First Light

Newsletter of the Alachua Astronomy Club

North Central Florida's
Amateur Astronomy Club
29°39' North, 82°21' West

November/ December
Issue 111.1/1102.1

Member
Astronomical
League

Member
International
Dark-Sky Association

Photograph courtesy NASA
Comet Lovejoy seems poised to pierce the layers of Earth's atmosphere in a picture taken December 22 by astronaut Dan Burbank, commander of the Expedition 30 crew aboard the International Space Station.

Presidential Comments	Bob Lightner	AAC President

Well 2011 year is rapidly coming to an end and I wish to commend the many people who have been a part of the officers and volunteers for the Alachua Astronomy Club. These people make our club great and they rarely get the thanks that they deserve. So I plan on taking the opportunity to do that here. Our Vice President, Marlene Grabbe, has been quite a help with "ploof reeding" the agendas and our super club newsletter, FirstLight. Marlene has been at every Board meeting to assist with our decision making and has stood by as the "second in command." Thanks, Marlene!

Our Secretary this year was Paula McLain. She was superb. She made sense of the Board minutes, wrote great summaries of events and really set the bar high. Thanks, Paula!

Our Treasurer, Ivo Rabbell, kept the money straight this year--as well as other things! Ivo is a hard worker and he puts forth a 100% effort for the AAC. Part of his job is to maintain membership records and report them to the International Dark Sky Association. He also helps out at the UF Campus Teaching Observatory for the Public Nights. Thanks, Ivo!

Bill Helms served us as a Board member this year. Bill was a great help to me throughout this year. His past experience as president of the AAC also was quite welcome. Bill travels a long way to attend our functions. We deeply appreciate all the things he does for the AAC. Thanks, Bill!
Dr. Howard Eskildsen also travels a long way and he was one of our Board members this past year. He always made Board meetings fun and at the same time serious. He brings himself and our club lots of great P.R. with his fantastic astrophotography. The daily Lunar Photo of the Day often has his pictures. Thanks, Howard!

Pam Mydock was a Board member this year. She did so much for our club. Every committee she served on was productive and contributed to our success. Thanks, Pam!

Chuck Broward has kept the Amateur Telescope Making meetings interesting and fun. This special interest group faction of our club is quite interesting, thanks to Chuck's extensive knowledge, great humor and superb brownie-making talent. Chuck also has been our representative for ALCOR. Thanks, Chuck!

Bob O'Connell led our other special interest group, the lunar observers. Bob has been a steadfast feature in the AAC and his love of the moon spills over to the rest of our membership. He has been publishing articles and attending national lunar and astronomical meetings. All of his work in this area contributes immensely to how the AAC looks in the eyes of our nation and internationally. Thanks, Bob!

Mike Toomey has done so much this year beyond just Outreach. He has helped with our website, ran special workshops and attended the annual Starry Night planning sessions on behalf of our club. He has helped us with all of our varied Outreach events throughout the year, too. Thanks, Mike!

Tandy Carter continued on as our School Liaison this year, working with the area schools on special star parties for the children. His work has helped us show the heavens to countless numbers of school children this past year. Thanks, Tandy!

Dr. Andreas (Andy) Howell was our wonderful Program Chairman this year. He instituted the gift of a specially imprinted coffee (tea) mug for every presenter. The guest speakers he got for our club were truly second-to-none. Every meeting of the AAC this year had a superb speaker. Thanks, Andy!

Clint McLain, Paula McLain and Paul Griffin all had a hand in setting up our club's private star parties. We had some great ones this past year. Thanks ***to all of you*** for the work you did!!!

Dr. Arne Reykowsky kept on producing excellent newsletters like the one you are reading. His writing and design skills, along with his depth of understanding of the field of astronomy and astrophotography produced some really great FirstLight publications. Thanks, Arne!

Daniel Wells got our new website up and running, along with the help of Michael Ivey (who was the designer). Daniel put a huge amount of effort into making our new website more than just a forum site. It was very functional, easy to learn and provides the club with much-needed two-way communication and information. His work was greatly appreciated. Thanks, Daniel!

JoAnn Stevener continued to be an excellent hostess this past year. She always had snacks and drinks available at our meetings and her deviled eggs were something I always looked forward to. She also went to the UF Campus Teaching Observatory for the Public Nights and even set up hot cocoa for our ground-breaking at the Newberry Star Park in cold January. Thanks, JoAnn!

I pray that I have not forgotten anyone. If I have, please forgive me. You can plainly see that our club has a LOT of hard working members. If you would like to run for an office, make the nominating committee aware of your interests this next October. The AAC is always looking for folks who want to help our club progress forward.

2012 is an important milestone in the AAC. It is our ***Quadranscentennial*** (25^{th} year, Silver) anniversary. We have a new slate of officers who are going to make this special anniversary a memorable one. I look forward to 2012 with great optimism. I hope it will be a great year in the continuing history of the AAC. Thank you, my fellow members, for allowing me to serve as your president!

Alachua Astronomy Club, Inc.
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AAC Meeting Location - AAC regular meetings are held on the second Tuesday of each month **at 7:00 p.m.** at the Florida Museum of Natural History, **Powell Hall**, in the Lucille T. Maloney Classroom, on UF campus, unless otherwise announced. All meetings are free and open to the public. Join us for some great discussions and stargazing afterwards. Please visit our website for more information (floridastars.org). There is no monthly meeting in December.

Submitting Articles to FirstLight

The AAC encourages readers to submit articles and letters for inclusion in *FirstLight*. The AAC reserves the right to review and edit all articles and letters before publication. Send all materials directly to the *FirstLight* Editor.

Materials must reach the *FirstLight* Editor at least 30 days prior to the publication date.

