NASA Space Place

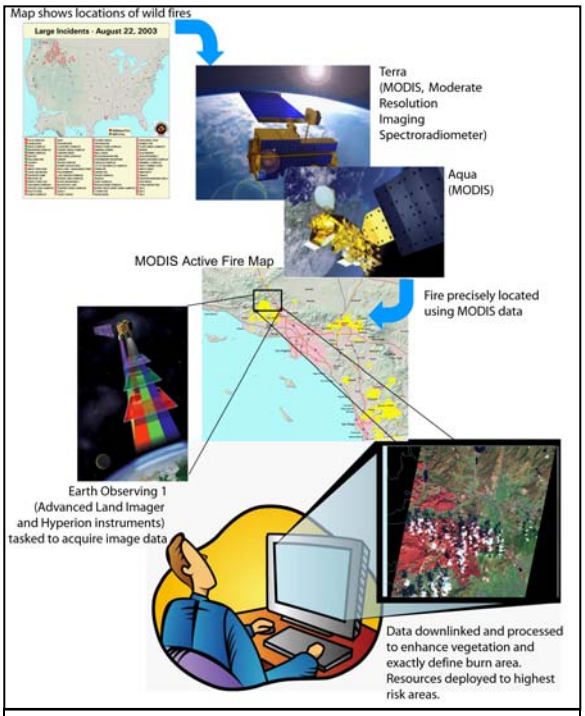
A Google for Satellites: Sensor Web 2.0

If you could see every satellite passing overhead each day, it would look like a chaotic meteor shower in slow motion.

Hundreds of satellites now swarm over the Earth in a spherical shell of high technology. Many of these satellites gaze at the planet's surface, gathering torrents of scientific data using a dizzying array of advanced sensors — an extraordinary record of our dynamic planet.

To help people tap into this resource, NASA researchers such as Daniel Mandl are developing a "Google for satellites," a web portal that would make requesting data from Earth-observing satellites almost as easy as typing a search into Google.

"You just click on it and it takes care of all the details for you across many sensors," Mandl explains.



A "Google for satellites" type of web portal will allow users to request real-time data from Earth observing satellites.

Currently, most satellites are each controlled separately from the others, each one dauntingly complex to use. But starting with NASA's Earth Observing-1 (EO-1) satellite, part of the agency's New Millennium Program, Mandl and his team are building a prototype that stitches these satellites together into a seamless, easy-to-use network called "Sensor Web 2.0."

The vision is to simply enter a location anywhere on Earth into the website's search field along with the desired information types — wildfire maps, vegetation types, floodwater salinity, oil spill extent — and software written by the team goes to work.

"Not only will it find the best sensor, but with proper access rights, you could actually trigger a satellite to take an image in the area of interest," Mandl says. Within hours, the software will send messages to satellites instructing them to gather the needed data, and then download and crunch that raw data to produce easy-to-read maps.

For example, during the recent crisis in Myanmar (Burma) caused by Cyclone Nargis, an experimental gathering of data was triggered through Sensor Web 2.0 using a variety of NASA satellites including EO-1. "One thing we might wish to map is the salinity of flood waters in order to help rescue workers plan their relief efforts," Mandl says. If the floodwater in an area was salty, aid workers would need to bring in bottled water, but if flood water was fresh, water purifiers would suffice. An early and correct decision could save lives.

Thus far, Mandl and his team have expanded Sensor Web 2.0 beyond EO-1 to include three other satellites and an unmanned aircraft. He hopes to double the number of satellites in the network every 18 months, eventually weaving the jumble of satellites circling overhead into a web of sensors with unprecedented power to observe and understand our ever-changing planet.

