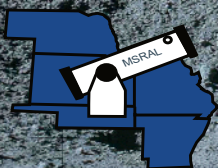
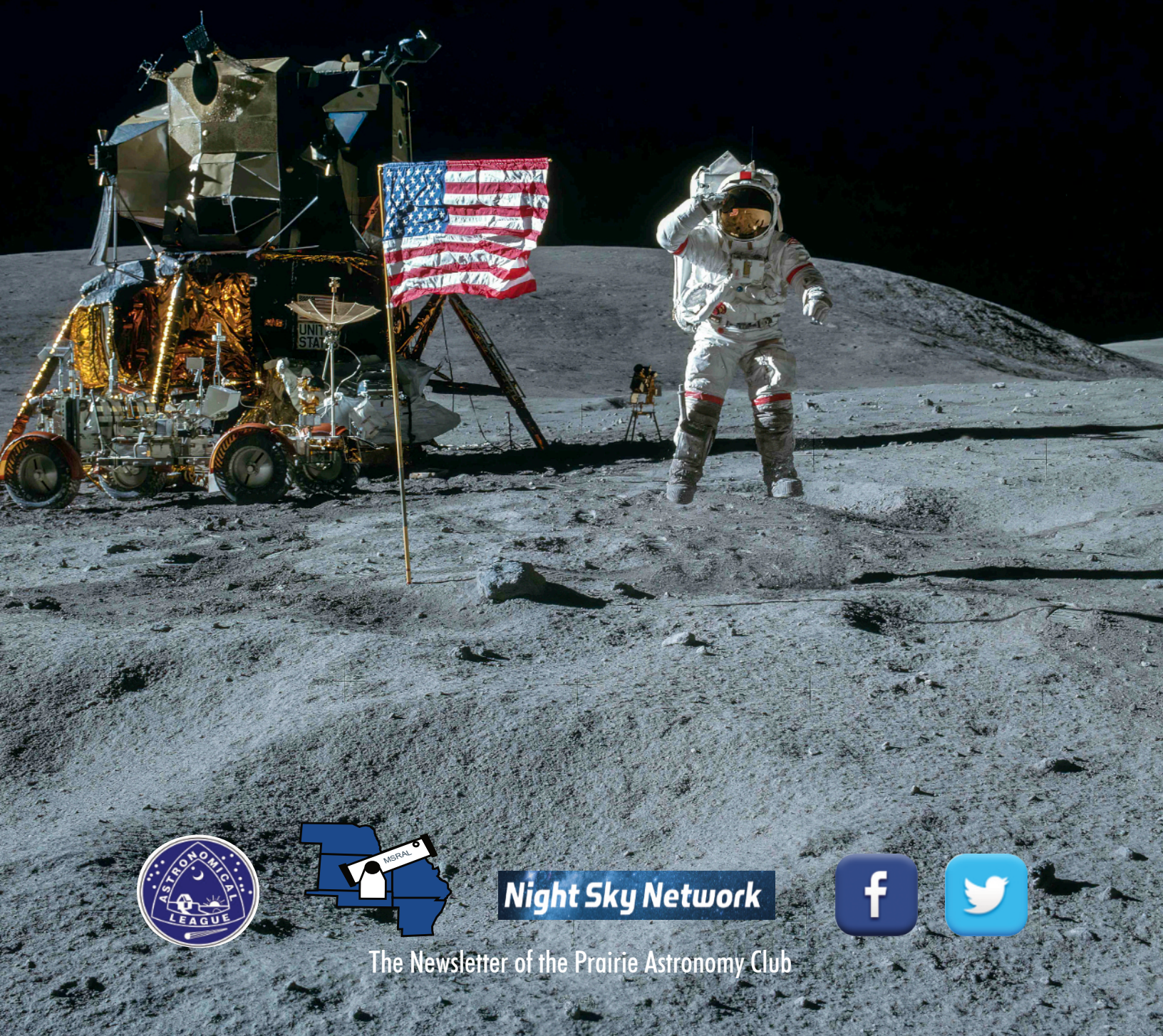


The Prairie Astronomer

March 2022 Volume 63, Issue #3

IN THIS ISSUE: Apollo Photogrammetry
Webb Telescope
ARP41



Night Sky Network



The Newsletter of the Prairie Astronomy Club

The Prairie Astronomer



NEXT MEETING AND PROGRAM

March 29: How to drive a rover on Mars, and other useful skills for an itinerant space traveler

Perseverance successfully landed on Mars over a year ago and has been busy ever since. In this talk, we'll review various mission accomplishments up to this point including early science results and sample caching activities, cover future plans, and also discuss the success of the Mars helicopter Ingenuity. Lastly, this talk will cover some of the essential tools and technologies that the operations team uses to drive a rover over unknown terrains on Mars and keep the vehicle safe in a harsh environment, all while accomplishing invaluable science activities.

FUTURE PROGRAMS

April: Emily Moravec, "Chasing Radio Galaxies Across the Universe"

June: Solar Observing Party

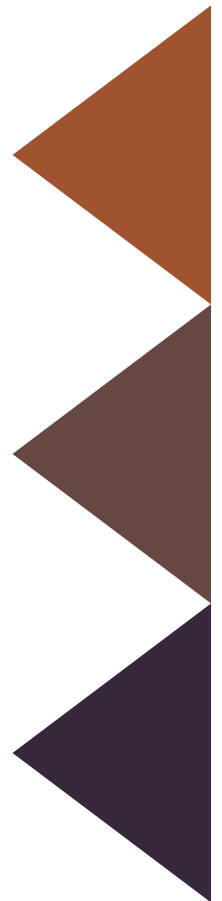
August: Review of NSP

October: Club Viewing Night

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Cover: Apollo 16, April, 1972. John Young jumps off the ground and salutes for this superb tourist picture. He is off the ground about 1.45 seconds which, in the lunar gravity field, means that he launched himself at a velocity of about 1.17 m/s and reached a maximum height of 0.42 m.. Photo Credit: NASA. Image was processed by Mark Dahmke in Lightroom and upscaled using Topaz Gigapixel.



CALENDAR

PAC Meeting
 March 29, 7:30pm at Hyde Observatory
 Program: How to drive a rover on Mars, and other useful skills for an itinerant space traveler

PAC Meeting
 Program: Chasing Radio Galaxies Across the Universe, Emily Moravec
 April 26, 7:30pm

Astrophotography class at Hyde Observatory
 May 5

Midstates Astronomical League Conference, June 3-5
 St. Louis, Missouri

Nebraska Star Party
 July 24-29, Merritt Reservoir, Valentine, NE

ALCON, New Mexico, July 28-30

2022 STAR PARTY DATES

	Date	Date
January	28	2/5
February	25	3/4
March	25	4/1
April	22	29
May	20	27
June	17	24
July	22	29
NSP	7/24	7/29
August	19	26
September	23	30
October	21	28
November	18	25
December	16	23

Dates in **BOLD** are closest to the New Moon.

CLUB OFFICERS

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Meeting Minutes

Jim White

Bob Kacvinsky called the meeting to order at 7:34 p.m. Tonight's meeting is being held in person at Branched Oak Observatory and online through ZOOM. Tonight's program will be on Enhancing Your Views with Filters, presented by Dave Knisely.

Bob gave Jim Kvasnicka's observing report because of a dental procedure Jim had today. February 25th and March 4th are the next star parties. The February 25th star party is scheduled to be at Branched Oak Observatory and the March 4th star party is scheduled to be at the club observing site. Bob covered planet visibility for March, the Messier list of items visible in March and NGC items visible in March. Jim's full observing report will be in this month's newsletter.

The new storage shed that the club just purchased has been delivered to Branched Oak Observatory and set up. Bob has put a shelf in the shed and built a step at the entrance and also put a light in the shed but is waiting until after the weather gets nice to mount it so that we can get the shed painted.

Bob has been in contact with the club member Katelyn Farneth, who is an artist, about painting some planets on the shed once it is painted and Katelyn has expressed an interest in painting a mural on it. PAC needs to check with Branched Oak Observatory to see what we can and can't do in regards to painting our storage shed so it will be interesting to see what we come up with!

