Weather and Climate
AOSC 200

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Hannah Daley (hmdaley@umd.edu)
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Joseph Knisely (jknisely@umd.edu)
Lindsey Rodio (larodio@umd.edu)

Class Web Site: http://www.atmos.umd.edu/~tcanty/aosc200

Textbook: Weather: A Consice Introduction
by: Gregory Hakim and Jérôme Patou

Tim's Info

Office: ATL 3427

Phone: 5-5360

Office Hours:

Wednesday 3:30-5:00 PM or by appointment

When emailing, please put AOSC 200 in the subject line and be sure to sign your name at the end of the email

Lectures:

Session 1:	**Tuesday & Thursday 12:30-1:45 pm**	**ATL 2324**
Session 2:	**Tuesday & Thursday 2:00-3:15 pm**	**ATL 2324**

Discussion Sections

Section	Day/Time	Location	Teaching Assistant
Session 1: 0101	Wed. 1:00-1:50 pm	ATL 2428	Joseph Knisely
Session 1: 0102	Wed. 2:00-2:50 pm	CHM 0127	Austin Hope
Session 1: 0103	Wed. 3:00-3:50 pm	ATL 2330	Joseph Knisely
Session 1: 0104	Wed. 2:00-2:50 pm	PLS 1146	Hannah Daley
Session 2: 0201	Wed. 2:00-2:50 pm	SPH 0307	Lindsey Rodio
Session 2: 0202	Wed. 3:00-3:50 pm	CHM 0127	Austin Hope
Session 2: 0203	Mon. 1:00-1:50 pm	CHM 0127	Justin Hicks
Session 2: 0204	Mon. 2:00-2:50 pm	ATL 2416	Justin Hicks

Class Logistics

Grades Distribution:

Admission tickets	5%
Topic of the Day	10%
Quizzes	20%
Project	20%
Mid-term Exam	20%
Final Exam	25%

Admission tickets

- links to admission tickets on the course calendar
- based on reading material for that lecture
- must be completed by ***NOON*** on the due date
- four lowest scores will be dropped.

Class Logistics

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Topic of the Day	**10%**
Quizzes	**20%**
Project	**20%**
Mid-term Exam	**20%**
Final Exam	**25%**

Topic of the Day

- Discussions based on topical events, review of course material, etc.
- **Must be in class or discussion to get credit**
- There will be several before the mid-term (lowest grade will be dropped)
- There will be several after the mid-term (lowest grade will be dropped)

Quizzes

- two short in-class quizzes spaced between the exams
- based on material covered up to prior lecture, non-cumulative

Class Logistics

Grades Distribution:

Admission tickets	**5%**
Topic of the Day	**10%**
Quizzes	**20%**
Project	**20%**
Mid-term Exam	**20%**
Final Exam	**25%**

Projects

- 2 group projects completed in discussion section
- topics will focus on the intersection between science and our daily lives
- in class presentations and written, individual paper
- grades based on quality of group presentation and effort of individual

Exams

- Mid-term exam based on material covered until that point
- Cumulative final exam weighted more on material covered later in semester
  - **Session 2 (2pm class) final exam: Dec 14 10:30am–12:30pm**
  - **Session 1 (12:30pm class) final exam: Dec 16 1:30pm– 3:30pm**

Class Logistics

Lecture Recordings

- lectures will be recorded and available for review
- meant to help you study
- catch up on material missed in class
- ***if daily attendance drops too low, links to lectures will be disabled***

Extra Credit

- **There is no extra credit**

Class Logistics

Lecture Recordings

- lectures will be recorded and available for review
- meant to help you study
- catch up on material missed in class
- ***if daily attendance drops too low, links to lectures will be disabled***

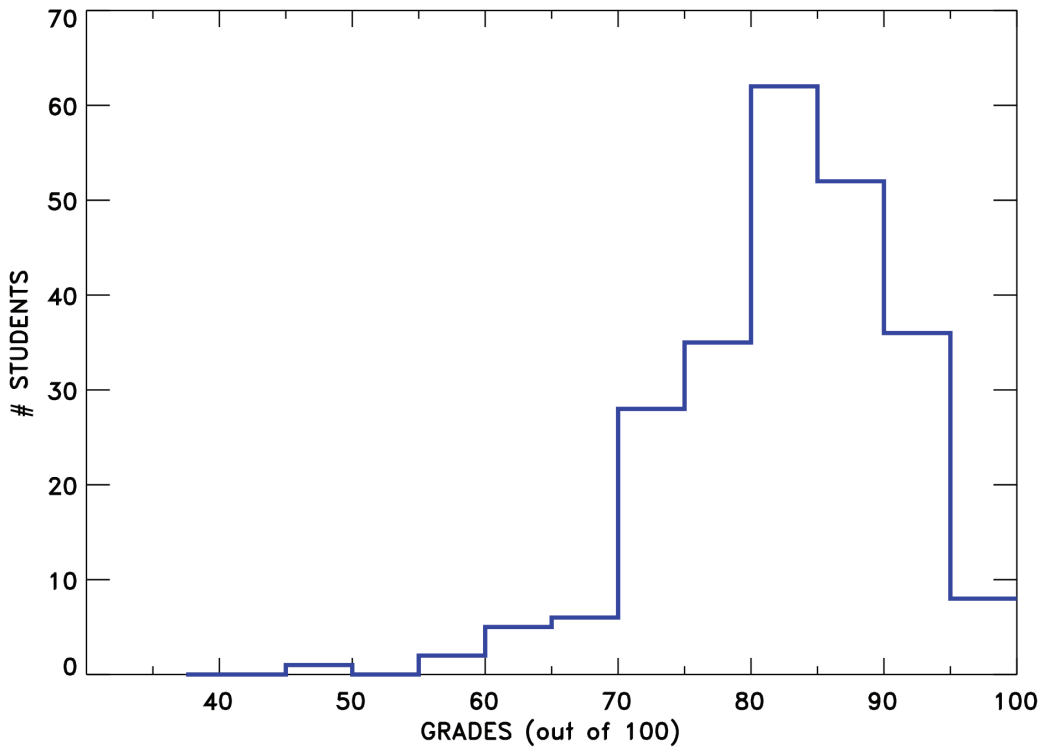
Will grades be curved?

See previous answer about extra credit…

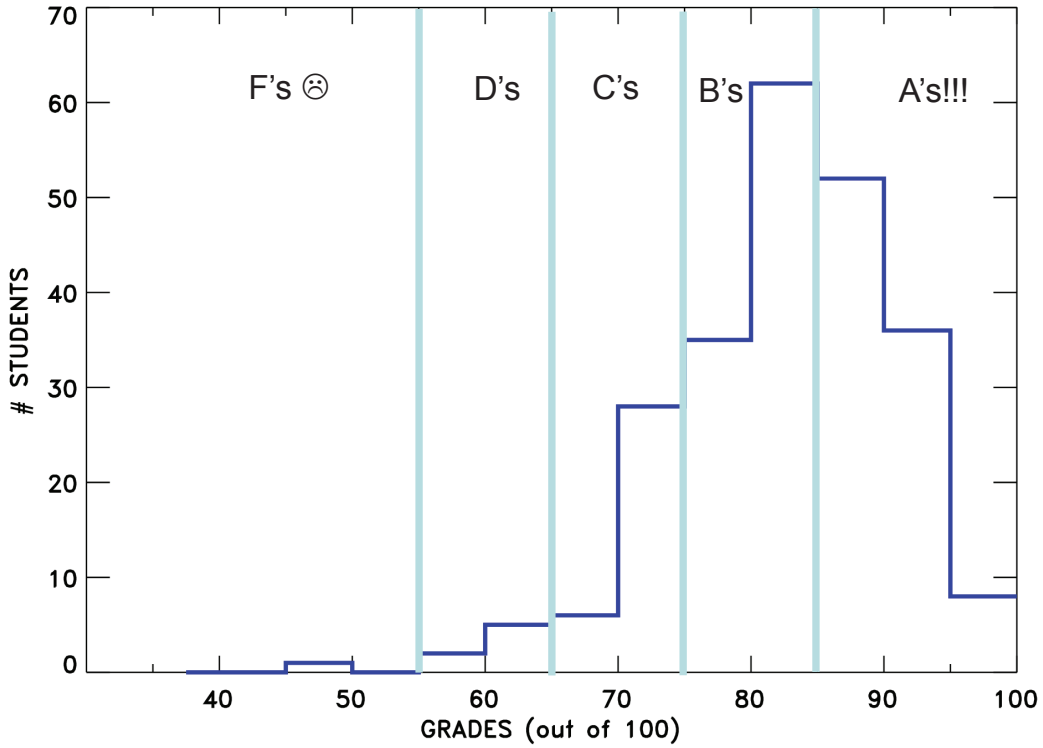
Grade point distribution

Points	Letter Grade
95 – 100	A+
90 – 94.9	A
85 – 89.9	A–
81 – 84.9	B+
78 – 80.9	B
75 – 77.9	B–
71 – 74.9	C+
68 – 70.9	C
65 – 67.9	C–
61 – 64.9	D+
58 – 60.9	D
55 – 57.9	D–
below 54.9	F

Spring 2019 Final Grades



Spring 2019 Final Grades



Class Logistics
We're here to help!!!

If you find yourself struggling with course material, please contact the instructor or a TA right away. **Often, a short conversation will really clear things up!** Waiting until the end of the semester is too late to learn everything we go over in class. Seriously, come talk to us... we get lonely sometimes.