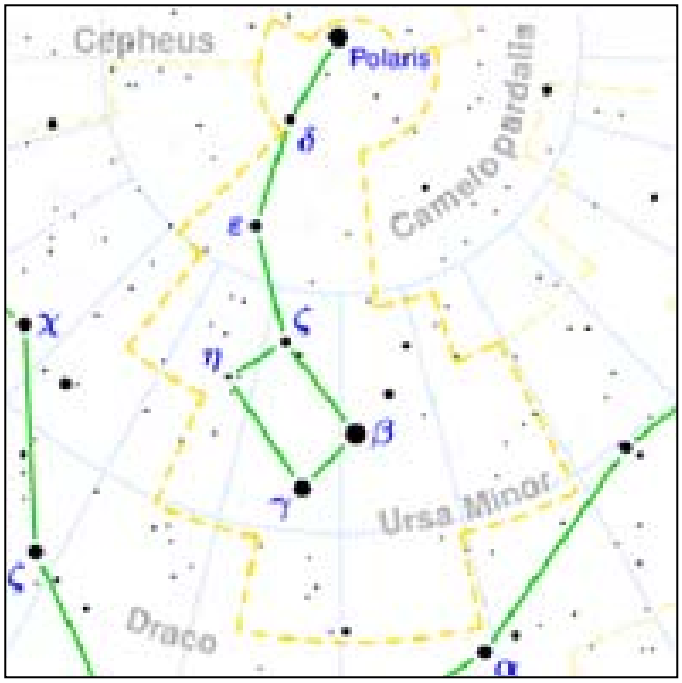
To learn more about the EO-1 sensor web initiatives, go to http://eo1.gsfc.nasa.gov/new/extended/sensorWeb/sensorWeb.html. Kids (and grown-ups) can get an idea of the resolution of EO-1's Hyperion Imager and how it can distinguish among species of trees—from space at http://spaceplace.nasa.gov/en/kids/eo1_1.shtml .

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

Polaris

By Mike Simonsen, Simostronomy

I've won and lost a lot of money for people in silly bar bets about Polaris. People have the common misconception that Polaris, the North Star, is the brightest star in the sky. It's not; Sirius holds that honor. It's not even in the top 20 brightest stars. It comes in at number 48. That'll be five dollars, thank you.



And as my friends and family all know, if you ask me an astronomy question after a few drinks, you are not going to get a short answer. So here is the rest of the fascinating story of the North Star, Polaris.

Polaris, also named alpha Ursa Minoris, is the brightest star in the Little Dipper. It marks the end of the handle. By a twist of luck it, also happens to reside very close to the North Celestial Pole (NCP). This is the point in the sky that all the stars in the north rotate around. It's not exactly on the NCP, in fact it's more than a Moons width away, so it scribes out a very small circle in long exposure star trail images like this one below. To the unaided eye it appears that all the stars rotate around Polaris while it remains fixed in one spot.

This fact has been known since ancient times, and Polaris has been used for navigation for centuries. The Chinese philosopher, Confucius, remarked, "He who exercises government by means of his virtue may be compared to the north polar star, which keeps its place and all the stars turn towards it." Not only does it tell you where north is, its angle above the horizon roughly equals your latitude on Earth.

Through binoculars Polaris looks like the diamond in a small asterism called the 'Engagement Ring'.

Through a small telescope it is easy to see that Polaris is actually a double star, a fact discovered by William Herschel in 1780. This visual companion is known as alpha UMi B.

In 1929, another fainter and much closer companion was detected spectroscopically, but it wasn't until 2006 that we were actually able to image this close dwarf star with the Hubble Space Telescope. This third member of the system is called alpha UMi Ab.

In spite of Shakespeare's Julius Caesar declaring, "I am as constant as the Northern Star, of whose true fixed and resting quality, there is no fellow in the firmament", not only is it not at rest in the firmament, the North Star is not constant in brightness either! Polaris is a variable star, and as it turns out, a rather interesting, unique variable star.

(Continued on page 8)

Call For Observations–Draco

By A.J. Crayon

Fortunately Draco gives us much to choose from because of its size. Even after this month's selection there are still many objects left for another visit. For this month the galaxies in and around the head of the dragon range from magnitude 9.9 to 12th. That is all but the Draco Dwarf, a difficult but not impossible task.

Also, for this month, a slightly different format will be tried and hope it doesn't make the article too long, yet adds more interest. Let me know what you think.

NGC6140 is claimed to have an irregular figure but its bar is in PA 95°. Depending on telescope size its 6.3'X4.6' dimensions, and 12th mag, can be anywhere from considerable faint to moderately bright.

8" F6 Newtonian, 150X; Charlie Whiting: I could not detect this galaxy at any lower powers. I saw it as very faint, roundish, about 3' diameter, and evenly bright across the halo.

8" f10, SCT at 90X; AJ Crayon: This is an elongated, very faint tough to see galaxy. It is 6'X1' in a northeast position and 12th mag. What is probably seen is the central bar. Averted vision didn't bring in any additional details. There is a 9th mag star to the Northwest but close in are 3 stars of 10th and 11th mag that form a arc reminding one of the head of Scorpius.

