Blog: Climate Change in Alvin, TX

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Introduction

Alvin, a small city in the Houston metropolitan area of Texas, is home to a weather station that has collected data since 1898, longer than any other weather station in Western Texas. Available online through the National Oceanic and Atmospheric Adminsitration (NOAA), this data can be helpful in analyzing local weather and climate trends in Houston to determine how we are being impacted by climate change.
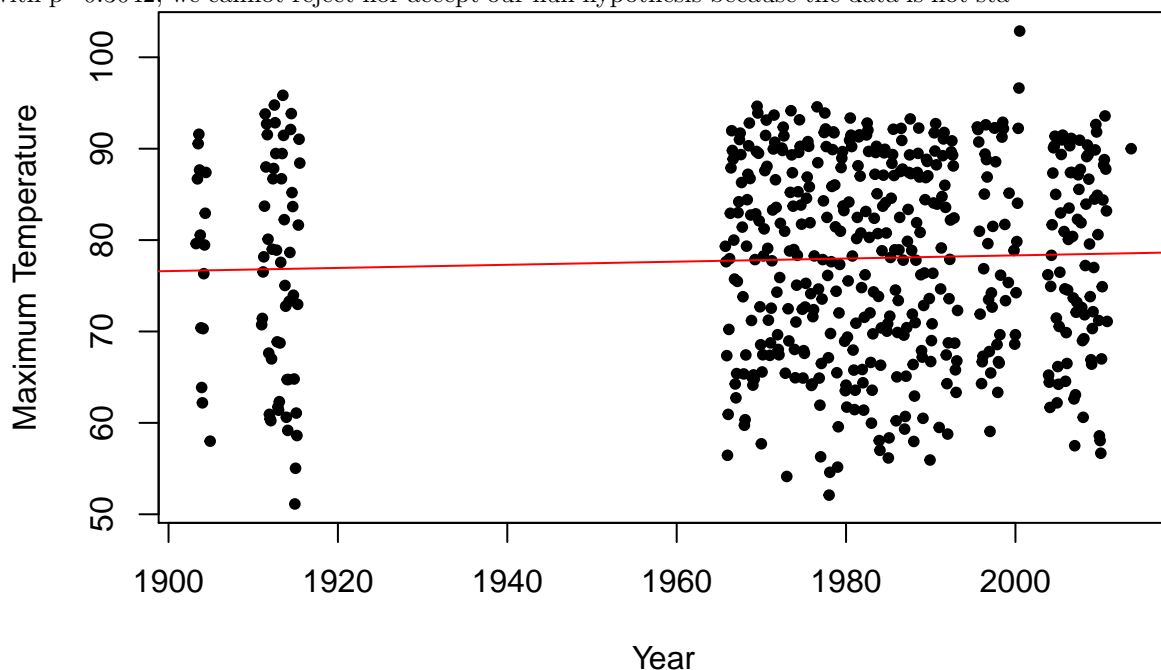
Hypotheses

Alternative Hypothesis: The maximum temperature in Alvin, TX has increased from 1998-2013.

Null hypothesis: The maximum temperature in Alvin, TX has decreased from 1998-2013.

