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CLIMATIC CONDITION OF CALABAR AS TYPIFIED BY SOME METEOROLOGICAL PARAMETERS

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ABSTRACT

This study aims at analysing some meteorological data collected by the meteorological department of the Margaret Ekpo International Airport, Calabar between 1985 and 2003. The main objectives were to provide average figures and curves of Calabar climate, and to identify possible trends since 1985. Results show that seven out of nine parameters studied indicated marked seasonal variations. There is indeed a clear warming trend and most of the other parameters appear to have significant contribution to climatic change. Wind velocity and evaporation have also slightly decreased. Increase in population may have played an important role as the town has experience tremendous growth due to the renewed emphases on tourism, urbanization and business typified by the establishment of TINAPA business resort in Calabar, Nigeria

KEYWORDS: Climate trend, weather composites, urbanization, tourism, TINAPA business resort.

1.0 INTRODUCTION

Knowledge of meteorological conditions is crucial to any architectural, industrial, agricultural and business enterprise. Apart from the obvious rainfall and temperature factors, evaporation, sunshine and humidity are also affecting productivity, tourism and the way plants grow. Usually climate is of less importance because of its very large timescale, but with the persistent adverse effects of certain climatic factors it has become necessary to take an overall view of changes induced by the industrial era, deforestation, urbanization and tourism,(Goudie, 1989, Landsberg, 1988). The aim of this study is thus to provide figures as well as composite (average) curves for the main meteorological parameters and identify possible seasonal trends. Only the most significant results have been presented here. Christoph and Fink, (2005) report that the June – September rainfall was below average along the climatologically wet Guinea coast since 1990 except in 1991 and 1996. This was indicative of a downward trend.

Jacob and Rajvanshi, (2006) observed a clear warming trend which was linked to changes in the surroundings (micro climate) of the station studied. It was surprisingly observed that increase in temperature did not seem to have any influence on the decreasing trend of evaporation. Regional decreases in relative humidity found over Eastern Canals are attributed to cooler inclinations in the winter half year associated with the increasing positive phase of the North Atlantic oscillation, (IPCC, 2001). Sometimes changes were difficult to find because of the problem of homogeneity in data and instrumentation (Rose and Elliot, 2001).

Much of the sub-Saharan African straddles the tropical equatorial zones of the globe and only in the Southern and Northern regions over lap with the wind regime of the temperate water lines (Grubb and Meyer, 1993). The figures presented by Karekezi (1994) showed that wind speeds prevailing in the Southern part of Nigeria are particularly low perhaps due to the prevalence of the inter tropical convergence zone, ITCZ. Wind speeds are low ranging from 7.2ms^{-1} to 9.7ms^{-1}. besides, there was evidence of a decreasing wind speed trend in the area. Sambo (1987) showed that for Nigeria, mean value range from 2.32ms^{-1} in Port Harcourt and 3.89ms^{-1} in Sokoto. Ojosu and Salawu (1990) provided the mean wind speed in most major Nigerian towns. Values range from 1.59ms^{-1} for Mina, Niger State and 4.476ms^{-1} for Sokoto, taken at a height of 25m above ground level. These values are important in determining the wind regime in Calabar and Nigeria in general. The evidence of changing wind pattern is consistent with current global warming trend. Anecdotal wind trend studies done in several places tend to support this decreasing trend in Nigeria, (Ayoade, 1980; Ojosu and Salawu, 1990).

The physical and emotional wellbeing of man depend to a large extend on the climatic conditions around him especially on matters of health, energy and comfort. Climate is a factor in human efficiency. This is why majority of health resorts and tourism sites are located in sunny areas, (Okpiliya et al, 2006, Thom, 1959). The effects of rainfall in the distribution of vegetation are obvious but the spatial humidity pattern may also play a role in determining regional vegetation pattern. (Sellers, 1965)

2.0 Geography of Calabar

The weather station is located at the Margaret Ekpo International Airport in Calabar. The station lies at an altitude of 62.3m above sea level, at 4°71' latitude and 8°55' longitude. It is almost surrounded by swampy wet lands and rivers at distances between three to five kilometers to the south, east and west of the station, respectively. Two major winds which significantly affect the climate of the West African coast blow across this region bringing about two major seasons in this area, namely: wet and dry seasons. The pattern of these winds follow the duration of the Indian monsoon winds, (Ewona and Udo, 2008).

