



First Light

The Newsletter of the Cape Cod Astronomical Society



December 2006

Vol. 17 No. 8

Moocusser's 21 st Century Almanac			
By Jim Carlson			
Full Moon – Mon. December 04 at 19:26 EST			
Last Quarter – Tue. December 12 at 09:33 EST			
New Moon – Wed. December 20 at 09:02 EST			
First Quarter – Wed. December 27 at 09:49 EST			
Object	Dec. 01 (EST)	Dec. 16 (EST)	Dec. 30 (EST)
Sun	R: 06:48 S: 16:11	07:01 16:11	07:07 16:20
Mercury	R: 05:10 S: 15:17	06:06 15:23	07:00 15:54
Venus	R: 07:33 S: 16:40	08:00 16:59	08:14 17:30
Moon	R: 13:45 S: 02:42	03:08 13:14	13:24 04:18
Mars	R: 05:47 S: 15:27	05:42 15:02	05:36 14:43
Jupiter	R: 06:10 S: 15:46	05:28 14:58	04:44 14:10
Saturn	R: 21:53 S: 11:45	20:53 10:46	19:51 09:46
Uranus	R: 12:16 S: 23:21	11:17 22:23	10:19 21:26
Neptune	R: 11:14 S: 21:21	10:16 20:24	09:18 19:27
Pluto is still a planet	R: 07:40 S: 17:43	06:43 16:46	05:47 15:49
December 2006 Events (UT)			
02 – Moon at perigee (227,374 miles).			
03 – Mars at descending node.			
04 – Moon 0.6° north of M45 at 03:00 UT (22:00 EST on the 3rd).			
06 – Saturn stationary.			
07 – CCAS meeting beginning promptly at 7:30. Club vice president Mike Hunter will discuss “The Future of Science.” Mike “will cover the limitations of science and mathematics, the impact of faith based systems, the belief that scientists have discovered almost all that there is to know, and what the future holds for science.”			
09 – Mercury 1° north of Mars at 20:00 UT			
10 – Saturn 1.2° south of Moon at 11:00 UT and Mercury 0.1° north of Jupiter at 16:00 UT.			
12 – Mars 0.8° south of Jupiter at 00 UT (19:00 EST on the 11th.)			

13 – Moon at apogee (251,294 miles).
14 – Mercury 5° north of Antares at 08:00 UT. Geminid meteors peak at 11:00 UT.
15 – Spica 0.8° north of the Moon at 11:00 UT.
17 – Mercury at descending node.
18 – Pluto (is still a planet) in conjunction with the Sun (which is still a star). Jupiter 6° north of the Moon.
19 – Mars 4° north of Antares at 03:00 UT (22:00 EST on the 18th). Mars 5° North of the Moon at 04:00 UT (23:00 EST on the 18th). Antares 0.4° north of the Moon at 04:00 UT (23:00 EST on the 18th)..
22 – Winter solstice at 00:22 UT (19:22 EST on the 21st). Ursid meteors peak at 19:00 UT.
24 – Neptune 3° north of the Moon at 03:00 UT (22:00 EST on the 23rd).
25 – Uranus 0.08° south of the Moon at 21:00 UT.
27 – Mercury and Venus at apelian.
28 – Moon at perigee (230,108 miles).
31 – Moon 0.7° north of M45.

Sources: TheSky6, Software Bisque
Observer's Handbook 2006 Royal Astronomical Society of Canada

The times of rise, transit, and set are for the days listed. On December 1st, for example, Saturn will transit the meridian at 04:51 EST, set at 11:45, and rise at 21:53.

December 7th Meeting

The program for the December meeting of the Cape Cod Astronomical Society will be "The Future of Science". Presented by Dr. Michael Hunter, a specialist in research design and statistics, the program will cover the limitations of science and mathematics, the impact of faith based systems, the belief that scientists have discovered almost all that there is to know, and what the future holds for science.

The meeting will be held in the newly renovated Dennis-Yarmouth High School library. Future monthly meetings will held either in the library or in the school's new auditorium, depending on which venue best fits the program for the evening.

