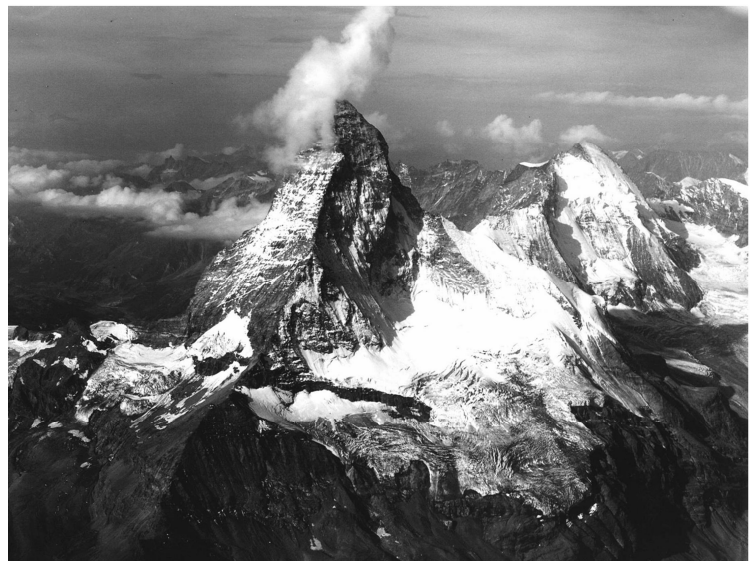
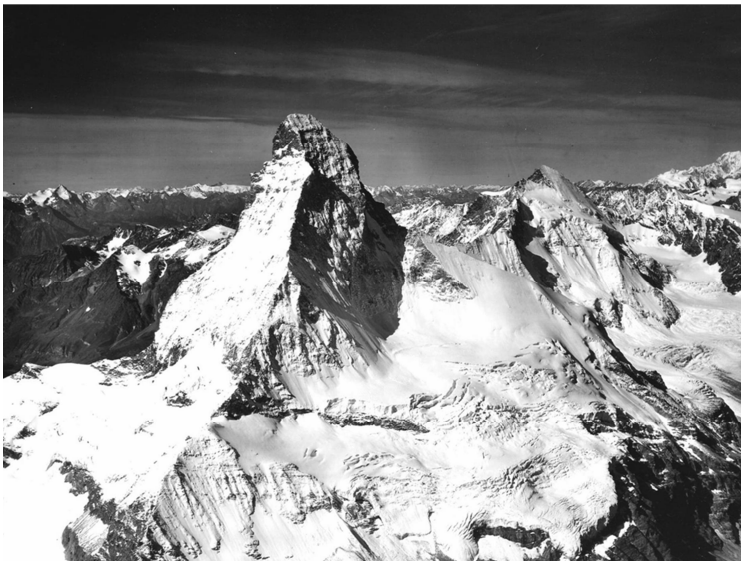
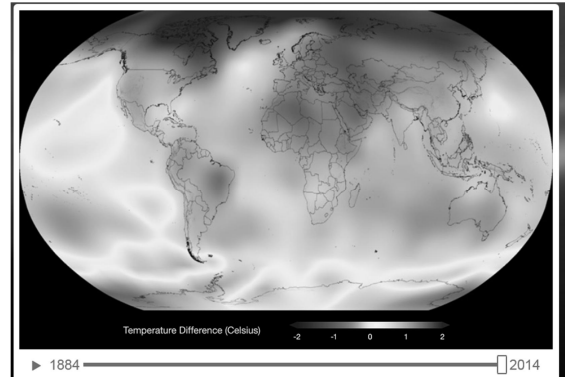


First Day Notes

- n Course ID & Attendance
- n www.schoology.com code: NFFFG-NH5GF
- n Order Reader
- n Schedule, RQ, Quizzes

Global Warming: Beliefs & Evidence

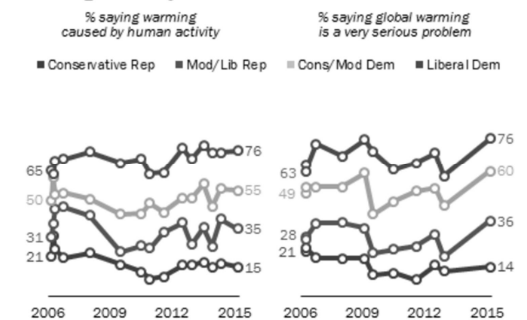


** I. Lecture Outline **

- I. Beliefs about Global Warming
- II. Historical Context
 - Humanity as event
 - Industrial revolution (*fossil fuel revolution*)
- III. Evidence & Consequences
- IV. Sensemaking:
 1. Factors shaping understanding
 2. Psychology, Politics, Ideology, Industrial History

GW Belief and Ideology

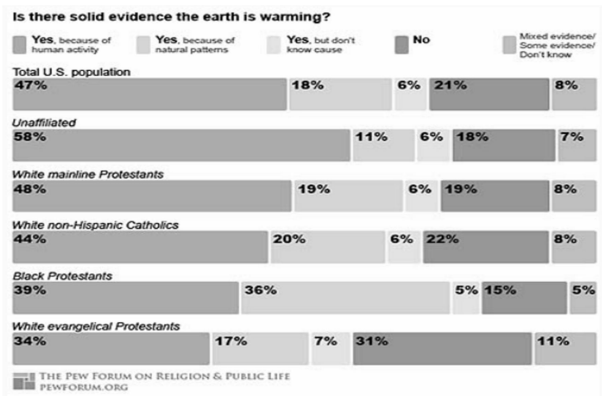
Growing Share of Most Ideological Groups Say Global Warming Is a Very Serious Problem



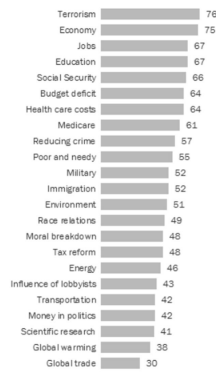
Survey conducted May 5-June 7, 2015.

