On the Issue of Carbon Dioxide Concentrations and Global Climate Change

by

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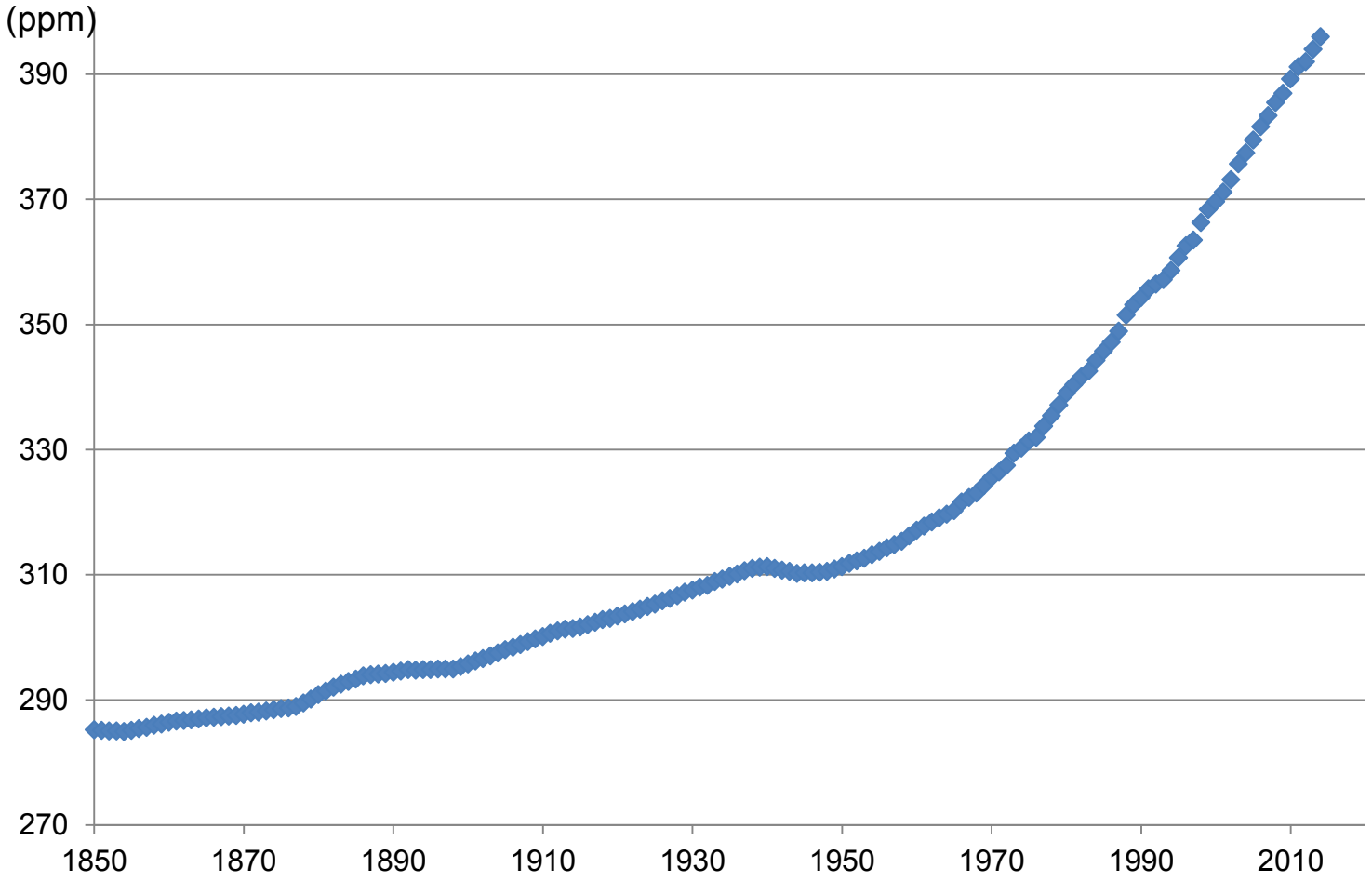
There are two issues to consider in this paper:

Issue 1: Climate scientists look at global warming as a time series of increasing CO_2 concentrations and a separate time series of global temperature anomalies. This process seems to be a fault in their analysis procedures.

Issue 2: Cross Correlation analysis of these time series determines how does CO_2 impact the climate and by how much?.