If you are experiencing difficulties in keeping up with academic demands, contact the **Counseling Center**

https://www.counseling.umd.edu/academic

or go here for specific tutoring options

http://tutoring.umd.edu

If you just need someone to speak with about issues outside of the classroom please contact the **Counseling Office** https://www.counseling.umd.edu/

Class Logistics

Know your rights!

For more information regarding your rights as a student and the University policies that cover missed classes, please visit the following website:

http://www.ugst.umd.edu/courserelatedpolicies.html

Class Logistics

Cell Phone and Computer usage:

Unfortunately, cell phone use is prohibited unless given express permission for use in class discussion. Staring at your phone not only keeps you from paying attention but it may distract those around you. We know that it may be difficult to pay attention at times but please try to do so. If you need to stand up and stretch or walk around a bit, please do so. If you are waiting for an important call or text message please wait outside the class.

If you are obviously using a phone during class:

1) You will be asked to put it away, if you continue
2) You will be asked to leave
3) Class will be stopped until you leave

Any material not covered in lecture due to time spent waiting for students to leave will be covered in the exams.

Computer use is permitted provided it is for reviewing posted lecture notes or to take notes. There may be in class discussions where computer use is encouraged. If you wish to use a computer while in class, you must sit in the first 6 rows of the middle section of seats. Cell phone rules apply for any computer use not related to class.

Class Logistics

Cell Phone and Computer usage:

Computers & Education 62 (2013) 24–31

Contents lists available at SciVerse ScienceDirect

Computers & Education

journal homepage: www.elsevier.com/locate/compedu

Laptop multitasking hinders classroom learning for both users and nearby peers

Faria Sana [a], Tina Weston [b,c], Nicholas J. Cepeda [b,c,*]

[a] McMaster University, Department of Psychology, Neuroscience, & Behaviour, 1280 Main Street West, Hamilton, ON L8S 4K1, Canada
[b] York University, Department of Psychology, 4700 Keele Street, Toronto, ON M3J 1P3, Canada
[c] York University, LaMarsh Centre for Child and Youth Research, 4700 Keele Street, Toronto, ON M3J 1P3, Canada

Laptops are commonplace in university classrooms. In light of cognitive psychology theory on costs associated with multitasking, we examined the effects of in-class laptop use on student learning in a simulated classroom. We found that participants who multitasked on a laptop during a lecture scored lower on a test compared to those who did not multitask, and participants who were in direct view of a multitasking peer scored lower on a test compared to those who were not. The results demonstrate that multitasking on a laptop poses a significant distraction to both users and fellow students and can be detrimental to comprehension of lecture content.

Class Logistics

Academic Honesty

The student-administered Honor Code and Honor Pledge prohibits students from cheating on exams, plagiarizing papers, submitting the same paper for credit in two courses without authorization, buying papers, submitting fraudulent documents and forging signatures. On every examination, paper or other academic exercise not specifically exempted by the instructor, students must write by hand and sign the following pledge:

I pledge on my honor that I have not given or received any unauthorized assistance on this examination (or assignment).

Compliance with the code is administered by the Student Honor Council, which strives to promote a community of trust on the College Park campus. Any instances of academic dishonesty will be referred to the Honor Council.

We will be using plagiarism software ("Turnitin") to check your project submissions. Any instances of plagiarism will be referred to the Honor Council.

What is Weather?

Weather is the conditions of the atmosphere at a specific place over shorter time periods.

There are many things we can measure to determine weather, for example

- Precipitation
- Temperature
- Wind speed
- Wind direction

Scientists would say that these observations describe the ***STATE*** of the atmosphere

Reasons to learn about weather:

- Good to be prepared

  Do you need to wear a coat? What will the roads be like?

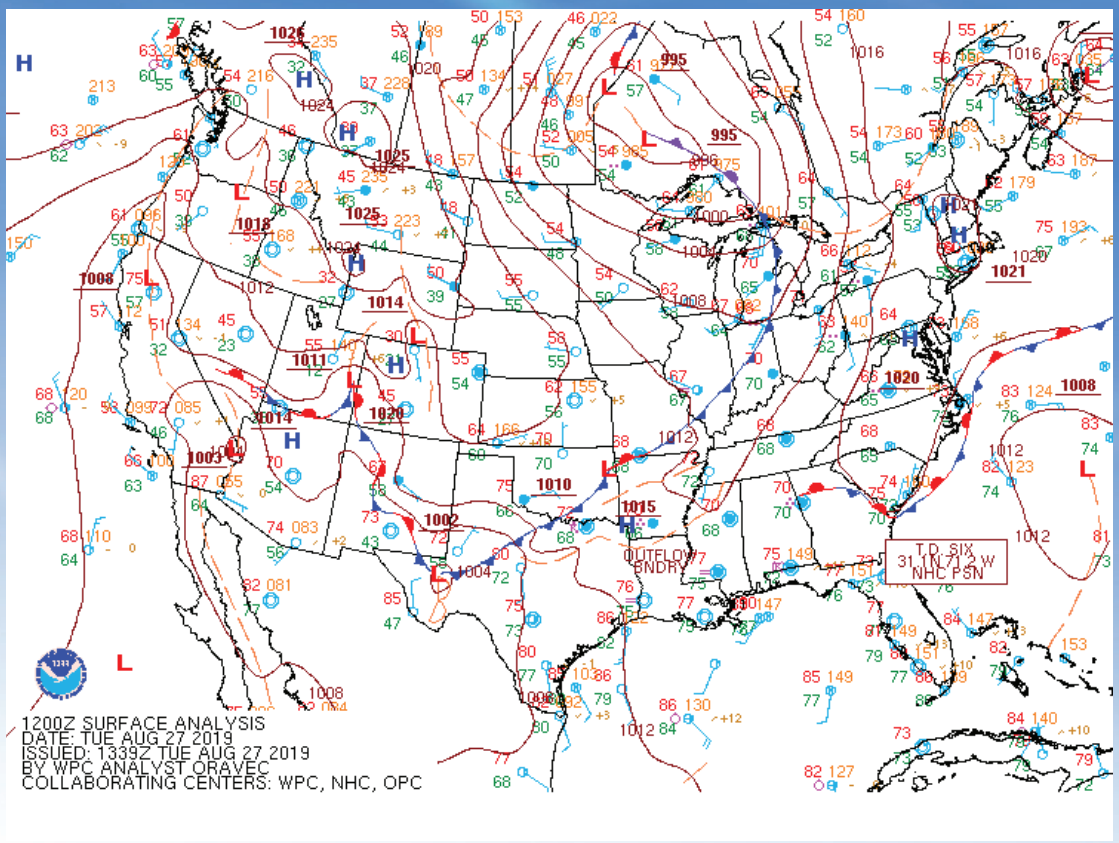
- Limit risk to lives and property

  Do schools/businesses need to close? Should people seek shelter?

- Gives you something to talk about in awkward social situations

  "Soooo….. crazy weather we're having."

Today's Weather Map



http://www.wpc.ncep.noaa.gov/sfc/namussfcwbg.gif

Weather Station Model

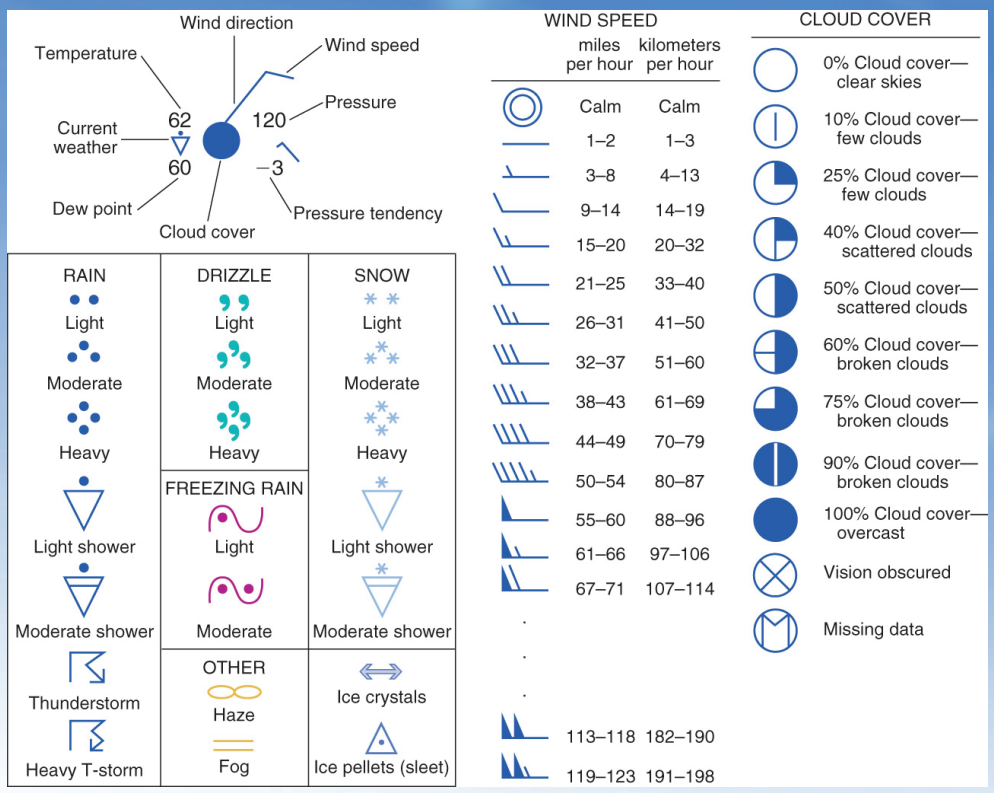


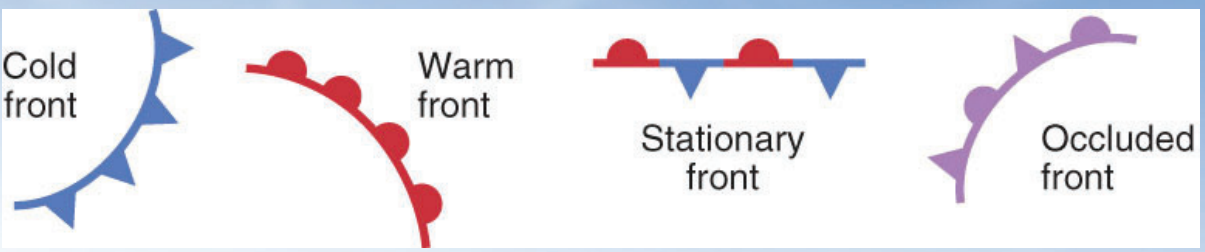
Fig 1-17 *Meteorology: Understanding the Atmosphere*