Astro Trivia

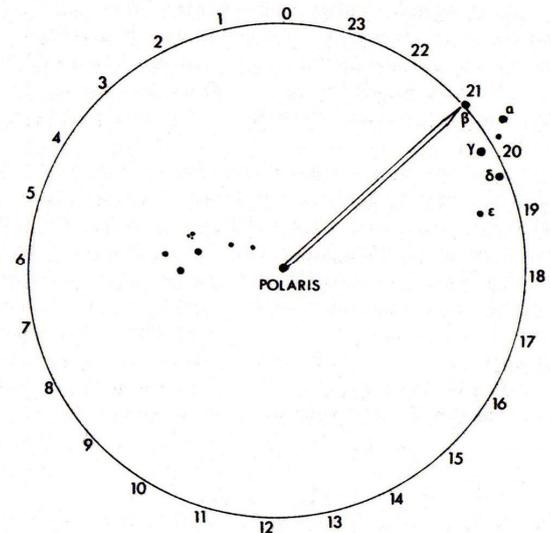
The December trivia question is “What are the Tadpoles?”

A Sidereal Clock

When you're out and about sometime in the first week of December look overhead for the star Alpheratz, the brightest object in the constellation Andromeda. It will lie about 75° above the horizon and is one of the stars that form the asterism known as the Great Square in Pegasus. Its right ascension is 00h 08m 23.3s. At approximately 19:02:20 EST on December 2nd it will cross the meridian and that instant the sidereal time will be Alpheratz's right ascension. In the next second the sidereal time will be 00h 08m 24.3s (or very close to it), and will be the right ascension of some other object transiting the meridian.

Without a calculator or computer, determining sidereal time is not easy task. But it happens that, with a little practice and the help of a star in Cassiopeia, you can make a rough estimate any time during the night. The star in question is named Caph, Beta Cassiopeiae (the genitive form of the Latin word), the easternmost star in the constellation. If you imagine that the pole star, Polaris, lies at the center of a celestial clock, and you then draw a line from Polaris to a point slightly to the east of Beta Cas, that line represents the hour hand of the sidereal clock, as illustrated at right..

Like Alpheratz in Andromeda, Caph lies close to the vernal equinox in the constellation Pisces. The vernal equinox is situated at exactly 0h right ascension and 0° declination, and because of precession, moves very slowly along the ecliptic towards the west. Since Beta Cas is at right ascension 00h 09m 10.7s (slightly further from the equinox than Alpheratz), and is visible all night long (unlike Alpheratz), it serves as an excellent marker for gauging sidereal time.



From *Experiments in Astronomy for Amateurs* by Richard Knox.

How far is 00h 00m from Beta Cas? 09m turns out to be a little more than 2° , about the twice the size of your thumb held at arms length. Note that right ascension increases to the east, in the opposite direction of the vernal equinox.

Note also that when looking north the clock's hand sweeps counterclockwise, the direction in which the sky rotates. Facing south, however, the sky rotates clockwise. ☺

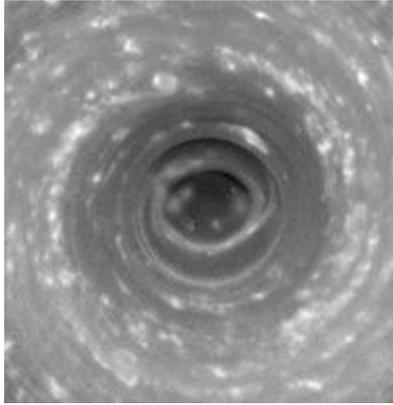
-- Jim Carlson --

NASA Sees into the Eye of a Monster Storm on Saturn

November 9, 2006

(Source: NASA/JPL/Space Science Institute)

NASA's Cassini spacecraft has seen something never before seen on another planet -- a hurricane-like storm at Saturn's south pole with a well-developed eye, ringed by towering clouds.

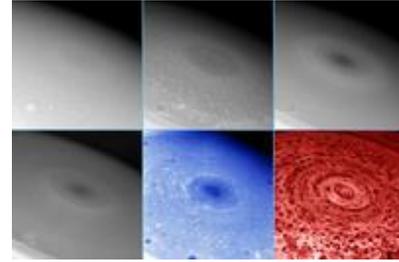


The "hurricane" spans a dark area inside a thick, brighter ring of clouds. It is approximately 8,000 kilometers (5,000 miles) across, or two thirds the diameter of Earth.

"It looks like a hurricane, but it doesn't behave like a hurricane," said Dr. Andrew Ingersoll, a member of Cassini's imaging team at the California Institute of Technology, Pasadena. "Whatever it is, we're going to focus on the eye of this storm and find out why it's there."

