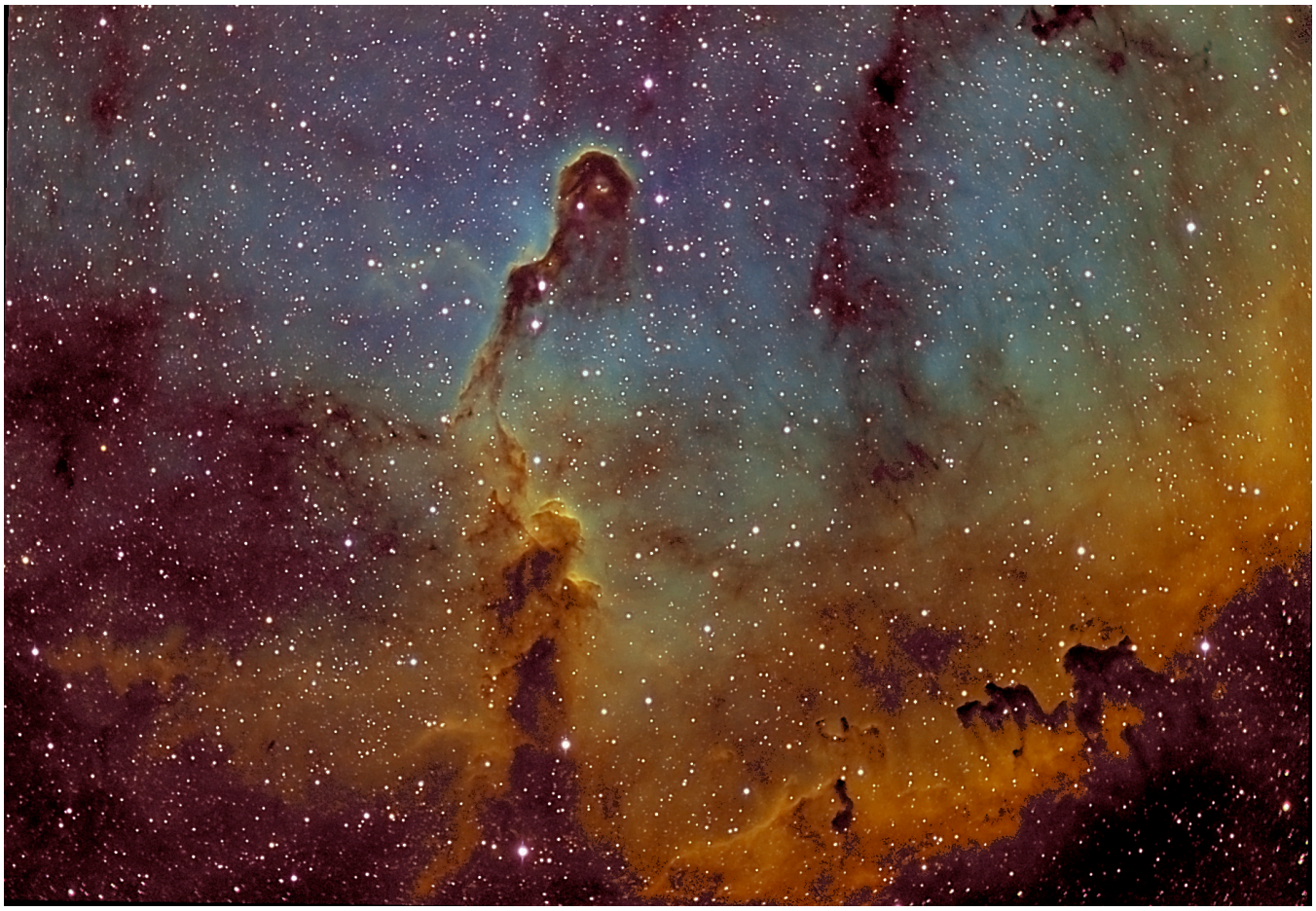
SkyWAAtch



The Elephant Trunk

Doug Baum captured this image of the Elephant Trunk nebula, IC 1396, in Cepheus. It's a Hubble Palette tri-color narrowband image--3.5 hours of H-alpha (7 x 30 minute subframes), 2 Hours of SII (4 x 30 minute subframes), and 5 Hours of OIII (10 x 30 minute subframes). Doug used a Takahashi FSQ-106 EDXII refractor and a QSI 532wsg CCD Camera on a EM-200 Mount.

