Roanoke Valley Astronomical Society

News About Amateur Astronomy
in Southwestern Virginia

Volume 27 – Number 1 January 2010

2010 Celestial Highlights

by John Goss

There is always something going on in the heavens above. The next twelve months bring a variety of sights and events that amateur astronomers won't want to miss. Let's look at some of them now, marking our calendars as we go. What follows is not an encyclopedia of events for the year, just some of the most interesting phenomena.

The Moon Among the Stars

A matter of perspective. Today's astro-imaging techniques allow amateurs to capture great shots of nebulae, clusters and galaxies. To obtain a more dramatic and unusual image, foreground objects are often included. This year, the Moon glides next to a few beautiful deep sky objects, providing that needed foreground interest. Here are three events where you can test your ability to juxtapose our nearest neighbor with incredibly distant targets:

January 11, 6:00 a.m.: The crescent Moon rises 45 arc minutes to the east of the globular cluster M4. At 6 a.m. they will be only 10° from the horizon.

February 9, 6:00 a.m.: The crescent Moon lies below M8 and M20. Will the meager light of the thin Moon swamp the two nebulae?

December 21, 3:00 a.m.: The dark, eclipsed full Moon allows binocular and telescopic observations of the star cluster M35 and the more distant NGC 2158.

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Mars Returns

Every twenty-six months or so, Mars makes a "close" approach to our Earth. It does so again on January 27 when its distance decreases to this encounter's minimum of 62 million miles. Remember back in 2003 when the Red Planet dropped to its closest distance in thousands of years? Then, it was just 35 million miles away.

The distance discrepancy between then and now is due to Mars' elliptical orbit. In 2003, Mars reached is closest distance to the sun, called perihelion, just a couple of days before it reached opposition. This time around, however, Mars will attain its greatest distance from the sun just about the same date that it reaches opposition.

Between the last two weeks of January and the first two weeks of February are the best dates to crank up the power and view Mars. This little world will culminate around midnight, and, with an altitude of over 70°, it may avoid large amounts of atmospheric distortion. In any event, beware! *Mars is always tough.*

Here are two occasions when Mars is situated near much more distant objects:

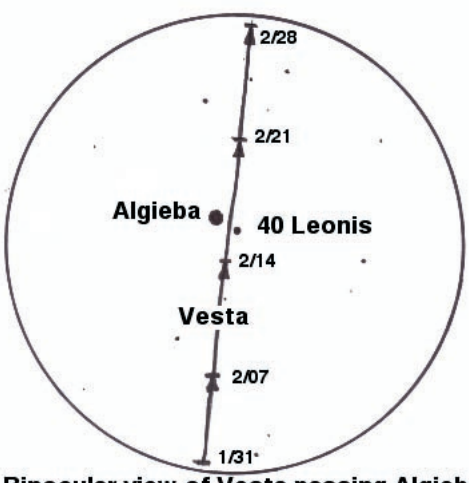
February 3, 8:00 p.m.: Mars moves 3° north of the star cluster M44.

April 12 — 19, 10:00 p.m.: Mars has a return engagement with M44.

The Brightest Asteroid

Asteroids just may be the most mysterious of all solar system denizens. They are frustratingly close, but divulge no trace of their true size. As their name implies, they always appear starlike.

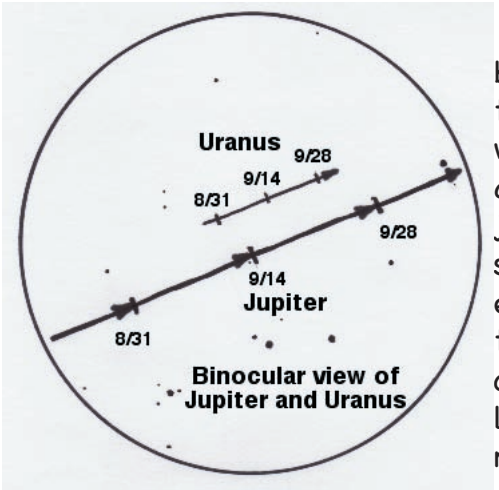
The Asteroid Belt's brightest member, Vesta, glides past the second brightest star in Leo, Algieba, giving it an easy means of positive identification. On February 16, it passes between the fifth magnitude star 40 Leonis and the second magnitude Gamma Leonis (Algieba). Appearing slightly dimmer than 40 Leonis, Vesta is an easy binocular object, so you won't need to set up a scope to catch this encounter. Look for Vesta just after darkness falls. Look again several hours later and you will notice that it will have changed its position with respect to Algieba and 40 Leonis. Vesta will brighten slightly until February 21 when it attains its closest distance to the Earth — a scant 132 million miles.



