Issue 2013-05

IO - May 2013

Eugene Astronomical Society
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Supernovae!!

by Bernie Bopp

"Novae" -— new stars that suddenly appear, brighten, and then fade below visibility — have been recorded for centuries. It was only in the 1930's however, that astronomers recognized that a new class of intrinsically very bright supernovae existed. We now recognize supernovae as exploding stars, some very large in mass (10 solar masses or greater) and some only slightly more massive than the Sun. Nearby supernovae (like Supernova 1987A) are rare and exciting events, and leave behind colorful and photogenic remnants like the Crab and Veil Nebulae. In the context of stellar evolution, this talk will explore how and why supernova explosions occur, and discuss supernova remnants: emission nebulae, neutron stars, and Black Holes.

We also encourage people to bring any new gear or projects they would like to show the rest of the club. The meeting is at 7:00 on Thursday, April 25th at EWEB's Community meeting room, 500 E. 4th in Eugene.

Next First Quarter Friday: May 17th

April's First Quarter Friday was clouded out, but our backup Saturday went better. Four of us were there with scopes, and Jon Schwartz came with a pair of binoculars on a tripod. We had about five customers, including a father and 5-year-old son. The son was really enthusiastic and he knew a lot about planets, so it was neat to show him Jupiter and later on Saturn after it rose high enough to see well.

We've had a few good nights since, too, with several club members taking scopes and interested onlookers showing up at the College Hill Reservoir to see what's up there. It looks like we may be edging out of the winter cloud deck and into our summer drought. Hooray for clear sky!

Here's hoping for a clear night on May 17th. If Friday is clouded out, we'll try again on Saturday the 18th.

First Quarter Fridays are laid-back opportunities to do some observing and promote astronomy at the same time. Mark your calendar and bring your scope to the College Hill Reservoir (24th and Lawrence in Eugene) and share the view with whoever shows up. Here's the schedule thru 2013:

May 17 (50% lit)	June 14 (35% lit)	July 12 (21% lit)
August 16 (80% lit)	September 13 (67% lit)	October 11 (53% lit)
November 8 (38% lit)	December 6 (24% lit)	

April Meeting Report:

At our April 25th meeting, Scott Fisher gave us an insider tour of the life of a professional astronomer. He has worked at several major observatories, including the Keck and the Gemini scopes atop Mauna Kea, the latter of which he spent 10 years with as a staff astronomer. He showed us some very impressive slides of the scopes in action and had us all envious of his experiences with (and sometimes inside) these big scopes. Scott is now working with the University of Oregon on a project wherein he hopes to enlist amateur astronomers to run meter-class telescopes remotely to help professional astronomers check up on the thousands of follow-up observations that our increasingly automated sky surveys require.

Frank and his portable binocular scope

Scott intended to talk with us about Pine Mountain Observatory as well, but we peppered him with so many questions about the Gemini scope and adaptive optics that he never got to it. We'll have to have him back for another talk. Judging by the enthusiastic response to this one, that'll be a well-attended program.

Also at the meeting, Frank Szczepanski showed us a neat hand-held binocular scope that he built with two 4" mirrors from Surplus shed. It's an amazingly lightweight and convenient grab-and-go binoscope.

Gordon Landers

Longtime EAS member and good friend Gordon Landers died on April 12th due to complications of cancer. He had been fighting it throughout the fall and winter, but the cancer was too advanced to beat.

Gordon was one of our more visible members, often taking his telescope to star parties at College Hill and at schools, and to impromptu outings at Eagle's Rest and Ridge. After an early romance with a 10" dob and the associated back pains of using a straight-through finder, he became a refractor afficionado. He was a Stellarvue guy in particular, graduating from a 4" to a 5" model just last year. He enjoyed the give and take with big dob lovers about his "tiny" scopes versus the dobs' obstructed images, and gave as well as he got. He was always happy to share a crisp, diffraction-free view through his scopes, and was just as happy to look through other people's big dobs so long as he didn't have to sight through the finders.

Gordon blasts away dew for an extended observing session at Eagle's Ridge

Gordon and his wife, Dinah, travelled to Georgia in the winters to visit family. Summers were our astronomy times with them, and as this summer observing season gets under way, we're definitely going to miss Gordon. We hope Dinah will still join us from time to time whenever she would like to go observing or to our club meetings.

