

Soil Temperature Protocol - Diurnal Cycle Measurement

Field Guide

Task

Measure soil and air temperature at least five times a day for two days.

What You Need

- Soil Temperature Data Sheet – Diurnal Cycle
- Hammer (if soil is extra firm)
- Soil thermometer
- Watch
- Soil Thermometer spacers
- Pen or pencil
- 12 cm or longer nail marked at 5 cm, 7 cm, 10 cm and 12 cm from its point (if soil is not soft)
- Science Log (notebook)
- Thermometer (for current air temperature)

In the Field

1. Fill in the top portion of the *Soil Temperature Data Sheet* and choose your first sampling point. Proceed to step 3 if soil is firm, or go to step 4. (Remember that you will be repeating steps 2-15 at least four more times.)
2. Locate your next sampling point 10 cm from your previous measurements. See Figure SO-TE-2. (If soil is soft, skip to step 4).
3. Use the nail to make a pilot hole 5 cm deep for the thermometer. If the ground is extra firm and you have to use a hammer, make the hole 7 cm deep. Pull the nail out carefully, disturbing the soil as little as possible. Twisting as you pull may help. If the soil cracks or bulges up, offset 10 cm and try again.
4. Insert the thermometer through the longer spacer so that 7 cm of the thermometer extends below the bottom of the guide. The dial should be against the top of the spacer.
5. Gently push the thermometer into the soil.
6. Wait 2 minutes. Record the temperature and time in your Science Log.
7. Wait 1 minute. Record the temperature and time in your Science Log.
8. If the 2 readings are within 1.0° C of each other, record this value and the time on the *Soil Temperature Data Sheet* for the current sample, 5 cm reading. If the 2 temperatures are not within 1.0° C, continue taking temperature readings at 1-minute intervals until 2 consecutive readings are within 1.0° C.

9. Remove the thermometer from the hole (If the soil is soft, skip step 10).
10. Use the nail to deepen the hole to 10 cm. If you have to use a hammer, deepen the hole to 12 cm.
11. Replace the long spacer with the short one so that 12 cm of the thermometer extends below the bottom of the spacer. Insert the thermometer in the same hole. Gently push down until the thermometer tip is 12 cm below the surface.
12. Wait 2 minutes. Record the temperature and time in your Science Log.
13. Wait 1 minute. Record the temperature and time in your Science Log.
14. If the 2 readings are within 1.0°C of each other, record this value and time on the *Soil Temperature Data Sheet* for the current sample, 10 cm reading. If the 2 temperatures are not within 1.0°C , continue taking temperature readings at 1-minute intervals until 2 consecutive readings are within 1.0°C .
15. Read and record the current air temperature from the thermometer in the instrument shelter by following the *Current Temperature Protocol* in the *Atmosphere Investigation*. The *Soil Temperature Data Sheet* allows students to plot their diurnal soil temperature data.
16. Repeat steps 2-15 every 2 to 3 hours for at least 5 measurement times. See Figure SO-TE-2. Note that the times in figure are suggestions only. Choose times that work with your schedule.
17. The next day, repeat steps 2-16. Note that you will need a new *Soil Temperature Data Sheet* for the second day.

Figure SO-TE-2: Soil Temperature: Layout of Diurnal Observation