Binocular view of Vesta passing Algieba

The Year to Find Uranus

In 2009, Jupiter moved several times past the eighth major planet in the solar system, Neptune. This year it is Uranus' turn. From the middle of May until early 2011, Jupiter and Uranus share the same binocular field of view. They pass closely by each other on June 7, September 19, and January 5, 2011. The best encounter will be the evenings in mid-September when both planets reach opposition.



Uranus is bright enough to be seen with the unaided eye, but just barely so. Binoculars easily reveal the position of the starlike Uranus near glaring

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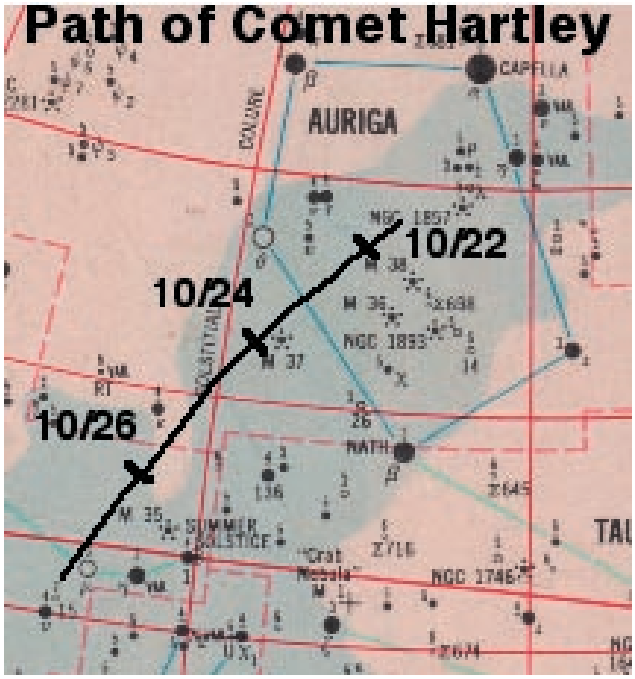
Jupiter. A telescope employing magnifications of greater than 100 shows the small greenish disk of our seventh planet.

Comet, anyone?



As it is in most years, this year's big unknown is whether we'll be graced by a comet. The most promising prospect is Comet 103P/Hartley 2, which is due to reach its closest distance to Earth — 11 million miles — on October 20. It is projected to brighten to magnitude 4.5 as it travels south in Auriga first passing Capella, then M38 and M37, and finally M35 at the foot of Gemini. Wait until 10 p.m. for Hartley to rise out of the atmospheric muck before you do any serious observing.

Due to interfering moonlight, the best dates to see this space snowball may be before October 14 and after October 28. Let's hope for a nice October surprise!

Vanishing Moon

The winter solstice brings amateurs an interesting celestial event — a total lunar eclipse. You'll have to stay up late and brave cold temperatures to see it, though. Totality begins at 2:40 a.m., and ends at 3:54. This gives you a strange chance to see how the stellar sky appears in mid afternoon on the summer solstice, June 21. With the moon substituting for the sun, the distant stars can be seen shining behind it. Certainly, this is an ususal perspective.

The eclipsed moon dimly glows 3° to the southwest of the large star cluster M35. This should provide an intriguing sight for stargazers, for binocular users and for astro-imagers alike!

Frank Baratta's Astro-Quiz

Though beach walks are not exactly activities we associate with the month of January in our part of the world, we all will especially want to avoid them on the 30th of this month. How come?

