COMPARATIVE ANALYSIS_GITEGA_OCTOBER 2024

1. DATA COMPARISON OF MANUAL STATION VS AUTOMATIC STATION

1.1.TEMPERATURE

1.1.1. EXTREMES TEMPERATURE

i. Maximum temperature

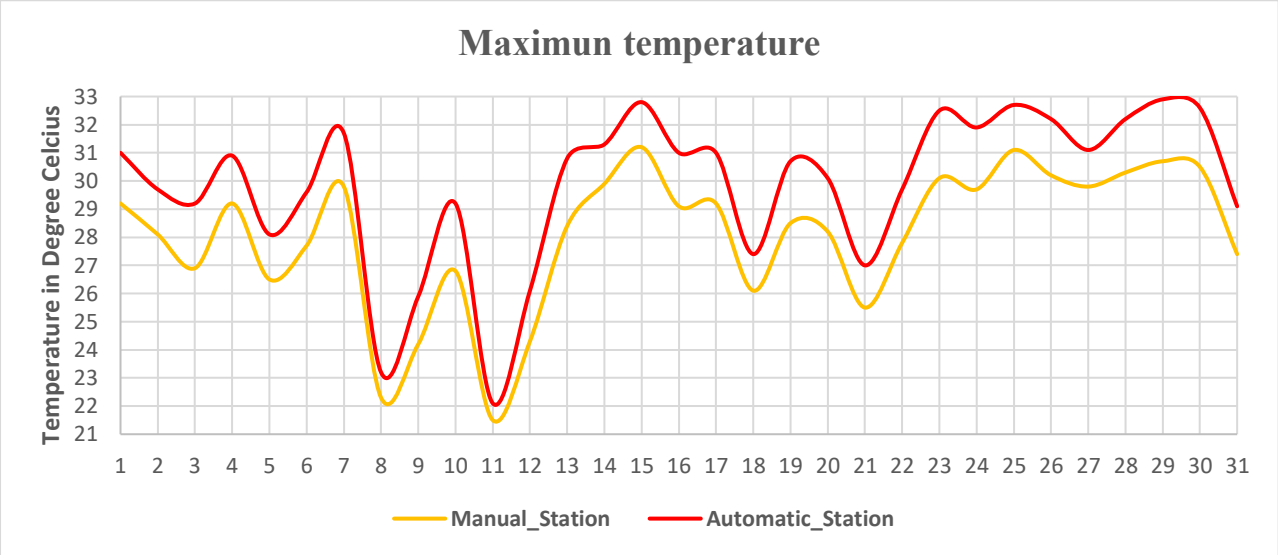

Figure 1: Daily Maximum temperature recorded by Automatic and Manual stations.

Figure 1 illustrates that the manual temperature readings from two stations are consistent; however, the automatic station recorded a higher temperature compared to the manual station, with a difference of **2.4°C** observed on October 13, 2024 on this day is where maximum sunshine hours were recorded.

