Current Astronomy

SEPTEMBER/OCTOBER
2009

RIVER BEND ASTRONOMY CLUB NEWSLETTER

The Last Quarter Moon is a beautiful site through a telescope, if you plan to be out observing in the early hours of the morning.
Photo © 2006 Brian Lockett, Goleta Air and Space Museum

INSIDE THIS ISSUE

River Bend Astronomy club serves astronomy enthusiasts of the American Bottom region, the Mississippi River bluffs and beyond, fostering observation, education, and a spirit of camaraderie.

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Affiliated with the Astronomical League, dedicated to fostering astronomical education, providing incentives for astronomical observation and research, and assisting communication among amateur astronomical societies. www.astroleague.org

Affiliated with the NASA Night Sky Network, a nationwide coalition of amateur astronomy clubs bringing the science, technology and inspiration of NASA's missions to the general public.

Current Astronomy

EDITOR	Bill Breeden
EDITOR EMERITUS & GRAPHIC DESIGN	Eric Young

Monthly Meetings

Saturday, September 19, 2009 * 7:00 PM
Saturday, October 17, 2009 * 7:00 PM
Saturday, November 14, 2009 * 7:00 PM
Kronk Observatory
132 Jessica Drive, St. Jacob, IL 62281

Looked Up Lately?

Join River Bend Astronomy Club

Want to learn more about astronomy? The members of RiverBend Astronomy Club invite you to join. You won't need expensive tools or special skills – just a passion for observing the natural world.

- Meetings offer learning, peeks through great telescopes, and fun under the stars.
- You will receive the club newsletter, *Current Astronomy*, packed with news and photos.
- Get connected with our member-only online discussion group.
- Borrow from the club's multimedia library.
- Borrow from the club's selection of solar telescopes.
- And that's not all! Through club membership you also join the Astronomical League, with its special programs and colorful quarterly newsletter *The Reflector* to enrich your hobby.
- We meet monthly, observe regularly, email news and quips constantly, and generally have a good time. Won't you join us?

Name_____
Address_____
City_____State_____Zip_____
Phone_____
Email address_____
Where did you hear of our club?_____
_____
How long have you been interested in astronomy?_____
Do you have optical equipment?_____
Are you afraid of the dark? ___Yes ___No (just kidding)
I am submitted my application for:
_____Adult Membership(s) ___Youth Membership(s)
$20/year each (18 yrs. and up) $15/year each (17 yrs. and under)
I enclose a check for $_____ made out to:
Mike Veith, Treasurer, RBAC
Signature_____
Date_____

Mail to: River Bend Astronomy Club
c/o Gary Kronk, 132 Jessica Drive, St. Jacob, IL 62281.
Email: rbac@riverbendastro.com

NEWS

Moonstruck!

By Rita Breeden

I know that most of you amateur astronomers know all there is to know about the moon. It must be very simple because every outreach you go to, the moon is the star of the show. Well some of those young future astronomers can ask some pretty important questions that I immediately pass on to Bill. I'd love to answer those questions myself, but I can't.

Actually, two years ago I decided that it was time for me to go for my next Astronomical League certificate and what could be more important and simple than the moon. I found out that the moon is not very simple. Bill has been trying to teach me the Moon rise times for 13 years. I have decided that I need to study the moon is small pieces.

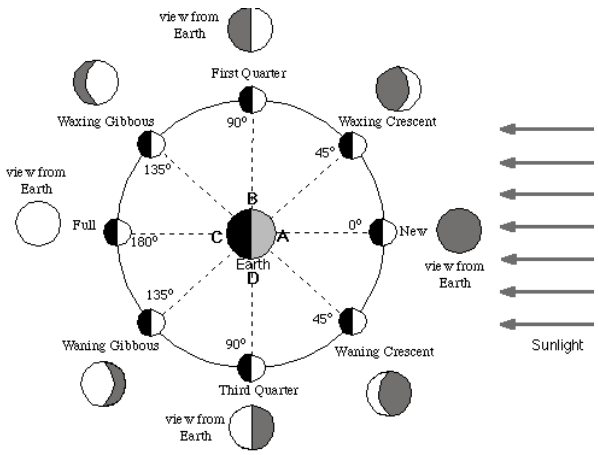
I began looking on the internet for information on the moon to help me prepare for the Astronomy League certificate. I began collecting information but never actually worked on the certificate. I have decided that this is going to be my year. For those of you who don't know the Moon very well, please enjoy my snippets in the Current Astronomy Newsletter.

