



## EPHEMERIS

The official newsletter of the Prescott Astronomy Club (PAC)  
*e-phem-er-is*: a time-based listing of future positions of solar system objects

## JANUARY 2018

### UPCOMING EVENTS

Wednesday, January 3 - Regular PAC meeting @ 6:30 PM in the Jim and Linda Lee Planetarium, STEM bldg., Embry-Riddle Aeronautical University. A map of the planetarium's location is at the end of the newsletter.



Wednesday, January 10 - METASIG @ 5:00 PM at local restaurant. Sign up at January 3 meeting.

Wednesday, January 17 - Board meeting @ 6:30 PM.

### PROPOSED COMPUTER & SOFTWARE PURCHASE

The board of directors has approved a proposal to purchase a laptop computer and accounting software for organizing club membership finances. For continuity, the computer would pass to each successive treasurer. The proposed purchase would cost about \$600 and will require club member approval at the January 3 meeting.

### 2017 ANNUAL CHRISTMAS PARTY

By Doug Tilley

On December 13<sup>th</sup> our club celebrated its annual Christmas party in a private room at the Gurley St. Grill Restaurant with about 40 members in attendance. Prior to the dinner portion of the party, the members had a chance to socialize with each other and share various holiday and astronomical stories. After the dinner the club presented its first annual awards. Long time member Fulton Wright and VP Joel Cohen presented the awards. Award recipients were:



Super Nova Award: Pat Birck

Annual Exceptional Volunteer Service Awards: Adam England and Jerry Shaw

Certificates of Appreciation Awards: Neil Stockton, Marilyn Unruh, and John Baesemann

Presidential Community Award: Embry-Riddle Aeronautical University.

At the end of the evening, the club raffled off five Harkins movie theater gift cards.

## REFLECTIONS

By Pat Birck

I want to thank the Board of Directors and the members of PAC for awarding me the Supernova Award at the Christmas Holiday party. The honor has caused me to reflect on the science of astronomy and my interest in it. The following are some of these reflections.

By the light of day we experience the reality of our environment through all of our senses – sight, sound, smell, taste, and touch. We know and understand our environment -- the trees, mountains, rivers, critters and many other aspects of our daytime reality -- not totally but to a significant extent. In the darkness of night though, we experience a quite different reality that is no less real, but for the most part not available to our senses. Even our sense of sight is greatly diminished at night. For example, we can experience some of the Orion Nebula through our sense of sight, with the aid of a telescope, but we can't touch, hear, smell, or taste it. To a much greater extent the reality of darkness is a mystery that the science of astronomy has sought to discover and understand, probably as long as humans have inhabited Earth. Perhaps that is what makes this branch of science so interesting. For sure there is more that we don't understand about the cosmos than we do understand.

For me all of the forms of reality – daytime and nighttime, on Earth and in the cosmos, those of which we have limited understanding, those whose understanding is yet to be discovered, and those of which we have no understanding – are evidence of God's creation and are therefore, the earliest revelation of the Divine. Wouldn't the world be a better place if we all recognized that all of us share the same wonders of creation, whether we are Christian, Hindu, Buddhist, Jewish, Muslim, etc. or none of the above; whether we live in the US, Iran, Russia, Korea, Mexico or anywhere else; whether we consider ourselves liberal or conservative (whatever those labels mean); whether we are recent immigrants or immigrants from long ago; whether we are black, white, brown, green, purple or any other color.



My interest in astronomy tends toward education because I feel that it is often through education that a person can attain a better life. Education is no guarantee of anything but it gives a person a higher probability of avoiding or escaping poverty. That's why I think the Club's outreach activities – star parties, public presentations, member programs – are especially important, as well as being fun. I invite all members to enjoy these activities. Thanks for reading my ramblings!

