# The Prairie Astronomer

November 2015 Volume 56, Issue #11

**November Program**

## Pluto's Tartarus Dorsa Mountains

*How to Buy a Telescope*

Night Sky Network

The Newsletter of the Prairie Astronomy Club

The Prairie Astronomer

# NEXT PAC MEETING: November 24, 7:30pm

## At Hyde Memorial Observatory

### PROGRAM

**How to Buy a Telescope**
Every holiday season people ponder buying telescopes as gifts, for their children, for their family or for friends. The few designs found in most department stores offer little information and clerks are rarely knowledgeable. Buying on the Internet or home shopping channels without any help doesn't inspire confidence. What if you had a chance to have help in making that purchase?

The Prairie Astronomy Club offers this assistance this month at its regular meeting at 7:30pm at Hyde Observatory on Tuesday, November 24th with a session on "how to buy a telescope." Experienced amateurs will provide examples of both the good and bad purchases and lots of helpful hints.

### FUTURE PROGRAMS

December: PAC Holiday Gathering
Program: Mark Dahmke, Astrophotography

January: "How to Use Your Telescope"


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

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# EVENTS

PAC Meeting
"How to Buy a Telescope"
Tuesday November 24th, 2015, 7:30pm
Hyde Observatory

PAC Holiday Gathering (members only)
Tuesday December 29th, 2015, 7:30pm
Location to be determined

Newsletter submission deadline November 15

PAC Meeting
"How to Use Your Telescope"
Tuesday January 26th, 2016, 7:30pm
Hyde Observatory

# 2015 STAR PARTY DATES

Photo by Brian Sivill

Dates in underlined are closest to the new moon

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.)

## 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

## ADDRESS

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

## 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/

Night Sky Network

# PAC Meeting Minutes

Minutes for the meeting of October 27, 2015

President Jim Kvasnicka called the meeting to order.

Welcome members and guests Jarrod and Gregg(?)

Upcoming Events,

Hyde Memorial Observatory is open every Sat night 7-10PM, except Halloween Oct. 31

UNL's Behlen will host a Haunted open house Saturday, October 31 7:30-11:30

The next PAC star parties will be Friday Nov 6 & 13 at the farm

Branched Oak Observatory will hold a Public star party Nov 14 7-10PM

Next PAC meeting Nov 24. Program 'How to Buy a Telescope'

Jim reviewed the dues and benefits of club membership.

Jim provided his monthly observing report for November.

Club business

Elections were held. The nominees for each office are:

President: Jim Kvasnicka

Vice President: Brett Boller

2nd Vice President: Beth Jenckes

Treasurer: John Reinert

Secretary: Lee Taylor

Jim asked if the current nominees still wished to be considered, and invited other nominations.

No other nominations were received. Nominations were closed and the nominees were unanimously elected to their respective positions.

Adjourn to our program on beginning astrophotography by Brett Boller.

Respectfully submitted by,

Lee Taylor

*Cover Photo:*

*In this extended color image of Pluto taken by NASA's New Horizons spacecraft, rounded and bizarrely textured mountains, informally named the Tartarus Dorsa, rise up along Pluto's day-night terminator and show intricate but puzzling patterns of blue-gray ridges and reddish material in between. This view, roughly 330 miles (530 kilometers) across, combines blue, red and infrared images taken by the Ralph/Multispectral Visual Imaging Camera (MVIC) on July 14, 2015, and resolves details and colors on scales as small as 0.8 miles (1.3 kilometers).*

## 2016 Star Party Dates

| | Star Party Date | Star Party Date | Lunar Party Date |
|---|---|---|---|
| January | Jan 1st | **Jan 8th** | |
| February | Jan 29th | **Feb 5th** | |
| March | Mar 4th | **Mar 11th** | |
| April | Apr 1st | **Apr 8th** | Apr 15th |
| May | Apr 29th | **May 6th** | May 13th |
| June | May 27th | **Jun 3rd** | |
| July | **Jul 1st** | Jul 8th | |
| **NSP** | **July 31st - August 5th** | | |
| August | Jul 29th | **Aug 5th** | Aug 12th |
| August | Aug 26th | **Sep 2nd** | Sep 9th |
| September | Sep 23rd | **Sep 30th** | |
| October | Oct 21st | **Oct 28th** | |
| November | Nov 25th | **Dec 2nd** | |
| December | Dec 23rd | **Dec 30th** | |

*This view from the Mast Camera (Mastcam) on NASA's Curiosity Mars rover shows a dark sand dune in the middle distance. The rover's examination of dunes on the way toward higher layers of Mount Sharp will be the first in-place study of an active sand dune anywhere other than Earth.*

*The dunes on Curiosity's route are part of a band of dunes called "Bagnold Dunes," along the northwestern edge of Mount Sharp. The informal naming recognizes British military engineer Ralph Bagnold (1896-1990), a pioneer in the study of how winds move sand particles of dunes on Earth. The dune field is evident as a dark band in orbital images of the area inside Gale Crater were Curiosity has been active since landing in 2012, such as a traverse map at PIA20162.*

# The Maelstrom

*The vortex at Saturn's north pole -- seen here in the infrared -- takes on the menacing look of something from the imagination of Edgar Allan Poe. But really, of course, it's just another example of the amazing, mesmerizing meteorology on Saturn.*

*The eye of the immense cyclone is about 2,000 kilometers (1,250 miles) wide, 20 times larger than most on Earth. For another view of the vortex, see PIA14946.*

*This view is centered on clouds at 89 degrees north latitude, 109 degrees west longitude. North is up and rotated 33 degrees to the left. The image was taken with the Cassini spacecraft narrow-angle camera on June 14, 2013 using a spectral filter sensitive to wavelengths of near-infrared light centered at 750 nanometers.The view was acquired at a distance of approximately 476,000 miles (766,000 kilometers) from Saturn and at a Sun-Saturn-spacecraft, or phase, angle of 45 degrees. Image scale is 3 miles (5 kilometers) per pixel. Image credit: NASA/JPL-Caltech/Space Science Institute.*

# Radar Images Provide New Details on Halloween Asteroid

The highest-resolution radar images of asteroid 2015 TB145's safe flyby of Earth have been processed. NASA scientists used giant, Earth-based radio telescopes to bounce radar signals off the asteroid as it flew past Earth on Oct. 31 at 10 a.m. PDT (1 p.m. EDT) at about 1.3 lunar distances (300,000 miles, or 480,000 kilometers) from Earth. Asteroid 2015 TB145 is spherical in shape and approximately 2,000 feet (600 meters) in diameter.

"The radar images of asteroid 2015 TB145 show portions of the surface not seen previously and reveal pronounced concavities, bright spots that might be boulders, and other complex features that could be ridges," said Lance Benner of NASA's Jet Propulsion Laboratory in Pasadena, California, who leads NASA's asteroid radar research program. "The images look distinctly different from the Arecibo radar images obtained on Oct. 30 and are probably the result of seeing the asteroid from a different perspective in its three-hour rotation period."

