



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

JULY 2017

UPCOMING EVENTS

Wednesday, July 5 - Regular PAC meeting @ 6:30 PM in Rm. 107, Bldg. 74, Embry-Riddle Aeronautical University. Club member and webmaster Russ Chappell will talk about the PAC website.



Wednesday, June 12 - METASIG @ 5:00 PM at local restaurant. Sign up at July 5 meeting.

Wednesday, July 19 - Board meeting @ 6:30 PM.

Wednesday, July 26 - Friendly Pines Camp @ 8:00 PM for children with heart disease. . Sign up at July 5 meeting.

SOLAR ECLIPSE CELEBRATION - PRESCOTT VALLEY - AUGUST 21

Club member Adam England is coordinating a Solar Eclipse Celebration with the Prescott Valley Public Library for the eclipse on Monday, August 21 - see flier in Appendix. We are seeking club members who can bring solar scopes, talk about astronomy and show the partial eclipse to the public. The town of PV has offered their large outdoor screen to stream NASA coverage of the eclipse from around the country. There will also be displays from the local photography club on how to safely photograph the sun and educational crafts like homemade eclipse viewers. Adam is contacting science educators from the community to share their knowledge with students, attending the event as a field trip, and the general public. If you would like to help or need additional information, contact Adam at:



Adam M. England

Direct Dial: 928-227-9001 ext. 09213
Cell Phone: 928-642-0073
Email: adam.England@libertymutual.com

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).

USGS ASTROGEOLOGY SCIENCE CENTER - JUNE 13

The Mission of the USGS Astrogeology Science Center is to be a national resource for the integration of planetary geoscience, cartography, and remote sensing. They serve as explorers and surveyors, with a unique heritage of proven expertise and international leadership, to enable the ongoing successful investigation of the Solar System for humankind.

On Tuesday, June 13th, 12 members of the astronomy club enjoyed a tour of the facility. The fun began in the lobby where there is a lunar rover-training vehicle. The display cases are filled with models of almost every spacecraft and mementoes from many of the missions. There is even an impression of Neil Armstrong's hand in cement. The mail hallway is a representation of the solar system with every planet highlighted with the most recent maps and information. Bill McDonald even found a picture of the seismic measuring device he worked on that is on the Moon.

We were fortunate to have a presentation by Dr. Colin Dundas on his work on Mars gulleys.

Our host, David Portree, is the Manager of the Regional Planetary Information for the facility. For the last 10 years, he has been cataloging and archiving the records, pictures and memorabilia from the many and varied space missions. His office was a treasure of space related items that made the tour a real trip through space and time.



THE SHAPE OF THE SOLAR SYSTEM

By Marcus Woo

When Stamatios (Tom) Krimigis was selected for the Voyager mission in 1971, he became the team's youngest principal investigator of an instrument, responsible for the Low Energy Charged Particles (LECP) instrument. It would measure the ions coursing around and between the planets, as well as those beyond. Little did he know, though, that more than 40 years later, both Voyager 1 and 2 still would be speeding through space, continuing to literally reshape our view of the solar system.



The solar system is enclosed in a vast bubble, carved out by the solar wind blowing against the gas of the interstellar medium. For more than half a century, scientists thought that as the sun

moved through the galaxy, the interstellar medium would push back on the heliosphere, elongating the bubble and giving it a pointy, comet-like tail similar to the magnetospheres—bubbles formed by magnetic fields—surrounding Earth and most of the other planets

"We in the heliophysics community have lived with this picture for 55 years," said Krimigis, of The Johns Hopkins University Applied Physics Laboratory in Laurel, Maryland. "And we did that because we didn't have any data. It was all theory."

But now, he and his colleagues have the data. New measurements from Voyager and the Cassini spacecraft suggest that the bubble isn't pointy after all. It's spherical.

Their analysis relies on measuring high-speed particles from the heliosphere boundary. There, the heated ions from the solar wind can strike neutral atoms coming from the interstellar medium and snatch away an electron. Those ions become neutral atoms, and ricochet back toward the sun and the planets, uninhibited by the interplanetary magnetic field.

