

# Climate Variability and Change

## Making Georgia Greener

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# What is Climate?

The average weather

...or at least that is what we learned in middle school...

...that definition is not very meaningful!

# What is Climate?

Climate is the various states or patterns of the atmosphere.

The quantification of climate includes:

- Measurements of the "Average"
  - the mean, the mode, the median
- Measurements of the Variability
  - the variance, extremes, the range
- Measurements of Occurrence
  - statistical measurements (skewness and kurtosis)
  - return intervals

# What is Climate?

## Top 15 Rainfall Extremes in Georgia Since 1900 (Daily)

- 18.00 SAINT GEORGE, GA (August 29, 1911)
- 15.00 GLENNVILLE, GA (September 27, 1929)
- 14.59 DONALSONVILLE, GA (September 15, 2002)
- 13.68 LOUISVILLE 1 E, GA (August 13, 1940)
- 13.20 COVINGTON, GA (October 3, 1906)
- 12.75 CLAYTON 1 SSW, GA (September 17, 2004)
- 12.75 BROOKLET 1 W, GA (September 27, 1929)
- 12.75 BLUE RIDGE RESVR DAM, GA (September 27, 1929)
- 12.36 BRUNSWICK FAA AIRPORT, GA (August 22, 1969)
- 12.15 BUTLER, GA (July 5, 1994)
- 12.14 BYRON EXP STN, GA (July 6, 1994)
- 11.45 TYBEE ISLAND, GA (Oct. 13, 1994)
- 10.88 BLAKELY, GA (March 15, 1929)
- 10.74 MONTEZUMA, GA (July 6, 1994)
- 10.50 EXPERIMENT, GA (July 5, 1994)

# What is Climate?

## Monthly Range in Temperatures Across Georgia (1900 – 2000)

Jan	89	1975	Lumber City	-17	1940	CCC Camp F16 (Lafayette)
Feb	90	1918	Glennville	-12	1899	Diamond*
Mar	99	1907	Brunswick	-5	1993	Blairsville
Apr	99	1986	Brunswick	12	1983	Clayton
May	108	1953	Bainbridge	25	1963	Blairsville
Jun	110	1959	Warrenton	34	1966	Blairsville
<b>Jul</b>	<b>112</b>	<b>1952</b>	<b>Louisville</b>	40	1937	Blairsville
<b>Aug</b>	<b>112</b>	<b>1983</b>	<b>Greenville</b>	40	1968	Clayton
Sep	111	1925	Americus	26	1967	Blairsville
Oct	105	1954	Fort Gaines	14	1961	Blairsville
Nov	93	1961	Brooklet	0	1950	Blairsville
Dec	89	1922	St George*	-9	1962	Blairsville

\* Earlier date at the same value and/or at the same or other location

# What is Climate?

Climate is the various states or patterns of the atmosphere.

Climate is much more than just the average weather!

# Georgia's Climate

What drives it?

LOCATION

LOCATION

LOCATION

Where is Georgia?

The background of the slide is a blue-tinted photograph of a vast ocean under a cloudy sky. The text "Where is Georgia?" is overlaid in the upper left quadrant in a white, sans-serif font.

# Where is Georgia?

Put the following cities in order from east to west

- Detroit
- Philadelphia
- Atlanta
- New York



Where is Georgia?

Did you get them in the correct order?

# Where is Georgia?

New York

Philadelphia

Detroit

Atlanta

Where is Georgia?



# Georgia's Climate

- Oceans
  - Atlantic
  - Gulf of Mexico
  - Equatorial Pacific
- Latitude
  - 7 months warm
  - 5 months cool

