DID YOU SEE THE BLUE MOON?

2004 July 31

Tonight: A Blue Moon
Credit & Copyright: Vic Winter (ICSTARS)

Explanation: How often does a full moon occur twice in a single month? It occurs exactly once in a Blue Moon. In fact, the modern usage of the term "Blue Moon" refers to the second Full Moon in a single month. July 31, 2004, the Blue Moon was the first since November 2001. A Blue Moon typically occurs every few years. The reason for the rarity of the Blue Moon is that the 29.53 days between full moons, from July 2 to July 31,2004, is just slightly shorter than the number of days in the average month! The term "Blue Moon" has recently been traced to an error in a magazine article in 1946. It is possible for the Moon to appear tinged by a blue hue, sometimes caused by fine dirt circulating in the Earth's atmosphere, possibly from a volcanic explosion. The above picture was taken not during a full moon but through a morning sky that appeared dark blue. The bright crescent is the only part directly exposed to sunlight - the rest of the Moon glows from sunlight reflected from the Earth. In this dramatic photo, however, the planet Jupiter is also visible along with its four largest moons.

This project has been adapted and amended from “The Astronomy Picture of the Day” from the website: **http://antwrp.gsfc.nasa.gov/apod/ap04724.html**, and **http://www.internet-encyclopedia.org/?title=Moon** by Starbase Oklahoma Instructor, Patricia G. Smith.

VIEW THE EARTH-SHADOWED SIDE OF THE MOON

The best view of the craters of the moon can be seen through simple binoculars or even a very inexpensive telescope on the night of either the waning or waxing crescent phase of the moon.

First find the bright crescent light of the moon. Then slowly move the view off the edge of the inside curve of the crescent. You will see amazing 3-D images of the craters, rills (the canyons), and rays (the sprays of moon dust that have been pushed out when the meteorites hit the surface of a planet or moon.)

The photo below is of an almost full Moon, August 2003; shot with Nikon D100 through a Celestron Super 8 telescope; two images merged in Photoshop Elements, and accessed from Wikipedia, the free encyclopedia.

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Composition

More than 4.5 billion years ago, the surface of the Moon was a liquid magma ocean. Scientists think that one component of lunar rocks, KREEP (K-potassium, Rare Earth Elements, and P-phosphorus), represents the last chemical remnant of that magma ocean. KREEP is actually a composite of what scientists term "incompatible elements": those which cannot fit into a crystal structure and thus were left behind, floating to the surface of the magma. For researchers, KREEP is a convenient tracer, useful for reporting the story of the volcanic history of the lunar crust and chronicling the frequency of impacts by comets and other celestial bodies.

The lunar crust is composed of a variety of primary elements, including uranium, thorium, potassium, oxygen, silicon, magnesium, iron, titanium, calcium, aluminum and hydrogen. When bombarded by cosmic rays, each element bounces back into space its own radiation, in the form of gamma rays. Some elements, such as uranium, thorium and potassium, are radioactive and emit gamma rays on their own. However, regardless of what causes them, gamma rays for each element are all different from one another -- each produces a unique spectral "signature," detectable by a spectrometer. A complete global mapping of the Moon for the abundance of these elements has never been performed.

A **transient lunar phenomenon (TLP)** is a sometimes inexplicable change of color or shape seen on the surface of the moon. Some may be caused by gas escaping from underground cavities after moonquakes.

Moon craters (magnify)

Over time, comets and meteorites continually bombard the Moon. Water-rich meteorites and comets, largely water ice, may leave significant traces of water on the lunar surface. Energy from sunlight splits much of this water into its constituent elements hydrogen and oxygen, both of which usually fly off into space immediately. Some water molecules, however, may have literally hopped along the surface and gotten trapped inside craters at the lunar poles. Due to the very slight "tilt" of the Moon's axis, only 1.5°, some of these deep craters never receive any light from the Sun - they are permanently shadowed. It is in such craters that scientists expect to find frozen water if it is there at all. If found, water ice could be mined and then split into hydrogen and oxygen by solar panel-equipped electric power stations or a nuclear generator. Such components could make space operations as well as human colonization on the Moon possible. Although the equatorial Moon rock collected by Apollo astronauts contained no traces of water, the recent Clementine mission suggested that small, frozen pockets of water ice (remnants of water-rich comet impacts) may be embedded unmelted in the permanently shadowed regions of the lunar crust. Although the pockets are thought to be small, the overall amount of water was suggested to be quite significant - one billion cubic meters, or an amount the size of Lake Erie. The presence of usable quantities of water on the Moon would be an important factor in rendering lunar habitation cost-effective, since transporting water (or hydrogen and oxygen) from Earth would be prohibitively expensive.

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