COWICHAN VALLEY STARFINDERS ASTRONOMY CLUB

Clear Skies

Volume 14, Issue 7 November 2009

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Categories

Quick Links

Greetings!

Welcome to the Cowichan Valley StarFinders Astronomy club's "Clear Skies" monthly newsletter.

For those of you who unable to make last month's social you missed out on a great topic. Our very own Gerry Rozema presented his and Christina's Journey into and beyond the average astronomer. It was titled " From Eyepieces to Exo-planets: Our Journey in Astronomy". I was so wonderful that I ended up paying the next day for forcing myself to stay and listen to the full talk. I know I speak for everyone when I say the talk was one of the best talks we have had. For those of you who missed it check out the Social Highlights section to get a review by our Secretary ☺

At the time of this writing wel have not heard of who our speaker for this month's social will be, so keep checking your emails as we will send confirmation of speaker and topics prior to the social.

Enter the CVSF November Contest!

For all you dedicated newsletter readers, we (*the editors*) decided we all need a little pick me up about this time of year. A low and behold the CVSF November Contest was born ☺

Contest: Answer, what does Pink Flloyd, Hemmingway and Elvis have in common?
Rules: One entry per family
How to Enter: email newsletter@starfinders.ca All right answers will be put into a hat and one lucky winner/family will win a prize! So get your thinking caps on and enter today.
Contest Closing: November 30th.

An finally, thanks to this month's contributers Moe Raven, Paul Randall and Bryon Thompson for their input and enthusiasm.

back

Socials

Socials are held on the **4th Wednesday of each month** at the home of Bryon and Freda. See the website for a map or follow these directions.
Island Hwy, Mill Bay
Turn on Frayne Rd towards ocean (Serious Coffee is on the corner)
Turn right on Huckleberry Rd
3rd house on the left across from Springbank road and Mail boxes.
Look for the STAR sign
Please park on Huckleberry or Springbank Rd's.
Call Brian 743-6633 if you need directions

Our next Social will be held at **7:30 on WEDNESDAY November 24th**
The feature is TBA, so please keep checking your email or the website for updated information .

Highlights - Oct 28/09

By Paul Randall

Hey boys and girls. I thought I'd surprise everyone (with a little prompting from our fantastic editors) and actually submit the minutes of the last meeting.

We had a good turnout and as usual great cookies, tea and coffee but I think the big draws to our meetings are the great people and conversations that develop.

Our speaker this month was Gerry Rozema and his talk was entitled " From Eyepiece to Exoplanets, Our Journey through Astronomy"

It was a verbal and pictorial expose' about he and Chris's experience from the simple beginnings with their 1st small telescope to their present much larger and more numerous telescopes, cameras and spectral analysis equipment.

They discovered early on that the pictures on the box of their new telescope were very misleading. They decide to see how much they could see and learn using minimal equipment.

Over a three and a half year span they have mastered the art of digital astrophotography and have recently taken on searching for Exoplanets (planets orbiting other stars) using a radio velocity technique that utilizes spectrum analysis. It sounds very complicated but Gerry says it isn't really, just very time consuming. Some of their photo sessions take all night and are comprised of hundreds of photos that get "stacked" using a program called Deep Sky stacker. It is a free down load program. The multiple images are put together to bring out details and colours.

He also talked about several different types of science that are possible using back yard equipment at reasonable cost. It is possible to search for Exoplanets, asteroids, variable stars, meteoroids and a number of other things as well as taking fantastic pictures of things you can't even see without a telescope.

Gerry and Chris have come a long way in a short time and are doing real science in their back yard, pretty cool stuff. Shows what you can do if you put some effort into it. Keep up the great work!

back

Upcoming Events

Every Monday - Astronomy Café from 7:30pm - 9:00 pm
Get together with local astronomers at the Fairfield Community Centre to discuss the night sky over coffee. On clear nights, there is observing too. Perfect for people interested in starting this hobby. All ages welcome.

Oct 30 to Nov12 Victoria Comic Book and Sci-Fi Fantacy Convention at Harbour Towers Hotel, Victoria.
Editor Note: I know Paul R was looking for Volunteers for this event. I'm not sure if they still are however if you are intersted contact us and we will pass it along.
Admission Day Pass: $20, Weekend: $30.

Nov 1 to 30 – Victoria Centre RASC Neighbourhood Sidewalk Astronomy -
locations and time to be decided by each volunteer. Keep watch for this event coming to your neighborhood.

Nov 14 - Victoria Centre RASC Annual General Meeting and Dinner at Gorge Vale Golf Club. The total number of dinners has to be **confirmed by Monday, November 9**. Please reserve your spot before that date, by sending email to Li-Ann Skibo at: Treasurer .
Nov 24 at 6:30pm – Victoria RASC Night Sky Viewing at Cattle Point
400 years ago Galileo first gazed at the first quarter moon and for ever changed our view of the cosmos. To celebrate this event the Victoria Centre is hosting a

public viewing event at Cattle Point.

Nov 25 to 28, University of Victoria, Phoenix Theatre,Victoria,
A workshop production of a new play by UVic's Dr. Jennifer Wise, centred on the lives of Galileo's children. Very few tickets are available. Email aholierh@uvic.ca to get your name on the list.

