



THE OBSERVER

East Valley Astronomy Club



[The Arms of M106 - APOD February 6, 2013](#)

[Image Data -Hubble Legacy Archive.](#)

[Robert Gendler, Jay Gabany, Processing - Robert Gendler](#)

EVAC This Month

by Claude Haynes

January was pretty cloudy and rainy, but we did manage a milestone at the Observatory. We welcomed our 100,000th viewer, which is pretty remarkable after just over 10 years of operation. Susan Arn and her sons received the honor with a plaque and calendar. We count viewers as people come to the eyepiece, so we probably have had fewer people as many stay and view several objects. This count includes school solar events, private sessions for scouts and individuals and special events like eclipses. We also upgraded the GRCO eyepiece collection with some 70 degree and 68 degree

field of view eyepieces. Orion was having a sale, and we took advantage to get a set to replace some of our older models. The GRCO is a popular spot, and a great addition to the community. Thanks to all of our volunteers, and the support of EVAC, the Gilbert Rotary and Town of Gilbert.

In January we also remembered Gene Lucas. He was a founding member of EVAC, and a longtime member of the Saguaro Astronomy Club. Gene passed away in December and he was interred at the Veteran's Memorial Cemetery. Gene was a very knowledgeable

UPCOMING EVENTS:

- Public Party - February 10*
- EVAC Monthly Meeting - February 17*
- Local Star Party - February 18*
- Deep Sky Star Party - February 25*
- Check out all of the upcoming club events in the Calendars on page 12.*

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EVAC This Month

Continued from page 1

observer, and a great font of information and opinion. He will be greatly missed.

Our speaker for February is Craig Hardgrove from ASU. He is manager of a cube sat launch for a lunar satellite

looking for water on the moon's poles. A great project, and another win for space science in Arizona.

Keep looking up (but bundle up)

If It's Clear...

by Fulton Wright, Jr. Prescott Astronomy Club

February 2017

Celestial events (from Sky & Telescope magazine, Astronomy magazine, and anywhere else I can find information) customized for Prescott, Arizona. All times are Mountain Standard Time.

During this month, Venus goes from 39% illuminated and 31 arc-seconds in diameter to 17% illuminated and 47 arc-seconds in diameter. These two changes leave the brightness unchanged at magnitude -4.6.

For the comet hunters among you, check out the article in Astronomy Magazine, February 2017, p.42. It's not unaided eye, but binoculars should be adequate.

On Wednesday, February 1, at 6:41 AM, Europa moves in front of Jupiter. 9 minutes later Europa's shadow (which has been on Jupiter since 4:22 AM) leaves the planet. Later that same night you can watch an entire transit of Ganymede. Here is the schedule:

11:26 PM Jupiter rises.

11:56 PM Ganymede's shadow falls on Jupiter.

02:26 AM (Thursday) Ganymede's shadow leaves Jupiter.

04:42 AM Ganymede moves in front of Jupiter.

06:42 AM Ganymede's transit ends.

07:01 AM Civil twilight (a few stars still visible) begins.

(You will have another chance to observe a shadow transit of Ganymede [but not the transit of the satellite itself] on February 9 between 3:55 AM and 6:22 AM.)

On Friday, February 3, the Moon will be at first quarter and set at 1:12 AM (Saturday).

On Saturday, February 4, after about 7:00 PM, you can see the northern part of the Moon at its best. Libration

tips that part toward us. In particular, now is a good time to try to find those illusive craterlets in the floor of the crater Plato.

On Friday, February 10, the Moon is full and rises at 6:08 PM (1 minute before sunset) spoiling any chance of seeing faint fuzzies for the night. If the Moon looks a bit strange on rising, it is because it is in a deep penumbral (almost partial) eclipse at the time of its rising. The last vestige of eclipse will be visible around 7:15 PM and the last (unobservable, 4th contact with the penumbra) event will happen at 7:55 PM. Tonight will be a good time to observe the albedo (brightness) features of the full Moon with no shadows showing the topography of craters.

On Saturday, February 18, about 6:00 AM, you can see the southern part of the Moon at its best. Libration tips that part of the Moon toward us. In particular now is a good time to look at the giant crater, Clavius, with its string of decreasing size craters inside it. The Moon is at last quarter phase and rises at 12:50 AM.

On Saturday, February 25, the Moon is new and you have all night to hunt for faint fuzzies.

On Sunday, February 26, about 7:30 PM, Mars (magnitude 1) and Uranus (magnitude 6) are 35 arc-minutes apart.

