

# Astronomy Club of Lompoc Presents The Sidereal Times



Lunar Scape (see page 5)

**Meeting News** At the February meeting we had a presentation by Dr Joe Bassi about VAFB Dart program and the Oumaumau object that swept through the Solar system In 2017.

**Reminder:** ACL club meeting Friday March 12<sup>th</sup> on Zoom Video 7:00 Pm.



**Lunar Calendar:**

New Moon 13<sup>th</sup>  
Full Moon 28<sup>th</sup>



## Presidents Message

Hello, Fellow Sky Watchers,

Our February meeting was excellent, with eight members and, in addition to Dr. Joe Bassi, two guests. Joe's DART Mission presentation was as lively as always and followed by good discussion, especially around the mysterious Oumaumau. Joe also answered questions about DART, which will be launching from Vandenberg, though not when he projected.

Two days after Joe's program, NASA announced that the launch date for DART had been delayed from July to November. This decision resulted from problems with two components critical to success, the DRACO navigation camera and the roll-out solar array. Without eyes or power, the mission could not happen.

The DART Mission, as Joe explained, is a testbed operation demonstrating the feasibility of altering the path of an object, such as a large asteroid, away from colliding with Earth. Interestingly, a major instrument tracking such threats was the Aricebo Radio Telescope. Will there be funding to restore or replace Aricebo? We shall see. The New Horizon Pluto mission was literally saved early in its design and construction phase only by an earmark written into the 2003 Federal budget. Hopefully funds will be found to restore or replace Arcibo in time to "save the planet."

Meanwhile, we celebrate the successful landing on Mars of the Perseverance rover. Remarkable color photos and videos of the landing itself are streaming back to JPL headquarters. While I was observing Mars this past summer and fall I knew that images from various probes above and on the Red Planet helped me better understand the areas of brown, orange and white that I saw. I was given knowledge that was missing for astronomers until that first black and white photo from Mariner IV in 1965. Perseverance is already enriching such insight.

Our next ACL meeting via Zoom will be on March 12, at 7:00PM. Contact me before the 10th if you have a friend you wish to invite to the meeting.

Skyward,  
Tom

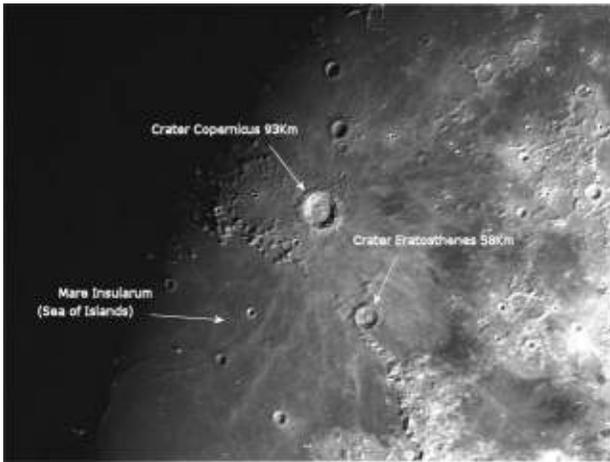
## Events

**March 6<sup>th</sup> 13<sup>th</sup> and 20<sup>th</sup>** *Star Party Cancelled, due to the still present Covid 19 virus.*

**March 6<sup>th</sup>** The Planet Mercury reaches greatest Western elongation of 27.3 degrees from the Sun. This is the best time to view Mercury. Since it will be at its highest point above the horizon in the morning sky. Look for it low in the Eastern sky just before sunrise.

