

Snake River Skies

The Newsletter of the Magic Valley Astronomical Society

www.mvastro.org

Membership Meeting

Saturday, July 11th 2015
7:00pm at the
Herrett Center for Arts & Science
College of Southern Idaho.
Public Star Party Follows at the
Centennial Observatory

Club Officers

Robert Mayer, President
mayerbrt@gmail.com
208-312-1203

Terry Wofford, Vice President
terrywofford@hotmail.com
208-308-1821

Gary Leavitt, Secretary
leavittg@cableone.net
208-731-7476

Jim Tubbs, Treasurer / ALCOR
jtubbs015@msn.com
208-404-2999

David Olsen, Newsletter Editor
editor@mvastro.org

Rick Widmer, Webmaster
rick@developersdesk.com

Magic Valley Astronomical Society is a
member of the Astronomical League



M-51 imaged by
Rick Widmer &
Ken Thomason
Herrett Telescope
Shotwell Camera

President's Message

Colleagues,

With the heat that's expected to hit the first part of the month, getting out at night would be a perfect way to beat the temperatures. Here are some opportunities...

On July 4, MVAS is helping out at the 50th Anniversary of the Central Idaho 4-H at its camp 17 miles north of Ketchum.

July 11th is the annual pot-luck barbeque, followed by the regular star party at the Herrett Center. Volunteers are especially needed here, and based on last month's experience, if you want to bring your telescope and set it up on the lawn, we'd love to have you there.

July 14th, the New Horizon's mission passes by the Pluto system.

July 16th, is Chris Anderson's Astronomy Talk on the New Horizon's Mission.

July 18th is Pomerelle. Based on last year's attendance, we could really use some volunteers. If you're interested in going, but not sure how to transport your telescope, please contact Terry Wofford.





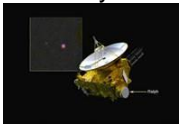




For more details, check out the e-mail chats.

Clear Views,
Rob Mayer

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Calendars for July

Event Calendar

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			<div>1</div> <div>Canada Day</div> <div>ISP Planning Mtg. @ 6:30pm Board Mtg. 7:00pm at the Louie's Restaurant</div>	<div>2</div> <div>Full Moon Thunder Moon Algonquin</div> 	<div>3</div>	<div>4</div> <div>Independence Day</div> 
<div>5</div> <div>Moon Perigee subtending 32' 7"</div> 	<div>6</div>	<div>7</div>	<div>8</div> <div>Last Quarter</div> 	<div>9</div>	<div>10</div>	<div>11</div> <div>General Membership Mtg. 19:00 Herrett Center Public Star party follows Centennial Observatory</div>
<div>12</div>	<div>13</div>	<div>14</div> <div>New Horizon's reaches the Pluto System</div> 	<div>15</div>	<div>16</div> <div>New Moon Lunation 1145</div> 	<div>17</div>	<div>18</div>
<div>19</div>	<div>20</div>	<div>21</div> <div>Moon Apogee subtending 29' 14"</div> 	<div>22</div>	<div>23</div>	<div>24</div> <div>First Quarter</div> 	<div>25</div>
<div>26</div>	<div>27</div>	<div>28</div>	<div>29</div>	<div>30</div>	<div>31</div> <div>Full Moon Blue Moon</div> 	

Snake River Skies is the Newsletter of the Magic Valley Astronomical Society and is published electronically once a month.

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July Celestial Calendar and Trivia

- 7/1 Venus is 0.4 degree south of Jupiter.
- 7/5 Venus is at the descending node today.
- 7/6 Neptune is 3 degrees south of the Moon; Pluto (magnitude +14.1, apparent size 0.1"); the Earth is at aphelion (152,093,481 kilometers or 94,506,462 miles from the Sun)
- 7/9 The Moon is 0.8 degree south of Uranus.
- 7/10 Venus is at its greatest illuminated extent at 4:00; the Curtiss Cross, an X-shaped illumination effect located between the craters Parry and Gambart, is predicted to occur at 5:28 UT (subtract 6-hours).
- 7/12 Mercury is at the ascending node today; the Moon is 0.9 degree north of the first-magnitude star Aldebaran (α Tauri).
- 7/16 Mercury is at perihelion today.
- 7/18 The Moon is 4 degrees south of Jupiter.
- 7/19 The Moon is 0.4 degree south of Venus.
- 7/23 Venus is stationary at 6:00; the Lunar X, also known as the Werner or Purbach Cross, an X-shaped illumination effect involving various rims and ridges between the craters La Caille, Blanchinus, and Purbach, is predicted to occur at 13:45 UT; Mercury is in superior conjunction.
- 7/25 Asteroid 1 Ceres (magnitude +7.8) is at opposition.
- 7/26 The Moon is 2 degrees north of Saturn at 8:00; Uranus is stationary.
- 7/27 Mercury is at its greatest heliocentric latitude north today.
- 7/31 Venus is 6 degrees south of Jupiter at 20:00

Friedrich Bessel was born this month. The first photograph of a star, namely Vega, was taken on July 17, 1850. The first photograph of a total solar eclipse was taken on July 28, 1851.

Strong moonlight will interfere with the peak of this year's Southern Delta Aquarid meteor shower on the morning of July 30th. The other minor meteor showers with southern radiants occurring this month are the Alpha Capricornids, the Piscis Austrinids, and the Northern Delta Aquarids.

