

Snake River Skies

The Newsletter of the Magic Valley Astronomical Society

www.mvastro.org

Membership Meeting

Saturday, December 9th 2017
7:00pm at the
Herrett Center for Arts & Science
College of Southern Idaho.
Public Star Party Follows at the
Centennial Observatory

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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

Tim Frazier

MVAS president's message, January 2018

Happy New Year everyone! Last year went out with the amazing Geminids and this year begins with a [super moon](#) and the [Quadrantid](#) meteor shower. This shower normally has a very strong, if brief, peak but will be compromised by that bright moon. These provide beautiful celestial shows for welcoming in the New Year.

Another event worth celebrating is not about bright objects but quite the opposite: the nation's first dark sky reserve was officially opened in December. The [Central Idaho Dark Sky Reserve](#) covers 3600 square kilometers (1400 square miles), stretches from Ketchum to Stanley and includes land in three counties plus the Sawtooth National Recreation Area. It is the first such reserve in the U.S. and one of only 12 in the world. It is the third largest such reserve, exceeded only by ones in Canada and New Zealand. Hopefully we can schedule a star party in the new reserve this year.

Looking further into this month, our January 13th meeting is a telescope clinic for anyone with questions about their scopes. This year's clinic will be an open workshop forum with Rob, Gary and myself presenting different aspects of observing and equipment use. Everyone's input to this program is welcome. Please encourage any friends who might have received a telescope for Christmas, or simply have questions about getting one, to attend.

Another January event occurs on the 25th when we officially receive our grant money from First Federal Bank. The big check presentation will be at a noon luncheon held by First Federal at the Blue Lakes Country Club. Everyone is invited to attend but let me know if you plan to come, as the caterer needs a headcount.






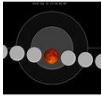
This grant, which will purchase a trailer for our equipment, would never have happened without the help of all of you and particularly the wonderful letters of recommendation from Kristin Fletcher of the Sawtooth Botanical Gardens, Diane Garcia from Hagerman Fossil Beds and, of course, Chris Anderson. This clear demonstration of our community service was the critical point that convinced the granting agency to fund our request. This whole process also shows what we can do as a group when we dedicate ourselves to a common goal. Who knows what else we can accomplish. A new, large club telescope perhaps?

Looking forward to a great New Year,

Tim

Calendars

January 2018

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1 New Year's Day 	2 Full Moon Wolf Moon  100% Visible	3	4	5	6
7	8 Last Quarter Visible 55% ↓ 	9	10	11	12	13
14	15 Martin Luther King Day	16	17 New Moon Lunation 1176 1% Visible ↑ 	18	19	20
21	22	23	24 First Quarter 46% Visible ↑ 	25	26	27
28	29	30	31 Total Lunar Eclipse see page 8 for Details 			

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Be Safe – Get Out There – Explore Your Universe

Celestial Calendar

All times, unless otherwise noted, are UT (subtract seven hours and, when appropriate, one calendar day for MST)

- 1/1 Mercury is at greatest western elongation (22.7 degrees) at 20:00; the Moon is at perigee, the closest one of 2018, subtending 33' 31" from a distance of 356,565 kilometers (221,559 miles), at 21:49
- 1/2 Full Moon of 2018, occurs in Gemini at 2:24; asteroid 8 Flora (magnitude +8.2) is at opposition in Gemini at 18:00; Uranus is stationary in right ascension at 21:00
- 1/3 The Earth is at perihelion (147,097,223 kilometers or 91,401,983 miles distant from the Sun) at 5:35; the Moon is 2.3 degrees south of the bright open cluster M44 (the Beehive Cluster or Praesepe) in Cancer at 19:50; the peak of the Quadrantid meteor shower (40 to 120 or more per hour) occurs at 20:00
- 1/4 The latest sunrise of 2018 at latitude 40 degrees north occurs today; the Moon is at the ascending node at 7:48
- 1/5 The Moon is 0.9 degree north of the first-magnitude star Regulus (Alpha Leonis), with an occultation occurring in northern Canada and Alaska, at 7:24
- 1/7 The latest onset of morning twilight of 2018 at latitude 40 degrees north occurs today; Mars is 0.25 degree south of Jupiter today
- 1/9 Venus is in superior conjunction at 7:00; Pluto is in conjunction with the Sun at 10:00
- 1/10 The Curtiss Cross, an X-shaped clair-obscure illumination effect located between the craters Parry and Gambart, is predicted to be at a midpoint at 17:13
- 1/11 The Moon is 4.3 degrees north of Jupiter at 5:59; the Moon is 4.6 degrees north of Mars at 10:03
- 1/12 The Moon is 0.4 degree south of the asteroid 4 Vesta at 4:00
- 1/13 Mercury (magnitude -0.3) is 0.6 degree north of Saturn (magnitude +0.5) at 8:00
- 1/15 The Moon is at apogee, subtending 29' 24" from a distance of 406,464 kilometers (252,565 miles), at 2:10; the Moon is 2.6 degrees north of Saturn at 2:13; the Moon is 3.4 degrees north of Mercury at 7:24
- 1/18 The Moon is at the descending node at 14:28
- 1/20 The Moon is 1.6 degrees south of Neptune at 20:00
- 1/23 Venus is at aphelion at 17:00
- 1/24 The Moon is 5.0 degrees north of Uranus at 1:00; the Lunar X (the Purbach or Werner Cross), an X-shaped illumination effect involving various rims and ridges between the craters La Caille, Blanchinus, and Purbach, is predicted to begin at approximately 4:42; sunrise takes place on the isolated lunar mountain Mons Pico at 9:53.
- 1/25 Sunrise takes place on the isolated lunar mountain Mons Piton at 1:12; Mercury is at aphelion at 11:00
- 1/27 The Moon is 0.7 degree north of the first-magnitude star Aldebaran (Alpha Tauri), with an occultation taking place in Canada, Alaska, and central and southern Asia, at 10:09
- 1/30 The Moon is at perigee, subtending 33' 17" from a distance of 358,994 kilometers (223,068 miles), at 9:57
- 1/31 The Moon is 2.3 degrees south of M44 at 7:19; asteroid 1 Ceres (magnitude +6.8) is at opposition in Cancer at 13:00; Full Moon occurs in Cancer at 13:27; a total lunar eclipse is underway, with the eclipsed Moon reaching greatest eclipse at 13:29; the Moon is at the ascending node at 18:46

Johannes Hevelius (1611-1687), Ernst Abbe (1840-1905), George Van Biesbroeck (1880-1974), Luboš Kohoutek (1935), and Stephen Hawking (1942) were born this month.

Galileo Galilei discovered Io, Europa, and Callisto on January 7, 1610. Galileo Galilei discovered Ganymede on January 13, 1610. Nicolas-Louis de Lacaille discovered NGC 3372 (the Eta Carinae Nebula) on January 25, 1752. Charles Messier discovered the globular cluster M56 on January 23, 1779. Charles Messier discovered the globular cluster M80 on January 4, 1781. William Herschel discovered the spiral galaxy NGC 1084 on January 10, 1785. Pierre François André Méchain discovered Comet 2P/Encke on January 17, 1786. William Herschel discovered Titania and Oberon, two satellites of Uranus, on January 11, 1787. Giuseppe Piazzi discovered the first asteroid, 1 Ceres, on January 1, 1801. Louis Daguerre took the first photograph of the Moon on January 2, 1839. Alvan Clark discovered the white dwarf star Sirius B (the Pup) on January 31, 1862. The 36-inch Clark refractor at the Lick Observatory saw first light on January 3, 1888. Charles Perrine discovered the Jovian satellite Elara on January 2, 1905. Philibert Jacques Melotte discovered the Jovian satellite Pasiphae on January 27, 1908. Clyde Tombaugh photographed Pluto on January 23, 1930. Mike Brown, Chad Trujillo, and David Rabinowitz discovered Eris on January 5, 2005.