No services have been announced yet, nor any wishes for memorial donations. We'll post notice on our email list as soon as we hear anything.

Reflections on Pine Mountain Observatory

by Mel Bartels

I was elected President of the Friends of Pine Mountain Observatory after Dr. Kemp's death from cancer. Little did we know that we would be in a cage fight for the observatory's life. Detractors of Dr. Kemp from the Physics Dept. led by U of O second in command Moseley attempted to shut down the observatory for financial reasons. We won a public victory — PMO stayed open with a maintenance budget. And I got a real taste for fairly big politics.

Dr. Kemp, a solid state physicist by training, made the cover of Time Magazine in 1970 for his discovery of magnetic white dwarf stars using an instrument he invented that measured circular polarization, validating a long predicted theory. Interestingly, Kemp's main rival was none other than Roger Angel, now famous for the Spinning Mirror Lab at the University of Arizona. This discovery along with earlier infrared work by Ira Nolt put PMO on the map as "the best small observatory in the world." Coincidently I taught Ira's daughter trumpet lessons. Ira was a very generous and kind person; his stories of growing up in Amish country were a real hoot.

Dr. Kemp had an amazing ability to raise money from moneyed interests out of Portland. These people began the Friends of Pine Mountain Observatory. Funding from NSF is for staff and instrumentation. It's not for domes and telescopes and grounds and facility upkeep.

After Kemp's death the moneyed interests melted away and a new group composed more of advanced amateurs interested in the observatory and educational outreach held sway. Eugene club members figured prominently, including Rob Adams who served as President and Rick Kang's long standing educational outreach efforts. Other EAS members like Jean Grendler and Sue Moe ushered in the subsequent era. Additional EAS members that volunteered extraordinary hours included Frank Casebolt, Barb Shaw, Jim Bottorff and Tracy Stephensen.

Dr. Ebbighausen started Pine Mountain Obs. by moving the Fecker 15 inch Cassegrain from Sisters out past Bend. The move was made for drier days and cloudless ultra-dark nights. No one ever imagined that light pollution one day would threaten the observatory. I took astronomy classes from Ebbighausen. He was quite the character with his chain smoking in class and his tough tests and lectures. No one sat in front except those unfortunate ones who came to class last. Ebbighausen would drill them mercilessly during class. He'd be talking about Kepler's three laws of planetary motion, pacing back and forth, lighting up cigarettes, then suddenly turn to a hapless victim in the front row and say something along the lines of, "Young lady, stand up and tell us about Kepler's third law." All his victims trembled and a few even managed to murmur something. We'd all then get his lecture about reading his textbook and coming prepared for class. Yea, like that helped!

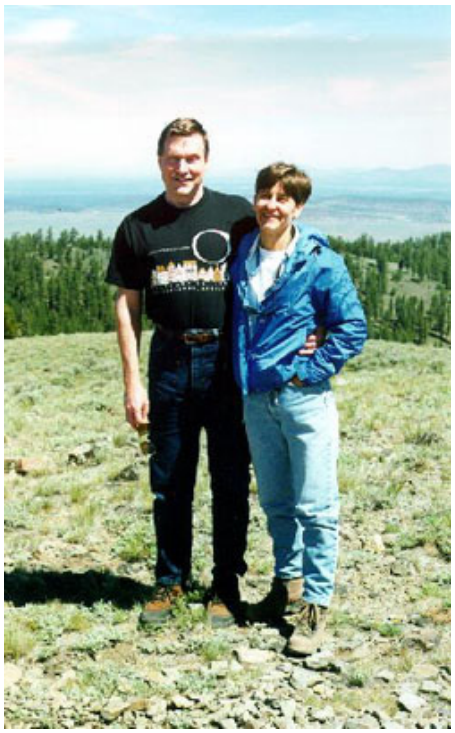
Nonetheless, or maybe because of, his classes were among the most popular on campus. He was easily distracted into telling stories. One of my favorites was of his observing craters on Mars during his graduate years at Yerkes Observatory that nearly got him kicked out of the graduate program because he was wasting valuable time using the scope visually. He suppressed his observations during his lifetime. Near the end of his life the early Mars probes revealed craters on Mars. He gave a series of standing room only lectures at the new planetarium here in Eugene. Barnard and Mellish also saw craters. Barnard too refrained from reporting his drawings. Mellish, an amateur with little to lose, did not. I sent letters to the editor of several publications mentioning Ebbighausen's recollections. Regrettably I see from searching the internet that Ebbighausen's name is not mentioned, and indeed, there is considerable verbiage devoted to convincing us all that Barnard and Mellish's observations were delusions at the eyepiece of the giant refractor. See http://adsabs.harvard.edu/full/1994JBAA..104..281S Nonetheless, Ebbighausen told the exact same story every time over the years. Three craters. 1200x on the Yerkes refractor. Perfect seeing just before morning twilight. At opposition. No dust storms. Director coming in yelling at him to get on with observing program B since he had finished program A early; if he ever caught him lollygagging observing Mars again he'd be kicked out on the spot.

