

Association of Temperature Change with Raiditive Forcing and its Impact; a Micro Level Analysis on Bangladesh

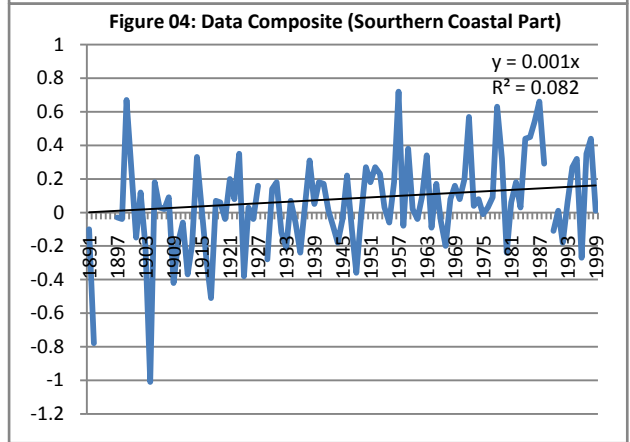
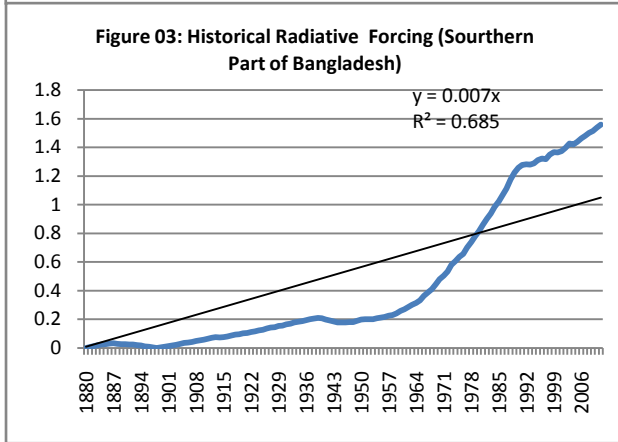
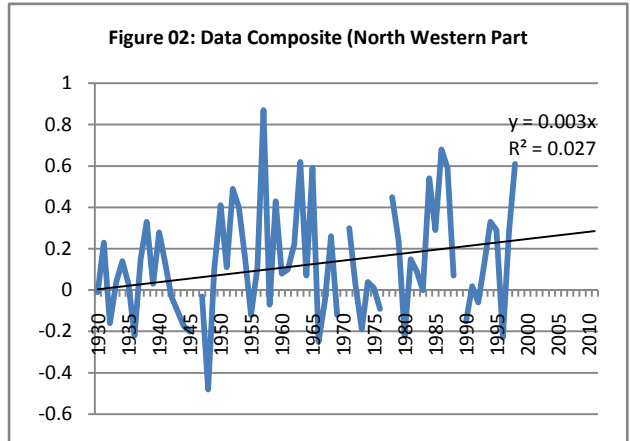
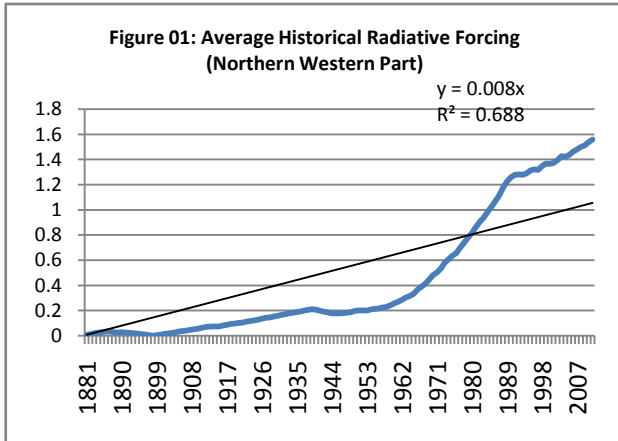
To understand the temperature trend in micro level on Bangladesh, I am intended to analyze the given data in two section; 1st section contains the analysis for north western part (Bogra, Dinajpur, Pabna, Jessor, Rajshahi and Rangpur) of Bangladesh and other section contains the seven (Khulna, Sathkhir, Maijhd Court, Chittagong A and P and Barisal) stations which locates close to coastal southern part of Bangladesh. Bangladesh is an agricultural country while north western part of Bangladesh is well known as food storage but in recent years the temperature in this part is showing erratic character.