The Sun, the Moon, & the Planets



The Sun is located in Sagittarius on January 1st. It enters Capricornus on January 19th.

Data (magnitude, apparent size, illumination, and distance from the Earth in astronomical units) for the planets and Pluto on January 1: Mercury (-0.3, 6.7", 62%, 1.00 a.u., Ophiuchus), Venus (-4.0, 9.8", 100%, 1.71 a.u., Sagittarius), Mars (+1.5, 4.8", 93%, 1.96 a.u., Libra), Jupiter (-1.8, 33.1", 99%, 5.96 a.u., Libra), Saturn (+0.5, 15.1", 100%, 11.03 a.u., Sagittarius), Uranus (+5.8, 3.5", 100%, 19.90 a.u. on December 16th, Pisces), Neptune (+7.9, 2.2", 100%, 30.61 a.u. on December 16th, Aquarius), Pluto (+14.3, 0.1", 100%, 34.45 a.u. on December 16th, Sagittarius).

During the evening, Uranus lies in the south and Neptune in the southwest. At midnight, Uranus is in the west. Mercury, Mars, and Saturn can be seen in the southeast and Jupiter in the south in the morning.

In early January, the Sun, Venus, Saturn, and Pluto are all located in Sagittarius and Mars and Jupiter are located in Libra. On January 11th, the waning crescent Moon, Mars, and Jupiter form a compact triangle in the pre-dawn sky. Mercury, Saturn, and a very thin waning crescent Moon form a triangle very low in the southeastern morning sky on January 15th.

Mercury grows brighter (magnitude -0.3 to magnitude -0.5) as it shrinks in apparent size (6.7 arc seconds to 4.9 arc seconds) but waxes in phase (62% illumination to 95% illumination) during the course of the month. Mercury is at greatest western elongation on January 1st. On January 13th, Mercury and Saturn are only 0.6 degree apart.

Venus reaches superior conjunction on January 9th and consequently is not visible this month.

Earth is 0.9833 a.u. distant from the Sun at perihelion on January 3rd. On that date, it's 3% (5.0 million kilometers or 3.1 million miles) closer to the Sun than at aphelion on July 6th and about 2.7% closer to the Sun than on average.

Mars grows a bit larger and brighter and exhibits a gibbous phase this month. The Red Planet (magnitude +1.5) lies 2.6 degrees west of Jupiter (magnitude -1.8) on the first day of the year. Mars passes 0.6 degree north of the third-magnitude double star Zubenelgenubi (Alpha Librae) on January 2nd. Mars and Jupiter are separated by just 16 arc minutes, their closest conjunction since 2004, on January 7th. Mars is 4.6 degrees south of the waning crescent Moon on January 11th. It enters Scorpius on January 31st. On that date, Mars is positioned nine degrees northwest of Antares (magnitude +1.1), the rival of Mars.

During January, **Jupiter's** disk increases in size from 33.1 arc seconds to 35.8 arc seconds as it brightens from magnitude -1.8 to magnitude -2.0. Data on Galilean satellite events is available online at <http://www.shallowsky.com/jupiter/> and <http://www.skyandtelescope.com/observing/interactive-sky-watching-tools/> and on page 51 of the January 2018 issue of Sky & Telescope. Click on <http://www.skyandtelescope.com/observing/interactive-sky-watching-tools/> or consult page 50 of the January 2018 issue of Sky & Telescope to determine transit times of the central meridian by the Great Red Spot.

Saturn climbs higher into the morning sky as the month progresses. It attains an altitude of about ten degrees an hour before sunrise by January's end. At that time, the Ringed Planet rises over two hours before the Sun.

Throughout January, Uranus can be found approximately 3 degrees north of the fifth-magnitude star Mu Piscium.

Neptune is located 0.5 degree southeast of the fourth-magnitude star Lambda Aquarii on January 1st. By the end of the month, Neptune lies 1.1 degrees due east of that star.

Online finder charts for Uranus and Neptune can be found at <http://www.nakedeyeplanets.com/uranus.htm> and <http://www.nakedeyeplanets.com/neptune.htm> and also at http://www.skyandtelescope.com/wp-content/uploads/WEB_Uranus_Neptune17.pdf

For more on the planets and how to locate them, browse <http://www.nakedeyeplanets.com/> and <https://freestarcharts.com/planets-this-month>

The dwarf planet **Pluto** is in conjunction with the Sun on January 7th.

Asteroids



Asteroid 20 Massalia drops slightly in brightness to ninth magnitude as it takes a westward course through eastern Taurus this month. It passes about 0.5 degree to the west of the fifth-magnitude star 114 Tauri on January 1st and 0.2 degree to the south of the fifth-magnitude star 109 Tauri on January 10th and January 11th. Massalia is positioned approximately 0.5 degree south of the sixth-magnitude star 108 Tauri on January 18th and is even closer on January 31st as it proceeds on an eastward prograde loop. The dwarf planet/asteroid 1 Ceres (magnitude +6.8) is at opposition in Cancer on January 31st. See http://asteroidoccultation.com/2018_01_si.htm for information on asteroid occultation events taking place this month. Consult <http://www.curtrenz.com/asteroids.html> to learn more about a number of asteroids.

Comets



Comet C/2016 R2 (PanSTARRS) may shine at tenth magnitude as it glides northwestward through Taurus. It passes about two degrees southwest of Melotte 25 (the Hyades) on January 1st. By January 31st, the comet lies a bit more than two degrees to the southeast of M45 (the Pleiades). Visit <http://cometchasing.skyhound.com/> and <http://www.aerith.net/comet/future-n.html> for information on comets visible this month and in the near future. A discussion on upcoming comets for this year can be heard at <https://soundcloud.com/observersnotebook/the-observers-notebook-bright-comets-for-2018>

Meteors



The Quadrantid meteor shower peaks on January 3rd. Bright moonlight from the 96%-illuminated, waning gibbous Moon will compromise the peak of this year's Quadrantids. The Quadrantid shower can sometimes reach zenithal hourly rates of more than 100 meteors per hour for a relatively short period of time. The radiant of the Quadrantids lies at the junction of the constellations of Boötes, Hercules, and Draco, in what was once called Quadrans Muralis. The near-Earth asteroid 2003 EH1, which may be an extinct comet, is believed to be the source of these meteors. See page 51 of the January 2018 issue of Sky & Telescope or browse <http://earthsky.org/?p=155137> and <http://meteorshowersonline.com/quadrantids.html> for more on the Quadrantids.

Carbon Star



Notable carbon star: R Leporis (Hind's Crimson Star) Right Ascension: 04^h 59^m 36.3487^s Declination: -14° 48' 22.518"

ISS



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/>

A wealth of information on the celestial bodies comprising the solar system is posted at <http://www.curtrenz.com/astronomy.html> and <http://nineplanets.org/>

The Deep Sky



Free star maps for January can be downloaded at <http://www.skymaps.com/downloads.html> and <http://www.telescope.com/content.jsp?pageName=Monthly-Star-Chart>

Omicron2 (40) Eridani is a fourth-magnitude triple star system consisting of three dwarf stars: a type K1V yellow-orange dwarf (A) known as Keid, a type DA4 white dwarf (B), and a type M4.5e red dwarf ©. Omicron is located about 16 light years from the Earth at 4h15m16.32s, -7°39'10.34". Ninth-magnitude Omicron B is the most easily visible white dwarf star and can be seen with an aperture of six inches.

