April 2010

THE SPECTROGRAM

Newsletter for the Society of Telescopy, Astronomy, and Radio

Inside this Issue

S*T*A*R
P.O. Box 863
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On the web at:
http://www.starastronomy.org

Edited by: Bob Fowler

April's Meeting

The next meeting of S*T*A*R will be on Thursday, April 1st, 2010 and will feature Al Witzgall who will speak about "Space Telescopes: The How, Why, When and Discoveries Made by Orbital Observatories". All are welcome. The meeting will begin promptly at 8:00pm at the Monmouth Museum on the Brookdale Community College campus.

Editor's Corner

Many thanks to Nancy McGuire, Dave Nelson, Randy Walton, & Steve Fedor for contributing to this month's Spectrogram.

Reminder to pay membership dues $25/individual, $35/family. Donations are appreciated. Make payments to our treasurer Rob Nunn at a club meeting or mail a check payable to S*T*A*R Astronomy Society Inc to:

S*T*A*R Astronomy Society
P.O. Box 863
Red Bank, NJ 07701

May Issue

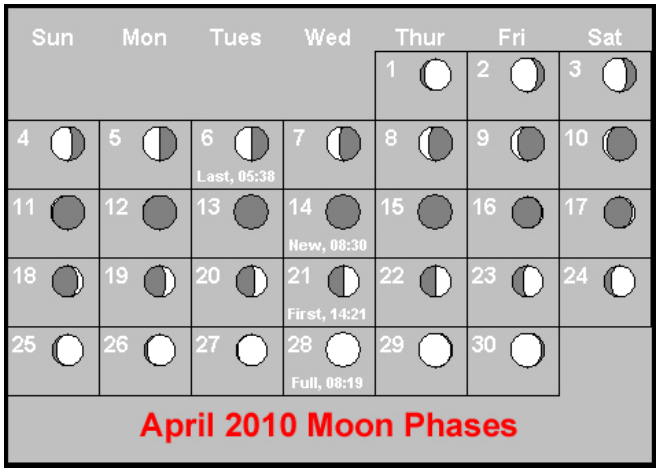
Please submit articles and contributions for the next *Spectrogram* by April 26.
Please email to fowler@verizon.net.

Calendar

- Apr 1, 2010 – "Space Telescopes" presented by Al Witzgall
- Apr 22, 2010 – Nut Swamp Elementary School First Star Party
- May 6, 2010 - TBA
- Jun 3, 2010 – Annual Business Meeting

Got Pix? Like to Write?

Have you been out observing with your friends? Have you made any great astro-images? How about a story and pictures of your latest ATM project? If you have anything you'd like to share, email fowler@verizon.net and let us know what you've got!



President's Corner April 2010

by Nancy McGuire

Perhaps I should call this the President's Quarterly since I have not been diligent about writing every month! My apologies.

I am excited about, and would like to write a bit about our opportunity to use the Dorbrook Park location for observing. I had my first opportunity to observe there for last weekend's Messier Marathon. Unfortunately, high clouds did not allow us to truly check out the site's capabilities from a light pollution standpoint. However, I will say that Dorbrook is very accessible to most of our members and that will allow even for weekday outings since it is close to many of our members.

Our observing site there is wide open with great horizons in every direction! It is easy to unload the scopes from where we park on the road and roll right out into the field. And a rare treat – Port-O-John's complete with all of the amenities (especially nice for us gals)!

But wear your boots – we do share the field with the Canada geese and some other critters.

Again, from me and the club, big thanks to Dennis O'Leary and John Batinsey for pursuing and securing the Dorbrook site for us!

And thanks also to Ahmad and the observing group who will be scheduling observing sessions and prompting us to get out and observe.

Regarding the Messier Marathon itself, due to bad weather on the originally planned weekend, and some folks wanting to get to some really dark skies for this, we were not able to have a big group event. But I hope that many of you did get out there on some night and had success finding many (or all!) of the objects!

Russian cosmonaut Oleg Kotov, Expedition 22 flight engineer, in a session of extravehicular activity (EVA) as maintenance and construction continue on the International Space Station.

Are you a S*T*A*R Member?