The Glorious Winter Hexagon

One of the most beautiful things you can find in the night sky is winter's gathering of bright constellations. They are currently on the meridian and staring you in the face. Meet the "Winter Hexagon" and the bright constellations whose brightest stars anchor the six-sided polygon. Let's start with Capella, the brightest star in Auriga, the Charioteer. Going counterclockwise, cruise on to Castor in Gemini, the Twins. Now we cheat just a little by pivoting over to Pollux and consider the two stars one stop since they're less than five degrees apart. Moving south we push on to Procyon in Canis Minor. Then we set sail southwest to Sirius, the sky's brightest star (magnitude -1.4) in Canis Major. Sweeping northwest, we rise to Rigel in Orion, the Hunter. Pressing on to the northwest, we accelerate to Aldebaran in Taurus the Bull. To complete the Hexagon, we cast our final line to Capella.

In no other part of the night sky in the northern hemisphere can we see so many bright constellations in such a small area. Not even the summer night sky can compete with it. The summer sky may have a brighter Milky Way but the winter sky simply has a disproportionately larger number of brighter stars. Of the brightest 23 stars seen from Earth (excluding the Sun), 9 can be found in the Hexagon versus 4 in the summer sky. The typical clearer winter atmospheric transparency also helps boost the winter stars' appearance somewhat, compared to muggy, humid summer skies.

There is no doubt that the constellation of Orion is not only the king of constellations but the centerpiece of the winter sky. Perhaps the most distinctive thing about Orion are the three 2nd magnitude stars comprising the Hunter's Belt. Nowhere else in the sky will you find anything like it. Often amateur astronomers are asked, "What are those three stars I see at night?" And of course, we know exactly what they're talking about. Alnilak, Alnilam and Mintaka form an almost straight line two degrees long. The celestial equator runs just 1/3 of a degree above Mintaka making that star a good marker for the boundary between the two stellar hemispheres. Orion has two magnificent bright stars. Denoting the Hunter's right shoulder in the upper left portion of the constellation is Betelgeuse, a red supergiant star shining at magnitude 0.50 and looking more orange than red to

human eyes. Kitty-corner from Betelgeuse is blazing white Rigel at magnitude 0.12, the brightest star in Orion. Rigel, 775 light years away, is one of the most luminous stars in the Galaxy (estimated to be at least 60,000 times as luminous as the Sun). A spectral class B8 supergiant with an absolute magnitude of -7.1, Rigel would appear as a magnitude -10 star if it were as close to us as Sirius' 8.6 light year distance.

One could spend all night observing deep sky objects and double stars in Orion. Certainly, the unrivaled target in the constellation is M42, the Orion Nebula, the best example of an emission nebula in the northern sky. Its nebulous nature is evident even with the naked eye as a fuzzy looking star in the middle of Orion's Sword, the three dim stars below the Belt. It looks great even in the smallest of telescopes. Open clusters and nebulae can be found above and below M42. M78, a reflection nebula, would be more popular if not for the spectacular M42 to its west. NGC 2169, the "37" cluster in Orion's "Elbow" is unique in looking like that number, albeit backwards in telescopes with reversed images. If double stars make your heart flutter, try Sigma Orionis just below Alnilak. It's a four- star system that reminds one of Jupiter and 3 of its moons. Iota Orionis below M42 is a nice triple star. Alnilak and Mintaka sport companions also. Rigel is good practice for splitting Sirius and its elusive "Pup" (mags -1.4, 8.5, Sep. 10.78"). Though splitting Rigel can be tough due to the primary being so bright, it's a piece of cake compared to Sirius. If you can't split Rigel, Sirius will be hopeless. Rigel's specs are: mag 0.3, 6.8, Sep. 9.52". The Pup season is upon us, so now is the time to take the challenge of splitting Sirius, something that's probably on every stargazer's bucket list. The writer finally accomplished the feat on March 30, 2016 using an 11" SCT at 280x with the help of a hexagonal mask (no relation to the title of this article). Tip – try going after it at dusk before it gets too dark.

This winter dress warmly, step outside, and enjoy one of the greatest shows off Earth – the Winter Hexagon.

