

ENVS 4100/3521 Climate Politics & Policy

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Obama State of Union address 2012



- @ 7 pm Tuesday
- (1) What will Obama say about climate change?
- (2) What will Obama say about energy (security)?



advances in clean energy “will only translate into clean energy jobs if businesses know there will be a market for what they’re selling.”

~ Obama SOTU 2011

“ I know that there are those who disagree with the overwhelming scientific evidence on climate change. But here’s the thing - even if you doubt the evidence, providing incentives for energy-efficiency and clean energy are the right thing to do for our future - because the nation that leads the clean energy economy will be the nation that leads the global economy. And America must be that nation.” ~ Obama SOTU 2010

ENVS 4100 primer



- 1) What is climate change and global warming
- 2) It is happening
- 3) How it is happening
- 4) How much is happening → indications
- 5) How we know what we know → direct observation, proxy data, models
- 6) How human activities matter
- 7) How much/in what ways human activities matter
- 8) What is being done about it

Hulme (2009) Why we disagree?



FOUR contemporary & contrasting ways of narrating the significance of climate change:

1. as a battleground between different ways of knowing
2. as a justification for commodification
3. as an inspiration for new social movements
4. as a threat to ethnic, national and global security

“How does the idea of climate change alter the way we arrive at and achieve our personal aspirations and our collective social goals?”

Hulme (2009) Why we disagree?



FOUR themes

1. climates have both physical and cultural meaning
2. climate change is used to carry/convey ideological assumptions and projections
3. climate changes & understanding changes
4. the ways climate stories are told has changed

“Disagreements about climate change are as likely to reveal conflicts within and between societies about the ideologies we carry and promote, as they are to be rooted in contrary readings of the scientific evidence that humans are implicated in physical climate change” (p. 33)

1) climate change, global warming



increases in greenhouse gases in the atmosphere cause **changes** in the **climate**

- e.g. change in temp → **global warming**

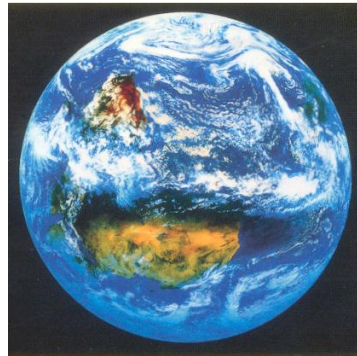
CLIMATE CHARACTERISTICS

SIMPLE

- temperature and rainfall frequency
→ occur *with* regularity

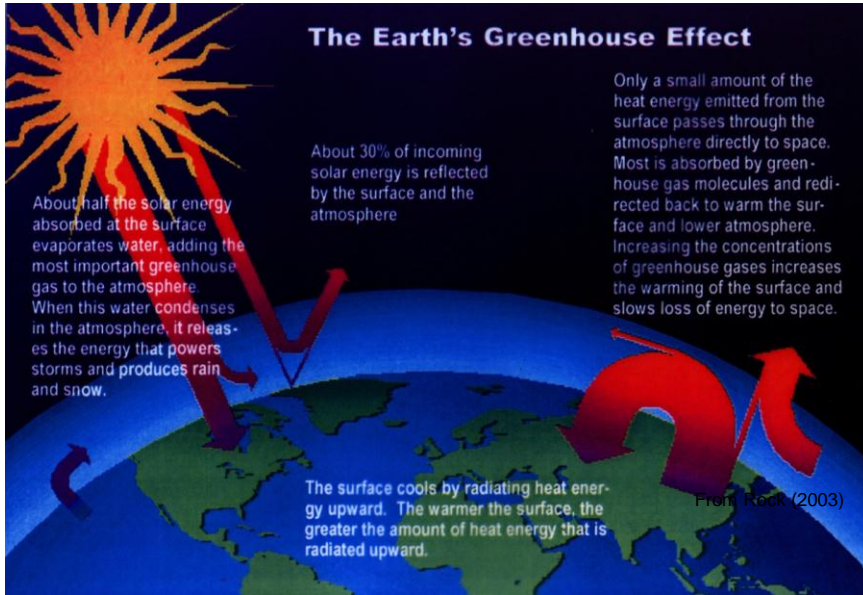
COMPLEX:

- drought, floods, hurricanes
→ occur *without* regularity

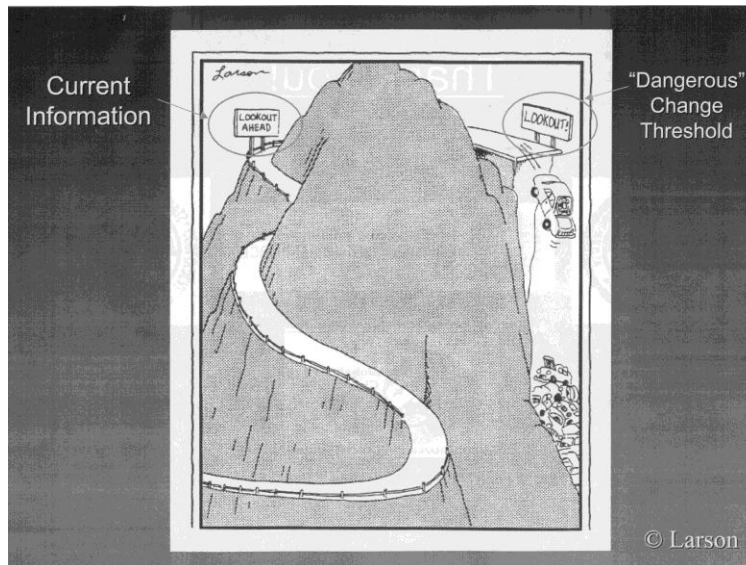


Maslin (2002)

2) It is happening



abrupt vs. gradual change

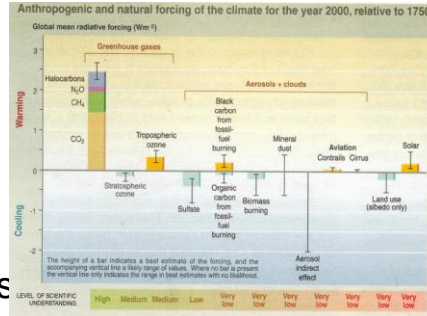


3) how it is happening



The most important GHGs:

- Carbon Dioxide (CO₂)
- Methane (CH₄)
- tropospheric Ozone (O₃)
- Halocarbons: chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs, HFCs)
- Water Vapor (H₂O_v)
- Nitrous Oxide (N₂O)



IPCC (2001)

cycles and processes



Sources and Sinks

- Source e.g. → industrial emissions
- Sinks
 - Oceans
 - Soil
 - Forests and tundra
 - Atmosphere

Table 1.1 The main greenhouse gases (From UNEP 2001. United Nations Environment Programme: Introduction to Climate Change. Accessed April 17, 2001 from www.grida.no/climate/unep/Intro.htm).

Greenhouse gases	Chemical formula	Preindustrial concentration (ppbv)	Concentration in 1994 (ppbv)	Atmospheric lifetime (years) ^a	Anthropogenic sources	Global Warming Potential (GWP) ^b
Carbon dioxide	CO ₂	278,000	358,000	Variable	Fossil-fuel combustion Land-use conversion Cement production	1
Methane	CH ₄	700	1,721	12.2 ± 3	Fossil fuels Rice paddies Waste dumps Livestock	21 ^c
Nitrous oxide	N ₂ O	275	311	120	Fertilizer Industrial processes Combustion	310
CFC-12	CCl ₂ F ₂	0	0.503	102	Liquid coolants Foams	6,200-7,100 ^d
HCFC-22	CHClF ₂	0	0.105	12.1	Liquid coolants	1,300-1,400 ^d
Perfluoro-methane	CF ₄	0	0.070	50,000	Production of aluminum	6,500
Sulfur hexa-fluoride	SF ₆	0	0.032	3,200	Dielectric fluid	23,900

Residence time: time in atmosphere

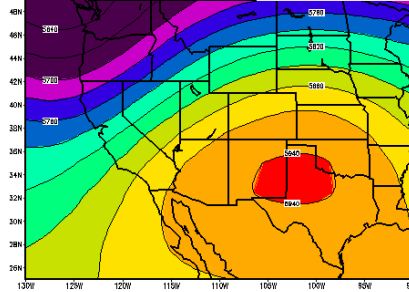
Global Warming Potential (GWP): ratio of radiation (heat) change by GHG compared to carbon dioxide