For years the club had our August get together at PMO. We'd make Newtonian burgers with Cassegrain onion and tomato slices. It does snow in August there! I'd always get there before dark. It wasn't that I didn't know my way. I didn't want to run over jack rabbits that would start hopping around like mad in the dark. Then there was the time when we were stopped by a large bull with cows who decided that standing in the middle of the road and staring us down was the day's entertainment. Honking the horn did nothing but rolling down the window, leaning out and yelling "Yippee" got a slow mosey underway. Maybe they thought we, being from Eugene, were yelling "hippie." Being that these cows were proper central Oregon cows of conservative political views, they moved away in a slow offended manner.

It could be dang cold there too. On the bad nights we'd go into the basement of the 24" and huddle around the heater. It was so difficult to go back out into the blowing cold air. Worse was the night we set up in the snow. Two feet of snow, zero degrees F with 20 mph winds. Our scopes filled up with blowing snow. Even when the air temperature was 'just cold,' 'dang cold' could still get you. We did early cold camera astrophotography on the 15". Naturally I engineered a rolled film cold camera made from carefully tooled plastic. Lynn Carroll though took the low tech road – he simply duct taped on a slab of dry ice to the back of his Pentax camera. An hour later after carefully guiding on the Andromeda Galaxy, he pulled off the dry ice (it didn't sublimate much because it is cold at night even in the dome) and released the camera shutter. Nothing. A few gingerly laid in taps on the camera. Still nothing. Finally a series of quiet four letter words convinced the shutter release to unfreeze and click shut minutes later while we continued to guide manually.

In those days the visitors program averaged 50-100 people a night. We all ran the scopes. Mary in particular ran a tight ship in the 24". One night a couple of kids were playing a little too rambunctiously while waiting in the dark in the dome. Mary scolded the mother, "Whoever owns these kids better tell them to cool it real quick!" A woman's voice then rang out, "Come here kids! Knock it off." Followed by, "Wait a moment, you're not my kids!"

My tradition was to climb the hill overlooking the domes just before morning twilight to take in the full sky. Being in the domes for long periods of times can be claustrophobic. The stars were always so astonishingly bright horizon to horizon with the occasional colorful Aurora dancing to the north. The cold no longer mattered; the wind no longer felt. I was engulfed by stars; holding off the morning twilight by mental concentration for one more moment. Only the howl of the wind past my upturned face reminded me of where I stood on a summit of the world.



Mel and Barb atop Pine Mountain

For an August 6, 1972 article on Pine Mountain in the Register-Guard, go to: http://news.google.com/newspapers?id=it1VAAAAIBAJ&jtp=28

Thank You Castle Storage

For the last five years, Castle Storage has generously provided EAS a place to store its telescopes and equipment. EAS would like to thank Castle Storage for their generosity and support for our group. Please give them a call if you need a storage space, and tell your friends. They are great people and offer secure and quality storage units.

A Hobby Killer Revived

by Jerry Oltion

We've all seen hobby killers: those pitifully tiny scopes with plastic lenses and 0.965" Huygens eyepieces wobbling around on rickety equatorial mounts. If you've been involved in amateur astronomy long, you probably have at least one that someone has given you stashed away in a closet, waiting for that friend to forget about it so you can finally throw it away. I had one that came with a reasonably decent Newtonian scope that I turned into a dob, leaving the mount gathering dust in my garage.

