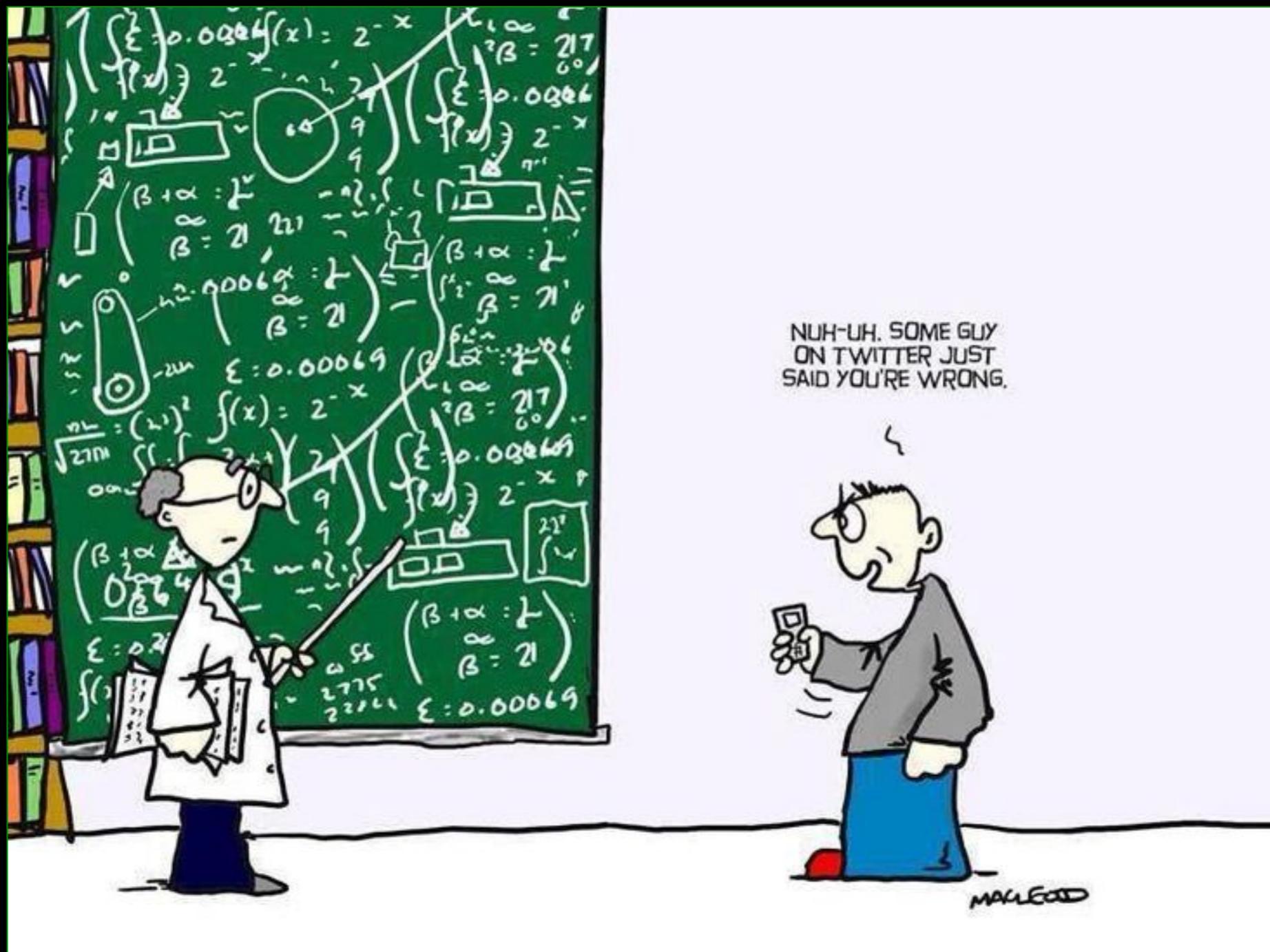


Challenges of Communicating Weather and Climate Extremes:

Southeast Climate Consortium,
Oct 19th University of Georgia





J. MARSHALL SHEPHERD, PhD

Distinguished Georgia Athletic Association Professor

Director, UGA Atmospheric Sciences Program

2013 President, American Meteorological Society

Host, Weather Channel's WxGeeks

@DrShepherd2013

Why I am Here?

“

I believe too many scientists are comfortable in the ivory tower, journal space, and conferences. However, a gale of misinformation rushes in to replace the void if scientists are not communicating to the public, stakeholders, and students.

Dr. Marshall Shepherd

”

Why I Do This?



For doing scientific outreach you must:

“establish scientific credibility and carefully evaluate whether they have the unshakeable temperament that is necessary for times when they may be challenged”

--Dr. Marshall Shepherd in <http://www.nature.com/naturejobs/science/articles/10.1038/nj7533-231a>

Who's Your Speaker Today?

Please Join
 Gala Co-Chairs, *Natalie Allen* & *Gara Isdell Lee*,
 and the CPF Board of Directors as we celebrate the incomparable
Dr. Jane Goodall (Exemplar Awardee),
Dr. Marshall Shepherd (Protector of the Earth Awardee),
Carter & *Olivia Ries* (Young Superhero for Earth Awardees)
 and other amazing environmental heroes.
 Our special guest will be CNN broadcast legend, *Larry King*.

Buy
 Tickets
 Now



Don't miss out! This eco-benefit is known to sell out, so we encourage you to purchase your tables or tickets early.



Weather Geeks

8/3 12:00p - 12:30p | TV-G

Weather. J. Marshall Shepherd. No information available. Series, Talk.

5:50p
 Fri 8/1



Sun 8/3	11:30a	12:00p	12:30p
362 WEAHD	< Weather Center Live	Weather Geeks	Weather Center Live >
363 GEBA	Christ for All Nations	Joel Osteen	Joyce Meyer: Battl...
364 INSP	< Dr. Quinn, Medicine...	Christy	
365 GTV	< Lest We Forget	Power 4 Today	Call for Prayer >
366 JLTV	< Talkline With Zev Br...	Shalom Sesame	
367 WHT	Champion Forest Ba...	Rabbi Jonathan Ber...	International Fello...

- 12hrs + 12hrs Guide Options

Forbes / Tech

10 Stocks to Buy Now

AUG 16, 2015 @ 4:39 PM 9,254 VIEWS

10 Common Myths And Misconceptions About The Science Of Weather



Marshall Shepherd, CONTRIBUTOR

I write about weather and climate related topics (and study them too)

FOLLOW ON FORBES (7)

Opinions expressed by Forbes Contributors are their own.

FULL BIO

Well, it's that time of year. Media organizations are covering the "forecast" from the *Old Farmer's Almanac*. This year it is saying more freezing temperatures and more snow. I am not going to write about the accuracy of almanacs. There are good discussions about this by [Eric Holthaus in Slate](#), Meteorologist [Scott Sabol](#) or [Capital Weather Gang](#).

GSK and Singapore,
 40-years of
 partnership in Asia.

Read on
 to find your edge in Asia.

singapore



Senate Briefing, EPW, 2013



White House,
Moderated Champions
of Change Event, 2015

So What Are The Challenges?

- Everyone Has a Bully Pulpit Now.....
- Too Many Graphs, Not Enough Common Ground
- “I have 20 inches of Global Warming in my yard”...
Cute Tweet But Oh So Scientifically Wrong
- Overcoming Perceptions
- The Causation Problem
- Zombie Theories

Challenge #1:

Everyone Has A Bully Pulpit
Now

HOW TO GET AWAY WITH SAYING SOMETHING CRAZY

1. Begin with "I'm no expert, but"

2. Say something crazy.

3. End with "I'm just asking questions."

I'M NO EXPERT, BUT...