Submission of articles are accepted **by e-mail or on a CD**. Submit as either a plain text or Microsoft Word file. (In addition, you can also send a copy as a .pdf file but you also need to send your text or Word file.) Send pictures, figures or diagrams as separate .gif or .jpg file.

Mailing Address for Hard Copies or CDs

Note: Since our mailbox is *not* checked daily, mail materials well before the deadline date. (Hence, submission by e-mail is much preferred!)

c/o FirstLight Editor
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Gainesville, FL 32614-1591 USA

By E-Mail: Send e-mail with your attached files to **FirstLight@floridastars.org**.

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STAR PARTY / OBSERVATION SCHEDULE: Upcoming Events - 2011			
Event	**Date**	**Location**	**Start/End Time**
Stargazing at Hickory Ranch	Saturday, January 21	Hickory Ranch, Paynes Prairie	6:00pm-9:00pm EST
Star Party at NSP	Saturday, January 28	NSP	Setup starts at 5:00pm. Sunset is at 6:04pm. Please arrive before sunset.

School Outreach Program: Upcoming Events - 2011			
School	**Date**	**Location** Check the website for directions	**Start/End Time**
Williston Elementary	Thursday, February 2	801 S Main Street, Williston Florida, 32646	5:00pm-10:00pm Sunset: 18:06
Oak Hall	Thursday, February 29	8009 SW 14th Ave. Gainesville, FL 32607	5:30pm-9:30pm

Rosemary Hill	**Bob Lightner**	**AAC President**

Here are some photos I took at Rosemary Hill this past month. The boys are (1) my nephew, J.T. Smith and his friend (I forget his name at the moment). J.T. is an astronomy enthusiast (wearing the maroon jacket) and he was excited to see the large telescope.

Dr. Reyes took the CCD camera off of the scope, inserted a secondary mirror and allowed us to "LOOK" through the 30-inch. It was great!

Starry Night

Starry Night

Our Annual Holiday Party

Bob Lightner | **AAC President**

December 3, 2011 at the Residence of Mark and Cindy Barnett

Well, if you have ever attended a royal feast, then you know what we all experienced this month at our last official gathering of 2011. There was food, food, food, galore for everyone. There was also plenty to drink and we even tried to slip in a little informal meeting. Several of our members were awarded the AAC “STAR” awards (JoAnn Stevener, Ivo Rabell, Rich Russen, and yours truly). We even had an impromptu contest on finding astronomical words in a crossword and word -search puzzle. Pam Mydock won both contests and was awarded two prizes for her efforts.
The merriment began at six o’clock and ended around ten. I think I gained five pounds that evening. Everything was tasty and I must brag on our wonderful cooks. The AAC has an extremely excellent bunch of master chefs! When we aren’t looking skyward, we are busy eating delicacies from several different cultures and kitchens. I think we need to list this as an additional perk for being a member. What do you think?
Anyway, these photos will show you that we all had a delightful evening. Make sure you set aside next year’s Holiday Party; date TBA.

Our Annual Holiday Party

Bob Lightner

AAC President

Equation of Time	Arne Reykowski	FirstLight Editor

With excerpts from Wikipedia, the free encyclopedia

If, over the course of an entire year, we would take a picture of the sun in the sky at exactly the same time of the day and overlay these pictures into a composite image, we would get an image similar to Fig 1. The pattern described by the sun in the sky is called "Analemma".

We all understand that due to the inclination of the Earth's axis, the suns apparent trajectory in the sky changes during a year. The longest trajectory with the highest elevation of the sun at noon signifies the Summer solstice and the shortest trajectory indicates the Winter Solstice. Well, this explains the different trajectories, but why does the sun describe a "Figure Eight" style Analemma, instead of just a simple straight line?

The answer is, that something causes a shift in the apparent daily arrival time of the sun (called the apparent solar time) over the period of a year. This difference between apparent solar time and mean solar time is given by the "Equation of Time" (Fig. 2). At any given instant, this difference will be the same for every observer. The equation of time can be found in tables (for example, The Astronomical Almanac) or estimated with formulas given below.

Apparent (or true) solar time can be obtained for example by measurement of the current position (hour angle) of the Sun, or indicated (with limited accuracy) by a sundial. Mean solar time, for