In the news, February 18th was the 1-year anniversary of Perseverance landing on Mars. It is the heaviest landing ever, it so far has five samples collected for possible return to earth at a later date, the **Mars Oxygen In-Situ Resource Utilization Experiment (MOXIE)** was able to successfully generate some oxygen and they drove one day with an auto drive of approximately 1000 ft. Ingenuity, the helicopter that was taken to Mars on Perseverance, just finished its 19th flight on Mars. It was originally planned to take 5 flights on Mars before dying. It keeps hopping along with Perseverance and helping NASA to determine which way they should drive the rover.

Bob Kacvinsky and Bill Lohrberg have gotten together and reached out to NASA to see if we can get a speaker in March to talk about Perseverance. The Hyde Board met recently and one of their topics of discussion involved us being able to resume in person meetings at Hyde, things sound promising that we will be able to return to in-person meetings at Hyde in March.

John Reinert was asked about the treasurer's report and he said that he had paid the bill for our newly acquired shed, he is collecting dues for anyone who is currently up for renewal. Mark Dahmke and John are looking at an online experience for paying dues and possibly collecting donations, more news to follow. Please keep your dues up to date. John is also looking at putting together a plan for synchronizing dues payments to one or possibly two different times of the year instead of everyone's due date falling on the month that they originally joined which would greatly simplify the treasure's job, more news on this to follow also.

Bob Kacvinsky mentioned dates coming up for different astronomy events around the country in the coming months. ALCON will be July 28th to 30th in Albuquerque, New Mexico which overlaps NSP (Nebraska Star Party). MSRAL (Mid States Region of the Astronomical League) is June 1st to 3rd just outside of Columbia, Missouri. Rocky Mountain Star Stare (<https://rmss.org>) is June 22nd to 26th and is outside of Colorado

Springs at around 7600 ft. Bob Kacvinsky and Jim Kvasnicka are planning to attend so if anyone else is interested feel free to get in touch with Bob or Jim. Okie-Tex Star Party is September 23rd to October 1st. NSP is July 24th to 29th. On March 5th Branched Oak Observatory is having a star party and PAC members that are interested in helping by bringing out their scopes and setting them up for people to look thru it would be greatly appreciated, contact Brett

Boller if you can help. Brett will send out a note via Night Sky and Jim K. will send out a reminder with the star party email reminders. Last item of business is the Mentorship Program which is up and running. We have six members that have asked for mentors and six members that have expressed a desire to be a mentor.

Bob adjourned the meeting at 8:00 pm and introduced tonight's presenter Dave Knisely.



The March PAC Meeting was held at Branched Oak Observatory

The President's Message

Bob Kacvinsky



Welcome back to Hyde and live meetings. Yahoo. We will still co-operate our live meeting with a Zoom link to accommodate our remote members and those that still are uncomfortable with gathering live. One take away from Covid is we have learned how to use Zoom which has allowed us to have remote speakers from across a vast astronomic universe. Our upcoming March meeting will be no exception.

PAC's next meeting will be Tuesday, March 29th at 7:30 pm. Our speaker will be Evan Hilgemann, a Mechanical Engineer from NASA's JPL in California. Evan splits his time between operating the Mars Rover Curiosity with helping to design the SPEREx space telescope. He has also worked on designs from the small CubeSat orbiters to a 100 foot expandable array system. He has accepted our invitation to share highlights from the first year of Mars Rover Perseverance. His talk abstract includes:

Abstract: Perseverance

successfully landed on Mars over a year ago and has been busy ever since. In this talk, we'll review various mission accomplishments up to this point including early science results and sample caching activities, cover future plans, and also discuss the success of the Mars helicopter Ingenuity. Lastly, this talk will cover some of the essential tools and technologies that the operations team uses to drive a rover over unknown terrains on Mars and keep the vehicle safe in a harsh environment, all while accomplishing invaluable science activities.

You will not want to miss this month's meeting and an opportunity to ask questions about the Mars Rover Projects with one of the "inside" engineers. Be sure to mark your calendars.

We are beginning to receive interests in public star parties and opportunities to share our love of "what's up there". The Astronomical League has set up a special observing challenge to help kick start public and

club observing. The program runs from now through June. Participants just need to observe 12 bright objects out of a list of 22. Most are Messier galaxies with magnitudes brighter than 10.7 allowing even smaller aperture telescopes are able to complete the challenge. Twelve of the objects are 9 Mag or brighter and could possible be done with binoculars at a dark sky site like the Farm.

You recently received an invitation from Jim Kvasnicka and I to participate in the AL special observing challenge. We would like to target our next star party nights – March 25th and April 1st along with April 2nd – for PAC members and guests to complete the challenge. Observing will be at the PAC Farm site SE of Cortland. Jim or I can provide you with an observing log sheet to use for your tracking notes and rough sketches along with a copy of the AL observing list. Drop us an email if you would like

a copy of both sheets prior to the observing nights. We added the Saturday, April 2nd night in for those that have Friday night conflicts.

Following the completion of the challenge, Jim will submit our entries to the AL for completion and award certificates. We will plan a celebration awards program later this summer. The AL Challenge Program is a great way to kick start us back into the observing mode. We invite all PAC members to join along with the Mentorship Group this fun observing challenge. One last incentive is by doing the challenge, you will have completed over 10% of the AL Messier Observing Program. Let's have some fun.

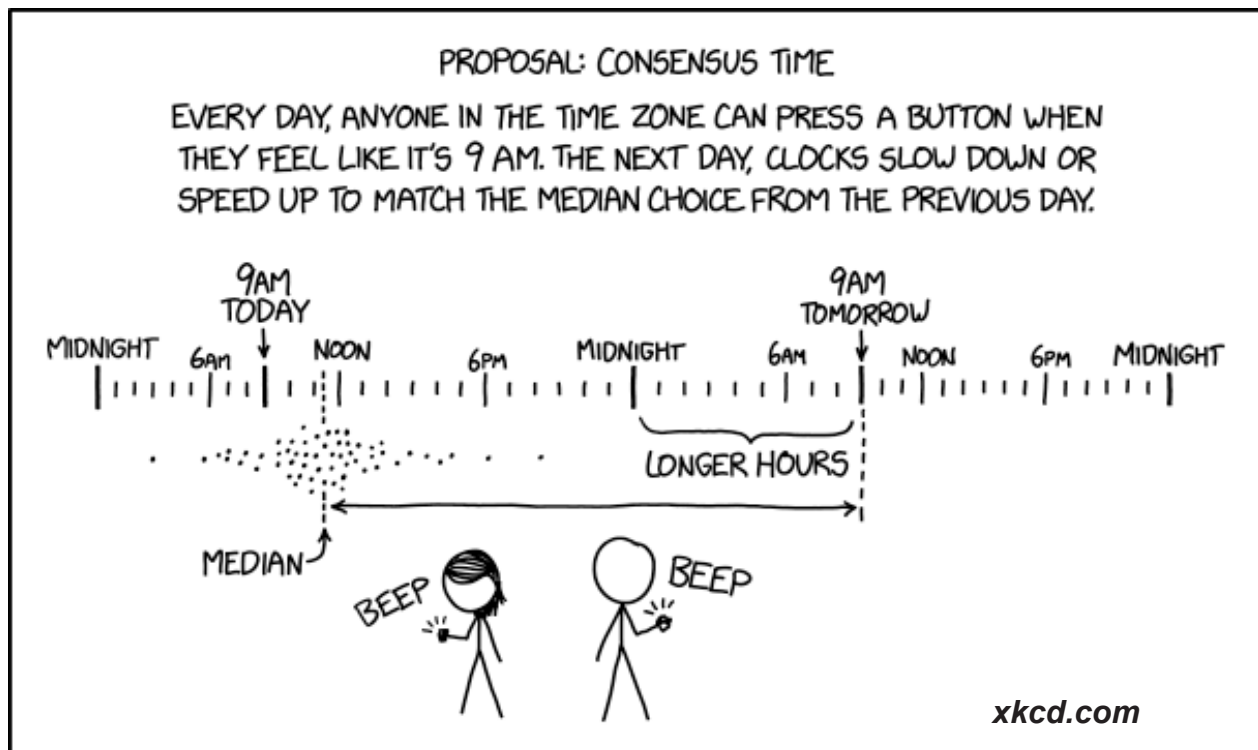
The Lincoln risk dial has been lowered into the yellow range and hopefully will move into the green later in March or early April. The Hyde Board has targeted reopening the observatory once the risk dial has been in the green for a minimum of 2 weeks. If you would like to help out as a Supervisor, Deck Lead, or deck worker please let any of the PAC officers know or drop me a email and I will forward it to the coordinator. We have high school volunteers that operate the telescopes with only a little basic training so you don't need to be a rocket scientist to help out. Most volunteers only work once every 6 weeks, so the time commitment is minimal. Come give it a try, you will find it is a lot of fun seeing the

expressions of a 5 year old seeing Saturn's rings for the first time.

