



climate change

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for Creative Responses to Climate Change workshop
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Our Planet

Name: Earth

Description: a slightly oblate sphere


Height: surface area ~ $5.1 \times 10^{14} \text{ m}^2$

- *highest point*: Mount Everest
- *lowest point*: Marianas Trench


Weight: 5.98×10^{27} grams

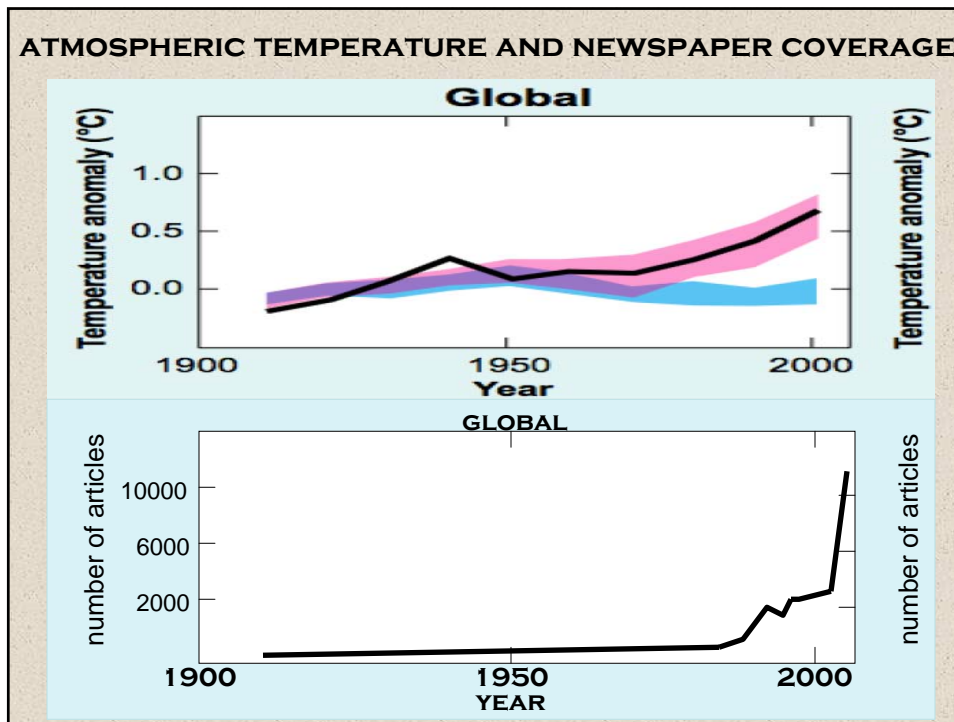
Age: 4.6 billion years

Interests: supporting life; rotating and revolving



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An Essential 'Top Ten'

- 1) What is climate change and global warming?
- 2) Is it happening?
- 3) How is it happening?
- 4) How much is happening?
- 5) How do we know what we know?
- 6) What is going to happen?
- 7) Do human activities matter?
- 8) How much/in what ways human activities matter?
- 9) What are some impacts from climate change?
- 10) What is being done about it?

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key questions

- what is climate change and global warming?
- how much is the climate changing?
- do human activities matter?
- how much are 'we' contributing to it?
- what are some impacts?

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What is climate change and global warming?

changes in the climate

- to regain energy balance
- a focus on increases in greenhouse gases in the atmosphere

- e.g. change in temperature
- global warming



Maslin (2002)

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Is it happening?

planetary energy budget

- balance of incoming (short-wave) and outgoing (long-wave) radiation

radiative forcing

- alterations in planetary energy budget
- external and internal forcing

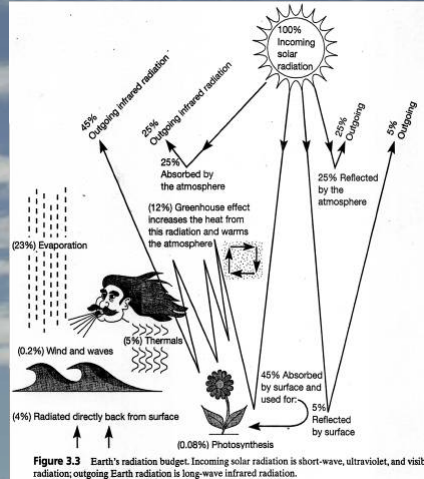


Figure 3.3 Earth's radiation budget. Incoming solar radiation is short-wave, ultraviolet, and visible radiation; outgoing Earth radiation is long-wave infrared radiation.

