The Prairie Astronomer

December 2022 Volume 63, Issue #12

IN THIS ISSUE:

The Newsletter of the Prairie Astronomy Club

The Prairie Astronomer

The next regular meeting is January 31st at 7:30pm at Hyde Observatory

NEXT MEETING AND PROGRAM

Holiday gathering, December 20th at 7pm at Tanner's Restaurant, 8600 S 30th Street in Lincoln.

The next regular meeting will be on January 31st at Hyde Observatory.

UPCOMING PROGRAMS

May: Annual Club Dinner
June: Solar Star Party

CONTENTS

Cover: This infrared image of the Orion Nebula features plenty of dust but no stars. In these infrared wavelengths, it's possible to see hot spots where new stars are forming, while unseen bright, massive stars have carved out caverns of empty space. Credit: ESA/NASA/JPL-Caltech

Background photo: Brett Boller

CALENDAR

PAC Meeting
December 20th, 7pm
Holiday Gathering, Tanner's Restaurant

Special Program: How to Use Your Telescope
January 20th at 5:15pm Branched Oak Observatory

PAC Meeting
January 31, 7:30pm at Hyde Observatory
Program: The Northern Lights and a Trip to the Arctic - Mark Dahmke

PAC Meeting
February 28th 7:30pm at Hyde Observatory

2023 STAR PARTY DATES

	Date	Date
January	13	**20**
February	10	**17**
March	17	**24**
April	14	**21**
May	12	**19**
June	9	**16**
July	7	**14**
NSP	7/16	7/22
August	11	**18**
September	8	**15**
October	6	**13**
November	3	**10**
December	8	**15**

Dates in BOLD are closest to the New Moon.

CLUB OFFICERS

President	Jason O'Flaherty jflaher@gmail.com
Vice President	Brett Boller proboller86@yahoo.com
2nd VP (Program Chair)	Bill Lohrberg wmlohrberg89@gmail.com
Secretary	Jim White jrwhite2188@gmail.com
Treasurer	John Reinert jr6@aol.com
Club Observing Chair	Jim Kvasnicka jim.kvasnicka@yahoo.com
Outreach Coordinator	Christine Parkyn cpparky@gmail.com
Website and Newsletter Editor	Mark Dahmke mark@dahmke.com

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Night Sky Network

www.prairieastronomyclub.org

Meeting Minutes

Jim White

Jason O'Flaherty started the meeting at 7:34. Tonight's meeting is Jason's first as new president of the Prairie Astronomy Club and is being held in person and online via Zoom. To start the meeting there was a request from a member in attendance to introduce the new club officers. Jason introduced himself as the new President, First Vice President is Brett Boller, Second Vice President is Bill Lohrberg, Secretary is Jim White and John Reinert is the Treasurer.

Jason turned the meeting over to Jim Kvasnicka, the club's Observing Chair, for his monthly observing report. Upcoming star parties are December 16th and December 23rd, looking ahead to January they are on the 13th and the 20th. We have been holding are star parties at Clatonia Recreation Area because the regular sight at Jim's brother in-law's farm currently has cattle on it. Jim and Bob did some scouting around and found the Clatonia Recreation Area which has skies comparable to the farm. Going forward we will probably continue to use the Clatonia Recreation Area since the skies are comparable to the farm site and the club can save about five hundred dollars a year not having to pay rent for the farm site and mowing. Venus is visible at dusk and Mercury will become visible after December 10th. Something to look forward to is December 7th when the Moon will occult Mars. Jim's full observing report can be found in this newsletter.

The meeting was turned over to John Reinert at 7:40 for the treasurer's report. The clubs account balances haven't changed much as we don't spend much and don't have any current projects that require any club funds. One of the club's CDs had matured and those funds were rolled into a money market fund. John is looking into some electronic banking options that exist but is a little concerned with some of the options not having any local personal support available. Our newest member is Rachel Scheet from Mueller Planetarium at UNL's Morrill Hall. Mark Dahmke and John continue to collaborate on the web-based dues payment system. At 7:43 John turned the meeting back over to Jason.

Jason announced that we have a YouTube Channel. We currently have three videos on our YouTube channel. The club also has a Facebook page that you can follow. On Sunday, November 20th, we had our How to Buy a Telescope class at Hyde Observatory. We had six people that showed up to help with the

class, Bob Kacvinski, Jim Kvasnicka, Jim White, Dave Knisely, Mark Dahmke and Jason O'Flaherty. The class was streamed live on Facebook and open to the public. Unfortunately, we didn't have anyone attend at the Observatory but did we did have 39 people click on the live stream and had up to 7 viewers at one time. The recording will be available on YouTube and lasts approximately 45 minutes. Jason sent out the PAC 2022 survey to the membership to fill out and was available for one week, from November 16th to the 23rd. Seventeen people responded to the survey and there will be an anonymized summary of the survey made available. The Holiday party will be at Tanner's on Tuesday the 20th of December. There will be no December club meeting due to the upcoming Christmas Holiday. There will be star parties at the Clatonia Recreation Area on December 16th and 23rd if weather is suitable. Jim Kvasnicka noted that on Friday night after Thanksgiving we had 7 people show up for the star party at the Clatonia Recreation Area. In January we will have the How to Use Your Telescope class at one of our monthly star parties and it will be held at Branched Oak Observatory. The time and date for the class will be sent out. This concluded tonight's meeting.