Theme: <u>Evidence of climate warming is not evidence of what causes the warming!</u>

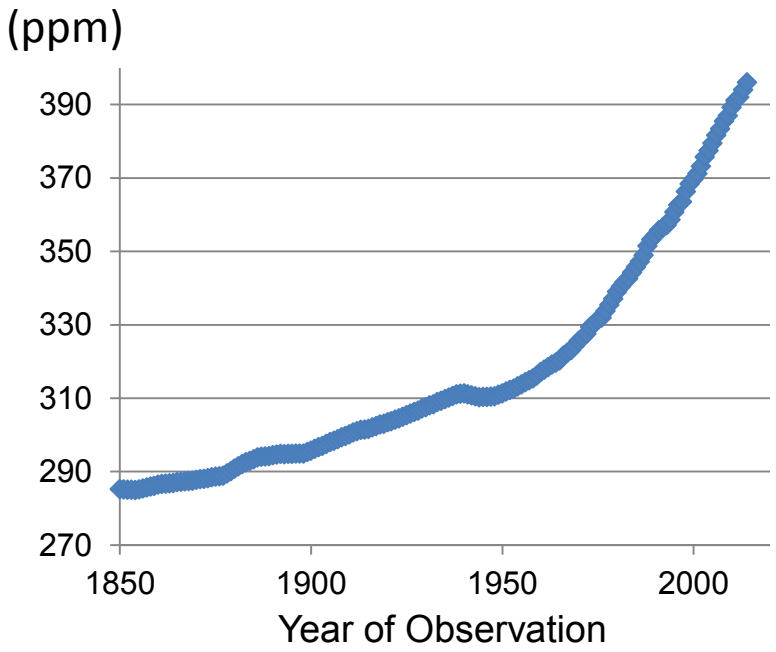
Global Increase in Carbon Dioxide from NASA GISS Dzta Set (US)

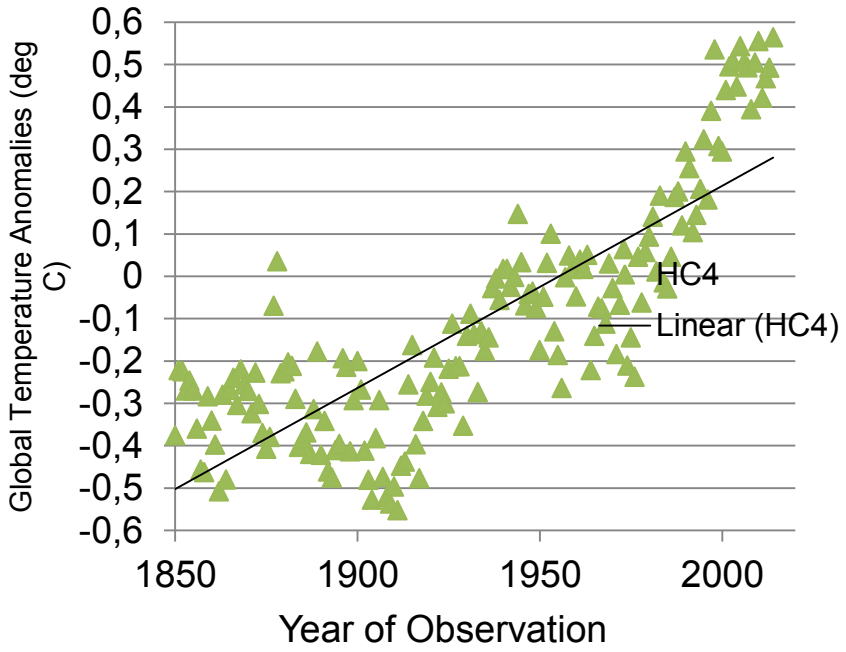


Plot of Temperature Anomalies from the HadCRUT4 Data Set - (UK)