Information on Iridium flares and passes of the ISS, the Tiangong-1, the USAF's X-37B, the HST, and other satellites can be found at <http://www.heavens-above.com/>

The Moon is 14.4 days old and is located in Ophiuchus on July 1st at 0:00 UT. At that time, it is illuminated 98.5%. The Moon is at its greatest northern declination of +18.4 degrees on July 14th and its greatest southern declination of -18.4 degrees on July 1st and -18.3 degrees on July 28th. Longitudinal libration is at a maximum of +5.1 degrees on July 14th and a minimum of -6.6 degrees on July 27th. Latitudinal libration is at a maximum of +6.5 degrees on July 14th and a minimum of -6.5 degrees on July 1st and -6.6 degrees on July 28th. New Moon takes place on July 16th at 1:24 UT. Two Full Moons occur this month, the first so-called Blue Moon since August 2012. The Moon passes four degrees south of Jupiter on July 18th and two degrees north of Saturn on July 26th. During July, Venus, Uranus, and the first-magnitude star Aldebaran are occulted by the Moon from various parts of the world. See <http://www.lunar-occ...ota/iotandx.htm> for information on these and other lunar occultations taking place this month. Visit <http://saberdoesthes...does-the-stars/> for tips on spotting extreme crescent Moons. Times and dates for the lunar light rays predicted to occur in July are available at <http://www.lunar-occ...o/rays/rays.htm>

The Sun is located in Gemini on July 1st. The Earth is farthest from the Sun on July 6th, when it is 3.3% more distant than it was at perihelion and 1.7% farther than its average distance.

Brightness, apparent size, illumination, distance from the Earth in astronomical units, and location data for the planets and Pluto on July 1st: Mercury (-0.2 magnitude, 7.0", 52% illuminated, 0.96 a.u., Taurus), Venus (-4.6 magnitude, 32.3", 34% illuminated, 0.52 a.u., Leo), Mars (+1.6 magnitude, 3.6", 100% illuminated, 2.58 a.u., Gemini), Jupiter (-1.8 magnitude, 32.4", 100% illuminated, 6.08 a.u., Leo), Saturn (+0.2 magnitude, 18.1", 100% illuminated, 9.18 a.u., Libra), Uranus (+5.8 magnitude, 3.5", 100% illuminated, 19.92 a.u. on July 16, Pisces), Neptune (+7.8 magnitude, 2.3", 100% illuminated, 29.25 a.u. on July 16, Aquarius), and Pluto (+14.1 magnitude, 0.1", 100% illuminated, 31.91 a.u. on July 16, Sagittarius).

Venus is located in the west, Jupiter in the west, and Saturn in the south during the evening. At midnight, Saturn is in the southwest and Neptune in the southeast. In the morning, Mercury can be found in the northeast, Uranus in the southeast, and Neptune in the south.

Mercury is at perihelion on July 16th. It reaches superior conjunction on July 23rd. By month's end, Mercury shrinks to an angular diameter of 5.0 arc seconds but increases in illumination from 52 to 96% and brightens from magnitude -0.2 to magnitude -1.3.

Venus and Jupiter are in conjunction on July 1st. The two brightest planets are in conjunction again on July 31st. Venus and Jupiter are separated by less than seven degrees from July 1st to July 31st. The southwestern motion (as seen from mid-northern latitudes) of Venus increases the separation from 0.4 degree on July 1st to four degrees on July 9th. On July 10th, Venus shines at its brightest (magnitude -4.7) for the current apparition. Venus is situated three degrees from the first-magnitude star Regulus from July 11th to July 18th. The thin crescent Moon, Venus, Jupiter, and Regulus lie within seven degrees of one another on the evening of July 18th. Venus begins retrograde (westward) motion on July 23rd. During July, Venus increases in apparent diameter from 32.3 to 51.4 arc seconds and decreases in illumination from 34 to 8%.

Mars is not visible this month.

Jupiter lies low in the west in the constellation of Leo. Jupiter and Venus have the same apparent diameter (32 arc seconds) on July 1st. The two planets are positioned less than one degree apart that evening. The final of a series of mutual events of the Galilean satellites that began in August of last year take place for observers in western North America in early July. Ganymede partially occults Io for four minutes beginning at 10:29 p.m. CDT on July 2nd. On July 5th, Io occults Ganymede for two minutes starting at 10:18 p.m. MDT. Io occults Europa for five minutes starting at 9:46 p.m. MDT on July 7th.

In mid-July, Saturn's rings span 40 arc seconds and are inclined by 24 degrees. The disk of the planet subtends 18 arc seconds at the equator. Saturn's brightest satellite, eighth-magnitude Titan, passes due north of the planet on July 6th and July 22nd and due south on July 13th and July 29th. The much fainter satellite Iapetus lies 2.2 arc minutes south of the planet on July 16th.

Uranus remains within 0.6 degree of the fourth-magnitude star Zeta Piscium during July. It rises around midnight at the end of the month.

Neptune is 2.1 degrees southwest of the fourth-magnitude star Lambda Aquarii at the start of the month. By the end of July, the eighth planet is located 2.6 degrees from that star.

Finder charts for Uranus and Neptune can be found at <http://www.nakedeyep....com/uranus.htm> and <http://www.nakedeyep...com/neptune.htm>

Pluto reaches opposition on July 6th. A historic flyby by the New Horizons spacecraft takes place on July 14th. See pages 20 to 27 of the July issue of Sky & Telescope & <https://www.nasa.gov...main/index.html> for further information. For more on the planets and how to locate them, browse <http://www.nakedeyepplanets.com/>

Comet 141P/Machholz travels from Pisces to Perseus this month, assuming that it is still intact. This periodic comet fragmented into five pieces a number of years ago and hasn't been observed since 2005. Browse <http://cometchasing.skyhound.com/> and <http://www.aerith.ne...t/future-n.html> for additional information on comets visible in July.