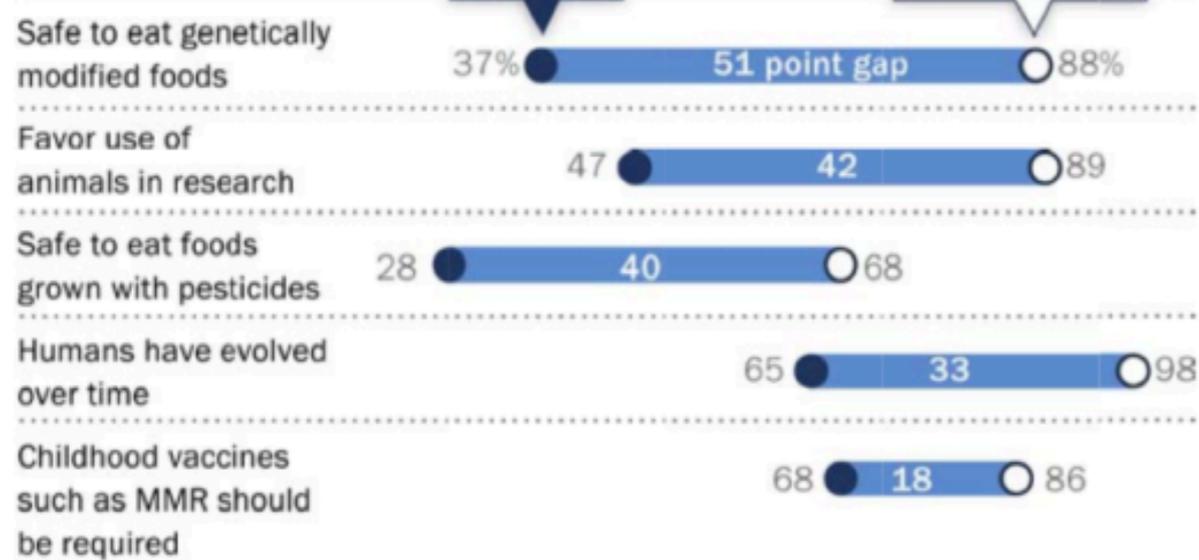
MAYBE KENNEDY WAS ASSASSINATED BY NASA BECAUSE HE LEARNED THEY WERE GOING TO FAKE THE MOON LANDING.

I'M JUST ASKING QUESTIONS!

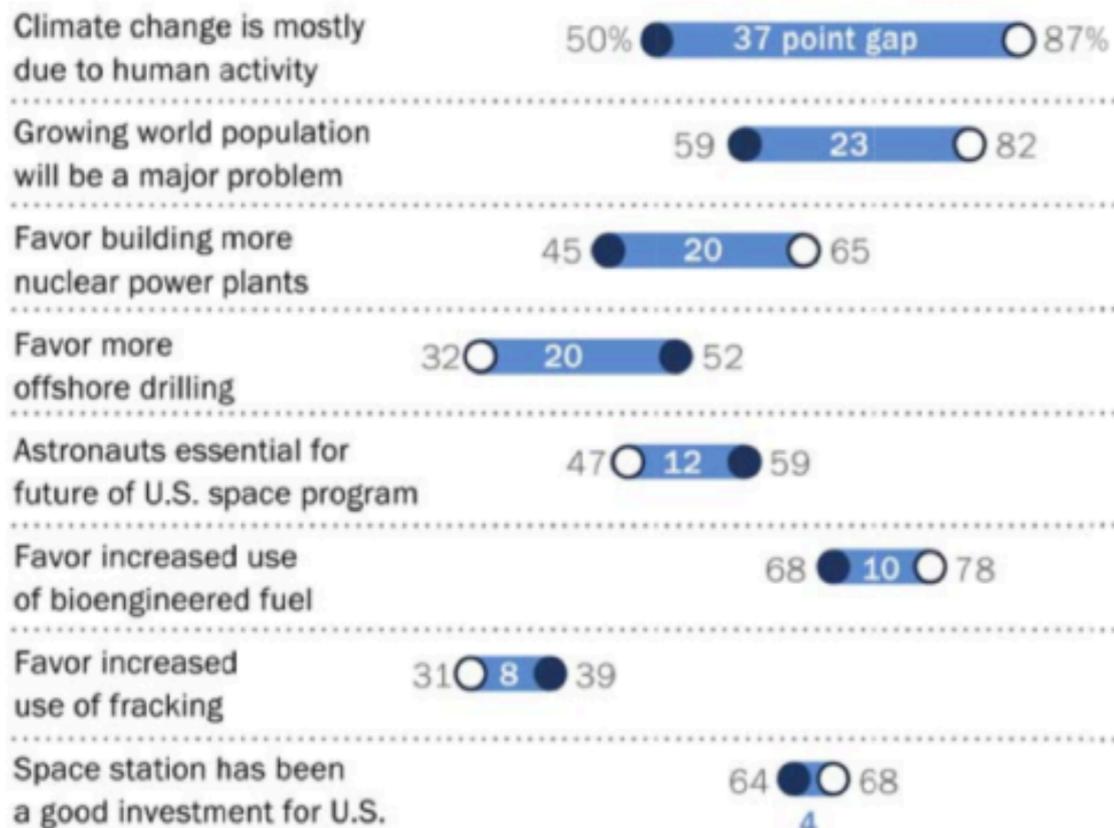
Opinion Differences Between Public and Scientists

