



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 2017

UPCOMING EVENTS



Wednesday, January 4 - Regular PAC meeting @ 6:30 PM in Rm 107, Bldg 74, Embry-Riddle Aeronautical University. Tom Polakis will present "Time-lapse Imaging With Three Very Different Cameras."

While much of nature appears static during the short time frames in which we observe them, photographic time-lapse sequences bring them to life. Speeding up these slow movements allow patterns to emerge that often have interesting explanations. This presentation will feature time-lapse videos created by an SLR, a planetary webcam, and a CCD camera, with subjects ranging from the Earth's rotation to changes in deep space.

Wednesday, January 11 - METASIG @ 5:00 PM at local restaurant. Sign up at meeting on January 4.

Wednesday, January 18 - Board meeting @ 6:30 PM.

Thursday, January 19 - Third Thursday Presentation @ 6:00 PM in the Founder's Suite, Prescott Public Library. Robert Ward will present "Planetary Science Research". Robert Ward has a profound passion for science. Seeing meteorites he has personally recovered being used to advance scientific research, knowledge, and understanding is one of his greatest joys. Rarely seen without his cowboy boots and black Stetson hat, Robert is often referred to as the "Space Cowboy." His private collection features specimens of virtually every known meteorite composition from all over the world.

2017 PAC OFFICERS

The slate of 2017 Prescott Astronomy Club officers were approved by club members at the November 2 regular club meeting. The 2017 club officers are:

President - Jeff Stillman

Director at Large - Pat Bledsoe

Vice-President - Joel Cohen

Director at Large - Bill McDonald

Secretary - Doug Tilley

Director at Large - Dick Lewis

Treasurer - Stephen Eubanks

Director at Large - John Baesemann

2017 SOLAR ECLIPSE BALLOON PROJECT

On August 21, 2017, the moon's shadow will sweep eastward from Oregon to North Carolina across the United States during a rare total eclipse of the sun. During this eclipse, the moon's shadow will pass over Glendo State Park in Wyoming. The ASCEND! Project, funded by NASA Space Grant and headed by Jack Crabtree, will photograph the moon's shadow from a high altitude balloon. Members of the Prescott Astronomy Club have the opportunity to be part of this exciting project.



Arrival in Glendo State Park is scheduled for August 19, 2017, with departure no later than August 23.

The ASCENT! Team and members of the Prescott Astronomy Club will provide talks about the balloon project and telescope viewing during the eclipse and clear night observing at the campground. If you are interested in participating or want additional information, contact Jerry and Corinne Shaw at cmsshaw0430@aol.com or (928) 772-0941.

BIG SCIENCE IN SMALL PACKAGES

By Marcus Woo

About 250 miles overhead, a satellite the size of a loaf of bread flies in orbit. It's one of hundreds of so-called CubeSats—spacecraft that come in relatively inexpensive and compact packages—that have launched over the years. So far, most CubeSats have been commercial satellites, student projects, or technology demonstrations. But this one, dubbed MinXSS ("minks") is NASA's first CubeSat with a bona fide science mission.



Launched in December 2015, MinXSS has been observing the sun in X-rays with unprecedented detail. Its goal is to better understand the physics behind phenomena like solar flares – eruptions on the sun that produce dramatic bursts of energy and radiation.

Much of the newly-released radiation from solar flares is concentrated in X-rays, and, in particular, the lower energy range called soft X-rays. But other spacecraft don't have the

capability to measure this part of the sun's spectrum at high resolution—which is where MinXSS, short for Miniature Solar X-ray Spectrometer, comes in.

Using MinXSS to monitor how the soft X-ray spectrum changes over time, scientists can track changes in the composition in the sun's corona, the hot outermost layer of the sun. While the sun's visible surface, the photosphere, is about 6000 Kelvin (10,000 degrees Fahrenheit), areas of the corona reach tens of millions of degrees during a solar flare. But even without a flare, the corona smolders at a million degrees—and no one knows why.

