

Cycles and Trends - Global Temperature

Statistics of Climate Change - Temperature Rise is Non Monotonic 70 Year Cycles

NASA Global Annual Mean Surface Air Temp

<http://data.giss.nasa.gov/gistemp/graphs/> Fig1A-H

1980 to 2009: NASA_Annual_Mean_Temp.txt

GTemp := READPRN("GISS NASA Global Temp Mean Fig2A.TXT")

Reference: "ABRUPT GLOBAL TEMPERATURE CHANGE AND THE INSTRUMENTAL RECORD,"
Menne

Break into Four 35 Year Periods: 1880 to 1910, 1911 to 1945, 1946 to 1980 and 1981 to 2010

Find Regression Lines to Four Periods

L1 := line(submatrix(GTemp,0,31,0,0),submatrix(GTemp,0,31,2,2))

L2 := line(submatrix(GTemp,32,64,0,0),submatrix(GTemp,32,64,2,2))

L3 := line(submatrix(GTemp,65,99,0,0),submatrix(GTemp,65,99,2,2))

L4 := line(submatrix(GTemp,100,129,0,0),submatrix(GTemp,100,129,2,2))

T1 := L1₀ + L1₁·submatrix(GTemp,0,31,0,0)

T2 := L2₀ + L2₁·submatrix(GTemp,32,64,0,0) GTemp_{30,0} = 1910

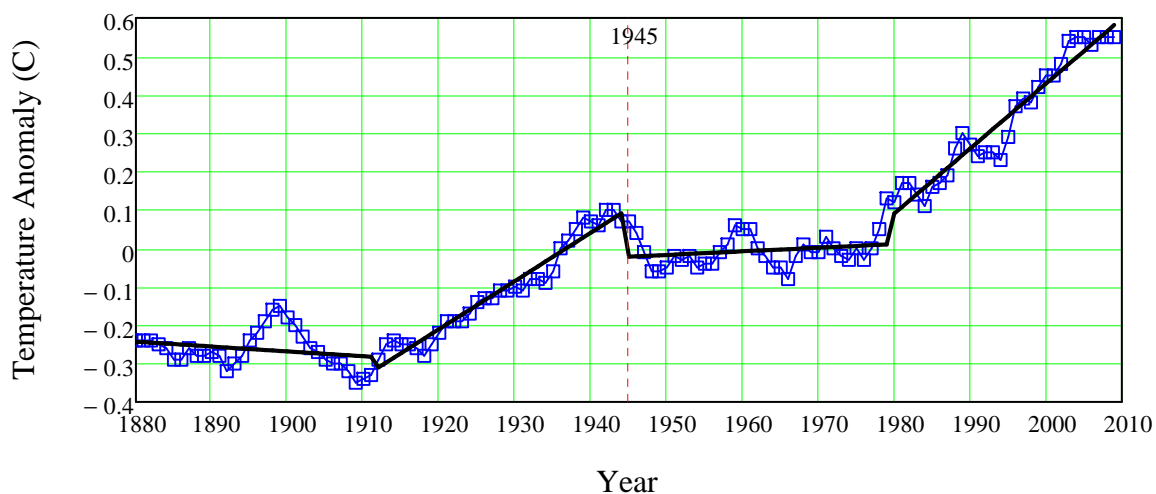
T3 := L3₀ + L3₁·submatrix(GTemp,65,99,0,0) GTemp_{65,0} = 1945

T4 := L4₀ + L4₁·submatrix(GTemp,100,129,0,0) GTemp_{100,0} = 1980

T_{abrupt} := stack(T1, T2, T3, T4) WRITEPRN("GAbrupt.txt") := T_{abrupt} ■

Temperature Plateaus and then Climbs in 70 Year Cycles

NOAA Global Annual Mean Temperature



Correlation Coefficient: $\text{corr}(GTemp^{(2)}, T_{\text{abrupt}}) = 0.986$ $\text{Stdev}(T_{\text{abrupt}}) = 0.234$

t Test $t := \frac{0.98622}{0.23434} = 4.209$

These 70 year cycles are statistically significant