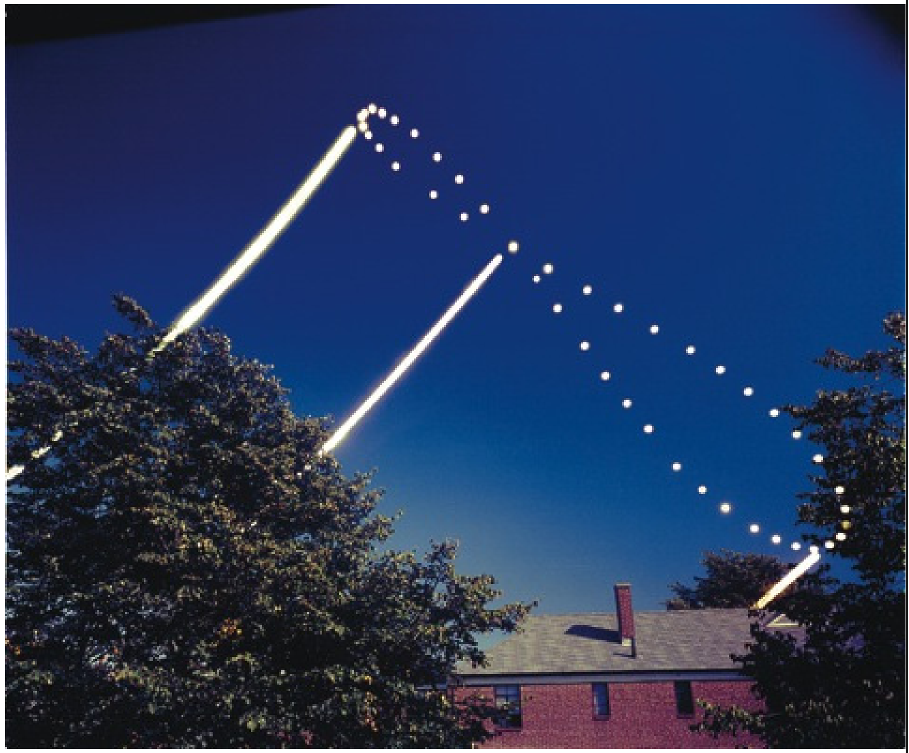


Fig. 1 The Analemma

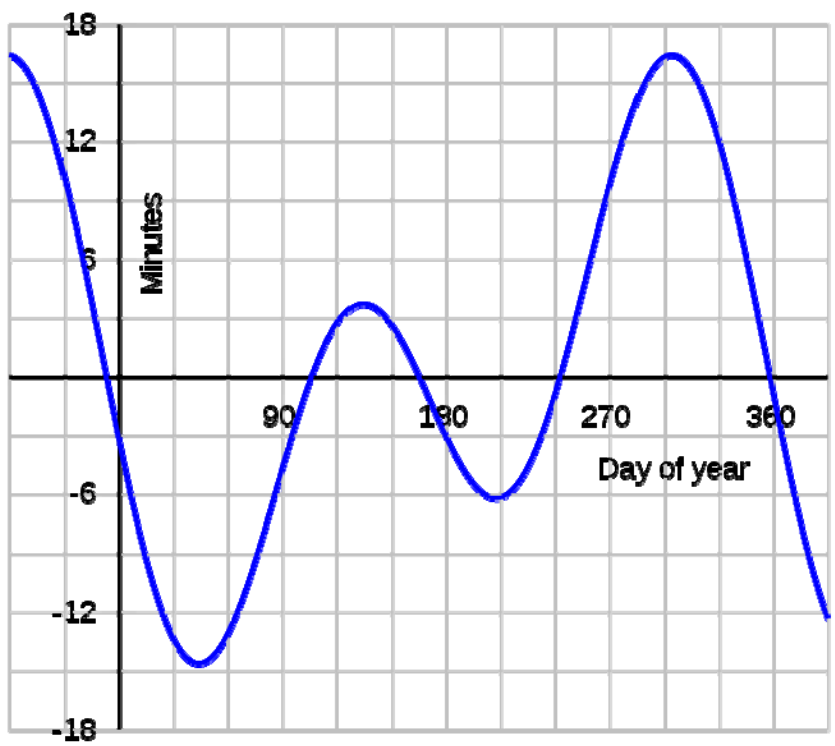


Fig. 2 The equation of time — The difference between apparent solar time and mean solar time over the course of a year. This is also the difference between the actual time the sun crosses the meridian (apparent noon) and the mean local noon.

the same place, would be the time indicated by a steady clock set so that over the year its differences from apparent solar time average to zero (with zero net gain or loss over the year).

During a year the equation of time varies as shown on the graph; its change from one year to the next is slight. Apparent time, and the sundial, can be ahead (fast) by as much as 16 min 33 s (around 3 November), or behind (slow) by as much as 14 min 6 s (around 12 February). The equation of time has zeros near 15 April, 13 June, 1 September and 25 December.

The graph of the equation of time is closely approximated by the sum of two sine curves, one with a period of a year and one with a period of half a year. The curves reflect two astronomical effects, each causing a different non-uniformity in the apparent daily motion of the Sun relative to the stars:

the obliquity of the ecliptic (the plane of the Earth's annual orbital motion around the Sun), which is inclined by about 23.44 degrees relative to the plane of the Earth's equator; and the eccentricity of the Earth's orbit around the Sun, which is about 0.017. The equation of time is also the east or west component of the analemma, a curve representing the angular offset of the Sun from its mean position on the celestial sphere as viewed from Earth.