Tonight's speaker is Blair Belt who is an astronomer and environmentalist with Mayland Earth to Sky Park & Bare Dark Sky Observatory in Burnsville, NC which is an International Dark Sky Park. Blair is joining us via Zoom.

Online Dues Payment

The club dues payment form has finally gone live on the PAC website. The link can be found under the "About" menu pulldown. Here's the direct link:

https://www.prairieastronomyclub.org/pay-dues-online/

New members can sign up online and you can also pay your annual dues with either a credit card or paypal. If you're already a member and are renewing within 30 days of your anniversary date, select the early renewal option for a discount.

Reflections on a Stellar Year

Jason O'Flaherty

'Tis the time to spread some good cheer

A season filled with love for those we hold dear

As we look back on the year that has passed

We give thanks for all the joy that's amassed

We gaze up at the sky, with stars shining bright

Such a glorious view, oh what a sight

As we move closer to this January new

Let's look back on the year with a PAC Yearly Review

In December, the JWST did take flight

As it soared into space, a cosmic delight

In January, we started a new mentorship plan

Pairing up new members with an experienced hand

In February, for in-person meetings, we yearned

At the Branched Oak Observatory, our spirits returned

In March, a new storage shed was erected

With room for all our scopes, together and protected

In April, the main feature story

Was the reopening of the Hyde Observatory

In May, we had a lunar eclipse

Two parties, many observers, it was the ultimate fix

For how to photograph great balls of gas

Nothing better than an astrophotography class

In June, the planets did align

A beautiful sight, oh so divine

In July was the 29th Nebraska Star Party

With no smoke, the stars were quite hearty

In August, a party to celebrate

The JWST's first photo, so great

In September, the IDA had a new place

Merritt Reservoir, the 200th dark space

The DART mission, we watched it commence

An asteroid impact, to prepare our defense

In October, was International Observe the Moon night

With 5 telescopes on hand, oh what a sight

Also our club shed got a new face

With pictures of planets, it looks just like space

In November, new officers were elected

Bob Kacvinsky, goodbye, you are respected

With our first online class, How to buy a Scope

Dealing with live streaming, we learned to cope

Well, that concludes our yearly review

I wish you the best, if you're seasoned or new

So let's raise a glass to another great year

Merry Christmas to all, may your skies remain clear

The President's Message

Jason O'Flaherty

I'd like to express my thanks to Blair Belt-Clark from Earth to Sky Park who presented at our November meeting. It was incredibly interesting to see how a different region handles the challenges of managing a dark sky. Judging by the number of questions and comments after the presentation, it seemed many others enjoyed it as much as I did. Thanks to Bill Lohrberg and Jack Dunn for setting that up. The recording should be available on our YouTube channel very soon if it isn't up already.

As a reminder, we are having our Holiday Party on December 20th starting at 7 p.m. Officially, it'll last until around 8:30, but I suppose there's nothing stopping anyone from staying longer if they'd like. I cleared it with Tanners to let us order off the menu with the count of 17 from the RSVP instead of ordering catering. However, I know some people couldn't RSVP in time so the number might be larger. All are welcome, but if we have more than 17, I ask everyone to have patience with the Tanners staff if orders take longer than expected to prepare.

Next, I'd like to share some of the more interesting stats from this year's PAC survey.

17 members responded.

Meetings

- 94% gave a high rating of our guest speakers and presenters
- The main request for improvement was to have more in-person speakers
- The most requested topic for new presentations was information for individual knowledge, such as telescopes, eyepieces, and cameras. Earth-based observing and celestial bodies were tied for second.
- Overwhelmingly, the number one request for improvements to Zoom is better interaction between Zoom attendees and those in person
- 88% said they were okay with live streaming our meetings to the public on Facebook

Star Parties

- There was a pretty equal distribution regarding the distance a person is willing to drive for star parties, between under 30 minutes up to 1.5 hours. Bless the one exception who said they'd drive over 2 hours for a good dark sky site. You truly are dedicated.
- 76.5% of people said they own their own scope and know how to use it. 23.5% are either in the market or would like to learn

President's Message, continued.

how to use it better

- The three most popular things to observe are Deep Sky Objects, whatever a person feels like, and the moon and planets.

Treasury

- All respondents were either okay or would consider moving to a specified month for collecting dues, with Quarter 1 being the most popular time to collect them.
- Nearly 2/3rds of respondents said they'd prefer to pay digitally.

Thank you to everyone who took the time to respond. The officers will review the full results at a soon-to-be-scheduled officer meeting to help us with planning the next year.