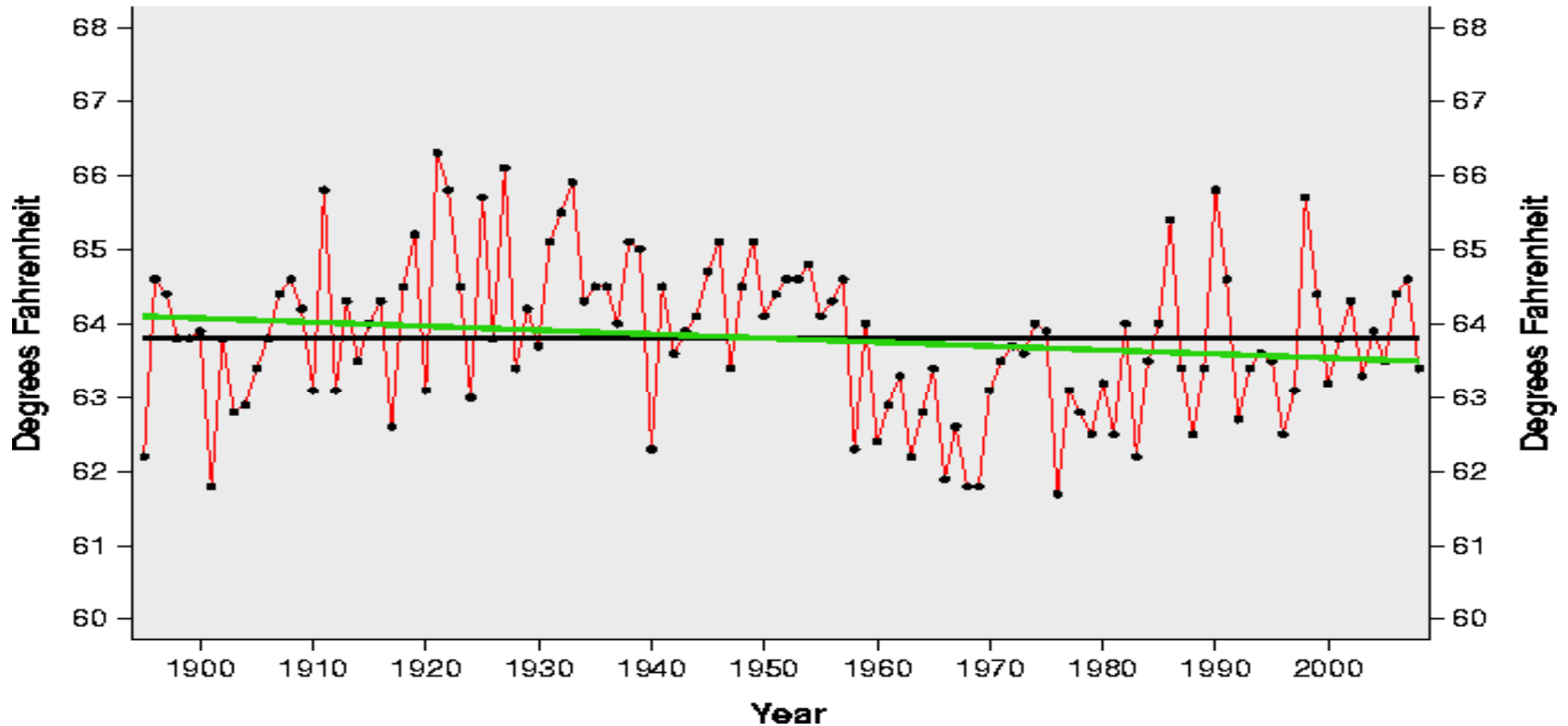
# Georgia's Climate

## IS VARIABLE

- seasonally
- decadal