S*T*A*R is the proud owner of a monstrous 25" Dobsonian Obsession reflector – which members can gain access to!

Meetings are the first Thursday of each month, except July and August, at 8:00 PM at the Monmouth Museum on the Brookdale Community College campus. Meetings generally consist of lectures and discussions by members or guest speakers on a variety of interesting astronomical topics. S*T*A*R is a member of United Astronomy Clubs of New Jersey (UACNJ), the Astronomical League (AL), and the International Dark Sky Association (IDA).

Memberships: ( )Individual....$25 ( ) Family...$35

Name_____

Address_____

City_____State___Zip_____

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Make checks payable to: S*T*A*R Astronomy Society, Inc. and mail to P.O. Box 863, Red Bank, NJ 07701

March Meeting Minutes

The March 4th, 2010 meeting of S*T*A*R Astronomy Club began at 8:08 pm. There were 37 members and non-members in attendance. President Nancy McGuire chaired the meeting and began by welcoming a first time attendee.

Dave Britz began the evening by showing a humorous video about our expanding universe.

Beginning at 8:17 S*T*A*R was treated to a lecture by Dr. S. W. Jha, an associate professor of astronomy at Rutgers, titled “Surveying the Universe with Supernovae.” Dr, Jha’s presentation was fascinating and covered many topics in cosmology as well as his current efforts to find new supernovae. The talk concluded at 9:40 at which time coffee break began.

The meeting resumed at 10:09 with Dennis O’Leary giving us his NASA update. Dennis presented us with information on current NASA missions as well as many pictures of the shuttle, the Solar Dynamics Laboratory Mars, Pluto Lunar and Martian ice.

Frank Loso then presented “Object of the Month.” This month’s objects were OC M35 and NGC-2158. Frank also suggested to get out and look at Mars because although it’s getting smaller it still is a worthwhile object to observe.

Mike Sullivan handed out flyers showing the location of Quazar 3C273 which is two billion light years away. Mike said he has seen it from his backyard and appears as a dim blue star.

Steve Siegel then discussed the upcoming Messier Marathon which would be held in Doorbrook Park on 3/13.

V.P. Rich Gaynor discussed four upcoming star parties and requested membership to help with scopes.
-Conover Road for Mike Lindner on 3/17 (since has been postponed. New date TBD)
-Pine Brook School in Manalapan 3/19
-Millburn, NJ with Dennis O’Leary on 3/23
-Nut Swamp Elementary School in Middletown 4/22

The meeting was the adjourned at 10:53 p.m.

Solar “Conveyor Belt” Runs at Record-High Speeds

Solar physicist David Hathaway of NASA's Marshall Space flight Center in Huntsville, AL and graduate student Lisa Rightmire of the University of Memphis in Tennessee have been monitoring the sun using the Solar and Heliospheric Observatory (SOHO). They observe a massive circulating current of fire (hot plasma) within the sun operating at a faster pace as reported in the March 12th issue of Science.

The current of fire is a conveyor belt-like system called the Meridional Flow which rises to the surface at the sun's equator and spreads out toward the poles where it sinks back into the sun. "Normally it reaches peak speeds of about 20 mph," says Hathaway. "However, in 2004 the speed increased to nearly 30 mph and has remained that fast since."

The faster pace is a revelation because it occurred during the deepest solar minimum in almost 100 years and indications that the next solar cycle will be a weak one. This contradicts some theories that say a fast pace results in increased sunspot production. But it agrees with others that say a fast pace results in decreased sunspot production.

The faster rate of currents on the sun and the expected weaker solar cycle have affects for those of us here on Earth. One affect is the temperature increase of the Earth could slow down, there would be fewer auroras, and to the extent that we depend on satellites, GPS, and cell phones there should be less disruption in service.

