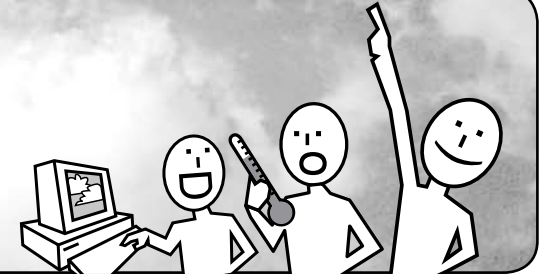


# The CERES S'COOL Project

The Clouds and the Earth's Radiant Energy System

Students' Cloud Observations On-Line

<http://scool.larc.nasa.gov>



## WHAT IS S'COOL?

Students' Cloud Observations On-Line (S'COOL) is a hands-on project which supports NASA research on the Earth's climate. Science, math, and geography are used as students observe, compute and locate vital information through ground truth observations for the CERES instrument.

## WHAT ARE GROUND TRUTH OBSERVATIONS?

To establish the ground truth, a person on the ground (or in an airplane) makes the same observation at the exact time the satellite does. The two observations are then compared to help evaluate how well the satellite instrument and the scientific analysis methods are performing. When patterns of disagreement are found, they can lead to improvements in the analysis methods.

## WHAT IS CERES?

Clouds and the Earth's Radiant Energy System (CERES) is a satellite instrument designed to allow scientists to better understand clouds and their effects on the Earth's climate. CERES measures the heat and sunlight reaching its sensors when it observes clear and cloudy areas of the globe. This helps scientists figure out where clouds act to heat and cool the surface and how clouds are changing due to human activities on Earth.

## WHAT IS REQUIRED?

Students make basic weather observations and record the type, amount, and features of clouds in the sky within +/- 15 minutes of the satellite passing over their location. No special instruments are required. Observations are then entered into an on-line form, e-mailed, faxed, or mailed to NASA Langley for entry into an on-line database. Students have access to their results and the corresponding satellite data, as well as to observations from other participating observers.

## IS THERE A COST INVOLVED?

Instructional materials, and information necessary for reporting their results will be mailed to participants. Recognition incentives are available for student observers. There is no cost involved!

## EDUCATIONAL STANDARDS

The S'COOL web site identifies the specific U.S. national standards for science, math and geography, and the related state standards for science that are most relevant to S'COOL at each grade level. It also reports suggested classroom management strategies that teachers have used in implementing S'COOL.

## WHAT CAN YOU TEACH THROUGH S'COOL?

Teachers can adapt and build on the S'COOL project according to the instructional needs and level of their students. Below are some ideas of relevant topics:

## Science:

- Cloud Formations and Identification
- Weather
- Climate
- Instruments and Concepts of Pressure/Temperature/Humidity
- Earth and Atmospheric Science
- Electromagnetic Spectrum
- Orbits and Gravity
- Unit Conversions
- Hands-on Measurements/Observing Skills
- How do Scientists Work

## Technology:

- Use of Computers and the Internet

## Math:

- Addition/Subtraction/Multiplication/ Division
- Fractions/Decimals/Percentages
- Averaging
- Graphing/Plotting/Charts

## Language Arts: Vocabulary & Foreign Language

- Reading/Writing
- Similes and Descriptive Writing
- Technical Writing

## Geography:

- Latitude and Longitude
- Maps

## Social Science:

- Human impact on the Planet
- Teamwork

## HOW TO PARTICIPATE

### Method 1:

for groups observing from a permanent location

1. Register your class using the on-line form:  
<http://science-edu.larc.nasa.gov/SCOOL/register/>
2. Determine when the satellite passes over your school. Use the S'COOL web site, or we will compute and transmit the times to you separately.

### Method 2:

for non-permanent observation sites

1. Visit <http://science-edu.larc.nasa.gov/SCOOL/Rover/>
2. Determine when the satellite passes over your location. Use the "When to Observe" tab to determine the satellite overpass times. Be careful when entering latitude/longitude. In the US, longitude will be negative.

### Methods 1&2:

#### On observation days:

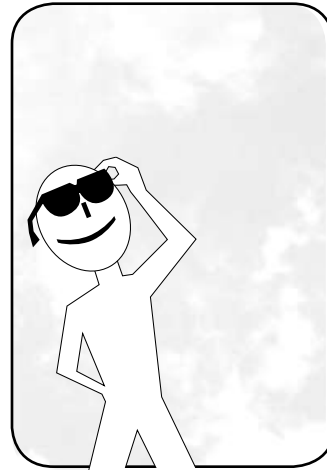
3. Make basic weather observations and record the types and features of clouds at the appointed time.
4. Transmit the observations via the on-line form, e-mail, fax, or mail to the S'COOL Team.

#### After observation days:

5. Compare your results to those reported by other locations and to corresponding satellite data.
6. Give feedback on the project.

## EDUCATIONAL EXCELLENCE

S'COOL is a unique project that involves students in collaborative research with NASA scientists to create learning opportunities and to educate inquisitive minds.

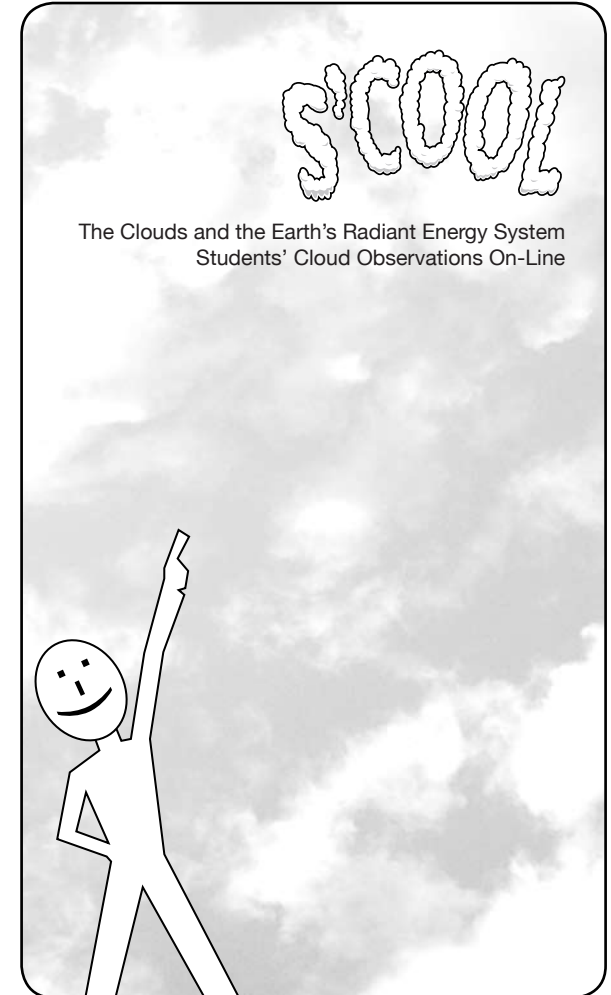


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| Teachers            | 3-12 |
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National Aeronautics and  
Space Administration



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[www.nasa.gov](http://www.nasa.gov)