

Communicating Uncertainty in Climate Change



ENVIRONMENTAL
LAW • INSTITUTE®



MINNESOTA
PUBLIC RADIO®

Paul Huttner
Chief Meteorologist
Minnesota Public Radio



So you wanna be a Broadcast Meteorologist???



You might want to be a Broadcast Meteorologist if:

- Explain a complex science to general public
- Issue weather forecasts of varying **uncertainty**...
- Suffer public ridicule when forecast goes horribly bad
- Endure 'Polar Vortex weather hate mail'
- Enjoy constant joking about "being wrong half the time and still getting paid."
- **Meteorologists must communicate varying levels of uncertainty daily! (forecast models & outcomes)**



MPR weekly radio show on climate science



**MINNESOTA
PUBLIC RADIO®**

Established in February 2013



MPR weekly radio show on climate science

MPRnews

Wednesday, September 17, 2014



55° in [Twin Cities](#)

[Weather Report >](#)

[Traffic Report >](#)

Member Supported · [Join Now >](#)

[Arts & Culture](#)

[MN Today](#)

[Politics](#)

[Business](#)

[Education](#)

[Environment](#)

[Health](#)

[Regional](#)

[Ground Level](#)



MPR NEWS

Hourly News

ON

[Find A Program](#)

SPONSOR

MINNEAPOLIS



[Related](#)

Climate Cast

What economists can teach climate change scientists

Bob Litterman, former head of the risk department at Goldman Sachs, explains how risk models common to the financial industry can help craft climate policy.

[The Daily Circuit, September 10, 2014](#)

Our continuing look at climate change

The latest research on our changing climate.

[The Daily Circuit, September 3, 2014](#)

How climate change could ruin your breakfast

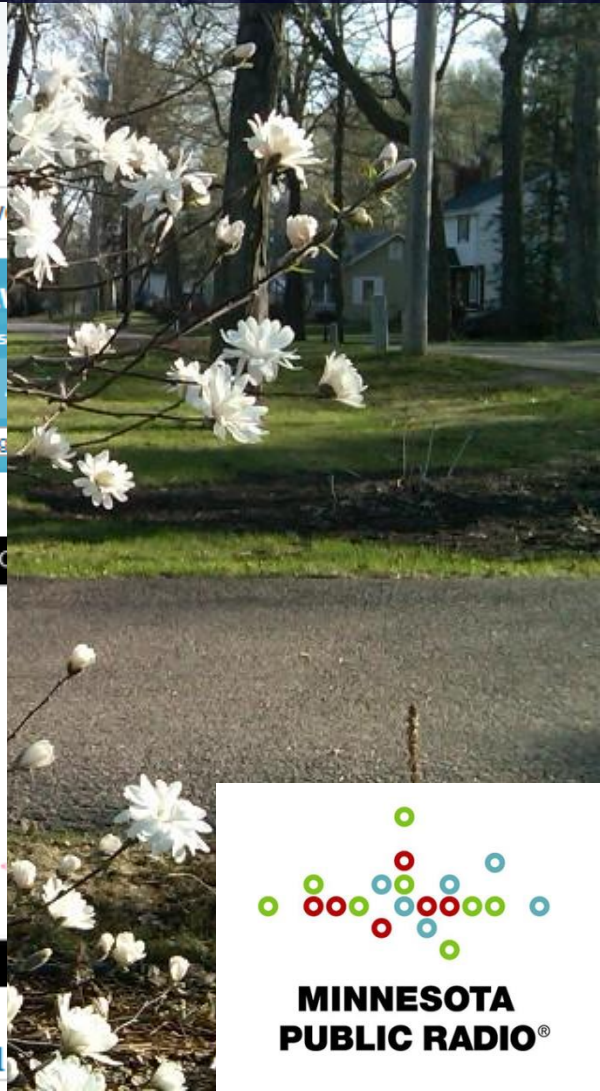
Hazelnut prices are spiking and that's bad news for lovers of Nutella spread.

[The Daily Circuit, August 28, 2014](#)

Climate Cast

MPR Meteorologist Paul Huttner and University of St. Thomas Professor John Abraham will be talking about the unusually hot world temperatures in 2014 and take your questions.

