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Long Term Temperature Variability and Trend over Kerala

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Abstract: Climate change poses major challengess in the enviorment. Inorder to understand the impact of climate change over Kerala select cities, Thiruvananthapuram, Ernakulam and Kannur. A study has been extended over the long term meterological data such as temperature. A period thirty years beginning 1981 has been chosen. The method of linear trend model has been used for the study. The thirty year study reveals there is an increasing trend in temperature throughout the study period. It is inferred that the small state of Kerala also be affected by the climate change.
Keywords: Temperature, climate change, South Kerala, Central Kerala, North Kerala Trend analysis

I. INTRODUCTION

Climate change is a vey serious issue now-a-days. One of the consequences of increasing temperature is the higher frequency in extreme weather events. Studies show that this frequency of cyclones has increased considerably over the years due to rise in sea surface temperature [1]. Earth is warming up, and there is now over whelming scientific census that it is happening as a result of human action. Climate change is very dangerous these days because the pollution of water, soil, land and water. We would not have clean water to drink, clean air to breathe and clean food to eat. Surface temperature of earth is also increasing. Failure of farmers in adapting to changing climate will have negative effect on agricultural productivity and food security. Human activities are the main reason for climate change. People in general believe that weather pattern changing and they believe summers in their areas are getting hoter and lengthening and winter shoter and warmer which is direct consequence of the global warming [2].

II. DATA AND METHODOLOGY

The available meteorological data for the study period 1981-2012 in respect of annual maximum temperature has been collected from Indian Meteorological department (IMD) Pune. The locations selected for during the study periods are Thiruvanathapuram, Ernakulam and Kannur. In this present study an attempt has been done to identify temperature variability and trend over Kerala. A statistical method used which involves the calculation of the annual temperature beginning 1981. Based on monthly time series of these stations, average monthly and annual means are calculated. The method of linear trend model has been used for performing the trend analysis of the behaviour of annual temperature.

III. RESULTS AND DISCUSSIONS

A. Monthly Average Temperature Trend of Kerala

As a part of temperature variability over Kerala, the monthly maxima and minima temperature have been given in table1. From the table, it is seen that there is a difference between the two. The monthly average temperatures of Kerala have been plotted through figures 3.1a to c.

TABLE 1
MONTHLY AVERAGE TEMPERATURE

Location	Temperature(^oC)			
	Maximum	Month	Minimum	Month
Thiruvanathapuram	33.6	March	29.8	July
Ernakulam	33	April	29.6	July
Kannur	34.5	April	29.3	July

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Location	Year	Maximum Temperature (^oC)	Year	Minimum Temperature (^oc)
Thiruvanathapuram	2012	32.5	1984	31
Ernakulam	2012	32.2	1981	31
Kannur	2009	33.3	1982	30.9