11" f/10 SCT at 339x; Dick Harshaw: Small, slightly brighter center. A 13th mag star lies 2 min W.

16" F4.5 Dobsonian, 261x; Dave Hofland: At **55x** a small barely detectable glow. At **261x** a bright small nucleus is all that is seen directly, with AV a diffuse round haze, ~2.5' diam with a hint of stellar core within a bright nucleus that fades rapidly away to no clear edge. An ~11th mag star <1' NW, a pair of ~10th mag stars just inside the NNW edge of the FOV ~10' away

18" f4.5, Dob, 329X; Dan Gruber: This galaxy has an extremely faint halo about 6' X 4' E – W, brightening gradually to a dim core about 2' X 1' with the same orientation. There is no nucleus. The galaxy is surrounded by a 10' circle of very faint mag 13 – 14 stars.

Next is **NGC6340** is round and a nearly face-on early type spiral. Other galaxies in the field include IC1251 and IC1254, at mag 14.2 and 14.9 respectively.

8" F6 Newtonian, 38x; Charlie Whiting: I detected this galaxy as a tiny smudge just south of an 11th mag star. At **60X** it was seen as small and round, and having a stellar nucleus. At **150X** I estimated a visual diameter of 2'. The halo was of mostly even brightness. There was a tiny stellar nucleus.

8" f/10 SCT at 104x; Dick Harshaw: Small and bright, the axis runs SE-NW. A faint pair (12m) lies 5 min N. Faint but very rich field.

8" f10, SCT at 145X; AJ Crayon: This galaxy isn't very much; it is 3' and 12th mag. It's uniformly illuminated, faint and round. With averted vision it is a little bigger and has a very little brighter middle. There is a double looking star just off the Northwest edge of 11th and 13th mag. Another galaxy was just glimpsed, when using averted vision, to the north at round and very faint. Only one there is 14th mag IC 1251.

16" F4.5 Dobsonian, 261x; Dave Hofland: At **55x** a diffuse round hazy spot S of and very close to an 11th mag star, a 7th mag star is about 15' to the SW. At **261x** a rather bright ~3' diam round glow gradually brighter to the middle with a stellar core, wide diffuse misty halo with AV, <1' SE of 11th mag star with an ~13th mag companion. Two faint galaxies share the FOV, 14.9 mag IC 1251 is about 7' N and 15th mag IC 1254 is ~8' NE, both require AV to see. Although both are nearly same listed magnitude, IC 1251 was much easier to detect. Chart shows 15.3 mag PGC 59812 ~20' N but I was not able to detect it.

18" f4.5, Dob, 329X; Dan Gruber: A galaxy with a circular halo about 3' in diameter, a circular core, and a non-stellar nucleus.

The **Draco Dwarf**, UGC10822 and a member of the Local Group of Galaxies, is next and its magnitude is listed as 9.9. Beware this can be misleading because its size is 33.5'X18. 9'and that gives it a low surface brightness. The SAC database lists the surface brightness as 17.2. So, in order to bag this one, you need a clear transparent evening and must pan around the area to detect its faint setting.

In an 8", Dick Harshaw (from suburban setting): you've got to be kidding???

8" F6 Newtonian, 150X; Charlie Whiting: This galaxy is supposed to be very large and have very low surface brightness. There is a distinctive pattern of 7 fairly bright stars that occupy roughly the middle portion of this galaxy. At low and medium power there is no sign of the galaxy. Following A J's suggestion, I went to high power and stared awhile, looking for any hints of its existence. Sure enough there were some ghostly patches seen with averted vision. They are very faint; all but invisible. But they are there. They showed up persistently while scanning around.

8" f6, Newtonian at 60X; AJ Crayon: Wow this is a very low surface brightness galaxy, elongated in northerly PA with some very faint stars embedded. The UHC didn't help. This observation circa 1999.

(Continued on page 5)

(Continued from page 4)

16" F4.5 Dobsonian; Dave Hofland: Clear night, transparency estimated about mag 5.5, able to star hop to the right location and confirm star geometry but I just could not separate anything of this galaxy beyond the overlying faint stars. Will try again under darker skies another night.

Continuing on our way finds **NGC6412** that that sports a small bar, yet the galaxy has some detail. Unfortunately, because of its magnitude, the bar is difficult to see.