The famous eclipsing variable star Algol (Beta Persei) is at a minimum, decreasing in magnitude from 2.1 to 3.4, on January 1st, 4th, 7th, 10th, 13th, 15th, 18th, 21st, 24th, 27th, and 30th. Consult page 50 of the January 2018 issue of Sky & Telescope for the times of the minima. The Demon Star is at minimum brightness for approximately two hours centered at 9:19 p.m. EST on January 10th and at 11:04 p.m. EST on January 30th. For more on Algol, see <http://stars.astro.illinois.edu/sow/Algol.html> and <http://www.solstation.com/stars2/algol3.htm>

A wealth of information on solar system celestial bodies is posted at <http://www.curtrenz.com/astronomy.html> and <http://nineplanets.org/>

Data on current supernovae can be found at <http://www.rochesterastronomy.org/snimages/>

Information on observing some of the more prominent Messier galaxies is available at <http://www.cloudynights.com/topic/358295-how-to-locate-some-of-the-major-messier-galaxies-and-helpful-advice-for-novice-amateur-astronomers/>

Finder charts for the Messier objects and other deep-sky objects are posted at <https://freestarcharts.com/messier> and <https://freestarcharts.com/ngc-7023> and http://www.cambridge.org/features/turnleft/seasonal_skies_october-december.htm

Telrad finder charts for the Messier Catalog and the SAC's 110 Best of the NGC are posted at http://www.astro-tom.com/messier/messier_finder_charts/map1.pdf and <http://www.saguaroastro.org/content/db/Book110BestNGC.pdf> respectively.

Deep-sky object list generators can be found at <https://dso-browser.com/> and <http://www.virtualcolony.com/sac/> and <http://tonightssky.com/MainPage.php>

Freeware sky atlases can be downloaded at <http://www.deepskywatch.com/index.html> (Click on Sky Atlas) and <https://www.uv.es/jrtorres/triatlas.html>

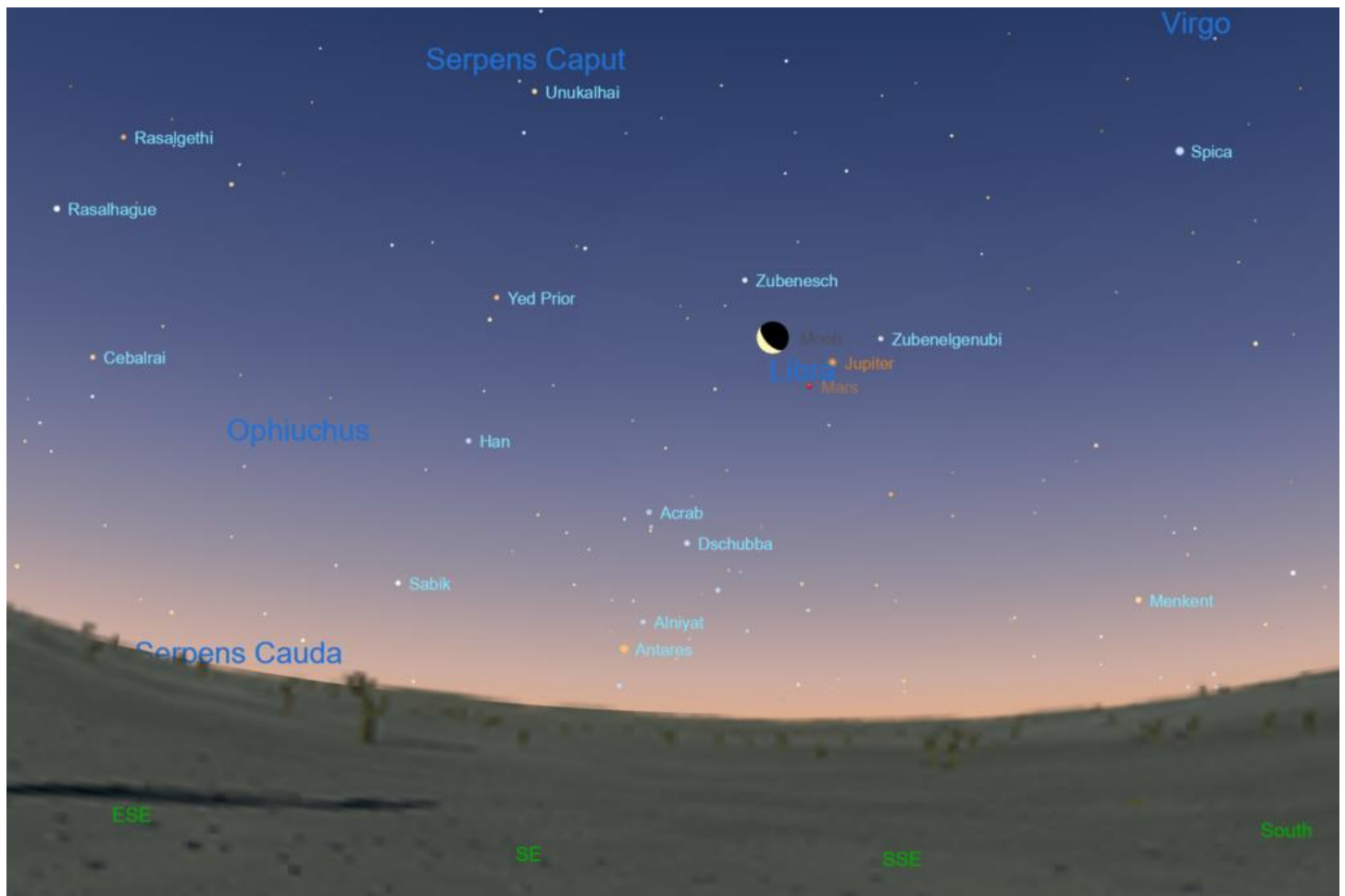
Seventy deep-sky objects for January: B26-28, B29, M36, M37, M38, NGC 1664, NGC 1778, NGC 1857, NGC 1893, NGC 1907, NGC 1931 (Auriga); IC 361, Kemble 1 (Kemble's Cascade asterism), NGC 1501, NGC 1502, NGC 1530, NGC 1569 (Camelopardalis); NGC 1507, NGC 1518, NGC 1531, NGC 1532, NGC 1535, NGC 1537, NGC 1600, NGC 1637, NGC 1659, NGC 1700 (Eridanus); IC 418, M79, NGC 1832, NGC 1888, NGC 1964 (Lepus); B33, Cr65, Cr69, Cr70, IC 434, M42, M43, M78, NGC 1662, NGC 1973-75-77, NGC 1981, NGC 1999, NGC 2022, NGC 2023, NGC 2024, NGC 2112 (Orion); Be11, NGC 1491, NGC 1496, NGC 1499, NGC 1513, NGC 1528, NGC 1545, NGC 1548, NGC 1579, NGC 1582, NGC 1605, NGC 1624 (Perseus); DoDz3, DoDz4, M1, Mel 25, NGC 1514, NGC 1587, NGC 1647, NGC 1746, NGC 1807, NGC 1817 (Taurus)

Top ten binocular deep-sky objects for January: Cr65, Kemble 1, M36, M37, M38, M42, NGC 1528, NGC 1647, NGC 1746, NGC 1981