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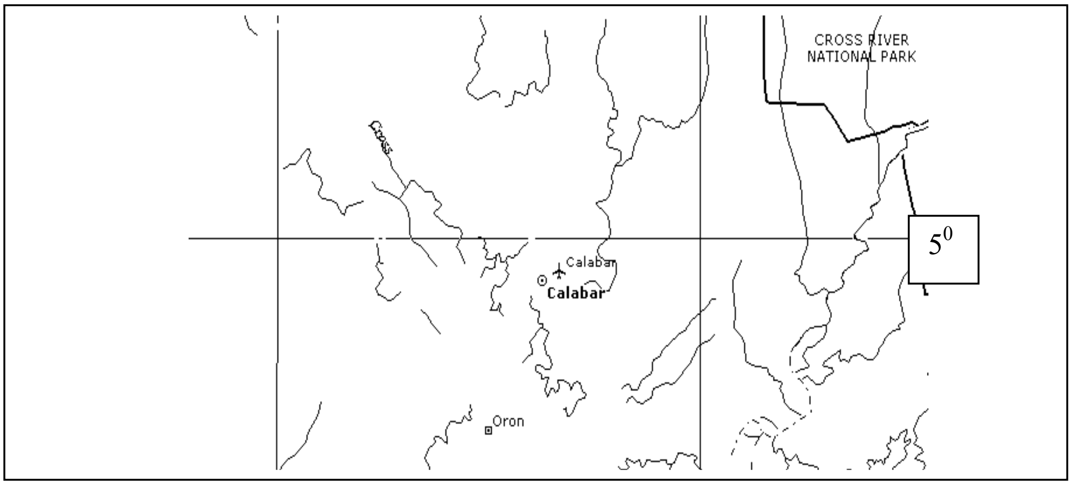

Figure 1 : Location of Calabar (adapted from Microsoft Encarta, 2006)

3.0 Data source

The data on maximum temperature, relative humidity, rainfall, hours of bright sunshine, cloud cover and evaporation used for the study where extracted from the meteorological records of the meteorological department of the Margaret Ekpo International Airport in Calabar, from 1985-1994 - a period of ten years and from the national meteorological data bank at Oshodi, from 1993-2003 - a period of 11 years. This shows an overlap of two years. Other details concerning the data and data preparation as used in this work is contained in Ewona and Udo, (2008a).

4.0 RESULTS AND DISCUSSION

The average values of meteorological parameters in Calabar have been summarized in table 1. We observe from the table that total annual rainfall of about 4,528.08mm places Calabar as one of the heaviest rainfall areas of the world. Temperature variations between maximum and minimum temperature are typical of a humid tropical climate. This is reflective of the high humidity pattern in the area. The sun shines for 4 to 5 five hours a day. From figure 2, we note that there is no strong correlation between maximum temperature and minimum temperature. The correlation value is only about 0.38. However, we observe that the temperature of Calabar fluctuates between 22.6C and 30.8C.

Table 1: Average values of Calabar weather

Parameter		Instrument used	Period	Value	Duration of data
Temperature	Mean daily maximum	Max/min thermometer	9h – 9h next day LST	30.70^{0}C	19 years (1985 – 2003)
	Mean daily minimum			23.00^{0}C	
	Mean daily temperature difference.			7.89^{0}C	
Rainfall	Yearly rainfall	Class A Rain gauge	6h-6h next day LST	4528.08 mm/y	19 years (1985 – 2003)
	Number of rainy days			276.33 d/y	
Wind	Mean Speed	Cup Anemo-meter	6h-6h next day LST	4.335606 km/h	10 years (1985 – 1994)
Relative humidity	Mean daily value	Class A hygrothermograph	@ 9.00 h GMT	83.75 %	11 years (1993-2003)
Cloud amount	Mean daily Cloud cover	Naked eye observation	6h-19h next day LST	6.95 oktas	15 years (1989 – 2003)
Sunshine duration	Mean daily Sunshine duration	Campbell sunshine recorder	9h-9h LST	4.69 h/d	11 years (1993 – 2003)
Evaporation	Mean daily evaporation	Piche evaporimeter	6h-6h LST	2.53 mm/d	6 years (1989 – 1994)

