



*Making sense in warming world
- the scientific and moral
perspectives.*

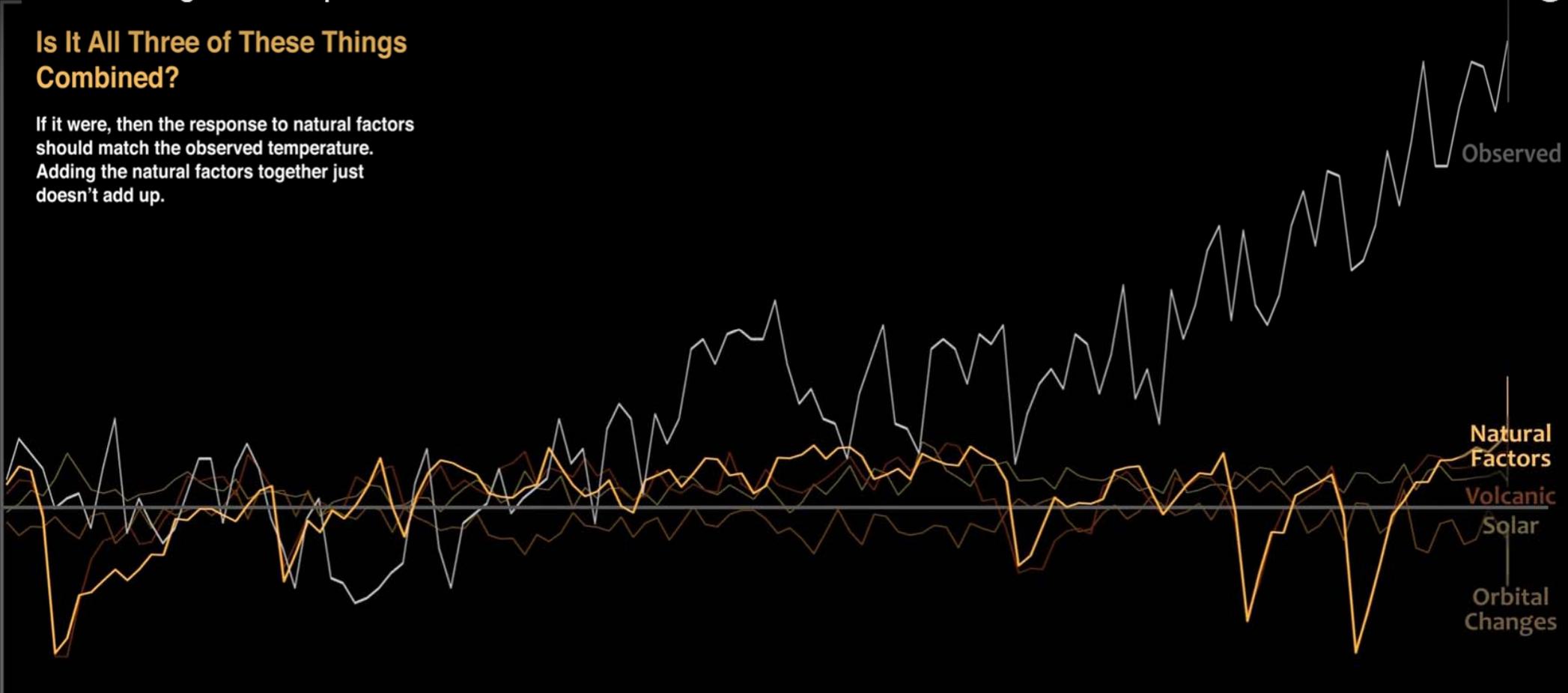
Programme for Liberal Studies, Education Bureau
LEUNG WING MO
30.3.2017

Climate always changes. It's not us!

How global warming stacks up

Is It All Three of These Things Combined?

If it were, then the response to natural factors should match the observed temperature. Adding the natural factors together just doesn't add up.

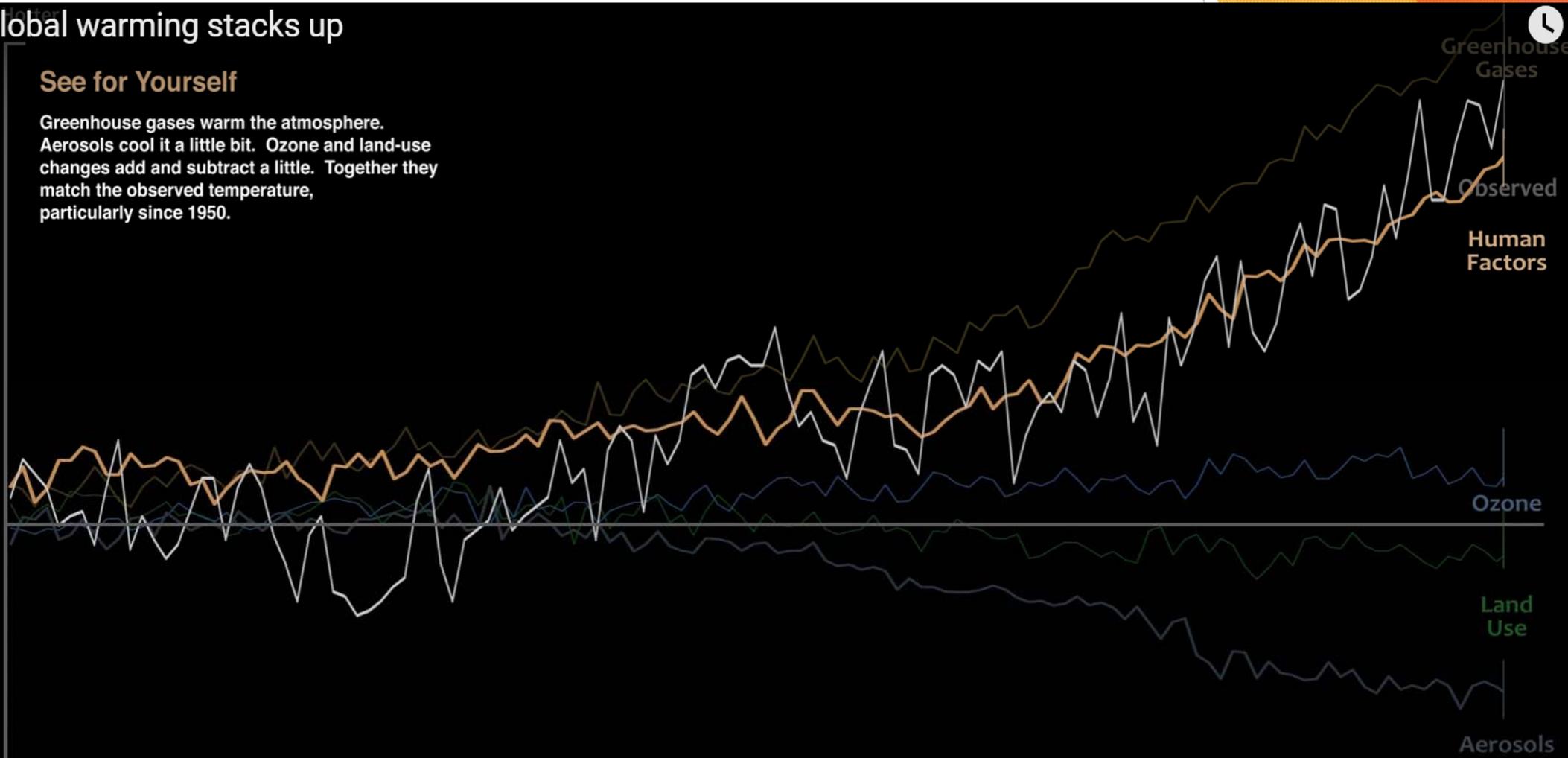


It's us!