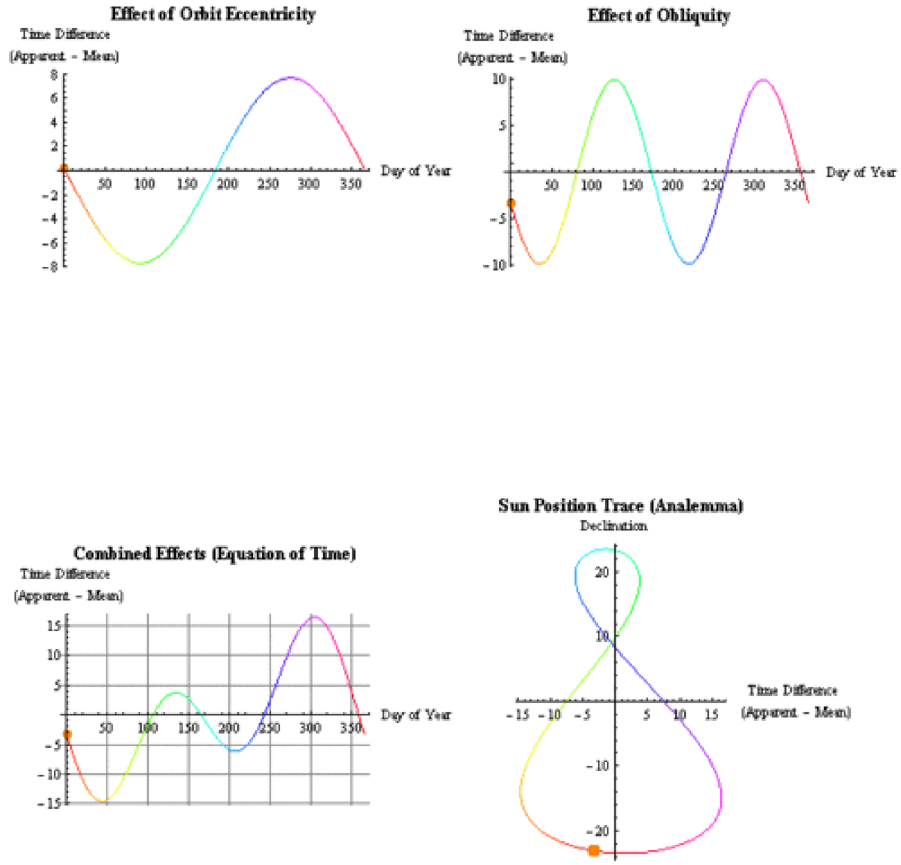


Fig. 3 The Effects of Earth’s Orbit Eccentricity and Earth’s Axis Obliquity on the Equation of Time and the Analemma.

Eccentricity of the Earth's orbit

The Earth revolves around the Sun. As seen from Earth, the Sun appears to revolve once around the Earth through the background stars in one year. If the Earth orbited the Sun with a constant speed, in a circular orbit in a plane perpendicular to the Earth's axis, then the Sun would culminate every day at exactly the same time, and be a perfect time keeper (except for the very small effect of the slowing rotation of the Earth). But the orbit of the Earth is an ellipse, and its speed varies between 30.287 and 29.291 km/s, according to Kepler's laws of planetary motion, and its angular speed also varies, and thus the Sun appears to move faster (relative to the background stars) at perihelion (currently around January 3) and slower at aphelion a half year later. At these extreme points, this effect increases (respectively, decreases) the real solar day by 7.9 seconds from its mean. This daily difference accumulates over a period. As a result, the eccentricity of the Earth's orbit contributes a sine wave variation with an amplitude of 7.66 minutes and a period of one year to the equation of time. The zero points are reached at perihelion (at the beginning of

January) and aphelion (beginning of July) while the maximum values are in early April (negative) and early October (positive).

Obliquity of the ecliptic

However, even if the Earth's orbit were circular, the motion of the Sun along the celestial equator would still not be uniform. This is a consequence of the tilt of the Earth's rotation with respect to its orbit, or equivalently, the tilt of the ecliptic (the path of the sun against the celestial sphere) with respect to the celestial equator. The projection of this motion onto the celestial equator, along which "clock time" is measured, is a maximum at the solstices, when the yearly movement of the Sun is parallel to the equator and appears as a change in right ascension, and is a minimum at the equinoxes, when the Sun moves in a sloping direction and appears mainly as a change in declination, leaving less for the component in right ascension, which is the only component that affects the duration of the solar day. As a consequence of that, the daily shift of the shadow cast by the Sun in a sundial, due to obliquity, is smaller close to the equinoxes and greater close to the solstices. At the equinoxes, the Sun is seen slowing down by up to 20.3 seconds every day and at the solstices speeding up by the same amount.
In the figure on the right, we can see the monthly variation of the apparent slope of the plane of the ecliptic at solar midday as seen from Earth. This variation is due to the apparent precession of the rotating Earth through the year, as seen from the Sun at solar midday.
In terms of the equation of time, the inclination of the ecliptic results in the contribution of another sine wave variation with an amplitude of 9.87 minutes and a period of a half year to the equation of time. The zero points of this sine wave are reached at the equinoxes and solstices, while the maxima are at the beginning of February and August (negative) and the beginning of May and November (positive).

Do other Planets have Analemmas?

On Earth, the analemma appears as a figure eight, but on other solar system bodies it may be very different because of the interplay between the tilt of each body's axis and the elliptical shape of its orbit. In the following list, "day" and "year" refer to the synodic day and sidereal year of the particular body:

Mercury: Because orbital resonance makes the day exactly two years long, the method of plotting the Sun's position at the same time each day would yield only a single point. However, the equation of time can still be calculated for any time of the year, so an analemma can be graphed with this information. The resulting curve is a nearly straight east-west line.
Venus: There are slightly less than two days per year, so it would take several years to accumulate a complete analemma by the usual method. The resulting curve is an ellipse.
Mars: teardrop
Jupiter: ellipse
Saturn: technically a figure 8, but the northern loop is so small that it more closely resembles a teardrop
Uranus: figure 8
Neptune: figure 8

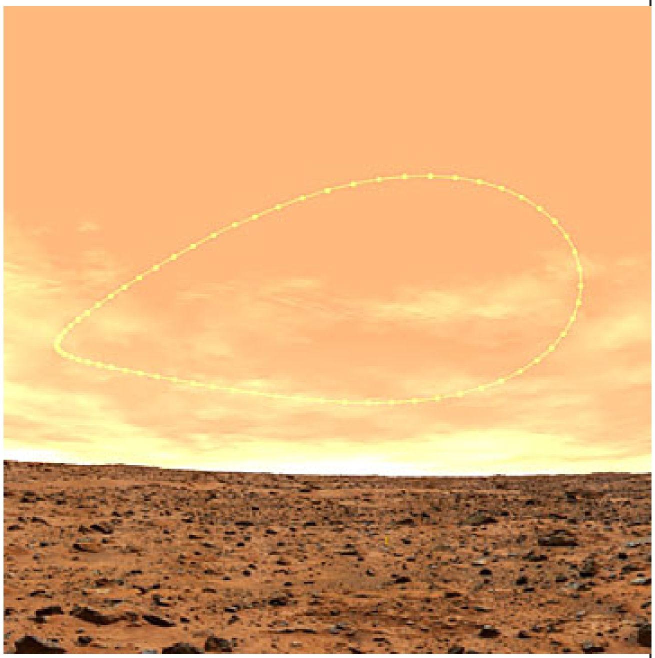
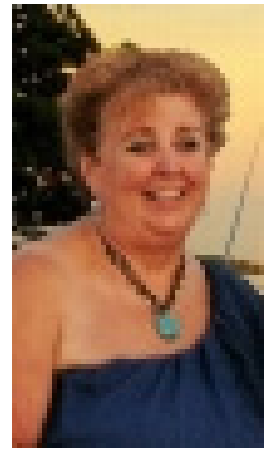


Fig. 4 Analemma on Mars.