4) How much? indications



Temperatures globally have risen 1.1°F in the last century

Temperatures are expected to increase 2°F to 11.5°F by 2100

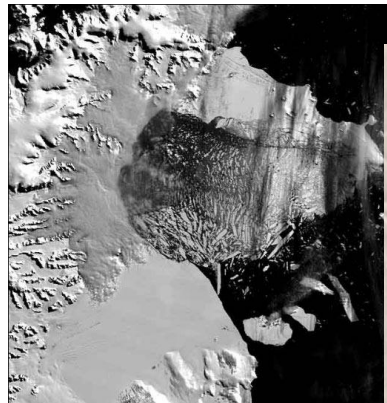


another indication



The global average sea level has risen

- past rise: 4 to 8 inches in the past 100 years
- future rise: 7.5 to 23 inches by 2100



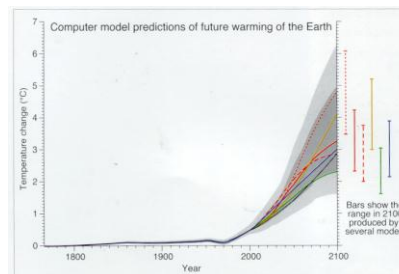
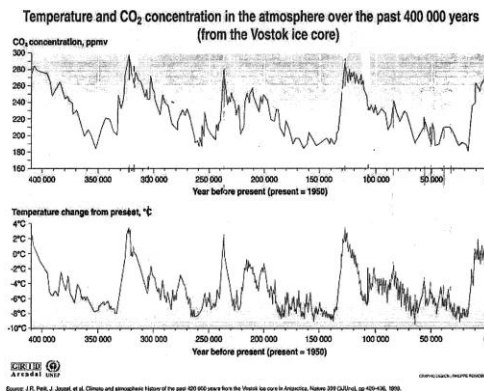
NASA (2002)



5) How we know what we know



direct observations ~ proxies ~ models



6) human activities matter



Natural Greenhouse Effect

- Makes the world habitable
- Without it, Earth would be about 60°F cooler

Enhanced Greenhouse Effect

- from human activities (anthropogenic)
- abundant evidence

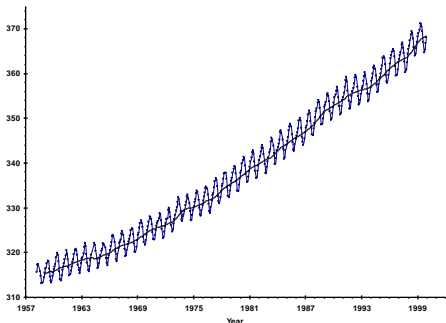


Maslin (2002)

The Keeling Curve



- studied the interactions of atmospheric CO₂ and temperature over time
- Mauna Loa Monthly CO₂ Record, 1957 → present
- CO₂ has risen to about 385 ppm (approx 33% rise since Industrial Revolution)