Radar images of asteroid 2015 TB145 acquired by Arecibo Observatory are available at these sites:

http://on.fb.me/1MahsY8

https://twitter.com/AreciboRadar/status/661293813713928192

To obtain these highest-resolution radar images of the asteroid, scientists used the 230-foot (70-meter) DSS-14 antenna at Goldstone, California, to transmit high-power microwaves toward the asteroid. The signal bounced off the asteroid, and its radar echoes were received by the National Radio Astronomy Observatory's 100-meter (330-foot) Green Bank Telescope in West Virginia. The radar images achieve a spatial resolution as fine as 13 feet (4 meters) per pixel.

The next time that asteroid 2015 TB145 will be in Earth's neighborhood will be in September 2018, when it will make a distant pass at about 24 million miles (38 million kilometers), or about a quarter the distance between Earth and the sun.

Radar is a powerful technique for studying an asteroid's size, shape, rotation, surface features and surface roughness, and for improving the calculation of asteroid orbits. Radar measurements of asteroid distances and velocities often enable computation of asteroid orbits much further into the future than would be possible otherwise.

NASA places a high priority on tracking asteroids and protecting our home planet from them. In fact, the U.S. has the most robust and productive survey and detection program for discovering near-Earth objects (NEOs). To date, U.S. assets have discovered about 98 percent of known NEOs.

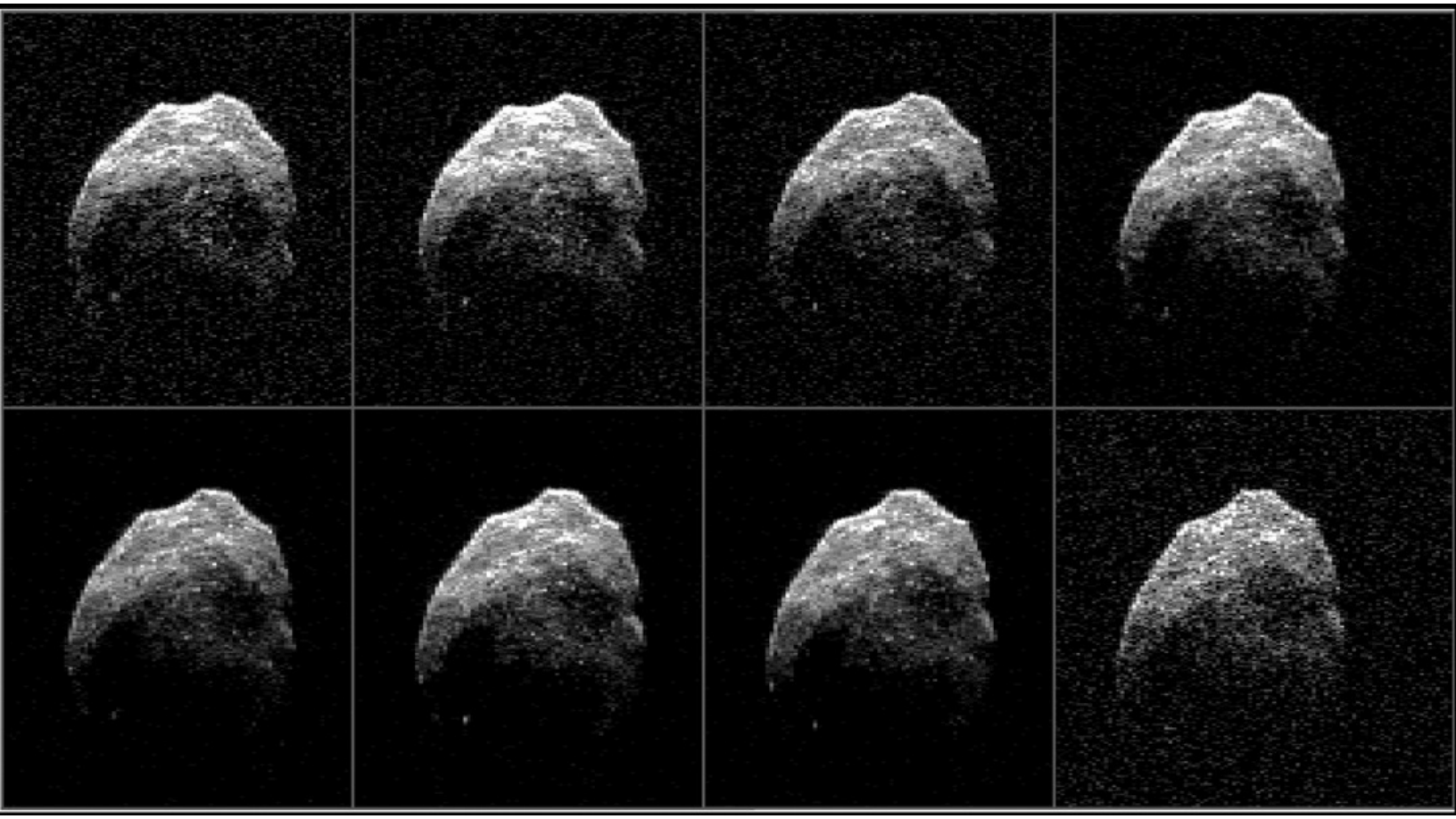
In addition to the resources NASA puts into understanding asteroids, it also partners with other U.S. government agencies, university-based astronomers, and space science institutes across the country, often with grants, interagency transfers and other contracts from NASA, and also with international space agencies and institutions that are working to track and better understand these objects. In addition, NASA values the work of numerous highly skilled amateur astronomers, whose accurate observational data helps improve asteroid orbits after they are found.

JPL hosts the Center for Near-Earth Object Studies for NASA's Near-Earth Object Observations Program within the agency's Science Mission Directorate.

