Overview of Climate Science and Insurer Initiatives on Climate Change

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U.S. Global Change Research Program Milestone Study (2009)

Synthesizes a decade of prior US government research (21 studies)
9 regions; 7 sectors
31 authors
569 citations
700 pages of review comments

Source: US Global Change Research Program (2009) "Global Climate Change Impacts in the United States."

Key Finding: **Widespread climate-related impacts are occurring now and are expected to increase**

Heavy Downpours
More rain is already coming in very heavy events, and this trend is projected to increase across the nation. Such events are harmful to transportation infrastructure, agriculture, water quality, and human health.
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Heat Waves
Heat waves will become more frequent and intense, increasing threats to human health and quality of life, especially in cities.

Agriculture
Increasing heat, pests, floods, weeds, and water stress will present increasing challenges for crop and livestock production.
ecosystems will be lost.
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.

Coastal Communities
Sea-level rise and storm surge will increase threats to homes and infrastructure including water, sewer, transportation, and communication systems. Many barrier islands and coastal marshes that protect the coastline and support healthy ecosystems will be lost.

Water and Energy
As warming increases competition for water, the energy sector will be strongly affected as power plants require large amounts of water for cooling.
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Energy Supply
Warming will decrease demand for heating energy in winter and increase demand for cooling energy in summer. The latter will result in significant increases in electricity use and peak demand in most regions.

Water Supply
Reduced summer runoff, increased winter runoff, and increasing demands will compound current stresses on water supplies and flood management, especially in the West.
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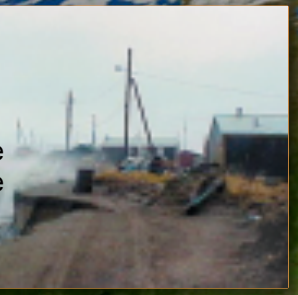
Source: US Global Change Research Program (2009) "Global Climate Change Impacts in the United States."

Key Finding: **Widespread climate-related impacts are occurring now and are expected to increase**

Sea Ice and Permafrost

Risks and costs in Alaska increase as thawing of permafrost damages roads, buildings, and forests, and declining sea ice increases coastal erosion and threatens the existence of some communities.



Forests

Forest growth is generally projected to increase in much of the East, but decrease in much of the West as water becomes even scarcer. Major shifts in species are expected, such as maple-beech-birch forests being replaced by oak-hickory in the Northeast. Insect infestations and wildfires are projected to increase as warming progresses.

Coldwater Fish

Salmon, trout, and other coldwater fish will face additional stresses as water temperatures rise and summer streamflows decline. Ecosystems and the tourism and recreation they support will be adversely affected.

Interacting Stresses

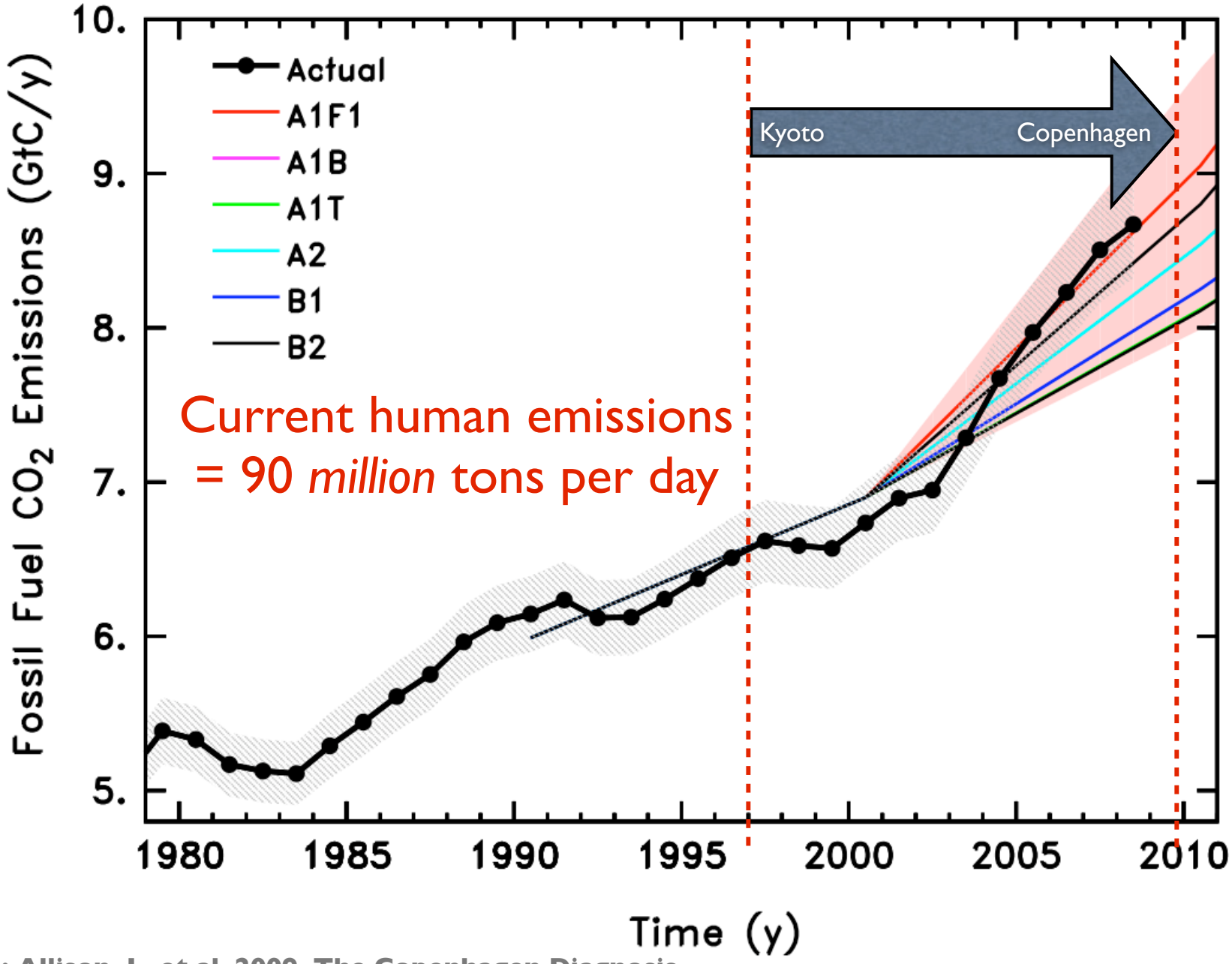
Population shifts and development choices are making more Americans vulnerable to climate change impacts. An aging populace, and continued population shifts to the Southeast, Southwest, and coastal cities amplify risks associated with extreme heat, sea-level rise, storm surge, and increasing water scarcity in some regions.

Coral Reefs

Rising water temperatures and ocean acidification threaten coral reefs and the rich ecosystems they support. These and other climate-related impacts on coastal and marine ecosystems will have major implications for tourism and fisheries.

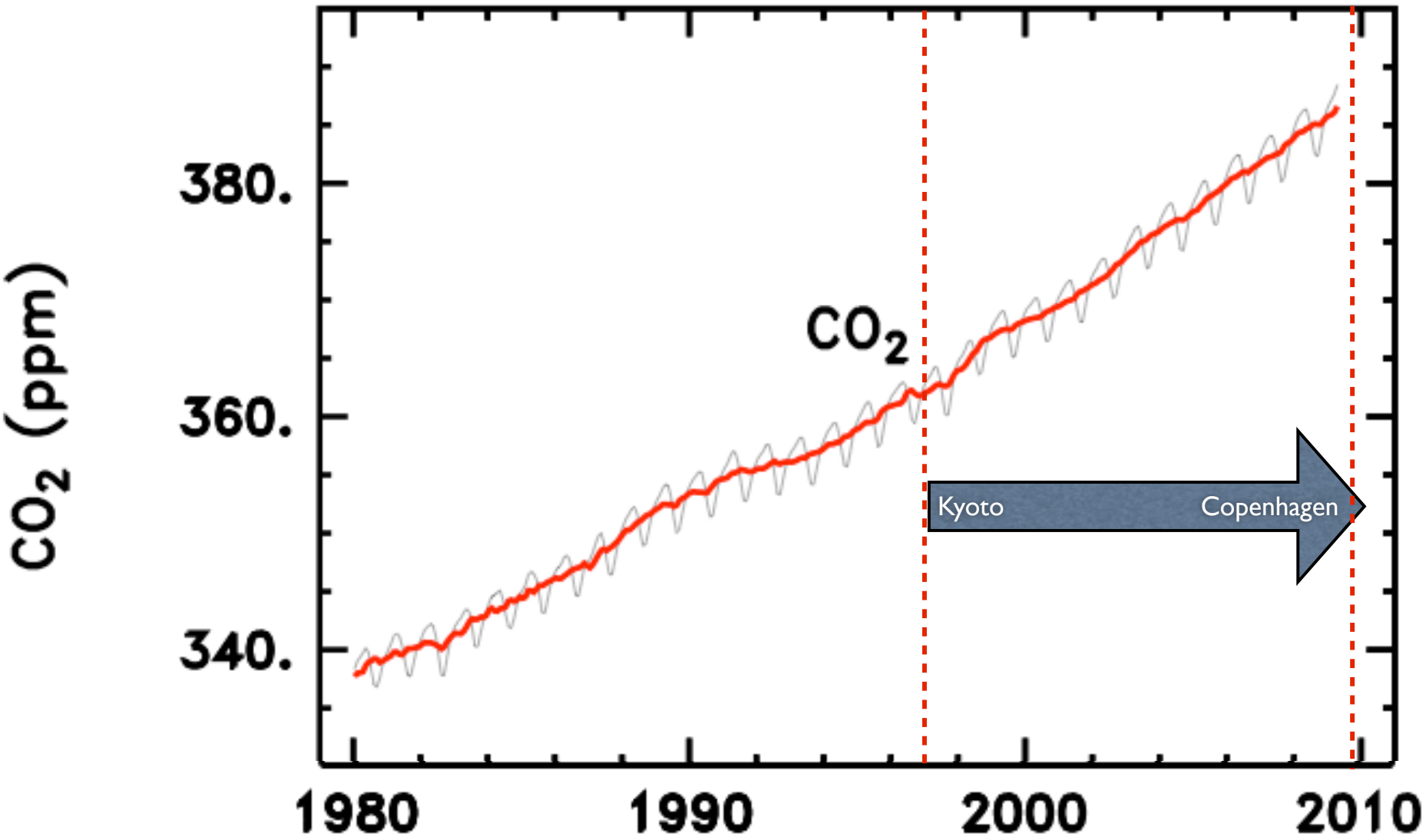
Source: US Global Change Research Program (2009) "Global Climate Change Impacts in the United States."

