



SMAP-GPM Joint Mission Teacher Workshop
Wednesday, June 26, 2013; 8:00AM-4:00PM
NASA Goddard Space Flight Center's Visitors Center

Morning Agenda

8:00-8:30	Check-In	All
8:30-8:40	Hello, Introductions, Objectives	Brian Campbell, SMAP Education Lead
8:40-9:15	Activity: Filtration	Izolda Trakhtenberg, "The Soil Lady", Soil Specialist
9:15-9:45	Talk: What are "SMAP" and "GPM" and how they are connected to the Water Cycle?	Dr. Karen Mohr, Research Meteorologist
9:45-10:00	Bio Break	All
10:00-10:20	Activity: Earth's Freshwater	Dorian Janney, GPM Education Lead
10:20-10:50	Talk: The SMAP Mission: Measuring Soil Moisture from Space	Dr. Peggy O'Neill, Deputy Project Scientist for SMAP
10:50-11:00	Bio Break	All
11:00-11:30	Activity: Soil Moisture Probe Activity	Brian Campbell
11:30-1:00	Lunch On Your Own	All

Afternoon Agenda

1:00-1:30	Activity: Making Your Own Rain Gauge	Dorian Janney
1:30-2:00	Talk: The GPM Mission: Measuring Global Scientist	Dr. Dalia Kirschbaum, GPM Mission Scientist
2:00-3:00	Talk/Activity: Soil Characterization	Izolda Trakhtenberg
3:00-3:15	Bio Break	All
3:15-3:45	Discuss Connections: SMAP and GPM; Soil Moisture and Global Precipitation; Activities and Classroom Science Standards	All
3:45-4:00	Evaluation	All
4:00	Final Remarks and Adjournment	Brian Campbell

Workshop Objectives

At the SMAP-GPM Joint Mission Teacher Workshop we will:

1. Increase middle school teachers' knowledge about Earth science content
2. Share hands-on activities and resources that increase the awareness of the importance of studying soil and precipitation
3. Identify the correlation between precipitation and soil moisture in our Earth System
4. Identify the correlation of the soil characteristics, soil water content and soil moisture
5. Align Earth science presented in workshop to the Next Generation Science Standards (NGSS)

Individual Mission Education Objectives:

SMAP Mission: Soil Moisture Active Passive (SMAP) will provide global measurements of soil moisture and its freeze/thaw state. These measurements will be used to enhance understanding of processes that link the water, energy and carbon cycles, and to extend the capabilities of weather and climate prediction models. SMAP data will also be used to quantify net carbon flux in boreal landscapes and to develop improved flood prediction and drought monitoring capabilities.

1. Develop an understanding of soil moisture and surface freeze/thaw
2. Identify and characterize soil types
3. Understand how soil moisture variations affect the evolution of weather and climate
4. Discover NASA educational resources that can be used to teach students about the water cycle, weather and climate, satellite technology and instrumentation, and societal applications (flooding, drought, freshwater availability, etc.)

GPM Mission: Global Precipitation Measurement (GPM) is an international satellite mission that will set a new standard for precipitation measurements from space, providing the next-generation observations of rain and snow worldwide every three hours. The GPM mission data will advance our understanding of the water and energy cycles and extend the use of precipitation data to directly benefit society.

1. Develop an understanding of the availability of Earth's freshwater resources
2. Understand how Earth's freshwater moves through Earth's systems
3. Distinguish between weather and climate, and gain an understanding of how scientists study each of these phenomena
4. Discover NASA educational resources that can be used to teach students about the water cycle, weather and climate, satellite technology and instrumentation, and societal applications (flooding, drought, freshwater availability, etc.)

Next Generation Science Standards (NGSS) related to the workshop include:

ESS2.A: Earth's Materials and Systems

The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future.

ESS2.C: The Roles of Water in Earth's Surface Processes

Water's movements—both on the land and underground—cause weathering and erosion, which change the land's surface features and create underground formations.

ESS2.C: The Roles of Water in Earth's Surface Processes

Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land.

Global movements of water and its changes in form are propelled by sunlight and gravity.

ESS2.C: The Roles of Water in Earth's Surface Processes

The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns.

ESS2.C: The Roles of Water in Earth's Surface Processes

Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents.

ESS2.D: Weather and Climate

Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns.

The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through ocean currents.

Because these patterns are so complex, weather can only be predicted probabilistically.

ESS3.A: Natural Resources

Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes.

ESS3.B: Natural Hazards

Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events.