Composites for temperature, rainfall and sunshine duration are given in figures 2, 3 and 4. These figures show the relationship between weather parameters during this period. From Figure 3 and 4, we note that the pattern of rainfall in Calabar generally has the following characteristics:

1. Rain is expected every month of the year though in small amounts during the months of December, January and February.
2. The rains increase steadily to peak in the month of July, from where they decline until December.
3. There is a relatively shorter dry season with scanty rainfall.
4. The effect of the dry and dusty North West trade wind which begins in October is not very significant in this coastal town as we have significant amount of rain fall in the months of October and November.
5. The break in the rainy season normally found around the month of August is not pronounced as can be seen in the single peak of rainfall in figure 4.
6. Months with higher rainfall totals are well correlated with months with higher number of rain days and months with heavy downpours
7. Figure 4 indicates that most of the rain falls during 10 months of the year (February to November). Thus the second half is much more significant, accounting for 60.9% of yearly rainfall in 108 days of the second half of the year, the first half of the year produces only 39.1% in just 68 days.

As in most coastal towns in Nigeria, rainfall is highly concentrated with single rainfall as high as 180mm and an average of only 175 rainy days in the year. With a monthly total annual rainfall of about 2859.838mm on average, rainfalls are generally heavy. This figure which is the highest in the country is more than twice the values of the National average of 1280mm.These heavy downpour are difficult to harvest because of the surface runoff. Hence gully erosion and constant flooding are among the most common environmental problems threatening the survival of the town, (Ewona and Udo, 2008; NIMET, 2006).