1. Moon rise times
The New Moon always rises at sunrise.
The first quarter Moon rises at noon.
The Full Moon rises at sunset.
The last quarter Moon rises at midnight.
Moonrise takes place about 50 minutes later each day than the day before.

2. Percent of the Moon's surface illuminated
The percent of the Moon's surface illuminated is a more refined, quantitative description of the Moon's appearance than is the phase.

Considering the Moon as a circular disk, the ratio of the area illuminated by direct sunlight to its total area is the fraction of the Moon's surface illuminated; multiplied by 100, it is the percent illuminated. At New Moon the percent illuminated is 0; at First and Last Quarters it is 50%; and at Full Moon it is 100%. During the crescent phases the percent illuminated is between 0 and 50% and during gibbous phases it is between 50% and 100%.

For practical purposes, phases of the Moon and the percent of the Moon illuminated are independent of the location on the Earth from where the Moon is observed. That is, all the phases occur at the same time regardless of the observer's position.



The Sun-Moon angle is the angle defined by Sun->Earth->Moon with Earth (where *you* are) as the angle vertex. As the Sun-Moon angle increases we see more of the sunlit part of the Moon. Note that if this drawing were to scale, then the Moon would be half this size and its orbit would be about 22 **times** larger in diameter and the Sun would be about 389 **times** farther away than the Moon!

New Moon
This is the first of the moon phases. The moon's dark side is facing us, and this invisible disk is only up when the sun is out.

Waxing Crescent Moon
"Waxing" means growing and refers to
the size of the illuminated part of the moon that is increasing.

First Quarter Moon

Rises at noon, and stays in the sky until midnight.

Waxing Gibbous Moon

Full Moon
The full moon occurs when the Moon lies on the opposite side of Earth from the Sun. The moon as seen from the surface of the earth is fully illuminated by the sun at this time, presenting a "full" round disc to viewers on earth. As always, only half the total surface of the moon is illuminated.
The full moon reaches its highest elevation at midnight

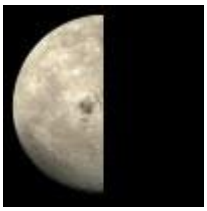
A full moon is the only time when a lunar eclipse is possible; at that time the moon may move through the shadow cast by the earth. However, because of the tilt of the moon's orbit around the earth relative to the earth's orbit around the sun, the moon may pass aboveor below the shadow, so a lunar eclipse does not occur at every full moon.

Full moons are generally a poor time to conduct astronomical observations, since the bright reflected sunlight from the moon overwhelms the dimmer light from stars.

Waning Gibbous Moon
"Waning" means shrinking. When the the Moon is said to be waning, we see a little less of the Moon each day until it completely disappears when the Moon is New.

Last Quarter Moon

It's rising is delayed until midnight, and it stays in the sky until noon.



Waning Crescent Moon

In the northern hemisphere, if the right side of the Moon is dark, the light part is shrinking: the Moon is waning (moving towards a new Moon). If the left side is dark, the Moon is waxing (moving towards a full Moon). The acronym mnemonic "DOC" represents this ("D" is the waxing Moon; "O" the full moon; and "C" the waning moon). In the Southern hemisphere, this is reversed, and the mnemonic is "COD". RBAC

Get a Masters Degree in Astronomy – Online!

By Mark A. Brown

What's that? Go back to school? Me? No way; I'm too old and too busy.

How many times have you said that to yourself? Indeed, that's what I said back in 2007. But after two rigorous years, I finally completed my Master's degree in Astronomy in June. The thought process of going back to school actually started in May 2005 when I traveled to California's Jet Propulsion Laboratory (JPL) to meet up with Marni Berendsen from the Astronomical Society of the Pacific. Some of you may recall that I traveled there to represent River Bend Astronomy Club as a result of our Night Sky Network outreach efforts from the previous year (See Current Astronomy Issues Nov. & Dec 2005). Over the course of three days Marni and I conversed about various subjects as we toured the sights in southern California. Somehow the subject of me going back to school and obtaining a Masters degree kept coming up in conversation. It seemed too far fetched and the thought of being in my 40s and going back to school sounded like a formidable task. But Marni saw something in me and encouraged me to check it out. Indeed, my curiosity was sparked and with the thought that it could be done online was intriguing. Marni too had completed her Masters degree online just a few years earlier which was proof positive any middle-aged person could complete the task.

