Measuring Soil Temperatures at South Penquite Farm.

Background information:

Incoming solar radiation can be absorbed or reflected by the earth's surface. This can affect the soil acidity and temperature. South Penquite Farm has a variety of soil types ranging from fertile brown earths to organic peaty humus soils, through to polzolic conditions. These have an increasing acidity/ pH. The temperature gradient can vary across different soil types and depths. The top soil is closest to the surface and therefore has the greatest range in temperature. Each soil type can absorb different intensities of incoming solar radiation and temperature therefore varies between different soils.

Aim and Key Questions:

The principal aim of this field visit is to collect temperature readings at different depths in three contrasting soil types (A, B & C) to begin an investigation into soil temperatures.

The following key questions will be investigated:

1. How does the soil temperature vary with increasing depth?
2. How do soil temperatures vary among different soil types?

Equipment and methods:

To measure how the soil temperature varies with increasing depth a soil auger, digitalised temperature probe and ruler are required.

1. Select the site, which is representative of soil type A.
2. Using the soil auger, bore your first core (Nb: this should be sufficiently deep enough to take at least 3 temperature readings - 25cm).
3. Lay your sample along the ground and using the ruler, mark the midpoint of each depth increment. Insert the temperature probe to measure the soil temperature at depths of 5cm, 15cm and 25 cm.
4. Record the results in the table below. Continue with the same borehole until you reach a depth of 25cm (if you hit rock select a different sample nearby).
5. Underline the terms which best describe the colour, texture and moisture content of your core.
6. Repeat your readings at two separate, but representative, sites elsewhere with the *same soil type*.
7. Repeat stages 1-6 at soil types B & C.

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SOIL TYPE: _____

Depth of soil	Mid-point of depth(cm)	Sample 1 temperatures (°C)	Sample 2 temperatures (°C)	Sample 3 temperatures (°C)	Average across 3 samples (°C)
0-10cm	5				
10-20cm	15				
20-30cm	25				
	Underline the terms that best describe this core.	• Colour is *very dark*, *dark*, *average*, *light*. • Texture is *coarse sand*, *fine sand*, *silt*, *clay*. • Moisture is *very wet*, *wet*, *moist*, *dry*, *dusty*	• Colour is *very dark*, *dark*, *average*, *light*. • Texture is *coarse sand*, *fine sand*, *silt*, *clay*. • Moisture is *very wet*, *wet*, *moist*, *dry*, *dusty*	• Colour is *very dark*, *dark*, *average*, *light*. • Texture is *coarse sand*, *fine sand*, *silt*, *clay*. • Moisture is *very wet*, *wet*, *moist*, *dry*, *dusty*	

Follow up tasks:

1. Plot a scatter graph of average temperature against depth of soil (Nb: temperature is plotted along y-axis and depth along x-axis) for each soil type. It is advised to plot all three soil types on the same graph for ease of comparison.
2. Which soil type had the highest temperatures? What factors led to this soil type having the highest temperatures?
3. Which soil type had the lowest temperatures? What factors led to this soil type having the lowest temperatures?
4. Which soil type had the greatest range in temperature? What factors led to this soil type having the greatest range in temperature?

Extension work.

Attempt the same exercise, but this time compare the soils that are found under different types of vegetation (plants).

	Air temperature	Ground temperature	Soil temperature at 5 cm	Soil temperature at 15cm
Grassland				
Heath				
Woodland				
Other- state the type of plant cover				

What did the experiment tell you about the temperatures in different places?
What else may cause the temperature to be different on various parts of the farm?

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