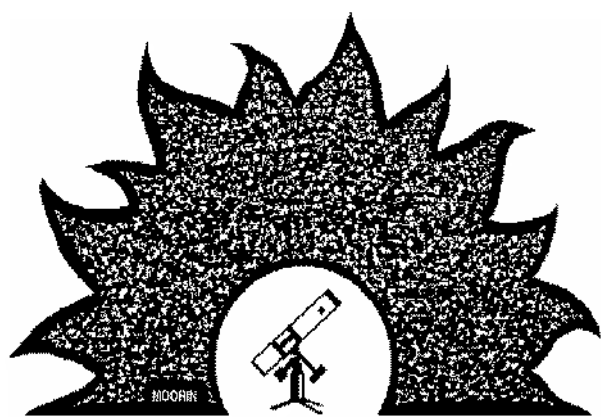




PAStimes

Phoenix Astronomical Society

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Summer 2015

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PHOENIX ASTRONOMICAL SOCIETY — ESTABLISHED 1948

Senzer, Robert (Bob)

This Obit ran in the Az Republic on Wednesday May 13, 2015, placed there through Sam Insana for PAS.

Bob Senzer passed away April 28, 2015, at his home in Phoenix. He is survived by his brother Mike and several cousins. Bob was born in Ancon in the Panama Canal Zone on August 9, 1957, and grew up in Gamboa. He earned his BS Degree in Mathematics from the University of Pennsylvania and his Masters Degree in Computer Information Sciences from Dartmouth. Bob worked for the Bureau of Economic Analysis at the US Department of Commerce in Washington DC and also worked at AT&T. He later taught mathematics at Paradise Valley and Rio Salado Community Colleges; he also taught at Ombudsman Charter High School in Peoria. He liked watching baseball, studying politics and discussing economics. Since he was a child Bob loved astronomy and the

space program. He was a member of the Phoenix Astronomical Society for several years.

Bob attended lectures, helped out at star parties and participated in the socials. All those who knew him will miss this kind and decent man. There will be a celebration of life for Bob hosted by the Phoenix Astronomical Society on May 14, 2015, starting at 7 pm at Paradise Valley Community College in room LS-205. Close friends and relatives are invited and should RSVP at events@pasaz.org. In lieu of flowers, donations may be made in Bob Senzer's name directly to: The National Math and Science Initiative @ nms.org. The donation link is near the bottom of the Home Page. ***



Robert (Bob) Senzer:
Aug 9, 1957 - Apr 28, 2015

See Celebration of Life on page 15

2015/2016 New PAS Officers

By Terri, Event Coordinator

New officers and directors take their positions at the September 2015 meeting. At that time, past officers will turn over their position badges to the new group - President: Sam Insana, Vice President: Howard Moneta, Treasurer: Eric Steinberg, Event Coordinator: Terri Finch, Editor: Don Boyd, Member at Large: Jenny Weitz (1 year term), Member at Large: Alex Vrenios (2 year term) and Meeting Host: Rodney Fong. Congratulations to our new PAS Officers!

Past Officers are asked to attend this meeting. We would like to thank Past Treasurer Mike Marron for all his years of service to the club managing the finances, and Past President Bruce Wurst for his many

guest speakers, running of the meetings and providing snacks at the meetings for everyone to enjoy, including the bottled water. We'd also like to thank Dave Hellman, Member at Large, and of course, we thank Terri Finch, who held the position of President and Vice President for many years, this year as Vice President. Come congratulate the New Officers and come thank the Past Officers at this meeting.

In their own words...

**Sam Is
President:**

**STARRY EYED
THOUGHTS
FROM PRESI-
DENT ELECT
SAM**

In the past:

- As a child always wanted to know what was out there
- With the neighborhood kids would sit outside on the lawn at night and "study the stars"

See "New PAS Officers" on page 5

Phoenix Astronomical Society Contact Info

<u>President / Librarian</u>	Bruce Wurst	602-971-3555	President@pasaz.org
<u>Vice President / Events Coordinator</u>	Terri Finch	602-561-5398	VicePresident@pasaz.org
<u>Treasurer</u>	Mike Marron	480-488-3031	Treasurer@pasaz.org
<u>Newsletter Editor</u>	Don K. Boyd	480-963-7189	Editor@pasaz.org
<u>PAS Host</u>	Rodney Fong	602-432-4318	
<u>Member-At-Large</u>	Alfred P. Fantegrossi	603-548-8353	alfantegrossi@comcast.net
<u>Member-At-Large</u>	Jenny Weitz	602-787-6818	jennifer.weitz@paradisevalley.edu
<u>Webmaster</u>	Chris Johnson		Webmaster@pasaz.org

July - August Upcoming Events

By Terri, Event Coordinator, RSVP to Events@pasaz.org

Since we don't have summer PAS meetings or a monthly summer newsletter, here is an updated schedule of events for summer 2015. More events may be added to the list, so check the website for updates at

<http://www.pasaz.org/forums/calendar.php>

July 3: Fireworks Party in Carefree - Public is invited, but RSVP is Required with Terri Events@pasaz.org. Potluck is at 5:30. For the potluck, bring a main dish and a drink (no alcohol) to share. Fireworks don't happen until 9pm. There will be socializing, eating, movies, and games until fireworks and after fireworks. Bring a movie to share on the big screen TV, or a game you want to play with a bunch of people who love games. For the Fireworks, please bring cold refreshments, such as ice cream or popsicles to share. Everyone welcome! No star party, as the Moon is too full. A donation to Mike is requested for hosting this party.

July 4: Free Planetarium Show for PAS Members Only, in Carefree. Times

Vary and RSVP is required with Ron to attend.

July 5: Free Planetarium Show for PAS Members Only, in Carefree. Times Vary and RSVP is required with Ron to attend.

July 11: PAS Members Only - Special Meeting. Includes Meeting of the Minds, potluck and Members only Star Party. RSVP required with Terri. A donation is requested for the host of this party.

July 14: New Horizons craft arrives at Pluto.

July 18: Public Star Party in Carefree. RSVP required with Terri Events@pasaz.org. For the potluck at 5:30, bring a main dish and a drink (no alcohol) to share. Everyone Welcome but only with RSVP. This is also a Birthday Party for Don Boyd, PAS Editor. Come celebrate with us! A donation to Mike is requested for hosting this party.

July 26: Free Telescope Workshop at Bookmans, 19th Ave and Northern in Phoenix - 3:30pm to 5:30pm. RSVP is

required with Terri. When you RSVP, email the make and model of the telescope you need assistance with. We also assist with suggestions and advice on what telescope to purchase to match your needs. We have no telescopes for sale at this event.

July 28: Delta Aquarids Meteor Shower peak - Meteors can be seen from 5 days prior, to 5 days after this date from your backyard.

■ ■ ■ ■ ■ ■ ■ ■ ■ ■

Aug 12: Perseids Meteor Shower peak - Meteors can be seen from 5 days prior, to 5 days after this date.

Aug 30: Free Telescope Workshop at Bookmans, 19th Ave and Northern in Phoenix - 3:30pm to 5:30pm. RSVP is required with Terri. When you RSVP, email the make and model of the telescope you need assistance with. We also assist with suggestions and advice on what telescope to purchase to match your needs. We have no telescopes for sale at this event. ***

Awards Ceremony Apr 9

By Terri, Event Coordinator

The awards ceremony evening started at 6:30 with Bob Senzer, Rodney Fong and Howard Moneta assisting in the setup. Attending this event were: Bette, Ed and Bruce Wurst, Darlene Ahlefeld, Diane and Alex Vrenios, Don Boyd, Eric Steinberg and Ora Kurland, Howard Moneta, Jake, Jane and Malcott Denison, Kevin Witts, Mike Marron, Bob Ewing, Bob Senzer, Rodney Fong, Sam Insana and William and Terri Finch. That's 21 in attendance. The PAS Pizza party segment of the evening began around 7, with most of the PAS Members attendance. 10 pizzas were ordered based on people's preferences

(thanks to those who put in an order). We asked that everyone stick to what they ordered at first, but there was plenty left so later it was ok to just take what looked good. This year, PAS paid for the Sardella's pizza which thankfully was ready right on time. A number of other snacks were also brought by various members. The Snack Fund, which was meant to help pay for the pizza, received \$9 which will go into the PAS bank account.

While we ate, we watched a Year in Review slideshow prepared by me of the best photos I have from 2014. We had some

technical difficulties in getting the slide-show to play, but with assistance from William, Eric, Jake, and Kevin, we got it going and watched it 2 times through. I also showed some other photos, without captions, in no particular order for everyone to enjoy.

Around 7:35pm, we surprised Howard with a birthday cake! Howard's birthday is April 10, and since we were all together, I thought it would be nice to celebrate with him.

After eating, we began the awards ceremony segment with President Bruce wel-

Awards Ceremony Apr 9

Continued from Page 2

coming everyone to the event. There were 39 awards given in these categories: Top Performer, Messier Marathon, Halloween Costume Contest and the Night Sky Network (NSN) Awards. Some awards included cash or a pin, and most of the awardees were given the opportunity to pick a prize from the prize table. The list of prizes donated to this event is found in the forums at this link:

<http://www.pasaz.org/forums/showthread.php?p=2506#post2506>

You can see the detailed results for the prizes in the table Awards Ceremony Agenda on page 4.

Terri started by explaining the first four "Top Performer" awards, after which Bruce took the floor to give them out: Cash prizes, a Certificate, a prize from the prize table and a specially-made pin were awarded for "Most Votes Overall." That one went to Terri Finch. "Leader of the Club" was also awarded to Terri, while "Most Active" went to Mike Marron, and "Unsung Hero" was awarded to Rodney Fong. Terri then took the floor again for the awards for the PAS Messier Marathon which took place

on Mar 21 at Mike Marron's home in Care-free. First and second places went to Kevin Witts and Howard Moneta who received a certificate and a prize from the prize table. Third place to sixth place recipients got certificates right away and prizes from the table after all the other awardees had chosen. Congratulations!

Next was the Halloween Costume Contest Award, won by Sam Insana for his costume of "Alien Indigestion." You can read all about this fun event in the January 2015 PAStimes Newsletter at this link: <http://www.pasaz.org/PAStimes/2014/2015/2015-01.pdf>.

