AOH OBSERVER

Summer 2019

The Newsletter of the Astronomers of Humboldt

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Thank you to Catrina Howatt, Ken Yanosko, and Greta Turney for your contribution of images to this Issue.

AOH Summer Calendar 2019.

The most updated information for each event can be found at **http://astrohum.org/upcoming.html.**

Saturday June 1. **Regular Monthly Meeting/Public Observing.**
We plan to meet at Kneeland Airport at 8:00 pm. Check the weather and the Kneeland Sky Cam.
The most up to date information will be posted on the events page at **www.astrohum.org.**

Saturday June 22. **Star Party at Albee Creek Campground** (HRSP). Volunteers meet at 8:00 p.m. at the meadow to the south of the Kiosk. Contact grace@astrohum.org if you plan to attend. Rain cancels this event.

Saturday June 29. **Regular Monthly Meeting/Public Observing at Kneeland.** Since this is the nearest Saturday to the July 2 new moon, technically this is a July meeting. Check website for location and meeting time.

Saturday July 20. **Fiftieth Anniversary of Apollo 11 Moon landing**. This event will take place at Burlington Campground (HRSP). There will be afternoon activities in the picnic area, a campfire talk at the Amphitheater, and an evening star party. Contact grace@astrohum.org if you would like to participate.

Saturday August 3. **Regular Monthly Meeting/Public Observing at Kneeland.** Check website for location and meeting time.

Monday August 12. **Perseid Meteor Shower**. Observe on your own.

Saturday August 17. **Star Party at Albee Creek Campground** (HRSP). Volunteers meet at 7:00 p.m. at the meadow to the south of the Kiosk. Contact grace@astrohum.org if you plan to attend. Rain cancels this event.

Saturday August 31. **Regular Monthly Meeting/Public Observing at Kneeland.** Check website for location and meeting time.

Spring 2019 Outreach/Club Activities Report

We had more rain than sunshine during Spring 2019. In spite of the dreary weather, the AOH managed to host several outreach events that included telescope observing. We broke a few curses (more on that later), introduced some new activities from our Night Sky Network toolkits, and made a positive contribution to our community. Thank you to our volunteers for coming out to these events, and sharing your knowledge and enthusiasm with our visitors. All images shown were taken by Grace Wheeler except where noted.

HSU Natural History Museum Discovery Day, March 30

The first outreach event for the spring was held at HSU Natural History Museum. The theme of this year's Discovery Day was "Journey through Time." In keeping with the topic, Mark Wilson and I brought the meteorite collection and talked about why scientists study these ancient rocks to understand what the early solar system was like, and how the inner rocky planets were formed. We also talked about the physical and chemical attributes of meteorites, and how these were similar and different from Earth rocks. The kids (and parents) did the "meteorites and meteorwrongs" activity, and some of the kids went meteorite hunting in our mock-up of a desert landscape. Melinda Bailey lent us the Museum's meteorite collection (see below) and encouraged us to let the visitors handle them.

Mark and Grace at the space rock display. (Image credit: Ken Yanosko)

The Museum's meteorite collection. The size of these meteorites is impressive.

Using magnets to assess the iron content of a stony chondrite and an iron meteorite.

Answering the question "Where do space rocks come from?"

Searching for meteorites using color, density, texture, and Iron content.

Outside the Museum, we set up telescopes to view the Moon, Venus (Ken Y.) and the Sun (Becky C.) Several people off the street wandered by to look through the scopes. For many, it was the first time that they had ever looked through a telescope, or have seen any celestial object through a telescope. In the four years that we have presented at the Museum, this was the first time that we had clear skies (the curse of the cloudy skies broken!)

Viewing the moon through Ken's Dob.

A look at Venus (and the mirror) through a C-6.

Viewing the sun through a hydrogen-alpha solar telescope.

Becky showing the different layers of the Sun's atmosphere.

AOH Messier Marathon/Public Observing, March 30

After two years of not having a Messier Marathon, the ”curse” was finally lifted, and we were able to have one at Kneeland Airport. President Brent Howatt called up and ordered good weather, and what was looking marginal on Friday, turned out to be clear on Saturday (good call Brent). Except for the fog bank to the west and haziness to the south, the skies were clear, and we saw plenty of stars. We had eight members (Brent, Frank, Grace, Don, Mark W., Philip, Rebecca, and Dean). Will and his father Tim from Troop 99 came to observe with us. Dean brought his new telescope, a Celestron CPC 1100, and got it up and running. We gathered around Dean's telescope and viewed the Orion Nebula, the Andromeda Galaxy, and the Sombrero Galaxy (welcome to outreach Dean!) I’m not sure if anyone was really competing during the Marathon—we were just happy to observe after many months of cloudy skies. Brent found 15 Messier Objects, and Frank found several as well. We showed the visitors from Troop 99 the various deep sky objects in the Messier Catalog: globular clusters (M3, M13), a star nursery (Orion Nebula), an open cluster (Pleiades), galaxies (M31, M82, M81) and a supernova remnant (M1). We ended at 10:30 p.m. when the fog crept onto the runway. We were cold and exhausted but satisfied that we had participated in the 39th Annual AOH Messier Marathon.

