

Climate change in the South and Southeast US climate regions

An analysis of average annual temperatures
from 1895 to 2019

Introduction & problem statement

- Global warming and keeping the Earth's average temperature increase below 2C.
- More costly extreme weather events.
- Is climate change evenly affecting temperatures in nearby regions with similar geographic features (South and Southeast)?
- Are there rising temperatures in the South in the past 2 decades?
- Reinforce need to take drastic mitigating steps by public and policymakers.

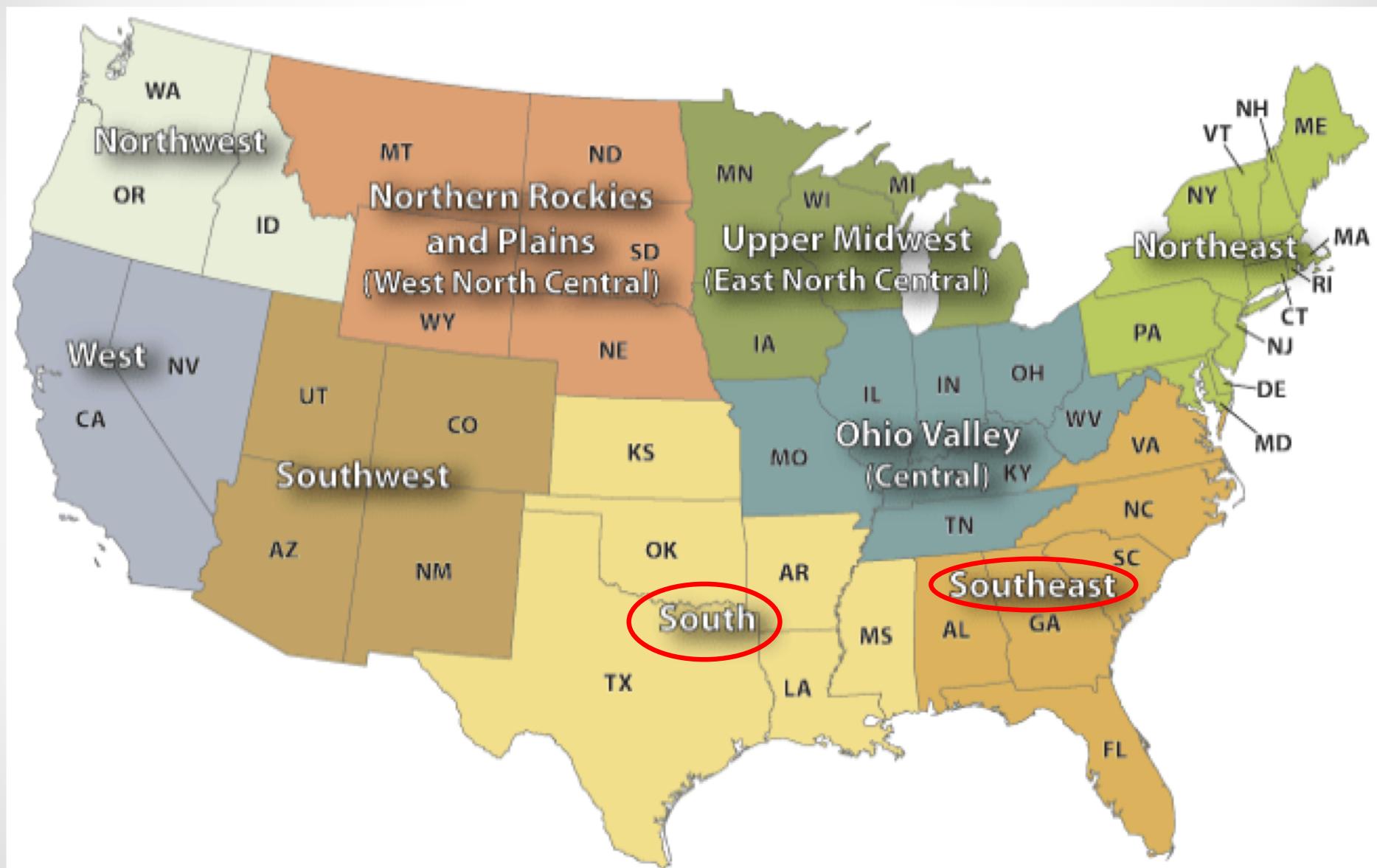
Dataset

- ❖ Annual mean temperatures for 3,107 counties in the US Lower 48 states, between 1895 and 2019, for a total of **388,375** temperature data entries.
- ❖ Original data on the Washington Post GitHub ([climdiv_county_year.csv](#)).