NASA Launches (provided by NASA.Com):

Date: Nov. 16
Mission: STS-129
Launch Vehicle: Space Shuttle Atlantis
Launch Site: Kennedy Space Center - Launch Pad 39A
Launch Time: 2:28 p.m. EST
Landing: Nov. 27, 9:47 a.m. EST
Description: Space shuttle Atlantis will deliver components including two spare gyroscopes, two nitrogen tank assemblies, two pump modules, an ammonia tank assembly and a spare latching end effector for the station's robotic arm to the International Space Station.

back

This Month In History

Courtesy of: Nick Greene, About.com

- Nov 03 - Taurids Meteor Shower Peak
- Nov 03 - 35th Anniversary (1973), Mariner 10 Launch (Venus & Mercury Flyby Mission)
- Nov 08 - 40th Anniversary (1968), Pioneer 9 Launch (Solar Orbiter)
- Nov 10 - 40th Anniversary (1968), Zond 6 Launch (USSR Moon Orbit & Return)
- Nov 10 - 185th Anniversary (1823), Waseda Meteorite Fall (Hit House in Japan)
- Nov 13 - 30th Anniversary (1978), HEAO-2 Launch
- Nov 15 - 20th Anniversary (1988), Buran Launch (USSR Space Shuttle)
- Nov 15 - William Herschel's 270th Birthday (1738)
- Nov 16 - 35th Anniversary (1973), Skylab 4 Launch (Last Launch to Skylab)
- Nov 17 - Leonids Meteor Shower Peak
- Nov 22 - 10th Anniversary (1998), Galileo, Europa 18 Flyby
- Nov 26 - 45th Anniversary (1963), Explorer 18 Launch
- Nov 29 - Christian Doppler's 205th Birthday (1803)

back

Cool Pics/Videos

Want to show off your latest pics? Well here's your chance; email the editor at My Cool Pics and we will try to post them in the next edition of "Clear Skies".

The province wants you to switch to solar energy, but how reliable is the information on its website? CBC speaks to the executive director of Solarbc.ca http://www.cbc.ca/ontheisland/media/20090922200010a8f.ram

Did you know there are 88 constellations in the night sky? This episode of Astronomy Cast will help you to learn about the constellations and other star formations, their history, their connection to the zodiac, and how to find some of them. Click on the link to view the episode and play the mp3 http://www.astronomycast.com/amateur-astronomy/observing/ep-157-constellations/

Check out our Photo gallery on the website where you can find pics from past and current Island Star Parties (ISP). Quick link is http://starfinders.ca/photogallery.htm

back

Featured Articles

Articles

RETURN TO CATEGORIES

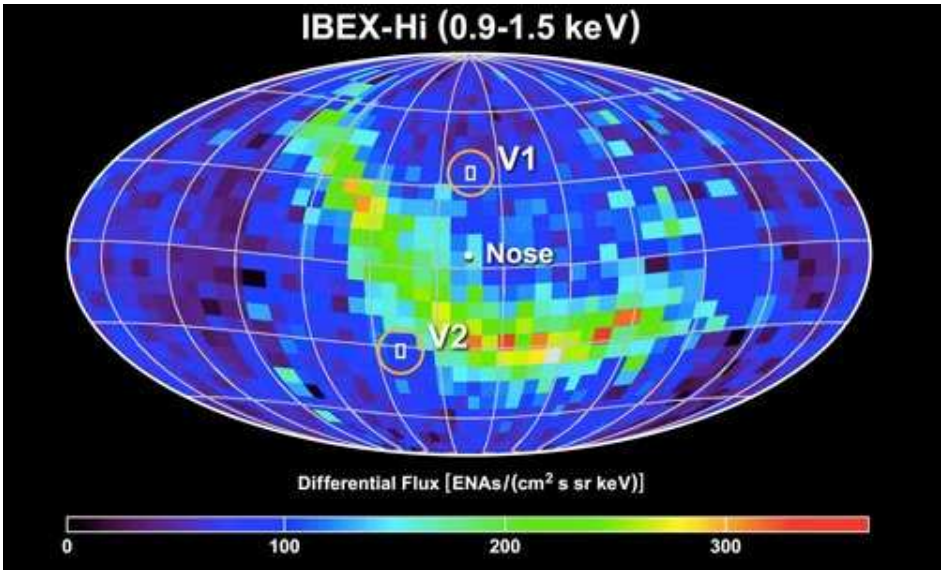
1. Giant Ribbon Discovered at the Edge of the Solar System
2. How the Moon Produces its own Water
3. The Sun's Sneaky Variability
4. Last Visit Home for ESA Comet Chaser
5. Hidden Territory on Mercury Revealed
6. Carbon Atmosphere Discovered on Neutron Star

Giant Ribbon Discovered at the Edge of the Solar System–

October 15/09 credit Science@NASA

For years, researchers have known that the solar system is surrounded by a vast bubble of magnetism. Called the "heliosphere," it springs from the sun and extends far beyond the orbit of Pluto, providing a first line of defense against cosmic rays and interstellar clouds that try to enter our local space. Although the heliosphere is huge and literally fills the sky, it emits no light and no one has actually seen it until now.

NASA's IBEX (Interstellar Boundary Explorer) spacecraft has made the first all-sky maps of the heliosphere and the results have taken researchers by surprise. The maps are bisected by a bright, winding ribbon of unknown origin:



Above: IBEX's all-sky map of energetic neutral atom emission reveals a bright filament of unknown origin. V1 and V2 indicate the positions of the Voyager spacecraft.

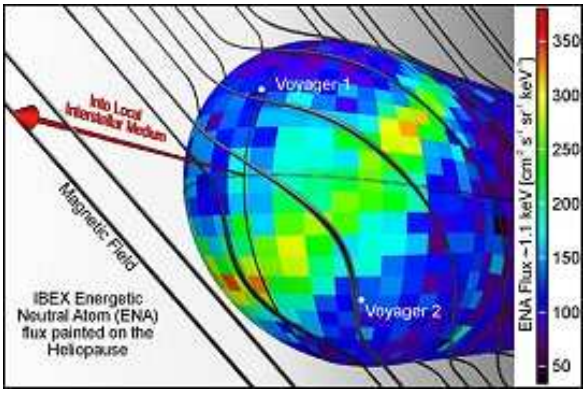
"This is a shocking new result," says IBEX principal investigator Dave McComas of the Southwest Research Institute. "We had no idea this ribbon existed--or what has created it. Our previous ideas about the outer heliosphere are going to have to be revised."

