# SEASONAL PEDOCLIMATIC MONITORING WITH SENSORS FOR AGRICULTURAL PLANNING

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## INTRODUCTION

Soil is one of the elements of landscape that allows us to interpret the quality of the natural environment. The climatic condition of soils is fundamental for planning agricultural practices, which makes useful its monitoring. Geotechnologies are efficient tools for this, optimizing the need for time-consuming fieldworks.

## OBJECTIVE

Analyze data from soil temperature and humidity monitoring sensors under different land covers and land uses.

## MATERIALS AND METHODS

Data was recorded every hour for 1 year and 6 months in a property with coffee plantation and woodland, in Minas Gerais - Brazil. In both land covers, a monitoring system was installed (Figure 1 and 2) with a set of temperature and humidity sensors, at 10 and 50 centimeters (cm) from soil surface.

The monitoring site under the coffee plantation collected information from two nearby points: one on a terrace with forage peanuts (Arachis pintoi) covering the soil surface (Figure 3), and the other with no vegetation cover. In the forest fragment area, one point was sampled.

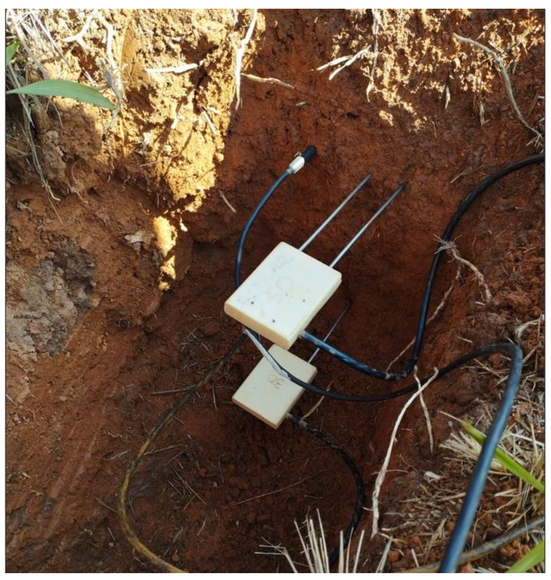

Figure 1. Temperature and humidity sensors installed at 10 and 50 cm in the soil.

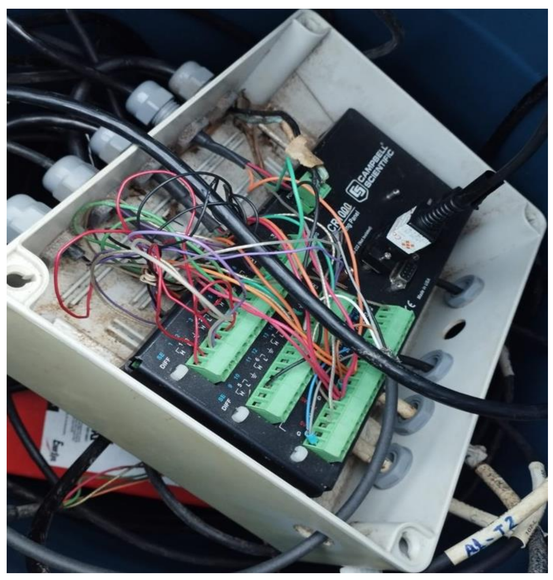

Figure 2. Datalogger connected with communication cables and power supply.

Figure 3. Covered area of the coffee plantation where the equipment was installed.

## RESULTS

**Temperature (Figure 4)**

- Soil temperature averages: Spring= 22.55°C; Summer= 23.59°C; Fall= 20.72°C; Winter= 18.74°C;
- Highest variability: Fall (2°C) and Winter (1.3°C). Lowest variability: Summer (0.61°C) and Spring (1.13°C);
- Highest average: Uncovered area (23.42°C). Lowest average: Forest area (20.32°C);
- Surface layers in coffee plantation: Highest variability, especially in uncovered areas.