How global warming stacks up

See for Yourself

Greenhouse gases warm the atmosphere. Aerosols cool it a little bit. Ozone and land-use changes add and subtract a little. Together they match the observed temperature, particularly since 1950.



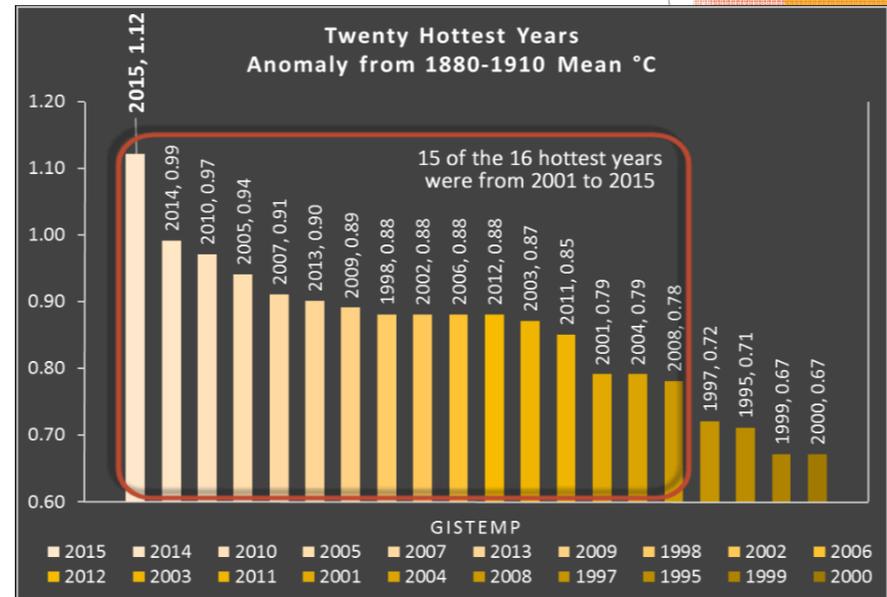
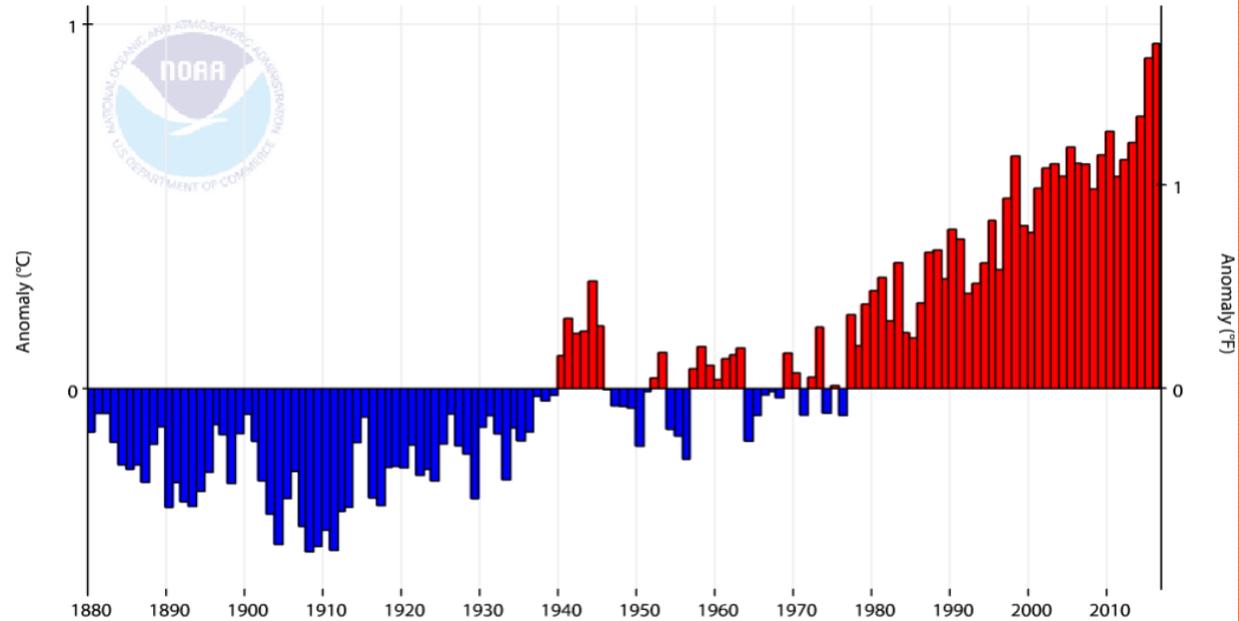
3 consecutive hottest years in a row
Odds = ?

[Note: there are 137 years of record (1880 - 2016).]

16 out of 17 hottest years were from 2001 - 2016.

Odds = ?

Global Land and Ocean Temperature Anomalies, January-December



Odds = 649,739 : 1

(Note: there are 52 cards in a full deck)

Odds = 13,983,816 : 1

(Note: there are 49 numbers)



Next Draw

Next Draw Number	17/027
Draw Date	07/03/2017 (Tuesday)
Stop Selling Time	9:15 PM
Turnover	\$13,486,685
Jackpot / Snowball	\$13,529,128
Estimated 1st Division Prize Fund	\$19,000,000

Quick Pick



Last Draw

Draw Number :	Draw Date :	Total Turnover :	Prize	Unit Prize
17/026	04/03/2017(Saturday)	\$40,562,217	1st	

Draw Results :