Although the ribbon looks bright in the IBEX map, it does not glow in any conventional sense. The ribbon is not a source of light, but rather a source of particles--energetic neutral atoms or ENAs. IBEX's sensors can detect these particles, which are produced in the outer heliosphere where the solar wind begins to slow down and mix with interstellar matter from outside the solar system.

"This ribbon winds between the two Voyager spacecraft and was not observed by either of them," notes Eric Christian, IBEX deputy mission scientist at NASA's Goddard Space Flight Center. "It's like having two weather stations, but missing the big storm that runs between them."

Unlike the Voyager spacecraft, which have spent decades traveling to the edge of the solar system for in situ sampling, IBEX stayed closer to home. It is in Earth orbit, spinning around and collecting ENAs from all directions. This gives IBEX the unique "big picture" view necessary to discover something as vast as the ribbon.

The ribbon also has fine structure--small filaments of ENA emission no more than a few degrees wide: image. The fine structure is as much of a mystery as the ribbon itself, researchers say. One important clue: The ribbon runs perpendicular to the direction of the galactic magnetic field just outside the heliosphere, as shown in the illustration at right.



"That cannot be a coincidence," says McComas. But what does it mean? No one knows. "We're missing some fundamental aspect of the interaction between the heliosphere and the rest of the galaxy. Theorists are working like crazy to figure this out." Understanding the physics of the outer heliosphere is important because of the role it plays in shielding the solar system against cosmic rays. The heliosphere's size and shape are key factors in determining its shielding power and, thus, how many cosmic rays reach Earth. For the first time, IBEX is revealing how the heliosphere might respond when it bumps into interstellar clouds and galactic magnetic fields.

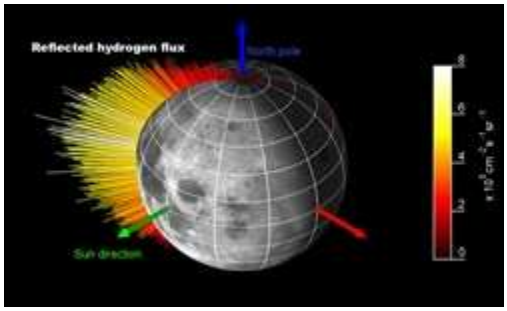
"IBEX is now making a second all-sky map, and we're eager to see if the ribbon is changing," says McComas. "Watching the ribbon evolve--if it is evolving--could yield more clues."

back

How the Moon Produces its own Water– October 15/09 credit ESA

The Moon is a big sponge that absorbs electrically charged particles given out by the Sun. These particles interact with the oxygen present in some dust grains on the lunar surface, producing water. This discovery, made by the European Space Agency (ESA)-Indian Space Research Organization's (ISRO) Sub KeV Atom Reflecting Analyzer (SARA) instrument onboard the Indian Chandrayaan-1 lunar orbiter, confirms how water is likely being created on the lunar surface.

It also gives scientists a new way to take images of the Moon and other airless bodies in the solar system.



The lunar surface is a loose collection of irregular dust grains, known as regolith. Incoming particles should be trapped in the spaces between the grains and absorbed. When this happens to protons, they are expected to interact with the oxygen in the lunar regolith to produce hydroxyl and water. The signature for these molecules was found recently and reported by Chandrayaan-1's Moon Mineralogy Mapper (M3) instrument team.

The SARA results confirm that solar hydrogen nuclei are indeed being absorbed by the lunar regolith but also highlight a mystery — not every proton is absorbed, one out of every five rebounds into space. In the process, the proton joins with an electron to become an atom of hydrogen. "We didn't expect to see this at all," said Stas Barabash at the Swedish Institute of Space Physics.

Although Barabash and his colleagues do not know what causes the reflections, the discovery paves the way for a new type of image to be made. The hydrogen shoots off with speeds of around 447,387 miles per hour (720,000 kilometers per hour) and escapes without being deflected by the Moon's weak gravity.

Hydrogen is also electrically neutral, and it is not diverted by the magnetic fields in space. The atoms fly in straight lines, just like photons of light. In principle, each atom can be traced back to its origin, and an image of the surface can be made. The areas that emit most hydrogen will show up the brightest.

While the Moon does not generate a global magnetic field, some lunar rocks are magnetized. Barabash and his team are currently making images to look for such 'magnetic anomalies' in lunar rocks. These generate magnetic bubbles that deflect incoming protons away into surrounding regions, making magnetic rocks appear dark in a hydrogen image. The incoming protons are part of the solar wind, a constant stream of particles given off by the Sun. They collide with every celestial object in the solar system but are usually stopped by the body's atmosphere. On bodies without such a natural shield, for example asteroids or the planet Mercury, the solar wind reaches the ground. The SARA team expects that these objects, too, will reflect many of the incoming protons back into space as hydrogen atoms.

This knowledge provides timely advice for the scientists and engineers who are readying ESA's BepiColombo mission to Mercury. The spacecraft will be carrying two similar instruments to SARA and may find that the inner-most planet is reflecting more hydrogen than the Moon because the solar wind is more concentrated closer to the Sun.

