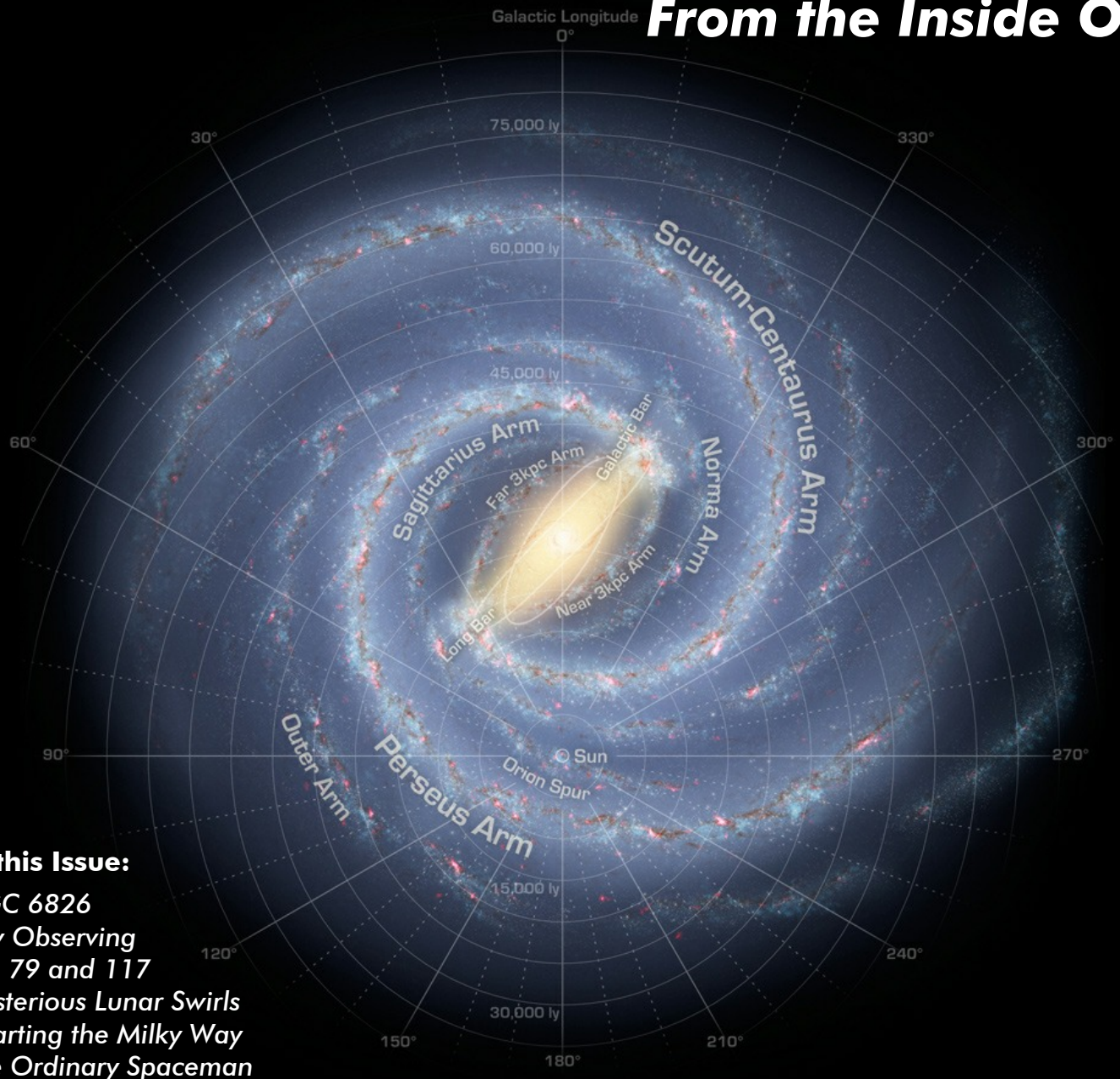
The Prairie Astronomer

June 2015 Volume 56, Issue #6

Charting the Milky Way From the Inside Out



In this Issue:

Image credit: NASA/JPL-Caltech/Federal University of Rio Grande do Sul

Night Sky Network

The Newsletter of the Prairie Astronomy Club

NEXT PAC MEETING:
Solar Observing Party
June 30, 7:30pm

Program

The program for the June 2015 PAC Meeting will be a Solar Observing Party. For your enjoyment Dave Churilla, Dave Knisely, Bill Lohrberg, and Jim Kvasnicka will be setting up telescopes for viewing the sun and talking one on one about getting started in solar viewing. Bill and Jim will be setting up white light filters on their telescopes which will enable you to see sunspots and their detail as well as some solar granulation. Dave Knisely and Dave Churilla will be setting up 3 dedicated H-Alpha filter telescopes: Dave C's Lunt 60 mm double stack, Hyde's 60 mm Coronado, and Dave's K's PST. These will give surface details such as prominences, filaments, and active areas around sunspots. If the viewing is good Dave C. will have his Lunt configured with the double stack for more detail (but will likely need to remove it as the sun get closer to setting).

We will set up at 6 PM and viewing will go until 8 PM. At 8:15 PM everyone can adjourn to Hyde for a short version of the club's business meeting. If you have a telescope with a solar filter you are welcome to set up with us. NOTE: Do NOT set up to view the sun WITHOUT a solar filter. NOTE: if cloudy Dave and Dave will talk about H-Alpha viewing and solar viewing in general.

PAC E-Mail:
info@prairieastronomyclub.org

PAC-LIST:
Subscribe through GoogleGroups. To post messages to the list, send to the address:

pac-list@googlegroups.com

The Prairie Astronomer is published monthly by the Prairie Astronomy Club, Inc. Membership expiration date is listed on the mailing label. Membership dues are: **Regular $30/yr, Family $35/yr**. Address all new memberships and renewals to: **The Prairie Astronomy Club, Inc., PO Box 5585, Lincoln, NE 68505-0585**. For other club information, please contact one of the club officers listed to the right. Newsletter comments and articles should be submitted to: **Mark Dahmke, P. O. Box 5585, Lincoln, NE 68505 or** mark@dahmke.com, no less than ten days prior to the club meeting. The Prairie Astronomy Club meets the last Tuesday of each month at Hyde Memorial Observatory in Lincoln, NE.

Events

PAC Meeting
Tuesday June 30th, 2015, 7:30pm
Hyde Observatory

Nebraska Star Party, July 12-17

PAC Meeting
Tuesday July 28th, 2015, 7:30pm
Hyde Observatory

PAC Meeting
Tuesday August 25th, 2015, 7:30pm
Hyde Observatory

Newsletter submission deadline July 18

PAC Star Party Dates

Dates in bold are closest to the new moon

2015 Star Party Dates
Jan 16,**23**, Feb 13,**20**
Mar 13,**20**, Apr 10,**17**
May 8,**15**, Jun 12,**19**
Jul 10,**17**
NSP **Jul 12-17**
Aug 7,**14**, Sep 4,**11**
Oct **9**,16, Nov 6,**13**
Dec 4,**11**

Lunar Party Dates
Mar 27, Apr 24, Jul 24, Aug 21

(Lunar party dates are tentative, sites to be determined.)

Address

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

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, contact Dave Churilla. If you keep a scope for more than a week, please check in once a week, to verify the location of the telescope and how long you plan to use it. The checkout time limit will be two weeks, but can be extended if no one else has requested use of a club scope.