EVAC Meeting Minutes

by Cynthia Jones (January 20, 2017)

Location: Southeast Regional Library

Attendance: 68 members and guests

- I. The meeting was called to order by President Don Wrigley at 7:30 p.m.
- II. Visitors were welcomed and asked to stand and introduce themselves.
- III. New officers were introduced – updated list is on the EVAC website.
- IV. Lynn Young, Public Events Coordinator, covered upcoming school events and asked for volunteers to help. No telescope is needed. Help with managing traffic would be useful. If setting up a scope, just find your favorite object and know a few facts – extensive knowledge is not needed. Contact Lynn to volunteer events@evaonline.org.
- V. Claude Haynes provided an update on GRCO (Gilbert Rotary Centennial Observatory) activities:
 - a. There was a solar event – with no sun
 - b. GRCO reached 100,000 viewers
 - c. New things: computer problems mean a new computer is needed, new eyepieces have been purchased, several Deep Space calendars, Observer Handbooks and a telescope are available for purchase
 - d. EVAC is a hub for the SciTech festival - see <http://azscitech.org> for upcoming events and activities
 - e. Two new telescopes, and a pair of binoculars were donated to the library.
 - f. Volunteers are needed at the Observatory. Contact Claude Haynes vp@evaonline.org.
- VI. Treasurer's Report – see Page 6.
- VII. The Berkeley Open Clusters and, Palomar

- Globular Clusters Observing Awards were presented to David Douglas by the President.
- VIII. In Memoriam remembrance for Gene Lucas was acknowledged. Gene was a co-founder of EVAC and will be missed.
 - IX. Member Presentations
 - a. Bruce Barron – presentation on Amateur Spectroscopy titled Lessons Learned – Getting Started
 - b. Tom Polakis – shared aerial photos taken at Hovatter Airstrip (see page 6), CTA 102 Quasar (Dec 2016 & Jan 2017) and photos of the international space station crossing the surface of the moon and, an image of the moon, Venus, Mercury – Jan 2017. (see images of airstrip and space station credited to Tom in this issue of the newsletter)
 - c. Gordon Rosner – provided a visual illustrating the size of the sun in relative to the ear (see image credited to Gordon in this issue of the newsletter)
 - X. Guest Speaker presentation: The Physics of the Space Race by Dr. Steven Desch, School of Earth & Space Exploration, Arizona State University was the last and featured item for the meeting (see presentation summary/ highlights on Page 5).

EVAC January Guest Speaker Highlights

by Cynthia Jones



The Physics of the Space Race

Dr. Steven Desch, School of Earth & Space Exploration, Arizona State University

The critical importance of physics in shaping the space race was the focus of this presentation. Dr. Desch set the foundation by exploring Delta-v (Δv) which is produced by reaction engines, such as rocket engines, and is proportional to the thrust per unit mass, and burn time, and is used to determine the mass of propellant required for the given maneuver through the Tsiolkovsky rocket equation.

Dr. Desch provided engaging graphics showing orbital velocities around the earth and moon to explain how travel from earth to the moon and back are achieved. Explanations of LEO (lower earth orbit) and LLO (low lunar orbit) provided a technical look at how spacecraft need to escape gravity and negotiate orbit when leaving earth, entering moon orbit as well as what's involved in a return trip.

Goddard Rocket Nozzles were mentioned as an important development allowing rockets to gain the necessary velocity. Dr. Desch emphasized that it's all about the laws of physics for a successful launch. He suggested that the future of space travel is Ion Propulsion.

In concluding this presentation Dr. Desch stated that one of the key issues related to a Mars landing is choosing either fast expensive arrival or economy with slower arrival. Faster travel requires significantly more fuel, with the attendant complications, but it's less time in space for astronauts. Economic travel, which requires less fuel, will take much longer and brings the complications of long periods of time in space and away from earth for the mission crews.

While there are many existing target dates for a landing time on Mars – Dr. Desch feels that a truly realistic date is July 20, 2044.

Summary below taken from ASU Faculty Bio Information

Steve Desch is a theoretical astrophysicist who models the formation of solar systems and planetary processes. His modeling draws on his expertise in magnetohydrodynamics, radiative transfer, dust microphysics, meteoritics, and other astrophysics, as well as numerical computing. His research interests include: chondrule formation; origin of the Solar System's short-lived radionuclides; star formation and protoplanetary disk evolution; astromineralogy; Martian dust devils; and cryovolcanism on Kuiper Belt Objects. Steve Desch is the 2003 recipient of the Meteoritical Society's Alfred O. Nier Prize.

