# Is Florida Getting Warmer?

Sean Barry

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## 1 Introduction

Relationships between time and environmental changes have long since been critical in the study of climate change. Such relationships can easily be shown by simple correlation tests, such as in this analysis. In the given dataset, mean annual temperatures were recorded in Key West Florida starting in the year 1901 and ending in 2000.

## 2 Methods and Results

Using R, a simple Pearson correlation coefficient was calculated using the cor() function. This resulted in a coefficient of 0.533, a moderate positive correlation. To calculate an approximate asymptotic p-value, the temperature data was shuffled, retested and recorded 1000 times. Then a simple function was written to calculate what fraction of results were greater than the initial result, which was interpreted as a p value. This value was exactly 0 indicating significant results.

## 3 Source Code

```r
# Load data and visualize
load("../data/KeyWestAnnualMeanTemperature.RData")
plot(ats)

# Computing observed correlation coefficient
YearTempCor <- cor(ats$Year, ats$Temp, use = "everything", method = "pearson")
paste(YearTempCor)

# Performing random shuffling and storing correlation coefficients
set.seed(22042002) # setting seed for reproducibility
n_iter <- 1000 # Number of random shuffles
random_corrs <- numeric(n_iter)

for (i in 1:n_iter) {
  shuffled_temp <- sample(ats$Temp) # shuffle temp
  random_corrs[i] <- cor(ats$Year, shuffled_temp, method = "pearson")
}
# each correlation is stored and can be viewed with print(random_corrs)

# calculate p value
p_value <- mean(random_corrs >= YearTempCor)
paste(p_value)
```