One of our newest member Dean with his CPC 1100.

Frank setting up his “push to” (digital setting circles) Dob telescope.

Brent with his C-8.

(L-R) Brent, Dean, Tim, Grace, Frank, and Will.

Yuri’s Night, April 12

On April 12th, the AOH volunteers convened on the Arcata Plaza for Yuri’s Night, an annual global event celebrating human spaceflight and space exploration. The event was organized by NASA Solar System Ambassador Becky Chambers and held during Arts Arcata. Becky and Bea took charge of the tent where they had posters on space exploration and examples of different spacecraft. They also answered questions about astronomy and the various NASA missions. Grace and Don ran the telescopes and visitors viewed the Moon, Sun (and sunspots), and Mars. Thank you to Ken Yanosko for his help in setting up the tent and displays. A big shout out to the attendees who braved a chilly and windy evening to celebrate space exploration.

The first quarter moon was overhead.

Becky and Bea at the tent. (Image credit:Ken Yanosko)

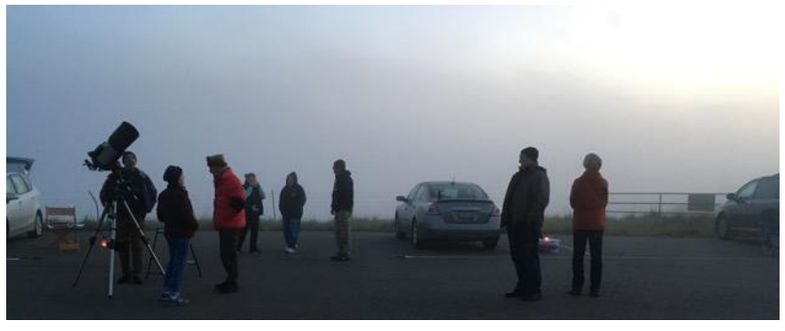
Viewing sunspots on the sun with a white solar filter. (Image credit: Ken Yanosko)

Viewing the quarter moon with a C-6.

Kneeland Star Party, April 27

The Kneeland Star Party was moved up a week to avoid the inclement weather that was predicted for May 4th. Unfortunately, the sky was not as clear as forecasted. The attendees included ten members (including new members Dean and Marian, and Kate and Calvin) and seven guests. Brent hosted some families at his telescope where they viewed Mars and some Leo galaxies. Grace showed Will (from Scout Troop 99) how to align a GoTo telescope, and he found the globular clusters M3 and M53, and the galaxies M81, M82, and M87. We had about an hour of clear skies overhead before ground fog moved in and ended the party. Thank you to everyone who came out for the first official public observing event of the year.

Ketcher and his dad setting up their Newtonian on the runway. (Image credit: Catrina Howatt)



Early evening optimism: waiting for sunset and hoping for clearing skies.

It was foggy on the runway but clear overhead.

Kneeland School Astronomy Day, May 8th

Our last outreach event for spring was at Kneeland School. Grace, Ken, Dan, and Greg met with students at Kneeland School for daytime observing and other activities. The students saw two big sunspots, the red chromosphere of the sun (courtesy of Dan's hydrogen-alpha solar telescope), Venus, and the moon (which played peekaboo in the clouds). Ken talked about the solar system, sunspots, and phases of the moon. We also did a test run of our Galileoscope Program (thank you Dan and Greg), and the students got a chance to aim and focus the telescopes. The students, teachers, and staff were an enthusiastic audience. The photos below were taken by Greta Turney, Kneeland School.

Learning about the planets in the solar system with Ken.

Viewing the sun (Ken) and Venus (Grace) through telescopes.

Viewing the sun through a hydrogen-alpha telescope (Dan) and with solar projection (Greg).

Simulating the phases of the Moon with Ken.

Greg helping students set up the Galileoscope.

Learning to aim and and focus the Galileoscopes.

Jupiter Shines in June

By David Prosper

Jupiter stakes its claim as the king of the planets in June, shining bright all night. **Saturn** trails behind Jupiter, and the **Moon** passes by both planets mid-month. **Mercury** puts on its best evening appearance in 2019 late in the month, outshining nearby **Mars** at sunset.

Jupiter is visible almost the entire evening this month. Earth will be between Jupiter and the Sun on June 10, meaning Jupiter is at **opposition**. On that date, Jupiter rises in the east as the Sun sets in the west, remaining visible the entire night. Jupiter will be one of the brightest objects in the night sky, shining at magnitude -2.6. Its four largest moons and cloud bands are easily spotted with even a small telescope.