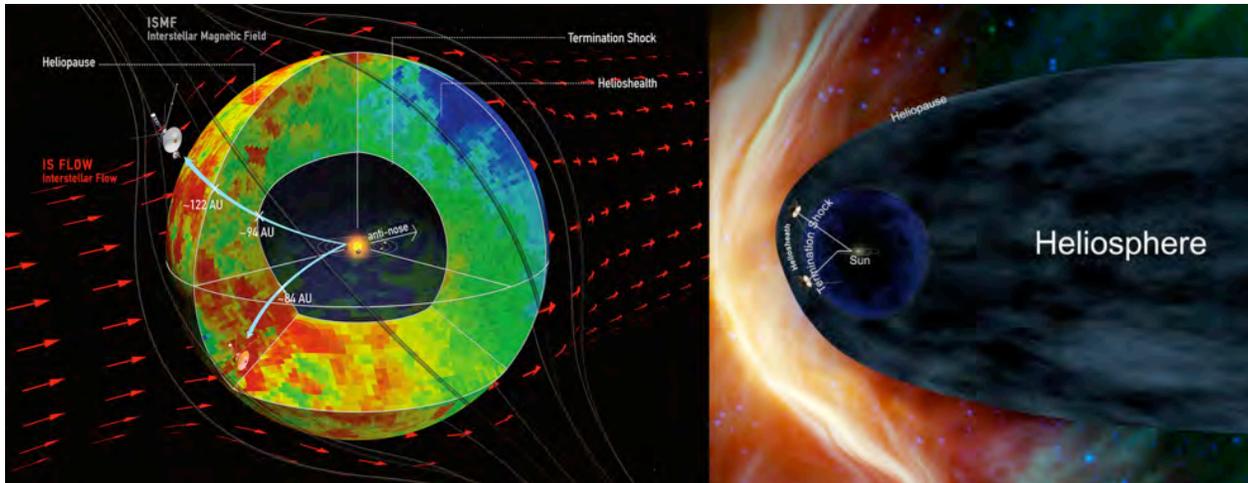
Voyager is now at the edge of the heliosphere, where its LECP instrument can detect those solar-wind ions. The researchers found that the number of measured ions rise and fall with increased and decreased solar activity, matching the 11-year solar cycle, showing that the particles are indeed originating from the sun.

Meanwhile, Cassini, which launched 20 years after Voyager in 1997, has been measuring those neutral atoms bouncing back, using another instrument led by Krimigis, the Magnetosphere Imaging Instrument (MIMI). Between 2003 and 2014, the number of measured atoms soared and dropped in the same way as the ions, revealing that the latter begat the former. The neutral atoms must therefore come from the edge of the heliosphere.

If the heliosphere were comet-shaped, atoms from the tail would take longer to arrive at MIMI than those from the head. But the measurements from MIMI, which can detect incoming atoms from all directions, were the same everywhere. This suggests the distance to the heliosphere is the same every which way. The heliosphere, then, must be round, upending most scientists' prior assumptions.

It's a discovery more than four decades in the making. As Cassini ends its mission this year, the Voyager spacecraft will continue blazing through interstellar space, their remarkable longevity having been essential for revealing the heliosphere's shape.

"Without them," Krimigis says, "we wouldn't be able to do any of this."



New data from NASA's Cassini and Voyager show that the heliosphere — the bubble of the sun's magnetic influence that surrounds the solar system — may be much more compact and rounded than previously thought. The image on the left shows a compact model of the heliosphere, supported by this latest data, while the image on the right shows an alternate model with an extended tail. The main difference is the new model's lack of a trailing, comet-like tail on one side of the heliosphere. This tail is shown in the old model in light blue. Image credits: Dialynas, et al. (left); NASA (right)

IF IT'S CLEAR

By Fulton Wright, Jr., PAC

Celestial events (from Sky & Telescope magazine, Astronomy magazine and anywhere else I can find information) customized for Prescott, Arizona. Remember, the Moon is 1/2 degree or 30 arcminutes in diameter. All times are Mountain Standard Time.



On Monday, July 3, you can see some events with Jupiter's moons. Here is the schedule:

07:47 PM Sunset.

08:02 PM Io moves in front of the planet.

08:15 PM You can probably find the planet in the dusk.

09:17 PM Io's shadow falls on the planet.

09:42 PM Europa moves in front of the planet.

10:13 PM Io leaves the face of the planet.

11:25 PM Io's shadow leaves the planet.