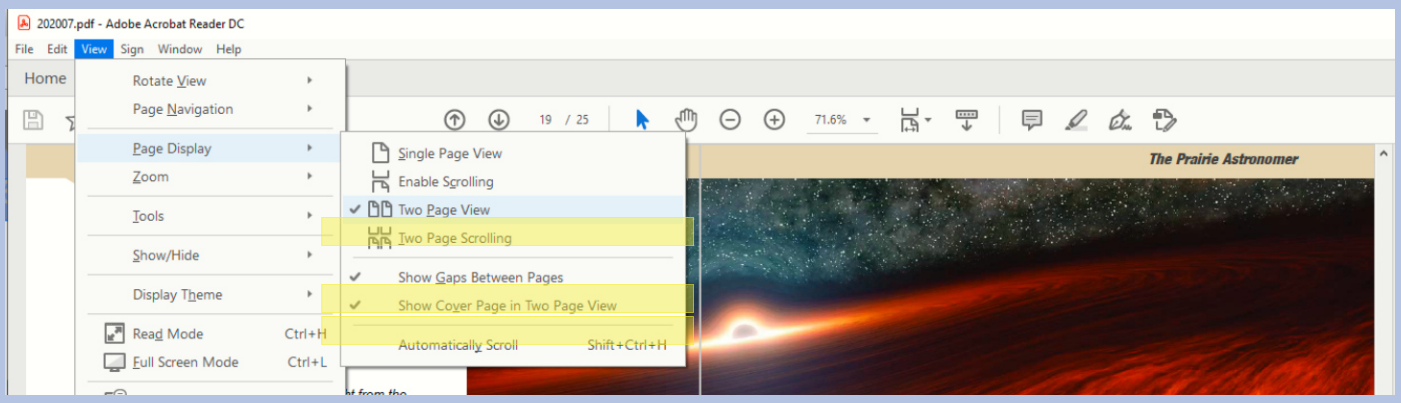
As a reminder, we will have our annual "How to Use Your Telescope" class on January 20th, starting at 5:15 p.m. at Branched Oak Observatory. This is the same night as our Star Party, which obviously will also be out at BOO. The sun is scheduled to set around 5:30 p.m. There is an ad for this class on our Facebook Page. Please consider sharing it to help spread the word.

If I don't see you before January, I hope you have a very good holiday season and a blessed start to your new year.

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

Clatonia Star Party

By Dave Knisely

Astrophotography

M33 The Pinwheel/Triangulum Galaxy by Jim White

14 - 2 minute exposures,Camera - Nikon D750 (unmodified), Telescope - Celestron 925 EdgeHD, Mount - Celestron CGX, Celestron OAG (Off-Axis Guider), ZWO ASI174MM Mini guide camera,Stacked and processed in PixInsight

Astrophotography

California Nebula by Brett Boller

Astrophotography

The Horsehead Nebula by Brett Boller

Astrophotography

Thors Helmet by Brett Boller

ARP 50

The Mantrap Skies Image Catalog

Rick Johnson

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.

Arp 50/NGC 1520 is located in eastern Cetus just across the border with Aquarius and is just under 400 million light-years away. It is a rather questionable object in many ways. First, many catalogs, including the database in The Sky 6 that I use to point my scope say Arp 50 is NGC 5625 pointing me to the opposite side of the sky. Thus, when I set up the script file for it then went to bed I got up to find blank images and an error message telling me the object was beyond my scope's horizon limits. By default, the scope parked itself and shut down. So the camera took way out of focus images of the observatory wall two feet away from the front of the scope!

Arp 50 is really IC 1520 so when I entered that I got a good image. Not easy as it is about at my -15 degree declination limit.

Another reason this is a questionable object is Arp's classification of it under spiral galaxies with small high surface brightness companions on the arms. To what is he referring? He doesn't say. The galaxy has several bright knots and arcs in

ARP50, continued.

