Starscan

Johnson Space Center Astronomical Society

Volume 25, Number 12 December 2009

MERRY CHRISTMAS EVERYONE

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Un mensaje del Presidente
(A message from the President)

Sneezons Greetings!

Another year has passed and for many ended on a high note with the snow we had last week. Hopefully it helps some like me get into the holiday spirit. I was taken with Ken's picture from the porch of the barracks as well as the shots taken by Becky from their New Mexico digs. This momentum of holiday spirit takes us into our Winter Solstice gathering this month followed on Saturday (weather permitting) with a star party at the Haak Winery. Then we turn the corner on 2009. Connie and I want to wish everyone a happy Holiday season, a happy New Year, and most of all, that 2010 becomes one of JSCAS's best years yet.

David Haviland

LETTER FROM THE EDITOR
By Connie Haviland

Hi Everyone!!
Sorry for the delay with the Starscan this month. I am not sure how many of you know that on Novermber 16th, David's mother passed away after approximately 9years of dealing with Alzhiemer's Disease. This happening right before the holidays has caused some delays in other areas of our lives and those things had to be put on hold. I am happy to say, although late, this month's edition will be out before our Solstice party.

Enjoy…..Connie Haviland

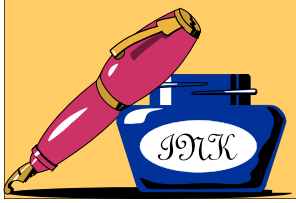
LETTER TO THE EDITOR

Folks:

Hernan has asked to be relieved of doing the deep sky presentation and the corresponding article for the Starscan. We need someone to step up to the plate and take this on. Any of the imaging group want to toss their hat into the ring?

We are very grateful for Hernan's efforts in doing these over the past year. However, we will continue to be entertained as Hernan will continue with the "oddities".

David



Star Parties for 2009

Bob Taylor

DECEMBER HAAK WINERY DECEMBER 12

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Need volunteers

What's Happening at the George!!!

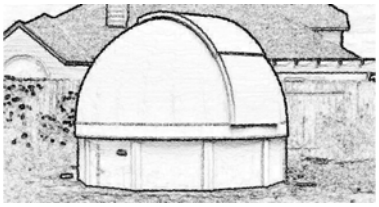
Cynthia Gustava

NOTHING WAS SENT TO ME…PLEASE CONTACT CYNTHIA GUSTAVA REGARDING THIS MONTH'S SCHEDULE AT THE GEORGE

December – No Family Space Day Scheduled. Enjoy your holidays!
Please 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

Building Your Own Observatory (Part II-D)
Wall Assembly



The evening of June 7, I sat down and compiled a list of items needed to complete the dome. I was feeling good. The dome was outside on the building. The end was in sight. An hour later depression sank in. The punch list included 30 tasks. If I worked every day until the end of the month I estimated I could finish before the building permit expired (the first week of July). Over the next 3 weeks every hour not spent at work or sleep was devoted to the completion of the observatory.

Sealing and Painting the Dome

Once the dome was in place on the walls, the first task was waterproofing the skin. I attached the dome skirt to cover the gap between the wall cap and the bottom of the dome ring. The skirt consisted of 8-foot sections of hardboard and plastic lattice edging. The lattice edging was attached to the lower edge of the skirt. I sealed all seams using a roof patch on the recommendation of the elastomeric roof paint manufacturer. Approximately one gallon of roof patch was required to seal 200 feet of seams. Prior to applying primer paint to the skin, I roughed up the smooth surface of the hardboard skin with a random orbit sander and 150-grit sandpaper. Next I applied a single coat of primer paint to the entire external surface of the dome. I purchased a 5-gallon container of elastomeric roof paint and applied the paint in 5 coats over several days.

Shutter Construction and Installation

As mentioned in last month's article, I did not finalize the shutter design until a few days prior to its construction and installation. The design consisted of two sections. The lower section was connected to the dome base ring using a 30-inch piano hinge. The piano hinge allows the lower shutter to swing down far enough to provide the telescope access to sky elevations as low as 10 degrees. The upper shutter rolls up and over the top of the dome on 8 1-inch caster wheels. The wheels ride on the shutter rail (the center plywood lamination of the slit arches). I fastened 1/16-inch thick aluminum bar to the shutter rail to protect the wood surface and provide a smooth riding surface for the wheels. The frame for each shutter was assembled with ¾-inch plywood arcs and 2x4 lumber. I cut the arcs with the router using the same jig utilized during the dome rib assembly. Each shutter has 4 arcs. 2 arcs are paired and placed at the outside edges of the shutter. The paired arcs are separated by an approximate 2-inch gap. The shutter rail sits in the gap. The lower portion of the shutter arcs and the upper portion of the shutter rail overlap by slightly more than an inch. The upper shutter wheels sit in the 2-inch gap and each are attached to a brass rod axle. The axles in turn are captured in a hole drilled through each shutter arc. Each arc pair is

Dome Rotation Guides

Rotation guides were required to keep the dome centered on the wall. I manually rotate the dome by pushing on a dome rib. Pushing on a single point applies tangential forces that cause the dome to rotate but also cause the center of rotation to wander. To prevent the wandering, I installed 5 rotation guides on alternating walls. Each guide was built with 2x4 lumber, Simpson Strong-Tie framing brackets and a small rigid caster. The rotation guide is mounted on the wall cap with lag screws. I cut slots in the guide for the lag crew holes so that each guide may be adjusted. The slots are hidden under the washers in the image below.

Construction Completion

Upon installation of the rotation guides, the primary construction of the dome was complete. All that remained were additional coats of paint, installation of the turnbuckle dome anchors and installation of interlocking rubberized flooring tiles.

All went according to plan except for the turnbuckle anchor installation. My design showed 22 turnbuckles but did not specify how the turnbuckles would be attached to the dome and wall header. My preliminary idea would be to use eyebolts on the dome and wall header. Upon fitting the turnbuckle I discovered I did not have proper clearance over the inside edge of the dome ring. I discussed this problem with neighbors and co-workers and a bracket design evolved from these discussions. Fortunately, a co-worker had a metal shop and volunteered to build the brackets. Pictured here to the right, is the prototype bracket.

Lessons Learned

Over the course of construction, I made numerous mistakes and discovered better ways to accomplish specific tasks. Some mistakes led to additional expense. Nearly all delayed the process. Below is a list of what I learned building my observatory.

Plan Ahead – I spent considerable time in planning the big tasks throughout the project. However, I had a tendency to under plan the small items and thus, wasted an enormous amount of time. Plan and review supply lists to avoid excessive runs to the store. Whatever the construction task at hand, plan tool organization. Keep pencils, screwdrivers, hammers, etc. in a planned consistent location. I was constantly looking for my pencil during construction. A planned, consistent storage location would have saved time.

Be Flexible – Be prepared for change. While many items turned out as I envisioned them, others did not. Expect some changes with your design to be forced by difficulty in construction.

Be Realistic with Progress – I learned that nearly every task takes three times the amount of time I expected. While your estimation abilities may be superior to mine, you will likely run into problems that delay progress. Expect the delays. On any given day, underestimate what you feel you can accomplish. If you include "unexpected" delays, you will likely stay on schedule.