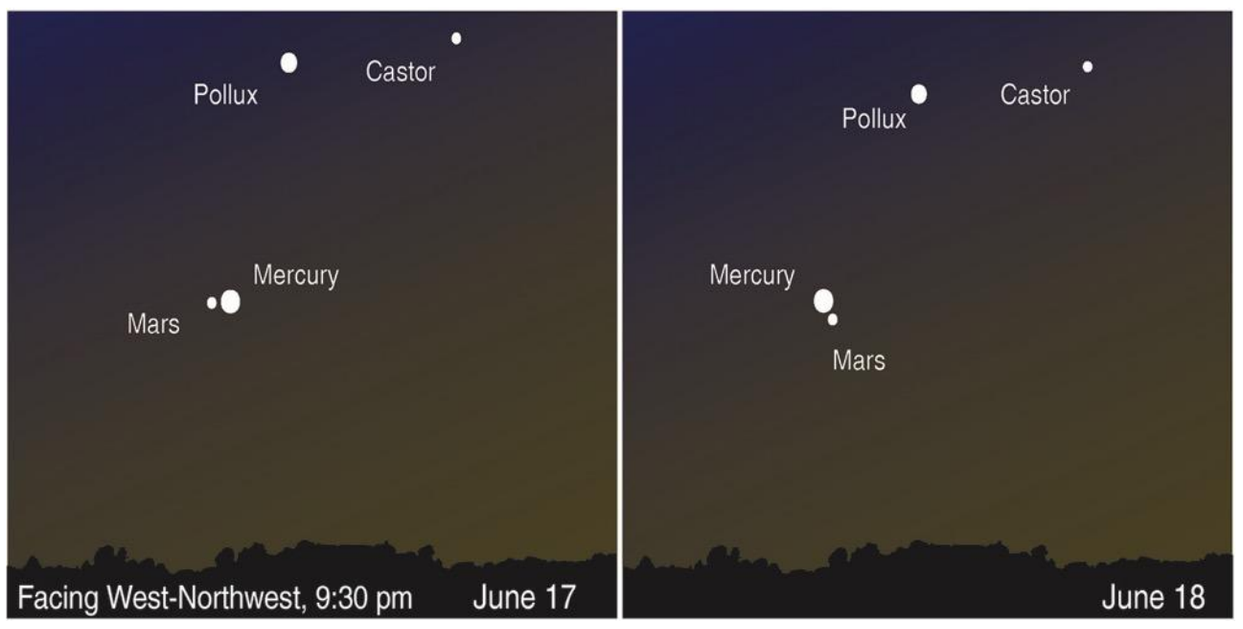
What if your sky is cloudy or you don't have a telescope? See far more of Jupiter than we can observe from Earth with NASA's **Juno** mission! Juno has been orbiting Jupiter since 2016, swooping mere thousands of miles above its cloud tops in its extremely elliptical polar orbits, which take the probe over 5 million miles away at its furthest point! These extreme orbits minimize Juno's exposure to Jupiter's powerful radiation as it studies the gas giant's internal structure, especially its intense magnetic fields. Juno's hardy JunoCam instrument takes incredible photos of Jupiter's raging storms during its flybys. All of the images are available to the public, and citizen scientists are doing amazing things with them. You can too! Find out more at bit.ly/JunoCam

Saturn rises about two hours after Jupiter and is visible before midnight. The ringed planet rises earlier each evening as its own opposition approaches in July. The **Moon** appears near both gas giants mid-month. The Moon's tour begins on June 16 as it approaches Jupiter, and its visit ends on June 19 after swinging past Saturn.

Mercury is back in evening skies and will be highest after sunset on June 23, just two days after the summer solstice! Spot it low in the western horizon, close to the much dimmer and redder **Mars**. This is your best chance this year to spot Mercury in the evening, and nearly your last chance to see Mars, too! The two smallest planets of our solar system pass close to each other the evenings of June 17-18, coming within just ¼ degree, or half the width of a full Moon, making for a potentially great landscape photo at twilight.

Discover more about NASA's current and future missions at nasa.gov.

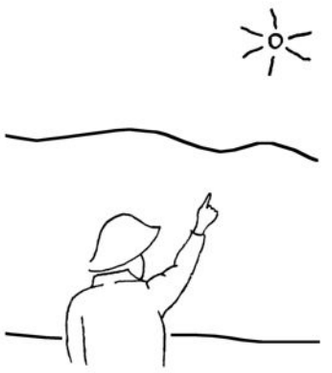
A giant storm in Jupiter's north polar region, captured by JunoCam on February 4, 2019. Image processing performed by citizen scientists Gerald Eichstädt and Seán Doran. Source: bit.ly/JupiterSpiral



Mars and Mercury after sunset the evenings of June 17-18, 2019. Image created with assistance from Stellarium.