PEW RESEARCH CENTER

Religion & GW Belief (2009)



Public's Policy Priorities for 2015
% rating each a top priority for Obama and Congress ...



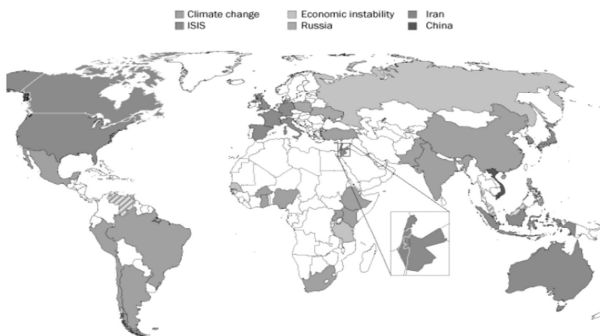
Survey conducted Jan. 7-11, 2015.
PEW RESEARCH CENTER

Pew Jan 2007

ISIS Bigger concern in "West" (2015)

Greatest Threats around the World

Top concern



Note: In Malaysia and Venezuela, both climate change and economic instability are top concerns.

Scientists vs. Others

Public Agrees Earth Is Warming, But Differs with Scientists over the Cause

| View on climate change | Public % | Scientists % |
|------------------------------------|----------|--------------|
| Warming is due to human activity | 49 | 84 |
| Warming is due to natural changes | 36 | 10 |
| No solid evidence earth is warming | 11 | 4 |
| Global warming is ... | | |
| Very serious problem | 47 | 70 |
| Somewhat serious | 26 | 22 |
| Not too serious | 11 | 4 |
| Not a problem | 13 | 2 |

Figures read down.

More Scientific Consensus over Evolution and Climate Change than Public Thinks

| | |
|--|----|
| Evolution | |
| % of the public who says scientists generally agree that humans have evolved | 60 |
| % of scientists who say humans have evolved | 97 |
| Climate Change | |
| % of the public who says scientists generally agree that the earth is getting warmer because of human activity | 56 |
| % of scientists who say that the earth is getting warmer because of human activity | 84 |

Political Affiliation of Scientists

Party Affiliation among Scientists

| | Rep % | Dem % | Ind % |
|--------------------------|-------|-------|-------|
| All scientists | 6 | 55 | 32 |
| <i>Employment sector</i> | | | |
| Government | 7 | 52 | 33 |
| Academic | 5 | 60 | 30 |
| Industry | 10 | 47 | 37 |
| Non-profit | 3 | 55 | 32 |
| <i>Field</i> | | | |
| Biological and Medical | 6 | 58 | 31 |
| Chemistry | 9 | 49 | 37 |
| Geosciences | 4 | 62 | 25 |
| Physics and Astronomy | 6 | 53 | 35 |

Figures read across.

Relation to Psychology???

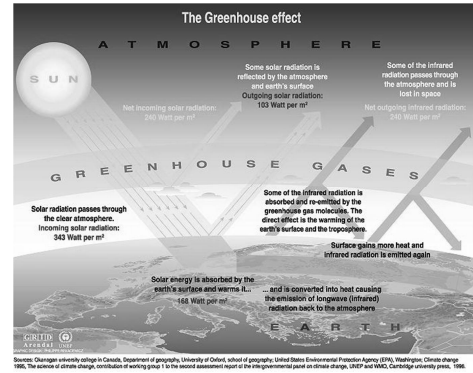
- n Human behavior causes global warming
 1. Desire to drive cars
 2. Desire to live in detached, large, suburban homes
 3. Desire to have children
 4. Desire to eat meat
- n Psychologists can help change behaviors
 1. Identify causes of behaviors (e.g., definition of "success")
 2. Identify how to motivate changes
 3. Identify actions individuals & governments can take

*** I. Historical Context ***

What frame of reference do we need to approach global warming?

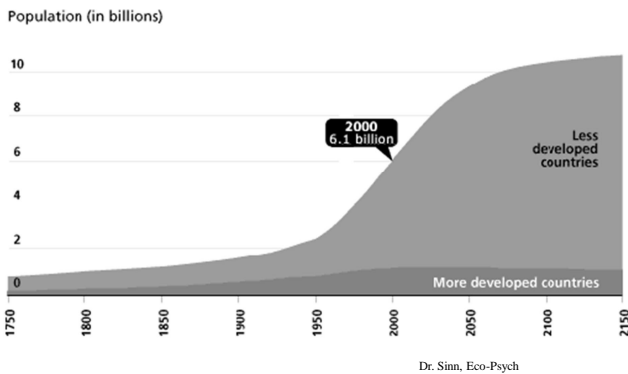
- n Basic earth science
- n Human species as a new phenomenon
- n Consequences of industrialization