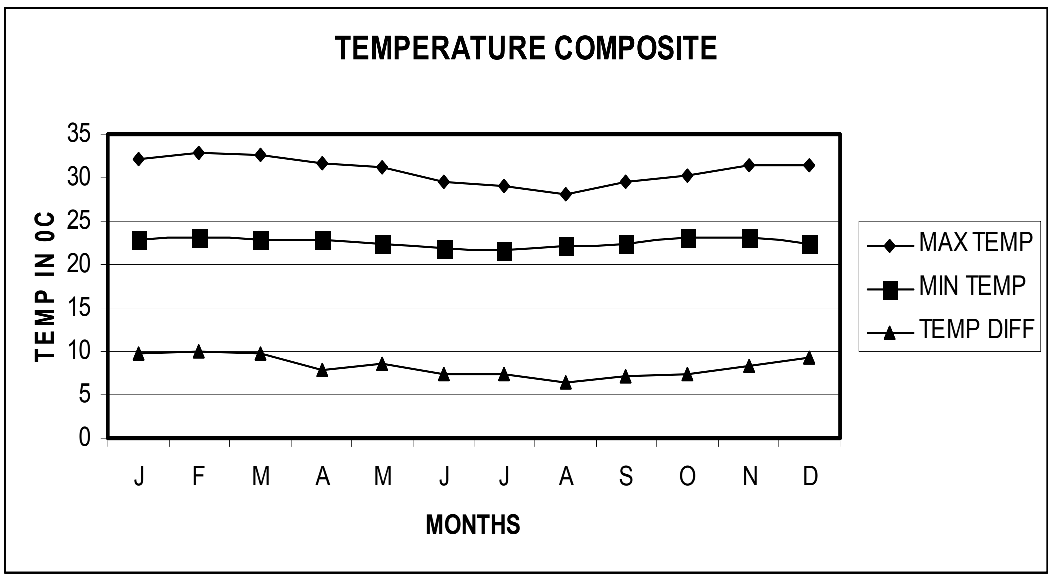

Figure 2: Monthly mean daily temperature composite

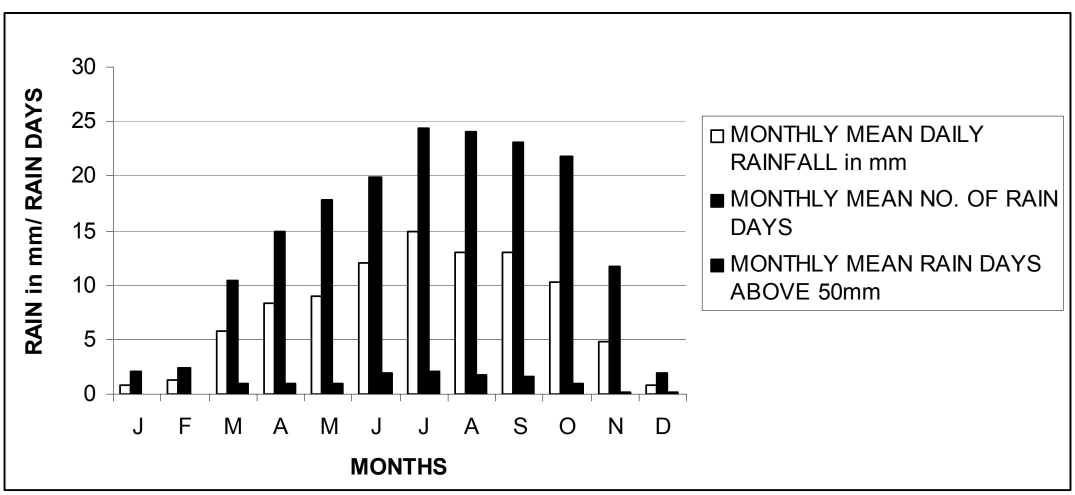

Figure 3: Rainfall composite

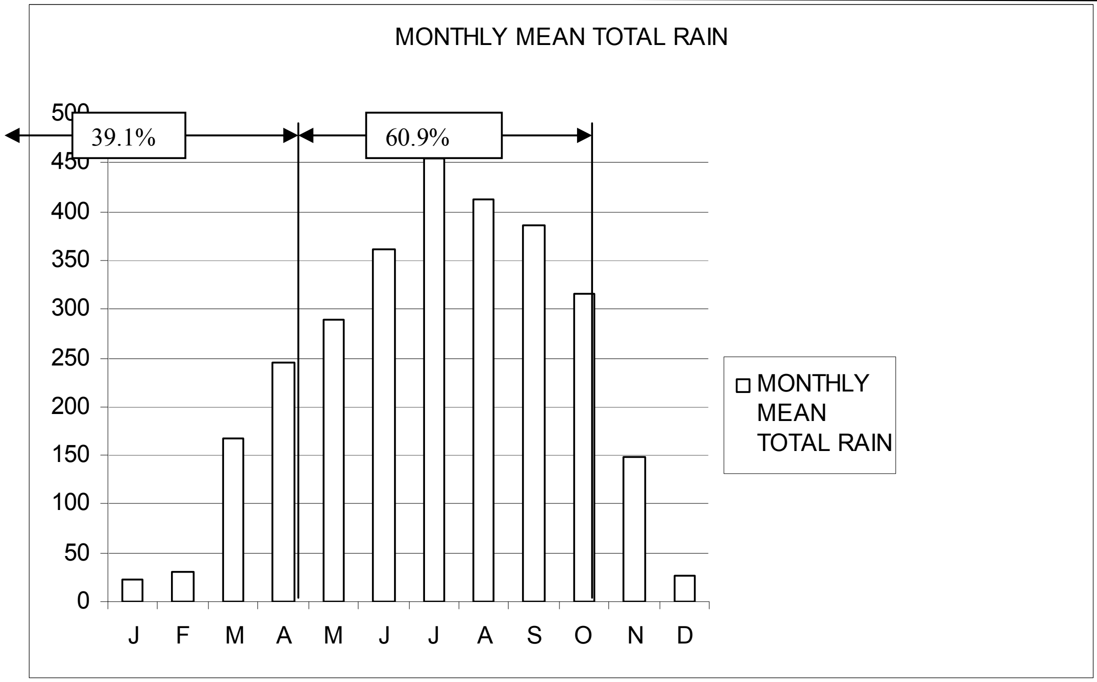

Figure 4: Monthly mean daily total rainfall composite

From Figures 5 and 6, we observe that Calabar, as a tropical city enjoys uninterrupted 4 to 5 hours of bright sunshine every day in spite of the heavy rains in the area. Though sunshine duration does not show seasonal tendency, there is evidence of decrease in sunshine hours between the months of June and October when convectional cloudiness is expected at its peak, (Udo and Aro 2000, and Ewona and Udo, 2008b). Relative humidity has very strong seasonal inclination as can be seen from Figure 6.

