S'COOL BREEZE

Student's Cloud Observations On-Line

Volume 1, Issue 11 **December 2000**

Fall Events

The S'COOL's October Intensive Observation Period (IOP) coincided with National Earth Science Week. Participants responded with tremendous support in this endeavor. Participants from around the globe responded with some schools submitting 4 or more reports during IOP week. Selecting data from that time period would give your class a great opportunity for comparing your location with others from around the globe. Your efforts were greatly appreciated.

School visits by team members occurred in several locations. Lin Chambers visited Forrest Elementary School in Hampton, Virginia. Mrs. Scullary's 5th graders have now begun reporting on the cloud conditions.

Team member Doug Stoddard visited Toano Middle School in Williamsburg, Virginia,. Carolyn Green visited 2 schools in Mason, Ohio. First graders in Steven Sideris' class at Mason Heights Elementary School tried their hand at designing satellites. Watch out NASA. There may be a better way to observe from outer space!! After reading and singing about clouds and practicing their understanding of fractions, Ms. Brown's class at Western Row went outside to make their first observation for the S'COOL Project. They learned that working for NASA can be *cool* work.

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In the Shadow of the Earth

Article by Dr. Dave Kratz, research scientist in the Radiation and Aerosol Branch, NASA, Langley Research Center, Hampton, Virginia.

Every 29 1/2 days, a period of time known as a synodic month, the orbits of the earth around the sun and the moon around the earth carry the moon to the side of the earth opposite from the sun. When this occurs, a person on the nighttime side of the earth generally sees a full moon, assuming of course that the skies are clear. If, however, the orbit of the moon around the earth is in the same plane as the orbit of the earth around the sun, then the moon will cross through the shadow of the earth. This is known as a lunar eclipse. Since the orbit of the moon around the earth is tilted a few degrees from the orbit of the sun (see Figure 1), lunar eclipses don't occur every

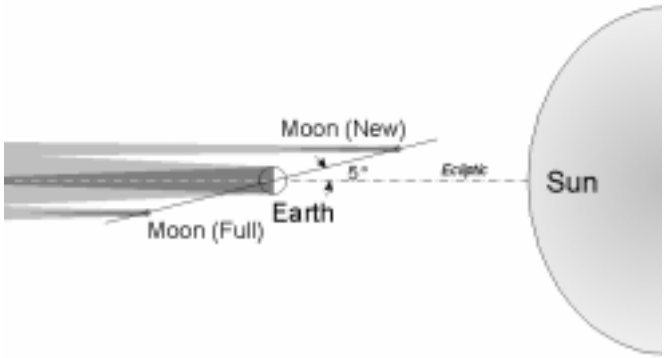

Fig. 1 Why don't eclipses occur every month? An edge-on view shows how the plane of the moon's orbit around the earth is tilted with respect to the plane of the earth's orbit around the sun. There are times, however, when the entire moon passes through the shadow of the Earth, and that's when a total lunar eclipse occurs. (Used with permission of Phillip S. Harrinton)

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month. Even when a lunar eclipse does occur, sometimes only part of the light from the sun is blocked from reaching the moon. This is known as a penumbral eclipse. On other occasions, only a part of the lunar surface falls completely within the shadow of the earth. This is known as a partial lunar eclipse. There are occasions, however, 17 times during the period from January 1, 1998, to December 31, 2017, when the entire moon is within the shadow of the earth. This is known as a total lunar eclipse. The next time this will happen is on January 9, 2001, from 19:50 to 20:52 UT (convert this to your local time to see whether you can watch it happen!).