1. Stable vs. Cumulative GW



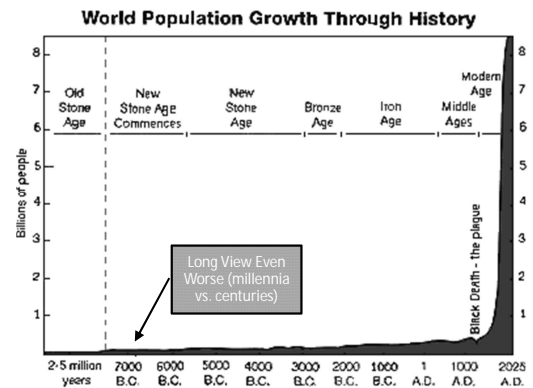
Dr. Sinn, Eco-Psych

2a. Population Explosion, Short View



Dr. Sinn, Eco-Psych

2b. Population Explosion, Long View

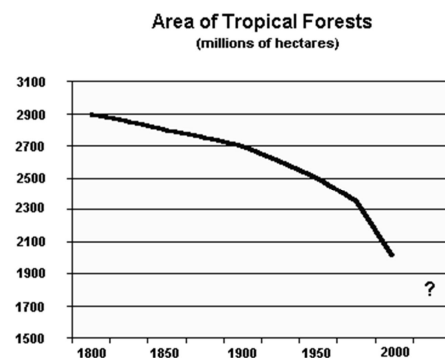


3. Humanity Untested Phenomenon

Imagine 6 Day "Week" of Evolution of Life

1. Start Monday morning at 12:00 midnight
2. End Saturday night at 12:00 midnight
3. When do modern humans arise?
4. When does recorded human history begin?

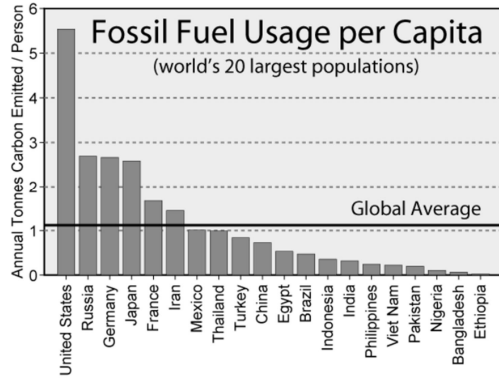
4. Humans = Drastic Change



n Total % of All Forests Lost?

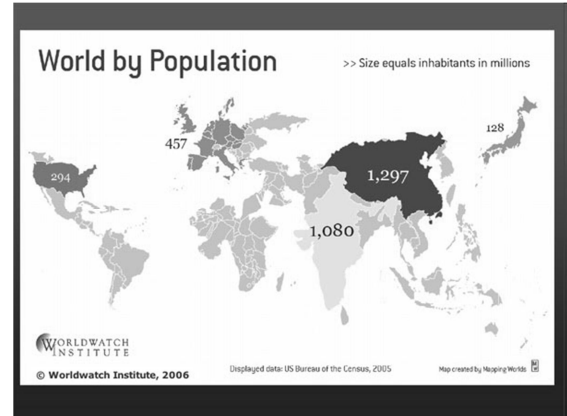
Dr. Sinn, Eco-Psych

5a. US FF use bad now...



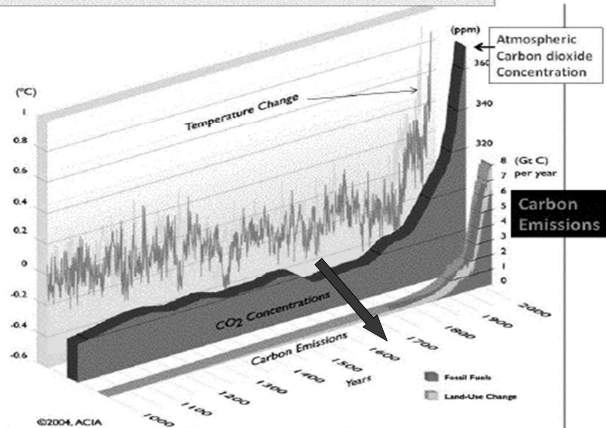
http://www.globalwarmingart.com/wiki/File:Fossil_Fuel_Usage.png

5b. ... others will make worse (India & China)



6. Industrial Explosion Begins

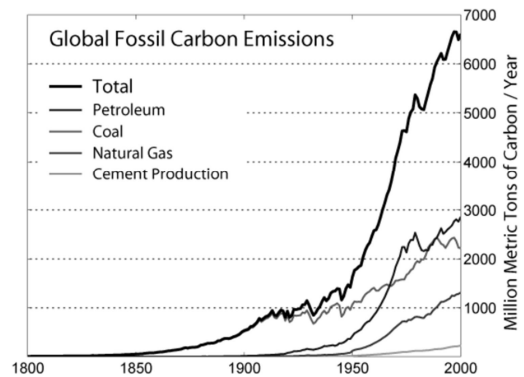
1000 years of Global Climate to Year 2000



Global Oil use per day now?

7. FF use still increasing

File:Global Carbon Emission by Type.png



Marland, G., T.A. Boden, and R.J. Andres (2003). "Global, Regional, and National CO₂ Emissions" in *Trends: A Compendium of Data on Global Change*. Oak Ridge, Tenn., U.S.A.: Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy.