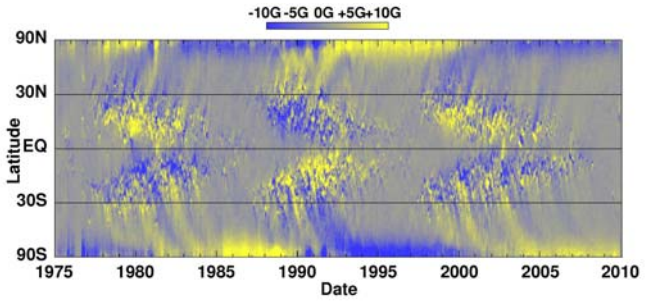
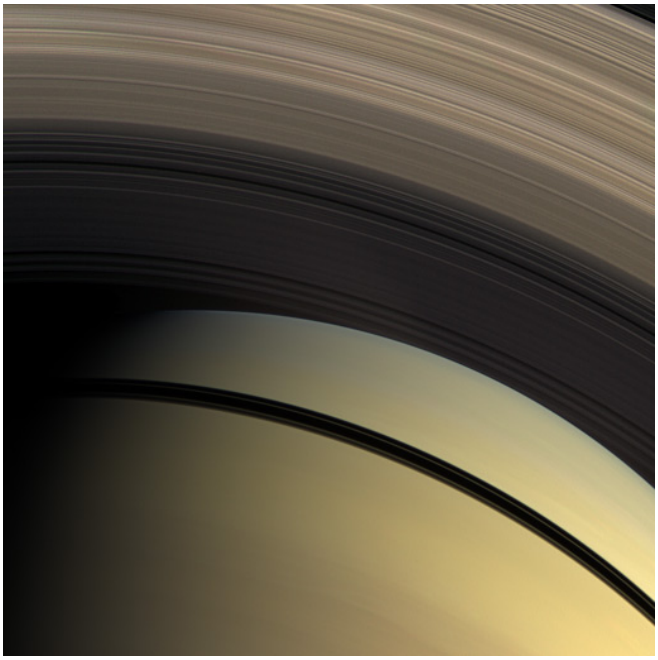


Diagram of the distribution of the sun's magnetic field over three 11-year solar cycles. Yellow represents magnetic field directed out of the sun. Blue represents magnetic field into the sun. Sunspots themselves produce the "Butterfly" pattern at low latitudes. The sun's meridional flow from the equator to the poles in each hemisphere carries magnetic remains of the sunspots to the poles. This produces the streaks seen at higher latitudes and reverses the magnetic polarity of the sun's poles every 11 years. Image credit: NASA/MSFC/David Hathaway

Cassini Shows Saturnian Roller Derby

From our vantage point on Earth, Saturn may look like a peaceful orb with rings worthy of a carefully raked Zen garden, but NASA's Cassini spacecraft has been shadowing the gas giant long enough to see that the rings are a rough and tumble roller derby. It has also revealed that the planet itself roils with strange weather and shifting patterns of charged particles. Two review papers to be published in the March 19 issue of the journal Science synthesize Cassini's findings since arriving at Saturn in 2004.

"This rambunctious system gives us a new feel for how an early solar system might have behaved," said Linda Spilker, a planetary scientist and the new Cassini project scientist at NASA's Jet Propulsion Laboratory in Pasadena, Calif. "This kind of deep, rich data can only be collected by an orbiting spacecraft, and we look forward to the next seven years around Saturn bringing even more surprises."



This natural color view from the Cassini spacecraft highlights the myriad gradations in the transparency of Saturn's inner rings. Image credit: NASA/JPL/Space Science Institute

In the paper describing the elegant mess of activity in the rings, lead author Jeff Cuzzi, Cassini's interdisciplinary scientist for rings and dust who is based at NASA Ames Research Center, Moffett Field, Calif., describes how Cassini has shown us that collisions are routine and chunks of ice leave trails of debris in their wakes. Spacecraft data have also revealed how small moons play tug-of-war with ring material and how bits of rubble that would otherwise join together to become moons are ultimately ripped apart by the gravitational pull that Saturn exerts.

During equinox, the period when sunlight hits the rings exactly edge-on, Cassini witnessed rings that are normally flat - about tens of meters (yards) thick - being flipped up as high as the Rocky Mountains.

The spacecraft has also shown that the rings are composed mostly of water ice, with a mysterious reddish contaminant that could be rust or small organic molecules similar to those found in red vegetables on Earth.