ii. Minimum temperature

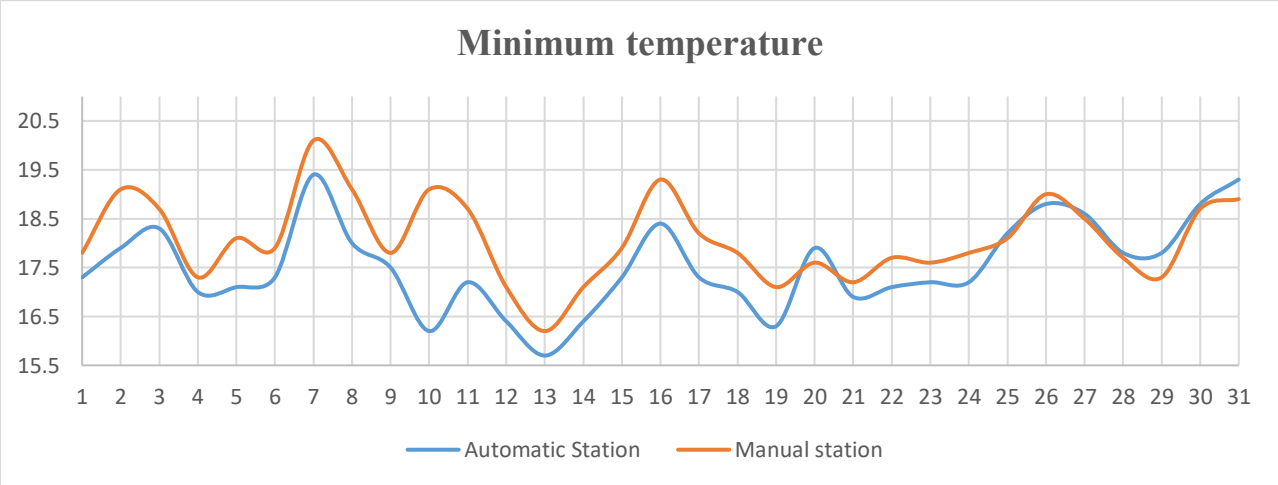

Figure 2: Minimum temperature

Figure 2 reveals that the daily minimum temperatures recorded by the manual and automatic stations are sequentially aligned. However, the automatic station recorded a lower temperature

than the manual station, with a difference of 2.9°C observed on October 10, 2024(this day experience no special event).

iii. Hourly temperature

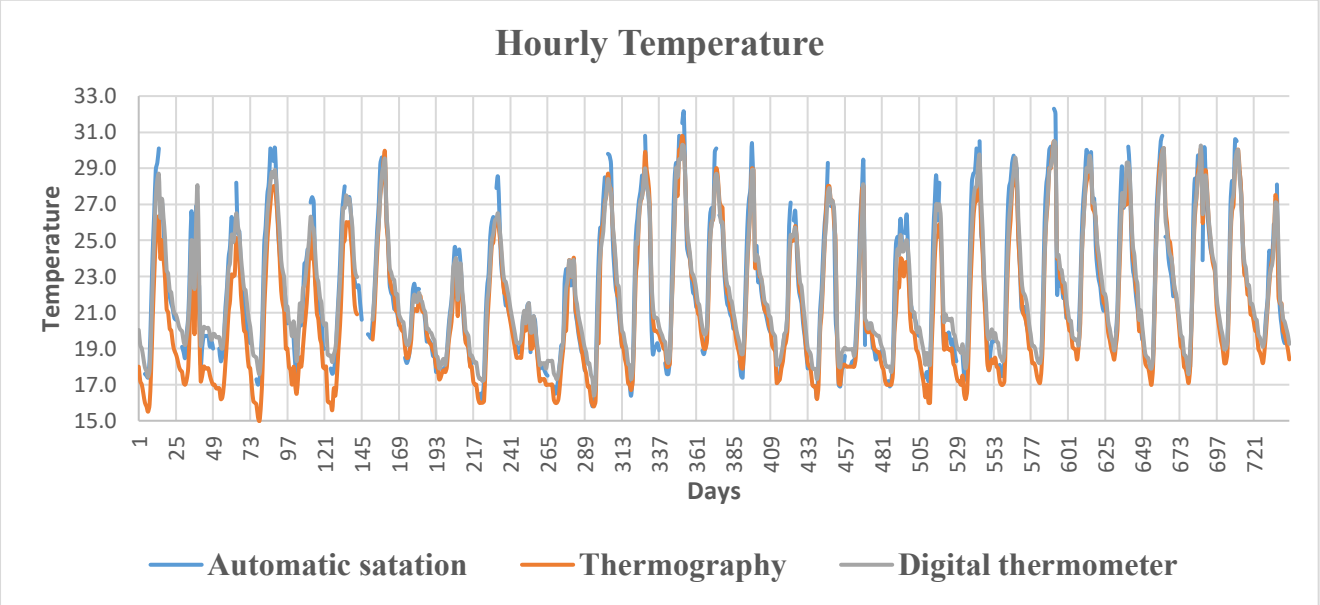

Figure 3: Hourly temperature

Figure 3 presents a comparison among the automatic station, thermography, and digital thermometer. The data reveals a strong correlation between the automatic station and the digital thermometer, surpassing any other pairing, while the correlation between the automatic station and thermography is the weakest.

Table 1: Standard deviation resulting in pairing the instruments.