The last set of awards went to the participants in public outreach. The Night Sky Network provides a printable award from their website for those who have attended 3+ outreach events in a year. Terri used that to create the 28 awards needed and Bruce printed them. After Terri explained the awards, Bruce presented them to this fine group of PAS Members. The awardees received an NSN Pin (3 of the pins were donated to PAS and the club purchased the rest), the NSN Certificate and a prize from

the prize table. 1st, 2nd and 3rd-place-tie, winners, got a cash award for their efforts and support to PAS. The charts used to track all the events will be linked to the forum thread about this event. I wish to thank everyone who attended and made this event a success, with particular thanks to everyone that brought snacks, to Rodney and Jane who helped with the cake, and to the guys that helped set up at the start. It was a fun, exhausting, funny, 'awarding' event!

I appreciate everyone who belongs to the PAS family, whether you got an award this year or not. Let's do more in 2015! Thank you all!

To find out what you need to do to get an award next year, please see the 2016 PAS Awards Ceremony plans in the private forums at this link: <http://www.pasaz.org/forums/showthread.php?p=2509#post2509>

Howard writes: Thanks for the cake! it was really nice. Thank you Terri!

Bob Ewing writes: Thanks for dinner. Fun meeting!!

Meeting of the Minds Apr 9

By Terri, Event Coordinator

There was a brief Meeting of the Minds held on April 9th after the PAS Awards Ceremony. These topics came only a day prior to the Awards Ceremony, so some PAS Members didn't get to attend to talk about the topics. The Meeting of the Minds (MOM's) started about 9pm and went about twenty minutes. Here are the topics and the results of this discussion. More details about these topics is in the Private Forums at this link: <http://www.pasaz.org/forums/showthread.php?p=2505#post2505>

Bruce proposed the idea of selling the Club Telescopes. They will be made available first to PAS Members and then to the general public probably through Ebay or Craig's List. The scopes in question, are: a) 8" GPS SCT with \$600 Jani-case included, b) 10" Meade LS3 or LX5 with tracking, and c) 12.5" Cave Newtonian with electronic tracking motor. Plus there are about 5 boxes of telescope parts. The vote on whether to sell was affirmative, so Bruce will prepare a complete list of the scopes the club owns and will post that out to the

club members. All the monies collected will go to the PAS treasury. Eyepieces that PAS owns will be made available for lending to Members. Bruce will provide a list of those on line in the Members Forums.

The next topic was introduced by Don. It is time to renew the contract with CTCA which expires at the end of May. Last year PAS voted to raise the rates. The question the Members discussed was phrased "Should we keep the amount we are charging CTCA for another year, since we just increased the amount last year?" The vote was to retain the current amount for one more year.

The third topic was about the Horkheimer Library Telescope Donation Competition. Mike had forwarded some info to me about this option that PAS could compete to get a telescope donated to PAS that we would then modify and donate to a Library of our choice. After much discussion and research to find out what this would involve, the members voted to decline doing this competition for various reasons.

That concluded our discussion for the Meeting of the Minds. The party / meeting came to a close about 9:30pm. Many thanks to Rodney, Bob Senzer, William and a few other Members who took the time to help me put the room back the way it was when we walked in that night. It was a great evening!



*Bruce was seen at the PAS Music Jam of Dec 21 2013 playing the banjo. Are you practicing up for the next PAS Music Jam in January or February?
Photo by Terri Finch.*

Awards Ceremony Agenda

Place	Top Performers	PAS Member	Votes	Pin	Certificate
1 st	Most Votes Overall	Terri Finch	16	✓	
1 st	Leader of the Club	Terri Finch	9	✓	
1 st	Most Active	Mike Marron	8	✓	
1 st	Unsung Hero	Rodney Fong	9	✓	
Place	Category	PAS Member	# Objects	Pin	Certificate
1 st	Messier Marathon	Kevin Witts	107		✓
2 nd	Messier Marathon	Howard Moneta	104		✓
3 rd	Messier Marathon	Eric Steinberg	54		✓
4 th	Messier Marathon	Don Boyd	39		✓
5 th	Messier Marathon	Sam Insana	14		✓
6 th	Messier Marathon	Pete Turner	10		✓
Place	Category	PAS Member		Pin	Certificate
1 st	Halloween Costume	Sam Insana			✓
Place	Category	PAS Member	# Events	Pin	Certificate
1 st	Public Outreach	Terri Finch	81	✓	✓
2 nd	Public Outreach	Mike Marron	66	✓	✓
3 rd	Public Outreach	William Finch	55	✓	✓
3 rd	Public Outreach	Don Boyd	55	✓	✓
	Public Outreach	Rodney Fong	43	✓	✓
	Public Outreach	Howard Moneta	40	✓	✓
	Public Outreach	Kevin Witts	38	✓	✓
	Public Outreach	Sam Insana	30	✓	✓
	Public Outreach	Eric Steinberg	28	✓	✓
	Public Outreach	Bob Senzer	27	✓	✓
	Public Outreach	Alex Vrenios	19	✓	✓
	Public Outreach	Leah Sapir	17	✓	✓
	Public Outreach	Earl DeLong	17	✓	✓
	Public Outreach	Bruce Wurst	17	✓	✓
	Public Outreach	Rick Cunningham	13	✓	✓
	Public Outreach	Terry Dancer	12	✓	✓
	Public Outreach	Paul Facuna	7	✓	✓
	Public Outreach	Ora Kurland	7	✓	✓
	Public Outreach	Jenny Weitz	7	✓	✓
	Public Outreach	Frank Insana	7	✓	✓
	Public Outreach	Alfred Fantegrossi	7	✓	✓
	Public Outreach	Roger Anzini	6	✓	✓
	Public Outreach	Ofelia Waters	6	✓	✓
	Public Outreach	Bob Ewing	6	✓	✓
	Public Outreach	Kevin Harcey	5	✓	✓
	Public Outreach	Pete Turner	4	✓	✓
	Public Outreach	Matt Kohl	4	✓	✓
	Public Outreach	Joe Collins	3	✓	✓

Continued from page 1

2015/2016 New PAS Officers

- Watched “Space Patrol”, “Flash Gordon”, “Buck Rogers”, “Forbidden Planet”, “Invaders from Mars”, “War of the Worlds”
- Read “Elevator to the Moon” (first book from my 1st grade library), “Martian Chronicles”, Newspaper articles on “Sputnik and then beginnings of NASA”
- In middle school got my first telescope (60 power tasco) only good for the moon, but had it out many nights looking for more.
- Elected President of Future Scientists and Engineers Club at West High School and planned our field trip to Lowell Observatory and Meteor Crater
- Went to Cal Tech, took an Astronomical Engineering course and applied to be an astronaut.
- Washed out of Astronaut training because of a hole in my retina but was hired by NASA to work for one year in the Planetary Quarantine Unit studying bacteria we were putting on the moon
- Bought my 8 inch Newtonian reflector on German Equatorial mount with clock drive after 10 years of practicing law, in 1985.
- First object I saw was Saturn at 300 power and I couldn’t sleep all night thinking of how I saw an object almost 1 billion miles away and it was so beautiful!
- Joined PAS early 1986 because I saw Pete Manley (PAS member) on channel 8 show discussing Halley’s comet.
- Photographed Halley’s comet through my telescope using 35 mm camera film.
- Met Clyde Tombaugh in 1988 with my wife and 2 month old son at a PAS meeting.
- Have been a member of PAS 29 years, active at star parties, socials, lectures, weather analysis, etc.

Going Forward:

- As President of PAS, I want us to

organize Field Trips to observatories and a club trip to the Total Solar eclipse in 2017 (Alex is doing a great job starting the research into this).

- We can do scientific astronomical research using our telescopes (spectroscopy, variable star analysis, study of occultations) or perhaps build a small radio telescope. Our club has the talented people, the equipment and the love of astronomy.
- PAS members should list the top 10 - 50 objects that look great in their telescopes in the Valley, so we can let others know what can be really seen under Phoenix skies in a 4 inch, 8 inch, 12 inch, 16 inch or even 22 inch, whether Newtonians, Dobbs, Schmidt Cassegrains or something else.
- PAS members should come up with a list of 5 - 10 of our favorite deep sky viewing sites like Antennas, Cow Track Ranch, Cherry Road, etc. We should calculate the Bortle numbers, location, time to drive, safety, facilities and typical weather, so we can let others know when they ask.
- PAS needs to update our Website. People of PAS shows 14 members, 7 of which are no longer active or alive. We currently have over a dozen very active members who should be on the list with their photographs and their story
- Although Sky and Telescope has a book on 99 Binocular highlights (most of which are faint smudges), we should come up with a list of about a dozen that look good enough to get binocular owners excited about astronomy.
- The Valley is over 2000 square miles in area. We need to set up carpooling so that members on the outskirts can more easily make it to the meetings and other events.
- Make sure PAS has an event every International Astronomy Day, which is twice a year.
- Now that digital cameras are so good, we should do more with astrophotography, although it should be kept as simple as possible so that all who want to can take photos of some of the easier targets (most of us don’t have time to spend hours using com-



PAS President: Sam Insana.
Photo by Terri Finch

plex computer imaging and Photo-shop-type programs, although we could have an advanced class for those with the time and desire).

- PAS officers should feel free to delegate some of the tasks, to keep from going crazy, to get more projects done, and to give all members a chance to contribute
- At PAS meetings, during the first half hour of socializing, short sci fi astronomy movies (10 to 20 minutes long) can be shown on the screen using the laptop and You Tube.
- We should get members to use our PAS library which has great books and videos
- On our PAS website under News and Events it is blank. We should have something to say. Also, for big public events we should send out press releases if we are not already doing so.
- If PAS members have other ideas or wish to discuss a problem with the club, they should feel free to contact me - I will be available. Everyone should be having a good time.

Over the next year, I will do a short article each month describing one or two of the above suggestions in more detail. However, anyone wanting to organize any of the above projects now should feel free to do so and to ask other PAS members for help.

I believe PAS is one of the best amateur astronomy clubs in the nation - Terri and others have worked very hard to get us

where we are. I am grateful for all of you who had the confidence to help elect me President so I can devote even more time to PAS and help all of us have an even better experience.

Howard is Vice President:

I have been fascinated with science, especially astronomy for my entire life. Within the last few years I have taken a strong interest in learning the night sky and observing its wonders for myself. The Phoenix Astronomical Society has been a wonderful resource - the members are friendly and knowledgeable and have encouraged my growth and development. I want to give back to the group; there are many ideas that I have as Vice President. We have a meetup.com group where I post all of our public events to over 120 followers. I'm also active with the telescope workshops and encourage our members to travel out to dark sky locations where we can really take in the beauty of the night sky. Living in Arizona, we are near some of the best astronomical research facilities in the world. I plan to encourage the club to come with me and see them for ourselves. Being an assistant to the President and the Event Coordinator are ways that I can help the club to grow. Please reach out to me if there is anything that I can do to help you enjoy the club.