EVAC January 2017 Meeting by Cynthia Jones

Shared by members at Jan 20, 2017 EVAC Meeting



Hovatter Airstrip drone
photos taken by Tom Polakis



Treasurer's Report

2016	YEAR TO DATE		Tuesday, November 29, 2016
	EVAC	GRCO	
INITIAL \$\$	5485	5457	
CATEGORY			DESCRIPTION
Income	1788	4051	sales, donations
Equipment	0	-1979	equipment needed
Services	-83	-152	expenses for services
Insurance	-202	-203	Event coverage
Web Support	-342	0	GoDaddy and Adobe
Memberships	2832	0	member dues
Astro Events	121	0	All Arizona Star Party ..etc
Organizations	-610	-250	Dark Sky, Astro League, ...
Calendar/R CAS	-245	0	Calendars and R CAS books
Meetings	-834	0	mainly refreshments
Speakers	-700	0	speakers at monthly meetings
Pin/Badges	-332	0	awards, badges and pins
MIS C	-82	0	other expenses
NET \$\$	1312	1467	
END \$\$	6797	6924	
Account Total	13720		

FIRST QUARTER MOON ON FEBRUARY 3 AT 23:19

***FULL MOON ON FEBRUARY 10 AT 19:33**

LAST QUARTER MOON ON FEBRUARY 18 AT 14:33

NEW MOON ON FEBRUARY 26 AT 09:58

Find Out What's Happening – Join EVAC-Announce List

If you would like to receive email announcements about EVAC meetings and activities please join the EVAC–Announce mailing list. Click on the link below to subscribe. Enter your full email address in the box titled User Options and press OK. You will receive a confirmation email. Your privacy is respected by EVAC and we will never sell your email address, or use it for non-club relevant solicitations. This mailing list is designed for communication from EVAC, and does not enable users to respond to the message. If you wish to contact club officers, please use the list on the Contact-Us tab. To subscribe to the EVAC – Announce mail group click: <http://www.freelists.org/list/evac-announce>

To unsubscribe use the same link, enter your email address and select Unsubscribe from the “Choose An Action” list.

Looking for that perfect weekend activity?

Why not resolve to getting involved?