12:11 AM (Tuesday) Europa leave the face of the planet.

12:18 AM Europa's shadow falls on the planet.

12:24 AM Jupiter sets.

On Saturday, July 8, the full Moon rises at 7:27 PM (19 minutes before Sunset) spoiling any chance of seeing faint fuzzies for the night.

On Sunday, July 16, the Moon is at third quarter phase and rises at 12:32 AM (Monday).

On Saturday, July 22, it is new Moon and you have all night to hunt for faint fuzzies.

On Sunday, July 30, the Moon is at first quarter phase and sets at 12:19 AM (Monday).

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). You can also bring up the question at the meeting.

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



OBSERVING LISTS

Observing lists are available on the PAC website to provide guidance and goals for visual and astrophotography programs. Current lists are:

Astroleague Lunar 100

Bright Nebulae

Dunlop 100

Globular Clusters

Herschel II

Messier

Planet Maps

Royal Astronomical Society of Canada Finest NGC

Saguaro Astronomy Club Best NGC

Telescope Showpieces

Binocular Showpieces

Caldwell

Face-On Spiral Galaxies

Herschel 400

Hidden Treasures

Open Clusters

Planetary Nebulae

S&T Lunar 100

The Secret Deep



The lists are in PDF format and can be downloaded and printed for use.

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>



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Starry Nights Coordinator: Open
Webmaster: Russell Chappell

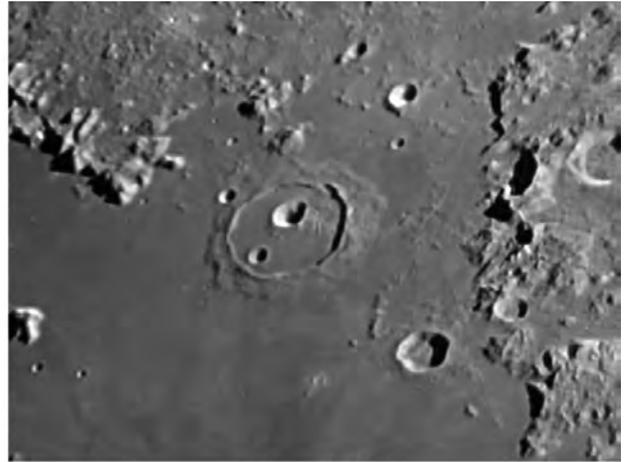


SELECT FEATURES FROM ASTROLEAGUE'S LUNAR CLUB

Images by David Viscio



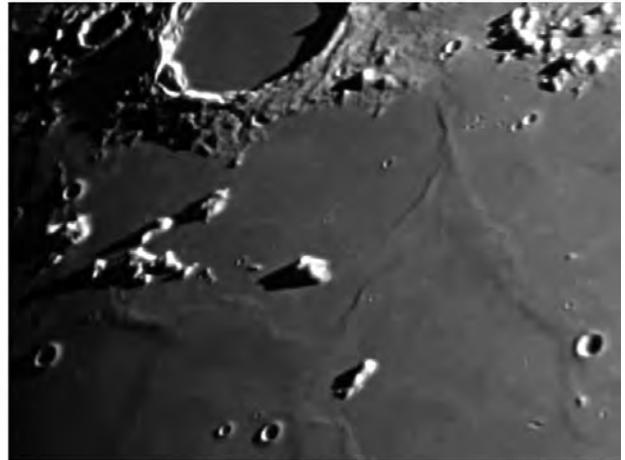
Posidonius



Cassini



Gassendi



Mons Pico



Rima Hyginus



Rupes Recta

THE PRESCOTT VALLEY PUBLIC LIBRARY AND
THE PRESCOTT ASTRONOMY CLUB PRESENT...



SOLAR ECLIPSE CELEBRATION

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MONDAY AUGUST 21

9AM-12PM

PV CIVIC CENTER AMPHITHEATER

CALL 928-759-6188 WITH QUESTIONS

ON THIS DAY, A TOTAL ECLIPSE OF THE SUN WILL BE
VISIBLE IN THE UNITED STATES FOR THE FIRST TIME IN
ALMOST 40 YEARS! JOIN US TO LEARN WHY THIS
HAPPENS AND SAFELY EXPERIENCE THIS MAGICAL
EVENT. ACTIVITIES FOR ALL AGES!