Weather and Climate: Satellite Meteorology

Presented by: Rudo Kashiri

December 13, 2012
6:30 p.m. – 8:00 p.m. Eastern time
Introducing today’s presenter…

Rudo Kashiri
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Hampton, VA
Weather and Climate: Satellite Meteorology

Rudo Kashiri
NASA Explorer Schools
NASA + YOU = FUTURE
Session Agenda

- Basics of Satellite Meteorology
- NASA Connection
  - GOES
  - POES
- Featured Activity
- NASA Explorer Schools
Satellite Meteorology

- Grades 7-12
- National Science and Math Standards:
  - Energy in the Earth System
  - Data Analysis and Probability
Satellite History
Poll Audience

Have you used data from NASA satellites with your students?

✔ Yes  ❌ No
Let’s Pause for Questions
Types of Weather Satellites

POES
850 km orbit

GOES
36,000 km orbit
The GOES POES Program

Geostationary Operational Environmental Satellites

Polar Operational Environmental Satellites
Geostationary Orbit
GOES View of Hurricane Sandy
Polar Orbit

879 kilometers = ~ 500 miles
Use the characteristics for GOES and POES to determine the best satellite to monitor ice bergs.

| A. GOES | ▪ Image resolution is not very good because of distance from earth  
          ▪ Can not see the poles very well  
          ▪ Can view only one hemisphere |
|---------|---------------------------------------------------------------------|
| B. POES | ▪ Image resolution is good because it’s closer to earth  
          ▪ Sees the poles about 14 times a day  
          ▪ Sees tropical and middle latitude regions twice a day |
Satellite Remote Sensing Instruments

Imagers

Sounders
GOES Images
Which image is the visible wavelength?

A

B
1. Where are the tallest clouds?

2. Which is warmer, Lake Michigan or the land surfaces?
GOES or POES?
Let’s Pause for Questions
What is Earth System Science?
What will students learn?

- Forest fires and monitor biomass burning
- Biomass burning and global warming
- NASA’s research satellite program
- Urban Heat Islands
- Deepwater Horizon Disaster
Monitoring the Global Environment
POES offer striking snapshots of fires but can't track smoke plumes like GOES can. (why?)
Biomass Burning
Detecting Trace Gases in the Atmosphere

Which of the following is not a greenhouse gas?
A. Carbon dioxide
B. Methane
C. Nitrous oxide
D. Hydrogen
E. Water vapor
What are Urban Heat Islands?
Urban Heat Islands
Let’s Pause for Questions
Assessment Questions

Problem-Based Learning:
1. Global Climate Change
2. Biomass Burning in South America

Your research group has been tasked to:

- Analyze the cause-and-effect relationships that exist among Earth systems as a result of rainforest destruction
- Research the use of satellite technology to study biomass burning
- Make recommendations for future courses of action
- Create a multimedia presentation
The Scenario

An international community of scientists and government officials will convene in Brazil to discuss concerns over biomass burning and global deforestation. The UN has contacted you to examine the cumulative effects of deforestation and draw some conclusions about the connection between deforestation and the health of the planet.

Your research group has been tasked to analyze the cause-and-effect relationships that exist among Earth systems as a result of rainforest destruction.
Write Your Hypothesis
Present findings
Read & analyze problem
Hypothesis, ideas
What do we know?
What do we need to know?
What needs to be done?
Problem statement
Gather, organize, analyze, interpret
Present findings
Satellite Meteorology Resources

- Eyes on Earth
- Earth Observatory
- Satellite Observations in Education
- S’COOL
- MY NASA Data
I am interested in using GOES and POES data with my students.

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Let’s Pause for Questions
WEATHER AND CLIMATE: SATELLITE METEOROLOGY

Featured Lesson(s)
Monitoring the Global Climate

Essential Question
How do meteorologists use Earth-orbiting satellites to study weather and climate?

Description
The data for the Satellite Meteorology: Monitoring the Global Climate module is provided by satellites in NASA's and NOAA's GOES (Geostationary Operational, Environmental, Satellites) and POES (Polar Operational, Environmental, Satellites) programs. Students use authentic data from these geostationary satellites to detect and monitor forest fires and biomass burning. They use the data to monitor the "pulse of the planet." Urban heat islands are also identified.

Additional Resources

Lesson Information

- Subject(s) Covered: • Earth science, Physics
- Topic(s) Covered: • Sun-Earth sys • Meteorology — clouds, global climate change, atmospheric gases, greenhouse effect • Reading graphs and data representations • Interpreting data
- Activity Type: Online Investigation
- Grade Level: 7-12
- Instructional Objective: Students explain how environmental satellites are used to track global naturally occurring events such as hurricanes, tornadoes and wildfires and human-created events such as urban heat islands, greenhouse gas emissions and biomass burning.

Professional Development

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Thank you for joining us today.

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Thanks to today’s presenter!

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