Yet, the remainder of 2005 passed me by without me taking a lead on furthering my education. The thought was there, but the action never materialized. By the time June 2006 rolled around I found myself involved in another move following my military wife and family to Tyndall Air Force Base, Florida. I was devastated that I had to leave my job at the St. Louis Science Center's McDonnell Planetarium and my adjunct teaching position at McKendree University. Upon arrival in Florida, it was time to try to find another job just as I did during all my other moves. I found Panama City Community College had an opening for an astronomy instructor. After applying for the position, I quickly learned that despite my teaching experience and planetarium background, I wasn't being considered for the job. Why? The only reason was that I did not hold a Masters degree in Astronomy. I was certainly let down and wasn't sure if I should just become a beach bum and go on playing the role of Mr. Mom.

Then it dawned on me; all the things Marni and I talked about in 2005 was now coming back to haunt me. I thought long and hard about going back to school and that if I was ever going to increase my chances at landing a teaching position or working in a planetarium or just making myself more marketable in the real world, now was the time to go for the Masters degree.

At the time, there was no viable online Masters Degree astronomy programs offered in the United States. Marni indicated that Swinburne Astronomy Online (SAO) and James Cook University in Australia were the two universities that seemed most reputable and up to date in their course work. They were also the only universities that advertised their programs in Astronomy and Sky and Telescope magazine which I had seen on several occasions. After researching both programs, SAO seemed more appealing and I quickly found myself registered to start classes in Spring 2007 (Winter if you reside from the land down under).

According to Dr. Sarah Maddison, SAO coordinator and course instructor, Swinburne University was established in 1999 by legislation of the Parliament of the State of Victoria within the Commonwealth of Australia, and is a recognized university by the Australian Federal Government. The university offers three postgraduate degree programs; a Graduate Certificate of Science for Astronomy,

Graduate Diploma of Science in Astronomy and Master of Science in Astronomy which are all fully accredited by the Swinburne University Council.

Maddison also notes that SAO concentrates on the fundamental concepts of and key issues in contemporary astronomy, rather than its mathematical basis. So if you are an amateur astronomer, science educator and communicator, a person who works in an astronomy related field or if you have a love and passion for astronomy and want to know and understand more of the discoveries through astronomical research, then this program is designed for you. It is not a program that will place you on track for professional astronomy research or a PhD. It is a Masters by coursework and not a Masters by research. In the US, obtaining a Masters degree many times requires proof of research through completion and defending of a thesis component. Yet, just because this degree program is offered online and there is no real thesis component, does not mean it is not a true Masters degree. SAO is recognized and has been accepted by many US educational institutions and companies.

I should note that in order to enter SAO prospective students must show proof they have completed a Bachelors degree of some kind. They are required to send official transcripts to Swinburne with their initial application before they can be admitted to the university.

When I started the program, a total of 16 units were available, covering topics such as the Solar System, Stellar Astrophysics, Theories of Space and Time, Space Exploration, Astrophotography and CCD imaging and Astrobiology. In 2010 however, two units will be cut from the program leaving only 14 units to choose from. The Graduate Certificate requires successful completion of 4 units, the Graduate Diploma requires 8 units and the Masters degree requires completion of 12 units. What is this equivalent to in the US? From what I gather, each course or unit is equivalent to a 5 credit hour class that you might take at a US university. Upon completion of the Masters degree you will have earned the equivalent of 60 credit hours. Each semester of instruction and coursework lasts 12 weeks with a two week period after class instruction to complete and turn in a final written project of your choice. The class is assessed on the basis of participation through newsgroup email, an essay, two computer managed tests (CMT), and a final written project.

So, how does the course operate and work? When I started SAO, the course material was delivered on compact disks that I loaded onto my computer, but this has now been phased out and much of the material is downloaded from the SAO Black Board website in PDF format. The course material for each unit contains about 1500 slides which are broken down into various activities and topics of 35 to 50 slides. Within the slides are images, diagrams, links to animations and other websites and illustrated graphics. The material is written by professional astronomers and updated annually. Since there is no formal lecture, students are free to download and read over the material at their leisure. The material is also supplemented with reading assignments from one or two additional textbooks that students are highly recommended (not required) to purchase for the course. Each class is evenly broken up into distinct sections depending on the topic. Every fortnight or two weeks, students are encouraged to read over their PDF material and textbook reading assignments.