2nd \$1,228,690
3rd \$63,660

Evidence : CO₂ level, temperature, sea level

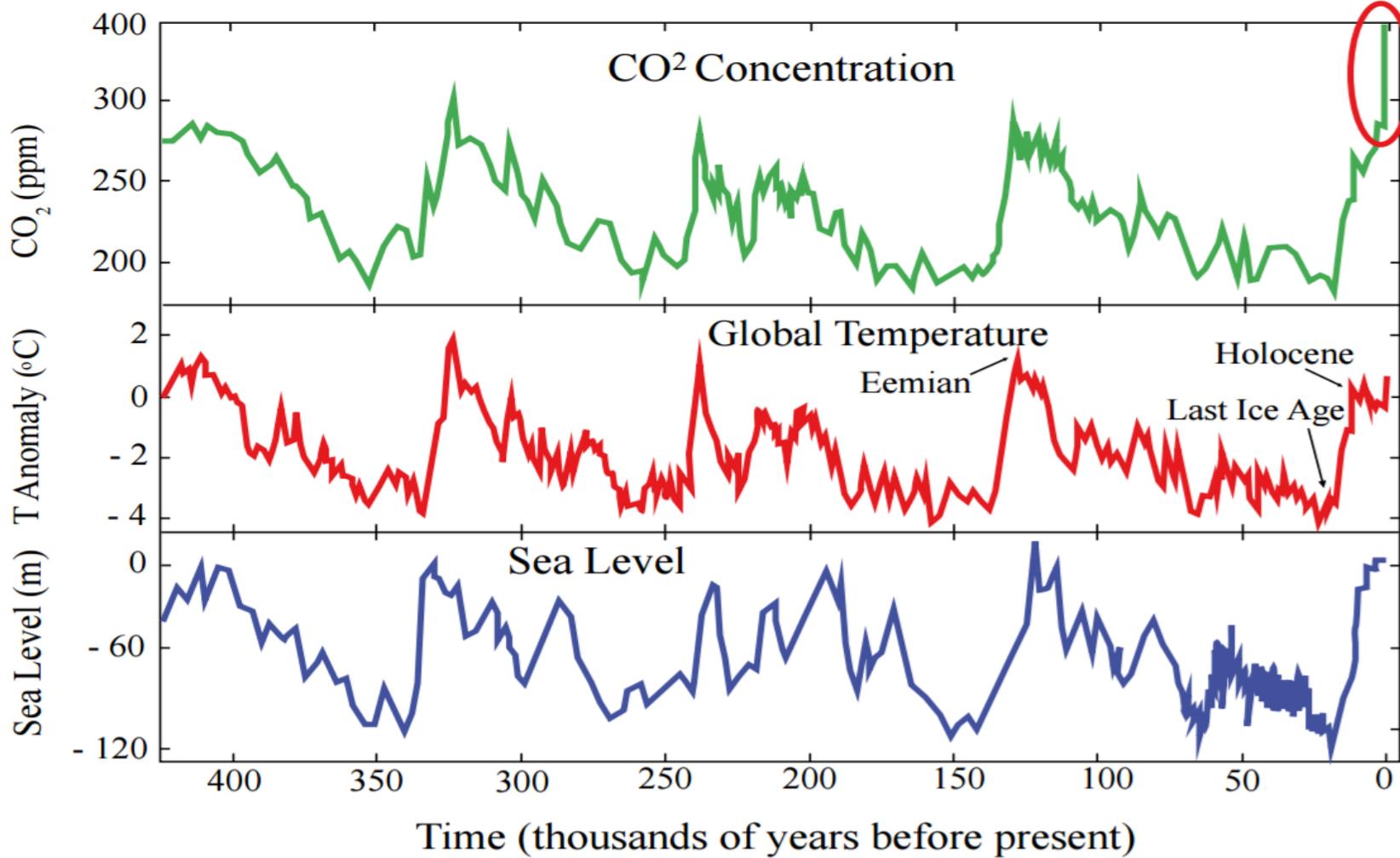


Photo credit: NASA

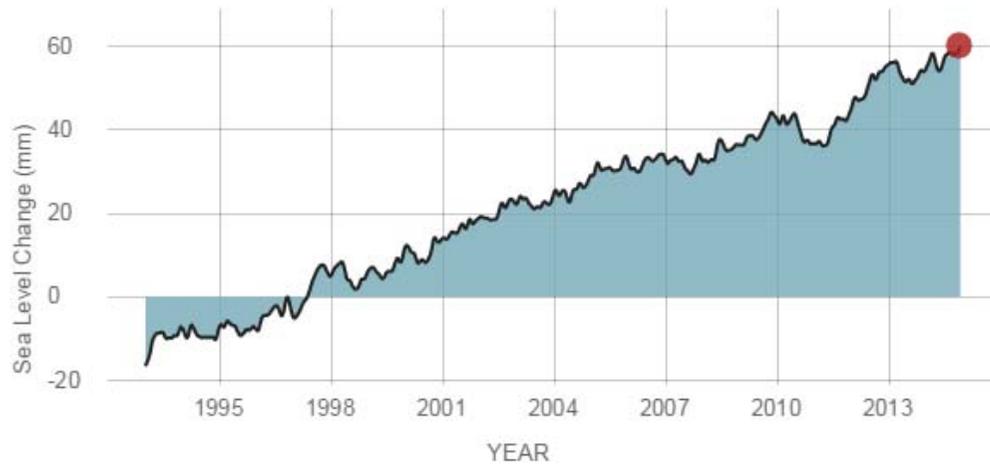
Evidence : Sea level rise

SATELLITE DATA: 1993-PRESENT

Data source: Satellite sea level observations.
Credit: NASA Goddard Space Flight Center

