

Protocols



Selecting, Exposing, and Defining a Soil Characterization Site

Students will select and define a site for soil characterization protocols and use a technique chosen by their teacher to expose a soil profile for characterization.

Soil Characterization Protocol

Students will identify horizons in a soil profile, observe the structure, color, consistence, texture, and the presence of rocks, roots, and carbonates of each horizon, and take samples for use in laboratory characterization protocols.

Soil Temperature Protocol

Students will measure near-surface soil temperature frequently near local solar noon and seasonally throughout two diurnal cycles.

Gravimetric and Volumetric Soil Moisture Protocols

Students will measure soil water content by comparing the wet and dry masses and volumes of samples.

Bulk Density Protocol

Students will measure the mass of a dry soil sample of known total volume including pore space to determine the density of the whole sample.

Soil Particle Density Protocol

Students will measure the volume of a known mass of dry soil particles and calculate the density of the particle portion only of a soil sample.

Particle Size Distribution Protocol

Students will suspend a known mass of dry soil in water and measure the specific gravity of the suspension after sand and then silt has settled out of the suspension to determine the amount of each soil particle size group in the sample.

Soil pH Protocol

Students will prepare a one-to-one mixture of dry soil and distilled water and then measure the pH of the liquid left after most of the soil has settled to the bottom of the mixture.

Soil Fertility Protocol

Students will use a GLOBE Soil Fertility Kit to prepare samples and determine whether nitrate, phosphate, and potassium are absent from a soil sample or present in low, medium or high concentrations.

Digital Multi-Day Max/Min/Current Air and Soil Temperature Protocol

Students will use a digital multi-day maximum/minimum thermometer mounted in their instrument shelter to measure the maximum and minimum air and soil temperatures for up to six previous 24-hour periods.

Digital Multi-Day Soil Temperatures Protocol

Students will use a second digital multi-day maximum/minimum thermometer mounted in their instrument shelter to measure the maximum and minimum soil temperatures at 5 cm and 50 cm depths for up to six previous 24-hour periods.

HOBO® Data Logger Protocol

Students will use four temperature probes and a data logger to measure air temperature and soil temperatures at depths of 5 cm, 10 cm, and 50 cm every 15 minutes.

Soil Moisture Sensor Protocol

Students will develop a calibration curve and use it to determine soil water content at depths of 10 cm, 30 cm, 60 cm, and 90 cm from meter readings of four soil moisture sensor blocks.

Water Infiltration Protocol

Students will use a dual ring infiltrometer that they can construct from large food container cans to measure the rate at which water soaks into the soil during a roughly 45-minute period.

Davis Soil Moisture and Temperature Station Protocol

Students install soil moisture sensors and temperature probes and connect them to a Davis Soil Moisture and Temperature Station. Data are logged every 15 minutes and periodically students transfer these data to a computer and report them to GLOBE.

Frost Tube Protocol

Students will construct a Frost Tube that is inserted into a hole in undisturbed and uncompacted soil. During the cold months, students measure the depth at which water in the Frost Tube has frozen, indicating that the surrounding soil has also frozen.