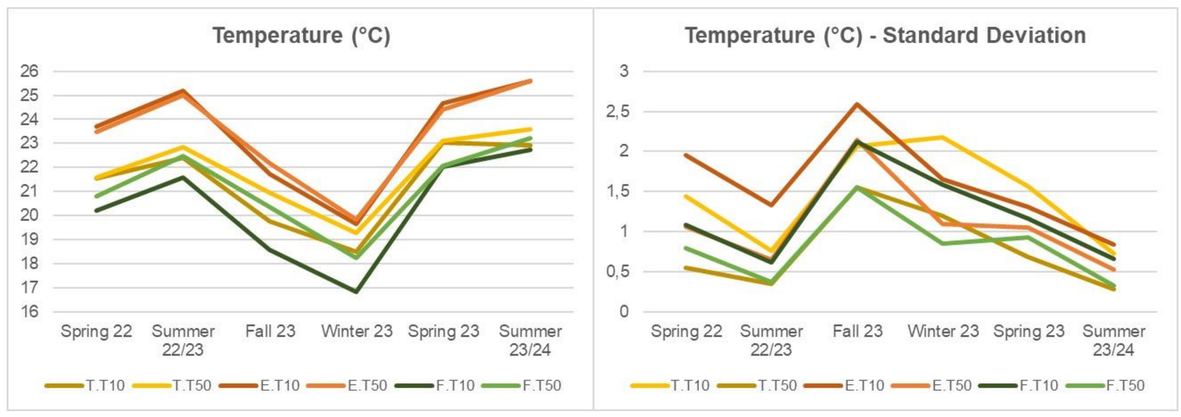


Figure 4. Graphs resulting from the temperature data collected

**Humidity (Figure 5)**

- Soil humidity avarages= Spring: 22.64%; Summer: 21.69%; Fall: 19.39%; Winter: 15.78%;
- Lowest variability: Winter (1.82%) and Fall (2.93%). Highest variability: Spring (4.54%) and Summer (3.56%).
- Maximum average: Coffee plantation surface points (24.6%). Minimum average: Forest area (18.93%).

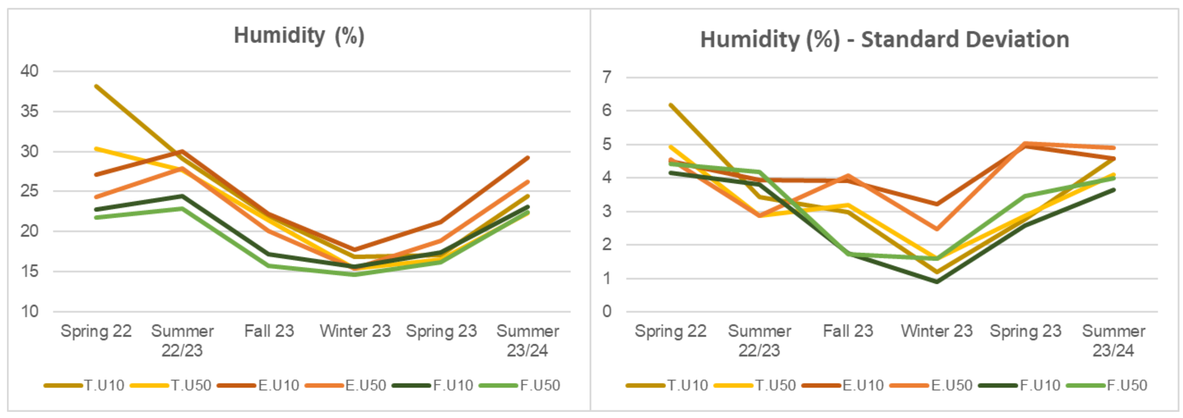


Figure 5. Graphs resulting from the humidity data collected.

## CONCLUSION

Seasonal variations match the area's dry winter and rainy summer. The denuded area's surface layer showed more variability due to its slope and lack of full cover, unlike areas with vegetation cover, which were more stable. This highlights the importance of vegetation in stabilizing soil, crucial for agriculture. Geotechnologies effectively tracked these variations, aiding sustainable practices.

## ACKNOWLEDGMENTS