8" F6 Newtonian, 150X; Charlie Whiting: Another galaxy that is too faint to be seen at less power. It is a roundish, ghostly blob about 3' in diameter. Evenly bright across the halo. It is NW of an 11th mag star. There's a very dim star at the southern edge of the halo. [14th mag].

8" f10, SCT at 90X; AJ Crayon: This galaxy isn't much at all. It is 3' and 12th mag; small, round and very faint. It is so faint that even the faintest red light destroys night vision enough that it isn't seen. It is at the end of a line of stars from the south of 8th, 10th and 12th mag.

8" f/10 SCT at 104x; Dick Harshaw" Small and faint, Geoff Chester called it "a bear!" Several nearby stars almost wash it out, including 8.3m SAO 8824 4 min S.

16" F4.5 Dobsonian, 261x; Dave Hofland: ~2° SW of 5th mag 35 Draconis. **55x** is a very small very faint spot of glow at the N end of an ~10' long ~N-S line of three stars (8, 9, and 11 mag) **261x** still a pretty faint ~2' diam glow, sort of a smoky feel to it, its not perfectly round, a wavy roundness. The halo is like a puff of smoke, textured, with a bright stellar core. A faint ~13th mag star nearly touching the SW edge of the halo. The line of three stars seen at **55x** runs from the 11th mag star ~1' SE, to the 8th mag ~4' SW. and the 9th mag ~8' SW near the edge of the FOV. Of the galaxies on this list I enjoyed this one the most.

18" f4.5, Dob, 209X; Dan Gruber: This galaxy actually looks much like a planetary nebula. It has a featureless circular halo of uniform brightness 3' in diameter and no apparent core or nucleus. There's one dim field star in the halo near the center.

The last galaxy is **NGC6654**, at 12th mag, slightly elongated with a faint bar. There is a faint star, I estimate to be around 15th mag, just to the west of the round, brighter middle. There is a 15th mag star 1.3" just to the east.

8" F6 Newtonian, 38X; Charlie Whiting: This galaxy was detected using averted vision at first. But after a while it could be seen with direct vision as a small gray blob. At **60X** it is still small. It is round and there is some brightening towards the middle. At **150X** I estimate it to be 2' in diameter, with no stellar core. There is a faint point of light that pops in and out of view within the halo and east of center.

8" f10, SCT at 90X; AJ Crayon: Another not much galaxy, is so faint that the faintest red light takes enough night vision away that it isn't seen. Need to rest for 2 or 3 minutes before being able to detect. It is 3', 12th mag is small and very faint. At times a slight elongation is detected, perhaps 1' or 2'. Just to its west is an 11th mag star.

11" f/10 SCT at 140x; Dick Harshaw: It is a fairly bright patch with a very slightly brighter middle just E of a N-S line of three 10th mag stars.

16" F4.5 Dobsonian, 261x; Dave Hofland: At low power **55x** a very faint spot of glow ~35' N of bright Chi Draconis. At **261x** a wide round misty diffuse halo ~2' diam, with a bright small nucleus. AV brings a fleeting stellar? spot overlying in the W side near the nucleus. Sharing the FOV are an ~11th mag star ~ 2' W, another ~11th mag star ~8' NW, and an ~10th mag star ~6' SSE.

18" f4.5, Dob, 209X; Dan Gruber: This is a roughly circular galaxy 2' in diameter, maybe a little elongated E – W, that brightens suddenly to a core but no nucleus.

Finally comes an asterism named after Fr. Lucian Kemble called **Kemble 2** and located at RA 18h35.0m Dec +72° 23'. It is 7th mag, 30' and forms a "Mini-Cassiopeia" like asterism.

9x50 finder scope; Charlie Whiting: This asterism is visible as a letter 'W'.

8" F6 Newtonian, 38X; Charlie Whiting: this definitely resembles Cassiopeia. The star at the center point of the 'W' is especially beautiful; very bright and golden hued.

8" f10, SCT at 90X; AJ Crayon: A real treat after looking at 3 very small, round and extremely faint galaxies. An asterism named after Jesuit Priest Fr. Kemble. It has a Cassiopeia like form with 13 stars from 7th to 12th mag, depending on where you determine the boundary. It has an orangish double looking star but am not certain it is part of asterism. The Cassiopeia asterism with 6 stars is visible in the 9X50 finder.

