



# Communicating climate science

**David Herring**

Director of Communications & Education  
NOAA Climate Program Office

[David.Herring@noaa.gov](mailto:David.Herring@noaa.gov)

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# Presentation overview

1. What is cultural literacy? What is science literacy?
2. Two threats to climate literacy today
3. A brief review of audiences and objectives
4. NOAA Climate Program Office's two-pronged strategy for climate communications

## Part I

What is cultural literacy?

What is scientific literacy?

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"TREFIL SURPASSES ALMOST ALL OTHER SCIENTISTS WRITING ABOUT SCIENCE FOR THE PUBLIC." —THE NEW YORK TIMES



# WHY SCIENCE?

JAMES TREFIL

CO-AUTHOR OF "THE DICTIONARY OF CULTURAL LITERACY"

“**Cultural Literacy** is the knowledge that educated people, at a given time and in a given place, assume that other people possess.”

“**Scientific Literacy** is the matrix of knowledge needed to understand enough about the physical universe to deal with issues that come across our horizon, in the news or elsewhere.”

— **Dr. James Trefil**

Theoretical Physicist, George Mason U.



What is **science literacy**? It is not a measure of what you know? Rather, science literacy is a measure of your ability to gather information and to discern credible from non-credible sources.

— **Dr. Jean Mayer**

Former president of Tufts University

## Part II

# Two threats to climate literacy today

# Science under attack: 'FUD' campaigns

*Industry groups are fighting government regulation by fomenting scientific uncertainty*

## DOUBT Is Their Product

By David Michaels  
Photographs by Mindy Jones

**F**ew scientific challenges are more complex than understanding the health risks of a chemical or drug. Investigators cannot feed toxic compounds to people to see what doses cause cancer. Instead laboratory researchers rely on animal tests, and epidemiologists examine the human exposures that have already happened in the field. Both types of studies have many uncertainties, and scientists must extrapolate from the evidence to make causal inferences and recommend protective measures. Because absolute certainty is rarely an option, regulatory programs would not be effective if such proof were required. Government officials have to use the best available evidence to set limits for harmful chemicals and determine the safety of pharmaceuticals.

Uncertainty is an inherent problem of science, but manufactured uncertainty is another matter entirely. Over the past three decades, industry groups have frequently become involved in the investigative process when their interests are threatened. If, for example, studies show that a company is exposing its workers to dangerous levels of a certain chemical, the business typically responds by hiring its own researchers to cast doubt on the studies. Or if a pharmaceutical firm faces questions about the safety of one of its drugs, its executives trumpet company-sponsored trials that show no significant health risks while ignoring or hiding other studies that are much less reassuring. The vilification of threatening research as "junk science" and the corresponding sanctification of industry-commissioned

vinyl chloride, chromium, benzene, benzidine, nickel, and a long list of other toxic chemicals and medications. What is more, Congress and the administration of President George W. Bush have encouraged such tactics by making it easier for private groups to challenge government-funded research. Although in some cases, companies may be raising legitimate arguments, the overall result is disturbing: many corporations have successfully avoided expense and inconvenience by blocking and stalling much needed protections for public health.

### The Taxicab Standard

A GOOD EXAMPLE of the current battles between industry and science is the controversy over beryllium. This lightweight metal is vital to the production of nuclear warheads because it increases the yield of the explosions; throughout the cold war, the U.S. nuclear weapons complex was the nation's largest consumer of the substance. Beryllium and its alloys are now used to make electronics equipment and even golf clubs. But the metal is also extremely toxic—breathing in tiny amounts can cause chronic beryllium disease (CBD), a debilitating ailment that scars the lungs. Victims have included not just the machinists who worked directly with the metal but others simply in the vicinity of the milling and grinding processes, often for very short periods. One accountant developed CBD after working for a few weeks each year in an office near where beryllium was being processed. CBD has also been diagnosed in people living near beryllium factories.



Michaels, David: "Doubt is Their Product." *Scientific American*. June 2005, page 96.

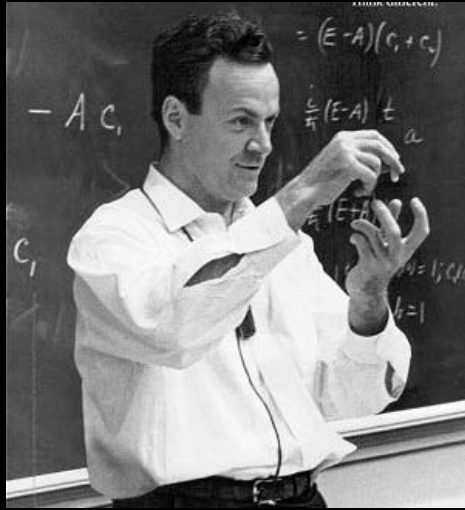
# Science under attack: media 'balance as bias'

“Media coverage can send the message to readers and viewers that the science is uncertain without ever mentioning the word uncertainty in stories. All that may be necessary to deliver that perception are competing scientific views without any sense of how the evidence lines up. The message of the traditional balanced account may be, ‘Well, who knows what’s really true?’ even when a story reports on a controversy in which both science and society have agreed that truth lies more firmly on one side than on the other.”

—Julia Corbett and Jessica Durfee

*Science Communication* (2004)





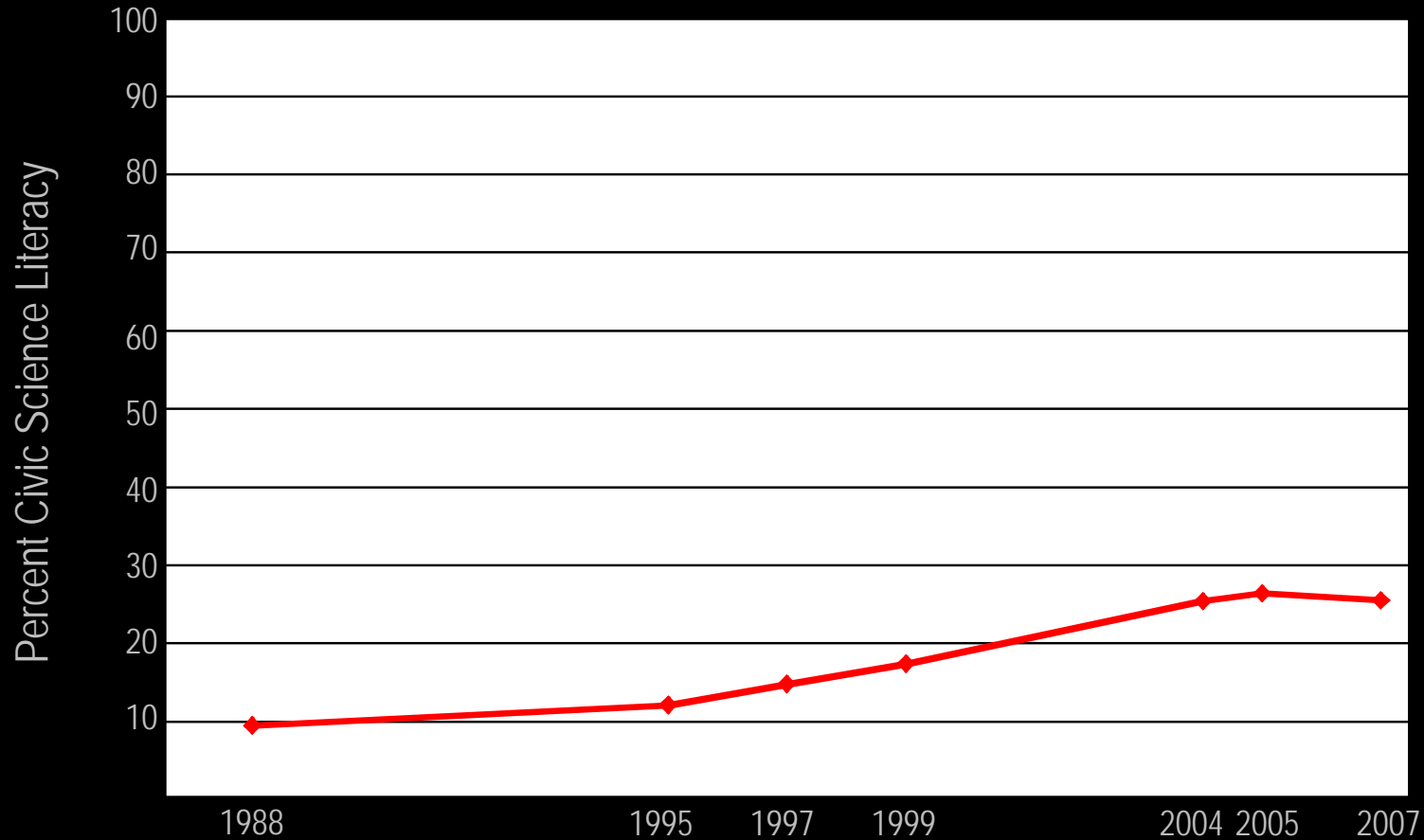
“Reality must take precedence  
over public relations for  
nature cannot be fooled.”