% of U.S. adults and AAAS scientists saying each of the following

Biomedical sciences



Climate, energy, space sciences

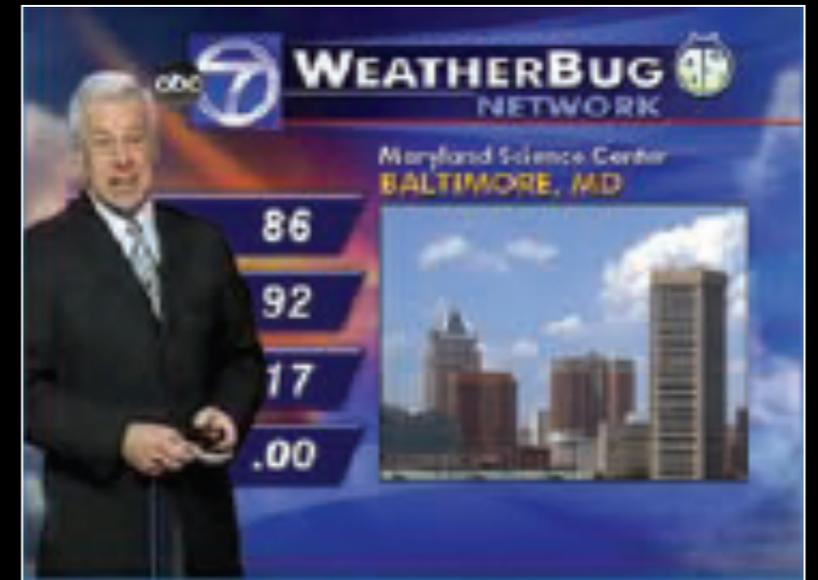
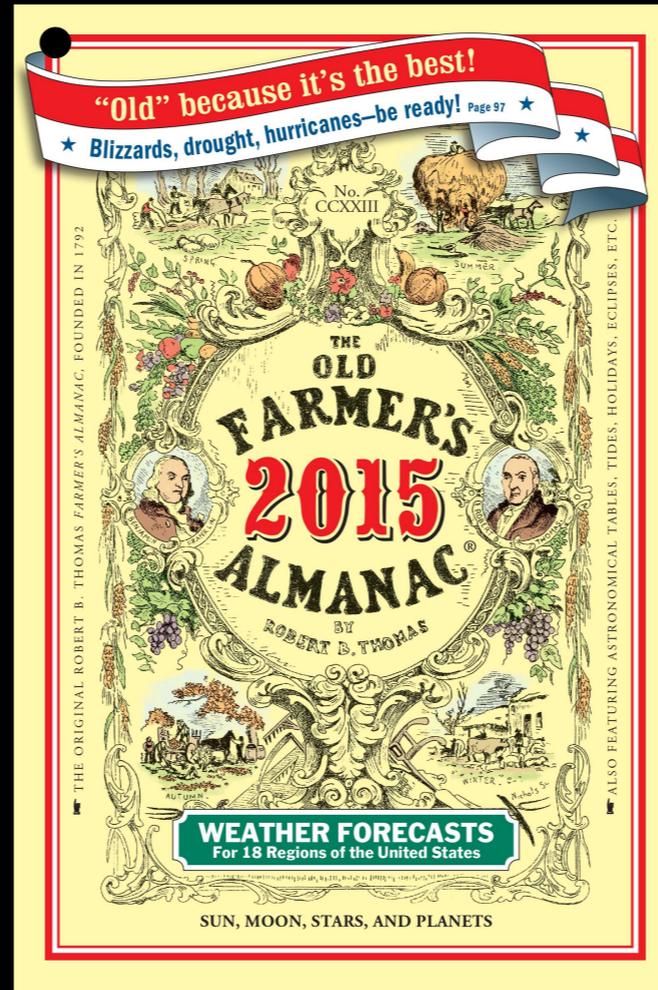


Survey of U.S. adults August 15-25, 2014. AAAS scientists survey Sept. 11-Oct. 13, 2014. Other responses and those saying don't know or giving no answer are not shown.

Yikes!



Who's the Expert on Weather and Climate?

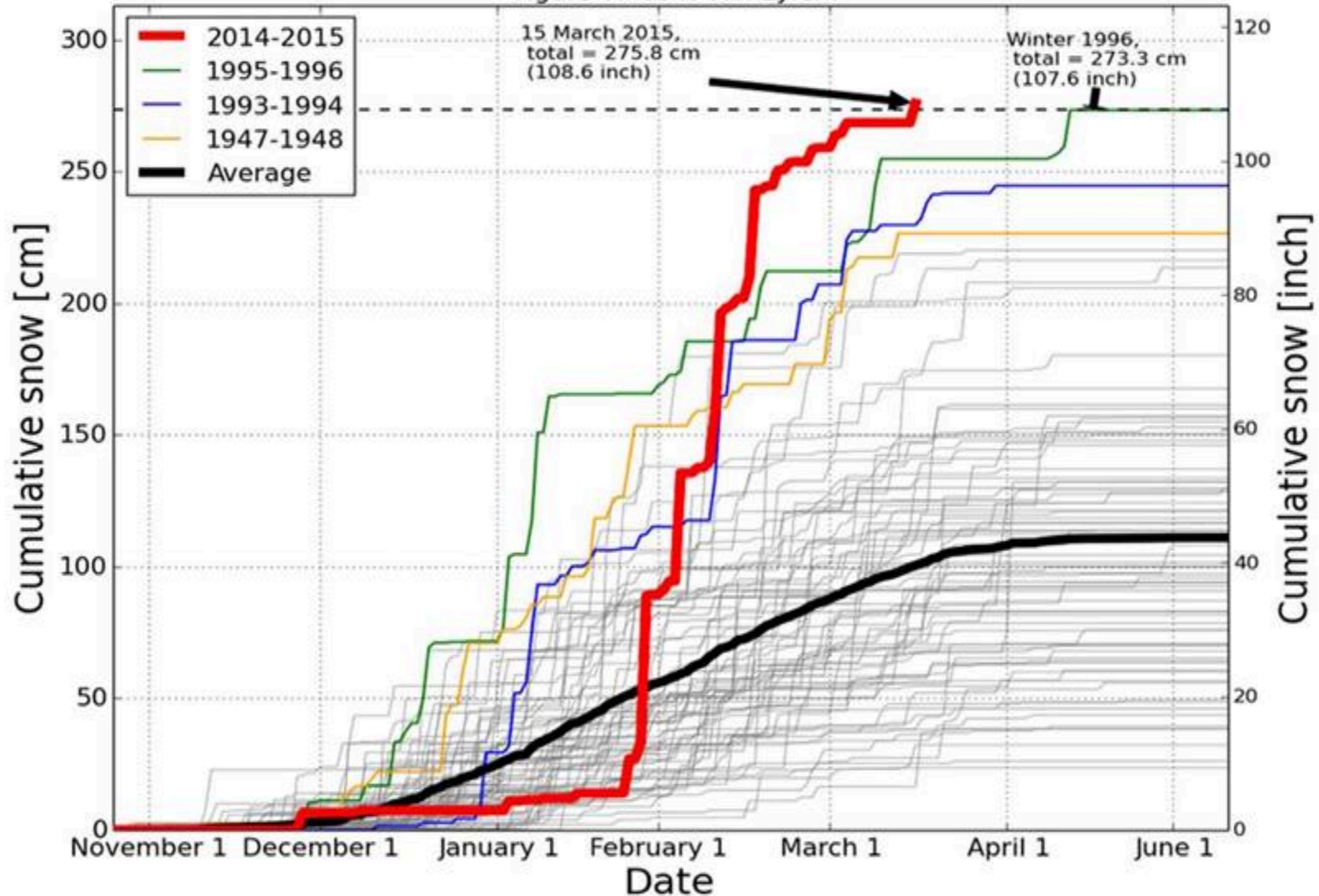


Challenge #2:

Too Many Graphs, Not
Enough Common Ground

Graphical Display of Boston Snow Statistics Since 1938

Cumulative snowfall in Boston per winter since 1938.
Data from NOAA (Boston Logan Station).
Figure Vincent Van Eylen.

