Starscan

Johnson Space Center
Astronomical Society

Volume 26, Number 2 February 2010

Al Kelly's L/RGB image of "Thor's Helmet", NGC 2359, in Canis Major

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Un mensaje del Presidente
(A message from the President)

Greetings:

OK folks, don't forget this Friday, Bob Taylor is up for the ever entertaining 2009 Year of Astronomy and Space and Review, and on the 20th of this month we have star party at the LPI.

Inside this issue I hope you will be as entertained and impressed as much as I was with the Science Fair project by our own Chris Well's daughter, Beatrice who did her project looking at light pollution.

Lastly, don't forget… NO MEETING next month as we will be heading to the Fort over the second weekend next month, March 11-14. Hope to see everyone there!

Finally, my heartfelt thanks to Al Kelly and his recent processing of one of my favorite objects, Thor's Helmut… as "acting editor" this month it spoke to be on the cover!

David Haviland

LETTER FROM THE EDITOR
By Connie Haviland

HI EVERYONE;

I thought I would let Dave create, produce, develop and design the Starscan this month, I found myself personally involved due to some technical difficulties on David's part. HE ASKED FOR HELP!!! Being the loving wife and understanding and caring editor I am, I gave him a hand. Honestly speaking, I have been suffering from a very nasty upper respiratory infection, complicated with a possible run of the flu and was unable to get the Starscan out this month. Please be kind and let him know how much we all appreciate his efforts in helping me out. ENJOY…..

LETTER TO THE EDITOR

Dear Members:

Trailer spots are first come first served. Tell your friend that all spots will have electric (30 amp), most will have water and 2 may be available with sewer hookups. This spring will be very busy for the fort. The weekend before the star party we will be hosting a trail ride. Then there is the star party. We get a 1 weekend break, then our living history event. There will be no early arrival or late leaving for the star party this spring.

Be sure to let Lisa (lisa@riverofstars.net) know if you are coming this spring, who all will be with you and what kind of accommodations you need.

Ken Lester

Star Parties for 2010

Bob Taylor

February 20th, 7 p.m. LPI—Mars (public star party)
March 11-14th, Fort McKavett!!!
April 16th, "dusk" - Haak Winery
May 22nd, 7 p.m. LPI—Moon and Planets
May/June, Date TBA "dusk" - Haak Winery
November 20th, 7p.m. LPI—Jupiter

Need volunteers

What's Happening at the George!!!

Saturday Public Observing – All times are dusk to 11:00 p.m..Please contact the following building manager teams to volunteer:

Feburary 06: Building Managers, Knauss/Rivich (birdbarn2000@yahoo.com / icgalaxies@cs.com)

Feburary 13: Building Managers, Lockwood/Kingsley (mplockwood@att.net / gnjkingsley@att.net)

Feburary 20: Building Managers, Lockwood/Mills (mplockwood@att.net / k5jmm@yahoo.com)

Feburary 27: Building Managers, Wilson/Wilson (gobserve@consolidated.net)

February 20th, 7 p.m.–9 p.m. – Night Viewing of Mars (telescopes provided by JSC Astronomical Society)

March 20th, 10 a.m.–1 p.m. – Sun-Earth Day: Magnetic Storms

April 17th, 10 a.m.–1 p.m. – Earth Day: AtmospheresPlease note: Each child must be accompanied by a responsible parent or adult the entire time they are visiting the LPI.

For more information e-mail Spaceday@lpi.usra.edu or call 281-486-2106.

For more information, go to
http://www.lpi.usra.edu/education/space_days/
Or call Katy at (281) 486-2106
3600 Bay Area Boulevard, Houston, Texas

★ Light Pollution! ★

By Beatrice Wells, 5th Grade Science Project

(Where are those stars – 3rd Place)

Many people are unaware that light pollution is happening. Light pollution is wasted energy that stays in the sky. If you look up at the sky at night it looks like a big color scale; that is light pollution. The scientific definition for light pollution is unwanted energy that stays in the atmosphere.

Light pollution does not just affect humans. Many species of animals experience dangerous effects of light pollution. For example up to five million song birds die every year by crashing into brightly lit skyscrapers. Migrating birds also become confused because light pollution blocks out some of the stars they use as guides on their routes. Light pollution affects newly hatched turtles because they follow the moon light to the water. Light pollution also harms many mammals. For example pumas hunt at night. Extra light nearby the forest makes it harder to hunt.

Light pollution also affects humans because it takes a lot of money to light the world. North America spends about one billion dollars a year on electricity for lights, but most of this is light pollution. Things that are cause light pollution are parking lot lights, security lights, and much more. One third of all lighting brightens the sky rather than its target. Light pollution energy never touches the ground. Light always travels in a straight line until it hits an object. Most stargazers hate light pollution because they cannot see a clear view of nature.

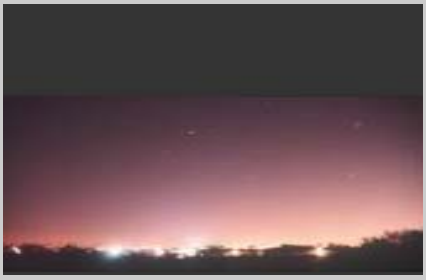
To reduce light pollution, flick on the light only when you need the light. Put timers on outdoor lights so they go off. If you are installing a new light ask about night sky friendly fixtures. A sky friendly light fixture focuses its light down to the ground.

Picture 1

Picture 1: Notice the color scale; this is light pollute

Picture 2: Sometimes light pollution is so bright it looks like day.

Picture 3: The color in this light pollution photo looks like fire.



Picture 2

Picture 3

BIBLIOGRAPHY

Dickinson, Terence. *Night Watch*. 3rd. buffalo, New York: Firefly Books, 1998. 47,48,6.

Cosier, Susan. "Night Lights." *SuperScience* April 2008: 12-14.

"Light Pollution." *National Park Service's Webranger web site* 12/7/09: 1-2. Web. 15 Dec 2009 retrieved from: http://www.teachersdomain.org/resource/lsps07.sci.life.oate.darksky

Problem
Which place has the least amount of light pollution, the George Observatory or my home in the suburbs?

Hypothesis
I predict that I can see all nine of the seven sisters (a known grouping of stars) including their parents at the George Observatory, but only four of them at home.

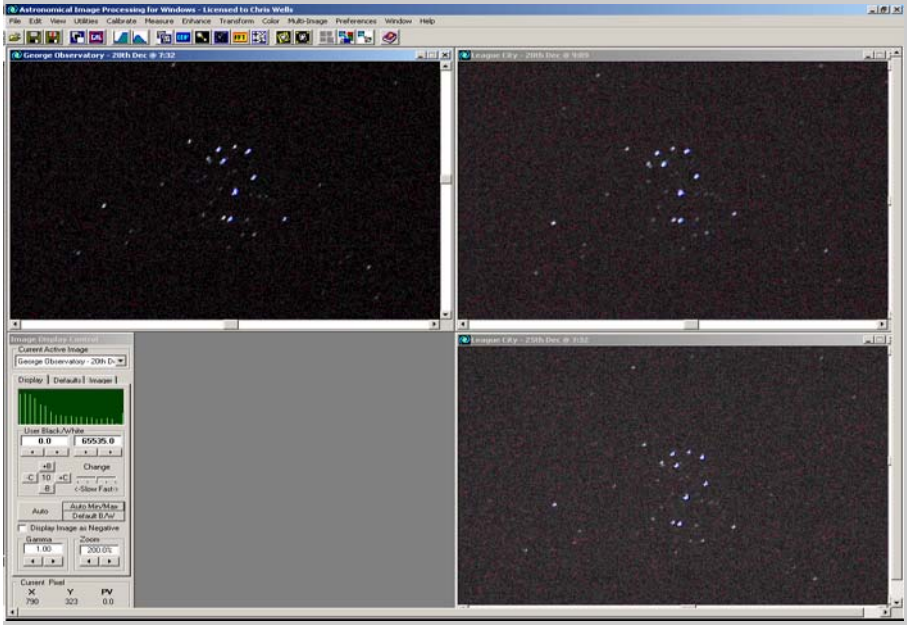
Materials
4 maps of the seven sisters
1 camera
1 tripod
3 highlighters
2 star
1 red flashlight

Procedure
Gather Materials
Go to the George Observatory
Set up camera
Find the 7 sisters with star map
Take picture of the seven sisters
Count how many stars I see
Highlight what I see on the map
Then go home
Repeat the steps at home