Schedule around the Weather – Pick a time of year to build your observatory that is most conducive to progress. I waited until too late in the spring to start construction. As a consequence, I ended up working in very hot and humid conditions during the last phases of the project. During construction, be prepared for both indoor and outdoor tasks so that bad weather does not impede progress.

Make construction a group project - Many hands make light work. If you can recruit help during construction, do it. I executed most of the observatory construction without help. Certain tasks required two or more workers. At times I was fortunate to have help from my brother, sons, neighbors and on occasion, my wife. Productivity increased dramatically when I had help.

Observatory Size – Make sure the size of your observatory is adequate but reasonable. In hindsight I could have built a dome with an 11-foot instead of 12-foot diameter. The dome is on the verge of being too heavy. If I had built a slightly smaller dome, I believe I would still have plenty of floor space. The dome would be lighter, and I would have saved on the cost of construction materials. When designing the structure, decide how much space you need, add a little room for expansion, and then build accordingly.

Sounding Boards – Talking though design and construction issues can be immensely helpful. If you have friends or neighbors who have construction knowledge, discuss your plans, ideas, problems and issues with them. I improved my design and avoided many potential problems through these discussions.

Be aware of building restrictions – Before you start construction, make sure you are adhering to any restrictions imposed by your home owners association and city building department. Know where you can build, how high, and with what materials. The building inspector will require you to build to code.

In conclusion, I hope this article series was informative and helpful to those who might consider building their own observatory. For me it was a very challenging and rewarding experience. After years of contemplation, I am excited to have the project completed. I have spent more time under the stars in the last two months than I have in the last two years. If anyone would like a tour of the observatory, post a message to the JSCAS listserver, and I'll be happy to arrange a visit.

Christmas Tree cluster taken by NASA's Spitzer Space Telescope

The signs of the holidays are all around us - wreaths on doors, twinkling lights in windows, and decorated trees in living rooms. Even outer space is joining the year-end celebration with this new image of a star-forming region called the Christmas Tree cluster recently taken by NASA's Spitzer Space Telescope. The Christmas Tree cluster was nicknamed by amateur astronomers for its appearance through small telescopes, which show a triangular outline of stars like a tree bedecked by dazzling holiday lights. The new infrared image reveals a different view: ribbons of gas and dust swirling like snow blowing in frigid winter winds and adorned by a festive collection of brilliant stars. The complex and breathtaking pattern of nebular emission traces a massive molecular cloud from which the cluster formed only recently.

Astronomers constructed the new image using data from two infrared cameras on Spitzer: the Infrared Array Camera, developed by the Smithsonian Astrophysical Observatory, and the Multiband Imaging Photometer for Spitzer, developed by the University of Arizona's Steward Observatory. The dramatic appearance of the Christmas Tree cluster in infrared light results from heat radiation from ribbons of glowing dust that swaddle dozens of newborn stars just beginning to emerge from their natal cocoons.

"Hundreds of new stars and planetary systems have been produced over the past few million years in a prodigious burst of birthing activity within this enormous star-making factory," said Charles Lada of the Harvard-Smithsonian Center for Astrophysics (CfA), a co-author on the study presenting the new image.

With Spitzer, astronomers can observe the nebula in otherwise invisible infrared light (or heat). Dust particles that permeate the cloud glow warmly in the infrared and reveal the intricate structure of the material that makes up this giant cloud. Moreover, infrared radiation provides astronomers with a much deeper view than visible radiation into the celestial womb of gas and dust that make up this massive molecular cloud. As a result they can directly observe growing young stellar embryos, known as protostars, which are otherwise invisible.

The Spitzer images reveal a conspicuous and curious new ornament on the "Christmas tree": a collection of bright young protostars spatially arranged in a geometrical configuration that resembles spokes on a wheel or perhaps the pattern of a snowflake ornament. This new ornament is only now, for the first time, rendered visible by Spitzer's unique infrared detectors.

"That was a wonderful holiday surprise for us!" said Paula Teixeira of CfA, lead author on the study. "The spatial regularity of these protostars provides us with a critical clue about the very nature of the process of stellar birth in the Spokes, or Snowflake, cluster."

The spacings of the protostars in the Snowflake cluster confirm basic theoretical expectations, which predict that the average distance between forming protostars should be set by the density and temperature of the natal cloudy material.

The cluster is located about 3.000 light-years from the Earth in the constellation Monoceros the Unicorn.

JPL manages the Spitzer mission for NASA's Science Mission Directorate. Science operations are conducted at the Spitzer Science Center at the California Institute of Technology in Pasadena. NASA's Goddard Space Flight Center built Spitzer's Infrared Array Camera. The instrument's principal investigator is Giovanni Fazio of CfA.

Headquartered in Cambridge, Mass., the Harvard-Smithsonian Center for Astrophysics (CfA) is a joint collaboration between the Smithsonian Astrophysical Observatory and the Harvard College Observatory. CfA scientists, organized into six research divisions, study the origin, evolution and ultimate fate of the universe.

Source: http://www.spaceflightnow.com/news/n0512/24tree/

Credit: NASA / JPL-Caltech / P.S. Teixeira & C.J. Lada (CfA), E.T. Young (U. Arizona)

Sandtrapped Rover Makes a Big Discovery 12.02.2009
From: http://science.nasa.gov/headlines/y2009/02dec_troy.htm?list1089931

December 2, 2009: Homer's Iliad tells the story of Troy, a city besieged by the Greeks in the Trojan War. Today, a lone robot sits besieged in the sands of Troy while engineers and scientists plot its escape. Welcome to "Troy" – Mars style. NASA's robotic rover Spirit is bogged down on the Red Planet in a place the rover team named after the ancient city.
So why aren't scientists lamenting?

"The rover's spinning wheels have broken through a crust, and we've found something supremely interesting in the disturbed soil," says Ray Arvidson of the Washington University in St. Louis.

Spirit, like its twin rover Opportunity, has roamed the Red Planet for nearly 6 years. During that time, the rover has had some close calls and come out fighting from each. In fact, it's been driving backwards since one of its wheels jammed in 2006.