Region of Bangladesh	Annual Historical Radiative forcing (RF) (Watts/m ²)	Annual Combined RF (Watts/m ²)	Decadal RF (Watts/m ² in 2005)	Seasonal Temperature	Temperature 1881	Temperature in 2000	Predicted Temperature in 2050	Predicted Temperature in 2099
North Western Part	0.008	0.003	0.2132	26.20° C	20.11° C	20.27° C	21.89° C	24.13° C
Southern Coastal Part	0.007	0.001	0.4750	27.52° C	19.36° C	20.10° C	21.55° C	25.05° C

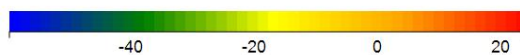
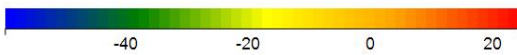
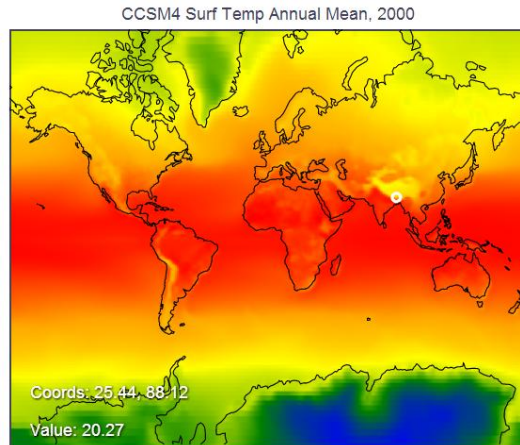
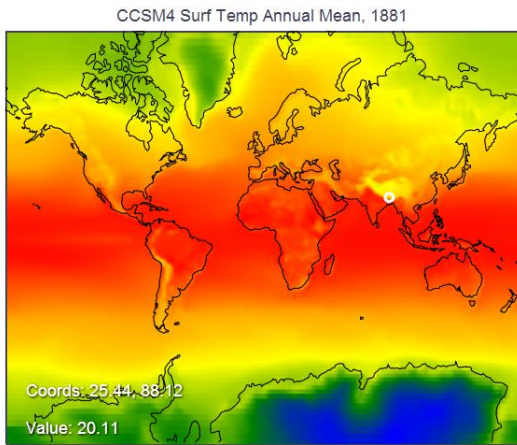
North Western Part: My observation about the trend of historical RF in North Western Bangladesh is; in an average it is increasing at the rate of 0.008 Watts/m² from 1881 to 2011. According to the data, the RF was 0.007 Watts/m² in the year 1881. The forcing has increased significantly from the mid 19th century and it became 1.559 Watts/m² in 2011. Simultaneously the trend of annual combined RF data (<http://climatemodels.uchicago.edu/timeseries/#ZtBBDCH>) indicates the increase of the forcing. From 1831 to 2011 the rate of average annual increase is 0.003 Watts/m². On the other hand, the decadal change also represents the increase of RF. It was 0.0693 Watts/m² in the year 1935 and reached to 0.2132 Watts/m² in 2005 (Figure-1 & 2). Based on the seasonal data it is found that temperature remains lowest in the month of January which is 15.2608° C while it reaches its peak in July when it becomes 26.2098° C. However, to visualize the difference, GCM-CCSM4 model under “AR5 Climate Model Mapper” is used. In the map the annual mean temperature represents that the temperature was 20.11° C in 1881 and became 20.27° C in 2000. The model predicts, it will be 21.89° C and 24.13° C in 2025 and 2099 respectively (Map 01: GCSM4 Annual Mean Surface Temperature 1881, 2000, 2050 and 2099).