I also have an Orion Short-Tube 80, a fine grab-and-go scope that I mounted on a camera tripod. Only problem was, when I'd point the scope anywhere near the zenith, its weight was too much for the tripod head. I needed a good alt-az mount that would let me balance the scope and aim it anywhere.

Jerry's repurposed equatorial mount

Enter the hobby-killer. Dan Jarvis had shown me an alt-az mount he'd made out of an old equatorial mount, and that made me realize I had my alt-az mount right there at hand. Simply tilt the polar axis straight up and use that for the azimuth axis, and use the former declination axis for altitude.

That worked well enough in theory, but in practice it was too easy to swing all the weight around to one side of the mount, making it too easy to tip over. The solution is to lock down the polar axis and use the joint where the entire head meets the tripod as the azumuth bearing. That way everything pivots around the center of the mount. You can fine-tune the friction by loosening the central bolt. You might need a plastic washer made from a milk jug between the head and the tripod, but I was lucky enough to have smooth motion with the factory setup.

The scope still sticks out over the side a ways, but not enough to overbalance the mount. In fact, the uneven weight helps damp the infamous hobby-killer wobble. (I did tighten up the bearings, too, which also helped a bunch.)

Mount the scope so both slow-motion knobs face you. That way you can make fine adjustments easily. The polar axis's slow-motion control works just fine with the axis locked down. In fact, that's the only way it will work. The declination axis (now altitude axis) needs to be just snug enough to provide some friction, but not tight. It's an easy adjustment to make, with lots of leeway because you don't need to worry about balance in that axis once you've centered the scope on the mount.

Why not use it as an equatorial mount? I could easily do that if I wanted, but then I would have to put a counterweight on it (more weight to carry and one more thing sticking out to bump into in the dark), and I would have to go through all the contortions an EQ mount requires of you when you want to look at awkward parts of the sky. With an alt-az mount, aiming it is simple and intuitive, your eyepiece stays in a convenient orientation, and with the fine-motion controls facing you it's just as easy to track objects along two axes as it is to do it with an EQ mount on one axis.

It's not the best alt-az mount in the world, but it sure beats a camera tripod. And it not only revived the hobby-killer mount, but the Short-Tube 80 as well. Now that I have a decent mount for it, I use it a lot more.

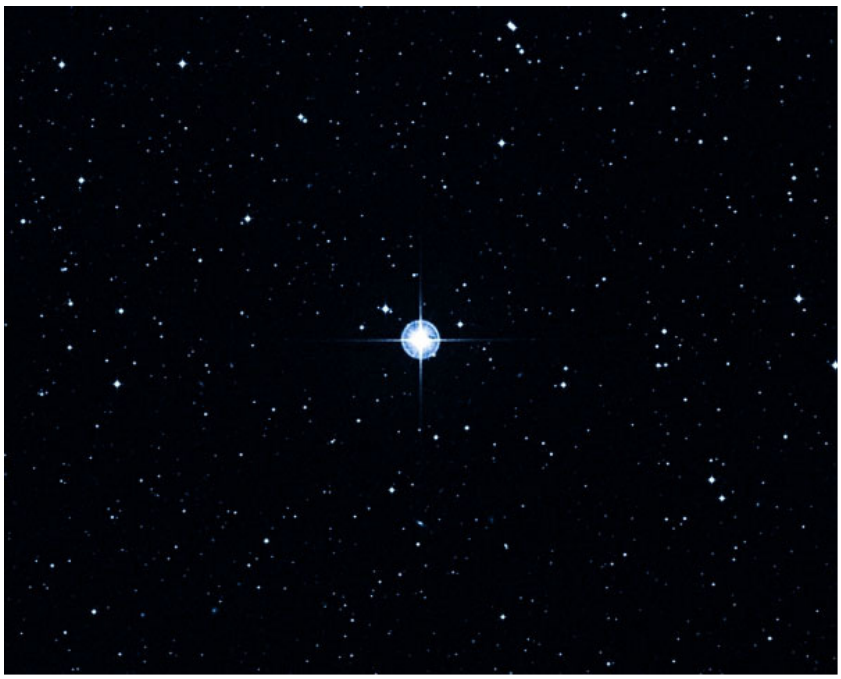
The Methuselah Star

by Sam Pitts

Astronomers using NASA's Hubble Telescope have come closer to establishing the Birth Certificate, the age of HD 140283 the "Methuselah Star." The star is thought to be 14.5 billion years old with an error of +/- .8 Billion Years. This star creates a huge issue since the Universe is thought to be only 13.8 billion Years old.