100mm Orion refractor: Available

10 inch Meade Dobsonian: Available

13 inch Truss Dobsonian: Available

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

Night Sky Network

Club Officers

President	Jim Kvasnicka (402) 423-7390 jim.kvasnicka@yahoo.com
Vice President	Brett Boller proboller86@yahoo.com
2nd VP (Program Chair)	Dave Churilla dchurilla@neb.rr.com
Secretary	Lee Taylor otaylor88@gmail.com
Treasurer	John Reinert jr6@aol.com
Club Observing Chair	Jim Kvasnicka jim.kvasnicka@yahoo.com
Outreach Coordinator	Dan Delzell dan@delzell.net
Website and Newsletter Editor	Mark Dahmke mark@dahmke.com

Websites

www.prairieastronomyclub.org
https://nightsky.jpl.nasa.gov
www.hydeobservatory.info
www.nebraskastarparty.org
www.OmahaAstro.com
Panhandleastronomyclub.com
www.universetoday.com/
www.planetary.org/home/
http://www.darksky.org/

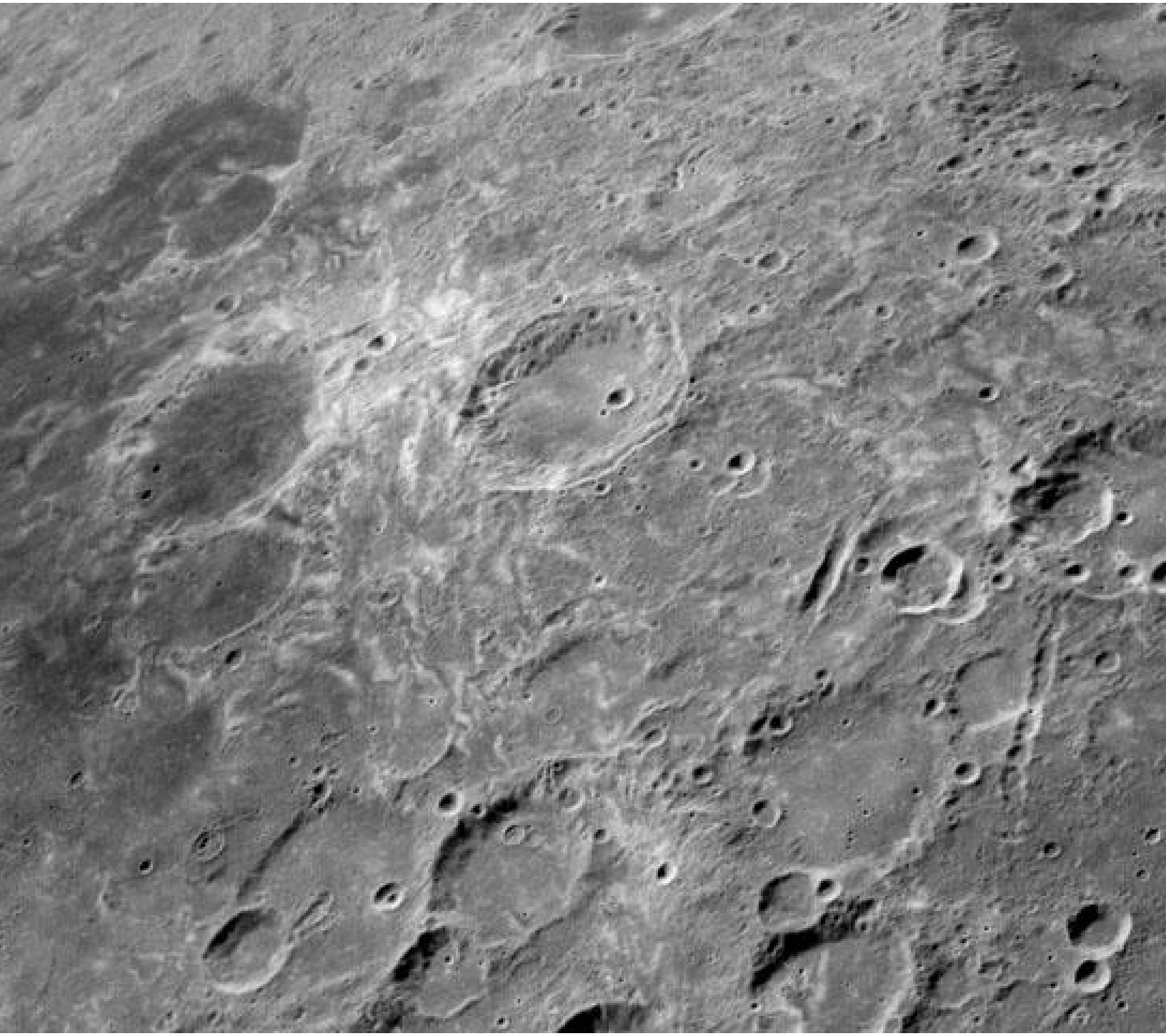
Club Apparel

Order club apparel from cafepress.com:

Shop through Amazon Smile to automatically donate to PAC:

PAC Meeting Minutes

There was no business meeting in May.



Source of mysterious lunar swirls

New research suggests that comet collisions could explain the formation of lunar swirls like these at Mare Marginis on the Moon's far side. Image: NASA

Crashing Comets May Explain Mysterious Lunar Swirls

Twisty swirls of bright soil on the lunar surface have long fascinated scientists. An early theory said the swirls were caused by anomalies in the lunar crust's magnetic field. New computer simulation techniques suggest a different cause: Crashing comets.

PROVIDENCE, R.I. [Brown University] — Brown University researchers have produced new evidence that lunar swirls — wispy bright regions scattered on the Moon's surface — were created by several comet collisions over the last 100 million years.

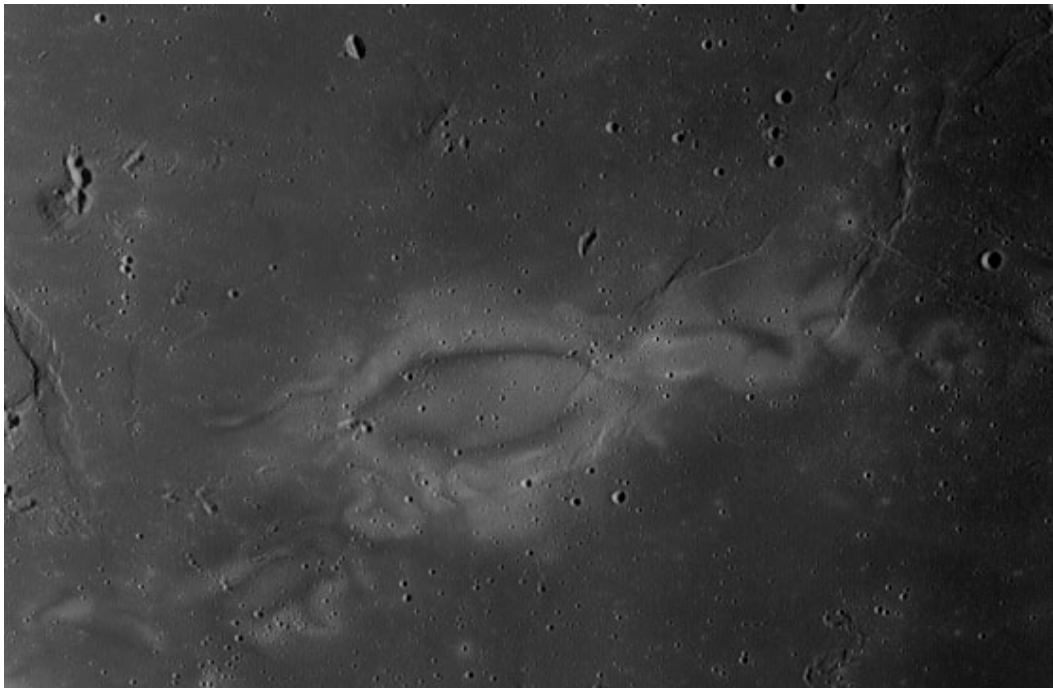
In a paper published in the journal Icarus, the researchers use state-of-the-art computer models to simulate the dynamics of comet impacts on the lunar soil. The simulations suggest that such impacts can account for many of the features in the mysterious swirls.

"We think this makes a pretty strong case that the swirls represent remnants of cometary collisions," said Peter Schultz, a planetary geoscientist at Brown University. Schultz co-wrote the paper with his former graduate student, Megan Bruck Syal, who is now a researcher at the Lawrence Livermore National Laboratory.

Lunar swirls have been the source of debate for years. The twisting, swirling streaks of bright soil stretch, in some cases, for thousands of miles across the lunar surface. Most are found on the unseen far side of the Moon, but one famous swirl called Reiner Gamma can be seen by telescope on the southwestern corner of the Moon's near side. "It was my favorite object to look at when I was an amateur astronomer," Schultz said.

At first glance, the swirls do not appear to be related to large impact craters or any other topography. "They simply look as if someone had finger-painted the surface," Schultz said. "There has been an intense debate about what causes these features."

In the 1970s, scientists discovered that many of the swirls were associated with anomalies of the Moon's crustal magnetic field. That revelation led to one hypothesis for how the swirls may have formed. Rocks below the surface in those spots might contain remanent magnetism from early in the Moon's history, when its magnetic field was much stronger than it is now. It had been proposed that those strong, locally trapped magnetic fields deflect the onslaught of the solar wind, which was thought to slowly darken the Moon's surface. The swirls would remain brighter than the surrounding soil because of those magnetic shields.