More information about asteroids and near-Earth objects is at these sites:

http://neo.jpl.nasa.gov

http://www.jpl.nasa.gov/asteroidwatch



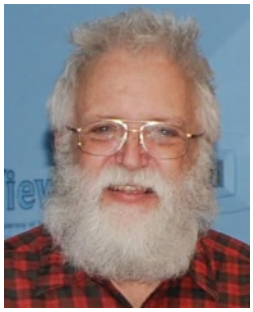
*The 230-foot (70-meter) DSS-14 antenna at Goldstone, Ca. obtained these radar images of asteroid 2015 TB145 on Oct. 31, 2015.*

*Asteroid 2015 TB145 is depicted in eight individual radar images collected on Oct. 31, 2015 between 5:55 a.m. PDT (8:55 a.m. EDT) and 6:08 a.m. PDT (9:08 a.m. EDT). At the time the radar images were taken, the asteroid was between 440,000 miles (710,000 kilometers) and about 430,000 miles (690,000 kilometers) distant. Asteroid 2015 TB145 safely flew past Earth on Oct. 31, at 10:00 a.m. PDT (1 p.m. EDT) at about 1.3 lunar distances (300,000 miles, 480,000 kilometers).*

*To obtain the radar images, the scientists used the 230-foot (70-meter) DSS-14 antenna at Goldstone, California, to transmit high power microwaves toward the asteroid. The signal bounced of the asteroid, and their radar echoes were received by the National Radio Astronomy Observatory's 100-meter (330-foot) Green Bank Telescope in West Virginia. The images achieve a spatial resolution of about 13 feet (4 meters) per pixel.*

# vdB 126 and PN PM2-41 Probable Proto Star

*Rick Johnson*



This field in western Vulpecula is centered on HD 182918, the illuminating star for vdB 126. The Sky has its distance at about 2900 light-years. It is located in the Milky Way but in a dust lane which helps hold down the stars at the same time reddening them quite a bit. Three dark clouds cross the image right to left they are Dobashi 1980, 1982 and 1988.

The only other object identified at SIMBAD of interest is what SIMBAD calls PN PM2-41 a possible planetary nebula. If it is it is the strangest planetary nebula I've seen. It has a cometary like tail going to the south and above it at the orange star above is a faint arc of nebulosity that appears related. SIMBAD sites three papers on this object, one is the original IRAS discovery of it. The other two however are on protostars in which it is listed as IRAS 19247+2238. The authors are quite sure it is a protostar, exactly the opposite of a planetary nebula. The former is the birth of a star while the latter the death of a star. This article considers both the upper and lower object to be protostars that IRAS' low resolution saw as one object rather than two. The later paper on this is seen here: http://iopscience.iop.org/1538-3881/138/5/1193/pdf/1538-3881_138_5_1193.pdf PN PM2-41 looks typical of some protostars I've imaged in the past and nothing like any

planetary I've taken so I'll go with these two papers that consider it a protostar. The paper was unable to come up with a distance measurement for either unfortunately.

This image was taken when the skies were smoky from Canadian wildfires. It was less the night it was taken but it has likely skewed my color balance somewhat. It certainly reduced my limiting magnitude by at least one magnitude, maybe a bit more. Still this was the first July night I could even collect photons as prior nights only stars 2.5 magnitude or brighter were visible at the zenith. No stars were seen below 45 degrees, just the planet Venus and a hint of Jupiter. Earlier in the month when I looked at the moon it was fainter and redder than at all but the darkest total eclipse I've seen. Yet the fires were about 800 km away with most over 1000 km.

My The Sky6 Pro's database locates "SAC vdB 126" about 13' east and a bit south of its real position. Those slewing to it with that program should use HD 182918 instead.


*Annotated*

# At Pluto, New Horizons Finds Geology of All Ages, Possible Ice Volcanoes, Insight into Planetary Origins

From possible ice volcanoes to geologically diverse surfaces to oddly behaving moons that could have formed through mergers of smaller moons, Pluto system discoveries continue to surprise scientists on NASA's New Horizons mission team.

"The New Horizons mission has taken what we thought we knew about Pluto and turned it upside down," said Jim Green, director of planetary science at NASA Headquarters in Washington. "It's why we explore – to satisfy our innate curiosity and answer deeper questions about how we got here and what lies beyond the next horizon."

The New Horizons team is discussing numerous findings at the 47th Annual Meeting of the Division for Planetary Sciences (DPS) of the American Astronomical Society (AAS) this week in National Harbor, Maryland. Just four months after the spacecraft encountered Pluto, science team members are presenting more than 50 reports on exciting discoveries.

"It's hard to imagine how rapidly our view of Pluto and its moons are evolving as new data stream in each week. As the discoveries pour in from those data, Pluto is becoming a star of the solar system," said mission Principal Investigator Alan Stern of the Southwest Research Institute, Boulder, Colorado. "Moreover, I'd wager that for most planetary scientists, any one or two of our latest major findings on one world would be considered astounding. To have them all is simply incredible."

In one such discovery, New Horizons geologists have combined images of Pluto's surface to make 3-D maps that indicate that two of Pluto's most distinctive mountains could be cryovolcanoes—ice volcanoes that may have been active in the recent geological past.

The two cryovolcano candidates are large features measuring tens of miles (tens of kilometers) across and several miles or kilometers high. "These are big mountains with a large hole in their summit, and on Earth that generally means one thing—a volcano," said Oliver White, New Horizons postdoctoral researcher with NASA's Ames Research Center, Moffett Field, California. While their appearance is similar to volcanoes on Earth that spew molten rock, ice volcanoes on Pluto are expected to emit a somewhat melted slurry of substances such as water ice, nitrogen, ammonia, or methane on Pluto.

White stresses that the team's interpretation of these features as volcanoes is tentative. However, "If they are volcanic, then the summit depression would likely have formed via collapse as material is erupted from underneath. The strange hummocky texture of the mountain flanks may represent volcanic flows of some sort that have travelled down from the summit region and onto the plains beyond, but why they are hummocky, and what they are made of, we don't yet know."

If Pluto is proven to have volcanoes, it will provide an important new clue to its geologic and atmospheric evolution. "After all, nothing like this has been seen in the deep outer solar system," said Jeffrey Moore, New Horizons Geology, Geophysics and Imaging team leader, also from NASA Ames.

Pluto's Long History of Geologic Activity

Another of the more surprising findings from New Horizons is the wide range of surface ages found on Pluto, from ancient to intermediate to relatively young in geological terms. Crater counts used to determine surface unit ages indicate that Pluto has ancient surface areas dating to just after the formation of the planets, about 4 billion years ago. In addition, there's a vast area that was geologically born "yesterday," meaning it may have formed within the past 10 million years. This area – informally named Sputnik Planum – appears on the left side of Pluto's "heart" and is completely impact-free in all images returned to date.

Scientists wondered if Sputnik Planum's smooth, icy plains

were an oddity; did a recent geological episode form the plains long after all other geologic activity ceased?

Apparently not. New data from crater counts reveal the presence of intermediate or "middle-aged" terrains on Pluto as well. This suggests that Sputnik Planum is not an anomaly—that Pluto has been geologically active throughout much of its more than 4-billion-year history. "We've mapped more than a thousand craters, which vary greatly in size and appearance," said postdoctoral researcher Kelsi Singer, of the Southwest Research Institute (SwRI) in Boulder, Colorado. "Among other things, I expect cratering studies like these to give us important new insights into how this part of the solar system formed."

Building Blocks of the Solar System

Crater counts are giving the New Horizons team insight into the structure of the Kuiper Belt itself. The dearth of smaller craters across Pluto and its large moon Charon indicate that the Kuiper Belt likely had fewer smaller objects than some models had predicted. This leads New Horizons scientists to doubt a longstanding model that all Kuiper Belt objects formed by accumulating much smaller objects of less than a mile wide. The absence of small craters on Pluto and Charon support other models theorizing that Kuiper Belt objects tens of miles across may have formed directly, at their current—or close to current—size.

