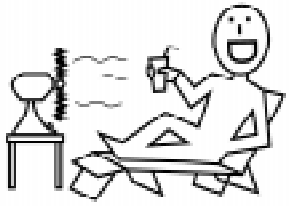


S'COOL BREEZE

Student's Cloud Observations On-Line

Volume 2 , Issue 2 June 2001

Inside this issue:

The Observations are IN!

S'COOL OBSERVERS: TOP 25

The database continues to grow as students head OUT to observe and send their data IN. Thank you to all the participating schools who have contributed to this effort by submitting observations. We would like to recognize our top 25 schools who have reported the greatest number of observations this year for the months of August 2000-April 2001.

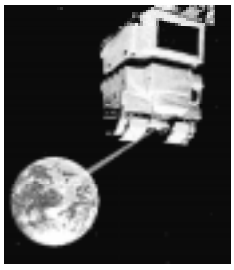
This Year's Top 25 Observing Schools are:

1. College Otfried, Wissembourg, France
2. Chartiers Houston Jr. Sr. High School, Houston, PA, USA
3. Colegio de Desarrollo Rural, Antioquia, Colombia
4. Daniel Boone Middle School, Birdsboro, PA, USA
5. Burlington County Institute of Technology, Medford, NJ, USA
6. Baku International School, Baku, Azerbaijan
7. Columbia Middle School, Logansport, IN, USA
8. Ecole Communales, Martigny, Switzerland
9. Waynesboro Area High School, Waynesboro, PA, USA
10. Waiau Elementary School, Pearl City, HI, USA
11. Ecole Jean Jaures, Le Versoud, France
12. College Les Tamarins, Ile de La Reunion, France
13. West Springfield High School, Springfield, VA, USA
14. Bakersville School, Manchester, NH, USA
15. Hancock County High School, Lewisport, KY, USA
16. Sissonville Elementary School, Sessionville, WV, USA
17. St. Ignatius High School, St. Ignatius, MT, USA
18. Peru Central School, Peru, NY, USA
19. Rockcastle County Middle School, Mt. Vernon, KY, USA
20. Northwest Cabarrus Middle School, Concord, NC, USA
21. Kinnoull Primary School, Perth, Scotland, UK
22. Bamberg Elementary School, Bamberg, Germany
23. Geodinamica-fisica Academia del Perpetuo, San Juan, PR, USA
24. Lycee Albert Schweitzer, Reguisheim, France
25. Franklin Smith Elementary School, Blue Springs, MO, USA

Access over 3,000 S'COOL observations made this past year on the S'COOL Database at: http://scool.larc.nasa.gov/query_data.html

The Long Road to Satellite Cloud Properties

Dr. Lin Chambers, S'COOL Director, NASA Langley Research Center, Hampton, Virginia.



In a perfect world, CERES data would be processed and immediately placed into the S'COOL database for you to compare with. In reality, it simply takes a while to get there. Unlike weather satellites, the processing of CERES data is not as simple as "taking a picture" to put on the web. In order to obtain cloud properties to compare with the ground observations, several steps are necessary. The CERES data must be transmitted down from the satellite and sent through several ground stations before finally arriving at the Langley Atmospheric Sciences Data Center (ASDC, formerly known as the DAAC). Once there, the data must be carefully calibrated according to exacting knowledge of the instrument to obtain the most accurate, climate-quality information possible.

After the calibration process is complete, we then need additional information to help us interpret the CERES data. This includes maps of surface vegetation types, the presence of snow and ice, and information from weather forecast models that tells us about the amount of water vapor and other things in the atmosphere. Finally, we also require data from the companion imager instrument (VIRS on TRMM or MODIS on Terra) to do the cloud detection and identification. The CERES team is the only science team involved

(Continued on page 2)

Satellite Cloud Properties *(continued from page 1)*

with the Terra spacecraft which produces a global data product depending on measurements from more than one instrument. While this allows us to obtain some very useful information connecting energy flows to properties of the atmosphere, it also makes us vulnerable to twice as many problems. VIRS and MODIS are the responsibility of other teams of scientists, and they have to deal with the same issues of calibration, etc, that we deal with on CERES. Because the imagers have more channels than CERES (i.e., they take pictures filtered for only red, green, and blue light, as well as other parts of the electromagnetic spectrum), calibration of these instruments is harder.

When the imager data are calibrated, the CERES team can finally compute cloud properties. This process is complete on TRMM, and cloud properties from TRMM were placed in the S'COOL database in the spring of 2000, about 2 years after measurements began. Unfortunately, the CERES instrument on TRMM experienced a hardware problem beginning in August 1998, so essentially no data are available after that time. A S'COOL data comparison report will be available on the web soon.