Fmissions



Source: Allison, I., et al. 2009. The Copenhagen Diagnosis

Greenhouse Gases



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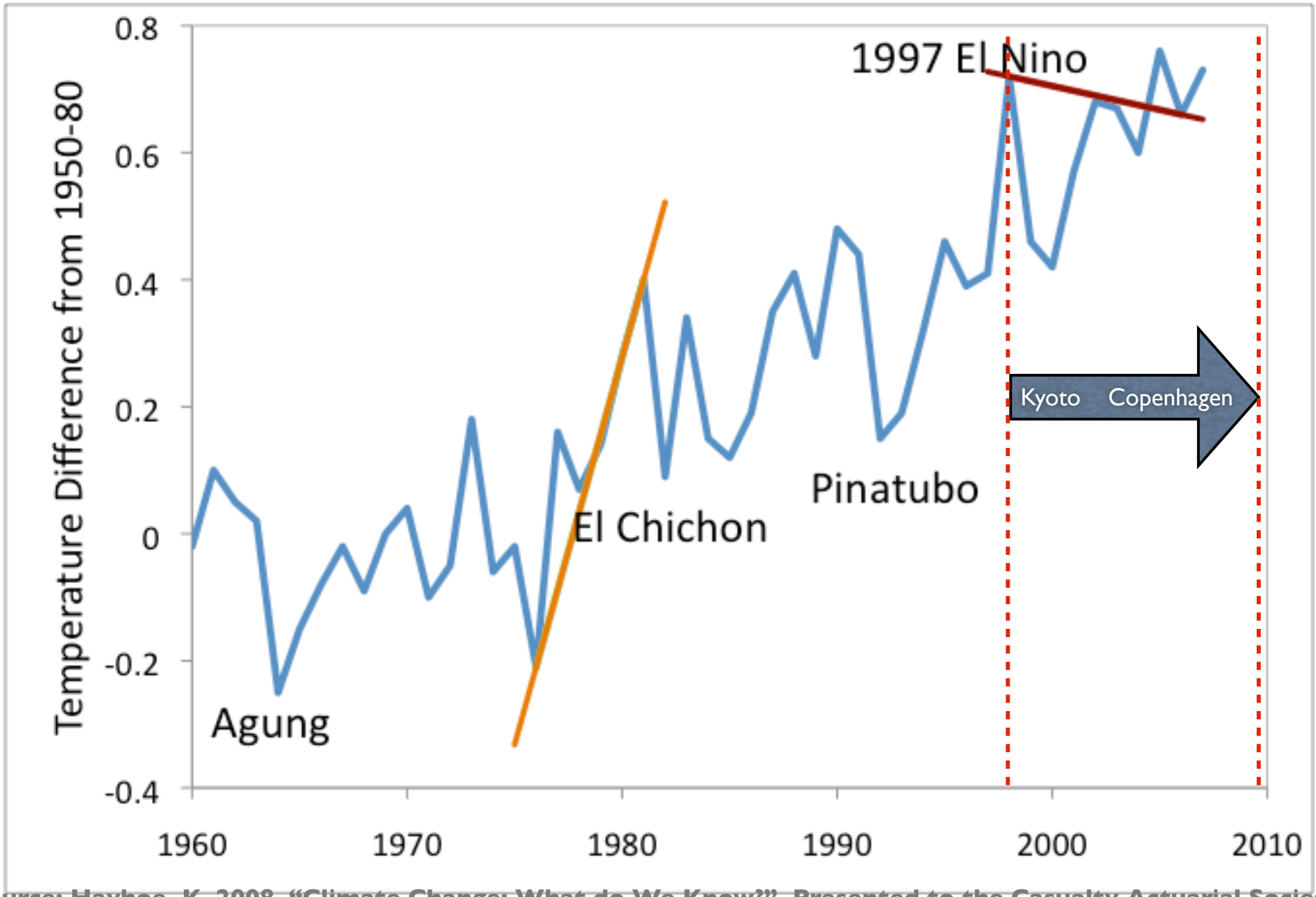
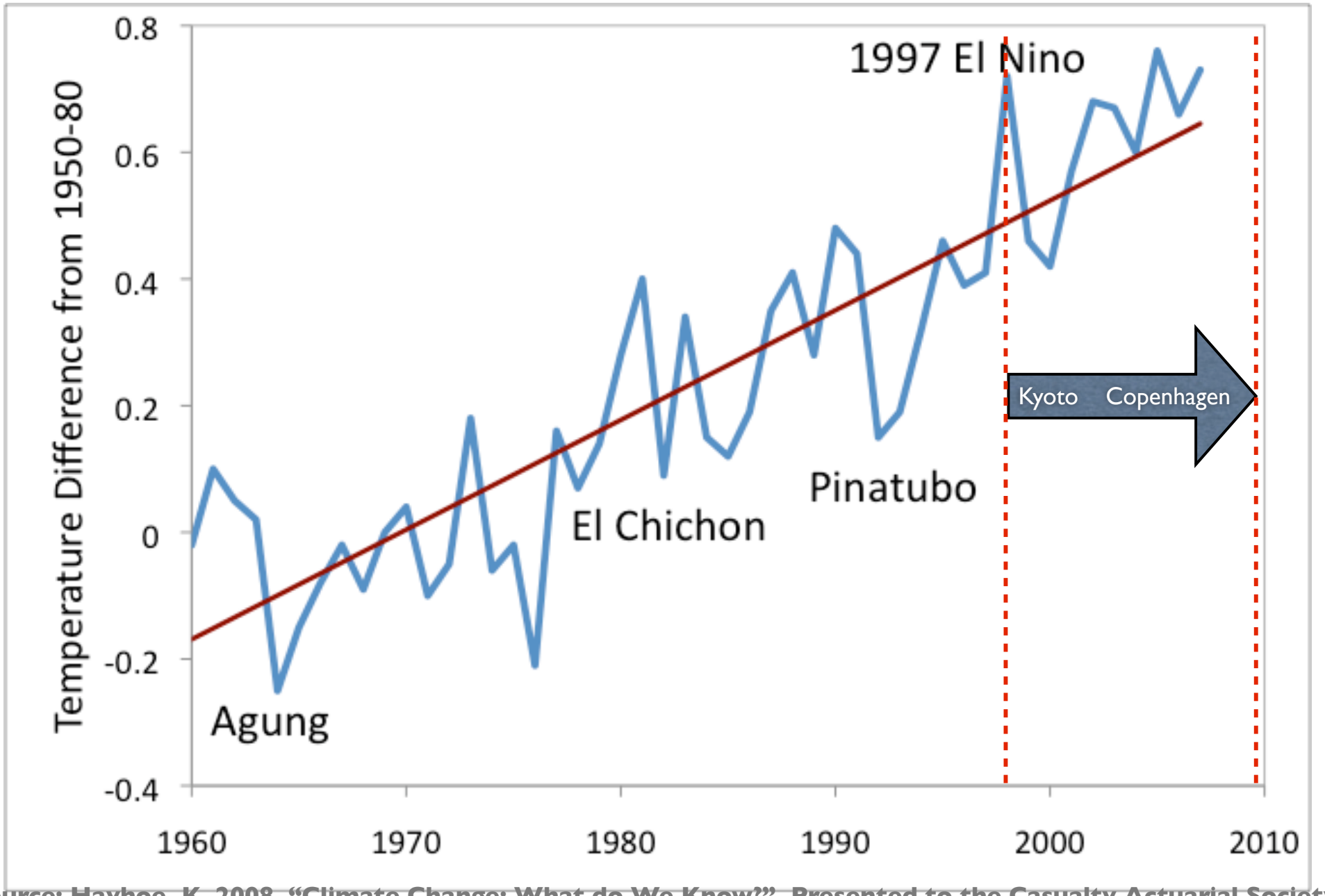
Weather



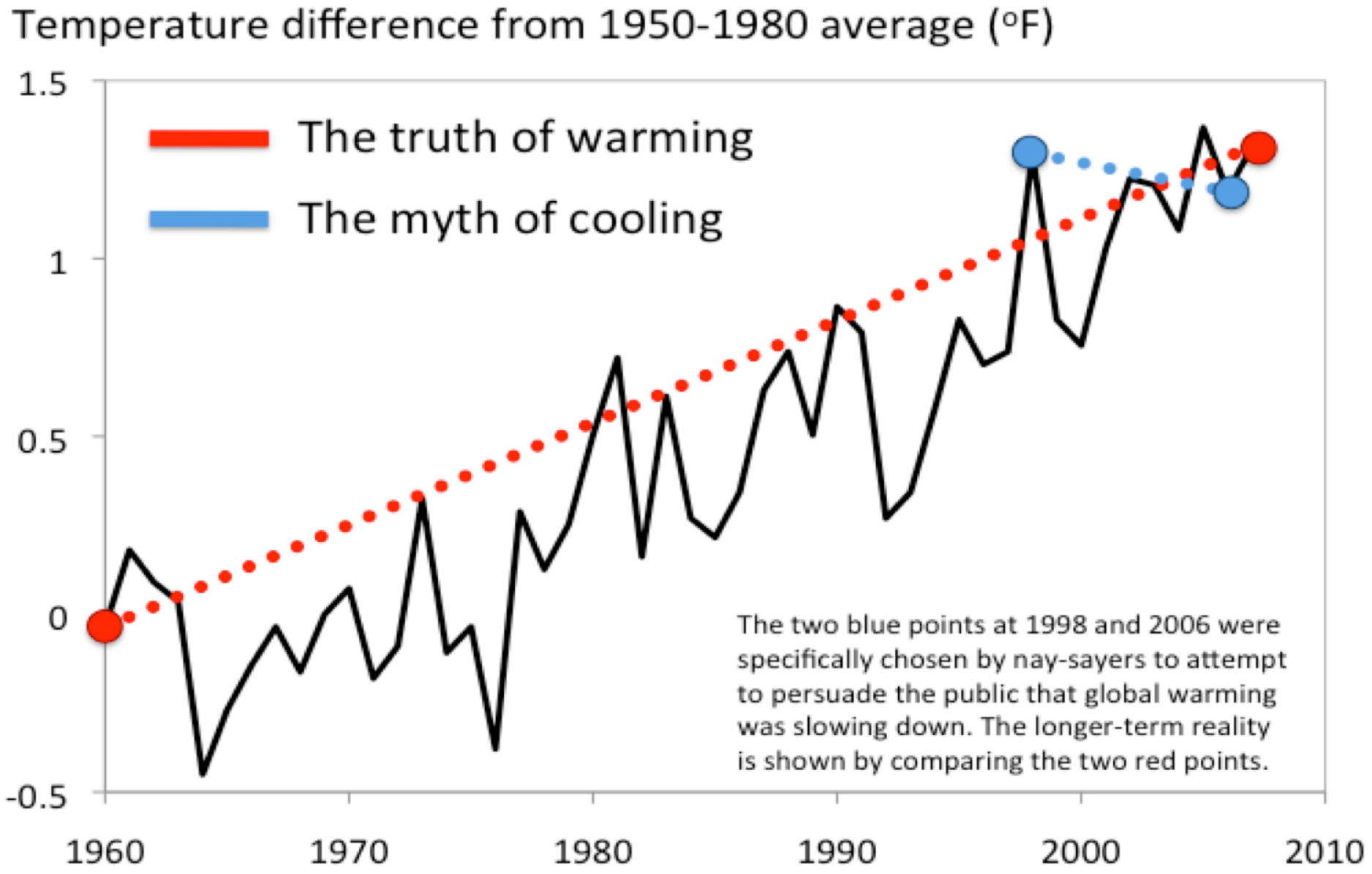
Source: Hayhoe, K. 2008. "Climate Change: What do We Know?" Presented to the Casualty Actuarial Society.

Climate



Source: Hayhoe, K. 2008. "Climate Change: What do We Know?" Presented to the Casualty Actuarial Society.