A movie taken by Cassini's camera over a three-hour period reveals winds around Saturn's south pole blowing clockwise at 550 kilometers (350 miles) per hour. The camera also saw the shadow cast by a ring of towering clouds surrounding the pole, and two spiral arms of clouds extending from the central ring. These ring clouds, 30 to 75 kilometers (20 to 45 miles) above those in the center of the storm, are two to five times taller than the clouds of thunderstorms and hurricanes on Earth.

Eye-wall clouds are a distinguishing feature of hurricanes on Earth. They form where moist air flows inward across the ocean's surface, rising vertically and releasing a heavy rain around an interior circle of descending air that is the eye of the storm itself. Though it is uncertain whether such moist convection is driving Saturn's storm, the dark "eye" at the pole, the eye-wall clouds and the spiral arms together indicate a hurricane-like system.



These images of Saturn's south pole, taken by two different instruments, show the hurricane-like storm swirling there and features in the clouds at various depths surrounding the pole.

Distinctive eye-wall clouds had not been seen on any planet other than Earth. Even Jupiter's Great Red Spot, much larger than Saturn's polar storm, has no eye or eye-wall and is relatively calm at the center.

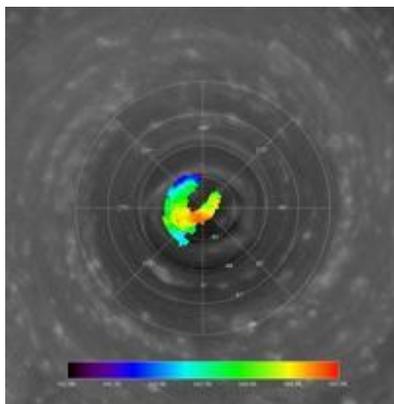
This giant Saturnian storm is apparently different from hurricanes on Earth because it is locked to the pole and does not drift around. Also, since Saturn is a gaseous planet, the storm forms without an ocean at its base.

In the Cassini imagery, the eye looks dark at infrared wavelengths where methane gas absorbs the light and only the highest clouds are visible.

"The clear skies over the eye appear to extend down to a level about twice as deep as the usual cloud level observed on Saturn," said Dr. Kevin H. Baines of Cassini's visual and infrared mapping spectrometer team at NASA's Jet Propulsion Laboratory, Pasadena, Calif. "This gives us the deepest view yet into Saturn over a wide range of wavelengths, and reveals a mysterious set of dark clouds at the bottom of the eye."

Infrared images taken by the Keck I telescope in Mauna Kea, Hawaii, had previously shown Saturn's south pole to be warm. Cassini's composite infrared spectrometer has confirmed this with higher-resolution temperature maps of the area. The spectrometer observed a temperature increase of about 2 Kelvin (4

degrees Fahrenheit) at the pole. The instrument measured high temperatures in the upper troposphere and stratosphere, regions higher in the atmosphere than the clouds seen by the Cassini imaging instruments.



This view shows temperature data from the composite infrared spectrometer overlaid onto an image from the imaging science subsystem wide-angle camera.

"The winds decrease with height, and the atmosphere is sinking, compressing and heating over the South Pole," said Dr. Richard Achterberg, a member of Cassini's composite infrared spectrometer team at NASA's Goddard Spaceflight Center, Greenbelt, Md

Observations taken over the next few years, as the south pole season changes from summer to fall, will help scientists understand the role seasons play in driving the dramatic meteorology at the south pole of Saturn.

The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. The Jet Propulsion Laboratory, a division of the California Institute of Technology in Pasadena, manages the Cassini-Huygens mission for NASA's Science Mission Directorate, Washington. The Cassini orbiter was designed, developed and assembled at JPL. The imaging team is based at the Space Science Institute, Boulder, Colo. The visual and infrared mapping spectrometer team is based at the University of Arizona. The composite infrared spectrometer team is based at Goddard.

Pretty Pictures of the Month



M31 (4 image mosaic, camera: SAC10) John Buonomo



IC410 (camera: SAC10) Steve Bodin

Cape Cod Astronomical Society

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The **Cape Cod Astronomical Society** meets at 7:30 pm on the first Thursday of every month at the Dennis-Yarmouth Regional High School in Yarmouth, Massachusetts. Meetings are open to the public. Membership dues are \$30 for adults, \$15 for students in two year colleges, no charge for students in K-12 schools.

Cape Cod Astronomical Foundation

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