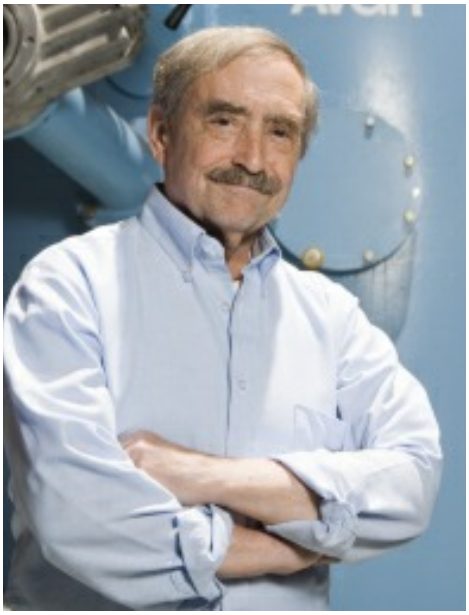


How Reiner Gamma got that way

Areas scoured by a comet's impact appear brighter when the sun strikes at a certain angle. Reiner Gamma, on the Moon's near side, appears brightest in the crescent moon just before sunrise. Image: NASA/Lunar Reconnaissance Orbiter

But Schultz had a different idea for how the swirls may form — one that has its roots in watching the lunar modules land on the Moon during the Apollo program.

“You could see that the whole area around the lunar modules was smooth and bright because



“We think this makes a pretty strong case that the swirls represent remnants of cometary collisions,” said Peter Schultz, a planetary geoscientist at Brown University. [Pete was also a founding member of PAC.]

of the gas from the engines scoured the surface,” Schultz said. “That was part of what got me started thinking comet impacts could cause the swirls.”

Comets carry their own gaseous atmosphere called a coma. Schultz thought that when small comets slam into the Moon’s surface — as they occasionally do — the coma may scour away loose soil from the surface, not unlike the gas from the lunar modules. That scouring may produce the bright swirls.

Schultz first published a paper outlining the idea in the journal Nature in 1980. That paper focused on how the scouring of the delicate upper layer of lunar soils could produce brightness consistent with the swirls. The structure of the grains in the upper layer (termed the “fairy castle structure” because of the way grains stick together) scatters sun’s rays, causing a dimmer and darker appearance. When this structure is stripped away, the remaining smoothed surface would be brighter than unaffected areas, especially when the sun’s rays strike it at certain angles. For Reiner Gamma on the lunar nearside, those areas appear brightest during the crescent Moon just before sunrise.

As computer simulations of impact dynamics have gotten better, Schultz and Bruck-Syal decided it might be time to take a second look at whether comet impacts could produce that kind of scouring. Their new simulations showed that the impact of a comet coma plus its icy core would indeed have the effect of blowing away the smallest grains that sit atop the lunar soil. The simulations showed that the scoured area would stretch for perhaps thousands of kilometers from the impact point, consistent with the swirling streaks that extend across the Moon's surface. Eddies and vortices created by the gaseous impact would explain the swirls’ twisty, sinuous appearance.

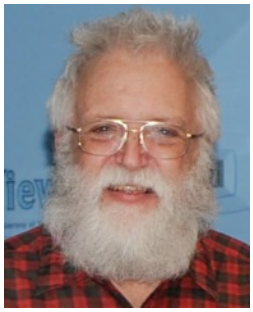
The comet impact hypothesis could also explain the presence of magnetic anomalies near the swirls. The simulations showed that a comet impact would melt some of the tiny particles near the surface. When small, iron-rich particles are melted and then cooled, they record the presence of any magnetic field that may be present at the time. “Comets carry with them a magnetic field created by streaming charged particles that interact with the solar wind,” Schultz said. “As the gas collides with the lunar surface, the cometary magnetic field becomes amplified and recorded in the small particles when they cool.”

Taken together, the results offer a more complete picture of how the swirls form, the researchers say.

“This is the first time anyone has looked at this using modern computational techniques,” Schultz said. “Everything we see in simulations of comet impacts is consistent with the swirls as we see them on the Moon. We think this process provides a consistent explanation, but may need new Moon missions to finally resolve the debate.”

Arp 79 and 117 Reprocessed

Rick Johnson



This is a reprocess of an image taken back in 2009. My processing toolkit was limited as was my ability to use what tools I had. So it was time to redo it after I looked at it and got an instant yuck reaction in my stomach. I cheated by starting with a partly processed TIFF luminance image and since the color data looked good but for color balance I used it as I had processed it the first time except to adjust color balance some, mainly to remove air glow that tends to be strong at my latitude. Also I wasn't doing annotated images back then. There was enough else going on I needed to go into that I had skipped in the original post 6 years ago.

This is a two for one Arp image that contains both Arp 79 and Arp 117. Arp 79 is listed by Arp under the category for spiral galaxies with high surface brightness companions. But there's no such companion. Arp's only comment on the object refers to the two star knots in the southern arm saying; "Small separation between two knots in arm." There is an orange field star in the other arm but I don't see

how that looks anything like a companion galaxy either. Some have said he is referring to the brightening of the arm where those two star knots are located but since he refers to them and the brightening looks nothing like a companion I can't imagine that was his intent. It does have a strange feature, a straight bar of blue stars that appears separate from the galaxy seen below the two star knots. It's far from being of high surface brightness but could be considered a companion I suppose. I find nothing on it.

The right of two star knots in the arm is SDSS J141007.08+173647.6 which NED does call a galaxy rather than part of a galaxy but I've see many such star knots listed this way so I don't put a lot of credence into that classification. The other star knot isn't listed at NED at all nor is the bar. Seems there's lots of mystery to this one. While it looks like a small spiral it is actually pretty normal sized at 70,000 light-years. It's just its distance that makes it seem small. It is sometimes known as NGC 5490C (NGC 5490 is at the bottom of my image) and is classified as SB(s)bc.

Arp 117 is listed by Arp under his classification for elliptical-like galaxies close to and perturbing spirals. Thus by his classification the small galaxy is perturbing the big one. Arp apparently sees this as a warping of the spiral for which he notes: "Flattening of spiral's nucleus appears to be in a different plane than the arms." I'm not so sure I see what he is talking about. The core is very bright with a bright but short bar. Does he see this as a spiral seen edge on inside a face on set of arms? Other than this I don't see what he is talking about. While both galaxies have the same redshift and thus likely about the same distance from us it also could be their relative motions are actually quite different but their distance difference covers this up. I'd think there'd be distortions in the smaller companion as well as the spiral. I don't see that the companion is anything but very normal looking. It is IC 982, a SA0+ galaxy and the spiral is IC 983 a SB(r)bc galaxy. Note that except for the pseudo ring structure its classification is the same as that of Arp 79 even though they appear very different.

Arp 117 was discovered by Stephane Javelle on May 27, 1891. IC 982 is about 80,000 light-years across while the spiral IC 983 is absolutely huge at over 325,000 light-years dwarfing everything around it.

Note in the annotated image there are many dwarf galaxies with a redshift indicating they are part of the same group. Many having almost exactly the same redshift in fact.

The other major galaxy in the image is NGC 5490 that for some reason I didn't get entirely on the frame. It is listed simply as an Elliptical galaxy and has a very similar redshift to the two Arp systems. Indicating it is likely part of the same group. It was discovered by William Herschel on March 14, 1784. It is in the second Herschel 400 observing program. I can't directly measure its size on my image since it is partly out of the frame. Using NED's diameter it would be about 125,000 light years in size using a distance of 250,000 million light-years determined by mostly type 1A super nova measurements though redshift places it a bit closer and thus smaller. It may be its own group as there are other galaxies around it with redshifts a bit less than that of the two Arp systems.

14" LX200R @ f/10, L=4x10' RGB=2x10' binned 3x3, STL-11000XM, Paramount ME

A Unique Sighting of ISS

Rick Brown

On May 30th, while preparing for a volunteer stint on deck at Hyde, I investigated whether any bright satellites would be visible that evening, and came across quite a surprise. It looked as though the International Space Station was bound to pass *very* close to Saturn at about 9:51; in fact, on the rough charts provided by the heavens-above.com website, the two seemed practically to intersect.