- ❖ Edited to include state's name. Final dataset for this study on Google Drive [here](#).
- ❖ Data includes annual mean temperatures for the US Lower 48:
 - ❖ Area code for each county.
 - ❖ Recording year.
 - ❖ The name of the state.*
 - ❖ Temperatures in degrees Fahrenheit (F).
 - ❖ Temperatures in degrees Celsius (C).*

Hypotheses

- Are there differences in average annual temperatures between the South and the Southeast, from 1895 through 2019?
- Are there differences in mean annual temperatures in the South between the past two decades 2000-2009 and 2010-2019?

US Climate Regions

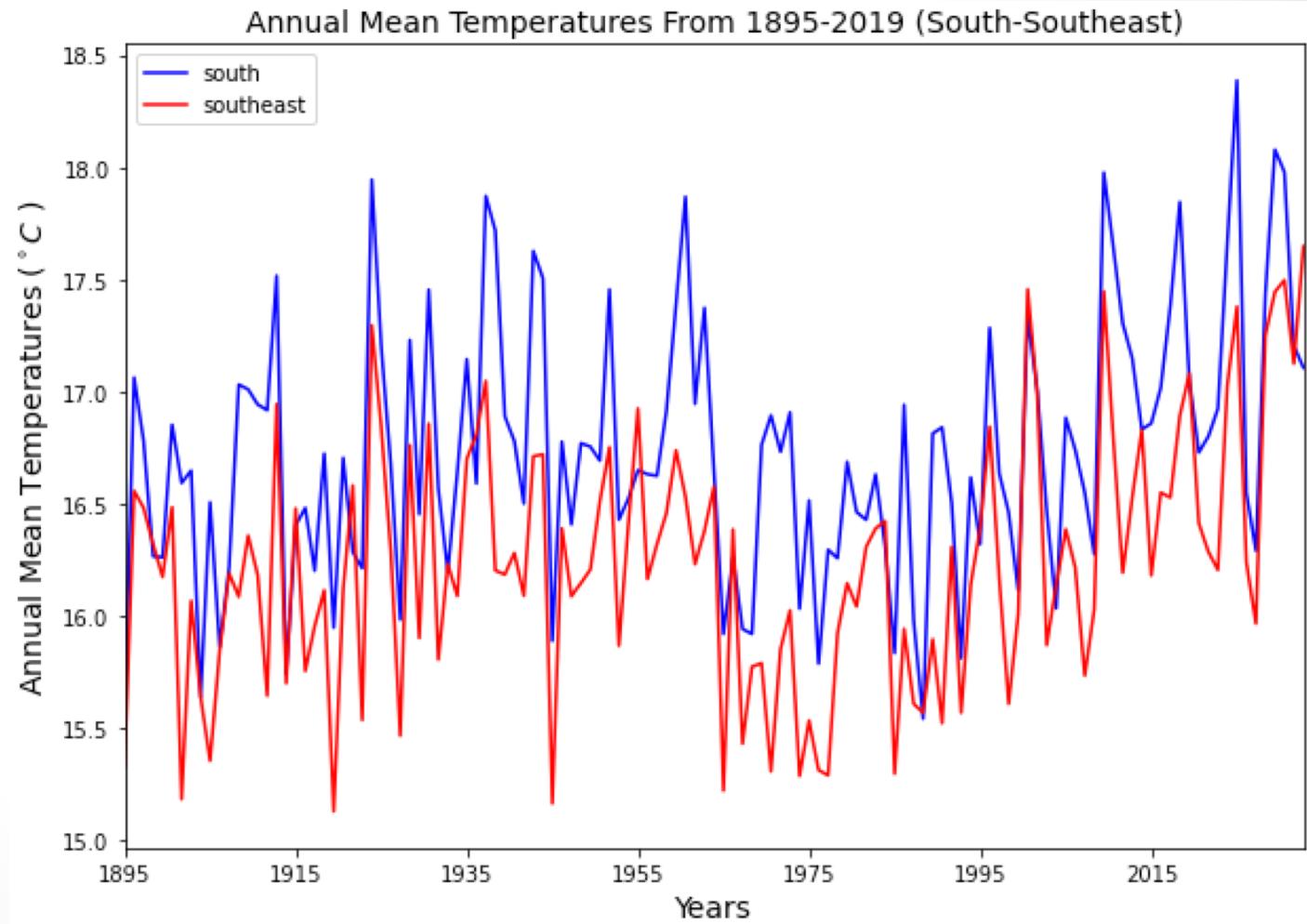


Hypothesis 1

Are there differences in average annual temperatures between the South and the Southeast, from 1895 through 2019?