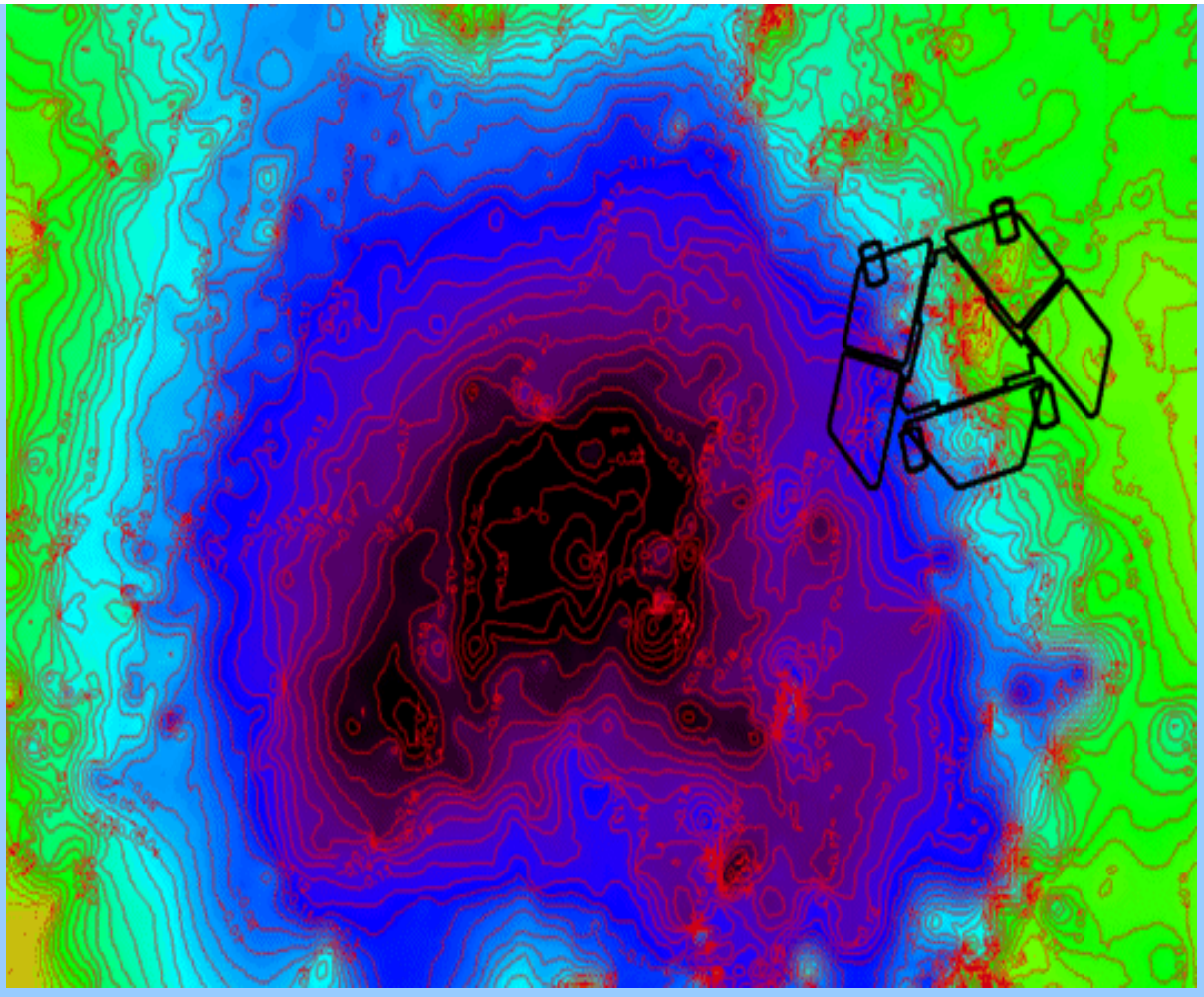
Above: Spirit surveys its own predicament. The bright soil pictured left is loose, fluffy material churned by the rover's left-front wheel as Spirit, driving backwards, broke through a darker, crusty surface. At right is the least-

From the beginning, the rovers' motto has been "follow the water." Both rovers have been searching Mars for minerals formed in the presence of H2O. Mars appears dry today, but minerals can provide clues that water was once there.
"It's been easy for Opportunity to find such minerals," explains Arvidson. "Opportunity landed in an ancient lake bed. Spirit has had to work much harder. Spirit landed in basaltic plains formed by lava flows chewed up by repeated meteoroid impacts. There's been little evidence of anything that was ever very wet."

But when Spirit reached an area of Mars called the "Columbia Hills," the whole complexion of the mission changed. "Spirit came across iron hydroxide, a mineral that forms in the presence of water. That alerted us to the change. We started coming across more and more rocks formed in the presence of water."

Then Spirit got stuck in a patch of loose soil on the edge of a small crater. Heavy sigh. Stuck again.
But wait!"Spirit had to get stuck to make its next discovery," says Arvidson.

As the rover tried to break free, its wheels began to churn up the soil, uncovering sulfates underneath.
"Sulfates are minerals just beneath the surface that shout to us that they were formed in steam vents, since steam has sulfur in it. Steam is associated with hydrothermal activity – evidence of water-charged explosive volcanism. Such areas could have once supported life."
"And most amazingly, the boundary between the sulfate-rich soil and the soil with just the generic concentration of sulfates runs right down the middle of the stranded rover. Spirit is lodged on the edge of a crater -- sitting astride the boundary!"



Above: A topographic map of Spirit's surroundings at Troy. Spirit is straddling the edge of a small crater. Sulfate materials are located in the crater (from the middle of the rover and extending to the left). The topo map was generated from stereo images taken by Spirit's navigation camera when it was approaching the area in April 7, 2009.

"Also, the robot found that the top of the sulfate material is crusty. Ancient sulfates probably formed this crust as they were processed by variations in climate associated with changes in Mars' orbit over millions of years."

Here's what the scientists think: When a Martian pole faces the sun in Martian summer, it gets warmer at that pole and the water ice shifts to the equator. It even snows there! Warm dark soil under the snow causes the bottom layer of snow to melt. The water trickles into the sulfates, dissolving the water-soluble iron sulfates and forming a crust with the calcium sulfates remaining.

"By being stuck at Troy, Spirit has been able to teach us about the modern water cycle on Mars." Indeed, Spirit's saga at Troy has given scientists material evidence of past water on Mars on two time scales: ancient volcanic times, and cycles ongoing to the present day.

"We've sat here for more than 6 months. That's a long time to take measurements. We've learned a lot. Troy is a good place to be under siege, but we're ready to leave."

Will Spirit break free to continue its incredible journey? Tune in to Science@NASA to find out if the escape plan works.

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

Contributed by David Haviland and Jim Wessel

The December Sky

ASTEROID MAPPING WITH SMALL DEPLOYABLE OBSERVATORIES
Paul D. Maley

Asteroids can be described as unmapped bodies that reside mostly in orbits between the orbits of Mars and Jupiter. Amateur astronomers have been participating in indirect mapping for some years using the technique of watching them as they pass between a star and the earth creating a brief eclipse. Asteroid 'occultations' are the closest thing we have to being able to participate in serious science in this interesting discipline.

A recent innovation has allowed us to expand our capabilities. This is the creation of off the shelf telescopes using 50mm binocular parts (~$65) and 80mm Orion f/5 refractors (~$320.) to serve as the optical detectors. Behind the optics goes a video camera, the most current being a PC164EX2 from Supercircuits (~$150.) which feeds a signal into a camcorder (from ~$100.). The key to timing the eclipse is a time inserter which can be hard to find. The most recent model called the Kiwi (~$300.) has been discontinued but provides a valuable GPS signal into the video which can be viewed on the small camcorder screen.

On Nov. 20, 2009 the International Occultation Timing Association had its annual meeting in Florida in conjunction with the occultation of the asteroid 234 Barbara and the 7.5 magnitude star HIP34106. The 13.1 magnitude asteroid was scheduled to eclipse the star for up to 8 seconds from both Europe and Florida, this being a transatlantic event.