- multi-decadal

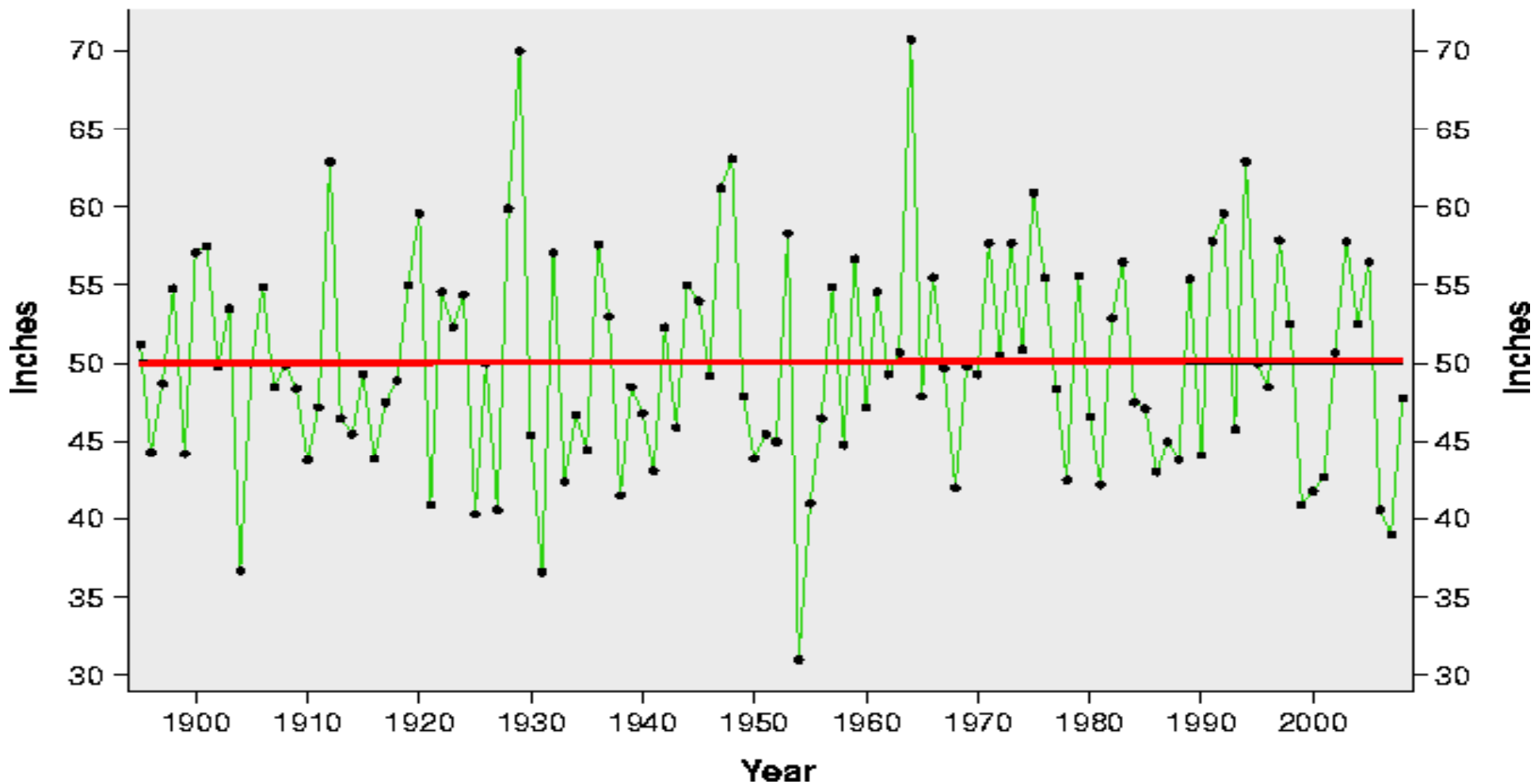
# Annual Average Temperature Trend - Georgia -