RATE OF CHANGE

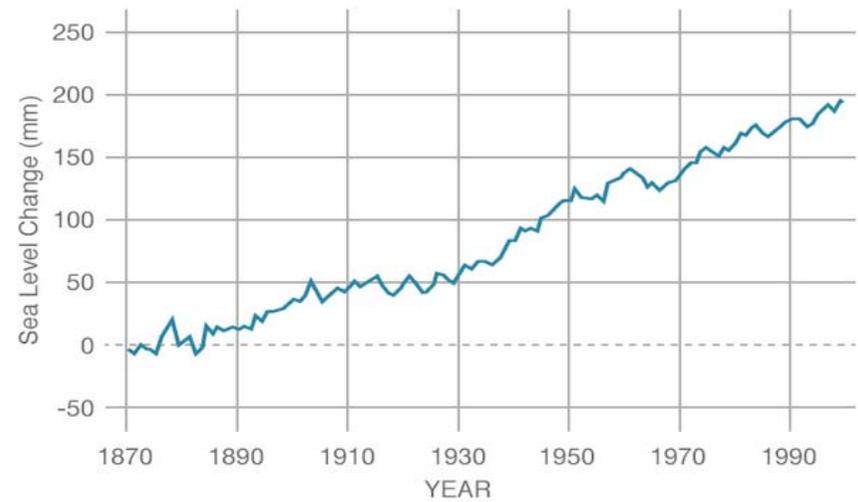
↑ **3.18**
mm per year



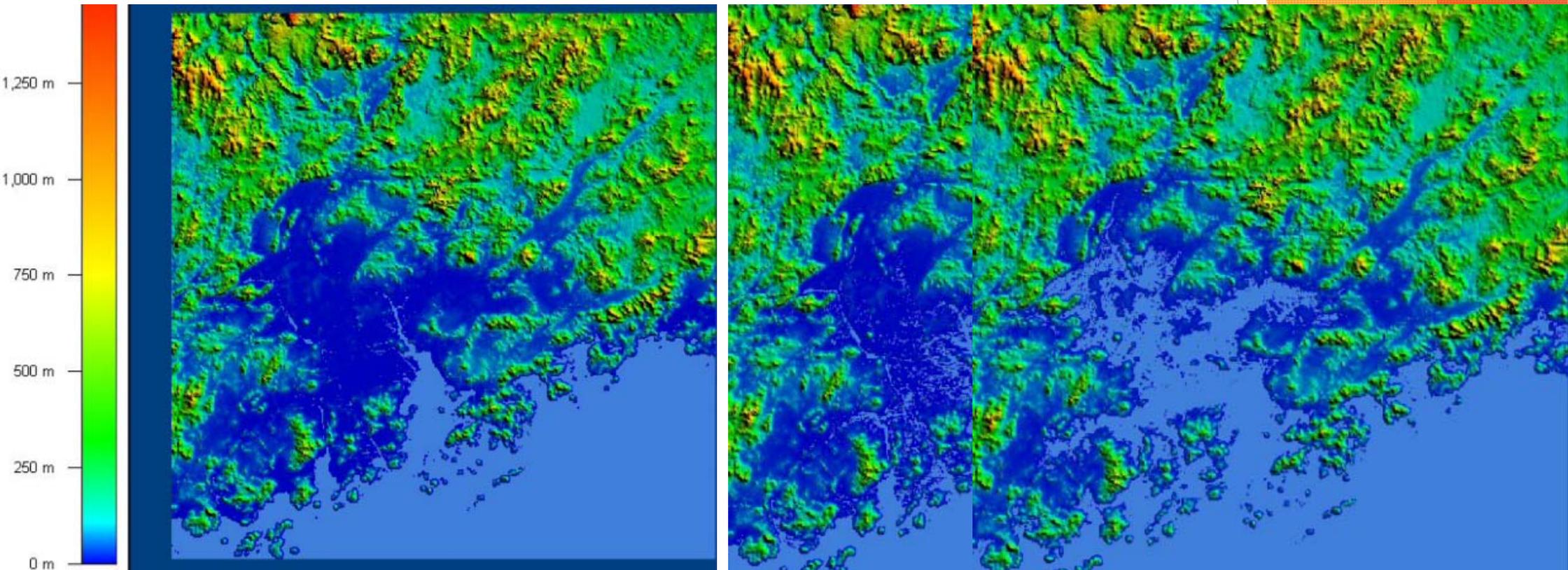
Graphics : NASA

GROUND DATA: 1870-2000

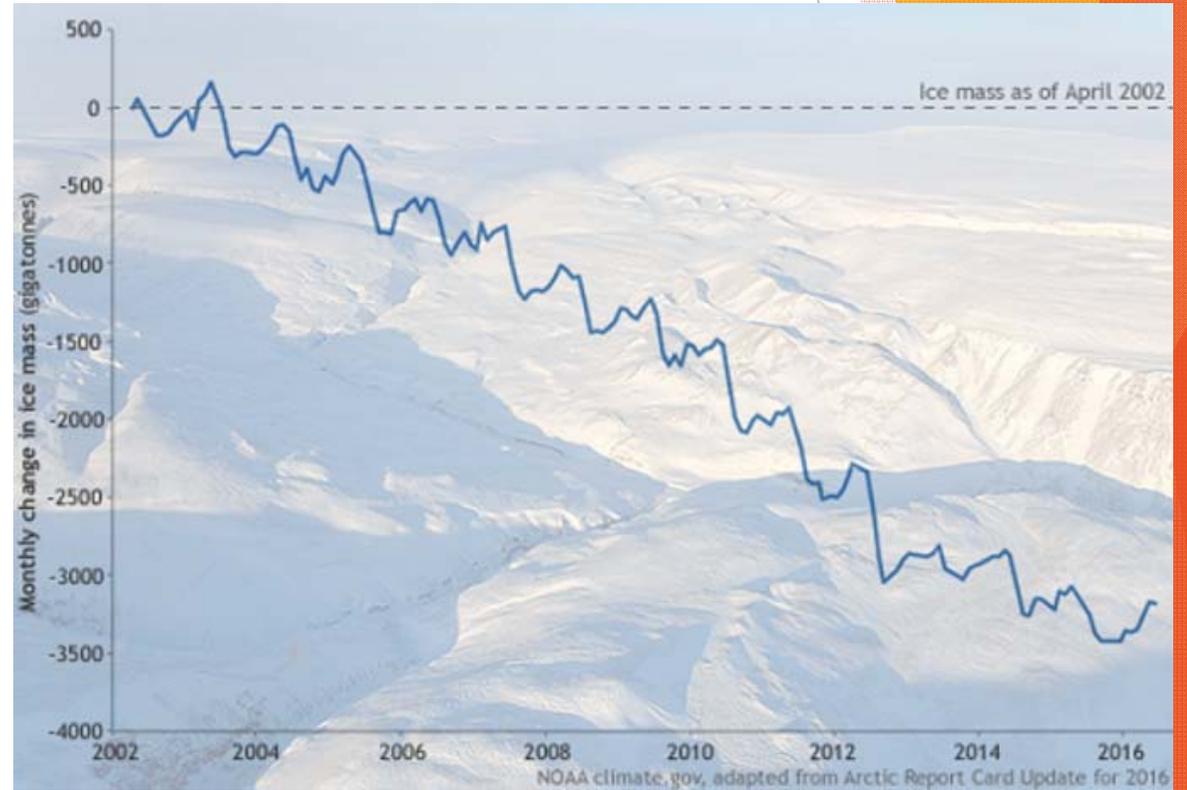
Data source: Coastal tide gauge records.
Credit: CSIRO



Inundation around the Pearl River Delta caused by a sea level rise. WONG, Agnes K.M, et al.