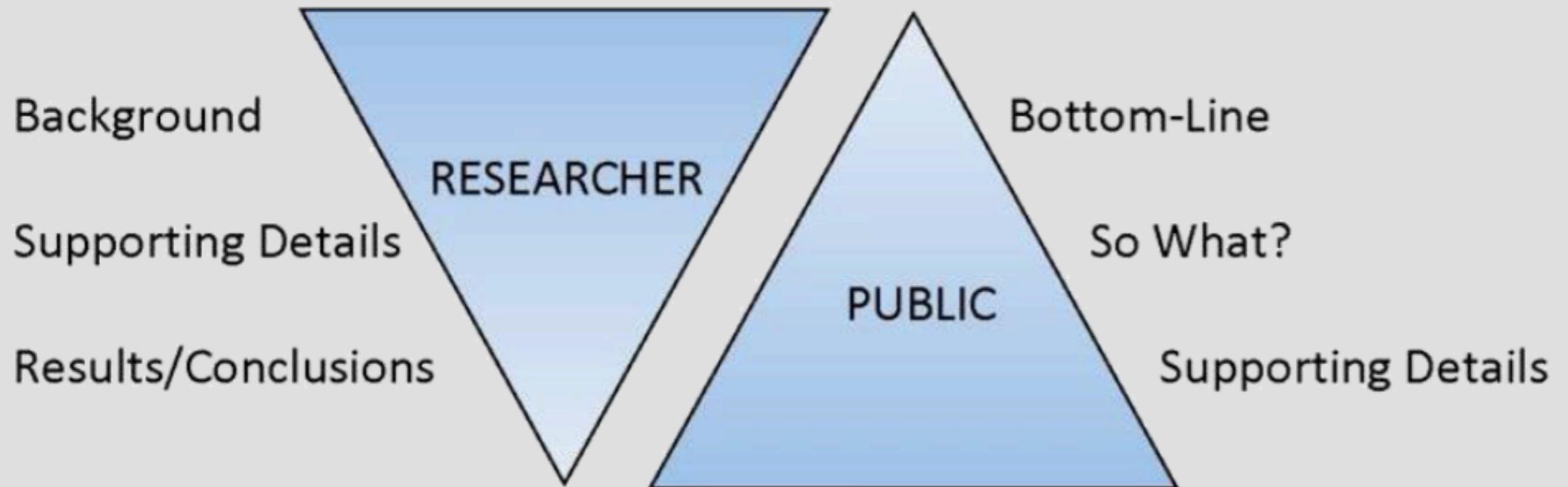


Terms that have different meanings for scientists and the public

Scientific term	Public meaning	Better choice
enhance	improve	intensify, increase
aerosol	spray can	tiny atmospheric particle
positive trend	good trend	upward trend
positive feedback	good response, praise	vicious cycle, self-reinforcing cycle
theory	hunch, speculation	scientific understanding
uncertainty	ignorance	range
error	mistake, wrong, incorrect	difference from exact true number
bias	distortion, political motive	offset from an observation
sign	indication, astrological sign	plus or minus sign
values	ethics, monetary value	numbers, quantity
manipulation	illicit tampering	scientific data processing
scheme	devious plot	systematic plan
anomaly	abnormal occurrence	change from long-term average

A table from the article :
[Communicating the Science of Climate Change,](#) by Richard C. J. Somerville and Susan Joy Hassol, from the October 2011 issue of *Physics Today*, page 48:

Different styles of communication



Farmers skeptical about validity of climate change

May 9, 2014 by Mick Kulikowski



The recently released **National Climate Assessment**, reported by a team of 300 experts, including a panel from the National Academy of Sciences, asserts that climate change is already impacting the United States, and that the warming of the past 50 years is "primarily due to human-induced emissions of heat-trapping gases."

Gwinnett Place Ford

**WHY BUY
PRE-OWNED
PEACE OF MIND**

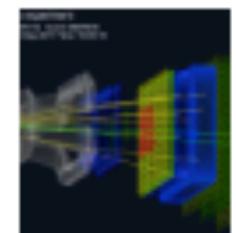
Great Savings
and
Big Savings

**FORD CERTIFIED
PRE-OWNED**

Backed by
Ford Motor Company

GwinnettPlaceFord.com

Featured



Best of
revolutionary
reactor
thinking

Use E.L.F.L.A.N.D (via USFS Steve McNulty)

- E Establish Contact
- L Listen
- F Find Common Ground
- L Lessen Mistrust
- A Assess Needs
- N Nurture
- D Deliver

A CLIMATE SCIENTIST'S ELEVATOR PITCH

I WOULDN'T START WITH SCIENCE.
START WITH VALUES.

SAY WHAT YOU CARE ABOUT.
FIND COMMON GROUND WITH THE
PERSON YOU ARE TALKING TO.

THEN, THE SCIENCE MESSAGE
GOES LIKE THIS: IT'S REAL.
IT'S US. IT'S BAD. BUT THERE
ARE ALL KINDS OF SOLUTIONS.



I ♥ KATHARINE HAYHOE!

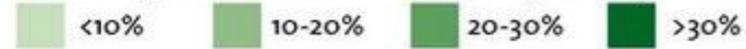
AN EXAMPLE: I CARE ABOUT TEXAS.* WE DON'T HAVE A FUTURE WITHOUT WATER. CLIMATE CHANGE WILL MAKE WATER MORE SCARCE HERE.** WE KNOW CLIMATE IS CHANGING AND HUMANS ARE RESPONSIBLE.*** BUT HERE ARE ALL THE GREAT THINGS WE'RE ALREADY DOING [GIVE EXAMPLES!] AND WE CAN DO MORE IN TEXAS TO BENEFIT OURSELVES AND GIVE OURSELVES A MORE SECURE FUTURE.****

*START WITH VALUES AND A PERSONAL CONNECTION **GIVE THE LOCAL CONTEXT ***TALK SCIENCE IN PLAIN TERMS ****TALK ABOUT LOCAL SOLUTIONS AND BENEFITS.
AND SANDWICH THE WHOLE THING IN VALUES! SEE THE ORIGINAL VIDEO AT CLIMATECROCKS.COM

Where Does Your Food Come From?

California's drought affects the whole country's fruits, veggies, and nuts.

Percentage of Total US Production by County



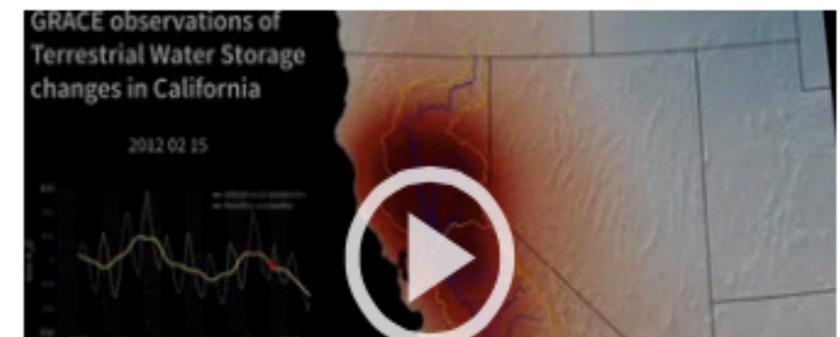
Crop maps based on 2012 figures. Data: US Drought Monitor, California Department of Food and Agriculture, US Department of Agriculture. Art: US Drought Monitor, Wikimedia Commons.

Common Ground...



Op-Ed

California has about one year of water left. Will you ration now?



Industry Awakens to Threat of Climate Change

By CORAL DAVENPORT JAN. 23, 2014

EMAIL

FACEBOOK

TWITTER

SAVE

MORE



WASHINGTON — Coca-Cola has always been more focused on its economic bottom line than on global warming, but when the company lost a lucrative operating license in India because of a serious water shortage there in 2004, things began to change.

Today, after a decade of increasing damage to Coke's balance sheet as global droughts dried up the water needed to produce its soda, the company has embraced the idea of climate change as an economically disruptive force.

“Increased droughts, more unpredictable variability, 100-year floods every two years,” said Jeffrey Seabright, Coke's vice president for environment and water resources, listing the problems that he said were also



A Coke bottling plant in Winona, Minn. The company has been affected by global droughts. Andrew Link/Winona Daily News, via Associated Press

“Increased drought, more unpredictable variability, 100-year floods every 2 year,” said Jeffrey Seabright, Coke's VP for Environment and Water Resources, when we look at our essential ingredients, we see those events as threats”

Challenge #3:

“I have 20 inches of Global Warming in my yard”...Cute Tweet But Oh So Scientifically Wrong.....

*Weather is your Mood,
Climate is your personality*



Weather →

← Climate

Uncertainty: Blame O.J.



Uncertainty?