The Elephant trunk is an emission nebula where young stars ionize and illuminate the surrounding dust and gas. The nebula is thought to be 2400 light years away.

Events for January 2011

WAA Lectures

"Best Winter Targets for Astrophotography"
Friday January 7th, 8:00pm
Miller Lecture Hall, Pace University
Pleasantville, NY

Dr. Reuben Kier will speak on the best objects to image during the winter. Dr. Kier has contributed photos to, and written for, *Sky and Telescope*. He is the author of The 100 Best Astrophotography Targets and lectures frequently on astrophotography. Free and open to the public.

Upcoming Lectures
Miller Lecture Hall, Pace University
Pleasantville, NY

On February 4th, the speaker will be David High; his talk will be entitled "Voyager Exits the Solar System." Free and open to the public

Starway to Heaven

Saturday January 1st, 6:30-9:00PM
Meadow Picnic Area, Ward Pound Ridge Reservation, Cross River

This is our scheduled Starway to Heaven observing date for January, weather permitting. Free and open to the public. The scheduled rain/cloud date is January 8th. Participants and quests should read our General Observing Guidelines.

New Members. . .

Rajarshi Das - Armonk
Henry Barnard - Tarrytown
Scott Mellis - New Rochelle

Renewing Members. . .

James Frost - Rye Brook
Mandira Roy - Hastings on Hudson
The Maida Family - Port Chester
Al Forman - Croton
Valerie & David Doyle - Chappaqua
John James - Sunnyside
Doug & Vivian Towers - Yonkers

Courtesy of Rick Bria, the International Space Station (ISS) is captured as it passes near the constellation Cassiopeia. In the foreground is the Mary Aloysia Hardey Observatory which is on the grounds of the Convent of the Sacred Heart.

Call: 1-877-456-5778 (toll free) for announcements, weather cancellations, or questions. Also, don't forget to periodically visit the WAA website at:

http://www.westchesterastronomers.org/.

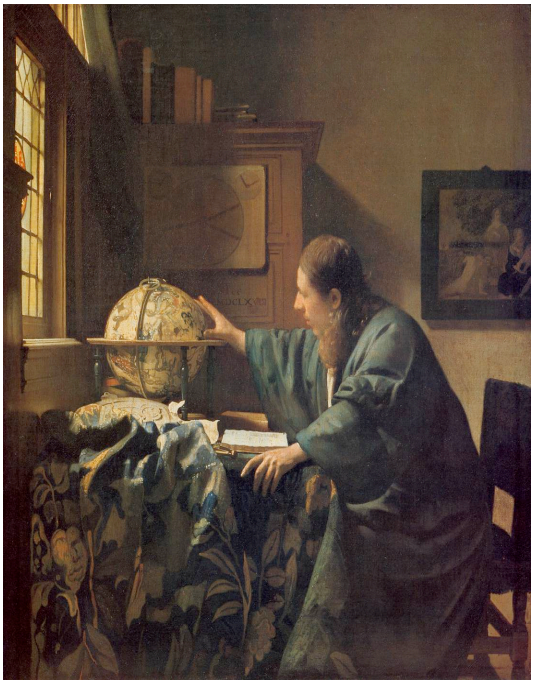
Westchester Amateur Astronomers, Inc., a 501(c)(3) organization, is open to people of all ages with the desire to learn more about astronomy. The Mailing address is: P.O. Box 44, Valhalla, New York 10595. Phone: 1-877-456-5778. Observing at Ward Pound Ridge Reservation, Routes 35 and 121 South, Cross River. Annual membership is $25 per family, and includes discounts on *Sky & Telescope* and *Astronomy* magazine subscriptions. Officers: President: Doug Baum; Senior Vice President: Larry Faltz; Vice President Public Relations: David Parmet; Vice President Educational Programs: Pat Mahon; Treasurer: Rob Baker; Secretary/Vice President Membership: Paul Alimena; Vice President Field Events: Bob Kelly; Newsletter: Tom Boustead.