Earlier estimates in 2000 put the star at 16 billion years, which means either cosmology is wrong, stellar physics is wrong, or the star's distance is wrong. New Hubble measurements have refined the distance, which still puts it as old or older than the Universe. The star's age overlaps the age of the Universe as independently determined by the rate of expansion of space, an analysis of the microwave background from the big bang and measurements of radioactive decay.

The "Methuselah Star has been observed for about a hundred years as it streaks by in the sky at a high rate of motion. It is a visitor to our stellar neighborhood. Its orbit carries it down through the plane of our galaxy from the ancient halo of stars that encircle the Milky Way, and will eventually slingshot back to the galactic halo.



The Methuzelah Star. Credit: Digitized Sky Survey (DSS), STScI/AURA, Palomar/Caltech, and UKSTU/AAO

This conclusion was bolstered by the 1950s astronomers who were able to measure a deficiency of heavier elements in the star as compared to other stars in our galactic neighborhood. The halo stars are among the first inhabitants of our galaxy and collectively represent an older population from the stars, like our Sun, that formed later in the disk. This means that the star formed at a very early time before the universe was largely "polluted" with heavier elements forged inside stars through nucleosynthesis. (The Methuselah star has an anemic 1/250th as much of the heavy element content of our Sun and other stars in our solar neighborhood.)

The star, which is at the very first stages of expanding into a red giant, can be seen with binoculars as a 7th-magnitude object in the constellation Libra. Hubble's observational prowess was used to refine the distance to the star, which comes out to be 190.1 light-years. Bond and his team performed this measurement by using trigonometric parallax, where an apparent shift in the position of a star is caused by a change in the observer's position.

The parallax of nearby stars can be measured by observing them from opposite points in Earth's orbit around the Sun. The star's true distance from Earth can then be precisely calculated through straightforward triangulation. Once the true distance is known, an exact value for the star's intrinsic brightness can be calculated. Knowing a star's intrinsic brightness is a fundamental prerequisite to estimating its age.

Before the Hubble observation, the European Space Agency's Hipparcos satellite made a precise measurement of the star's parallax, but with an age measurement uncertainty of 2 billion years. One of

Hubble's three Fine Guidance Sensors measured the position of the Methuselah Star. It turns out that the star's parallax came out to be virtually identical to the Hipparcos measurements. But Hubble's precision is five times better than that of Hipparcos. Bond's team managed to shrink the uncertainty so that the age estimate was five times more precise.

With a better handle on the star's brightness Bond's team refined the star's age by applying contemporary theories about the star's burn rate, chemical abundances, and internal structure. New ideas are that leftover helium diffuses deeper into the core and so the star has less hydrogen to burn via nuclear fusion. This means it uses fuel faster and that correspondingly lowers the age.