Analyzing the Data: Maximum Temperatures

Below are the monthly mean temperatures in Alvin, TX from 1998-2013. There is an overall increasing trend in the data. However, with p=0.3042, we cannot reject nor accept our null hypothesis because the data is not sta-
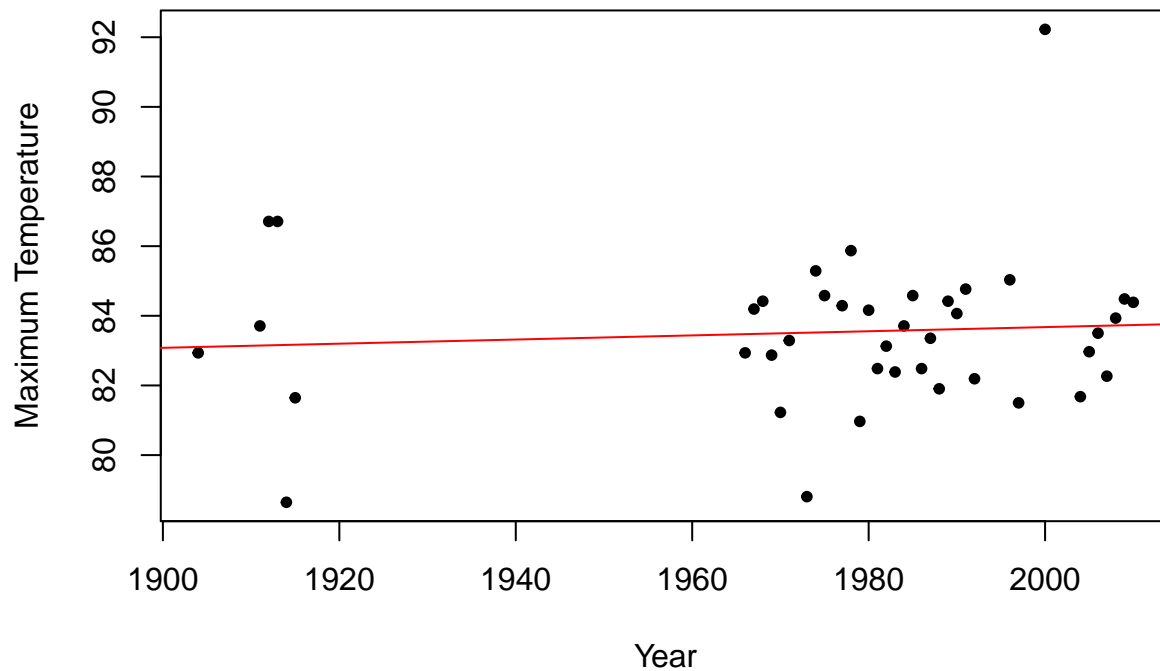

tistically significant.

As shown in the graph above, there is a huge portion of missing data from about 1920-1960. A gap in data this large poses questions about the validity of the data set. To see if the trend exists independently of this missing data, we can look only at the data collected after 1960.
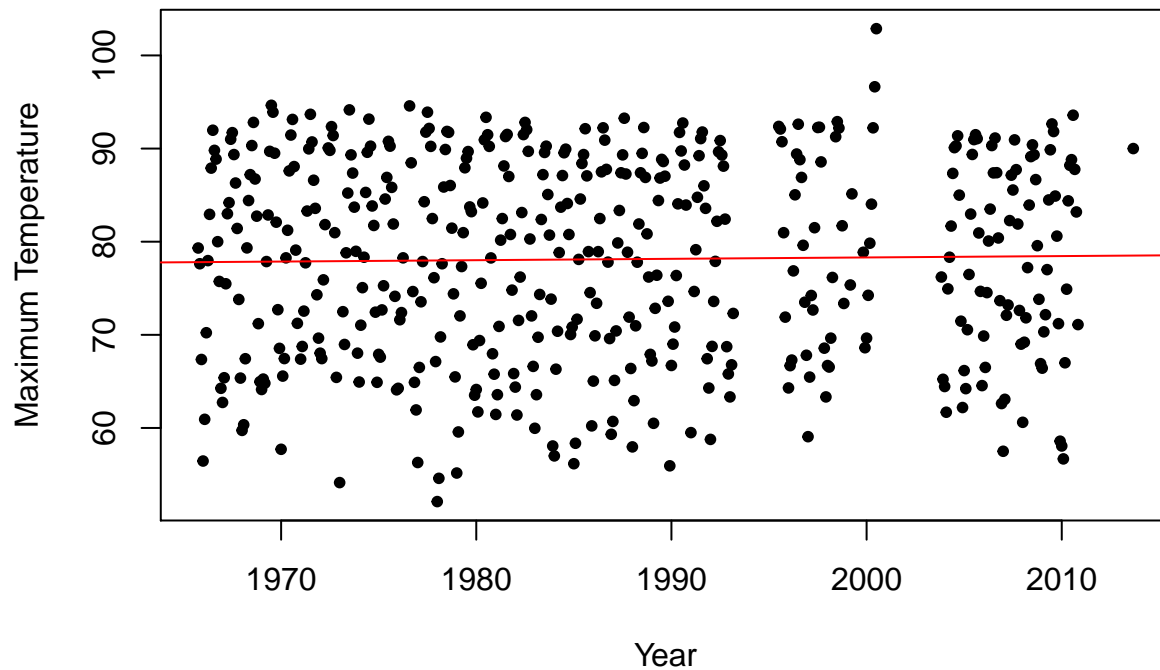
As shown above, the mean monthly temperatures from 1960-2013 are still increasing. With a p-value of 0.6986 we cannot reject or support the hypethesis. However, looking at the graph from 1970 on shows us that the increasing trend of temperatures persists regardless of the missing data.