Pictures

Picture 4: Light Pollution at home – notice Orion

Picture 5: Light dome of Houston from the George

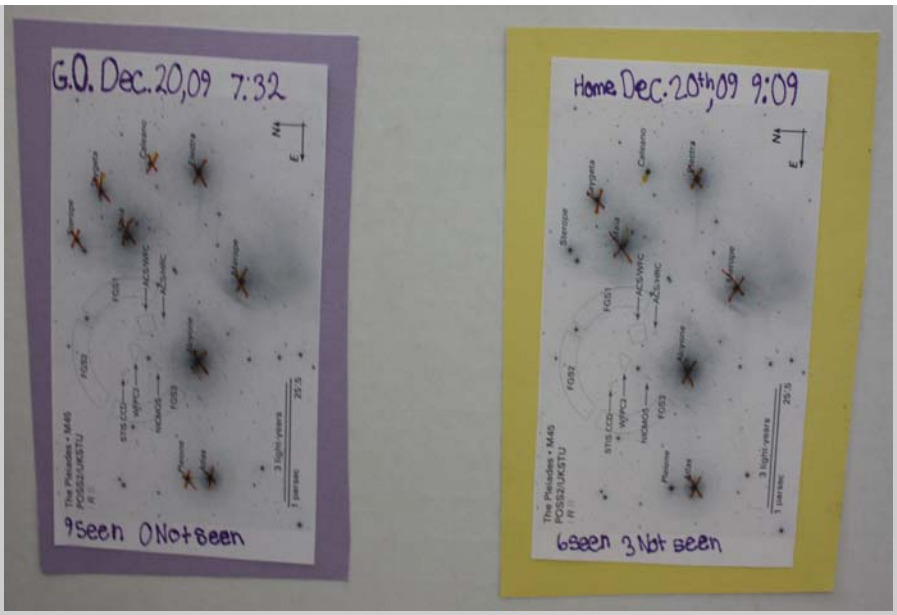


Picture 6: Pleiades from the George Observatory and from Home

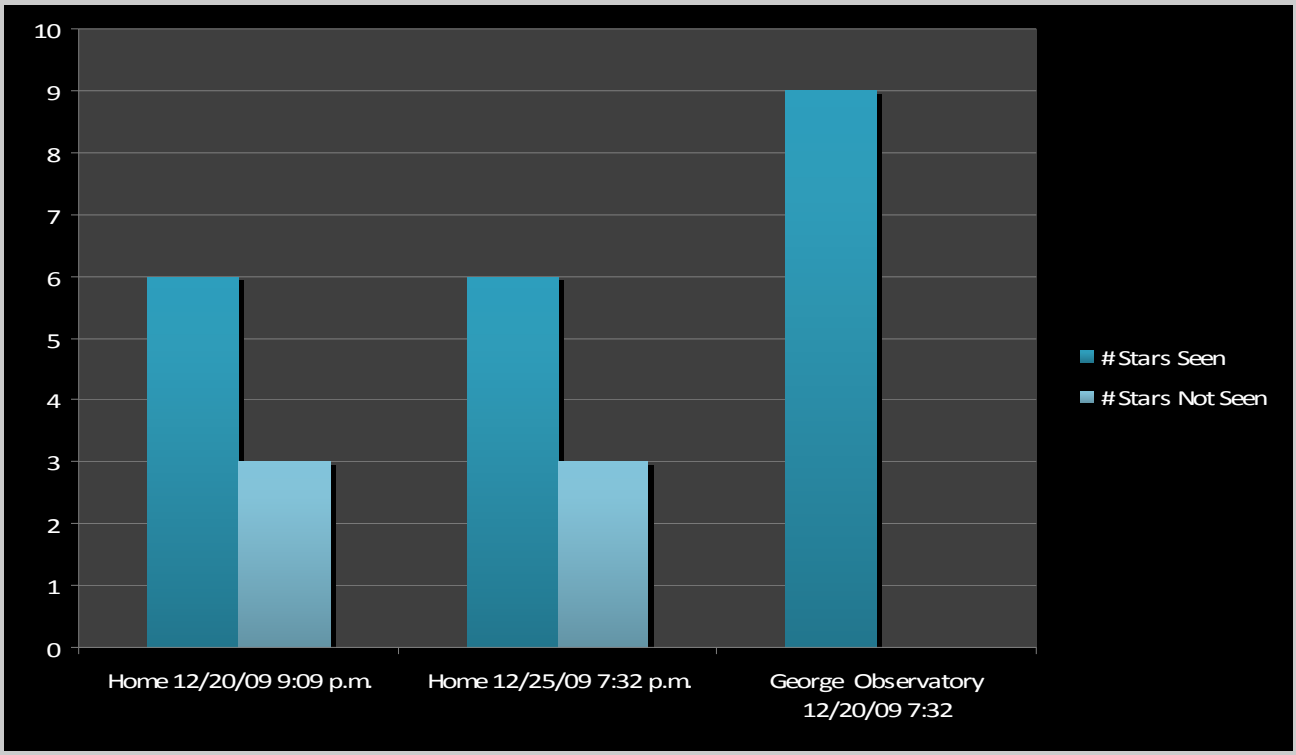
Data

	Star Viewing Location, Date and Time		
Star Name	Home 12/20/09 9:09 p.m.	Home 12/25/09 7:32 p.m.	George Observatory 12/20/09 7:32 p.m.
Pleione	Not seen	Not seen	Seen
Atlas	Seen	Seen	Seen
Alcyone	Seen	Seen	Seen
Merope	Seen	Seen	Seen
Electra	Seen	Seen	Seen
Caleano	Not seen	Not seen	Seen
Taygeta	Seen	Seen	Seen
Sterope	Not seen	Not seen	Seen
Maia	Seen	Seen	Seen

(Data cont'd)



Results



Conclusion

I tested two places to determine which one has the greatest amount of light pollution and how much greater. At the George Observatory, I saw three more of the stars that make up the seven sisters star grouping than at home. My hypothesis was partly correct and partly incorrect. I believe I saw more stars at the George Observatory than at home because we live near a shopping center, which has a lot of lighting. I learned that I should always go to a place like the George Observatory for astronomy. Next time, I would like to test a different area such as out in the country and another dark place.

Application

This information will help me in the real world because it will help me to find a good place for star gazing.

Spirit is Now a Stationary Science Platform

http://science.nasa.gov/headlines/y2010/26jan_spirit.htm?list1352372

January 26, 2010: After six years of unprecedented exploration of the Red Planet, NASA's Mars Exploration Rover Spirit is no longer a fully mobile robot. NASA has designated Spirit a stationary science platform after efforts during the past several months to free it from a sand trap have been unsuccessful.

The venerable robot's primary task in the next few weeks will be to position itself to combat the severe Martian winter. If Spirit survives, it will continue conducting significant new science from its final location. The rover's mission could continue for several months to years."Spirit is not dead; it has just entered another phase of its long life," said Doug McCuistion, director of the Mars Exploration Program at NASA Headquarters in Washington.

RIGHT: Spirit's last tracks. This view from Spirit's navigation camera shows tracks left by the rover as it drove backward, dragging its inoperable right-front wheel, to the location where the rover became trapped in soft sand in April 2009.

We told the world last year that attempts to set the beloved robot free may not be successful," adds McCuistion. "It looks like Spirit's current location on Mars will be its final resting place."

Ten months ago, as Spirit was driving south beside the western edge of a low plateau called Home Plate, its wheels broke through a crusty surface and churned into soft sand hidden underneath.

After Spirit became embedded, the rover team crafted plans for trying to get the six-wheeled vehicle free using its five functioning wheels – the sixth wheel quit working in 2006, limiting Spirit's mobility. The planning included experiments with a test rover in a sandbox at NASA's Jet Propulsion Laboratory in Pasadena, Calif., plus analysis, modeling and reviews. In November, another wheel qu it working, making a difficult situation even worse.

Recent drives have yielded the best results since Spirit became embedded. However, the coming winter mandates a change in strategy. It is mid-autumn at the solar-powered robot's home on Mars. Winter will begin in May. Solar energy is declining and expected to become insufficient to power further driving by mid-February. The rover team plans to use those remaining potential drives for improving the rover's tilt. Spirit currently tilts slightly toward the south. The winter sun stays in the northern sky, so decreasing the southward tilt would boost the amount of sunshine on the rover's solar panels.

"We need to lift the rear of the rover, or the left side of the rover, or both," said Ashley Stroupe, a rover driver at JPL. "Lifting the rear wheels out of their ruts by driving backward and slightly uphill will help. If necessary, we can try to lower the front right of the rover by attempting to drop the right-front wheel into a rut or dig it into a hole."

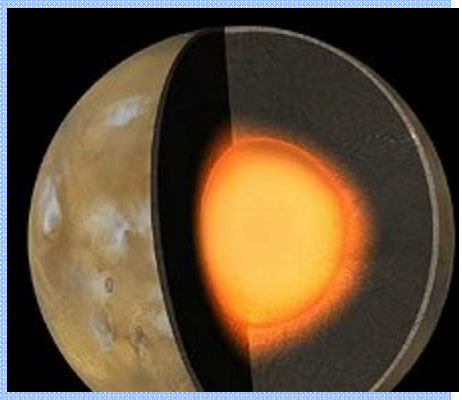
Right: Ashley Stroupe, a rover driver at JPL who has been involved in the efforts to free Spirit.