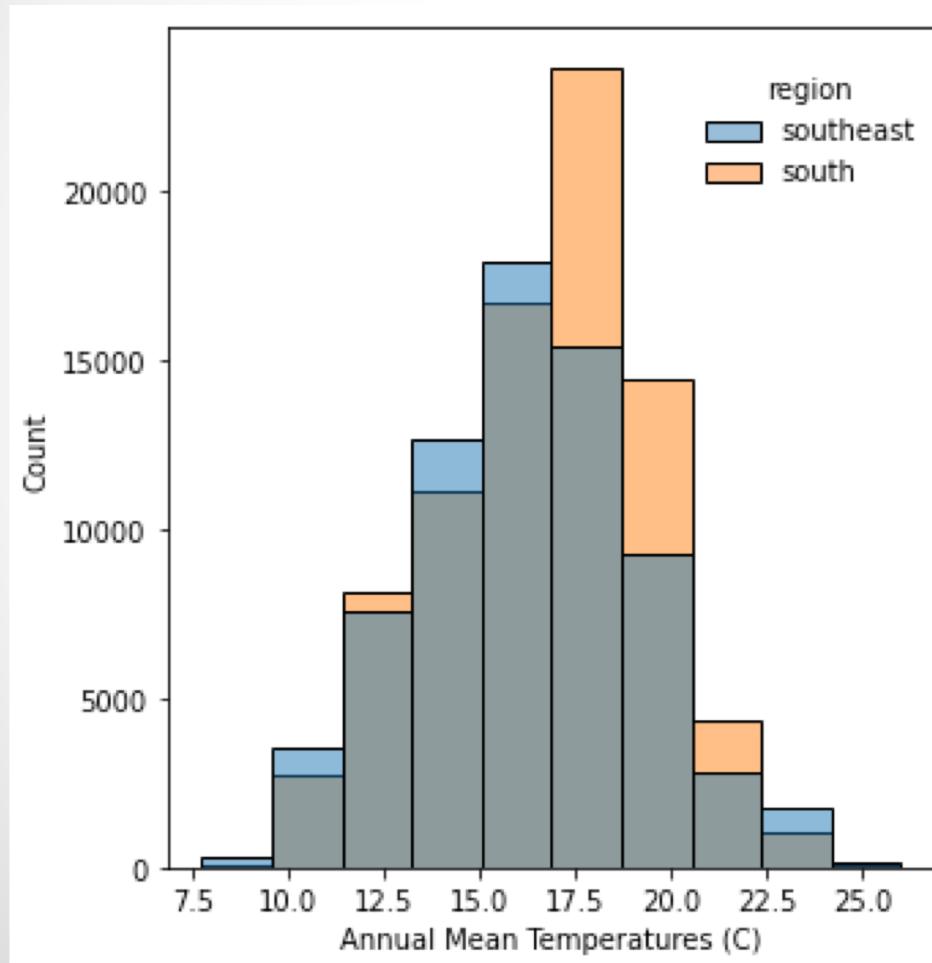
Ho: There are no differences.

Ha: There are differences.