- Actual Temperature
- Average Temperature
- Trend



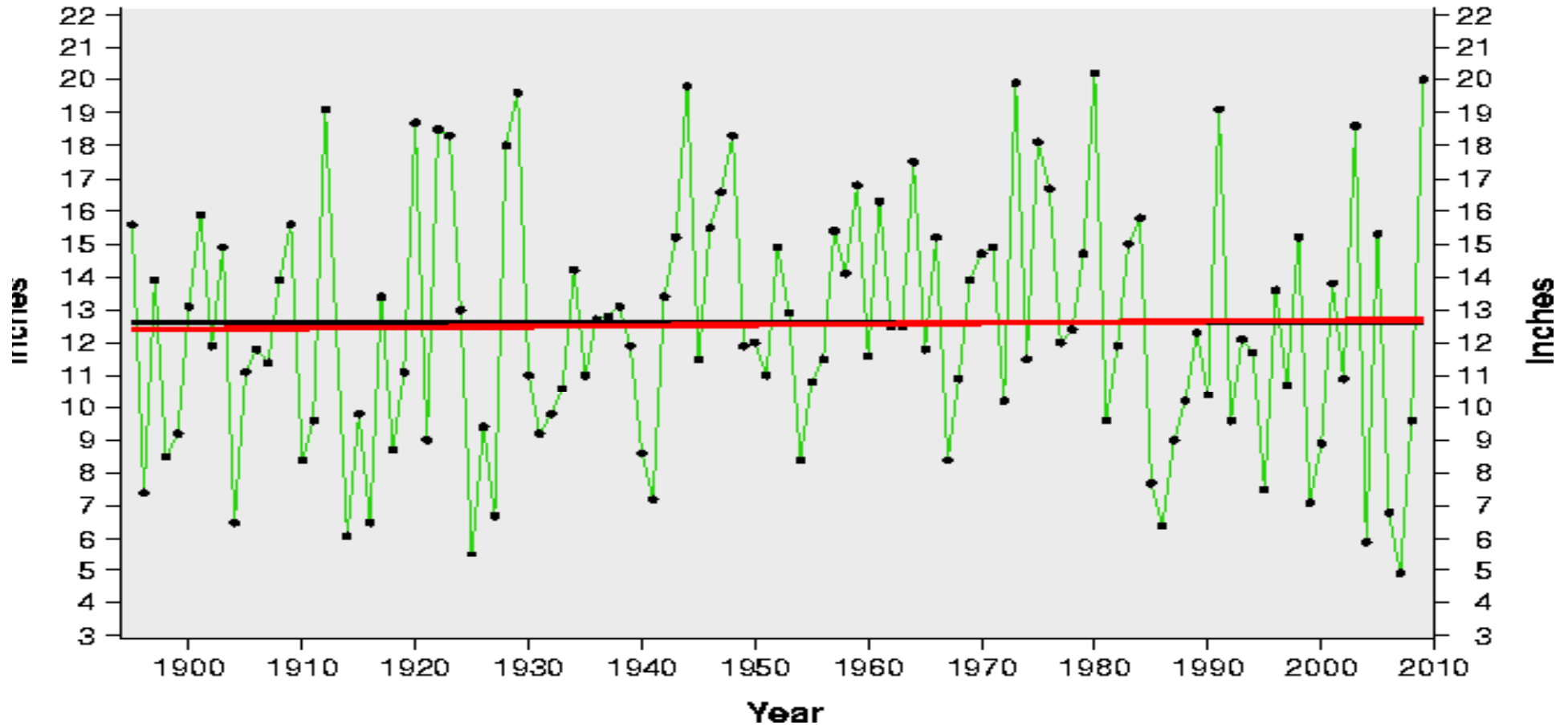
# Annual Rainfall Trend - Georgia

- Actual Precipitation
- Average Precipitation
- Trend



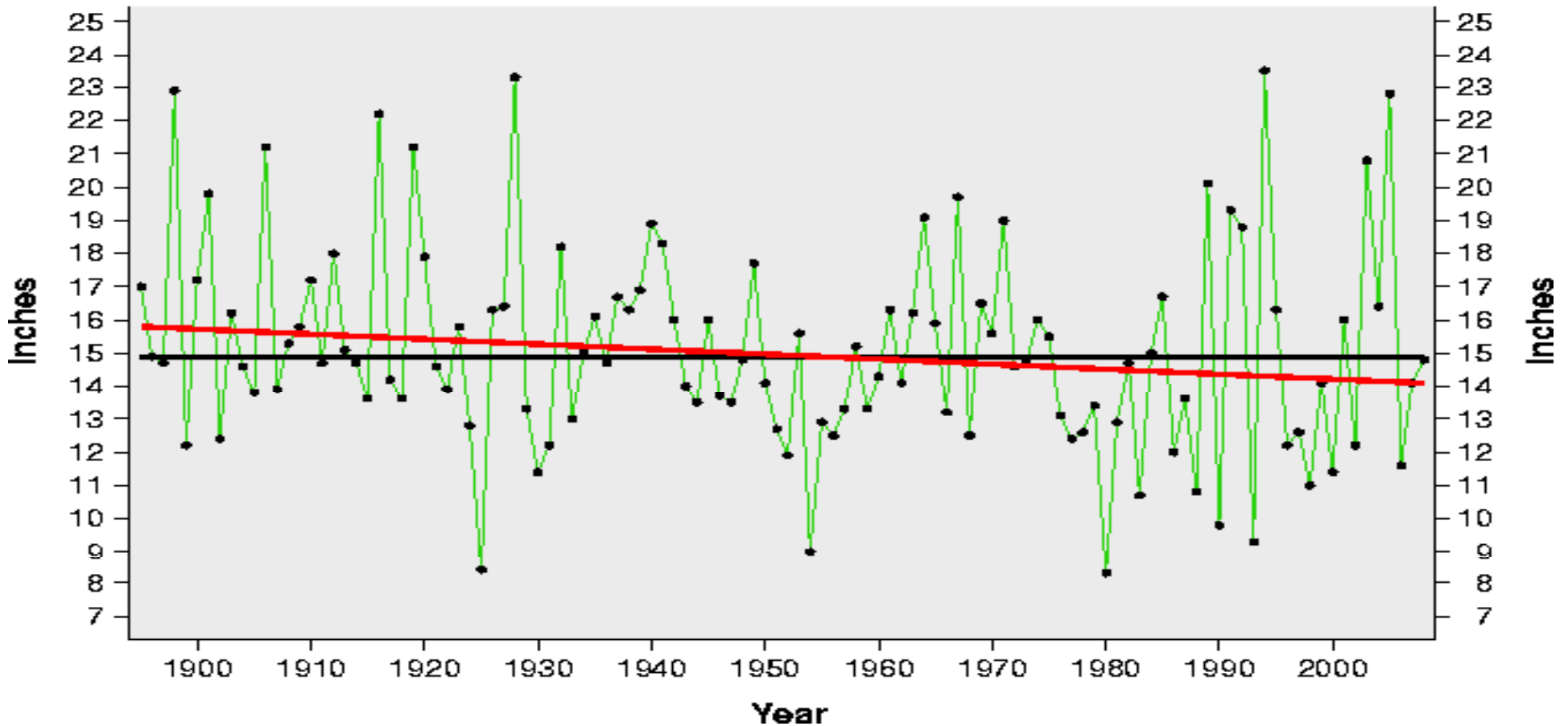
# Spring Rainfall Trend - Georgia

— Actual Precipitation  
— Average Precipitation  
— Trend



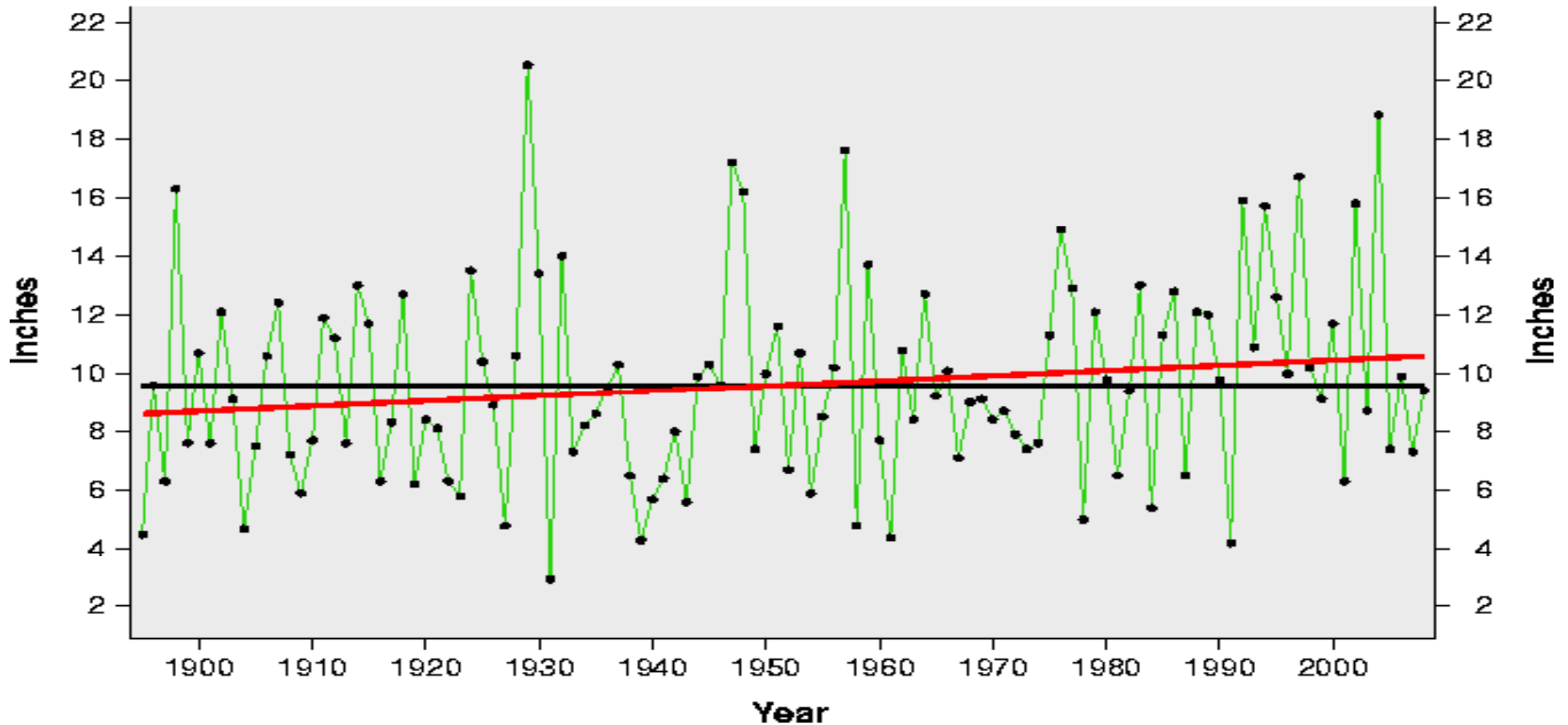
# Summer Rainfall Trend - Georgia

- Actual Precipitation
- Average Precipitation
- Trend



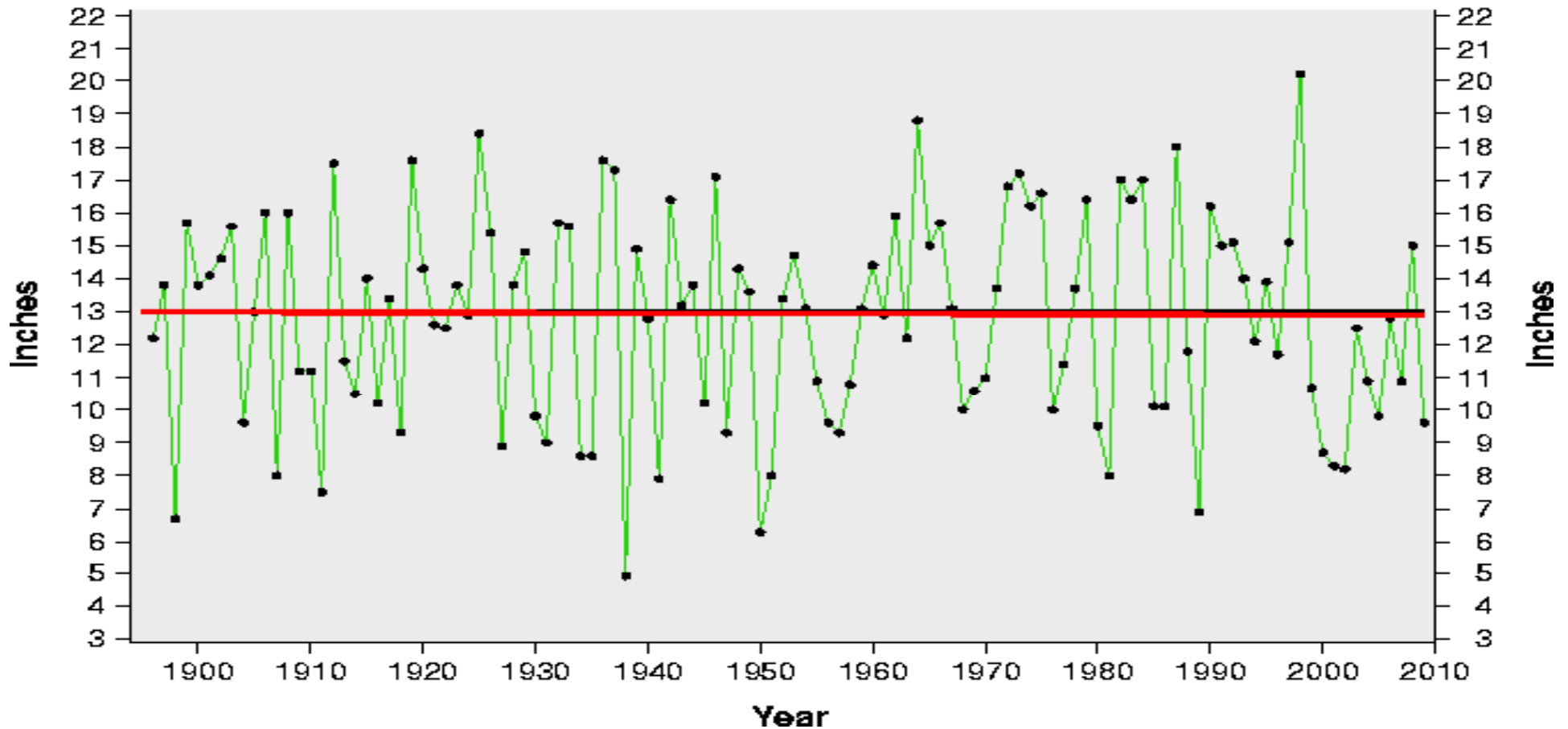
# Fall Rainfall Trend - Georgia

— Actual Precipitation  
— Average Precipitation  
— Trend



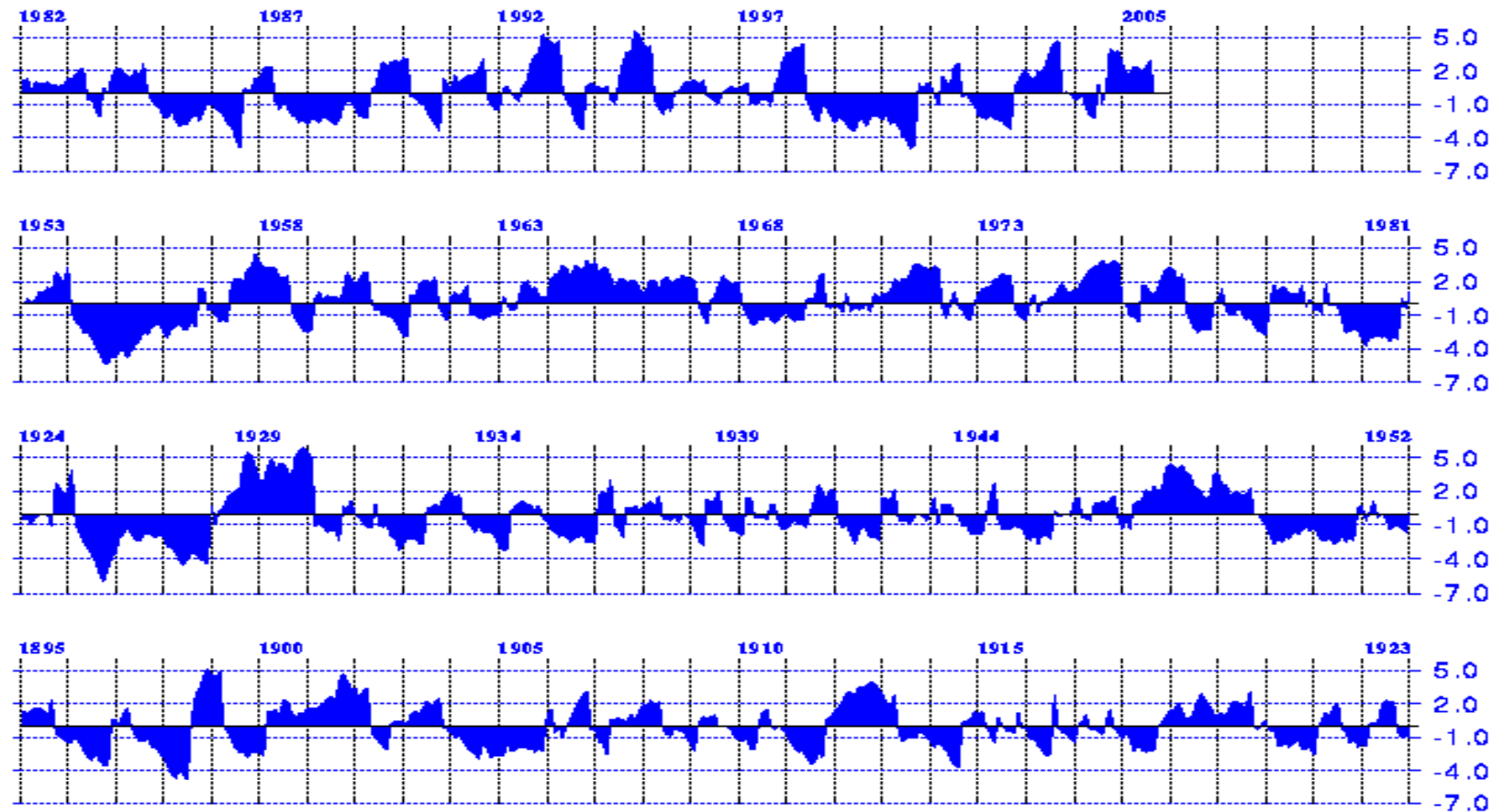
# Winter Rainfall Trend - Georgia

- Actual Precipitation
- Average Precipitation
- Trend



# Drought History – Central Georgia

## Palmer Drought Severity Index



Georgia - Division 05: 1895-2005 (Monthly Averages)