In order to analyze statistically significant data, we can look at maximum temperatures for each month rather than the entire year.
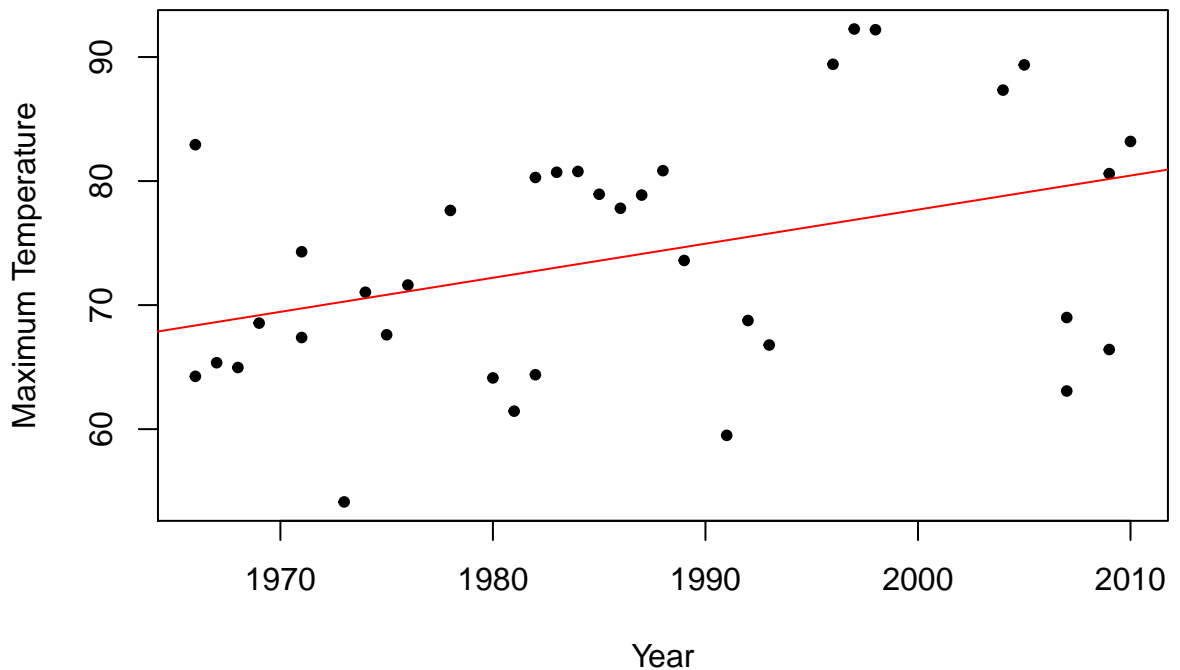
In the month of December, for instance, the maximum monthly temperature increased (p=.015). We reject the null hypothesis, meaning that the maximum temperature of December increased from 1898-2013.