Eric is Treasurer:

Aside from having a lifelong interest in Astronomy and a passion for dark-sky observing (and dark skies in general), I have had long experience in the accounting and bookkeeping world. My involvements run from managing an eight-person accounting

department in the corporate world to doing the books for my own IT business for 25 years to designing and coding a full-charge Oracle-based accounting system, to being treasurer for another non-profit group. I'm currently employed part-time as a bookkeeper at a Scottsdale private school.

As PAS treasurer, my first goals are to computerize the society's books, be able to

create financial statements, reports and projections as needed, streamline the payment process for events and make the financial state of PAS as transparent as possible. I look forward to the challenges ahead!



PAS Vice President: Howard Moneta. Photo by Terri Finch



Past President: Bruce Wurst. Photo by Terri Finch



PAS Treasurer: Eric Steinberg. Photo by Terri Finch



Past Vice President: Terri Finch. Photo by Alex



Past Treasurer: Mike Marron. Photo by Terri Finch

Astro Tech: Sudden Ionospheric Disturbances

by Alex Vrenios, PAS Member at Large

A solar flare can temporarily knock out terrestrial radio communications and permanently damage Earth-orbiting satellites. Studying their intensity and their frequency of occurrence can help us understand them better and hopefully, enable us to predict them in order to minimize the amount of damage they might do.

Amateur radio astronomers are providing valuable data that enhances this under-

standing through a global detection and reporting network. Instead of detecting the flares directly, they detect the effect that a solar flare has on the Earth's ionosphere, noting the exact time of the disturbance and its intensity. Here's how it works.

Imagine the Earth and its atmosphere as a baseball with a thin, seamless leather cover. Only part of the atmosphere gets direct sunlight. If we cut away all but the

sunlit part of that cover, our imagined Earth looks more like a ball wearing a small hemispherical cap that always faces the Sun. This "cap" represents the part of the atmosphere that is ionized by the Sun's rays: the ionosphere. The portion of the Earth's atmosphere that faces the Sun is always ionized to a greater or lesser extent depending on where we are in the solar cycle. A solar flare can dramatically increase the level of ionization.

See "Astro Tech" on page 7

New in PAStimes Newsletter this PAS Season

By Terri, Event Coordinator & Copy Editor

This is so exciting! This PAS season, starting in the summer issue, we will have some great, new monthly article submissions from PAS Members.

Continuing with a monthly article about what is visible in the night sky each month, Leah Sapir will be providing her contribution called "AZ Sky." We look forward to enjoying more of her very informative, helpful, and interesting pieces to help us all enjoy the sky each night.

New this PAS Season, we will have Kevin Witts writing a monthly article entitled "Way Out There!" which will focus on fun, unusual stuff related to our hobby. I am greatly looking forward to reading these articles.

Also new this Season will be the President's Column provided by President Sam Insana, in which he will discuss various aspects of PAS, what we have done, what we want to do and more about the club.

Finally, we have a new author/member providing a column called "Astro Tech" which will be focusing on the technology of astronomical and astrophysical research. This new column will be provided monthly by Alex Vrenios.

Submissions to the Newsletter are greatly appreciated. Send them to Events@pasaz.org and look for these wonderful additions to our PAStimes Newsletter throughout the PAS Season of September 2015 to May 2016 (PAS Sea-

sons run the same as the Grade School schedules). Many thanks to these fine PAS Members who take the time to write awesome articles to entice, illuminate, and tickle your mind!



*Astro Tech by Alex Vrenios.
Photo by Terri Finch*



*Way Out There by Kevin Witts.
Photo by Terri Finch*



*President's Corner by Sam Insana
Photo by Terri Finch*

Astro Tech: Sudden Ionospheric Disturbances

Continued from page 6

Ionization increases caused by solar flares can knock out medium and high frequency communications for the duration of that event. Very low frequency (VLF: 3 to 30 kHz) communications on the other hand, are actually enhanced because of an increase in the ionosphere's reflection coefficient.

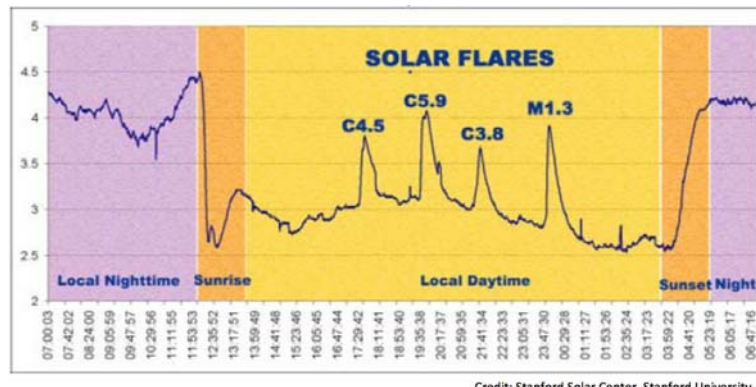
VLF signals can penetrate water, so many governments use these frequencies to communicate with their submarines. Interpreting the meaning of these signals may be impossible, but we can easily receive them, especially at night. In the daytime VLF signals are attenuated, but when a solar flare causes a sudden ionospheric disturbance, there is a spike in the reception of the VLF signal. A VLF reception spike usually indicates a SID (Sudden Ionospheric

Disturbance) event. (See plot.)

SID event spikes can be detected by a home-built loop antenna and an inexpensive receiver, and plotted by a modest personal computer. Data logs can be sent to the Stanford University Solar Center where researchers who study solar phenomena correlate SID events with X-ray and UV radiation level data from GOES satellites.

SARA, the Society of Amateur Radio Astronomers, makes a VLF receiver, ca-

bles, software and set of instruction manuals that are available to anyone who may be interested. Special groups, like high school science classes, e.g. can get these kits for free. Contact supersid@radioastronomy.org for further information.



Credit: Stanford Solar Center, Stanford University

Special Meeting of the Minds

July 11 in Carefree 5:30pm

By Terri, Event Coordinator

PAS officers and members are invited to a special meeting to amend the by-laws of PAS in order to add a Secretary position and then to appoint a Secretary. The job of this person will be to take minutes of the meetings (which can be done in "review of the meeting" format), and keep in touch with other astronomy clubs. This is an officer position.

The meeting will be held in Carefree at Mike's home on July 11. There will be a potluck, evening star party, the Meeting of the Minds (MOM's) for the election and

discussion of the upcoming DBG Luminaria events at the end of 2015. All members are asked to attend. RSVP is required. For the potluck, bring a main dish and a drink to share. There will be a \$1/attendee donation on the honor system to Mike for hosting the event. We know PAS people are appreciative of Mike's hospitality.

The Agenda for the night will be: Potluck, Meeting of the Minds, Star Party, Movies. The sun sets about 7:40pm. The potluck will take place at 5:30pm. The Meeting of the Minds (Voting on the

amendment and a discussion about the upcoming DBG Luminaria Event) will begin at about 6:30pm, and the Star Party will start shortly after the MOM's concludes. PAS Members and their immediate households are invited to this New Moon/dark sky event! Bring your telescope. This is a closed meeting - please, no guests. For this meeting, kids can attend since we will be having a star party and movies after the main meeting, kids of PAS Members. See you there!

Many Thanks to the PAS Telescope Team

By Terri Finch, Event Coordinator

As the PAS year (Sept to May) comes to an end and the new one begins, I'd like to take a moment to thank all my hard working, reliable telescope team members

for all they do for PAS. We've had a great year of school events, corporate events and private events which kept us so very busy! I look forward to another year with my

awesome telescope team, without whom none of these events could happen.

Messier Marathon at Mike's Mar 21

By Terri, Event Coordinator

Attending this event were: Alex Vrenios, Pete Turner, Sam and Frank Insana, Don Boyd, Eric Steinberg, William and Terri Finch, Rodney Fong, Mike Marron (Host), George Zukauckas, Dalia (Guest), Joe Acquavella, Bob Senzer, Earl DeLong and Diann Smith (New PAS Member). The evening started out with a bunch of chicken, some pizza, and some side dishes. I wish to thank those who brought food. William and I attended dinner and then had to leave at 8:30pm. The skies were perfectly clear the whole time we were there. Many thanks to Mike for hosting this awesome event!!!

Eric writes: I observed at Mike's for 5 ½ hours, viewing 54 Messier objects with my 16" (straight manual) Dob. I likely would have gotten an additional 20 had I been able to stave off sleep for another hour but alas, it was not to be. I was gratified though, at being able to get M74 and M77. Though I have seen them overhead, I've never gotten them at a Messier Marathon. This time, about 20 minutes of hunting paid off!

Pete writes: I want to thank Mike for hosting an all-nighter, or in my case until 1:30AM. I had difficulty with my GOTO,

so I used a manual approach. My backup was Messier maps for Telrad finder scopes. Not the easiest method, but I was able to get 10 objects (8 at Mike's and then in the early morning at my house I got two more). This was my first taste of going for DSOs that are not slam dunks. Don, Eric and Sam were very helpful with some of their locating suggestions.

Sam writes: My son Frank and I attended the Messier Marathon PAS Star Party at Mike's on Saturday night March 21st. I used my 8 inch newtonian reflector. I tried finding the first 3 Messier objects listed on the handout sheet, after sunset, but the sky was too bright to see the faint objects so low in the sky. I then decided on another approach. I would try to see Messier Objects I had never seen before. After 5 hours of observing I found 12 new galaxies, one new nebula, and one new globular cluster, for a total of 14 new Messier objects. I had seen 53 Messier objects in the past, so now I have seen 67 total. After trying to sleep on Mike's couch for a couple hours I got up again and spotted Nova Sagittaris 2015 No. 2. It had exploded on March 15th and had gone from over 10.5 magnitude to around 4.5. I couldn't see it

with my naked eye since it was low in the south horizon where the Phoenix glow was a problem. But using my setting circles I found it at 18 HR 37' RH and -28 degrees 56' Dec. It looked like a bright star through the telescope with several faint stars in the background. Earl was still there at 4 am and he and I both saw the object, although it did not look spectacular. By 4 am we could see the Milky Way at Mike's house. It was a good night for viewing. Peter, Eric, Rodney, Alex, Earl, and I all had our telescopes for viewing - some left early and some stayed most of the night. Don was also there with his scope and spent most of the night. Frank hiked Mike's desert areas at night and ran into a Great Horned Owl, several Coyotes, mule deer, and several other interesting creatures. The next morning Mike, Frank and I went to El Encanto for a buffet. It was great, but a little too much after the fine potluck the night before.