"It has been amazing to see the rings come to life before our very eyes, changing even as we watch, being colorful and taking on a tangible, 3-D nature," Cuzzi said. "The rings were still a nearly unstructured object in even the best telescopes when I was a grad student, but Cassini has brought us an intimate familiarity with them."

Cuzzi said Cassini scientists were surprised to find such fine-scale structure nearly everywhere in the rings, forcing them to be very careful about generalizing their findings across the entire ring disk. The discovery that the rings are clumpy has also called into question some of the previous estimates for the mass of the rings because there might be clusters of material hidden inside of the clumps that have not yet been measured.

In the review paper on Saturn's atmosphere, ionosphere and magnetosphere, lead author Tamas Gombosi, Cassini's interdisciplinary scientist for magnetosphere and plasma science who is based at the University of Michigan in Ann Arbor, describes how Cassini helped scientists understand a south polar vortex that has a diameter 20 to 40 times that of a terrestrial hurricane, and the bizarrely stable hexagon-shaped jet stream at the planet's north pole. Cassini scientists have also calculated a variation in Saturn's wind speeds at different altitudes and latitudes that is 10 times greater than the wind speed variation on Earth.

According to Gombosi's paper, Cassini has also shown us that the small moon Enceladus, not the sun or Saturn's largest moon Titan, is the biggest contributor of charged particles to Saturn's magnetic environment. The charged particles from Enceladus, a moon that features a plume of water vapor and other gases spraying from its south polar region, also contribute to the auroras around the poles of the planet.

"We learned from Cassini that the Saturnian magnetosphere is swimming in water," Gombosi said. "This is unique in the solar system and makes Saturn's plasma environment particularly fascinating."

Of course, Cassini's intense investigation has opened up a host of new mysteries. For example, Cassini has shown us images of occasional cannon-ball-like objects that rocket across one of the outer rings known as the F ring, without

many clues about where they came from or why they quickly disappear.

Learning more about a kind of radio emission known as "kilometric radiation" at Saturn has unsettled debates about the planet's rotation rate rather than settled them. While the regular periods of kilometric radiation have given scientists a sense of the rotation rate at Jupiter, Saturn has clocked different periods for the radiation during NASA's Voyager flybys in 1980 and 1981 and the nearly six years of Cassini's investigations. The modulations vary by about 30 seconds to a minute, but they shouldn't be varying at all. The inconsistency may be related to a source in the magnetic bubble around the planet rather than the core of the gas giant, but scientists are still debating.

"Cassini has answered questions we were not even smart enough to ask when the mission was planned and raised a lot of new ones," Cuzzi said. "We are hot on the trail, though."

The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. JPL manages the project for NASA's Science Mission Directorate in Washington. The Cassini orbiter was designed, developed and assembled at JPL.

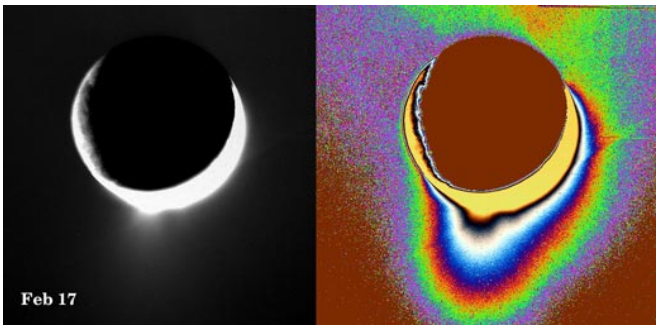
More Cassini information is available at http://www.nasa.gov/cassini and http://saturn.jpl.nasa.gov.

NASA's Cassini Discovers Potential Liquid Water on Enceladus

NASA's Cassini spacecraft may have found evidence of liquid water reservoirs that erupt in Yellowstone-like geysers on Saturn's moon Enceladus. The rare occurrence of liquid water so near the surface raises many new questions about the mysterious moon.

"We realize that this is a radical conclusion -- that we may have evidence for liquid water within a body so small and so cold," said Dr. Carolyn Porco, Cassini imaging team leader at Space Science Institute, Boulder, Colo. "However, if we are right, we have significantly broadened the diversity of solar system environments where we might possibly have conditions suitable for living organisms."