[The Daily Circuit, August 21, 2014](#)



**MINNESOTA
PUBLIC RADIO®**

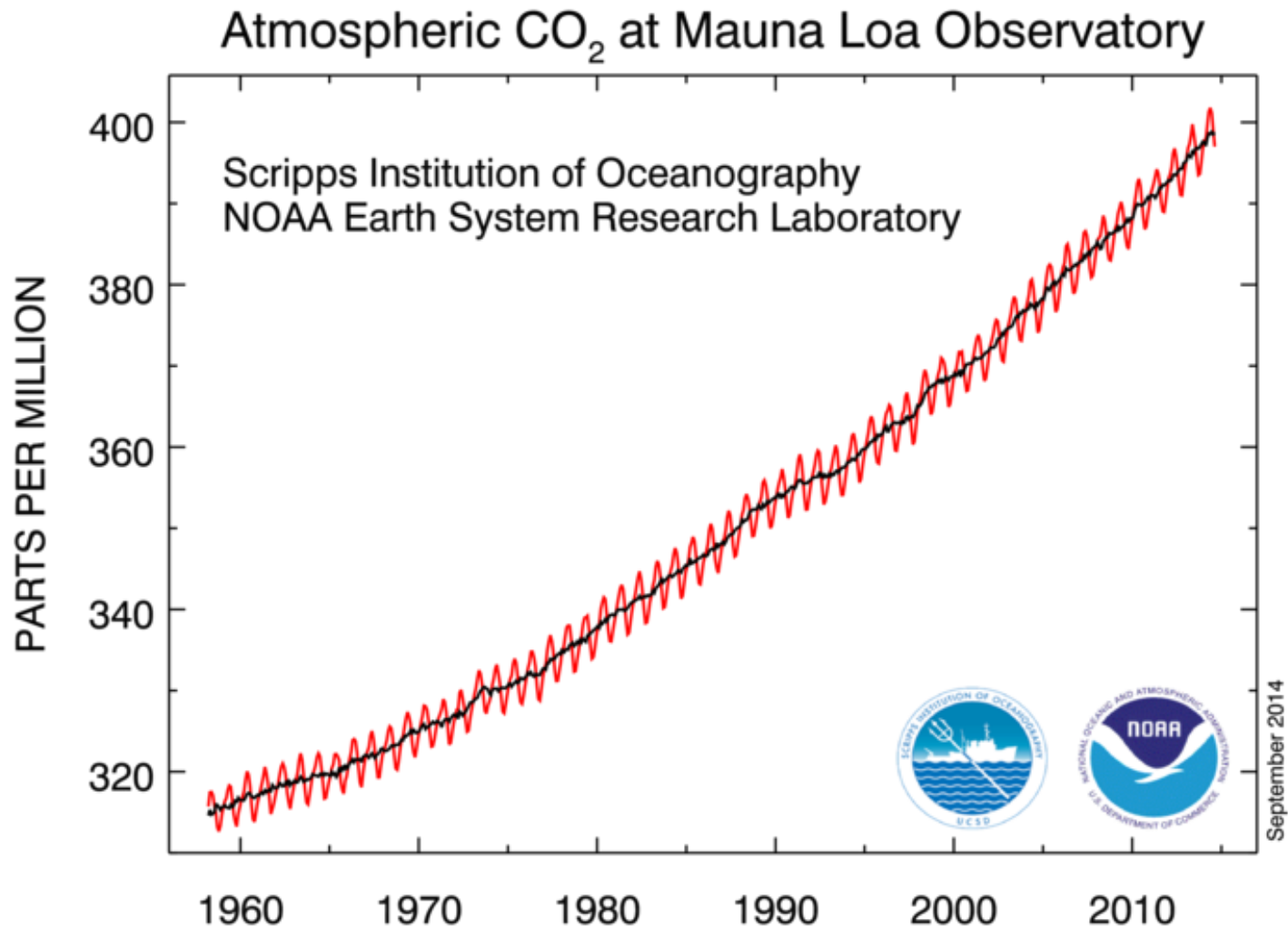
Climate Cast mission

- What is the latest evolving climate science?
- How to best *communicate* climate science?
- Make sometimes obscure trends *meaningful*
- Relate to peoples weather/climate experience
- Use analogies to make trends clearer
- Stick to science – avoid policy advocacy

How do we communicate inherent uncertainty in CC?