— Dr. Richard Feynman  
Physicist

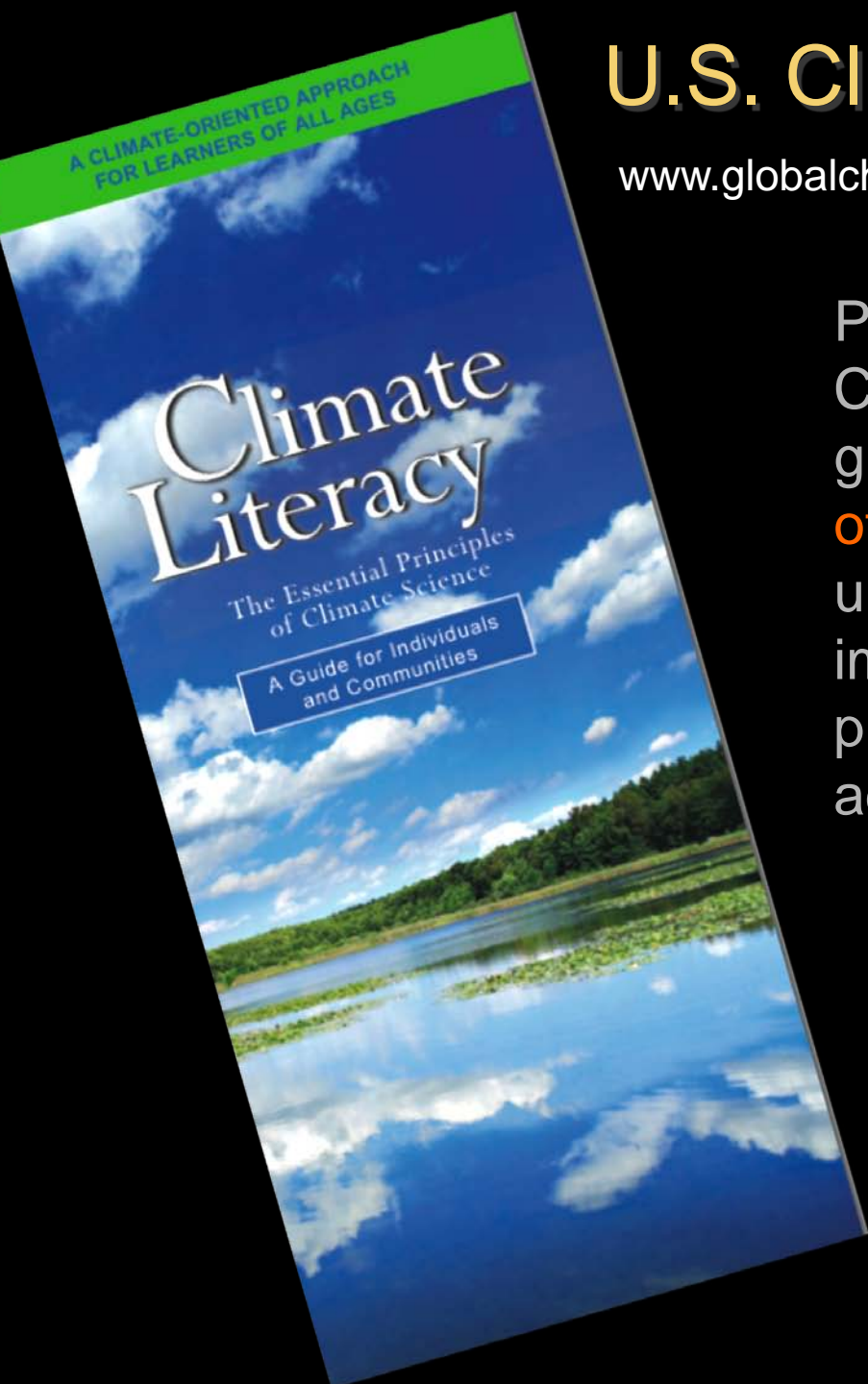
## Part III

# A brief review of American publics

# Good news / bad news about the state of public science literacy\*



\*Miller, J.D. (2008): "Civic Scientific Literacy: The role of the media in the electronic era." White paper presented at AAAS Conference.

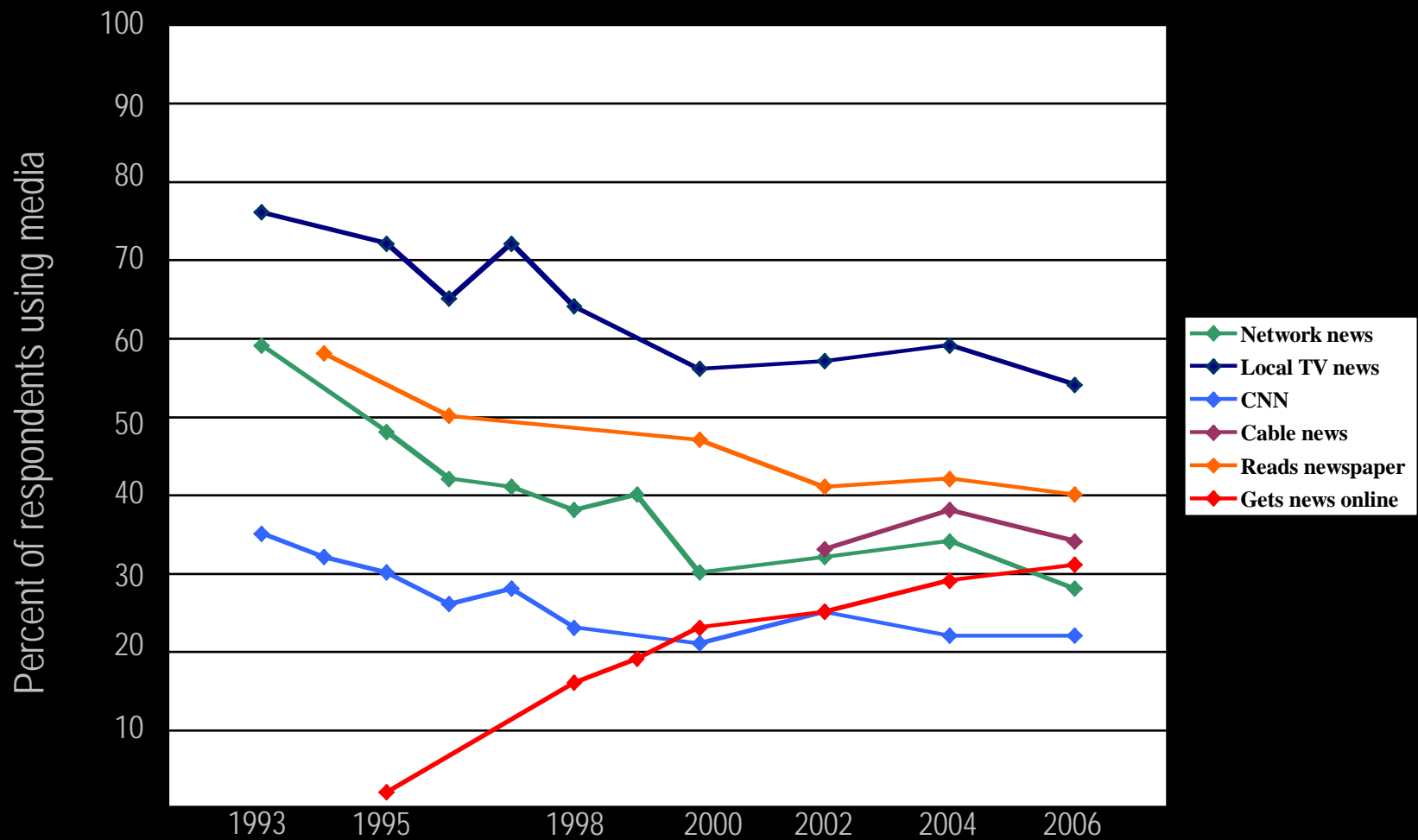


# U.S. Climate Literacy Guide

[www.globalchange.gov/resources/educators/climate-literacy](http://www.globalchange.gov/resources/educators/climate-literacy)