The new PAC Shed is up and ready for painting at the Branched Oak Observatory site. Thanks to everyone for helping to finally get an accessible and secure site for our telescope equipment. Once the weather warms up we will finish the final painting. PAC member Katelyn Farneth has offered to share her artistic talents to add a little "space" to the final outside view.

Wish you all Clear Dark Skies – and hopefully a few daily rain showers.

Bob Kacvinsky
kacvinskyb@yahoo.com
402-840-0084



Club Storage Shed at Branched Oak Observatory has been Installed

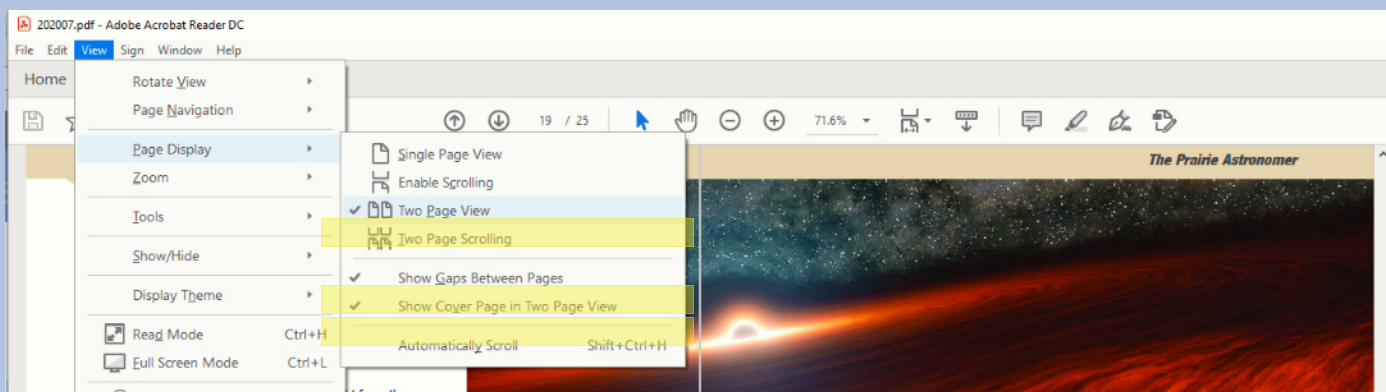


The new telescope storage shed has been delivered to Branched Oak Observatory and set up. Bob built a step at the entrance and also put a light in the shed.

Notices

New Newsletter Format

How to Adjust Adobe Acrobat Settings for Two Page View



To view this newsletter in magazine spread format in Acrobat, select View ->Page Display->Two Page View. Acrobat will then show two pages side by side. Also make sure the checkboxes “Show Cover Page in Two Page View” and “Show Gaps Between Pages” are checked. If you have it setup correctly, the cover page will be displayed by itself and subsequent pages will be side by side with the odd numbered pages on the left.

PAC Newsletter Archive

Back issues of the Prairie Astronomer from 1962 to present are now available online:

<https://www.prairieastronomyclub.org/newsletters>

PAC-LIST

Subscribe through [GoogleGroups](#) or contact Mark Dahmke to be added to the list. You'll need a Google/gmail account, but if you want to use a different email address, just associate that address with your google account to access Google Groups. Once subscribed, you can view message history through the GoogleGroups website.

To post messages to the list, send to this address: pac-list@googlegroups.com



Rick Johnson

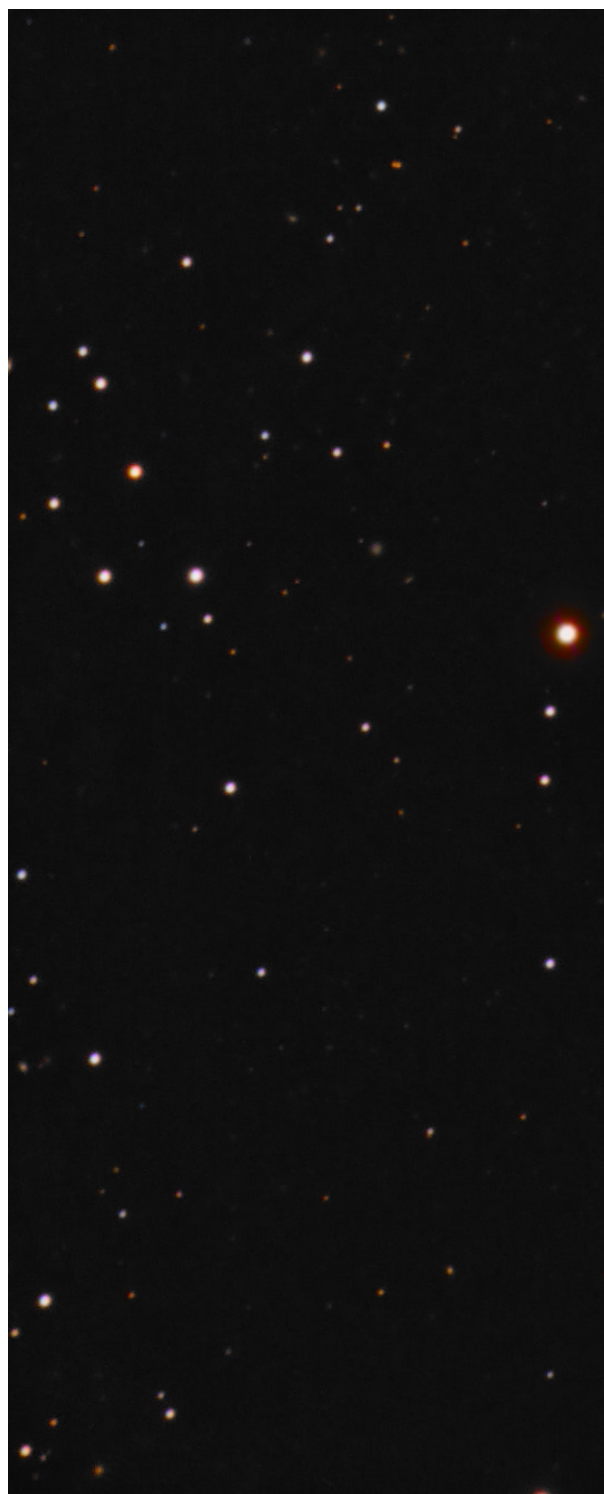
ARP 41

Arp 41/NGC 1232 belongs to Arp's class for spiral galaxies with low surface brightness companions on their arms. It is located in Eridanus some 67 million light-years distant by redshift. At -20 degrees it is too low in my sky for me to get a decent image. I normally don't even try when this low but this one was big and bright so had to try anyway. I'm glad I did. While fuzzy I still was able to pull out some of its many HII regions even though no H alpha filter was used. The galaxy was discovered by William Herschel on October 20, 1784 but isn't in either of the Herschel 400 programs.

While Arp apparently considered the companion to be on the arm that is likely not the case. Optical redshift puts the companion, NGC 1232A, nearly 5 times more distant at 293 million light-years. But a note at NED says that HI radio data shows a redshift of about the same as Arp 41 itself. They offer

no explanation and call it a mystery. Considering it is on an arm I would think the radio HI data is for NGC 1232 in the background rather than NGC 1232A. I saw nothing to rule this out which puzzles me. NED makes no mention of this difference. Older papers also consider it a dwarf companion saying things like; "Typical dwarf SB(s)m system." and "Dwarf SB(s)m satellite at 4.0 arcmin following NGC 1232."