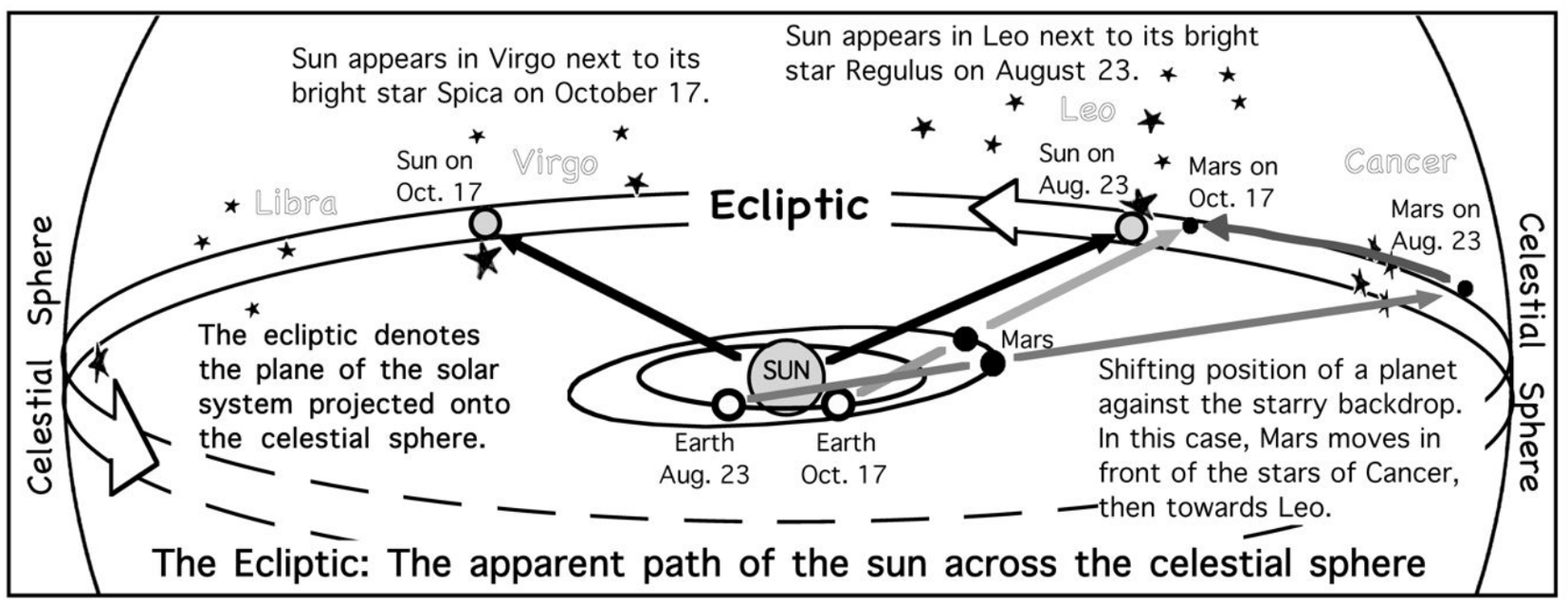
Republished from the Astroleague.
The original can be found here.

Is that a planet or a star?



Three tell tale visual characteristics of a planet:

1. A planet shines with a steady light, unless it is very close to the horizon. It doesn't "twinkle," while a star does.
2. A planet is always located near the ecliptic.
3. A planet slowly shifts its position nightly with respect to the background stars.



The Ecliptic: The apparent path of the sun across the celestial sphere

Mercury

- Either low above the western horizon in the evening, or low above the eastern horizon in the morning.
- A challenge to spot.

Venus

- Either above the western horizon in the evening, or rising above the eastern horizon in the morning.
- Dazzling white object.
- Very easy to see.

Mars

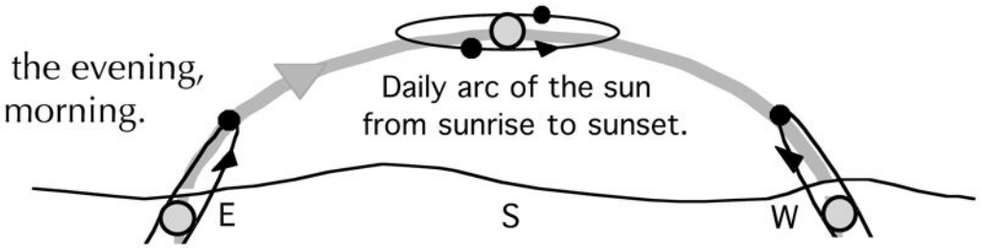
When it is close to Earth, Mars is a bright red-orange object in the east after sunset, high in the sky near midnight, and in the west before sunrise.

Jupiter

When it is not positioned near the sun, Jupiter is always seen as a very bright pale yellow object.

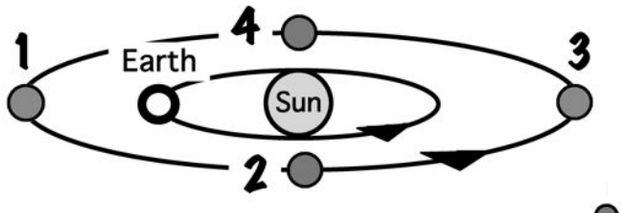
Saturn

When it does not appear close to the sun, Saturn is seen as a bright creamy starlike object.

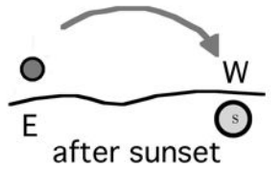


The Inner Planets: Mercury and Venus

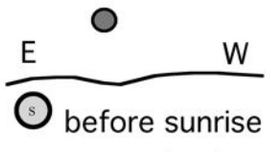
The Outer Planets: Mars, Jupiter, and Saturn



1 When the planet is opposite the sun, it rises near sunset and is visible all night. It is closest to the Earth and shines at its brightest.