8a. Green House Gas Explosion

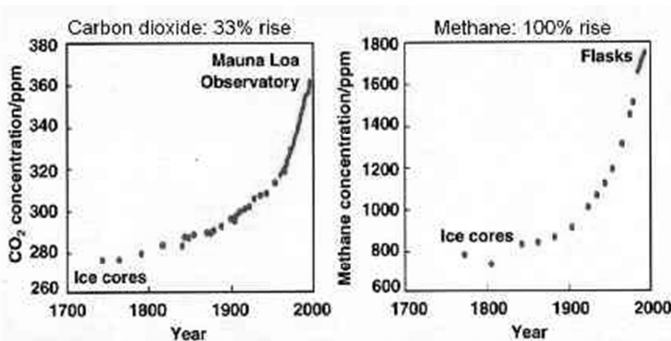
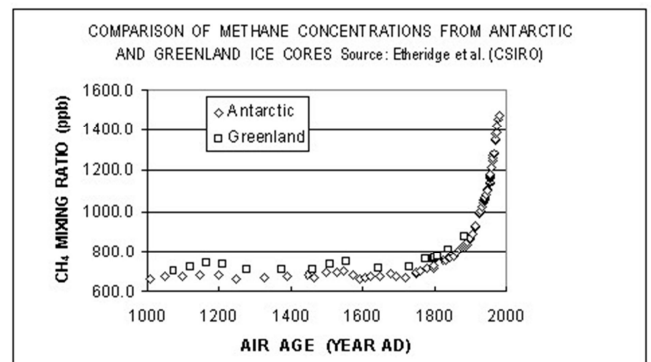
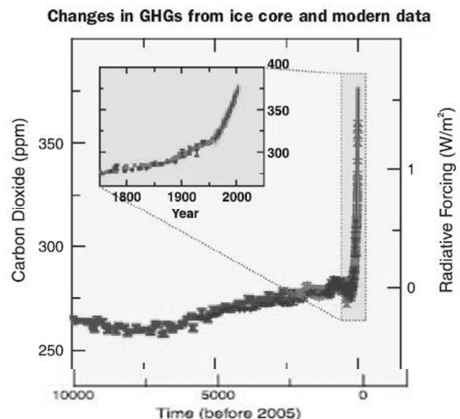


Figure 4. Atmospheric concentrations of carbon dioxide and methane since 1750 (from IPCC 2001, SPM)

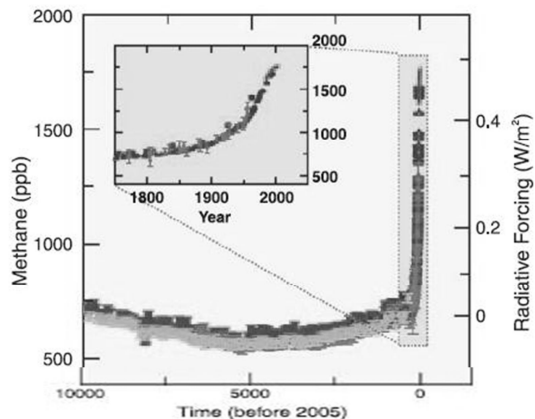
8b. Different locations, same story



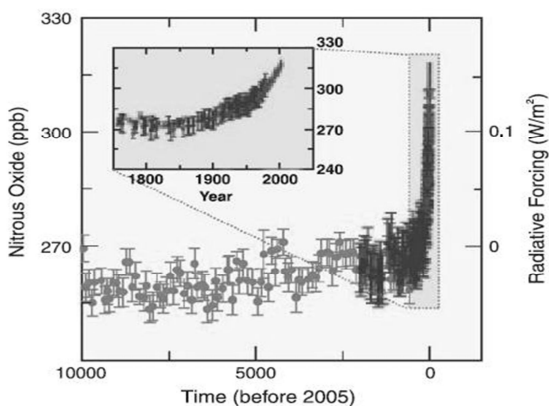
8c. Carbon Dioxide Spiking



8d. Methane Spiking



8e. GHG – Nitrous Oxide Spiking



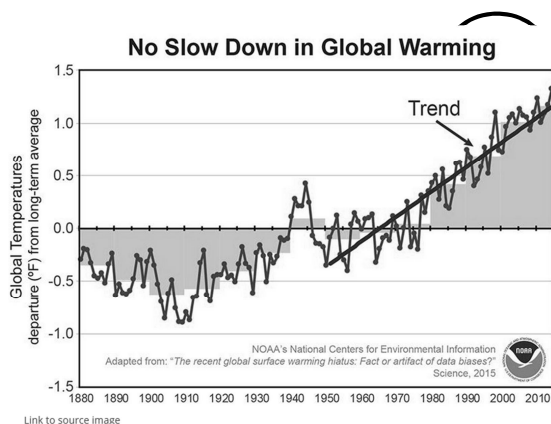
Historical Context Summary

1. Population Explosion: historical, impending
2. Humanity new phenomenon on planet
 - n Global deforestation
 - n Green house gases
 - n Ongoing Experiment
3. Industrial explosion
4. Greenhouse gas explosion

III. Evidence & Consequences

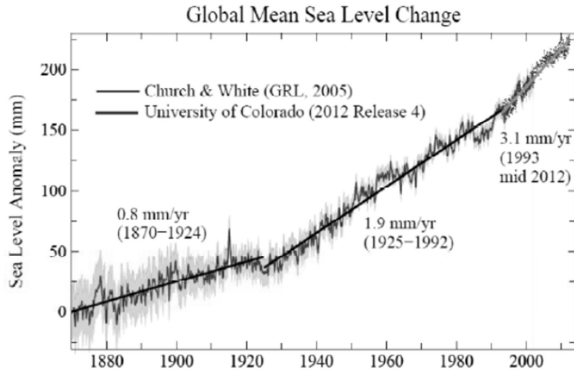
- n What types of evidence do we see?
- n Does the evidence fit together?
- n How dramatic is the evidence of change?
- n Possible consequences?

1. Clear GW Trend

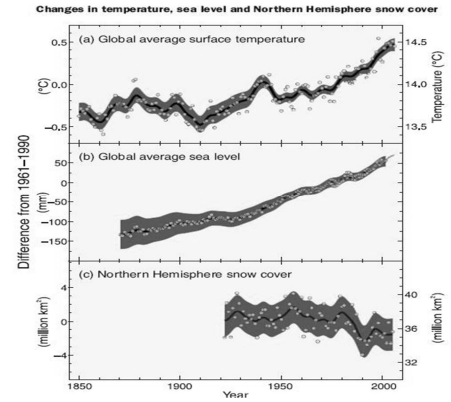


[Link to source image](#)