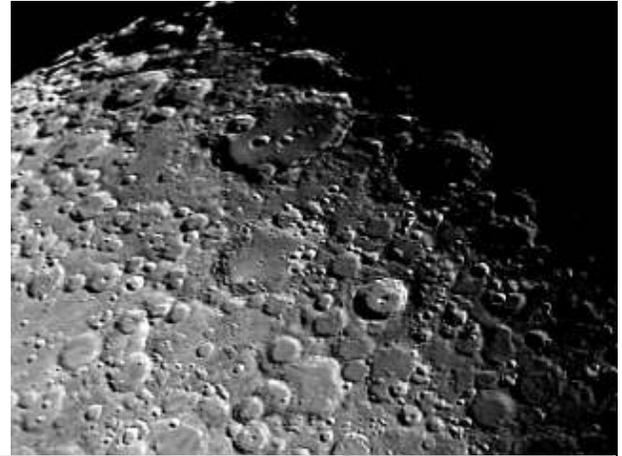
**March 20<sup>th</sup>** March Equinox occurs at 09:27 UTC. The Sun will shine directly on the Equator and there will be nearly equal amounts of day and night throughout the world. This is also the first day of Spring in the northern hemisphere (Vernal Equinox) and the first day of Fall in the southern hemisphere (Autuminal Equinox).

**March 20<sup>th</sup>** Venus at Greatest Western Elongation of 46.6 degrees from the Sun. This is the best time of year to view Venus since it will be at its highest point above the horizon in the morning sky. Look for the bright planet in the Eastern sky before Sunrise.



## Star party's and Events

**Feb 6<sup>th</sup>, 13<sup>th</sup> and 20<sup>th</sup>** *Star Party @ observatory was Cancelled due to Covid-19 pandemic.*



## March 2021 Moon



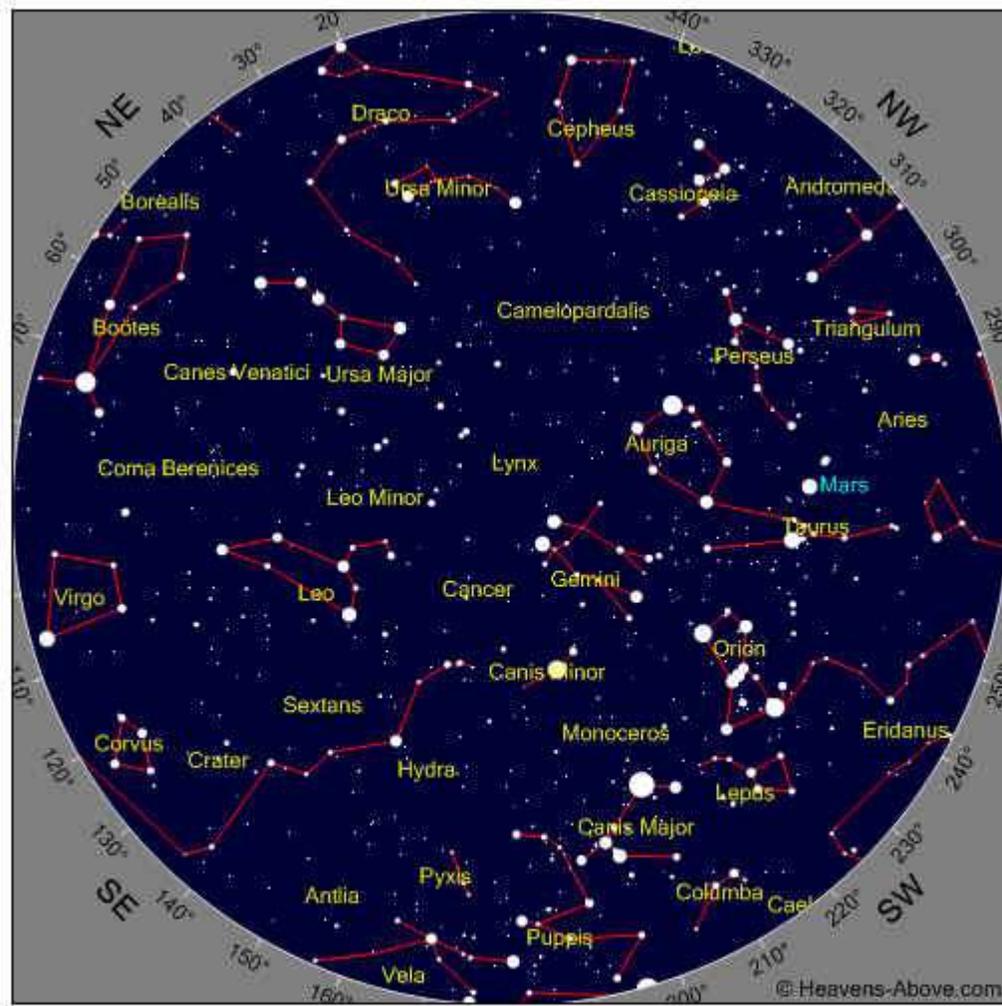
Full 28<sup>th</sup>, New 13<sup>th</sup>, Last Quarter 6<sup>th</sup>, First Quarter 21<sup>st</sup>