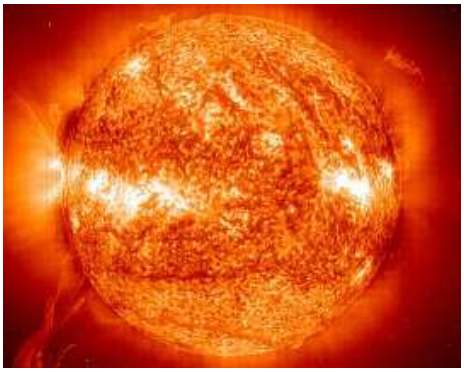
back

The Sun's Sneaky Variability– October 27/09 credit Science@NASA

Every 11 years, the sun undergoes a furious upheaval. Dark sunspots burst forth from beneath the sun's surface. Explosions as powerful as a billion atomic bombs spark intense flares of high-energy radiation. Clouds of gas big enough to swallow planets break away from the sun and billow into space. It's a flamboyant display of stellar power.

So why can't we see any of it?

Almost none of the drama of Solar Maximum is visible to the human eye. Look at the sun in the noontime sky and—ho-hum—it's the same old bland ball of bright light. "The problem is, human eyes are tuned to the wrong wavelength," explains Tom Woods, a solar physicist at the University of Colorado in Boulder. "If you want to get a good look at solar activity, you need to look in the EUV."



Right: The active sun photographed at EUV wavelengths by the Solar and Heliospheric Observatory in the year 2000.

EUV is short for "extreme ultraviolet," a high-energy form of ultraviolet radiation with wavelengths between 1 and 120 nanometers. EUV photons are much more energetic and dangerous than the ordinary UV rays that cause sunburns. Fortunately for humans, Earth's atmosphere blocks solar EUV; otherwise a day at the beach could be fatal.

When the sun is active, intense solar EUV emissions can rise and fall by factors of thousands in just a matter of minutes. These surges heat Earth's upper atmosphere, puffing it up and increasing the drag on satellites. EUV photons also break apart atoms and molecules, creating a layer of ions in the upper atmosphere that can severely disturb radio signals.

To monitor these energetic photons, NASA is going to launch a sensor named "EVE," short for EUV Variability Experiment, onboard the Solar Dynamics Observatory as early as this winter.

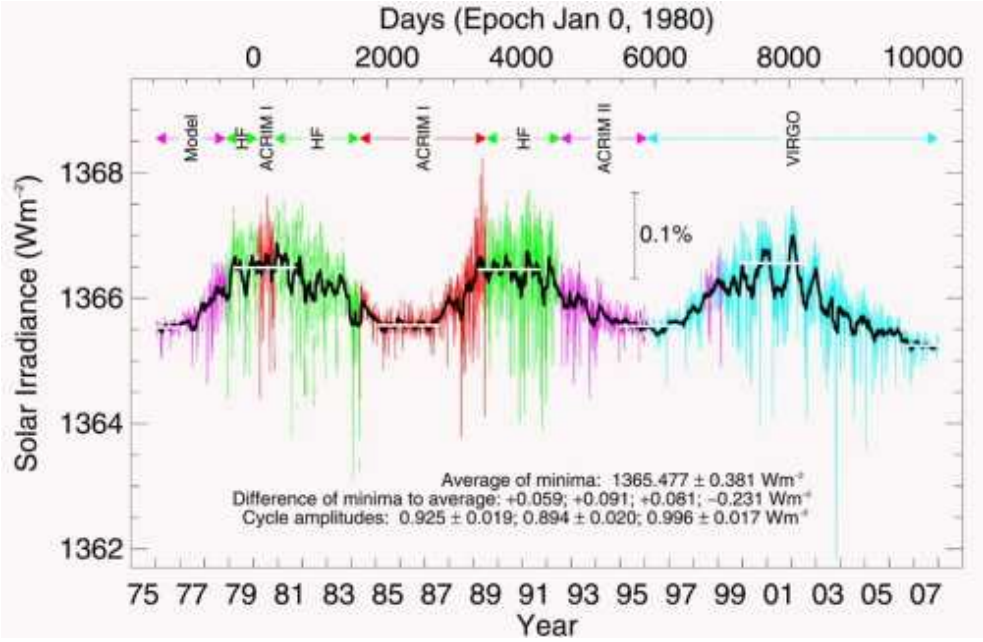
"EVE gives us the highest time resolution (10 sec) and the highest spectral resolution (< 0.1 nm) that we've ever had for measuring the sun, and we'll have it 24/7," says Woods, the lead scientist for EVE. "This is a huge improvement over past missions."

Right: The Extreme Ultraviolet Variability Experiment (EVE) with its primary sensors labeled.

Although EVE is designed to study solar activity, its first order of business is to study solar inactivity. SDO is going to launch during the deepest solar minimum in almost 100 years. Sunspots, flares and CMEs are at low ebb. That's okay with Woods. He considers solar minimum just as interesting as solar maximum.

"Solar minimum is a quiet time when we can establish a baseline for evaluating long-term trends," he explains. "All stars are variable at some level, and the sun is no exception. We want to compare the sun's brightness now to its brightness during previous minima and ask ourselves, is the sun getting brighter or dimmer?"

Lately, the answer seems to be dimmer. Measurements by a variety of spacecraft indicate a 12-year lessening of the sun's "irradiance" by about 0.02% at visible wavelengths and 6% at EUV wavelengths. These results, which compare the solar minimum of 2008-09 to the previous minimum of 1996, are still very preliminary. EVE will improve confidence in the trend by pinning down the EUV spectrum with unprecedented accuracy.



Above: Space-age measurements of the total solar irradiance or "TSI". TSI is the sun's brightness summed across all the wavelengths of the electromagnetic spectrum--visible light and EUV included. TSI goes up and down with the 11 year solar cycle. Credit: C. Fröhlich.