Don writes: My scope was not working well for the first few objects, I found them but had to do a long spiral search, then I went to M45 and realized that it was not even close to being in the scope. Meade has a function called "sync to object" which tells the computer where you actually found

Messier Marathon at Mike's

Continued from page 8

the object, it then uses that info for objects in the same general vicinity, which improves the goto. After I did this my goto's were much more accurate, so I went back to see if I could find the first 3 objects on the list, but I could not see them. I tried looking at other galaxies but could not see them in my scope, so I decided to concentrate on globular and open clusters. Since I was using a goto I spent some time looking at them and helping Peter find them. His goto was not working well at all and all the objects he found were by star hopping. One

of the more interesting objects I found was M37, an open cluster. At X30 it looked like a nebula, so I said "that can't be it." Then I did a search and could not find an open cluster in the area. I showed it to Peter and he agreed that it looked like a nebula, but he suggested I try higher power and when I did it resolved into a nice tight open cluster with a spiral quality to it. I was also very surprised to find M1 though I could only see it with averted vision. Because I was mainly looking for globular and open clusters, I ran out of objects around midnight

and so went in to the house to warm up. I went back outside at about 1:30 and found a few more objects, then back in about 2:30 planning to nap for a couple of hours. At 5:20 I woke up and realized it was starting to get light, but thought I could get a couple more of the open clusters. I did find a few more before the glow from the impending sunrise washed them out... I ended up with 39 objects. I packed up and got home about 7am.

2015 All Arizona Messier Marathon - Salome Emergency Airfield

By various attendees

Kevin Witts writes: On Saturday, March 21, 2015, I was able to participate in the All Arizona Messier Marathon sponsored by the Saguaro Astronomy Club. I recently purchased a Celestron CPC 1100 scope and was eager to break it in. I've never participated in the messier marathon before, as I know that Go-to scopes were frowned upon in the past, but saw that Go-To's were now accepted. I made it a goal to catch all 110 objects. I realize that there is minimal skill involved when using a go-to scope, but my personal choice is to actually see as many objects as possible rather than spending all night looking for things and only seeing a fraction of the list. To each his own.

The event was held at the Salome Emergency Airfield located off of I-10 near the KOFA Wildlife Refuge. The airfield sits about 2 hours west of Phoenix, 40 miles past the Palo Verde Nuclear Plant. The site is ideal for dark sky observation as it is located in a very remote area away from all man-made light sources. The site is very close to the Antennas site and offers a better view of the southern and eastern horizons than Antennas. However, there is more of the Phoenix sky-glow apparent as there are not any mountains close enough to obscure it. More on that later... The ground at the site is flat with minimal rocks as it served as an airfield at one time and has only small shrubs sporadically placed allowing plenty of room to stretch out and set up. SAC had also arranged to have two Port-a-johns placed on site, which was very welcome.

I arrived at approximately 3:00 and

was very surprised to find lots of people already there. The encampment featured a plethora of RVs of every size and description and most campsites already set with scopes ready to go but covered from the afternoon sun and elements. I selected a site that had a 360 degree view of the sky that wouldn't be obstructed by any vehicles. Howard Monetta arrived just after I did and I was pleased to have some companionship for the night. Prior to unpacking the vehicles, Howard and I decided to walk around the area and introduce ourselves to others. I'd estimate that there were about 80 people there, but the area is so large that it never seemed crowded to me. Our first stop was at a large RV with a Televue banner hanging from it. The owner and his wife were marketing reps for Televue and had brought a set of eyepieces that they planned to lend out for the evening. A few people had already requested some of the more popular ones for loan. He was a very nice guy and we talked for a few minutes. We then made our way around to the different campsites and found everyone to be friendly. There were all types of scopes present and quite a few astro-photographers as well. We were also pleased to see that there were a group of model rocketeers there who were launching some really cool rockets throughout the day.

Howard and I set up our equipment at around 4:30 or so, I also set up my bed for the evening as I planned to sleep out under the stars, something that I try to do as much as possible. I set up a chaise lounge with a pillow and fleece blanket.

Just before sunset, the SAC had a group meeting to cover some basic rules and also raffle off some prizes. Howard and I had bought some raffle tickets earlier and each won a prize. I won an event t-shirt and Howard won the grand prize, a tabletop scope with a mount and Go-to computer.

We waited for darkness to arrive and started the marathon once a few stars appeared. The skies were crystal clear and there was no wind throughout the evening... a perfect night.

I decided to follow the recommended order and chose M-77 as my first item. Unfortunately, the next two objects (M 74 and M33) were too low on the horizon to the west and the remaining sunset obscured them from view. I feel like I saw something, but wanted to play by the rules, so I didn't check these off. After that, the marathon truly kicked in.

I was able to check off 50 items by 9:30 and was thrilled with the views my new scope provided. The go-to feature allowed me to move from object to object quickly and everything looked great. Around 9:30, I found that the next set of objects had not risen yet, so I took a break and relaxed on the "bed".

Just prior to that, Howard introduced me to one of the most spectacular views I'd ever seen. For a brief window, NGC 5139 became visible just above the horizon. Omega Centauri is perhaps the most amazing globular cluster in the sky and only peeks above the horizon on rare occasions. It has a diameter of 150 light years and contains 10 Million stars. It is an unbeliev-

able sight and we were happy to let some of our neighboring gazers see the view. All were awestruck by it.

I slept very lightly throughout the evening and rose numerous times to check off some more objects as they rose throughout the evening. I also searched a bunch of NGC objects between marathon sessions and saw the "Needle Galaxy", NGC 4565, which is an unusual and amazing object.

My final observation session came at around 5:11 a.m. as I was able to check off 7-8 remaining objects from the list. Unfortunately, M 30 rose so late in the morning hours that it came up in the glow of the morning sun. I wasn't able to definitively see the object, so, in good conscience, couldn't check it off.

Overall, I viewed 107 of Charles Messier's objects and I can say that each was clear and apparent in my scope. I felt tired on Sunday as I didn't really sleep much even when lying down, but I'm very happy that I did it. I saw some amazing objects, a ton of galaxies that were new to me and some fantastic star clusters. I was also able to see Jupiter better than I had before, with a moon shadow crossing it earlier in the evening. I also got a chance to say hello to Saturn, whom I'd missed since last summer.

I'd highly recommend a trip to this dark sky site to anyone who might be apprehensive. The area is safe, dark and secluded. The evening would require "primitive car camping", but it's truly worth it to experience dark skies and solitude. I saw objects that I would never have a chance to see near the city. There is also nothing like sleeping outside under a canopy of stars on a cool night in Arizona.

Howard writes: This year's All Arizona Messier Marathon was held at the Salome Emergency Airstrip about 100 miles

outside of Phoenix Arizona. Kevin Witts and I attended from PAS.

I'm really happy to have seen 104 amazing Messier objects. There were only a few that were missed. M33 at dusk was tough to see. Couldn't decide if I was seeing it through extreme averted vision or extreme imaginary version. Either way, I don't feel that I actually observed that object so didn't count it on the list. The other missing objects were due to miscalculating when the sun would come up and so snoozing a few minutes longer than I should have. Oh well, always good to leave something unexplored as a goal for the next time.

The goto telescope and a very dark sky make finding the objects trivial but it still takes endurance and persistence to get through the whole list. We ran out of visible Messier objects several times during the night so we switched to the NGC list to fill the time. The Needle Galaxy (NGC 4565) was quite a sight and at 2am, NGC 5139 also known as Omega Centauri was clear and spectacular. Working the list from 6pm until 6am is a long task so I took a couple of nice naps stretched out in the back of the car and then rolled out of the sleeping bag and was back at it. Goto telescope or not, it's great to have seen these objects with my own eyes. I definitely respect those who accomplish so much by star hopping or with setting circles.

For the brighter objects, I would find them in the telescope, look through the Telrad to see where they were located and then walk over to the binoculars while holding my gaze at the same place in the sky. I was pretty successful with the technique and observed a couple of globular clusters and a few open clusters in the binoculars for the first time. Going through the list was eye opening. It put the objects into perspective. I had no idea there were so

many Messier globular clusters, many of them becoming visible right before dawn. Those globular clusters were so beautiful that they gave me the energy to keep going until the sun came up.

One thing I would do differently next time is to bring a better red light. I was using the headlamp that I typically bring to dark sky events but found that constantly turning it on and off was sub-optimal. A red flashlight or a red desk lamp would have worked much better for looking at the paper list and taking notes. Another thing to improve on is time management, there's no reason to be observing objects right as they appear above the horizon just to check them off a list. The same sights will still be visible a couple of hours later with much more definition. It felt like rapidly going from paper to eyepiece and back again was getting in the way of what really mattered, experiencing the starry sky overhead.

Speaking of taking notes, it had rained a couple of days earlier, and while the ground was completely dry during the day, after dark the water seeped up through the dirt and caused a lot of humidity. Chairs, tables, and some equipment were soaked. Taking notes on a soggy piece of paper was tough. Interestingly, I didn't notice any fogging up of the telescope.

It was great having Kevin at the event as well because I think we encouraged each other to keep going. Overall, the event was really well-planned by members of SAC and EVAC. It was estimated that there were 65 vehicles on the lot with approximately 80 people in attendance. People were genuinely happy to see a couple of PAS members at an "All Arizona" event. The Grand Canyon star party isn't too far off and the October "All Arizona" star party will also take place at the Salome airstrip.

Honor Student Star Party at PVCC Mar 27

By Terri, Event Coordinator

It was a beautiful evening, with perfect clear skies. Roger Anzini with his 16", Bruce Wurst with his 20" and Terri using Bruce's 12" scope were in attendance. There were 200+ honor students bussed in to this event from schools all over Phoenix, Tucson and Flagstaff. They were treated to a DJ and other activities, as well as observing with the three PAS Members doing the star party up by the telescope dome on the

Main Campus. The objects of the night were Orion Nebula, Jupiter, Venus (for a while until she set behind the building), the Moon and the E.T. Open Cluster. The students were thrilled - they loved looking at the various objects and learning about them, and they asked a lot of questions about the telescopes. PAS wishes to thank Jenny Weitz for having us at this awesome event and providing the pizza!



Roger Anzini (far left) & Bruce Wurst (far right) set up their scopes for the Honor Student Star Party hosted by PVCC. Many thanks to Jenny for having us at this wonderful event!