- What data is **observed**? (measured)
- What trends are forecast? (modeled)
- What extreme weather events “fit”?
- Observed extreme weather trends through the lens of what was predicted by climate change?

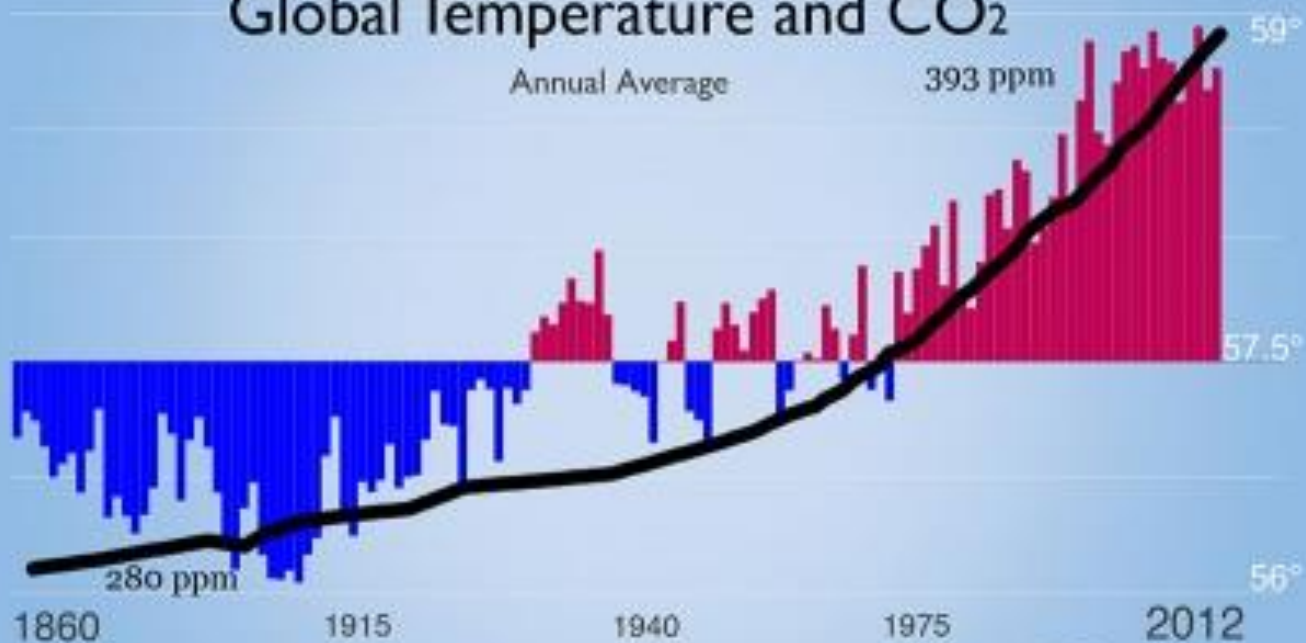
Highest certainty: Observed/measured data