The sun's intrinsic variability and its potential for future changes are not fully understood—hence the need for EVE. "The EUV portion of the sun's spectrum is what changes most during a solar cycle," says Woods, "and that is the part of the spectrum we will be observing."

Woods gazes out his office window at the Colorado sun. It looks the same as usual. EVE, he knows, will have a different story to tell.

back

Last Visit Home for European Space Agency's Comet Chaser– October 22/09 credit ESA.

The European Space Agency's (ESA) Rosetta comet chaser will swing by Earth November 13 to pick up orbital energy and begin the final leg of its 10-year journey to the outer solar system. Several observations of the Earth-Moon system are planned before the spacecraft heads out to study comet 67/P Churyumov-Gerasimenko.

This will be the third Earth swing-by, the last of Rosetta's four planetary gravity assists. The swing-by will provide exactly the boost Rosetta needs to continue into the outer solar system. The craft is scheduled for a close encounter with asteroid 21 Lutetia in July next year.

Rosetta is expected to arrive at its final destination May 2014. There, it will release the Philae lander for in-situ studies on the surface. The spacecraft will then escort the comet on its journey toward the Sun, studying it closely for up to 2 years.

As it closes in on Earth next month, Rosetta will have traveled almost 2.8 billion miles (4.5 billion kilometers) since launch. It will speed past Earth at 496 miles per minute (798 kilometers per minute), passing above the Indian Ocean at 109° E, 8° S, just south of the Indonesian island of Java. The gravity-assist will increase the spacecraft's speed by 3.6 km/s with respect to the Sun.

Instruments in Action
While the swing-by is critical for achieving the velocity required to reach its ultimate destination, the close encounter also will be used to study the Earth-Moon system from Rosetta's unique perspective.

Several instruments that usually hibernate during the long trek will be turned on in the week before the swing-by.

Follow the Swingby Live
The Rosetta Blog will be updated regularly for this final planetary swing-by. Follow crucial events live via the blog and the dedicated ESA Rosetta mission website.

Critical Swing-by Events
Closest approach is scheduled for 2:45 EST (08:45 CET) November 13, but mission operators will perform a number of critical actions before and after the swing-by to ensure that Rosetta is on the right trajectory.

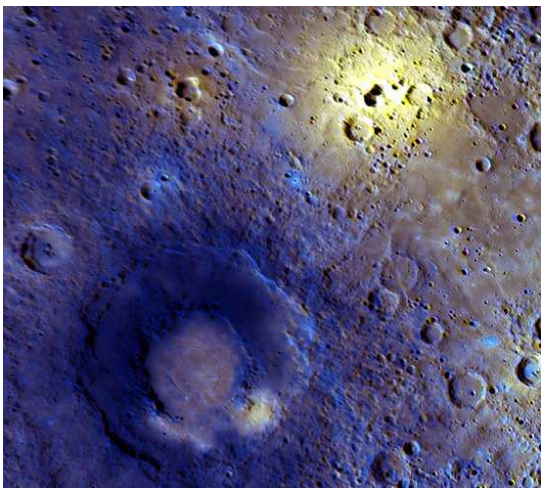
back

Hidden Territory on Mercury Revealed– November 3/09 credit Science@NASA

The MESSENGER spacecraft's third flyby of the planet Mercury has given scientists, for the first time, an almost complete view of the planet's surface and revealed some dramatic changes in Mercury's comet-like tail.

"The new images remind us that Mercury continues to hold surprises," says Sean Solomon, principal investigator for the mission and director of the Department of Terrestrial Magnetism at the Carnegie Institution of Washington.

The probe flew by Mercury on Sept. 29th, executing a critical gravity assist maneuver designed to help MESSENGER enter Mercury-orbit in 2011. Despite shutting down temporarily because of a power system switchover during a solar eclipse, the spacecraft's cameras and instruments revealed 6 percent of the planet's surface never before seen at close range, including this picturesque region pocked by impact craters and molded by volcanic activity:

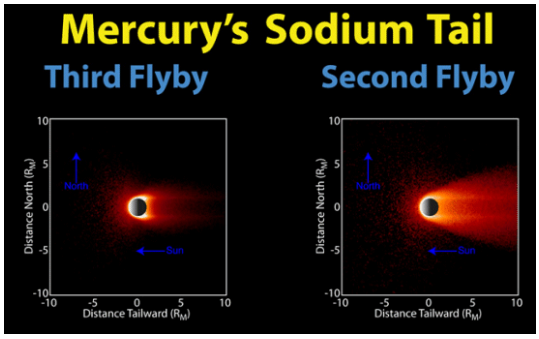


Right: This enhanced-color view was created with a statistical technique that highlights subtle color variations seen in the 11 filters of MESSENGER's wide-angle camera. The colors are often related to the composition of underlying material.

The bright region in the upper-right corner of the image surrounds a suspected explosive volcanic vent. The 290-km-diameter double-ring basin near the bottom of the image has a smooth interior that may be the result of effusive volcanism.

"This double-ring basin, seen in detail for the first time, is remarkably well preserved," notes Brett Denevi, a member of the probe's imaging team and a postdoctoral researcher at Arizona State University. "The inner floor of this basin is even younger than the basin itself and differs in color from its surroundings. We may have found the youngest volcanic material on Mercury."

One of the spacecraft's instruments conducted its most extensive observations to date of Mercury's ultrathin atmosphere or "exosphere." Material in the exosphere comes mainly from the surface of Mercury, knocked aloft by solar radiation, solar wind bombardment and meteoroid vaporization: diagram. This wispy gaseous envelope is stretched by solar radiation pressure into a long, comet-like tail, which seems to be changing as Mercury moves around the sun. "A striking illustration of what we call 'seasonal' effects in Mercury's exosphere is that the neutral sodium tail, so prominent in the first two flybys, is now significantly reduced in extent," says participating scientist Ron Vervack of the Johns Hopkins University Applied Physics Laboratory in Laurel, Md.