As far as assessment and grading, instructors will open up the newsgroup discussions for each class where students are required to ask at least one question and answer one question in the newsgroup during each fortnight. The questions are posed by you and other students as well as by the instructor. Students answer from each other's queries after researching the answers in the course material, textbook and from the internet. Meeting such a quota seems

simple enough, but students are graded on participation. So, it is always better to do much more than the minimum.

This is where the most interaction takes place between students and instructor. It's not like a normal classroom and takes some getting used to. We all know how tedious email can be and deciphering its content can also be tricky. Instructors will intervene when necessary and are also available to keep topic discussions on track. They can add interesting aspects from their own professional experience which can lead to further postings of questions and answers. Some classes are more energetic and lively than others. It is not uncommon to be faced with 100 to 200 newsgroup postings per week. I took Astrobiology as my final SAO course where I had to swim through over 500 newsgroup postings in a two week time frame!!! The discussion was great, but at times it was almost overwhelming.

Do students need to read and respond to every posting? Absolutely not! Students pick and chose what questions sound interesting and those they feel they can adequately research and answer. It is important that a student research and post thorough answers to questions because at the end of each semester, they nominate which three of their newsgroup contributions should be graded. Their research, content, ability to effectively communicate astronomy concepts and overall participation during the semester determines their grade in this crucial part of the assessment.

Essays are another part of the SAO assessment. Within the first two weeks students are required to choose an essay topic from a list of 5 topics. Again this allows a student to research and draw material together from the course content and deliver a 2000 word essay that communicates an astronomy concept to a non-specialist audience. It is not necessarily a technical paper, but one that the student understands and can relate it to a person who may not be familiar with astronomy. I look at it as the ability to bring an astronomy concept down to the human level. Students are required to thoroughly reference their material or risk a deduction in points. These essays are graded by the class instructor and they look for references from journals such as the Astrophysical Journal, Nature, Science, and other reputable websites, periodicals and books. SAO students are provided access to an extensive library of journals to conduct their research. The essays are usually submitted and marked by mid-semester so students can take useful feedback from their instructor to build their confidence and see what type of writing is expected. This allows them to apply what they learned toward their larger end of semester writing project.

Are there exams? Yes, the class is also assessed through a student's ability to complete two online exams or computer managed tests (CMT). They are administered midway and at the end of the semester. They are open book and open note. The CMTs are designed to measure a student's conceptual understanding of the wide range of topics presented during the semester. The CMTs vary depending on the instructor and the course material. Most CMTs have on the average 10 to 20 questions and are a mix of short answer (10 to 60 words) or essay style answers (100 to 300 words). When I say these CMTs measure a student's conceptual understanding that means finding the answers aren't as simple as going to the index of the textbook and finding the section or page where the answer may reside. Sometimes it involves research on the internet or through journal articles. Don't panic because students have one full week in which to find, compose and post their answers.

The largest part of the assessment requires students to complete a major project which counts 30% of the total grade. The project is a much larger undertaking than the essay and must be 10-12 single spaced type written pages. Students pick their projects in the first few weeks of class so essentially they have

close to three months in which to research and work on their projects. The projects are open-ended and range from strictly internet and journal research of a topic or may actually involve hands-on observational work with their own personal telescope and/or imaging equipment. The projects are intended to be challenging offering the reward of higher-order learning for the student to show their ability to research, organize, and to clearly and adequately communicate their research and/or observations involved with their project. Students are assigned an advisor for the project and their job is to offer advice and direction for research and to ensure that students complete their paper on time. Some of these advisors are professional astronomers, educators, professionals who work in astronomy related disciplines, or PhD candidates. They grade the projects, not the class instructor.

If you're not a math person, then don't worry. This path of coursework is not designed to get you bogged down in differential Calculus. Will you encounter some math? Yes, but most of it will be in the CMTs and something that you'll likely find in the course notes or textbook. I am horrible at math and it absolutely scares me at times, but I made it through the program just fine. Sometimes finding an answer to a math-related question requires research and a lot of patience and persistence. Basic Algebra, Geometry, Trigonometry and some Calculus are helpful, and for those pursuing a Masters degree you should already have much of this in your background. However, what you don't know you can find and learn from the tremendous instructors and students in your classes or from SAO tutorial websites. Everyone in SAO is there to help and learn from one another. There is no such thing as a stupid question and it's perfectly fine to lose some pride when asking for help. The thing to remember is that with online courses no one can hear you scream. If you need help and assistance – ASK!