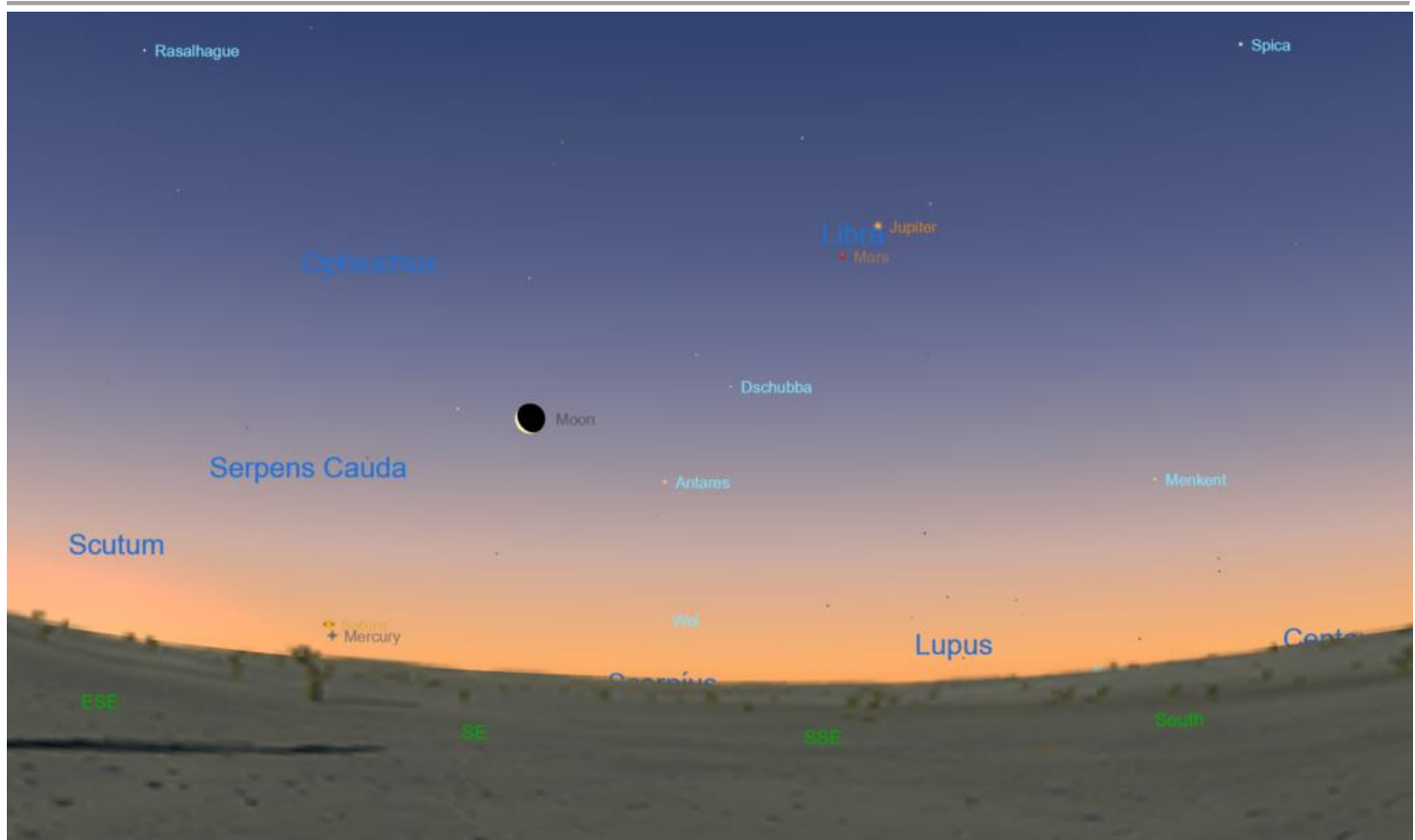
Top ten deep-sky objects for January: M1, M36, M37, M38, M42, M43, M78, M79, NGC 1501, NGC 2024

Challenge deep-sky object for January: IC 2118 (Eridanus)

The objects listed above are located between 4:00 and 6:00 hours of right ascension.



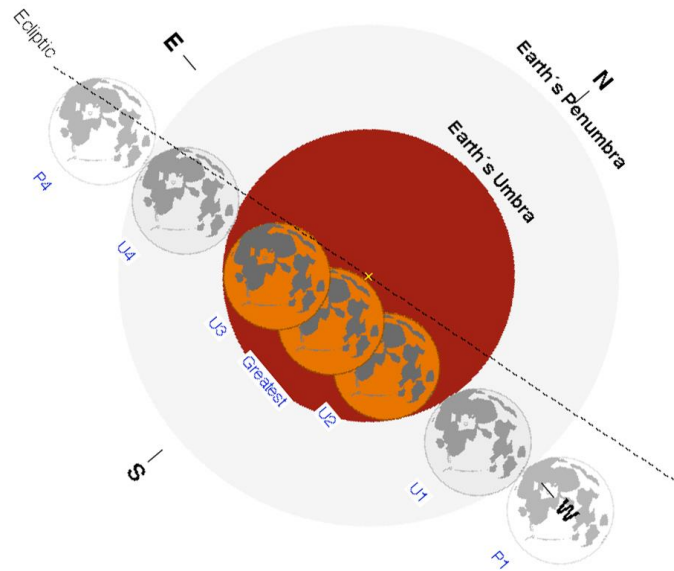
Jupiter, Mars, and the Moon on the early morning of January 11, 2018.



Saturn and Mercury rise low over the eastern horizon before dawn on January 13, 2018. A waning crescent Moon, Jupiter, and Mars are also visible.

The Total Lunar Eclipse of Wednesday, January 31st, 2018

This is the only eclipse of any kind (lunar or solar) visible in Idaho this year, the next being another total lunar eclipse in January of 2019.



Adapted from a [diagram by NASA](#). Note that, although the moon's orbital motion will cause it to move to the upper left relative to Earth's shadow, it (and the shadow) will be moving to the lower *right* (towards the western horizon) due to Earth's rotation. Thus, for observers in the U.S., the moon will be moving lower in the sky relative to the local horizon throughout the eclipse.

Eclipse timeline (all times listed are in Mountain Standard Time (UT-7 hrs.), and rise/set/twilight times are given for Twin Falls, Idaho, USA):

- 3:51 AM — **First penumbral contact (P1)**. The upper left edge of the moon begins to enter Earth's penumbral (partial) shadow. The subtle decrease in illumination of the moon will not be noticeable to the eye.
- 4:30 AM — **Centennial Observatory opens** for telescope viewing, weather permitting. **Please dress warmly!** By this time, the upper left edge of the moon should be noticeably darkened.
- 4:48 AM — **First umbral contact (U1)**. The moon begins to enter Earth's umbral (full) shadow. A small, dark "bite" begins to grow ever larger from the moon's upper left edge.
- 5:52 AM — **Total phase begins (U2)** (second umbral contact). The moon is completely immersed in Earth's umbra, appearing dark red-orange, orange-brown, or darker depending on global atmospheric conditions.
- 6:16 AM — **Start of astronomical twilight**. The first hint of pre-dawn glow begins to appear low in the east.
- 6:25 AM — **Moon too low for viewing with the Norman Herrett telescope**. Now 15° above the horizon, the moon can no longer be tracked with the observatory's 24" telescope. Smaller telescopes will be used on the second-story Stargazers' Deck.
- 6:31 AM — **Greatest eclipse**. The moon reaches its maximum excursion into the umbral shadow, appearing at its darkest for this eclipse. For this particular eclipse, the moon passes just south of the center of Earth's full (umbral) shadow, so it should appear fairly dark, with the lower left edge possibly appearing very subtly brighter than the upper right, which is deepest into the shadow.
- 7:08 AM — **Total phase ends (U3)** (third umbral contact). The moon begins to emerge from Earth's umbra, with a growing, bright sliver appearing at left edge of the lunar disk.
- 7:30 AM — **Observatory closes**. With the moon roughly half-way out of the umbral shadow, it will be too low to view due to the trees to the west of the observatory.
- 7:53 AM — **Sunrise**
- 7:58 AM — **Moonset**. The moon sets as seen from southern Idaho. The emergence from the umbral shadow (U4, at 8:11 AM), and the penumbral shadow (P4, at 9:08 AM) occur after the moon has passed below our local horizon.