The occultation was quite successful and the resulting two dimensional profile of the asteroid is shown in the following diagram. Each chord is numbered across the asteroid. The dotted line symbolizes the predicted center of the eclipse where the longest occultation should have taken place. Where there is one continuous line, this means the observer did not see an occultation (chords 1-5, 28 and 29). The star's light never faded. The star was occulted beginning at station 6 and the last station to experience the eclipse was 27. Interesting topography is delineated beginning with chord 23 where there is clearly a double occultation with a gap in between. The outline of the asteroid is rather strange and there is speculation by a French team that the asteroid is actually a contact binary. Data produced by this specific occultation does not confirm a binary nature. But the detail you see in the diagram would not have been possible without the deployment of many stations at roughly 4 mile intervals perpendicular to the direction of travel of the occultation shadow. Observations were made in Germany and in Florida making this a truly transatlantic endeavour.

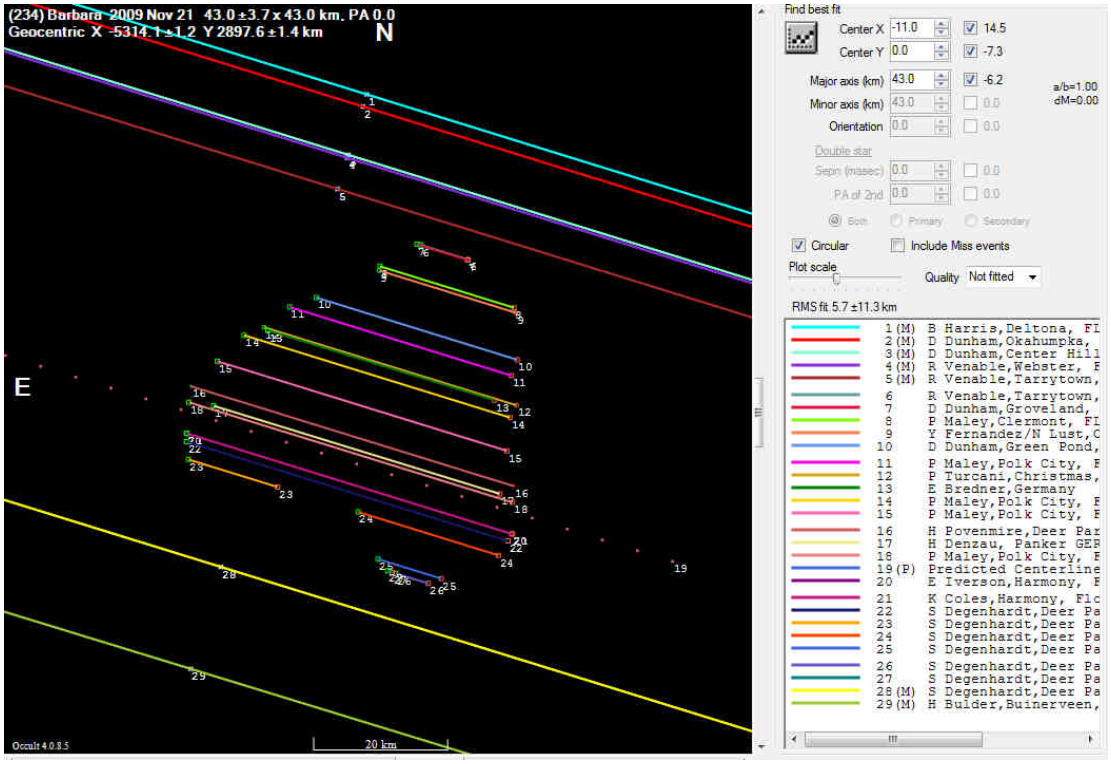


Figure 1. The results of the occultation data.

Figure 2. The transatlantic path of the Barbara occultation.

I assembled 5 stations to carry with me on the Continental Airlines flight from Houston to Orlando and successfully set them up roughly 4 to 5 miles apart from each other perpendicular to the occultation path in conjunction with other team members. What made this occultation special was that I was using Sony TV remotes to talk to each of the camcorders located at four of the stations. All I had to do was to program the remotes to turn on / off the camcorders at the appropriate time after deploying them, and then leave, hoping the equipment was well hidden and would not be disturbed or stolen until I returned hours later to retrieve them. Richard Nugent set up 3 stations, one of which was indeed stolen. The only problem I had was a state trooper who stopped behind my car 9 minutes before the occultation. I quickly explained what I was doing there and he went on his way.

That night, humidity was high and there was a chance of fog. To prevent damage to the camcorders I borrowed 5 towels from the Fairfield Inn and after turning on each camcorder and connecting the battery to power the camera, wrapped the camcorder and battery and left. The towel served to protect and help identify the location of the equipment in the dark. For this occultation the 50mm binocular devices were set on small tripods. All were painted black to minimize detection by others.

Figure 3. The path over Florida. The north blue line that goes over Orlando is the predicted northern limit, while the lower blue line that goes from St. Petersburg to West Melbourne is the predicted southern limit.

POINTERS AND HINTS

Because it takes lots of time to set up many pieces of equipment, time is critical to success. Every time one adds a remote site it means adding cables, connectors, being sure batteries are fully charged, the optics are correctly pointed and dew shields placed in front of the optics to prevent stray light. Luckily the cameras take little power but an 8 pack of AA batteries provides enough energy to run during the 3 to 4 hours that the instruments are on their own.

Prepointing to a dummy star in the exact spot in the sky prior to the event facilitates not having to find the actual star to be occulted ahead of time. Clock driven mounts are not required either. Simply obtain a set of prepoint charts using the program called GUIDE, set up each site at the correct time on a new dummy star that is convenient, and leave the equipment. The dummy stars are all located on the same declination line. As the earth turns the stars sweep through the field of view until the precise moment of occultation when (if you set it up correctly) the target star is in the center of the field while the camcorder is recording for about a 6 minute interval (occultation time +/-3 minutes or so).

All of this is not so simple as I have learned. Practice and more practice makes success possible. But if you get in a hurry and make one mistake, all can be lost for a given site. Another important point is to prelocate candidate sites using GOOGLE EARTH and then setting them up on the same road (if practical) with a clear view to that part of the sky where the occultation will occur. Getting to the site the day/night before is vital because you must know if the sites are really dark or not, whether dogs are about or if you are on private property. I was chased off at gunpoint recently in Alabama because I took the chance of setting up on private property not realizing that barking dogs would alert the owner.

Dew shields can be made of black paper taped to the barrel of the optics extending far enough out so that dew formation is mitigated. It is important to know where your sites are so that once you set them up you actually can find them again in the dark. Once in Arizona I only had 2 sites set up and it took more than one hour of backtracking to relocate the one remote site that I set up. It was so dark and features looked so similar that I mistook one location for another. Using a GPS can help solve this problem.

Because one person and one telescope can capture a minimal amount of data, or in some cases no data at all if the predicted path is in error, having the capacity to set up multiple sites can save the day and bring in some valuable information. Scattering a number of small observing stations operating without human intervention offers a terrific application to asteroid science.

Timing should not be forgotten. Canon camcorders have an internal clock built in. Once it is activated, the clock runs continually. Before each site is set up, about 20 seconds of GPS time must be inserted onto the recorder. It does not matter when, but preferably in the hours preceding the occultation. After the occultation, time can be inserted on the back end of the tape before the equipment is disassembled. Be sure to locate the precise latitude, longitude and altitude of the site using GPS before departure. In this way there is a clear link between the GPS time standard and the internal clock. Interpolation can be used between the two time strips to obtain the actual time of any disappearance/reappearance on the tape.