ASU West Mar 26

By Terri, Event Coordinator

It was a perfect night for viewing, with clear skies all night. The temperatures weren't chilly at all until near the end when Howard and I put on our light jackets though the rest of the team didn't think it was cold yet. The air was also very still also, which made viewing a pleasure.

Many thanks to Paul Schmidtke for having us at this event and for treating all of us to dinner. That was a nice surprise. The telescope team for this night was: William and Terri Finch doing handouts, traffic monitoring, greeting attendees and Q&A (though hardly any kids attended). William also brought his 10" dob. Howard Moneta came with his 8" SCT, Kevin Witts with his 11" SCT, Mike Marron with his Meteorites and Paul with an 8" dob he borrowed from the college collection. Paul captured some photos prior to it getting too dark to take any more.

Attendance was pretty good and those who stopped by to visit really stuck around. There were about 10 of Paul's students who viewed various objects, took notes and got their papers stamped by me. They observed the Moon (William), Orion Nebula (Kevin), Jupiter (Howard), Venus (Paul) and later in the night, the E.T. Cluster (William). Kevin also showed the Moon later in the evening.

Jupiter had an awesome happening... Io was transiting in front of Jupiter, then about an hour later, Io moved off of Jupiter and Io's shadow showed up across Jupiter. Also, we saw the Great Red Spot on Jupiter. What a wonderful night!

Kevin shared a fascinating "hair" on the face of the Moon. Some of us had a hard time finding it at first, but now that we know where it is, I will be looking for it in the future. Very cool! Thank you, Kevin, for sharing this awesome Moon feature!

Besides Paul's students, I'd say we had about 70 other people there from the public. There were 2 kids (younger than 12) and some young adults, but most of the attendance were "young at heart." William, Howard and I had a very nice talk with Christine Mintzmyer and her dad, Ken, through much of the evening. And Mike, of course, with his meteorites, stole the show!

Prior to this evening's event, the whole telescope team had dinner at Arby's - it was a great time with friends! The next ASU

West event will be on Paul's birthday Oct 8. Hope to see you there!

Paul writes: Yes, a great event. Will get pix to you soon. Not sure about attendance. Never had any long lines. Maybe 100-150.



Now "THIS" Is a Star Party! We had a great collection on scopes and a wonderful time. Many thanks to Paul for inviting us to do this event at ASU West. Photo by Paul Schmidtke.



Howard, all set up and ready for the first observer to come along and enjoy a view of Jupiter. Photo by Paul Schmidtke.



William with his scope, set up and ready, (L to R) Terri setting up the table of handouts, and behind her, Kevin with his scope, all ready for a big crowd. Photo by Paul Schmidtke.



A group forms around Mike as he shares his Meteorites with everyone at the ASU West Star Party. Photo by Terri.



Howard & William level Howard's scope at the ASU West Star Party. Photo by Paul Schmidtke.



Kevin "needs his space" as his shirt says. We all got a great dose of space this night at the star party. We saw a few new things! Photo by Paul Schmidtke.



Mike setting up his Meteorite display. It was a great event with just enough people to keep everyone busy. Photo by Paul Schmidtke.

Total Lunar Eclipse of Apr 4

By Various PAS Members

Pete Turner writes: I watched the eclipse from my house as everything I read indicated it would be above any obstructions in the direction of 262 degrees. I got up at 3:30 and looked outside to see the moon eclipsed by about 25%. I made some coffee, set up my camera on a tripod facing the moon and got some pictures as it progressed towards totality. I also viewed the moon through binoculars. The pictures and non-binocular viewing showed more of the blood moon than the binoculars did.

As totality came on, my camera wouldn't take any more pictures due to lack of light. In addition to lack of light, there were clouds that cropped up which reduced moon visibility. I took some more pictures with my iPhone held by hand, however most were unsteady. I'll scan through all of my images on my PC and send the best later on tonight.

As others have reported, the moon's reddish tinge was at the bottom left. It was dark in the middle band, with a sunlit patch at the top. It was interesting to watch the lighted part move around the rim to the top

and then past it. I have to assume that the sunlit part eventually went away although I didn't see it completely vanish.

Alex & Diane Vrenios write: All the predictions we read about the lunar eclipse said pretty much the same thing: that it would be in totality around 5AM Saturday, April 4th for only about five minutes and that we would need a clear view of the western horizon. Diane and I have a favorite place nearby with a full view to the west, but it's a little scary at 5AM. Eclipses don't happen that often so we planned to brave the darkness and go there anyway.

I got up at 4, took care of the dog and put some chairs and our binoculars in the car. By 4:30 we were on the road. We arrived at a very bleak looking and deserted Lookout Mountain trailhead at 4:40, set up the chairs, grabbed our binoculars and got cozy for the event. The first thing we saw was how high up the moon was. "We could have watched this from our back yard!" When a car pulled up and parked behind us, two young people got out and headed for the trail. They were polite, but it seemed

way too early to be hiking, and they showed no interest in the moon. We put our gear back in the car and went back home, where our little dog would protect us and a fresh pot of coffee would keep us warm.

The eclipse was well underway by the time we settled into our patio chairs. There was a layer of thin clouds covering the moon, but that did not seem to interfere with the view, which was crisp and clear. As totality approached, the bottom part of the moon turned a dull red, contrasting beautifully with a thin strip of snowy white moon at the top. We both thought how much this looked like Mars when we first saw its polar cap!

The dog went back to sleep and we just sat in the stillness, watching the subtle changes as the event played out.

Lunar eclipses happen in fours, we discovered, called tetrads. There have been three so far, and the last of the four is predicted for September 28th, later this year. We definitely plan to attend.

Archway School Apr 10

By Kevin Witts

Nice clear skies in place for this school event. I brought my solar scope and was able to show a few people the Sun before it set. The primary crowd arrived just at dusk and I was able to show about 30 people a nice view of Jupiter before it got dark out. There were four clear moons with some cloud bands - many who had never seen it before described it as amazing.

I stayed with Jupiter for about 45 min-

utes due to a never ending line of viewers and then switched over to the Orion Nebula before it got too low in the sky. I was also able to show the crowd the Stargate, the Ghost of Jupiter and Mizar/Alcor. Many of the parents and kids appreciated descriptions of how nebulae work, galactic distances such as AUs and light years; they also enjoyed using the binoculars to resolve stars in Orion and to see the Mizar/Alcor

split.

I encountered some very smart kids all of whom were well behaved, polite and interested. I received many thanks for our participation. The staff of the school were awesome and very involved. It seems like a great school that certainly challenges kids to think and ask questions. It's always a pleasure to visit Archway School.

Antennas Apr 12

By Howard Moneta

On Sunday April 12th 2015, Eric Steinberg and I traveled to the Antennas observing site. The weather reports from the week before were not favorable but the forecasts improved greatly in the days leading up to the trip. On the day of the trip, I noticed cloud cover over the Phoenix area and strong winds as I was packing the car. The cloud cover broke while driving out of town and by the time I arrived at the observing site about 100 miles west of the valley, things were looking good.

It gets dark a few minutes later each day leading up to the Summer solstice so deciding when to leave the house and still allow for an hour to set up before dark takes some estimating. Eric arrived a few minutes before me. We set up our equipment in record time and had plenty of light left to eat dinner and enjoy the serenity of the Arizona desert.

I had several observational highlights for the evening. The Whirlpool Galaxy is very impressive out there with clearly de-

fined spiral arms and visible interaction with the smaller companion galaxy. Another highlight was panning the binoculars through the constellation Auriga and seeing M37, M36, and M38 each come into the field of view. Saturn was visible later in the evening and I ended out the night with a beautiful look at Omega Centauri and the Needle Galaxy.

Telescope Workshop at Bookmans Apr 12

By Terri, Event Coordinator

We had only one RSVP, but Christine and Johnny who came to find out how to work their telescope were wonderful. In attendance at this event, from PAS were: Don Boyd, William and Terri Finch, Mike Marron, Joe Aquavella, Bob Senzer, Alex Vrenios and Rodney Fong, along with Bette, Ed and Bruce Wurst. The event was a great success. Christine and Johnny left with a bunch of information and ideas on how to improve the scope they have, what eyepieces may work best in it and a list of the upcoming events they could attend to get help with their scope at a star party.

PAS was set up in a different location

this day due to another event taking over the front window area where we usually are. Katy Spratt helped PAS get set up over in the book area. Many thanks to Katy for providing this location for our event.

After the event concluded, several of us went to Carlos O'Briens for dinner. The attendees were: Mike, Rodney, Alex and his wife Diane, William and Terri and Joe and Bob. It was a good dinner and our favorite waiter, Daniel was there to take care of us. Thank you Daniel, and thank you telescope team for a very productive event!



*Christine & Johnny with their scope, seeking assistance at this Telescope Workshop.
Photo by Terri.*

Black Mountain Campus Star Party Apr 16

By Various Attendees

Sam Insana writes: On April 16, 2015 we had a good star party at PVCC Black Mountain campus. There were dozens of students and public who enjoyed our several telescopes and Mike's meteorites. With my 8 inch newtonian reflector I showed Venus, Jupiter, Orion Nebula, M44 (Beehive open cluster), Cancer Iota (double star), M81 (galaxy), M82 (galaxy) and M3 (globular cluster). The reason for the large number of objects was that numerous students came up to me and requested them for their astronomy class assignment. I explained details of each object and also answered their questions about the kind of telescope, power used, focal ratio, etc... The best place for observing was at the far western end of the new parking lot where four of the lights were turned off for us. Any further east, and we would have to fight the lights that are left on for the construction site. The weather forecasts were correct for little cloud cover and little wind, however at about 5 pm there was a scare in that the sky darkened with what looked like a rain storm coming in. Nevertheless, by 6 pm, it cleared and the weather was fine.

Rodney assisted the telescope team by directing people to our scopes, which were far from the main parking lot and buildings. The PAS members with scopes were Kevin Witts, Sam Insana, Howard Moneta, Eric Steinberg, and Bob Ewing. Bob Senzer helped out Mike Marron with his meteorites. A potential new member, Christine, brought her new 10 inch Dob and all of us helped out with her questions. Another lady brought 15 power binoculars and showed several good objects. A new PAS member Ray Adams attended and enjoyed the star party. He would like to bring his 10 inch Dob to the next star party.

Bob Ewing writes: Had a spectacular evening at BMC!!

Clear as a bell!! And.....no stadium lights! !!! Had students from Black Mtn. Campus and Union Hills campus and also Scottsdale CC with George Muncaster. Plus some public visitors. Venus and Jupiter were of course very bright! Many other objects from open clusters to globular clusters to galaxies were seen.