NED classes NGC 1232 as SAB(rs)c with HII so sees both elements of a normal and of a barred spiral. The NGC project says SC I. The companion is classed by NED as SB(s)m same as the papers seeing it as a dwarf companion. If it is really 5 times more distant then it is not a dwarf. Hubble would resolve stars in it at the distance of NGC 1232 but unfortunately has not looked at it. For now, I'm going with the visual redshift distance of about 300 million light years.



The Mantrap Skies Image Catalog

Rick Johnson, a founding member of the Prairie Astronomy Club, passed away in January, 2019. His legacy lives on through his comprehensive catalog of over 1600 images at www.mantrapskies.com.



Focus on Constellations

Leo

Jim Kvasnicka

Leo, the Lion is one of the most distinctive constellation patterns in the sky. The head and forequarters of the Lion are marked by the asterism called the sickle. Leo, as is typical of constellations off the Milky Way, contains many galaxies. A number of them are large and bright. Leo contains five galaxies with Messier numbers: M65, M66, M95, M96, and M105. The constellation contains several interesting double stars. One of them Algieba, Gamma Leonis, is one of the finest double stars in the sky. Leo contains the radiant of the Leonid meteor shower which peaks every year around November 17th. The constellation Leo is best seen in April.

Showpiece Objects

Galaxies: M65, M66, M95, M96, M105, NGC 2903, NGC 3521, NGC 3628

Multiple Stars: Alpha Leonis (Regulus), Gamma Leonis (Algieba), 54 Leonis, 88 Leonis

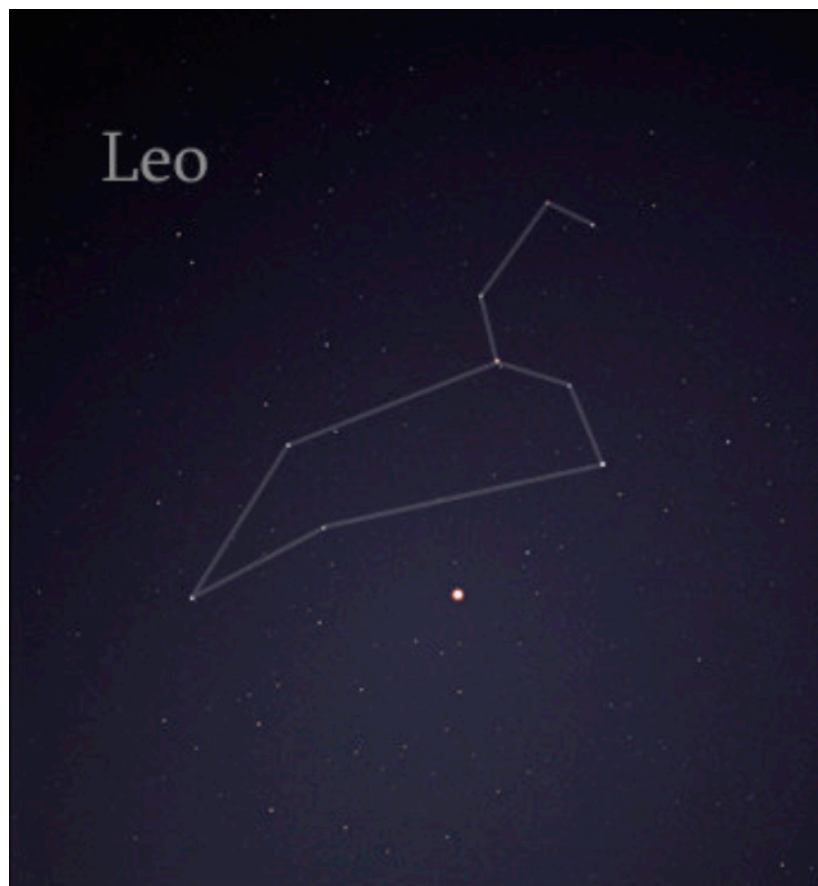
Mythology

In Greek mythology the celestial Lion was associated with the Nemean Lion slain by Hercules as the first of his Twelve Labors. The Greeks inherited the Lion from the Babylonians before them. A common theme in Babylonian art is

a battle between a Lion and a Bull with the Lion always defeating the Bull.

Number of Objects
Magnitude 12.0 and Brighter

Galaxies: 58



By Till Credner - Own work: AlltheSky.com, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=20042019>

April Observing

Jim Kvasnicka



Planets

Venus, Jupiter, Saturn, Mars: All four planets are positioned in the dawn sky. On April 5th Mars and Saturn are separated by just 24". On April 18th all four planets are evenly spaced in a line. On April 30th Jupiter and Venus are just $\frac{1}{2}^\circ$ apart.

Mercury: In the evening sky after sunset.

Uranus and Neptune: Not visible.

Meteor Showers

Lyrids: Peaks the night of April 21-22. Expect up to 20 meteors per hour. The waning gibbous Moon will interfere.

Messier List

M40: Multiple star in Ursa Major.

M65/M66: Part of the Leo Triplet Group.

M95/M96: Galaxies in Leo that fit in the same FOV.

M105: Galaxy in Leo.

M106: Galaxy in Canes Venatici.

M108: Galaxy in Ursa Major.

M109: Galaxy in Ursa Major.

Last Month: M41, M44, M46, M47, M48, M50, M67, M81, M82, M93

Next Month: M49, M51, M61, M63, M64, M85, M94, M101, M102, M104

NGC and other Deep Sky Objects

NGC 2903: Elongated galaxy in Leo.

NGC 3077: Galaxy in Ursa Major.

NGC 3384: Galaxy in Leo.

NGC 3521: Elongated galaxy in Leo.

NGC 3631: Galaxy in Ursa Major.

NGC 3675:
Elongated
galaxy in Ursa Major.

Double Star Program List

Alpha Leonis: Regulus, white and yellow stars.

Gamma Leonis: Algieba, pair of yellow stars.

54 Leonis: Yellow primary with a greenish colored secondary.

Alpha Canum Venaticorum: Cor Caroli, bluish white and greenish yellow stars.

Zeta Ursa Majoris: Mizar, pair of white stars.

Gamma Virginis: Porrima, close pair of yellow stars.

24 Comae Berenices: Yellow primary with a pale blue secondary.

Delta Corvi: White and rose colored stars.

Challenge Object

NGC 3190 Group: NGC 3190 is the brightest member in a group of galaxies in Leo that include NGC3185, NGC 3187, and NGC 3193.

Studying the Next Interstellar Interloper with Webb

One of the most exciting findings in planetary science in recent years is the discovery of interstellar objects passing through our solar system. So far, astronomers have confirmed only two of these interlopers from other star systems — 1I/'Oumuamua in 2017 and 2I/Borisov in 2018 — but many, many more are thought to exist. Scientists have had only limited ability to study these objects once discovered, but all of that is about to change with NASA's James Webb Space Telescope.

"The supreme sensitivity and power of Webb now present us with an unprecedented opportunity to investigate the chemical composition of these interstellar objects and find out so

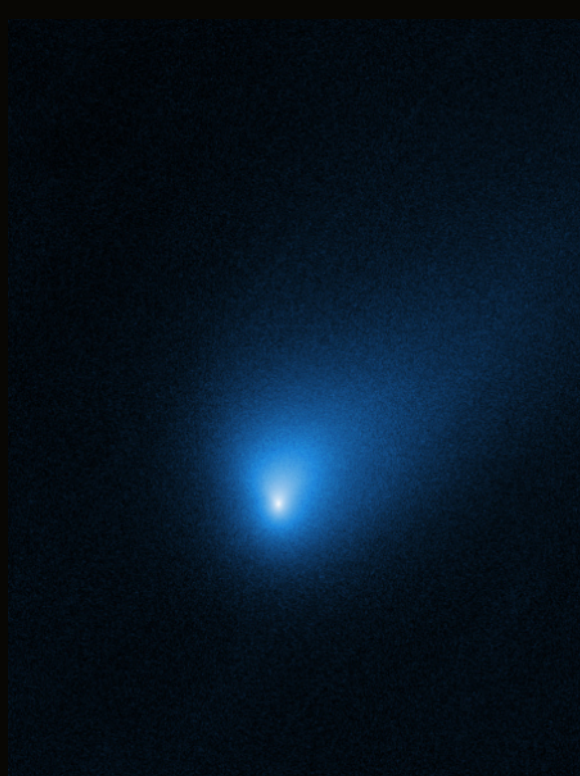
much more about their nature: where they come from, how they were made, and what they can tell us about the conditions present in their home systems," explained Martin Cordiner, principal investigator of a Webb Target of Opportunity program to study the composition of an interstellar object.