### Moon Facts and Folklore

A pale full Moon indicates rain, while a red one brings wind.

Earth is about 80 times the volume than the Moon, but both are about the same age.  
In some Chinese religions offerings are made to the ancestors on the night of the full Moon.

**March 2021 Sky**  
Some Objects of interest, M42, Mars, Double Cluster

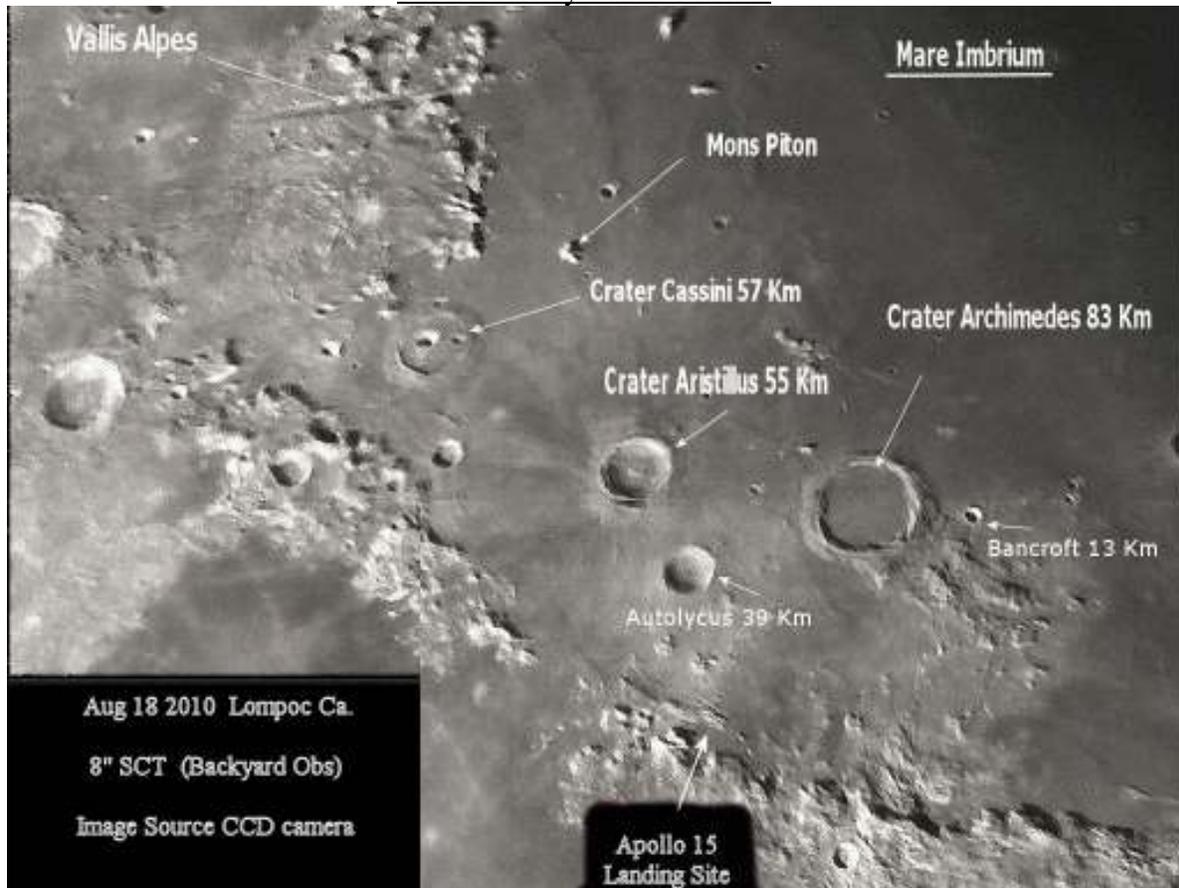


**Time**

Year	2021	Month	3	Day	10	Hour	20	Minute	56
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Photo Courtesy Vahan Yeterian