## **SNOWY WORLDS BEYOND EARTH**

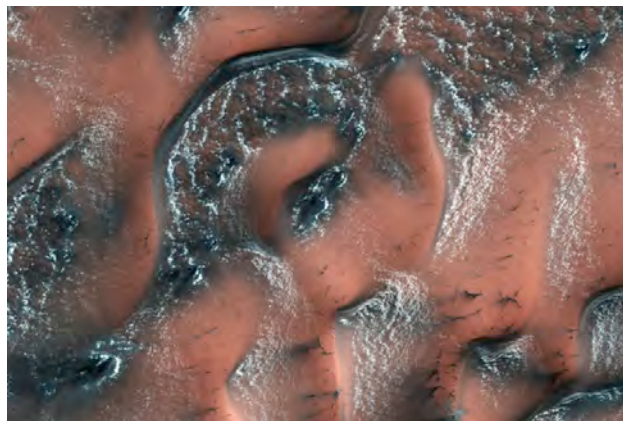
By Linda Hermans-Killiam

There are many places on Earth where it snows, but did you know it snows on other worlds, too? Here are just a few of the places where you might find snow beyond Earth:



### **Mars**

The north pole and south pole of Mars have ice caps that grow and shrink with the seasons. These ice caps are made mainly of water ice—the same kind of ice you'd find on Earth. However, the snow that falls there is made of carbon dioxide—the same ingredient used to make dry ice here on Earth. Carbon dioxide is in the Martian atmosphere and it freezes and falls to the surface of the planet as snow. In 2017, NASA's Mars Reconnaissance Orbiter took photos of the sand dunes around Mars' north pole. The slopes of these dunes were covered with carbon dioxide snow and ice.

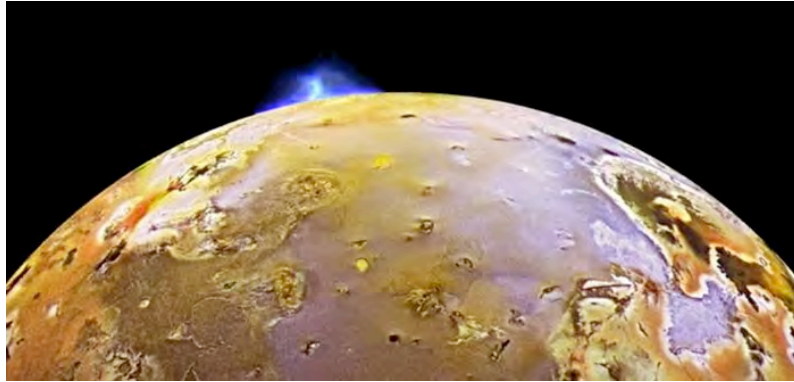


*NASA's Mars Reconnaissance Orbiter captured this image of carbon dioxide snow covering dunes on Mars. Credit: NASA/JPL/University of Arizona*

### **A Moon of Jupiter: Io**

There are dozens of moons that orbit Jupiter and one of them, called Io, has snowflakes made out

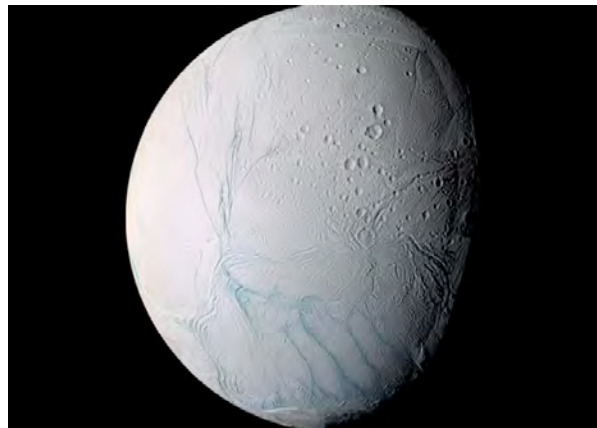
of sulfur. In 2001, NASA's Galileo spacecraft detected these sulfur snowflakes just above Io's south pole. The sulfur shoots into space from a volcano on Io's surface. In space, the sulfur quickly freezes to form snowflakes that fall back down to the surface.