High-resolution Cassini images show icy jets and towering plumes ejecting large quantities of particles at high speed. Scientists examined several models to explain the process. They ruled out the idea that the particles are produced by or blown off the moon's surface by vapor created when warm water ice converts to a gas. Instead, scientists have found evidence for a much more exciting possibility -- the jets might be erupting from near-surface pockets of liquid water above 0 degrees Celsius (32 degrees Fahrenheit), like cold versions of the Old Faithful geyser in Yellowstone.



Plumes of icy material extend above the southern polar region of Saturn's moon Enceladus as imaged by the Cassini spacecraft in February 2005. The monochrome view is presented along with a color-coded version on the right. The latter reveals a fainter and much more extended plume component. Images like these are being analyzed by scientists as they seek to explain the processes that could be producing such incredible features. As reported in the journal Science on March 10, 2006, imaging scientists believe that the plumes are geysers erupting from pressurized subsurface reservoirs of liquid water above 273 degrees Kelvin (0 degrees Celsius).

Mission scientists report these and other Enceladus findings in this week's issue of Science.

"We previously knew of at most three places where active volcanism exists: Jupiter's moon Io, Earth, and possibly Neptune's moon Triton. Cassini changed all that, making Enceladus the latest member of this very exclusive club, and one of the most exciting places in the solar system," said Dr. John Spencer, Cassini scientist, Southwest Research Institute, Boulder, Colo.

"Other moons in the solar system have liquid-water oceans covered by kilometers of icy crust," said Dr. Andrew Ingersoll, imaging team member and atmospheric scientist at the California Institute of Technology, Pasadena, Calif. "What's different here is that pockets of liquid water may be no more than tens of meters below the surface."

Other unexplained oddities now make sense. "As Cassini approached Saturn, we discovered that the Saturnian system is filled with oxygen atoms. At the time we had no idea where the oxygen was coming from," said Dr. Candy Hansen, Cassini scientist at NASA's Jet Propulsion Laboratory in Pasadena. "Now we know that Enceladus is spewing out water molecules, which break down into oxygen and hydrogen."

Scientists are also seeing variability at Enceladus. "Even when Cassini is not flying close to Enceladus, we can detect that the plume's activity has been changing through its varying effects on the soup of electrically-charged particles that flow past the moon," said Dr. Geraint H. Jones, Cassini scientist, magnetospheric imaging instrument, Max Planck

Institute for Solar System Research, Katlenburg-Lindau, Germany.

Scientists still have many questions. Why is Enceladus currently so active? Are other sites on Enceladus active? Might this activity have been continuous enough over the moon's history for life to have had a chance to take hold in the moon's interior?

"Our search for liquid water has taken a new turn. The type of evidence for liquid water on Enceladus is very different from what we've seen at Jupiter's moon Europa. On Europa the evidence from surface geological features points to an internal ocean. On Enceladus the evidence is direct observation of water vapor venting from sources close to the surface," said Dr. Peter Thomas, Cassini imaging scientist, Cornell University, Ithaca, N.Y.

In the spring of 2008, scientists will get another chance to look at Enceladus when Cassini flies within 350 kilometers (approximately 220 miles), but much work remains after Cassini's four-year prime mission is over.

"There's no question that, along with the moon Titan, Enceladus should be a very high priority for us. Saturn has given us two exciting worlds to explore," said Dr. Jonathan Lunine, Cassini interdisciplinary scientist, University of Arizona, Tucson, Ariz.

The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. JPL, a division of the Caltech, manages the mission for NASA's Science Mission Directorate. The Cassini orbiter was designed, developed and assembled at JPL.

For images and more information, visit: http://www.nasa.gov/cassini and http://saturn.jpl.nasa.gov .

NASA Mars Rover Getting Smarter as it Gets Older

PASADENA, Calif. -- NASA's Mars Exploration Rover Opportunity, now in its seventh year on Mars, has a new capability to make its own choices about whether to make additional observations of rocks that it spots on arrival at a new location.

Software uploaded this winter is the latest example of NASA taking advantage of the twin Mars rovers' unanticipated longevity for real Martian test drives of advances made in robotic autonomy for future missions.