Asteroid / dwarf planet 1 Ceres (magnitude +7.8) reaches opposition in Sagittarius on July 25th. Asteroid 8 Leto reaches opposition (magnitude +10.2) in Microscopium on July 30th. Asteroid 2 Pallas dims from magnitude +9.5 to +9.8, as it heads southwestward through Hercules. Information on asteroid occultations taking place this month is available at http://www.asteroido.../2015_07_si.htm

A wealth of current information on solar system celestial bodies is posted at <http://www.curtrenz....tronomical.html>

Notable carbon star for July: T Draconis

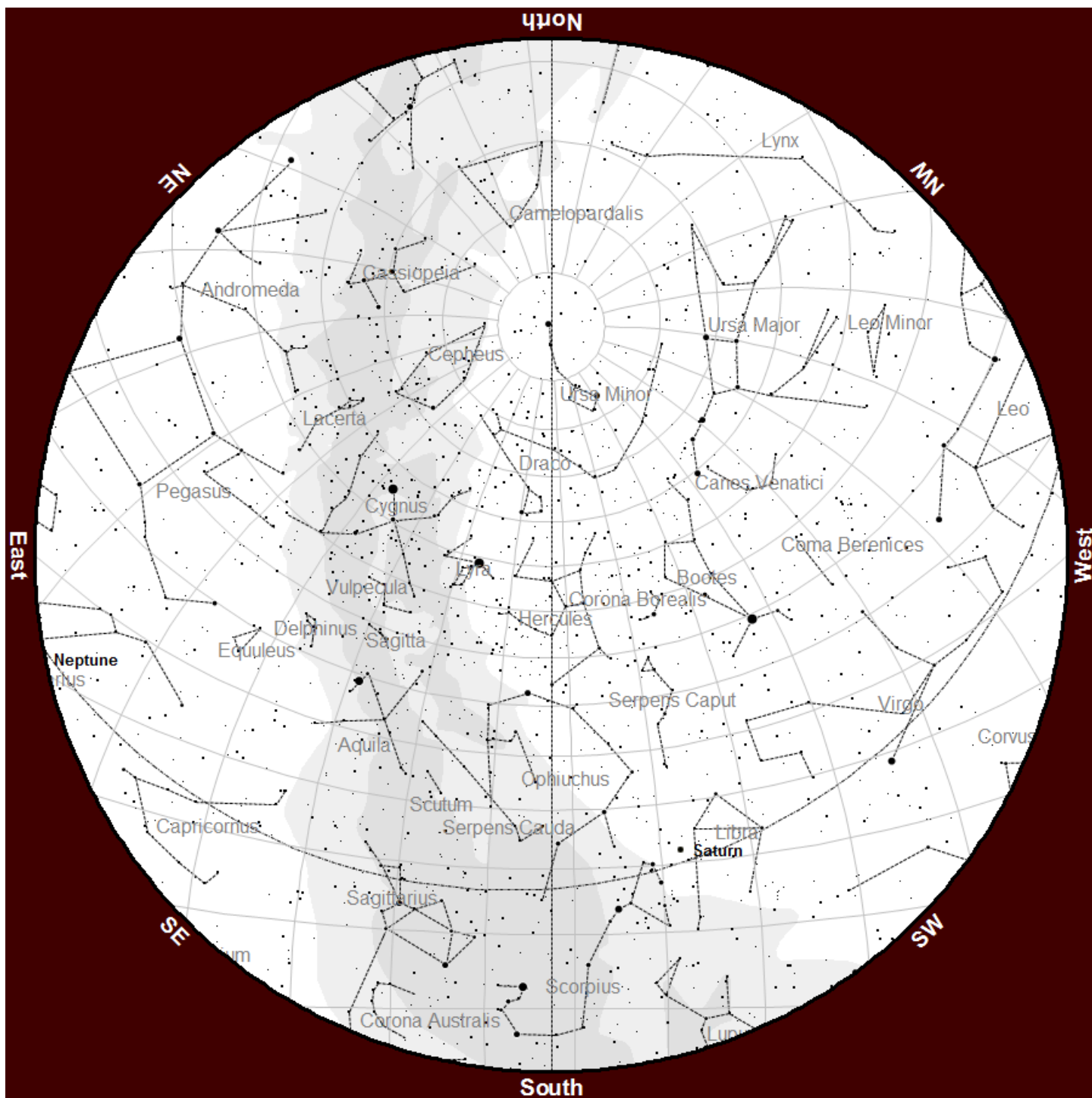
Top ten binocular deep-sky objects for July: IC 4665, LDN 1773, M4, M6, M7, M10, M12, M13, M92, NGC 6231

Top ten deep-sky objects for July: M4, M6, M7, M10, M12, M13, M92, NGC 6210, NGC 6231, NGC 6543

Challenge deep-sky object for July: NGC 6380 (Scorpius)

The objects listed above are located between 16:00 and 18:00 hours of right ascension.

Planisphere for July



Mid-month, end of astronomical twilight (11:15 PM).

Planisphere courtesy of Chris Anderson, Observatory Manager, Herrett Center College of Southern Idaho, Twin Falls, ID

Be Safe – Get Out There – Explore Your Universe

Binocular Universe

Once in a Blue Moon
Article by: Phil Harrington

Once in a Blue Moon." We have all used that phrase at one time or another when talking about something that only happens on rare occasions. Astronomically speaking, today's definition of a "Blue Moon" refers to the second Full Moon occurring in the same calendar month. Since there are about 29.5 days between Full Moons, every now and then the phases will line up so that the full phase will occur on the 1st or 2nd of a month and a second full phase will take place on the 30th or 31st. Such occurrences are rare, hence the popular saying.

How the term became associated with an astronomical event, that of the second full Moon in a calendar month, remains something of a mystery. Research published in the March and May 1999 issues of Sky & Telescope magazine showed that the term Blue Moon may have actually started out as a seasonal, rather than monthly, reference. The 1937 edition of the Maine Farmer's Almanac defines the term as the third Full Moon in any season that contains four. Since each season has three months, most would only have three Full Moons. Four Full Moons would be rare indeed. But in an ironic twist, the modern meaning of the second Full Moon in a given month likely originated from an error in the March 1946 issue of Sky & Telescope!