Left: Mercury's comet-like tail as traced by neutral sodium atoms has substantially decreased in size since MESSENGER's 2nd flyby in Oct. 2008. The two panels are extended models fit to data sampled relatively close to Mercury.

"This difference is related to expected variations in solar radiation pressure as Mercury moves in its [elliptical orbit around the sun]," adds Vervack. "Mercury's exosphere is one of the most dynamic in the solar system."

The observations also show that calcium and magnesium in the exosphere exhibit different seasonal changes than sodium--a difference that researchers do not yet fully understand. After MESSENGER enters Mercury orbit in 2011, it can make a continuous study of seasonal changes in all exospheric constituents. That will provide key information on the relative importance of the processes that generate, sustain, and modify Mercury's atmosphere.

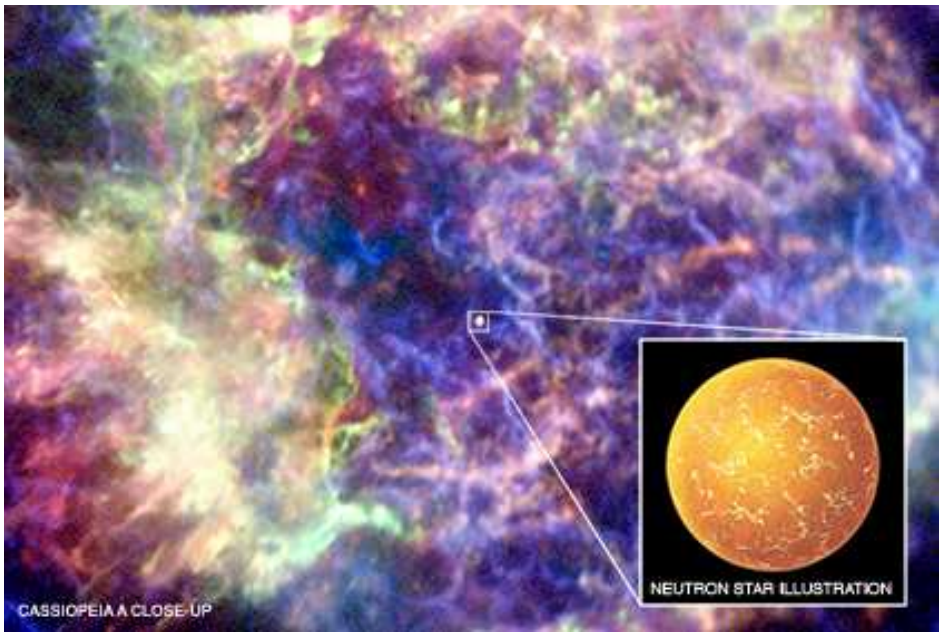
Approximately 98 percent of Mercury's surface now has been imaged by NASA spacecraft. After MESSENGER goes into orbit, it will see the polar regions, which are the only remaining unobserved areas of the planet.

Click here for more images and data from the 3rd flyby.

back

Carbon Atmosphere Discovered On Neutron Star – November 4/09

credit Chandra



Evidence for a thin veil of carbon has been found on the neutron star in the Cassiopeia A supernova remnant. This discovery, made with NASA's Chandra X-ray Observatory, resolves a ten-year mystery surrounding this object.

"The compact star at the center of this famous supernova remnant has been an enigma since its discovery," said Wynn Ho of the University of Southampton and lead author of a paper that appears in the latest issue of Nature. "Now we finally understand that it can be produced by a hot neutron star with a carbon atmosphere."

By analyzing Chandra's X-ray spectrum - akin to a fingerprint of energy - and applying it to theoretical models, Ho and his colleague Craig Heinke, from the University of Alberta, determined that the neutron star in Cassiopeia A, or Cas A for short, has an ultra-thin coating of carbon. This is the first time the composition of an atmosphere of an isolated neutron star has been confirmed.

The Chandra "First Light" image of Cas A in 1999 revealed a previously undetected point-like source of X-rays at the center. This object was presumed to be a neutron star, the typical remnant of an exploded star, but researchers were unable to understand its properties. Defying astronomers' expectations, this object did not show any X-ray or radio pulsations or any signs of radio pulsar activity.

By applying a model of a neutron star with a carbon atmosphere to this object, Ho and Heinke found that the region emitting X-rays would uniformly cover a typical neutron star. This would explain the lack of X-ray pulsations because -- like a lightbulb that shines consistently in all directions -- this neutron star would be unlikely to display any changes in its intensity as it rotates.

Scientists previously have used a neutron star model with a hydrogen atmosphere giving a much smaller emission area, corresponding to a hot spot on a typical neutron star, which should produce X-ray pulsations as it rotates. Interpreting the hydrogen atmosphere model without pulsations would require a tiny size,

consistent only with exotic stars made of strange quark matter.

"Our carbon veil solves one of the big questions about the neutron star in Cas A," said Craig Heinke. "People have been willing to consider some weird explanations, so it's a relief to discover a less peculiar solution."

Unlike most astronomical objects, neutron stars are small enough to understand on a human scale. For example, neutron stars typically have a diameter of about 14 miles, only slightly longer than a half-marathon. The atmosphere of a neutron star is on an even smaller scale. The researchers calculate that the carbon atmosphere is only about 4 inches thick, because it has been compressed by a surface gravity that is 100 billion times stronger than on Earth.