Packing for such an expedition revealed the carrying 6 sets of equipment is the maximum that I can haul comfortably with one backpack and one briefcase holding all of what I need. One checked bag was mandatory and it was used to carry batteries and the small tripods--all carefully cushioned to minimize the prospect of airline damage.

In the field the Kiwi time inserter takes several minutes to acquire a signal. The indication is a flashing red light that initiates once the minimum number of satellites have been detected. A small yellow button is pushed twice to log the coordinates of the GPS box, and after this the time signals will continue to be displayed. Because the appearance of the digital numbers on the camcorder screen are of low contrast it helps to manually adjust a potentiometer located inside the GPS unit to brighten the display as much as possible.

Linking a TV remote to a specific camcorder must be done outside with GPS (so the GPS can pick up satellites) and optics all set up as if in the field. If you are doing this in the daytime, bright sunlight can make it nearly impossible to see the GPS display and it is preferable to look through the camcorder view-finder rather than open the side mounted (larger) screen.

Another way is to not use a timer and manually activate the camcorders at each remote site, hoping the batteries will last long enough from start through occultation time. It is best to buy the longest life batteries possible (rechargeable) and to bring plenty of spare batteries where required.
If an occultation is passing over your home, you might consider setting up a station there that a family member or friend can run for you, while you travel to another location to set up a second tended station. Use prepoint charts to prepoint the optics, then when in the field, use a cell phone to contact the person at home to activate the recorder at the proper time. This is a minimum multi-station set up and can work quite well especially if there is a lot of uncertainty in the path. Your second site should be chosen with this uncertainty in mind, traveling as far as is practical.

Safety is always the most important factor in participating in asteroid occultation observations (followed by mission success and time). Avoid taking any risks with your equipment, your personal safety, speed on roadways, locating sites in areas where there are lights or people (unless impossible to avoid), near railroad tracks or heavily traveled roads. Always let your family know where you will be and keep a cell phone fully charged and handy. When you find your own tended site, have a rapid exit strategy prepared in case you have to leave hurriedly. Take care in locating your site so that it is on solid ground, away from hazards such as cliffs, holes, fire ants, animal pens, water, etc. Assure that your vehicle will not get stuck before venturing into an area with which you are not familiar.

Do not set up a remote site so that it can be discovered by passers by. If you are tending a site, stay off road so that people cannot see you and police won't interrupt your data collection. This has happened on more than one occasion and can result in ruined observations if it occurs at the wrong time. Always carry identification with you and consider print out something you can hand to some one who may be curious about what you are doing.

Mission success is your ultimate goal so check and double check your equipment and strategy before you leave home. Assure you have backup equipment or components that could fail in hand. Equipment failures are quite common experiences. Once you are in the field it is generally too late to find spares.
Time is the most important component in data collection. Without an accurate time reference the data you collect may be mostly useless. You must have an accurately set watch and keep track of when it is necessary to start/end your observation. In addition, a WWV receiver or GPS time inserter are the two generally accepted time standard sources.

For more information contact me at pdmaley@yahoo.com.

SUNRISE AND SUNSET SCHEDULE FOR DECEMBER

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1 Twi A: 5:34am Twi: 6:33am Sunrise: 6:59am Sunset: 5:21pm Twi: 5:47pm Twi A: 6:46pm Moonrise: 4:46pm Moonset: 6:19am	2 Twi A: 5:35am Twi: 6:34am Sunrise: 7:00am Sunset: 5:21pm Twi: 5:47pm Twi A: 6:46pm Moonrise: 5:46pm Moonset: 7:26am Full Moon: 1:31am	3 Twi A: 5:36am Twi: 6:34am Sunrise: 7:00am Sunset: 5:21pm Twi: 5:47pm Twi A: 6:46pm Moonrise: 6:52pm Moonset: 8:29am	4 Twi A: 5:37am Twi: 6:35am Sunrise: 7:01am Sunset: 5:21pm Twi: 5:47pm Twi A: 6:46pm Moonrise: 8:02pm Moonset: 9:26am	5 Twi A: 5:37am Twi: 6:36am Sunrise: 7:02am Sunset: 5:21pm Twi: 5:47pm Twi A: 6:46pm Moonrise: 9:13pm Moonset: 10:15am
6 Twi A: 5:38am Twi: 6:36am Sunrise: 7:03am Sunset: 5:21pm Twi: 5:48pm Twi A: 6:46pm Moonrise: 10:21pm Moonset: 10:58am	7 Twi A: 5:39am Twi: 6:37am Sunrise: 7:03am Sunset: 5:22pm Twi: 5:48pm Twi A: 6:46pm Moonrise: 11:26pm Moonset: 11:36am	8 Twi A: 5:39am Twi: 6:38am Sunrise: 7:04am Sunset: 5:22pm Twi: 5:48pm Twi A: 6:47pm Moonrise: none Moonset: 12:10pm Last Qtr: 6:14pm	9 Twi A: 5:40am Twi: 6:39am Sunrise: 7:05am Sunset: 5:22pm Twi: 5:48pm Twi A: 6:47pm Moonrise: 12:29am Moonset: 12:43pm	10 Twi A: 5:40am Twi: 6:39am Sunrise: 7:05am Sunset: 5:22pm Twi: 5:48pm Twi A: 6:47pm Moonrise: 1:31am Moonset: 1:16pm	11 Twi A: 5:41am Twi: 6:40am Sunrise: 7:06am Sunset: 5:22pm Twi: 5:48pm Twi A: 6:47pm Moonrise: 2:32am Moonset: 1:50pm	12 Twi A: 5:42am Twi: 6:41am Sunrise: 7:07am Sunset: 5:22pm Twi: 5:49pm Twi A: 6:48pm Moonrise: 3:33am Moonset: 2:27pm
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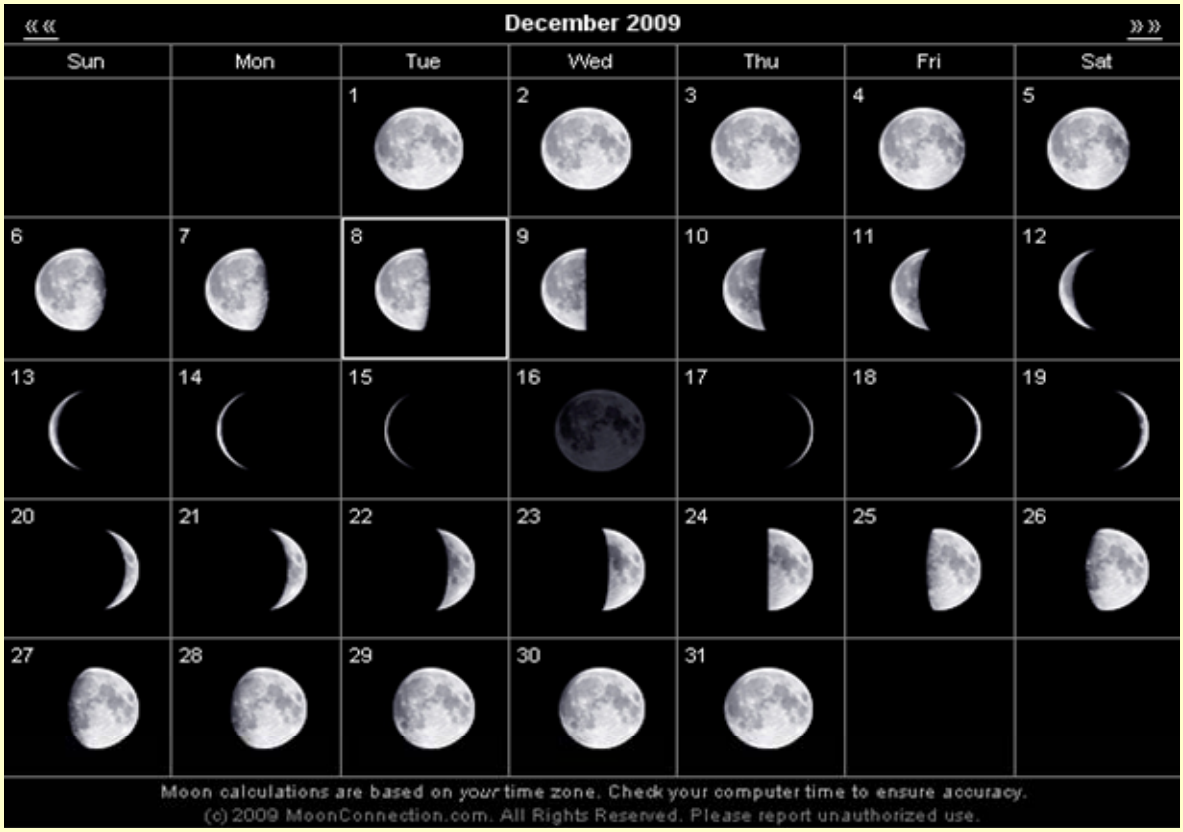
PHASES OF THE MOON FOR THE MONTH OF NOVEMBER