Answer to Last Month's Astro-Quiz: **Last month we asked what astronomical term happens also to be the shortest word in the English language containing 3 "y"s. The word is syzygy, the nearly straight-line configuration of three celestial bodies in a gravitational system, such as the alignment of the sun, moon, and earth during a solar or lunar eclipse. The word comes to us from the Late Latin syzygia, "conjunction," which is from the Greek syzygos, "yoked together" (from syn + zygon, "yoke").**

2010 Astronomical Resolutions

We know what "happens" to our new year's resolutions. Yes, we all want to lose weight, have more money, better health, more friends, and so forth. But we don't do much about it. Despite this universal laziness, or procrastination, there is our Universe to consider. Why not make some 2010 astronomical resolutions?

Let me, Clark, start out with mine: I have two. First, I want to finish my Caldwell objects list. I've only been playing with it for more than four years. Talk about procrastination!! Second, I want to have our club's newsletter recognized again by the Astronomical League. I will need ongoing help on this second resolution, from multiple members.

Are you a dark skies imager? If so, why not try to come up with something that would be accepted for an Astronomy Picture of the Day (APOD)? Some of their amazing images are done with simple cameras, or with modest tracking telescopic lenses. If you stay creative, and get lucky, maybe 2010 will be the year you get an image accepted for the APOD.

Not an imager? Not a confident imager? New Years resolutions are for ourselves, actually. Try one or more of these ideas:

Why not go for seeing everything on the Messier list? Why not go out on a night with very stable skies and crank up the power to see something that you have long wanted to see, but it was too blurry? Why not introduce a young person or two in your neighborhood to the glories of the night skies? Why not compose astronomy poetry? Why not get more active in the RVAS? Why not contribute regularly to the RVAS newsletter? Why not help organize our club's hosting of the 2010 VAAS convention? Whatever resolutions you choose to fulfill, it's all going to be good.

The Roanoke Valley Astronomical Society is a membership organization of amateur astronomers dedicated to the pursuit of astronomical observational and photographic activities. **Meetings are held at 7:30 p.m. on the third Monday of each month, at the Center in the Square in downtown Roanoke, Virginia. Meetings are open to the public.** Observing sessions are held one or two weekends a month at a dark-sky site. Yearly individual dues are $20.00. Family dues are $25.00. Student dues are $10.00. Articles, quotes, etc. published in the newsletter do not necessarily reflect the views of the RVAS or its editor.

RVAS web page: *http://rvasclub.org*

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Stardust in Your Rain Gutters

by Jack Gross

The meteor, or "shooting star," we see as it blazes across the night sky is light emitted when fragments, usually rather small, of cosmic material burn high up in the earth's atmosphere. The bright but momentary flare is caused by atmospheric pressure and friction as pieces of extraterrestrial material become so hot that they become incandescent, as does the ionized air around them.

A "meteoroid" is the cosmic debris found floating around the solar system. If a meteor reaches the ground and survives intact, then it is called a "meteorite." Most meteoroids burn up when they enter the atmosphere. Chunks that do survive are very valuable to both scientists and collectors The leftover debris is mostly just meteor dust called "micrometeorites."

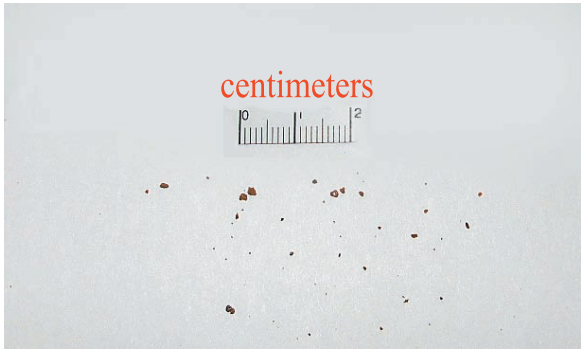
It is estimated that over 40,000 tons of this stuff fall on the Earth each year. In fact, an argument, now debunked, some times used by creationists as proof of their Biblical young earth theory (6,000 years) is that that meteorites are not found in deep layers of sediment – therefore they must have been deposited recently. Actually, meteorite dust and debris are commonly found in deep, ancient sediments.

Collecting meteorites can be an expensive hobby. Like most collectibles, the price of a specimen varies greatly, and is determined by many factors including type, size, rarity, aesthetic appeal, and the association with some famous meteorite. They can sell for as little as 50¢ to hundreds of dollars per gram. Typical prices are often $10 to $40 per gram. Alternatively, searching for them can involve major expenditures of travel and time.