Of course attending SAO or any other college or university comes with a price. Each course costs 1100 Australian dollars. Depending on the value of the US dollar and exchange rate, my cost was about 900 to 950 US dollars per class. Tack on the additional cost of textbooks (purchased from Amazon.com) and the cost increased to 1000 bucks or more. It's not totally unreasonable.

What did I gain from doing an online astronomy course? Looking back, obtaining an online degree did have its perks. I could work from the comfort of my own home and at my own pace. I encountered no commute times to class or highway or street traffic (only internet traffic). And in the event I had to pick up and move, all I needed was my computer, an internet connection and email address to continue on with the program. This worked great since between 2006 and 2008 my military wife and the family had to pick up and move three different times. I also met a lot of interesting folks from this online program. I was able to communicate with other students and instructors from the US, United Kingdom, Australia, Indonesia, Canada, Columbia, and New Zealand, just to name a few. I learned a great deal not only from the instructors but also from my fellow classmates and I was able to give back some of my own knowledge and personal experiences; both of which was very rewarding.

Everyone came from a variety of professional backgrounds. Some of the folks in SAO were in their 60s and 70s and fully retired with only a general interest in astronomy. I encountered SAO students who were airline pilots, school teachers, biologists, medical doctors, physicists and other scientists holding PhDs, staff astronomers from Kitt Peak, Mauna Kea, and Siding Spring observatories and even astronaut Anousheh Ansari. Some of these students had no background in astronomy and wanted to take the course so they could simply unwind at the end of the day. One of my SAO instructors was Steven Edberg whom I met during my visit

to JPL. He is a NASA scientist who worked on Galileo, Cassini, CRAF (Comet Rendezvous & Asteroid Flyby) mission and is now working on the Space Interferometry Mission (SIM). And even on your back steps in Illinois, one of my project advisors was Dr. Pamela Gay who teaches at SIUE and is host for the popular internet "Astronomy Cast" program. She helped and graded my Major Project Thesis which was a comet research project I did with the mentoring and guidance of Gary Kronk in 2008. I have yet to meet Pamela, but I spent several hours communicating with her by phone and email. By the way, she really does have a sexy voice.

There were drawbacks to SAO. I was very busy and spent a lot of time away from my family so I could complete this degree in the least amount of time. But of course this was at my choosing and because I'm a perfectionist. Most people were working professionals taking one SAO class per semester and they had been in SAO nearly since its inception. Even that is quite tasking especially if you have family and other timely commitments. I had high hopes of completing the degree in four semesters. Unfortunately that didn't happen. I was looking to punish myself and took three grueling classes at a time for the first three semesters. Because of SAO scheduling, I had to complete the final three classes during my forth and fifth semesters. So if you can imagine pouring over 1500 PDF slides per class, taking exams, writing essays and projects and managing and responding to the overwhelming number of newsgroup emails, you'll see that it was quite a daunting task. In addition, I wished the classes could have included some type of occasional video instruction. I sincerely miss the one-on-one, face-to-face interaction between student and teacher. It is quite challenging to try and visualize a concept in three dimensions while reading an instructor's or student's text explanation on a one dimensional screen.

Is SAO or any other online degree program for everyone? Probably not, but you'll never know unless you try. Obtaining a degree online is no walk in the park. Only you can decide if you want to take that next step toward obtaining an advanced degree. SAO was a challenge for me and ultimately worth the time and sacrifice. No matter if you are trying to complete an Associate, Bachelors or Masters Degree, the amount of time, effort and work you put into it and what you get out of it is ultimately up to you. If you are fulfilled by your accomplishments, willing to do some research to get results and can effectively put those results into writing, then the amount of knowledge gained, far outweighs everything else. Did SAO make a better astronomer out of me? No, I'm the same old guy, but armed with a bit more knowledge and tools that allow me to communicate the wonders of astronomy to others. Will this degree land me the perfect job? Only time will tell.

Finally, if there's one thing I discovered, it's that you're certainly never too old to go back to school.

If you'd like to find out more information about SAO, you're certainly welcomed to contact me or you can visit their webpage at: http://astronomy.swin.edu.au/sao/ RBAC

NASA Space Place

SARSAT to the Rescue

If a plane crashes in the woods and nobody hears it, does it make a sound?

Never mind contemplating this scenario as a philosophical riddle. This can be a real life or death question. And the answer most of the time is that, even if no people are nearby, *something* is indeed listening high above.