The end of the new parking lot was

quite dark. Thanks to all of the folks who brought out telescopes. And thanks to PAS and PVCC for setting up.

Eric Steinberg writes: Though the evening started off moderately breezy, the wind died down by dark, leaving clear skies and good viewing conditions. The situation on the ground was slightly more problematic – there was no RSVP for the event, so we just chose what seemed like a good spot only to discover later that the lights where we were could not be turned off and that the designated dark area was about a hundred yards further west. It was something of a sight to see all those (including the 22") scopes being moved! Eventually we got set in the new area and were able to do some viewing, however, the glare from the adjoining area lights was pretty bad. Nevertheless, there were a goodly number of attendees who were uniformly fascinated and enthusiastic about the views we offered. In the end it was a great, if tiring night.

Antennas Apr 18

By Howard Moneta

It was a good night. The weather was clear and the temperature was perfect and didn't start to get cold until midnight. I counted 15 cars at the Antennas on Saturday night including several people who had already been there for a few days and a record five people from PAS! Binocular

highlights for me included finding M46, M47, and M48 in the binos for the first time and observing some of my favorites such as M41, and M37, as well as M3 and M5 again. Telescope highlights included the Cigar Galaxy, Needle Galaxy, Whirlpool Galaxy, and the great globular clusters in

the spring sky. There was a lot to see so I continued observing until almost 3 AM. Scorpius, Sagittarius, and Cygnus rose late in the evening and provided a beautiful view of the Milky Way. I ended the evening with the Wild Duck Cluster, the Swan Nebula, and the Trifid Nebula.

Career Day at Rancho Gabriela May 5

By Terri, Event Coordinator

We had a really hot day ahead of us. William Finch and I grabbed the PST and handouts and headed to Surprise to do the Career Day event at Rancho Gabriela School, with the help of Don Boyd with his solar scope, Mike Marron with his meteorites and Matt Kohl to help with handouts. Mike had arrived early and took a nap in the car while we started the setup (I sent Matt over to wake him up). Don arrived when William and I did, after picking up Matt. William and I took the Career Day fliers we had made last year to give to the two lowest grades this year, since last year we had blanketed the whole school with them. Though the day started with clear skies, they soon turned cloudy. From about 9:00 to 9:40 we had the hot sun on us, but lost it shortly after. William packed up the PST around 11am but there were sunspots that we could see through Don's scope so Don stayed set up while the rest of us did handouts.

This year, there were a few changes in that they assembled the classes into larger groups. Last year, the kids came out, one grade at a time, while this year we had multi-grade groups that came out on a timed schedule until about 2:00 pm when we packed up to leave. The groups of kids moved through very quickly this year leaving not much time to talk to them or do

Q&A. I had put up a table just for handouts so they'd take them this year, and not feel pressured to get them from me, but most didn't take one. I did manage to give away about half the box I had brought, though.

We enjoyed the food, the kids, the fun, the excitement and the other displays in the auditorium, where Mike had his meteorite table.

We are looking forward to doing this event again next year. I'd estimate about half the kids who came out, saw what we wanted them to see. The rest were glad to get outdoors and run around for a few minutes even if they didn't look at what we were showing. Many thanks to Julie Merrill for inviting us to do this event. We enjoy this event and being able to share the view of the Sun with everyone.



Don Boyd set up to do Solar viewing at Rancho Gabriela Career Day on May 5, 2015.

Photo by Terri



William & Don doing Solar Viewing. William is taking down his scope, as the Sun has gone behind a big black cloud. Don waits for the cloud to leave. Photo by Terri.



School kids line up to look through Don's scope at this event. It was a very hot day & the Sun was taking breaks behind the clouds, more often than not. Photo by Terri.

Ward Academy School Star Party May 8

By Sam Insana, PAS Star Tour member

On May 8, 2015, we had a star party at Ward Academy school in Tempe. At 1 pm it was totally cloudy and raining, however the school did not want to cancel since it had been cancelled 2 months before and couldn't be rescheduled again before the end of the year. Don and I looked at satellite and radar and figured there might be a gap in the storm system from about 3 pm until 8 pm - we had looked at 12 weather forecasts which were all over the place, so we decided to give it a try, hoping to at least show the Sun, Jupiter and Venus.

From 6:15 pm until 6:35 pm Peter Turner, Don Boyd and I showed sunspots. I also showed an incredible solar flare with the PST. It started out as a little nub on the limb of the sun and within 30 minutes it grew about 100,000 miles longer with a loop and then 2 long fingers. It was the first

time I could actually see a flare move while watching it. Normally it takes several minutes to an hour to notice movement. Then a giant cloud covered the sun for good, so only 15 out of the approximately 75 people got to see it.

After an hour of waiting for the clouds to move, everyone was able to see Jupiter and Venus. Mike Marron was once again a hit with his meteorites and really helped us with the cloud delay. The playground equipment also helped a lot during that time. Overall, it was windy and cool and ended with total cloud cover, but it turned out okay since we were able to show a few good objects. The parents, teachers and students thanked us for coming out.



Rodney Fong: PAS Meeting Host. Rodney served last year and will continue to be the 2015/2016 PAS Meeting Host. This photo was taken by Terri Finch on Jan 22, 2015 at the PVCC Telescope Workshop. Rodney is an Awesome Meeting Host!

Celebration of Life: Jerry Belcher & Bob Senzer

By Terri, Event Coordinator & V.P.

On May 14 at PVCC Main Campus, a "Celebration of Life" party was held from 7pm to 10pm in remembrance of two fine PAS Members. Jerry Belcher passed away on Nov 13, 2014 and Bob Senzer passed away on Apr 28, 2015. All of PAS and any guests who knew these gentlemen were invited. PAS Provided the pizza for the party, President Bruce provided bottled water and various members brought snacks to share. The event included a slideshow of these two men while people ate, after which we opened the floor to anyone who wanted to present or share memories of Bob and Jerry with the group.

We first shared our memories of Jerry

Belcher. Sam Insana gave a two-minute presentation about what he remembered of Jerry. Joe Collins put his thoughts in, as did Kevin Witts, William Finch, Howard Moneta, Paul Facuna, Don Boyd, Renee Collins and Mike Marron who shared stories about the "Shangri La Prank".

Next we spoke about Bob Senzer. Sam Insana shared a few minutes of memories of Bob as did Alex, who put together a very nice slide show for this event. Kevin Witts and Howard Moneta talked about Bob, as well. Steve, a friend of Bob's talked about him as did Mike Marron, Renee Collins, Eric Stenberg and Bob's Friend Jerry. Judy Wolf also talked about Bob and how close

they were.

It was a moving time of remembrance and reflection.

Many thanks to the members who provided photos for this event: Kevin Adams for photos from previous events, Don Boyd for several great photos that really captured Bob's personality and Matt Kohl for photos of Jerry. I also had a collection of photos of Bob and Jerry to share. Many thanks also to PAS for providing the pizza for this party, and to everyone who provided additional snacks. Photos of this event will be in the PAS Photo Gallery, soon.

"Havdalah" Event for Congregation Beth Tefillah May 16

By Eric Steinberg

On Saturday May 16th, Eric Steinberg conducted a star party for Congregation Beth Tefillah of Scottsdale at a private home in Paradise Valley. Havdalah is the brief ceremony that marks the end of the Jewish Sabbath each Saturday around an hour after sunset. Because in days past, the end of the Sabbath was determined by the appearance of three stars in the sky, there is a natural lead-in to look at the heavens. After the ceremony, Eric provided a ten-

minute talk about God's promise to Abraham that his offspring will be "as numerous as the stars", tying it to a discussion of just how many stars there are, whether visible to the naked eye, through telescopes, in the galaxy or estimated throughout the universe (that number may be 1029, that is 1 followed by 29 zeroes (and if you were an F4U Corsair pilot, being followed by 29 Zeroes was bad news!)). Both earlier as well as after the talk, Eric was able to show

a number of objects including Jupiter, Izar (double-star in Bootes) and the Cat's Eye nebula (NGC 6543). Unfortunately, though the evening started out crystal-clear, by the time the event really got started, clouds were rolling in from the south, leaving a completely overcast sky by the end. Nevertheless, the 50 or so attendees were really appreciative and look forward to doing this one again.

Antennas Trip on May 17th

By Eric Steinberg

PAS members Eric Steinberg, Howard Moneta and Earl DeLong made the voyage out to Antennas on May 17, joining Steve Coe and friend Don there for the night. Conditions were beautiful on arrival – low 80's, a little breeze and clear skies – and only got better into the evening. The wind died down and skies were, as Steve Coe put it "about as good as they get here." Seeing was steady enough that Saturn showed the Cassini Division as a sharp clear band and a distinct ring-shadow on the surface. Even more helpful was the high level of transparency: Deep space objects were bright and vivid, with even faint Herschel II list items being clearly discernible. Particularly stun-

ning was M51, the Whirlpool Galaxy with lots of spiral structure showing and the streamer of material from the smaller galaxy clearly seen without averted vision. Other standouts were M3, M5, M104 (The Sombrero Galaxy), M101 and the glorious Omega Centauri. The weather stayed mild all night, though some wind began to build around 11:30. Through the evening I was able to add 20 more items to my Herschel II project. Howard and I knocked off around 1:00 (though I just lay in the recliner staring at the Milky Way for a little while longer). Earl stayed up all night and was gone at first light. When Arizona skies are good, they're really good.



Rick Cunningham & Kevin Witts with Rick's scope at Leprecon in June 2015 at the Embassy Suites North. Photo by Terri Finch.

What Are People 'Wining' About Now?

By Sam Insana, PAS Member

On Sunday May 17th, I was asked to bring my 8 inch telescope to my wife's wine club party in Northeast Scottsdale near Pinnacle Peak. We did solar viewing starting at 6 pm observing sunspots and then solar flares with the PST. There was a large amount of food and drink from 6:30 to 7:30 pm for the approximately 40 adults who attended. We then saw Venus, Jupiter, M44

(Beehive open cluster), Cancer Iota (double star), M81 and M82 (galaxies), M13 (globular cluster) and Saturn at 10pm for the end-of-the-evening show stopper. The only object I planned to show that I couldn't was M57 (ring nebula) since the house we were at had a large extension that blocked that view. We had very good night skies in the desert setting with no clouds, no rain and no

wind. At the end of the evening I played the grand piano they had inside for about 30 minutes. Everyone really enjoyed themselves though it was unclear if it was because of the heavenly views or the many bottles of wine consumed. This was a freebie I did for my wife's friends.