December
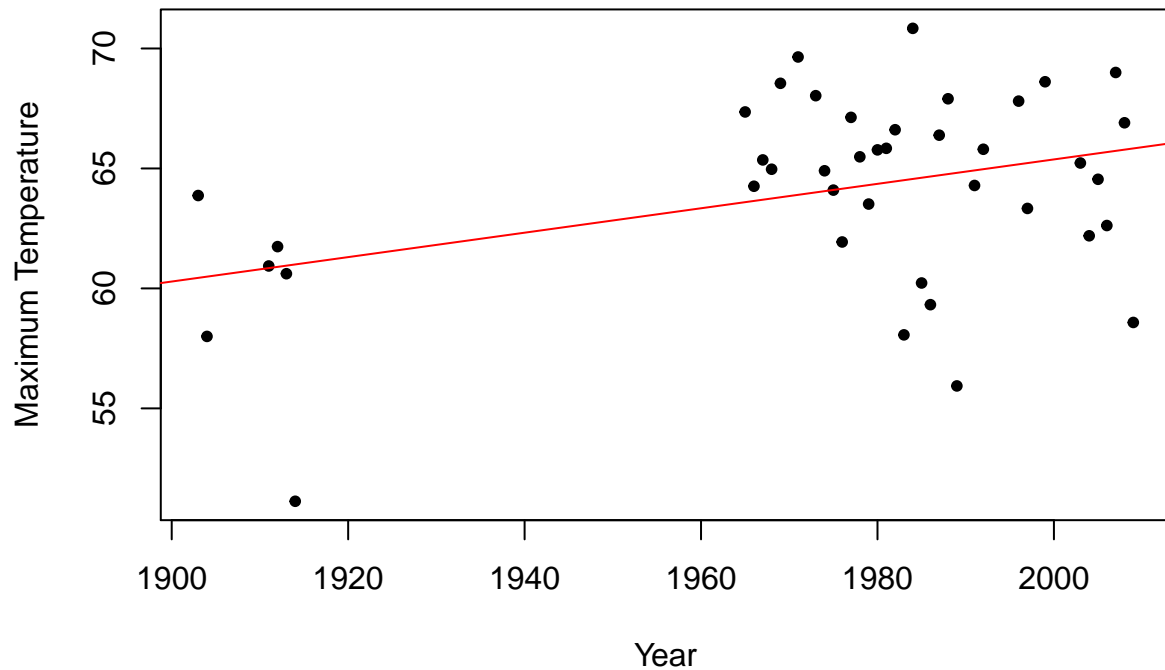
The data from 1960 to 2013 show a similar increasing trend. With a p-value