16" F4.5 Dobsonian, 114x; Dave Hofland: ~1° ESE of 3.6 mag Chi Draconis, an asterism consisting primarily of 6 bright stars in a remarkably similar pattern as the Cassiopeia "W". Easily seen at **55x**, covers half the FOV at **114x**, ~20'x8' aligned NE-SW with the top of the "W" to NE. It is a bit more laterally compressed than Cassiopeia, with the "W" being shape being rather symmetrical where the Cassiopeia asterism is a bit stretched to one side. Brightest stars about mag 7. Surrounding dimmer stars number an additional 10 or 12 in the general area. A very pretty asterism.

(Continued on page 6)

September 2008

SUN	MON	TUE	WED	THU	FRI	SAT
	1	2	3	4	5	6
7 ☽	8	9 ATM Meeting 1930, Paul Lind's House	10	11	12 SAC Meeting, GCU 1930	13
14	15 ○	16	17	18	19	20
21 ☾	22	23	24	25	26	27 SAC Star Party, Cherry II
28	29 ●	30				

Schedule of Events for September 2008

Sept. 7th	Moon at First Quarter at 0704mst.
Sept. 9th	ATM Sub group meeting at Paul Lind's house
Sept. 12th	SAC Meeting at Grand Canyon University at 1930, Speaker TBA
Sept. 15th	Moon is full at 0213mst.
Sept. 21st	Moon at Last Quarter at 2204mst.
Sept. 22nd	Autumnal Equinox at 0844mst.
Sept. 27th	SAC Star Party at Saddle Mountain; Sunset: 1815, Ast Twilight: 1938, Moonrise: 0455
Sept. 29th	Moon is new at 0112mst.

Future Planning

Oct 25th, 2008	All Arizona Star Party.

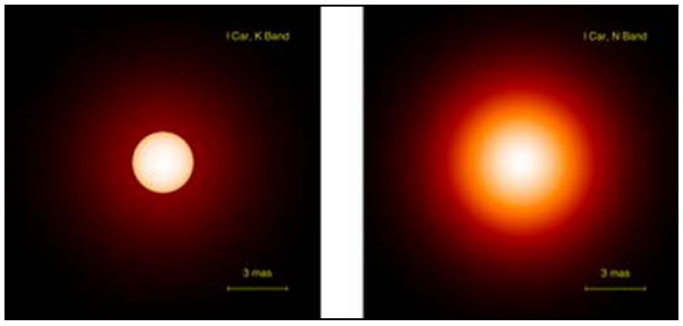
(Continued from page 3)

Polaris is a Cepheid variable. These are stars that pulsate with periods of a few days. The expansion and contraction of the outer atmosphere leads to changes in brightness. These stars are typically yellow giants or super-giants. They are huge stars, 40-180 times the radius of our Sun and much more massive. Polaris is six times as massive as our Sun and its radius is 45 times that of the Sun. Polaris is the closest of these stars, at a distance of 431 light years.

Cepheids have the unique characteristic that the period of the star, the time it takes to go from maximum light to minimum and back again, is directly proportional to the absolute magnitude (brightness) of the star. If we know the period and how bright the star 'appears' from earth, we can determine with a great deal of accuracy how far away the star is. In this way Cepheids have been used as benchmarks, or 'standard candles' to measure distances. Since these stars tend to be huge and bright, we can even see them in galaxies outside the Milky Way.

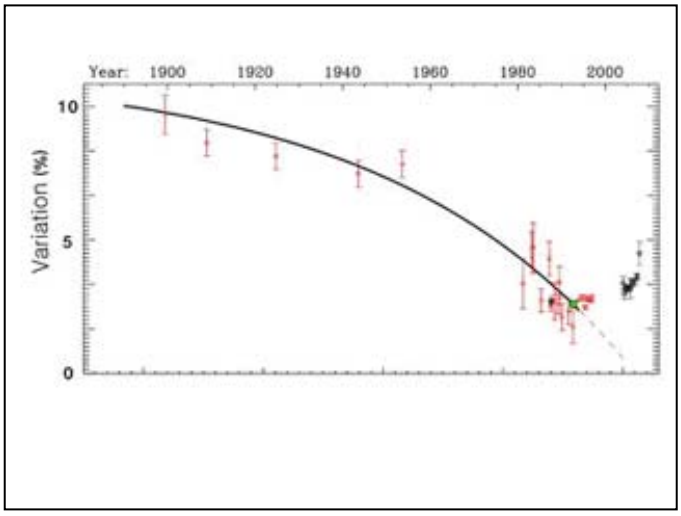
Since Cepheids are used to measure the distance to galaxies and the expansion rate of the universe, it is essential to understand their physics and evolution. Being able to image and study the exact motion of Polaris and alpha UMi Ab is a boon for astronomers who want to determine the mass of Polaris accurately. Analyzing the orbits of double stars is one of the most effective ways astronomers have for determining the mass of stars. Knowing the mass is the most important ingredient in understanding the evolution and other properties of stars.