Published by the U.S. Global Change Research Program, this guide presents **essential principles of climate science** to help people understand Earth's climate system, implications of climate change, and provides context for understanding adaptation and mitigation options.

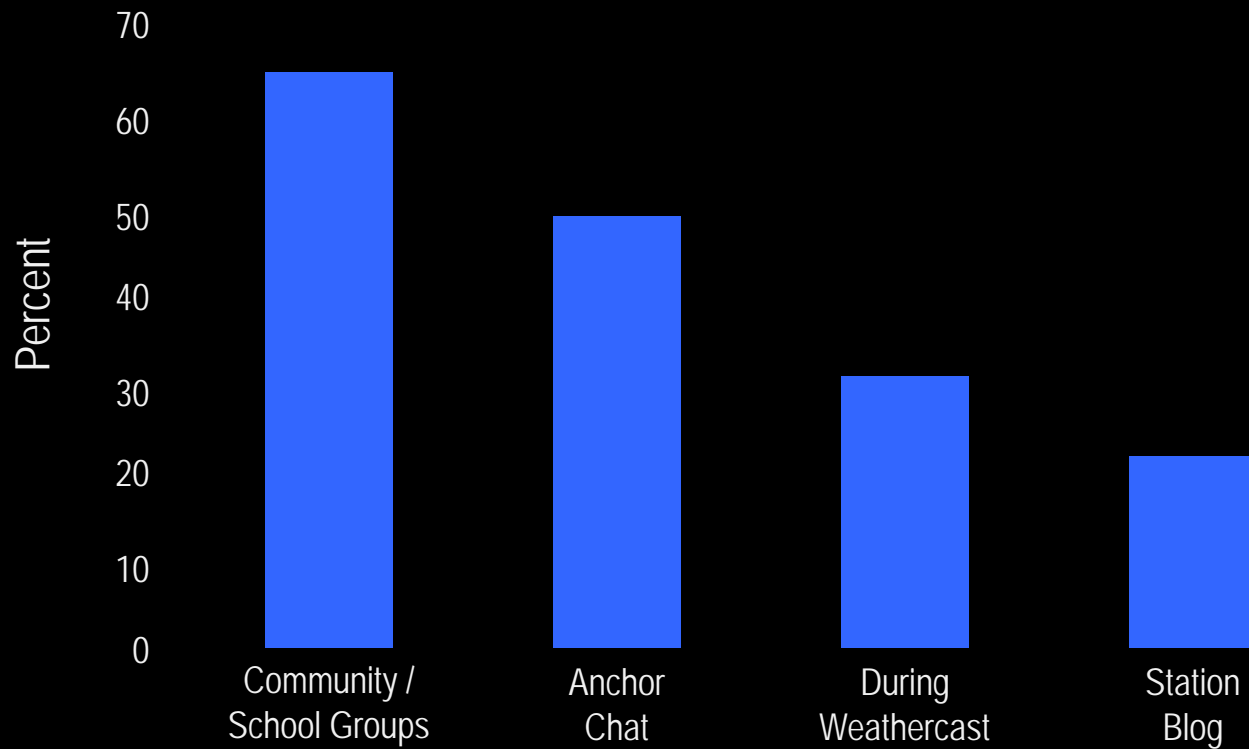
# Trends in public media use\*



\*Miller, J.D. (2008): "Civic Scientific Literacy: The role of the media in the electronic era." White paper presented at AAAS Conference.

# Survey of TV meteorologists on climate change\*

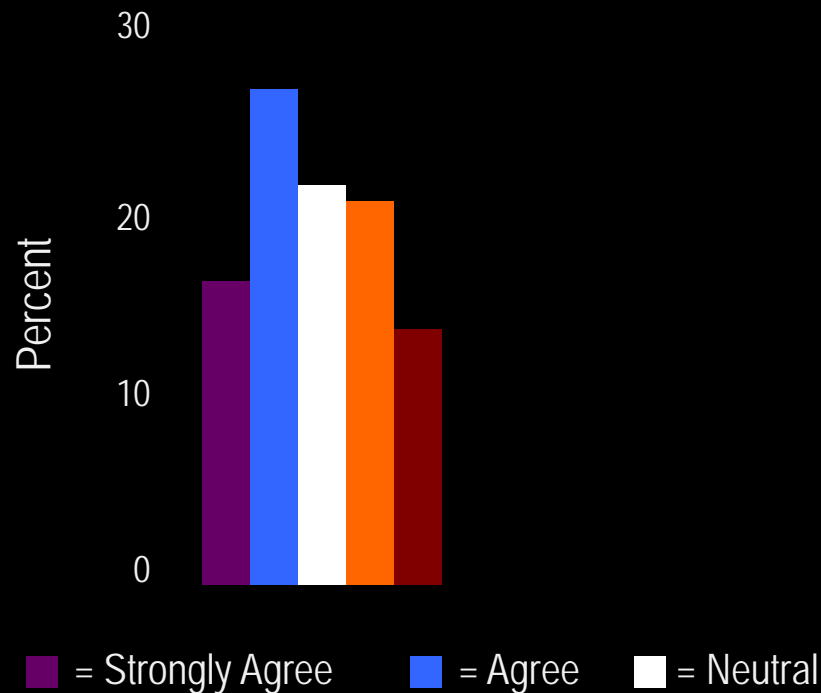
Percent of meteorologists talking about climate change in public venues.



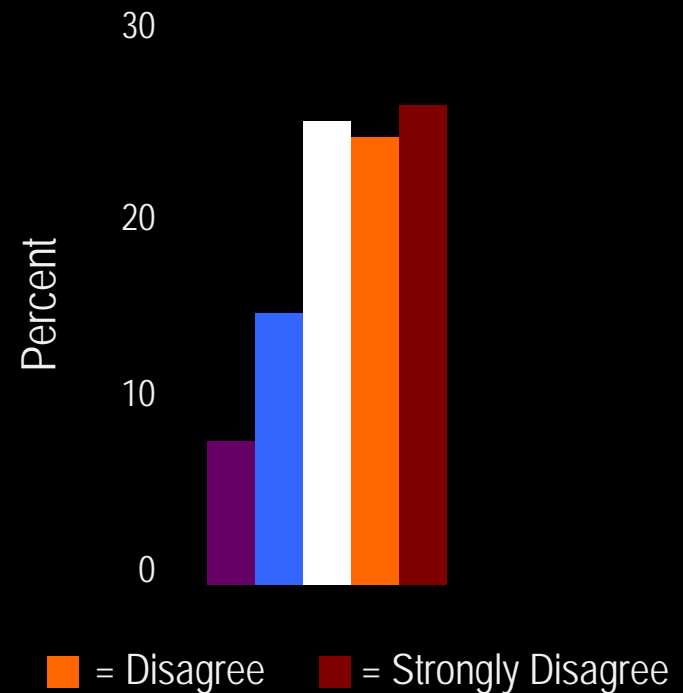
\*NEEF Survey Results (2008).