In fact, the evidence that many Kuiper Belt objects could have been "born large" has scientists excited that New Horizons' next potential target – the 30-mile-wide (40-50 kilometer wide) KBO named 2014 MU69 – which may offer the first detailed look at just such a pristine, ancient building block of the solar system.

Spinning, Merged Moons

The New Horizons mission is also shedding new light on Pluto's fascinating system of moons and their unusual properties. For example, nearly every other moon in the solar system, including Earth's moon, is in synchronous rotation, but not so of Pluto's small moons. These small satellites are spinning much faster, with Hydra – the most distant moon - rotating an unprecedented 89 times during a single lap around Pluto. Scientists believe these spin rates could be chaotic (i.e., variable) because Charon exerts a strong torque that prevents each small moon from settling down into synchronous rotation, which means keeping one face toward the planet.

Another oddity of Pluto's moons: scientists expected the satellites to wobble, but not to this degree. "Pluto's moons are behaving like spinning tops," said co-investigator Mark Showalter of the SETI Institute in Mountain View, California.

Images of Pluto's four smallest satellites also indicate that several of them could have been born from mergers of two or more former moons, suggesting the presence of more moons at some point. "We suspect from this that Pluto had more moons in the past, in the aftermath of the big impact that also created Charon," said Showalter.

Pluto's Frigid, Extended Atmosphere

The New Horizons team is presenting new data at DPS that reveal Pluto's upper atmosphere is significantly colder and therefore more compact than Earth-based models had indicated. As a result, scientists have discovered that Pluto's atmospheric escape rate is thousands of times lower than had been thought. It now appears that Pluto's atmosphere escapes by the same mechanism as do gases from the atmospheres of Earth and Mars – rather than the previously believed escape process that more resembled escape from cometary atmospheres.

New Horizons is part of NASA's New Frontiers Program, managed by the agency's Marshall Space Flight Center in Huntsville, Alabama. The Johns Hopkins University Applied Physics Laboratory in Laurel, Maryland, designed, built, and operates the New Horizons spacecraft and manages the mission for NASA's Science Mission Directorate. The Southwest Research Institute leads the science mission, payload operations, and encounter science planning.

For more information on the New Horizons mission, including fact sheets, video and images, visit http://www.nasa.gov/newhorizons and http://pluto.jhuapl.edu.