Another interesting discovery in the last few years is that Polaris and many other Cepheids are shrouded in an envelope of gas, some 2 to 3 times the size of the stars themselves. The physical processes that have created these envelopes are still uncertain, but it is probable that these envelopes were created from matter ejected by the star itself.



As a consequence of the large amplitude oscillations of these humungous stars in a period of just a few days, material in the photospheres of these variable stars can be moving with velocities up to 100,000 km/h. It doesn't seem too unlikely that occasionally these stars might lose their gravitational grip on some of this fast moving material. Astronomers are studying the link between this pulsation, the mass loss and the formation of these envelopes.

Even stranger than all this, is the fact that Polaris has been steadily quieting down its pulsations over the last 100 years. Around 1900 the variations in brightness were about 10% of the average luminosity. During the last half of the 20th century Polaris' variations had dropped to approximately 2%. No other Cepheid is known to have gone through this. Astronomers believed they were witnessing the evolution of the star before their very eyes, and that eventually we would see Polaris' variations snuff out entirely.
In the course of performing this death-watch, it was discovered recently that Polaris is actually coming back to life! The amplitude of pulsations is on the rise. The evolutionary explanation of the changes in Polaris may not hold water any more, and astronomers will be scrambling to collect more data to figure out what is actually happening.



So, while she may not be the brightest star in the night sky, Polaris is one of the most intriguing.

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Bits and Pisces, Minutes of the June General Meeting

By A.J. Crayon

First order of business, after calling the meeting to order, is for visitor introduction. Four came forward with introductions and short; comments.

The treasurers report indicated there was $4109.00 in checking, $88.00 cash on hand. Year to date has $2112.00 coming in and $2860.00 in expenses.

Announcements started with Steve Coe indicating he was resigning as the Novice Group Chairman and that it would be taken over by another Steve, Steve Dodder. Steve Coe has done an excellent job over the years and we look forward to Steve Dodder serving as the new Chairman. The Heck With The Monsoon Star Party was July 26th at Cherry Rd site. Unfortunately no one attended because of weather *(ed. Note: This has been rescheduled for Aug. 23rd)*. Steve also showed some images of the moon, Regulus and Mars alignment. Jack Jones announced that Alabama member David Hofland was awarded the SAC 110 Best Lunar Objects.

The Grand Canyon Star Party, north rim, was discussed by Steve Dodder. There were approximately 200 people every night. Yet the number of scopes that could be accommodated is limited by the size of the veranda.
An upcoming event are SAC DOTM on August 2nd, but was clouded out; August 15th next SAC meeting, August 23rd SAC star party.

Esteemed vice-president Jennifer Polakis discussed Chris Watson's Sky Galaxy project and her discovery of a new asterism called, *Jennifer's Confluence.*. It is near NGC6567 and has the position 18 13 46 -18 48.6 (J2000). Jerry Belcher discussed and displayed his 50mm f4 refractor.

Jeff Hopkins gave a trial run on a short presentation titled *Light.* It will be presented at the Desert West Community Center. The pickle light demonstration indicated a yellow spectrum. You had to see it to believe it – a pickle has a yellow spectrum!

Jack Jones shared his experience with the Grand Canyon Star Party, south rim, by showing pictures and nice piggyback constellation shots.

By break time there were 36 folks in attendance.

Vice President Jennifer Polakis introduced the speaker, none other than Tom Polakis. His topic was titled *Rounding the Curve on Planetary Imaging*. He discussed his equipment for planetary imaging and how to improve on your results.

Monthly Trivia Question

What was the primary responsibility of the Flight Control Officer call signed "RETRO"?

Last month's Answer: Here an obscure question for you this month: What is a Quindar Tone? (No fair peeking. Don't look it up!)