Weather Maps

Front: Boundary between two differing *air masses*

Type of fronts

Cold – cold air replacing warm air
Warm – warm air replacing cold air
Stationary – border between to different fronts, neither front strong enough to move the other
Occluded – cold front overtakes a warm front



Weather Maps

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Type of fronts

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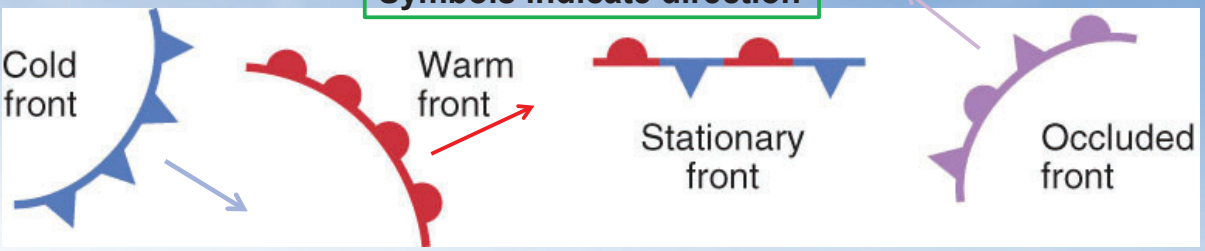
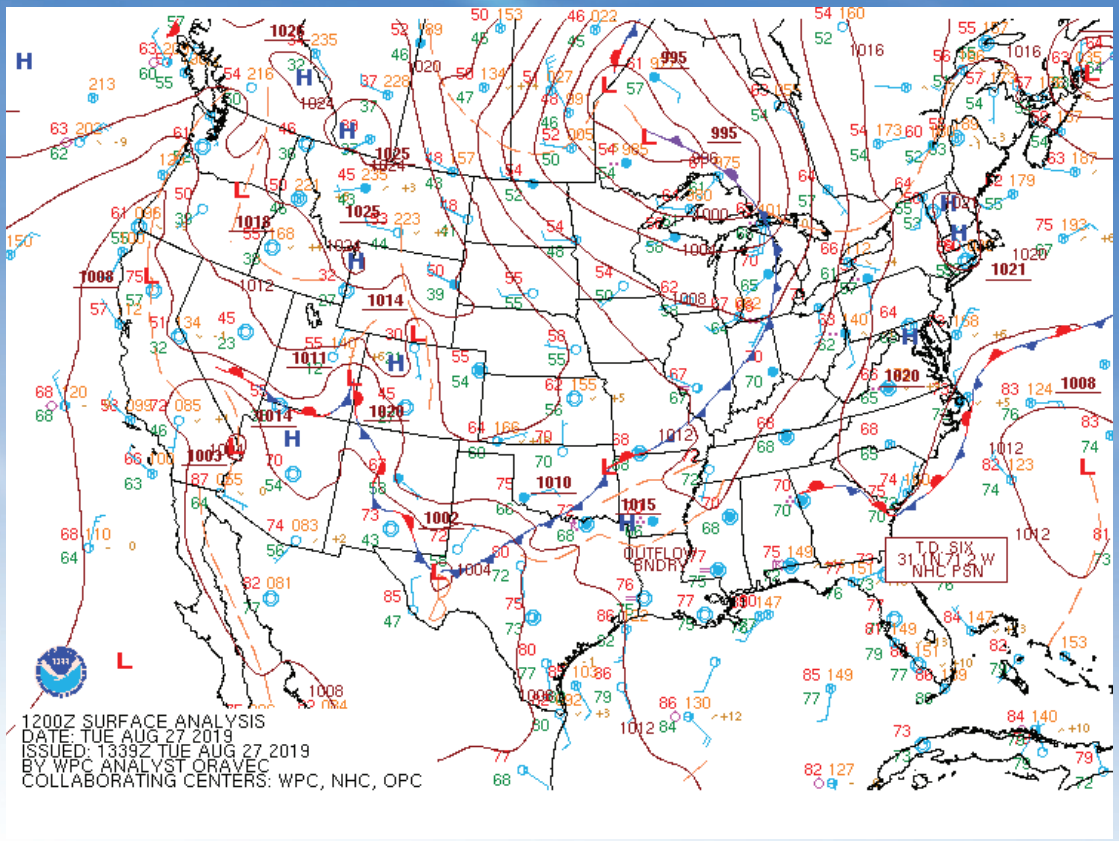
Symbols indicate direction