Global Temperature and CO₂

Annual Average

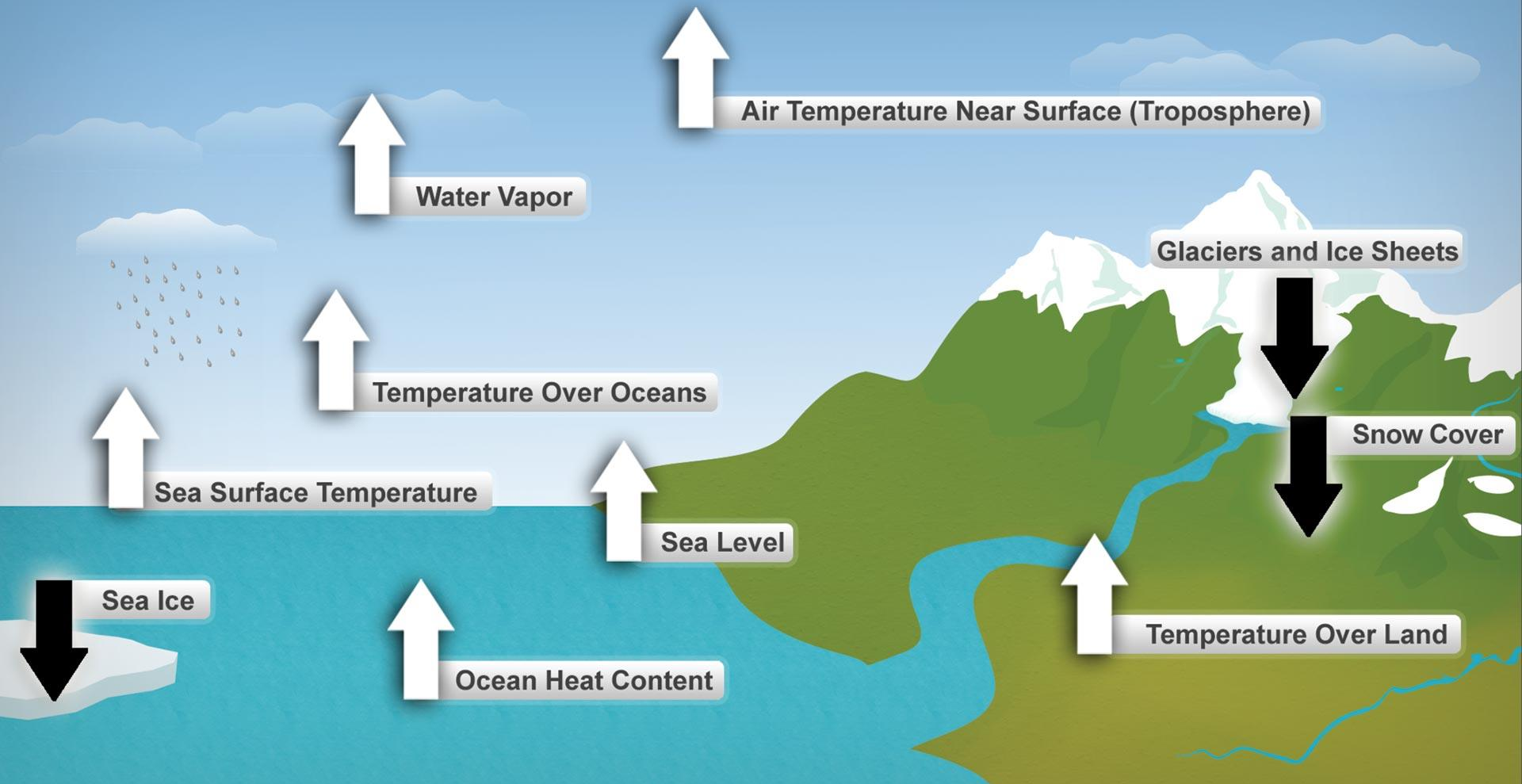
393 ppm



Data: NOAA/National Climatic Data Center

CLIMATE  CENTRAL

Ten Indicators of a Warming World



These are just some of the indicators measured globally over many decades that show that the Earth's climate is warming. White arrows indicate increasing trends; black arrows indicate decreasing trends. All the indicators expected to increase in a warming world are increasing, and all those expected to decrease in a warming world are decreasing. (Figure source: NOAA NCDC, based on data updated from Kennedy et al. 2010¹).

Global Climate Change: Recent Impacts ⁷

Phenomena	Likelihood that trend occurred in late 20th century
Cold days, cold nights and frost less frequent over land areas	Very likely >90%
More frequent hot days and nights	Very likely >90%
Heat waves more frequent over most land areas	Likely >66%
Increased incidence of extreme high sea level *	Likely >66%
Global area affected by drought has increased (since 1970s)	Likely in some regions >66%
Increase in intense tropical cyclone activity in North Atlantic (since 1970)	Likely in some regions >66%

* Excluding tsunamis, which are not due to climate change.