At its current angle, Spirit probably would not have enough power to keep communicating with Earth through the Martian winter. Even a few degrees of improvement in tilt might make enough difference to enable communication every few days.

"Getting through the winter will all come down to temperature and how cold the rover electronics will get," said John Callas, project manager at JPL for Spirit and its twin rover, Opportunity. "Every bit of energy produced by Spirit's solar arrays will go into keeping the rover's critical electronics warm, either by having the electronics on or by turning on essential heaters." Even in a stationary state, Spirit continues scientific research.

"There's a class of science we can do only with a stationary vehicle that we had put off during the years of driving," said Steve Squyres, a researcher at Cornell University and principal investigator for Spirit and Opportunity. "Degraded mobility does not mean the mission ends abruptly. Instead, it lets us transition to stationary science.

One stationary experiment Spirit has begun studies tiny wobbles in the rotation of Mars to gain insight about the planet's core. This requires months of radio-tracking the motion of a point on the surface of Mars to calculate long-term motion with an accuracy of a few inches.



Right: As a stationary platform, Spirit will help probe the core of Mars

"If the final scientific feather in Spirit's cap is determining whether the core of Mars is liquid or solid, that would be wonderful -- it's so different from the other knowledge we've gained from Spirit," said Squyres. Tools on Spirit's robotic arm can study variations in the composition of nearby soil, which has been affected by water. Stationary science also includes watching how wind moves soil particles and monitoring the Martian atmosphere. Spirit may have been stopped, but it hasn't stopped discovering the secrets of Mars. Stay tuned to Science@NASA for updates. Tools on Spirit's robotic arm can study variations in the composition of nearby soil, which has been affected by water. Stationary science also includes watching how wind moves soil particles and monitoring the Martian atmosphere.

Spirit may have been stopped, but it hasn't stopped discovering the secrets of Mars. Stay tuned to Science@NASA for updates.

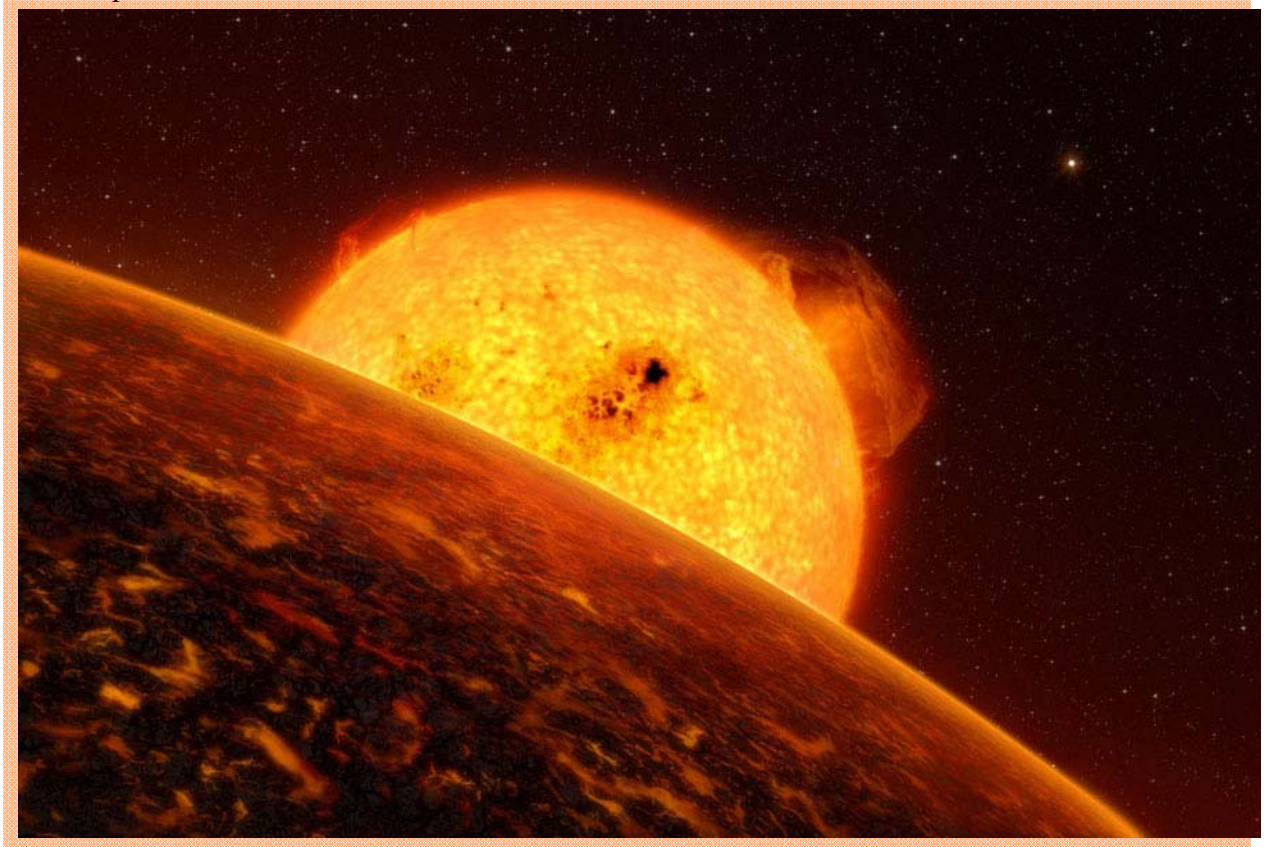
Editor: Dr. Tony Phillips | Credit: Science@NASA

Contributed by Jim Wessel

Alien Planet Safari

January 14, 2010: The premiere observatory of the next decade, the James Webb Space Telescope, will launch in 2014 in search of "big game"--namely, the first stars and galaxies ever formed in our Universe. But the "little game" could turn out to be just as interesting. There's a dawning awareness among astronomers that the world's largest infrared telescope is going to be a canny hunter of planets circling faraway stars.

see caption"Webb was originally conceived to search for the first galaxies and address the big cosmological questions associated with them, but we now know it can contribute powerfully to the planet hunt," says Mark Clampin of NASA's Goddard Space Flight Center. "Exoplanets are tremendously exciting. The field is changing literally by the day. I gave a talk on exoplanets the other day, and in the time between writing and delivering the speech, astronomers announced 30 new planets!"



Above: An artist's concept of an exoplanet. Image credit: ESO.

The Webb telescope is the tool for carrying out detailed, high precision follow-up studies of these new planets other telescopes are flushing out of hiding. And such planets are sneaky -- hiding in the glare of their own "suns."

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"It's like trying to find a firefly's flash in the beam from a lighthouse," says Jonathan Gardner, Webb Deputy Senior Project Scientist from Goddard. "But there are ways to do it!"

One way is called "transit science," which means studying the light from a star when a planet passes in front of the star.

"Webb will measure the total light the star emits and then measure the amount of light when the planet crosses in front," explains Gardner. "This telescope can even detect brightness changes that occur when the planet passes behind the star. With some Doppler measurements from ground-based surveys, all this information helps us determine the planet's mass and radius, and then astronomers can start to think about the planet's composition."

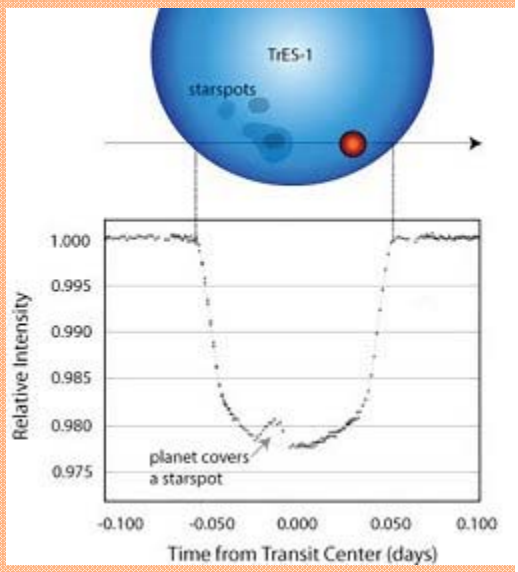
Below: Size is a key advantage in the planet hunt, and Webb is a truly enormous telescope. On the left we see Webb's mirror compared to Hubble's, and on the right there is a life-sized model of Webb on the grounds of the Goddard Space Flight Center in Maryland.

"We can also do spectroscopy during the transit," Gardner continues. "We measure the spectrum of the starlight before the transit, then again when the starlight is filtered through the planet's atmosphere during the transit."

The starlight changes as it goes through the planet's atmosphere.