How to Find Stars 101	Paula McLain	Secretary



So you've decided to be an astronomer! Your not alone although its something you can do by yourself.

Since the beginning of time those small pin points of light have mesmerized us. Not to long ago I decided to learn the basic's of beginning astronomy. Since you can get very scientific information with measurements and mathematical statistics from so many talented sources including MANY of the members in our club I'm going to to give YOU the beginner the very basics you need to not feel overwhelmed by astronomical information. Most of the things I'm going to tell you are done without binoculars or telescopes so don't feel you can't do astronomy without those things.

First let me tell you that any member you talk to at a club meeting or star party or outreach is willing to help you learn. My advice is listen and even if you haven't understood everything they tell you or think you will remember any of that you actually will remember something even if its one thing a name of a star or constellation, a tiny fact, anything. You have to think of each bit of information you learn as a block. You stack them up one at a time climbing higher and higher toward those stars that are calling to you.

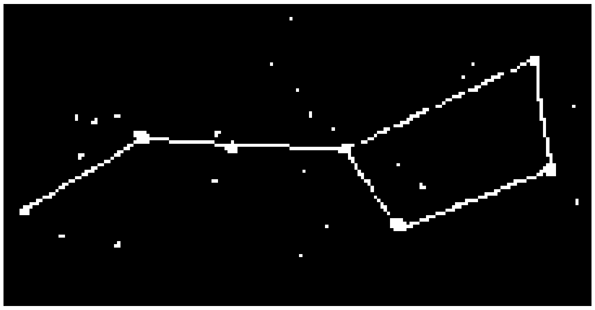
Next get a journal or notebook scribble your name and title it and start your own Star Book. Every time you go outside at night or right after you come in write down descriptions locations and draw what you saw. (line drawings are perfect you don't need to be an artist to do this). Make sure you note where it is in the sky by E – W – N – S or NW. Include the time, date and how far up from the horizon it was.

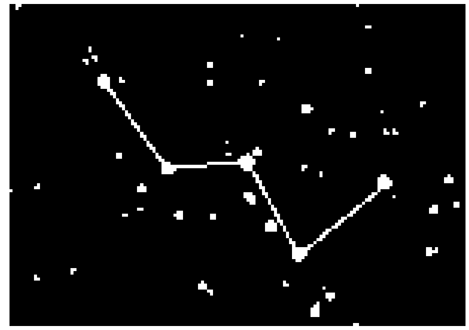
Lets look North

The Sky is always changing both seasonally and nightly so depending on the time you look and what time of year it is there will be different stars to look at.. The stars move nightly across the sky from east to west (because the earth is turning counter clockwise), except a central hub of stars to the NORTH which are visible all year long this group of stars are called North circumpolar constellations, Polaris the north star and is the only stationary star because it is directly above the earths axis. Think of the earth like a big ball with a stick going thru the middle of it. Hold your hand on one end of the stick and put the other on the ground. Now turn the stick so the ball is spinning. Think of your hand as the star Polaris its at the top and doesn't move. The stars closest to Polaris that form a circle around Polaris move more slowly because they too are very close to the top of the ball and your hand. Now, north circumpolar constellations doesn't seem like such a hard thing to remember.

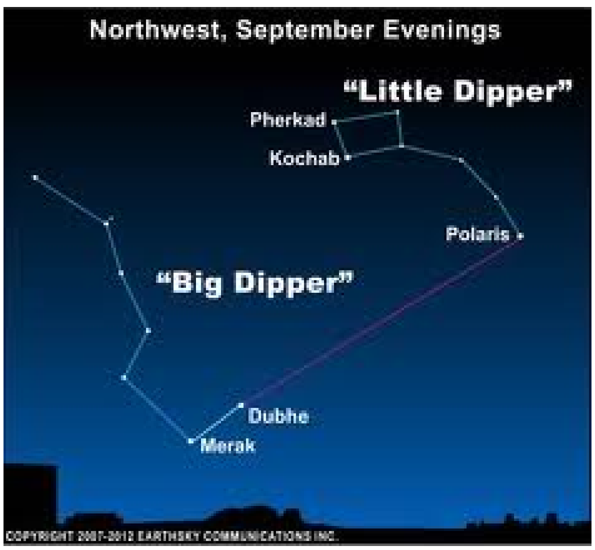
A constellation is a grouping of stars that make an imaginary shape. The ones we are familiar with were named by the ancient Greeks after mythological characters, people, animals and objects. In different parts of the world, people have made up different shapes out of the same groups of bright stars. It is like a game of connecting the dots. In the past creating imaginary images out of stars became useful for navigating at night and for keeping track of the seasons. We have 88 constellations.

The constellations that seem to rotate around Polaris are Ursa Major (the great bear) Ursa Minor (the little bear) and Cassiopeia (the Queen of Ethiopia).





Inside constellations are common shapes and patterns which are called asterisms. These patterns are easy to find when you look up and help you located constellations and stars in the night sky. In Cassiopeia you will see a W or M pattern depending on which way the constellation is turned. In Ursa Major you will see the Big Dipper and in Ursa Minor you will see the little Dipper.



Polaris is found at the end of the handle of the little Dipper which is harder to see in the sky because some of the stars are fainter. So find the Big Dipper in the north sky imagine a line drawn across the outermost two stars in the "cup" of the dipper, and extend this line about 5 times the distance between those two stars.