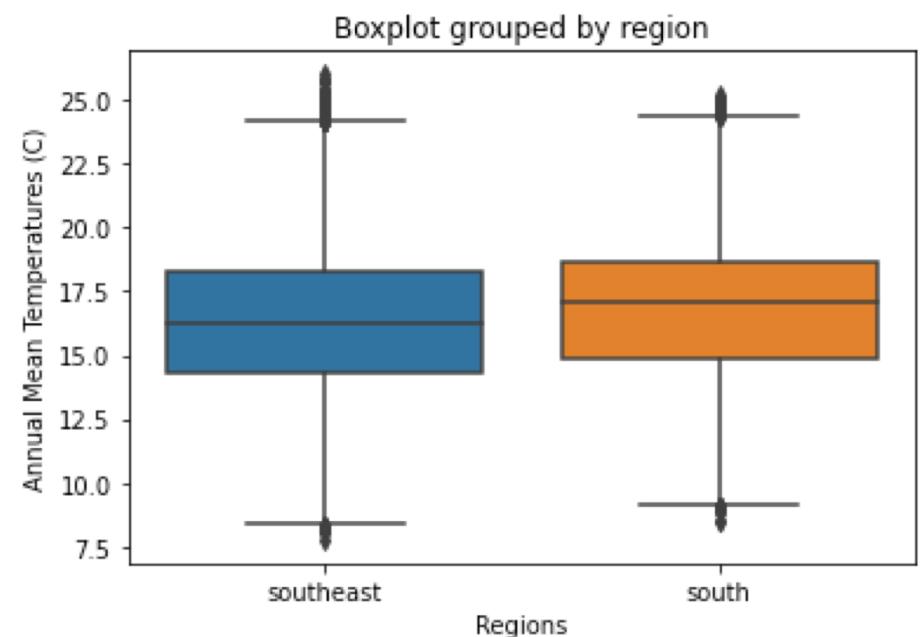


Distribution visualization

Histogram

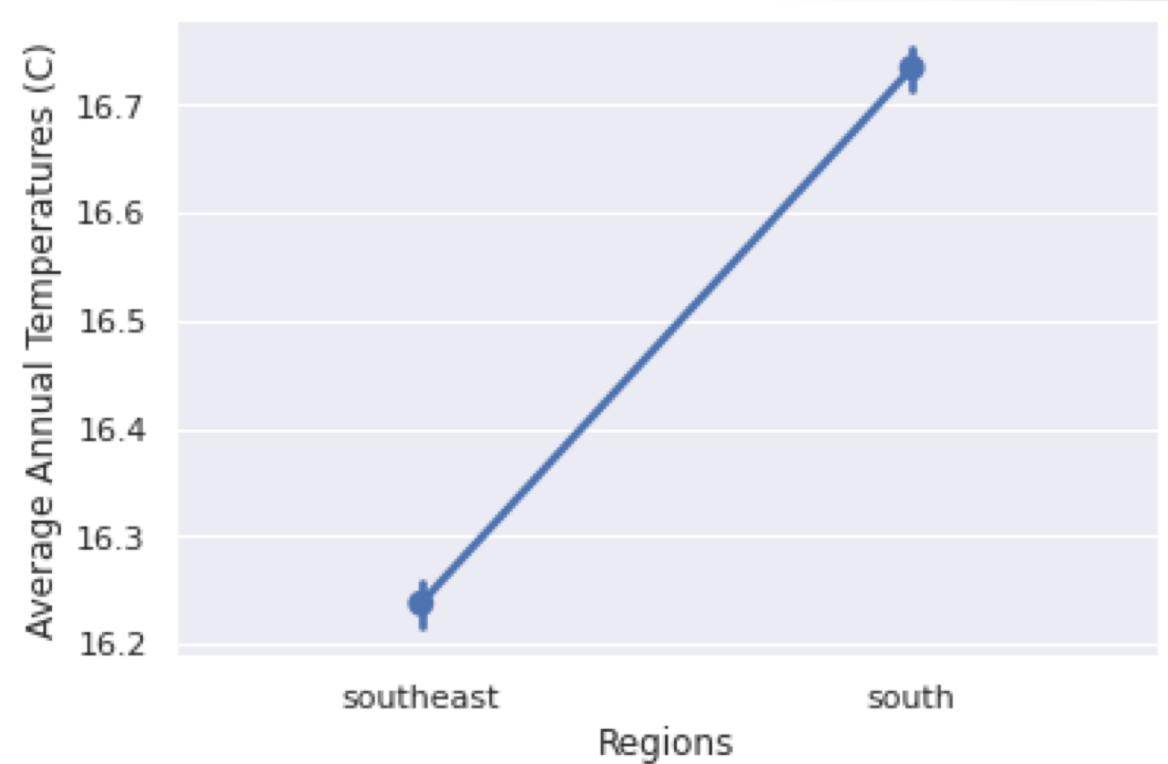


Box Plot



Statistically significant difference in mean temperatures between the South and Southeast (1895 - 2019)

- P-value < .001
- Difference in mean annual temperatures with 95% certainty: 0.47 – 0.52 degrees C.



