Satellite Meteorology: Monitoring the Global Environment

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1. Introduction activity
2. Satellite Meteorology Overview
3. NASA Connection
4. Sample Module
5. Additional Teaching Resources
What’s on a satellite?

- Communications
- Sensors/Instruments
- "Bus"
- Power
How do we monitor the Earth’s Energy Budget?

The CERES instruments are remote sensors that measure the solar reflected and Earth emitted radiation.
What the Students Observe

Satellite View of Clouds

Mountains with snow & ice

http://science-edu.larc.nasa.gov/SCOOL/register/
Imagine this picture represents a certain number of clouds in the sky!

Be ready with an answer in 5 seconds!
Total Guesses = 726
Average Guess = 66.4
Let’s Pause for Questions
About the Product

1. Using NASA Satellite for Grades 7-12

2. Correlates to National Science and Math Standards:
   - Energy in the Earth System
   - Data Analysis and Probability

3. Time for each Module: 20-30 min; Problem Based Learning: 1-2 45 minute class periods

4. Individual or paired activity

5. Materials

6. Basic knowledge of the layout of the country
Have you used data from NASA satellites with your students?

√ Yes  X No
An overview of meteorological satellites
The GOES POES Program

Geostationary Operational Environmental Satellites

Polar Operational Environmental Satellites
Geostationary Orbit

- 22,300 miles
- 36,000 kilometers
Polar Orbit
Use the characteristics for GOES and POES below to determine the satellite used to monitor ice bergs?

**A. Geostationary**
- Image resolution is not very good because of distance from earth
- Can not see the poles very well
- Can view only one hemisphere

**B. Polar**
- 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
Let’s Pause for Questions
The Lesson: Satellite Meteorology
Student Activity
Monitoring the Global Environment

Students will be able to interpret data from environmental satellites and draw conclusions from those data.

Part 1: Investigating climate change
Part 2: Problem Based Learning
Biomass burning and global climate change
Featured Activity

Monitoring the Global Environment

Technological breakthroughs in the 1990's paved the way for incredible remote sensing capabilities for the 21st century.

These enhanced capabilities are utilized by dozens of satellites continuously collecting data from multiple vantage points, allowing scientists from different countries to transcend political and geographical boundaries by sharing data and ideas towards the common mission of caring for planet Earth.

In this module, you will learn:

- How geostationary satellites are used to detect forest fires & monitor biomass burning
- The connection between biomass burning and global warming
- NASA's research satellite program designed to monitor "the pulse of the planet"
- Using satellite images to identify Urban Heat Islands, and
- The next polar orbiting satellite program - (NPOESS)

Continue...
Featured Activity

- GOES spots forest fires and monitors biomass burning
- Satellite Sounders detect trace gases in the atmosphere
- Biomass Burning and Global Climate Change
- POES monitors the pulse of the planet (The EOS program)
- Satellite Images from the MODIS radiometer
Urban Heat Islands

Remote Sensing Using Weather Satellites

- Introduce students to Urban heat Islands
- Identify Urban areas in Northeast United States
Let’s Pause for Questions
Satellite observations in education

Resources
Access resources useful to building your own learning activities
- User's Guide
- Reusable Content Object Directory

Real-Time Satellite Data
Access real-time satellite data related to the learning activities

About Us
This site represents a community of educators dedicated to teaching about remote sensing
- Feedback
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Learning Activities
Select from a list of learning activities you can incorporate into your instruction...

1) Principles in Remote Sensing
   Learn about the principles in remote sensing.

2) Great Lakes Weather and Climate
   Discover the unique weather systems and patterns of the Great Lakes Region.

3) Water Vapor Imagery
   Identify and analyze jet streams using water vapor imagery.

4) Hunting Icebergs
   Identify, measure, and track icebergs through satellite imagery.

5) Coastal Upwelling
   Explore physical drivers and biological consequences of coastal upwelling.

http://www.ssec.wisc.edu/sose/
Assessment Questions

If POES flies so much closer to the Earth than GOES, why bother using instruments on GOES to monitor things like forest fires or biomass burning?

Problem-Based Learning

Global Climate Change

• Analyze the cause-and-effect relationships of a warming climate
• Discuss use of satellite technology to study climate change
• Create a presentation of policy recommendations for the Governor
I will be interested in using GOES and POES satellites data with my students.

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Let's Pause for Questions
Global Climate Change

http://climate.nasa.gov

GLOBAL CLIMATE CHANGE
NASA’s Eyes on the Earth

VITAL SIGNS OF THE PLANET

ARCTIC SEA ICE • CARBON DIOXIDE • SEA LEVEL • GLOBAL TEMPERATURE • OZONE HOLE

The big thaw?
Unexpected ice loss detected in East Antarctica

NEWS AND FEATURES

‘The Copenhagen Diagnosis’
New report highlights recent climate change

The big thaw?
Unexpected ice loss detected in East Antarctica

Contingency plan
NASA considers new roles for existing QuickScat

COOL STUFF

Eyes on the Earth 3D
Fly alongside NASA satellites in 3D.

Sea Level Viewer
Explore sea level from space.

Climate Time Machine
Travel through Earth’s recent climate history.

10 Things You Never Knew
Discover surprising facts about our home planet.

COMMUNICATIONS FROM THE FIELD

my big fat planet
Latest: Follow the yellow brick road.

CLIMATE Reel
Climate change news and videos.
World of Change

Earth is constantly changing. Some changes are a natural part of the climate system, such as the seasonal expansion and contraction of the Arctic sea ice pack. The responsibility for other changes, such as the Antarctic ozone hole, falls squarely on humanity’s shoulders. Our World of Change series documents how our planet’s land, ocean, atmosphere, and sun are changing over time.

Solar Activity


http://earthobservatory.nasa.gov/Features/WorldOfChange/
http://mynasadata.larc.nasa.gov/
In the Layers panel turn on the Weather options.

Downloads: latest.kml (Google Earth file)
Let’s Pause for Questions
One forum for each module

http://neon.intronetworks.com/#
Thank you to the sponsor of tonight's Web Seminar:
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