The imaginary line points almost exactly at Polaris.

Because Polaris doesn't move seafarer's used it to guide them home and once you know where it is you will always be able to find north at night. Polaris is not a particularly bright star although it is the brightest star in the little dipper. In fact Polaris is actually a double star (two stars that share gravity and rotate around each other) Actually there is a third star caught up in this gravity which means its really a triple star but its very small and farther away. It is also a variable star which means depending what day your looking at it, it will be a little brighter or dimmer. You can't see the second star with your naked eyes but if you get a chance to look at Polaris in a telescope you will see that that one twinkling star is actually two really close to each other.

Who knew that one small star could have so much going for it? YOU do now! So what did you find in the Northern sky? Here's a list.

1. Polaris the north star (a triple star system, visual binary, variable star that doesn't move)
2. 3 Circumpolar Constellations (Ursa Major, Ursa Minor and Cassiopeia)
3. 3 Asterisms (the big Dipper, the little Dipper and the W of Cassiopeia)

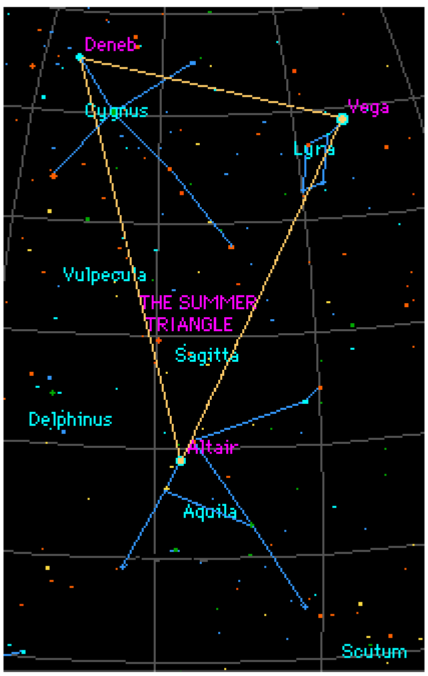
I'm going to over the next few months write in this topic information that you can use to help you when you go outside at night. My advice is don't try and read all of it at once and if you have questions feel free to ask no matter how simple you think it is. If I don't know the answer I can assure you someone in this club will or we will find out! I'm attaching this information as a pdf so that if you would like to download it or print it you can use it for reference when your outside or share it with your friends.

So you've been bitten by the astronomy bug and you've become familiar with the northern sky. It's time to to turn your back to the north for now to see what the rest of the night sky can offer you.

Summer

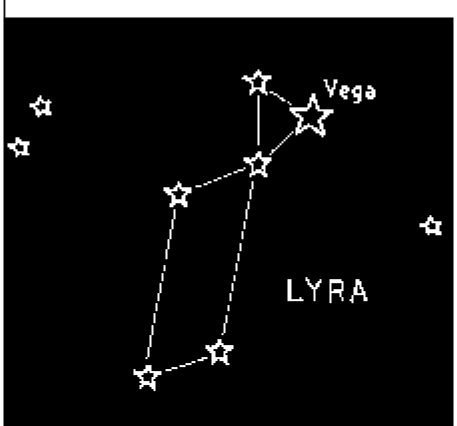
So you've arrived to the long lazy days of Summer. To astronomers it means different things. Shorter nights and hot hazy evenings give rise to bugs and clouds making looking at the summer sky less reliable and there ARE plenty of things in the summer sky to look at even without binoculars or a telescope.

Stars are given ratings to show how bright they are. This is called their magnitude. Brightness of stars are assigned a number starting with the brightest star starting at about -1 magnitude. Dimmer stars are zero or positive numbers. The larger the number means the dimmer the star is. For example, a star -1 magnitude is brighter than a star 0 magnitude. A star 0 magnitude is brighter than a star 1 magnitude. A star 1 magnitude is brighter than a star 2 magnitude. A star 4 magnitude is brighter than a star 5 magnitude. Magnitude sequence for stars starting with the brightest is -1, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 magnitude, ... etc.



Three brilliant stars form this stellar right triangle making it our best heavenly landmark in the Summer night sky. Vega high above and its western point appears the brightest of the three. Deneb, also high above and to the east of Vega, appears the dimmest. Altair shines below in the south, forming the most distant point of this great triad.
These three stunning stars are an unofficial star group or asterism that link the three constellations ... Lyra, Cygnus the Swan and Aquila the Eagle. This Summer Triangle lies high above, over the Milky Way which now sweeps across the heavens from north to south.

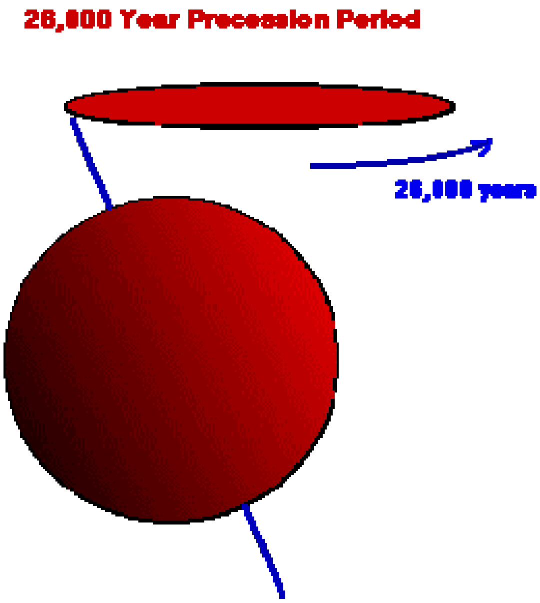
The biggest treat in the summer sky is the Milky Way itself. On a clear evening that double stripe of hazy clouds that arch over your head from north to south is not wispy clouds but our own galaxy spiraling away from us almost edge on. You see our solar system is on one of the outer arms of our galaxy so we not only get the treat of seeing outside our own galaxy we also get to look back to the heart of ours in all its splendor. All that milky haze is the glow of billions of stars in our own galaxy and if you have binoculars and you focus in on that stripe of white you will begin to realize just how many stars make up that white glow.