*A volcano shooting molten sulfur out from the surface of Io. Credit: NASA/JPL-Caltech*

### **A Moon of Saturn: Enceladus**

Saturn's moon, Enceladus, has geysers that shoot water vapor out into space. There it freezes and falls back to the surface as snow. Some of the ice also escapes Enceladus to become part of Saturn's rings. The water vapor comes from a heated ocean which lies beneath the moon's icy surface. (Jupiter's moon Europa is also an icy world with a liquid ocean below the frozen surface.) All of this ice and snow make Enceladus one of the brightest objects in our solar system.

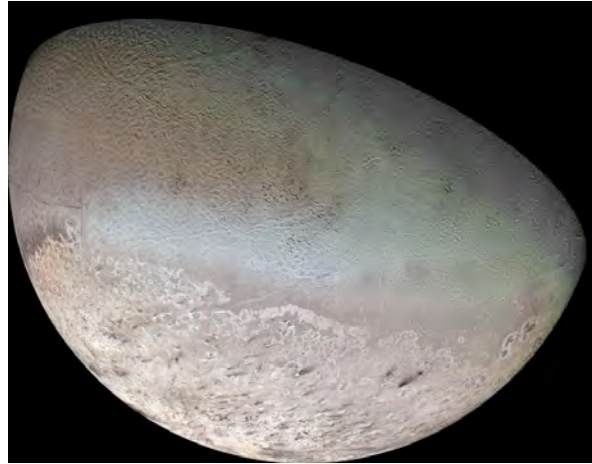


*Enceladus as viewed from NASA's Cassini spacecraft. Credit: NASA*

### **A Moon of Neptune: Triton**

Neptune's largest moon is Triton. It has the coldest surface known in our solar system. Triton's atmosphere is made up mainly of nitrogen. This nitrogen freezes onto its surface covering Triton with ice made of frozen nitrogen. Triton also has geysers like Enceladus, though they are smaller

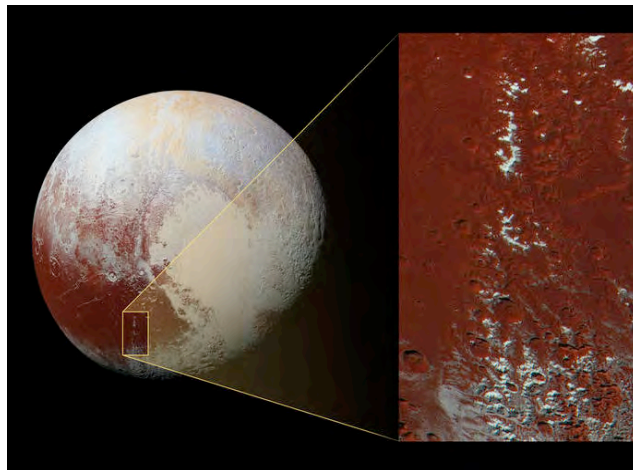
and made of nitrogen rather than water.



*The Voyager 2 mission captured this image of Triton. The black streaks are created by nitrogen geysers.  
Credit: NASA/JPL/USGS*

## **Pluto**

Farther out in our solar system lies the dwarf planet Pluto. In 2016, scientists on the New Horizons mission discovered a mountain chain on Pluto where the mountains were capped with methane snow and ice.



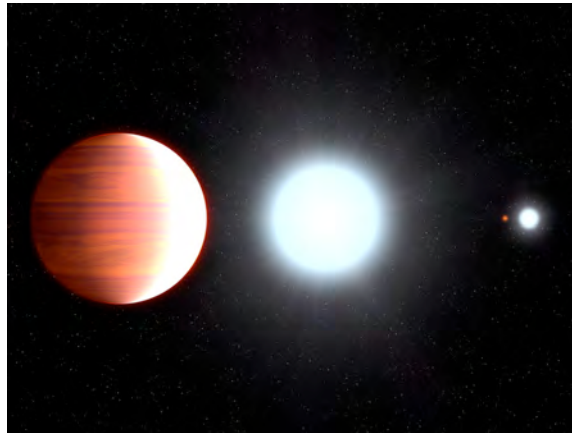
*The snowy Cthulhu (pronounced kuh-THU-lu) mountain range on Pluto.  
Credits: NASA/JHUAPL/SwRI*

