

# Analysis of Autocorrelation in Florida Weather

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## 1 Introduction

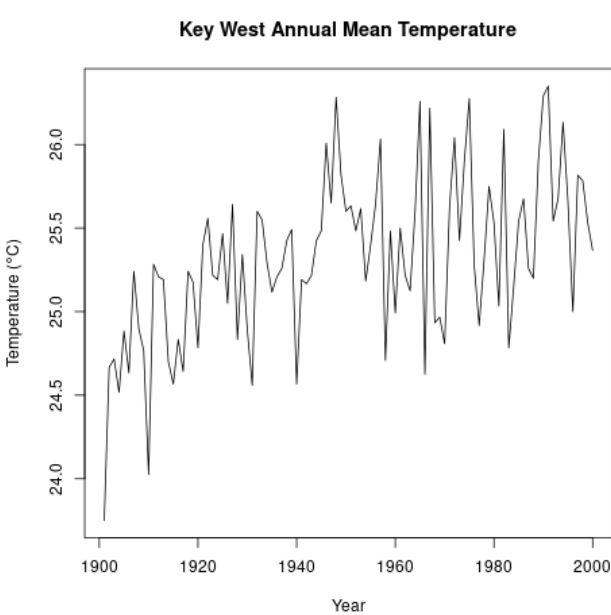
The purpose of this analysis is to determine whether the temperatures of one year are significantly correlated with the next year (successive years) in Key West, Florida.

## 2 Methodology

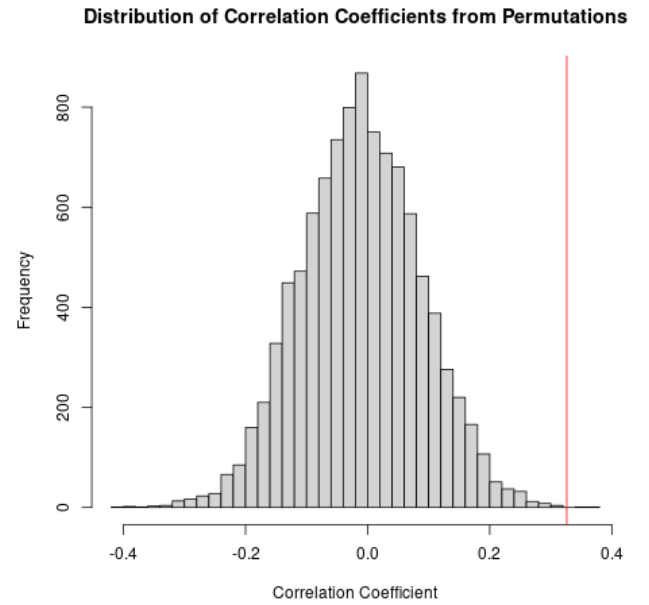
To address the inherent non-independence of successive measurements in a time series, the original correlation between successive years was compared to a distribution of correlations obtained from permuting the time series data 10000 times. As data was normally distributed, a Pearson's correlation test was used for both the original test statistic and for each permutation.

## 3 Results

Temperature increased by  $1.61^{\circ}\text{C}$  between 1901 and 2000 (see Fig. 1a), with strong autocorrelation between successive years ( $r = 0.33$ ,  $df = 97$ ,  $p = 2 \times 10^{-4}$ ).



(a) Key West annual mean temperatures throughout the 20th century



(b) Distribution of correlation coefficients from permutations, with the red line representing the p-value obtained from the real data.

Correlation coefficients from permutations ranged between 0.38 and -0.40, with a mean of 0 (see Fig. 1b).