# Survey of TV meteorologists on climate change\*

“Warming of the climate system is unequivocal.” (IPCC Conclusion)

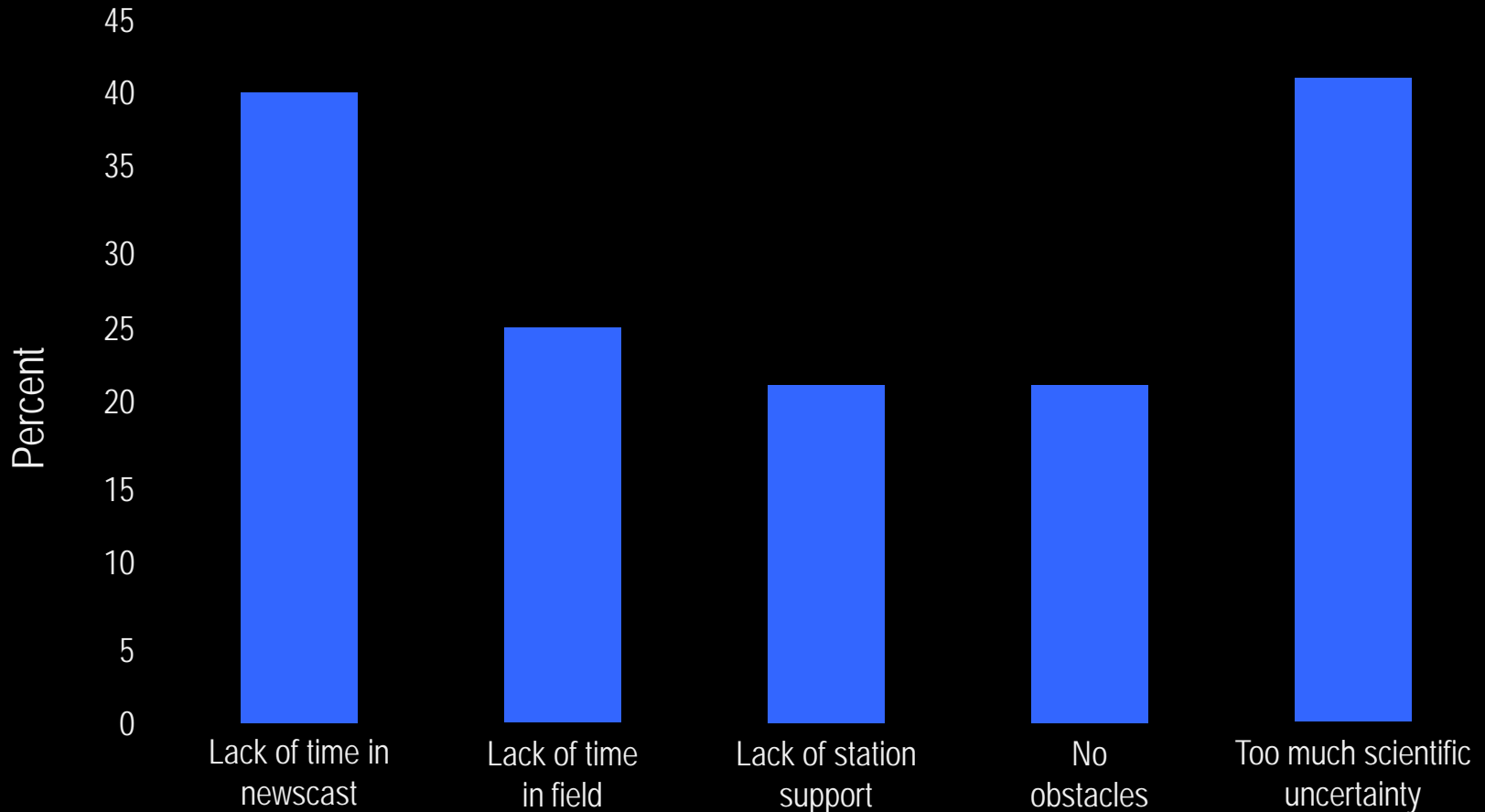


“Most of the warming since 1950 is very likely human-induced.” (IPCC conclusion)



# Survey of TV meteorologists on climate change\*

## Obstacles to reporting on climate change?

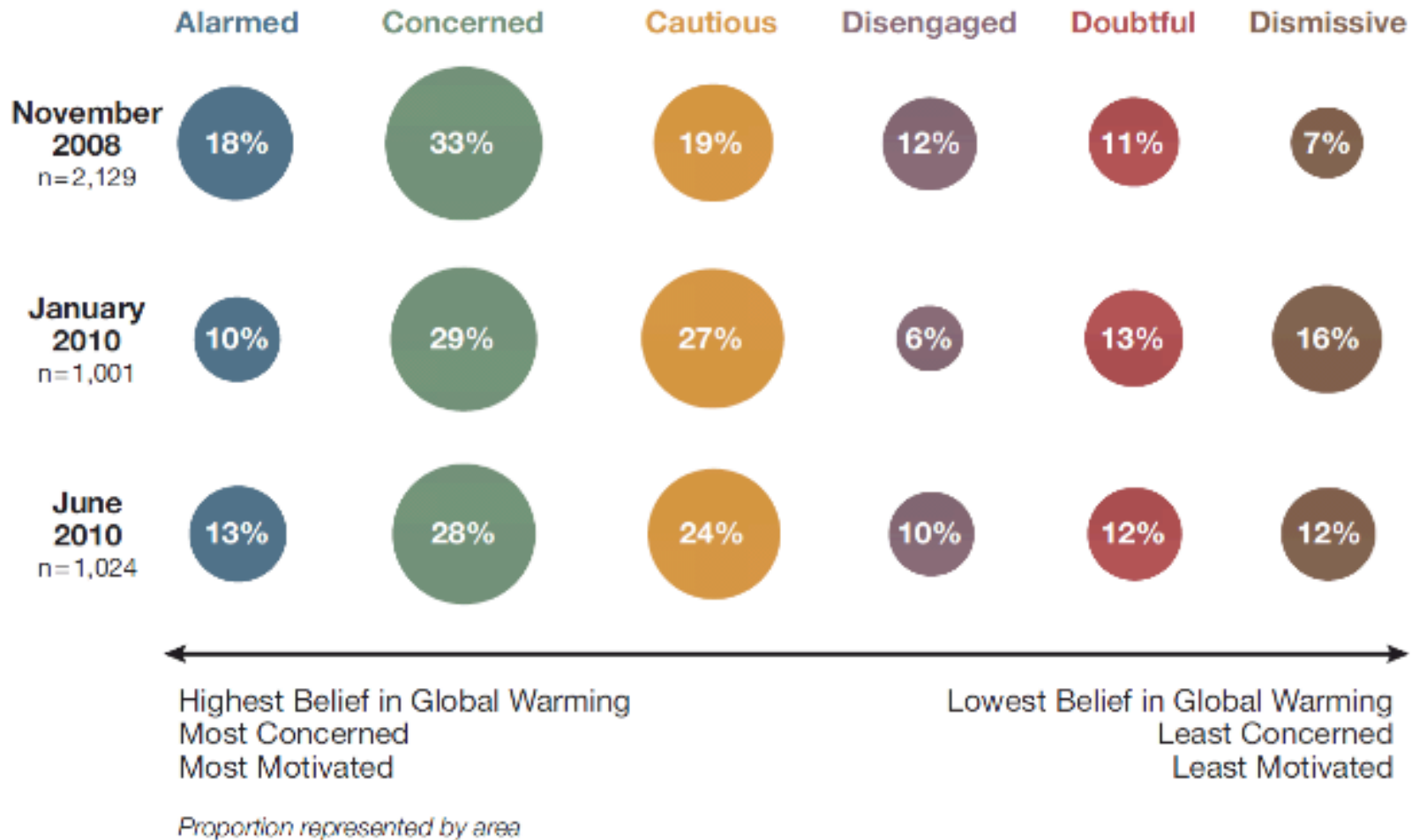


\*NEEF Survey Results (2008).