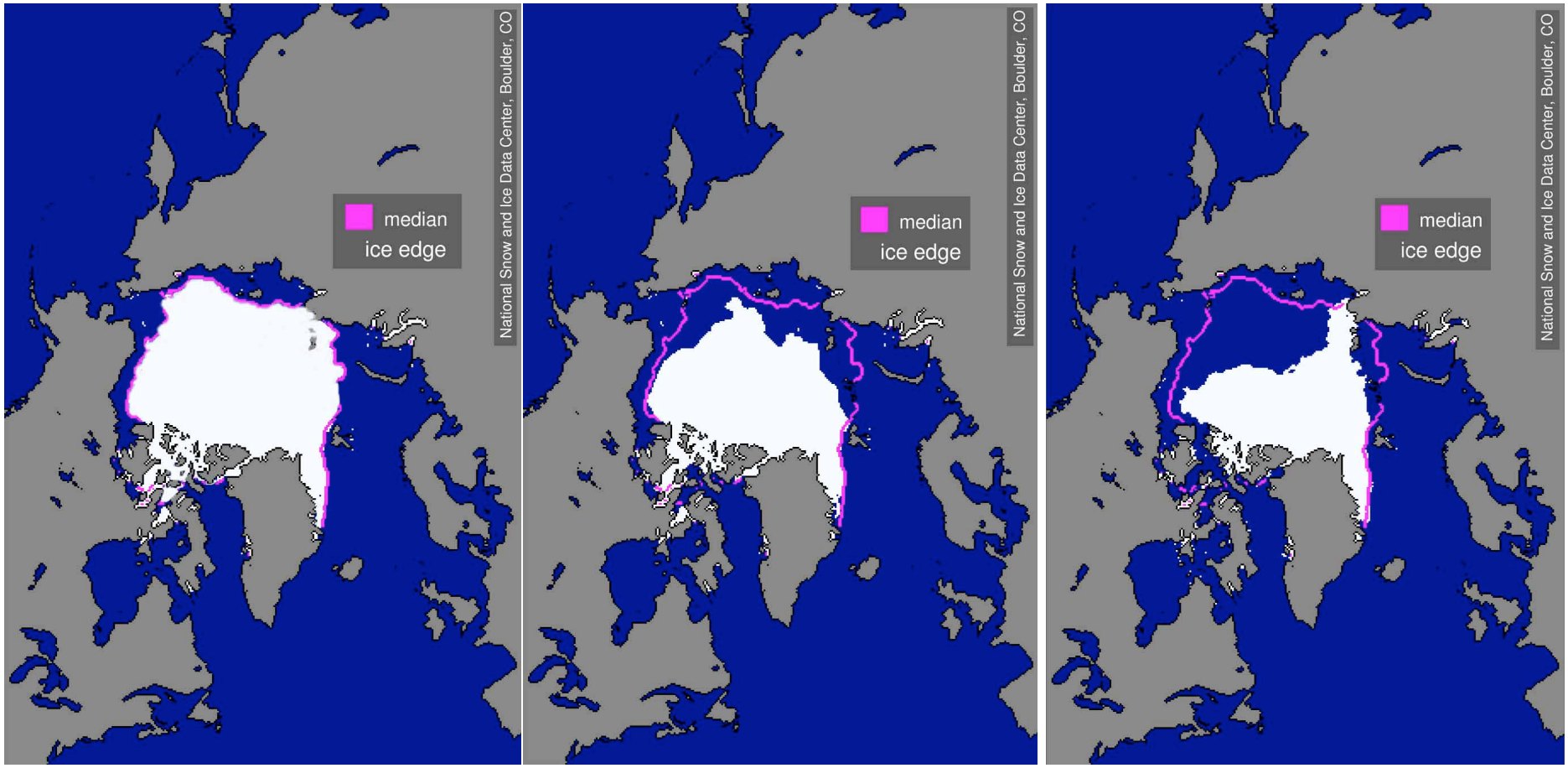
Manufactured Uncertainty



Source: Hayhoe, K. 2008. "Climate Change: What do We Know?" Presented to the Casualty Actuarial Society.

Sea & Land Ice

Median 1979-2000 | September 21, 2005 | September 16, 2007

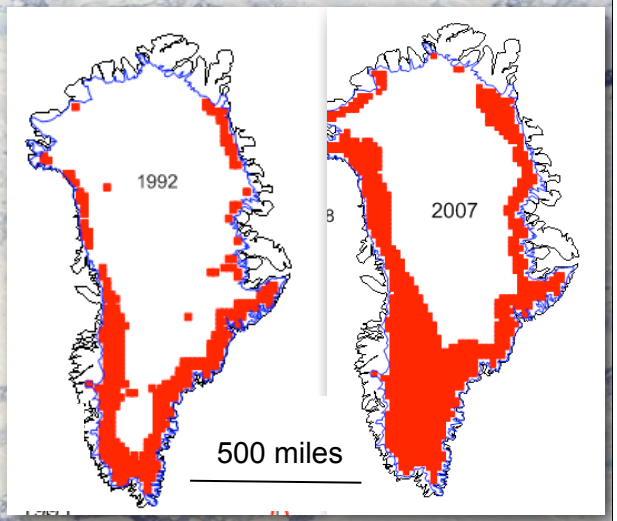


6.74 M square km | 5.32 M square km | 4.13 M square km

Loss = area of Alaska + Texas (1 M sq. miles) http://nsidc.org/news/press/2007_seaiceminimum/20070810_index.html

Across the Arctic, over 2 trillion tons between 2003 and 2008 (NASA)

Sea & Land Ice

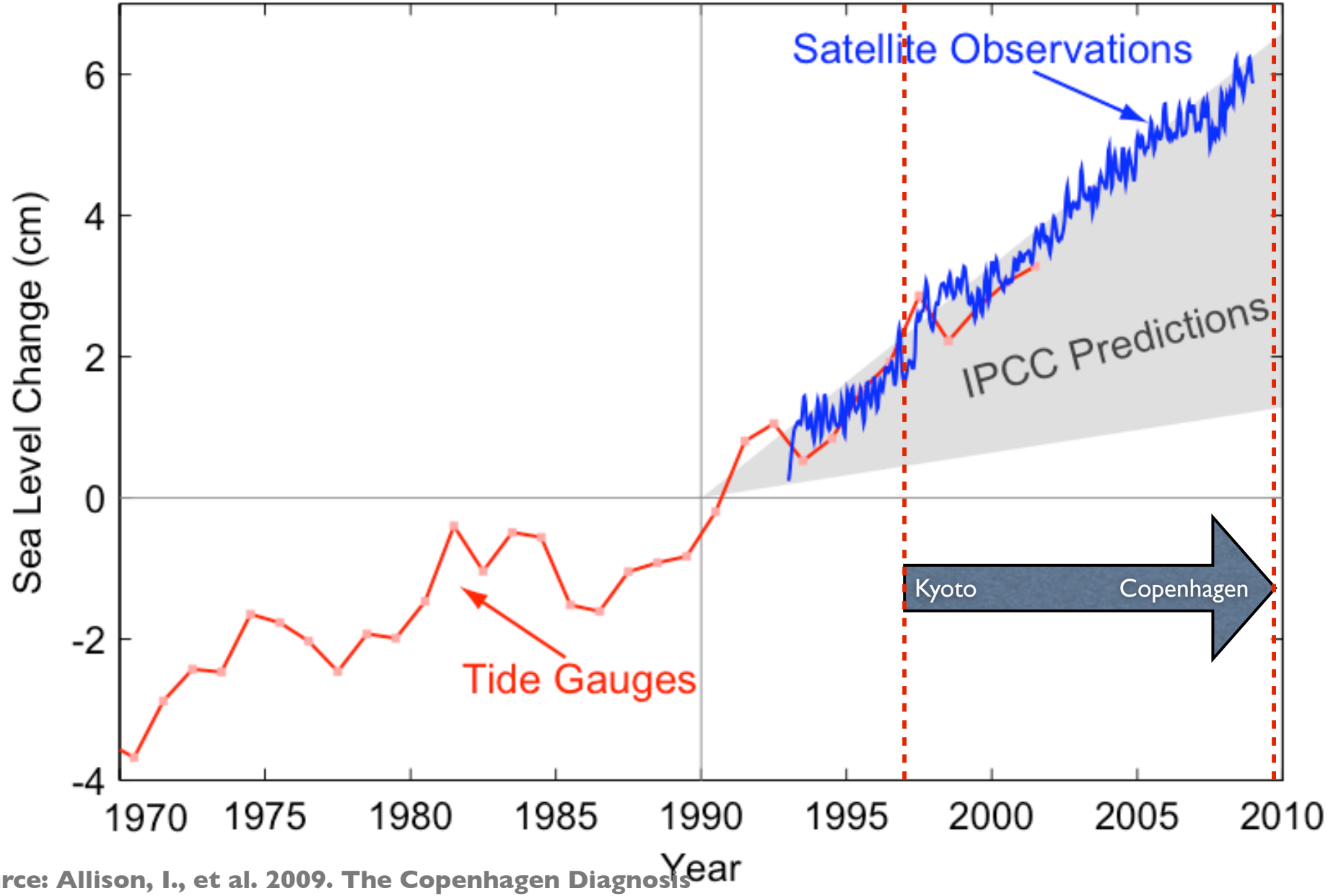


Glaciers

Blomstrandbrennen Glacier in Norway

Source: Hayhoe, K. 2008. "Climate Change: What do We Know?" Presented to the Casualty Actuarial Society.