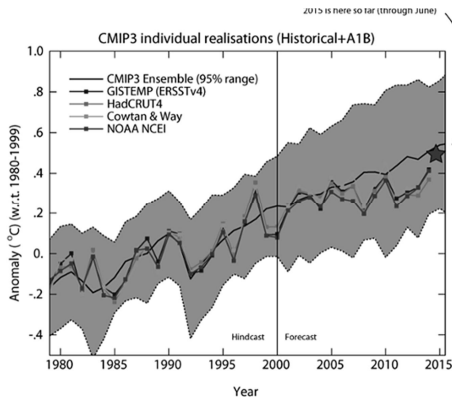
2. Sea Level Rising



3. Evidence converges



4. Models Accurate

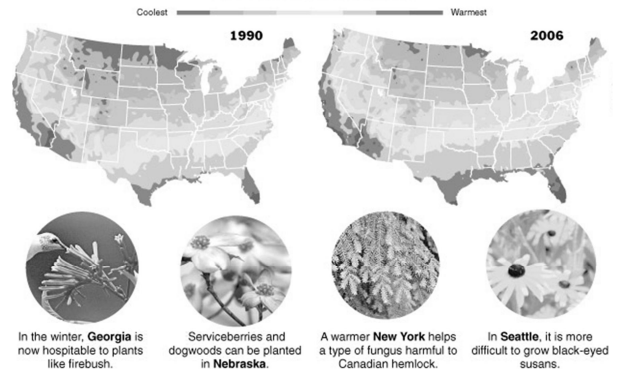


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<http://www.theguardian.com/environment/climate-consensus-97-per-cent/2015/aug/10/2015-global-temperatures-right-in-line-with-climate-model-predictions>

5a. Vegetation shifting north

The zones in the maps correspond to low temperatures. As warmer zones cover more of the United States, different types of plants will grow in many areas.

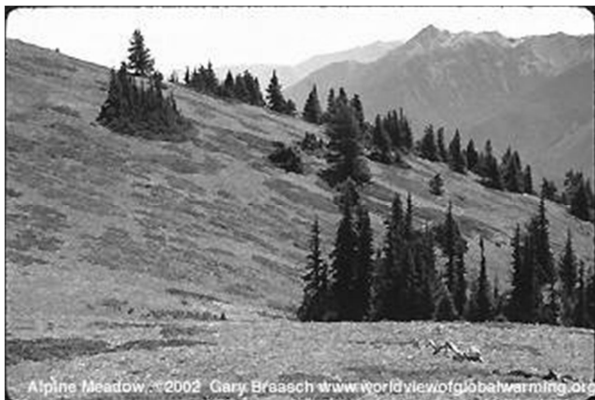


1990 zones are by the United States Department of Agriculture. 2006 zones are by the National Arbor Day Foundation.

Sources: National Arbor Day Foundation; National Wildlife Federation

The New York Times

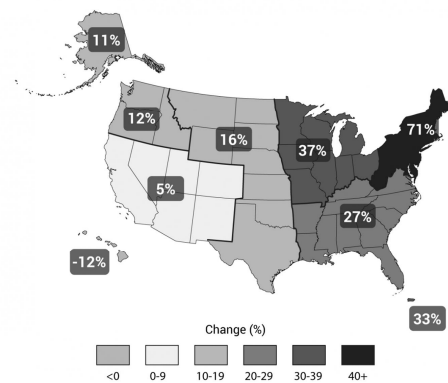
5b. Vegetation shifting higher



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6a. Weather events more extreme

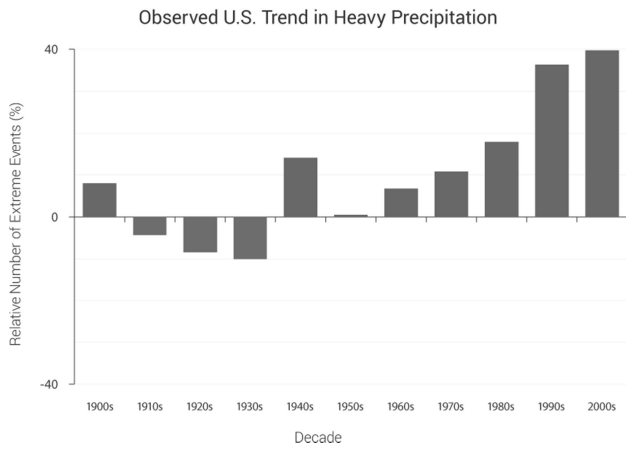
Observed Change in Very Heavy Precipitation



<http://nca2014.globalchange.gov/report/our-changing-climate/heavy-downpours-increasing#intro-section-2>

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6b. More Heavy Precipitation Events



7a. Glaciers retreating



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Alaska, Muir Glacier 1941-2004

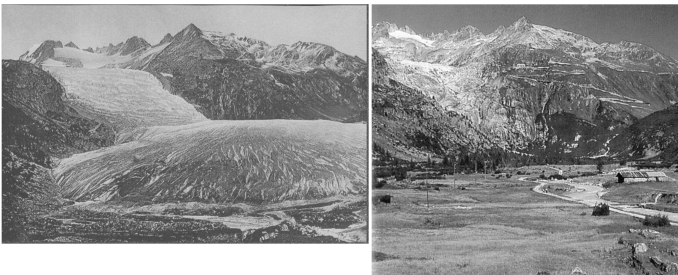


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Alps



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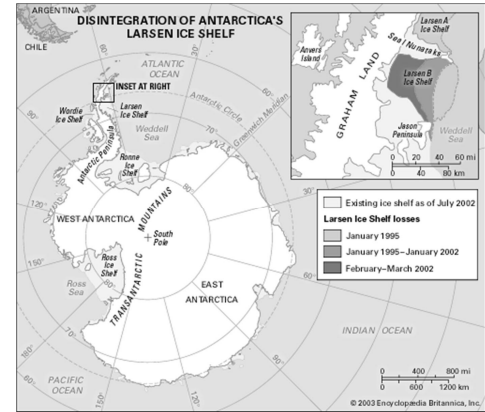
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Ice on Mount Hood (1984-2002)