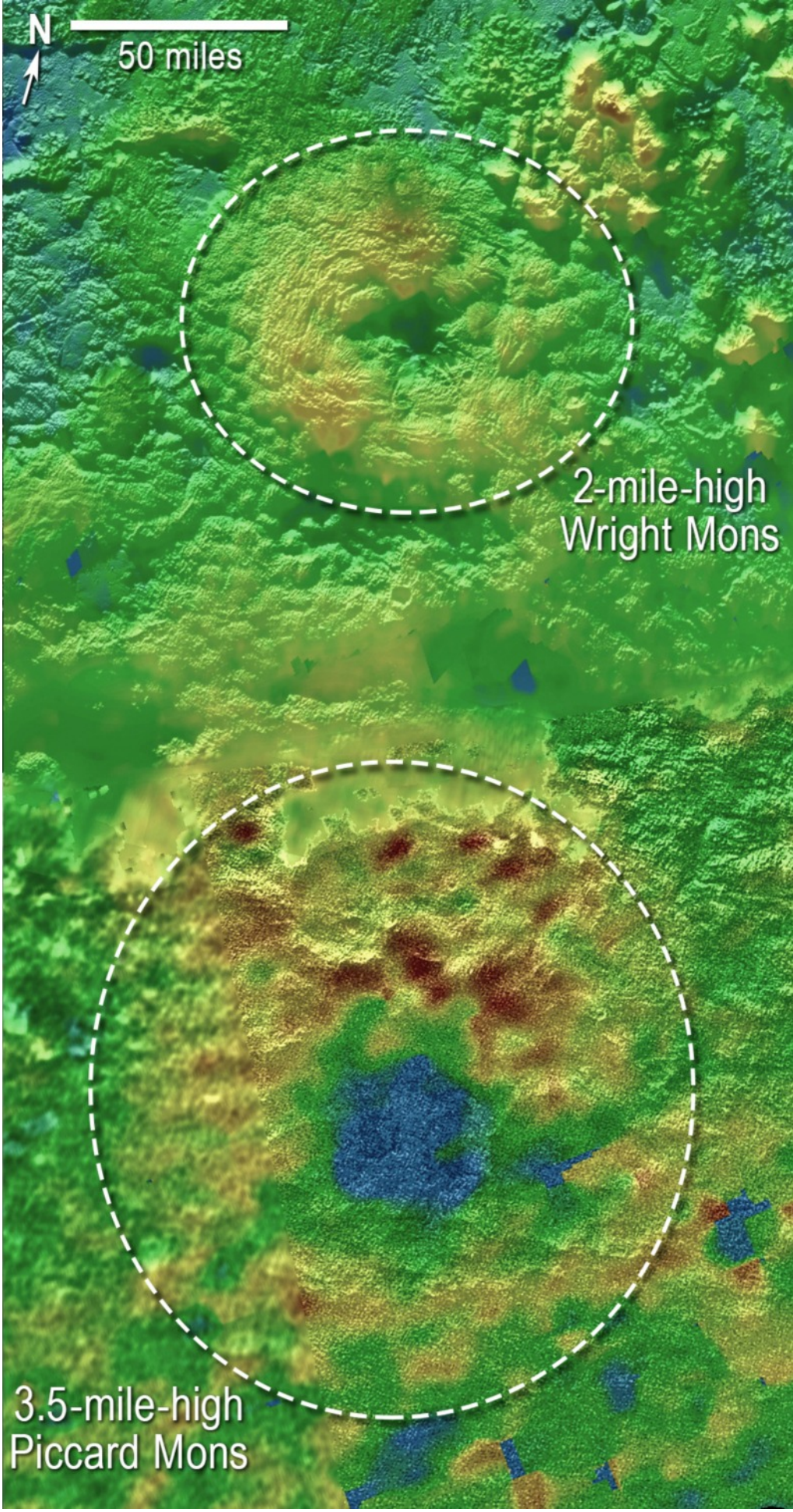
*Ice Volcanoes and Topography*

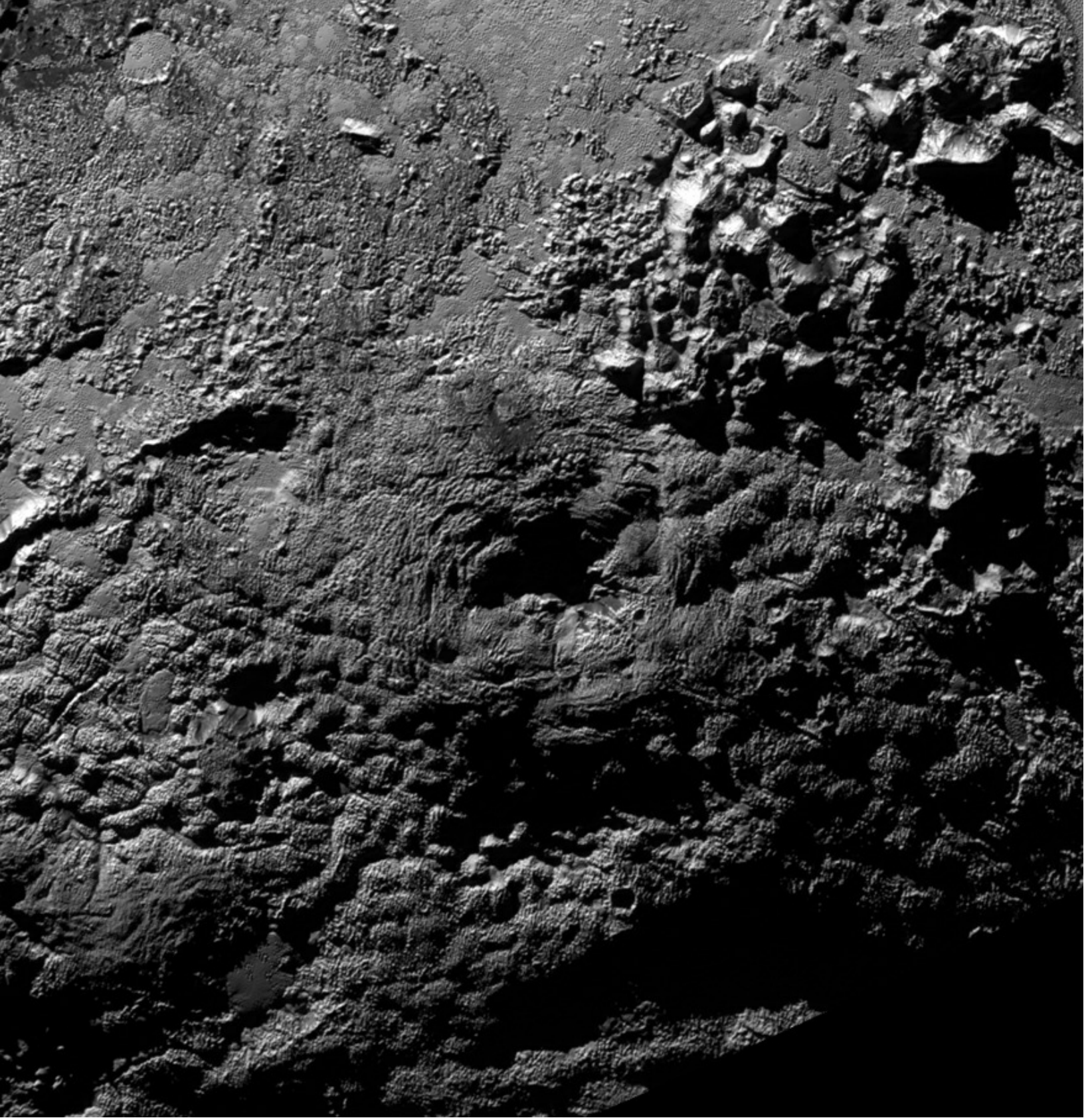
*Release Date: November 9, 2015*

*Keywords: LORRI, Pluto, Ralph*

*Scientists using New Horizons images of Pluto's surface to make 3-D topographic maps have discovered that two of Pluto's mountains, informally named Wright Mons and Piccard Mons, could possibly be ice volcanoes. The color is shown to depict changes in elevation, with blue indicating lower terrain and brown showing higher elevation; green terrains are at intermediate heights.*

*Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute*





*Ice Volcanoes on Pluto?*

*The informally named feature Wright Mons, located south of Sputnik Planum on Pluto, is an unusual feature that's about 100 miles (160 kilometers) wide and 13,000 feet (4 kilometers) high. It displays a summit depression (visible in the center of the image) that's approximately 35 miles (56 kilometers) across, with a distinctive hummocky texture on its sides. The rim of the summit depression also shows concentric fracturing. New Horizons scientists believe that this mountain and another, Piccard Mons, could have been formed by the 'cryovolcanic' eruption of ices from beneath Pluto's surface.*

# December Observing: What to View

*Jim Kvasnicka*

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

**Planets**

**Neptune and Uranus:** In Aquarius and Pisces.
**Jupiter:** Rises by 10:30 to end the month.
**Mars:** Rises around 2:00 am with a disk 5" wide.
**Venus:** Rises 3 hours before the Sun at magnitude -4.0.
**Saturn:** Becomes visible mid – December about an hour before Sun rise.
**Mercury:** Very low in the evening and difficult to see.

**Meteor Showers**

**Geminids:** Peaks the nights of December 13th and 14th. Predictions are for a zenithal hourly rate (ZHR) of 120. The moon will be a waxing crescent and not interfere.

**Messier List**

**M2:** Class II globular cluster in Aquarius.
**M15:** Class IV globular cluster in Pegasus.
**M29**: Open cluster in Cygnus.
**M31:** The Andromeda Galaxy.
**M32:** Companion galaxy to M31.
**M110:** Companion galaxy to M31.
**Last Month:** M27, M30, M56, M57, M71, M72, M73
**Next Month:** M33, M34, M52, M74, M76, M77, M103

**NGC and other Deep Sky Objects**

**NGC 157:** Galaxy in Cetus.
**NGC 246:** PN in Cetus.
**NGC 247:** Galaxy in Cetus.
**NGC 578:** Galaxy in Cetus.
**NGC 672:** Galaxy in Triangulum.

**Double Star Program List**

**Eta Cassiopeiae:** Yellow primary with a rose colored secondary.
**Sigma Cassiopeiae:** Yellow and light blue pair.
**Theta Aurigae:** Bright white and pale blue stars.
**1 Camelopardalis:** White and pale blue pair.
**32 Camelopardalis:** Equal white stars.
**Gamma Ceti:** White primary with a yellow secondary.
**Chi Tauri**: White primary with a pale blue secondary.
**118 Tauri:** White and yellow pair.

**Challenge Object**

**NGC 777 and NGC 778:** Galaxy pair in Triangulum. NGC 777 is the larger and brighter of the pair with NGC 778 smaller and dimmer located 8' south of NGC 777.