"For people who are used to hearing about immense sizes of things in space, it might be a surprise that we can study something so small," said Ho. "It's also funny to think that such a thin veil over this star played a key role in frustrating researchers."

In Earth's time frame, the estimated age of the neutron star in Cas A is only several hundred years, making it about ten times younger than other neutron stars with detected surface emission. Therefore, the Cas A neutron star gives a unique window into the early life of a cooling neutron star.

The carbon itself comes from a combination of material that has fallen back after the supernova, and nuclear reactions on the hot surface of the neutron star which convert hydrogen and helium into carbon.

The X-ray spectrum and lack of pulsar activity suggest that the magnetic field on the surface of this neutron star is relatively weak. Similarly low magnetic fields are implied for several other young neutron stars by study of their weak X-ray pulsations. It is not known whether these neutron stars will have low magnetic fields for their entire lives, and never become radio pulsars, or whether processes in their interior will lead to the development of stronger magnetic fields as they age.

NASA's Marshall Space Flight Center in Huntsville, Ala., manages the Chandra program for NASA's Science Mission Directorate in Washington. The Smithsonian Astrophysical Observatory controls Chandra's science and flight operations from Cambridge, Mass.

back

Buy and Sell

Here's your chance to clean out the closet and find a home for your slightly used treasures. Post your buy and sell items by emailing the Editor with your details.

Newtonian for Sale

Good permanent Newtonian scope (not portable) with 13 1/2 inch mirror, 4" Steel Alt Azimuth mount with concrete counter balance. Includes various eyepieces. More info contact John MacArthur at jandlmac@shaw.ca

back

Ask an Expert

Have you been thumbing through the Astronomy or Sky and Telescope magazine and have some questions on the latest and greatest in astronomy gear? Or maybe you're narrowing down your search for just the right telescope and want to know the difference between Dobsonians, Schmidt-Cassegrains, Reflector and Refractors. Well wonder no more, email Brian Robilliard our resident expert to get the "inside scoop" on what's hot or not in astronomy gear.

Are you seeing double or unable to focus? Chances are you need to collimate

your scope. Are you looking for a good eyepiece? Why do you need to know the focal length of your telescope's mirror and how do you determine the focal length? For answers to these and other telescope questions email Ed Maxfield our expert on telescope tips, hints and suggestions.

Are you new to astronomy? Want to know the how to find objects in the sky? Or just wondering what that bright object in the evening sky is? Well wonder no more; email Bryon Thompson our Public Outreach Officer and master of Astronomy 101 basics.

back

Kids Korner

For the younger astronomers. We want your input on what you would like to see happening at the club. Tell us a bit about yourself and why you love astronomy. Email the Editor with your submissions. For the older folks, if you have any ideas that might spark the interest of a young upcoming astronomer, please send your submissions to the editor.

Science Experiment: Energy from the Sun! Courtesy of National Research Council Canada

Make Your Own Solar Array

Here on Earth, we use the energy from the Sun for many things. Spacecraft rely on the Sun's energy as a form of power for motors. Spacecraft that travel great distances away from the Sun cannot make this form of energy its only source. The missions to Mars are able to use limited solar energy in the form of rechargeable batteries but they also need alternate energy sources.

The International Space Station will capitalize on the Sun's energy. This is evident by the size of the solar arrays. These panels will focus the rays of the Sun and harness the energy into a usable form.

Purpose

•To construct a solar motor

Materials and Equipment

•Three tin cans (large soup cans)
•Can opener
•Pencil and paper
•Masking tape
•Straight pins with heads
•Sheet of white paper or aluminum foil 15 cm square
•Scissors
•Wire
•Wooden blocks, bricks, or stacks of books

Method

1. Remove both ends from the three large cans. Tape the cans together to form a column.
2. Position the tin can column on top of two supports (such as the bricks) in direct sunlight. Make sure there is a space between the ground and the tin can column (provided by the bricks.)
3. Tape a straight pin (head down) to one end of a piece of wire. Bend the wire and tape it to the top of the tin can in the column so that the pin points upward in the centre of the column.
4. Make a pinwheel. Cut a 15 cm sheet of paper or aluminum foil diagonally from each corner to within 1 centimeter of the centre. Bend every other point back to the centre of the square. Tape the points together at the centre.
5. Balance the pinwheel on the pin in the middle of the tin can column. Record your findings.
6. Draw a diagram of the solar motor and label all parts.

Observations/Results

•Record your observations.
•Post your results in your Team Blog.

Questions

- What caused the pinwheel to turn?
- How could you make it turn faster?
- How could this information be used in the design of the habitat on Mars?

back

The Sky This Month

By Bryon Thompson

Observing Site: Duncan, 48.783°N, 123.700°W

Well it's November which signals the beginning of the unofficial "Mars observing season." As midnight rolls around, the red planet is a great viewing object. By late November the planet will brighten to magnitude 0.0 and will not only grow brighter during this month, but it also grows bigger to a disk span of 10" by month's end. At this size, there should be a lot of surface detail if viewing through an 8-inch or larger telescope. It is also a great time to observe the north polar cap which should be in good view because the cap now tilts toward Earth.

Jupiter is a good distraction while you're waiting for the red planets appearance. It is visible for several hours after sunset, so take some time to observe it now as it will set even earlier next month. If you are lucky on the "*wet-coast*" and the skies clear, you may see what Galileo marveled at four hundred years ago; all four moons will lie east or west in a line along Jupiter's equator on **November 11**.

As November progresses, Saturn rises much earlier and climbs significantly higher into the predawn sky. By the time twilight begins on the 30th, Saturn stands nearly halfway to the zenith in the south-eastern sky. A waning crescent Moon slides past Saturn **November 12**.