## **Beyond Our Solar System**

There might even be snow far outside our solar system! Kepler-13Ab is a hot, giant planet 1,730 light years from Earth. It's nine times more massive than Jupiter and it orbits very close to its star. The Hubble Space Telescope detected evidence of titanium oxide—the mineral used in sunscreen—in this planet's upper atmosphere. On the cooler side of Kepler-13Ab that faces



away from its host star, the planet's strong gravity might cause the titanium oxide to fall down as "snow."



*This is an artist's illustration of what Kepler-13Ab might look like. Credit: NASA/ESA/G. Bacon (STScI)*

Want to learn more about weather on other planets? Check out NASA Space Place:  
<https://spaceplace.nasa.gov/planet-weather>

## **LET'S PARTY FOR JANUARY**

Astronomical objects for public (and private) star parties.  
by Fulton Wright, Jr.

Flashy, deep-sky objects, visible in the middle of the month, at the end of astronomical twilight, 7:10 PM this month, (when it really gets dark). This list, customized for Prescott, Arizona, should work well anywhere in the state and the lower 48 states.



*Double Stars (2 or 3 stars, close together)*

Gamma Andromedae (Almach), Mag: 2.1 & 5.0, Sep: 10 arc-seconds  
R.A.: 2hr 5min, Dec.: +42deg 45'

Gamma Arietis (Mesarthim), Mag: 3.9 & 4.6, Sep: 7 arc-seconds  
R.A.: 1hr 55min, Dec.: +19deg 23'

*Open Clusters (about 50 bright stars)*

M37 (NGC2099), Mag: 5.6, Size: 14arc-minutes

R.A.: 5hr 53min, Dec.: +32deg 33'

Double Cluster (NGC869 and 884), Mag: 5.3 and 6.1, Size: 18 and 18 arc-minutes, centers 28 arc-minutes apart

R.A.: 2hr 22min, Dec.: +57deg 12'

M 45 (Pleiades), Mag: 1.5, Size: 120 arc-minutes

R.A.: 3hr 48min, Dec.: +24deg 10'

*Globular Clusters (about 200,000 dim stars)*

M2 (NGC7089), Mag: 6.5, Size: 16 arc-minutes

R.A.: 21hrs 34min, Dec.: -0deg 45'

M15 (NGC7078), Mag: 6.2, Size: 18 arc-minutes

R.A.: 21hrs 31min, Dec.: +12deg 15'

M79 (NGC1904), Mag: 7.7, Size: 10 arc-minutes

R.A.: 5hrs 25min, Dec.: +24deg 31'

*Galaxies (about 200,000,000 very dim and distant stars)*

M31 (Andromeda galaxy with M32 & M110), Mag: 3.4 (7.9 & 8.0), Size: 180 x 70 arc-minutes (8 x 5 & 16 x 10)

R.A.: 0hr 44min, Dec.: +41deg 22'

M77 (Cetus A), Mag: 9.0, Size: 6 x 6 arc-minutes

R.A.: 2hr 44min, Dec.: +0deg 4'

*Diffuse Nebulae (gas and dust lit by a nearby star)*

M42 (Orion Nebula), Mag: 3.7, Size: 85 x 60 arc-minutes

R.A.: 5hrs 36min, Dec.: -5deg 26'

*Planetary Nebulae (gas shell from exploding star, looks like Uranus in telescope)*

NGC1535 (Cleopatra's Eye), Mag: 9.4, Size: 0.8 arc-minutes

R.A.: 4hr 15m, Dec.: -12deg 42'

## **NEED TO KNOW - ASK A MEMBER**

A new 15-minute segment is being added to the regular general meetings where members can have their 'burning' questions answered by other knowledgeable members. If you have an

astronomy related question you would like explained, submit the question to Jeff Stillman ([jstillman50@cableone.net](mailto:jstillman50@cableone.net)). You can also bring up the question at the meeting.