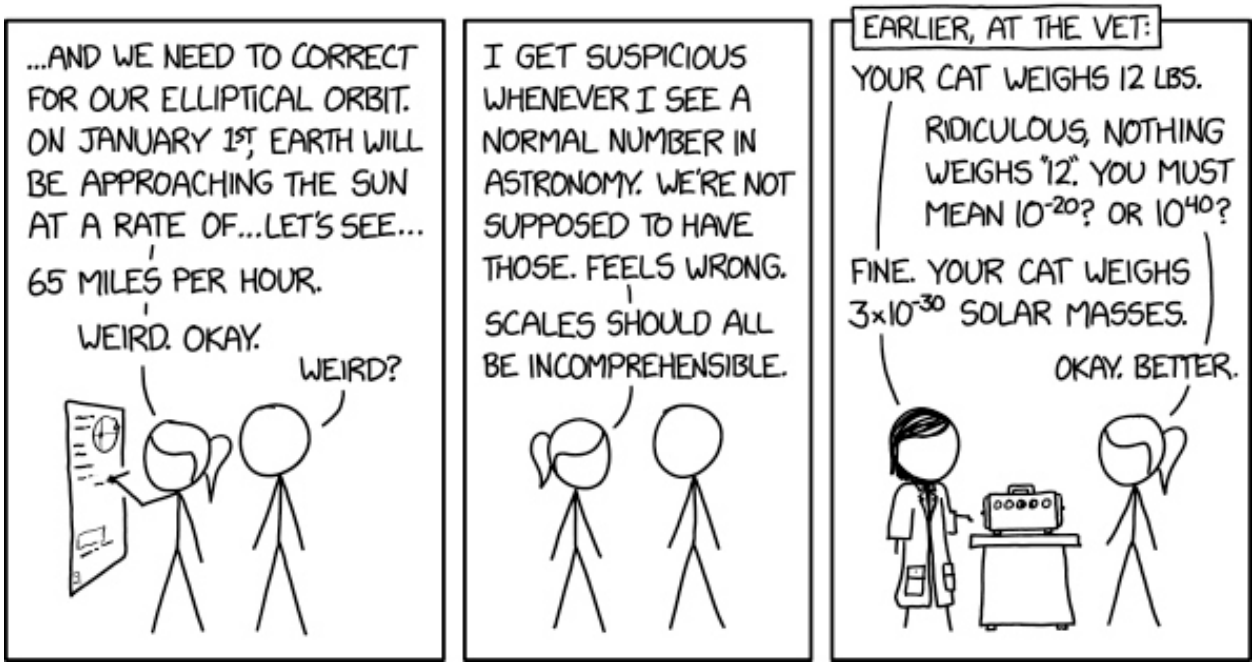
the arms as well as a faint diffuse blob on the end of the southern arm. This NED classifies as a second galaxy. It certainly doesn't have a high surface brightness, however, being nearly indistinguishable from the arm in Arp's image. There's a nice bright knot in the other arm above a short bright arc. Is this knot what Arp refers to, it does have a rather high surface brightness. Some articles I found say there is no nearby galaxy at all. Others call it a M51 type system. I can't find any high resolution images of it on the net. In my image, a few seconds of arc above the "second galaxy" according to NED and left is a near starlike object. The PSF though is not right for a star. This could be due to it being in the fuzz of the arm or because it is a distant galaxy. Flip a coin. I need far more resolution to settle this.

I'm not the only one puzzled by this one. Science writer Courtney Seligman is too. http://cseligman.com/text/atlas/ic15.htm#ic1520 Unfortunately, his image isn't any better than Arp's. Arp's image was taken under what he calls a seeing class of 1. He defines 3 as being 1" to 1.5" with each class about twice as good (5 maximum) or bad (1 minimum). So Arp's image would be taken under 4" or so seeing. And I thought my seeing was bad! The POSS survey plate images are better than his of this entry. The galaxy was discovered by Stephane Javelle on November 4, 1891.

If that low surface brightness blob is a separate galaxy is it nearby and could it have the mass to pull out that arm? There's nothing on it that I find to help answer this. To me, this is a coin flip as to the existence of a second galaxy. If none why is the arm distorted? It is a rather lonely galaxy it would appear. NED has no distance data on any other galaxy in the entire frame. One out of frame to the north is listed at 1.5 billion light-years so not involved. 2MASX J23581154-1400522, to the northeast, is the only likely candidate I find but without any distance data, there's no way to know if this is a reasonable one. Most galaxies in the field are cataloged only by the APMUKS, an automatic plate measurement survey using the UK's Schmidt telescope. This can't provide distance data. I marked one of these and could have marked a hundred or so. As with many modern catalogs, the name gives its position, J2000 coordinates in this case.

My image did pick up 5 asteroids but again, another problem. One is unknown to the Minor Planet Center and is apparently one they haven't included as yet. It might even be undiscovered. If so it will remain that way as this image was taken 2010 September

5.28UT so a bit late for follow-up. (Edit: It is still not in the Minor Planet Center's database 6 years later.) 4 others were in their database and are marked on the annotated image. The unknown is marked with a question mark, the others with their name and the planet center's magnitude estimate. One is buried in the glow of a "bright" (7th magnitude so too faint to see naked eye) F2V type star.



xkcd.com

Focus on Constellations: Taurus

Jim Kvasnicka

Taurus the Bull covers 797 square degrees of the sky. The Bull's horns extend NE to the stars Beta and Zeta Tauri and its face is the "V" formed by the Hyades Star Cluster. The first magnitude star Aldebaran is one of the Bull's eyes. The constellation is rich in open clusters and diffuse nebulae. It contains the two finest naked-eye open clusters in the Hyades and Pleiades, M45. It also contains the supernova remnant M1, the famous Crab Nebula.

Showpiece Objects

Open Clusters: M45 (Pleiades), Mel 25 (Hyades),

SNREM: M1

Planetary Nebulae: NGC 1514

Mythology

In Greek mythology Taurus is associated with the Bull who abducted Europa, the beautiful daughter of Arenor, King of Sidon. Europa was attracted to a white bull in her father's herd. She adorned the bull with flowers and climbed on the gentle bull's back for a ride. However, the bull was actually Jupiter in disguise who planned from the start to abduct her. The bull ran off with Europa on his back and went into the sea and swam all the way to Crete.