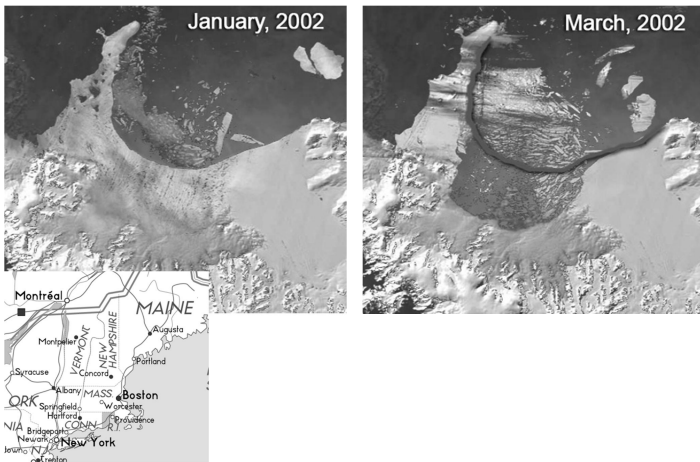
Dr. Sinn, Eco-Psych

8a. Antarctic Ice Shelves Melting



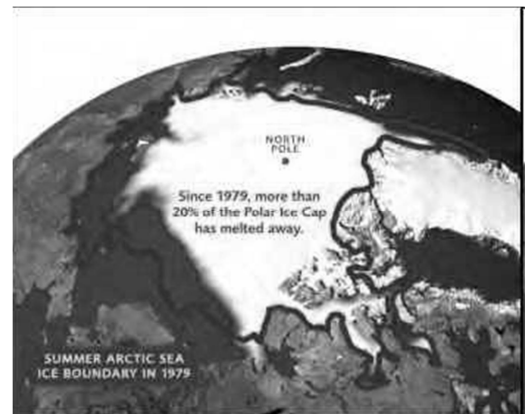
Dr. Sinn, Eco-Psych

8b. Larsen B Ice Shelf

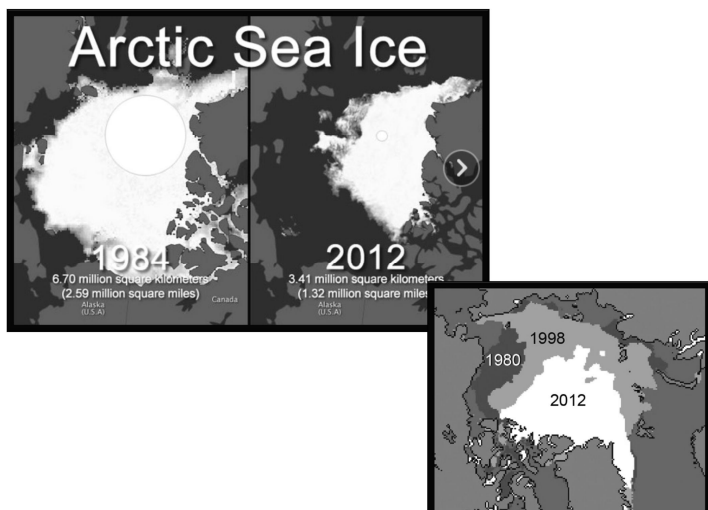


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8c. Arctic Pole Melting

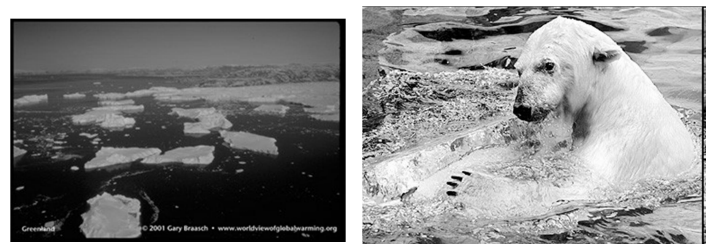


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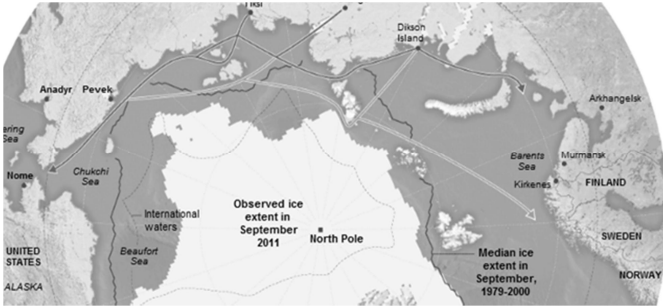
Dr. Sinn, Eco-Psych

8d. Polar Bears Drowning



Dr. Sinn, Eco-Psych

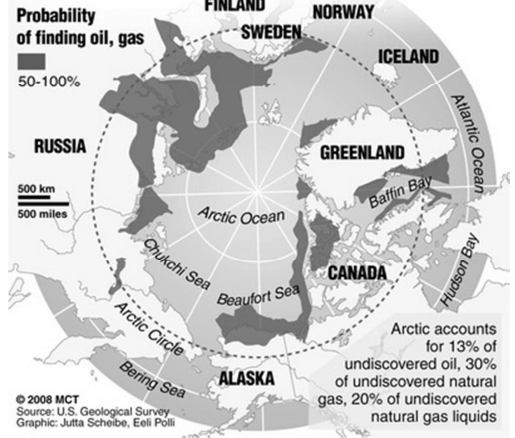
8e. Northwest Passage now Open!!