of 0.021, we can reject the null hy-
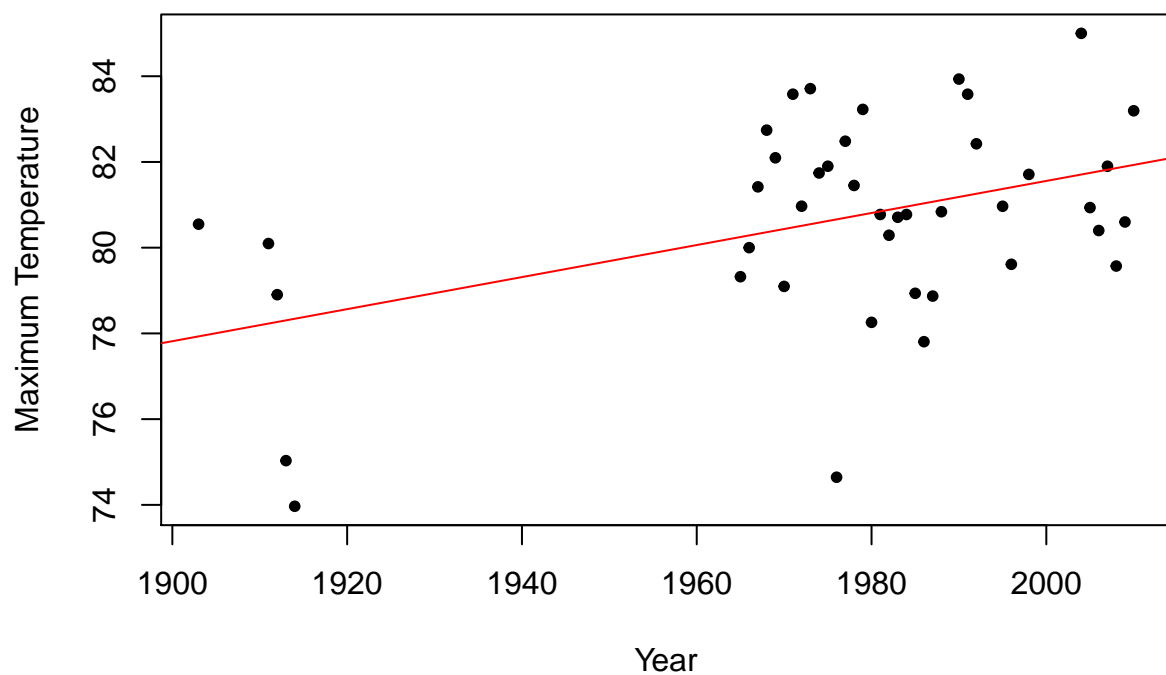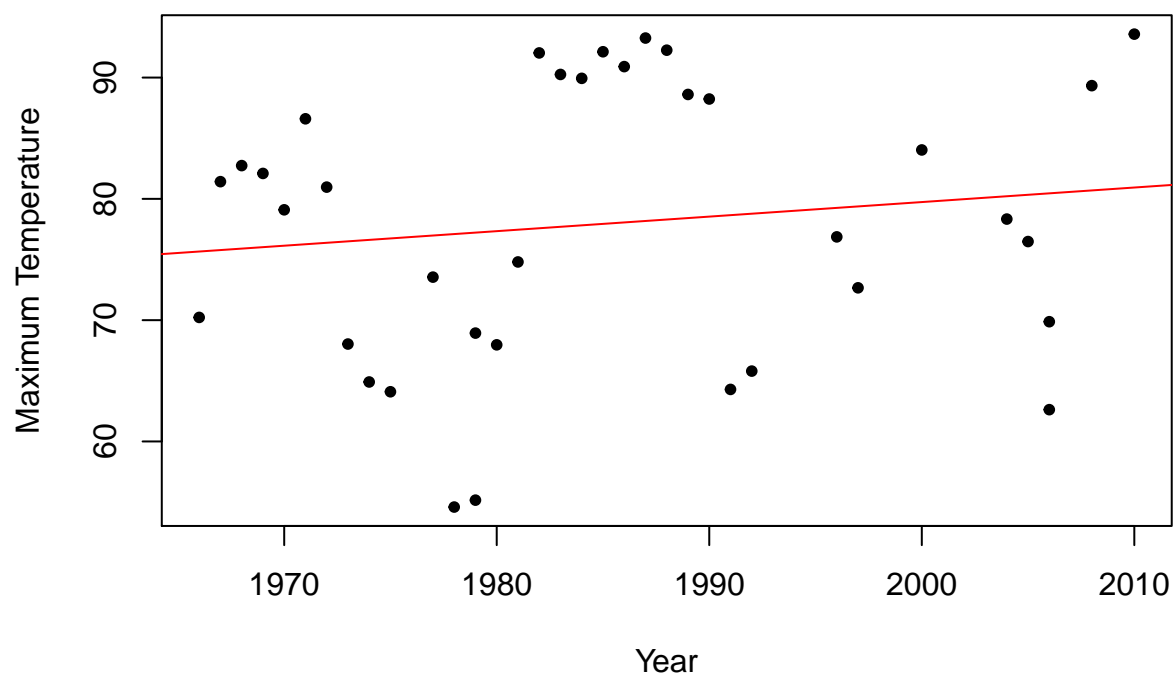
December