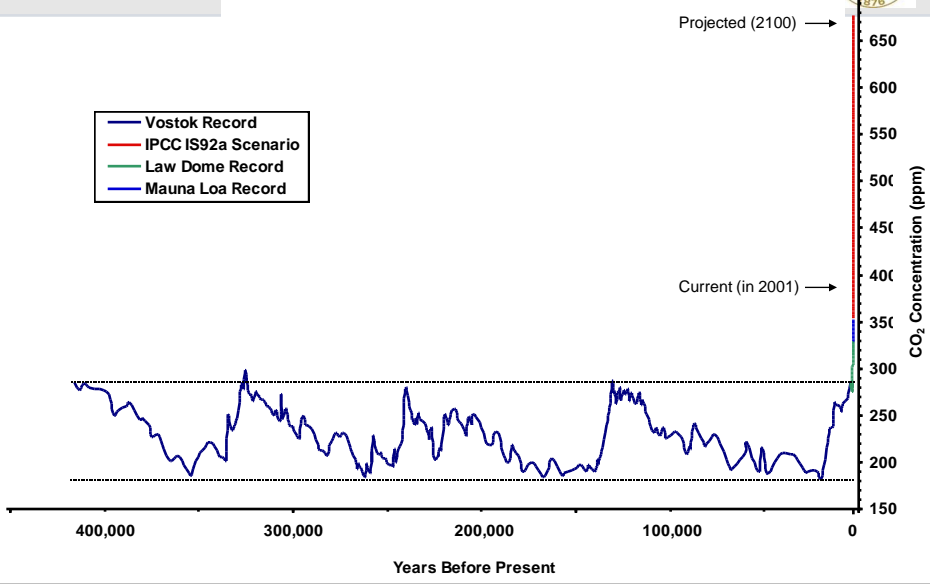


Source: C.D. Keeling and T.P. Whorf

CO₂ Concentration in Ice Cores and Atmospheric CO₂ Projection for Next 100 Years

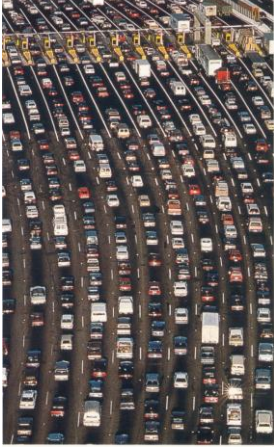


- Vostok Record
- IPCC IS92a Scenario
- Law Dome Record
- Mauna Loa Record



Source: C. D. Keeling and T. P. Whorf; Etheridge *et al.*; Barnola *et al.*; (PAGES / IGBP); IPCC

7) How much are we contributing to it?
Carbon-Based Industry and Society



The Anthropocene Era
~ Crutzen

The 'Hydrocarbon Man'
~ Apenzeller

The 'Greenhouse Century'
~ Schneider

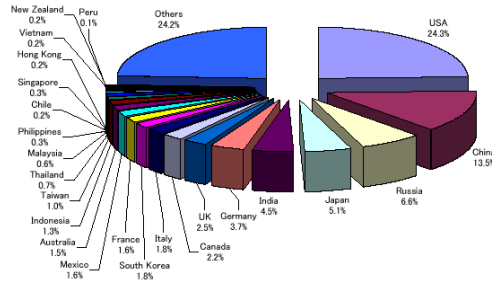
Energy, Population,
Consumption and
Inequality



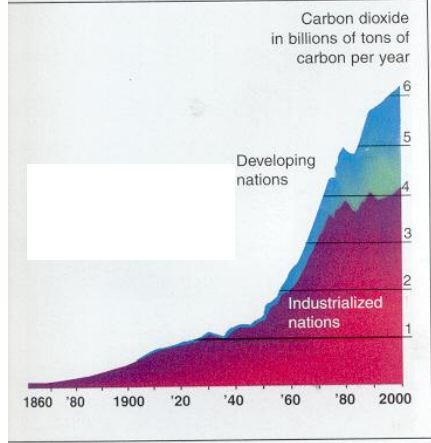
Ways to view anthro contributions



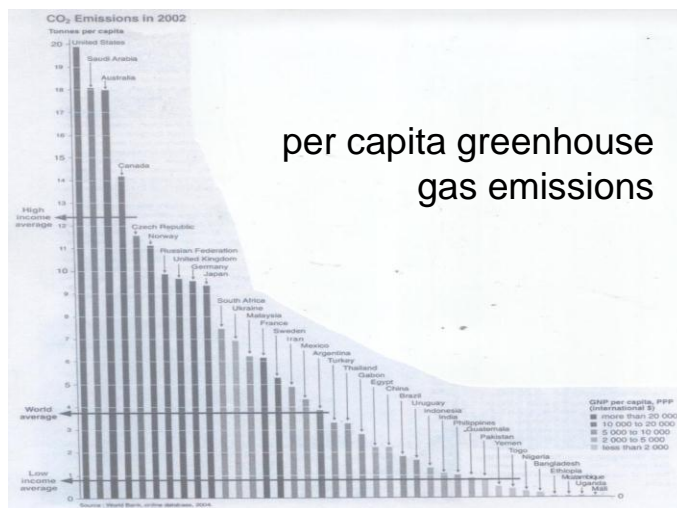
By Country/Nation



Global North/Global South



Ways to view anthro contributions



8) What is being done about it



Mitigation ~ human intervention to reduce the sources of GHGs

Adaptation ~ the alteration of an organism or the capacity to make changes to suit conditions different than those normally encountered



Maslin (2002)