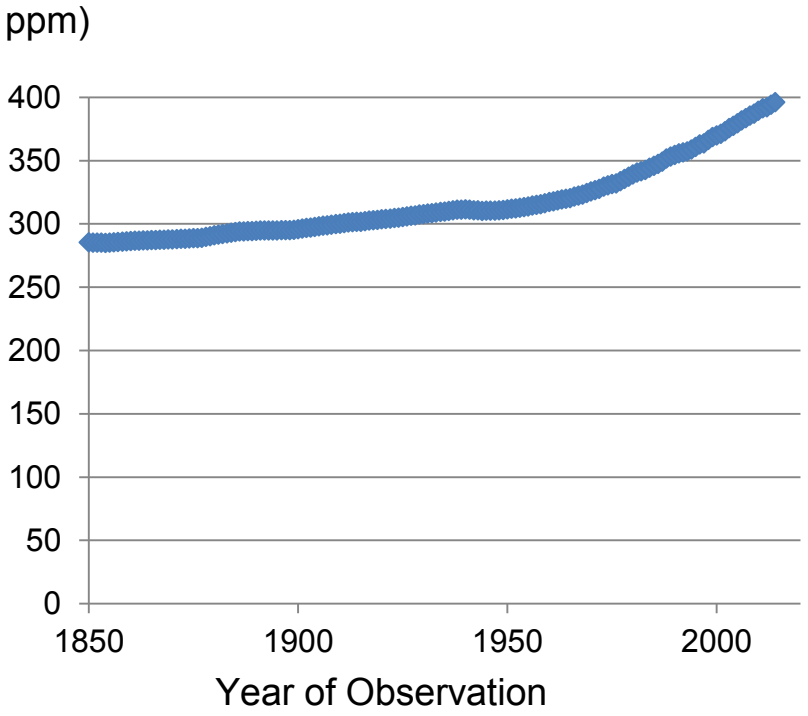


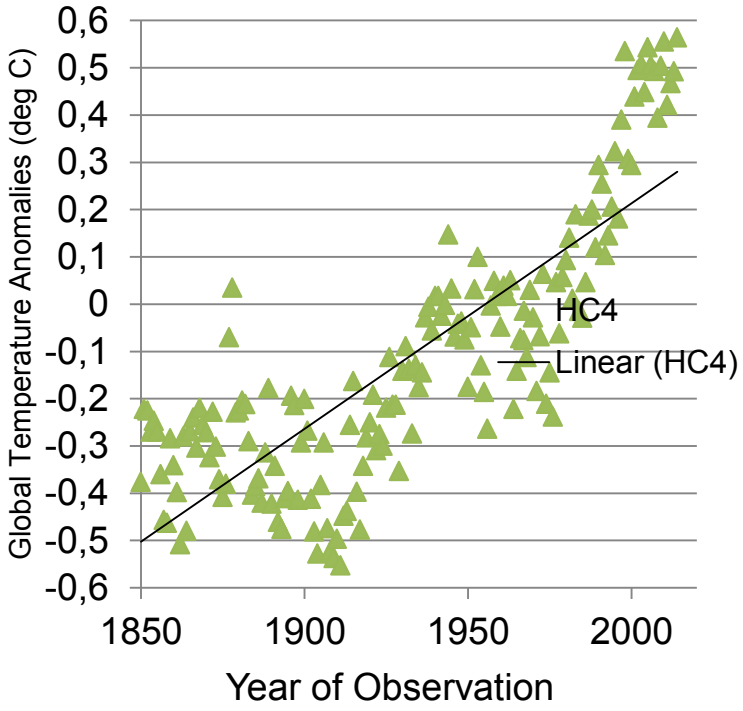
Comparison of Carbon Dioxide Increase and Temperature Anomalies