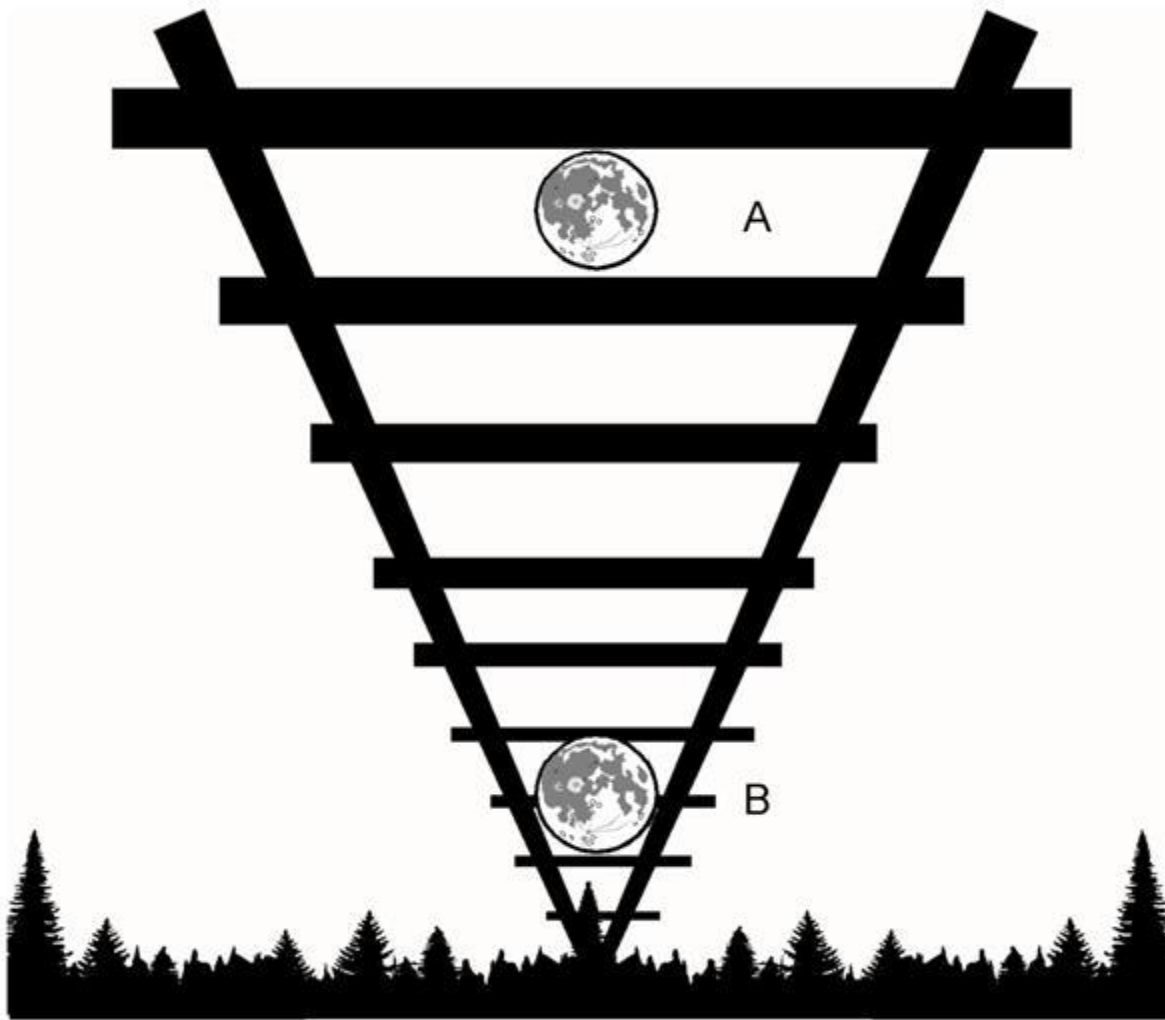
Sticking with the modern, if not technically correct, definition, then this month is once in a Blue Moon. The first Full Moon takes place at 02:19 UT on July 2, while the second occurs at 10:42 UT on July 31.



Above: Full Moon rising over Long Island Sound. Photo by the author.

Let's use the occasion of the Blue Moon to tour our neighbor through binoculars. But before we do, I am sure that you have noticed how large the Full Moon can appear when it rises above the horizon. This is just an optical illusion known as the **Moon Illusion**. The real cause of the Moon Illusion has been debated for years, maybe centuries. Some insist that the effect is caused by distortion imparted by our planet's atmosphere. This can be quickly dismissed, however, since refraction would actually cause the Moon to shrink. To prove that refraction has nothing to do with it, take a photograph of the rising Moon. Then, come back a few hours later, when the Moon appears "normal," and take another. Holding the two photos together will show that the Moon appears the same size in each. Try it yourself!

Some say that the Moon Illusion is caused by our seeing it next to tangible things, such as trees and buildings. This is sometimes referred to as the Ponzo Illusion, first described by Mario Ponzo in 1913. Here's the Ponzo Illusion as applied the Moon.