"The ability to study one of these and find out its composition — to really see material from around another planetary system close up — is truly an amazing thing," said Cordiner, an astrophysicist at NASA's Goddard Space Flight Center in Greenbelt, Maryland, and The Catholic University of America. The first two interstellar objects detected were very different: One was very

comet-like, and one was not. Cordiner and his team hope to find out how unique those objects were and whether they're representative of the broader population of

This Hubble Space Telescope image of 2I/Borisov shows the first observed rogue comet, a comet from interstellar space that is not gravitationally bound to a star. It was discovered in 2019 and is the second identified interstellar interloper, after 'Oumuamua. 2I/Borisov looks a lot like the traditional comets found inside our solar system, which sublimate ices, and cast off dust as they are warmed by the Sun. The wandering comet provided invaluable clues to the chemical composition, structure, and dust characteristics of planetary building blocks presumably forged in an alien star system. It's rapidly moving away from our Sun and will eventually head back into interstellar space, never to return.

Credits: NASA, ESA, and D. Jewitt (UCLA)



interstellar objects.

Triggering Process

Astronomers are constantly monitoring various sources of information ranging from amateur observers to professional observatories in the hopes of finding the next interstellar interloper. When the next such object is first detected, scientists won't immediately be certain if it's an interstellar object. They'll need additional observations over a period of days, weeks, or even months to confirm it — depending on its brightness.

Once they have confirmation that the object came from outside the solar system based on its "hyperbolic" orbit, and they are certain the object didn't come from the outer reaches of our own solar system or the Oort cloud, they can calculate the trajectory of the object across the sky. If that trajectory intersects with Webb's viewing field, Cordiner and his team will make the observations.

The Science

The team will use Webb's spectroscopic capabilities in both the near-infrared and mid-infrared bands to study two different aspects of the interstellar object. First, using the Near-Infrared

Spectrograph (NIRSpec), they will analyze the chemical fingerprints of gases released by the object as any ices that might be present are vaporized by our Sun's heat. Second, with the Mid-Infrared Instrument (MIRI), they will observe any dust that the object is producing — small, microscopic particles; larger grains; and even pebbles that may be lifted off the surface and surrounding the object.

With its high spectral resolution, NIRSpec can pick out the emission from individual gases, allowing the team to detect specific molecules such as water, methanol, formaldehyde, carbon dioxide, carbon monoxide, and methane. MIRI, in the mid-infrared, is more tuned to the heat spectrum produced by solid particles, such as dust grains or the object's nucleus.

Powerful New Insights

In our own solar system, comets are icy remnants from the era of planet formation around our Sun, so they can provide unique insight into the chemical conditions present in the earliest history of our solar system. This Webb program has the ability to reveal — for the first time — similarly powerful insights into the chemistry

of the formation of planets around other stars.

Astronomers don't fully understand the exact chemical processes involved in forming planets. For example, how does a planet arise from simple chemical ingredients? Does it happen in the same way around all stars? Was there anything peculiar about the way our own planets formed around our Sun, compared with how they form around other stars elsewhere in the galaxy? If scientists can get proof of the chemical conditions present in other planetary systems by observing an interstellar object and seeing what it's made of, then they can get a much clearer picture of the true extent of chemistry that's possible in those other planetary systems.

A New Window with Webb

Interstellar objects have not been observed before in these important near- and mid-infrared wavelength ranges, so the possibilities for new discoveries are quite profound. With trillions and trillions of interstellar objects buzzing around the galaxy, the team doesn't know what they are going to find, but they know that it will be fascinating.

Continued on page 25.

Lunar Photogrammetry Using Apollo-Era Photographs

Mark Dahmke



In 2012 Autodesk released an iOS app that could be used to generate 3D models from a set of photos taken from various angles. I installed it on my iPad and started experimenting with small objects. It then occurred to me that maybe I could make 3D models of my cats.

Unfortunately cats won't remain completely motionless for more than a nanosecond, so a single camera from multiple angles just won't work.

In my quest to make models of fast-moving felines, I bought several cheap Canon Powershot cameras on ebay. The Autodesk app was not up to the task of combining that many images at the resolution I needed, so I tried a couple of cloud apps and then decided on a Windows package called PhotoScan.

Photoscan did a passably good job, but I quickly discovered that I needed to scale it up with more cameras. I therefore bought another 23 used Powershot cameras and built a rig out of PVC pipe and added three studio flash units to get even lighting. I won't go into any more detail here, but if

you want to read more about that project, [here's the link](#).

I use PhotoScan (now called MetaShape) for lots of other purposes, including building 3D models of terrain and buildings based on drone photos. Here are a few examples.

In January, 2022 Jack Dunn presented a program at PAC about planetarium technology and one example shown involved 3D models of the lunar surface. That started me thinking about the

possibility of using MetaShape to extract 3D models from vintage Apollo imagery. I've done



One of the source photos of the Charlie Duke family photo.



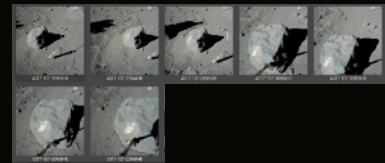
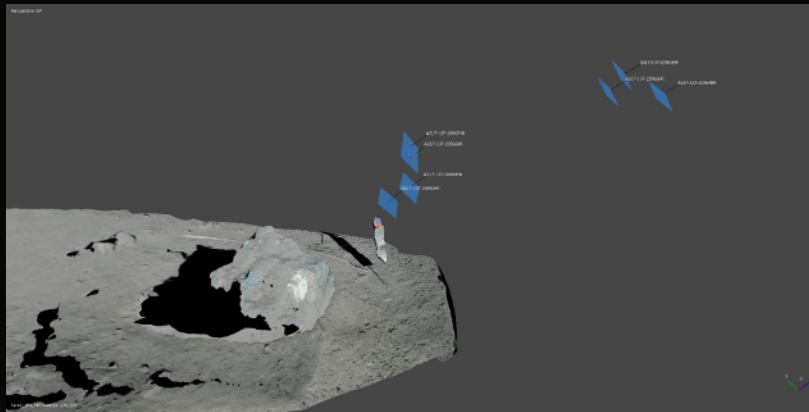
Charlie Duke left a photo of his family on the lunar surface during EVA-3 in April, 1972. This model was generated from just three photographs.

it before with my own photos taken with film cameras and it sometimes works. All you need is at least two photos taken from different angles. Two photos will give you a stereo pair, but to see around an object and get a 3D model of more than just one side, you need

photos from every possible angle.

Fortunately, I found several usable sets of photos from Apollo 11 to 17 on the Apollo Imagery website (<https://www.hq.nasa.gov/alsj/main.html>).

All models were built using an Intel i7-12700K 20 core CPU with 64GB of RAM and an Nvidia RTX-3060 GPU, which has 12GB of RAM. I'm now running Windows 11 Pro. Prior to my recent computer upgrade I had an i7-8700K with a GTX 1060 GPU.



These seven photos of Apollo 17 Station 2 Boulder 3 were used to generate the 3D model shown below. Left: the blue rectangles show the computed locations of the camera relative to the scene.

Note that since there were no photos of the other side of the boulder the model has several gaps, shown in black. The source photos are available at [AS17-137-20963](https://www.hq.nasa.gov/alsj/main.html).