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?

CONNIE'S CREATIVE DESIGN
FOR YOUR MONOGRAM NEEDS

FOR CLUB CLOTHING, HATS, APRONS, TOTE BAGS OR ANYTHING ELSE

CONTACT CONNIE AT:
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.

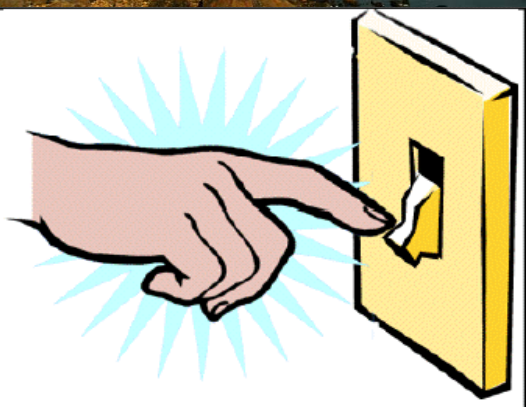
.Do you have a question about light pollution, protecting the night sky, or IDA's resources? **Get Help from IDA** http://www.darksky.org/mc/page.do?sitePageId=56399

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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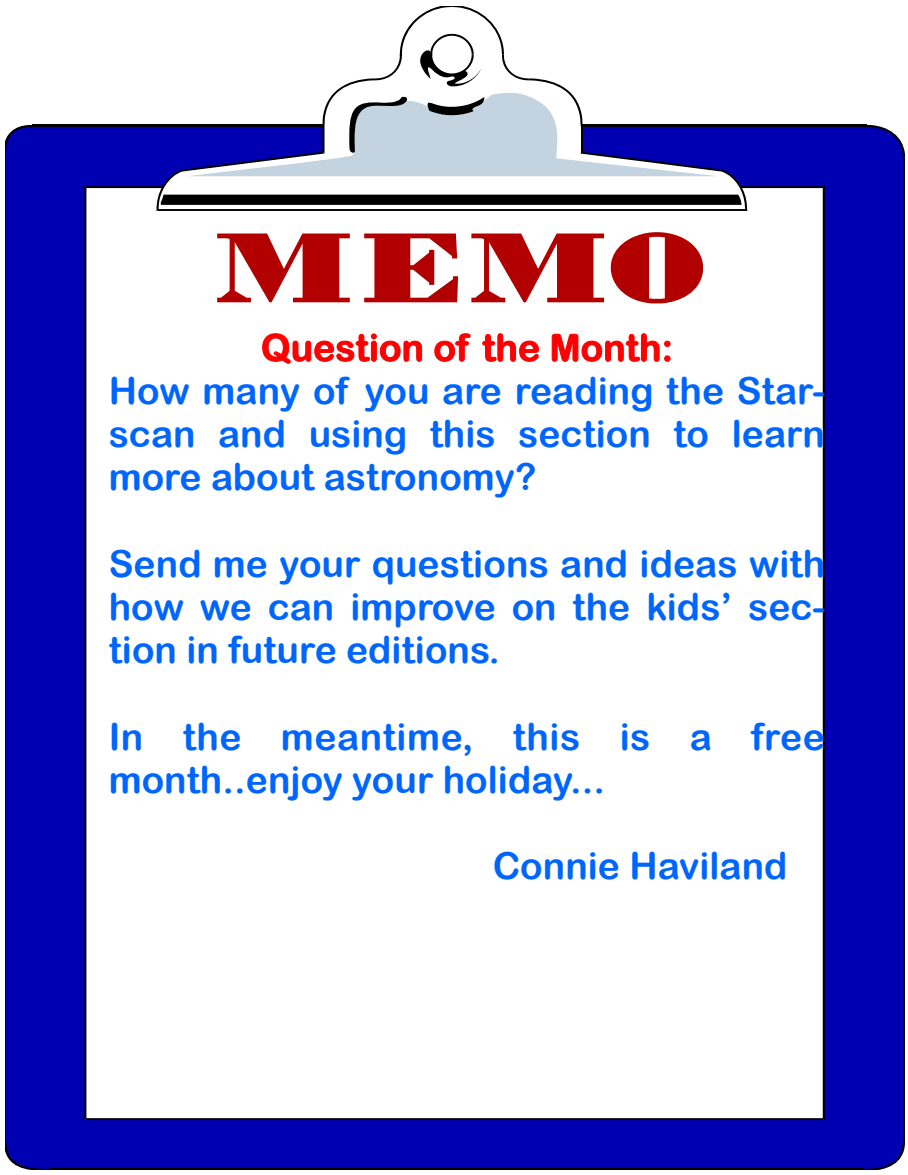
Vice President – Chris Randall
Secretary – David Haviland
Starscan Editor – Connie Haviland
Star Party Chairperson –
Librarian – Bob and Karen Taylor
Historian – Chris Randall
Scientific Expeditions – Paul Maley
Web Master—Chris Randall

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:

How many of you are reading the Starscan and using this section to learn more about astronomy?