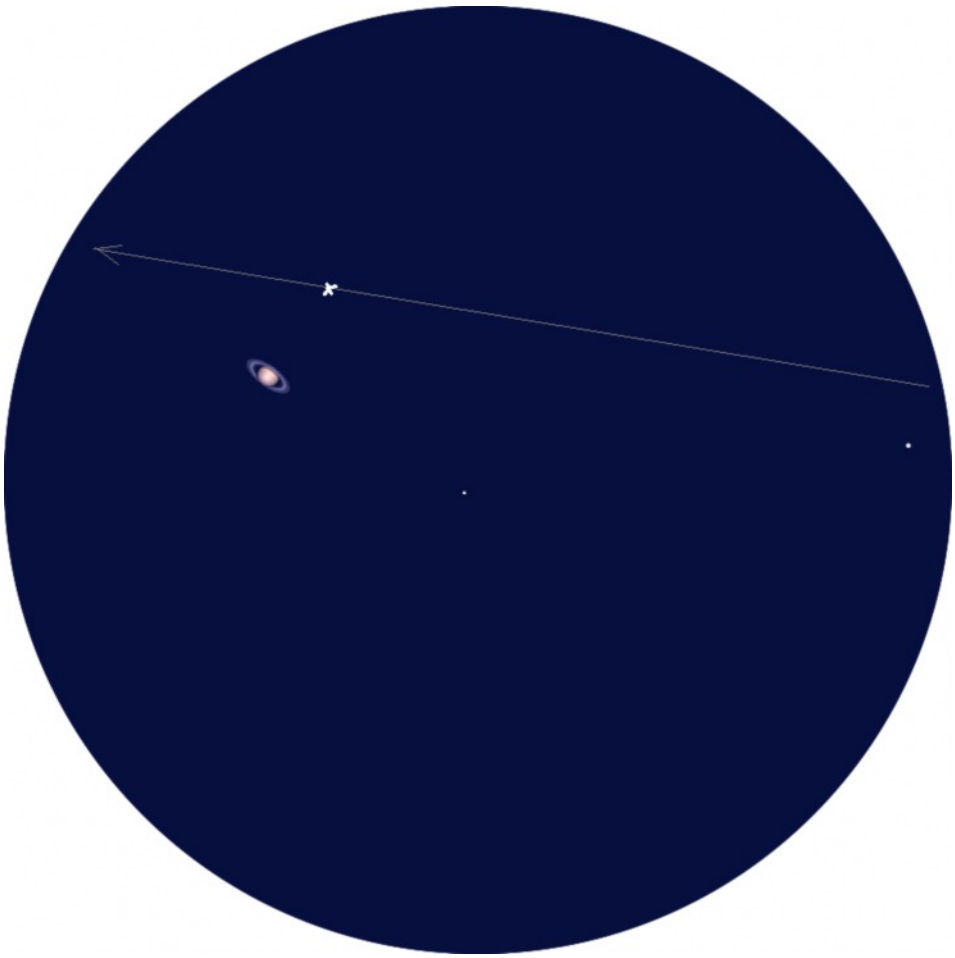
I used some simulation software called “Starry Night” to get a better look. When configured for viewing from Hyde Observatory, this had the ISS passing within a very small fraction of a degree of Saturn; well within the field of view any telescope that might be trained on the planet at the time.

This presented quite a unique opportunity! It’s very easy to find Saturn in a telescope; but it’s a real bear to locate the fast-moving ISS unless you’ve got some pretty fancy tracking equipment. At Hyde, by good fortune, we had telescopes in exactly the right location to witness the “near transit” (even a few miles away, parallax would have placed the ISS in a different configuration with Saturn, possibly outside of a telescope’s field of view). And it was a clear, Saturday night!

So, when I arrived at Hyde that evening, I formed a plan with my two assistants, Jordan and Caelum. A few minutes before the appointed time, we would call the visitors’ attention to the southeast sky, and ask them to watch for the rising ISS. Meanwhile, we would swing all the telescopes around to point to Saturn, and the three of us would see what we could see through the eyepieces.

As it turned out, technical difficulties kept the 11-inch telescope out of the game. But while the visitors were very happily watching the ISS coast through the sky and placing bets on whether it would crash into Saturn, Caelum watched at the 9.5-inch and I at the 14-inch. Then we both said “Whoa!” simultaneously as the satellite zipped through our fields of view in less than a second.

I've sketched here what I think I saw, with a little artistic help from Starry Night. I'm *fairly* sure I saw some detail of the satellite's profile (a sort of bumpy sparkle as shown here)—this is not unreasonable, as a calculation shows that the ISS would have had an angular size of about 20 arc seconds, on the order of the size of Saturn’s globe—but it really zoomed by so fast that memory is a poor servant here. My friend Caelum, who has much younger eyes and undoubtedly a better memory, says he is quite certain that he clearly saw detail on the satellite.



NASA's Cassini imaging scientists processed this view of Saturn's moon Dione, taken during a close flyby on June 16, 2015. This was Cassini's fourth targeted flyby of Dione and the spacecraft had a close approach altitude of 321 miles (516 kilometers) from Dione's surface. For more information about the Cassini-Huygens mission visit http://saturn.jpl.nasa.gov and http://www.nasa.gov/cassini. The Cassini imaging team homepage is at http://ciclops.org.

Charting the Milky Way From the Inside Out

Imagine trying to create a map of your house while confined to only the living room. You might peek through the doors into other rooms or look for light spilling in through the windows. But, in the end, the walls and lack of visibility would largely prevent you from seeing the big picture.

The job of mapping our own Milky Way galaxy from planet Earth, situated about two-thirds of the way out from the galaxy's center, is similarly difficult. Clouds of dust permeate the Milky Way, blocking our view of the galaxy's stars. Today, researchers have a suitable map of our galaxy's spiral structure, but, like early explorers charting new territory, they continue to patiently and meticulously fill in the blanks.

Recently, researchers have turned to a new mapping method that takes advantage of data from NASA's Wide-field Infrared Survey Explorer, or WISE. Using WISE, the research team has discovered more than 400 dust-shrouded nurseries of stars, which trace the shape of our galaxy's spiral arms. Seven of these "embedded star clusters" are described in a new study published online May 20 in the Monthly Notices of the Royal Astronomical Society.

"The sun's location within the dust-obscured galactic disk is a complicating factor to observe the galactic structure," said Denilso Camargo, lead author of the paper from the Federal University of Rio Grande do Sul in Brazil.

The results support the four-arm model of our galaxy's spiral structure. For the last few years, various methods of charting the Milky Way have largely led to a picture of four spiral arms. The arms are where most stars in the galaxy are born. They are stuffed with gas and dust, the ingredients of stars. Two of the arms, called Perseus and Scutum-Centaurus, seem to be more prominent and jam-packed with stars, while the Sagittarius and Outer arms have as much gas as the other two arms but not as many stars.

The new WISE study finds embedded star clusters in the Perseus, Sagittarius, and Outer arms. Data from the Two Micron All Sky Survey (2MASS), a ground-based predecessor of WISE from NASA, the National Science Foundation and the University of Massachusetts, Amherst, helped narrow down the distances to the clusters and pinpoint their location.

Embedded star clusters are a powerful tool for visualizing the whereabouts of spiral arms because the clusters are young, and their stars haven't yet drifted away and out of the arms. Stars begin their lives in the dense, gas-rich neighborhoods of spiral arms, but they migrate away over time. These embedded star clusters complement other techniques for mapping our galaxy, such as those used by radio telescopes, which detect the dense gas clouds in spiral arms.

"Spiral arms are like traffic jams in that the gas and stars crowd together and move more slowly in the arms. As material passes through the dense spiral arms, it is compressed and this triggers more star formation," said Camargo.

WISE is ideal for finding the embedded star clusters because its infrared vision can cut through the dust that fills the galaxy and shrouds the clusters. What's more, WISE scanned the whole sky, so it was able to perform a thorough survey of the shape of our Milky Way. NASA's Spitzer Space Telescope also uses infrared images to map the Milky Way's territory. Spitzer looks along specific lines of sight and counts stars. The spiral arms will have the densest star populations.

NASA's Jet Propulsion Laboratory in Pasadena, California managed and operated WISE for NASA's Science Mission Directorate in Washington. The spacecraft was put into hibernation mode in 2011, after it scanned the entire sky twice, thereby completing its main objectives. In September 2013, WISE was reactivated, renamed NEOWISE and assigned a new mission to assist NASA's efforts to identify potentially hazardous near-Earth objects.

