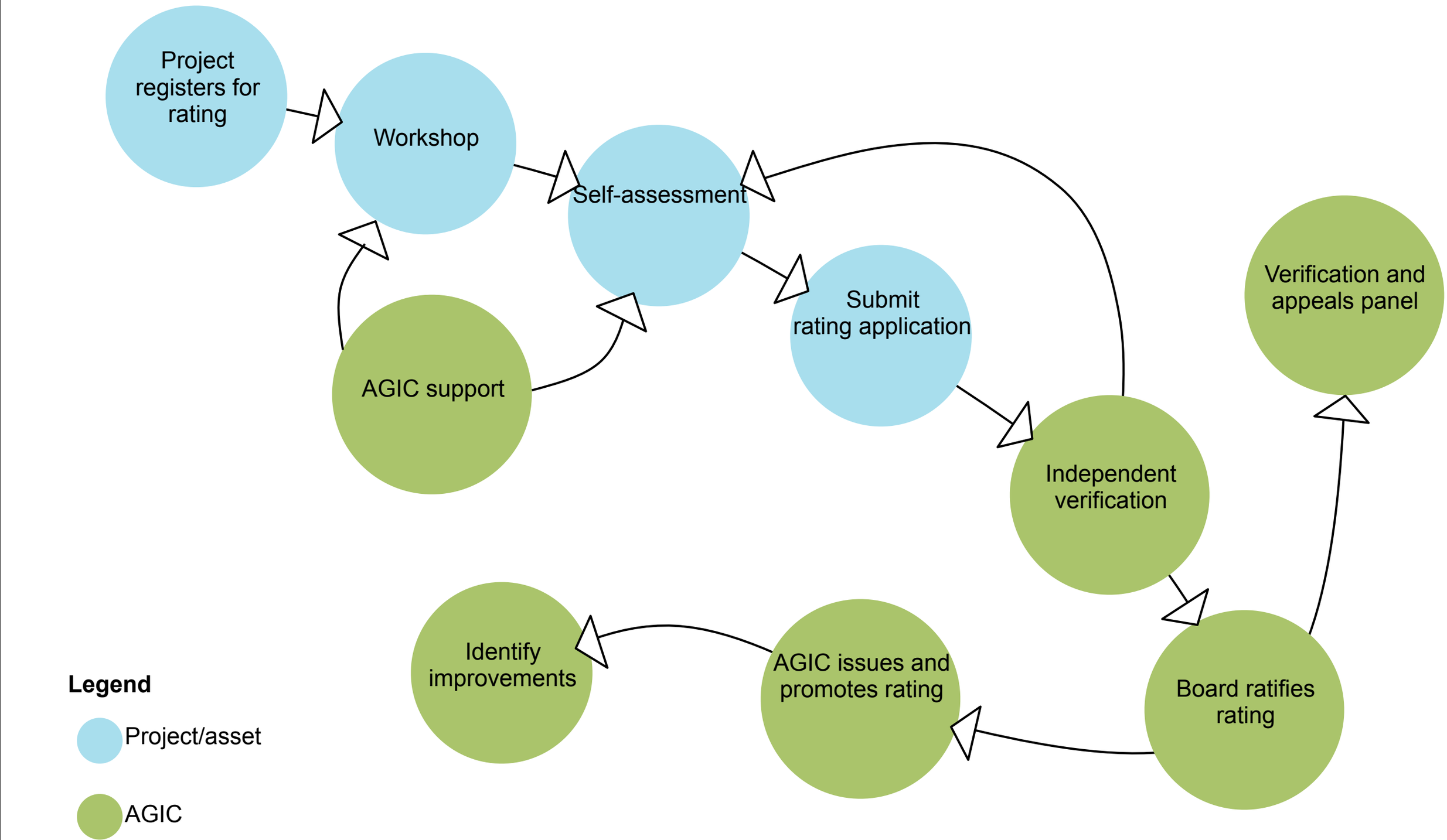
Aligns with EEO and NGERS

Aligned with Green Star Communities

Lifecycle analysis based Materials calculator

References the Australian Urban Design Protocol

Rating Process



IS Rating Tool Demo

Infrastructure Sustainability Rating Tool
Version 1.0

Release date: 16/03/2012
Original release date: 29/02/2012

Themes	Categories	Categories	No. Credits	Score Possible
Management and Governance	Management Systems	Man	8	10.5
	Procurement and Purchasing	Pro	4	5.0
	Climate Change Adaptation	Cli	2	5.0
Using Resources	Energy and Carbon	Ene	3	10.5
	Water	Wat	3	7.0
	Materials	Mat	2	7.0
Emissions, Pollution and Waste	Discharges to Air, Land and Water	Dis	5	10.5
	Land	Lan	4	7.0
	Waste	Was	3	7.0
Ecology	Ecology	Eco	4	10.5
People and Place	Community Health, Well-being and Safety	Hea	3	5.0
	Heritage	Her	2	5.0
	Stakeholder Participation	Sta	4	5.0
	Urban and Landscape Design	Urb	4	5.0
			51	100
Innovation	Innovation	Inn	1	5

Menu
Introduction >>
Instructions >>
Project/Asset Input >>
Start Credits >>
Credit Summary >>
Graphical Summary >>

The IS Brand

- A project/asset can only refer to it IS rating if it has been formally verified by AGIC

- The IS symbol is a trademark and must be appropriately used

- Assessors have a role to protect and promote the IS brand

Rating Costs and Benefits

Costs and benefits of infrastructure sustainability

(Additional) design, construction and operating costs and benefits of initiatives