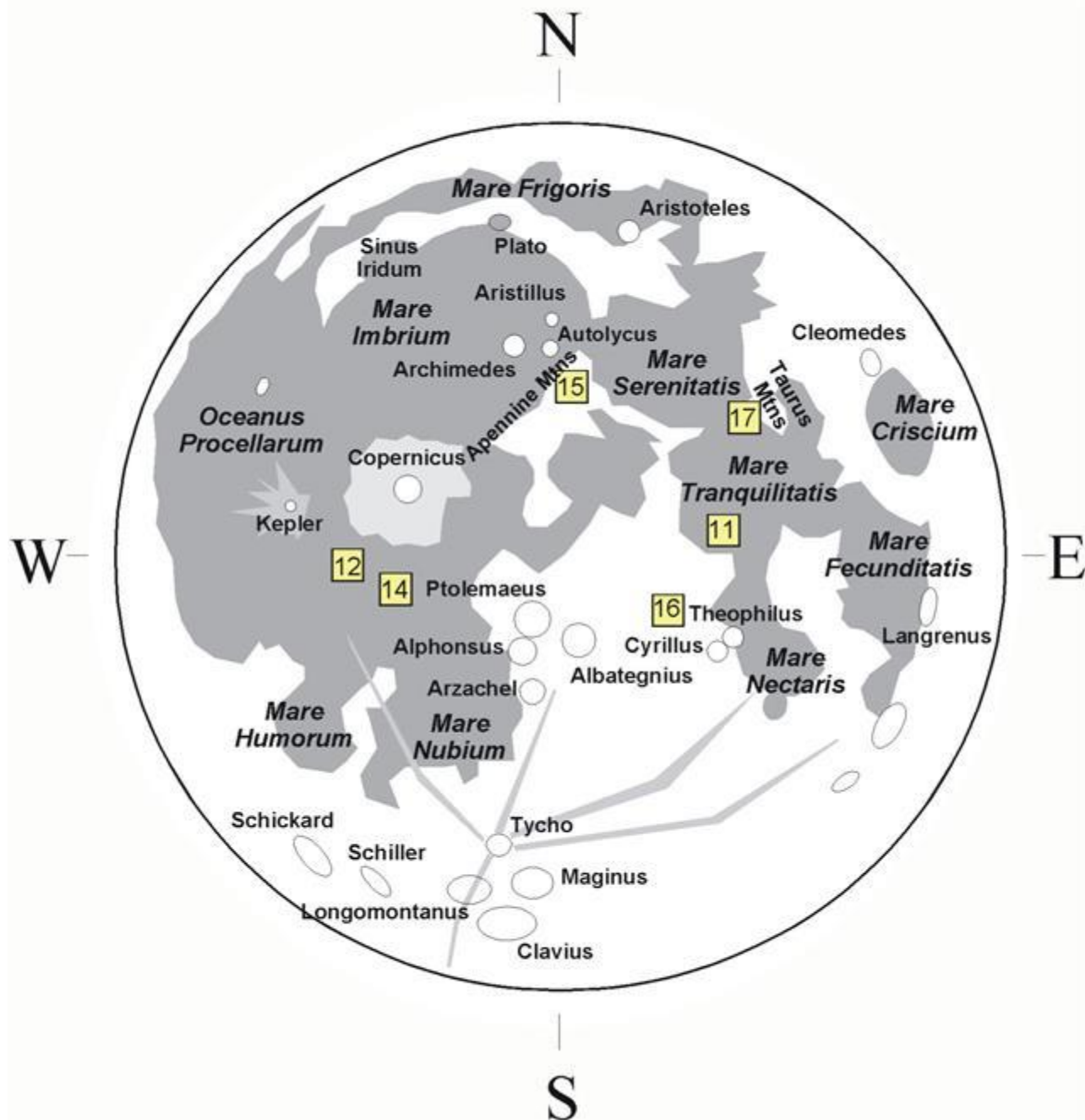
Which Moon appears larger, A or B? They are really both the same. The Ponzo-Illusion explanation, however, doesn't hold up for the simple reason that the illusion persists even when the Moon is seen rising beyond a featureless plain, on the ocean, and even from aircraft. There has to be more to it than that.

Another possible explanation comes from [Donald McCready](#), professor emeritus of psychology at the University of Wisconsin-Whitewater. McCready says that it's not that the Moon appears larger when rising, but rather, it appears smaller when higher in the sky because of the way our eyes perceive distances to far-away objects. When the Moon is rising, our eyes take distance cues from the horizon, causing the Moon to appear very far away (an effect called oculomotor macropsia). But when we look higher in the sky, there are few cues. Our eyes, therefore, adjust to their resting focus of about 3 to 6 feet (1 to 2 meters) away. Because of this, that more-distant object appears to cover a smaller angle (oculomotor micropsia). While a convincing argument, other experts feel that the size differences induced by oculomotor macropsia and micropsia are not sufficient to explain the Moon Illusion.

Here is an interesting experiment that you can conduct yourself. Next time you notice the Moon Illusion, look at the Moon through an empty roll of paper towels, noting how much of the field of view is covered by the Moon's disk. Return a few hours later, after the Moon has risen and the illusion is gone. Look at the Moon again through the tube. Does it appear larger, smaller, or the same as before? In all likelihood, it looks exactly the same size, proving that the Moon Illusion is just that.

Full Moon is usually not a great time for viewing because it appears so bright and starkly lit. It does, however, give us a chance to catch the very prominent crater Tycho. Named for the famous 16th-century Danish astronomer, Tycho looks like a dazzling jewel toward the southern edge (bottom) of the disk. Tycho measures 52 miles across, but what's most impressive is its amazing system of rays that traces northward for more than 900 miles.

This month also marks the 46th anniversary of astronauts landing on the Moon. Between July 1969 and December 1972, six teams of United States astronauts ventured across the gap between Earth and Moon to land and walk on that distant world. To commemorate those historic events, let's try to find where each touched down.



Above: Finder chart for this month's *Binocular Universe*. Chart adapted from [Astronomy For All Ages](#)
Click the chart to open a printable PDF version in a new window.

We'll begin with **Apollo 11**, "Tranquility Base." The dark gray outline of the Sea of Tranquility, **Mare Tranquillitatis**, looks almost perfectly round from our earthly vantage point. The best time to view Mare Tranquillitatis is during the waxing crescent phases, the weekend of July 18-19. Apollo 11 landed near the southwestern shore (lower left edge as viewed through binoculars).

Apollo 12 landed on **Oceanus Procellarum** (the Ocean of Storms) in November 1969. Dominating the waxing gibbous phases, the Ocean of Storms covers more than one million square miles. The mission's exact landing site lies south of the prominent crater Copernicus, which sees sunrise two nights after First Quarter. Copernicus measures 60 miles and is easy to find where Mare Imbrium meets Oceanus Procellarum. Under the right lighting, the brilliant ray system of Copernicus explodes into view against the darker background of the maria. Even its central mountain peak may be glimpsed in 7x binoculars. Watch over the next several nights as sunlight first bathes the crater's sharply defined walls, catching the tip of the peak, before sliding down to the crater floor.