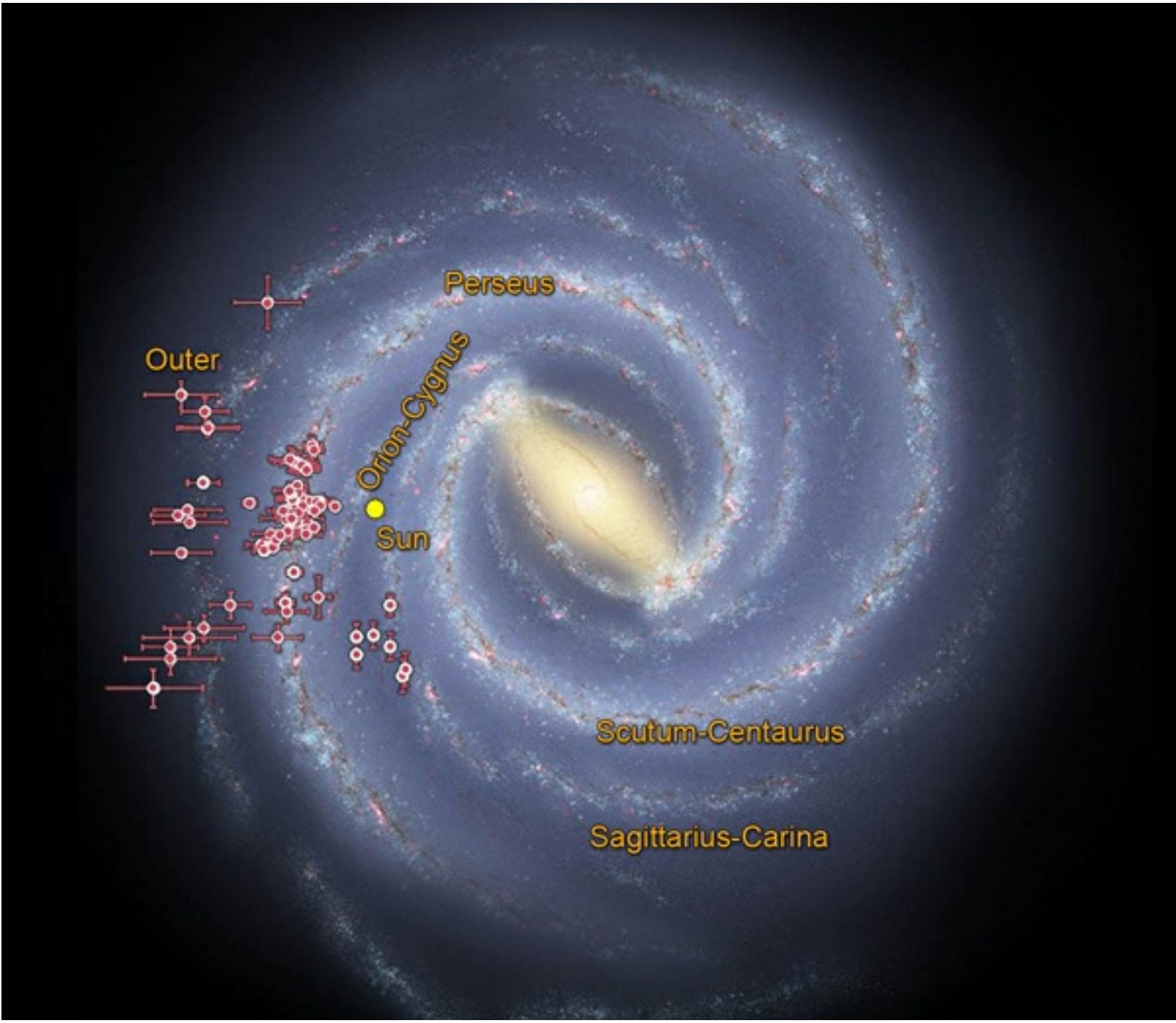
Other authors of the study are: Charles Bonatto and Eduardo Bica, also with the Federal University of Rio Grande do Sul.

For more information on WISE, visit: http://www.nasa.gov/wise

Previous research from Camargo's team found two embedded clusters far outside the plane of our Milky Way, 16,000 light-years away. A feature story about that work is online at: http://www.jpl.nasa.gov/news/news.php?feature=4497

The new WISE study from the Monthly Notices of the Royal Astronomical Society is online at:

http://mnras.oxfordjournals.org/content/450/4/4150.full?keytype=ref&ijkey=tjeJAezGAmgdXzc



Astronomers using data from NASA's Wide-field Infrared Survey Explorer, or WISE, are helping to trace the shape of our Milky Way galaxy's spiral arms. Image credit: NASA/JPL-Caltech/Federal University of Rio Grande do Sul

July Observing: What to View

Jim Kvasnicka

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

Planets

Venus and Jupiter: The two planets start the month separated by just 0.6° and by 2° on July 4th. Jupiter dims to magnitude -1.7 with a disk 30" wide. By July 18th Venus is a crescent 43" wide.

Saturn: Can be found in Libra at magnitude 0.4. The rings remain 24° tilted.

Neptune and Uranus: Neptune rises a few hours after sunset and Uranus around midnight. Neither of the two are very high until just before dawn.

Mercury and Mars: On July 16th Mars is only 0.1° north of Mercury, but it will be difficult to see low in the bright dawn.

Messier List

M3: Class VI globular cluster in Canes Venatici.

M4: Class IX globular cluster in Scorpius.

M5: Class V globular cluster in Serpens Caput.

M53: Class V globular cluster in Coma Berenices.

M68: Class X globular cluster in Hydra.

M80: Class II globular cluster in Scorpius.

M83: Galaxy in Hydra.

Last Month: M58, M59, M60, M84, M86, M87, M88, M89, M90, M91, M98, M99, M100

Next Month: M6, M7, M8, M9, M10, M12, M19, M20, M21, M23, M62, M107

NGC and other Deep Sky Objects

NGC 6503: Galaxy in Draco.

NGC 6543: Cat's Eye Nebula in Draco.

NGC 6781: Planetary nebula in Aquila.

NGC 6818: Little Gem, planetary nebula in Sagittarius.

NGC 6822: Barnard's Galaxy in Sagittarius.

NGC 6826: The Blinking Planetary in Cygnus.

Double Star Program List

Nu Draconis: Equal pair of white stars.

Psi Draconis: Light yellow stars.

40/41 Draconis: Equal pair of light yellow stars.

Xi Scorpii: Yellow primary with a light blue secondary.

Struve 1999: Two yellow-orange stars.

Beta Scorpii: Blue-white primary with a light blue secondary.

Nu Scorpii: Yellow and light blue pair.

Delta Serpentis: Pale yellow pair.

Theta Serpentis: Two blue-white stars.

Challenge Object

Palomar 10: A Class XII globular cluster in Sagitta. Look for a very faint, diffuse patch of light 2' in diameter.

NGC Objects: NGC 6826

Jim Kvasnicka

The Blinking Planetary

NGC 6826 is a planetary nebula located in Cygnus. The Blinking Planetary was discovered by William Herschel in 1793.

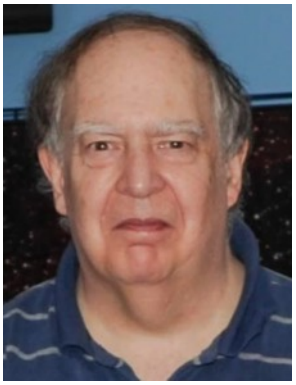
When you look at NGC 6826 its central star is visible. Look off to the side, use averted vision, and the nebulosity engulfs the star. It appears to blink off and on.

If you have a 12 inch or larger telescope, look for structure in the planetary shell. Use an OIII filter to reduce the central star brightness.

NGC 6826 has a listed magnitude of 8.8 and through a 10 inch telescope the bluish green planetary has an apparent size of 25" and is 3,000 light years distant. NGC 6826 is part of the Herschel 400 list and is also Caldwell Object 15.