IS specific costs

IS documentation costs

Rating fees to AGIC

Rating Costs and Benefits

Costs and benefits of infrastructure sustainability

Benefits outweigh costs

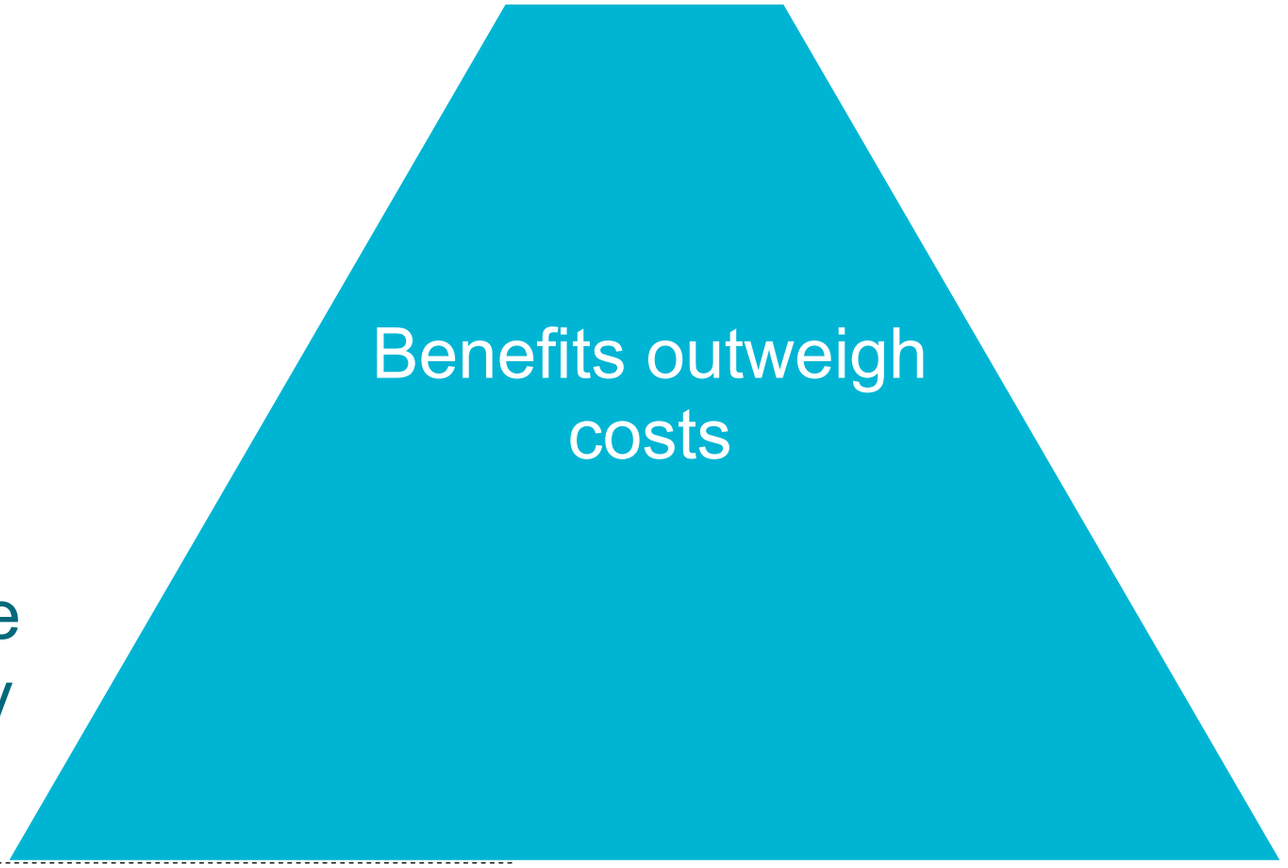
IS specific costs

IS documentation costs

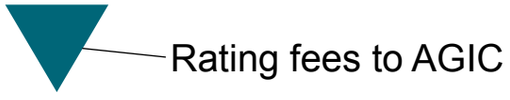
Rating fees to AGIC

Rating Costs and Benefits

Costs and benefits of infrastructure sustainability

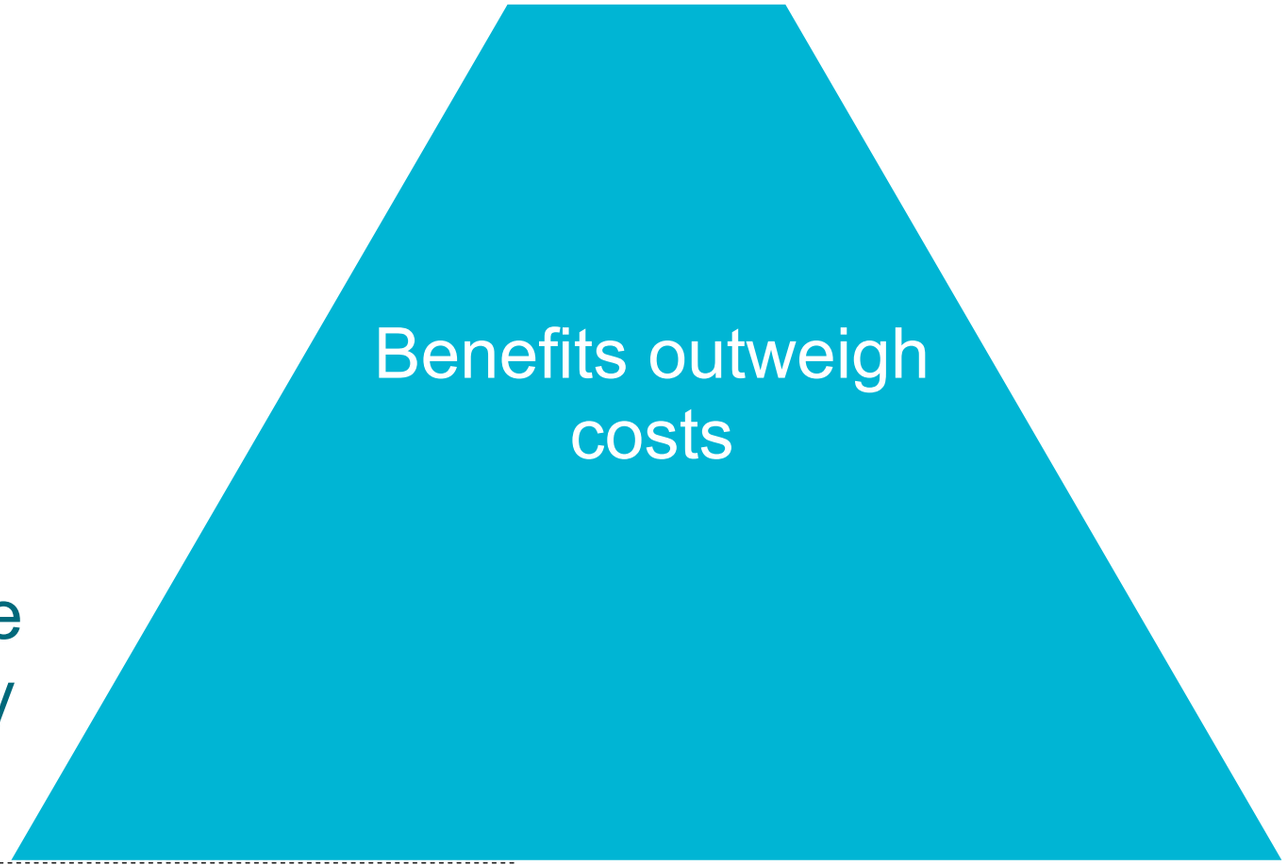


IS specific costs



Rating Costs and Benefits

Costs and benefits of infrastructure sustainability



<www.agic.net.au>

What can you do?

Practice the 5 R's:
Refuse, Reduce, Reuse, Repair, and Recycle

Jack Johnson 3r's song: http://www.youtube.com/watch?v=uSM2riAEX4U

What can you do?

Be Water Efficient: save up to 70%

≠

Water use: 210L/load, consumption: 21.8kL/yr

cost: $20/yr

Water use: 70L/load, consumption: 7.3kL/yr

cost: $6.60/yr

Approx 4.4yr payback

Calcs based on 2 loads/wk over 1 year. $0.91/kL

What can you do?