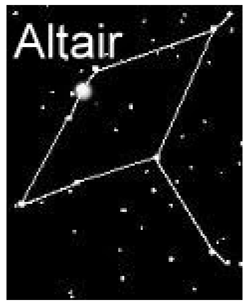
To locate Lyra and Vega, look overhead and look for a little lopsided rectangle with a triangle attached. It almost looks more like a kite with a tail.

Vega is interesting because of its relationship with Polaris (See you remember that star!) We already know that Polaris lies very close to the earths axis. Well the earth wobbles on its axis every 26,000 years or so when the earth wobbles back in another 12,000 or so years Vega will become our new north star.

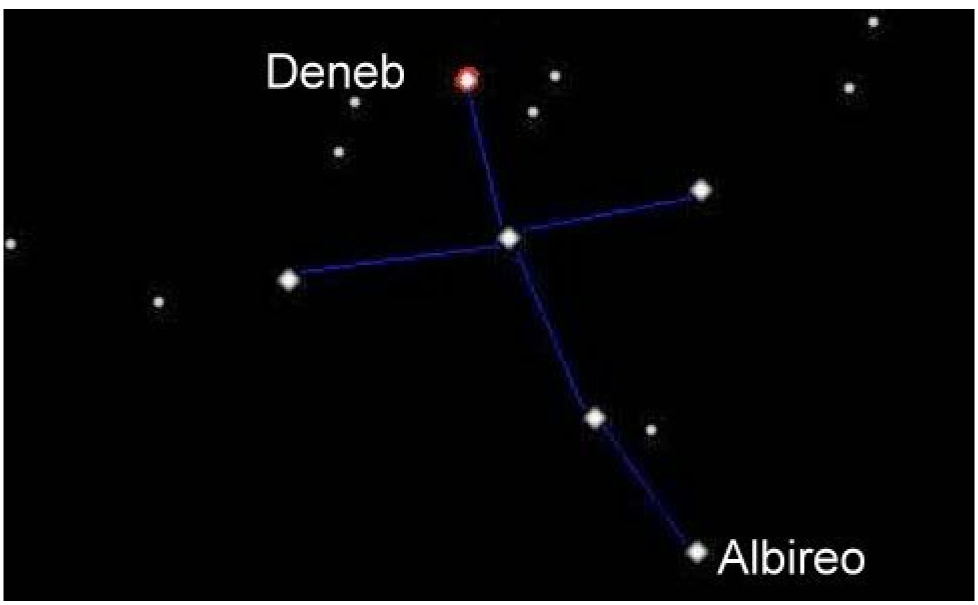
Our second Summer Triangle star, Deneb, is the tail of Cygnus the Swan. Deneb and four other bright stars of the Swan form an asterism called the Northern Cross, which is immersed in the Milky Way. Deneb is at the top of the cross, the star Albireo is at the base. Albireo is a double star famous for its rich colors of orange and blue (A true gator star!). The star pair can be split with binoculars, but the colors can be seen only through a telescope.

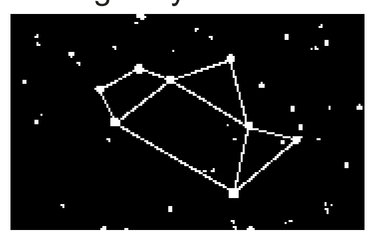


Farther south on the Milky Way is the bright star Altair and its parent constellation, Aquila the Eagle.
Depicted as an eagle, Aquila is named for the bird that belonged to Zeus



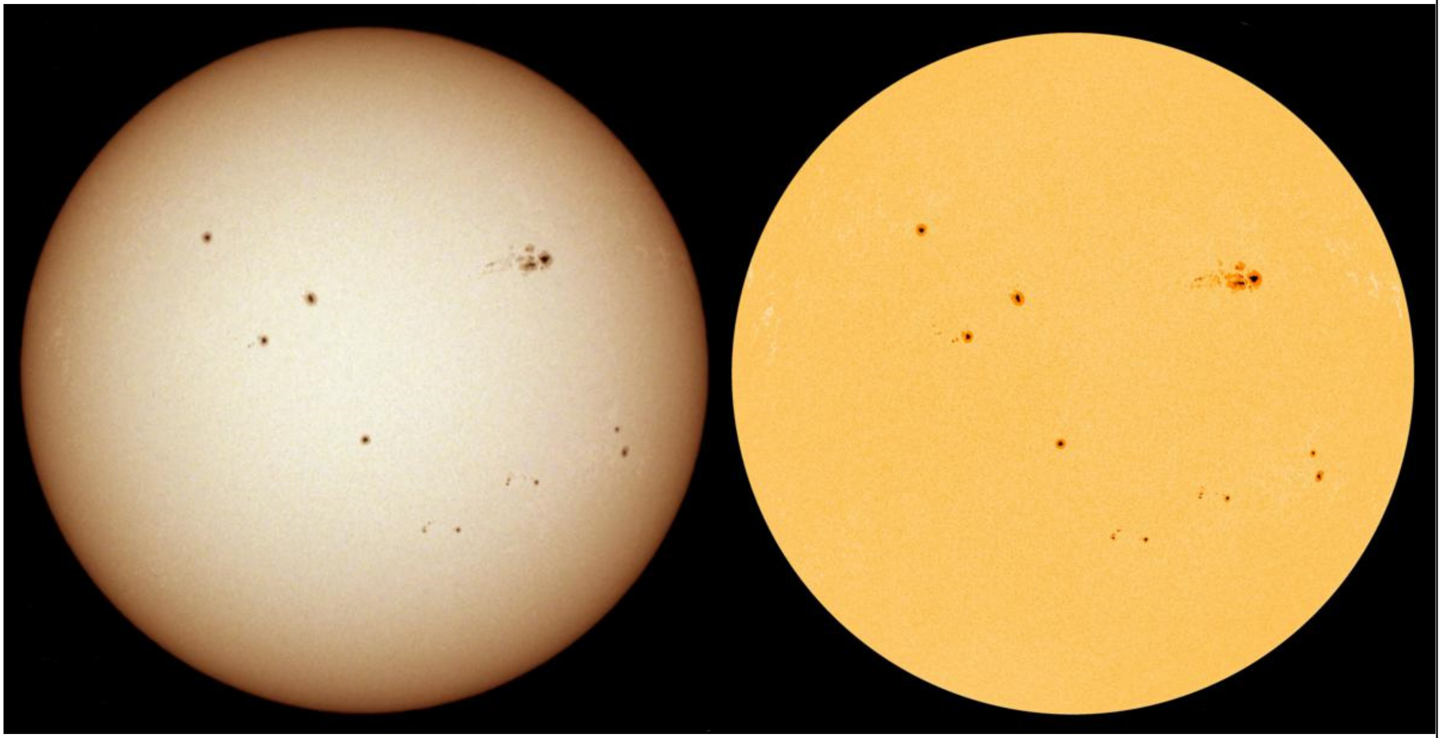
If you follow the Milky Way from Aquila toward the southern horizon, you should find a group of stars that looks like a teapot. This asterism is part of Sagittarius the Archer. This constellation marks the location of our galaxy's center.