Discussions and Recommendations

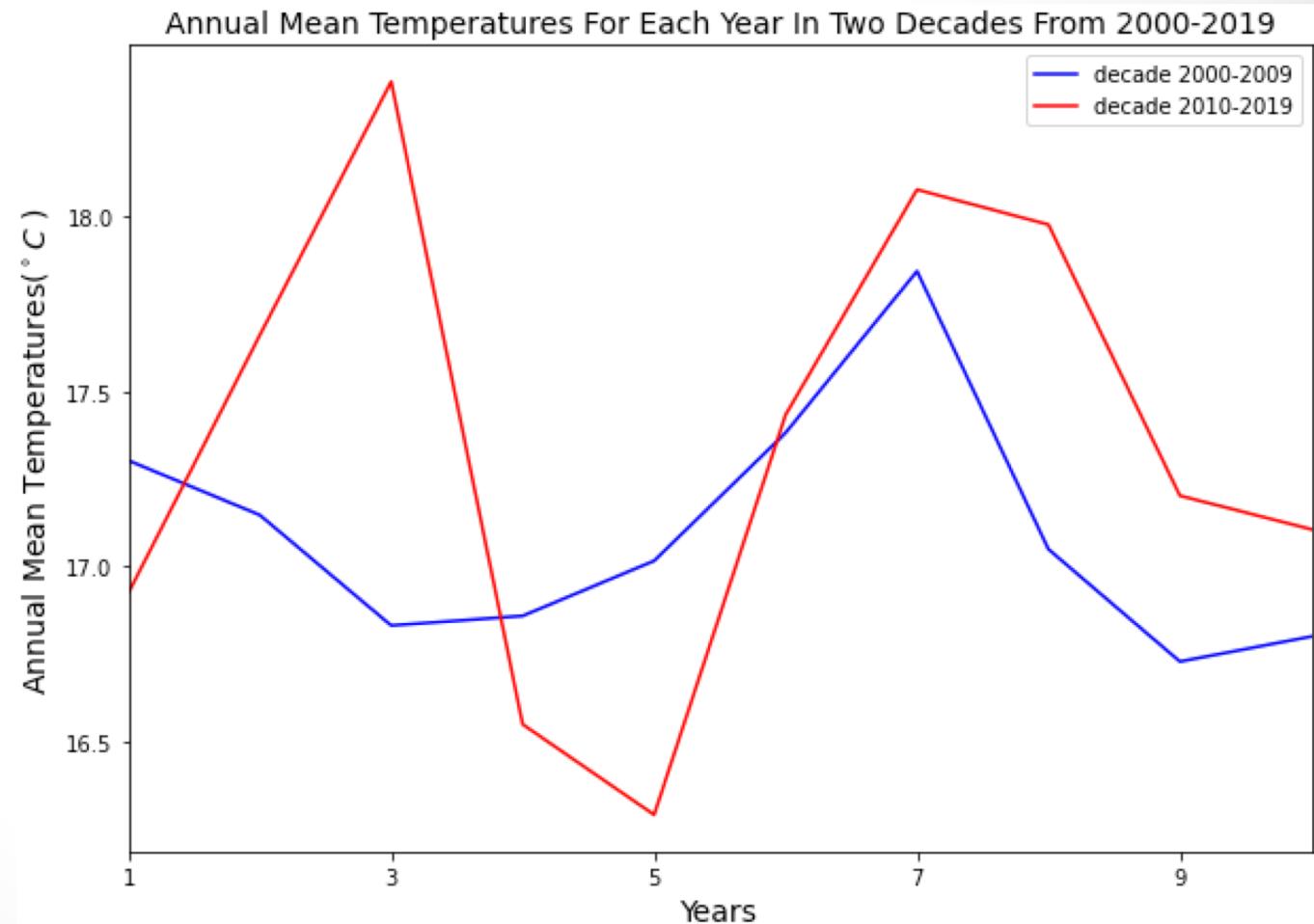
- ❖ Nearby regions with similar geographic features have significant different average annual temperatures (p-value < .001).
- ❖ Plausible explanation of more extreme billion-dollar weather disaster events in the South compared to the Southeast.
- Mitigating steps need to be taken immediately by the public and policymakers.
- Next steps: include precipitation data and investigate results through A/B testing.