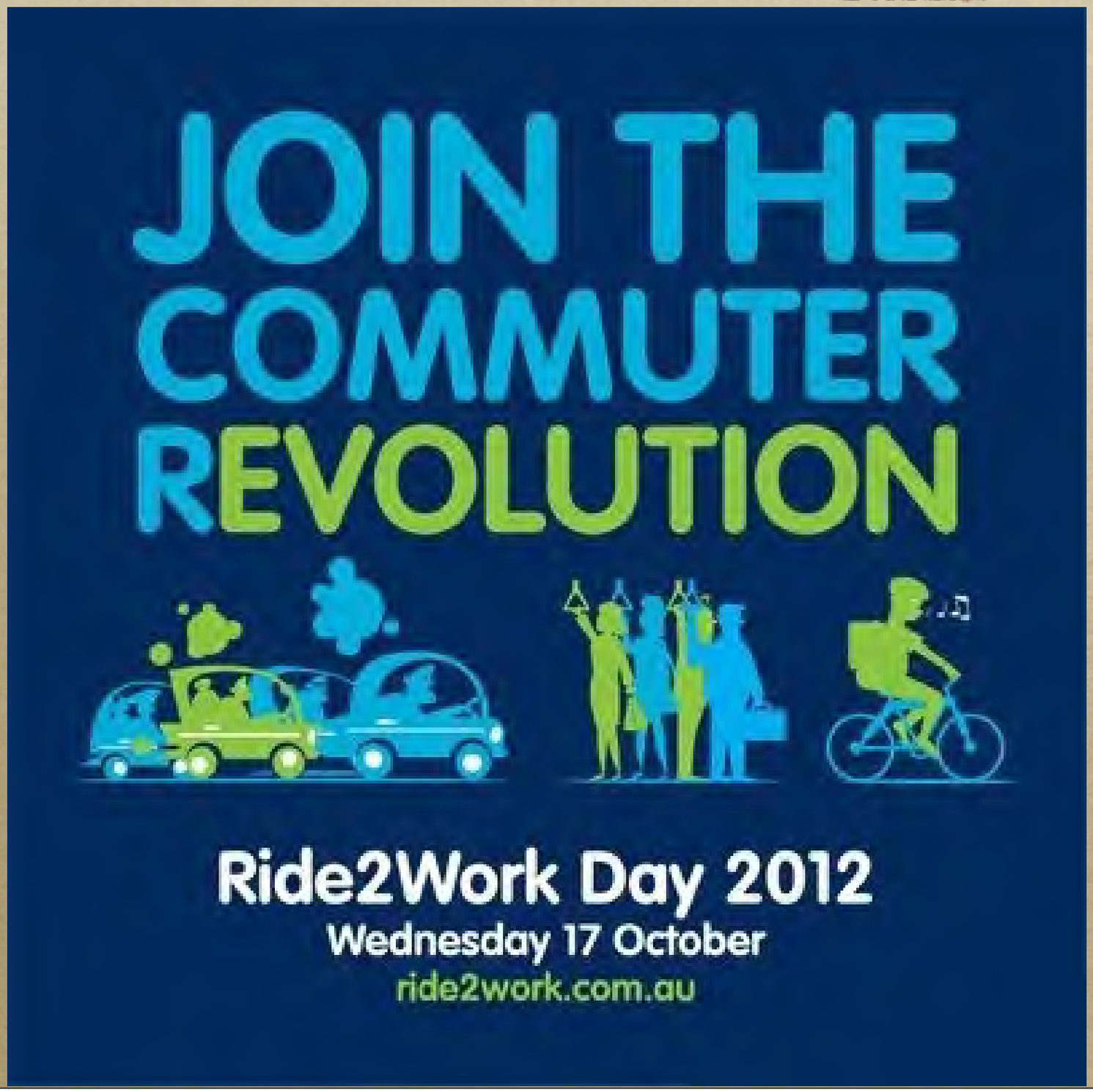
Australian Youth Climate Coalition

The Climate Project

One Million Women

Society for Sustainability & Environmental Engineering (SSEE)

What can you do?