	Automatic Weather Station and Digital thermometer	Thermography and Digital thermometer	Automatic and thermography
Mean difference(^{0}C)	0.8	1.0	1.1
Standard deviation(^{0}C)	0.5	0.7	0.9

1.2.RAINFALL

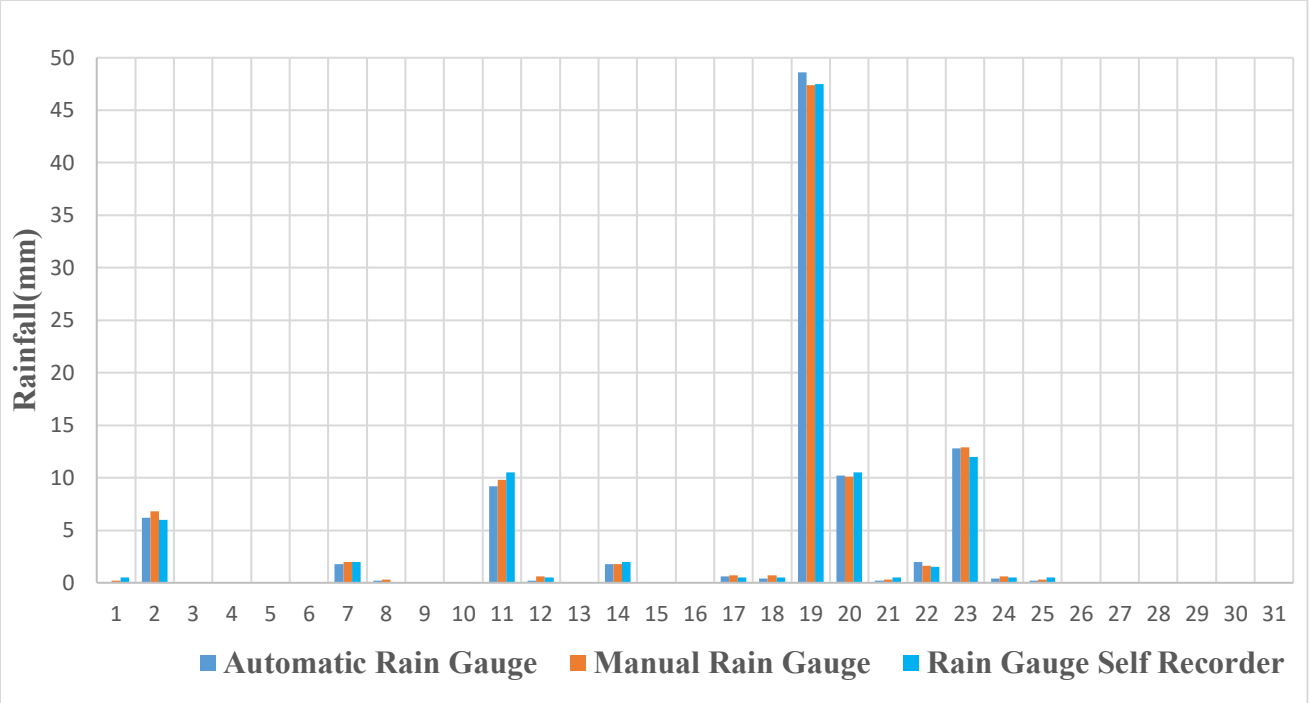

Figure 4: Rainfall

Figure 4 illustrates that both recorders consistently capture values that are nearly identical, displaying a high correlation in the data.