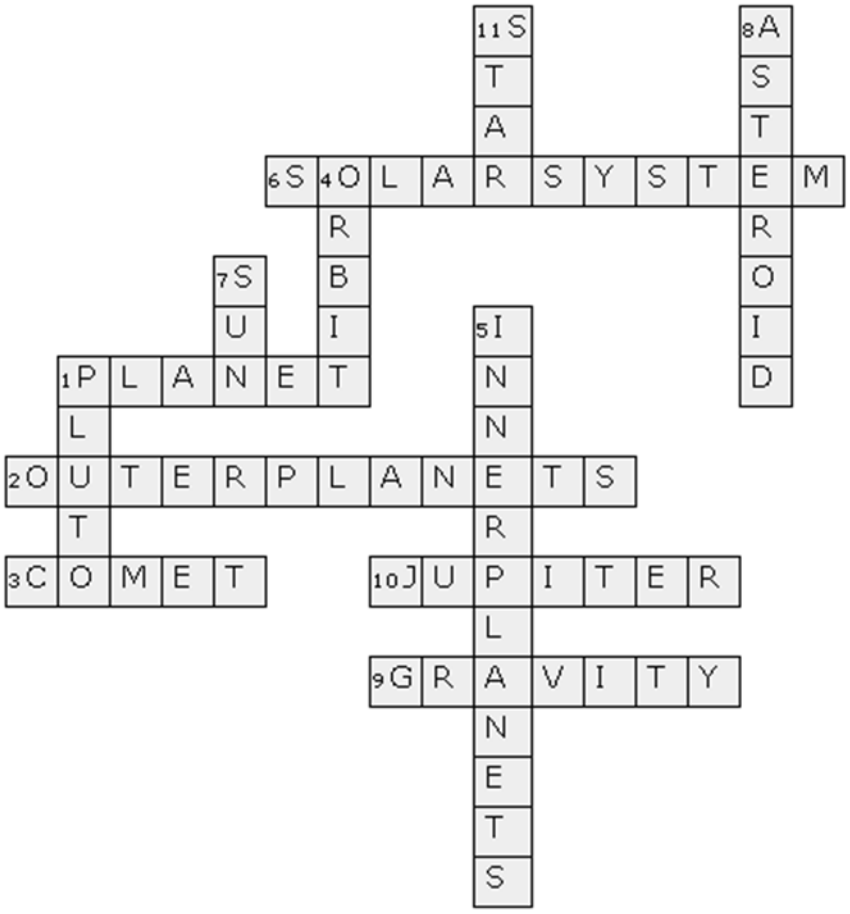
Send me your questions and ideas with how we can improve on the kids' section in future editions.

In the meantime, this is a free month..enjoy your holiday...

Connie Haviland

The Solar System KEY

Please complete the crossword puzzle below



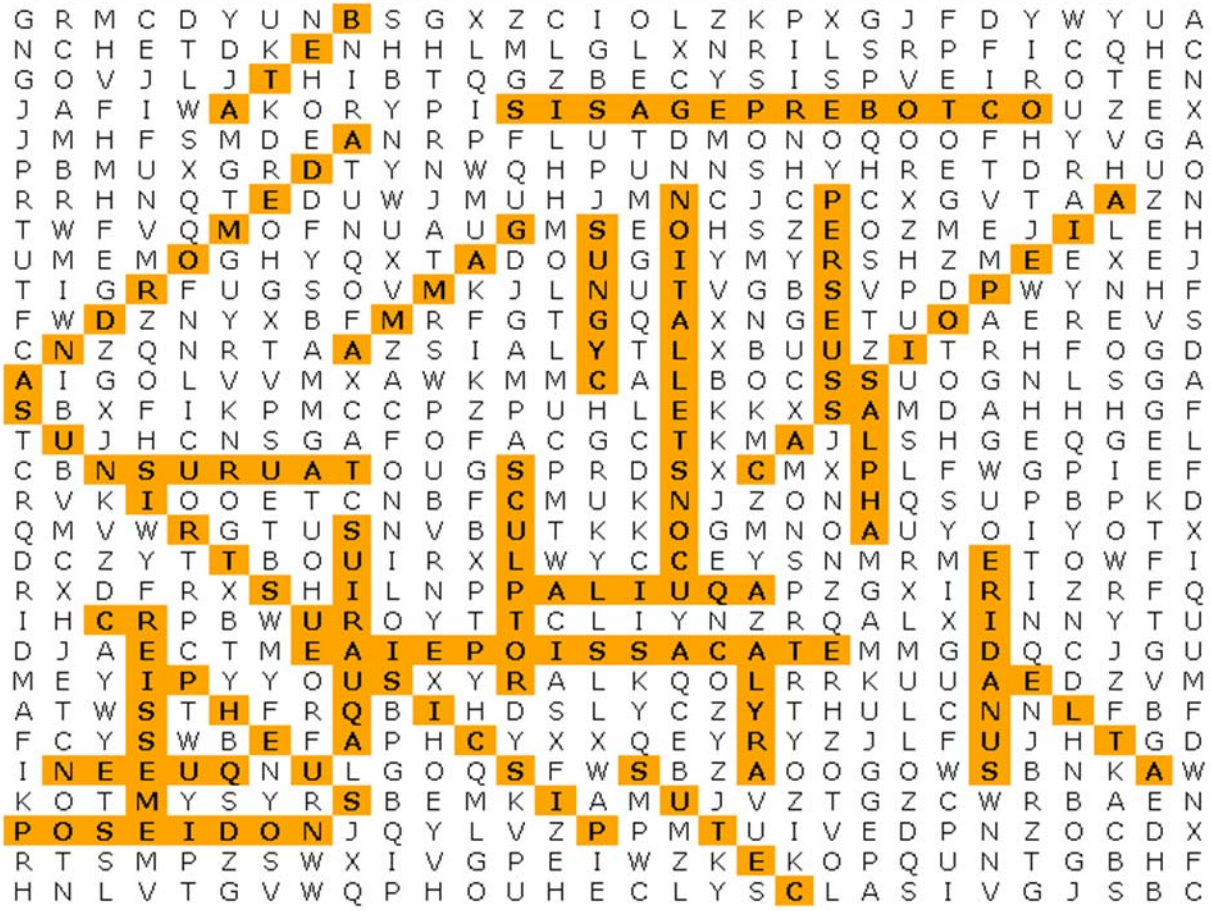
Across:

1. a large body of rock or gas that orbits the earth
2. five planets farthest from the sun
3. large ball of ice and dust that orbits the sun
6. the sun and the objects that orbit around it
9. the force of one object's pull on another
10. largest planet

Down:

1. smallest planet
4. the path the object takes as it moves around another object in space
5. four planets closest to the sun
7. center of the solar system
8. chunk of rock or metal that orbits the sun
11. hot ball of glowing gases

