AUGUST 2015

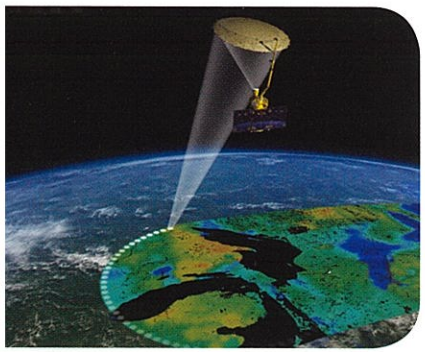
LEARNING ACTIVITY:

Soil Moisture

Grades 4-12

Materials

- Sponges with various pore sizes
- Dry soil materials, including sand (play sand or sand from a beach or dune), topsoil (from a lawn or garden), and cat litter
- Trays or baking dishes to hold water and wet sponges
- 250-ml clear containers (graduated beakers, if available)
- Balance (0.1 g sensitivity, at least 400 g capacity)
- Ruler (SI units)
- Calculator
- Computer with internet access



Soil Science Society of America

Source: Soil Science Society of America. Adapted with permission.

Soil moisture is the water stored in soil. This moisture is affected by precipitation, temperature, soil characteristics, and more. These same factors help determine the type of biome (community of living things) present and the suitability of land for growing crops.

The health of crops relies on an adequate supply of moisture and soil nutrients, among other things. As moisture availability declines, the normal function and growth of plants are disrupted, and crop yields are reduced. Also, as the climate changes, moisture availability is becoming more variable.

Where is the water in soil? Solids, liquids, and gases—the three phases of matter—are always present in soil. Small mineral and organic particles comprise the solid fraction, and there are spaces (pores) between the solid particles. Some pores are large, and others are very small. Air and water, the gas and liquid phases, exist in the pores. The size of the soil particles and pores affects how much water a soil can hold, as well as how that water moves through the soil.

Procedure

1. Visit www.soils4teachers.org/esw for complete details and instructions for this activity. This set of activities is designed to introduce you to the basic properties and measurements of soil water, and how the global distribution of soil moisture is monitored.
2. If you are a younger student, you will use sponges and soil materials to learn how and where soils hold water, how they release it, and the concepts of "gravimetric" and "volumetric" water content.
3. If you are an older student, you will collect data using the GLOBE Gravimetric & Volumetric Soil Moisture Protocols to collect ground-truthing (in-situ) data for the SMAP program. You will assist scientists by collecting data at a small, local scale in order to validate the SMAP satellite data. Learn more about participating at www.globe.gov/web/smap/overview.

Calling All Student Scientists!

Soil scientists and agronomists use gravimetric methods and in-situ instrumentation to monitor soil moisture at the field scale in cropped lands. Other scientists look at a bigger picture, using Earth-observing satellites to survey the planet for soil moisture changes. These data assist soil scientists, hydrologists, and climatologists in forecasting potential changes in moisture availability.

NASA recently launched a satellite called Soil Moisture Active Passive (SMAP) to monitor the water in the top 5 cm of soil. The SMAP mission team needs help and is partnering with GLOBE to get students involved in collecting ground truth measurements. These student-provided measurements will help scientists calibrate satellite information and interpret the data. To learn more, see http://smap.jpl.nasa.gov/.

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
						1
2 Friendship Day	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17 **Did You Know?** Hurricane Camille (Category 5) Strikes Mississippi, Louisiana and Virginia, 1969	18	19	20 **Did You Know?** Florissant Fossil Beds National Monument, Renowned for Insect Fossils, Authorized 1969	21	22
23 30	24 **Did You Know?** Hurricane Andrew (Category 5) Hits Florida and Louisiana, 1992 31	25 **Did You Know?** Hurricane Katrina (Category 5) Strikes Florida, Later Louisiana, 2005	26	27 **Did You Know?** Colonel Edwin Drake Drills First U.S. Oil Well in Titusville, Pennsylvania, 1859	28	29