

## The sun in Uganda (1)

About 10 years have passed since I started working on rice cultivation in Uganda. Here are some stories related to the sun in an equatorial country based on what I have observed.

### Time difference between standard time and actual sun movement

When I first arrived on my assignment in Uganda in March 2007, I woke up a little early due to jet lag and was relaxing. After a while, the dawn was over and I thought it was around 6:00am, but the time had already passed 7:00am and I was panicked. Uganda's territory is in the range of 29° to 35°E, but the meridian of Uganda's standard time, UTC+3-hours, is 45°E, which is in the far east of the territory. For this reason, the local solar noon in Kampala is later than noon at the standard time, and the sunrise is also later. The meridian 30°E, the standard of UTC+2-hours passes through the western edge of Uganda's territory, so if UTC+2-hours is standard time, I think it fits well with the rhythm of everyday life, but for locals, this may not be a big deal. And having no time difference with East African neighbors would be economically beneficial.

Japanese often start lunch around noon, but the peak hour of lunch time of Ugandan restaurants is after 13:00. It seems to me that Ugandan people are having lunch at the local solar noon time instead of at noon, standard time. I'm wondering about why human appetite is stimulated by the midday sun.

### Seasonal changes in sunrise and sunset time

In Uganda, nightfall becomes earlier and earlier from October to December. As in Japan, I felt that the days were getting shorter toward the winter solstice. One day, when I left the office, watching the sunset, I told my Ugandan colleague, "The sunset is getting early, these days." I was surprised by his answer, "Yes, and the dawn is also early." He was right. The day length was not getting shorter.

As shown in the figure below, the sunrise and sunset times in Kampala move earlier or later twice a year while maintaining the day length. The difference between the

earliest and latest times is 31 minutes. This is related to the orbiting of the earth while rotating, and it is a phenomenon that can be observed as a time lag of the local solar noon in Japan, but the change in day length is larger due to the high latitude of Japan. It cannot be recognized as a change in sunset time. It is a phenomenon that can be observed only under the equator where there is no difference in day length. Given these phenomena, I'm interested in whether the flowering time of rice in Uganda fluctuates seasonally within a range of 30 minutes or not. However, it is difficult to confirm this seasonal change because the flowering time of rice changes for more than one hour depending on whether it is sunny or cloudy.

If a Japanese watches the sunset every day around October in Uganda, he may feel that winter has come, but if he walks early in the morning, he may feel signs of spring.