One possibility is that many small nanoflares constantly heat the corona. Or, the heat may come from certain kinds of waves that propagate through the solar plasma. By looking at how the corona's composition changes, researchers can determine which mechanism is more important, says Tom Woods, a solar scientist at the University of Colorado at Boulder and principal investigator of MinXSS: "It's helping address this very long-term problem that's been around for 50 years: how is the corona heated to be so hot."

The \$1 million original mission has been gathering observations since June.

The satellite will likely burn up in Earth's atmosphere in March. But the researchers have built a second one slated for launch in 2017. MinXSS-2 will watch long-term solar activity—related to the sun's 11-year sunspot cycle—and how variability in the soft X-ray spectrum affects space weather, which can be a hazard for satellites. So the little-mission-that-could will continue—this time, flying at a higher, polar orbit for about five years.



Astronaut Tim Peake on board the International Space Station captured this image of a CubeSat deployment on May 16, 2016. The bottom-most CubeSat is the NASA-funded MinXSS CubeSat, which observes soft X-rays from the sun—such X-rays can disturb the ionosphere and thereby hamper radio and GPS signals. (The second CubeSat is CADRE — short for CubeSat investigating Atmospheric Density Response to Extreme driving - built by the University of Michigan and funded by the National Science Foundation.) Credit: ESA/NASA

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.



Starting Sunday, January 1, for about a week, around 6:30 PM or 7:00 PM, you could look low in the south-west for comet 45P-Honda-Mrkos-Pajdusakova with binoculars. Astronomy magazine, January 2017, p. 42 has an article on the comet complete with a star chart of its path.

On Monday, January 2, the Moon occults both Neptune and Mars, but, unfortunately, each has set before the event happens (Neptune by only 9 minutes, Mars by 2 1/2 hours). Drat.

On Thursday, January 5, the Moon is at first quarter phase and sets at 1:10 AM (Friday).

On Monday, January 9, you can watch the Moon occult a magnitude 3.6 star. The star, Gamma Tauri, disappears on the dark limb at 2:14 AM and reappears on the bright limb at 2:33 AM. One of the programs I use lists it as a close double star, so you might see it disappear in 2 steps.

On Wednesday, January 11, at 5:16 PM, the full Moon rises, spoiling any chance of seeing faint fuzzies for the night.

On Thursday, January 12, about 6:30 PM, Venus and Neptune are less than 1/2 a degree apart. They are not the same diameter or brightness. Venus is magnitude -4.4 and 25 arc-seconds across. Neptune is magnitude +7.9 and 2 arc-seconds across. Notice that Venus is almost exactly half lit (what we would call first quarter phase).

On Sunday, January 15, about 6:30 AM, you can see Mercury below and left of Saturn low in the south-east, and Jupiter near Spica much higher in the South.

On Tuesday, January 17, drat, we have another near miss. At 10:07 PM the Moon covers the magnitude 2.7 double star, Gamma Virginis. At 11:01 PM the Moon uncovers the double star. At 11:23 PM the double star rises. At 11:24 PM the Moon rises. Close but no cigar. At least you can see the objects near each other.

On Thursday, January 19, the Moon is at last quarter phase and rises at 1:13 AM (Friday).

On the night of Wednesday, January 25, after midnight (Thursday), you can see Ganymede transit the disk of Jupiter. It will be in front of the planet from 12:54 AM to 2:58 AM. It will transit the very northern part of Jupiter.

On Friday, January 27, it is new Moon and you have all night to hunt for faint fuzzies.

On Saturday, January 28, for those of you who like to watch events with Jupiter's moons, you have the best chance of the month. (More events will be observable in the coming months.) Here is the schedule:

11:41 PM Jupiter rises.

03:33 AM (Sunday) Io's shadow falls on Jupiter.

04:42 AM Io moves in front of Jupiter.

05:43 AM Io's shadow leaves Jupiter.

06:51 AM Io moves from in front of Jupiter.

07:30 AM the Sun rises.