OK, this is one of those things that on Jeopardy would be in the category "Names of things you didn't know had names". If you're over 45, you've almost certainly have heard a Quindar tone. These are the ubiquitous "Beeps" you hear during ground to space communications. The tones were essentially a switch that turned on and off the Capsule Communicators (CAPCOM) Audio link on the uplink to the Spacecraft. Since the Uplink was continuously transmitting data to the spacecraft, the CAPCOM's communication with other controllers, back rooms & other personnel would constantly be transmitted to the spacecraft. Thus when the CAPCOM keyed his Push to Talk (PTT) switch, a 2.575hz tone .25 second long "Intro Tone" would signal the Audio channel to open. When CAPCOM released the PTT, a second "Outro" tone slightly lower in pitch at 2.475hz (Also .25 Seconds long) would close the audio channel.

A common misconception was that the second tone originated from the spacecraft. If you listen to old audio from the Apollo landings you'll notice that that when CAPCOM ends his transmission, the Quindar tone sounds immediately, yet the response from the spacecraft comes two seconds later. This was due to the time the signal took to reach the spacecraft and the response to get back to earth.

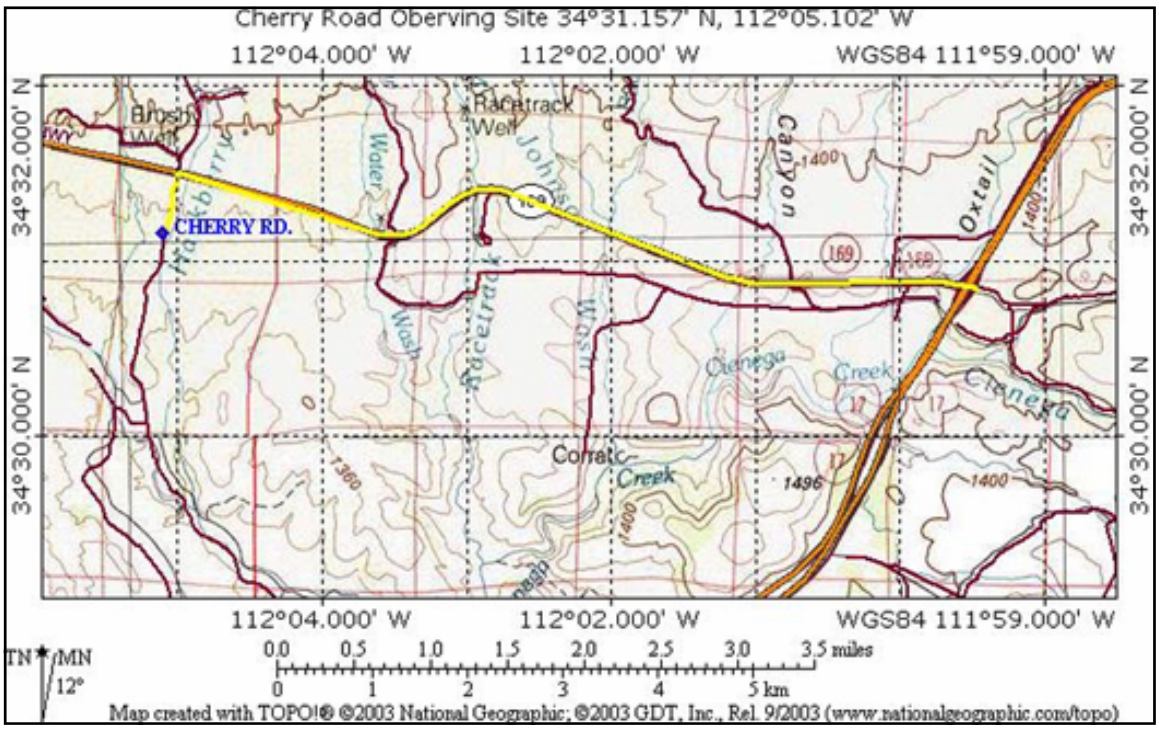
Quindar tones got their name from the company that manufactured the equipment that generated them.

BEEP: Click on the link below to hear a recording of Quindar tests from Apollo 11: BEEP:

http://history.nasa.gov/alsj/quindar2.html

SAC Membership Services

Cherry Rd. Star Parties



Take I-17 north to the Cherry Rd exit. Turn west (left) and continue on Cherry Rd for about 5 miles. Turn Left on the dirt road just past the sign that says Cherry 6. Note you turn in the direction Opposite the arrow on the sign. The site is 3/4 mile down the road on the left.