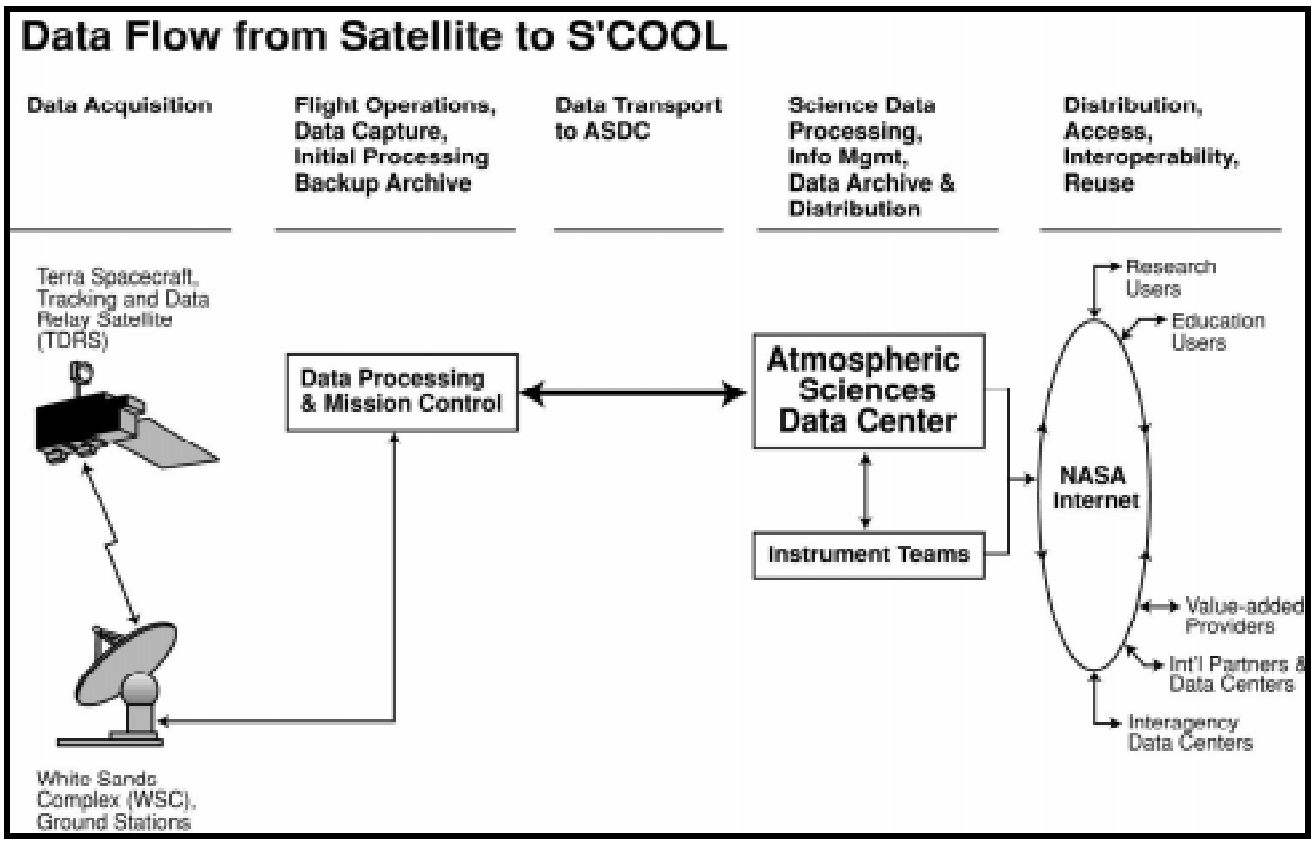
For Terra, the process of checking the calibration of the CERES data produced satisfactory results in October 2000, less than a year after launch (although the team continues to monitor and check the instrument) and we are now working with the MODIS team to settle on a stable calibration of the MODIS imager channels - of which there are 50! Terra also encountered new issues: the volume of data from MODIS is about 600 times larger (due to better spatial resolution and more channels) than that from VIRS. As a result, moving the data from one place to another, and storing it, becomes tricky (Terabytes of data - enough to fill more than 10,000 Zip disks or a million floppy disks each day!). The various teams are working on these problems and we hope to start getting cloud properties from CERES/Terra during Fall 2001, at which point we will begin to place them in the S'COOL database. During this time, improvements to the cloud algorithm continue to be made. This is a complex problem and it will continue to evolve based on new knowledge gained from various sources - including S'COOL!

While waiting for all this to be resolved, you do have a few options: weather satellite imagery for most of the Earth is placed on the web in near real-time.
The site at: **http://www.people.fas.harvard.edu/~dbaron/sat/** lists most of the places where you can find satellite pictures to compare to what your students saw from the surface.

You can also check out a cloud mask/cloud fraction product based on NOAA AVHRR data that is computed for S'COOL locations by a group of researchers at the University of Wisconsin-Madison. Visit: **http://cimss.ssec.wisc.edu/poes/scool.html**
This is a research product, so you may challenge your students to figure out how to read the information. If you do visit the site, please feel free to send comments to the site developer.