Number of Objects Magnitude 12.0 and Brighter

Galaxies: 2

Globular Clusters: 0

Open Clusters: 5

Planetary Nebulae: 1

Dark Nebulae: 3

Bright Nebulae: 2

SNREM: 1

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

January Observing

Jim Kvasnicka

This is a partial list of objects visible for the upcoming month.

Planets

Venus: Low in the WSW at sunset at magnitude -3.9.

Mercury: Low in the WSW difficult to see.

Saturn: In Capricornus at magnitude +0.8 with a disk 15.8" wide. On January 22nd Venus and Saturn are separated by just 21'.

Jupiter: In Pisces at magnitude -2.4 with a disk 39.3" wide.

Mars: In Taurus at magnitude -1.2 with a disk 14.7" wide.

Uranus and Neptune: Uranus in Aries, Neptune in Aquarius.

Meteor Showers

Quadrantids: Peaks the night of January 3-4, a waxing gibbous Moon will interfere.

Messier List

M33: The Pinwheel Galaxy in Triangulum.

M34: Open cluster in Perseus.

M52: Open cluster in Cassiopeia.

M74: Galaxy in Pisces.

M76: The Little Dumbbell in Perseus.

M77: Galaxy in Cetus.

M103: Open cluster in Cassiopeia.

Last Month: M2, M15, M29, M31, M32, M39, M110

Next Month: M1, M35, M36, M37, M38, M42, M43, M45, M78, M79

NGC and other Deep Sky Objects

NGC 1406: Galaxy in Fornax.

NGC 1425: Galaxy in Fornax.

NGC 1857: Open cluster in Auriga.

NGC 1907: Open cluster in Auriga.

NGC 1980: Emission nebula and open cluster in Orion just south of M42.

NGC 2169: The "37" Cluster in Orion.

Double Star Program List

Beta Orionis: Rigel, bright white and dim blue stars.

Delta Orionis: Mintaka, white and blue pair.

Struve 747: White pair of stars.

Lambda Orionis: White stars.

Theta 1 Orionis: The Trapezium.

Iota Orionis: White primary with a blue secondary.

Theta 2 Orionis: Three white stars.

Club Member Profile: Katelyn Farneth

Katelyn joined PAC in 2020

I'm a transplant from Pennsylvania, I moved to Lincoln directly after I studied abroad in Italy for my last semester of college. I worked at the LUX Center for the Arts as the Gallery Director until July 2022 when I decided to go back to school to become a pilot. I'm currently a private pilot working on becoming an airline transport pilot through Ignite Flight Academy here at KLNK. Apart from my furry family members most of my family lives in PA so I've collected hobbies and clubs as a way to build a Lincoln family which ultimately brought me to the club! Other interests include roller derby, collecting tattoos, painting, or working on my house.

I joined PAC in February 2020. Astronomy really gave me a new perspective and helped me get through the pandemic. Thank you all for being so open and willing to share this passion with newcomers like me.

I've always had an interest in astronomy but unfortunately was never able to pursue it until now. In February, 2020 I was leaving a relationship and felt like it was time to explore some of my personal interests as well as build a community with new people. I love the star parties and the opportunity to learn from all of you knowledgeable folks. I have a lot of interests but since I'm so new to astronomy my current focus has been learning to navigate the night sky and working through the Messier objects.

I have a homemade 10" dob (that provides a beautiful view after Bob graciously helped me clean it!)

I haven't been to a star party YET, I'm planning to go to NSP this year and would consider other regional star parties. If anyone has suggestions as to which ones are worth the trip please let me know! In

the summer of 2020 I went to a star party the club had at the farm. It was almost a perfect sky and not only were we making observation after observation but the fireflies were lighting up the field and it gave the illusion we were standing amongst the stars. I'll never forget that night.

So far I've completed two observing clubs: Messier list and Globular clusters.

NASA, ESA Reveal Tale of Death, Dust in Orion Constellation

In a tale of cosmic proportions, the region is being transformed by the massive stars that live and die within it.

A new image combining previously released data from three telescopes shows a region that includes the Orion Nebula, named after the mighty hunter from Greek mythology who was felled by a scorpion's sting. But the story of how this dusty region came to be is just as dramatic.

This infrared image of the Orion Nebula features plenty of dust but no stars. In these infrared wavelengths, it's possible to see hot spots where new stars are forming, while unseen bright, massive stars have carved out caverns of empty space. Credit: ESA/NASA/JPL-Caltech

The Orion Nebula is located in the constellation Orion, which takes the appearance of a hunter raising a club and shield at an unseen target. Three stars in a line are together known as Orion's belt; the region shown in the image aligns with another series of stars perpendicular to the belt, known as Orion's sword. If you could see it in the sky, the region would appear about the size of the full moon.