# Global Warming's 'Six Americas'

Figure 1: Proportion of the U.S. Population in the Six Americas



Leiserowitz, A., Maibach, E., & Roser-Renouf, C. & Smith, N. (2010) *Global Warming's Six Americas*, June 2010. Yale U. and George Mason U. New Haven, CT: Yale Project on Climate Change.

# Comparing the Publics' Risk Perceptions

## Global warming:

- ▶ seriousness of current impacts
- ▶ threat to non-human nature
- ▶ how concerned are you?

## Likelihood, worldwide, next 50 yrs of:

- ▶ water shortages
- ▶ increased rate of disease
- ▶ decreased standards of living

## Likelihood, where I live, next 50 years, of:

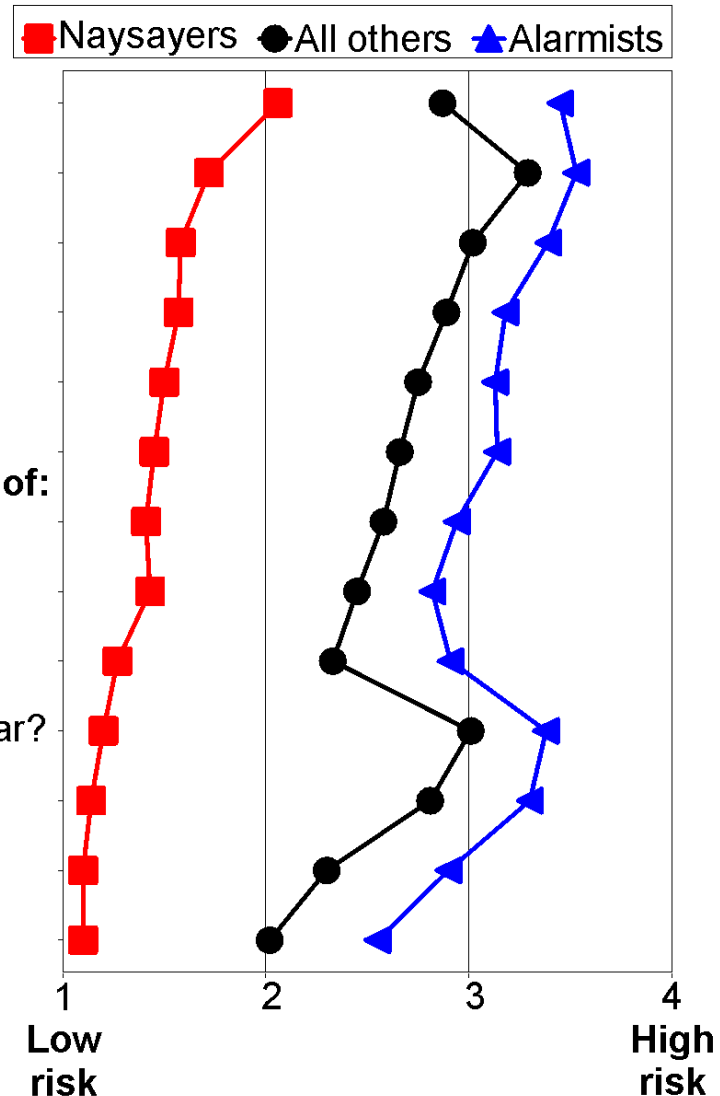
- ▶ water shortage
- ▶ increased chance of disease
- ▶ decreased standard of living

## How many, worldwide, next 50 yrs:

- ▶ will be injured/made ill each year?
- ▶ will die each year?

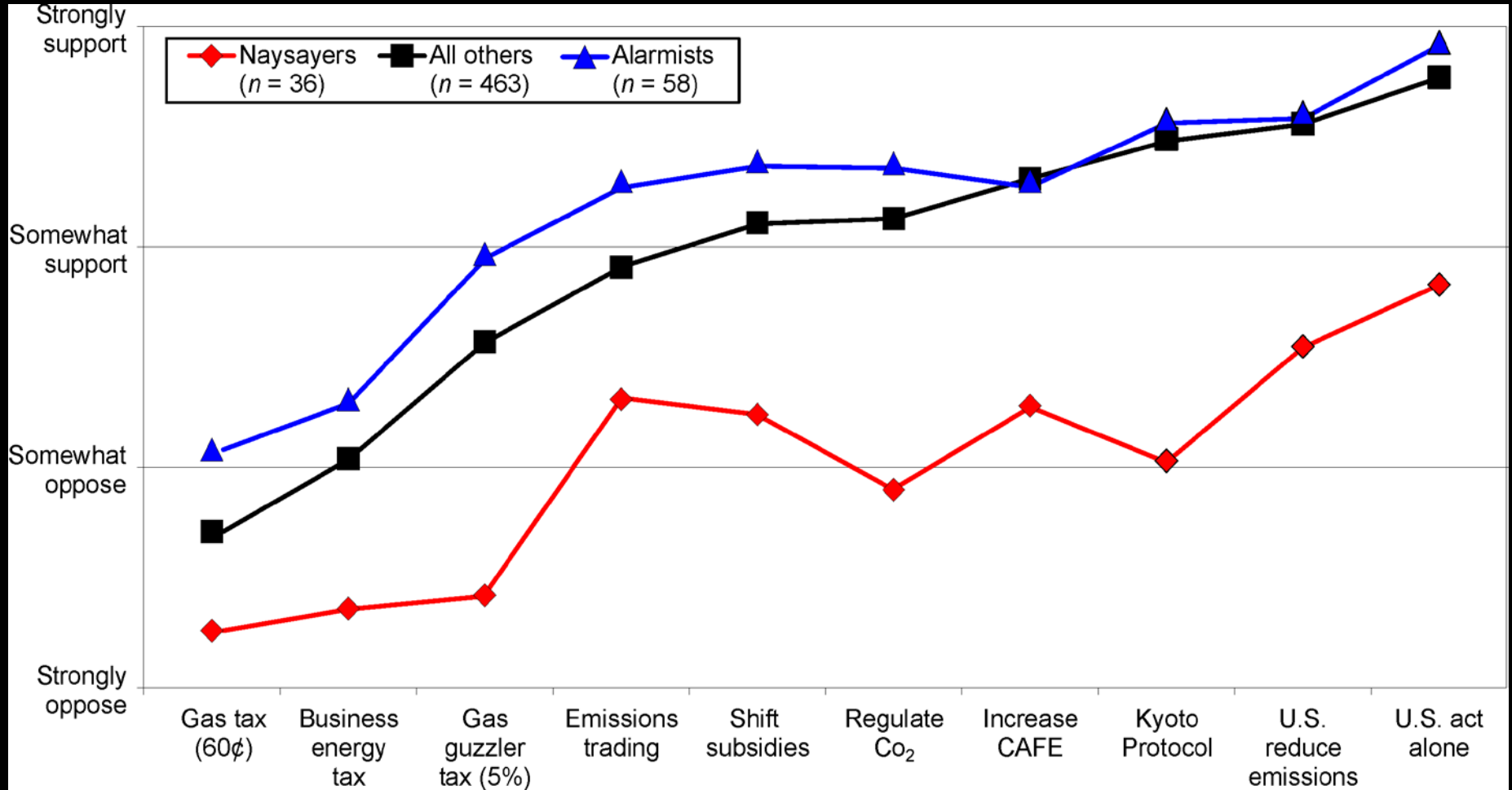
## How many, worldwide, currently:

- ▶ injured or ill each year?
- ▶ die each year?