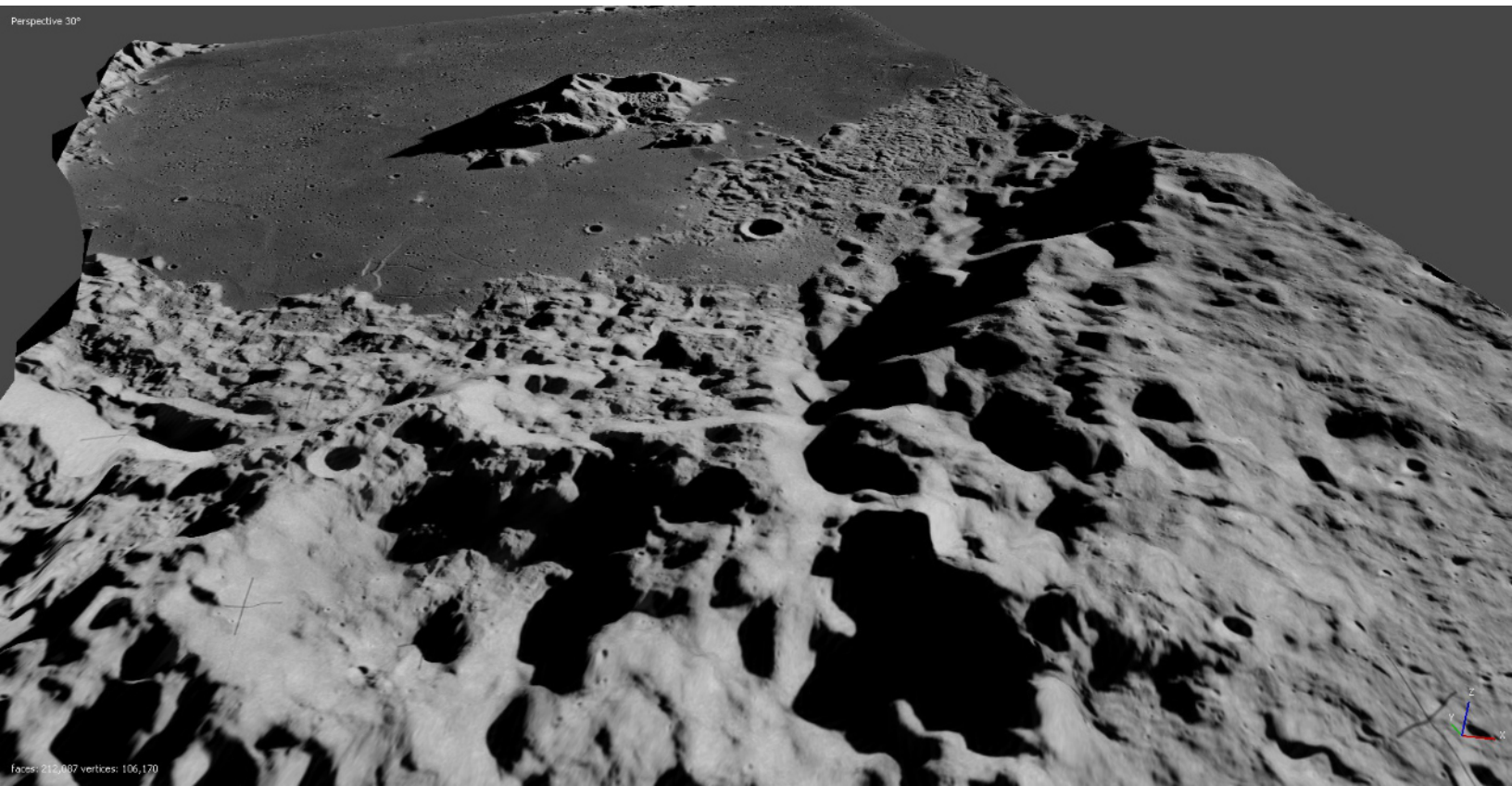
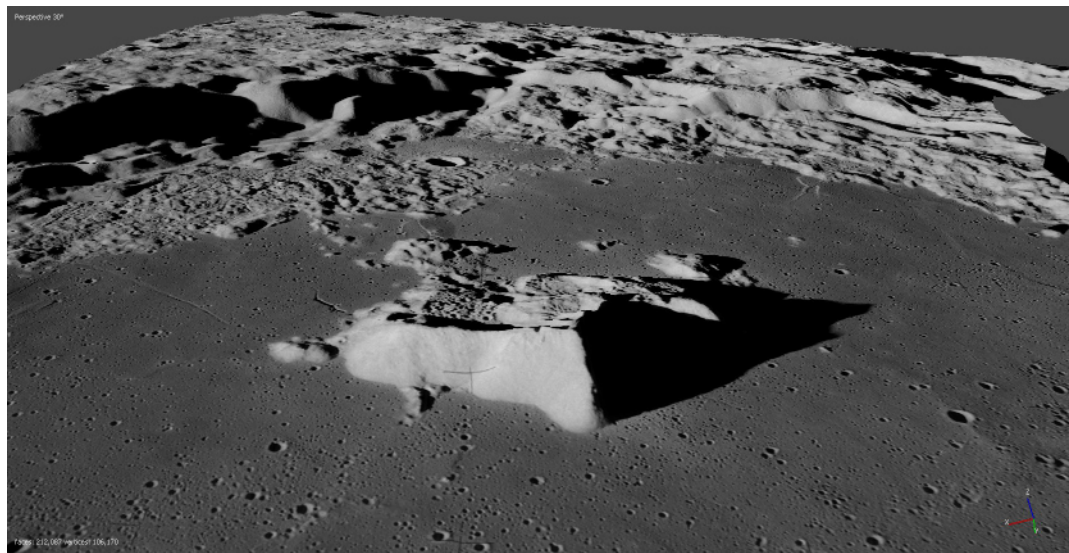
Photogrammetry, continued.

The performance difference is noticeable. On the old system, large models with more than a dozen or so source photos

would often fail due to out of memory errors or would take hours to process. Most of the models shown in this article were

generated in less than 15 minutes and often in only 3-5 minutes.

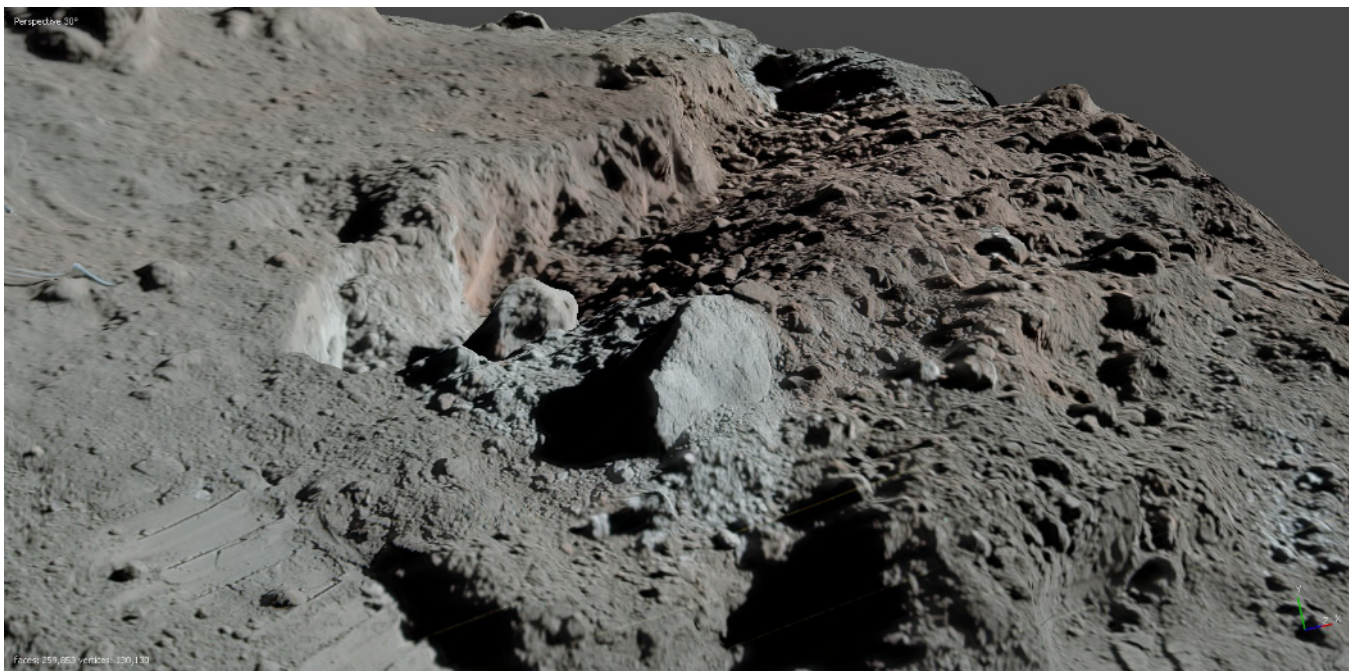
Tsiolkovsky Crater. This model was made from six photos: [AS17-139-21302](#) (shown below left) - [AS17-139-21307](#). The images to the right and bottom are two 3D views of the resulting model.