Two enormous caverns that dominate the cloud were carved out by giant stars (unseen in this image) that can release up to a million times more light than our Sun. All that radiation breaks apart dust grains there, helping to create the pair of cavities. Much of the remaining dust is swept away by winds from stars or when the stars die explosive deaths as supernovae.

The blue light in these areas indicates warm dust. Observed in infrared light – a range

Dust, continued.

of wavelengths outside what human eyes can detect – the views were provided by NASA's retired Spitzer Space Telescope and the Wide-Field Infrared Survey Explorer (WISE), which now operates under the moniker NEOWISE. Spitzer and WISE were both managed by NASA's Jet Propulsion Laboratory in Southern California.

Around the edge of the two cavernous regions, the dust that appears green is slightly cooler. Red indicates cold dust that reaches temperatures of about minus 440 Fahrenheit (minus 260 Celsius). The red and green light shows data from the now-retired Herschel Space Telescope, an ESA (European Space Agency) observatory that captured wavelengths of light in the far-infrared and microwave ranges, where cold dust radiates. Herschel's large mirror provided high-resolution views of these clouds, which are full of contours, nooks, and crannies. The cold dust appears mostly on the outskirts of the dust cloud, away from the regions where stars form.

In between the two hollow regions are orange filaments where dust condenses and forms new stars. Over time, these filaments may produce new giant stars that will once again reshape the region.

More About the Missions

JPL, a division of Caltech in Pasadena, managed Spitzer mission operations for NASA's Science Mission Directorate in Washington until the spacecraft was retired in 2020. Science operations were conducted at the Spitzer Science Center at IPAC at Caltech. Spacecraft operations were based at Lockheed Martin Space in Littleton, Colorado. The Spitzer data archive is housed at the Infrared Science Archive at IPAC at Caltech.

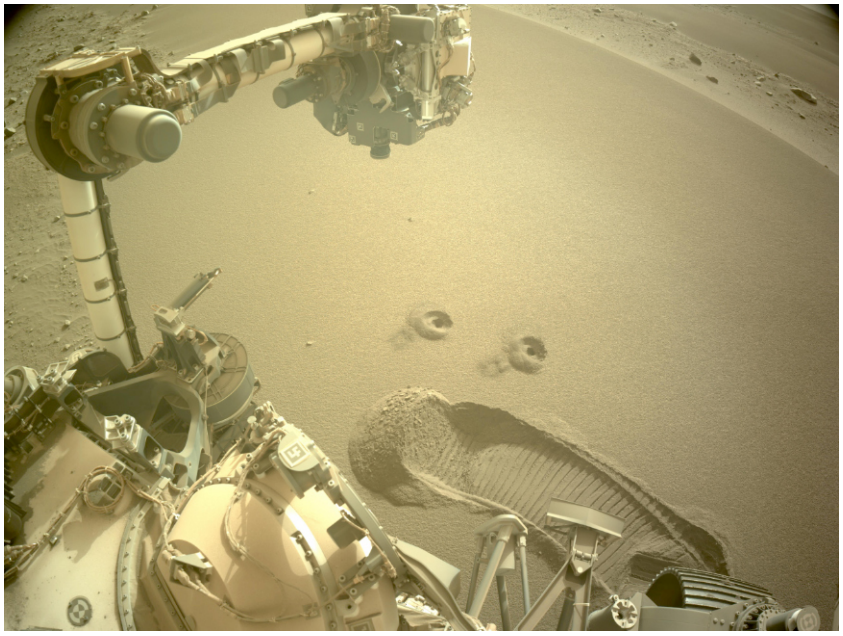
For more information about NASA's Spitzer mission, go to:

https://www.ipac.caltech.edu/project/spitzer

NASA's Perseverance Rover Gets the Dirt on Mars

The mission's first two samples of regolith – broken rock and dust – could help scientists better understand the Red Planet and engineers prepare for future missions there.

NASA's Perseverance rover snagged two new samples from the Martian surface on Dec. 2 and 6. But unlike the 15 rock cores collected to date, these newest samples came from a pile of wind-blown sand and dust similar to but smaller than a dune. Now contained in special metal collection tubes, one of these two samples will be considered for deposit on the Martian surface sometime this month as part of the Mars Sample Return campaign.



Two holes are left in the Martian surface after NASA's Perserverance rover used a specialized drill bit to collect the mission's first samples of regolith on December 2 and 6, 2022. Credit: NASA/JPL-Caltech

Scientists want to study Martian samples with powerful lab equipment on Earth to search for signs of ancient microbial life and to better understand the processes that have shaped the surface of Mars. Most of the samples will be rock; however, researchers also want to examine regolith – broken rock and dust – not only because of what it can teach us about geological processes and the environment on Mars, but also to mitigate some of the challenges astronauts will face on the Red Planet. Regolith can affect everything from spacesuits to solar panels, so it's just as interesting to engineers as it is to scientists.