That something is a network of satellites orbiting about 450 miles overhead. The "sound" they hear isn't the crash itself, but a distress signal from a radio beacon carried by many modern ships, aircraft, and even individual people venturing into remote wildernesses.

In the last 25 years, more than 25,000 lives have been saved using the satellite response system called Search and Rescue Satellite-aided Tracking (SARSAT). So what *are* these life-saving superhero satellites?

Why they are mild-mannered weather satellites.

"These satellites do double duty," says Mickey Fitzmaurice, a National Oceanic and Atmospheric Administration (NOAA) systems engineer for SARSAT. "Their primary purpose is to gather continuous weather data, of course. But while they're up there, they might as well be listening for distress signals too."

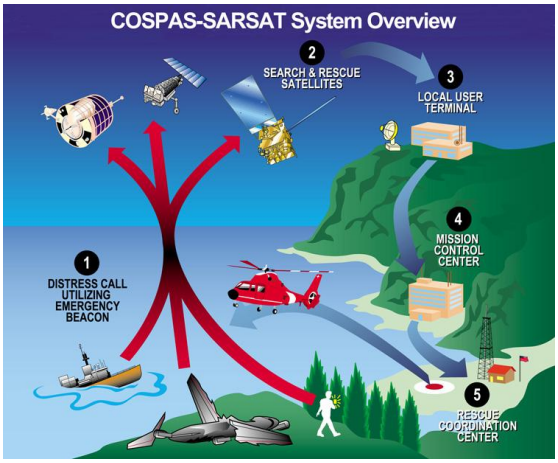
In February, NASA launched the newest of these Polar-orbiting Operational Environmental Satellites (or POES) into orbit. This new satellite, called N-Prime at launch and now dubbed NOAA-19, prevents a gap in this satellite network as another, aging NOAA satellite reached the end of its operational life.

"The launch of N-Prime was a big deal for us," Fitzmaurice says. With N-Prime/NOAA-19 in place, there are now six satellites in this network. Amongst them, they pass over every place on Earth, on average, about once an hour.

To pinpoint the location of an injured explorer, a sinking ship, or a downed plane, POES use the same Doppler effect that causes a car horn to sound higher-pitched when the car is moving toward you than it sounds after it passes by.

In a similar way, POES "hear" a higher frequency when they're moving toward the source of the distress signal, and a lower frequency when they've already passed overhead. It takes only three distress-signal bursts — each about 50 seconds apart — to determine the source's location.

Complementing the POES are the Geostationary Operational Environmental Satellites (GOES), which, besides providing weather data, continuously monitor the Western Hemisphere for distress signals. Since their geostationary orbit leaves them motionless with respect to Earth below, there is no Doppler effect to pinpoint location. However, they do provide near instantaneous notification of distress signals.



NOAA's polar-orbiting and geostationary satellites, along with Russia's Cospas spacecraft, are part of the sophisticated, international Search and Rescue Satellite-Aided Tracking System.

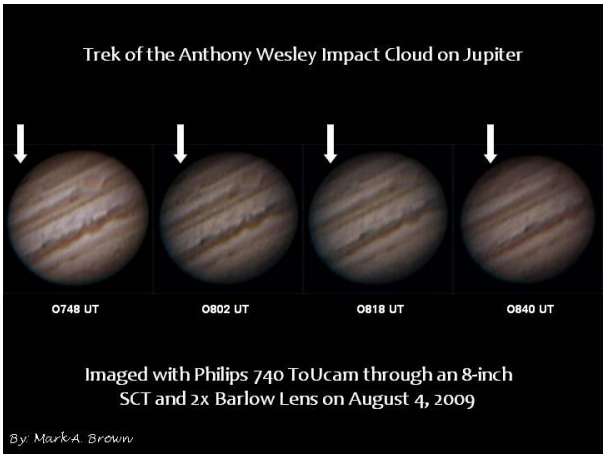
In the future, the network will be expanded by putting receivers on new Global Positioning System (GPS) satellites, Fitzmaurice says. "We want to be able to locate you after just one burst." With GPS, GOES will also be able to provide the location of the transmitter.

Philosophers beware: SARSAT is making "silent crashes" a thing of the past.
Download a two-page summary of NOAA-19 at www.osd.noaa.gov/POES/NOAA-NP_Fact_Sheet.pdf. The Space Place gives kids a chance to rescue stranded skiers using their emergency rescue beacons. The Wild Weather Adventure game awaits them at spaceplace.nasa.gov/en/kids/goes/wwa. RBAC

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

Anthony Wesley Impact Cloud on Jupiter

Mark Brown did some image processing on the Jupiter Impact Cloud on August 4, 2009.