# What About Climate Change?

The background of the slide is a blue-tinted photograph of a vast, calm ocean stretching to the horizon. The sky is filled with soft, white clouds, and the water's surface shows gentle ripples. The overall mood is serene and contemplative.

# What About Climate Change?

- What we know

# What About Climate Change?

- What we know
  - Average temperature of the earth's atmosphere has warmed 1 to 2 degrees (F) over the past century
  - Average temperature of the atmosphere in the Southeast has cooled slightly over the past century

# What About Climate Change?

- What we **DON'T** know
  - How much of the warming of the earth's atmosphere is caused by carbon dioxide, methane, and other human produced trace gases
  - How much of the warming is caused by human induced landscape changes; deforestation, urban sprawl, shifting agricultural practices

# What About Climate Change?

- What we **DON'T** know
  - How much of the warming is due to natural variability in the climate system which we do not understand.
  - How to properly account for clouds and ocean currents in the climate models (we are getting better but these are not simple systems)

If we are not sure, what should we do?

- That is a question of ethics not science

# My Thoughts

- There are several good reasons to decrease our dependency on oil and coal **regardless** of the global climate change – it doesn't matter if you accept global warming or not!

# My Thoughts

- Economics – the “ultimate” green

If you do not want to save money ....

Please send your check payable to

David Emory Stooksbury