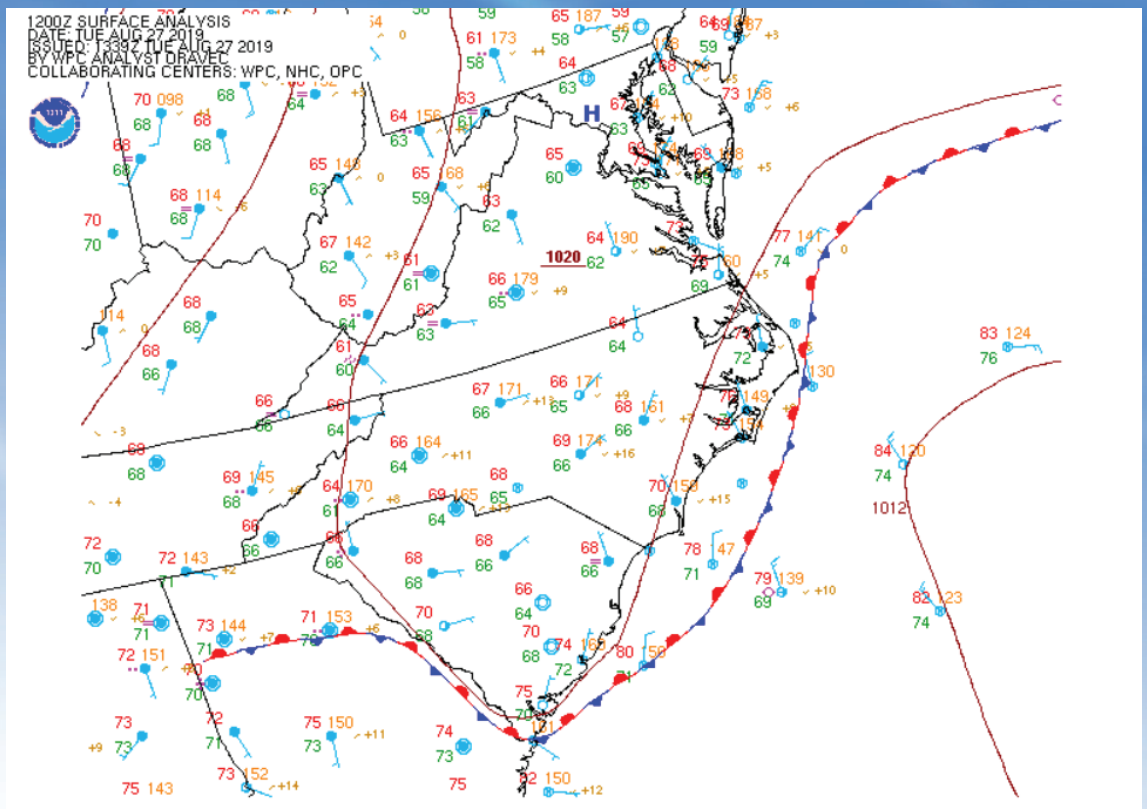


Today's Weather Map



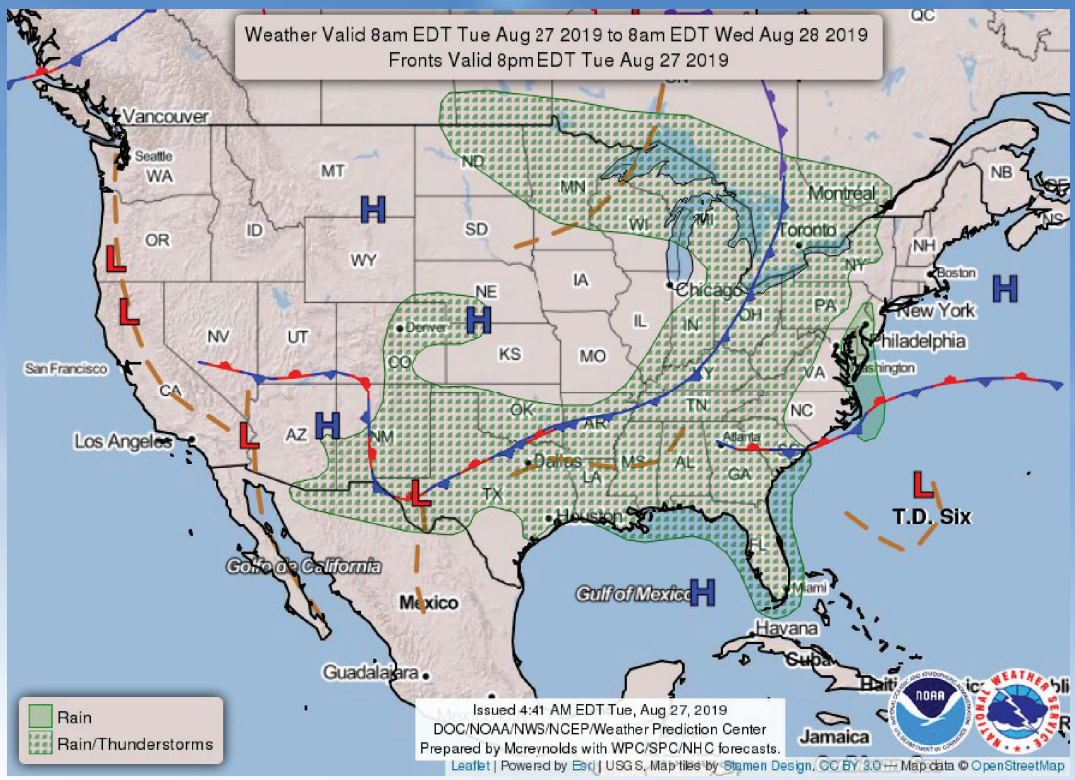
http://www.wpc.ncep.noaa.gov/sfc/namussfcwbg.gif

Today's Weather Map



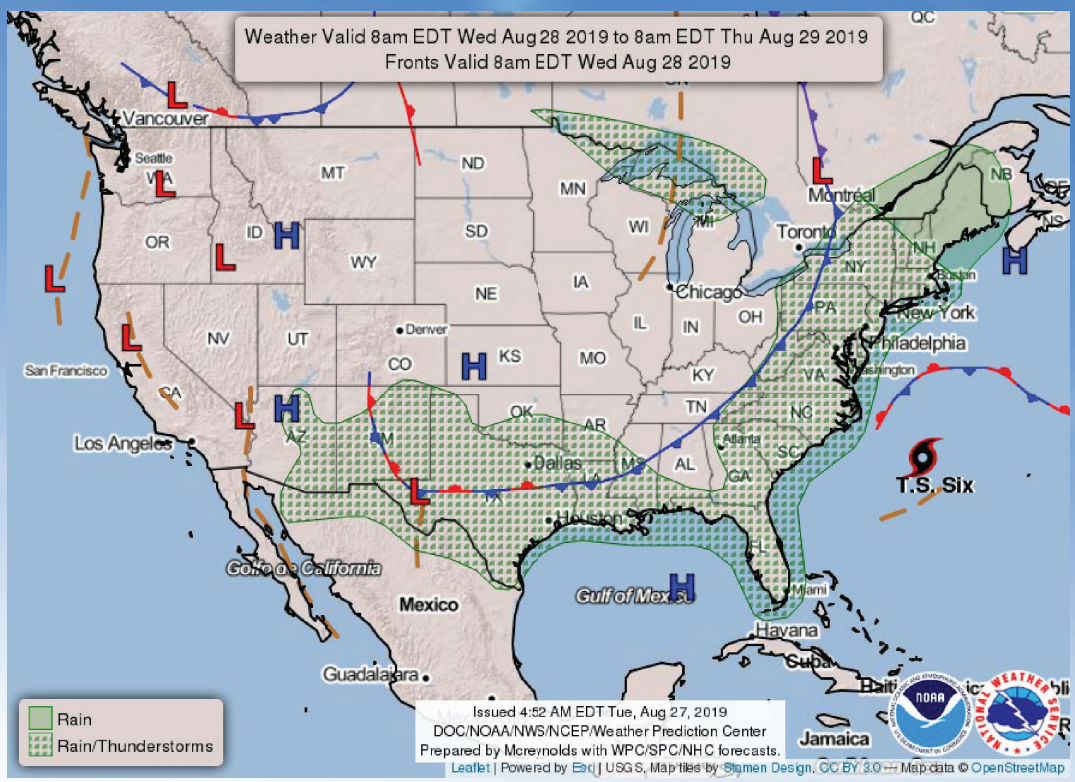
http://www.wpc.ncep.noaa.gov/html/sfcloop/namce_wbg.html

Today's Forecast



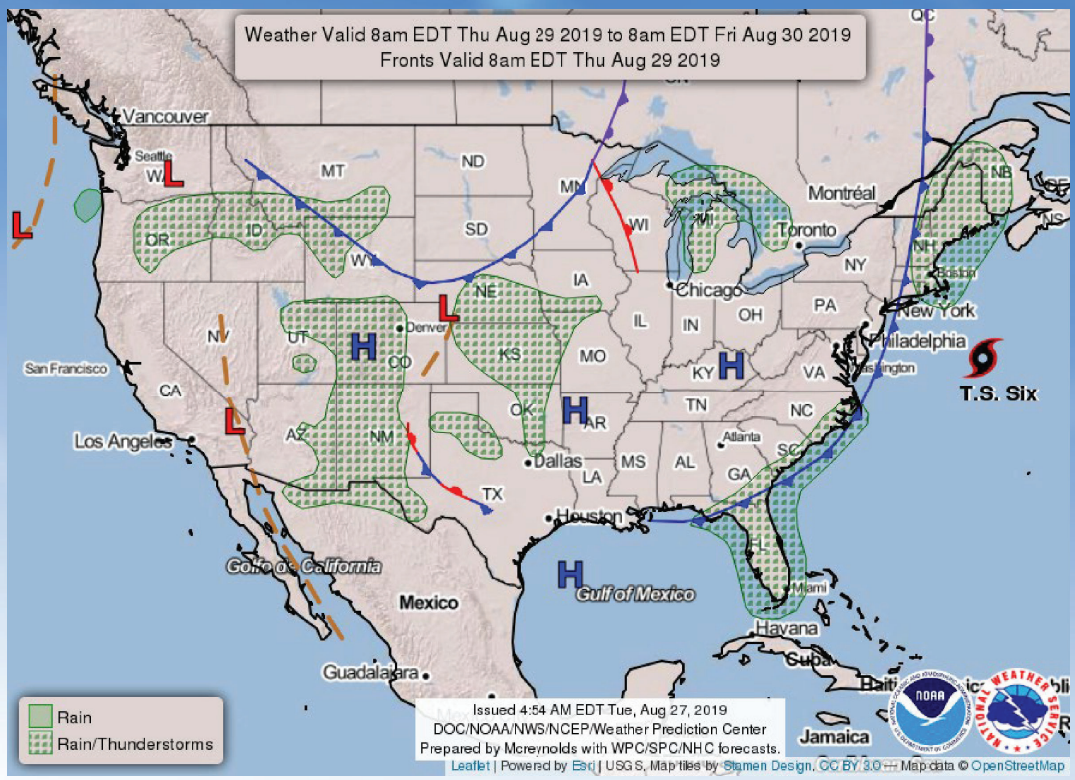
http://www.hpc.ncep.noaa.gov/national_forecast/natfcst.php