Sea Level Rise



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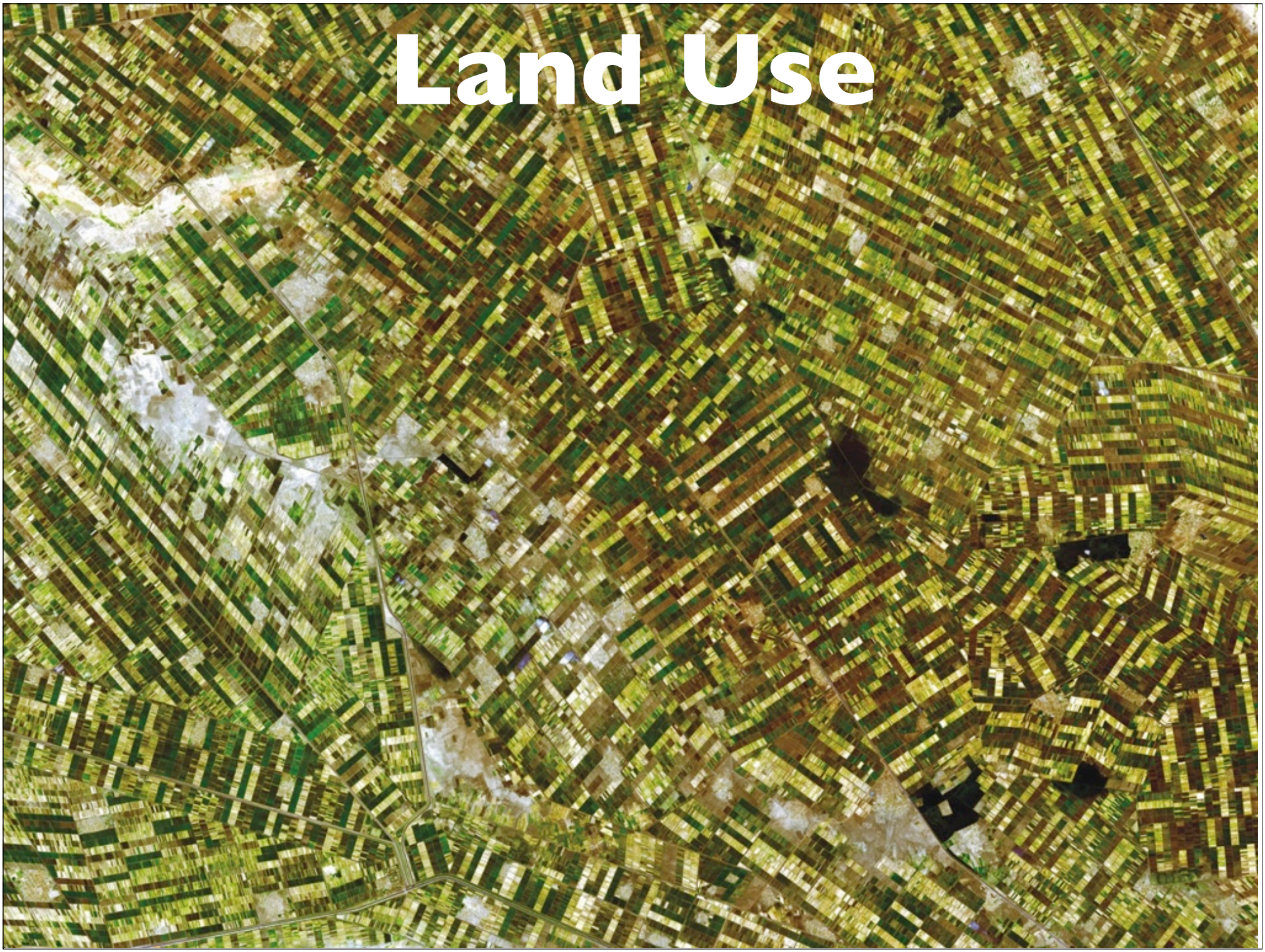
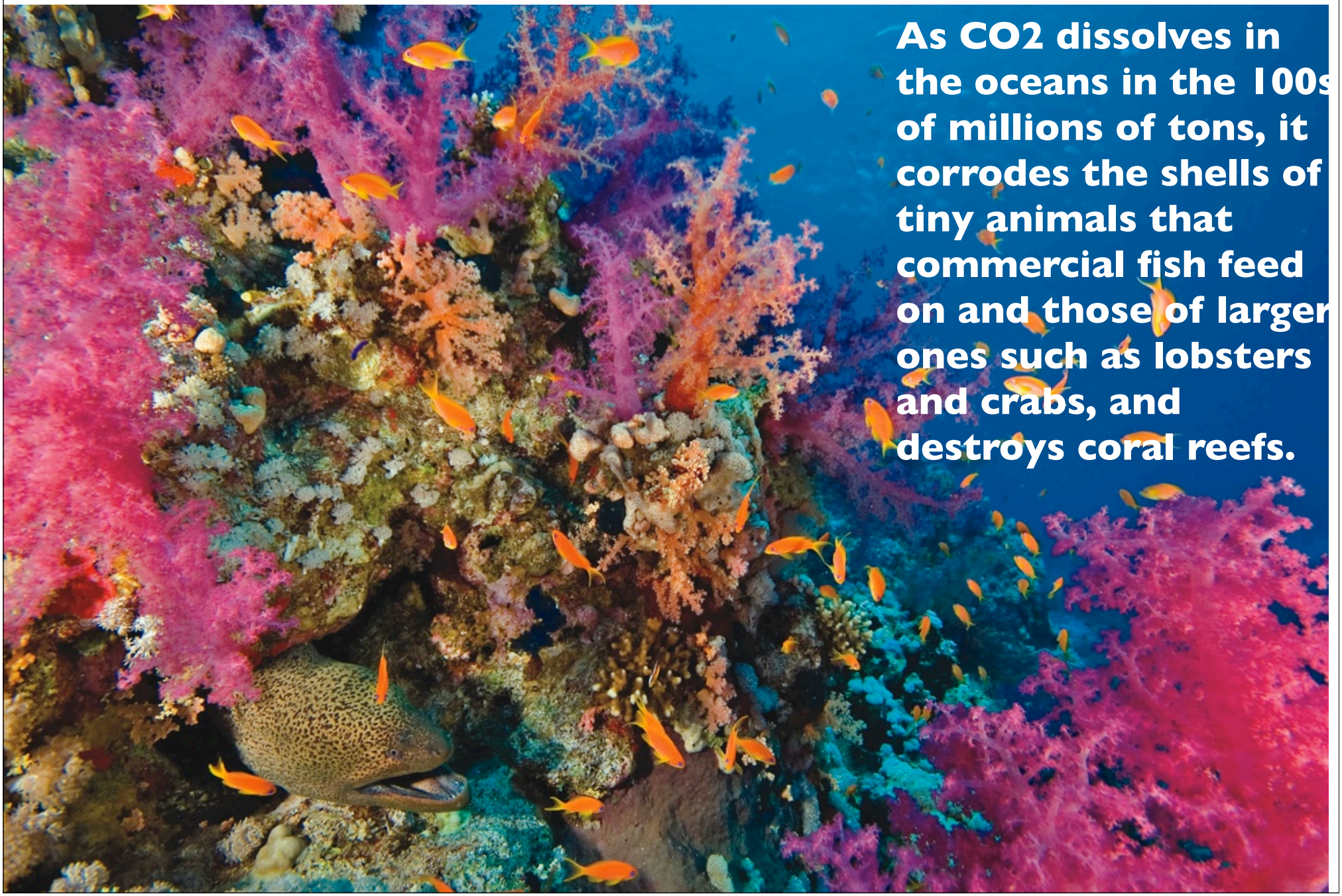
Land Use



Oceans



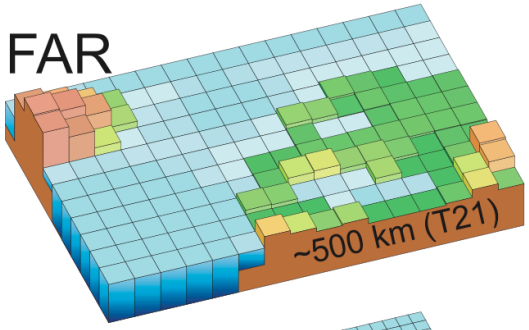
As CO_2 dissolves in the oceans in the 100s of millions of tons, it corrodes the shells of tiny animals that commercial fish feed on and those of larger ones such as lobsters and crabs, and destroys coral reefs.

Health & Air Quality

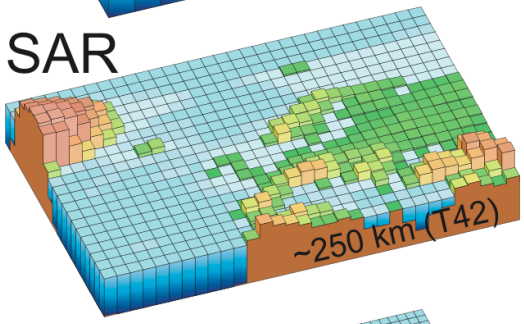
- Heat stress
- Respiratory illness
- Kidney disease
- Vector-borne disease
- Water-borne disease
- Food poisoning
- Natural-disasters
- Mental health

Modeling

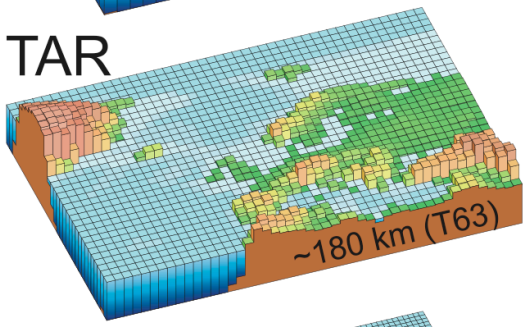
1990 FAR



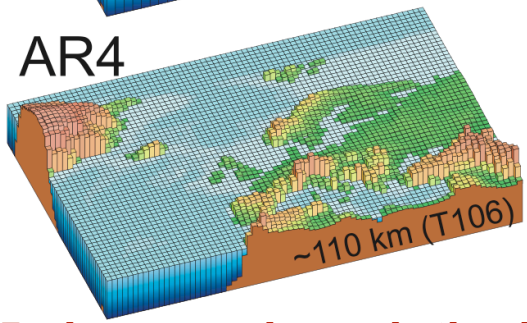
1995 SAR



2000 TAR

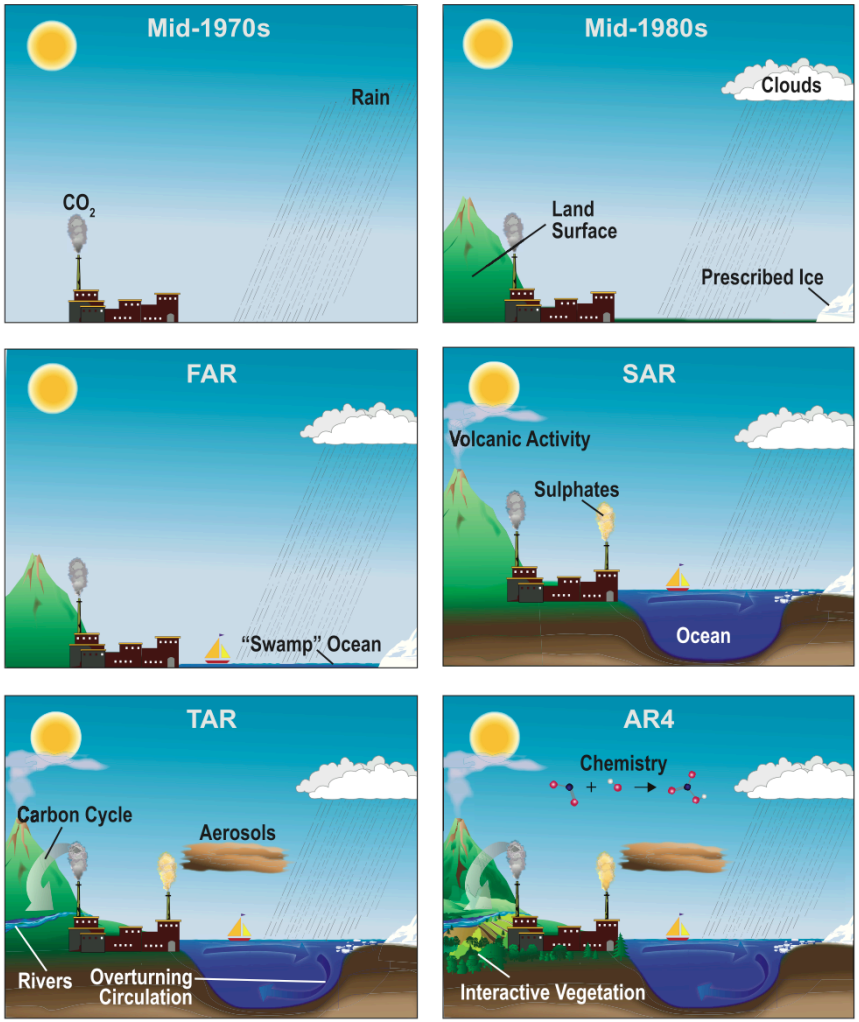


2005 AR4



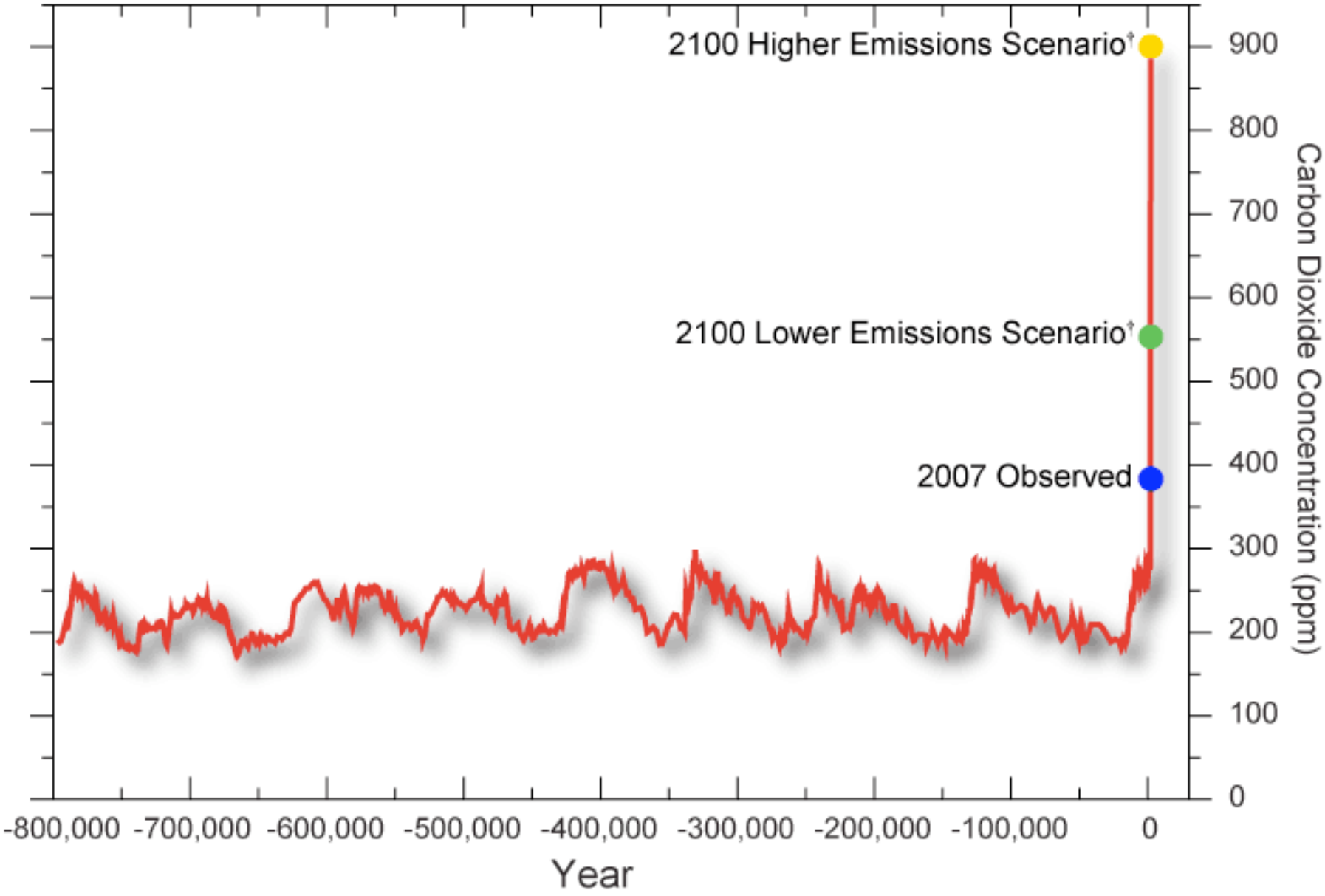
25x improved resolution!