Edwardsville Children's Museum Outreach on October 24!

By Bill Breeden

This is a reminder that our outreach event scheduled for October 24, 2009, will be from **1:00 to 3:30 PM in the afternoon**. The event will feature safe solar observing and telescope exhibits outdoors, weather permitting. The event will also include indoor presentations of the Night Sky Network kits. Mark your calendar, and if you can help, please plan on arriving at 12 noon for set up. RBAC

Looked Up Lately?

Observing is what we are about, so here are deep-sky observing lists for September and October. These lists include objects that transit around 10pm during September and October. Your observing sessions will be more fun if you are prepared with an observing plan before you head outside. Prepare a list of your own, or print these and bring 'em to our next meeting/observing session.

September Observing List

Prepared by Bill Breeden

Double Stars

_____ 31 Cygni SAO 49337 Const. CYG Type DS RA 20 13.6 Decl. +46° 44' Mag. 3.8 6.7 4.8
_____ 61 Cygni SAO 70919 Const. CYG Type DS RA 21 06.9 Decl. +38° 45' Mag. 5.2 6.0
_____ Alpha Capricorni SAO 163422 Al Giedi Const. CAP Type DS RA 20 18.1 Decl. -12° 33' Mag. 3.6 4.2
_____ Beta Capricorni SAO 163481 Dabih Const. CAP Type DS RA 20 21.0 Decl. -14° 47' Mag. 3.4 6.2
_____ Beta Cephei SAO 10057 Alfirk Const. CEP Type DS RA 21 28.7 Decl. +70° 34' Mag. 3.2 7.9
_____ Epsilon Pegasi SAO 127029 Enif Const. PEG Type DS RA 21 44.2 Decl. +09° 52' Mag. 2.4 8.4
_____ Gamma Delphini SAO 106475 Const. DEL Type DS RA 20 46.7 Decl. +16° 07' Mag. 4.5 5.5
_____ Struve 2816 SAO 33626 - Const. Type DS RA 21 39.0 Decl. +57° 29' Mag. 5.6 7.7 7.8

Messier Objects

_____ M2 NGC7089 Const. AQR Type GC RA 21 33.5 Decl. -00 49 Mag. 6.3
_____ M15 NGC7078 Const. PEG Type GC RA 21 30.0 Decl. +12 10 Mag. 6
_____ M29 NGC6913 Const. CYG Type OC RA 20 23.9 Decl. +38 32 Mag. 7.1
_____ M30 NGC7099 Const. CAP Type GC RA 21 40.4 Decl. -23 11 Mag. 8.4
_____ M39 NGC7092 Const. CYG Type OC RA 21 32.2 Decl. +48 26 Mag. 5.2
_____ M72 NGC6981 Const. AQR Type GC RA 20 53.5 Decl. -12 32 Mag. 9.8
_____ M73 NGC6994 Const. AQR Type A RA 20 58.9 Decl. -12 38 Mag. 9
_____ M75 NGC6864 Const. SGR Type GC RA 20 06.1 Decl. -21 55 Mag. 8

Caldwell Objects

_____ C004 NGC7023 Const. CEP Type BN RA 21 01 48.00 Decl. +68 12 00.0 Mag. 6.8
_____ C012 NGC6946 Const. CEP Type SG RA 20 34 48.00 Decl. +60 09 00.0 Mag. 9.7
_____ C019 IC5146 Cocoon Nebula Const. CYG Type BN RA 21 53 30.00 Decl. +47 16 00.0 Mag. 10
_____ C020 NGC7000 North America Nebula Const. CYG Type BN RA 20 58 48.00 Decl. +44 20 00.0 Mag. 6
_____ C027 NGC6888 Crescent Nebula Const. CYG Type BN RA 20 12 00.00 Decl. +38 21 00.0 Mag. 7.5
_____ C033 NGC6992/5 East Veil Nebula Const. CYG Type SN RA 20 56 24.00 Decl. +31 43 00.0 Mag.
_____ C034 NGC6960 West Veil Nebula Const. CYG Type SN RA 20 45 42.00 Decl. +30 43 00.0 Mag.
_____ C037 NGC6885 Const. VUL Type OC RA 20 12 00.00 Decl. +26 29 00.0 Mag. 5.7
_____ C042 NGC7006 Const. DEL Type GC RA 21 01 30.00 Decl. +16 11 00.0 Mag. 10.6
_____ C047 NGC6934 Const. DEL Type GC RA 20 34 12.00 Decl. +07 24 00.0 Mag. 8.9
_____ C055 NGC7009 Saturn Nebula Const. AQR Type PN RA 21 04 12.00 Decl. -11 22 00.0 Mag. 8.3

