Lesson 33: Activity 3 – Is it Precipitating or Just Cloudy?

Time: 2-3 Class Periods

Teacher Overview: Students as individuals, and then in groups, look at various sources of data to form conclusions about simple data. They get a sense for the variation in 'cloud cover' across the country. Then, they consider: *If it is cloudy, how often is it precipitating?* The best part about this activity is that it gives a student the idea that his or her interpretation is as good as anyone else's. They interpret data differently and get different results. This is often true in science. Some students will see that a state seems mostly cloudy, and others will not. Neither group's observation is particularly better than that of the other.

Materials:

- U.S. States Map

Objective:

- Students will investigate the relationship between observed cloudy conditions and precipitation using satellite and internet data.
- Students will accomplish this by:
  - ✓ Analyzing, observing, and interpreting satellite imagery.
  - ✓ Interpreting maps from the WDLC website.
  - ✓ Computing fractions of states observing various cloud conditions.
  - ✓ Computing fractions of states currently observing precipitation.

Classroom Management:

Each group of <u>three</u> students has the following members:

a. Satellite Pro
b. Radar Expert
c. Station Model Map Expert

Scenario:

Over the past few years an increasing amount of weather information has become available to meteorologists from satellites and weather stations. The information is made available for the public on the internet. Since many Earth systems studies are necessary with great amounts of information coming from satellites, NASA requests help from schools with technology resources, to assist in a study of clouds and precipitation.

You are to determine the relationship between sky conditions and clouds, and precipitation for the United States for a typical day and present your findings.

Discussion Questions:

1. What is the weather like outside today?

2. Step outside to observe the clouds, report your findings.

3. Then, just think, out of the 50 states in the United States, how many do you think are observing "cloudy" conditions right now? How many do you think are observing "sunny" skies? Keep a record of these answers.

What people *perceive* is true is not necessarily true when it comes to scientific data. The activity that you will do today will prove to you whether your thinking is correct or not.

Activities:

Distribute the tables with the 50 U.S. States.

Teacher Tip: Sometimes the radar map will present tiny areas of additional "noise" or "ground clutter" where it may actually not be raining. Students should consider this in their analysis.

1. Gather data from the 50 U.S. States, including Alaska and Hawaii.

   a. The **Satellite Pro** must study the **satellite image**.

   b. The **Radar Expert** will get the **radar map** and report on the locations of precipitation areas.

   c. The **Station Model Map Expert** will get the **station model map** and report on states with clear skies, partly cloudy, mostly cloudy, cloudy, and reported precipitation conditions.

2. Each group must discuss its findings by studying the three total maps and making a group decision. Fill out the tables listing the names of the 50 states vertically.

For the **Cloud Cover Table**:

- If a state is 'clear' or 'partly cloudy,' a check is made under the **No** column:


- If a state is 'mostly cloudy' or 'cloudy,' a check is made under the **Yes** column:


For the **Precipitation Table**:

- Is there precipitation, rain or snow? (Choose **YES** or **NO**.)

Name of State	Cloudy			
	No		Yes	
	clear	partly cloudy	mostly cloudy	cloudy
Alabama				
Alaska				
Arizona				
Arkansas				
California				
Colorado				
Connecticut				
Delaware				
Florida				
Georgia				
Hawaii				
Idaho				
Illinois				
Indiana				
Iowa				
Kansas				
Kentucky				
Louisiana				
Maine				
Maryland				
Massachusetts				
Michigan				
Minnesota				
Mississippi				
Missouri				
Montana				
Nebraska				
Nevada				
Mew Hampshire				
New Jersey				
New Mexico				
New York				
North Carolina				
North Dakota				
Ohio				
Oklahoma				
Oregon				
Pennsylvania				
Rhode Island				
South Carolina				
South Dakota				
Tennessee				
Texas				
Utah				
Vermont				
Virginia				
Washington				
West Virginia				
Wisconsin				
Wyoming				

Name of State	Precipitation	
	No	Yes
Alabama		
Alaska		
Arizona		
Arkansas		
California		
Colorado		
Connecticut		
Delaware		
Florida		
Georgia		
Hawaii		
Idaho		
Illinois		
Indiana		
Iowa		
Kansas		
Kentucky		
Louisiana		
Maine		
Maryland		
Massachusetts		
Michigan		
Minnesota		
Mississippi		
Missouri		
Montana		
Nebraska		
Nevada		
Mew Hampshire		
New Jersey		
New Mexico		
New York		
North Carolina		
North Dakota		
Ohio		
Oklahoma		
Oregon		
Pennsylvania		
Rhode Island		
South Carolina		
South Dakota		
Tennessee		
Texas		
Utah		
Vermont		
Virginia		
Washington		
West Virginia		
Wisconsin		
Wyoming		

3. Answer these questions.

   a. How many states have “Cloudy,” meaning ‘mostly cloudy’ or ‘cloudy,’ conditions?

   b. What fraction of the United States is this?

   c. How many states have stations that are observing precipitation?

   d. What fraction of the United States is this?

4. Each group reports their findings to the class for Question 3. When the findings differ, students will discuss why they disagree. After the discussion, students will have the opportunity to change their minds. If the students stick to their original opinion, the groups must understand that sometimes there is not a right or wrong answer, but rather it is a matter of interpretation.

5. Groups have an opportunity to redo their tables and their answers to Questions 3a to 3d.

6. Each group will use its data and create a **bar graph** representing the four cloud conditions (clear, partly cloudy, mostly cloudy, cloudy).

7. After the graphs are completed, the groups compare their graphs with the understanding that in science, conclusions can be different based on different interpretations.