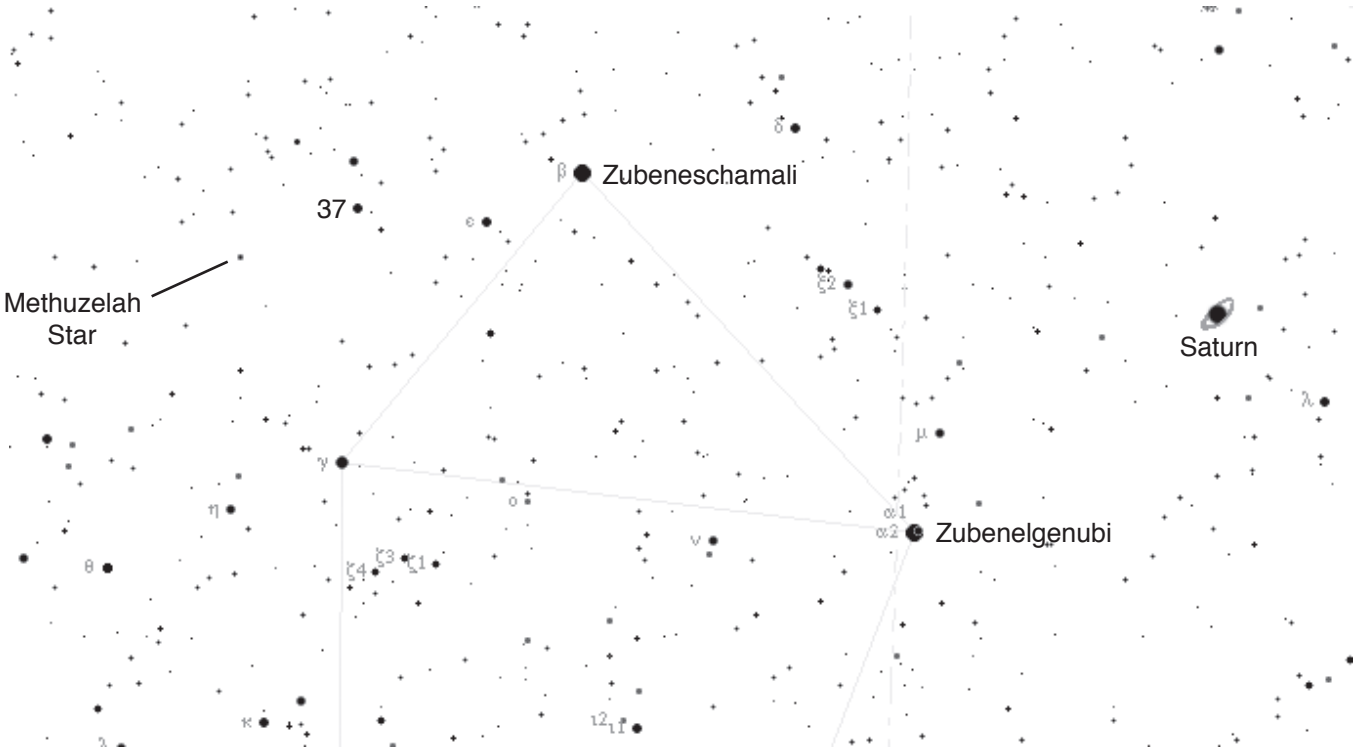
Also, the star has a higher than predicted oxygen-to-iron ratio, and this too lowers the age. Bond thinks that further oxygen measurement could reduce the star's age even more, because the star would have formed at a slightly later time when the universe was richer in oxygen abundance. Lowering the upper age limit would make the star unequivocally younger than the universe.

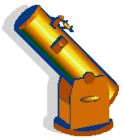
"Put all of those ingredients together and you get an age of 14.5 billion years, with a residual uncertainty that makes the star's age compatible with the age of the universe," said Bond. "This is the best star in the sky to do precision age calculations by virtue of its closeness and brightness." This Methuselah Star has seen many changes over its long life. It was likely born in a primeval dwarf galaxy. The dwarf galaxy eventually was gravitationally shredded and sucked in by the emerging Milky Way over 12 billion years ago.

The star retains its elongated orbit from that cannibalism event. Therefore, it's just passing through the solar neighborhood at a rocket-like speed of 800,000 miles per hour. It takes just 1,500 years to traverse a piece of sky with the angular width of the full Moon. The star's proper motion angular rate is so fast (0.13 milliarcseconds an hour) that Hubble could actually photograph its movement in a few hours.

For more information, see http://hubblesite.org/newscenter/archive/releases/2013/08/full/results/100/

To find the Methuzelah Star, look to the east of Saturn for the three bright stars at the top of Libra. From Zubeneschamali (gotta love that name!) head east-southeast past 37 Librae and go half again that distance and slightly south. You're now looking at the oldest known star in the universe.





Observing in May

May 2	May10	May 17	May 24
Mercury Rise: 5:45 AM	Mercury Behind Sun	Mercury Set: 9:17 PM	Mercury Set: 10:04 PM
Venus Set: 9:03 PM	Venus Set: 9:24 PM	Venus Set: 9:41 PM	Venus Set: 9:57 PM
Mars Rise: 5:56 AM	Mars Rise: 5:40 AM	Mars Rise: 5:26 AM	Mars Rise: 5:13 AM
Jupiter Set: 11:14 PM	Jupiter Set: 10:50 PM	Jupiter Set: 10:30 PM	Jupiter Set: 10:10 PM
Saturn Set: 6:13 AM	Saturn Set: 5:40 AM	Saturn Set: 5:11 AM	Saturn Set: 4:42 AM
Uranus Rise: 4:53: AM	Uranus Rise: 4:22 AM	Uranus Rise: 3:55 AM	Uranus Rise: 3:28 AM
Neptune Rise: 3:36 AM	Neptune Rise: 3:05 AM	Neptune Rise: 2:37 AM	Neptune Rise: 2:10 AM
Pluto Rise: 12:37 AM	Pluto Rise: 12:05 AM	Pluto Rise: 11:33 PM	Pluto Rise: 11:05 PM