Observers have the opportunity to view a nearly Full Moon at both the beginning and end of November. On the **November 14/15** new moon weekend check out a nice comet-galaxy duo. Comet C/2007 Q3 (Siding Spring) passes in front of the Coma-Virgo galaxy cluster, glowing around 10th magnitude. On the morning of November 15, the comet shares a medium-power field of view with the nearly edge-on spiral galaxy NGC 4216. Well-defined and stretching 8' by 2', the galaxy makes a striking contrast with the rounder comet.

Look for Melpomene during the midevening hours when it lies about a third of the way up in the southeastern sky. This main-belt asteroid lies about 2° east (to the left) of Eta throughout November. Glowing at magnitude 8.6, Melpomene appears brighter than all but a few of the nearby background stars. English astronomer John Hind first spotted Melpomene from London in June 1852. It was his fifth asteroid discovery, and the 18th overall. We'll have to wait 7 years for Melpomene to glow as bright as it does now. Its elliptical orbit brings it relatively close to the Sun every 3.5 years.

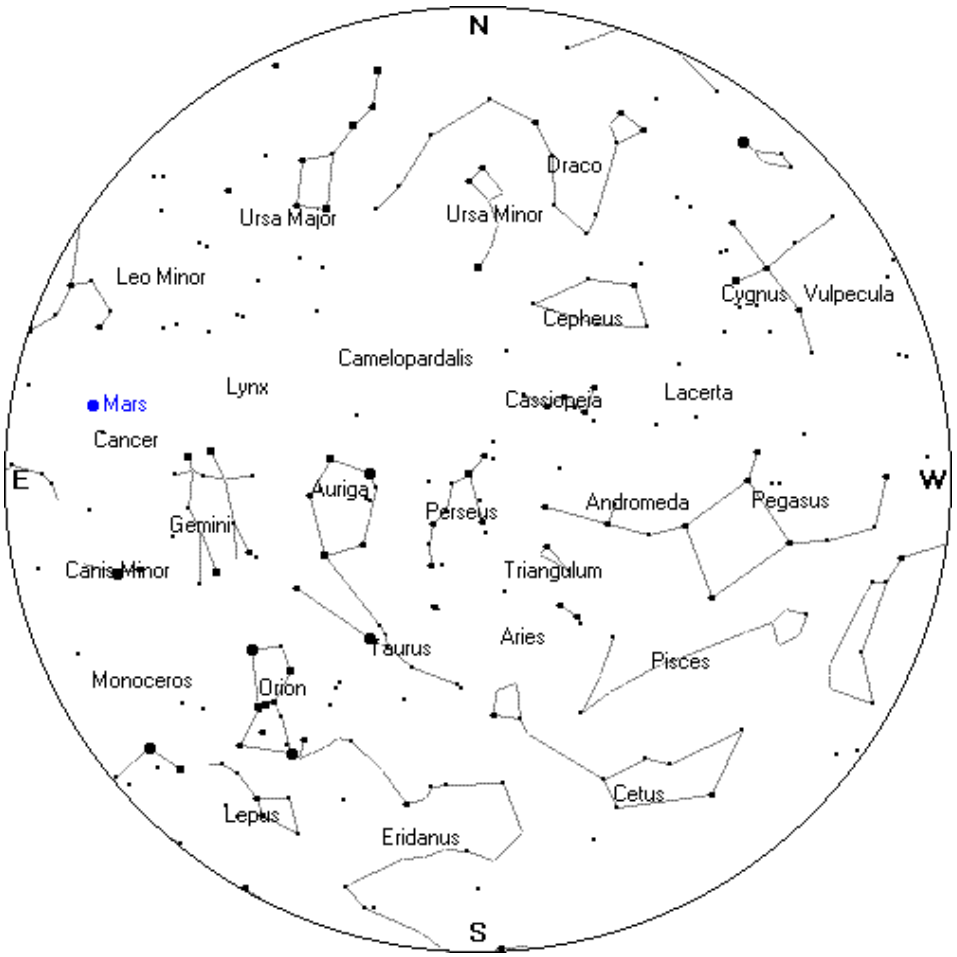
This month, the constellation Leo Minor can be seen high in the sky. Find Leo Minor and you will find where the Leonid meteor shower radiates from. The shower peaks this year on **November 17 & 18**, but you can usually see some meteors from November 13 - 20. The moon will be totally out of the way this year, providing an exceptional viewing experience. The shower itself has a cyclic peak year every 33 years where hundreds of meteors can be seen each hour. The last of these occurred in 2001. The higher rates arise because Earth is passing through heavy debris trails left by the Leonids' parent comet, 55P/Tempel-Tuttle.

Although November here on the west-coast is usually termed "the monsoon month" we may get lucky and see what the sky has to offer. Till next month, remember, astronomy is looking up.

11/2 Full Hunter's Moon
11/8 Last Quarter Moon
11/12 Waning, crescent Moon passes within 7°30' of Saturn
11/14-15 Comet C/2007 Q3 passes in front of the Coma-Virgo galaxy

11/15 Comet C/2007 Q3 shares medium field of view with spiral galaxy NGC
11/16 New Moon
11/17-18 Leonid meteor shower peaks
11/23 Triple conjunction Jupiter, Neptune and the waxing, crescent moon within 4°30′ of each other
11/24 First Quarter Moon
11/30 Jupiter and Neptune within 3° of each other

Sky Chart —Here's your mid-November midnight sky chart. In order to use the sky chart properly remember the centre of the chart is the sky directly above your head (or the Zenith). Turn the chart so that the direction you are facing is at the bottom of the chart (or pointed toward your toes). The star field directly in front of you will be between the bottom of the chart and the centre.



Sky Chart Courtesy of Heavens-Above

back