Yes, there is another simple way to collect these cosmic visitors that's easy, cheap and great fun for kids. Your roof makes an outstanding collecting surface, and your rain gutters are efficient accumulators for micrometeorites.

All that's required is rummaging around in the debris collected at the down spouts with a strong magnet. The super-strong rare earth magnets work great. Harbor Freight sells 10 in a pack for around $2.00. Glue one on the end of a short wooden dowel with epoxy or J-B Weld. You'll have a terrific star dust collector, as well as a useful tool for around the work shop. I used a $8.00 Retrieving Magnet with a 150 Lb. pull (Item 36904-1VGA) to collect the specimens shown in the picture.

If you have a corrugated plastic downspout, try tipping it up. Corrugations act like a gold sluice and may trap some larger meteorites. Be creative and look for other drainage outfalls to hunt.



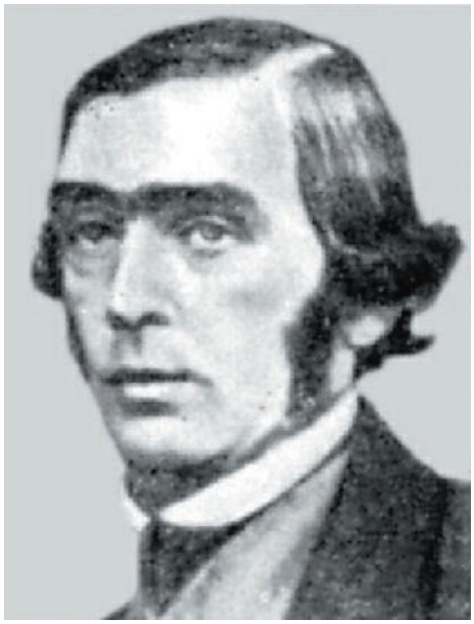
Good luck, and send Clark some pictures of your cosmic harvest.

ADVANCED Observing...

T Tauri and Hind's Variable Nebula NGC 1555

by Michael Good

The attached image ended a perfect day. My wife and I drove up to Dulles airport on Wednesday Dec 16, 2009, to pick up our son. The day was stunningly beautiful, and I had high expectations that it would remain clear. We got home around 7pm, and indeed it was still very clear. I opened the observatory to cool off, and then visited with my son until he fell asleep, having stayed awake 24 hours while returning stateside from working on his PostDoc in Sweden.



John Russell Hind

I captured some luminance on NGC 6946, a gem of a galaxy, but then moved on to today's object: T Tauri and Hind's Variable Nebula (NGC 1555). This month's advanced visual challenge is a tiny patch of nebulosity illuminated by the poster child for a category of variable stars: T Tauri. This star is about 460 light years from earth and is an irregular variable star alternating between magnitude 14 and more recently mag 9.3 over the last century. It varies several tenths of a magnitude almost daily in an irregular pattern. T Tauri is a definite double star, and possible triple star system.

The reflection nebula was discovered in 1852 by **John Russell Hind (1823-95)**, just north of the Hyades star cluster. He was working under dark skies with a 7" refractor. Details at this URL: *http://www.klima-luft.de/steinicke/ngcic/persons/hind.htm*

It is small, only about 1.5 arc minutes in size, and only about 40" (arc seconds) from the orange star T Tauri. The nebula began to fade and was gone from view using the largest telescopes of that day by 1868. Edward Barnard and Sherburne Burnham found it again in 1890, and so Hind's Variable nebula is now often referred to as "Burnham's nebula."

It has slowly brightened since the 1930's. Even now *it requires a large aperture to see it visually, such as 10" from a dark site.* If you do a Google search you will find the *www.davidarling.info* link for it, and APOD ran a gorgeous deep image of this region on Dec 13, 2007, taken by Don Goldman *http://apod.nasa.gov/apod/ap071213.html*.

To put a seasonal twist on my image, zooming in to the nebula almost looks like a baby in a manger, with a star overhead.

For imaging this region I started with 20 minutes of luminance, taken with short 2 minute integrations to reduce blooming from

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the magnitude 8.36 star close to T Tauri. I started taking 2 minute color integrations only to see strong reflections from this same mag 8 star, bouncing off the color filters (multipath), so I reduced to only using 1 minute color integrations. The Celestron 14" native f/11 was used with a Celestron f6.3 focal reducer producing about f/7 after the light passed over the AO7 adaptive optics tip/tilt mirror.