# Focus on Constellations: Perseus

*Jim Kvasnicka*

**Perseus**
Perseus the Hero lies in the Milky Way and is rich in such typical Milky Way objects as open clusters and diffuse nebulae. Perseus has two Messier objects, open cluster M34 and the planetary nebula M76. Both are fine sights but the most outstanding object in Perseus goes to the Double Cluster, NGC 869 and NGC 884. The constellation Perseus is best seen in December.

**Showpiece Objects**
**Open Clusters:** M34, NGC 869 and NGC 884 (The Double Cluster)
**Planetary Nebulae:** M76 (The Little Dumbbell)
**Double Stars:** Theta Persei, Eta Persei (Miram)
**Variable Stars:** Beta Persei (Algol)

**Mythology**
Perseus slew the Medusa, the snake haired Gorgan. Anyone who looked at Medusa would turn into stone. Perseus got around this problem by not looking directly at her. He did this by looking at her reflection in his shield. He killed the Medusa by cutting off her head. Some of her blood fell into the sea and mixed with sea foam out of which sprang Pegasus the white winged horse. Later while riding Pegasus he came across Andromeda chained to the rocks on the sea shore as a sacrifice to the sea monster Cetus. Perseus was able to kill the Cetus by pulling the head of the Medusa from a bag and holding it up to Cetus. The monster looked at the head of Medusa and was turned into stone.

**Number of Objects Magnitude 12.0 and Brighter**
**Galaxies:** 9
**Open Clusters:** 19
**Planetary Nebulae:** 1
**Bright Nebulae:** 1
**Dark Nebulae:** 1

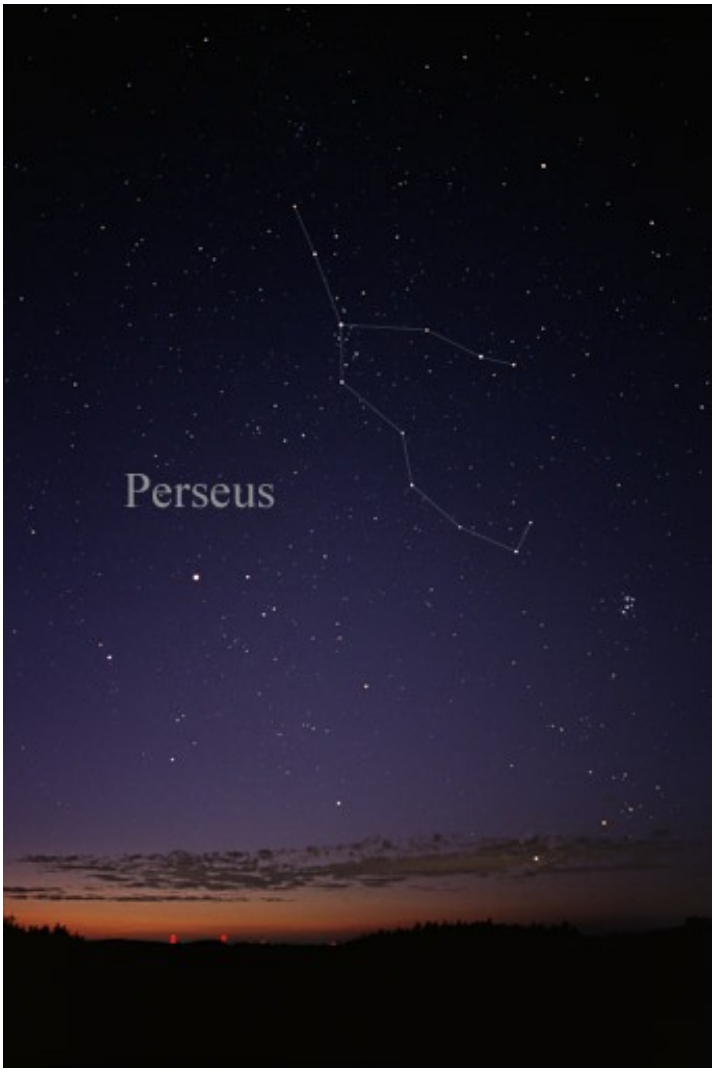



Photo by Till Credner, source: Wikipedia.

## A New "Mathematical" Definition Proposed for What Constitutes a Planet

Nancy Atkinson, Universe Today

In the current (heated) debate of what constitutes a planet, it seems everyone can agree at least one thing: The current definition put forth by the International Astronomical Union is actually quite vague and it really only applies to our own Solar System. So while the definition is unclear at best in our own neighborhood, it also doesn't provide a framework for classifying the thousands of exo-worlds that are being discovered on almost a weekly basis.

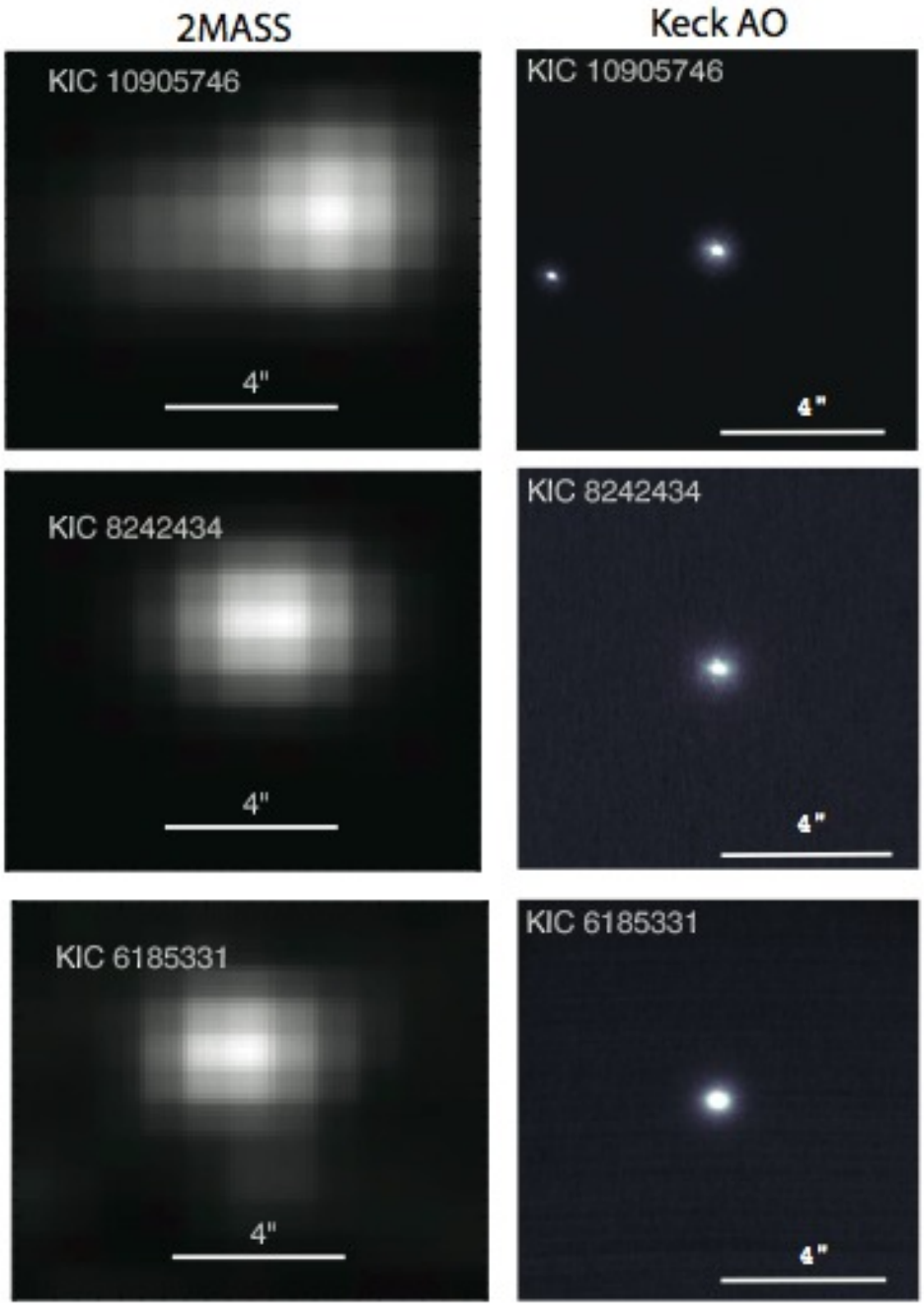
Since math has been dubbed "the language of the Universe" it seems rather fitting and logical to use arithmetic to help in framing a better definition for planethood.

