Questions for our Togolese colleagues:

1.    Please describe your methods of data collection, for

 a)    Temperature

At each hour of each day, we take the temperature at our conventional stations.

 b)    Rainfall

As for rainfall, it's measured at the end of a rain. A day's rainfall measurement is the sum of the rains between 6 am of the day and 6 am of the next.

The observers collect the measurements and record them in the monthly climatological tables (MCT), and then send them at the end of each month to the offices in Lome for processing and archiving in the general database.

2.    What is the margin of error in both temperature and rainfall measurements? That is, how accurately can you read these, and has that changed over time? In particular, we assume that when you report “0” for rainfall, it represents a “non-detect” (and perhaps small but non-zero value).

Errors exist, but minimal, since no human activity is perfect, and the instruments may be defective on occasion. But in recent times, we have automatic stations with which to compare our observers' measurements from our conventional stations. On the basis of those comparisons, we are able to correct the observations, reducing the errors.

Zeros in the rainfall measurements signify that it hasn't rained, and not a "non-detect".

3.    Are mean temperatures available?

Yes, the mean temperature is available. It is derived from the daily minimum and maximum temperatures. That is to say that at the end of each day, one extracts the extreme temperatures (tmin and tmin) as

tmin= the lowest temperature of the day
tmax= the highest temperature of the day
tmean=(tmin+tmax)/2

4.    What actual physical instruments have been used for data collection (maker, model, etc.)?

The conventional  stations use traditional mechanical precision devices, and the devices of our automatic stations come from PULSONIC (<https://www.pulsonic.com/en/home/>).

5.    Are the variables consistent for each city over time (location within the city, time of day, type of collector, person collecting, instruments, elevation)?

Currently, with the exception of the conventional stations which provide data each hour, the automatic stations send data each 15 minutes to our servers. The observers are trained in the World Meteorological Organization accredited schools in Algeria, France, Niger ( at AGRHYMET – <http://www.agrhymet.ne/eng/>–and ACMAD – <http://www.acmad.net/new/?q=en/home>), China, etc.
Our country has an area of 56,600 km^2 with a national coverage of more than 60%. We have

* + 13 Conventional Synoptic Stations
	+ 7 conventional climatological stations
	+ 200 conventional rain gauge stations
	+ 136 automatic rain gauge stations
	+ 30 automatic synoptic stations

6.    We have observed some rows in the data that are exact replicates of earlier rows (two years may have identical temperature  information – Dapaong minima, 1972 and 1973, for example). How do we interpret that? Was missing data replaced with data from the prior year?

As for the minimal temperatures of Dapaong for years 1972 and 1973, there are no concerns about those measures. These are monthly averages, but there are fluctuations in the daily measurements for the month.

7.    Have there been any long-term, extreme events that could be causing an increase in Togolese temperatures (e.g. a drought)?

There are no extreme events which could be the cause of the increase in temperature in Togo. This increase in temperature is linked to deforestation and to global warming linked to the emission of greenhouse gases.

8.    Could you give us a summary of how you have observed climate changing over the period of data collection? For example, have you noticed the seasons (in particular, the dry season) getting longer or more severe over the course of the data collection?

 Climate change has been observed with diminishing rainfall (rains becoming rarer and rarer). The seasons are shifting and the annual agricultural seasons are disrupted. Those in the agricultural sectors are in trouble. Long sessions of drought are observed more often. Agricultural seasons are shorter. Nights are very hot, causing insomnia in the impoverished population, which hasn't the financial resources to air condition their homes. Expenses increase with the excessive consumption of electrical energy to make the rooms less warm.