This information is provided by Chris Anderson via the Herrett Center / Centennial Observatory website

Looking Through the Eyepiece

Phil Harrington's Cosmic Challenge

Target	Type	Best lunar phase (days after New Moon)
Lunar X, X2, Lunar V, and Aries' Hoofprint	Terminator shadow formations	Day 7
Suggested Aperture	Small Telescopes 3" - 6"	Big Binoculars 76.2mm - 152.4mm

The Moon's terminator is a fascinating sight through all telescopes. Here, along the lunar sunset/sunrise line, lighting can strike familiar lunar features in very unusual ways, transforming them in ways that go unsuspected when the Sun rides high overhead.

Such strange lighting effects are referred to by many as *Clair-Obscur Effects*. The term is adopted from an oil painting technique developed during the Renaissance that uses varying shades of colors and contrasts to create dramatic, three-dimensional effects. In painting, the Italian term *chiaroscuro* (translated "light-dark") is also used often for the same technique.

No region is richer in lunar *Clair-Obscur Effects* than the terminator on the night of First Quarter. Luna's brightness is not so overpowering that it dazzles our eyes, yet there is enough terrain showing that lets us enjoy its "magnificent desolation," as Apollo 11 astronaut Edwin Aldrin put it in 1969 when he became the second man to walk on that distant surface.

As the Sun rises higher in the lunar sky, its narrow angle plays wonderfully against the rugged terrain. Most unusual of all is sunrise near the crater Werner. In August 2004, Canadian amateur astronomer David Chapman noticed an odd apparition along the First Quarter's terminator. Northwest of the crater Werner, which was just seeing sunlight at the time, Chapman saw an "X" seemingly floating in darkness, detached from the sunlit surface. His letter about the apparition that ran in the November/December 2004 issue of the Canadian astronomy magazine [SkyNews](#) started a flood of observations, photographs, sketches, and reports by others who excitedly saw the X.



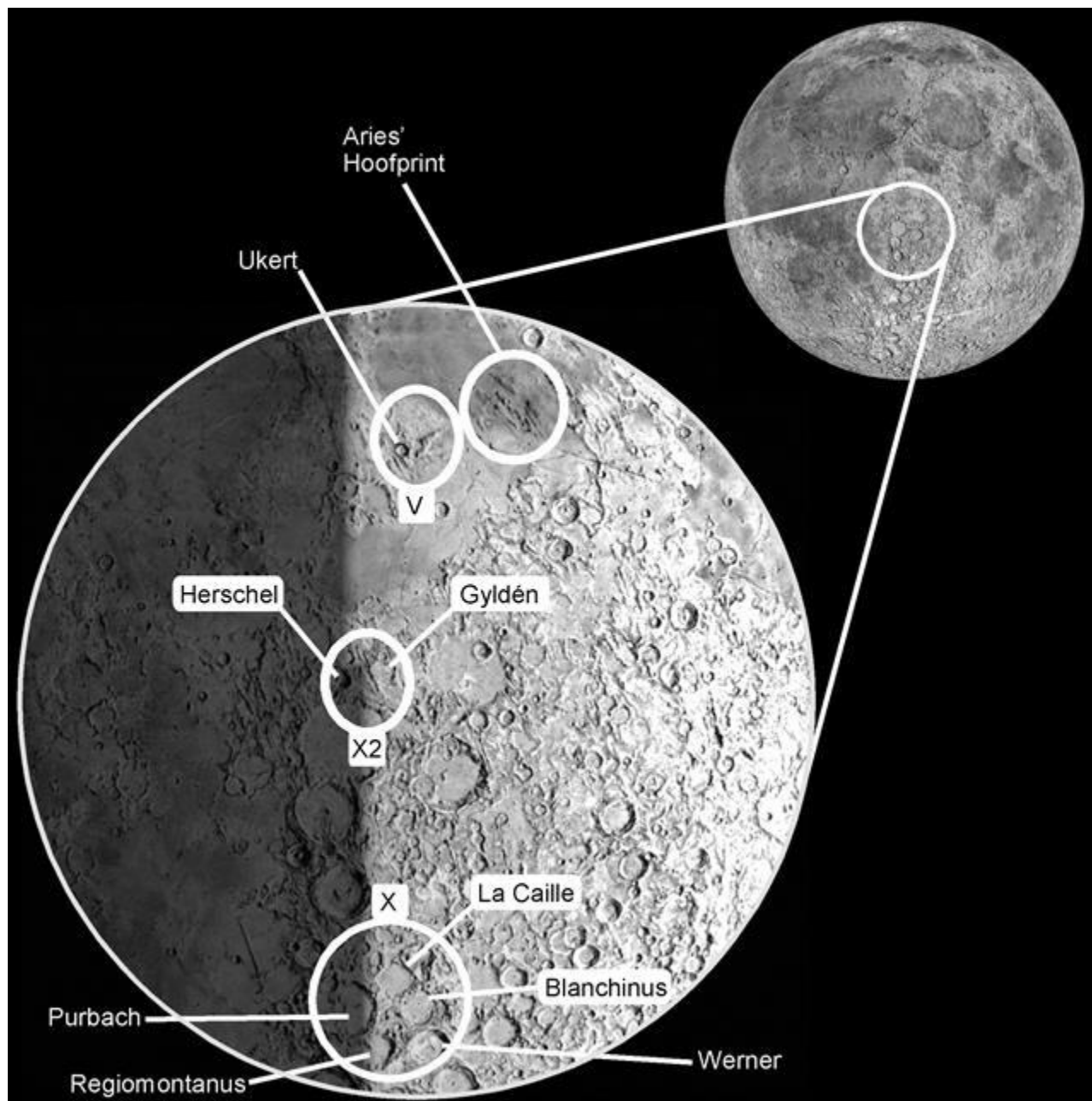
Above: Photo of the Lunar X, Lunar V, and Aries' Hoofprint.
Credit: Dan Wright using the Westport (CT) Astronomical Society's 12.5-inch f/4.8 reflector and Canon EOS 300D.

It turns out that Chapman's observation of the X was not the first. The formation is well seen on the First Quarter image among Lick Observatory's famous series of high-resolution lunar photos taken decades ago. This image has appeared in countless publications, including my own book: [Touring the Universe through Binoculars](#). But Chapman was apparently the first person to notice it and put a name to it.

The Lunar X, also known to some as the Werner X, is easy to see as long as you are looking in the right place and at the right time. Timing is critical! The X is formed by the confluence of four lunar craters: Purbach, La Caille, Regiomontanus, and Blanchinus. Purbach forms the eastern side of the X, while Blanchinus creates the western side. La Caille forms its northern boundary, and lastly, Regiomontanus marks the southern section.

The X's namesake, 70-kilometer-wide Werner, does not contribute directly. Instead, as Chapman points out, "Werner is the closest well-lit crater and makes an obvious beacon for observers."

Below: Finder chart for this month's [Cosmic Challenge](#). Compare this chart with the photos above and below. Chart created using Virtual Moon Atlas software and adapted from **Cosmic Challenge** by Phil Harrington. [Click on the chart to open a printable PDF version in a new window.](#)



High magnification is not required to see this unique lighting effect. I've had no trouble spotting it with 20x through a 4.5-inch Newtonian reflector. Indeed, it can even be seen through binoculars. But timing is important.