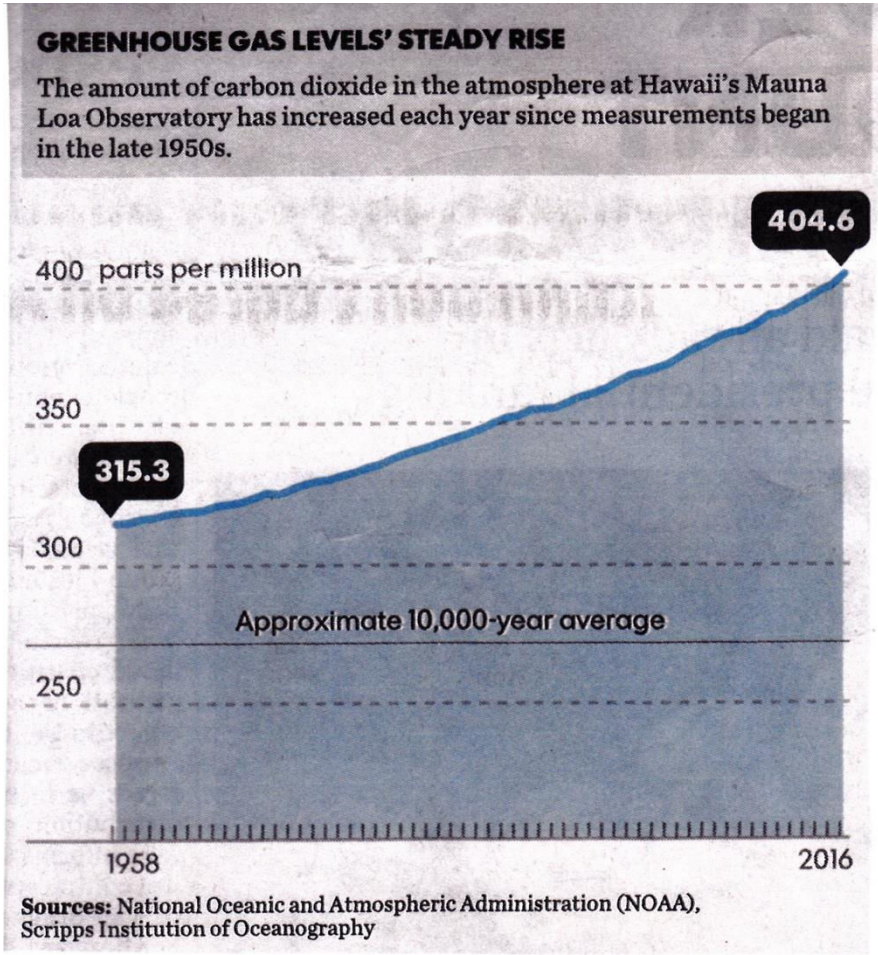


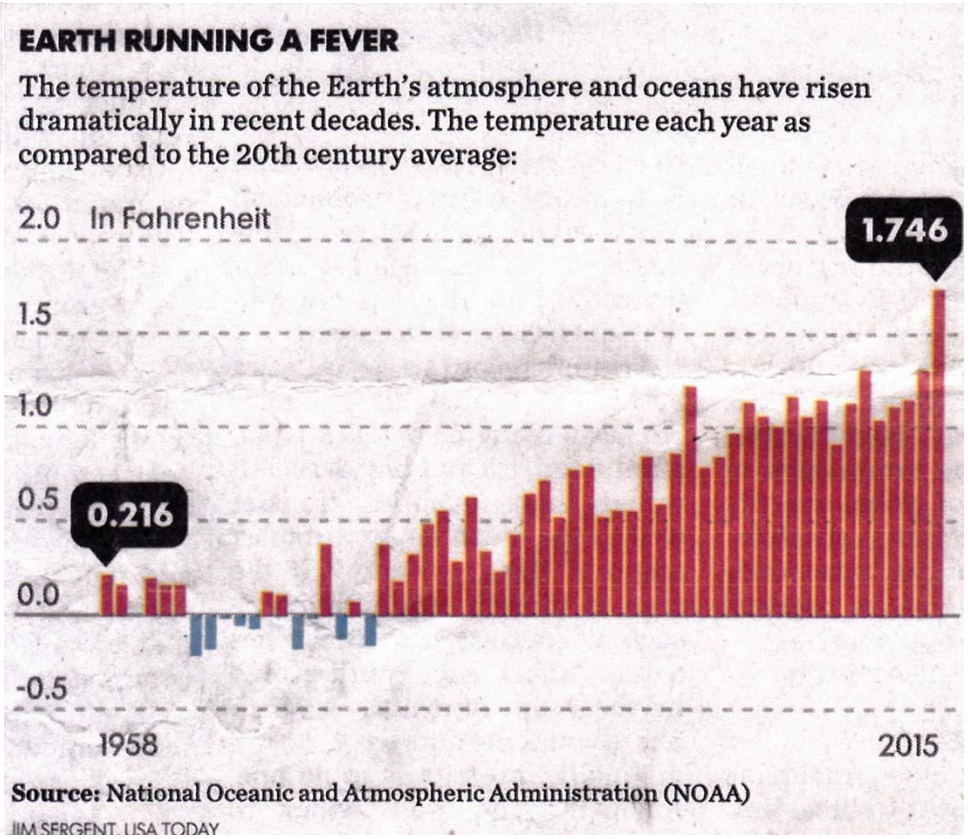
Comparison of Carbon Dioxide Increase and Temperature Anomalies





Carbon Dioxide Concentrations and Global Temperature Anomalies





Cross Correlation Formulation

Cross correlation is a standard method of estimating the degree to which two series are correlated. Consider two series X(i) and Y(i) where i = 0,1,2…N-1.