pothesis.

The months of October (p=.00405) and March (p=.0466) from 1898-2013 show similar trends of increasing maximum temperature and are statistically significant, therby rejecting the null hypothesis. The corresponding graphs from 1960-2013 are not statistically significant, but they assure as that there is still warming occuring de-

October

spite the missing data.

October

4
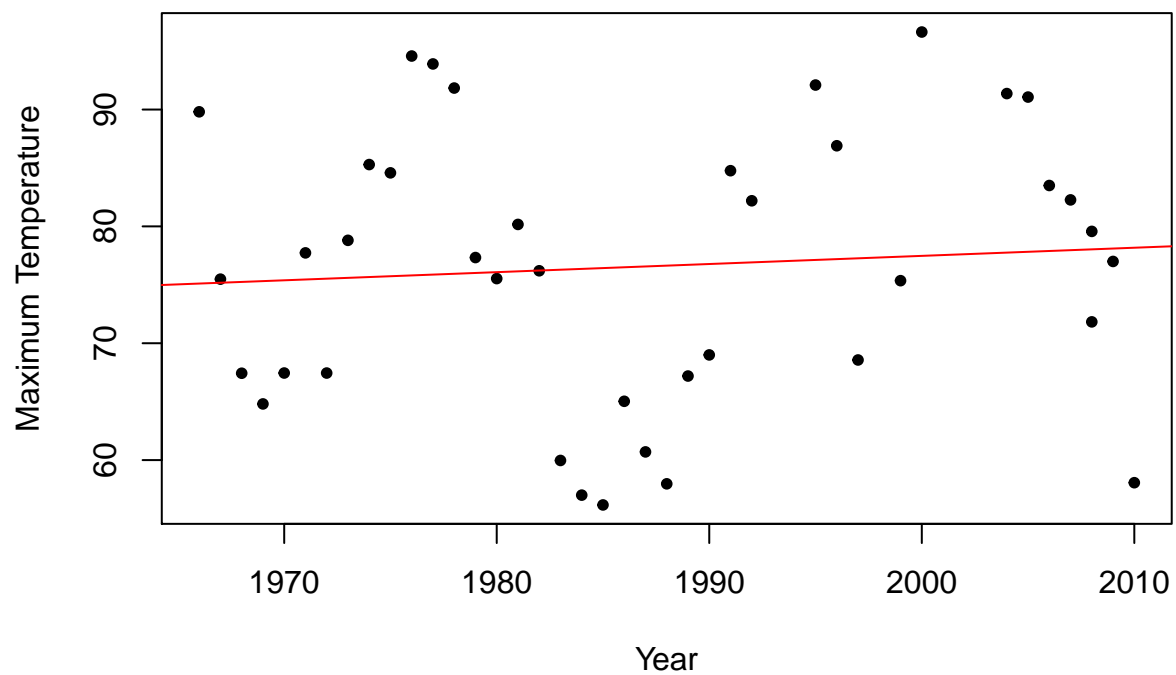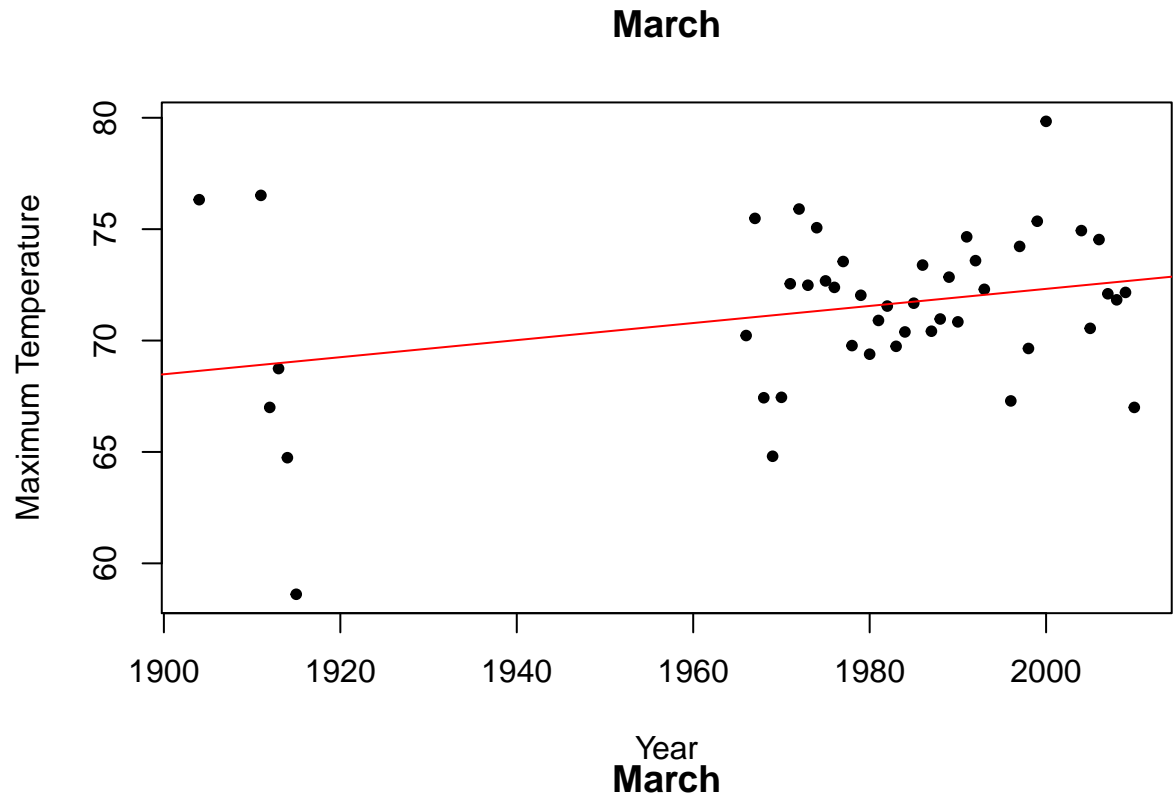
March