Though a satellite of Earth, the moon, with a diameter of about 2,159 miles (3,475 kilometers). The moon is a bit more than one-fourth (27 percent) the size of Earth, a much smaller ratio (1:4) than any other planets and their moons. This means the moon has a great effect on the planet and very possibly is what makes life on Earth possible. There are various theories about how the moon was created, but recent evidence indicates it formed when a huge collision tore a chunk of Earth away. The leading explanation was that a giant impact knocked off the raw ingredients for the moon off the primitive molten Earth and into orbit. Scientists have suggested the impactor was roughly 10 percent the mass of Earth, about the size of Mars. Because Earth and the moon are so similar in composition, researchers have concluded that the impact must have occurred about 95 million years after the formation of the solar system, give or take 32 million years. (The solar system is roughly 4.6 billion years old.) New studies in 2015 gave further weight to this theory, based on simulations of planets orbits in the early solar system, as well as newly uncovered differences in the abundance of the element tungsten-182 detected in the Earth and the moon. Although the large impact theory dominates the scientific community's discussion, there are several other ideas for the moon's formation. These include that the Earth captured the moon, that the moon fissioned out of the Earth, or that Earth may even have stolen the moon from Venus, according to a recent theory.

The moon very likely has a very small core, just 1 to 2 percent of the moon's mass and roughly 420 miles (680 km) wide. It likely consists mostly of iron, but may also contain large amounts of sulfur and other elements.

The moon is rocky. It's pockmarked with craters formed by asteroid impacts millions of years ago. Because there is no weather, the craters have not eroded. Orbiters have found traces of water on the lunar surface that may have originated from deep underground. They have also located hundreds of pits that could house explorers who remain on the moon long-term.

Ongoing observations from the (LRO) showed that water is more abundant on the slopes facing the Lunar South pole, although scientists do caution that the water quantity is comparable to an extremely dry desert. Meanwhile, a 2017 study suggested the moons interior could be abundant with water.

- **Average distance from Earth:** 238,855 miles (384,400 km)
- **Perigee (closest approach to Earth):** 225,700 miles (363,300 km)
- **Apogee (farthest distance from Earth):** 252,000 miles (405,500 km)
- **Orbit circumference:** 1,499,618.58 miles (2,413,402 km)
- **Mean orbit velocity:** 2,287 mph (3,680.5 km/h)

## **For What its Worth**

### ***Lunar Maria a Brief Account***

The name is also applied to the extensive surrounding region, called the Fra Mauro Formation, which lunar scientists interpret to be material ejected from the impact that formed the giant Imbrium Basin (Mare Imbrium)) to the north—the largest impact basin (Mare) on the Moon’s near side. A broad, shallow valley within the formation about 50 km (30 miles) north of Fra Mauro crater served as the site of the Apollo 14 manned lunar landing in February 1971. On two separate Moon walks, Apollo astronauts Alan Shepard and Edgar Mitchell collected samples of what was believed to be ejected rock; in later radiometric analysis on Earth, this material was found to have been thermally shocked about 3.9 billion years ago, presumably by the cataclysmic event that created Imbrium.

**Mare**, plural **Maria**, any flat, dark plain of lower elevation on the Moon. The term, which in Latin means “sea,” was erroneously applied to such features by telescopic observers of the 17th century. In actuality, Maria are huge basins containing lava flows marked by craters, ridges, faults, and straight and meandering valleys called Rilles and are devoid of water. There are about 20 major areas of this type, most of them—including the largest ones—located on the side of the Moon that always faces Earth. Maria are the largest topographic features on the Moon and can be seen from Earth with the unaided eye. (Together with the bright lunar highlands, they form the face of the “man in the moon.”)