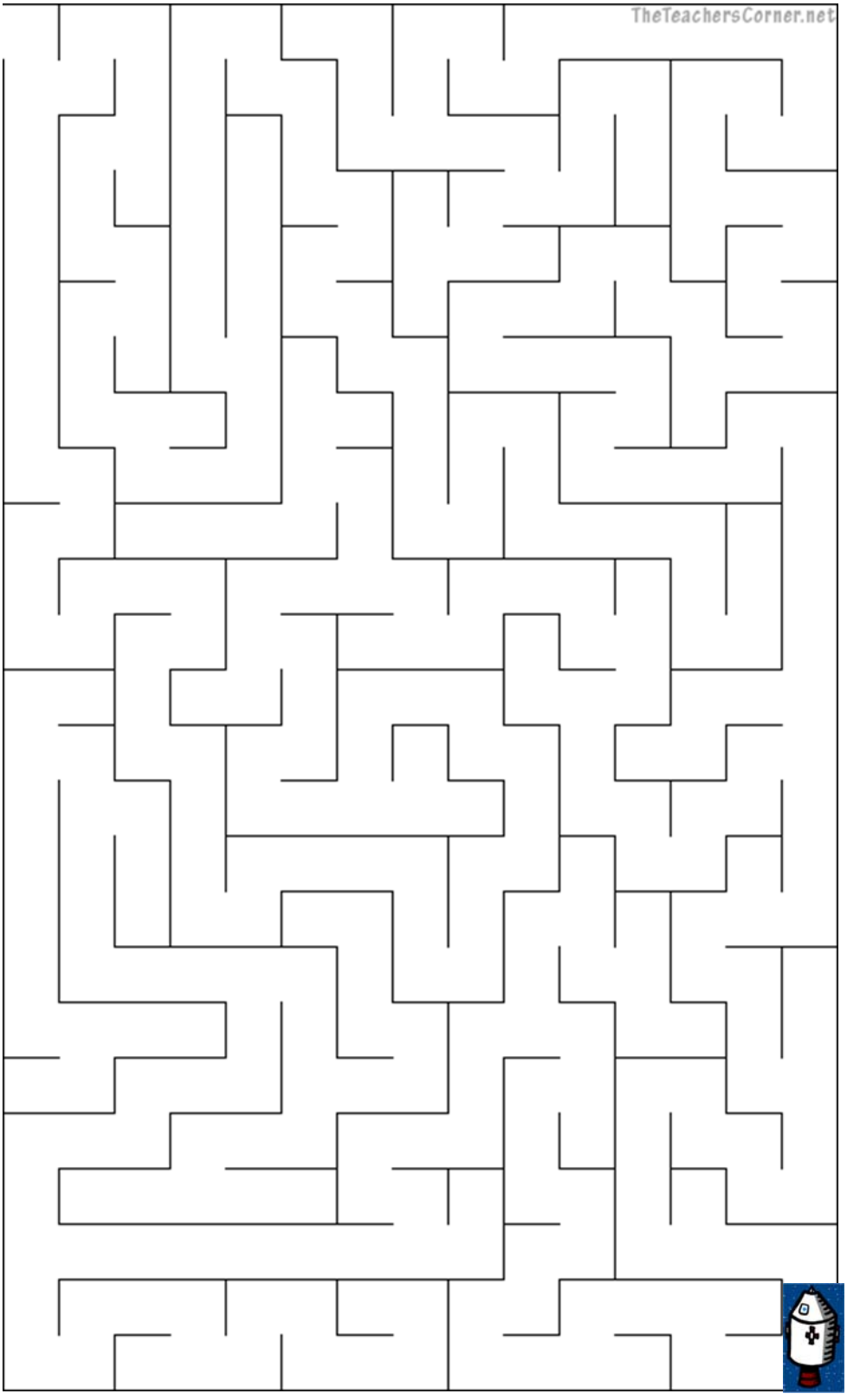
CONSTELLATIONS IN THE AUTUMN



ALPHA
ANDROMEDA
AQUARIUS
AQUILA
BETA
CASSIOPEIA
CEPHEUS
CETUS
CONSTELLATIONS
CYGNUS
DELTA
ERIDANUS
ETACASSIOPEIAE
GAMMA
LYRA
MESSIER
OCTOBER
PEGASIS
PERSEUS
PISCIS AUSTRINUS
POSEIDON
QUEEN
SCULPTOR
TAURUS

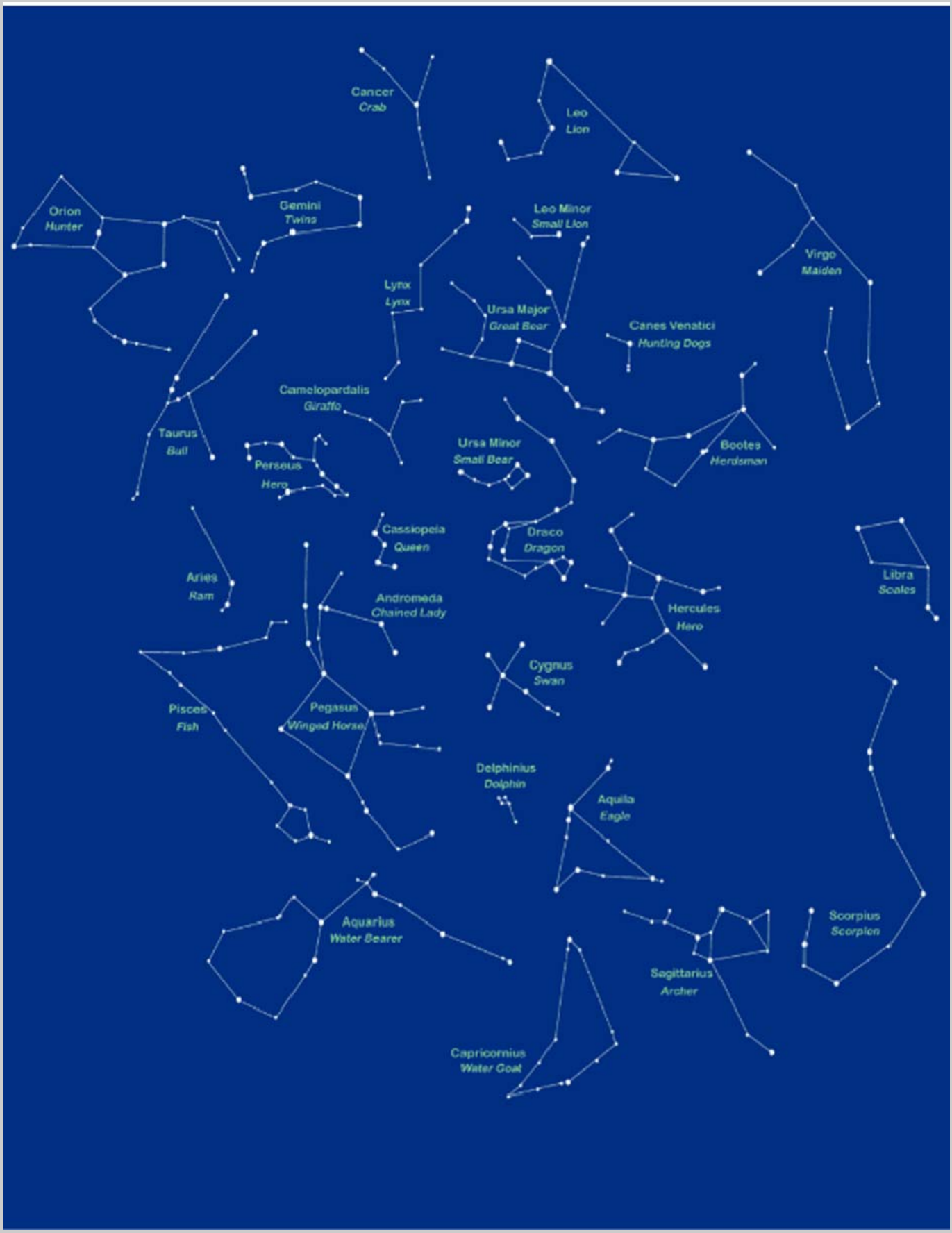
NASA IS WORKING ON SENDING MAN BACK TO THE MOON..CAN YOU HELP THEM???

FINISH 



START 

LEARN YOUR CONSTELLATIONS



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