The World in Global Climate Models



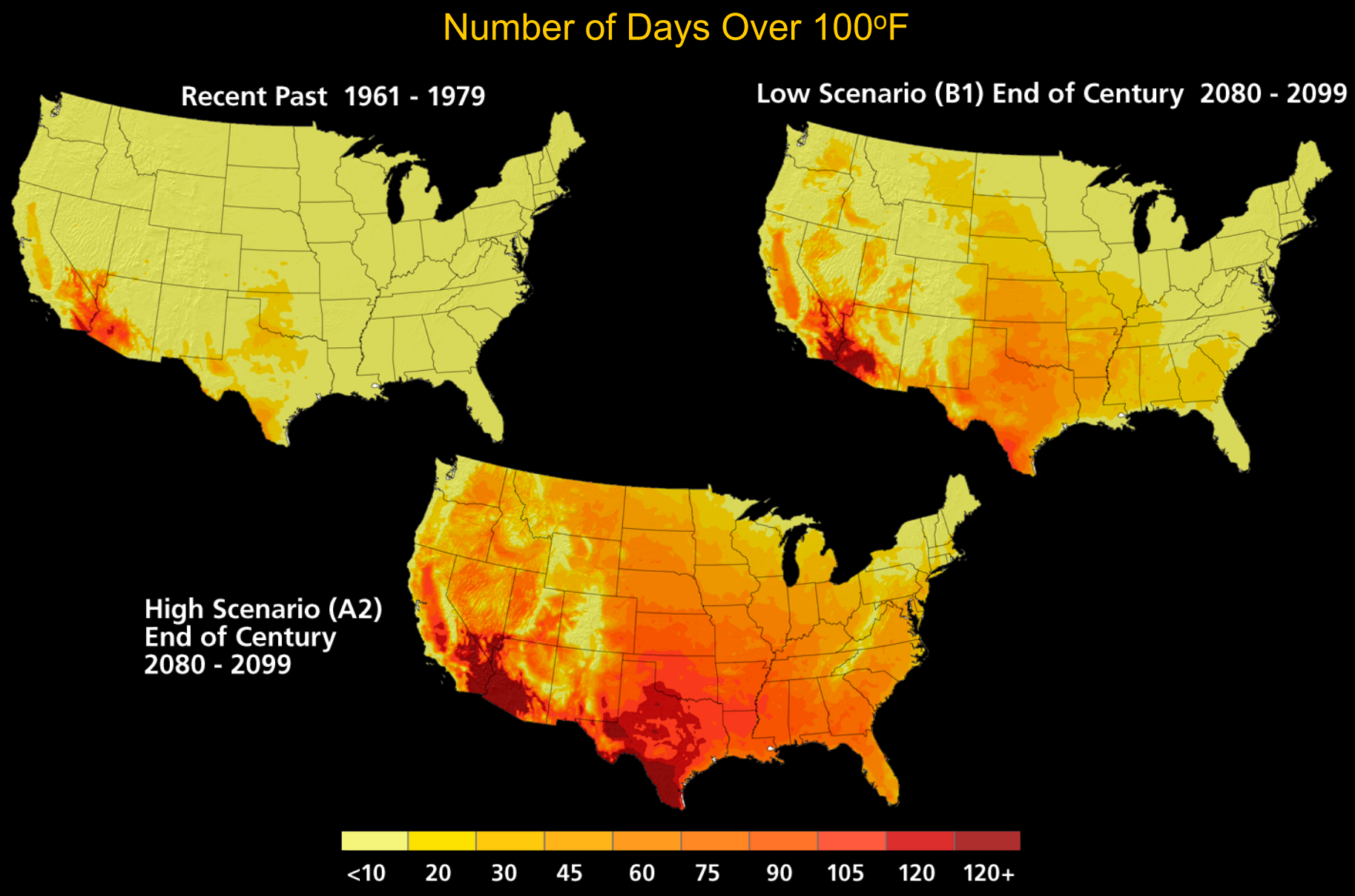
Source: Intergovernmental Panel on Climate Change, Fourth Assessment Report, WG1 (2007)

Into Unknown Territory



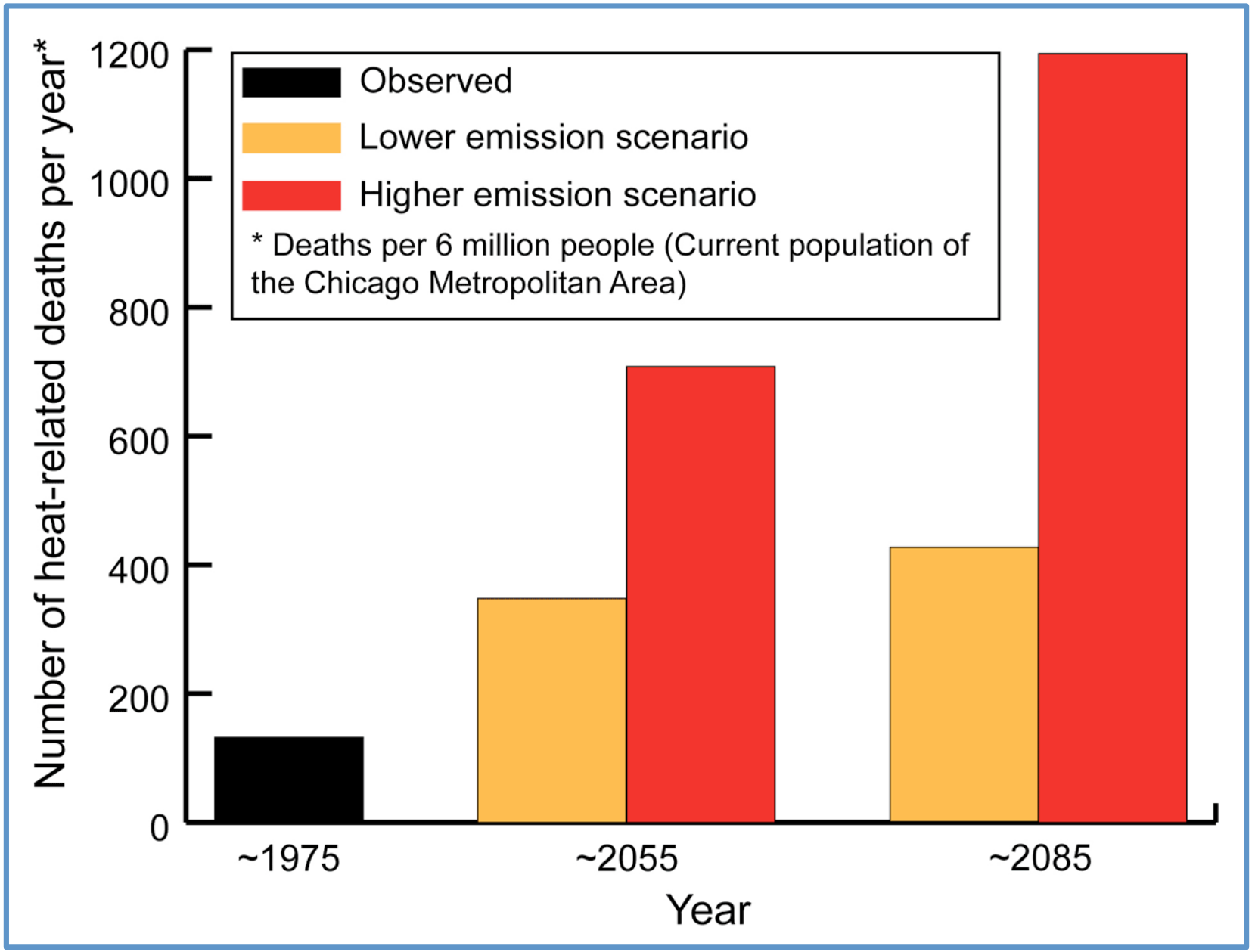
Source: US Global Change Research Program (2009) "Global Climate Change Impacts in the United States."

Key Finding: **Risks to human health will increase**



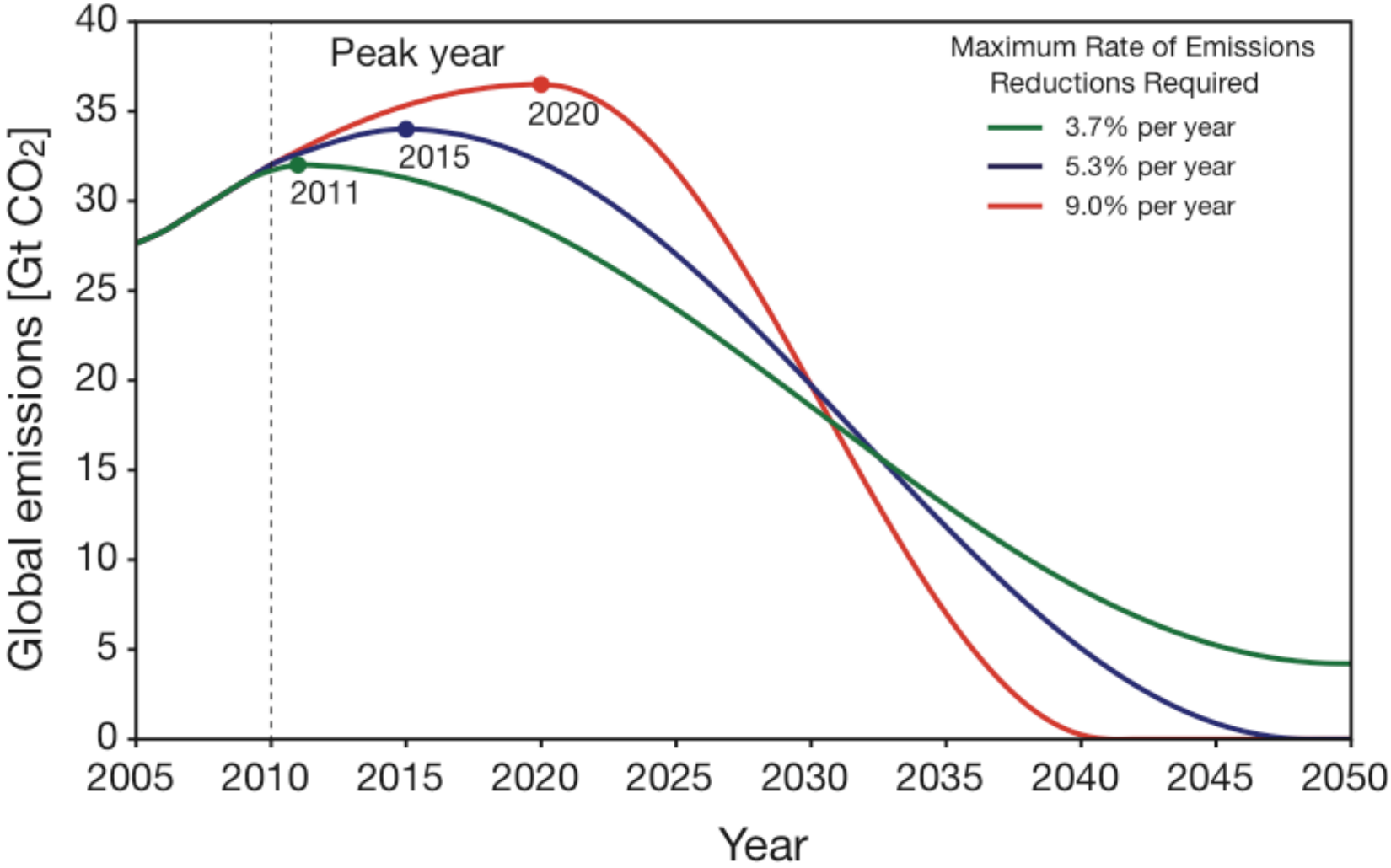
Source: US Global Change Research Program (2009) "Global Climate Change Impacts in the United States."