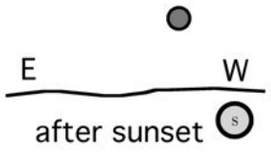


2 When the planet lies ahead of the Earth in their orbits, it is seen high in the east before sunrise. It is often said to be a "Morning Star" in the east.



3 When the planet moves on the far side of the sun, it appears in the day sky near the sun and can't be seen.

4 When the Earth lies ahead of the planet in their orbits, it is seen high in the west after sunset and sets around midnight. It is often said to be an "Evening Star" in the west.



This article is distributed by NASA Night Sky Network.
The Night Sky Network program supports astronomy clubs across the USA dedicated to astronomy outreach.
Visit nightsky.jpl.nasa.org to find local clubs, events, and more!

What does NASA science do for me?

illustration courtesy NASA Spinoff

It is easy to forget that all of the hard work, technology, and money that NASA pours into space research actually comes back down to Earth. In fact, many of NASA's missions and research focus on our planet! NASA also has many other projects with partners that use their research to enrich everyone's lives here on Earth-and this is not including such notable achievements such as satellite weather maps!

The **NASA Spinoff** program was created over fifty years ago to help facilitate licensing and development of their technologies to other companies and agencies for commercial development, quite literally helping to "spin off" their tech for use by others here on Earth--and in some cases, space! To date over ***1,800 spinoff technologies*** have been documented by the NASA Spinoff program.

Some notable examples of NASA spinoffs include:

- **Solar Cells**
- **Water Purification**
- **Memory foam** for your cozy bed and chairs
- **Firefighting equipmen**t, especially lightweight fireproof clothing and masks with much improved air filters
- **Highway safety grooves**, which help your car go around curves without slipping off by giving your tire better traction
- Many **safety features in modern aircraft**, such as de-icing technologies for wings, chemical detectors and imaging for plane maintenance, improved flight controls, and many many more
- **Image stabilization** for your binoculars and video cameras
- **The Dustbuster!**
- **Healthier baby food**

...and many more! Check out this Wikipedia page for a more extensive list of the technologies that NASA has had a direct role in developing, that in many cases we now take for granted.

It is worth noting that there are a few technologies that people commonly think of as being created by NASA that were independently created. **Tang** is a great example; it was developed by General Foods in 1957, and attained fame when used during food testing by NASA in the 60s (*even though some astronauts were not fans of the powdery not-quite-orange-juice*). The **microwave oven** is another famous technology often falsely thought of as a NASA development. It was in fact created shortly after World War 2, when radar technicians discovered that it wasn't such a good idea to stand in front of active equipment! Thankfully they found out via a melted candy bar, and not from severe burns!

Every year, NASA releases a report on its program, and the 2019 edition of the NASA Spinoff magazine is now available! Check it out here to find out the latest developments in NASA's down to Earth technological program.

Editor's Note: Article updated in 2019.

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https://nightsky.jpl.nasa.gov/news-display.cfm?News_ID=632.

THE CONVERSATION

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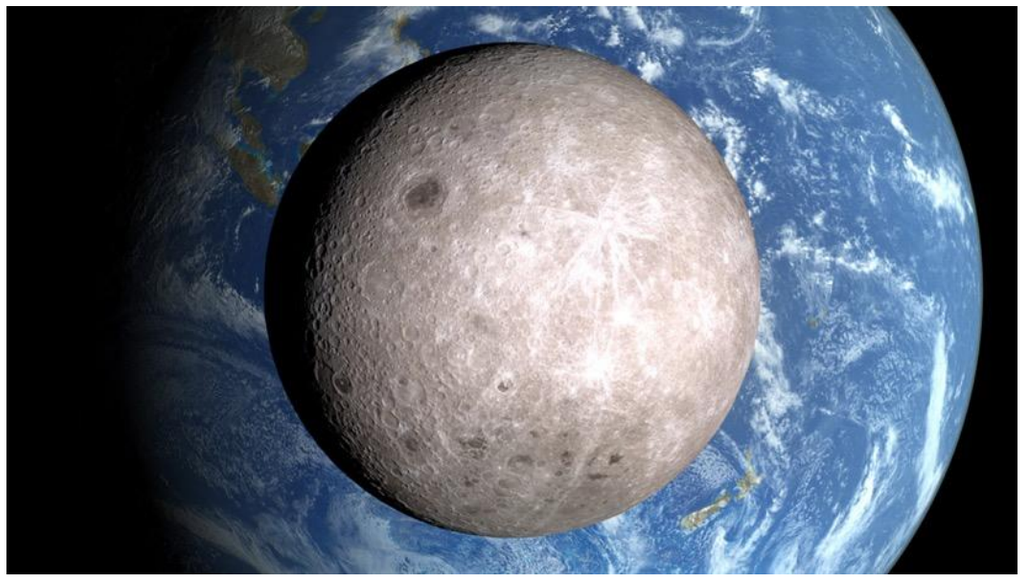
https://theconversation.com/whats-on-the-far-side-of-the-moon-111306

What's on the far side of the Moon?