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_____ RASC1 NGC7009 Saturn Nebula Const. AQR Type PN RA 21 04.2 Decl. -11 02 Mag. 8.3
_____ RASC98 NGC6888 Const. CYG Type SNR? RA 20 12.0 Decl. +38 21 Mag.
_____ RASC99a NGC6960 West Veil Nebula Const. CYG Type SNR RA 20 45.7 Decl. +30 43 Mag.
_____ RASC99b NGC6992/5 East Veil Nebula Const. CYG Type SNR RA 20 56.4 Decl. +31 43 Mag.
_____ RASC100 NGC7000 North America Nebula Const. CYG Type EN RA 20 58.8 Decl. +44 20 Mag. 6
_____ RASC101 NGC7027 Const. CYG Type PN? RA 21 07.1 Decl. +42 14 Mag. 10.4
_____ RASC106 NGC6940 Const. VUL Type OC RA 20 34.6 Decl. +28 18 Mag. 6.3

_____ RASC107 NGC6939 Const. CEP Type OC RA 20 31.4 Decl. +60 38 Mag. 7.8
_____ RASC108 NGC6946 Const. CEP Type G-Sc RA 20 34.8 Decl. +60 09 Mag. 8.9
_____ RASC109 NGC7129 Const. CEP Type RN RA 21 44.4 Decl. +66 10 Mag.

October Observing List

Prepared by Bill Breeden

Double Stars
_____ Xi Cephei SAO 19827 Kurhah Const. CEP Type DS RA 22 03.8 Decl. +64° 38' Mag. 4.4 6.5
_____ 8 Lacertae SAO 72509 - Const. LAC Type DS RA 22 35.9 Decl. +39° 38' Mag. 5.7 6.5
_____ 94 Aquarii SAO 165625 - Const. AQR Type DS RA 23 19.1 Decl. -13° 28' Mag. 5.3 7.3
_____ Delta Cephei SAO 34508 - Const. CEP Type DS RA 22 29.2 Decl. +58° 25' Mag. 3.9 6.3
_____ Zeta Aquarii SAO 146107 - Const. AQR Type DS RA 22 28.8 Decl. -00° 01' Mag. 4.3 4.5
Messier Objects
_____ M52 NGC7654 Const. CAS Type OC RA 23 24.2 Decl. +61 35 Mag. 7.3
Caldwell Objects
_____ C009 Sh2-155 Cave Nebula Const. CEP Type BN RA 22 56 48.00 Decl. +62 37 00.0 Mag. 7.7
_____ C011 NGC7635 Bubble Nebula Const. CAS Type BN RA 23 20 42.00 Decl. +61 12 00.0 Mag. 7
_____ C016 NGC7243 Const. LAC Type OC RA 22 15 18.00 Decl. +49 53 00.0 Mag. 6.4
_____ C022 NGC7662 Const. AND Type PN RA 23 25 54.00 Decl. +42 33 00.0 Mag. 9.2
_____ C030 NGC7331 Const. PEG Type SG RA 22 37 06.00 Decl. +34 25 00.0 Mag. 9.5
_____ C044 NGC7479 Const. PEG Type SG RA 23 04 54.00 Decl. +12 19 00.0 Mag. 11
_____ C063 NGC7293 Helix Nebula Const. AQR Type PN RA 22 29 36.00 Decl. -20 48 00.0 Mag. 6.5
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_____ RASC2 NGC7293 Const. AQR Type PN RA 22 29.6 Decl. -20 48 Mag. 6.5
_____ RASC3 NGC7331 Const. PEG Type G-Sb RA 22 37.1 Decl. +34 25 Mag. 9.5
_____ RASC4 NGC7635 Const. CAS Type EN RA 23 20.7 Decl. +61 12 Mag. -
_____ RASC5 NGC7789 Const. CAS Type OC RA 23 57.0 Decl. +56 44 Mag. 6.7
_____ RASC11 NGC7662 Blue Snowball Const. AND Type PN RA 23 25.9 Decl. +42 33 Mag. 9.2