1.3.HUMIDITY

i. Hourly Humidity

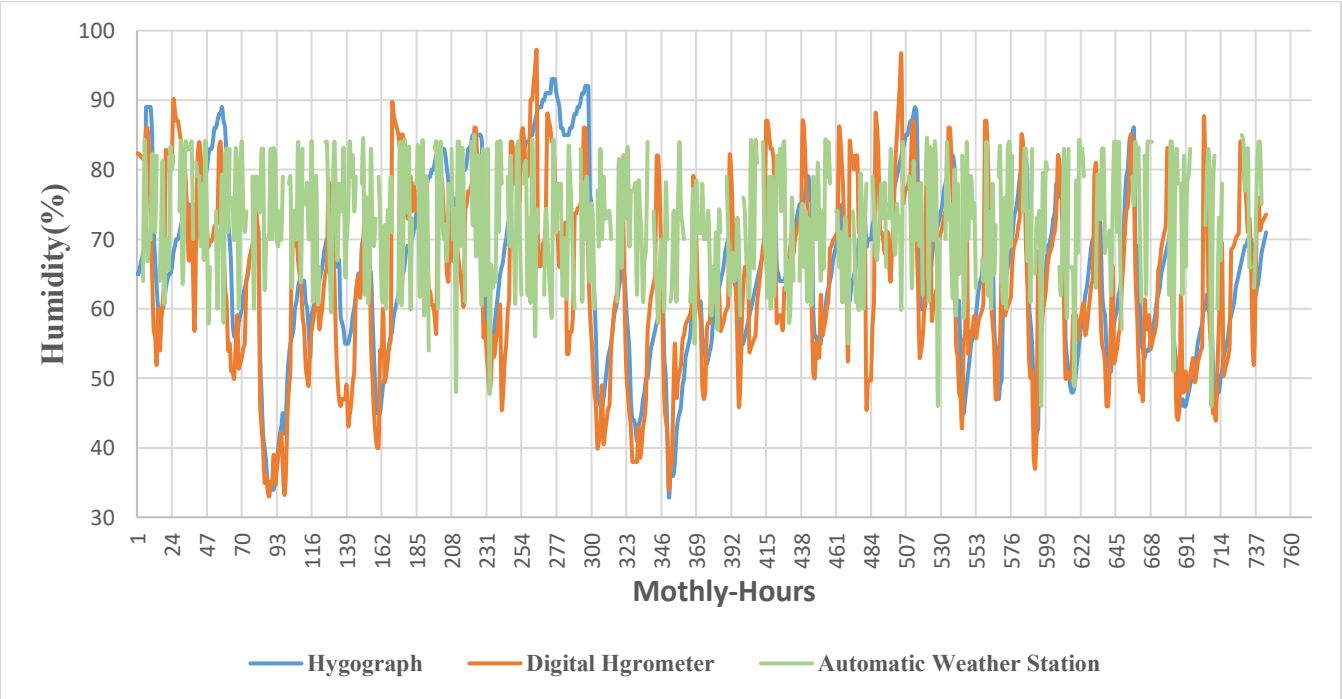

Figure 5: Hourly Humidity

Figure 5 compares the automatic station, hygrography, and digital hygrometer. The analysis shows a strong correlation between the hygrography and the digital hygrometer, which is higher than any other pairing. In contrast, the correlation between the automatic station and the digital hygrometer is the weakest.

Table 2: Mean and standard deviation

	Automatic Weather Station and Digital Hygrometer	Hygrograph and Digital Hygrometer	Automatic and Hygrograph
Mean difference (%)	15	8	14
Standard deviation (%)	10	6	9

1.4.SUNSHINE HOURS

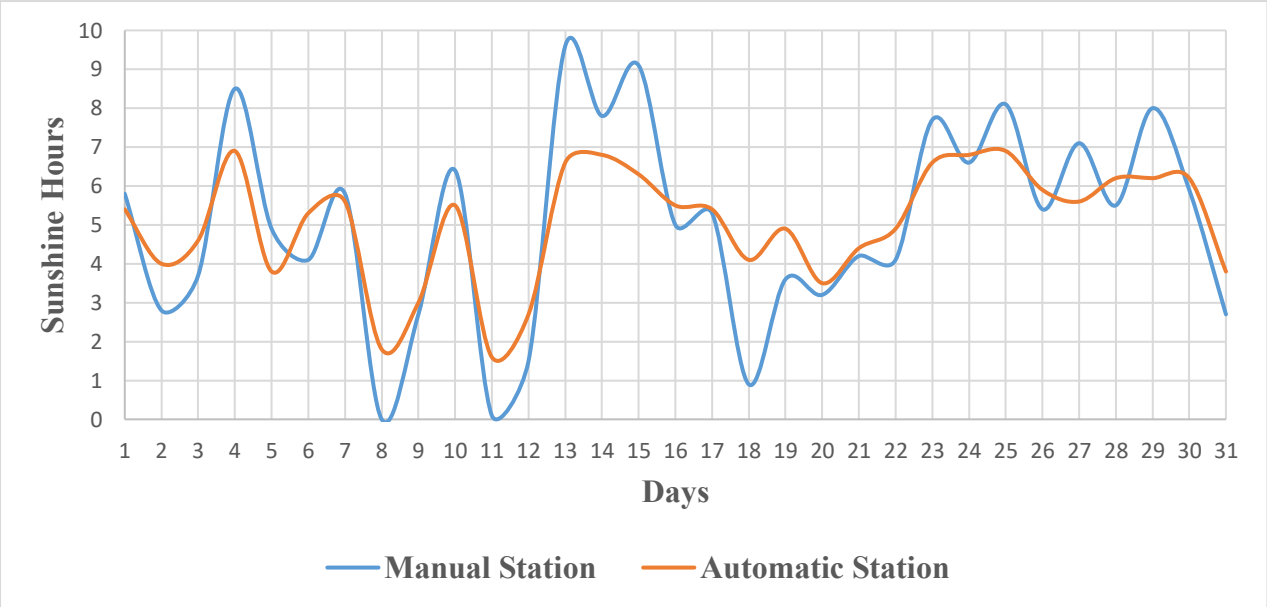

Figure 6: Insolation

Figure 6 highlights a significant discrepancy in the sunshine hours recorded by the two stations, suggesting that the solar radiation sensor may be providing inaccurate values.