"By comparing the two spectra for the star (in and out of transit), we can extract the planet's spectrum and learn about the planet's atmosphere," says Clampin. "We have to collect a lot of infrared light -- a billion or more photons -- for each spectral element to isolate features. Webb is perfect for this kind of study."

The telescope's huge 25 m2 collecting area can round up the herd of photons needed. And because Webb will be kept extremely cold thanks to its enormous sunshade and its location at the L2 Lagrange point, no extraneous source of heat will contaminate signals from the cosmos.



The transit method employed by Webb can not only discover planets but also map starspots.

"We're thrilled at Hubble's science, but we need low thermal background to see the faint infrared things we want to see," says Clampin. "And Hubble starts to see its own thermal signature at a certain point because it's not a very cold telescope.

"Webb will show us what the 'exoplanet zoo' looks like. This telescope will be very good at observing and taking spectra of gas giant planets, and we can take some spectral data on smaller planets, too, about Neptune-sized. Our telescope will also zoom in to study newly discovered super Earths' – planets bigger than Earth but smaller than Neptune."

Webb can also find planets on its own. "The Webb telescope will use a technique called coronagraphy to look for gas giant planets," says Gardner. "A star's light is so brilliant that it outshines any nearby planet by a million to a billion to 1, but inside three of Webb's four cameras there's a black spot the light can't go through. We'll put the star behind the black spot so we can see the planet next to the star. It's like when a car is driving toward you at night with its high beams on, and you use your hand to block out that light so you can see the road."

"Our eventual goal is to look for chemical evidence of life on some of these new planets. But we're not sure yet how well we'll be able to do that."

"Can Webb find signs of life on a planet like Earth?" asks Clampin. "The answer is probably not. A true Earth twin would be too small to emit enough infrared light from its atmosphere for Webb to pick up."

"Still, every time scientists make statements like that, someone proves them wrong. Transit science is changing so fast, it's hard to say exactly what wonders Webb's hunt will turn up."

Author: Dauna Coulter | Editor: Dr. Tony Phillips | Credit: Science@NASA

Contributed by our own Jim Wessel

IF YOU WANT TO CHECK OUT THE JAMES WEBB SPACE TELESCOPE, GO TO
http://www.jwst.nasa.gov/

Book Review for Johnson Space Center Astronomical Society

Title: Webb Society Deep-Sky Observer's Handbook: Volume 1: Double Stars
Editor: Kenneth Glyn Jones
Enslow Publishers, Hillside, New Jersey, 07205
Joint US-UK publication date: 1979
ISBN: 0-89490-027-7 (v. 1)

Living within the greater Houston light dome, forces us local astronomers to pursue one of two choices. They are either a distant trip to a remote dark site, or a concentration on celestial objects that effectively combat light pollution. About 99% of the time I have to do the latter. Double stars certainly fill the niche of observing 'bright objects' and you can learn an awful lot of astronomy and stellar physics in the meantime, if will you apply yourself a little bit. Having just recently finished off the Astronomy League's Double Star Observing List, I started pursuing this topic in a little more detail. The Webb Society Deep-Sky Observer's Handbook, Volume 1 – Double Stars, is the oldest, by publication date, of the three books I currently own on double stars.

While Kenneth Glyn Jones gets the credit for editing this book, it doesn't honor the person that truly did the majority of the writing. Robert Argyle, who is still an active double star observer 30 plus years later, actually wrote about 80% of the book. His writing style is easy to follow for the most part, although you get the typical English spellings (colours, centre, etc.) and the sentence structuring is decidedly different in flavor from typical contemporary American writing.

The first chapter of the book is entitled "A Brief History of Double Star Observing". I have to tell you, there is an amazing amount of information in these 7 pages. I want to share a couple of quick notes that I thought were particularly interesting when taken as a whole. First, Huygens discovered the relatively obscure and tight Theta Orionis (a.k.a. the Trapezium) to be a triple star in 1656, while the far brighter and much more obvious pair (to me, at least) Beta Cygni (a.k.a. Albireo) was not discovered until 1755. Second, William Herschel's important treatise on double stars was published in 1804, nearly 150 years after Huygens' observations, and this tome saw the real advent of double star observing. The historical section covers every major double star astronomer, his contributions concurrent with an implied timeline, and usually describes the telescope or optics and the observatory. Quite an accomplishment in so few pages, and it's not too terribly disjoint.

The second chapter deals with the types of double stars, which can be broken down into two major categories, those that can be detected at the eyepiece, and those that cannot. Under the former, the book covers Visual Binaries (these form the bulk of any amateur double star observing list) and Optical Doubles where two or more stars are aligned to our viewing perspective but are not gravitationally linked. Concerning stars that cannot be visually detected, there are again two categories. They are Spectroscopic Binaries, which are examined through the use of the like-named device, and Astrometric Binaries that are deduced by their varying proper motion.

Chapter three is covers seeing, the definition and appearance of the Airy disk, the Rayleigh Limit, and the Dawes's Limit. It also discusses the three major ways to conduct observations on double stars (visually, photographically, and through the use of a micrometer). The fourth chapter tells how to find a given double star and what sort of information should be recorded in an observer's logbook. Among the topics covered here are Separation, Magnitude, Color, Position Angle, and a brief section on how to how to draw them.

Chapter five provides the unique and most valuable section of this book in my opinion. "Micrometers and Double Star Measurements" alone was worth the cost of purchase. Here, Argyle goes through the use and design of several kinds of micrometers, ranging from the tried and true bifilar micrometer to the binocular micrometer to the interferometer and several variants in between. Sketches showing separation measurements, theta angle, and position angle and others demonstrate how the measurements are made. Yet more sketches of the actual design of a few micrometers are real assets to do-it-yourselfers that possess a little engineering or fabrication background.

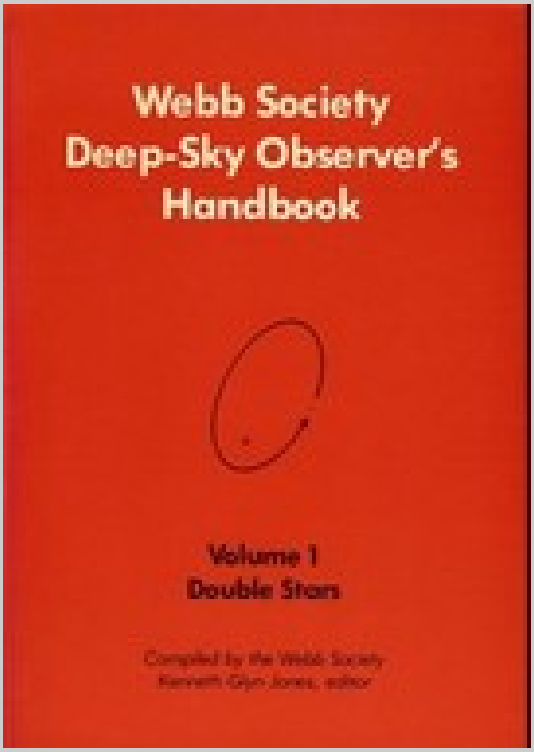
The next chapter on photography of double stars is obviously outdated as the use of digital cameras and CCDs has rendered photographic film largely extinct. That said, the conceptual value remains intact and I, for one, would be eager to try measuring double stars with the assistance of one or more of JSCAS' talented astrophotographers.

Chapter seven is a series of comprehensive biographies, in alphabetical order, of the prominent double star observers and researchers. The chapter is a fascinating read and I got a real appreciation for effort and dedication these men had for their chosen field of astronomy. I can only imagine the amount of time that was put into delving into background searches and for writing this section. There's way too much information contained within for me to provide a succinct account here. If you have a particular interest in history of astronomy, the purchase is even more worthwhile.

Chapter eight is a double star catalog, using the J2000 epoch, so it is not outdated by any means, and is still of value to the dedicated amateur observer. In flipping through the pages, I was immediately struck by the overwhelming number of STF (F.G.W. Struve, or sometimes designated Σ) and STT (Otto Struve, or OΣ) double stars. There are many others, to be sure, but these two account for the vast majority of double stars in this particular catalog. If you want an observing list to keep you busy for a LONG time to come, even under light polluted skies, here's a viable candidate.

Finally, the appendix includes the references and bibliography. I did not examine this in detail, but I would imagine a more recent and up to date book would better serve as a source for information.

Typically book reviews have a number of stars, or a number out of 10 rating. I'm not going to go there. My reading time is valuable to the point that if the book doesn't pass muster in short order, I don't finish reading it. Thus, any book review I might provide should be taken as a strong endorsement of the quality of the material. As you have probably discerned by now through this lengthy review, I found this book on double stars to be entirely worth the time it took read it. The section on micrometers is top shelf and I would like to personally put it to first hand use. The two historical sections were entirely enjoyable and have provided me with additional ideas for future presentations at our meetings. The only shortcoming that readily comes to my attention is a lack of sketches showing what some of the more noteworthy double and multiple star arrangements look like through a telescope. In closing, I would suggest that if you can find this book, and that's a reasonably big if, and if you are like me and interested in double stars, you probably ought to consider picking it up for your personal collection.