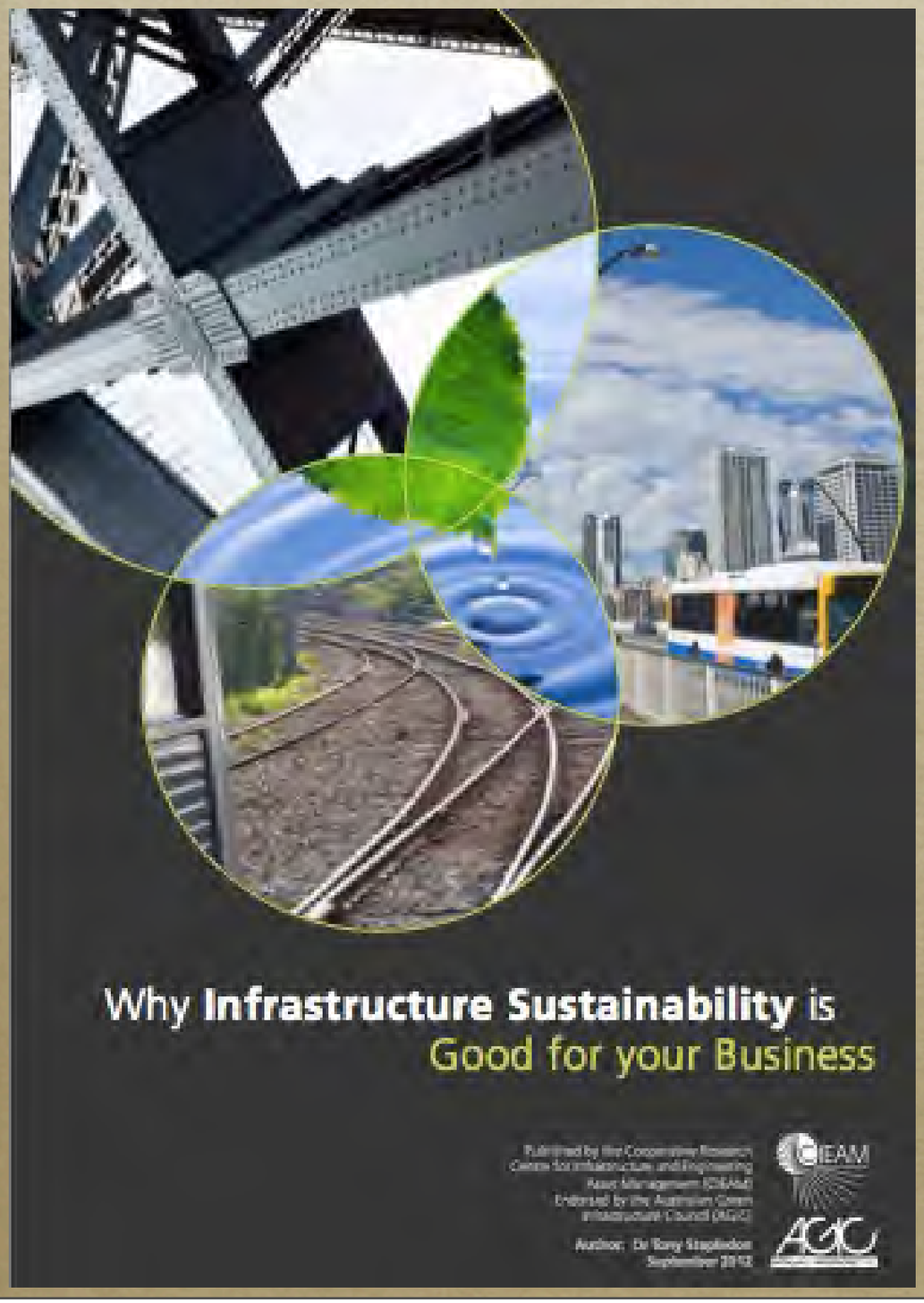
What can you do?