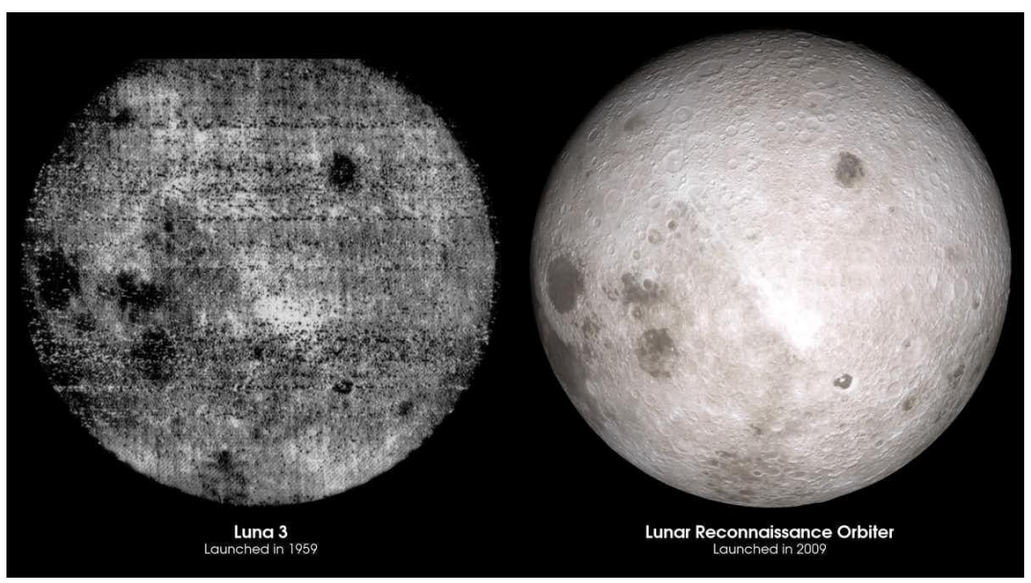
By Wayne Schlingman, Director of the Arne Slettebak Planetarium, The Ohio State University



The far side looks a lot like the near side. NASA's Scientific Visualization Studio, CC BY

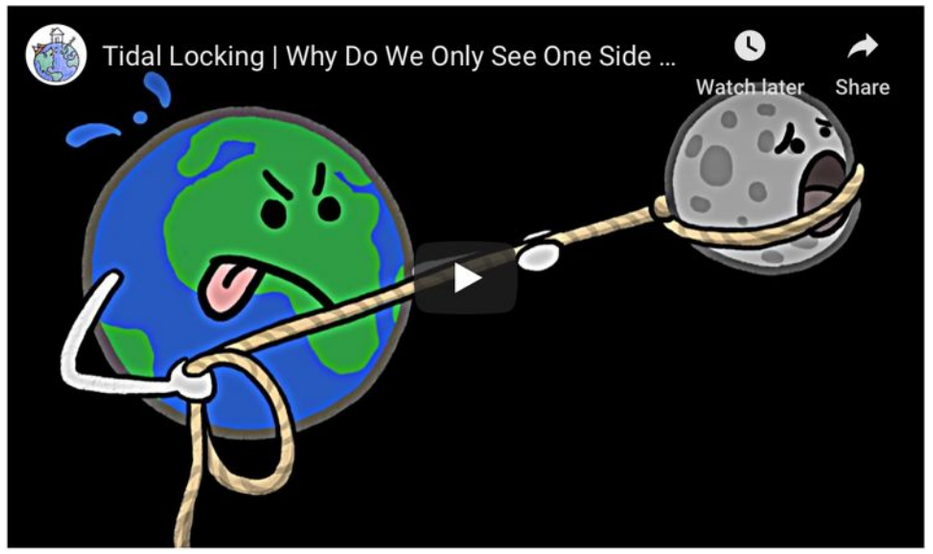
Looking up at the silvery orb of the Moon, you might recognize familiar shadows and shapes on its face from one night to the next. You see the same view of the Moon our early ancestors did as it lighted their way after sundown.

Only one side of the spherical Moon is ever visible from Earth – it wasn't until 1959 when the Soviet Spacecraft Luna 3 orbited the Moon and sent pictures home that human beings were able to see the "far side" of the Moon for the first time.



Comparison of humanity's first glimpse of the lunar far side and the same view thanks to LRO data 50 years later. NASA's Goddard Space Flight Center Scientific Visualization Studio, CC BY

A phenomenon called tidal locking is responsible for the consistent view. The Earth and its Moon are in close proximity and thus exert significant gravitational forces on each other. These tidal forces slow the rotations of both bodies. They locked the Moon's rotation in sync with its orbital period relatively soon after it formed – as a product of a collision between a Mars-sized object and the proto-Earth, 100 million years after the solar system coalesced.



The Moon's orbital period and rotational period are the same length of time. Tidal locking Why Do We See One Side of the Moon

Now the Moon takes one trip around the Earth in the same amount of time it takes to make one rotation around its own axis: about 28 days. From Earth, we always see the same face of the Moon; from the Moon, the Earth stands still in the sky.

