

# GLOBE Soil Moisture Campaign - Teacher's Guide

The goal of this data collection effort is to collect regional near-surface soil moisture data during two nine-day field campaigns each year. While most GLOBE measurements are collected on the school grounds, our objective is to collect data from areas away from your school site. The sections below outline when, where and how your samples should be collected. Do not hesitate to contact us if you have any questions about any step in this process.

## When?

Collect samples within the nine-day campaign time window, which is tied to Earth Science Week (Oct. 11-19, 2003) and the week surrounding Earth Day (Apr. 17-25, 2004) and. The samples can be collected at any time of day.

## Where?

Selecting appropriate sample sites is one of the harder tasks you will face. Soil moisture can vary depending upon the soil, canopy cover, slope of the land, and sun exposure. But most of all, it is related to the time since the last rain, snow or irrigation event. If at all possible, sample from regionally important or typical areas that are relatively uniform in character, flat, open (no canopy cover) and unirrigated. In some cases, where it is convenient to collect soil from the road right-of-way (see example, below), it is very important *not* to sample from a roadside ditch, which tends to be wetter than the surrounding landscape. Always make sure to respect private property and make sure your area is safe for digging (lookout for motorist blind spots, poisonous animals/insects, buried wires and pipes), particularly if you are next to a road.

## How?

Use a garden trowel, ruler and water tight container to collect duplicate near-surface soil samples, first from the surface down to 5 cm and then between 8 and 12 cm depth. Collect at least 150 g of soil or enough to fill an 8 oz (250 mL) cup half-way. Place each sample into a tin can or foil pouch and then seal it in a plastic bag. Carefully label each container and note where each sample came from (see the data worksheets). Later, you will record the wet weight of your samples, dry them and then record the dry weights (to the nearest 0.1 gram).

## Details – finding latitude & longitude

If possible, find the Global Positioning System (GPS) latitude and longitude of each of your data collection sites (reported as decimal degrees and elevations in meters). Average 5 consecutive readings, one minute apart to get a more accurate value. Sportsman, hikers and outdoor-orientated parents or staff might already

have a GPS your class could borrow. If a GPS is not available, you can interpolate latitude and longitude from a USGS topographic map.

## Details – drying your samples

Your samples should be dried at 105 °C for 24 hours in a soil oven, kiln or glass drying convective oven. Its even possible to build your own oven out of a clean 55 gal drum split in half and heated using four 100 W light bulbs (link to plans). A microwave might work for a few samples but takes time. We strongly encourage schools to contact local colleges, businesses, environmental offices or county extension agents to seek professional help drying your samples. Remember, as long as you record the wet weights as soon after collection as possible, you can dry your samples at any time.

## Details - reporting the data

If you are a GLOBE school, enter your data into the GLOBE archive using the near-surface protocol. Otherwise, Email or fax your completed data sheets to [jwash@hwr.arizona.edu](mailto:jwash@hwr.arizona.edu); 520-626-7770.

## Examples of sampling strategies

There is no single best way to collect campaign soil moisture. Here are some options that might be appropriate for different ages or degrees of effort. Remember that if you do not have a GPS location for each collection site, you will have to convert a street address to a latitude and longitude coordinate. Use push pins and a local map to plot each data collection location in the classroom. The general rule is to not travel more than an hour from your starting point, which means that the distance you cover depends on your mode of transportation.

### ***Backyard option***

Practice proper sampling technique at school, then have each student bring two properly collected samples from their backyards.

### ***Parkland option***

Take a class field trip to a local park or natural area. Look at a map of the area before you go and have the students plan a data collection strategy – they might suggest sampling as you walk along a loop trail OR breaking into many groups with each one sampling along transects radiating away from a central point.

### ***Roadside loop option***

Have different parent-student teams collect samples every 1-10 miles along the road as they drive in a loop beginning and ending at your school or their homes. Again, plan carefully beforehand so each driver will cover a different area. Stress safety and get permission to collect samples from private property.