IPCC/NASA

Global Climate Change: Future Trends ⁸

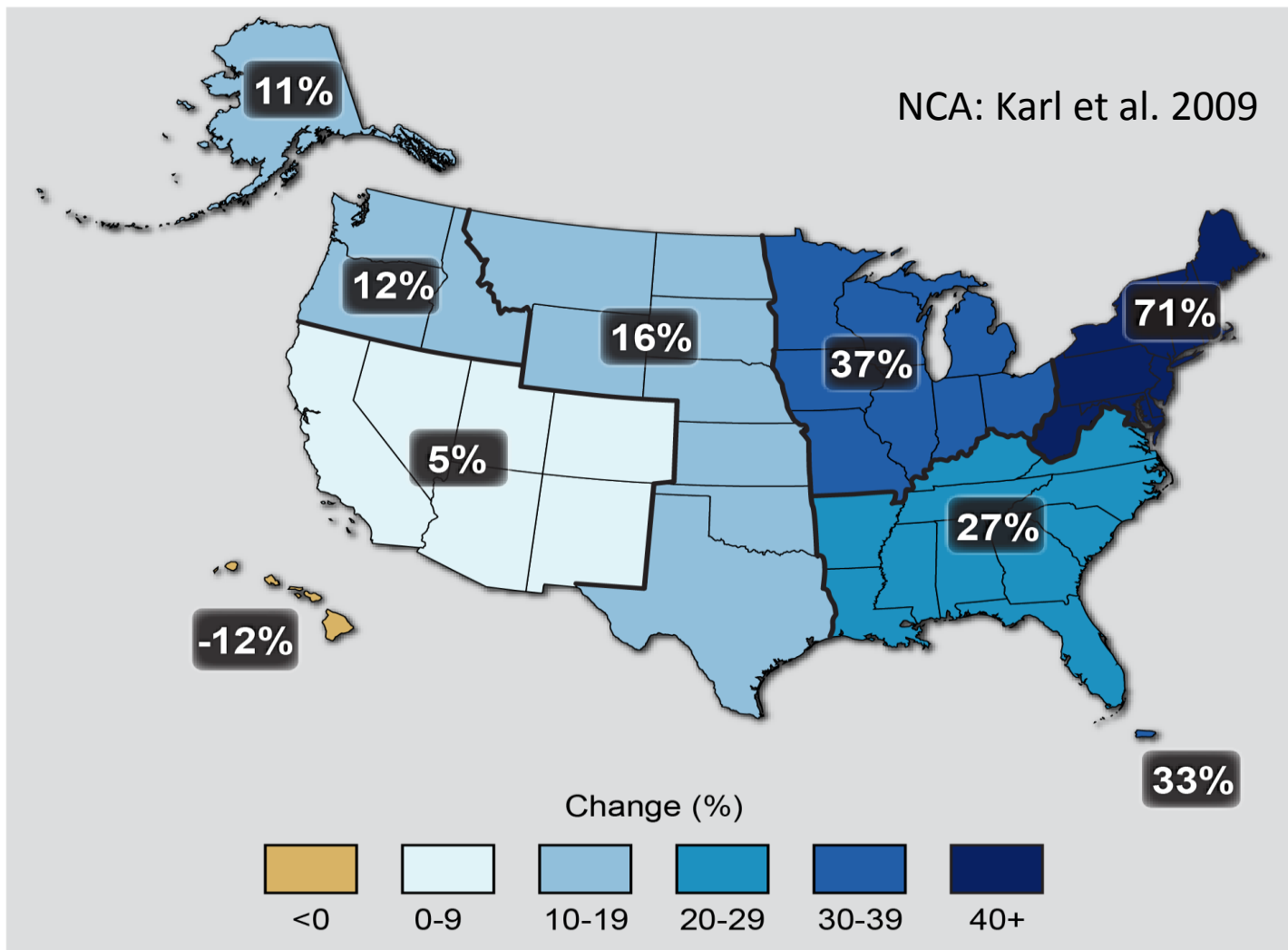
Phenomena	Likelihood of trend
Contraction of snow cover areas, increased thaw in permafrost regions, decrease in sea ice extent	Virtually certain >99%
Increased frequency of hot extremes, heat waves and heavy precipitation	Very likely to occur >90%
Increase in tropical cyclone intensity	Likely to occur >66%
Precipitation increases in high latitudes	Very likely to occur
Precipitation decreases in subtropical land regions	Very likely to occur
Decreased water resources in many semi-arid areas, including western U.S. and Mediterranean basin	High confidence