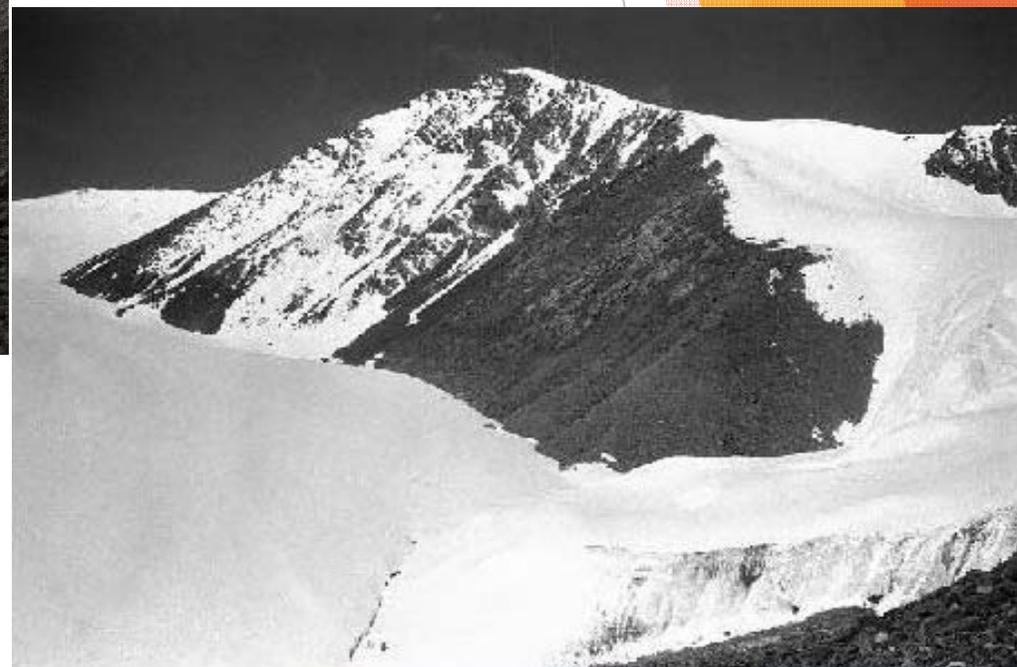
Evidence : Melting ice sheet



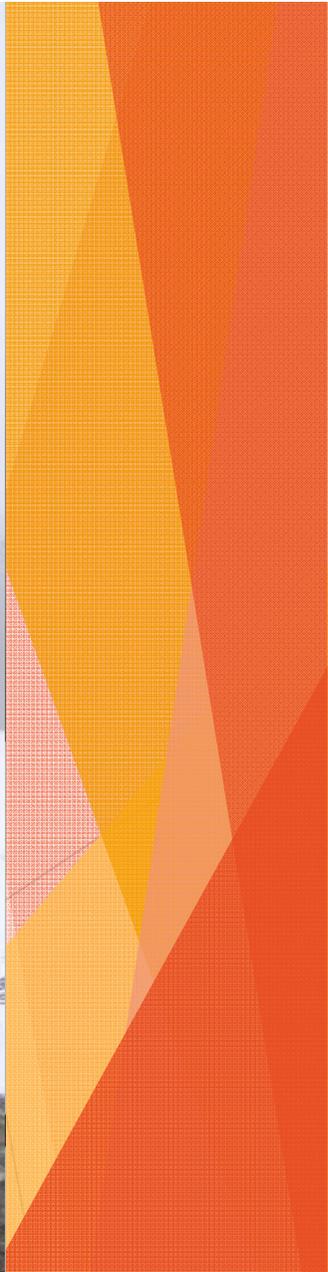
Evidence : Vanishing glacier



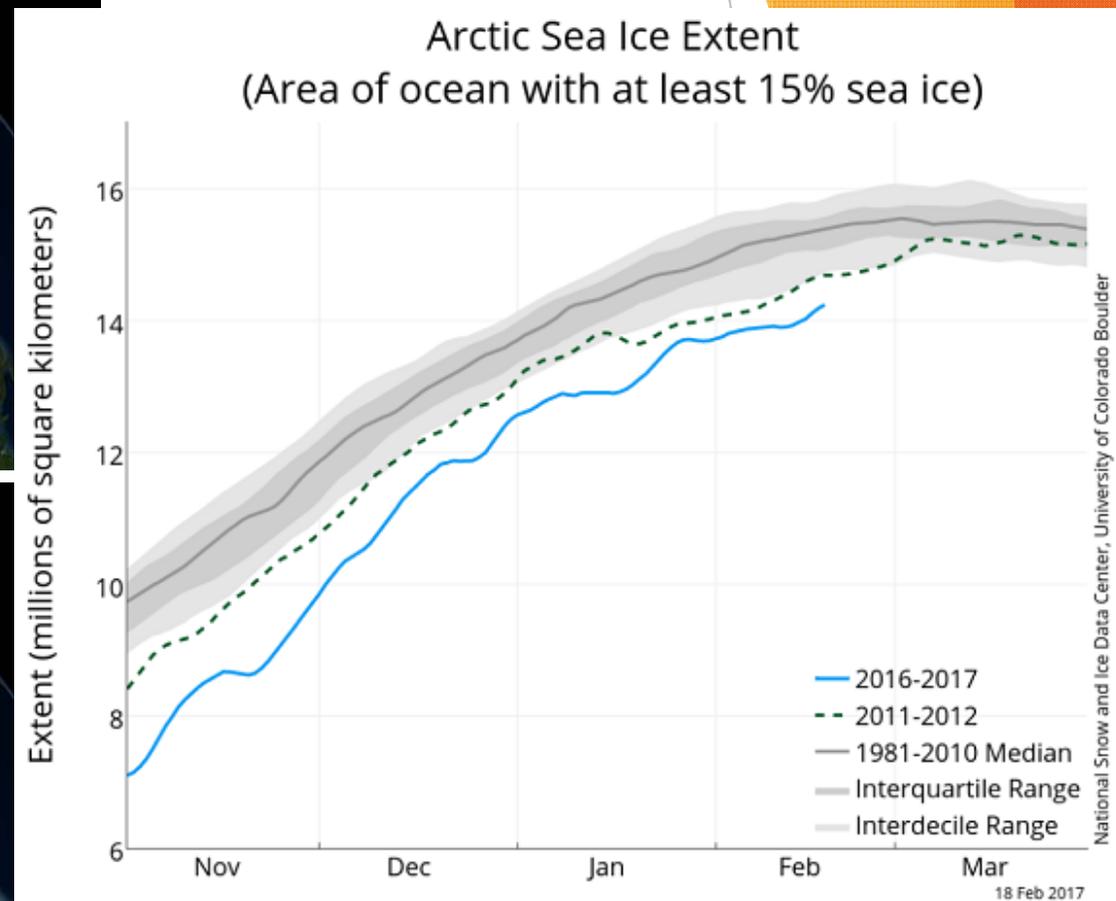
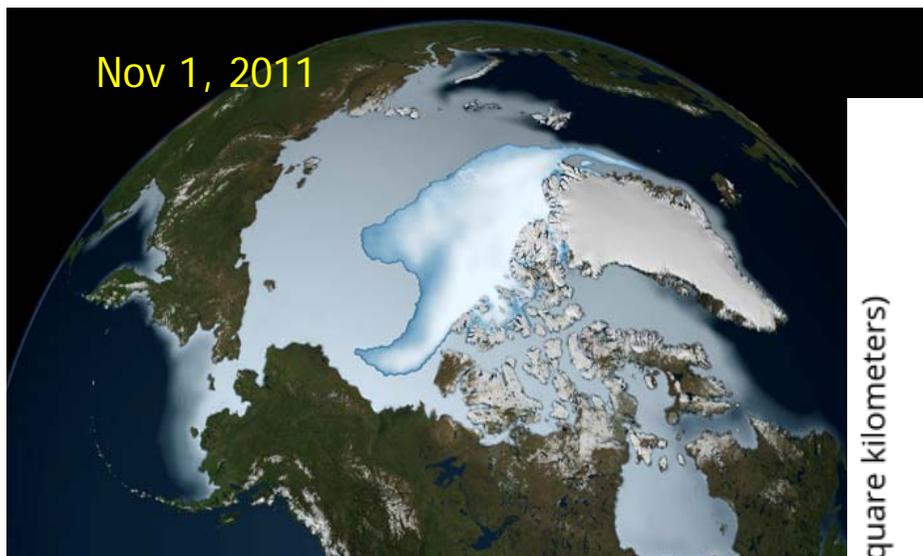
2013