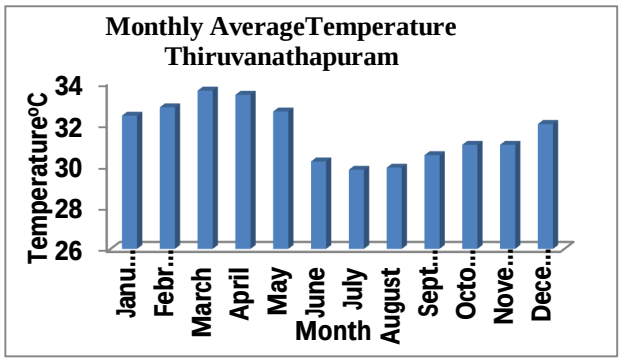

Fig. 3a

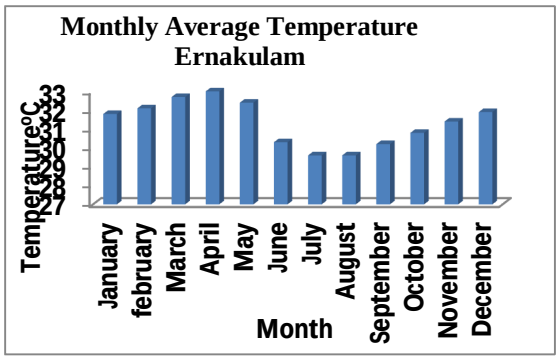

Fig. 3b

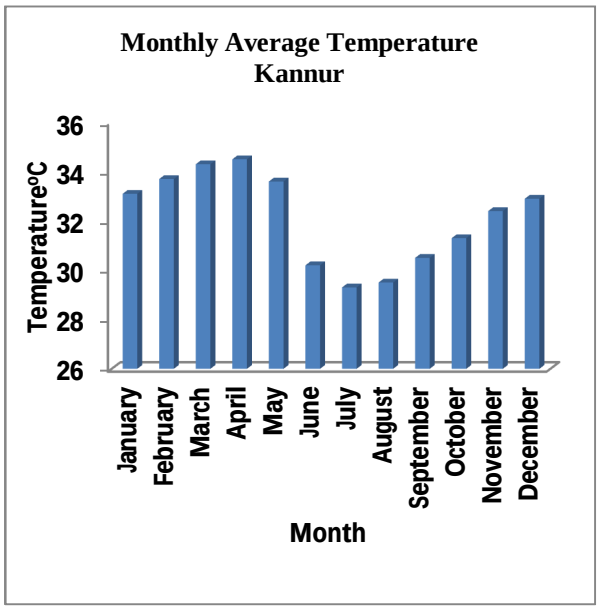

Fig.3c

The thirty year monthly average temperature reveals that from the figure 3a, it is seen that at Thiruvanathapuram, the lowest monthly average temperature of 29.8^{o}C has obtained in the month July and the highest value of 33.6^{o}C has obtained in the month March. Similarly figure 3b, it is seen that at Ernakulam a record of 29.6^{o}C as the lowest monthly average temperature obtained in the month July and 33°C as the highest temperature obtained in the month April and in figure 3c, at Kannur in the lowest of 29.3^{o}C in th month July and the highest of 34.5^{o}C is found in the month April. Over the study during thirty years it understood that in Kerala the maximum monthly average temperature seen in the month April and minimum temperature occurs during July.

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B. Annual Average temperature of Kerala

Table Ii Annual Average Temperature Trend

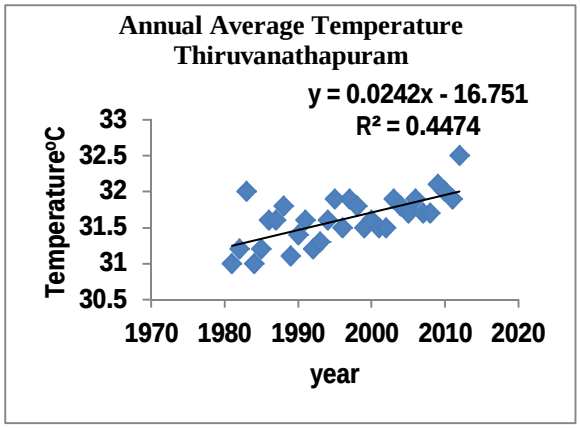

Fig. 3.1a

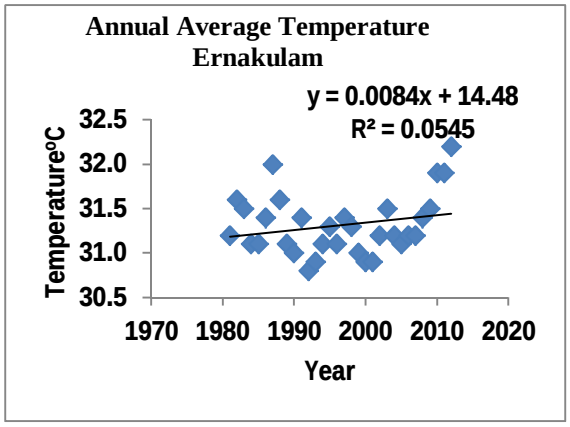

Fig. 3.1b

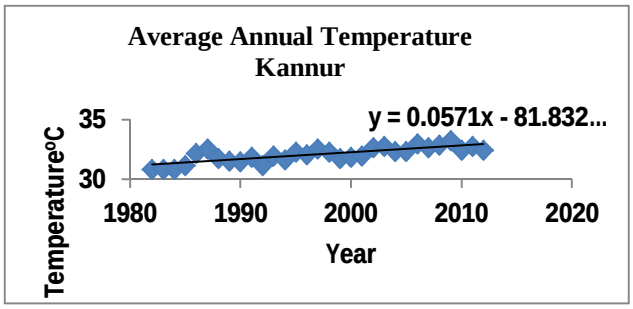

Fig. 3.1c

The trend analysis revealed from figures 3.1a to c, that there is an increase of trend all through the years over the locations. From the figure 3.1a, it is seen that at Thiruvanathapuram the lowest temperature of 31°C has obtained in the year 1984 and the highest value of 32.5°C in the year 2012. Similarly in figure 3.1b, it is seen that at Ernaulam a record of 31°C as the lowest annual temperture during 1981 and 32.2°C as the highest during 2012 and in figure 3.1c, at Kannur the lowest of 30.9°C during 1982 and the highest of 33.3°C during 2009 is seen. Increase in annual temperature trend at the locations reveals warming nature of the regions. The inter govenmental panel on climate change (IPCC, 2001) in its third assessment report estimated an increase of the average global temperature 0.6°C in last century. Sinha Ray and Sahai have also found an increasing tendency in mean temperature in some cities in India and attibuted it partly to rise in minimum temperature [3-4]. One of the most visible and well accepted evidence in receent years is the gradual increase in atmospheric pollution and aerosols [5]. The observation of the maximum and minimum temperatures at the locations Thiruvanathapuram, Ernakulam, kannur from the long term data of thirty years from 1981 reveals that, the minimum temperatures of the locations recorded the long temperature is very close to the maximum temperature. The range of the long term temperatures various from 1.2°C to 2.4°C.