The near side of the Moon is well studied because we can see it. The astronauts landed on the near side of the Moon so they could communicate with NASA here on Earth. All of the samples from the Apollo missions are from the near side.

Buzz Aldrin descends from the lunar module to the surface of the Moon on July 20,1969. JSC/NASA, CC BY

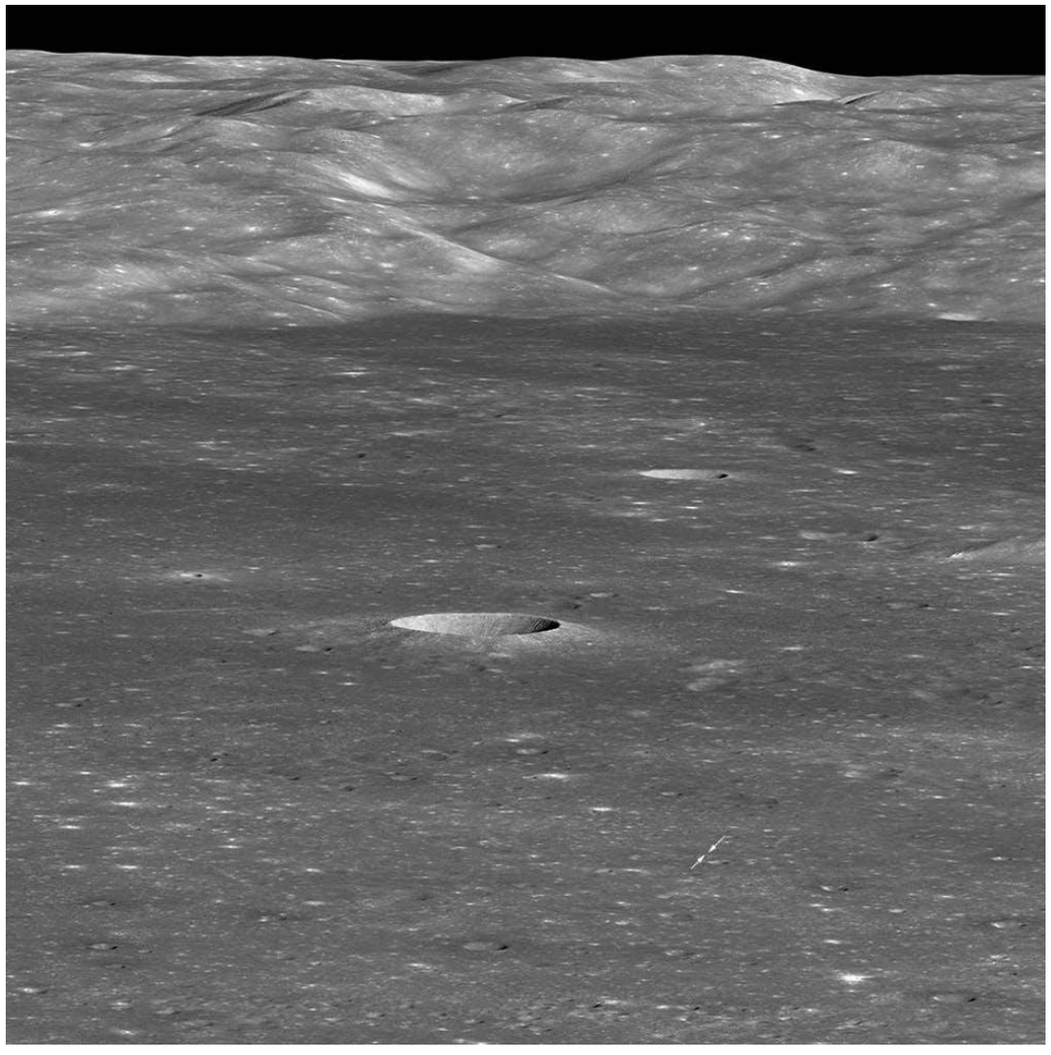
Although the far side of the Moon isn't visible from our vantage point, and with all due respect to Pink Floyd, it is not accurate to call it the dark side of the Moon. All sides of the moon experience night and day just like we do here on Earth. All sides have equal amounts of day and night over the course of a single month. A lunar day lasts about two Earth weeks.

With modern satellites, astronomers have completely mapped the lunar surface. A Chinese mission, Chang'e 4, is currently exploring the Aitken Basin on the far side of the Moon — the first such mission ever landed there. Researchers hope Chang'e 4 will help answer questions about the crater's surface features and test whether things can grow in lunar soil. A privately funded Israeli mission, Beresheet, started as a mission to compete for the Google Lunar X Prize. Despite crashing during an attempted landing earlier this month, the Beresheet team still won the Moon Shot Award.