Thirty Meter Telescope Delays and Issues

Jack Dunn



Most long-time PAC members know Larry Stepp, our former president and now the Telescope Manager of the Thirty Meter Telescope Project. Larry was most recently back in Lincoln for the holiday gathering in December. The project hasn't received a lot of publicity among the public - until recently. To build a telescope of this size has a number

of challenges. But now the challenges have been increased, not because of science or engineering, but politics and social media. TMT went through a long process of over seven years looking at environmental impact and meeting with folks on the Big Island and the Hawaiian community. The telescope location will not be on the top of Mauna Kea but rather trying to keep a low profile. None of this matters to a group of protestors and social media critics. They oppose putting another telescope on the mountain. In fact they want all of them to go away. It is somehow offensive to them or to Hawaiian culture. Hawaiians first came to the islands by navigating across the Pacific using the stars. This seems to have been forgotten. But the real force behind opposition to the telescope goes

far beyond astronomy, or even building an observatory. There is a very loud faction that wants Hawaii to leave the US and establish a separate nation. Today social media amplifies those that are most vocal in their opinions. And it doesn't depend on facts – just emotions. The land is leased from the state to the University of Hawaii. There are disputes as to whether University of Hawaii has been a good steward of the land. But actual studies don't seem to show that it has built Walmarts or overdeveloped on the mountain. TMT has gone out of its way to do more than anyone has done before in making the effort to involve Hawaiians, and be a good manager of environmental issues. Where as the other observatories paid a minimum fee (U of H pays $1 a year lease), TMT has committed to spending $1 million annually in support of science education on the island. As a recent Scientific American article put it: "For some, nothing less than a return of the mountain to its pristine state is acceptable. For others, the observatories are simply a convenient lightning rod to spark discussion of larger social issues affecting the islands' indigenous people." Recently the governor of Hawaii, attempting to appease both sides, came out in favor of continuing construction. However he put forth a number of conditions including the dismantling of half the telescopes on the mountain and revisiting the whole University of Hawaii's arrangement with the state. And of course they must have a commission to address Hawaiian cultural issues. Remember that I pointed out there had already been more meetings (and open public ones at that) with the Hawaiian community than any other project in the past. But of course when in doubt to look like you are doing something you form another committee.

Cultures can continue and they can grow. Building another telescope on the mountain does nothing to disturb the ability of locals to pursue their culture. What happened to the concept of the separation of church and state? Is the volcano god the primary arbiter of state policy? How many bloggers are native Hawaiians – not just college students looking for a cause? Who exactly can speak authoritatively for all native Hawaiians. Just being loud and throwing out a few Hawaiian words does not prove your heritage. It may be that the local populace has grievances with the way their state government has let contracts in the past. But TMT has worked hard to do things right. So are they to be punished for what others have done? From what I can see, those who speak most loudly don't seem to care about the local economy or educational opportunities for young people.

Understand that the recent statements by the governor do not have the force of law. However they may be followed by many hoping for compromise. There are some telescopes already slated for decommissioning. The governor's declaration calls for more. Sure as telescopes get older some would be retired. It is unclear what difference it would make to the Hawaiian culture whether there is one telescope or 10 on the mountain. I read an opinion by one local commentator in a Hawaiian newspaper who said we don't need TMT because we have the Hubble which he said was better. Guess he has never bothered to study the background of large observatories or what they contribute to science.

So that is where it stands at present. It is my hope that the governor's statement at least will get construction going again. If you have any interest I can point you to a number of good articles on the subject.

http://www.scientificamerican.com/article/on-mauna-kea-astronomers-and-hawaiians-can-share-the-skies/?

http://governor.hawaii.gov/main/governor-iges-transcribed-mauna-kea-story/

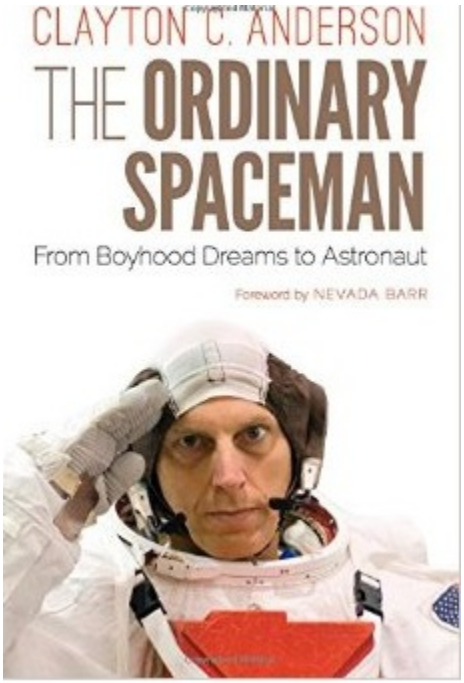
http://cso.caltech.edu/end-ops.html

He's Not So Ordinary: A Review of The Ordinary Spaceman

Jack Dunn

Back in 2000 I was attending a NASA workshop at Johnson Space Center for a small group of museum and Planetarium folk. Susan Anderson made a very fine presentation to the group about Distance Learning services from JSC. At the time she noticed my badge which gave my Nebraska location. Susan told me: "my husband just started astronaut training and he grew up in Nebraska.""You should meet him." Nebraskans know he spent five and one half months on the International Space Station and also flew again on STS-131. Flash forward to today. As an astronaut who has retired from spaceflight, this book covers Clayton Anderson's 30 year career at NASA. But I would suggest his book has far wider appeal than just in his state of origin because it is a story of perseverance, determination and inspiration. Anderson tells how a person from modest beginnings rises to heights about which most of us only dream. He applied to be an astronaut 15 times before succeeding.

If I were to describe this book in one word, it would be "honesty." Anderson is honest not only about his background and the love of his family; he's also honest about the difficulties he had understanding or conforming to maddening bureaucracies. Sometimes his non-conformity got him in trouble. A good example was his thought early in his career about public service announcements. Anderson noted that we see television PSAs all the time from sports and entertainment figures admonishing students to stay in school and work hard to graduate. But he noticed there were no astronauts making them. He wondered "why not." After all, sports and entertainment figures didn't necessarily owe success to education and certainly many of them might not have followed practices to pursue a good education. Astronauts do need that education. Many have at least masters degrees as he does. Asking that question of NASA officials got him first brushed off and eventually more or less reprimanded when he tried to pursue it. Active astronauts may answer a question that promotes staying in school. You and I have seen it at astronaut appearances and public interviews. But why was a direct pitch for education considered a negative. We still don't know. Today as a retired astronaut, Anderson has made pro-education public service announcements for Nebraska television stations. By relating this story, we gain insight into the character of someone who thought he could make things better – and sometimes much to



his chagrin, it even became a negative for a career path.

We've all seen books by astronauts that detail the complex and exhausting training for their job. Anderson goes into the training more deeply than anyone since Mike Mullane's "Riding Rockets." This book has the most complete discussion of going to the bathroom in outer space I've read so far. Let's face it – you all want to know about it (most common asked question to astronauts). He takes the reader along on survival training, training in Russia; and underwater training for spacewalks. Anderson spent over 40 hours spacewalking during his ISS and subsequent shuttle mission. But he also trained for long duration spaceflight in a project called

NEEMO (NASA Extreme Environment Mission Operations). This book takes you through the everyday experiences, the highs and lows encountered by crews testing what humans can achieve and endure in these environments.

In 2003, Anderson was one of the family escorts assigned to be with a family of the crew who flew the ill-fated STS-107 last flight of Columbia. Any reader will long remember his intimate portrait of that day when the joy of a fantastic mission turned in minutes to sadness as the spacecraft did not survive reentry.

Most of all, the book is a testament to the appreciation Anderson has for the life experiences he has had. Few of us have been personally joked about by a president of the United States and also informed: "the toilet on the station is broke – stop eating." Anderson takes it all in stride and with heartfelt thoughts about the people who have made it all worthwhile. There are both exhilarating heights and some dark times. But that just makes it a complete story.

"The Ordinary Spaceman" is now available at on-line retailers and in bookstores. I'll have a signed copy of the book to give away as a doorprize at NSP. Hopefully the Valentine bookstore will stock some to sell there. And Clay will be in Nebraska in late July at several places for book signings.

I'll close by quoting Shuttle Commander Eileen Collins from the back jacket of the book: "Clay blends his personal stories with his professional challenges." "Clays' experience will be motivation for anyone to never give up."

Ed Woerner with the club's 12.5" (left) and Larry Stepp, Monte Cole and Jess Williams on the right. Rick Johnson's 10" f/8 is in the background on the right. This photo was taken at one of the hobby and gem shows at the state fairgrounds in the mid-1960s.