If the timing is right, it's fascinating to watch the Sun rise over the X, slowly unveiling its ragged form over the course of an hour or so. The first rays catch the southeastern wall of Purbach. As the Sun climbs higher in the lunar sky, the X grows as Purbach's northeastern wall is lit, eventually merging with the southeastern rim to form one side of the X. The southwestern side of Blanchinus next sees the light, followed finally by La Caille to form the X. If you are a few hours late, the shadowing effect is lost and the X illusion disappears.

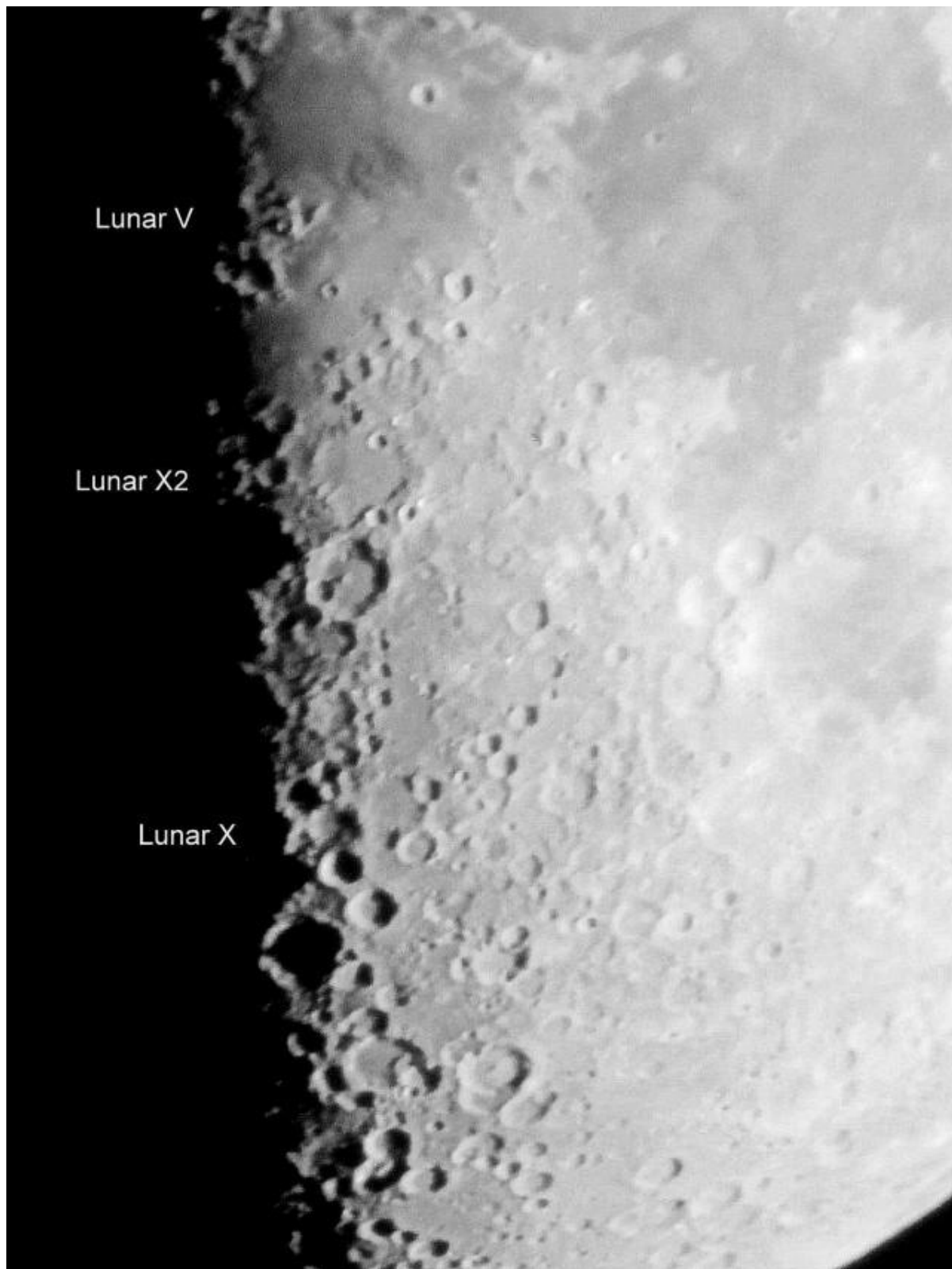
While you're enjoying the X, be sure not to miss the Lunar V, which lies nearby. That's right, we have another letter of the alphabet visible at the same time just to the X's north. The V is sandwiched between Mare Vaporum to its north and Sinus Medii to its south. This puts it more or less smack dab in the center of the disk.

The so-called Lunar V is formed by low-angled sunlight spangled across several small craters. The largest, 23-kilometer Ukert, forms a portion of the V's western edge, while a pair of intersecting ridges create the rest of the western edge as well as the eastern edge. Although the Lunar V is every bit as obvious as the Lunar X, it hasn't quite attracted the same level of attention among devout lunatics. Since both are visible at the same time, why not try both?

Incidentally, Ukert displays an unusual V-shaped triangular floor after the Sun has climbed higher in its sky. Return here within a few days of Full Moon to see this unusual appearance. Finding tiny Ukert at this phase will prove very difficult, but patient searching at 100x or more should let you reel it in. The triangular appearance of Ukert's floor has raised the eyebrows of paranormalists and ufologists for decades. Could this unusual appearance be artificial?? Is Ukert an extraterrestrial construction site??? I guess you'll have to judge for yourself.

As the X and V are drawing your attention, shift your concentration just to the east of the V and Ukert to a shadow feature nicknamed Aries' Hoofprint. First mentioned by name a decade ago in an edition of Astronomy magazine's e-mail newsletter, Aries' Hoofprint is formed from an intricate combination of brightly lit mountains and dark lava channels. Some call this striking *chiaroscuro* the "Horseshoe," while others prefer "Lunar Lips." If we want to alphabetize it, I supposed the "Lunar U" might be apropos. Personally, I favor the hoofprint analogy myself. On older lunar maps, you may find the area labeled "Mount Schneckenberg," which translates to "Snail Mountain." That odd name, bestowed by the International Astronomical Union, has since been retired.

Finally, return to the area an hour or two past the X's peak prominence and look halfway between it and the V. Can you spot a second X? Lunar X2 was first noticed by CN'er Dave Mitsky from Harrisburg, PA. Back on February 17, 2013, he described "a second Lunar X between the two other clair-obscure illumination effects." Referencing the [Virtual Moon Atlas](#), it appears that X2 is formed by the craters Gylde (to the east), Sporer (north), and maybe Herschel (west, in shadow).



Above: Photo of the Lunar X, X2, and Lunar V.

Credit: Dave Mitsky using a 6-inch f/8 Orion SkyQuest XT6 Dob and a Canon PowerShot SD980 IS camera.

The table below lists upcoming opportunities to spot all four of these Clair-Obscur features in 2018. The X and V will remain visible for up to two hours after the listed time, while X2 is at its best an hour or two past the stated time. The Hoofprint can be spotted up to an hour or so before the listed times and will remain visible for a few hours after.

2018 Lunar Alphabet Soup Visibility Timetable

Date	Time (UT)
Jan 24	04:35
Feb 22	18:05
Mar 24	06:59
Apr 22	19:18
May 22	07:08
Jun 20	18:42
Jul 20	06:15
Aug 18	18:05
Sep 17	06:25
Oct 16	19:21
Nov 15	08:49
Dec 14	22:39
Note: The dates and times listed are based on calculations made with the Lunar Terminator Visualization Tool by Jim Mosher and Henrik Bondo. This useful freeware program may be downloaded from http://ltvt.wikispaces.com/LTVT .	