Now, Opportunity's computer can examine images that the rover takes with its wide-angle navigation camera after a drive, and recognize rocks that meet specified criteria, such as rounded shape or light color. It can then center its narrower-angle panoramic camera on the chosen target and take multiple images through color filters.

"It's a way to get some bonus science," said Tara Estlin of NASA's Jet Propulsion Laboratory, Pasadena, Calif. She is a rover driver, a senior member of JPL's Artificial Intelligence Group and leader of development for this new software system.

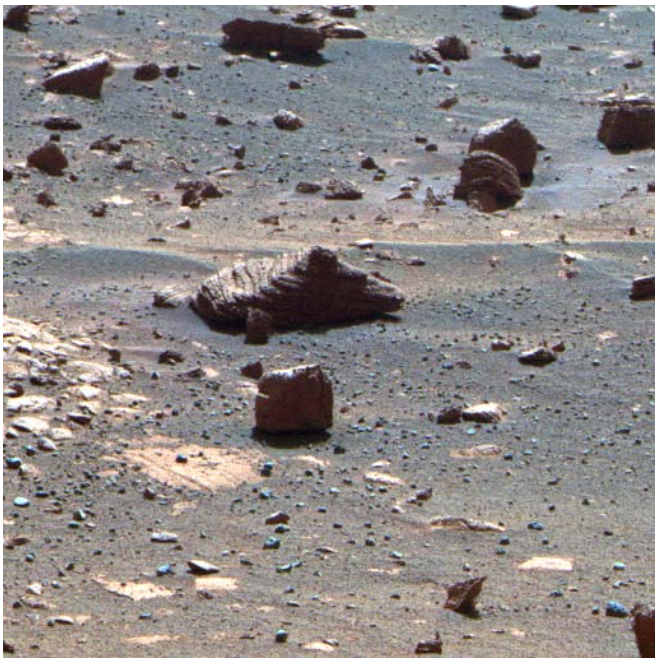
The new system is called Autonomous Exploration for Gathering Increased Science, or AEGIS. Without it, follow-up observations depend on first transmitting the post-drive navigation camera images to Earth for ground operators to check for targets of interest to examine on a later day. Because of time and data-volume constraints, the rover team may opt to drive the rover again before potential targets are identified or before examining targets that aren't highest priority.

This view results from the first observation of a target selected autonomously by a spacecraft on Mars. During the 2,172nd Martian day, or sol, of its mission on Mars (March 4, 2010), NASA's Mars Exploration Rover Opportunity used newly developed and uploaded software to choose a target from a wider-angle image and point its panoramic camera (Pancam) to observe the chosen target through 13 different filters.

The first images taken by a Mars rover choosing its own target show a rock about the size of a football, tan in color and layered in texture. It appears to be one of the rocks tossed outward onto the surface when an impact dug a nearby crater. Opportunity pointed its panoramic camera at this unnamed rock after analyzing a wider-angle photo taken by the rover's navigation camera at the end of a drive on March 4. Opportunity decided that this particular rock, out of more than 50 in the navigation camera photo, best met the

criteria that researchers had set for a target of interest: large and dark.

"It found exactly the target we would want it to find," Estlin said. "This checkout went just as we had planned, thanks to many people's work, but it's still amazing to see Opportunity performing a new autonomous activity after more than six years on Mars."



This view results from the first observation of a target selected autonomously by a spacecraft on Mars. During the 2,172nd Martian day, or sol, of its mission on Mars (March 4, 2010), NASA's Mars Exploration Rover Opportunity used newly developed and uploaded software to choose a target from a wider-angle image and point its panoramic camera (Pancam) to observe the chosen target through 13 different filters. Images taken through three of the filters are combined into this false-color view of the rock, which is about the size of a football.