“I find now that in the era of ‘arm-chair’ science – many people just don’t understand the scientific process, the peer-review process, etc. They see things more like a legal system and reasonable doubt. If there is reasonable doubt or slight uncertainty, they think the basic scientific premise is flawed. Science doesn’t work that way. There is uncertainty in an 80% chance of rain, but you will probably grab an umbrella. There is uncertainty in many medical doctors’ diagnoses, but we consume the information” ---**Dr. J. Marshall Shepherd**

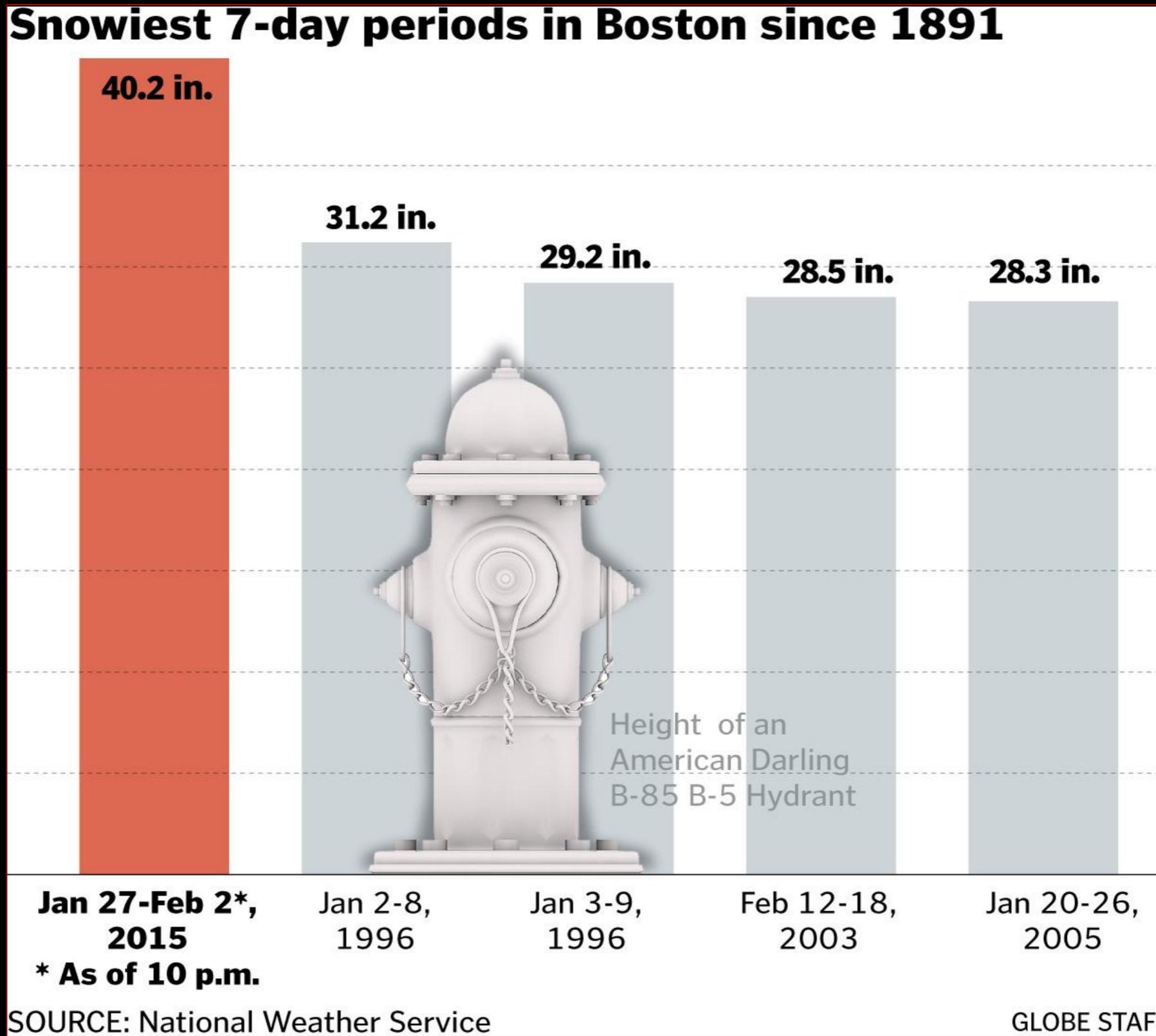
Peer-Review and the One-Study Mania

- Outside of Academia, Peer-Review is Relatively Meaningless Concept
- People DO understand concept of FDA Approval of Food and Drugs.
- Criticism of Peer Review Process (some warranted) shapes certain confirmation biases
- An Aside: I still find it amusing that some will invalidate peer review until they find “one” paper that supports their viewpoint

Challenge #4:

Overcoming Perceptions

Dr. Shepherd, All of this Snow in Boston, What Do You Mean Climate is Warming?



Perception: Watch, Advisory, Warning?



The Atlanta Snow Forecast (2/25). How did NWS do? Pretty Good, I think!

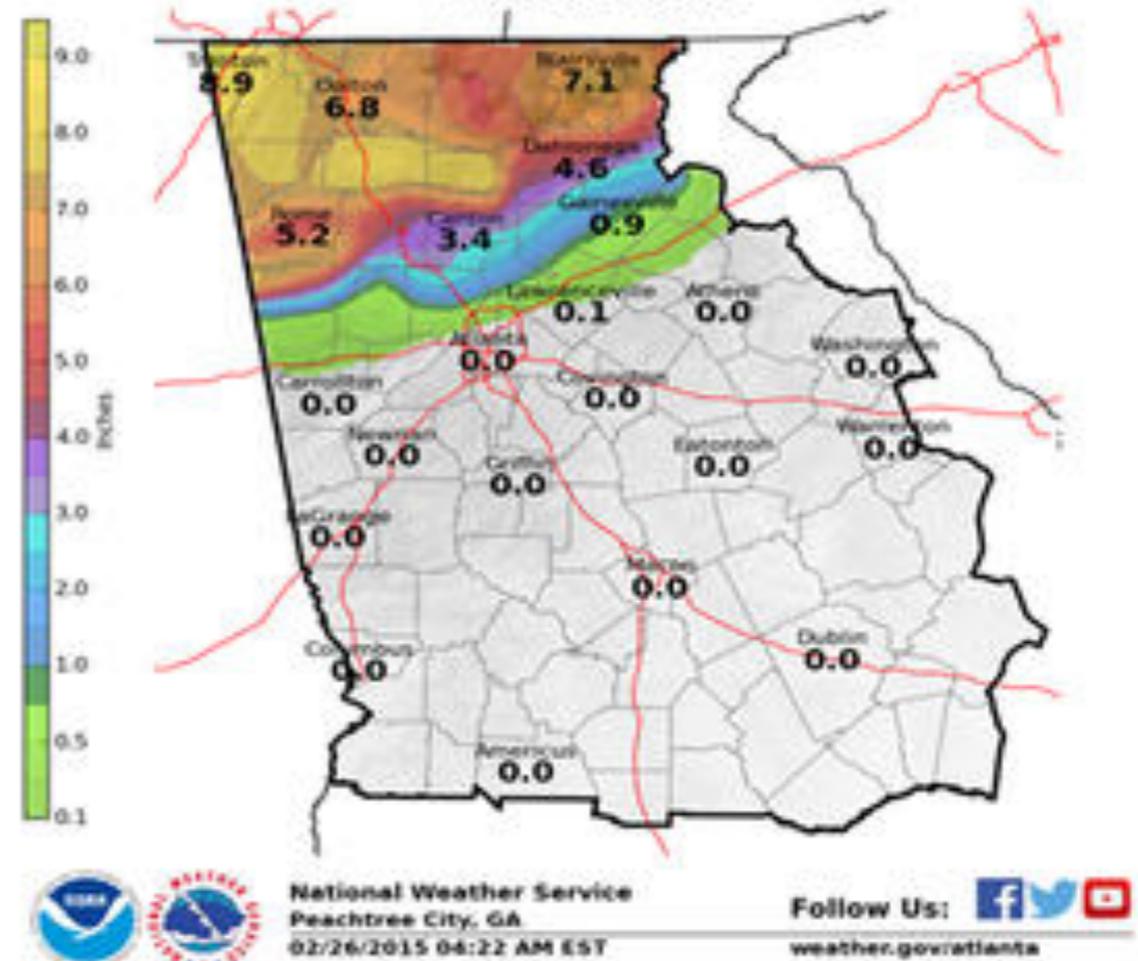
NWS Predicted

Today/Thu Snow Forecast (Official)