Giant Ribbon at the Edge of the Solar System: Mystery Solved?

January 15, 2010: Last year, when NASA's IBEX (Interstellar Boundary Explorer) spacecraft discovered a giant ribbon at the edge of the solar system, researchers were mystified. They called it a "shocking result" and puzzled over its origin. Now the mystery may have been solved.

"We believe the ribbon is a reflection," says Jacob Heerikhuisen, a NASA Heliophysics Guest Investigator from the University of Alabama in Huntsville. "It is where solar wind particles heading out into interstellar space are reflected back into the solar system by a galactic magnetic field."

Heerikhuisen is the lead author of a paper reporting the results in the Jan. 10th edition of the Astrophysical Journal Letters.

Right: An artist's concept of the Interstellar Boundary Explorer (IBEX).

This is an important finding," says Arik Posner, IBEX program scientist at NASA Headquarters. "Interstellar space just beyond the edge of the solar system is mostly unexplored territory. Now we know, there could be a strong, well-organized magnetic field sitting right on our doorstep."

The IBEX data fit in nicely with recent results from Voyager. Voyager 1 and 2 are near the edge of the solar system and they also have sensed strong* magnetism nearby. Voyager measurements are relatively local to the spacecraft, however. IBEX is filling in the "big picture." The ribbon it sees is vast and stretches almost all the way across the sky, suggesting that the magnetic field behind it must be equally vast.

Although maps of the ribbon (see below) seem to show a luminous body, the ribbon emits no light. Instead, it makes itself known via particles called "energetic neutral atoms" (ENAs)--mainly garden-variety hydrogen atoms. The ribbon emits these particles, which are picked up by IBEX in Earth orbit.

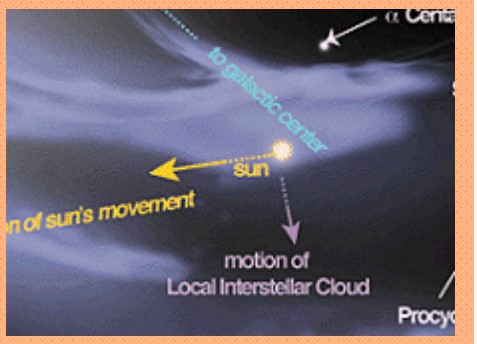
A comparison of IBEX observations (left) with a 3D magnetic reflection model (right).

The reflection process posited by Heerikhuisen et al. is a bit complicated, involving multiple "charge exchange" reactions between protons and hydrogen atoms. The upshot, however, is simple. Particles from the solar wind that escape the solar system are met ~100 astronomical units (~15 billion kilometers) away by an interstellar magnetic field. Magnetic forces intercept the escaping particles and sling them right back where they came from.

"If this mechanism is correct--and not everyone agrees--then the shape of the ribbon is telling us a lot about the orientation of the magnetic field in our corner of the Milky Way galaxy," notes Heerikhuisen.

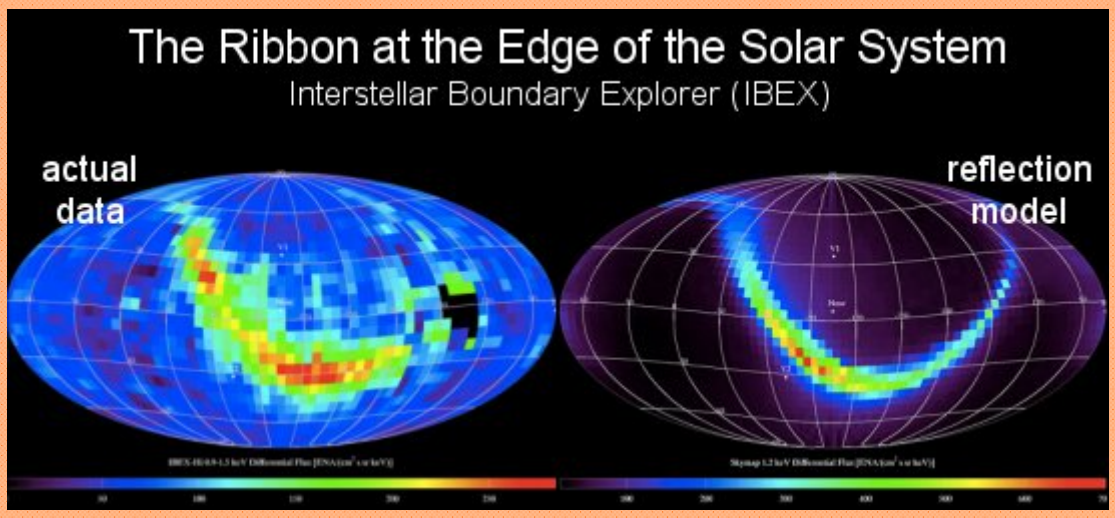
And upon this field, the future may hinge.

The solar system is passing through a region of the Milky Way filled with cosmic rays and interstellar clouds. The magnetic field of our own sun, inflated by the solar wind into a bubble called the "heliosphere," substantially protects us from these things. However, the bubble itself is vulnerable to external fields. A strong magnetic field just outside the solar system could press against the heliosphere and interact with it in unknown ways. Will this strengthen our natural shielding—or weaken it? No one can say.



Right: An artist's concept of interstellar clouds in the galactic neighborhood of the sun.

"IBEX will monitor the ribbon closely in the months and years ahead," says Posner. "We could see the shape of the ribbon change—and that would show us how we are interacting with the galaxy beyond."



It seems we can learn a lot by looking in the mirror. Stay tuned to Science@NASA for updates.

Author: Dr. Tony Phillips | Credit: Science@NASA

MORE INFORMATION:

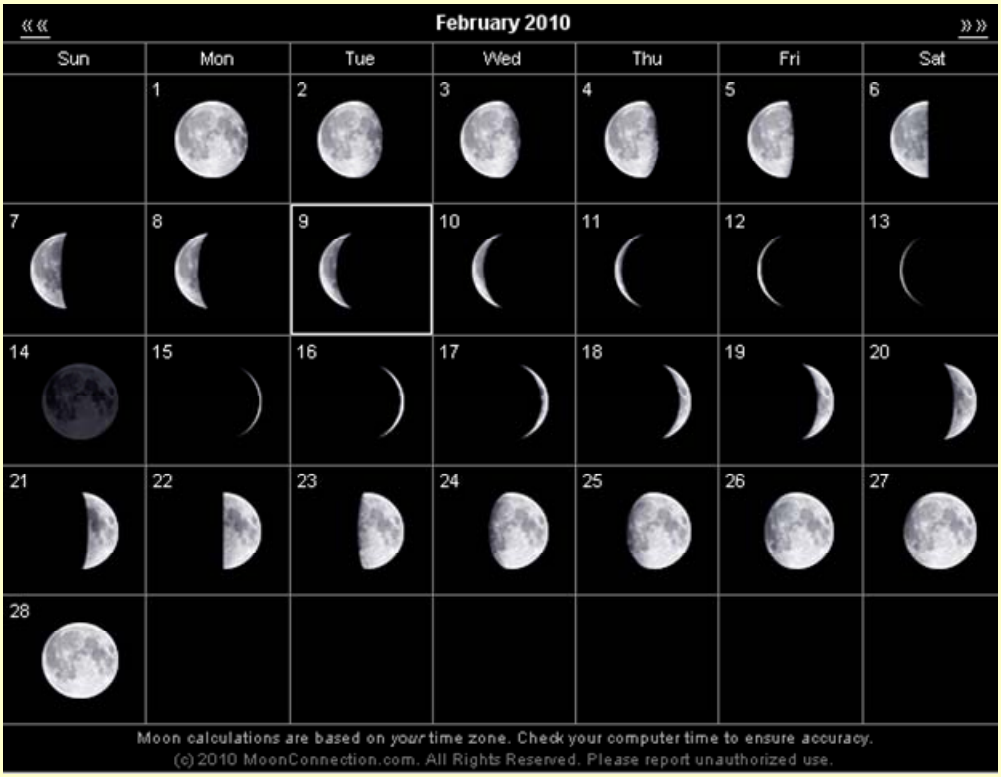
Footnote: * The strong interstellar fields mentioned in this story measure about ~5 microgauss. A microgauss is one millionth of a gauss, a unit of magnetic field strength popular among astronomers and geophysicists. Earth's magnetic field is about 0.5 gauss or 500,000 microgauss. Magnetic fields pervading interstellar space tend to be much less intense than planetary magnetic fields.