Articles and Photos

Astronomy in Art: Vermeer's *The Astronomer*

by Larry Faltz

Any trip to Paris must include a visit to the Louvre, one of the world's greatest (and largest) museums, and of course a stop in front of Leonardo DaVinci's famed Mona Lisa in the museum's Denon wing. Actually, the stop is at the back of an enormous, crazed crowd who are shooting innumerable flash pictures of La Gioconda (mostly pictures of their friends standing in front of her). She is protected from the energetic, pigment-bleaching photons by a thick, brownish-tinted piece of glass. (When I first saw the painting in 1976, the protection consisted of a single hapless museum guard with her back to the painting futilely shouting "Pas de flash! Pas de flash!") The hubbub is disconcerting and even dispiriting, and it inhibits any kind of aesthetic contemplation. It immediately propels any sensitive art lover to more distant and quieter parts of the museum, and so in late September 2009 Elyse and I found ourselves wandering through the Louvre's Richelieu wing among the 17th century Dutch paintings. And there we were reacquainted with Johannes Vermeer's masterpiece The Astronomer, which we first saw at the blockbuster Vermeer show at the National Gallery of Art in Washington, DC some 15 years ago. The Astronomer is not a large painting, only about 19x18 inches in size. What it lacks in size it more than makes up in detail, power and meaning.



Only 37 paintings by Vermeer are known to exist (one of which, The Concert, was stolen from the Isabella Stewart Gardner museum in Boston in 1990 and has not yet been recovered). We are fortunate to have 8 of them in New York, 5 at the Metropolitan Museum of Art and 3 at the Frick Collection. There are 4 more at the National Gallery. Many of Vermeer's works show indoor domestic scenes, lit from a window (almost always on the left) with paintings and maps on the back wall. The background images usually carry metaphorical content that gives heightened meaning to each scene. It is thought that he used a camera obscura to lay down the design. It is not just rarity that makes these works special, but all the things that great figurative art really needs: compositional structure, exquisite draftsmanship, magnificent detail (allowing us to identify the actual objects in the painting), ethereal lighting and interesting characters.

The Astronomer was one of a pair of paintings dated to 1668, the other being The Geographer (now in the Städelsches Kunstinstitut in Frankfurt, Germany). In each, a young man is engaged in serious thought about his craft. It is generally believed that the subject for both these paintings was the famous scientist and optician Anthony van Leeuwenhoek, who in addition to his invention of the microscope and discovery of microbes was a polymath with skills in navigation, astronomy, mathematics, philosophy and biology.

The young man is examining a celestial globe with a book open in front of him. The painting's detail is so meticulous that the globe can be identified as one made by Jodocus Hondius in Amsterdam in the early 17th century (3 are still in existence). Above and behind the globe is what appears to be a planisphere. Just below the globe, partially draped, is an astrolabe, specifically one made by Willem Jansz, probably in the 1620's. The book is the second edition of Adriaan Metius' Institutiones Astronomicae et Geographicae, a practical astronomy guide published in 1621 and much in use at the time. Metius was a disciple of the great observer Tycho Brahe. It is opened to chapter 3, which tells astronomers to "seek inspiration from

God" in addition to using good instruments, in order to achieve success in research. A further reference to spiritual stimulation comes in the painting on the wall to the right, apparently The Finding of Moses by Peter Lely (the painting is also seen in the background of another Vermeer work, Lady Writing a Letter to Her Maid, in the National Museum in Dublin). Moses was also reputed to be a polymath of sorts. He was said to be the "first geographer" because he led the exodus from Egypt, although how good a geographer he might have been can be judged by the fact that he got lost for 40 years. Like many scene paintings of the time The Astronomer is trying to tell us that lessons from the past illuminate our present. It says something about the philosophical and moral themes behind the activity, particularly the belief, widely held in the proto-scientific era, that divine guidance organizes the universe.