Hypothesis 2

Are there differences in mean annual temperatures in the South between the past two decades 2000-2009 and 2010-2019?

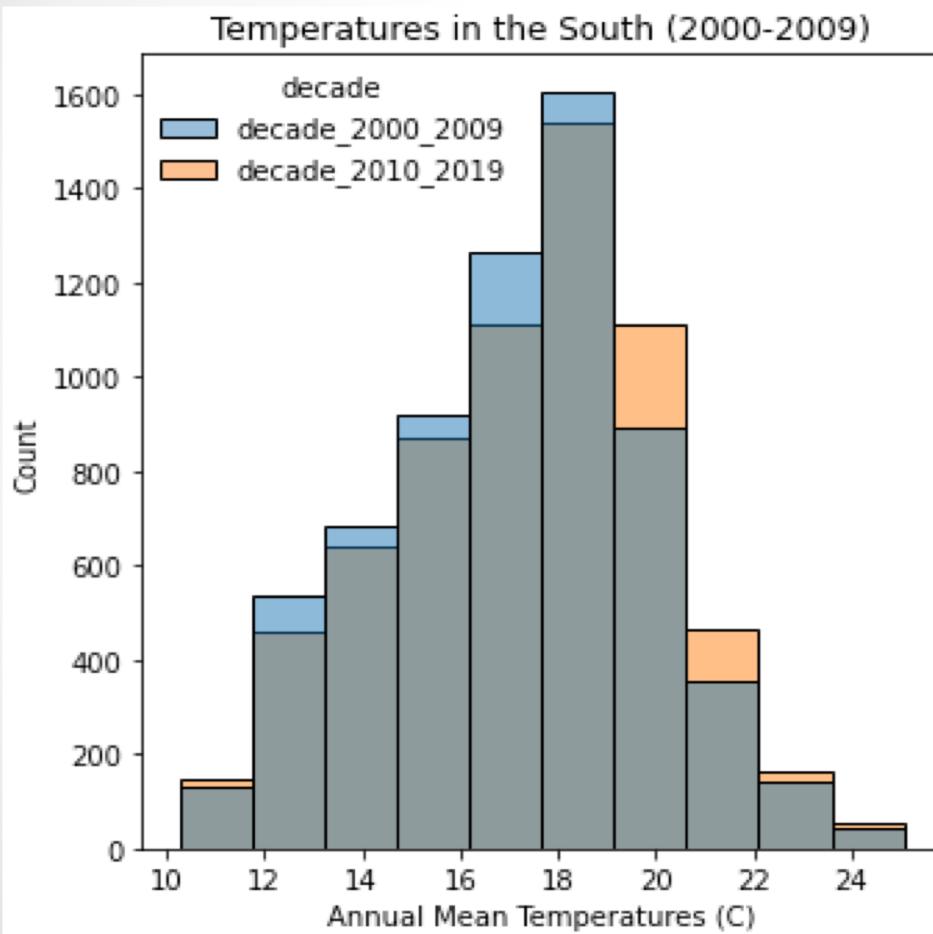
Ho: There are no differences.

Ha: There are differences.