*(if you **must** drive a personal vehicle)*

Go Hybrid Electric

Go All Electric

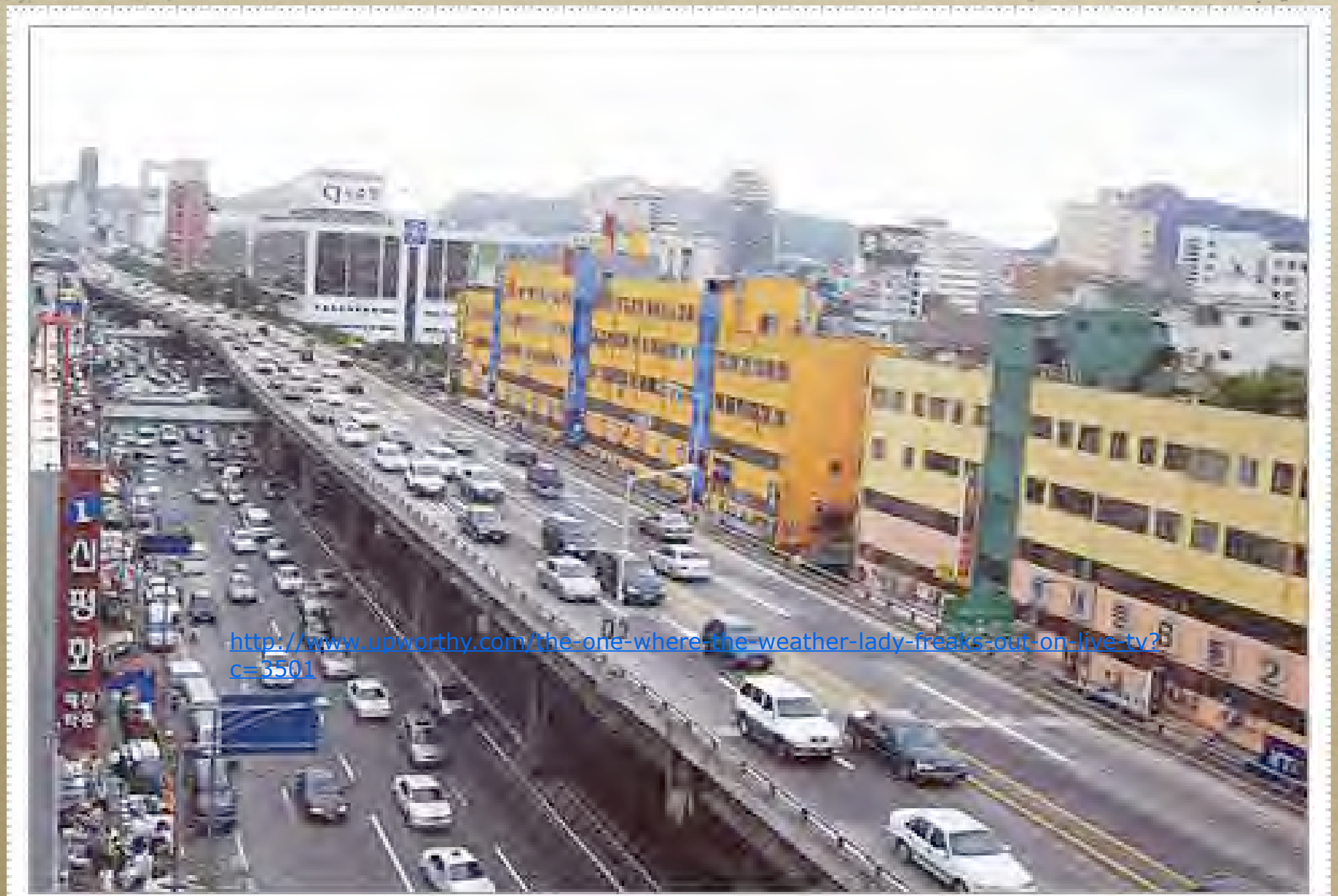
What can you do?



Develop a Business Case for Sustainability?

Soft launched at WCEAM 2012 last week in Korea.

What can Local Govt. do?