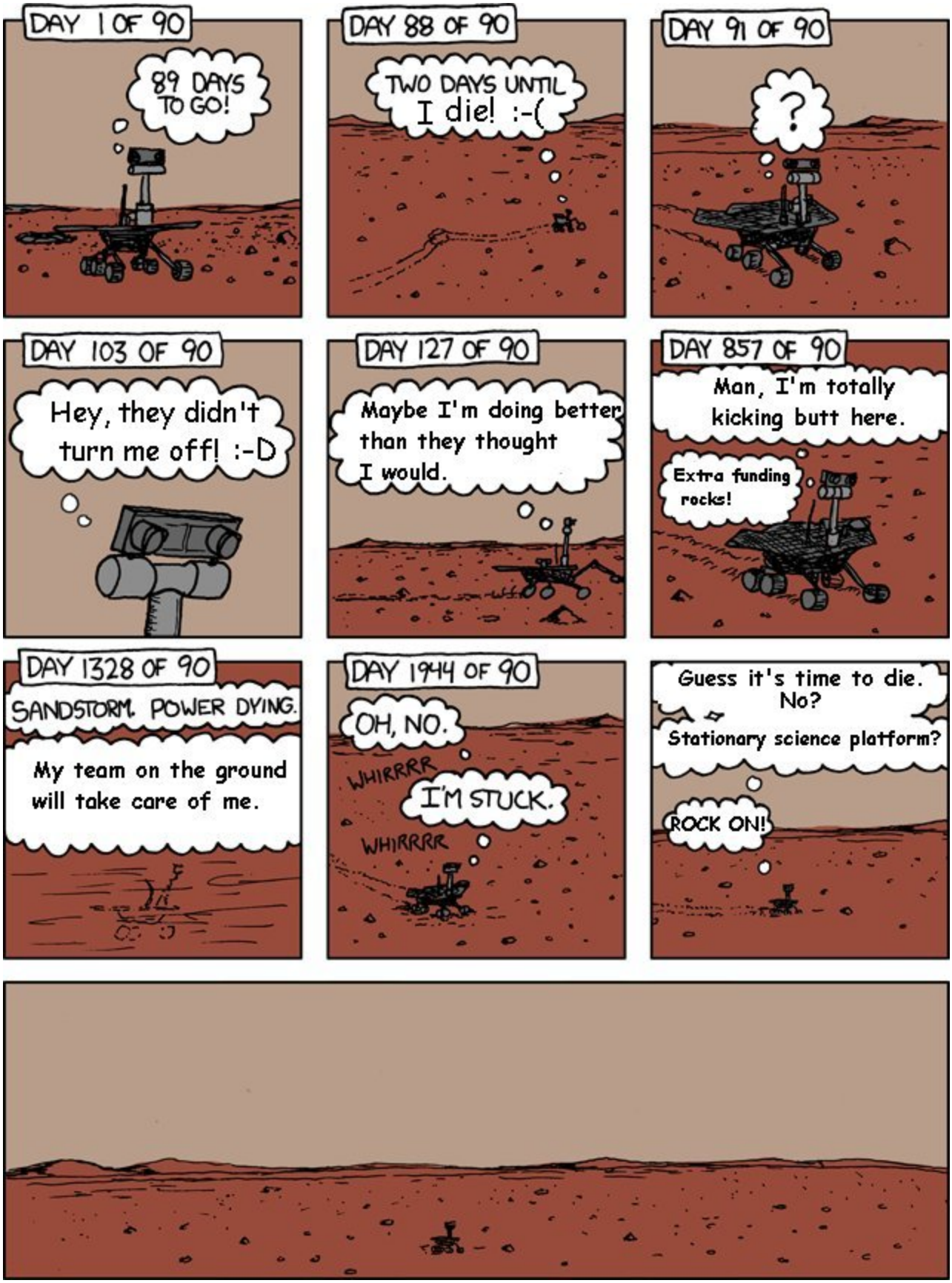
Credits: The IBEX spacecraft was launched in October 2008. Its science objective was to discover the nature of the interactions between the solar wind and the interstellar medium at the edge of our solar system. The Southwest Research Institute developed and leads the mission with a team of national and international partners. The spacecraft is the latest in NASA's series of low-cost, rapidly developed Small Explorers Program. NASA's Goddard Space Flight Center manages the program for the agency's Science Mission Directorate at NASA Headquarters in Washington.

SUNRISE AND SUNSET SCHEDULE FOR FEBRARY-2010

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1 Twi A: 5:50am Twi: 6:46am Sunrise: 7:11am Sunset: 5:58pm Twi: 6:23pm Twi A: 7:20pm Moonrise: 9:07pm Moonset: 8:39am	2 Twi A: 5:49am Twi: 6:46am Sunrise: 7:11am Sunset: 5:59pm Twi: 6:24pm Twi A: 7:20pm Moonrise: 10:12pm Moonset: 9:15am	3 Twi A: 5:49am Twi: 6:45am Sunrise: 7:10am Sunset: 6:00pm Twi: 6:25pm Twi A: 7:21pm Moonrise: 11:17pm Moonset: 9:50am	4 Twi A: 5:48am Twi: 6:45am Sunrise: 7:10am Sunset: 6:00pm Twi: 6:25pm Twi A: 7:22pm Moonrise: none Moonset: 10:27am	5 Twi A: 5:48am Twi: 6:44am Sunrise: 7:09am Sunset: 6:01pm Twi: 6:26pm Twi A: 7:23pm Moonrise: 12:20am Moonset: 11:06am Last Qtr: 5:49pm	6 Twi A: 5:47am Twi: 6:43am Sunrise: 7:08am Sunset: 6:02pm Twi: 6:27pm Twi A: 7:23pm Moonrise: 1:21am Moonset: 11:49am
7 Twi A: 5:46am Twi: 6:43am Sunrise: 7:08am Sunset: 6:03pm Twi: 6:28pm Twi A: 7:24pm Moonrise: 2:20am Moonset: 12:36pm	8 Twi A: 5:46am Twi: 6:42am Sunrise: 7:07am Sunset: 6:04pm Twi: 6:28pm Twi A: 7:25pm Moonrise: 3:16am Moonset: 1:28pm	9 Twi A: 5:45am Twi: 6:41am Sunrise: 7:06am Sunset: 6:05pm Twi: 6:29pm Twi A: 7:25pm Moonrise: 4:06am Moonset: 2:22pm	10 Twi A: 5:44am Twi: 6:41am Sunrise: 7:05am Sunset: 6:05pm Twi: 6:30pm Twi A: 7:26pm Moonrise: 4:51am Moonset: 3:17pm	11 Twi A: 5:44am Twi: 6:40am Sunrise: 7:04am Sunset: 6:06pm Twi: 6:31pm Twi A: 7:27pm Moonrise: 5:31am Moonset: 4:12pm	12 Twi A: 5:43am Twi: 6:39am Sunrise: 7:04am Sunset: 6:07pm Twi: 6:32pm Twi A: 7:28pm Moonrise: 6:06am Moonset: 5:07pm	13 Twi A: 5:42am Twi: 6:38am Sunrise: 7:03am Sunset: 6:08pm Twi: 6:32pm Twi A: 7:28pm Moonrise: 6:38am Moonset: 6:01pm New Moon: 8:52pm
14 Twi A: 5:42am Twi: 6:38am Sunrise: 7:02am Sunset: 6:09pm Twi: 6:33pm Twi A: 7:29pm Moonrise: 7:08am Moonset: 6:54pm	15 Twi A: 5:41am Twi: 6:37am Sunrise: 7:01am Sunset: 6:09pm Twi: 6:34pm Twi A: 7:30pm Moonrise: 7:36am Moonset: 7:47pm	16 Twi A: 5:40am Twi: 6:36am Sunrise: 7:00am Sunset: 6:10pm Twi: 6:35pm Twi A: 7:30pm Moonrise: 8:04am Moonset: 8:41pm	17 Twi A: 5:39am Twi: 6:35am Sunrise: 6:59am Sunset: 6:11pm Twi: 6:35pm Twi A: 7:31pm Moonrise: 8:33am Moonset: 9:35pm	18 Twi A: 5:38am Twi: 6:34am Sunrise: 6:58am Sunset: 6:12pm Twi: 6:36pm Twi A: 7:32pm Moonrise: 9:03am Moonset: 10:32pm	19 Twi A: 5:38am Twi: 6:33am Sunrise: 6:58am Sunset: 6:12pm Twi: 6:37pm Twi A: 7:32pm Moonrise: 9:37am Moonset: 11:31pm	20 Twi A: 5:37am Twi: 6:32am Sunrise: 6:57am Sunset: 6:13pm Twi: 6:37pm Twi A: 7:33pm Moonrise: 10:16am Moonset: none
21 Twi A: 5:36am Twi: 6:31am Sunrise: 6:56am Sunset: 6:14pm Twi: 6:38pm Twi A: 7:34pm Moonrise: 11:01am Moonset: 12:32am Fist Qtr: 6:43pm	22 Twi A: 5:35am Twi: 6:30am Sunrise: 6:55am Sunset: 6:15pm Twi: 6:39pm Twi A: 7:34pm Moonrise: 11:54am Moonset: 1:34am	23 Twi A: 5:34am Twi: 6:30am Sunrise: 6:54am Sunset: 6:15pm Twi: 6:40pm Twi A: 7:35pm Moonrise: 12:54pm Moonset: 2:34am	24 Twi A: 5:33am Twi: 6:29am Sunrise: 6:53am Sunset: 6:16pm Twi: 6:40pm Twi A: 7:36pm Moonrise: 2:01pm Moonset: 3:32am	25 Twi A: 5:32am Twi: 6:28am Sunrise: 6:52am Sunset: 6:17pm Twi: 6:41pm Twi A: 7:36pm Moonrise: 3:11pm Moonset: 4:24am	26 Twi A: 5:31am Twi: 6:27am Sunrise: 6:51am Sunset: 6:18pm Twi: 6:42pm Twi A: 7:37pm Moonrise: 4:22pm Moonset: 5:10am	27 Twi A: 5:30am Twi: 6:26am Sunrise: 6:50am Sunset: 6:18pm Twi: 6:42pm Twi A: 7:38pm Moonrise: 5:33pm Moonset: 5:52am
28 Twi A: 5:29am Twi: 6:25am Sunrise: 6:49am Sunset: 6:19pm Twi: 6:43pm Twi A: 7:38pm Moonrise: 6:42pm Moonset: 6:31am Full Moon: 10:38am						