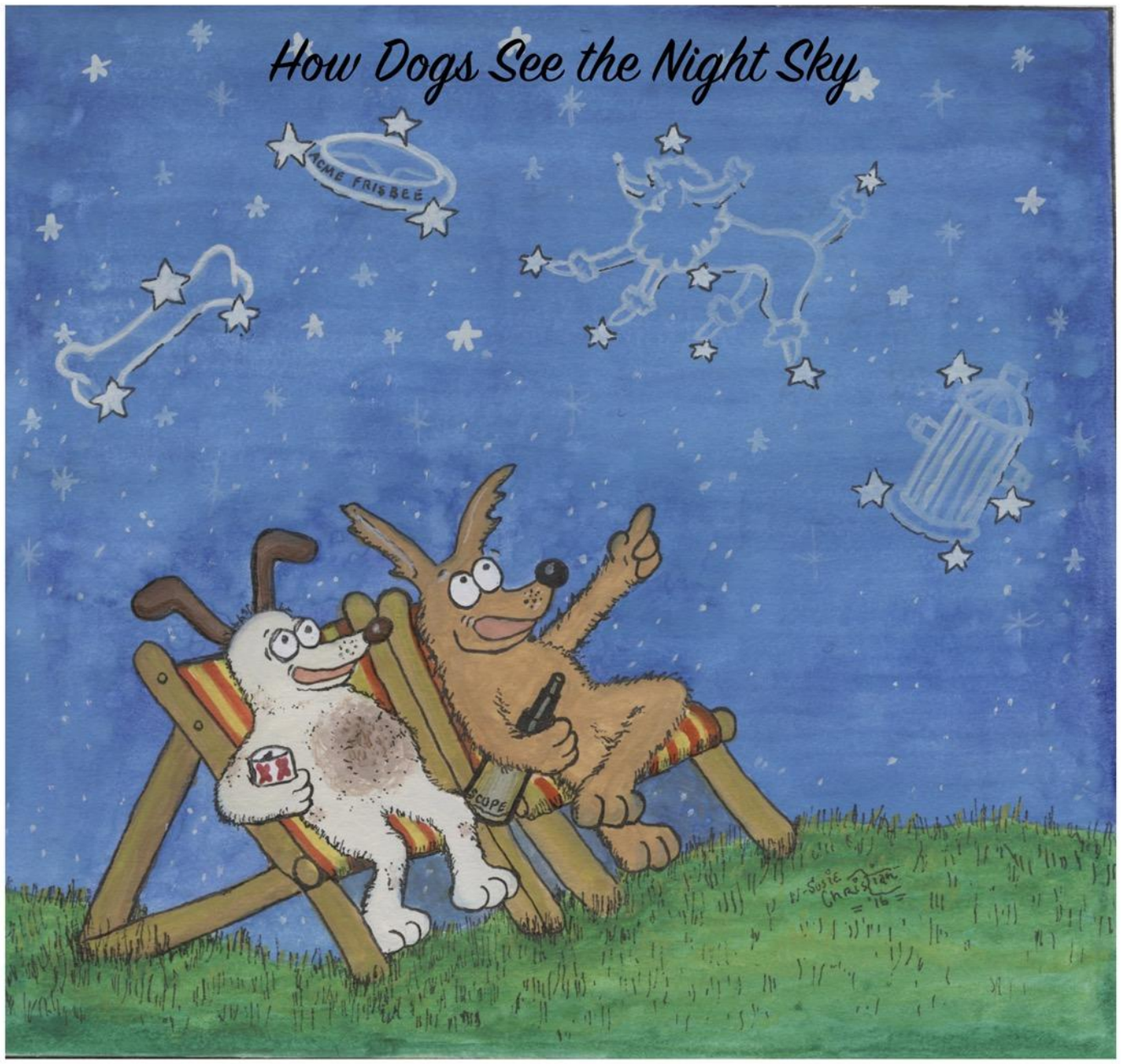
Being shielded from civilization means the far side of the moon is "radio dark." There, researchers can measure weak signals from the universe that would otherwise be drowned out. Chang'e 4, for instance, will be able to observe low-frequency radio light coming from the Sun or beyond that's impossible to detect here on the Earth due to human activity, such as TV and radio broadcasts and other forms of communication signals. Low-frequency radio peers back in time to the very first stars and the very first black holes, giving astronomers a greater understanding of how the structures of the universe began forming.

Rover missions also investigate all sides of the Moon as space scientists prepare for future human missions, looking to the Moon's resources to help humanity get to Mars. For instance, water – discovered by NASA's LCROSS satellite beneath the Moon's north and south poles in 2009 – can be broken up into hydrogen and oxygen and used for fuel and breathing.

Researchers are getting closer to exploring the Moon's polar craters, some of which have never seen the light of day – literally. They are deep and in just the right place to never have the Sun shine onto the crater floor. There are certainly dark parts of the Moon, but the whole far side isn't one of them.



Arrows indicate position of Chang'e 4 lander on the floor of the Moon's Von Kármán crater. The sharp crater behind and to the left of the landing site is 12,800 feet across and 1,970 feet deep. NASA/GSFC/Arizona State University, CC BY



Heavenly Bodies by Susie Christian

The Staff of the AOH Observer and the AOH Officers and the Board of Directors wish all of our members a happy summer filled with clear dark skies.