From the Archives: April, 1965

Our last meeting was held March 30th at the Union Loan and Savings Room. We had 26 in attendance and a very fine program and refreshments. We got lined up to have a display of our Club activities at a hobby show out at the fair grounds April 10th and 11th. We had about ten scopes and a very good display of pictures and charts. I think we did our Club a heap of good and believe we would have doubled our results if the weather had been half way decent. Steve Kunke, Tom Journey, Earl, Kim and Jim and Marvin all did a swell job. Hats off to you boys. Adrienne too. Earl Moser our program director is planning a sky show for our club out at his place in Hickman, Nebr. Hickman is about 15 miles south of Lincoln. His home is a mile or so west of Hickman and anyone can tell you the directions. The date will be April 23rd anytime after dark. Bring your scope and get a taste of what real seeing is. You will never forget what you can see out where city lights do not interfere.

Our next regular club meeting will be April 27th - April 28th. Just had to change the night because Union Savings room was taken every night in that week except Wednesday. Hope this does not inconvenience anyone too much. Remember April 28th 7:30pm. Union Loan Bldg is 56th and O St.

In addition to you regular members, this letter will go out to some sixteen interested persons who wished to be informed of our activities. They were contacted at the hobby show.

A Prairie Astronomy Club display at one of the hobby and gem shows at the fair grounds in the 1960s

Ceres Has Lots of Bright Spots

Bob King, Universe Today

Those bright mystery spots aren't the only ones on Ceres. Recent photos posted on JPL's Photojournal site feature a spectacular rayed crater resembling the familiar lunar craters Kepler and Copernicus.

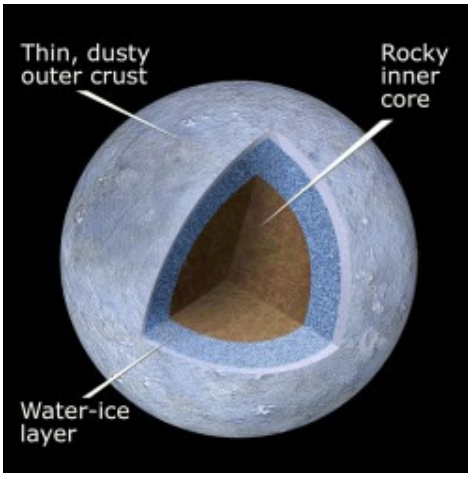
Lunar rays are bright because they contrast with their older surroundings which have been darkened by exposure to solar and cosmic radiation. Impacts expose fresh material from below the surface that settles into a spider web of rays around the newly excavated crater. Huge boulders lofted above the Moon's surface during the impact slam back into the crust to create secondary craters also crowned with bright dust and rock.

Most models of Ceres depict a rocky crust, mantle of ice and a rocky inner core. This makes us wonder if the bright material unearthed might be ice. If so, it would gradually vaporize on the virtually air-free dwarf planet.

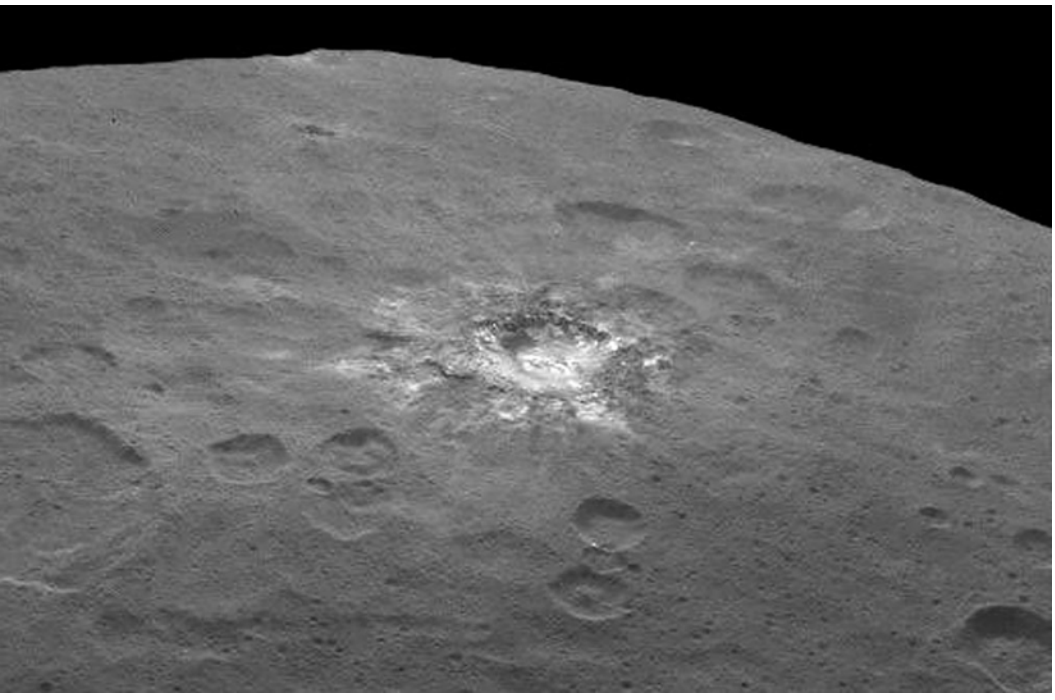
Dawn will spend through early 2016 at Ceres during its primary mission and then remain in orbit there perpetually. We should be able to cipher the composition of the white material during that time with the spacecraft's Gamma Ray and Neutron Detector and Visible and Infrared Mapping Spectrometer, but a lengthy stay might allow us to see changes in the extent of any ice exposures as they gradually vaporize away.

One thing we know for certain about Ceres are its dimensions. Dawn observations have revised the size to be about 599 miles (963 km) across at the equator

with a polar diameter of 554 miles (891 km). Like Earth and other planets, Ceres is a slightly flattened sphere wider at the equator than from pole to pole. The temperature there ranges from about -100°F (-73°C) during the day and dips to -225°F (-143°C) at night. That makes its daytime high about 28° warmer than coldest temperature ever recorded on Earth.

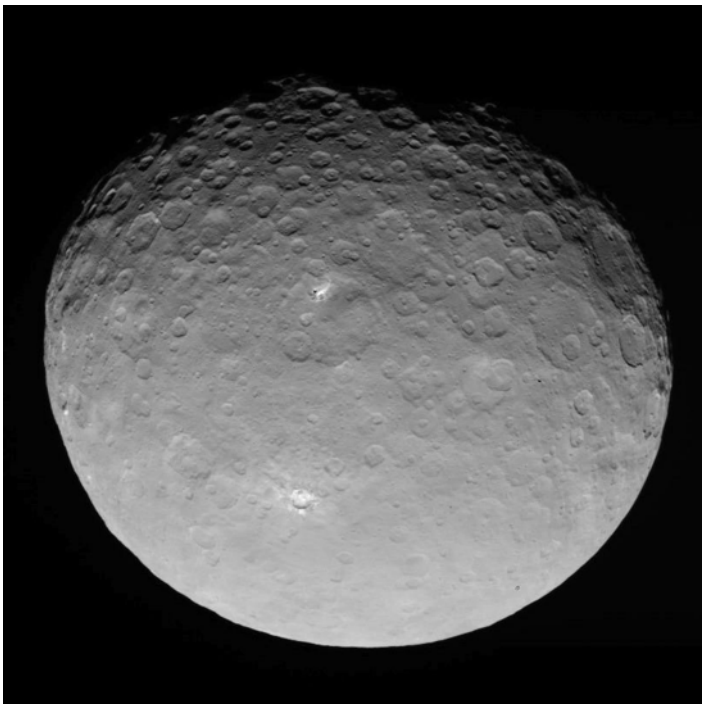


Based on Ceres' density, it contains a large fraction of low density materials including clays, water ice, salts and organic compounds. This schematic gives a general idea of the dwarf planet's makeup. Credit: NASA/ESA/STScI