March

Implications

The graphs of maximum temperatures show us that Texas is generally warming, and this is signifacntly significant when looking at the months of March, October, and December. Albeit Spring begins at the tailend of March, these are all Winter months. Warming winters can have drastic effects for Alvin and the

surrounding metropolitan areas of Houston and Galveston. Even a change of a few degrees can drastically effect how organisms, partulcarly small species, interact with their environment.

Although a temperature rise of a few degrees is unlikely to dramatically impact humans, it is the indirect impacts of rising temperature that will create challenges for us.

Take for instance, the issue of rising sea levels. As temperatures increase, the EPA estimates that Texas can expect sea levels to rise anywhere from two to five feet within the next century ("What Climate Change Means for Texas"). Texas's rising sea levels are exacerbated by the effects of local groundwater pumping, which causes the land to sink. Subsidence and rising sea levels are a recipe for floods, and historical data has shown that oil drilling and groundwater pumping are causing Texas to surpass its historical subsidence rates (Paine). In practical terms, this means billions of dollars' worth of flooding. A recent study cross-examined maps released by the National Oceanic Atmospheric Administration (NOAA) with house values in coastal areas across the United States. The study reveals that, with a sea level rise of six feet by 2100, 40 percent of homes in Galveston will be flooded, totaling a loss of $2.9 billion ("Climate Change and Housing"). Breaking climate change down to its economic, local impacts demonstrate how climate change is likely to effect us on an individual level.

Climate change is not only a danger to the wellbeing of our natural environment, but also to public health. A recent study assessed the linkages between rising temperatures and the presence of mosquito-transmitted dengue disease in Matamoros, Tamaulipas, Mexico, a town that shares a border with Texas. Although it does not study the impact of climate change on dengue directly, per say, it did find that "every 1°C increase in sea surface temperatures... was followed by a 19.4% increase in dengue incidence (18 weeks later)" (Brunkard). Other studies suggest that rising temperatures can lead to the emergence of mosquito-borne diseases, including malaria, dengue, and viral encephalitis, and rising SST and sea levels can foster growth of diseases such as cholera and shellfish poisoning (Patz). Even a minimal increase of one degree celsius has dramatic impacts on the spread of disease and, consequently, our heatlh.

Conclusion

In brief, warming temperatures and secondary impacts of climate change pose a threat to Texas's natural environment, safety, and economic wellbeing. The data collected from Alvin, TX demonstrates that there are trends of significant warming throughout the last century, particularly in winter months. Texas is vulnerable to property damage, national security threats, flooding, drought, and more if this evidence is not met with the proper legislation.