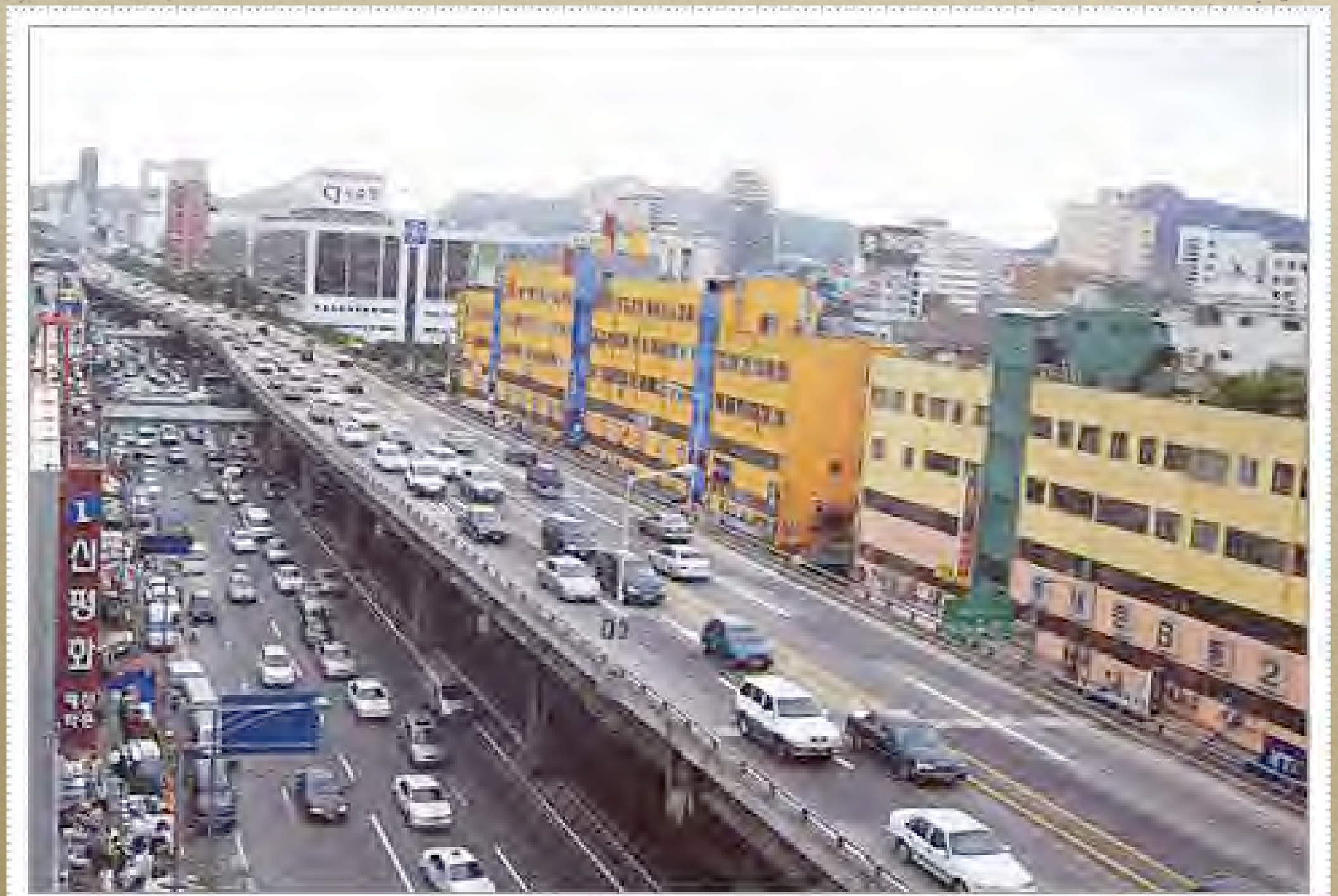
http://www.upworthy.com/the-one-where-the-weather-lady-freaks-out-on-live-tv?c=3501

1970

Give back WELLNESS

1998

Give back WELLNESS



1970

Give back WELLNESS

1998

Where are the cars?

Where are the cars?


CLIMATE
SUMMIT
WHAT IF IT'S A BIG HOAX AND WE CREATE A BETTER WORLD FOR NOTHING?
• ENERGY INDEPENDENCE
• PRESERVE RAINFORESTS
• SUSTAINABILITY
• GREEN JOBS
• LIVABLE CITIES
• RENEWABLES
• CLEAN WATER, AIR
• HEALTHY CHILDREN
• ETC. ETC.
ENGINEERS AUSTRALIA
JOEL PETT


Source: NASA

Wednesday, 31 October 12


tck
tck
tck
THERE
IS NO
PLANET B

So, to the Weather Report

http://www.youtube.com/watch?feature=player_embedded&v=TmfcJP_0eMc


SOCIETY FOR SUSTAINABILITY & ENVIRONMENTAL ENGINEERING
ENGINEERS
AUSTRALIA


ENGINEERS
AUSTRALIA