What other Clair-Obscur Effects have you spotted on the Moon? I'd love to hear about them, and possibly do a part 2 to this challenge sometime in the future. Drop me a line via my web site. Or better still, post your recommendations in this column's discussion forum for all to read.

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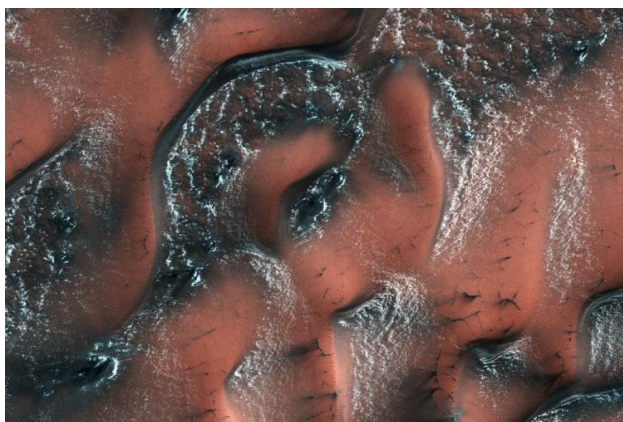
Snowy Worlds Beyond Earth

By Linda Hermans-Killiam

There are many places on Earth where it snows, but did you know it snows on other worlds, too? Here are just a few of the places where you might find snow beyond Earth:

Mars

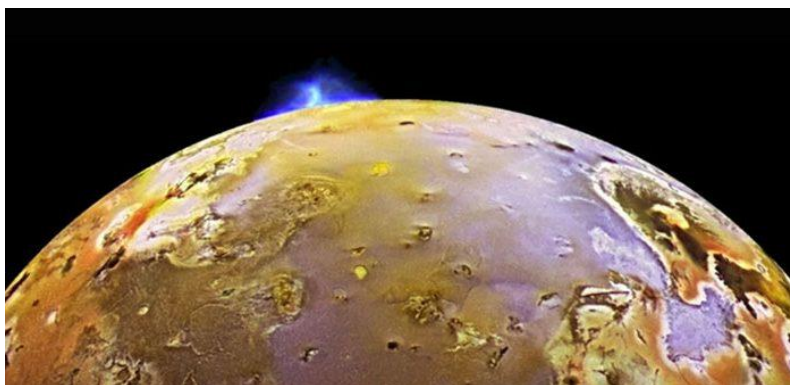
The north pole and south pole of Mars have ice caps that grow and shrink with the seasons. These ice caps are made mainly of water ice—the same kind of ice you'd find on Earth. However, the snow that falls there is made of carbon dioxide—the same ingredient used to make dry ice here on Earth. Carbon dioxide is in the Martian atmosphere and it freezes and falls to the surface of the planet as snow. In 2017, NASA's Mars Reconnaissance Orbiter took photos of the sand dunes around Mars' north pole. The slopes of these dunes were covered with carbon dioxide snow and ice.



NASA's Mars Reconnaissance Orbiter captured this image of carbon dioxide snow covering dunes on Mars.
Credit: NASA/JPL/University of Arizona

A Moon of Jupiter: Io

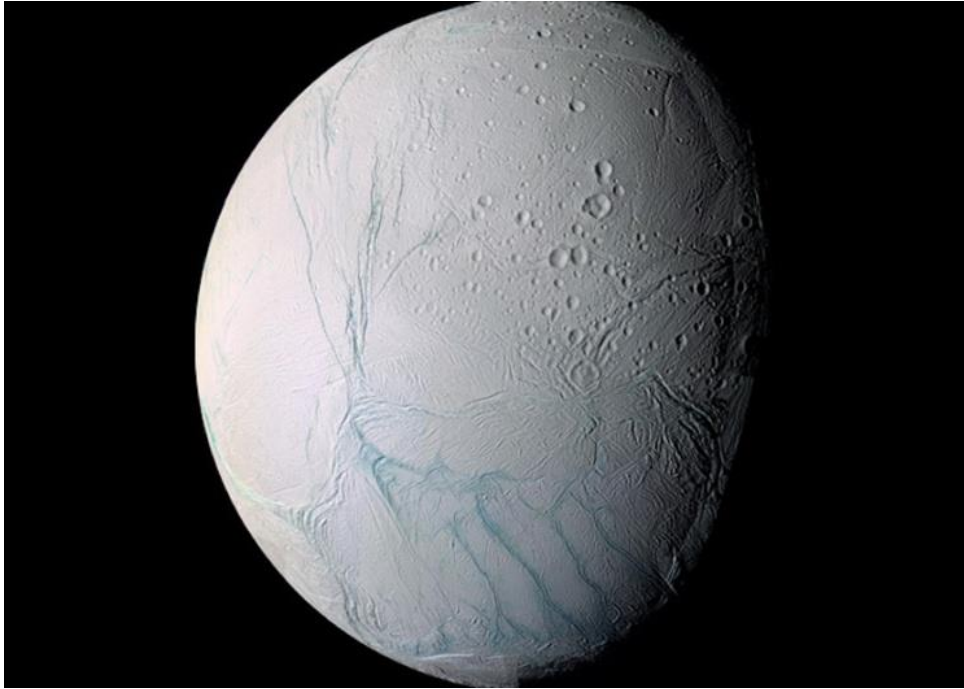
There are dozens of moons that orbit Jupiter and one of them, called Io, has snowflakes made out of sulfur. In 2001, NASA's Galileo spacecraft detected these sulfur snowflakes just above Io's south pole. The sulfur shoots into space from a volcano on Io's surface. In space, the sulfur quickly freezes to form snowflakes that fall back down to the surface.



A volcano shooting molten sulfur out from the surface of Io.
Credit: NASA/JPL-Caltech

A Moon of Saturn: Enceladus

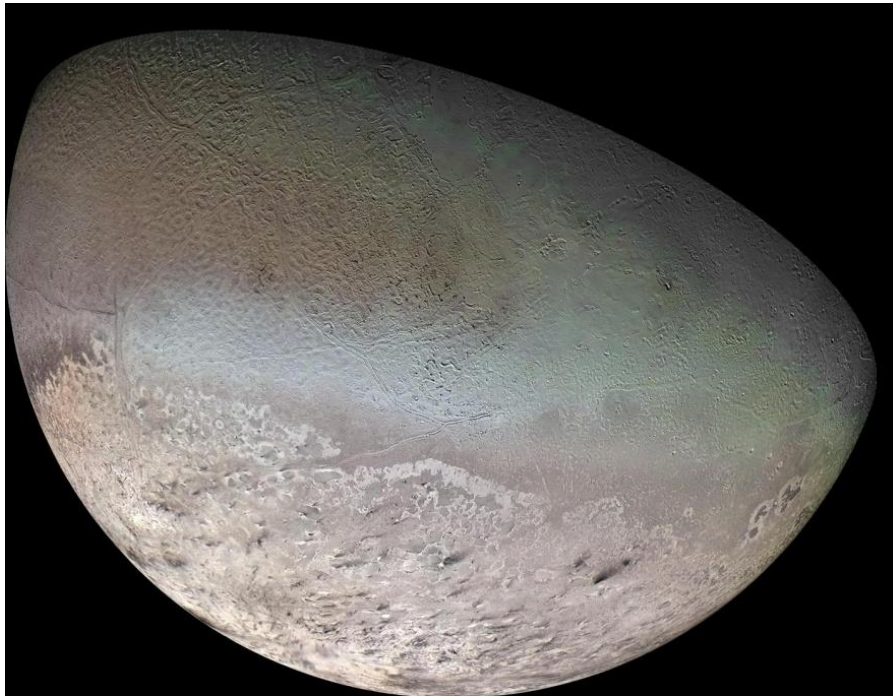
Saturn's moon, Enceladus, has geysers that shoot water vapor out into space. There it freezes and falls back to the surface as snow. Some of the ice also escapes Enceladus to become part of Saturn's rings. The water vapor comes from a heated ocean which lies beneath the moon's icy surface. (Jupiter's moon Europa is also an icy world with a liquid ocean below the frozen surface.) All of this ice and snow make Enceladus one of the brightest objects in our solar system.