Definitions of likelihood ranges used to express the assessed probability of occurrence: **virtually certain >99%, very likely >90%, likely >66%.**

Source: Summary for Policymakers, IPCC Synthesis report, November 2007
<http://www.ipcc.ch/>

Source: IPCC via NASA

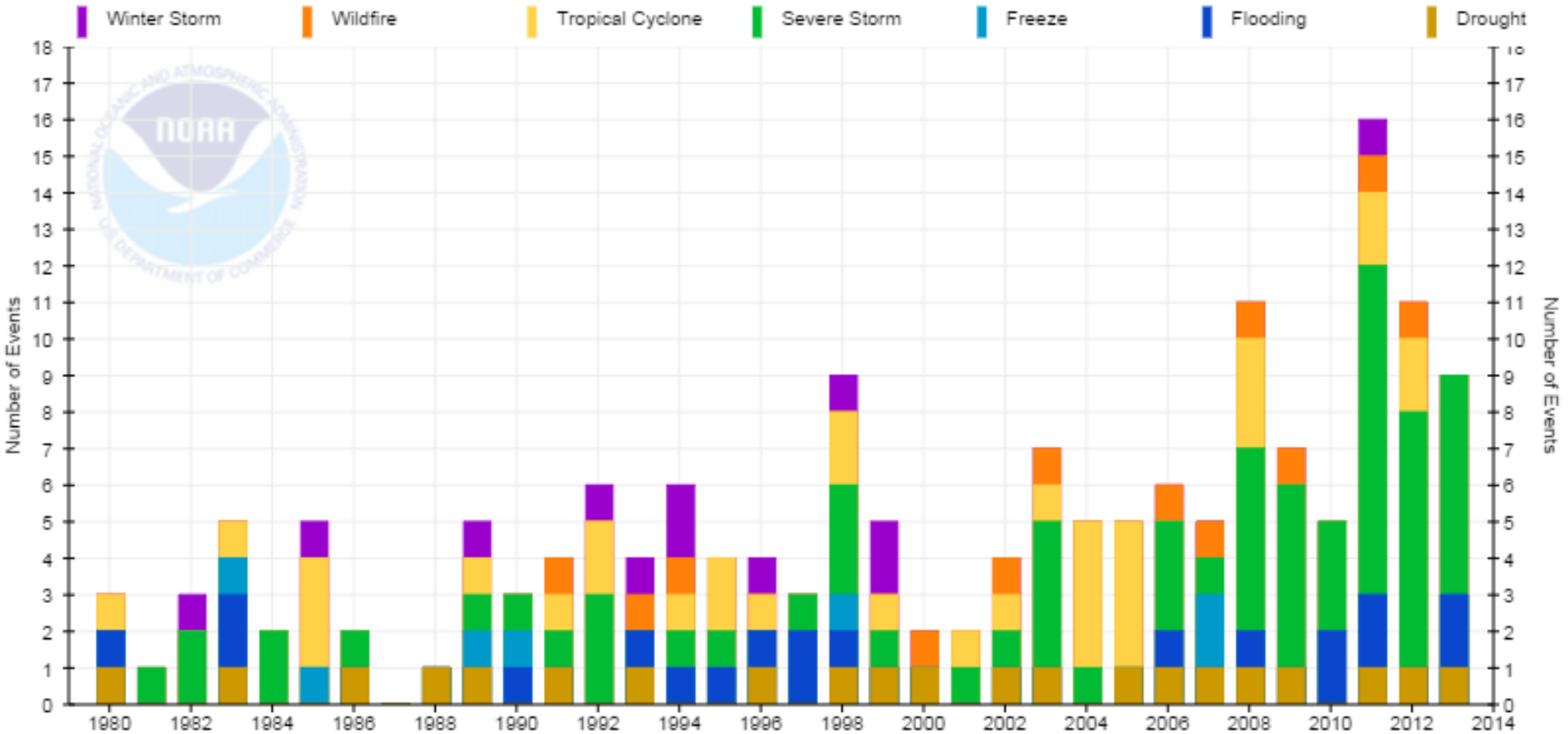
Observed Change in Very Heavy Precipitation