Projected Increase in Heat-Related Deaths in Chicago



Source: US Global Change Research Program (2009) "Global Climate Change Impacts in the United States."

Pathways to Avoid 2C Warming



Source: Allison, I., et al. 2009. The Copenhagen Diagnosis

Shifting Contrarian Views

- Flip-Flopping: Flat Denial > Maybe > Yes > No > ? (Too late...)
- Scientists thrive on debate and challenging one-another
- "Climate-Gate" - 3+ institutions illegally breached (desperation)
  - ★ Scientists are human (is this a surprise?)
  - ★ Restrictions on data come from weather agencies, not scientists
  - ★ UK temperature dataset is just 1 of 4
  - ★ Among scientists, a "trick" is a clever solution (not a deception)
  - ★ Rejected article was erroneous and on verge of retraction
  - ★ Ice sheets, ocean levels, droughts ... are not part of a conspiracy
- This "debate" appears to be about fear and ideology - not science
- **No notion of risk assessment & management is evident!**

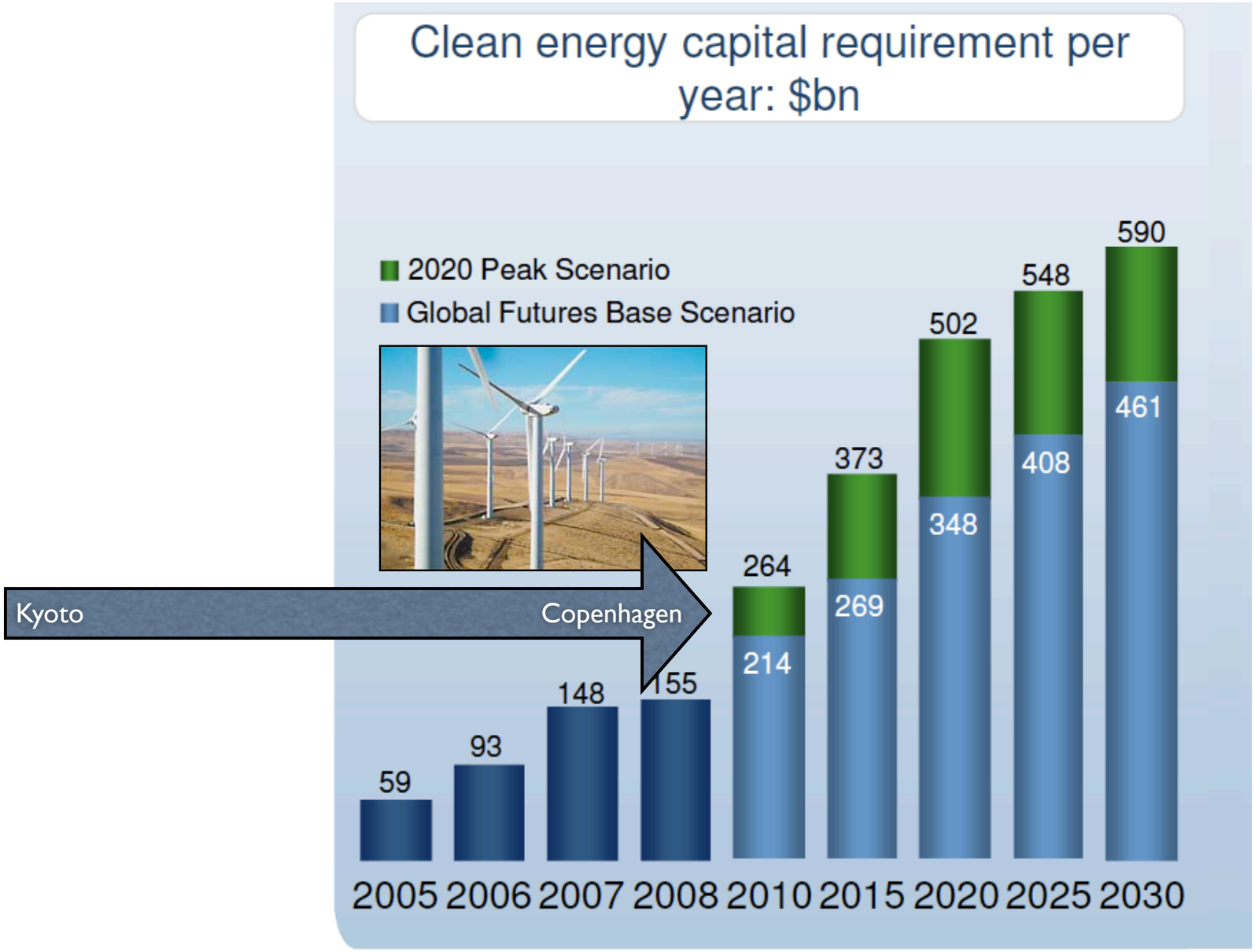
Social Climate is Changing

"We recognize unequivocally that there is a moral imperative to tackle the causes of global warming." - *Leaders of 9 faiths....*

"Christians, noting the fact that most of the climate change problem is human induced, are reminded that when God made humanity he commissioned us to exercise stewardship over the earth and its creatures.... Climate change is the latest evidence of our failure to exercise proper stewardship."

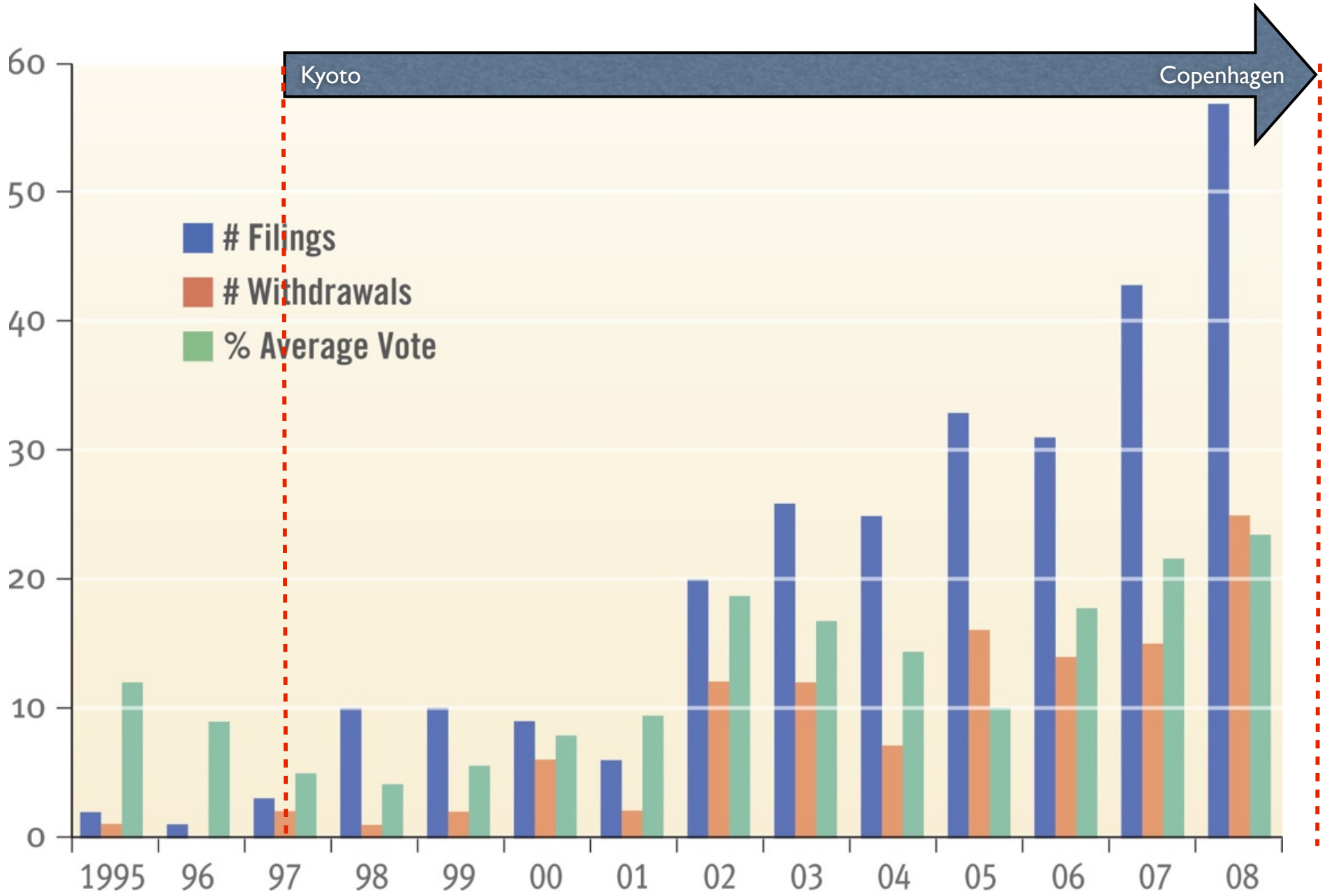
- *Evangelical Climate Initiative (ECI), 100 signatories*