1983



Evidence : Declining Arctic sea ice

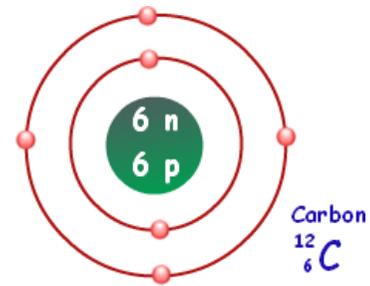


Evidence : Ocean acidification



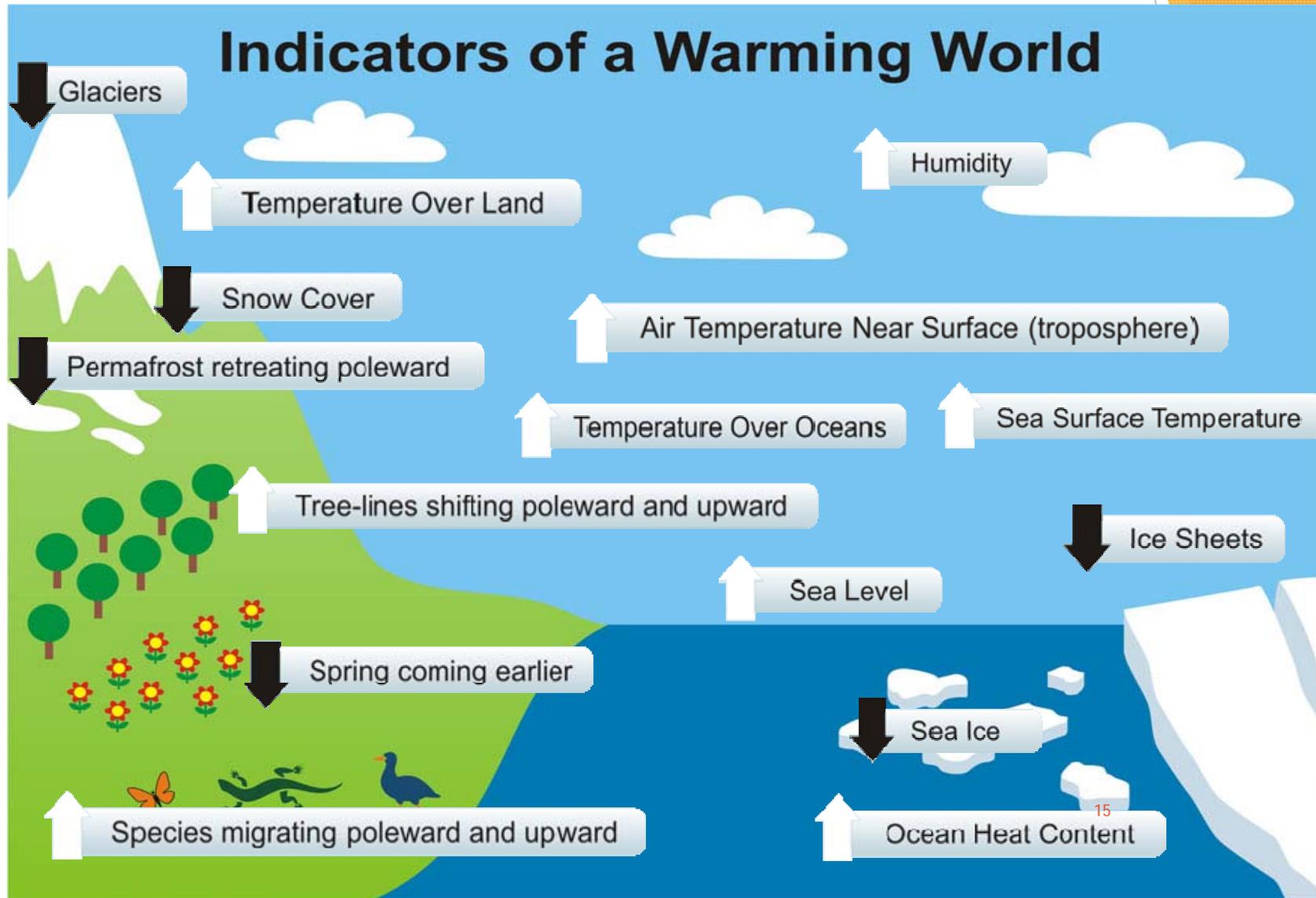
Source: National Geographic

Evidence : Forensic fingerprint (Isotopic carbon C12, C13, C14)



Measurement	Trend	Why?
CO2 level increasing	↑	CO2 released from burning fossil fuels is faster than it is taken up by land or ocean
Global C14 decreasing (radioactive, half life 5730 years)	↓	CO2 from burning fossil fuel is very low in C14 because of natural decay
Local C14	↓	Highly polluted areas have even lower C14 because the effect of fossil fuel burning is more marked locally
C13 (plants preferentially take up C12)	↓	Fossil fuels burning add CO2 to the atmosphere that have less C13.

The jigsaw puzzles (observations) fall into place

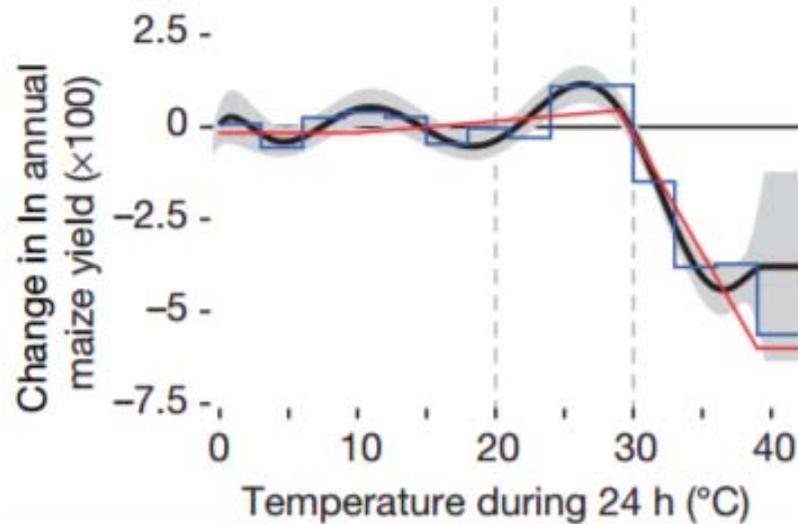
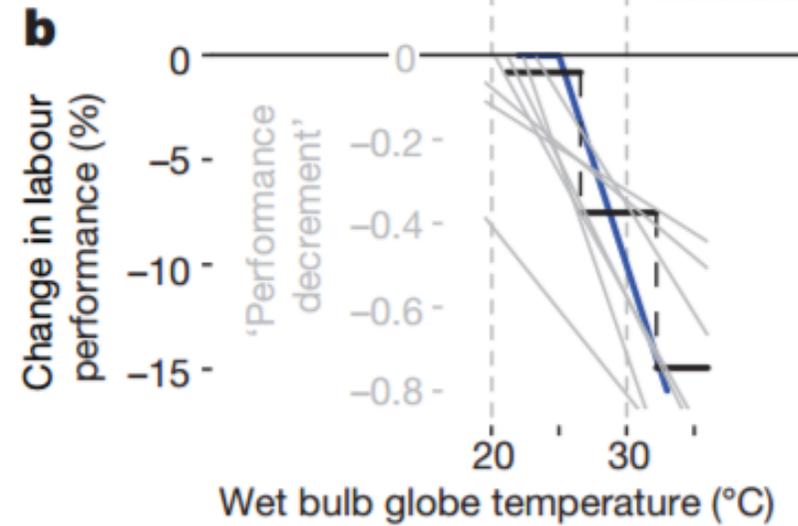
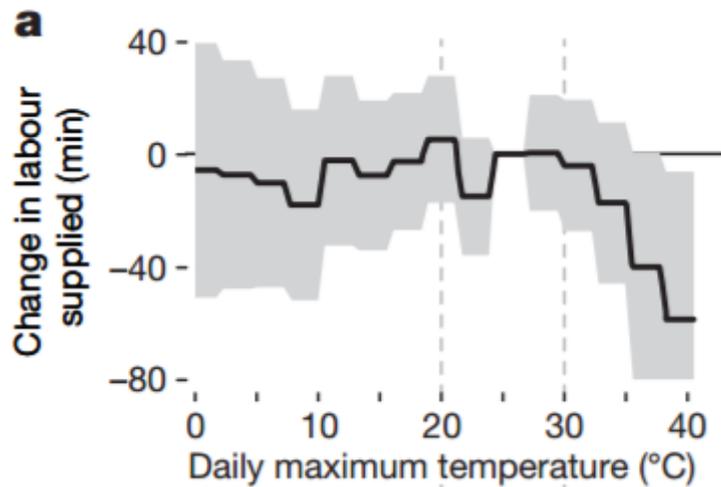