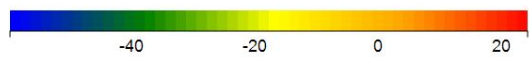
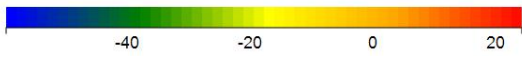
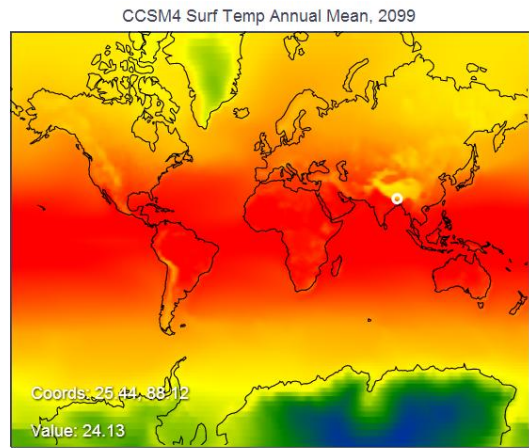
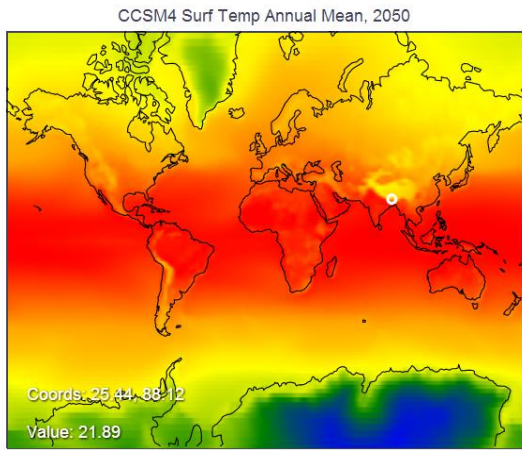
Southern Coastal Part: The southern part of the country is sowing slight low trend of change than northern Part (Figure 3 & 4). The annual rate of increase of RF is 0.007 Watts/m². On the other hand Annual Combined RF is 0.001 Watts/m² which is slower than northern part. Annual combined RF represents the increasing trend over time (<http://climatemodels.uchicago.edu/timeseries/#BaiBBBCBB>) though it is slower than north western part. In the year 1900 the combined RF was -0.1506 Watts/m² while it became 0.1894 in 1950 and became more than double in 2000 and reached to 0.4821 Watts/m². Upward trend is seen also seen decadal RF where it was 0.2084 Watts/m² in 1950 and it became 0.4750 Watts/m² in 2005. Seasonal temperature indicates that may is the month when highest temperature 27.52 °C prevails. GCM model map indicates that the surface temperature was 19.36° C in 1881 which became 20.10° C in 2000. Prediction suggests that it will be 20.05° C within the year 2099 (Map 02: GCSM4 Annual Mean Surface Temperature 1881, 2000, 2050 and 2099).

Therefore it is predicted that total 3.86 ° C temperatures will be rise from 2000 to 2099 which will adversely impact the traditional agriculture of the agro region. The geographical distributions of RF mechanism vary within and beyond the region. In Bangladesh it may vary due to direct or indirect effect of global warming though the country has very small contribution in CO2 emission. However the small increase of RF observed in the exercise indicates the slight difference of RF and temperature in between two parts of Bangladesh. In conclusion it can be said that high surface temperature has been accelerated in combined with methane from agricultural field and agricultural aerosol which has contributed the northern western part to become bit high in temperature than southern part. So it can be said that RF is impacting on temperature change in micro level which is also impacting the precipitation in recent years.



Temperature Map 01: Northern Region





Temperature Map 02: Southern Region