Wednesday's Forecast



http://www.hpc.ncep.noaa.gov/national_forecast/natfcst.php

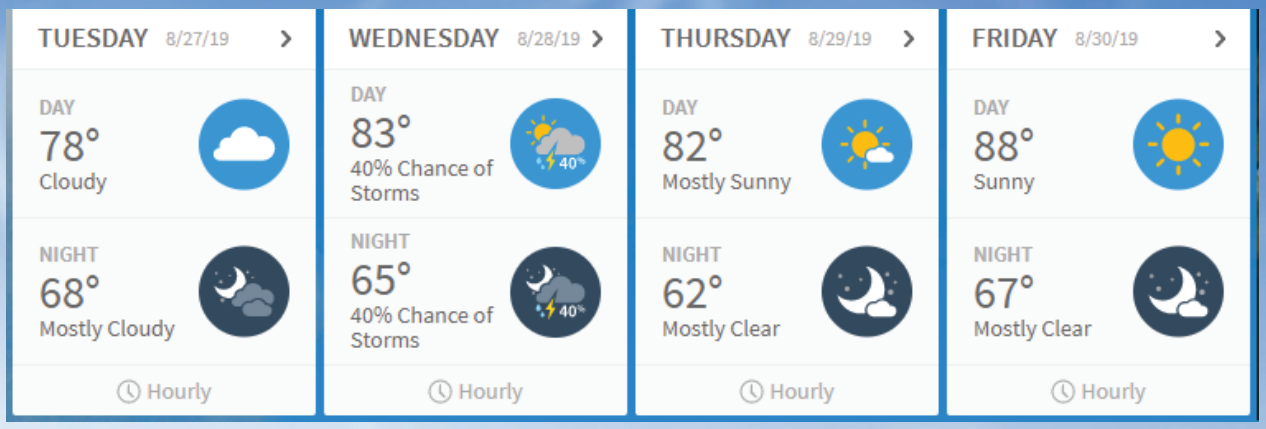
Thursday's Forecast



http://www.hpc.ncep.noaa.gov/national_forecast/natfcst.php

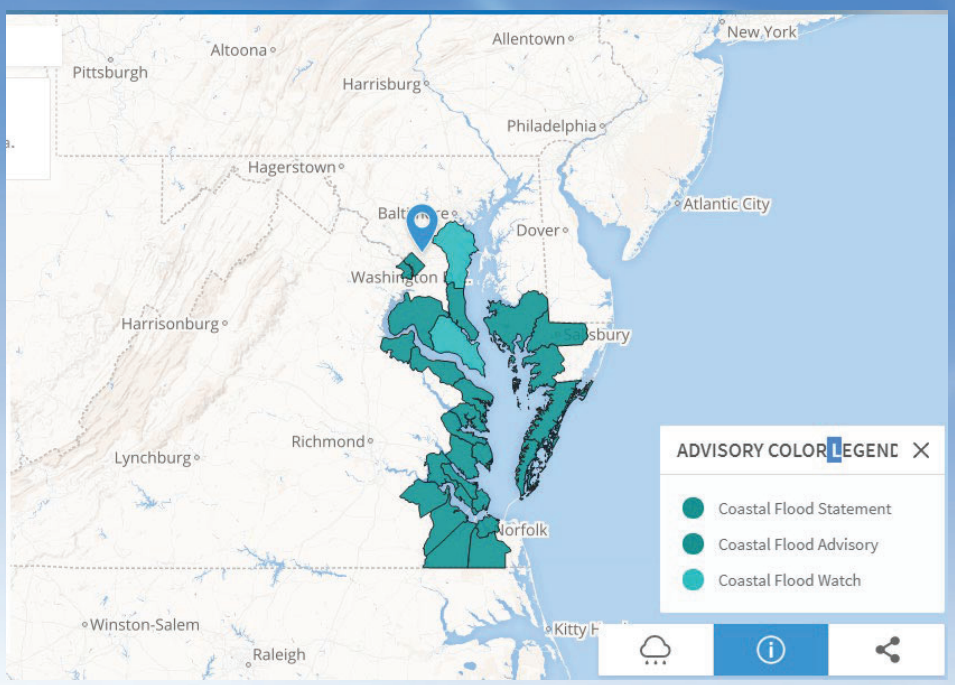
Weather and Climate

Our forecast?



https://www.weatherbug.com/weather-forecast/now/college-park-md-20740

Our forecast?



https://www.weatherbug.com/alerts/?center=38.9978413,-78.8818359,7

What is Climate?

"The slowly varying aspects of the atmosphere–hydrosphere–land surface system"

http://glossary.ametsoc.org/wiki/Climate

Climate is often thought of as the "average weather" or "average conditions"

When a meteorologist says…

"Average high temperatures for today are 85°F"

…. they're talking about climate

What is Climate Change?

"Any systematic change in the long-term statistics of climate elements (such as temperature, pressure, or winds) sustained over several decades or longer."

http://glossary.ametsoc.org/wiki/Climate_change

What this means:

Average conditions (temperature, snow fall, fog, etc.) are different now than some time in the past.

Climate is the set of conditions that prevails in a region over a ~30 year period.

- **Precipitation**
- **Temperature ← most commonly talked about**
- **Wind speed**
- **Wind direction**
- **Ocean height**

Reasons to learn about climate:

- **Good to be prepared**

  Will there be water restrictions or flooding? Will I need a better air conditioner or heater?

- **Limit risk to lives and property**

  Will hurricanes become more frequent? What will the growing season be like?

- **Wedding planners would love to know what the weather will be like in 10 years!**

What is Climate Change?

"Any systematic change in the long-term statistics of climate elements (such as temperature, pressure, or winds) sustained over several decades or longer."

http://glossary.ametsoc.org/wiki/Climate_change

Stop with that crazy science talk!

Climate change means that average trends are different now than at some time in the past.

What is Science?

Science is an organized body of knowledge on a specific subject

AND

it is also a process of learning about the natural world through the scientific method:

1) **Ask a question ("Why is the sky blue?")**
2) **Read up on what other people have done**
3) **Come up with a hypothesis ("It reflects blue light from the ocean")**
4) **Build an experiment to prove this ("Cover the ocean with purple plastic wrap and the sky will turn purple")**
5) **Analyze your data ("The sky did not turn purple")**
6) **Conclusion ("The sky is not blue because of the ocean. Also, don't cover the ocean with plastic wrap")**

What is Climate Change?

"But" ***insert politician, radio talk show host, blogger, etc name here*** **"says that…."**

This is a very contentious issue and it is my job to explain the current understanding of the SCIENCE.

"You're just another libtard overpaid government hack leaching off tax payers and making shit up to save his job"

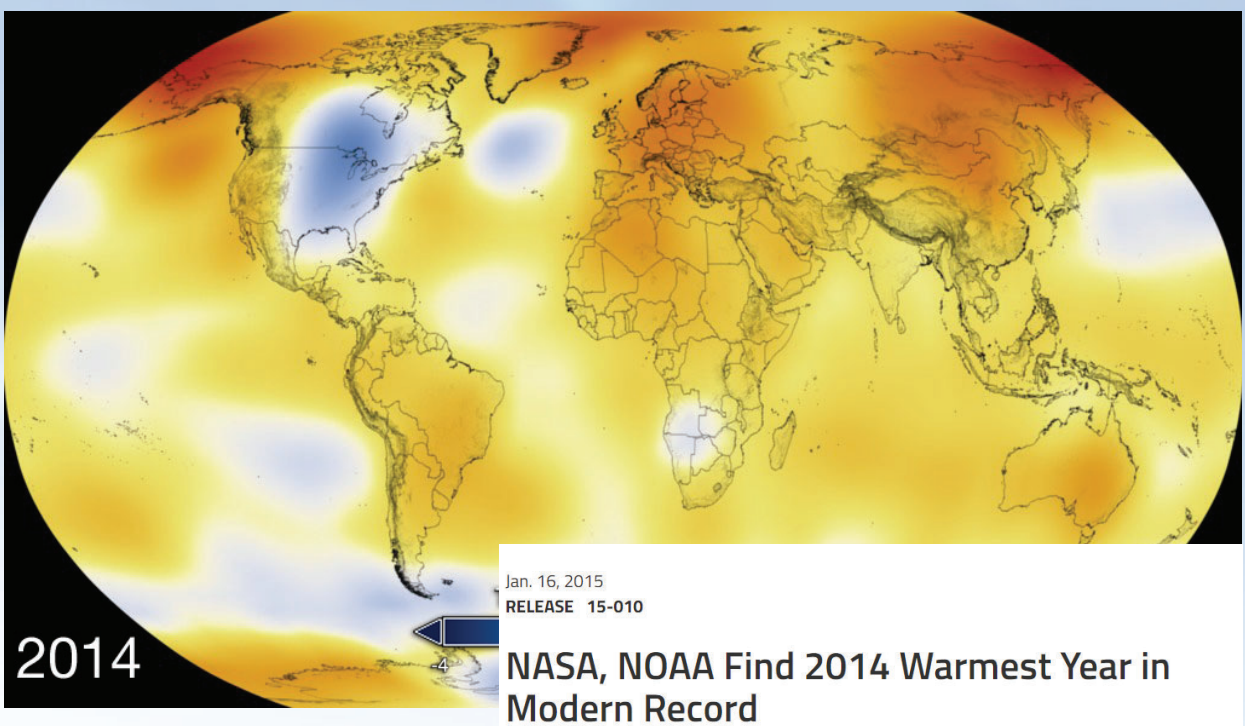
1) **I've never been paid for my climate research**

2) **Not only does my family refuse to speak to me about this but I've also been publicly ridiculed by some of the top climate scientists in the world**

3) **My research group is the "radical middle"**

"You know, I think it's weather patterns, frankly. And you know, and they change, as I said. It rained yesterday, it's a nice pretty day today. So the climate does change in short increments and in long increments."