Preliminary Actuals

Preliminary Snow Totals
Valid: February 25, 2015



NWS colleagues did a great job with the N. Georgia event. Left (Prediction), Right (Preliminary actual totals). Yes, the Rain/Snow Line ultimately crept about 15-20 miles further north. NOTE: forecasters warned that could happen. In meteorology, that is a great forecast given where are capability currently lies (accurate to within 15 miles, think about that). But, if you expected something and didn't get it, you may be upset. Read my blog, [6 things to know about snow forecasting in the South](#), to see why this was a pretty good forecast---

<http://www.wunderground.com/blog/DrShepherdWxGeeks/comment.html?entrynum=38>

Dr. Marshall Shepherd/UGA

Weather Myths

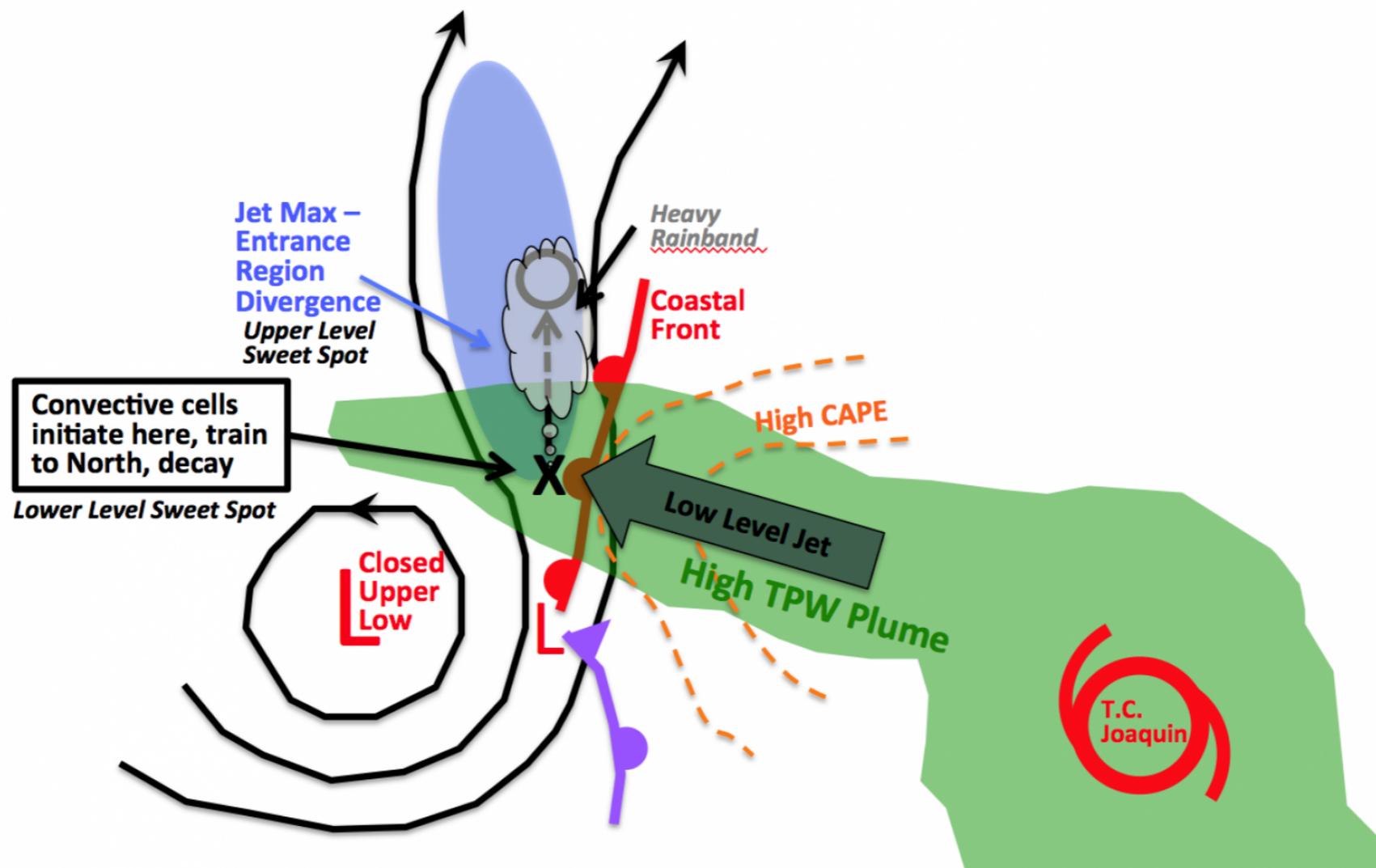
- Heat Lightning
- It Doesn't Get Cold In Deserts.....
- How are Hurricanes and Typhoons Different?
- Weather Forecasts are Wrong 50% of the Time
- Clouds coming out of airplanes are a government conspiracy
- Polar Vortex
- How are Weather Forecasts Made?
- Weather Apps are always right.
- Beware of “Wishcasting and Watch the Evolving Forecast

Challenge #5:

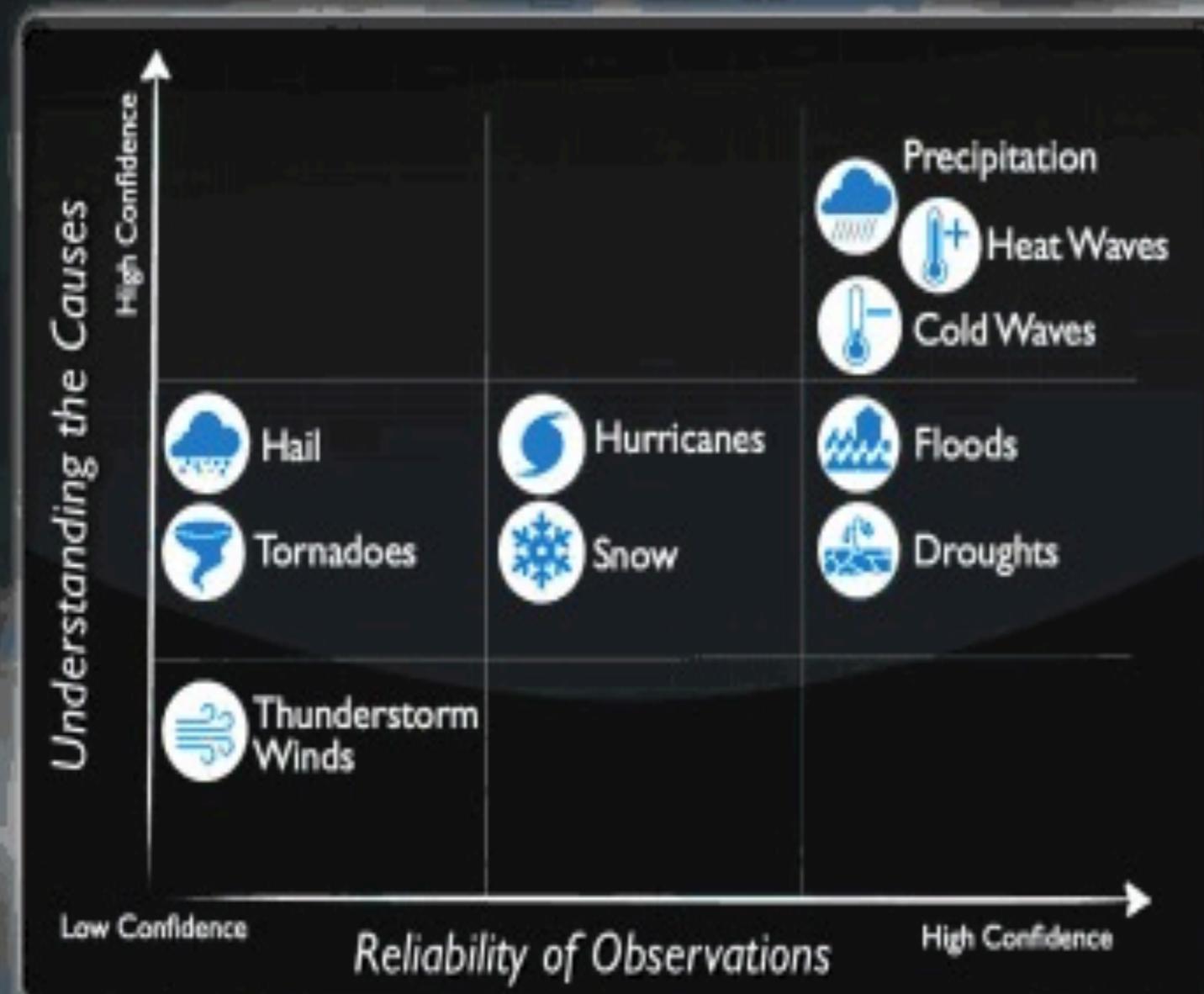
The Causation Problem

Were SC Floods Caused by Climate Change?

Ingredients of the South Carolina Rain Catastrophe



EXTREME WEATHER TRENDS: WHAT DO WE KNOW?



Source: Peterson et al., 2013. | Background Photo Credit: W. Owen via NASA



Figure 2: Our understanding of extreme weather trends within the context of climate change is a function of the reliability of our observations coupled with our understanding of the causes of the extreme weather phenomenon. Source: Peterson et al., 2013.

New National Academies Study on Attribution

An ad hoc NRC committee will examine the science of attribution of specific extreme weather events to human-caused climate change and natural variability.

- Provide an assessment of current scientific understanding and capabilities for attribution of specific extreme weather events to climate change.
- Provide guidance about the robustness of extreme event attribution science. The guidance should discriminate among different attribution approaches and different classes of extreme events, and it should consider various characteristics of the analysis (e.g., data coverage and quality, model performance, etc.).
- Identify research priorities for further development of the approaches.

<https://nas-sites.org/americasclimatechoices/studies-in-progress/extreme-weather-events-and-climate-change-attribution/>

Challenge #6:
Zombie Theories

“It is difficult to get a man to understand something, when his salary depends upon his not understanding it.”

—Upton Sinclair



Zombies abound...



MOST USED Climate Myths

and what the science really says...

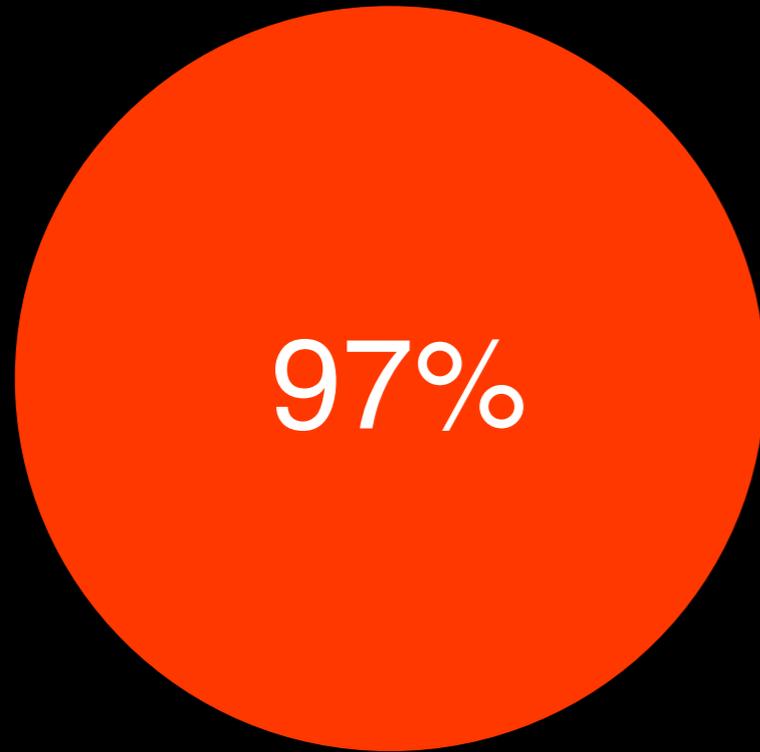
- 1 - Climate's changed before
 - 2 - It's the sun
 - 3 - It's not bad
 - 4 - There is no consensus
 - 5 - It's cooling
 - 6 - Models are unreliable
 - 7 - Temp record is unreliable
 - 8 - Animals and plants can adapt
 - 9 - It hasn't warmed since 1998
 - 10 - Antarctica is gaining ice
- [View All Arguments...](#)

Most skeptics focus on very short-term or long-term climate changes without looking at the rate at which the changes are occurring. They also tend to look at one place rather than consider the entire globe.

Changing climate will cause some areas to improve, particularly in the short to medium term, while other suffer most of the consequences.

