Abstract Confirmation Number: 782 (filename 950972)

Title: "A Revisit to the Global Warming Phenomenon"

A Revisit to the Global Warming Phenomenon

Pal Satyabrata

Principal, Swami Vivekananda Institute of Management and Computer Science, Karbala, Kolkata-700103, India, & Ex-Dean Post- Graduate Studies, Bidhan Chandra Krishi Viswavidyalaya, West Bengal, Pin-741252, India

E-mail: satyabrata.pal@hotmail.com

and

Pal Subhabaha

Assistant Professor, E- Learning Department, Sikkim Manipal University, Bangalore, Pin-560008, India

E-mail: Subhabaha@msn.com

Last 130 years have shown steady increase in the absolute mean global temperature. The period of 130 years can be divided into three main time-periods – 1880-1936, 1937-1980 and 1981-2009 based on the temperature variation pattern. While making study, it has been noticed that during the time-period 1880-1936, the mean absolute global temperature was around 13.77 degree centigrade which marginally increased to 14 degree centigrade during the time-period 1937-1980. The standard deviation of annual mean global temperature during both the time-periods 1880-1936 and 1937-1980 were almost same (0.09913 for 1880-1936 – 57 years period and 0.09314 – 44 years period). However, the change was remarkable during the period 1981-2009 (last 29 years). The mean absolute temperature went up to 14.41 degree centigrade during the short time-period of last 29 years and the variation seen during this period was also found to be very much note-worthy (standard deviation 0.155). The following table shows the outcome of the study –

Time Period	Mean Absolute Temperature	Standard Deviation
1880-1936	13.7739	0.09913
1937-1980	14.0086	0.09314
1981-2009	14.415	0.155

Seeing the variation in the last 29 years, we have tried to model the variation of the time period. We have tried to fit linear models as well as non-linear mixed models in

order to get an estimate of the future behaviour of the temperature variation. The linear as well as non-linear mixed models fit the data to a great extent (R-square ranging from 0.7 to 0.8). We have tried different types of linear and non-linear models of the following forms –

Y = Yearly Mean Absolute Global Temperature

X = Year

$Y = A + BX$

$Y = A + BX + CX^2$

$Y = \sum C_i X^i, \quad i=0,1, 2, 3, 4, 5, 6, 7, 8$

$Y = A + BX + CX^2 + EXP(DX)$

$Y = A + BX + CX^2 + EXP(DX + EX^2)$

$Y = A + BX + CX^2 + F*EXP(DX + EX^2)$

We have tried to model the last 29 years data using the above models and tried to forecast the future behaviour of the world absolute mean temperature. This paper also discusses the future pattern of the world mean temperature variation.

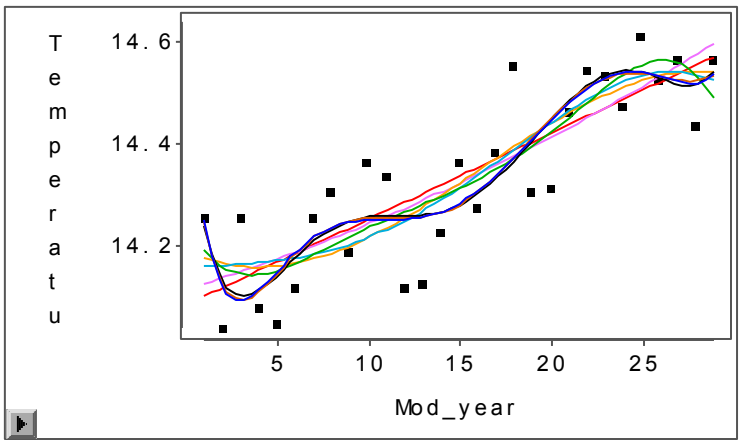

Figure 1 – Polynomial Models fitted in the last 29 years data (1980-2009)