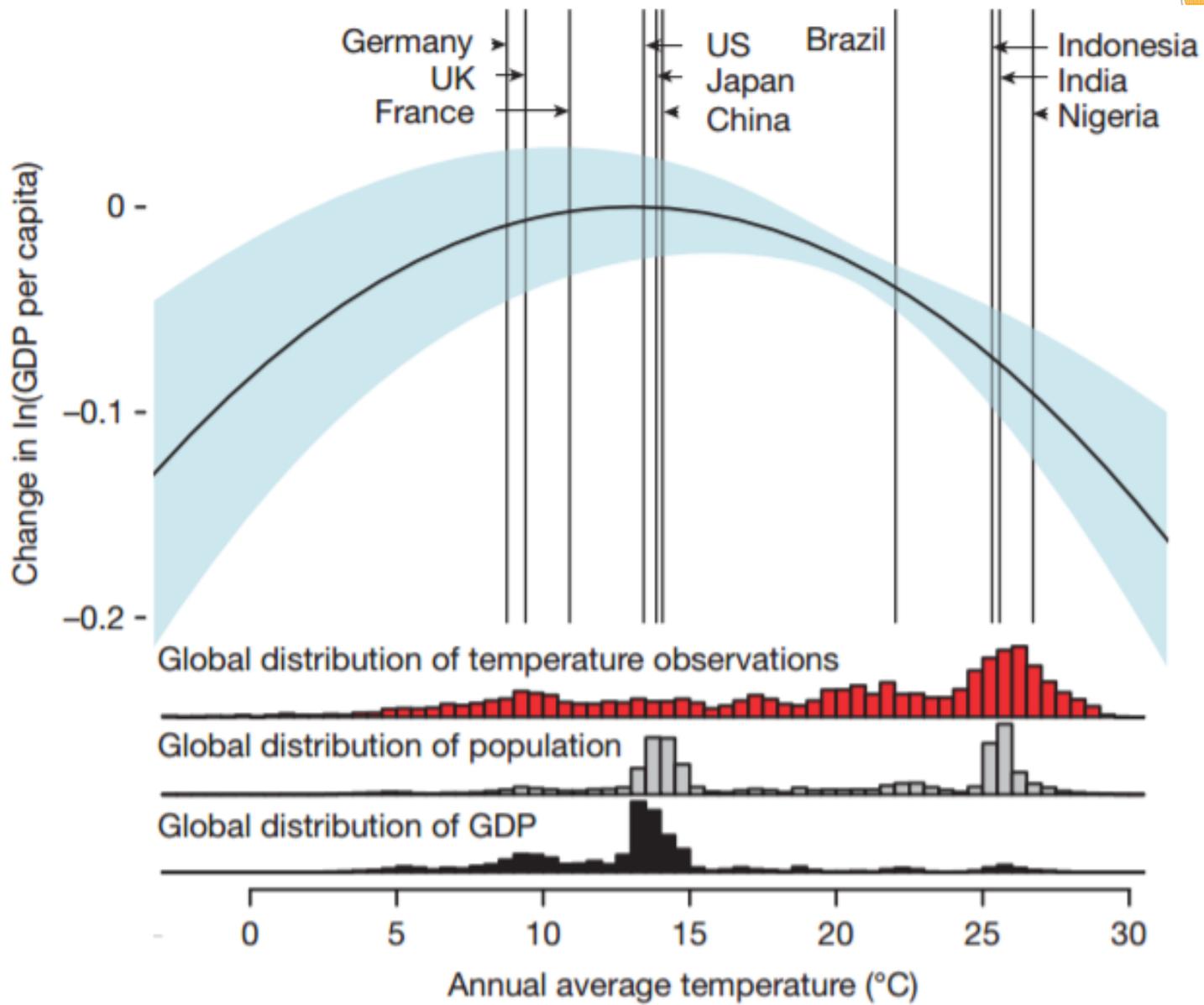
Ignorantia juris non excusat

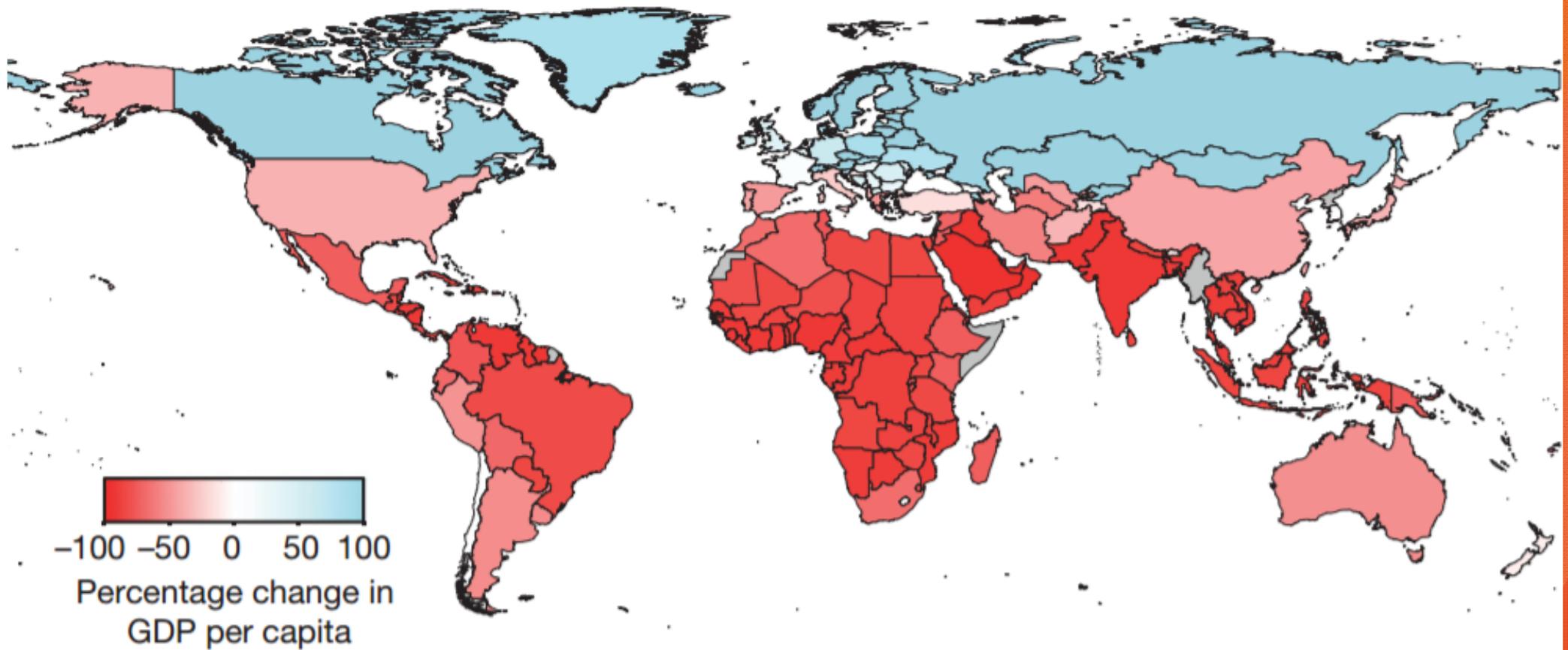
- ▶ 1824 - John Fourier brought attention to greenhouse effect
- ▶ 1859 - John Tyndall's experiment on absorption of IR by GHG
- ▶ 1896 - Svente Arrhenius's 1st calculation of global warming
- ▶ 1938 - G S Callendar warned that global warming was underway
- ▶ 1958 - Charles Keeling accurately measuring CO₂
- ▶ 1965 - President Lyndon B. Johnson : *This generation has altered the composition of the atmosphere on a global scale through a steady increase in carbon dioxide from the burning of fossil fuels.*
- ▶ 1988 - James Hansen told the US Senate that it was 99% certain that global warming was caused by increasing GHG
- ▶ 1988 - formation of IPCC
- ▶ 1990 - IPCC FAR ... Summary for Policymakers
- ▶

No excuse for turning a deaf ear !

Longer term impact: Global non-linear effect of temperature on economic production Marshall Burke et al, 2015, Nature







Percentage change in GDP per capita by 2100, RCP 8.5 (global output reduced by 23%, relative to a world without climate change)

BAU (Business As Usual), why?