And “No, It’s not about Grant Money 😊

Climate Scientists



● 3%



Alarmed

Concerned

Cautious

Disengaged

Doubtful

Dismissive

General Public

12%

27%

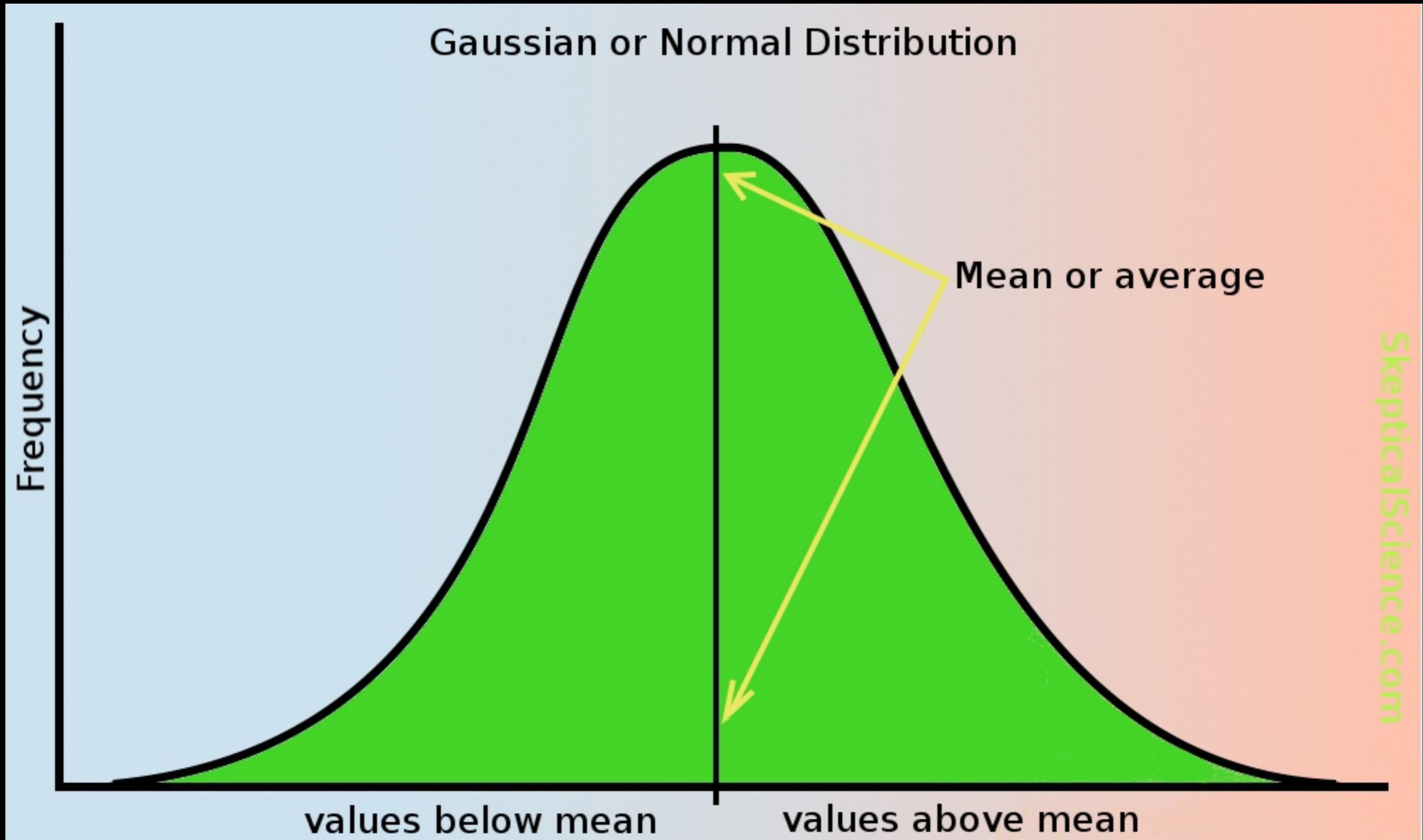
25%

10%

15%

10%

Find Common Ground



“Climate change is the challenge of our time. Each of us must recognize that the risks are personal. We’ve seen and felt the costs of underestimating the financial bubble. Let’s not ignore the climate bubble---**Henry Paulson, President George W. Bush’s Treasury Secretary**



University Lecture

Mr. Bob Inglis

Executive Director - Energy and Enterprise Initiative

"The Climate Conscience of a Conservative"

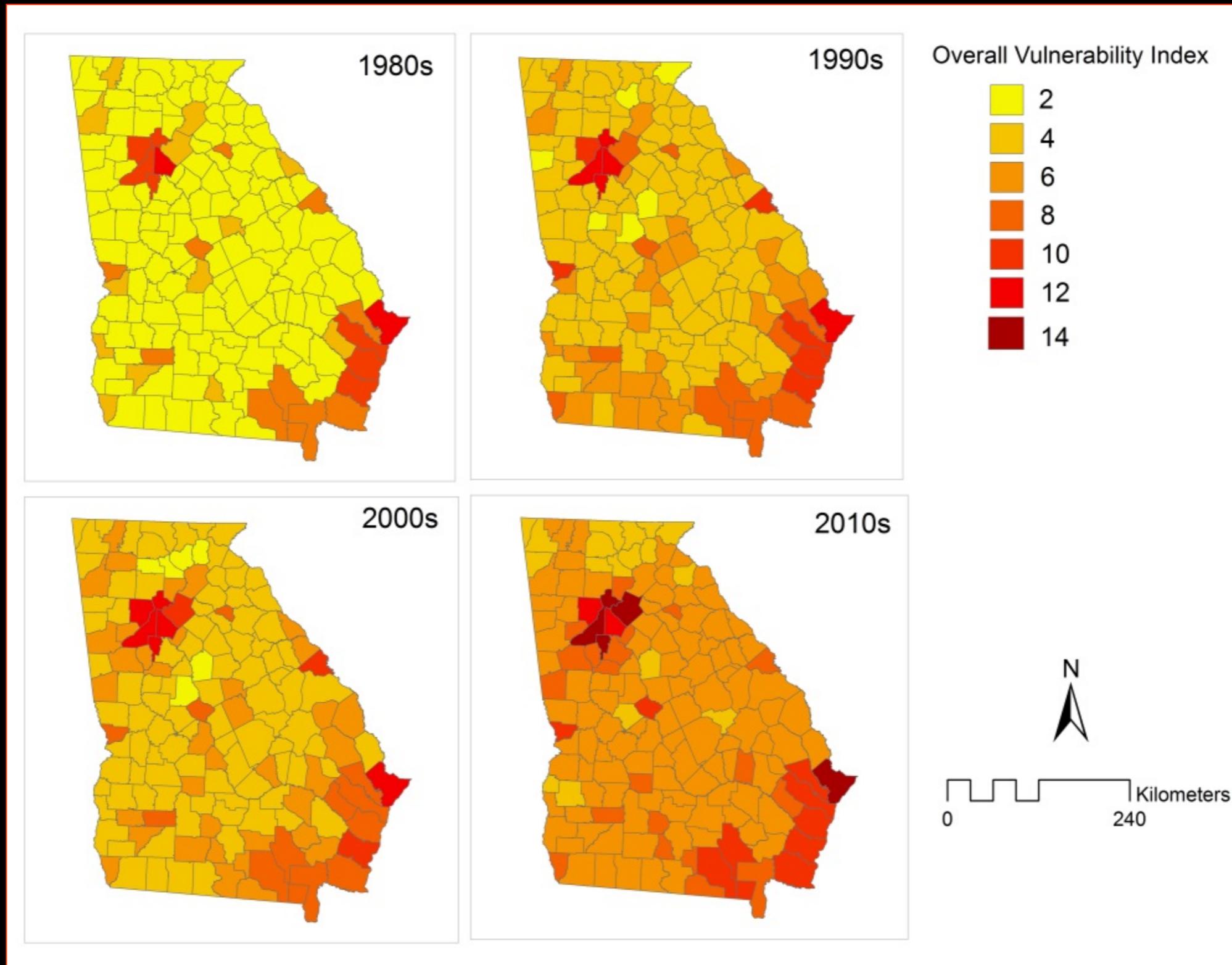
3:30 PM September 15, 2015

UGA Chapel

Cosponsored by the Division of Biological Sciences, Georgia Initiative for Climate and Society, School of Public and International Affairs, College of Engineering, Odum School of Ecology, College of Public Health and Franklin College of Arts and Sciences

“I have come to conclude that greenhouse gases and carbon pollution is not a good thing.....” **Lindsey Graham (SC-R)**

This is Happening Whether You Are Conservative, Liberal, or Other (KC, Shepherd, and Johnson 2015)



For my kids' sake, I hope those that say changes are a hoax are right...I have far more to lose than gain by being right.....



DAWG DAY AFTERNOON