As with rock cores, these latest samples were collected using a drill on the end of the rover's robotic arm. But for the regolith samples, Perseverance used a drill bit that looks like a spike with small holes on one end to gather loose material.

Engineers designed the special drill bit after extensive testing with simulated regolith developed by JPL. Called

Rover, continued.

Mojave Mars Simulant, it's made of volcanic rock crushed into a variety of particle sizes, from fine dust to coarse pebbles, based on images of regolith and data collected by previous Mars missions.

"Everything we learn about the size, shape, and chemistry of regolith grains helps us design and test better tools for future missions," said Iona Tirona of NASA's Jet Propulsion Laboratory in Southern California, which leads the Perseverance mission. Tirona was the activity lead for operations to collect the recent regolith sample. "The more data we have, the more realistic our simulants can be."

The Challenge of Dust

Studying regolith up close could help engineers design future Mars missions – as well as the equipment used by future Martian astronauts. Dust and regolith can damage spacecraft and science instruments alike. Regolith can jam sensitive parts and slow down rovers on the surface. The grains could also pose unique challenges to astronauts: Lunar regolith was discovered to be sharp enough to tear microscopic holes in spacesuits during the Apollo missions to the Moon.

Regolith could be helpful if packed against a habitat to shield astronauts from radiation, but it also contains risks: The Martian surface contains perchlorate, a toxic chemical that could threaten the health of astronauts if large amounts were accidentally inhaled or ingested.

"If we have a more permanent presence on Mars, we need to know how the dust and regolith will interact with our spacecraft and habitats," said Perseverance team member Erin Gibbons, a McGill University doctoral candidate who uses Mars regolith simulants as part of her work with the rover's rock-vaporizing laser, called SuperCam.

"Some of those dust grains could be as fine as cigarette smoke, and could get into an astronaut's breathing apparatus," added Gibbons, who was previously part of a NASA program studying human-robot exploration of Mars. "We want a fuller picture of which materials would be harmful to our explorers, whether they're human or robotic."

Besides answering questions about health and safety hazards, a tube of Martian regolith could inspire scientific wonder. Looking at it under a microscope would reveal a kaleidoscope of grains in different shapes and colors. Each one would be like a jigsaw puzzle piece, all of them joined together by wind and water over billions of years.

Rover, continued.

"There are so many different materials mixed into Martian regolith," said Libby Hausrath of University of Nevada, Las Vegas, one of Perseverance's sample return scientists. "Each sample represents an integrated history of the planet's surface."

As an expert on Earth's soils, Hausrath is most interested in finding signs of interaction between water and rock. On Earth, life is found practically everywhere there's water. The same could have been true for Mars billions of years ago, when the planet's climate was much more like Earth's.

More About the Mission

A key objective for Perseverance's mission on Mars is astrobiology, including the search for signs of ancient microbial life. The rover will characterize the planet's geology and past climate, pave the way for human exploration of the Red Planet, and be the first mission to collect and cache Martian rock and regolith (broken rock and dust).

Subsequent NASA missions, in cooperation with ESA (European Space Agency), would send spacecraft to Mars to collect these sealed samples from the surface and return them to Earth for in-depth analysis.

The Mars 2020 Perseverance mission is part of NASA's Moon to Mars exploration approach, which includes Artemis missions to the Moon that will help prepare for human exploration of the Red Planet.

JPL, which is managed for NASA by Caltech in Pasadena, California, built and manages operations of the Perseverance rover.

Optimism, a full-scale replica of NASA's Perseverance Mars rover, tests a model of Perseverance's regolith bit in a pile of simulated regolith – broken rock and dust – at JPL. Credit: NASA/JPL-Caltech

From the Archives

December, 1986

Some More Words on "Atlas" - Lee Thomas

At the last meeting, the club voted to authorize purchase of the decommissioned Atlas Missile site from the Firth Co-op for $250 per acre, or $1,062.50 for the total 4.25 acres that we wanted.

Meanwhile, the Firth Co-op board of directors was deciding that, in fact, they wanted $1,500 for the land, or about $352.94 pr acre.

They came back to us with that figure as a firm offer to sell. In addition, they said that, if we didn't want to spend the whole amount immediately, they would accept $500 and a 10% note across two years for the balance. (That would be a $600 principal + interest payment in 1988, assuming we bought the land early in 1987, and a $550 principal + interest payment in 1989) And, they asked that we build in an option for the Firth Co-op to repurchase the property should we ever decide to sell it.

I said that I doubted very much whether the club would go for the deal, but I would take it back to the committee The combined Board of Directors and Observatory Site Committee met on Tuesday evening,

December 9th we went over the other available sites that met our criteria for distance and usability and concluded that we probably would never locate one as favorable as Atlas.

We examined our financial situation at the same time, decided it was iffy, but possible to purchase the land depending how the club as a whole felt about the apparently tight operating that acquisition of the property would impose upon us for the next few years.

It was decided that we would bring the proposal to the full club for a vote at the December 30th meeting.