National Climate Assessment: Percent changes in the amount of precipitation falling in very heavy events (the heaviest 1%) from 1958 to 2012 for each region. There is a clear national trend toward a greater amount of precipitation being concentrated in very heavy events, particularly in the Northeast and Midwest. Karl et al. 2009

Follow the money?

Billion-Dollar Disaster Event Types by Year (CPI-Adjusted)



Hurricane Sandy?

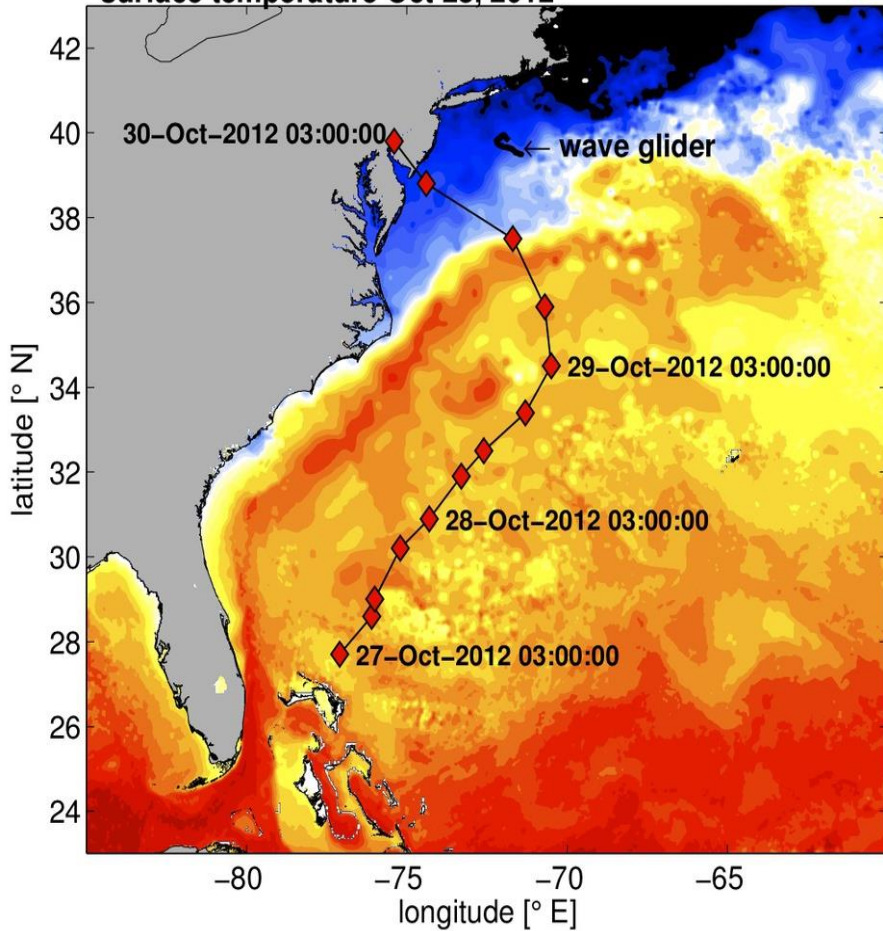
Sandy Pinned & Pushed West

Makings of a "Frankenstorm"