This week, UCLA professor Jean-Luc Margot has proposed a simple mathematical test that can be used to separate planets from other bodies like dwarf planets and minor planets. He says his new system is easy.

"One should not need a teleportation device to decide whether a newly discovered object is a planet," Margo said.

The new approach would use estimates of the star's mass and the planet's mass and orbital period. Since the IAU's definition is based primarily on the ability of a planet to "clear its orbit," (whether it can accumulate or dominate small bodies in its orbital neighborhood), Margot's test narrows this down to a specific timeframe of determining whether a body can clear a specific region around its orbit.

"A simple metric can be used to determine whether a planet or exoplanet can clear its orbital zone during a characteristic time scale, such as the lifetime of the host star on the main




*Three exoplanet candidates found by the Planet Hunters citizen science project. Credit: Zooniverse*

sequence," Margot writes in his paper. "This criterion requires only estimates of star mass, planet mass, and orbital period, making it possible to immediately classify 99% of all known exoplanets."

Under these criteria, all 8 planets and all classifiable exoplanets would be classified as planets. It also keeps the distinction between planets and dwarf planets, and as some have pointed out, would make our Moon a planet.

Margot says his definition would be useful in generalizing and simplifying the definition of a planet, and that the information for applying this for exoplanets is easily obtained with Earth- or space-based telescopes.

"The disparity between planets and non-planets is striking," Margot said. "The sharp distinction suggests that there is a fundamental difference in how these bodies formed, and the mere act of classifying them reveals something profound about nature."

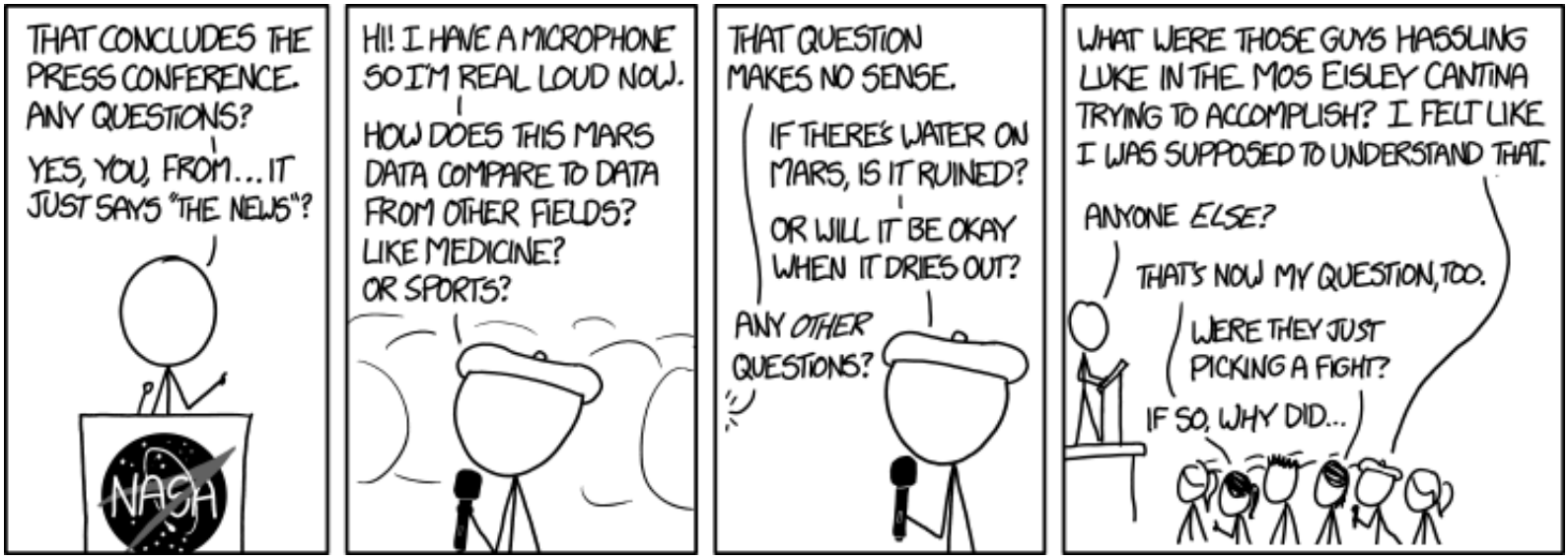
Margot also found that bodies that can clear their orbits, and therefore qualify as planets, are typically spherical.

"Because a quantitative orbit-clearing criterion can be applied to all planets and exoplanets," Margot writes, "it is possible to extend the 2006 IAU planet definition to stars other than the Sun and to remove any possible ambiguity about what it means to clear an orbital zone."

Margot presented his proposal at the annual meeting of the AAS's Division for Planetary Sciences and it is not known whether the new approach will be considered by the IAU.

Further reading: Margot's paper, UCLA press release

## NASA PRESS CONFERENCE




xkcd.com

# From the Archives: November, 1977



Observing Chairman's Report

## A REPORT ON HOW IT LOOKS THROUGH THE HYDE REFLECTORS

This month, I think I'll do what a lot of other people are doing and sing the praises of our latest astronomical addition to this area, namely Hyde Memorial Observatory. I have used telescopes ranging in size from a 2.4 inch refractor to a 30 inch reflector, and I can honestly say that this new observatory has one of the finest setups I have ever seen.