This image is closer to what might be seen visually than if I had taken more integration, but even with the short dataset, the dark cavity surrounding the nebula is visible, as is the greenish blue nebulosity from the reflection nebula.

Data was captured with CCDSoft. Data was processed (dark, flat, dark for flat) using AIP4Win. Gentle deconvolution was applied (Fast Lucy-Richardson) in AIP4Win, and the data had a linear filter applied prior to importing into Photoshop.

Color gradients are a nightmare when you do not shoot enough data. I could not image sky flats, so I used my undershirt diffuser screen against the single observatory wall light, which produces fairly severe vignetting from the flat frames. These vignetting patterns were corrected using Russell Croman's (RC-Astro) GradientXTerminator. This is a Photoshop plugin. First I select the brightest stars, aided by Noel Carboni's Photoshop Action for selecting bright stars. Then I expand by 4 pixels, and then feather 3 pixels. I apply the GradientXTerminator using medium detail and medium aggressiveness, and do this action on EACH color (red-green-blue), prior to combining to form the color dataset. I also apply this technique on the luminance data. I then combine the lum and color as overlays, and manually move them to register the images (arrow keys for fine motion).

When shooting such weak color data, I apply Levels as follows:

1) Never clip data. Move lower bar to start of data.

2) Keep upper bar at full range (for curves later).

3) Place middle selector at upper limit of the data.

This produces a lot of color noise. Apply a 2x resample of the color data to equal the luminance 1x1 binning. Flatten the color data, and then apply Curves to help reduce noise. I also made extensive use of Noel Carboni's Actions, including "Increase Star Color", "Enhance DSO and Reduce Stars", and "Lighten Only DSO and Dimmer Stars", ending up with extensive use of his deep sky and background noise cleaning actions. This $20 purchase has proved a huge time-saver, as well as improving consistency in my images. I finish up by converting to 8bit and applying a Carboni "Astro Frame" action, to put my labels at the bottom.

Moon in 1964 and in 2009

by Dave Thomas

Amateur astrophotography has come a long way in the years since the space age began. Here we have two photographs of the lunar surface, one taken by the NASA Ranger 7 moon probe on July 31, 1964 — the second image by our RVAS club astrophotographer Michael Good in 2009.

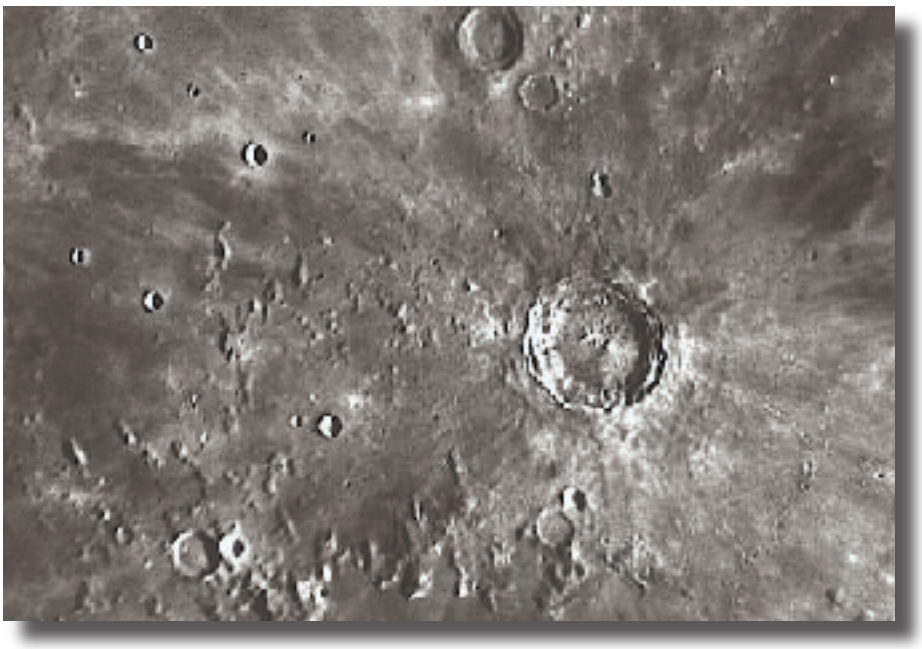
The Ranger 7 photo was transmitted to Earth just 17 minutes before the Ranger probe impacted the Lunar Surface. The photo shows the craters Ptolemaeus, Alphonsus, and Arzachel, on the shore of the Mare Nubium. The Michael Good photo was made December 27, 2009 of the crater Copernicus.