PHASES OF THE MOON FOR THE MONTH OF FEBRUARY-2010




DAY 1 OF 90
89 DAYS TO GO!
DAY 88 OF 90
TWO DAYS UNTIL I die! :-(
DAY 91 OF 90
?
DAY 103 OF 90
Hey, they didn't turn me off! :-D
DAY 127 OF 90
Maybe I'm doing better than they thought I would.
DAY 857 OF 90
Man, I'm totally kicking butt here.
Extra funding rocks!
DAY 1328 OF 90
SANDSTORM. POWER DYING.
My team on the ground will take care of me.
DAY 1944 OF 90
OH, NO.
WHIRRRR
I'M STUCK.
WHIRRRR
Guess it's time to die. No?
Stationary science platform?
ROCK ON!

Folks:
In times past, people that have wanted to take advantage of the club discount have had to write their check, put it in with the renewal slip, and then either mail it to me at my home or chase me down at a meeting. In most cases, within a week, I have sent out the renewal. Sometimes, and I don't really mind, the renewals have gone out at my expense for the postage. Without hesitation, question, or fail, it is not the most efficient means to maintain club subscriptions. So as secretary, I'd like to try something new...

You get all your stuff ready for the subscription, whether it be Astronomy or Sky & Telescope, you keep it - you hang on to it. Email (most reliable) or tell me when you see me that you want to take advantage of the club discount for either or both of these publications and that you need a supporting letter. What I'll do is get the letter together and email the "letter from the treasurer/secretary" back to you as a PDF. You print it off, and enclose it with your renewal. For this to work your computer must have Adobe Reader (which is free) and a means to print it. I would like this procedure to become the "Standard Operating Procedure" for Astronomy/S&T discounts through JSCAS. For those still not in the computer age, we can process things as we have in the past.

Clear skies,
David Haviland

NEED A NEW CLUB SHIRT?

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conniescreativedesign@gmail.com

Webpage is under construction, but will be up soon and I take PayPal as well.

ACTUAL PICTURES OF WHAT I HAVE DONE BOTH LIGHT AND DARK BACKGROUNDS

Light pollution:

Any adverse effect of artificial light including sky glow, glare, light trespass, light clutter, decreased visibility at night, and energy waste.

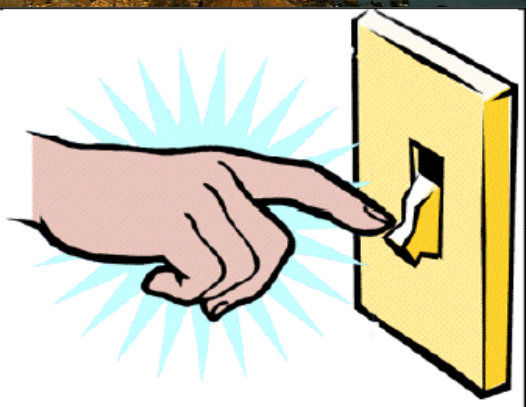
.Do you have a question about light pollution, protecting the night sky, or IDA's resources? **Get Help from IDA** http://www.darksky.org/mc/page.do?sitePageId=56399

Photograph © Phil Hart

IDA
THE LIGHT POLLUTION AUTHORITY

Help turn off the lights...

Join the
International Dark-Sky Association (IDA)
http://www.darksky.org
"To preserve and protect the nighttime environment and our heritage of dark skies through quality outdoor lighting."



Houston Area Astronomy Clubs

Brazosport Astronomy Club
Meets the Third Tuesday of the month, 7:45p.m.
At the Planetarium
400 College Drive
Clute, Texas (For more information, contact Judi James at the Planetarium 979-265-3376)

Fort Bend Astronomy Club http://www.fbac.org
Meets the third Friday of the month, 7:00 p.m.
Houston Community College Southwest Campus—Main Lecture Hall
10141 Cash Rd
Stafford, Texas 77477

Houston Astronomical Society http://spacibm.rice/edu/~has
Meets the first Friday of the month, 8:00 p.m.
University of Houston, University Park
Science and Research Building, Room 117

North Houston Astronomy Club http://www.astronomyclub.org
Meets the fourth Friday of the month, 7:30 p.m.
In the Teaching Theatre at Kingwood College
20000 Kingwood Drive
Kingwood, Texas

Galveston Stargazers
Meets the first Wednesday of the month At Home Cut Donuts, 6807 Stewart Rd, Galveston, TX
From 7PM to 9PM.
Contact: Jim Gilliam at Jim.Gilliam@dars.state.tx.us or
At (409)795-3620, M - F, 8AM to 5PM

Starscan Submission Procedures

Original articles of some relation to astronomy will be accepted up to 6 p. m. (18:00 hrs) on the 25th of each month. THE most convenient way to submit articles or a Calendar of Events is by email and is preferred, but hard copies (CD, disk) are also accepted. All articles must include author's name and phone number. Also include any picture credits. Word, WordPerfect, and text files will be accepted. I have set up a special email account so that I can keep all of the Starscan articles, pictures, information, etc, separate from all of the other email I get. This makes is much easier to edit and set up the Starscan

Please send all submissions to:
conniesstarscanaccount@gmail.com

The author of individual articles bears all responsibility for publishing any e-mail addresses in the article on the World Wide Web

Johnson Space Center Astronomical Society

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President – David Haviland
Vice President – Chris Randall
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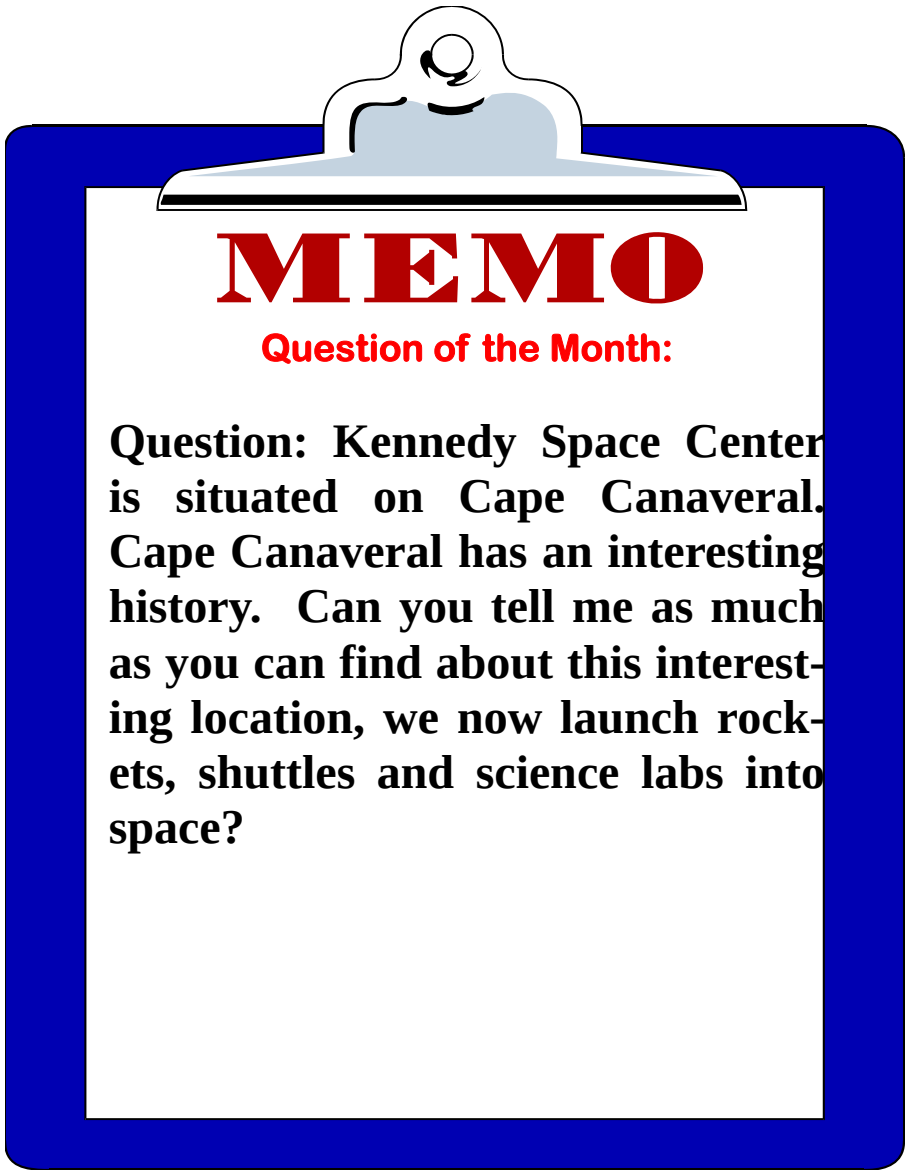
Web Master—Chris Randall

