NASA GLOBE

CAMP-to-SCHOOL

6th-8th Grade Protocols

Atmosphere

Scientists are investigating the atmosphere. They want to understand and predict:

- Weather (the air temperature, rain, snow, relative humidity, cloud conditions, and atmospheric pressure and the coming and going of storms)
- Climate (the average and extreme conditions of the atmosphere); Energy Budget (Land-Atmosphere interactions)
- Atmospheric Composition (the trace gases and particles in the air).

Each of these characteristics of the atmosphere affects us and our environment. What we wear and what we can do outside today depend on weather. Is it raining? Snowing? Sunny? Cold?

Air Temperature- 10 minutes

Measure the current air temperature when an instrument shelter is not available.

Clouds- 15 minutes

Observe and report which types of clouds are visible, how much of the sky is covered by clouds, and the opacity of clouds. Also report sky and surface conditions. Each observation is matched to satellite data of clouds taken about the same time and location. Cloud observations can be taken at any time!

Surface Temperature- 30 minutes

Students use an infrared thermometer (IRT) to measure the temperature of Earth's surface.

Biosphere

Earth's surface is two-thirds water. The continents on which we live make up the remainder. Until the launch of the first humans into space, we did not fully appreciate the beauty and diversity of our planet. We rely on Earth's surface (and a little bit above and below) to supply most of what we need to live. Therefore, mapping and monitoring this surface is critical to our wise use and protection of it. The Biosphere Investigation deals with the mapping and monitoring of both the surface and phenological indicators.

*= Need to participate in the Biometry protocols prior

Biometry

Students will learn how to use biological sampling techniques to quantify and describe a Land Cover Sample Site. Lessons Include:

- *Tree Height- 1 hour 30 minutes*

Build clinometers and work as a team to take and log tree height measurements.

- *MUC Investigation- 1 hour*

Use the Modified UNESCO Classification (MUC) System, a classification system which follows international standards and uses ecological terminology for the identification of specific land cover classes.

- *Canopy and Ground Cover- 1 hour 30 minutes*

Build densiometers and use tree identification books to log the canopy coverage of our forests.

- *Compass Investigation- 45 minutes*

Learn to use a compass and the pacing necessary to get to specific locations and take accurate measurements.

***Fire Fuel- 2 hours**

Students take additional measurements of fire fuel at Land Cover Sample Sites.

***Land Cover- 45 minutes**

Students locate, photograph, and determine the MUC class for 90 m x 90 m areas of homogeneous land cover.

Green-Up/Green- Down (only offered in the spring and fall)

- *Green-Up- 45 minutes*

Students will monitor the budburst and growth of leaves of selected trees, shrubs or grasses.

- *Green-Down- 45 minutes*

Students will use a GLOBE Plant Color Guide to monitor the change in color of selected leaves of trees, shrubs or grasses.

Hydrosphere

What is the condition of Earth's many surface waters – the streams, rivers, lakes, and coastal waters? How do these conditions vary over the year? Are these conditions changing from year to year?

Our knowledge of global trends in water measurements is based on sampling at very few sites. This sampling has generally been done only a few times. We seek to take many measurements at our site to understand how our water source is changing over time.

Alkalinity- 40 minutes

Students will measure the alkalinity of water using an alkalinity test kit.

Dissolved Oxygen- 40 minutes

Students will measure dissolved oxygen in the water at their site using a dissolved oxygen test kit.

Freshwater Macroinvertebrates- 1 hour 30 minutes

Students will collect, sort, identify, and count macroinvertebrates from habitats at their site.

Nitrates- 40 minutes

Students will measure the nitrate-nitrogen content of water using a nitrate test kit.

Water pH- 30 minutes

Students will measure the pH of water using pH paper.

Water Temperature- 15 minutes

Students will measure the temperature of water.

Pedosphere

Soils are one of Earth's essential natural resources, yet they are often taken for granted. Most people do not realize that soils are a living, breathing world supporting nearly all terrestrial life. Soils and the functions they play within an ecosystem vary greatly from one location to another as a result of many factors, including differences in climate, the animal and plant life living on them, the soil's parent material, the position of the soil on the landscape, and the age of the soil.

Using the data collected in the GLOBE Soil (Pedosphere) Investigation, students help scientists describe soils and understand how they function. They determine how soils change and the ways they affect other parts of the ecosystem, such as the climate, vegetation, and hydrology.

Soil Characterization- 1 hour & 30 minute

Students will use a technique chosen by their instructor to expose a soil profile for characterization.

Soil pH- 1 hour 30 minute

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- 1 hour 30 minute

Students will be able to measure the nitrate nitrogen, phosphate phosphorus and potassium contents of soils and be able to relate soil fertility to the physical and chemical properties of the soil.