Dark of the Moon Star Parties-2008

Date	*Sunset*	*Moonset*	*Twilight*	*Location*
January 5th	*1737*	*-*	*1905*	*Antennas*
February 9th	*1813*	*2113*	*1937*	*Antennas*
March 8th	*1835*	*2001*	*1957*	*Antennas*
May 3rd	*1915*	*-*	*2049*	*Cherry II*
July 5th	*1944*	*2157*	*2129*	*Cherry II*
August 2nd	*1927*	*2022*	*2103*	*Cherry II*
August 30th	*1857*	*-*	*2024*	*Cherry II*
October 4th	*1814*	*2125*	*1937*	*Antennas*
November 1st	*1742*	*2010*	*1906*	*Antennas*
December 27th	*1734*	*1748*	*1903*	*Antennas*

SAC Membership Services

Membership– Memberships are for the calendar year and are pro-rated for new members as follows: Jan– Mar: 100%; Apr– Jun: 75%; Jul-Sep: 50%; Oct-Dec; 25%.

- ☐ $28.00 Individual Membership
- ☐ $42.00 Family Membership
- ☐ $14.00 Newsletter Only
- ☐ $10.50 Nametag for members, Pinned Clasp
- ☐ $12.50 Nametag for members, Magnetic Clasp (will be mailed to address below)

Magazine Subscription Services

The following magazines are available at a discount to club members. Check the magazines you wish to subscribe to or renew, and pay the club treasurer. Please allow 3-4 months for the order to be processed.

- ☐ Sky & Telescope $33.00/yr
- ☐ Astronomy $34.00/yr
- ☐ Astronomy $60.00 for 2 Years

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City:_____ St:_____ Zip:_____

Phone:_____

E-Mail:_____

Bring completed form to a meeting or mail it with your remittance to:

SAC Treasurer
c/o Charlie Whiting
4526 W Purdue Ave
Glendale, AZ 85302

☐ **Check here if this is an update of information already on file.**

SAC on the Internet

SAC has several E-mail mailing lists. To subscribe, send an email to the email address and put Subscribe in the subject box.

SAC-Announce@freelists.org: SAC-Announce is a mailing list for just club announcements, Typically 3-5 messages per month.

SAC-Forum@freelists.org: SAC-Forum is a general discussion mailing list. Topics should be related to Astronomy or SAC

SAC-Board@freelists.org: SAC-Board is a mailing list for discussions of club business. If you'd like to see how the club is run (or not run), or have a question about the club, this is the list to read. Typically month to month matters are discussed.

AZ-Observing@freelists.org: AZ-Observing while not a Sac list , is well attended by SAC members. This is the list to with observing places around Arizona. Find out where people are going and what they saw.

Printed Newsletter

SAC can save a lot of money if you download the PDF version of the newsletter. PDF files are readable by both PC's and Macs. When the newsletter is published, a message will be sent to the address indicated above with the URL of the newsletter. Check the box below if you don't have access to the internet or if your prefer a printed copy.

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SAGUARO ASTRONOMY CLUB

August 2008

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Videmus Stellae

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SAC Schedule of Events 2008

SAC Meetings

January 18th, 2008	July 11th, 2008*
February 22nd, 2008	August 15th, 2008
March 21st, 2008	September 12th, 2008
April 11th, 2008*	October 10th, 2008*
May 16th, 2008*	November 14th, 2008
June 13th, 2008*	Holiday Party, TBA

** Rescheduled Meeting Date*

Future Planning

April 5th, 2008	All Arizona Messier Marathon
May 30th-June 1st, 2008	5 Mile Meadow Star Party
November 28th-30th, 2007	Autumn Stargaze

SAC Star Parties

Date	Sunset	Astronomical Twilight Ends	Moonrise	Site
Jan 5th, 2008	1737	1905	0608	A
Feb 2nd, 2008	1824	1929	0507	S
Mar 1st, 2008	1829	1952	0346	S
Apr 26th, 2008	1911	2042	0100	S
May 3rd, 2008	1915	2049	0401	C
Jun 28th, 2008	1945	2130	0142	C
Jul 26th, 2008	1935	2113	0021	C
Aug 23rd, 2008	1903	2033	2303	C
Sep 27th, 2008	1815	1938	0455	S
Oct 25th, 2008	1747	1910	0432	S
Nov 22nd, 2008	1726	1853	0331	S
Dec 120th, 2008	1730	1859	0128	S

S= Saddle Mountain; C= Cherry Road; A=Antennas