Phoenix Comicon 2015

PAS was invited to attend this event with an evening star party but due to some error on their part, PAS was forgotten in the scheduling and they canceled with us. We hope to attend next year! However, several of our members got the chance to attend the daytime portion of this event: Howard Moneta, Sam Insana, Frank Insana, Vera Stiesmeyer, Kevin Witts, and Mike Marron.

Sam writes: Saturday, May 30, Mike Marron, Vera, Frank and I spent the whole day at the Phoenix Comicon. I attended a dozen panels and events which were a lot of fun. The best of them in my opinion was a panel on 50 years of Humanism in Star Trek. It demonstrated that Star Trek especially during the Gene Roddenberry years, was based on Secular Humanism and was

anti-war, anti-slavery, anti-superstitions, anti-racism, pro-equal rights, pro-environmental protection, pro-universal healthcare, etc... Star Trek emphasized justice and tolerance. If you want to see a small part of this seminar, go to Youtube and type in Star Trek 50 years of Humanism. The 15 minute video is fantastic. We also saw Summer Glau (Firefly and Serenity fame); International movie shorts; Cosplay fashion show; Adventures and Disasters in Science; Finding other planets with life; Star Trek Fan Films; NASA Projects; Geeky Things to do in Az; Evolution, Vaccines and GMO's; Local Sci fi Comedians; and hundreds of exhibit booths containing comic books - action figures - artwork - costumes and more.



Mike Marron, Vera Stiesmeyer, Sam Insana in the Captain's Chair, and Frank Insana in the background at Comicon 2015.

Photo provided by Sam Insana.



"Beam me up, Scotty." Sam working the pseudo transporter with Vera, Mike & Frank waiting to be transported to the surface. Photo provided by Sam.

Desert Botanical Gardens Adult Education Astronomy Class June 12

By Terri, Event Coordinator

Wow, what a wonderful night! Though the sky wasn't great for viewing with a brown haze to it, and the air was muggy and hot, the attendance, and participation of the DBG Patrons was absolutely fantastic. We had 11 in attendance at this event. Bruce Wurst, William Finch, Terri Finch and Mike Marron arrived at 7pm for setup. Then, about 7:40pm, William and I walked over to the Education / Presentation Room at DBG to set up to do our presentation. We delayed a little while waiting for last minute attendees, starting the class a little late, but with almost everyone there.

William opened up the presentation with information on how telescopes work. He talked for about 10 minutes and then turned it over to me. I did a different presentation this time, planning to explain how to use and read a star chart, but never got to how to read the chart! I got off track talking about the planets that were visible, the

upcoming sky tour, and a few other things about the people of PAS who are involved in this event and the scopes they would be using. By the time I was done with my part of the presentation it was nearly 8:40.

We then led the group out to the observing area in the Garden Terrace. Bruce had set up William's scope on Jupiter and my scope on Venus. He took Saturn; we also showed many other great objects this night including: M3, M13, the Ring Nebula, Alcor and Mizar, the three planets named above, and more. Mike kept a crowd the whole night. We also had the help of Marty Michaelson, who is a volunteer at DBG - so helpful to have him there. He kept the non-class patrons from attending until all our class members were done for the night. He and I then opened it up, letting the other patrons take a look at the planets on their way out of the garden.

I did the sky tour around 9:15 and during it the attendees had a bunch of questions which I handed off to Bruce and Mike; among the three of us, we had a great presentation going for this group. We closed the night with a few more views and the majority of the group left about 8:30pm though one couple stayed until 10 pm.

Many thanks for DBG and Angelica Ellis, for inviting us to do this really awesome event and for being patient with the weather. It definitely paid off. We had scheduled this event for May 15, but had to cancel it due to a storm. I'm glad we waited - we had a much nicer, more organized, full event, that really flew by. I couldn't believe it!

Thanks also to my awesome Telescope Team members, Bruce, Mike and William! We hope to do another Adult Education Event soon at DBG.

Bookmans Telescope Workshop May 31

By Terri, Event Coordinator

It was hot, but a wonderful day to have an event at Bookmans - indoors. We had one official RSVP, Tina and two others who were walk-ins. Tina Atherton brought her 114EQ Celestron Power Seeker, James Laney brought his Celestron Power Seeker 127 EQ and we had Rick Lemler and Jerry Searcy bring their LX 90 8". Welcome new members Rick and Jerry to PAS!

William Finch helped Tina with her scope, and before Tina arrived, William and Rodney Fong helped James with his scope. Howard Moneta assisted Rick and Jerry. Kevin Witts and Mike Marron both brought meteorite displays which kept a crowd around them through most of the event. Alex Vrenios came and also helped James with his scope for a while. Amanda (Storm) Sallas and Terri Finch worked the handout table along with Bette and Ed Wurst. Don Boyd didn't get to attend this time as he was ill, but he stayed in touch with me via Skype during the event until we got too busy to chat.

Several people drifted by the PAS table and picked up our fliers with June star charts on one side and club info on the back. Many thanks to Bookmans for hosting our event and to all the great PAS volunteers at this event. After the event, Kevin, Howard and Rodney joined Storm, Terri and William for a great dinner at the Metro Center Olive Garden. The waiter wasn't super friendly and the place was very busy but the food was awesome! And of course, the people (from PAS) attending were terrific! We look forward to next

month's Bookmans Telescope Workshop on June 28th. See you there!

Alex writes: I met a really nice man named James who brought along his new 5" Newtonian telescope on a manual equatorial mount. He had seen one or two objects through it, but quickly discovered there was a lot going on that he didn't understand. He Googled "How do I align my new telescope?" and (lucky for him!) PAS caught his eye - especially, he noted, because there was a free telescope workshop that very weekend.

We got it all assembled and tightened down, and talked about how an equatorial mount works. How, once aligned to the north star, the slow motion controls could be used to track an object as it moved across the sky. We talked about the geometry and a little history of his telescope and aligned the spotter scope. We took a look at the eyepieces that came with the scope and compared them to the much higher quality set that he purchased separately, along with a couple of filters. He seemed a bit overwhelmed as many of us did when we first learned about our new telescopes.

I got the impression he was very happy to have found us, that he intended to join PAS and that he was really anxious to get outside to put all this new knowledge to good use. I look forward to seeing him again at our next club meeting in September.

Tina writes: It was wonderful! William, Rodney and Mike were extremely helpful and answered all my questions.



Three scopes attended this event. It was very busy at Bookmans on this day. Photo by Terri.



Mike Marron & Kevin Witts each brought their Meteorite Displays to show the public. Photo by Terri.

"Planet Hunters" at the ASC Planetarium June 20

By Sam Insana, PAS President

On June 20th, Vera and I attended the premiere of "Planet Hunters" at the Arizona Science Center Planetarium. It detailed the last 20 years of astronomy research into finding planets in other solar systems. To date they have confirmed about 2000 planets and have another 3000 as possible planets. There are various techniques used, but the one used most often is the transit analysis. The luminosity of the star is measured over time. When there is a slight decrease in the luminosity over a specific period of time and then the luminosity goes back up, a planet has been detected. The size of the planet and its distance from the star is also calculated. So far there have been on aver-

age over 2 planets per star observed. The majority of these planets are rocky, not gas giants and there are a number of them in the "Goldilocks" range from the star where water and atmosphere could exist. The Planet Hunter show was only about 20 minutes, but the planetarium had other activities including multiple choice questions on astronomy for the first 10 minutes and then a "rollercoaster" tour of the universe for the last 10 minutes, so all told you are in the planetarium about 40 minutes. I would recommend it if you want to learn more about the various techniques for discovering other planets.



Terry Dancer, seen at Mike's Leonids party on Nov 16, 2013. Terry is a PAStimes Star Tour Member. Photo by Terri Finch.

DBG Walk-around in Prep for Luminaria - June 16

By Terri, Event Coordinator

It was an super hot day at the Desert Botanical Gardens. There was an Extreme Heat Warning for all of Phoenix. Amanda "Storm" Sallas, my daughter, and I took a walk with Susan Rubin of DBG around the area in which DBG wants to put the PAS Telescope Team for the 2015 Luminaria events during the Holiday Season.

Susan met with us and we walked the Desert Wildflower Loop Trail together, talking about each location, looking at possibilities, roasting in the heat. About 45 minutes later, Susan had to leave for another appointment but told Storm and me to continue to walk around as long as we would like, to get all the info we needed. So we did.

We took a walk around again, but this time I took photos of each location, labeled it on the map as to where it was, and what it was called. Susan had named the areas while we walked, and I took notes, then

went back for the photos. While at each location, I took photos, then took out the compass and made notes as to which directions we can see from that location. Trees, cactus, mountains were in the way, so i took my time making these notes. After about 1.5 hours, we finished this walk and we went home.

I spent the next day creating a photo collection of the Walk-around DBG so that the Telescope Team for the Luminaria events, will know where to set up, what location is called what, what size scope will fit in each location and what direction can be seen in the night sky. That info is in the PAS Photo Gallery at this link: http://www.pasaz.org/forums/gallery.php?g2_itemId=14678.

Susan was telling me that after the Bruce Munro Light display is erected, some evening before we start the Luminaria events the weekend of Turkey Day, I

should go down to DBG and walk the area again to make notes on what 4 locations would be best for our telescopes. I may take my Telescope Team members with me for the next trip.

The photos that are seen with this article, are the 5 locations we are planning to put the telescopes. Two more areas were chosen to be the location for the Presenters. See the link for more details.

Many thanks to Storm for attending this Walk-Around Scouting event with me, and roasting in the extreme heat. And many thanks to Susan Rubin for allowing me time to work this out, plan it, and be ready to do the event when November 2015 arrives. I look forward to a review of the set up locations, closer to the Luminaria event dates and once the Bruce Munro Light display is there, to judge the amount of light that display will produce during our observing sessions.



Area 4: Water Tower. Photo by Terri



Area 1: Sonoran Point. Photo by Terri



Area 3: Bee Garden. Photo by Terri



Area 2: Pollinator Garden Sign. Photo by Terri



Area 5: Pistal & Stem. Photo by Terri

Way Out There! – The Mystery of the Moon Trees!

By Kevin Witts, PAS Member

Stuart Roosa was born on August 23, 1933 in Durango, Colorado and all he ever wanted to do was hunt, fish and fly planes. He probably never imagined himself involved in any way with botany or as a catalyst for one of the most unusual stories involving the manned space flight program.