After the near fatal Apollo 13 in April 1970, the Moon was next visited in February 1971 by **Apollo 14**. The hilly region known as **Fra Mauro** was chosen landing site. Fra Mauro is found near the southeastern shore of the Ocean of Storms, to the east, or right, of Apollo 12.

July 1971 saw **Apollo 15** land near the **Apennine Mountains**, which mark the southeastern edge of the Sea of Rains, **Mare Imbrium**. The arc of the Apennines is found just south of the prominent triangle of craters formed by **Aristillus**, **Autolycus**, and **Archimedes**. All three will lie near the Moon's terminator, or sunrise line, the night after First Quarter. **Apollo 16** landed near the crater **Descartes** in the highlands south of the Sea of Tranquility in April 1972. The craters **Theophilus** and **Cyrillus** lie to the east (right) of the landing site, while **Albategnius** is roughly an equal distance to its west, or left. The night before First Quarter is perfect for viewing this area. Just west of Albategnius, three more striking craters that almost touch each other's borders – **Ptolemaeus**, **Alphonsus**, and **Arzachel** – see sunrise the following evening.

Apollo 17's landing in December 1972 signaled an end to the Apollo era. We find its site near the **Taurus Mountains**, which form the eastern rim of the Sea of Serenity, **Mare Serenitatis**. The best to view this area is during the waxing crescent phases between July 20 and 23.

Besides reliving those magic days of Apollo, the Moon has plenty of wonderful sights to visit throughout July. Here are some of my favorites, divided by phase and beginning right after Full.

July 3 through 9 (Waning Gibbous to Last Quarter)

Mare Nubium, the Sea of Clouds, is notable for its unusually dark floor.

Mare Frigoris, the Sea of Cold, is most unusual in appearance. Instead of the typically circular plain, Mare Frigoris stretches for over 1,000 miles, but is no more than 45 miles wide at points.

July 10 through 14 (Last Quarter through Waning Crescent)

Mare Humorum, the Sea of Moisture, is a nearly circular dark plain to the south of Oceanus Procellarum. Measuring 230 miles in diameter, its surface appears quite smooth through binoculars.

Sinus Iridum, the Bay of Rainbows, is a favorite feature of the Moon. Originally, Sinus Iridum was a complete crater, but its southern wall was totally washed away when lava from Mare Imbrium crashed against it. Two promontories, named **Heraclides** and **Laplace**, mark the opening of the bay's 160-mile-wide mouth, while the **Juras Mountains** form its northern perimeter.

July 17 through 23 (Waxing Crescent)

Mare Crisium, the Sea of Crises, is a large oval plain measuring 345 miles by 375 miles, with the long dimension running east to west. This is just the opposite of the visual impression we get from Earth because of the foreshortening of the lunar globe. Unlike the other, interconnecting maria, Mare Crisium stands alone.

Langrenus, found on the southeastern shore of **Mare Fecunditatis**, is an amazing crater to watch from waxing crescent to Full Moon. As the sun rises higher in its sky, 80-mile-wide Langrenus seems to almost catch fire as its floor is transformed from a dull gray to a brilliant whitish glow.

July 24 through 30 (First Quarter through Waxing Gibbous)

Clavius, second largest crater (or walled plain, if you prefer) on the Moon's earthbound side, is one of the easiest to recognize. Its huge 136-mile-diameter walls are especially prominent the night after first quarter.

Kepler, though only 19 miles across, is one of the most prominent craters on the Moon. Situated on central Oceanus Procellarum, its bright ray pattern may remind you of a miniature Copernicus.

Longomontanus is seen to the northwest of Clavius and southwest of Tycho, while another obvious crater, **Maginus**, is found an equal distance east of Clavius and Tycho. Collectively, all four create a conspicuous diamond pattern of craters near the Moon's South Pole. Longomontanus measures 88 miles across, while Maginus spans 99 miles in diameter. While most people just casually glance at the Moon with binoculars, it's really quite amazing how much detail you can make out through binoculars with a concentrated effort. Of course, that also requires that you mount the binoculars on some sort of external support, to make it easier to go back and forth between eyepieces and a map.

The Moon map here shows some of the more prominent surface features as well as the Apollo landing sites, but to be a real *lunatic*, you need a real lunar atlas. Fortunately, there are several free apps and programs out there that serve the purpose very well. My favorite piece of software is [Virtual Moon Atlas](#) by Christian Legrand and Patrick Chevalley. You can download the latest version from their web site.

As far as iPhone apps go, I use the \$0.99 [Moon Map Pro](#) by Kari Kulmala. An abridged free version, simply called Moon Map, is also available. Each is based on the U.S. Geological Survey high-resolution surface map. The primary difference between the two is that the Pro version can overlay the maps with high-resolution photographs taken by the Lunar Reconnaissance orbiter.

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New Horizons: The First Mission to the Pluto System and the Kuiper Belt



Voyage to an Unexplored Planet and a New Realm

The New Horizons mission will help us understand worlds at the edge of our solar system by making the first reconnaissance of the dwarf planet Pluto and by venturing deeper into the distant, mysterious Kuiper Belt – a relic of solar system formation.

The Journey

New Horizons launched on Jan. 19, 2006; it swung past Jupiter for a gravity boost and scientific studies in February 2007, and will conduct a five-month-long reconnaissance flyby study of Pluto and its moons in summer 2015. Pluto closest approach is scheduled for July 14, 2015. As part of an extended mission, the spacecraft is expected to head farther into the Kuiper Belt to examine one or two of the ancient, icy mini-worlds in that vast region, at least a billion miles beyond Neptune's orbit. Sending a spacecraft on this long journey will help us answer basic questions about the surface properties, geology, interior makeup and atmospheres on these bodies.