Mackenzie (1998)

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greenhouse gases (GHGs)

- 'like the glass of a greenhouse'
- 'like a thickening blanket'



from Rock (2003)

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How much? some indications

Temperatures globally
have risen **0.6°C** in
the last century

Temperatures are
expected to increase
1.8 to 4.0°C by 2100



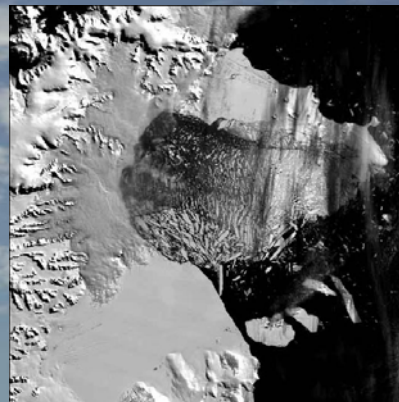
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another indication: sea level rise

The global average
sea level has risen

- past rise: 4 to 8 inches in the past 100 years
- future rise: 7 to 23 inches by 2100



NASA (2002)

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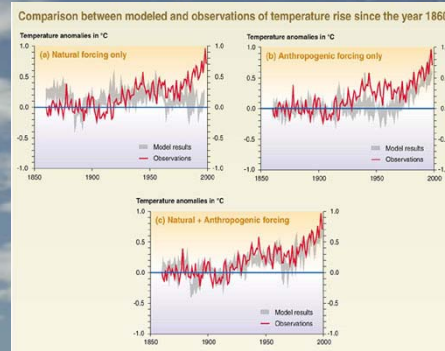
Do human activities matter?

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



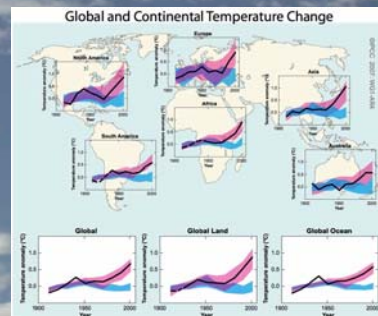
IPCC (2001)

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anthropogenic climate science

- 2007 IPCC AR4 WGI
"Most of the observed increase in globally averaged temperatures since the mid-20th century is **very likely due to the observed increase in anthropogenic greenhouse gas concentrations**"
- 2004 Oreskes study in Science
- 2000 Crowley study in Science
- IPCC 2001 TAR
- IPCC 1995 SAR
- The Keeling Curve (1957 →)



IPCC WGI 2007 fig SPM.4

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



Revkin (1992)

The Anthropocene Era
~ Crutzen

The 'Hydrocarbon Man'
~ Apenzeller

The 'Greenhouse Century'
~ Schneider



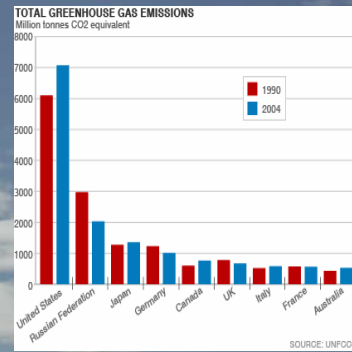
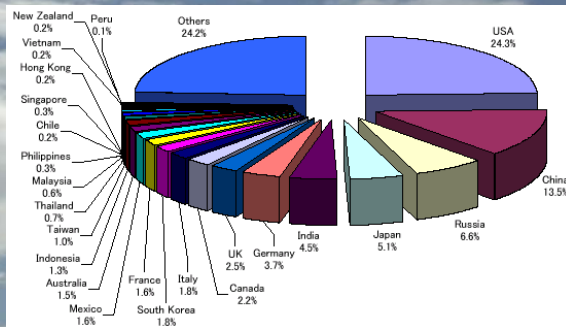
Revkin (1992)

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ways to view human contributions