Both photos are high resolution, but one was taken without the Earth's atmosphere in the way. The Earth-bound photo shows as much detail as the Ranger 7 photo taken just minutes before impact on the Lunar surface.

Ranger - 1964

Good - 2009

Less than perfect seeing conditions challenged Good. If his telescope had enjoyed the same seeing (no atmosphere) as the Ranger craft, his Copernican results could have been spectacular.



With constantly improving tools available to the amateur astrophotographer, more and more of the night sky is being recorded at ever increasing resolution and detail. It's not just the nearby moon.

Already, advanced amateur astrophotographers at favorable locations are probing and imaging deep space as well as gigantic telescopes could do in the 1960s.

An Appreciation of Stephen Hawking

by Genevieve Goss

"Where do we come from? How did the universe begin? Why is the universe the way it is? How will it end? All my life, I have been fascinated by the big questions that face us, and have tried to find scientific answers to them. If, like me, you have looked at the stars, and tried to make sense of what you see, you too have started to wonder what makes the universe exist." So states our January "Famous in Astronomy" birthday celebrant, British theoretical physicist, Stephen Hawking, who was born January 8, 1942 ("...on the 300th anniversary of Galileo's death", as he reminds people).

Hawking attended University College at Oxford, where he studied physics, because a degree in mathematics wasn't offered. After three years of "not very much work," he was awarded a degree and went on to Cambridge to study cosmology. It is in this field, along with quantum gravity, that Hawking has most distinguished himself, especially in the context of black holes. His work with Roger Penrose indicated the necessity of unifying Einstein's General Theory of Relativity with Quantum Theory, and it led to his discovery that black holes should emit radiation and eventually evaporate.

Despite a dismal prognosis when he was in his early twenties, Hawking has survived over forty years with ALS. His take on his disability is both simple and uplifting, as he describes his life before the diagnosis as boring and without meaning: "My expectations were reduced to zero when I was 21. Everything since then has been a bonus."

Crossing the boundary between science and pop culture, Hawking has had three popular best-sellers, in addition to his academic publications, as well as cameo appearances on *Star Trek: The Next Generation* and *The Simpsons.*

As he remarked on his fame: "The downside of my celebrity is that I cannot go anywhere in the world without being recognized. It is not enough for me to wear dark sunglasses and a wig. The wheelchair gives me away."

Sharing a birthday with Elvis Presley, Larry Storch, and Soupy Sales may further weaken astrological claims, but perhaps it has strengthened his sense of humor! My favorite Hawking quote discounts reports of UFOs: "We don't appear to have been visited by aliens," Hawking said. "Why would they only appear to cranks and weirdos?"

Top 12 Sites for Astronomy Newbies

by Clark M. Thomas

Each year has twelve months, so why not compile a starter list of the "top 12" astronomy sites for those new to our passion?

Over the past decade I have collected more than a thousand sites within my own links site, ***astronomy-links.net*** (keep the hyphen). It is impossible to fairly select a dazzling dozen for everybody from any large list. However, I am thinking about what would amaze, entice, and instruct somebody new to astronomy.

So, here is my arbitrary list for newbies. If site #1 can't get your blood pumping, then it's back to the sofa and Xbox for you, Bubba.

#1: Astronomy Picture of the Day.
antwrp.gsfc.nasa.gov/apod archivepix.html

This is an awesome collection of many of the finest astronomical images ever made, often from the Hubble. Each one has an explanation with references. Perfect to enjoy on a cloudy, rainy, snowy, cold, windy night. Inside the Internet the stars always brightly shine.

#2: NASA.
nasa.gov

Here is the home page for many NASA pages and programs. Visit as many as your brain can absorb. This is where some of your tax dollars are going, but only a tiny percentage. We may not be able to visualize a quasar, but we can easily visualize ourselves flying inside the Space Station.