New Science

The National Academy of Sciences has ranked the exploration of the Kuiper Belt – including Pluto – of the highest priority for solar system exploration. Generally, New Horizons seeks to understand where Pluto and its moons “fit in” with the other objects in the solar system, such as the inner rocky planets (Earth, Mars, Venus and Mercury) and the outer gas giants (Jupiter, Saturn, Uranus and Neptune). Pluto and its largest moon, Charon, belong to a third category known as “ice dwarfs.” They have solid surfaces but, unlike the terrestrial planets, a significant portion of their mass is icy material. Using Hubble Space Telescope images, New Horizons team members have discovered four previously unknown moons of Pluto: Nix, Hydra, Styx and Kerberos. A close-up look at these worlds from a spacecraft promises to tell an incredible story about the origins and outskirts of our solar system. New Horizons also will explore – for the first time – how ice dwarf planets like Pluto and Kuiper Belt bodies have evolved over time.

The Need to Explore

The United States has been the first nation to reach every planet from Mercury to Neptune with a space probe. If New Horizons is successful, it will allow the U.S. to complete the initial reconnaissance of the solar system.

New Horizon's Video <https://www.youtube.com/watch?v=aky9FFj4ybE> National Space Society

More information: <http://pluto.jhuapl.edu/> , attend the Astronomy Talk on the 16th, Attend the Idaho Star Party™, the guest speaker, Dr. Leslie Young, is an expert researcher on the dwarf planet Pluto, and will present a pair of talks regarding the New Horizons mission to the Pluto System.

No Surprise! Earth's Strongest Gravity Lies Atop The Highest Mountains

By Ethan Siegel

Put more mass beneath your feet and feel the downward acceleration due to gravity increase. Newton's law of universal gravitation may have been superseded by Einstein's, but it still describes the gravitational force and acceleration here on Earth to remarkable precision. The acceleration you experience is directly proportional to the amount of mass you "see," but inversely proportional to the distance from you to that mass squared.

The denser the mass beneath your feet, the stronger the gravitational force, and when you are closer to such a mass, the force is even greater. At higher elevations or even higher altitudes, you'd expect your gravitational force to drop as you move farther from Earth's center. You'd probably also expect that downward acceleration to be greater if you stood atop a large mountain than if you flew tens of thousands of feet above a flat ocean, with nothing but ultra-light air and liquid water beneath you for all those miles. In fact this is true, but not just due to the mountain's extra mass!

Earth is built like a layer-cake, with the less dense atmosphere, ocean, and crust floating atop the denser mantle, which in turn floats atop the outer and inner cores of our planet. An iceberg's buoyancy is enough to lift only about one tenth of it above the sea, with the other nine tenths below the surface. Similarly, each and every mountain range has a corresponding "invisible mountain" that dips deep into the mantle. Beneath the ocean floor, Earth's crust might be only three to six miles thick, but it can exceed 40 miles in thickness around major mountain ranges like the Himalayas and the Andes. It's where one of Earth's tectonic plates subducts beneath another that we see the largest gravitational anomalies: another confirmation of the theory of continental drift.

A combination of instruments aboard NASA's Gravity Recovery and Climate Experiment (GRACE) satellites, including the SuperSTAR accelerometer, the K-band ranging system and the onboard GPS receiver, have enabled the construction of the most accurate map of Earth's gravitational field ever: to accelerations of nanometers per second squared. While the mountaintops may be farther from Earth's center than any other point, the extra mass of the mountains and their roots – minus the mass of the displaced mantle – accounts for the true gravitational accelerations we actually see. It's only by the grace of these satellites that we can measure this to such accuracy and confirm what was first conjectured in the 1800s: that the full layer-cake structure of Earth must be accounted for to explain the gravity we experience on our world!

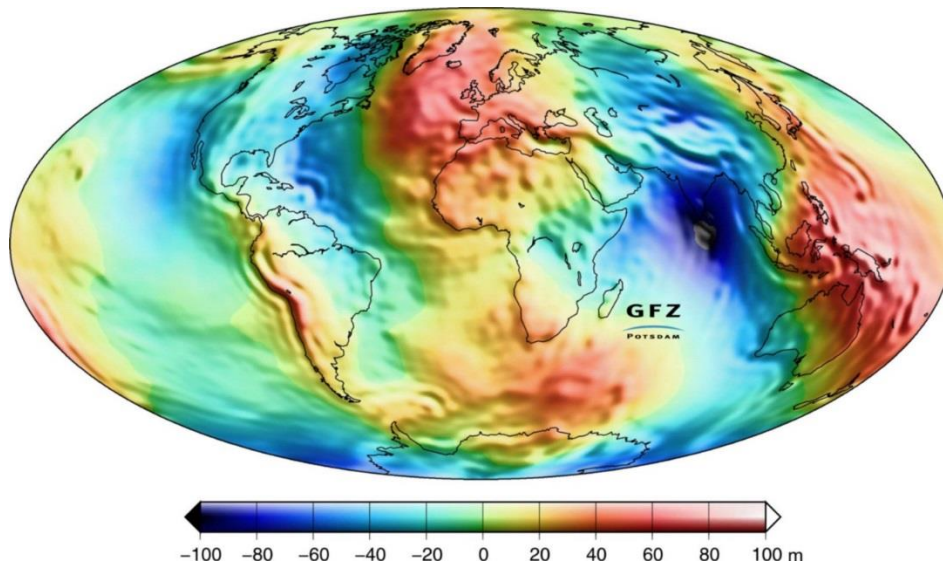


Image credit: NASA / GRACE mission / Christoph Reigber, et al. (2005): An Earth gravity field model complete to degree and order 150 from GRACE: EIGEN-GRACE02S, Journal of Geodynamics 39(1), 1–10. Reds indicate greater gravitational anomalies; blues are smaller ones.