In the decade or so before Vermeer painted The Astronomer, the modern science of astronomy began to take discernible shape. Gregory invented the reflecting telescope in 1663 and Newton's refined its design the same year as Vermeer's painting. Newton's greatest insights (gravity, calculus, the spectrum of light) were realized in the 1660's. Jupiter's cloud belts were first seen in 1664 (5 astronomers contend for the honor of discovery) and Cassini determined its rotational period in 1665. Huygens discovered Saturn's moon Titan in 1655 and figured out the planet's rings in 1656, publishing his results in 1659. That same year, he determined the approximate rotational period of Mars, further refined by Cassini in 1666. The comet of 1664 was the first one to have its path correctly understood. But astronomy was not yet fully liberated from astrology, which, except for the telescope, used the same tools, the astrolabe foremost among them. Tycho and Johannes Kepler (who died in 1630) were active astrologers. Some art scholars believe that Vermeer's astronomer is actually casting a horoscope, since he doesn't have a telescope (a Dutch invention, after all) and is working in the daytime. Nor was astronomy completely free from theology. In 1633 the Catholic Church had triumphed over Galileo, although this undoubtedly had less of an impact on scientific thought and progress in Protestant countries like the Netherlands. However, asking for divine help doesn't preclude one from being a rational and objective researcher, especially not in the 17th century. Isaac Newton, born in 1642 and perhaps the greatest scientific mind of all time, was profoundly religious. For Vermeer's astronomer, there is a deep and rational connection between the worlds of nature and faith, although it would be intriguing and revolutionary to posit that he has just made a discovery that challenges that link. It's not likely that the astronomer is merely planning that night's viewing, the way some of us study Cartes du Ciel in the afternoon before a WAA Starway to Heaven event, or that he is simply contemplating the beauty of the night sky using the representations of it available to him during the day. These latter two activities, as reasonable as they would be to us, are insufficient to warrant a reference to Moses, nor do they provide the necessary symbolism and moral impact a painting like this seeks to produce.

It is not surprising that astronomy would be an important subject in the Netherlands in the mid-17th century. As a seafaring people, the Dutch needed precise maps and accurate astronomical data for charting positions on the high seas. At least 6 other Vermeer interiors feature large, wall-mounted maps.

One of the elements in the painting that I find particularly wonderful is the astronomer's right hand, which is gently touching the globe. Maybe he is about to rotate it, or possibly he has just reached out to make contact with a piece of the sky of particular interest or beauty. It reminded me of the hand of another astronomer, Dr. Heywood Brown, as he touched the Monolith in Stanley Kubrick's movie 2001, a Space Odyssey. Brown's gesture communicates awe, reverence and not a small amount of anxiety, emotions that might also be overtaking Vermeer's astronomer. The position of the astronomer's body carries a tension that we might choose to interpret along similar lines. We are looking at a moment of discovery or enlightenment.

So when you get to the Louvre, of course visit its famous masterpieces: Mona Lisa, the Winged Victory of Samothrace, the Venus de Milo. But be sure to spend some quality time with Vermeer's The Astronomer. He may be one of the first of our amateur colleagues to be depicted in art.

Lunar Eclipse

Larry Faltz captured these images of the lunar eclipse the, which occurred on the winter solstice (December 21st). The last Northern winter solstice eclipse occurred in 1638.