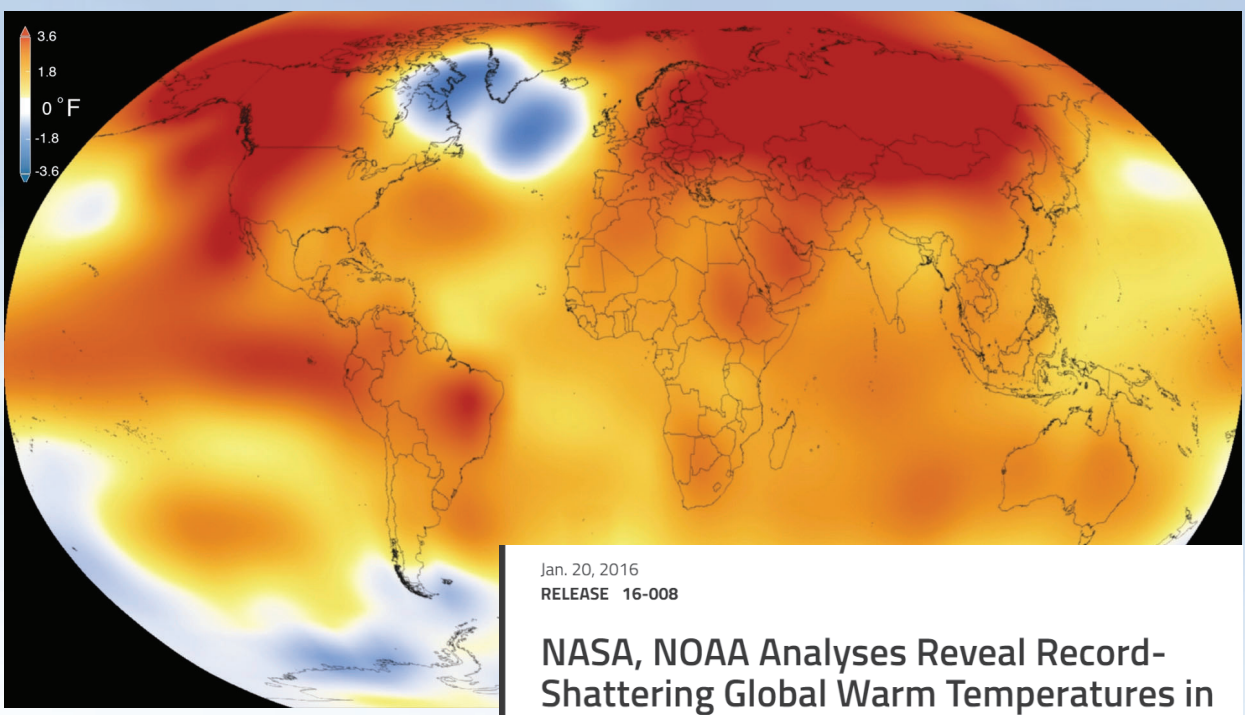
– US Government Official



Jan. 16, 2015
RELEASE 15-010

NASA, NOAA Find 2014 Warmest Year in Modern Record

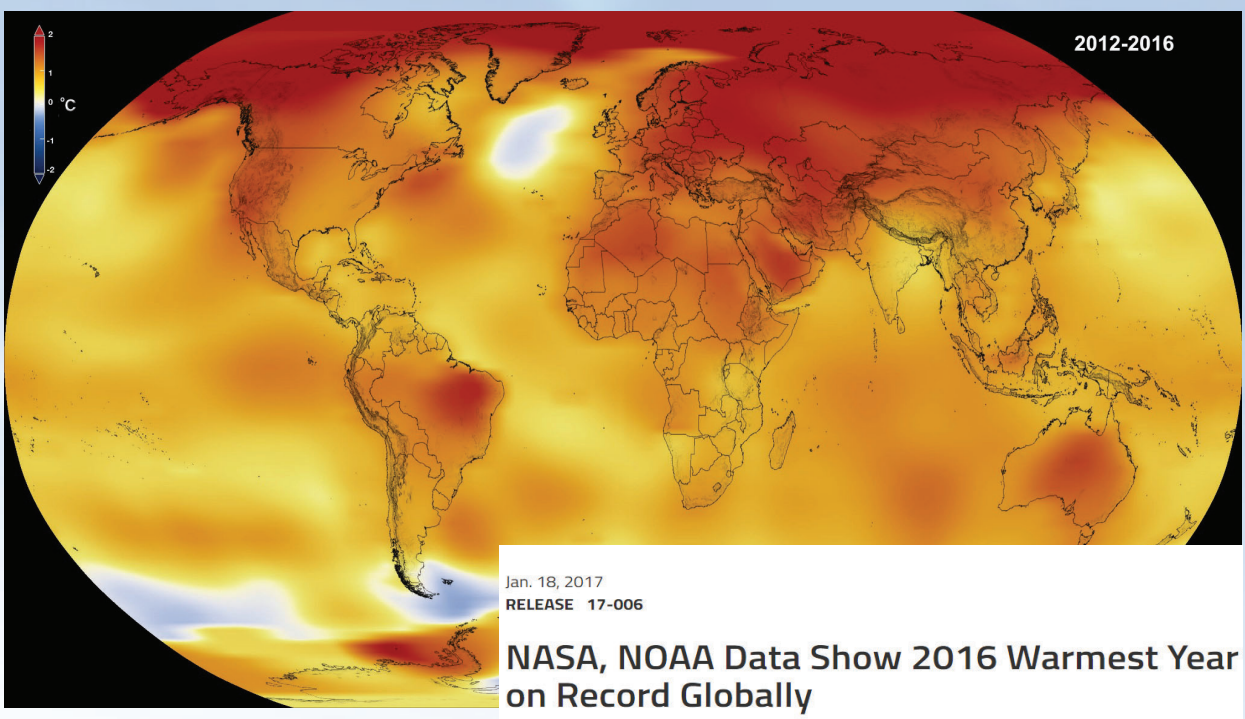
https://www.nasa.gov/press/2015/january/nasa-determines-2014-warmest-year-in-modern-record



Jan. 20, 2016
RELEASE 16-008

NASA, NOAA Analyses Reveal Record-Shattering Global Warm Temperatures in 2015

http://www.nasa.gov/press-release/nasa-noaa-analyses-reveal-record-shattering-global-warm-temperatures-in-2015

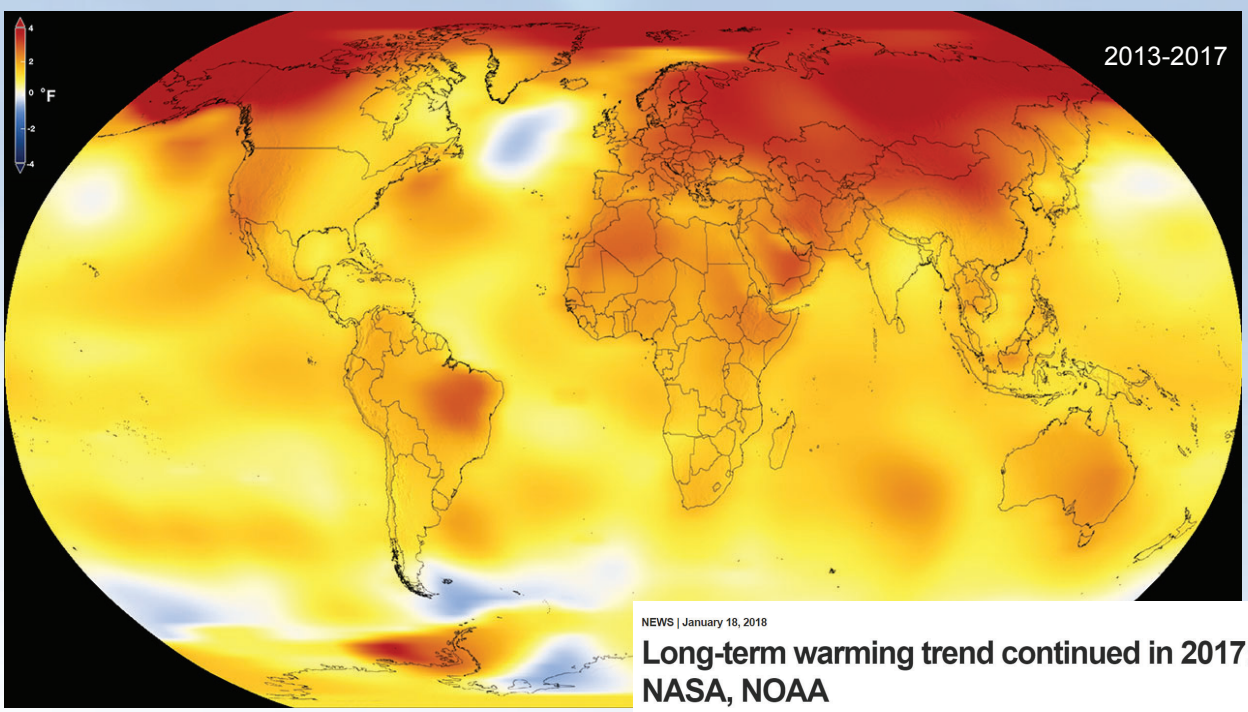


Jan. 18, 2017
RELEASE 17-006

NASA, NOAA Data Show 2016 Warmest Year on Record Globally

Earth's 2016 surface temperatures were the warmest since modern recordkeeping began in 18

https://www.nasa.gov/press-release/nasa-noaa-data-show-2016-warmest-year-on-record-globally