Since December 9th, we have received a substantial amount of money in donations/ pledges—$1,490 to be exact! Added to our previous Savings Account balance, we now have over $3,000 in the kitty. This does NOT include our regular checking account balance which is now slightly over $1,000. The donations came from six people, and one was for $1,000 (from an anonymous donor.)

Certainly, this means that, if we want to, we can purchase the land for $1,500, and do the necessary 'improvements to satisfy our insurance policy, which would run $500, and still have a comfortable margin for operating the first couple of years.

I presume that there are still some potential

Archives, Continued.

donors from whom we have not yet heard, whose generosity before January 1st would give our treasury more operating room and beat the tax man to the punch.

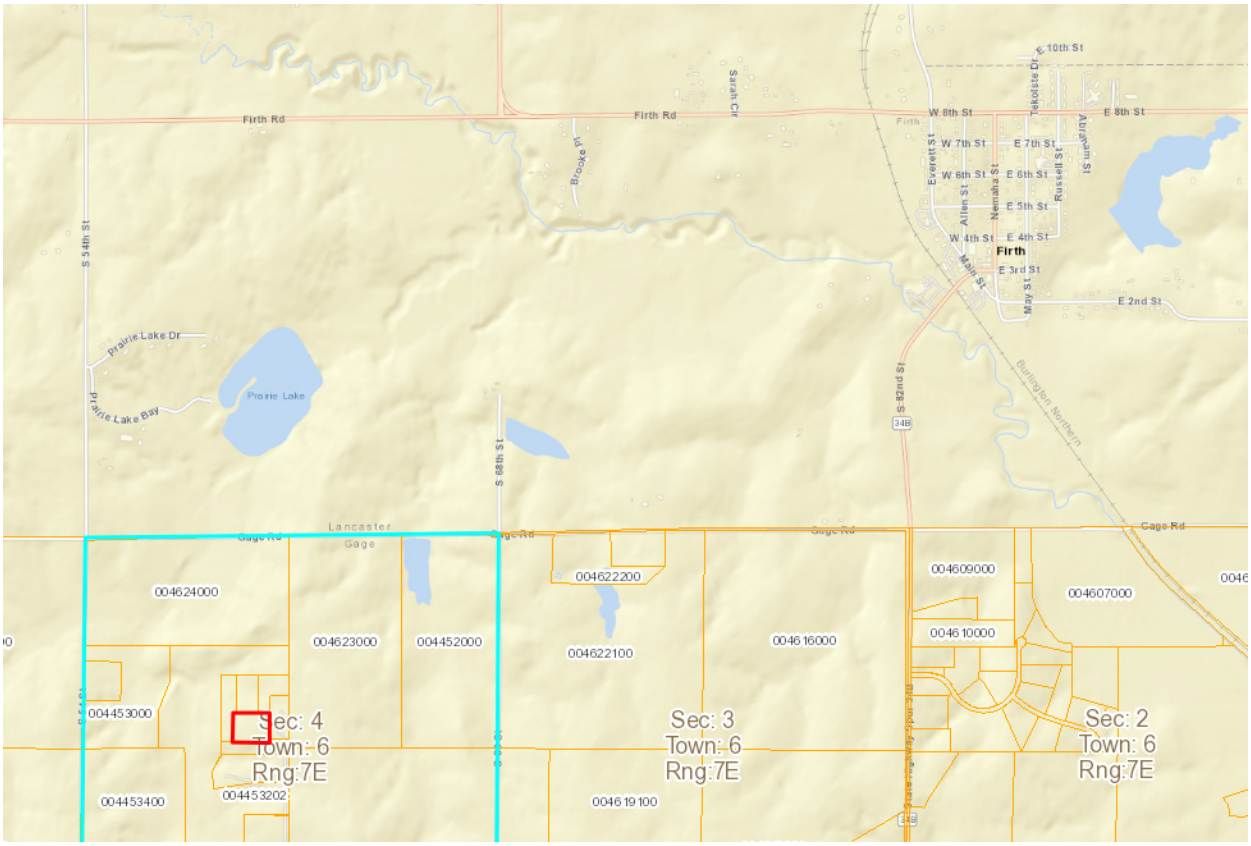
The Committee has also discussed a keyholder plan for regular site users that would generate some additional revenue.

It is too far into the winter to purchase Atlas Site now and close the access shaft, and I have discussed this problem with the Co-op manager. So long as we can close son the land by the Co-op's Annual meeting on march 27th, they are willing to accept a handshake deal that we will buy it.

It is a big step, certainly.

We need to discuss it, and vote. We still must watch our pennies and not get carried away, but, because of some very generous folks, it appears that we can get our preferred

permanent observing site without going into hock... if we want it.



The Atlas site was located about two miles southwest of Firth, Nebraska.

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.

ADDRESS

The Prairie Astronomer
c/o The Prairie Astronomy Club, Inc.
P.O. Box 5585
Lincoln, NE 68505-0585

info@prairieastronomyclub.org

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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.