Business Climate is Changing



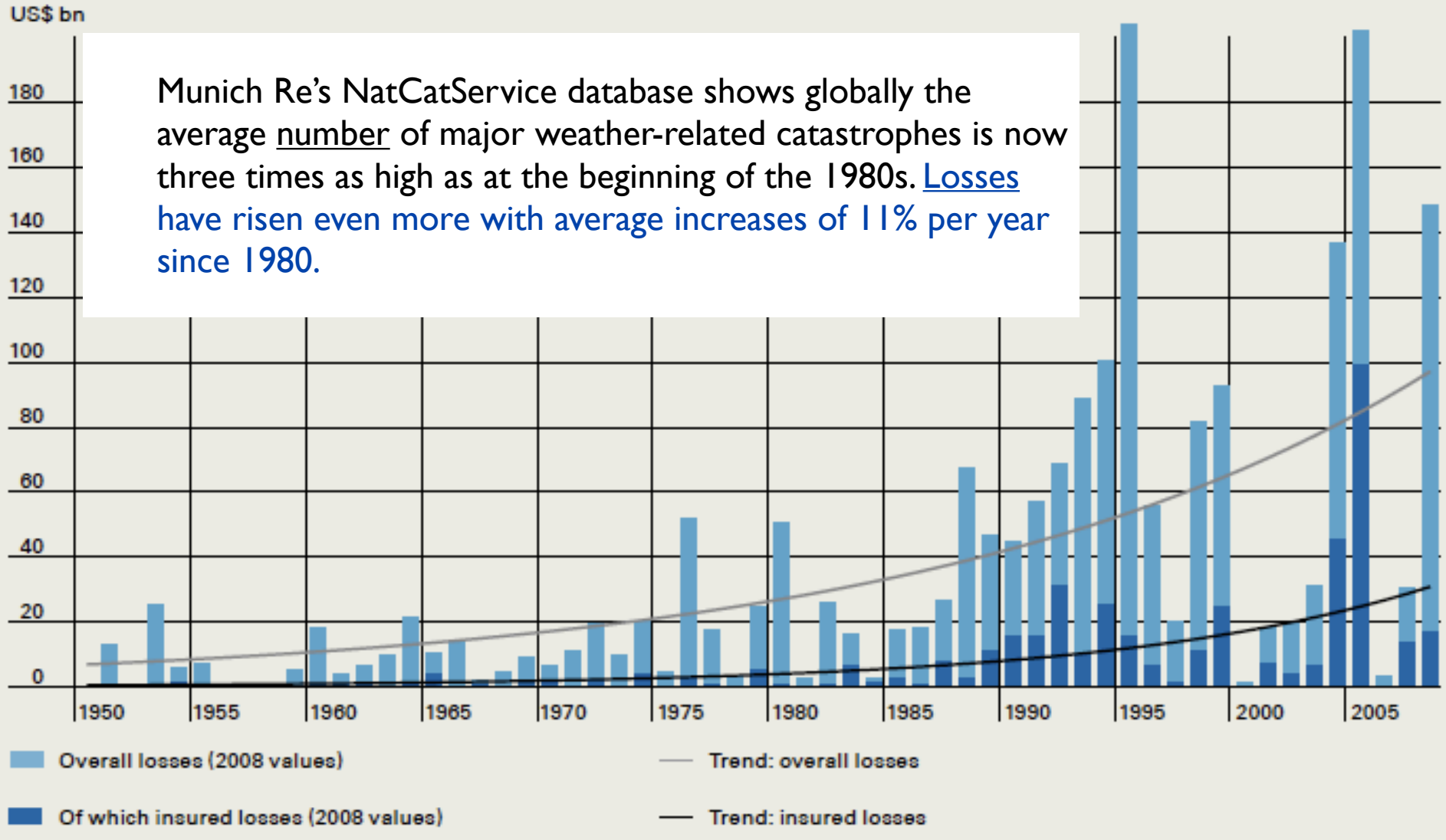
Source: New Energy Finance. "Global Futures 2009". IMF's World Economic Outlook.

US Shareholder Resolutions



Source: Mills, E. 2009. "From Risk to Opportunity: Insurer Responses to Climate Change." Published by Ceres.

Economic Losses



Munich Re's NatCatService database shows globally the average number of major weather-related catastrophes is now three times as high as at the beginning of the 1980s. Losses have risen even more with average increases of 11% per year since 1980.

Source: Munich Re, NatCatService (2009)

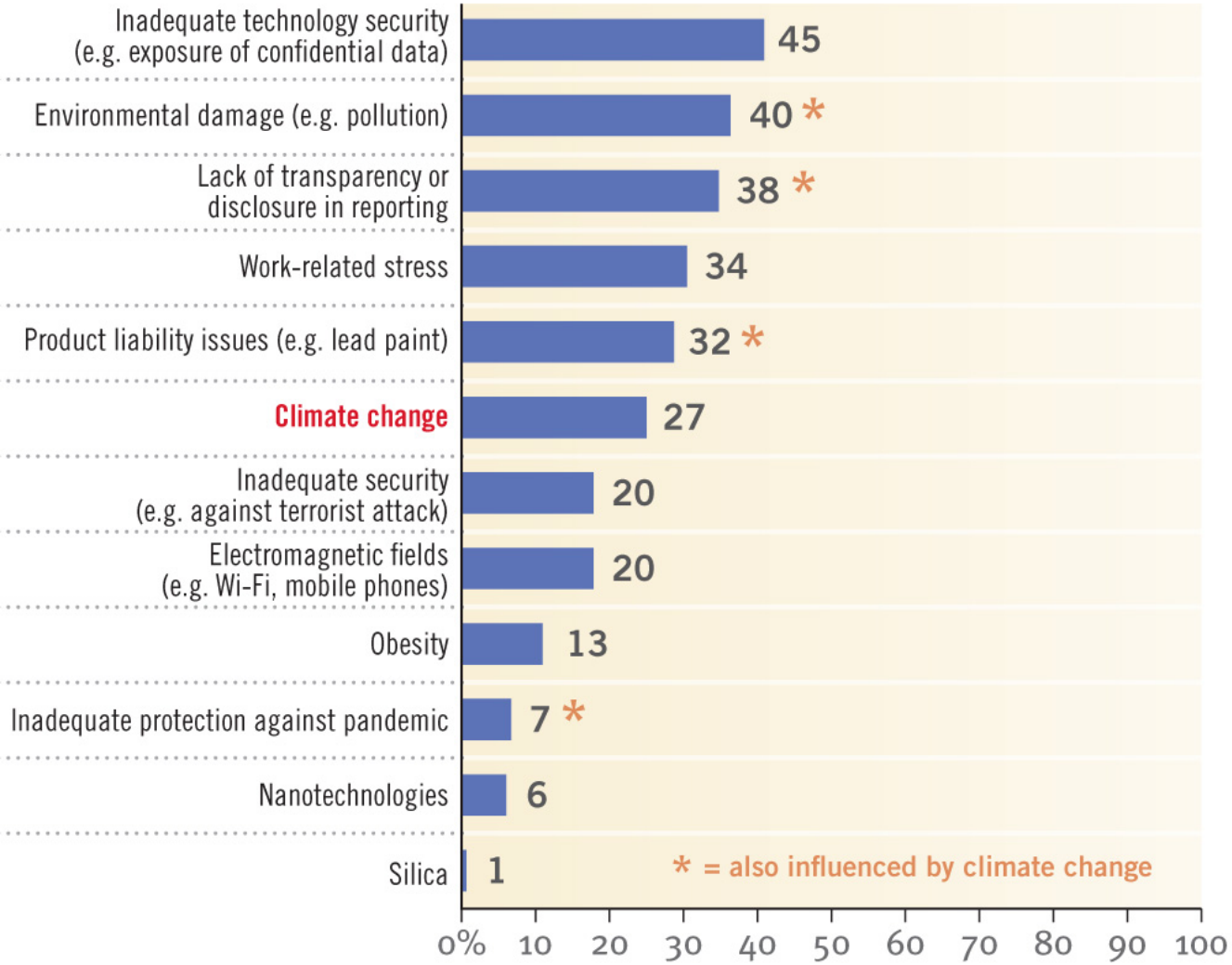
Systemic Climate Risks: ERM

- Underwriting
- Asset
- Reputational
- Regulatory
- Competitive

Risk of "missing" this is not unlike being blindsided by the current financial crisis

Lloyds of London survey

Looking ahead five years, which of the following could give rise to a major new wave of liability claims?



Source: Mills, E. 2009. "From Risk to Opportunity: Insurer Responses to Climate Change." Published by Ceres.

The Greening of Insurance

Report: *From Risk to Opportunity: 2008*

Reviewed >300 source documents

244 entities - $1.2T in premiums; $13T in assets; 2.2M workers

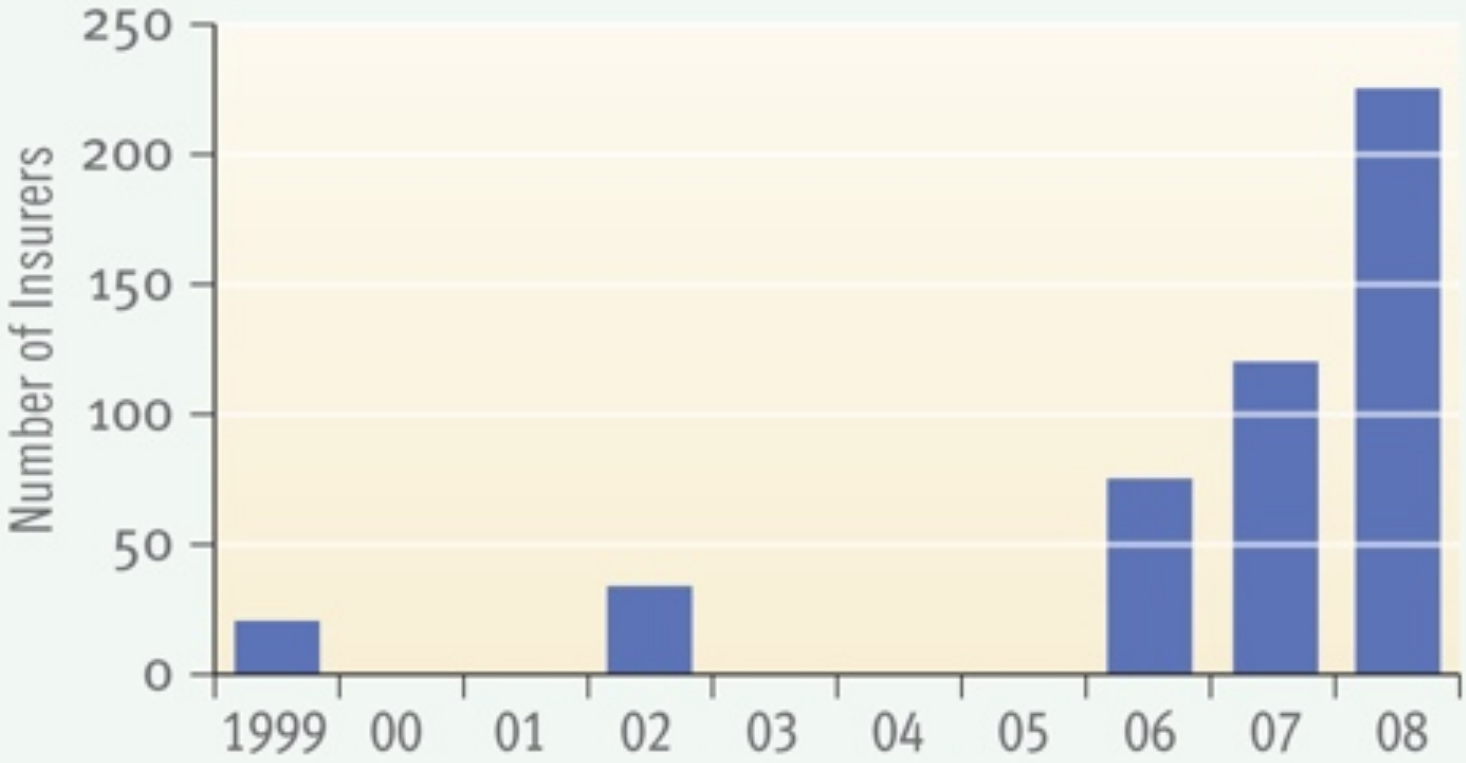
29 countries

>>> 643 products, services, and other activities<<<

50% year-over-year increase compared to 2007

Offerings

Insurers with Climate-friendly Products & Services (number)