The cross correlation coefficient ρ is defined as

$$\rho(x,y) = \Sigma i\ [(x(i) - mX) * (Y(i) - mY)] \text{ divided by } (\sigma x * \sigma y)$$

mX and mY are the means of their corresponding series and σx and σy are their respective standard deviations. The denominator serves to normalize the correlation coefficient such that **(-1 <= ρ <= +1),** the bounds indicating maximum correlation and 0 indicating no correlation.

The term $\mathbf{R}^2$ is defined as the square of the correlation coefficient (ρ^2) and is a measure of how much the variance of **Y(i)** is explained by the variance of **X(i).**

Cross-Correlation of Increases in CO_2 with Temperature Anomalies

Driving Question::

How much do increases in CO_2 concentration explain the record of global temperature warming?

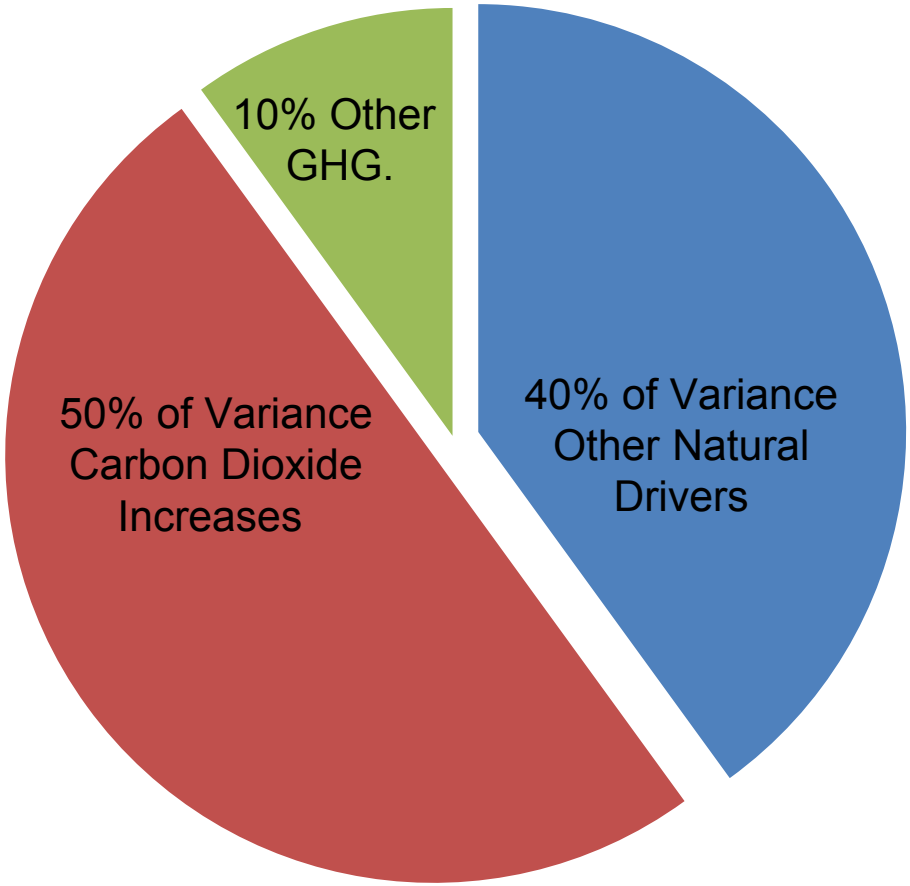
Global Data: . . . . . ➔ ρ **= 0.69 and R^2 = 48%**;

Northern Hemisphere:. . . . . ➔ ρ **= 0.68 and R^2 = 47%**;

Southern Hemisphere:. . . . . ➔ ρ **= 0.66 and R^2 = 44%**.

Results indicate less than 50% of the variance of global temperatures are explained by the variance of CO_2 concentrations.

Partitioning of Variances for Temperature Anomalies - HadCRUT4 Data Set.



Concluding Remarks

Driving Question::

The correlation between CO_2 emissions and global temperature rise is poor at 60%. If global warming is caused primarily by manmade increases in CO_2,

<u>Why is there not a 0.90 or higher correlation?</u>

<u>Theme:</u>

Evidence of global warming is not evidence of what causes the warming!