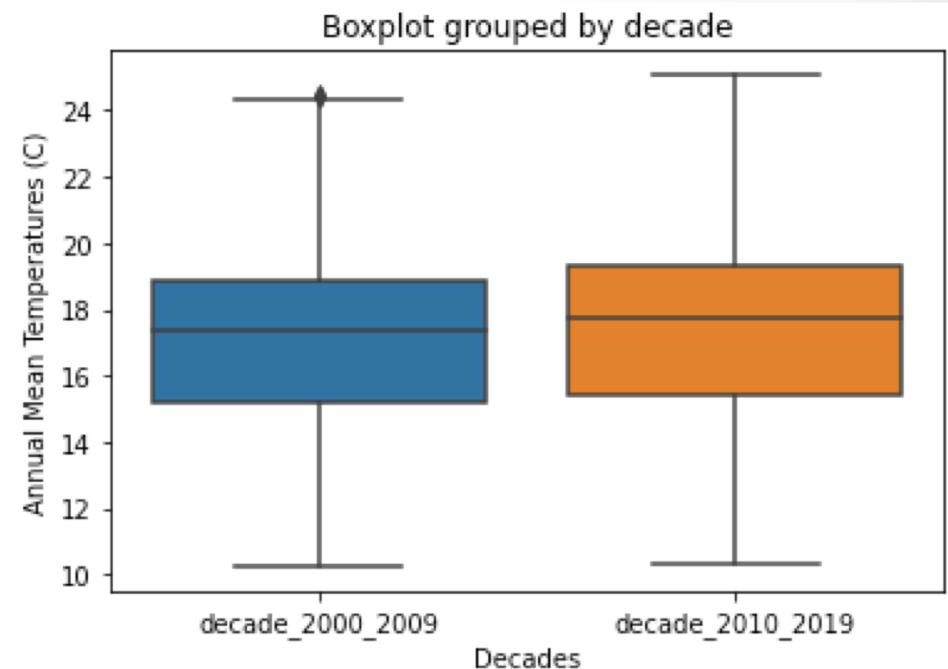


Distribution visualization – South

Histogram

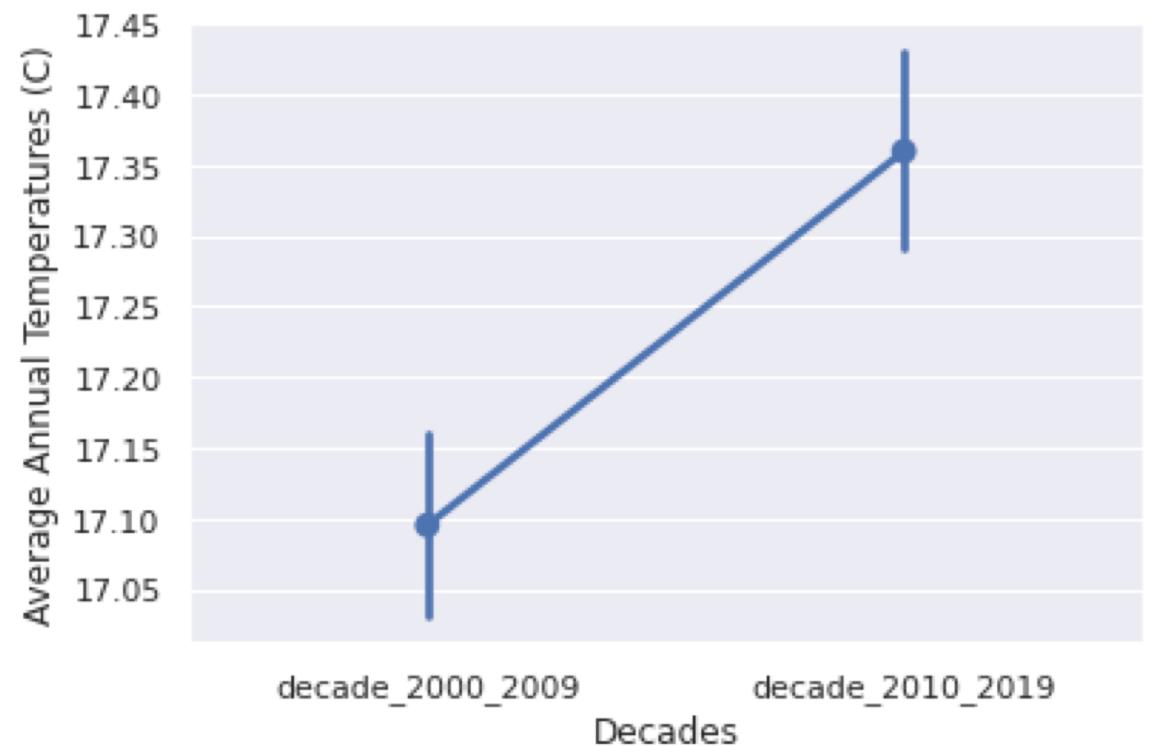


Box Plot



Statistically significant difference in mean annual temperatures in the South between 2000-2009 and 2010-2019

- P-value < .001
- Difference in mean annual temperatures with 95% confidence: 0.17 – 0.36 degrees C.



Discussions and Recommendations

- ❖ Alarming trends of warming temperatures in only two decades (p-value < .001).
 - ❖ Plausible explanation of more extreme billion-dollar weather disaster events in the South this last decade compared to the first one.
- Drastic mitigating steps need to be taken immediately to meet the 2C target of the Paris accord.
- Next steps: include precipitation data and investigate results through A/B testing.