There are many more summer constellations but baby steps, Remember the old adage “Can't see the forest for the trees” If you look for too many things you'll get overwhelmed.
So what have we learned to look for in Summer. Here's your list.
1. The Summer Triangle Asterism (Vega, Deneb and Altair)
2. The 3 constellations that those stars call home (Lyra, Cygnus, Aquila)
3. The Milky Way
4. The teapot Asterism inside Sagittarius
More segments to come. Again a pdf is attached if you'd like to share or reference this topic.

The Solar Disk Is Not Blank Any More	Howard Cohen	Club Member



The Solar Disk Is Not Blank Any More Even Through a Small Telescope

Some predictions say future sunspot cycles may show declining activity. However, the current cycle is gearing up with more sunspots, flares and coronal mass ejections than have been seen in several years. Even a good, small telescope (equipped with a safe solar filter) easily shows this.

On 2011 November 10, for example, I was helping my grandson earn his Cub Scout Belt Loop. One requirement is to set up and demonstrate how to focus a simple telescope. We set the telescope on the Sun. At least eight sunspot groups were visible with dozens of individual spots readily seen even through a three-inch refractor telescope from Gainesville, Florida. (See the left image in the attached jpg.)

Compare this view with the SOHO/NASA spacecraft image taken approximately four hours earlier in visible light at a wavelength of about 680 nm (right image). This is similar to the transmission of the solar filter used on the three-inch telescope.

Notice the small telescope image shows not only sunspots, which are cooler than their surroundings, but also the Sun's limb (edge) darkening. In addition, several white light faculae are visible near the left and right edges of the Sun. These are brighter and hotter areas of the Sun's visible disk (photosphere) and best seen near the solar limb against the darker background of the limb darkening.

So, small scopes are not just for kids.

Photo Details: Unguided photo taken through a full aperture Thousand Oaks Type 2+ Glass Solar Filter (transmission 1/1,000 of 1%) using a Tele Vue 76 mm aperture, f/6.3 APO refractor telescope with a 480 mm focal length and equipped with a Tele Vue 4x Powermate Amplifier for an effective focal length of 1,920 mm. Camera Used: Canon EOS 5D Mark II; Exposure 1/250 at ISO 800; effective f-stop f/25; White Balance Auto. This is a single image photograph taken 2011 Nov. 10 at 18:26 UT with some minor processing using Canon ZoomBrowser EX.

This image of Earth (on the left) and the moon (on the right) was taken by NASA's Juno spacecraft on Aug. 26, 2011, when the spacecraft was about 6 million miles (9.66 million kilometers) away. It was taken by the spacecraft's onboard camera, JunoCam. Image credit: NASA/JPL-Caltech/SwRI

PASADENA, Calif. – On its way to the biggest planet in the solar system -- Jupiter, NASA's Juno spacecraft took time to capture its home planet and its natural satellite -- the moon.

"This is a remarkable sight people get to see all too rarely," said Scott Bolton, Juno principal investigator from the Southwest Research Institute in San Antonio. "This view of our planet shows how Earth looks from the outside, illustrating a special perspective of our role and place in the universe. We see a humbling yet beautiful view of ourselves."

The image was taken by the spacecraft’s camera, JunoCam, on Aug. 26 when the spacecraft was about 6 million miles (9.66 million kilometers) away. The image was taken as part of the mission team’s checkout of the Juno spacecraft. The team is conducting its initial detailed checks on the spacecraft’s instruments and subsystems after its launch on Aug. 5.

Juno covered the distance from Earth to the moon (about 250,000 miles or 402,000 kilometers) in less than one day's time. It will take the spacecraft another five years and 1,740 million miles (2,800 million kilometers) to complete the journey to Jupiter. The spacecraft will orbit the planet's poles 33 times and use its eight science instruments to probe beneath the gas giant's obscuring cloud cover to learn more about its origins, structure, atmosphere and magnetosphere, and look for a potential solid planetary core.