## **VOLUNTEERS NEEDED**

Volunteers are needed for refreshment coordinator. If you would like to help and need additional information, please contact Jeff Stillman ([jstillman50@cableone.net](mailto:jstillman50@cableone.net)).

## **BOOKS AND MAGAZINES**

Over the years astronomy books have been donated to PAC. Boxes of these books will be available at the regular meetings. For a donation to PAC of \$1 per book, anyone can have a book. Books that are not purchased at a regular meeting will be available at the following Third Thursday programs. Any remaining unsold books will be donated to the Friends of the Prescott Public Library. We also have copies of past Sky and Telescope magazine. These will be available to any member wishing to take them. Unclaimed magazines will be recycled.



## **FOR SALE**

Please visit the Classified Ads section of the club website to view the items posted there for sale:

<http://prescottastronomyclub.org/classified-ads/>

New items are added now and then, so don't miss out on something that you would like to get for yourself...or a friend.



## **PAC MENTORS**

If you need advice on the purchase of astronomy equipment, setting up equipment, astrophotography, etc., contact a PAC mentor.

Jeff Stillman - Astrophotography - (928) 379-7088





David Viscio - General - (928) 775-2918

Greg Lutes - Visual Observing - (928) 445-4430

Joel Cohen - Beginner's Astronomy: Selecting & Using a Telescope - (856) 889-6496

Bill McDonald - Video Observing

John Carter - Video Observing - (928) 458-0570

## OBSERVING LISTS

Observing lists are available in PDF format on the PAC website to provide guidance and goals for visual and astrophotography programs.



Astroleague Lunar 100

Binocular Showpieces

Bright Nebulae

Caldwell

Dunlop 100

Face-On Spiral Galaxies

Globular Clusters

Herschel 400

Herschel II

Hidden Treasures

Messier

Open Clusters

Planet Maps

Planetary Nebulae

Royal Astronomical Society of Canada Finest NGC

Saguaro Astronomy Club Best NGC

S&T Lunar 100

Telescope Showpieces

The Secret Deep

## PAC WEBSITE & YAHOO GROUPS

Website: <http://www.prescottastronomyclub.org>

E-mail: <mailto:pacinfo@prescottastronomyclub.org>

Astrophotography special interest group:

<https://groups.yahoo.com/neo/groups/pacastrophotography/info>



## BOARD OF DIRECTORS

President: Jeff Stillman  
Vice President: John Carter  
Secretary: Doug Tilley  
Treasurer: John Baesemann

At Large: Pat Bledsoe  
At Large: Dennis Eaton  
At Large: Adam England  
At Large: Joel Cohen



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Highland Center Coordinator: David Viscio  
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Magazine Subscriptions: John Baesemann  
METASIG: Marilyn Unruh  
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Property Records: Doug Tilley  
Schools & Camps Outreach: Pat Birck  
Starry Nights Coordinator: Pat Birck  
Third Thursday Coordinator: Corinne Shaw & Pat Birck

Membership: John Baesemann  
Newsletter: David Viscio  
Refreshments: Open  
Publicity: Adam England  
Webmaster: Russell Chappell



**ASTRONOMY PICTURE OF THE DAY: December 13, 2017**

**METEORS OVER INNER MONGOLIA**

Image Credit & Copyright: Haitong Yu



*Did you ever get caught in a meteor shower? If yes, then every minute or so the sky sparked with fleeting flashes of light. This was the fate of the pictured astrophotographer during last year's Perseids meteor shower. During the featured three-hour image composite, about 90 Perseids rained down above Lake Duolun of Inner Mongolia, China. If you trace back the meteor streaks, you will find that most of them appear to radiate from a single constellation -- in this case Perseus. In fact, you can even tell which meteors are not Perseids because they track differently. Tonight promises to be another good night to get caught in a meteor shower because it is the peak for the Geminids. Gemini, the shower radiant, should rise shortly after sunset and be visible most of the night.*

# The Jim and Linda Lee Planetarium Embry-Riddle Aeronautical University