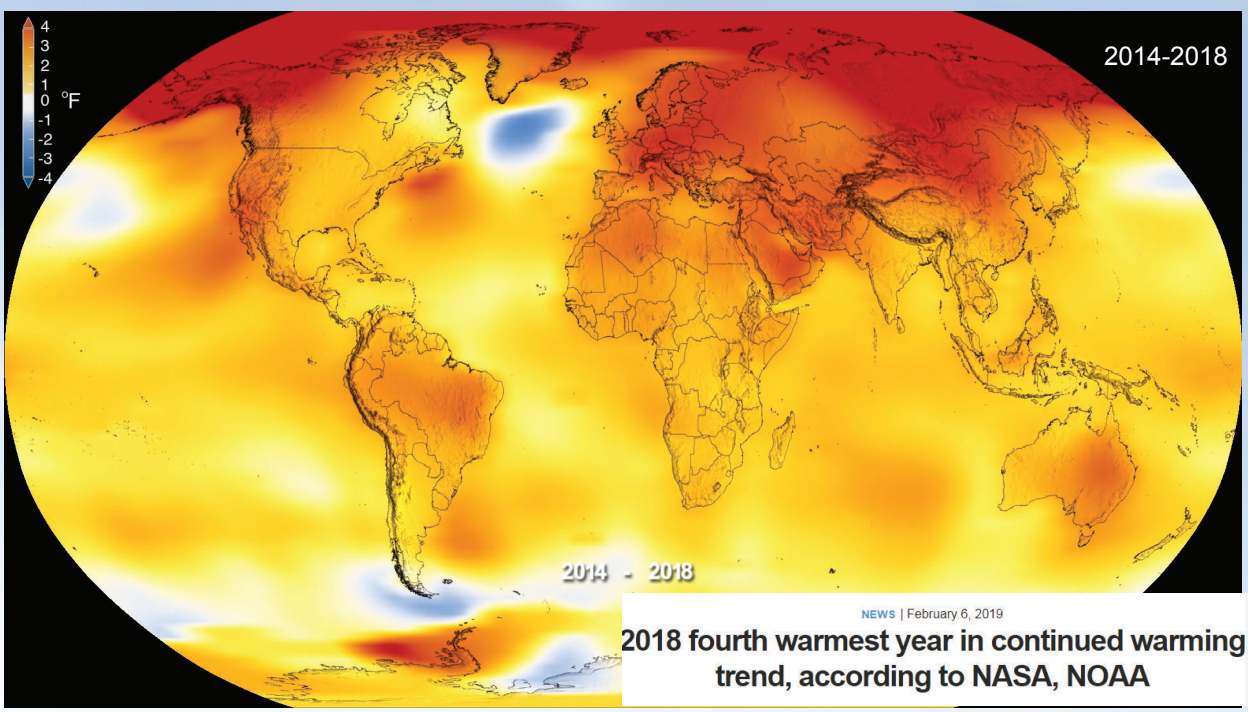


NEWS | January 18, 2018

Long-term warming trend continued in 2017: NASA, NOAA

From NASA

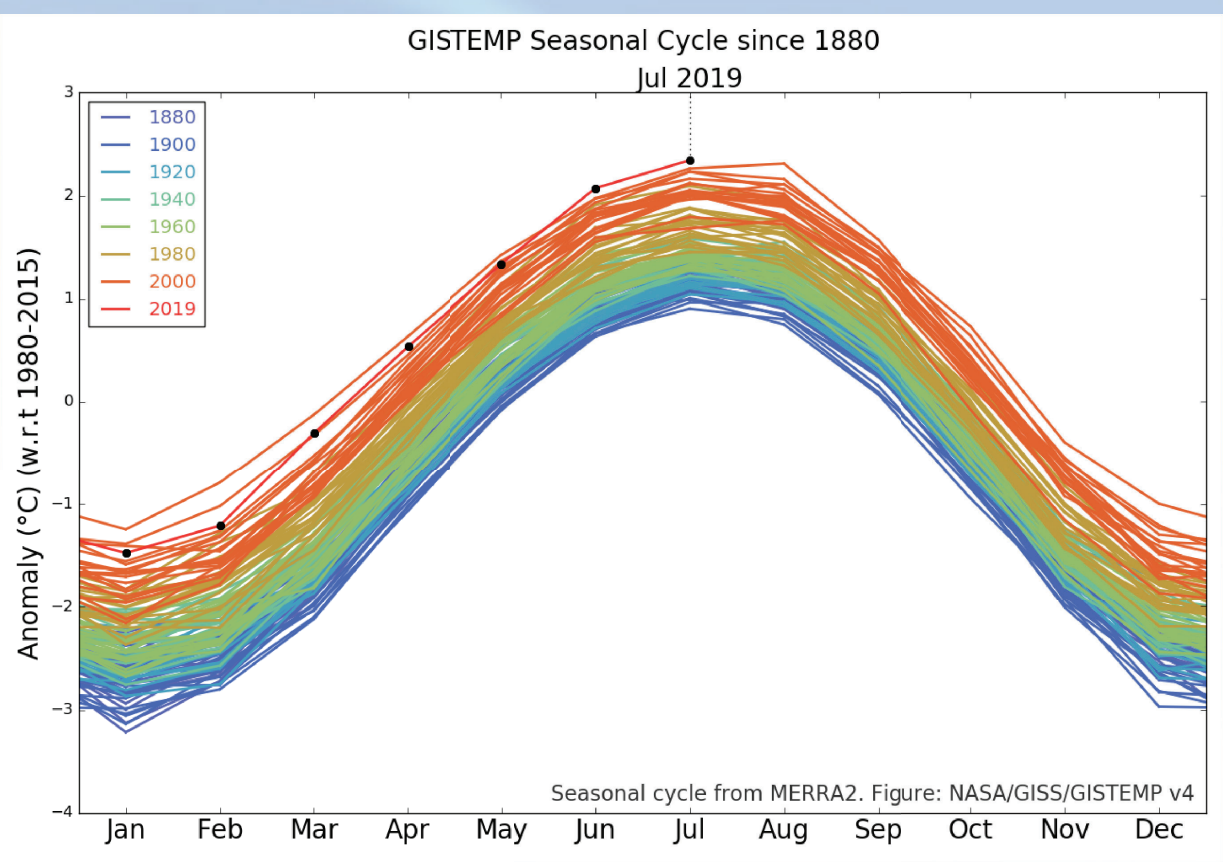
https://climate.nasa.gov/news/2671/long-term-warming-trend-continued-in-2017-nasa-noaa/



NEWS | February 6, 2019

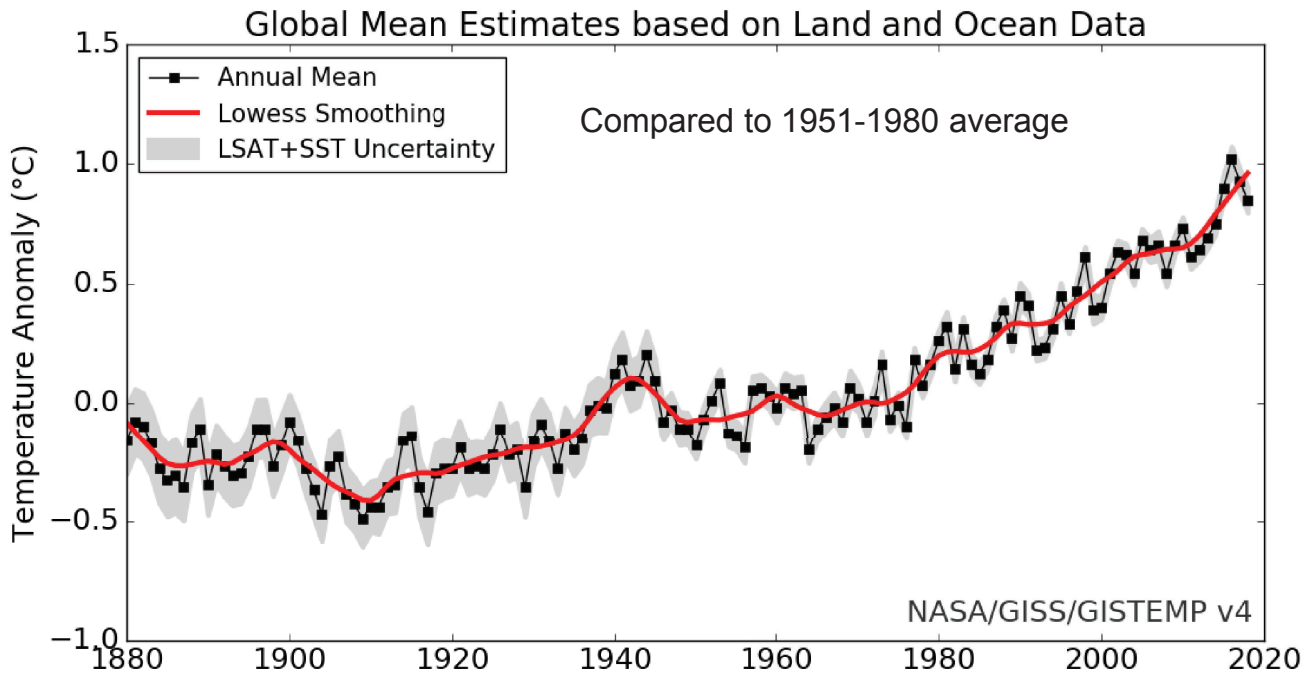
2018 fourth warmest year in continued warming trend, according to NASA, NOAA

https://climate.nasa.gov/news/2841/2018-fourth-warmest-year-in-continued-warming-trend-according-to-nasa-noaa/



https://data.giss.nasa.gov/gistemp/graphs/

Temperature anomaly: difference between temperature at a specific time to a 30 yr average