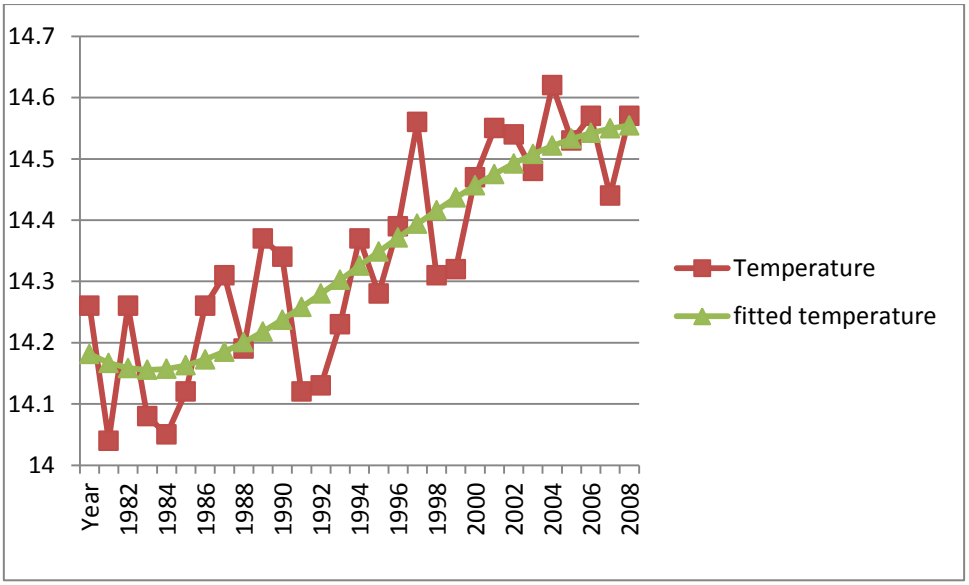

Figure 2 – The fitted Model $Y = A + BX + CX^2 + EXP(DX)$

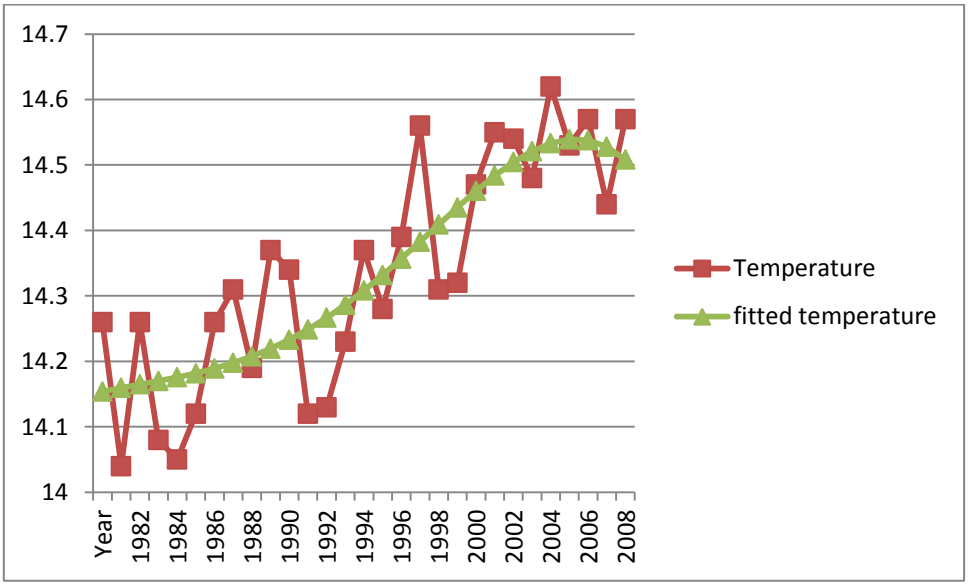

Figure 3 – The fitted Model $Y = A + BX + CX^2 + EXP(DX + EX^2)$

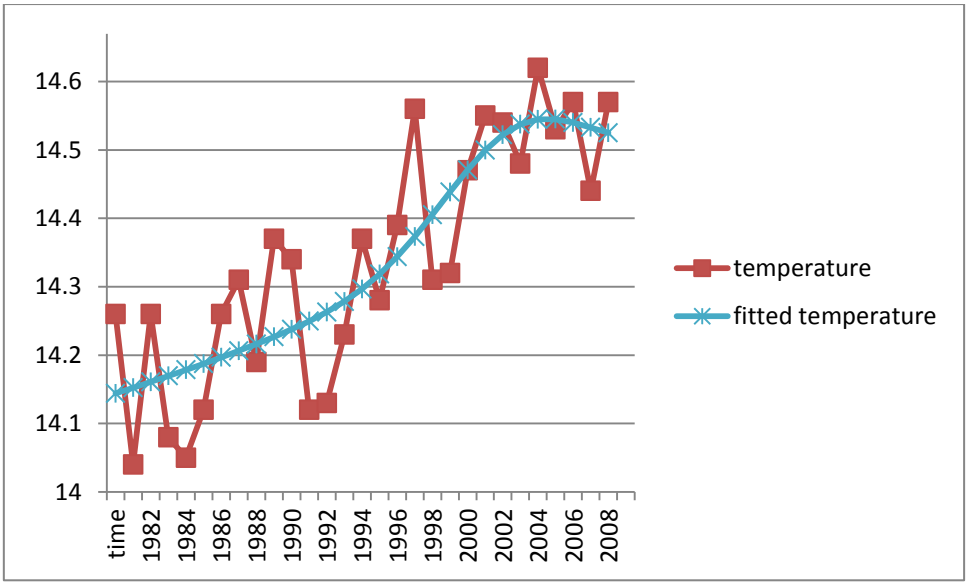

Figure 4 – The fitted Model $Y = A + BX + CX^2 + F*EXP(DX + EX^2)$

In the paper, the future patterns of the global temperature indicate a very slow rise in the global temperature in the next five years, and if such a trend continues further (beyond five years) it may usher in lesser vulnerable future in the sense we may encounter a plateau there-after for next ten years. Adequate execution of measures to lessen the emission of carbon and its compounds and also other harmful emissions across all countries over the world are/ will be key motivator in combating this universal menace looming large facing the survival of humankind. Some other facets, in a variety of perspectives, of this global issue will also be presented in the Talk.

DATA SOURCE

GLOBAL Land-Ocean Temperature Index in 0.01 degrees Celsius base period: 1951-1980 sources: GHCN 1880-06/2010 + SST: 1880-11/1981 HadISST1 12/1981-06/2010 Reynolds v2