1.5.SOIL TEMPERATURE

1.5.1. Soil temperature(10 Cm) at 12h00

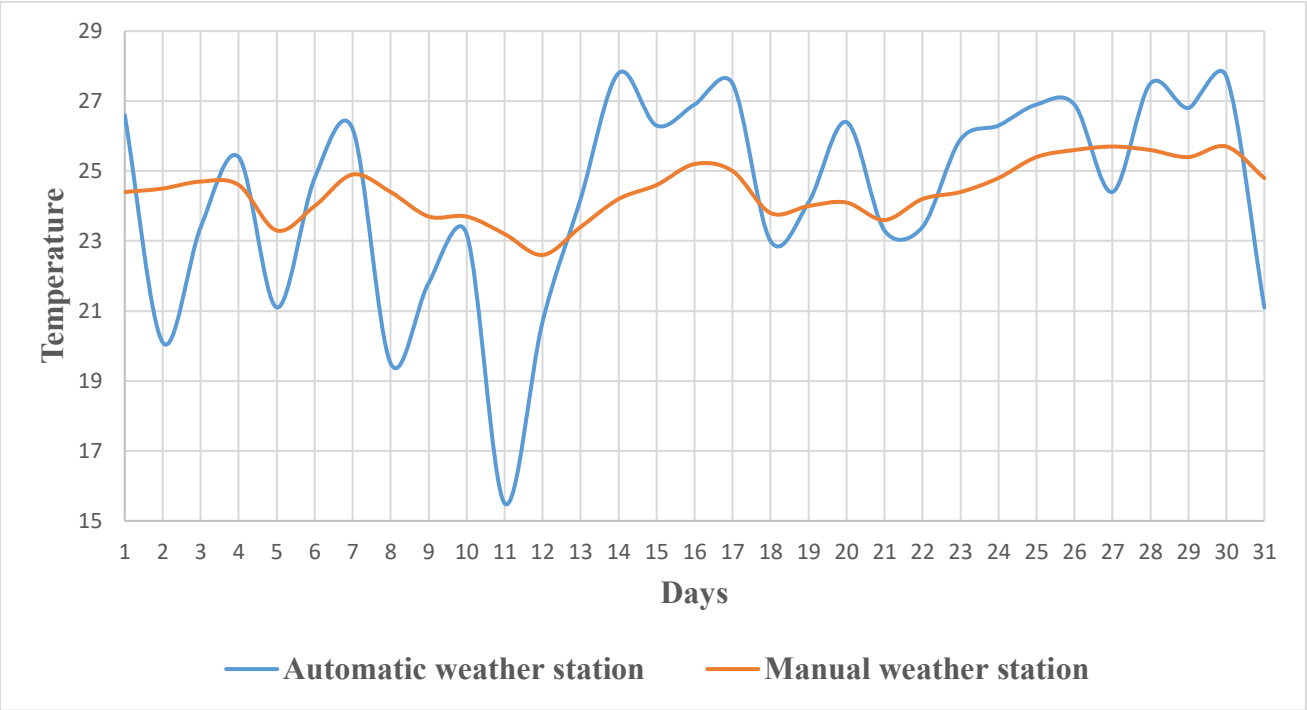

Figure 7: Soil temperature at 10 Cm taken at 12h00.

Figure 7 illustrates the lack of consistency between data collected by the automatic station and the manual station. This discrepancy raises suspicion, suggesting that one of the stations may have recorded incorrect values.

1.5.2. Wind direction and wind speed

Comparing wind direction and wind speed between the two stations is challenging because the manual station relies on observation from automatic station, while the automatic station calculates the average wind speed over a 10-minute interval. Since wind conditions can change every minute, the manual station may record values that differ significantly from those recorded by the automatic station.