Enceladus as viewed from NASA's Cassini spacecraft. Credit: NASA

A Moon of Neptune: Triton

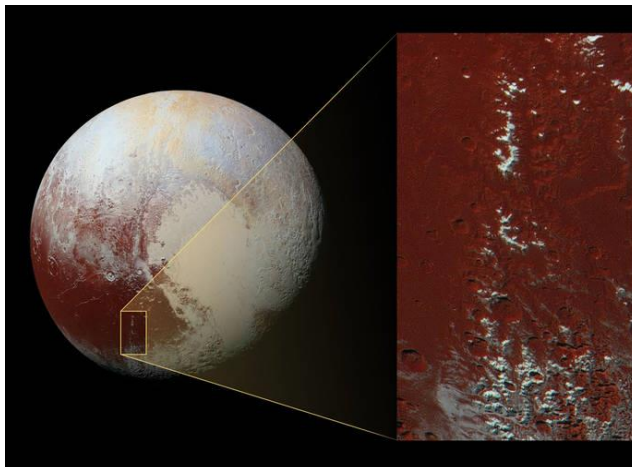
Neptune's largest moon is Triton. It has the coldest surface known in our solar system. Triton's atmosphere is made up mainly of nitrogen. This nitrogen freezes onto its surface covering Triton with ice made of frozen nitrogen. Triton also has geysers like Enceladus, though they are smaller and made of nitrogen rather than water.



The Voyager 2 mission captured this image of Triton. The black streaks are created by nitrogen geysers. Credit: NASA/JPL/USGS

Pluto

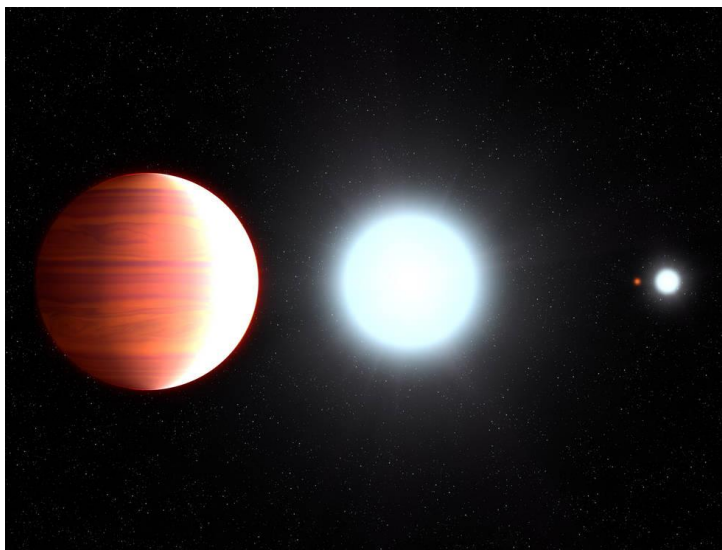
Farther out in our solar system lies the dwarf planet Pluto. In 2016, scientists on the New Horizons mission discovered a mountain chain on Pluto where the mountains were capped with methane snow and ice.



The snowy Cthulhu (pronounced kuh-THU-lu) mountain range on Pluto.
Credits: NASA/JHUAPL/SwRI

Beyond Our Solar System

There might even be snow far outside our solar system! Kepler-13Ab is a hot, giant planet 1,730 light years from Earth. It's nine times more massive than Jupiter and it orbits very close to its star. The Hubble Space Telescope detected evidence of titanium oxide—the mineral used in sunscreen—in this planet's upper atmosphere. On the cooler side of Kepler-13Ab that faces away from its host star, the planet's strong gravity might cause the titanium oxide to fall down as "snow."



This is an artist's illustration of what Kepler-13Ab might look like. Credit: NASA/ESA/G. Bacon (STScI)

Want to learn more about weather on other planets? Check out NASA Space Place: <https://spaceplace.nasa.gov/planet-weather>

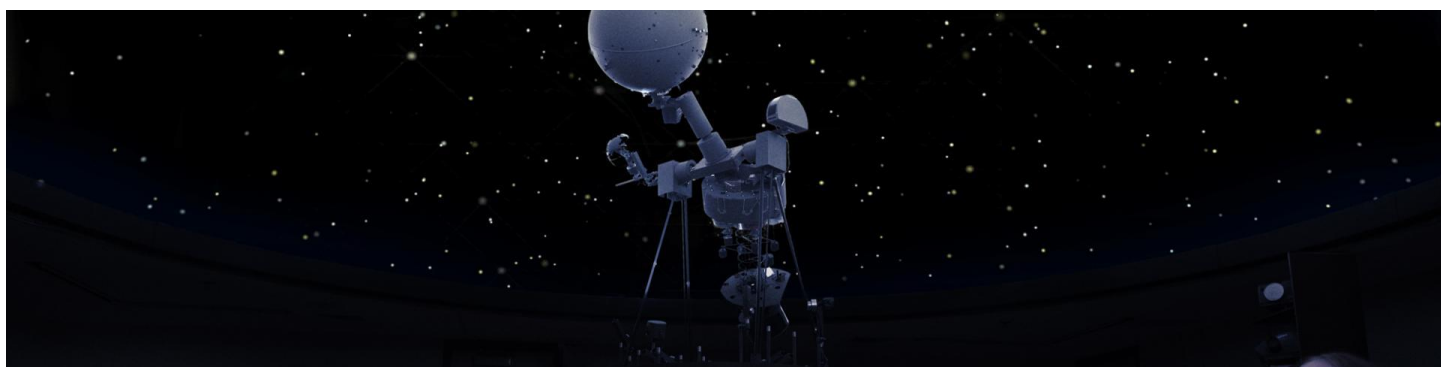
Observatories and Planetariums

Bruneau Dunes Observatory – Bruneau Dunes State Park, Bruneau, ID



The observatory is now **closed** for the season as of October 14th.

Whittenberger Planetarium – Caldwell, Idaho



Public Show Schedules and Information

[Schedule](#)

CSI Centennial Observatory / Faulkner Planetarium Herrett Center

Event	Place	Date	Time	Admission
Twin Falls Parks & Recreation "Cabin Fever Day" Solar Viewing	Centennial Observatory	Saturday, January 6 th , 2018	11:00 AM to 2:00 PM	FREE
Telescope Tuesday	Centennial Observatory	Tuesday, January 9 th , 2018	6:30 to 9:00 PM	\$1.50 or free with Faulkner Planetarium admission
Monthly Free Star Party	Centennial Observatory	Saturday, January 13 th , 2018	6:30 PM to midnight	FREE
Telescope Tuesday	Centennial Observatory	Tuesday, January 23 rd , 2018	6:45 to 9:00 PM	\$1.50 or free with Faulkner Planetarium admission
Total Lunar Eclipse	Centennial Observatory	Wednesday, January 31 st , 2018	4:30 to 7:30 AM	FREE

College of Southern Idaho Campus Twin Falls, ID Faulkner Planetarium / Show Times

<http://herrett.csi.edu/astronomy/planetarium/showtimes.asp>

[Now Showing](#)

About the Magic Valley Astronomical Society

Magic Valley Astronomical Society
550 Sparks St.
Twin Falls, ID

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, and \$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.