Three telescopes, including perhaps the second or third largest telescope in Nebraska, give this observatory a complete range of observing equipment. First, for narrow field and high magnification viewing of the planets and other small objects, the eight inch Cassegrain gives clear and sharp views while being easy to operate.

For wide field work, the club's eight-inch Newtonian gives fantastic views of the Pleiades, M31, and other large extended objects. And, for real deep sky work, the 14-inch Celestron is a gem. The view it gave of the ring nebula was one of the clearest I have ever seen.

There still exist some minor problems with the facility, but these haven't seriously marred its performance. I am also quite pleased at the club's response to properly manning the observatory during public nights, even when the weather isn't cooperative. I hope this continues and I also hope to see more members volunteer to help with this operation. Those who have been out in the past few weeks have seen the public's response and I think this alone attests to the value of having such a fine facility in Lincoln.

I've already been contacted by several people expressing an interest in our club because of this observatory and I feel that in addition to gaining a few new members, this observatory could help bring the entire membership into active cooperation and really show people what amateur astronomy means. The word "amateur" means something like "someone who participates in an activity for the joy and excitement it gives him," and we can really contribute something to this community if we introduce more people to the wonders of the universe.

--David Knisely

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THIS MONTH'S PROGRAM...

*(Continued from Page 1)*

*scopes (although it will be just a few days after full moon.)*

*So, to those members who haven't shown up at a meeting for awhile here's a program that ought to entice you--your astronomy club meeting where amateur astronomers should be--in a fine new observatory! See you there!*

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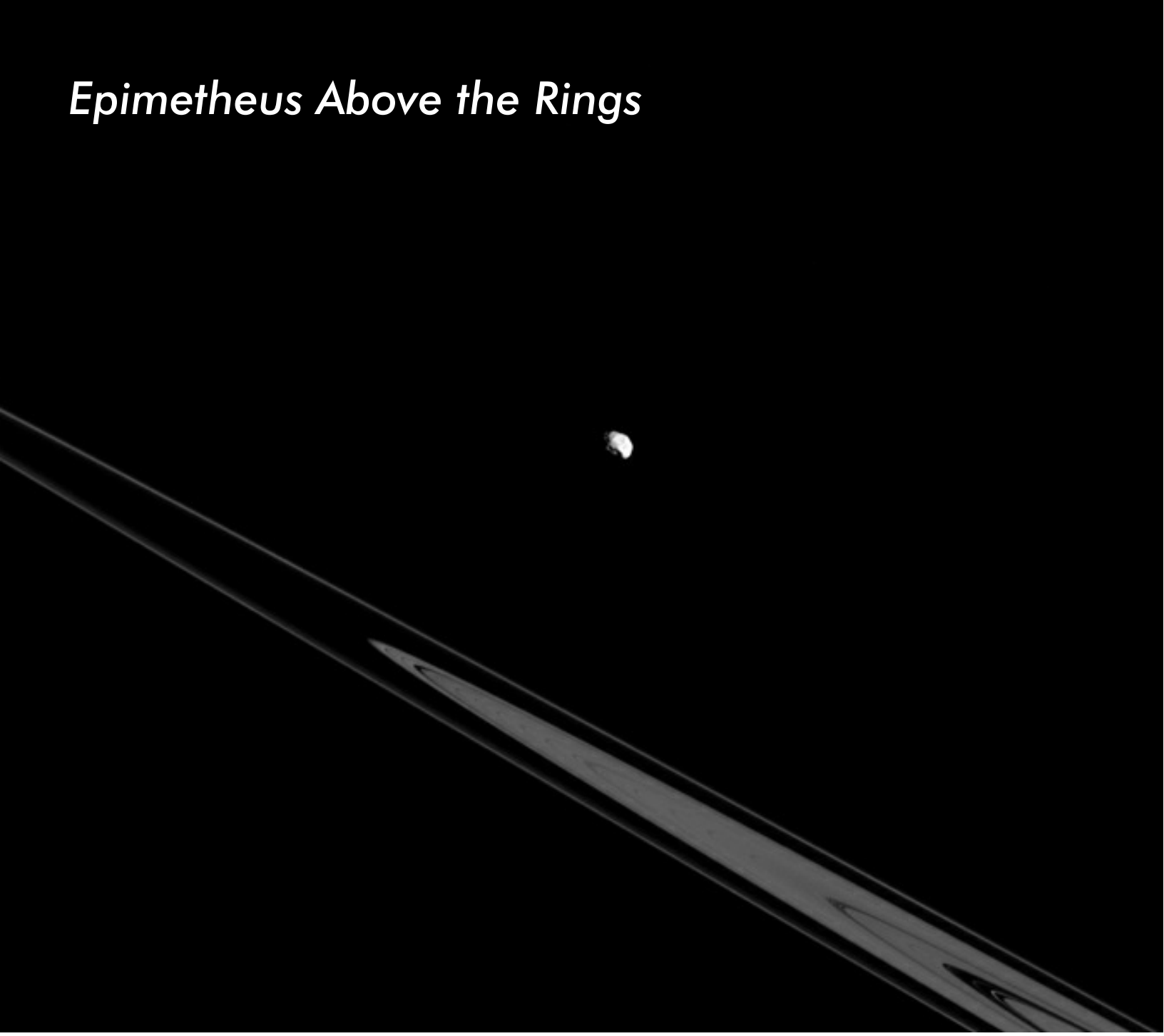
LASER PROGRAM AT DES MOINES

"Laser Journeys", a rock and light show using a $15,000 krypton laser, premiered November 4 at Sergent Planetarium in Des Moines. Call (515) 274-4138 for information.

# *Epimetheus Above the Rings*



*Although Epimetheus appears to be lurking above the rings here, it's actually just an illusion resulting from the viewing angle. In reality, Epimetheus and the rings both orbit in Saturn's equatorial plane.*

*Inner moons and rings orbit very near the equatorial plane of each of the four giant planets in our solar system, but more distant moons can have orbits wildly out of the equatorial plane. It has been theorized that the highly inclined orbits of the outer, distant moons are remnants of the random directions from which they approached the planets they orbit.*

*This view looks toward the unilluminated side of the rings from about -0.3 degrees below the ringplane. The image was taken in visible light with the Cassini spacecraft narrow-angle camera on July 26, 2015.*

*The view was obtained at a distance of approximately 500,000 miles (800,000 kilometers) from Epimetheus and at a Sun-Epimetheus-spacecraft, or phase, angle of 62 degrees. Image scale is 3 miles (5 kilometers) per pixel.*

# 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 Beth Jenckes. 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

# CLUB APPAREL

Order club apparel from cafepress.com:

Shop through Amazon Smile to automatically donate to PAC:

# CLUB OFFICERS

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