

Is Florida getting warmer?

Booming Bonobos - Eamonn, Chalita, Emma, Lizzie and Uva

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1 Introduction

By analysing a dataset containing average yearly temperatures in Key West, Florida, we can deduce whether Florida is getting warmer over time. In order to do this, we can calculate the correlation coefficient between the temperatures and the years.

2 Methods

A script was created in R to analyse the dataset. Spearman's correlation coefficient was calculated between the years and the average temperatures. In order to calculate a p-value for the increase in temperatures, permutation testing was used. The order of temperatures was shuffled randomly between years 10,000 times, and the correlation coefficient calculated for each random order. The p-value would thus be the number of random correlations greater than the base correlation, divided by 10,000.

3 Results

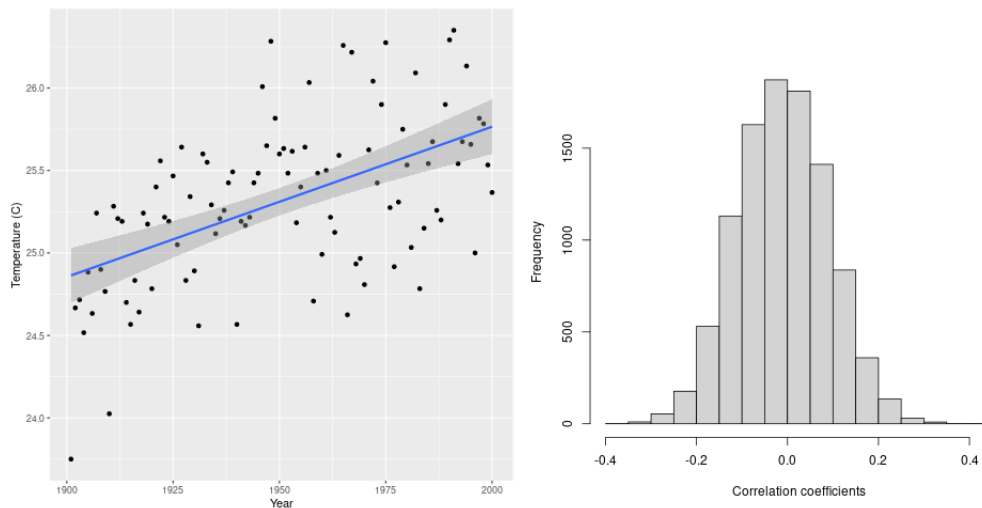


Figure One: (A) Temperature (C) vs. Year for Florida dataset. Line of best fit added with confidence interval. (B) Distribution of correlation coefficients for randomly permuted orders.

The correlation coefficient between the temperature and the year came to 0.526. 10,000 permutation tests were run, randomly shuffling the years. The Spearman's correlation coefficient was calculated for each of these random orders. The distribution of these is displayed in Figure One (B). None of these correlations were greater than the originally calculated correlation, meaning that the p-value is less than $1/10000$ (<0.0001). This indicates that the observed increase in temperature over the century of data is very likely to be a true increase, not due to random chance. This is likely to be an effect of climate change, although it could be a more regional weather pattern also. Further analysis would be needed to determine this.