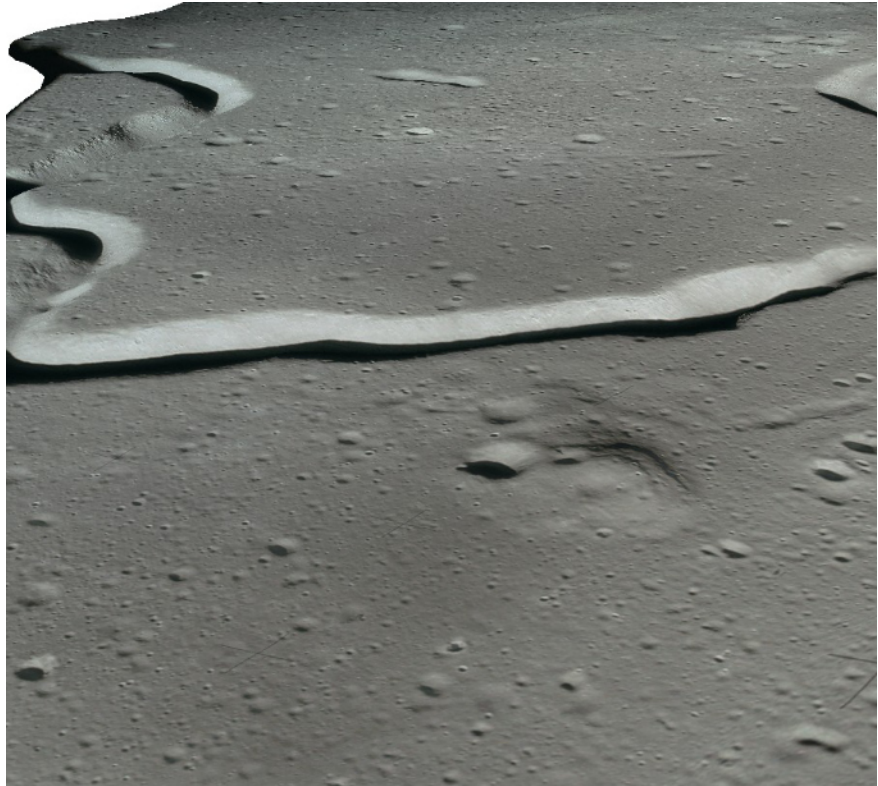
Often I only have two or three photos to work with and they're all from almost the same angle, so models don't always have very high fidelity. However one can still find interesting new views. Here is a close-up view of some Apollo 12 boot prints. Source: [AS12-49-7242 and 7243](#).



Below: [AS17-137-20984](#) - 20987 Apollo 17 Station 4, orange soil with trench and a boot print.



Right: the Apollo 15 landing site, Hadley Rille. Generated from [AS15-87-11716](#) - 11721.



Below: a close-up view of craters Macrobius A, B. One of the three source photos is shown at left. I find it interesting that Metashape will ignore close-up objects (the reaction control thrusters) and only generate a mesh for the areas that are in common on all three photos. However since it generates texture data from the photos, the crosshair registration marks are almost always visible and sometimes duplicated.



So far I've found a dozen or sets of photos that produce good models. Many more end up being a confusing mess because Metashape doesn't have enough data to build a point cloud or determine depth.

At the time, NASA and the geologists weren't interested in any more

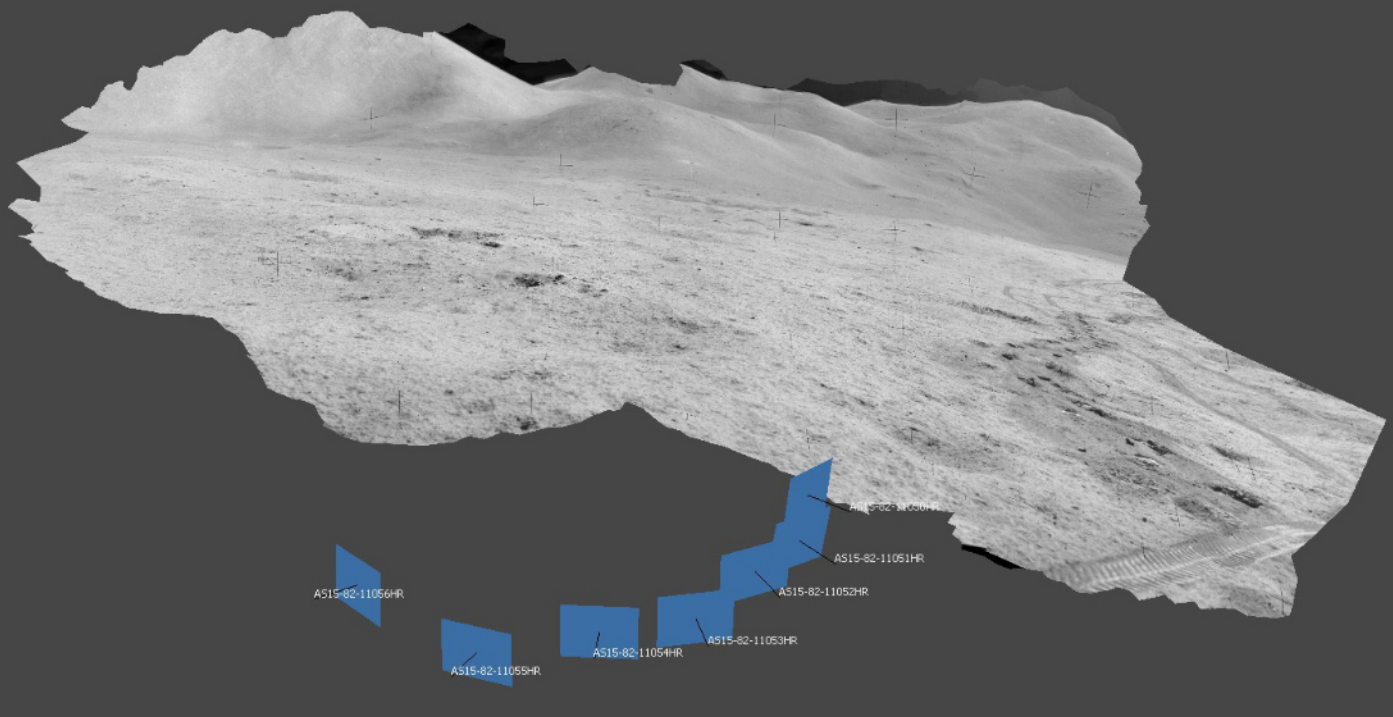
than stereo pairs and panoramics, and the astronauts didn't have time to walk around each station to take pictures from all angles.

I've spent a lot of time assembling 360 degree panoramics (as have many others). Since the panoramics were all taken from a single location,

Metashape has no depth data and often generates a flat 3d model or one that is distorted or even inverted.

I'm currently working on building a multi-panorama virtual tour map of one of the landing sites, but that's a subject for a future article or PAC program.