◀The Colorful Moon

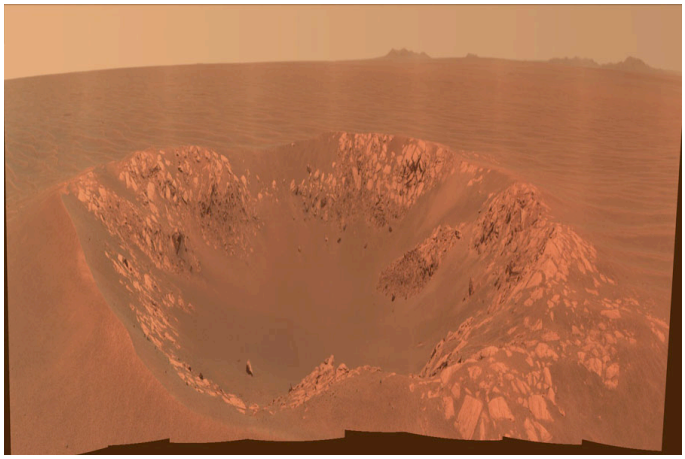
Rick Bria points out that when the Earth is exactly between the Moon and the Sun it will cast its shadow on the Moon. The Earth's atmosphere and dust scatter all light but red and that is why the Moon looks red during a lunar eclipse.

Rick took this four second exposure with a 76mm Refractor (480mm FL).

Martian Crater▶

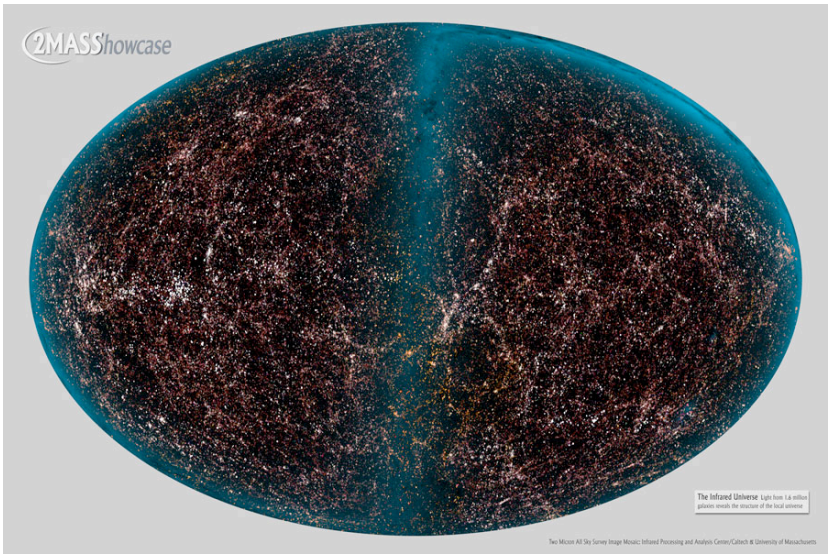
The robotic rover Opportunity has chanced across another small crater on Mars, now named Intrepid Crater. It is a 20-meter across impact basin slightly larger than Nereus Crater that Opportunity chanced across last year. The image is in approximately true color but horizontally compressed to accommodate a wide angle panorama.

Credit: Mars Exploration Rover Mission, Cornell, JPL, NASA



Northern Cross

Rick Bria provided this 'farewell until next year' picture of the summer constellation Cygnus, also known as the Northern Cross. The Northern Cross can be found in the west after dark. The bright star Deneb marks the head of the cross. Deneb is 20 times heavier, and over 200 times larger than our star, the Sun. Rick used a single 2 minute exposure (no calibration), a 28mm lens (at F4). Tracking was provided by a Meade scope base. He processed the image in Photoshop CS5.



One Million Galaxies

Are the nearest galaxies distributed randomly? A plot of over one million of the brightest "extended sources" detected by the Two Micron All Sky Survey (2MASS) shows that they are not. Many galaxies are gravitationally bound together to form clusters, which themselves are loosely bound into superclusters, which in turn are sometimes seen to align over even larger scale structures. In contrast, very bright stars inside our own Milky Way Galaxy cause the vertical blue sash.