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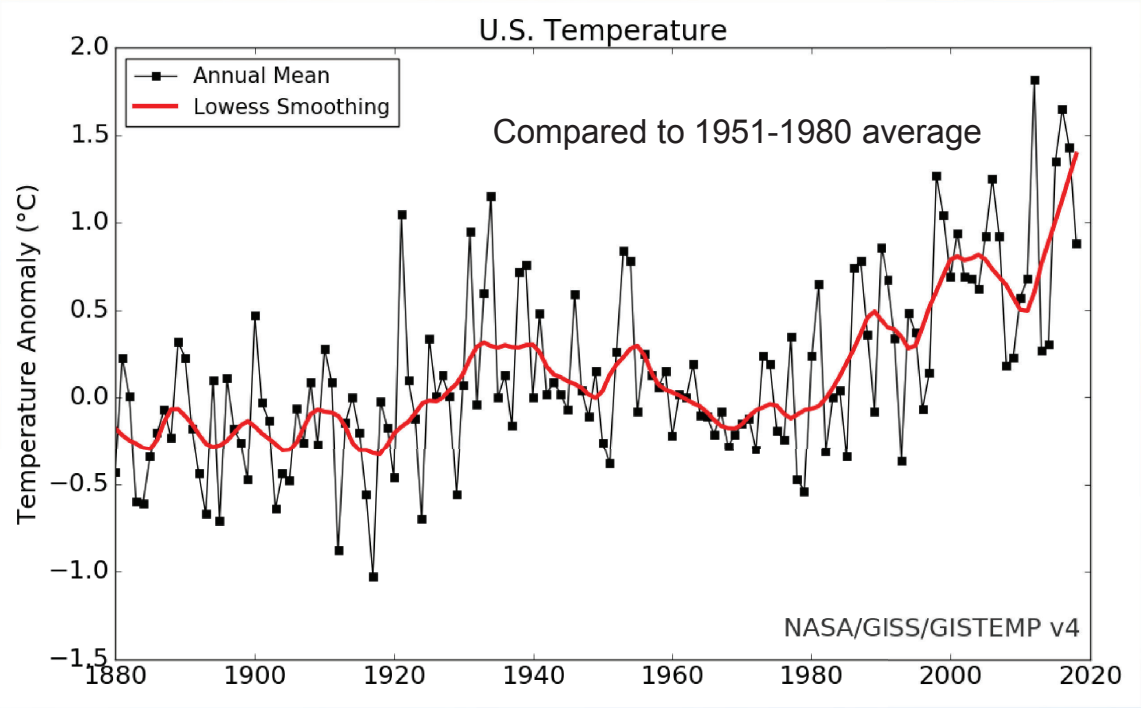
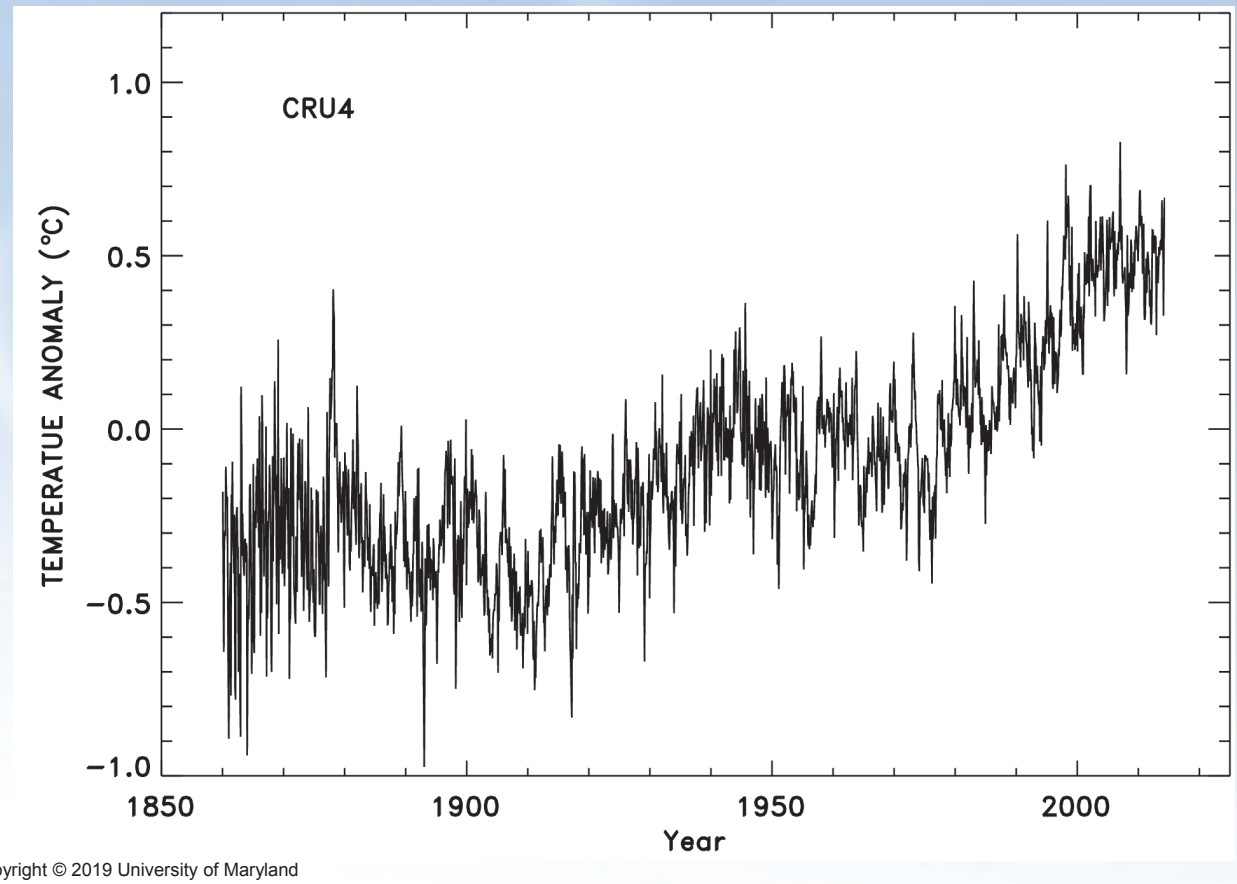
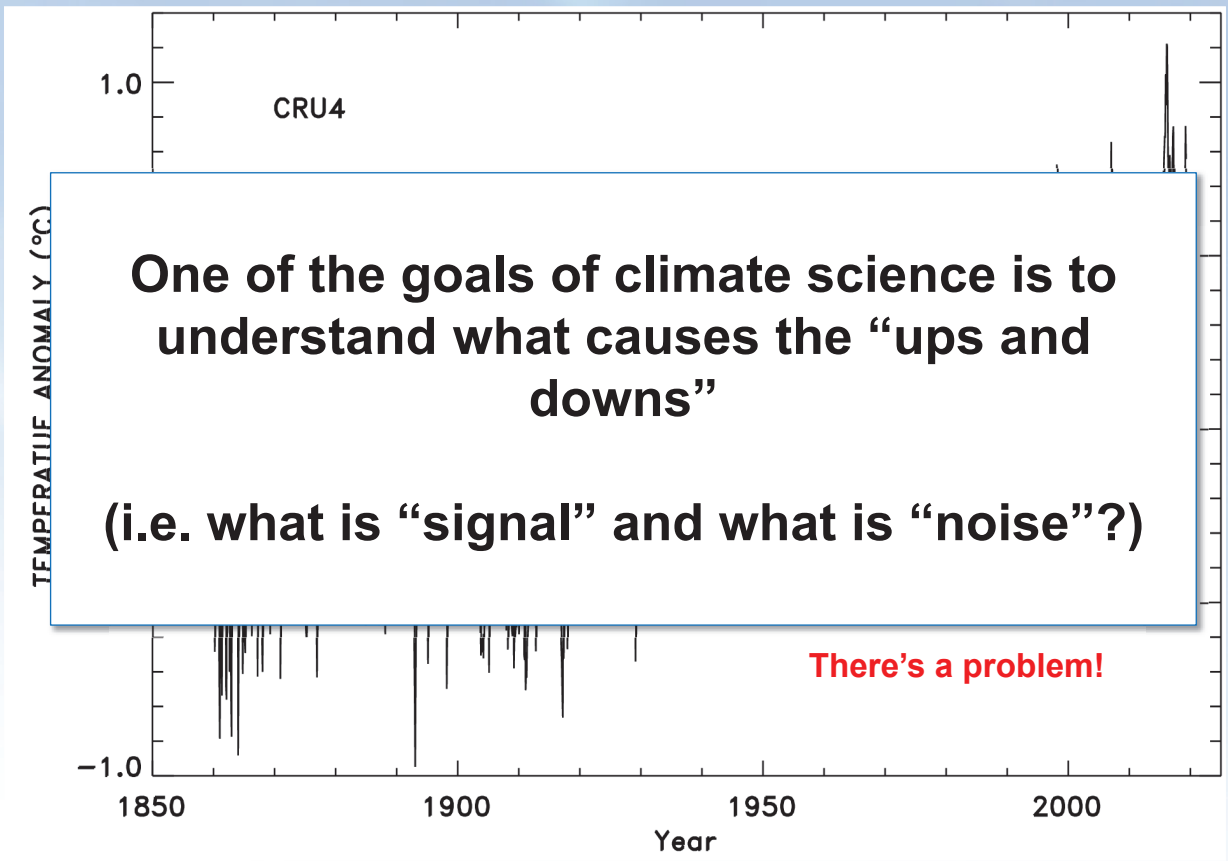


http://data.giss.nasa.gov/gistemp/graphs/

Global Monthly Temperature



Global Monthly Temperature



One of the goals of climate science is to understand what causes the "ups and downs"

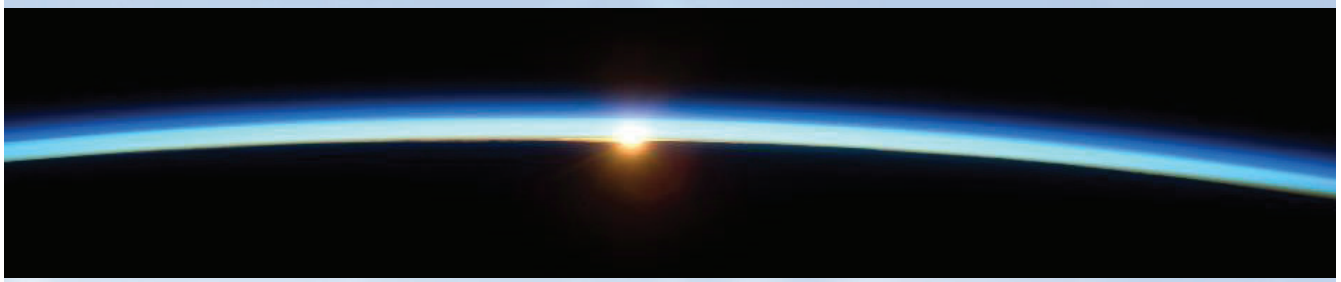
(i.e. what is "signal" and what is "noise"?)

There's a problem!

Weather and Climate

1°C rise in temperature…..so what?

Understanding the Atmosphere



Weather and climate are easy to talk about. Do a google search on the words "climate change" and see how many hits you get.

As scientists, we need to understand fundamentally what affects both weather and climate and how the two can interact.

This means we're going to have to dig into some details.