Perspective 30°

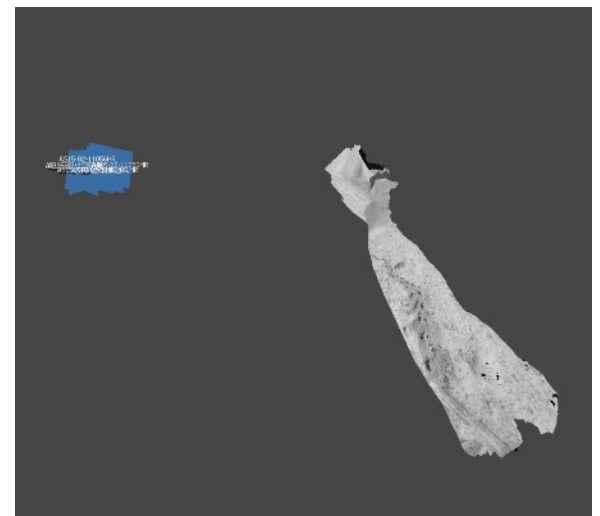


Faces: 246,476 vertices: 123,495

Panoramic [AS15-82-11050](#) - 11054 processed by Metashape. The estimated camera positions are shown as blue rectangles, however I suspect that they're also distorted due to the lack of depth information.

Right: the same 3D model viewed from a different angle. Since all photos were taken from the same location, it generated a warped surface that is almost two dimensional.

Photo credit: All images courtesy NASA. Some images were scanned by Kipp Teague,



29th Annual Nebraska Star Party



Photo Credit: Fred Hultstrand History in Pictures Collection, NDSU, Fargo, N.D.

Join us this summer as families from all over the US and around the world gather in the sparsely populated sand hills of North Central Nebraska to spend a good week under a galaxy of stars.

**July 24-29 at Merritt Reservoir, Valentine,
Nebraska**

[Online Registration is now open](#)

From the Archives

March, 1976

Comet West - Brilliant, Unexpected Maverick

Aside from its unanticipated brilliance (consistently one to two magnitudes brighter than initial predictions), Comet West has managed to command the attention of professionals and amateurs with some interesting antics in the morning sky.

Its prominent tail has, on close observation, been seen to include a broad dust tail composed of a number of "synchronic bands" according to Z. Sekanina of the Center for Astrophysics. "The bands showed a systematic translational motion of about 1.6 degrees per day and rotated at about 13 degrees per day relative to the faint plasma tail, one of them essentially coinciding with its southern border.

On a print obtained March 5, Sekanina noted as

many as 20 "synchronic bands," the most distant of which reached as far as 19 degrees from the nucleus with the dust tail extending 25 degrees.

Sekanina explained that the dust tail was complained of postperihelion partial emissions, while a faint section northeast of the nucleus was made up of somewhat heavier particulates emitted during the week before perihelion.

Brian G. Marsden of the Smithsonian Astrophysical Observatory speculated during the week of March 15 that Comet West might have broken up into a main cometary nucleus and as many as three smaller nuclei. Visual observations beginning March 5 indicated secondary nuclei at p.a. 50 degrees separation 3",

magnitude difference 0.5; another at 120 degrees, magnitude 0, no separation data; and one at 350 degrees, separated by about 4", magnitude difference 0.5.

Reliable estimates on Comet West indicated a magnitude of -3.65 shortly after perihelion on February 26, viewed during daylight. The comet declined to magnitude 0 by March 3 approximately magnitude 1 on March 6, and was still at magnitude 1 late on March 8. Original predictions were that West should have been down to magnitude 3.2 on the 8th--so, given its rapid advance into dark skies, providing contrast and retained brilliance, Comet West was turning out to be everything Kohoutek wasn't.

Club Member Profile: Jason O'Flaherty



Jason has been a member of PAC since 2020

I work as an App Dev Manager in a subdivision of NCR that makes banking software. My wife's name is Wendy and my daughter, Zarina, is a senior in high school. When she was younger and had more free time, the two of us would often go to the Saturday night Hyde public events.

I'm currently continuing my education and working towards a degree in Computer Management at Doane with a plan to graduate at the end of 2023. I have too many hobbies for my own good, but the shortlist is: I create YouTube videos on my channel <https://www.youtube.com/flarecorpmedia>; in the warm months, I cycle, kayak, and hike mountains; I practice photography.

I joined PAC two years ago in February 2020 after attending the last in-person meeting before the Covid shutdown. I went with a friend to watch the

Astrophotography presentation and joined after that meeting.

I decided I should finally humor my interest in astronomy by joining. I've enjoyed studying space ever since elementary school science classes. The life cycles of stars were some of my favorite topics, but I enjoy just about anything astronomy-related. As an amateur astronomer, I focus solely on astrophotography which lets me combine two of my interests. I also find it difficult to see things clearly in a telescope. A camera eliminates that issue for me.

I use an iOptron SkyGuider Pro equatorial mount with a Fujifilm X-T4 DSLR camera and a Fujinon 100-400mm lens which I sometimes pair with a 1.4x teleconverter to take my photos.

I've never been to a star party, but the past two years with covid weren't a

very opportune time to try to attend one for the first time. However, I usually enjoy the alone time while capturing my images. It gives me time to read about the object I'm photographing. My favorite books for getting information are:

Messier's Nebulae & Star Clusters by Kenneth Glyn Jones

Atlas of the Messier Objects: Highlights of the Deep Sky by Ronald Stoyan

I haven't completed any observing clubs, but I've never looked to see what they are. I have a personal goal of photographing all of the Messier objects, so maybe there is one for that. I catalog the photos and information about each object on my website at <https://www.jasonoflaherty.com/messier-objects>.

Jason O'Flaherty, continued.



For Sale

I have for sale a 12" Meade Lightbridge Truss Mount (Dobsonian) Telescope. It comes with a 2" Dual Speed Crayford Focuser, 26 mm 2" eyepiece, 2, Black Shroud, TelRad Finder (and a Red Dot Finder that's standard with the telescope). The scope is in like new condition. I've had it a few years but only used it about a half dozen times.

I'm asking \$750 for the setup. For more information and pictures please contact me at DCHURILLA@NEB.RR.COM

SPECIFICATIONS

Assembled OTA Weight:	38 lbs.
Assembled Mount Weight:	27 lbs.
Total Weight:	65 lbs.
Aperture:	12"
Focal Length:	1524 mm (60")
2" Crayford Style Dual Speed Focuser	

Contact:

Dave Churilla

402-467-1514 (home)

402-430-1282 (Cell)

DCHURILLA@NEB.RR.COM

Webb, continued from page 14.

"With Webb, we can do really interesting science at much fainter magnitudes or brightnesses," explained teammate Cristina Thomas, an assistant professor of astronomy at Northern Arizona University. "Also, we've never been able to observe interstellar objects in this region of the infrared. It opens a lot of opportunities for the

different compositional signatures that we're interested in. That's going to be a huge boon for us!"

The James Webb Space Telescope is the world's premier space science observatory. Webb will solve mysteries in our solar system, look beyond to distant worlds around other stars, and probe the mysterious structures and origins of our universe and

our place in it. Webb is an international program led by NASA with its partners, ESA (European Space Agency) and the Canadian Space Agency.

For more information about Webb, visit www.nasa.gov/webb.

CLUB MEMBERSHIP INFO

REGULAR MEMBER - \$30.00 per year. Includes club newsletter, and 1 vote at club meetings, plus all other standard club privileges.

FAMILY MEMBER - \$35.00 per year. Same as regular member except gets 2 votes at club meetings.

STUDENT MEMBER - \$10.00 per year with volunteer requirement.

If you renew your membership prior to your annual renewal date, you will receive a 10% discount.

Club members are also eligible for special subscription discounts on Sky & Telescope Magazine.

CLUB TELESCOPES

To check out one of the club telescopes, please contact a club officer. Scopes can be checked out at a regular club meeting and kept for one month. Checkout can be extended for another month if there are no other requests for the telescope, but you must notify a club officer in advance.

100mm Orion refractor: Available
 10 inch Meade Starfinder Dobsonian: Available
 13 inch Truss Dobsonian: Needs repair
 10 inch Zhumell: Needs mount

Buy the book! The Prairie Astronomy Club: Fifty Years of Amateur Astronomy. Order online from Amazon or lulu.com.

ADDRESS

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