#3: Jack Horkheimer's videos.
jackstargazer.com/JHSG_DNLD.html

According to his buddy, our own Jack Gross, Mr. Horkheimer is nearly down for the count — but you could never tell it from these spirited one-minute and five-minute astronomy lessons. Horkheimer's greatest talent is presenting something that could otherwise be seen as dry — as highly enticing and fun, which it really is.

#4: Guide to astronomy.
space.com/images/060323_welcome guide.pdf

Here's an eleven-page, downloadable .pdf that has almost everything one needs to get started in the hobby. Like a Swiss army telescope.

#5: Atlas of The Universe.
atlasoftheuniverse.com

Amazing and unique. My personal favorite, after #1. A great way to experience the vast dimensions of our known universe. Realize the depth of what we see.

#6: NightSky.
space.com/nightsky

This is the main portal for space.com. There are many treats therein. We have already featured its Guide to Astronomy.

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#7: Photos of the Solar System. ***solarviews.com/cap/index***

Many beautiful, educational views of our solar system neighbors. The little moving "stars" we call planets, and their even smaller moons, can be surprising when viewed up close. We can't zoom in on any exoplanets, yet.

Here is one of our newbie members eager to learn about the stars above. He's eccentric. Does all his viewing in the cold. (Thanks to Gary Hatfield.)

#8: Resources for kids. ***kn.pacbell.com/wired/fil/pages/listastronomsa.html***

We need more kids hooked on the stars. Sure beats getting hooked on cigarettes, or worse. This collection of cool (not Kool) resources can do it. Parental love helps too.

#9: Astronomical League clubs. ***astroleague.org/observing.html***

Not the very first site a newbie should visit. It does show you some challenging projects anybody can do, starting with beginner clubs. Everybody likes to join a club. Get really good, and you might even join the Master Observer club. We have one of these aces in our local club. We need more.

#10: Skyhound. ***observing.skyhound.com***

Unique site that I have long enjoyed. I even found the quasar in Eridanus, after being inspired by his description. It wasn't easy to pin down, but it remains the most exciting thing I have ever seen that looks like a 14th magnitude star, but is older than the Sun and Earth. "Hitch your wagon to a star," said Emerson. Today he might say, "Hitch your car to a quasar."

#11: Astronomy dictionary. ***enchantedlearning.com/subjects/astronomy/glossary/indext.shtml***

Every enterprise has its own special vocabulary. This illustrated site helps you understand what those weird words we astronomers use among ourselves really mean.

#12: Orion telescopes and binoculars. ***telescope.com***

Once you get the astronomy bug, there is no bug spray, just UPS shipments. You are doomed to a lifetime of strange stumbling around outside in the dark, filled with childlike happiness. Ignore the frostbite.

Calendar of Events

by Frank Baratta

MONTHLY MEETING: **MONTHLY MEETING: Monday, January 18th, 7:30 p.m., Center in the Square, Roanoke. The evening will feature Jane Haddad, a Roanoke biology educator, who will present aspects of astro-biology. That includes space aliens, ladies and gents.**

RVAS WEEKEND OBSERVING SESSIONS: Unless otherwise indicated, observing sessions are held at Cahas Mountain Overlook, milepost 139 on the Blue Ridge Parkway.

- Friday and Saturday, 8th and 9th. Sunset at 5:20 p.m. Astronomical twilight ends 6:53 p.m. The Moon rises at 2:41 a.m. and 3:45 a.m.

- Friday and Saturday, 15th and 16th. Sunset at 5:27 p.m. Astronomical twilight ends at 6:59 p.m. The Moon sets at 5:59 and 6:57 p.m.

- February Sessions: 5th and 6th; 12th and 13th.

Other Programs:

ROANOKE CITY PARKS DEPT. PUBLIC STARGAZE: Saturday, January 16th, at 6:15 p.m., Cahas Overlook, milepost 139, Blue Ridge Parkway. For City, County and other area residents; RVAS members welcome. Call 540-774-5651, for information. (Next session: February 13th, 6:45 p.m., Cahas Overlook.)

FRANKLIN COUNTY PARKS DEPT. PUBLIC STARGAZE: Saturday, March 6th, at 6:45 p.m.