On Tuesday, January 31, about 7:00 PM that the Moon, Mars, and Venus are all near each other in the sky.

TELESCOPES FOR MEMBERS' USE

The club has 2 telescope systems that are available for temporary long-term use and possession by a club member with the understanding that the scopes are club property and the user is also willing to bring them to the club's public star parties and private events at schools, camps, etc. The two scopes are as follows:

8-inch Celestron Nexstar with alt-az GoTo mount, tripod, red dot finder, hand controller, diagonal, several eyepieces, color filters, Nexstar Users Guide, Celestron manual, DC power cord, level, Orion case, and lens cleaner. It can run on internal batteries but not for long. A 12-volt AC/DC power source would be recommended.



8-inch Meade LX200 Classic with alt-az GoTo mount, tripod, finder scope, diagonal and several eyepieces.



If any member is interested in using either of these scopes, please contact Pat Birck.

GUIDELINES FOR PAC EQUIPMENT STORAGE SHED USE

The PAC board has recently completed an inventory of astronomy systems and equipment belonging to the club. The club has installed a small storage shed at Pat Birck's home to hold some of the equipment. Three club members have keys to access the shed: Pat Birck, Doug Tilley and John Baesemann. If club members want to obtain club equipment for temporary use or store equipment in the shed, please contact one of the 3 key holders. The following rules for obtaining and storing equipment are applicable:



Items stored

- Only property belonging to the Prescott Astronomy Club.
- No items containing hazardous materials or that may be flammable.
- Only items of use to the PAC as determined by the Board – i.e. no junk.

Records

A ledger will be kept in the shed containing the following information:

- A description of each item stored, the date it was entered into storage, the identity of the person putting it into storage, and the person from whom the item was received.
- A record of each item withdrawn from storage, the date it was withdrawn and the identity of the person taking custody.
- A copy of the ledger shall be given upon request to the custodian of PAC records.

Use of an item for longer than “temporary” requires Board approval.

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



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>



BOARD OF DIRECTORS

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Secretary: Doug Tilley

Treasurer: Stephen Eubanks

At Large: Pat Bledsoe

At Large: Dick Lewis

At Large: Bill McDonald

At Large: John Baesemann



PAC COORDINATORS

Astronomical League Coordinator: Pat Birck

Facebook: Jeff Stillman & Pam Shivak

Highland Center Coordinator: David Viscio

Hospitality: Corinne Shaw & Dick Lewis

Magazine Subscriptions: Stephen Eubanks

METASIG: Marilyn Unruh

PAC Affiliate Partner w/ NAU Space Grant Program – Jerry & Corinne Shaw

PAC Store Sales: Dick Felgenhour

Property Records: Fred Arndt

Schools & Camps Outreach: Pat Birck

Third Thursday Coordinator: Corinne Shaw & Pat Birck

Membership: Stephen Eubanks

Newsletter: David Viscio

Refreshments: Janie Thompson

Publicity: Stephen Eubanks

Starry Nights Coordinator: Open

Webmaster: Russell Chappell



APOD DEC 20, 2016 - SHARPLESS 308: STAR BUBBLE
Image Credit & Copyright: Anis Abdul



Explanation: Blown by fast winds from a hot, massive star, this cosmic bubble is huge. Cataloged as Sharpless 2-308 it lies some 5,200 light-years away toward the constellation of the Big Dog (Canis Major) and covers slightly more of the sky than a full moon. That corresponds to a diameter of 60 light-years at its estimated distance. The massive star that created the bubble, a Wolf-Rayet star, is the bright one near the center of the nebula. Wolf-Rayet stars have over 20 times the mass of the Sun and are thought to be in a brief, pre-supernova phase of massive star evolution. Fast winds from this Wolf-Rayet star create the bubble-shaped nebula as they sweep up slower moving material from an earlier phase of evolution. The windblown nebula has an age of about 70,000 years. Relatively faint emission captured in the expansive image is dominated by the glow of ionized oxygen atoms mapped to a blue hue.