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Soaring Temperatures in Ghana?

Stephens (1995) recently reported that temperatures in Ghana were increasing during this century and that the temperature rise could be evidence of a global warming signal. Using data from 11 stations, Stephens shows that the temperatures in the 1961 to 1990 period were higher than temperatures in the 1930 to 1960 period, noting that, between 1945 and 1990, temperatures in Ghana were 'soaring' upwards; suggested causes included the 'greenhouse' effect and the potential influences of urbanization. While I commend Stephens for the effort, I conducted the following research that may be of interest to individuals concerned with regional climate changes over the period of reliable historical records.

I collected the 1945 to 1994 monthly temperature anomaly data from the widely-used Jones (1994) data-set for the 5° latitude by 5° longitude grid cell that contains most of Ghana (centred on 7.5°N, 2.5°W). A plot of the 12-months' smoothed anomalies (Fig. 1) shows variability from year to year, but absolutely no evidence of any 'quite significant soaring of temperatures'. From 1945 to 1994, the temperatures in this grid cell actually cooled slightly, but at a statistically insignificant rate. From 1945 to 1990, there is simply no warming in the record.

The satellite-based lower-tropospheric temperature data developed and described by Spencer & Christy (1990) provides another opportunity for testing temperature trends in Ghana. I collected the updated satellite data for the five 2.5° latitude by 2.5° longitude grid cells that cover Ghana for the period 1979 to 1994, then smoothed the data using a 12-months filter, and plotted the data in Fig. 1. The satellite-based lower-tropospheric temperature data reveal a statistically highly significant cooling of 0.027°C per year over the period of record.

Although Ghana represents only 0.05% of the Earth's surface, it is important to analyse temperature trends even at this spatial scale. Stephens has shown that the temperatures at 11 stations in Ghana have increased since the end of World War II. However, this warming signal does not appear in the widely-used Jones (1994) data and it is certainly not found in the updated satellite-based Spencer & Christy (1990) lower-tropospheric temperature data.

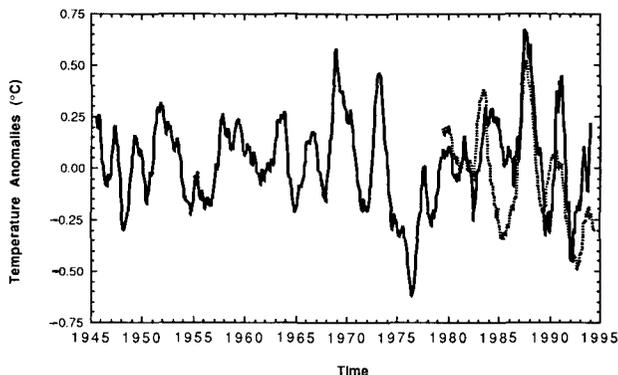


FIG. 1. Ghana monthly temperature anomalies based on the Jones (1994) near-surface air temperatures (solid line) and updated Spencer & Christy (1990) satellite-based lower-tropospheric temperature measurements (dotted line).

While there may be any number of causes for the patterns reported by Stephens, it seems likely that the reported temperature rise in Ghana is more related to local urbanization effects than to any regional signal associated with the buildup of 'greenhouse' gases.

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