Doing

During a total lunar eclipse, the earth blocks nearly all of the sunlight from reaching the moon. Indeed, if the earth had no atmosphere the moon would completely disappear from our sight. Luckily for us, the earth has an atmosphere which acts like a lens to redirect a fraction of the sunlight toward the moon. Since the earth's atmosphere scatters blue light more readily than red light (making the daytime sky appear blue) the totally eclipsed moon appears reddish. While the exact color and brightness of the totally eclipsed moon depend upon the atmospheric conditions, the amount of sunlight reaching the moon is reduced by approximately a factor of a million. Thus, a satellite sensor looking at the moon would see virtually no reflected warmth of the lunar surface. This makes it useful for calibrating the infrared channel of CERES. Indeed, the moon is the only naturally occurring source of infrared energy which is sufficiently large and bright enough to be useful for calibration studies. Thus, as part of an effort to check the stability of the CERES instruments on the Terra satellite, the CERES science team has proposed to scan the moon during the January 9, 2001 total lunar eclipse. Such calibration efforts (along with validation data such as you provide through the S'COOL project) are very important in assuring the long-term stability of the CERES instrument necessary to understanding our changing climate.

In addition to the time when the moon is eclipsed, there is a short period of time each month when the moon is located between the earth and the sun and is dark (new moon). During this time, the CERES instrument could obtain infrared calibration measurements by scanning the moon. This is, however, very risky, because the instrument could be damaged should it accidentally scan the sun, much like your eyes would be damaged if you look directly at the sun. Thus, the only safe time to do our calibration study is during the lunar eclipse.

First grade students of Mr. Sideris in Mason, Ohio, design satellites for future CERES missions.

a note from carolyn

I have had the wonderful privilege of working with the S'COOL project for 3 years. It has been a thrill for me to see it grow from 30 + to 600+, and to have the opportunity to visit some of you and correspond with so many more. I plan to retire early 2001, so I wanted to take this time to say thanks to the S'COOL Team and to all of you out there in S'COOL Land. Perhaps I will visit you, as my husband and I plan to do a lot of traveling in our retirement years. Other plans include playing with our 8 grandchildren and doing mission work for our church. I will keep in touch!

I leave you in the good hands of Lin, Doug, Dave, Stephanie, Kay, Susan and Roberto. To teachers, I would say, "Keep the thrill in teaching." To students, "Aim high." S'COOL is a great way to accomplish both.

TRY THIS

BLOW, WIND, BLOW

If pressure differences were the only thing acting on winds, they would simply blow from high to low pressure areas. However, the Coriolis effect causes winds to appear to curve as they blow. The Coriolis effect is an apparent curve in the direction of anything moving over the Earth's surface. To understand the effect, try this demonstration.

MATERIALS:

LAZY SUSAN OR MICROWAVE TURNTABLE

PIECE OF CARDBOARD, ABOUT 15 CM SQUARE

SCISSORS RULER

MARKER

DIRECTIONS

1. Cut a circle out of the cardboard the size of the turntable you use.
2. Make a dot in the center of the circle to represent the North Pole.
3. Place the cardboard "record" on the turntable. Using the ruler and the marker, draw a straight line from the center of the cardboard to one edge. This represents wind direction unaffected by Earth's rotation.
4. Slowly start the turntable rotating counterclockwise.
5. Again, using the ruler and marker, try to draw a straight line from the center of the cardboard to the edge. This represents winds moving from the North Pole toward the equator. Stop the turntable. Examine the line you have drawn.

CONCLUSIONS

1. Is the first line straight? The second?
2. Since you drew both lines with a ruler, what can you say about the wind's path?
3. Does the wind's path really change, or does it just seem to change?
4. Would air moving from the South Pole into the Southern Hemisphere move in the same direction? (Try this with a globe and chalk.)

(Taken from NASA's "Earth's mysterious Atmosphere")

Third grade student at Western Row Elementary School in Mason, Ohio, concentrates on a cloud fraction worksheet in preparation for first observation.

S'COOL Team member Carolyn Green introduces Mrs. Brown's students to clouds at Western Row Elementary .

Teacher Corner

- ISRAEL IS 46TH COUNTRY TO JOIN S'COOL. 649 SITES ARE REGISTERED.
- Claude Arnaud presented S'COOL at a France/Quebec conferences.

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Upcoming events

S'COOL Presentations
AGU, San Francisco, CA, Dec. '00
NSTA, Phoenix, AZ, Dec. '00

Guildford, UK, January, '01
Costa Mesa, California, January, '01
Cincinatti, Ohio, USA, February, '01

Aqua Launch, July 2001

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