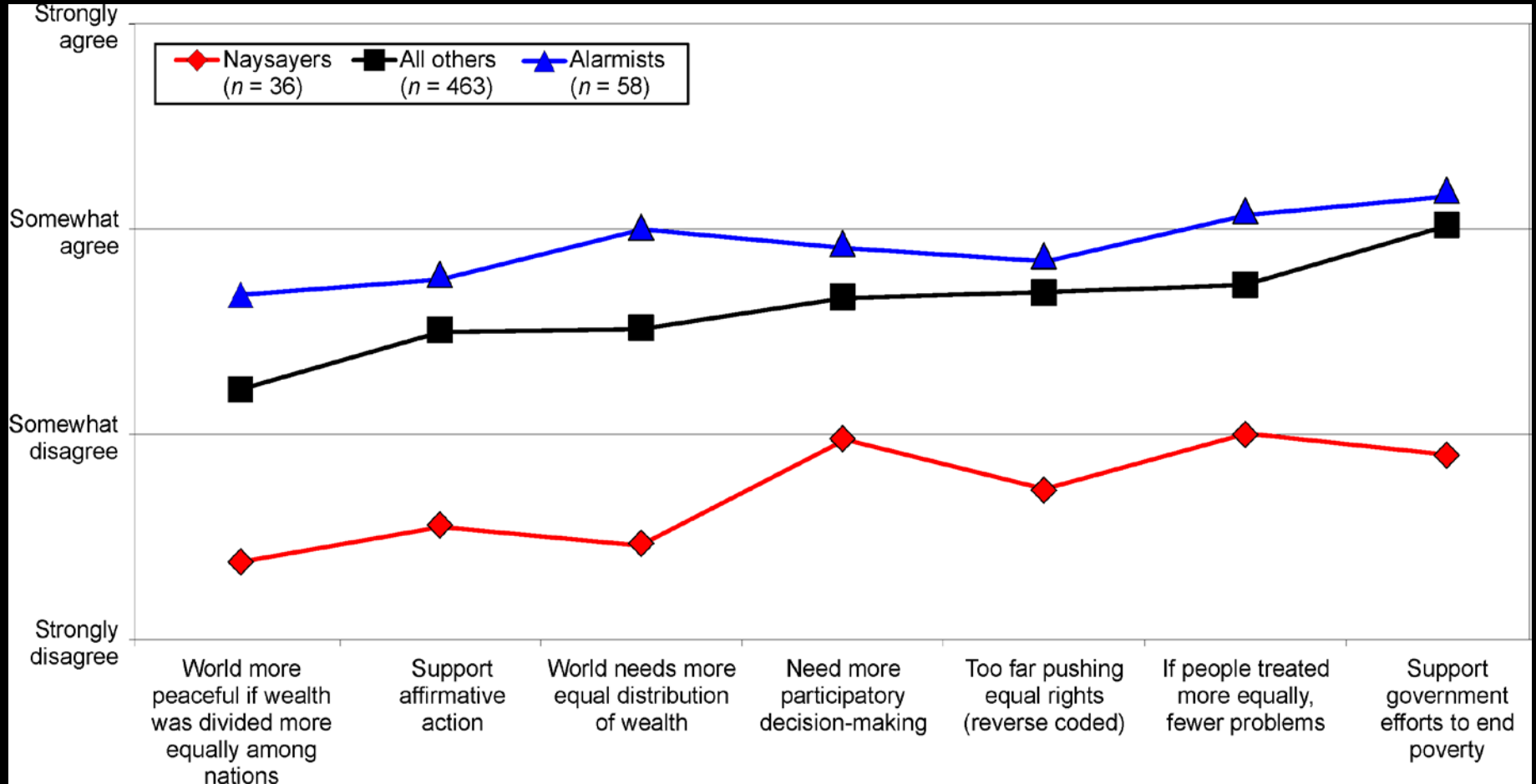
\*Source: A. Leiserowitz, Yale U., October 2003 (n = 2,189)

# Comparing the Publics' Policy Support



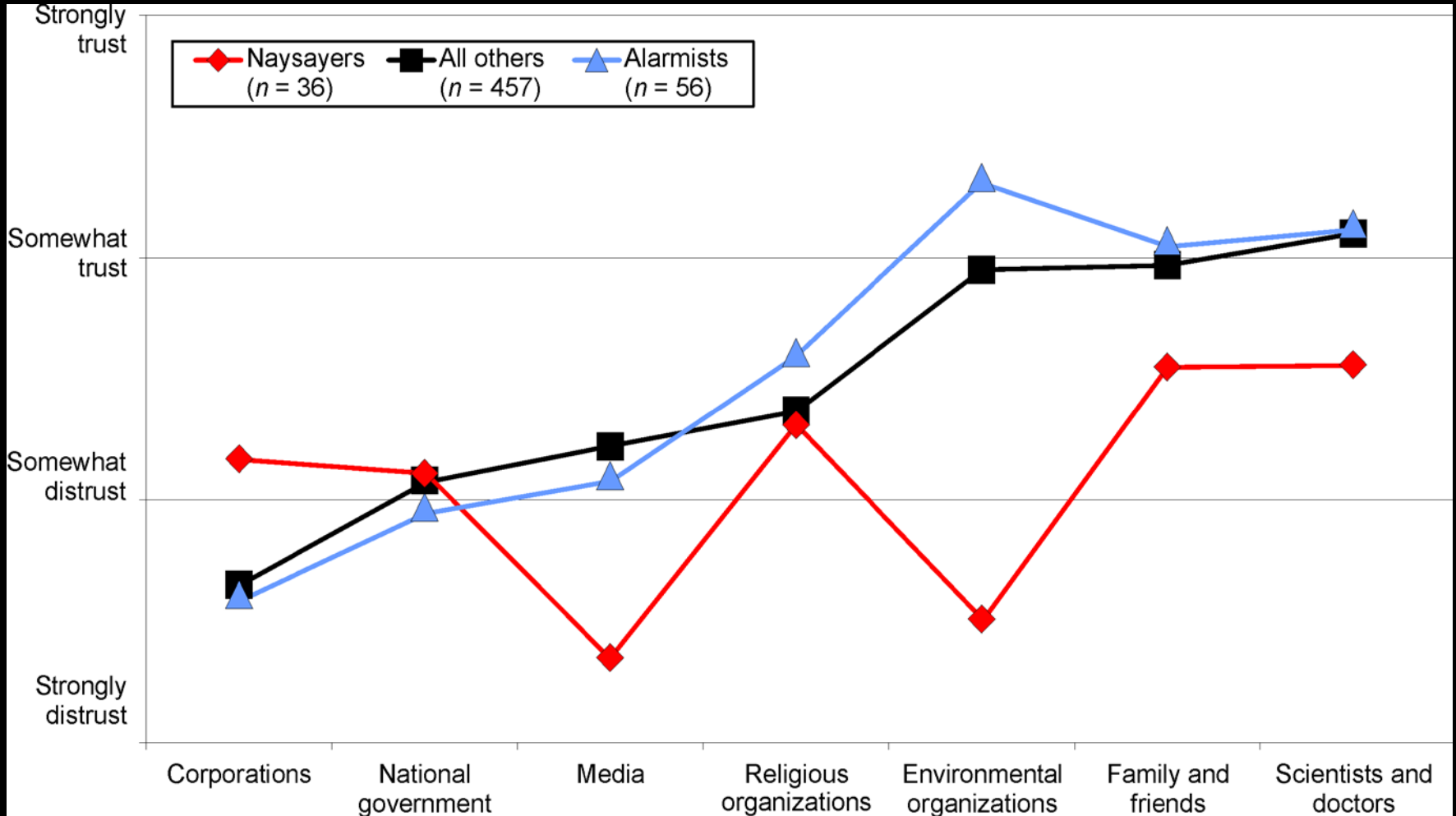
\*Source: A. Leiserowitz, Yale U., October 2003 (n = 2,189)

# Comparing the Publics' Egalitarian Values



# Comparing the Publics' Trust in Sources

How much do you trust the following groups to tell you the truth about global warming?