Samples of lunar rock and soil brought back by Apollo astronauts proved that the Maria are composed of basalt formed from surface lava flows that later congealed. The surface, down to approximately 5 meters (16 feet), shows effects of churning, fusing, and fragmenting as a result of several billion years of bombardment by small meteoroids. This debris layer, comprising rock fragments of all sizes down to fine dust, is called Regolith. Before the first unmanned spacecraft landings on the Moon in the 1960s, some astronomers feared that the surface would be so pulverized that the machines might sink in. These missions—and the manned landings that followed—revealed that the Regolith was only somewhat compressible and was firm enough to be supportive.

The Maria basins were formed beginning about 3.9 billion years ago during a period of intense bombardment by asteroid-sized bodies. This was well after the lunar crust had cooled and solidified enough, following the Moon’s formation, to retain large impact scars. Then, over a period lasting until perhaps three billion years ago, a long sequence of volcanic events flooded the giant basins and surrounding low-lying areas with magma originating hundreds of kilometers within the interior. Although the recognized giant impact basins are distributed similarly on the near and far sides of the Moon, most of the far-side basins were never flooded with lava to form maria. The reason remains to be clarified, but it may be related to an asymmetry of the Moon’s crust, which appears to be about twice as thick on the far side as on the near side and thus less likely to have been completely ruptured by large impacts. Most of the maria are associated with mascons, regions of particularly dense lava that create anomalies in the Moon’s gravitational field.

**Multi-ringed basin**, any of a class of geologic features that have been observed on various planets and satellites in the solar system. A multi-ringed basin typically resembles a bull’s-eye and may cover an area of many thousands of square kilometers. The outer rings of the basins are cliff like scarps that face inward. Because of the gradation of smaller examples into ordinary craters and because of the apparent ejecta-blanket patterns of radially striated terrain surrounding them, multi-ringed basins are believed to be giant impact features. The rings probably were formed as part of the crater-forming process during impact, although some hypotheses suggest that they were formed, or were enhanced, by post-impact collapse. Transitional structures between bowl-shaped craters and multi-ringed basins include craters with central peaks and larger craters with central rings of peaks. Partly owing to the unfortunate placement, relative to the Moon’s visible face, of the most prominent lunar examples, multi-ringed basins were only slowly recognized as coherent geologic features by geologists and astronomers.

**Crater**, circular depression in the surface of a planetary body. Most craters are the result of impacts of meteorites or of volcanic explosions. Meteorite craters are more common on the Moon and Mars and on other planets and natural satellites than on Earth, because most meteorites either burn up in Earth’s atmosphere before reaching its surface or erosion soon obscures the impact site. Craters made by exploding volcanoes (e.g., Crater Lake, Oregon) are more common on Earth than on the Moon, Mars, or Jupiter’s moon Io, where they have also been identified.

## *Astronomy Club Officers*



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Vice President &  
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## Club Meeting

**Reminder** ACL Club meeting Friday March 12<sup>th</sup>  
7:00 Pm On Zoom Video.

Star Parties (as always weather and Covid-19 permitting)

Other Astronomy Club Meetings

Central Coast Astronomical Society  
Link to web site...

<http://www.centralcoastastronomy.org/>

Santa Barbara Astronomical Unit  
Link to web site...

[http:// www.sbau.org/#AU\\_EVENTS\\_Calendar](http://www.sbau.org/#AU_EVENTS_Calendar)

Link to "Heavens Above" web site

[http:// www.heavens-above.com/](http://www.heavens-above.com/)

The web site link below will take you to some  
Great Milky Way interactive images and how  
It was developed. (Type it in the search box.)

<http://skysurvey.org/>

*"Astronomy compels the soul to look upward,  
and leads us from this world to another".  
(Plato)*



*ACL Club Logo*