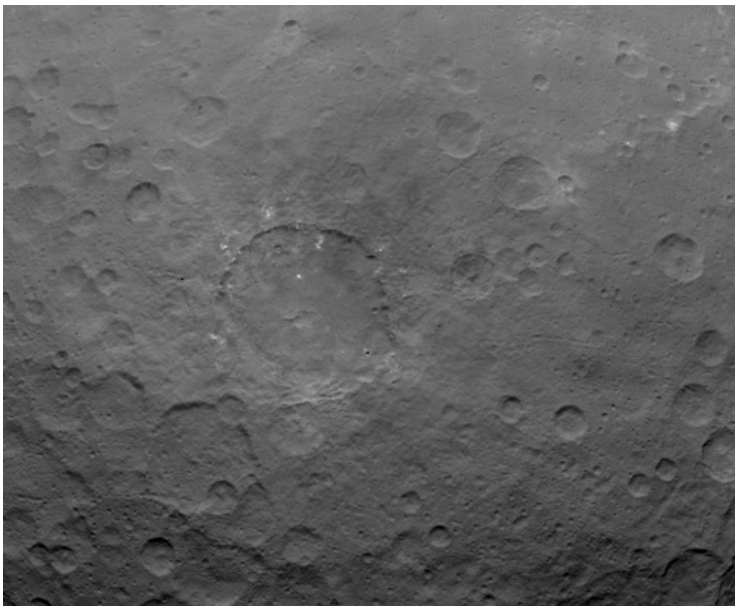


Left: Fresh material is exposed in a rayed crater on Ceres. Taken on June 6 from 2,700 miles (4,400 km), it has a resolution of 1,400 feet (410 meters) per pixel, Credit: NASA/JPL-Caltech/UCLA/ MPS/DLR/IDA

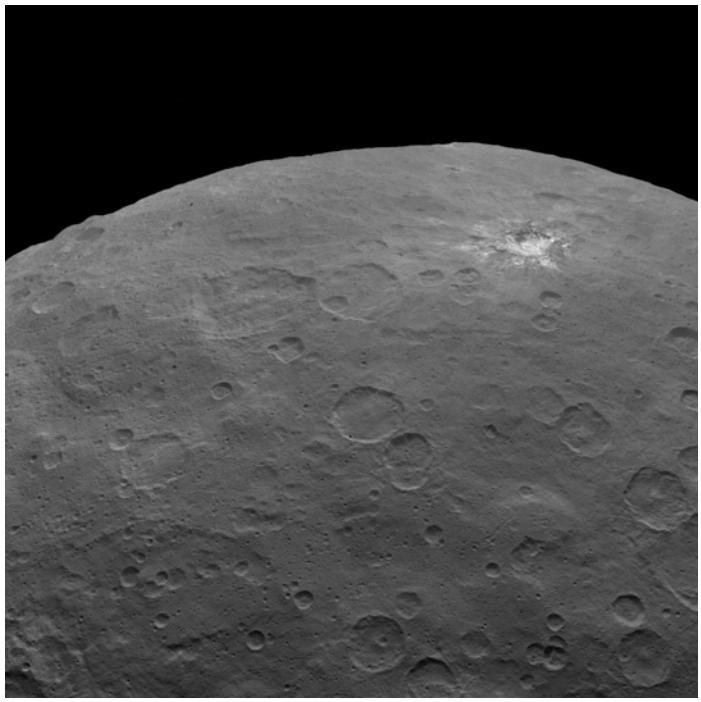
Unique view of the lunar crater Proclus showing an extension system of bright rays taken from Apollo 15. Credit: NASA



Taken back on May 4 from 8,400 miles (13,600 km), this photo shows the rayed crater (bottom) and another bright spot above center. Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA



Bright dots and patches of material are seen in this photo taken by Dawn on May 22, 2015 from 3,200 miles (5,100 km) away. Credit: NASA/JPL-



Uncropped, untoned view of the rayed crater seen in the earlier image. Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA

Noctilucent Clouds, as Seen from Earth Orbit

Astronaut Samantha Cristoforetti took photos of noctilucent clouds on flight day 195 of her stay on ISS. Credit: ESA/NASA.

Night clouds or noctilucent clouds are tenuous cloud-like phenomena that are the "ragged edge" of a much brighter and pervasive polar cloud layer called polar mesospheric clouds in the upper atmosphere, visible in a deep twilight. They are made of crystals of water ice. - Wikipedia.

And Astrophotography... from Earth Orbit

Another photo by Samantha Cristoforetti: "The Moon looks from here pretty much like it looks from Earth. Beautiful and mysterious... and still very far!"

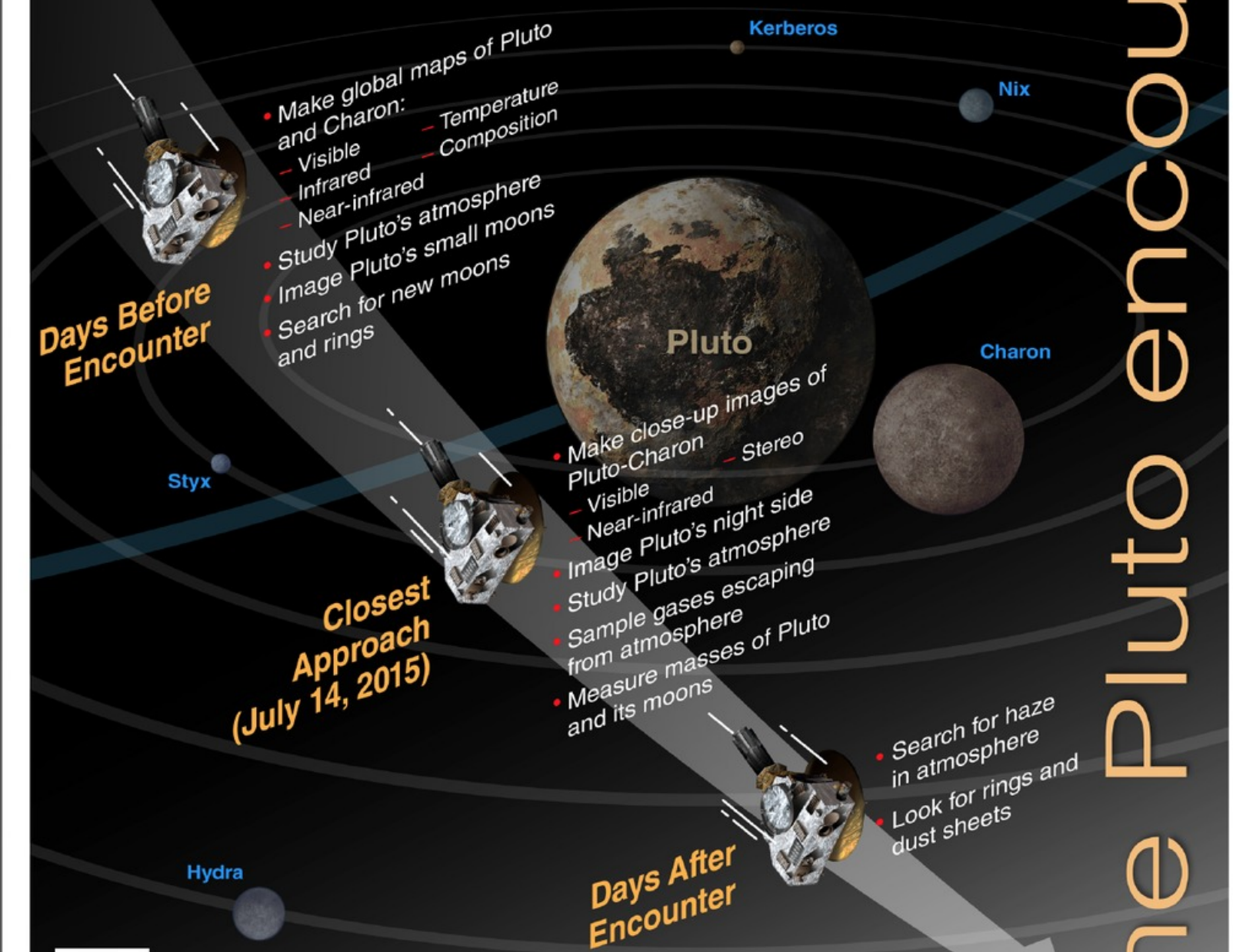
Nikon D4, 508mm, f/11, 1/1000 sec, ISO 800. Taken on February 28, 2015.

the Pluto encounter

NASA's New Horizons spacecraft will help researchers better understand the Pluto system at the frontier of our solar system for the first time. No spacecraft has ever traveled so far from the Sun to explore a planet.

During its closest approach in July 2015, the spacecraft's encounter sequence will be intricately choreographed and pre-programmed to study surface properties, geology, interior makeup and atmospheres. The spacecraft largely will operate autonomously during closest approach, with only occasional instructions sent from Earth. Some of the science studies are summarized here.

For illustration purposes only (not to scale)



www.pluto.jhuapl.edu

www.nasa.gov