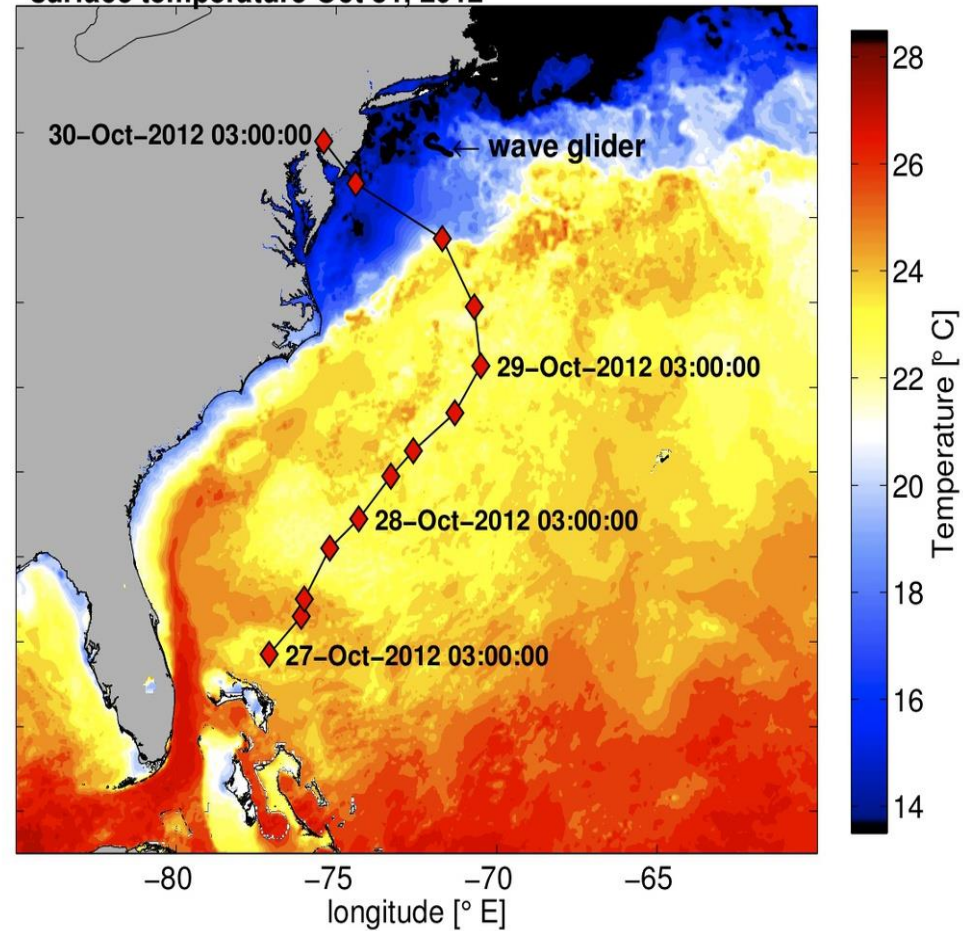


Water temps +5F

surface temperature Oct 28, 2012



surface temperature Oct 31, 2012



Is all weather now colored by climate change?

The answer to the oft-asked question of whether an event is caused by climate change is that it is the wrong question. All weather events are affected by climate change because the environment in which they occur is warmer and moister than it used to be....

The air is on average warmer and moister than it was prior to about 1970 and in turn has likely led to a 5–10 % effect on precipitation and storms that is greatly amplified in extremes. The warm moist air is readily advected onto land and caught up in weather systems as part of the hydrological cycle, where it contributes to more intense precipitation events that are widely observed to be occurring.

Kevin E. Trenberth, senior scientist, National Center for Atmospheric Research, in the journal *Climatic Change*, released under a Creative Commons-Attribution license (PDF [here](#), HTML [here](#))

Extreme weather & climate change-John Abraham-UST

What can we tie to humans?

Increases in extreme temperatures (heat waves)

Increased intense precipitation events (both continental as well as along coasts with more rainfall from hurricanes)

Increased rate of evaporation and drought setting on faster and longer

Increased extreme weather from jet stream fluctuations – potentially tied to loss of arctic ice and snow cover in NH

Increased regional flooding

Rising Sea level (not really a “weather” problem but when you connect it to storm surge with hurricanes, a real problem)

Increased thunderstorms

Where are there real questions?

Tornadoes?

What will happen to hurricanes?