SIGS

Observing Awards – Triple Nickel
Astronomy 101 — Triple Nickel
CCD Imaging – Al Kelly
Binocular Observing – "OPEN"
Telescope Making – Bob Taylor
Deep Sky Observing – Hernan Contreras

Astronomy and Kids

This is the section strictly for kids (or kids at heart). We will be including information, stories, ideas, puzzles or anything that has to do with astronomy. The only difference here is, it will be directed for children. We don't discourage parents or any other adult to get involved. In fact, we encourage it strongly. So we hope you enjoy this section and if it touches a child's interest in astronomy, our goal has been achieved. Enjoy!!



MEMO

Question of the Month:

Question: Kennedy Space Center is situated on Cape Canaveral. Cape Canaveral has an interesting history. Can you tell me as much as you can find about this interesting location, we now launch rockets, shuttles and science labs into space?

NAME THIS OBJECT AND TELL ME SOMETHING ABOUT IT

1. Name
2. Messier catalog number
3. What galaxy
4. Description, what is it:
5. What Constellation

SOLUTIONS AND ANSWERS

QUESTION: What is a HELIOSPHERE

ANSWER: The heliosphere is a bubble in space "blown" into the interstellar medium (the hydrogen and helium gas that permeates the galaxy) by the solar wind. Although electrically neutral atoms from interstellar space can penetrate this bubble, virtually all of the material in the heliosphere emanates from the Sun itself.

For the first ten billion kilometres of its radius, the solar wind travels at over a million kilometres per hour. As it begins to collide with the interstellar medium, it slows down before finally ceasing altogether. The point where the solar wind slows down is the termination shock; the point where the interstellar medium and solar wind pressures balance is called the heliopause; the point where the interstellar medium, travelling in the opposite direction, slows down as it collides with the heliosphere is the bow shock.

NAME_____

ASTRONOMICAL SCAVANGER HUNT

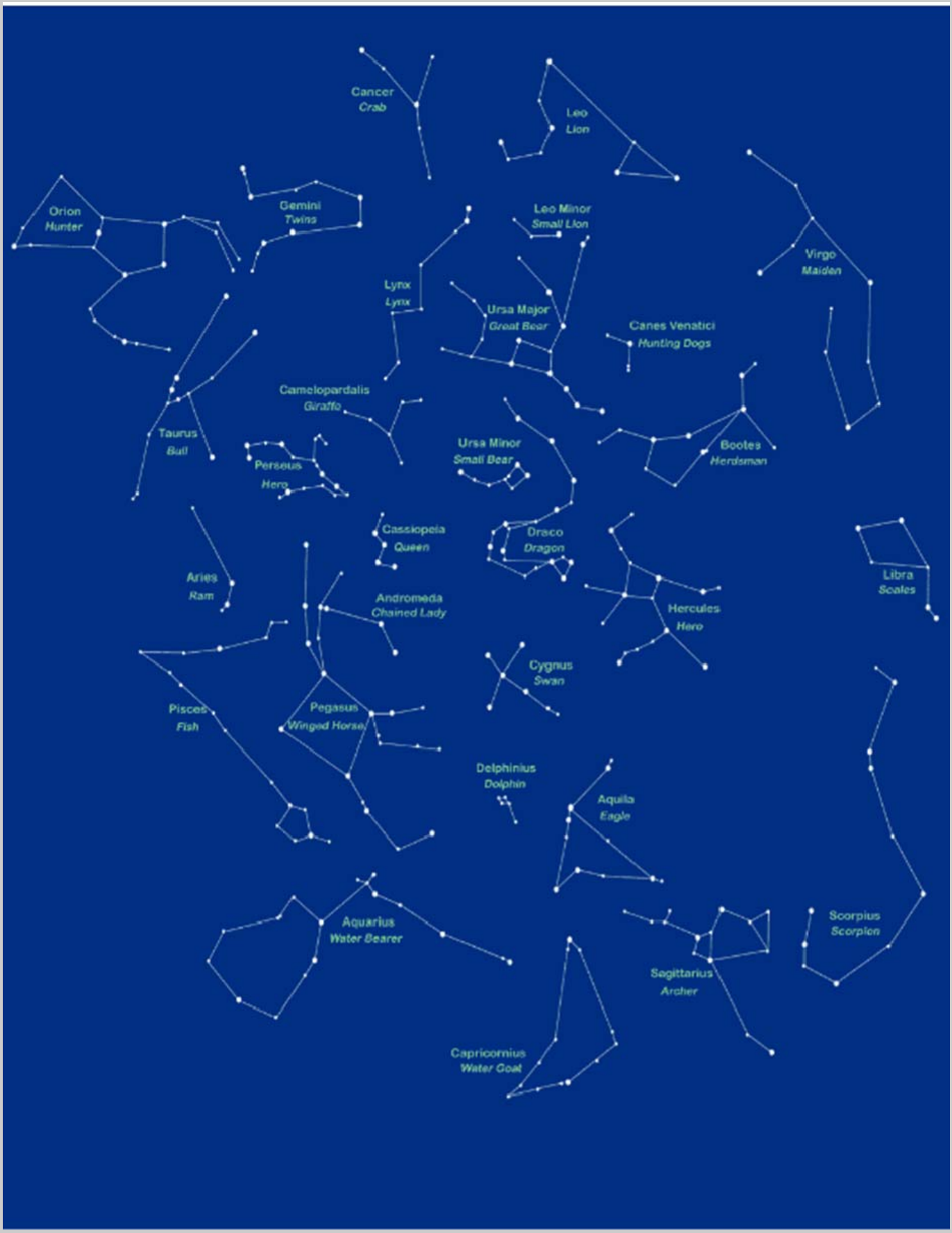
Let's see if you read the newsletter this month. All of these words can be found here in this month's newsletter

1. SHOLEEIPRHE _____
2. MIULEH _____
3. EGRYDNOH _____
4. ISTIPR _____
5. ESPSINRCOOM _____
6. OIETHLHAHSE _____
7. TOOBR _____
8. STRERIETLANL _____
9. OCMSIC _____
10. SLSIYOHEHIPC _____
11. VGOYERA _____
12. FFULF _____
13. ENYITSD _____
14. RPANEYATL _____
15. CSIUNRCOPAR _____
16. UATADINRDQ _____
17. EPSUGAS _____
18. RNMAOADED _____
19. ESUCT _____
20. GAUIAR _____
21. EESSURP _____
22. ESAAOIPICS _____
23. INIEMG _____
24. CISRNMJAOA _____
25. LINAHADV _____

ANSWERS:

1. HELIOSPHERE
2. HELIUM
3. HYDROGEN
4. SPIRIT
5. COMPRESSION
6. HELIOSHEATH
7. ROBOT
8. INTERSTELLAR
9. COSMIC
10. HELIOPHYSICS
11. VOYAGER
12. FLUFF
13. DENSITY
14. PLANETARY
15. CAPRICORNUS
16. QUADRANTID
17. PEGASUS
18. ANDROMEDA
19. CETUS
20. AURIGA
21. PERSEUS
22. CASSIOPEIA
23. GEMINI
24. CANISMAJOR
25. HAVILAND

LEARN YOUR CONSTELLATIONS



Snoopy says, never stop looking up..reach for the stars and may you always have clear skies!!!!