43 instances of pay-as-you-drive insurance or credits for low-emission vehicles

13 microinsurance programs

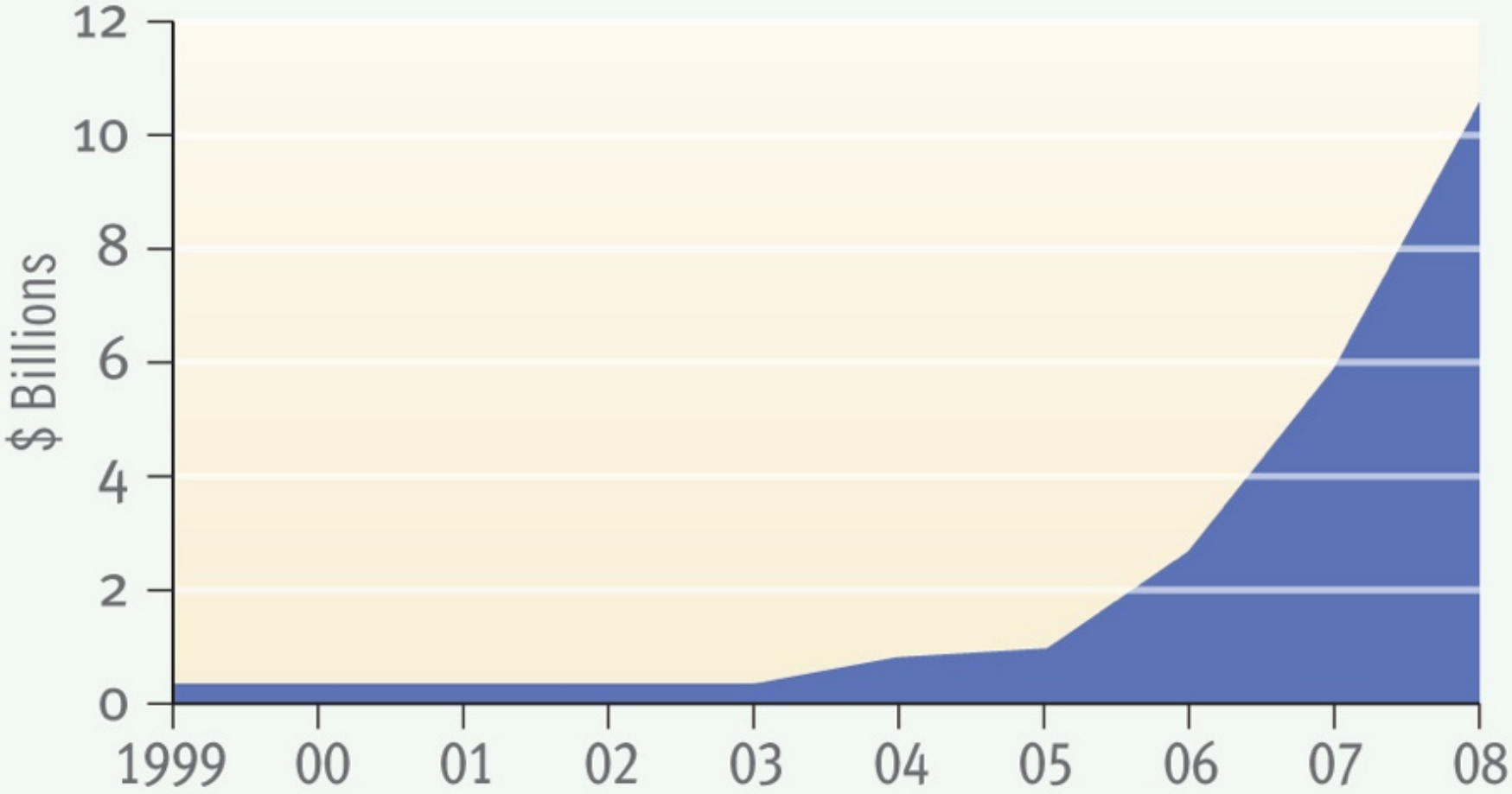
22 companies offering 39 green-buildings products and services

9 companies offering carbon offsets to customers

Source: Mills, E. 2009. "From Risk to Opportunity: Insurer Responses to Climate Change." Published by Ceres.

Investments

Investment in Climate Solutions ($Billion)



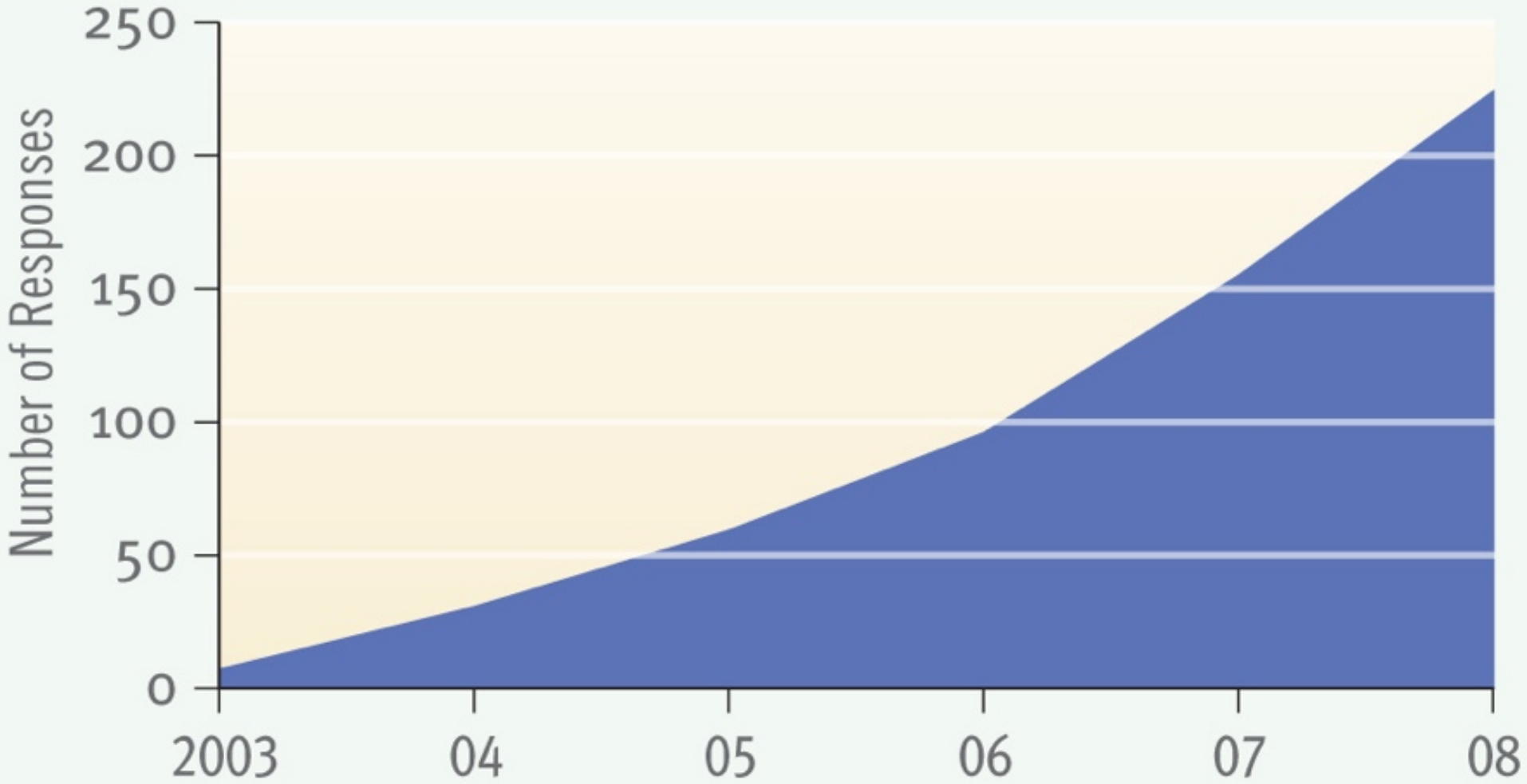
24 companies making direct investments

13 instances insurer financing of green projects

Source: Mills, E. 2009. "From Risk to Opportunity: Insurer Responses to Climate Change." Published by Ceres.

Disclosure

Insurer Responses to Carbon Disclosure Project Survey (number)



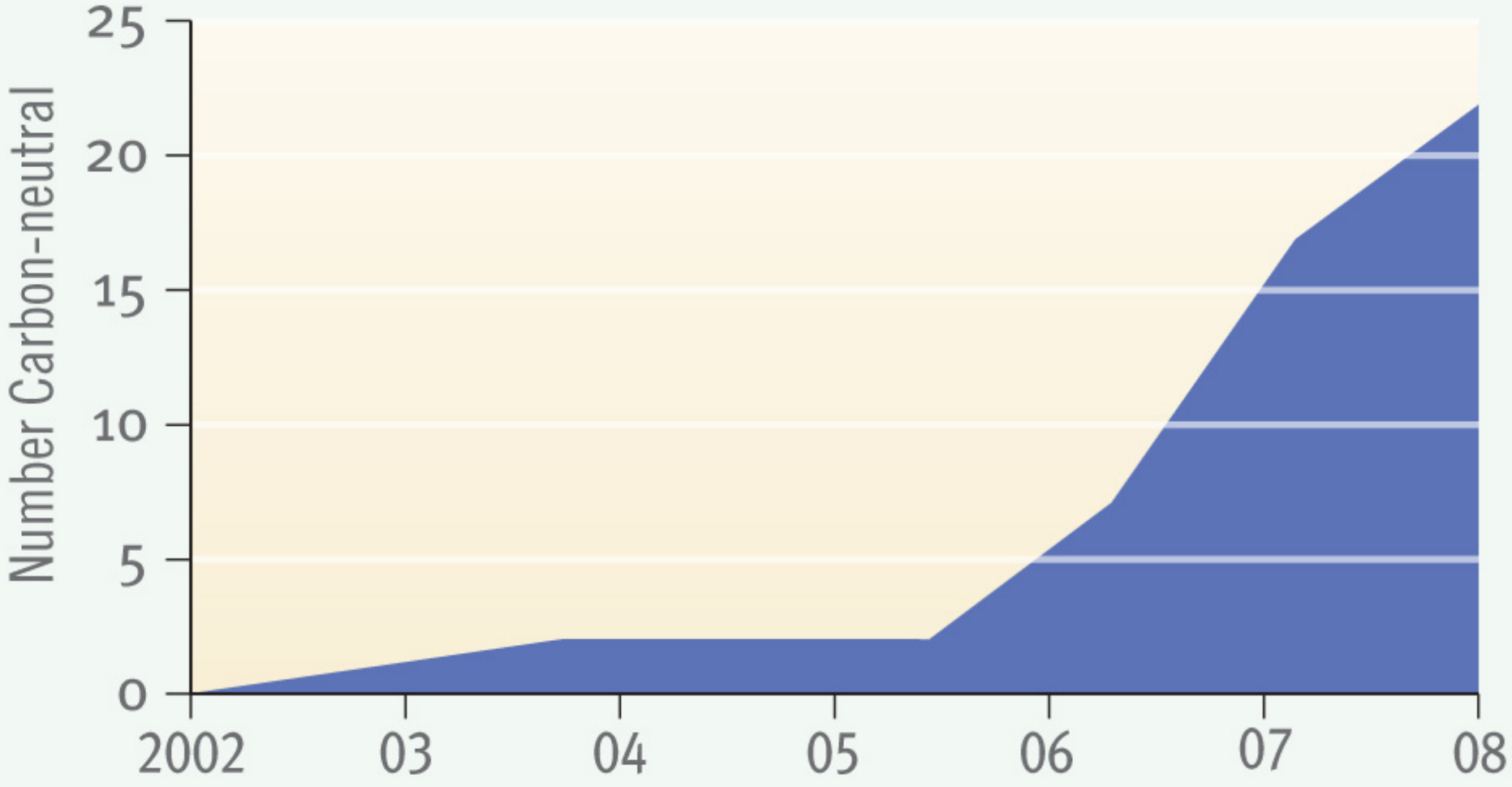
Carbon disclosure project: 66% reporting

SEC Disclosures: 15% reporting in 2006

Source: Mills, E. 2009. "From Risk to Opportunity: Insurer Responses to Climate Change." Published by Ceres.

Leadership

Carbon-Neutral Insurers and Intermediaries (number)



25 companies publishing corporate responsibility reports

23 companies with carbon-neutral commitments

Source: Mills, E. 2009. "From Risk to Opportunity: Insurer Responses to Climate Change." Published by Ceres.

Thank You

http://insurance.lbl.gov
emills@lbl.gov