\*Source: A. Leiserowitz, Yale U., October 2003 (n = 2,189)



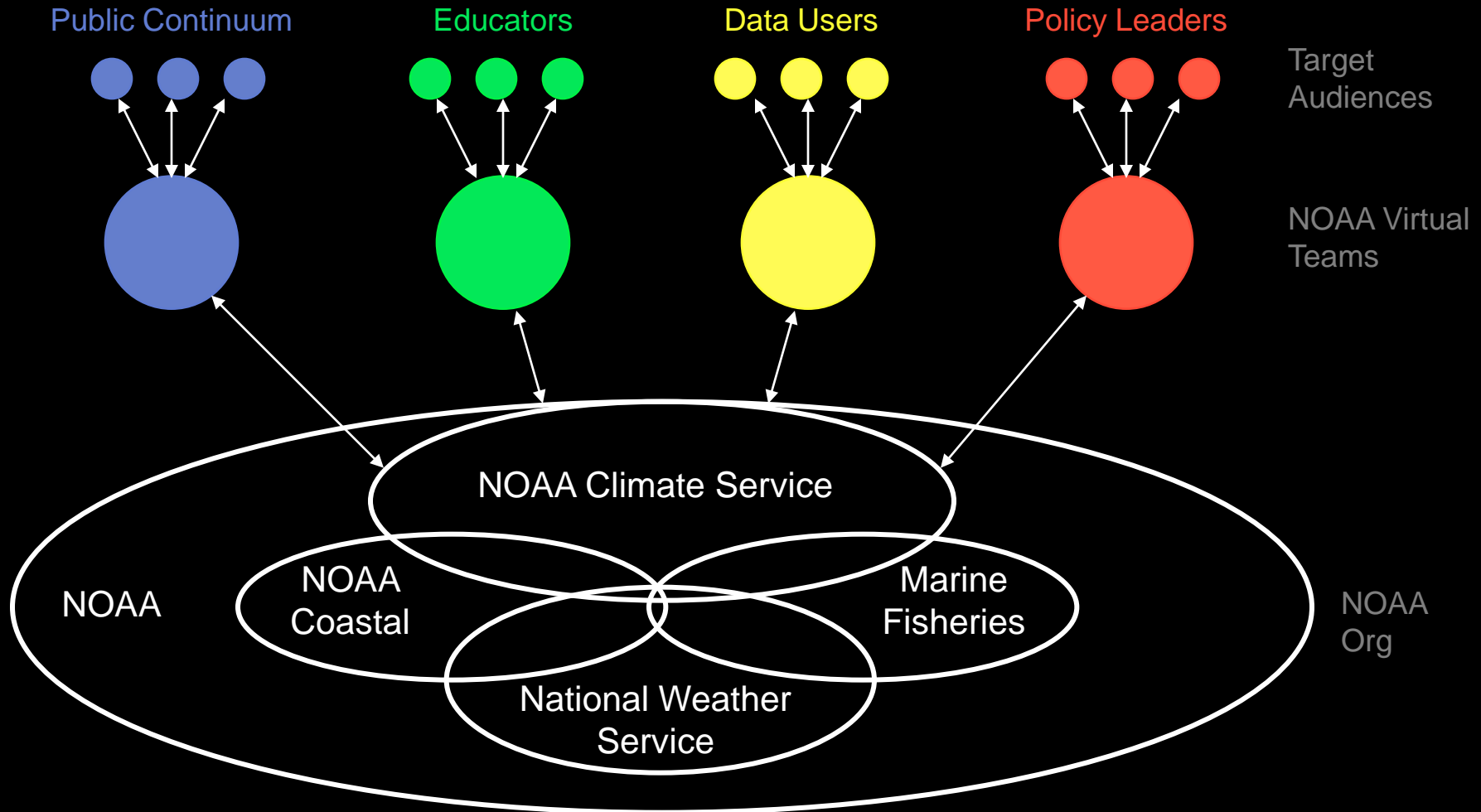
“**Dialog** is the single most underutilized tool in the public affairs portfolio, and the one most likely to yield the greatest long-term **credibility** and **success** in the communications arena of the 21st century. ”

—**Daniel Yankelovich**  
CEO, author, media & marketing research pioneer

## Part IV

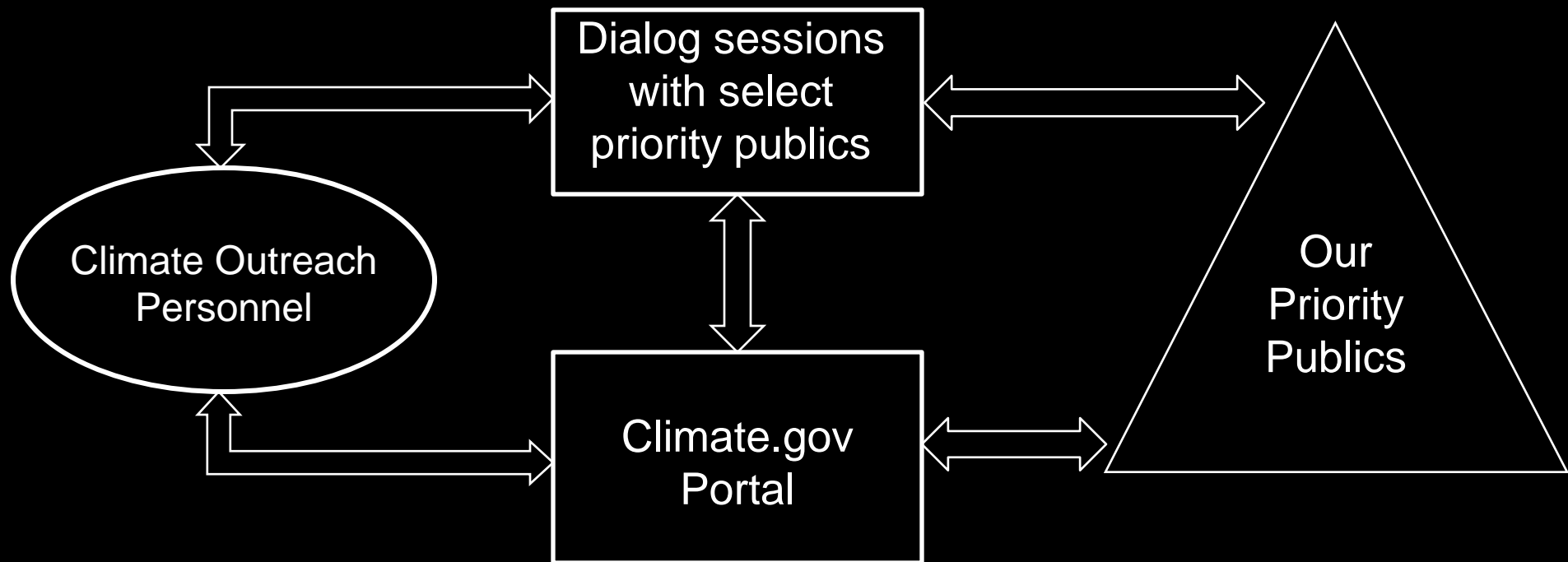
# NOAA Climate Communications Strategy

# The who - start at the audience interface and work backward into the agency





# Two-pronged strategy for building relationships with our publics



# NOAA's Climate Services Portal

<http://www.climate.gov>

The screenshot shows the NOAA Climate Services Portal Development Prototype. At the top, there is a navigation bar with links for NOAA HOME, WEATHER, OCEANS, FISHERIES, CHARTING, SATELLITES, CLIMATE, RESEARCH, COASTS, and CAREERS. The main header features the NOAA logo, the text "NOAA CLIMATE SERVICES" with "NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION" below it, and a "Development Prototype" label. Below the header is a search bar and a navigation menu with tabs for "ClimateWatch Magazine", "Data & Services", "Understanding Climate", and "Education". The main content area is divided into five sections: "Past & Present Climate", "Predictions", "NOAA Partners", "Climate & You", and "Data Library". Each section has a representative image and a brief description of its content.

The NCS Portal Prototype provides a well-integrated, online presentation of NOAA's climate data & services.

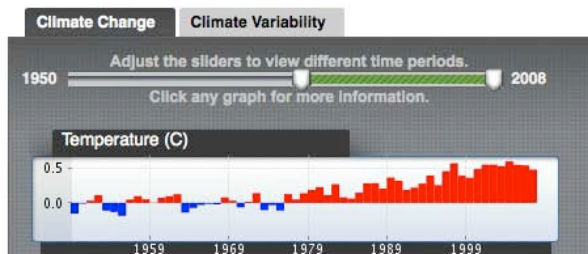
The prototype features four audience-focused sections:

- **ClimateWatch** for the public
- **Data & Services** for scientists and data users
- **Understanding Climate** for policy leaders
- **Education** for educators & students

The **Dashboard** is a data-driven synoptic overview of the state of the global climate system.