Contact Claude Haynes to join the staff at GRCO

Email: grco@evaconline.org



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Upcoming Meetings

February 17

March 17

April 21

May 19

June 16

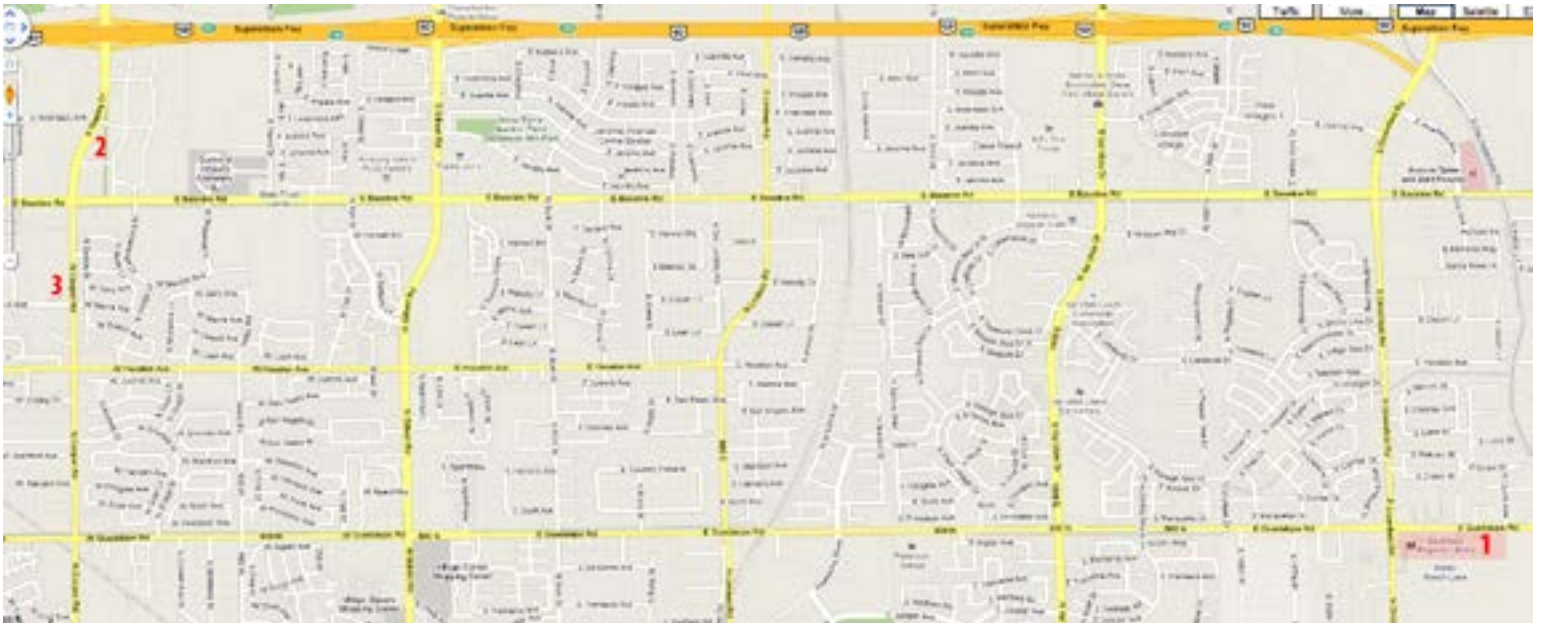
July 21

August 18

The monthly general meeting is your chance to find out what other club members are up to, learn about upcoming club events and listen to presentations by professional and well-known amateur astronomers.

Our meetings are held on the third Friday of each month at the Southeast Regional Library in Gilbert. The library is located at 775 N. Greenfield Road; on the southeast corner of Greenfield and Guadalupe Roads. Meetings begin at 7:30 pm.

Visitors are always welcome!



1 Southeast Regional Library
775 N. Greenfield Road
Gilbert, Az. 85234



FEBRUARY 2017

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28				

Feb 1 - Payne Jr High

Feb 2 - Carlson Elementary School

Feb 7 - Concordia Charter School

Feb 8 - C.O. Greenfield

Feb 9 - Navarette Elementary School

Feb 10 - Public Star Party

Feb 15 - Coronado Elementary School

Feb 16 - Kyrene De La Mariposa Elementary

Feb 17 - EVAC Monthly Meeting

Feb 18 - Local Star Party

Feb 21 - San Marcos Elementary

Feb 25 - Deep Sky Party

Feb 28 - Carson Jr High School

MARCH 2017

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Mar 10 - Public Star Party

Mar 17 - EVAC Monthly Meeting

Mar 18 - Local Star Party

Mar 24-25 - Messier Marathon

East Valley Astronomy Club -- 2017 Membership Form

Please complete this form and return it to the club Treasurer at the next meeting or mail it to EVAC, PO Box 2202, Mesa, Az, 85214-2202. Please include a check or money order made payable to EVAC for the appropriate amount.

IMPORTANT: All memberships expire on December 31 of each year.

Select one of the following:		
<input type="checkbox"/> New Member	<input type="checkbox"/> Renewal	<input type="checkbox"/> Change of Address
New Member Dues (dues are prorated, select according to the month you are joining the club):		
<input type="checkbox"/> \$30.00 Individual January through March	<input type="checkbox"/> \$22.50 Individual April through June	
<input type="checkbox"/> \$35.00 Family January through March	<input type="checkbox"/> \$26.25 Family April through June	
<input type="checkbox"/> \$15.00 Individual July through September	<input type="checkbox"/> \$37.50 Individual October through December	
<input type="checkbox"/> \$17.50 Family July through September	<input type="checkbox"/> \$43.75 Family October through December	
<i>Includes dues for the following year</i>		

Renewal (current members only):
<input type="checkbox"/> \$30.00 Individual <input type="checkbox"/> \$35.00 Family

Name Badges:
<input type="checkbox"/> \$10.00 Each (including postage) Quantity: _____
Name to imprint: _____

Total amount enclosed:

Please make check or money order payable to EVAC

Payment was remitted separately using PayPal Payment was remitted separately using my financial institution's online bill payment feature

Name: <input style="width: 95%;" type="text"/>	Phone: <input style="width: 95%;" type="text"/>
Address: <input style="width: 95%;" type="text"/>	Email: <input style="width: 95%;" type="text"/>
City, State, Zip: <input style="width: 95%;" type="text"/>	<input type="checkbox"/> Publish email address on website
	URL: <input style="width: 95%;" type="text"/>

The Observer is the official publication of the East Valley Astronomy Club. It is published monthly and made available electronically as an Adobe PDF document the first week of the month.

<input type="checkbox"/> General Observing <input type="checkbox"/> Cosmology <input type="checkbox"/> Lunar Observing <input type="checkbox"/> Telescope Making <input type="checkbox"/> Planetary Observing <input type="checkbox"/> Astrophotography <input type="checkbox"/> Deep Sky Observing <input type="checkbox"/> Other	
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Would you be interested in attending a beginner's workshop? Yes No

How did you discover East Valley Astronomy Club?

PO Box 2202
Mesa, AZ 85214-2202
www.evaconline.org

All members are required to have a liability release form (waiver) on file. Please complete one and forward to the Treasurer with your membership application or renewal.

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East Valley Astronomy Club
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