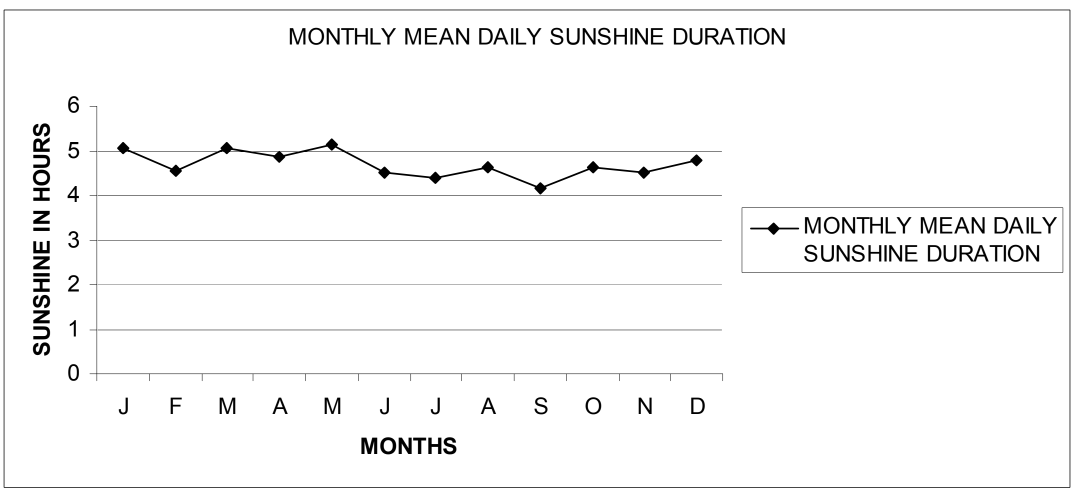

Figure 5: Monthly Mean Daily sunshine composite

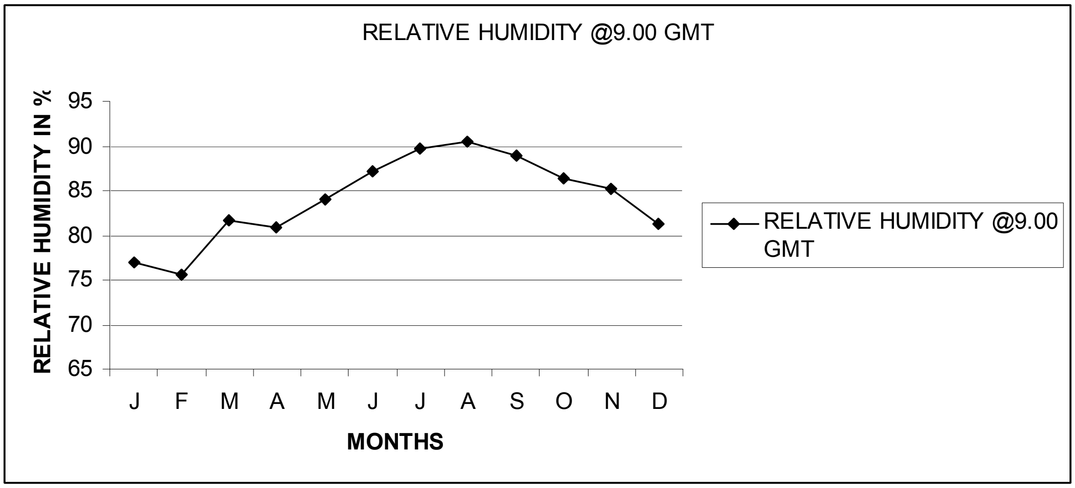

Figure 6: Monthly Mean Daily Relative humidity @ 9.00 GMT composite

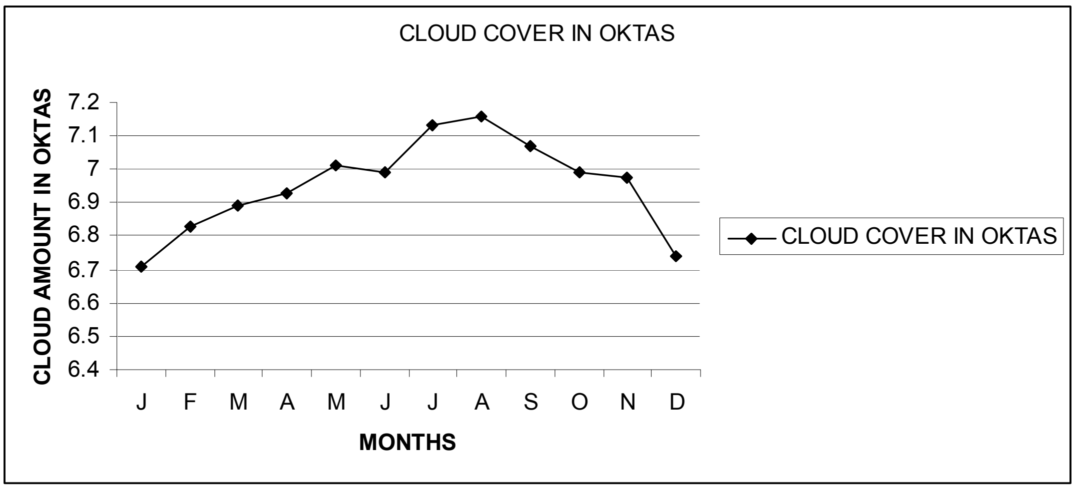

Figure 7: Monthly Mean Daily Cloud Amount Composite

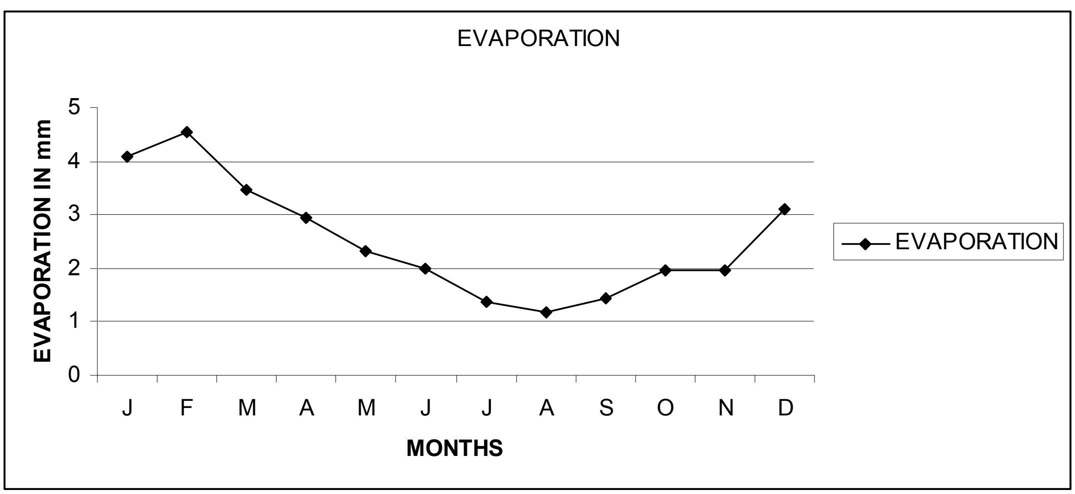

Figure 8: Monthly Mean Daily evaporation composite

Notice in Figure 2 to 8 that all the parameters except for sunshine duration show strong seasonality which peak in August. August of every year serves as the climatic axis over which the seasonal trends of meteorological parameters are reversed. This period is often referred to as "August break" in this part of the world. In terms of meteorological parameters, rather than regard this period of climatic twist as "August break" as it is popularly called, it is hereby suggested that this period which marks the climax or lowest values in most meteorological parameters be called “August reversal”.

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