8f. More oil now available (note irony)

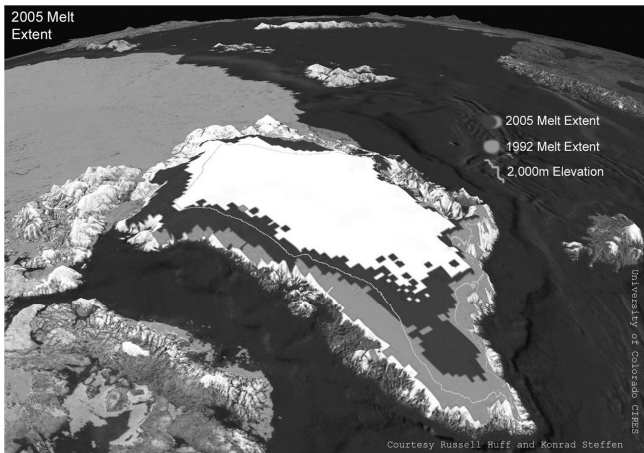
Oil and gas in the Arctic

Area north of the Arctic Circle has an estimated 90 billion barrels of undiscovered oil.

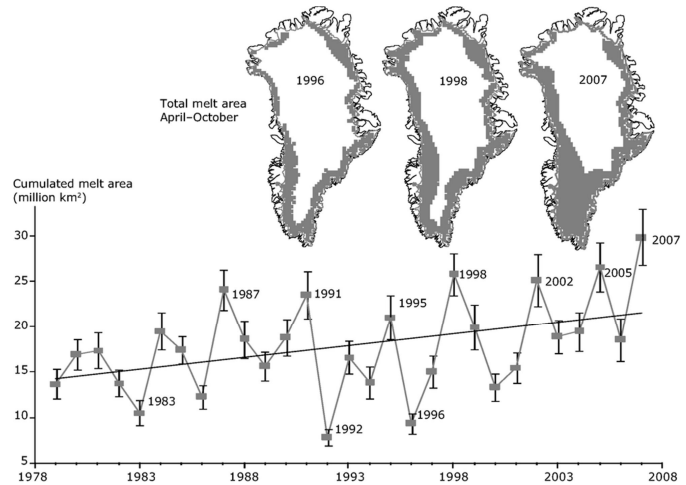


Arctic accounts for 13% of undiscovered oil, 30% of undiscovered natural gas, 20% of undiscovered natural gas liquids

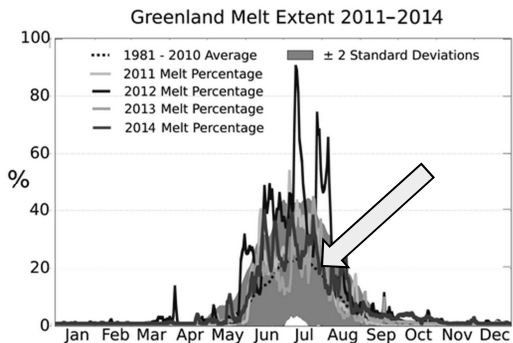
9. Greenland 1992 vs. 2005



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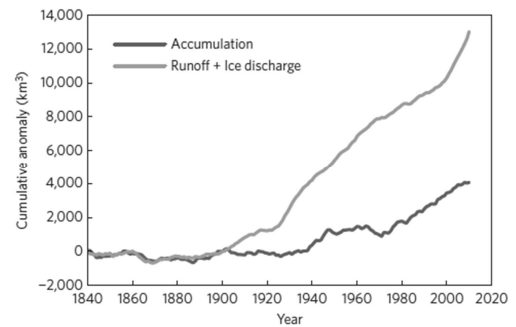
Changes in Amount Melted



SIDC / Thomas Mote, University of Georgia

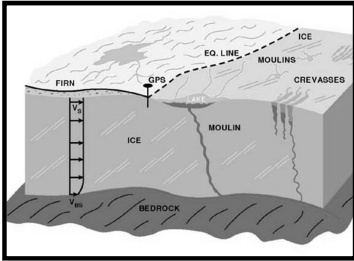
<http://nsidc.org/greenland-today/2015/01/2014-melt-season-in-review/>

Dynamic system, hard to predict



<http://journals.ametsoc.org/doi/abs/10.1175/JCLI-D-12-00546.1>

Ice-Sheet Moulins



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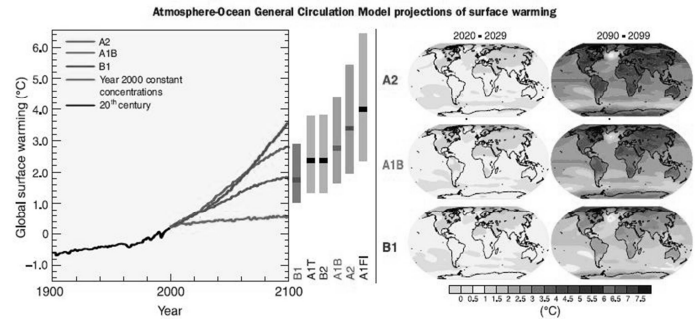
Evidence Summary

1. Rising Temperatures
2. Rising ocean temperatures, and rate rising
3. Evidence converges
4. Models accurately predict temperatures
5. Vegetation shifting: towards poles / higher altitudes
6. Weather events more extreme (precipitation)
7. Glaciers retreating
8. Antarctic & Arctic melting
9. Greenland melting

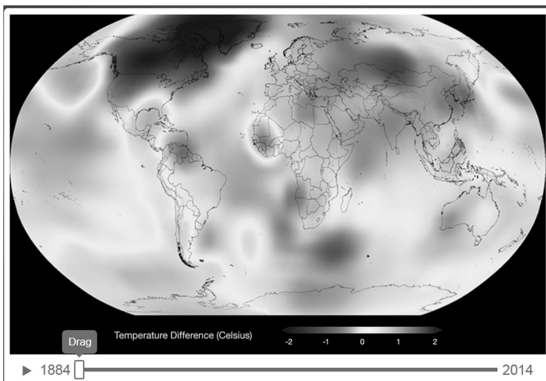
The Future

- n What's likely to happen?
- n What are the consequences?