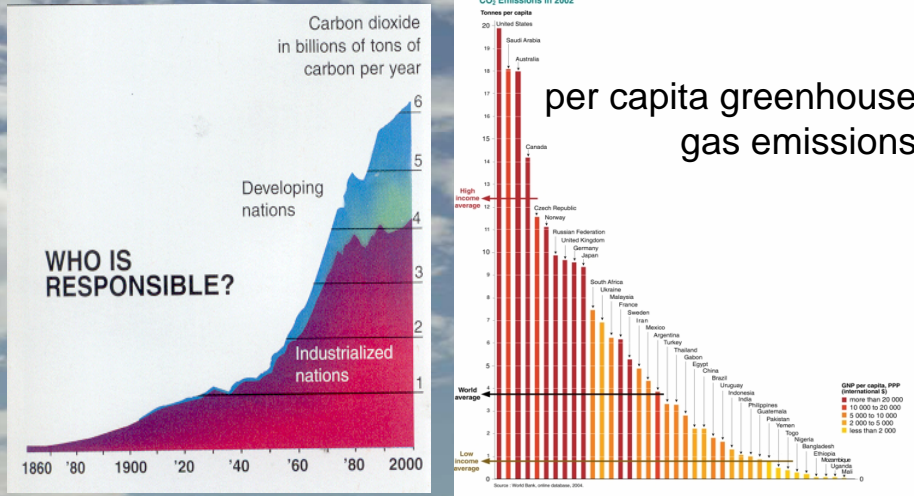
By Country/Nation



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ways to view human contributions

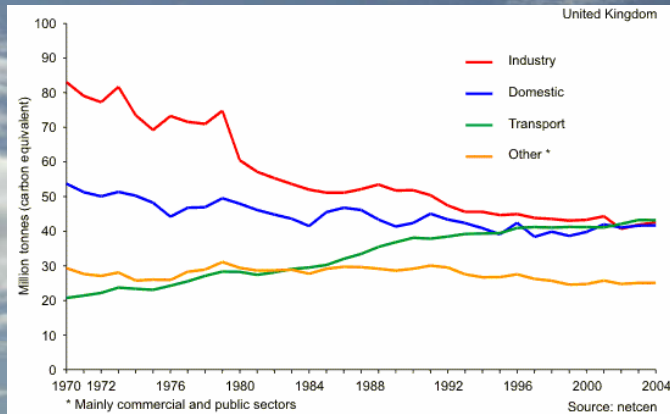


UNEP Vital Climate Change Graphics (2005)

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UK CO₂ emissions, 1970-2004



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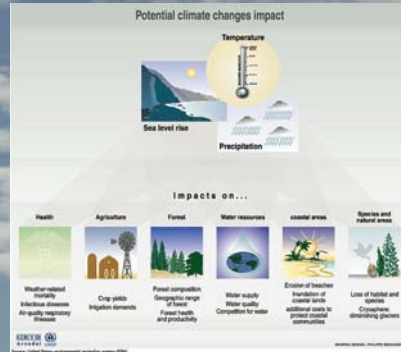
What are some climate change impacts?

Increase in intense rainfall events in some regions

Increased incidences of drought in other regions

Animals and plants/ocean life displaced due to temperature increases

Snow cover and ice extent have decreased



UNEP Vital Climate Change Graphics (2005)

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some climate change impacts in the Southeast UK (source: UKCIP)

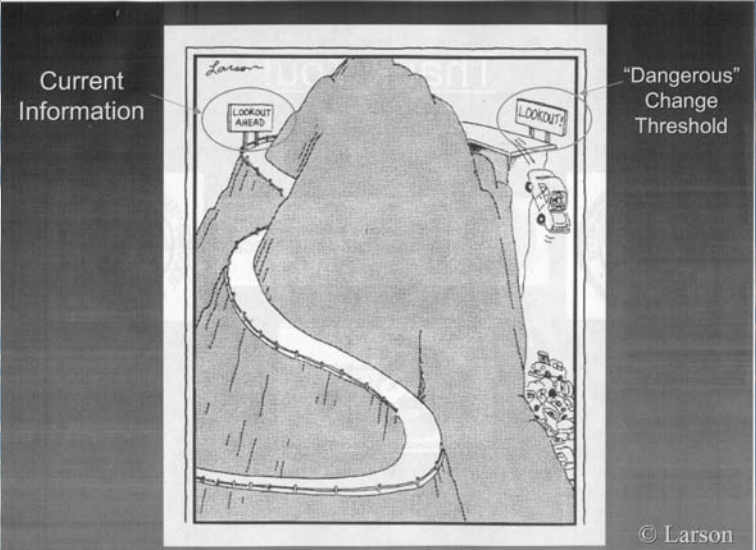
- river flooding will increase during the winter months
- sea level rise increases risk of saline intrusion
- increase in fungal diseases in forests
- local extinctions of species that migrate from region



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abrupt vs. gradual change



Current Information

"Dangerous" Change Threshold

© Larson

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further questions...

- what is my view of human-environment interactions? (e.g. anthropocentrism v. biocentrism; harmony v. struggle)
- how do different views clash/play out in the world? (materially, discursively...)
- what have future generations done for me lately? what have I done for future generations lately? (inter-generational equity questions)
- is the grass greener on the 'other'? Is the air more polluted in the 'other'? (intra-generational equity questions)
- is this a crisis? an opportunity? a constraint? a call to adventure?

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