The trend analysis of the long term data of annual average temperature of the locations given in figure 4.1a to c, express the fact that the trend is shooting up in all locations with the knowledge of the regression co-efficient of Thiruvanathapuram, Ernakulam and kannur whose values are respectively given as 0.447, 0.054 and 0.637. The overall temperature analysis reveals the observation explicits the inherent nature of climate change prevalent in the locations.

IV. CONCLUSION

The long term study reveals that the locations Thiruvanathapuram, Ernakulam and Kannur recorded the minimum temperature which is very close to maximum temperature. Monthly average temperature of all the locations shows an increasing temperature trend it indicates the sign of climate change. Annual average temperature of all the locations of Kerala region shows an increasing trend that indicates the warming nature of Earth.

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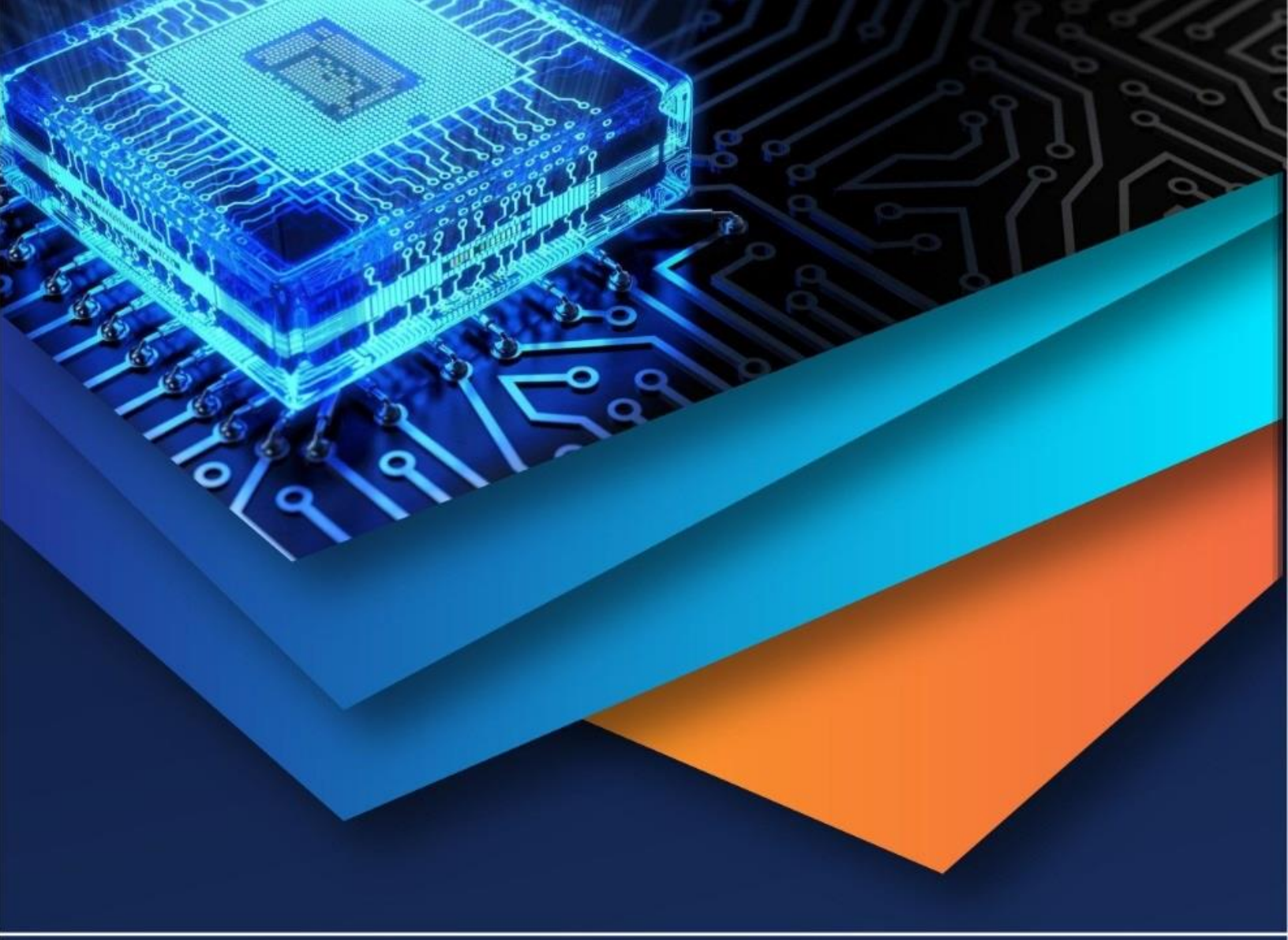

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