**Past Weather** allows users to easily retrieve weather data for any given location & date.

## Global Climate Dashboard



City, State or Zip  
01-14-2010  
Lookup

## News

**Tom Karl, Director of NOAA's National Climatic Data Center Answers Questions About Climate Science**


Mon, 14 Dec 2009

On Friday, Dec. 11, Tom Karl was the guest for a live webchat with Washington Post

# NOAA's New ClimateWatch Magazine


<http://www.climatewatch.noaa.gov>

NOAA HOME WEATHER OCEANS FISHERIES CHARTING SATELLITES CLIMATE RESEARCH COASTS CAREERS

 **NOAA CLIMATE SERVICES**  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NOAA Climate Portal » ClimateWatch Magazine » Articles

ClimateWatch Magazine **Articles** Images Conversations



**An Upwelling Crisis: Ocean Acidification** ▶

Featured Article, Fri, Oct 30th, 2009  
by Caitlyn Kennedy

In the summer of 2007, as oyster growers and hatchery managers in Washington state were experiencing yet another failed oyster harvest, Dr. Richard Feely set off on a research cruise to find out if the seawater itself was the culprit...

[READ ARTICLE ▶](#)

## Recent Articles



### Living with an Uncertain Monsoon

 ▶

Oct 29th, 2009 by Esther Conrad  
In May and June each year, speculation about the coming of the monsoon fills newspapers and conversations across India. Urban dwellers await respite from the heat and investors scrutinize forecasts to anticipate potential impacts on food prices. But none have more at stake than India's over 100 million farming households.



### Carbon Dioxide: Earth's Hottest Topic is Just Warming Up

 ▶

Oct 22nd, 2009 by Caitlyn Kennedy  
Carbon dioxide is everywhere: in the air, rising from cracks in the ocean floor, and in your soda can. Now it's showing up in the news! Find out why carbon dioxide is such a hot topic, and why it's going to be around for a long, long time.



### Rhode Island's Rising Tide

 ▶

Oct 22nd, 2009 by Hanna Goss  
Rhode Island's coasts are already feeling the impacts of rising seas. The Rhode Island Coastal Resources Management Council and Rhode Island Sea Grant are working with the legislature to explicitly address sea level rise and climate change in the state's building code.



### CSI: NOAA Climate Scene Investigators

 ▶

Oct 22nd, 2009 by Katy Human  
In NOAA's version of CSI, Marty Hoerling leads a group of climate and weather researchers who investigate killer climate patterns—heat waves, tornadoes, and floods—to figure out what may have triggered them.

An online magazine written and designed in a popular style. Goal is to grow an attentive public to NOAA & climate.

Contains 3 types of content:

- **Articles** and stories
- **Images** with captions & annotations
- **Videos** with scientists' commentaries

Features social media tools for subscriptions & RSS feeds, content rating, forward to a friend, and forms for facilitated feedback.

Climate Change

Climate Variability

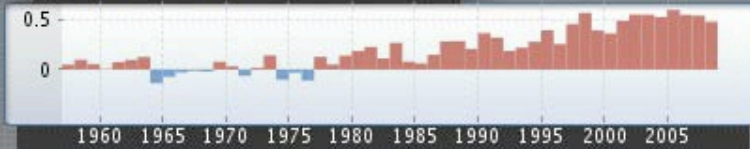
Adjust the sliders to view different time periods.

1957

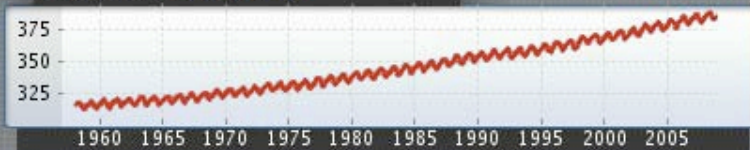
2008

Click any graph for more information.

Temperature (C)



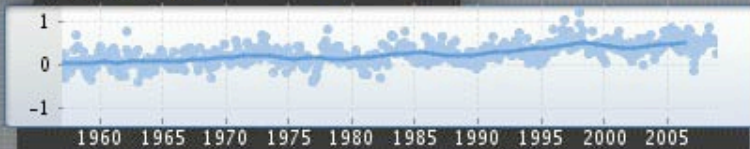
Carbon Dioxide (ppm)



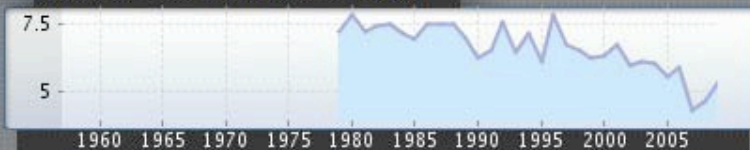
Incoming Sunlight (W/m<sup>2</sup>)



Sea Level (ft)



Arctic Sea Ice (annual min. in million km<sup>2</sup>)



# NCS Portal Dashboard

<http://www.climate.gov>

Just as a dashboard gives instant information on the status of a vehicle's various systems, NOAA's Global Climate Dashboard presents an overview of the current state of Earth's climate system in historical context.

The Dashboard is designed for people seeking a synoptic view about what we know about climate variability and change, particularly policy leaders.

Adjustable sliders up top allow users to focus on the time period of interest.

Hover cursor over graphs to produce brief "tool-tip" snippets stating what each parameter is showing.

Click on graphs to jump to more detailed landing pages with more details produced in a popular style.

Future plans include:

- Adding future climate scenarios out to 2100.
- Making graphs more interactive, using MultiGraph
- Rewriting Dashboard as an appliance that can be syndicated / hosted by others.



# NOAA CLIMATE SERVICES

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Development Prototype



Explore:

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[Data & Services](#)

[Understanding Climate](#)

[Education](#)

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## Featured Professional Development

Browse Featured Events : [1](#) | [2](#) | [3](#) | [4](#) |



## Featured Event

### Climate Change Science On a Sphere (SOS) Sphercast

International climate change education event using a Sphercast from COP15 to United States science centers to show climate change science and to interact with scientists gathered at COP15.

**Date:** December 8, 2009

**Location:** COP 15, Copenhagen, DK

**Type:** Informal Education

[Learn more](#)

## Upcoming Opportunities



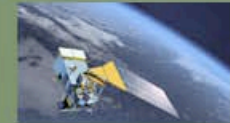
**Climate Change Here and Now: Coastal, Ocean and Atmospheric Impacts (NSTA)**

[Learn more](#)



**Climate Change Here and Now: Forest Ecosystem Impacts (NSTA)**

[Learn more](#)



**NOAA/NSTA Web Seminars on Monitoring Climate Change from Space**

[Sign up](#)

## Resources



**Global Climate Change Impacts in the Western United States**

[Learn info](#)



**Global Climate Change Impacts in the Eastern United States**

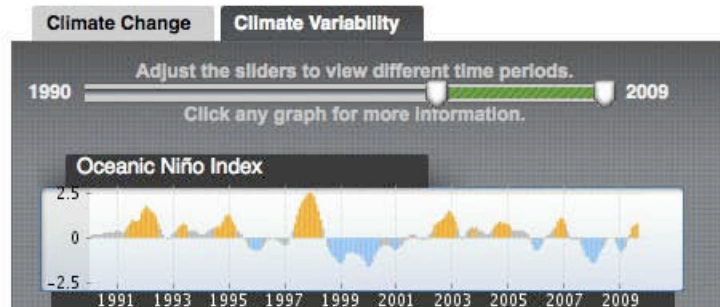
[Learn more](#)



**Climate Change: Fitting the Pieces Together (COMET)**

[Learn more](#)

## Global Climate Dashboard



City, State or Zip

02-01-2010

## News

### Tom Karl, Director of NOAA's National Climatic Data Center Answers Questions About Climate Science

Mon, 14 Dec 2009

On Friday, Dec. 11, Tom Karl was the guest for a live webchat with Washington Post readers about the science of climate change.