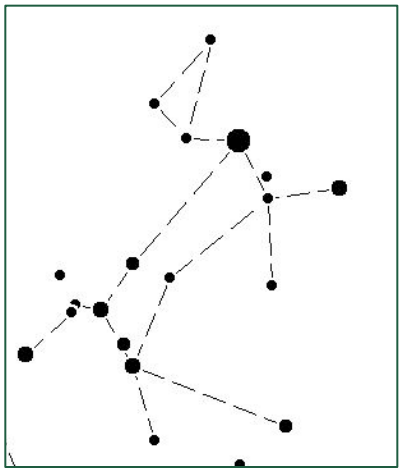
Credit: 2MASS, T. H. Jarrett, J. Carpenter, & R. Hurt

Constellation Corner

by Matt Ganis

Happy New Year everyone! Can you believe its 2011 already? It's amazing how fast time flies. As some of you may know, I keep all of the articles I write for the newsletter on my laptop (for reference) and it's amazing to see that this is the start of the 7th year for me writing these columns!! Thanks to Bob Kelly, my load has been "lightened" and I'm thankful for that.

At the end of 2010 I spent some time in my son's middle school talking to a section of 7th graders about astronomy focusing on stars, black holes and a myriad of other topics. But in talking about stars, I got to thinking about the various stages of life that stars go through and where to look for them in sky. Thus, this month's topic: White Dwarf stars.



Stars, like humans are basically born at a specific instant in time, they grow and mature into middle age and then, after a lifetime of converting hydrogen into helium (and helium into carbon and then oxygen) they reach the end of their lives and eventually die out. It's not that simple though. Some stars are more massive than others causing them to reach middle age (and thus the end of their lives) faster than their "lighter weight" counterparts. It's the stars mass (how much "stuff" there is inside the star) that determines not so much how long a star will live, but what it's final "days" will be like as it reaches its demise: Will the star just run out of fuel and die out, will it explode in a violent death or will it collapse into a blackhole and disappear from our visible universe?

White Dwarfs are indeed dying, cooling stars. As a star continues to deplete it's supply of Hydrogen, the core of the star becomes a dense mass of helium. As the core continues to contract and grow in temperature, the outer shell of leftover hydrogen begins to fuse again into helium further increasing the star's temperature. As the core compresses the newly forming white dwarf star begins to run out of helium and the star forms a carbon core. At this point, what's leftover of the outer envelope of the star lights up and is ejected from the star to form a planetary nebula (like the Ring Nebula in the the constellation of Lyra).

So what becomes of the core of the star? Based on the mass of the core, if there isn't enough material for the star to continue to compress, it will eventually cool off and simply extinguish. In the case of a White Dwarf star, the core of the star has accumulated a tremendous amount of mass in a very small area, yielding a tremendously dense star. Remember, density is defined as the amount of mass contained within a specific volume of space. In the case of the Earth, the computed density of the Earth is about 5.5 g/cm3 which is due to the large amount of iron located in the core of the Earth. So if you think about this, imagine a sphere with a radius of about 1 centimeter and squeeze about 5.5 grams of material into it – it would be tightly packed, so much so, that it would be a very dense rocky material. Now, in the case of a white dwarf (where the mass of the Sun is compressed into a sphere about the size of the Earth) the density reaches about 1,000,000g/cm3 – or a metric TON. Picture taking your car and "stuffing" it into a sphere with a radius of 1 centimeter (yes centimeter). One teaspoon of white dwarf material weighs in at over a ton.

Want to see a white dwarf ? Well, you can check out the ring nebula as I said earlier, or look to Sirius – not the bright star itself, but its companion, Sirius-B or nearby the companion to Procyon. You can't really see them (remember these are cooling stars almost at the end of their lives) but we can sense their presence, so we know they're there.