Observatories and Planetarium

Bruneau Dunes Observatory – Bruneau, ID



You're invited to star gaze at the Bruneau Dunes Observatory! See the night sky as you've never seen it before. Observatory tours and solar viewing (through a specially adapted telescope) begin one hour before sunset, and are free of cost. Following that, visitors can view short orientation program and then have the chance to survey the heavens through the observatory's collection of telescopes. There is a viewing fee of \$3 per person (children 5 and under are free of cost) for this. The observatory is open to the public from early July through mid-October on Friday and Saturday nights only, weather permitting. For presentation times, call 208-366-7919, or check the kiosk when you arrive at the park.

See our video: https://www.youtube.com/watch?v=v_TnnWx75k0#t=226

Centennial Observatory at the Herrett Center College of Southern Idaho – Twin Falls, ID www.herrett.csi.edu

Event	Place	Date	Time	Admission
Summer Solar Session #6	Centennial Observatory	Wednesday, July 1 st	1:30 to 3:30 PM	FREE
Summer Solar Session #7	Centennial Observatory	Wednesday, July 8 th	1:30 to 3:30 PM	FREE
Monthly Free Star Party	Centennial Observatory	Saturday, July 11 th	9:45 PM to midnight	FREE
Summer Solar Session #8	Centennial Observatory	Wednesday, July 15 th	1:30 to 3:30 PM	FREE
Bimonthly Astronomy Talk : "New Horizons at Pluto"	Faulkner Planetarium	Thursday, July 16 th	8:45 to 9:45 PM	See link for Info.
Astronomy Talk Night Telescope Viewing	Centennial Observatory	Thursday, July 16 th	9:45 to 11:45 PM	See link for Info.
Pomerelle Mountain Star Party (9 th annual)	Pomerelle Mountain Resort, Albion, Idaho	Saturday, July 18 th	3:00 PM to 12:00+ AM	See link for info:
Summer Solar Session #9	Centennial Observatory	Wednesday, July 22 nd	1:30 to 3:30 PM	FREE
Summer Solar Session #10	Centennial Observatory	Wednesday, July 29 th	1:30 to 3:30 PM	FREE

Faulkner Planetarium Show Schedule June 30 th – August 1 st , 2015					
Black Holes: The Other Side of Infinity w/Live Sky Tour (Black Holes)*					
Cosmic Colors: An Adventure Along the Spectrum (Cosmic Colors)*					
Flight of the Butterflies					
Moons: Worlds of Mystery (Moons)*					
One World, One Sky: Big Bird's Adventure (Sesame Street)					
Pink Floyd: Dark Side of the Moon (Dark Side)					
Pink Floyd: The Wall (The Wall)					
Rock On Demand (Rock)					
Solar System Odyssey (SS Odyssey)					
Violent Universe: Catastrophes of the Cosmos (Violent Universe)*					
Tuesday					
1:30 (SS Odyssey)	2:30 (Butterflies)	3:30 (Violent Universe)*		7:00 (Moons)☐	8:00 (Rock)
Wednesday					
1:30 (Sesame Street)	2:30 (Butterflies)	3:30 (Cosmic Colors)*			
Thursday					
1:30 (SS Odyssey)	2:30 (Butterflies)	3:30 (Violent Universe)*			
Friday					
1:30 (Sesame Street)	2:30 (Butterflies)	3:30 (Cosmic Colors)*		7:00 (Moons)*	8:00 (Dark Side)
Saturday					
1:30 (SS Odyssey)	2:30 (Butterflies)	3:30 (Moons)☐	4:30 (Black Holes)*	7:00 (Moons)*	8:00 (The Wall)

*Denotes a program that includes a live sky tour



About the Magic Valley Astronomical Society

Magic Valley Astronomical Society
P.O. Box 445
Kimberly, ID, USA 83341

The Magic Valley Astronomical Society (MVAS) was founded in 1976. The Society is a non-profit [501(c) 3] educational and scientific organization dedicated to bringing together people with an interest in astronomy. In partnership with the Centennial Observatory, Herrett Center, College of Southern Idaho - Twin Falls; we hold regularly scheduled monthly meetings and observation sessions, at which we share information on current astronomical events, tools and techniques for observation, astrophotography, astronomical computer software, and other topics concerning general astronomy. Members enthusiastically share their telescopes and knowledge of the night sky with all who are interested. In addition to our monthly public star parties we hold members only star parties at various locations throughout the Magic Valley.

MVAS promotes the education of astronomy and the exploration of the night sky along with safe solar observing through our public outreach programs. We provide two types of outreach; public star parties and events open to anyone interested in astronomy, and outreach programs for individual groups and organizations (e.g. schools, churches, scout troops, company events, etc.), setting up at your location. All of our outreach programs are provided by MVAS volunteers at no cost. However, MVAS will gladly accept donations. Donations enable us to continue and improve our public outreach programs.

Membership is not just about personal benefits. Your membership dues support the work that the Magic Valley Astronomical Society does in the community to promote the enjoyment and science of astronomy. Speakers, public star parties, classes and support for astronomy in schoolrooms, and outreach programs just to name a few of the programs that your membership dues support.

Annual Membership dues will be:

\$20.00 for individuals, families, \$10.00 for students.

Contact Treasurer Jim Tubbs for dues information via e-mail: jtubbs015@msn.com

Donations to our club are always welcome and are even tax deductible. Please contact a board member for details.

Membership Benefits:

Lending Telescopes: The society currently has three telescopes for loan and would gladly accept others please contact President Robert Mayer, for more information on these and other benefits.



Telescopes are an individual thing and not practical for public use. However, everyone should have the experience of a good look at the moon for at least 5 minutes in their life time. It is a dimension and feeling that is unexplainable. Pictures or TV can't give this feeling, awareness, or experience of true dimension. A person will not forget seeing our closest neighbor, the moon. Norman Herrett in a letter to Dr. J. L. Taylor, president of the College of Southern Idaho, Twin Falls, ID, USA circa 1980.