Over the summer, we plan to have a college student work on one other option. The CERES team also produces cloud information using a less sophisticated process depending on CERES data alone. This information is stored over the globe in boxes about 250 km square, so it may not perfectly correspond to what you observe. However, we think the exercise will produce some useful information. If it does, those CERES cloud data will be available in the S'COOL database by summer's end.

S'COOL participants are part of the CERES validation team. When you begin to make surface to satellite comparisons, we hope you will keep us informed of anything interesting you may find. There is always room for improvement in satellite data processing.



What a Difference a Prefix Makes

If eight bits equal a byte, what do a thousand bytes equal?

*Eight thousand bits or ONE **Kilo**bytes!*

Byte (8 bits)

1 byte : A single character B

A **bit** is the smallest piece of information a computer can handle.

Kilobyte (1,000 bytes)

1 Kilobyte: A very short story

Megabyte (1,000,000 bytes)

1.4 Megabyte: A 3.5 inch floppy disk

5 Megabytes: The complete works of Shakespeare

Gigabyte (1,000,000,000 bytes)

1 Gigabyte: A pickup truck filled with paper

20 Gigabytes: A good collection of the works of Beethoven

Terabyte (1,000,000,000,000 bytes)

1 Terabyte: 50,000 trees made into paper and printed.

10 Terabytes The printed collection of the U.S. Library of Congress

154 Terabytes: The amount of data archived at the (ASDC) Atmosphereic Sciences Data Center

Petabyte (1,000,000,000,000,000 bytes

2 Petabytes: All U.S. academic research libraries

Exabyte (1,000,000,000,000,000,000 bytes

5 Exabytes: All the words ever spoken by human beings

Let's see 5 Exabytes… that's forty billion billion bits, right?

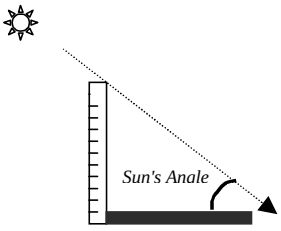
S'COOL visits Eugenio Maria de Hostos School in Mayaguez, Puerto Rico.

The students have fun during a satellite based activity.

The teacher, Mr. Enriquez, helps students with cloud identification.

¡EL CARTEL EN ESPAÑOL VIENE PRONTO!
SPANISH S'COOL POSTER IS COMING SOON!

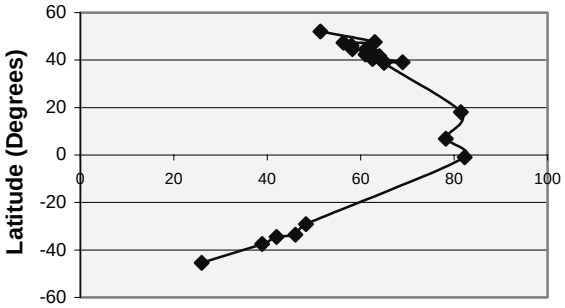
It's a Matter of LATITUDE



Schools from twelve countries measured and recorded the sun elevation angle from their school yard representing a range of latitudes from as far south as Argentina and as far north as Netherlands. This web based activity provided an opportunity for studying the relationship between the Sun and Earth for Sun-Earth Day on April 27. The Sun Elevation Angle Data are available at http://asd-www.larc.nasa.gov/SCOOL/sun-earth-act.html or through the S'COOL website. We plan on offering this activity throughout the year so students can make comparisons during different seasons.

Take a look at the results from April:

The Effect of Latitude on the Sun's Angle of Elevation



Teacher Corner

All registered schools are welcome to observe when convenient with your teaching schedule. There is no need to re-register. Your observations are welcome anytime.

Let us know if your e-mail or postal address changes over the summer.

Over 800 sites registered with S'COOL across the globe in 55 countries.

Please take a few minutes to provide us with feedback by completing the EDCATS Teacher survey on-line.

http://ehb2.gsfc.nasa.gov/edcats/centers/scool_teacher_survey.html

Thank you for your participation!

NASA Langley Research Center
CERES S'COOL Project
Mail Stop 420
Hampton, VA 23681-2199

Upcoming Events

COAA S'COOL Student Camp
July 11, 2001 UMD College Park, MD, USA

Summer S'COOL Workshop
July 16-20, 2001

Aqua Launch, 2001

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Douglas Stoddard, Editor
Lin Chambers, French Translator
Roberto Sepulveda, Spanish Translator

"The students love the project. Not even the cold weather can "freeze" their spirit. If the computer room is busy at the time of data collection, they choose to send it during their recess break."
Carlee Hurl, 6H ,Uncas School, Ardrossan, AB Canada

WHAT ARE YOUR STUDENTS SAYING ABOUT S'COOL?