Almanac

For January 2011 by Bob Kelly


Jan 4


Jan 12


Jan 19


Jan26

The New Year comes in with long (but cold) nights for observing, but astronomers can see the slow return to longer days. May your New Year be filled with the wonderful sights of the universe!

The New Year of 2011 starts with an apparently blank southern sky for the casual suburban observer, although Jupiter has an extra surprise for all observers using any optical aid. Then, the raucous gang of the Bull, the Hunter and the Big Dog storm in from the east with their bright stars and easy-to-recognize patterns. Do you prefer to imagine a more classic, seasonal scene? Perhaps Orion and Gemini can be Three Wise Men chasing after the star, played in this Epiphany season by Jupiter. Elsewhere in the evening sky, the Northern Cross stands straight up from the northwest horizon, its long axis pointing to the Milky Way arching high across the sky though the upside-down W (ok, call it an M) of Cassiopeia. Meanwhile, three planets shiver in the morning cold waiting for the intrepid observer to see that each is more than just a bright dot in the sky.

So, let's start with the not-as-early mornings, as Saturn and Spica, the team that guided Venus into the morning sky, now appear to be scurrying away from Venus, as if shrinking from her brilliance. Saturn looks, at first appearance, to be an ordinary bright star with little to note of its splendor when observed with a telescope. This month, Saturn comes to quadrature, so we get a 'peek around the corner' as Saturn's shadow falls on the rings, which gives the ringed planet an appearance of depth. The rings are opening wider; when can anyone see Cassini's Division at lower apertures?

Venus goes from a fat crescent to half-full this month. Using higher power eyepieces and looking when the sky is getting bright should help with observing Venus' phases. Last month, some people with extremely good eyesight were able to see the crescent without optical aid. I've read that Venus doesn't appear half full when it mathematically should. Venus' greatest elongation is on January 7th; when will Venus appear half-full? Mercury joins the morning show during the last week of December and is best in early January. Mercury follows Venus' example of moving quickly into the morning sky and jumps higher than usual above the horizon. High power should show Mercury's changing phase as it moves to greatest elongation the day after Venus. Sounds like a good landscape/skyscape photo-op. How many people on your train or subway platform will notice this sight? The crescent Moon joins Venus and Mercury December 30th through January 2nd and January 29th and 30th.

Jupiter continues its rule of the evening sky, up in the middle of the southern sky after sunset. Maybe it's just me, but Jupiter looks like it's higher than half-way above the horizon even when my planetarium program says its elevation is 45 degrees. Jupiter is past opposition and we are moving further away from it, but the bright Galilean moons can be seen moving in and out of Jupiter's shadow. The 7th planet, Uranus, is within one degree of Jupiter from December 28th though January 11th, making the 5.9 magnitude planet easy to find, even in binoculars. A 5.5 magnitude star is in the field, as well, in early January, for comparison. This is the last time Jupiter and Uranus will pass each other for many years. For everything you could want to know about observing Jupiter, pull up Larry Faltz's column in the Nov 2010 edition of the WAA newsletter.

Our planet gets closest to the Sun on January 3rd, but only by a few million miles, giving the Southern Hemisphere's summer a smidge more solar radiation than during the Northern Hemisphere's summer, when we are farthest from the Sun.

The early morning of the 4th is the peak time for the Quadrantid meteor shower. Its sharp peak occurs the evening before, when the shower's radiant is low in our skies. It might be worth a look on the evening of the 3rd for the possibility of seeing meteors that leave long trails as they skip across the top of our atmosphere.

The Space Shuttle Discovery has been 'taken back to the shop' into the humongous Vehicle Assembly Building for examination of the ribs of its external fuel tank, some of which were found to be damaged during inspections while NASA was investigating a fuel supply connector leak. Then next opportunity for launch is in February, with the final launch of Endeavour possible in April.

Updates and photos at my blog at bkellysky.wordpress.com .