Roosa's father served with the Army Corps of Engineers and the family travelled extensively, eventually settling in Claremore, Oklahoma. Stuart was a good student who graduated with honors from Claremore High School in 1951. He joined the U.S. Forest Service in 1953 as a smokejumper while also attending college in Oklahoma. Smokejumpers are professional firefighters who parachute into remote wilderness areas at the onset of forest fires to help contain the blaze before it has a chance to spread. A 1952 film titled "Red Skies of Montana" chronicled the life of a smokejumper and this undoubtedly drew Roosa to enlist in the profession, along with the promise of earning \$1000 during a summer stint in the program. Roosa dropped into at least four active fires during the summer of 1953.

After his summer jumping into forest fires, and while continuing to complete his college courses in Aeronautical Engineering, Roosa enlisted in the Air Force. His early assignments included testing fighter jets at Olmstead Air Force Base in Pennsylvania and experimental aircraft at Edwards Air Force Base in California. Roosa eventually received his Bachelor's degree in 1960 and decided a few years later to apply for NASA's newly created Astronaut program. While still serving with the Air Force, Roosa was accepted into the program and became a member of NASA's 5th astronaut class in 1966, joining other notable recruits Charlie Duke, Ken Mattingly, Jack Swigert and Ed Mitchell. Roughly half of Roosa's 19-man group would fly to the Moon while the other half would become part of the Skylab or Shuttle programs. In late 1969, Roosa was thrilled to find out that he'd been selected as the Command Module Pilot for the Apollo 14 mission to the Moon. Roosa would spend almost 34 hours orbiting the Moon while Original Mercury 7 astronaut (and the first American in space) Alan Shepard and classmate Ed Mitchell would land on the Lunar surface.

Apollo 14 was outfitted to conduct extensive experiments while orbiting the Moon and was also equipped to bring back a

significant amount of lunar material. Roosa's main job was to take extensive photographs of the Lunar surface and locate a prime spot for the landing of Apollo 16, scheduled for spring of 1972. Roosa would also carry some special cargo aboard the flight.

In January of 1971, several months before the Apollo 14 launch Stuart Roosa was contacted by Ed Cliff, Chief of the U.S. Forest Service, with a personal request. Cliff had learned of Roosa's service as a smokejumper and appealed to him to carry a select supply of seeds into space with him. The idea was to send a container holding hundreds of seeds of various species of trees into space. A control set of seeds from the same sources would be left on Earth. Upon their return from space, both sets of seeds would be germinated to determine if a flight in zero gravity would affect the seeds in any way.

Roosa agreed to be a part of the experiment and added the seeds to his personal flight kit. Apollo 14 launched into space on January 31, 1971 and the legend of the "Moon Trees" was born. The carefully packed kit contained 500-600 seeds from 6 different kinds of trees, including loblolly pine, sycamore, sweetgum, redwood and Douglas fir. The seeds rode along for the 9-day trip to the Moon and made 34 Lunar orbits during the journey.

After an on-target splashdown of the command module on February 9th, Roosa retrieved the seeds from his kit and handed them over to the NASA science team. During decontamination procedures, the seed packet burst open, scattering seeds all over the lab. It was assumed that the experiment was ruined. The seeds were then swept into a pile and turned over to the U.S. Forest Service. The seeds were divided in half and sent to Forest Service offices in Mississippi and California. Officials germinated the seeds and were thrilled to find that almost all sprouted normally. After a year, the Forest Service now had over 450 seedlings in its possession and no plan on how to disperse or plant them.

While some of the seedlings were saved by the Forest Service, most were given to foreign governments as gifts or sent to suitable locations in the U.S. to be planted as part of America's bicentennial celebration in 1976. Unfortunately, poor records were kept of the distribution and the Forest Service lost

track of the location of most of the "Moon Trees." Some were planted in Russia, Brazil and Switzerland. A few were presented as a gift to the Emperor of Japan. There are records of "Moon Trees" being planted at Valley Forge, Pa., on the lawn of the White House and in Washington Square in Philadelphia. Many were planted at various universities and NASA facilities across the country. Unfortunately, most were not tracked.

Currently, there is a movement in play to locate the missing Moon Trees, and via old records, researchers are finding them in many interesting places. There is a Moon Tree on location at a Girl Scout camp in Indiana and at the Goddard Space Flight Center in Greenbelt, Maryland. Kennedy Space Center in Florida has a few. St Stephen's Lutheran Church in El Dorado Hills, California has one as well. If you are ever hauled in to the police station in Holliston, Massachusetts, say "Hi" to the big sycamore tree out front...it's a Moon Tree. Kids attending Lowell Elementary School in Boise, Idaho have their own loblolly pine astronaut to shade them, as do students in the forestry program at Auburn University.

Many of the identified Moon Trees have signs describing their origin. Many of those same trees now have protective fencing around them to dissuade opportunistic botanists and amateur gardeners who, over the years, have taken clippings in hopes to start their own generation of Moon Trees.

Stuart Roosa died on December 12, 1994, but many of his fellow passengers on that trip to the Moon live on today in small town parks and on the stately lawns of universities throughout the U.S. and around the world. In fact, if you ever venture up to the cooler temperatures and clean mountain air of Flagstaff during the summer, make a stop at Flagstaff Jr. High School and have your picture taken next to the big Douglas fir out front - it's a Moon Tree. Likewise, if your journeys ever take you down to Tucson, be sure to grab a cool drink and sit in the shade of the large sycamore tree just outside of the Kuiper Science Building on the grounds of the University of Arizona. Even though your trip to Tucson may have seemed long, just think about the trip that the tree you are leaning against made. It travelled almost 500,000 miles as a seed and circled the Moon 34 times. Yep, it's a Moon Tree, too!



No Surprise! Earth's Strongest Gravity Lies Atop The Highest Mountains

By Ethan Siegel

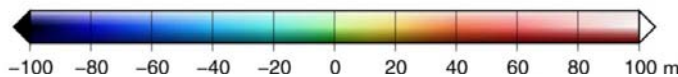
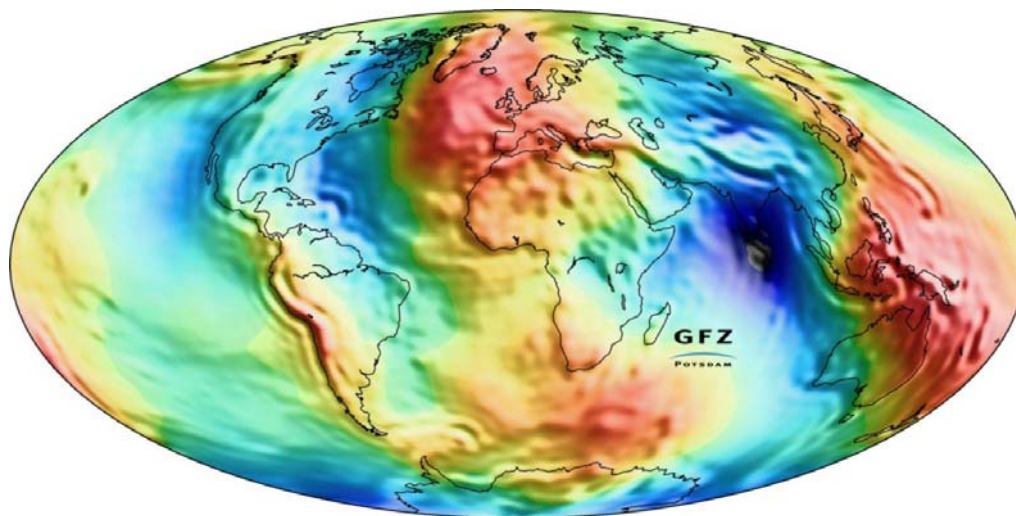
Put more mass beneath your feet and feel the downward acceleration due to gravity increase. Newton's law of universal gravitation may have been superseded by Einstein's, but it still describes the gravitational force and acceleration here on Earth to remarkable precision. The acceleration you experience is directly proportional to the amount of mass you "see," but inversely proportional to the distance from you to that mass squared.

The denser the mass beneath your feet, the stronger the gravitational force, and when you are closer to such a mass, the force is even greater. At higher elevations or even higher altitudes, you'd expect your gravitational force to drop as you move farther from Earth's center. You'd probably also expect that downward acceleration to be greater if you stood atop a large mountain than if you flew tens of thousands of feet above a flat ocean, with nothing but

ultra-light air and liquid water beneath you for all those miles. In fact this is true, but not just due to the mountain's extra mass!

Earth is built like a layer-cake, with the less dense atmosphere, ocean, and crust floating atop the denser mantle, which in turn floats atop the outer and inner cores of our planet. An iceberg's buoyancy is enough to lift only about one tenth of it above the sea, with the other nine tenths below the surface. Similarly, each and every mountain range has a corresponding "invisible mountain" that dips deep into the mantle. Beneath the ocean floor, Earth's crust might be only three to six miles thick, but it can exceed 40 miles in thickness around major mountain ranges like the Himalayas and the Andes. It's where one of Earth's tectonic plates subducts beneath another that we see the largest gravitational anomalies: another confirmation of the theory of continental drift.

A combination of instruments aboard NASA's Gravity Recovery and Climate Experiment (GRACE) satellites, including the SuperSTAR accelerometer, the K-band ranging system and the onboard GPS receiver, have enabled the construction of the most accurate map of Earth's gravitational field ever: to accelerations of nanometers per second squared. While the mountain-tops may be farther from Earth's center than any other point, the extra mass of the mountains and their roots – minus the mass of the displaced mantle – accounts for the true gravitational accelerations we actually see. It's only by the grace of these satellites that we can measure this to such accuracy and confirm what was first conjectured in the 1800s: that the full layer-cake structure of Earth must be accounted for to explain the gravity we experience on our world!



NASA / GRACE mission / Christoph Reigber, et al. (2005): An Earth gravity field model complete to degree and order 150 from GRACE: EIGEN-GRACE02S, *Journal of Geodynamics* 39(1),1–10. Reds indicate greater gravitational anomalies; blues are smaller ones.

2015 PAS GUEST SPEAKER LINE-UP

By Terri, Event Coordinator, Events@pasaz.org

Do you have an idea for a guest speaker? Email me the details. Here's a link to the scheduled guest speakers at PAS:
<http://www.pasaz.org/index.php?pageid=meetings>.

----- Summer Break -----

Sep 6: Members and Guests Night: Sign up with Terri to do a mini presentation.

Oct 1: Rik Hill "The Latest with CSS and Near Earth Asteroid Surveying"

Nov 5: David Williams "Year of the Dwarf Planet: Dawn at Ceres and New Horizons at Pluto"

Wishing Everyone a Summer filled with clear nights of Star Gazing!