Politicians speak louder than scientists

USEPA webpage :
CO2 is the *primary* greenhouse gas contributing to recent climate

Mar 10, 2017

USEPA Administrator Scott Pruitt :
CO2 is *NOT* a primary contributor to global warming.



*"I think that measuring with precision human activity on the climate is something very challenging to do and there's tremendous **disagreement** about the degree of impact, so no, I would not agree that CO2 is a primary contributor to the global warming that we see."*

21

*"But we don't know that yet. ... We need to **continue the debate.**"*

In contrast to other wrongdoings, we don't realize it's our moral obligations to cut CO2 emission!



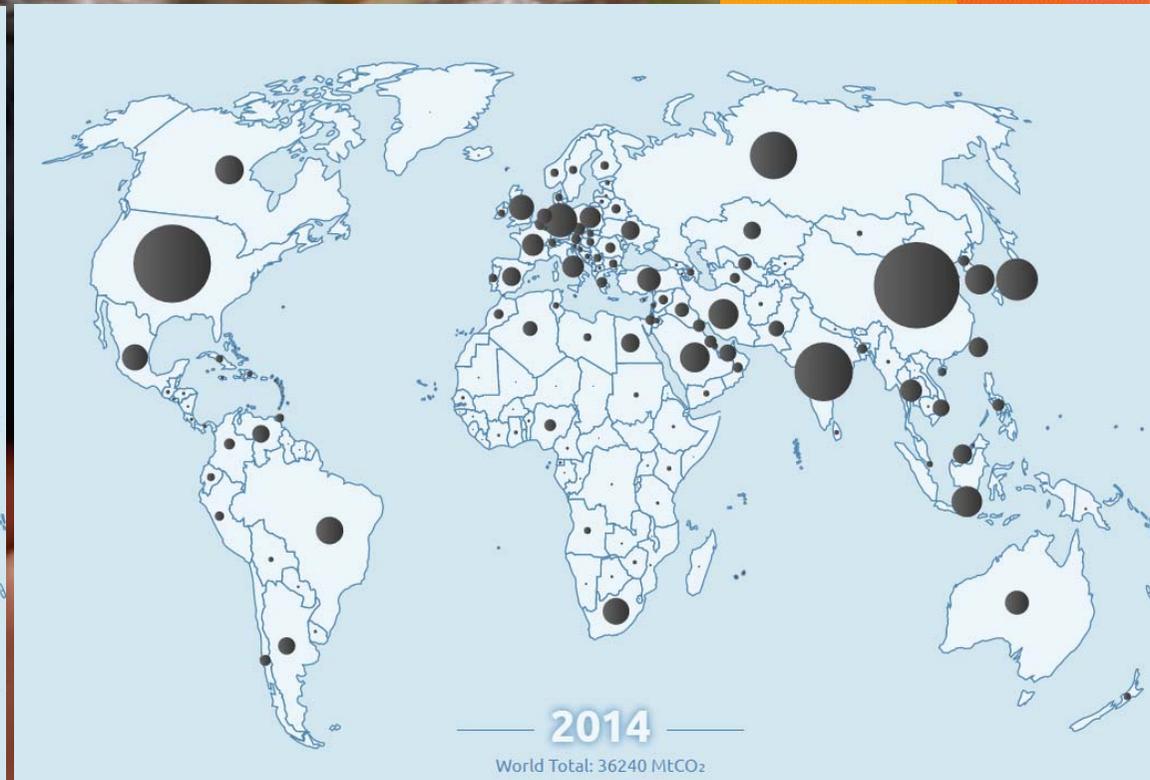
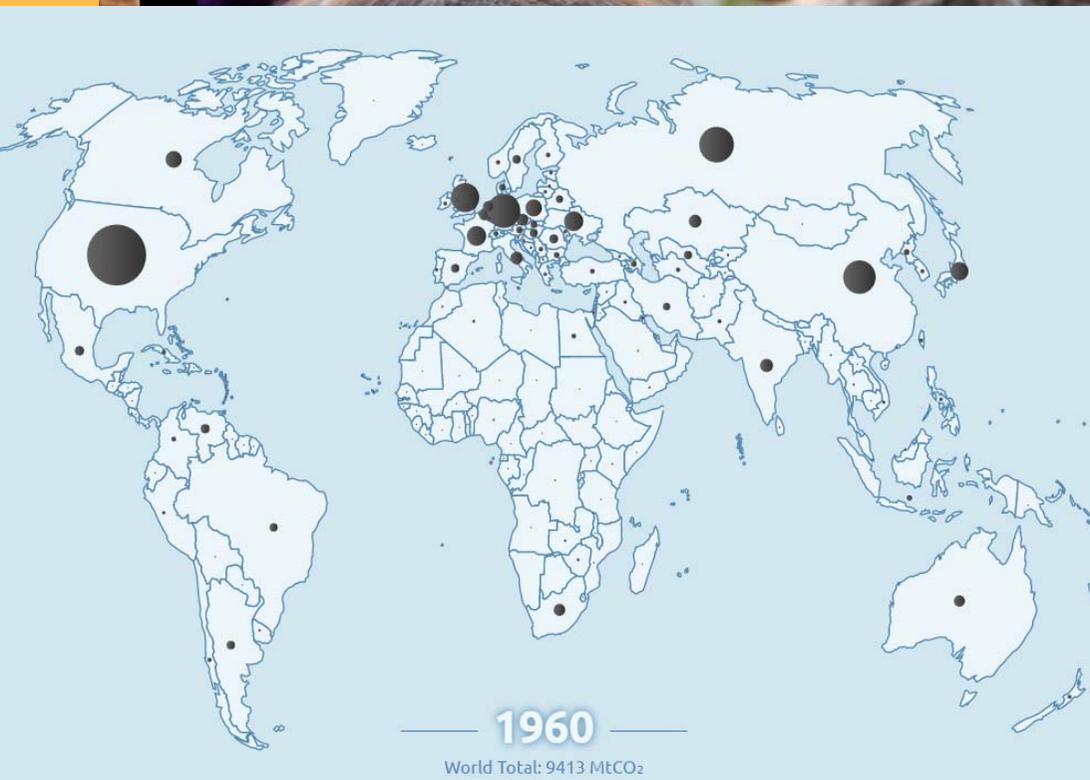


Displacement
of harm
across
time,
space,
species.





hardship, suffering, death, misery, forlorn,
dejected, despair, desperate, hopelessness



Poor people are more **vulnerable** to the effects of climate change, such as extreme weather and sea level rise, yet have contributed little to the causes.
It undermines justice, rights, and welfare of humans.

Appeal to ethics and morality

- ▶ Tragedy of the commons;
- ▶ Causing pain is wrong, ignoring the interests of others is wrong, whether we do it knowingly or not;
- ▶ reflects on the human goods that climate change can undermine;
- ▶ Redraw the moral circle, examines questions such as what actions are **right** or **wrong** in relation to climate change, who has what duties, and how these relate to others' rights;
- ▶ Understands that **inaction** amounts to gambling with the lives and suffering of people, now and in the future.

Opportunity :

- To *care about each other* and the nonhuman world in new ways;
- To be people of *conscience*;
- To be intimate with and *feeling compassion* for those experiencing the various consequences of climate intensification;
- To *show kindness* to one's fellows, humans and non-humans alike;
- To cultivate *a life of integrity* toward a climate-safe and more just world - a new, greener, ethos;
- To inculcate living a life that is *rich in ends* and *simple in means*, where the focus is on *being* rather than *having*.

It is not only for what we do that we are held responsible, but also
for we do not do. Moliere



Photo courtesy : Caveman Lee