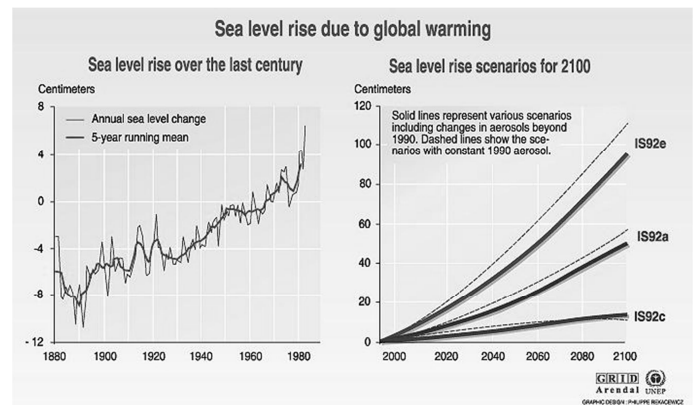
All predictions include warming



Global Temperature Time Machine



Sea Level Rises



Source: Climate change 1995, The science of climate change, contribution of working group 1 to the second assessment report of the intergovernmental panel on climate change, UNEP and WMO, Cambridge university press, 1996; Sea level rise over the last century, adapted from Gornitz and Lebedeff, 1987.

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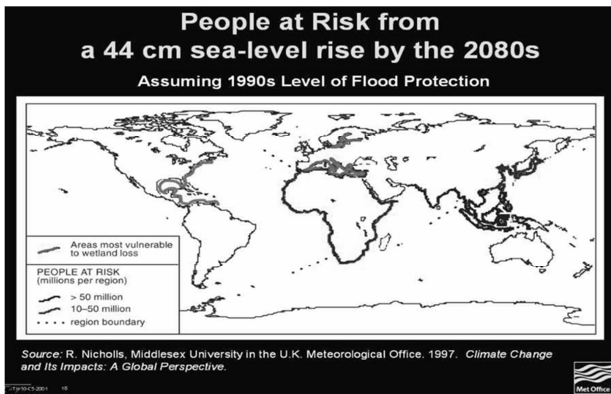


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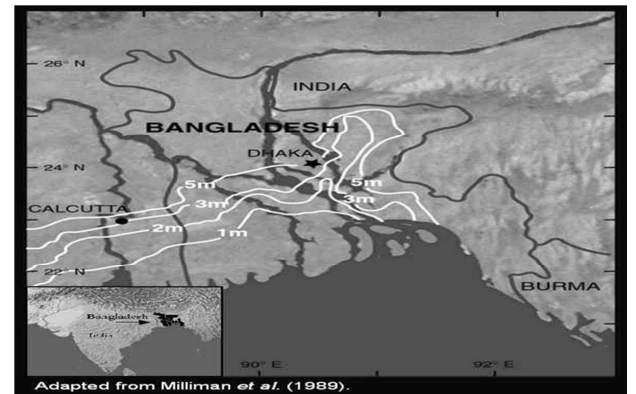


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10-50+ Million at Risk

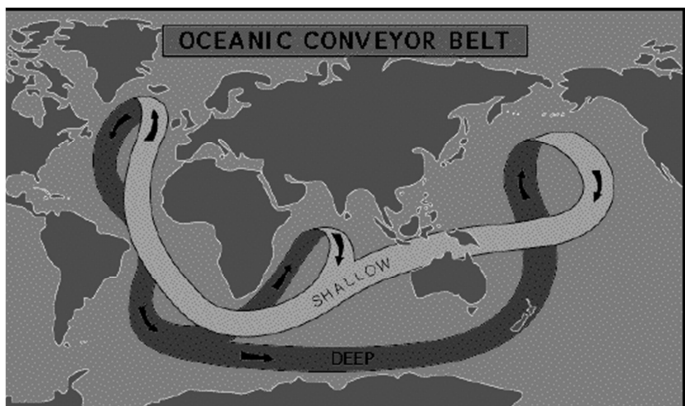


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If Greenland Goes...Bye-Bye Europe



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Other Consequences

1. Water supplies disappear
2. Ecosystems wither – species can't adapt fast enough; mass extinctions
3. Food production decreased – cereals
4. Health – increased diseases possible
5. Coastal – increased damage from floods and storms; wetlands lost, sea level rise

IV. Sensemaking factors:

1. Cosmological beliefs/orientation:
 - n Evolution, place of humanity
 - n Static vs. dynamic world view (ecology),
 - n Political orientation
2. Motivation:
 - n Who stands to gain, lose – psychologically, financially – advocates or skeptics?
 - n Cognitive dissonance
 - n Age and politics of deniers
 - n System justification

Sensemaking cont...

- n Previous industrial pollution phenomena
 1. DDT
 2. Ozone depletion
 3. leaded gasoline
 4. cigarette smoking
- n Scientific/statistical conservative bias
 1. Fear of type I error (false positives)
 2. Scientists not trained to persuade/advocate

Sensemaking cont...

- n Methodological
 1. Convergence of scientific data
 2. Journalistic bias: political vs. science reporting
 3. Oil co. behavior: funding, Arctic leasing rights
- n Pragmatic issues:
 1. Relative consequence of error: Prevention Principle (1% doctrine)
 2. Delayed impact; Catastrophic tipping points
 3. Gambling with unknown variables