And mail it to

310 Snapfinger Drive

Athens, GA 30605

Put in memo line - David's telescope fund

# My Thoughts

- **Economics**
- It is cheaper to conserve than to build more power plants – our electric bills will be lower or at least not rise as fast
- New compact lights are much cheaper to operate and require less energy; Compact fluorescent lights 13 W is equivalent to 60 W with conventional lighting (40% of electric power is for lights)
- Biofuels – ethanol (corn, grasses, pine trees) and biodiesel (soybeans and peanuts) can aid the economy of rural America
- Keeping billions of dollars in America for our use instead of sending it to someone else
- Passive solar building are not any more expensive to build than conventional buildings but will save on heating costs and thus save money

# My Thoughts

- National Security

Depending on someone who may not like us for our oil

Transportation over large distances subject to disruption do to terrorism, economic blackmail, or weather - remember gas shortages in north Georgia last fall?

# My Thoughts

## Health and Environmental

Coal power plants produce particulates and heavy metals - acidification of the oceans

Internal combustion engines produce air pollution - increased pulmonary disease

# My Thoughts

- Health and Environment
  - Better health from a less polluted environment

# My Thoughts

Several Reasons to move away from oil and coal as our primary energy sources

Economics – it pays

National Security – we are not depending on others

Health – a cleaner and healthier environment

Office of the State Climatologist

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