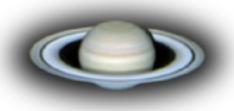
All times: Pacific Standard Time (Nov 3, 2013-March 9, 2014) = UT -8 hours or U.S. Pacific Daylight Time (March 10-November 2, 2013) = UT -7 hours.

Date	Moonrise	Moonset	Sunrise	Sunset	Twilight Begin	Twilight End
5/1/2013	01:30	11:49	06:03	20:16	04:09	22:11
5/2/2013	02:08	12:58	06:02	20:17	04:07	22:13
5/3/2013	02:42	14:07	06:01	20:19	04:05	22:15
5/4/2013	03:12	15:13	05:59	20:20	04:03	22:17
5/5/2013	03:40	16:19	05:58	20:21	04:01	22:19
5/6/2013	04:09	17:23	05:57	20:22	03:59	22:21
5/7/2013	04:37	18:25	05:55	20:23	03:57	22:23
5/8/2013	05:08	19:27	05:54	20:24	03:55	22:24
5/9/2013	05:42	20:26	05:53	20:26	03:53	22:26
5/10/2013	06:19	21:22	05:52	20:27	03:51	22:28
5/11/2013	07:01	22:14	05:50	20:28	03:49	22:30
5/12/2013	07:47	23:01	05:49	20:29	03:47	22:32
5/13/2013	08:38	23:43	05:48	20:30	03:45	22:34
5/14/2013	09:32		05:47	20:31	03:43	22:36
5/15/2013	10:29	00:21	05:46	20:32	03:41	22:38
5/16/2013	11:28	00:54	05:45	20:33	03:39	22:40
5/17/2013	12:28	01:25	05:44	20:35	03:38	22:42
5/18/2013	13:31	01:53	05:43	20:36	03:36	22:43
5/19/2013	14:35	02:21	05:42	20:37	03:34	22:45
5/20/2013	15:42	02:49	05:41	20:38	03:32	22:47
5/21/2013	16:51	03:19	05:40	20:39	03:30	22:49
5/22/2013	18:03	03:52	05:39	20:40	03:29	22:51
5/23/2013	19:17	04:31	05:38	20:41	03:27	22:53
5/24/2013	20:29	05:16	05:37	20:42	03:26	22:54
5/25/2013	21:36	06:09	05:37	20:43	03:24	22:56
5/26/2013	22:35	07:12	05:36	20:44	03:22	22:58
5/27/2013	23:25	08:21	05:35	20:44	03:21	22:59
5/28/2013		09:33	05:35	20:45	03:20	23:01
5/29/2013	00:07	10:46	05:34	20:46	03:18	23:03
5/30/2013	00:44	11:57	05:33	20:47	03:17	23:04
5/31/2013	01:15	13:05	05:33	20:48	03:16	23:06

All times are for Eugene, Oregon, Latitude 44º 3' Longitude 123º 06' for listed date

Items of Interest This Month

5/3 Io shadow transit 8:14 – 10:28
5/5 early AM, Eta Aquarid meteor shower peaks (but very sparse at our latitude)
5/10 thin crescent Moon near Venus
5/11 & 5/12 crescent Moon near Jupiter
5/13 Callisto crosses under Jupiter's south pole 8:00 – 10:00
5/17 First Quarter Friday Star Party
5/24 - 5/30 Jupiter, Venus, and Mercury close to one another at dusk (5/27 is best night)
5/26 Double shadow transit (Ganymede and Io) from dusk until Jupiter sets. This is probably the last chance to see a shadow transit this season.



For Current Occultation Information

Visit Derek C. Breit's web site: http://www.poyntsource.com/New/Regions/EAS.htm

Go to Regional Events and click on the Eugene, Oregon section. This will take you to a current list of Lunar & asteroid events for the Eugene area.