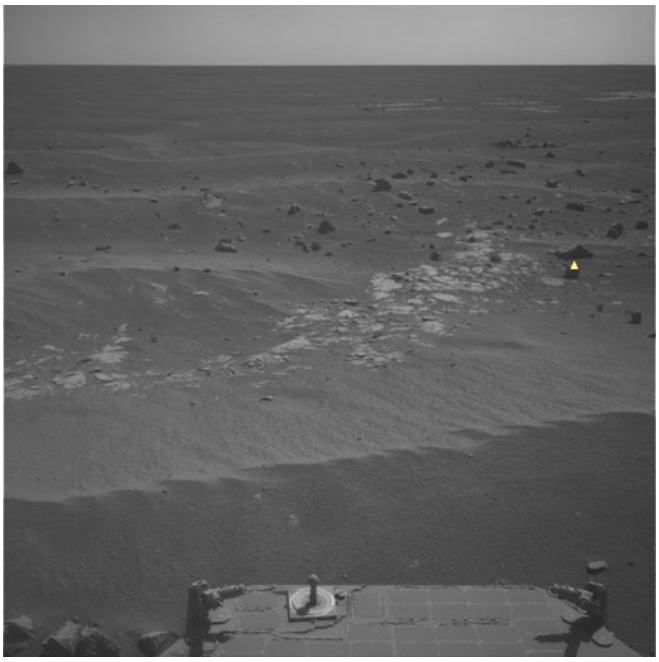
Opportunity can use the new software at stopping points along a single day's drive or at the end of the day's drive. This enables it to identify and examine targets of interest that might otherwise be missed.

"We spent years developing this capability on research rovers in the Mars Yard here at JPL," said Estlin. "Six years ago, we never expected that we would get a chance to use it on Opportunity."

The developers anticipate that the software will be useful for narrower field-of-view instruments on future rovers.

Other upgrades to software on Opportunity and its twin, Spirit, since the rovers' first year on Mars have improved other capabilities. These include choosing a route around obstacles and calculating how far to reach out a rover's arm to touch a rock. In 2007, both rovers gained the know-how to examine sets of sky images to determine which ones show clouds or dust devils, and then to transmit only the selected images. The newest software upload takes that a step further, enabling Opportunity to make decisions about acquiring new observations.

The AEGIS software lets scientists change the criteria it used for choosing potential targets. In some environments, rocks that are dark and angular could be higher-priority targets than rocks that are light and rounded, for example.



NASA's Mars Exploration Rover Opportunity took this image in preparation for the first autonomous selection of an observation target by a spacecraft on Mars. Opportunity used its navigation camera to take this image after a drive during the 2,172nd Martian day, or sol, of its mission on Mars (March 4, 2010). Using newly developed and uploaded software named Autonomous Exploration for Gathering Increased Science, or AEGIS, the rover analyzed the image to identify the feature that best matched criteria given for selecting a target. The top target that Opportunity selected with AEGIS is shown by the yellow marker. AEGIS was directed to look for rocks that were larger and darker in color. The rover then used the software to take more detailed observations of the selected target using its panoramic camera. The more-than-50 rocks in this image are near a young crater called "Concepcion" and might have been thrown outward by the impact that excavated the crater.

This new software system has been developed with assistance from NASA's Mars Exploration Rover Project and with funding from the New Millennium Program, the Mars Technology Program, the JPL Interplanetary Network Development Program, and the Intelligent Systems Program. The New Millennium Program tests advanced technology in space flight. JPL, a division of the California Institute of Technology in Pasadena, manages the Mars Exploration Rover Project for the NASA Science Mission Directorate, Washington.

Deadly Planets

By Patrick L. Barry and Dr. Tony Phillips

About 900 light years from here is a rocky planet not much bigger than Earth. It goes around its star once every hundred days, a trifle fast, but not too different from a standard Earth-year. At least two and possibly three other planets circle the same star, forming a complete solar system.

Interested? Don't be. Going there would be the last thing you ever do.

The star is a pulsar, PSR 1257+12, the seething-hot core of a supernova that exploded millions of years ago. Its planets are bathed not in gentle, life-giving sunshine but instead a blistering torrent of X-rays and high-energy particles.

"It would be like trying to live next to Chernobyl," says Charles Beichman, a scientist at JPL and director of the Michelson Science Center at Caltech.

Our own Sun emits small amounts of pulsar-like X-rays and high energy particles, but the amount of such radiation coming from a pulsar is "orders of magnitude more," he says. Even for a planet orbiting as far out as the Earth, this radiation could blow away the planet's atmosphere, and even vaporize sand right off the planet's surface.

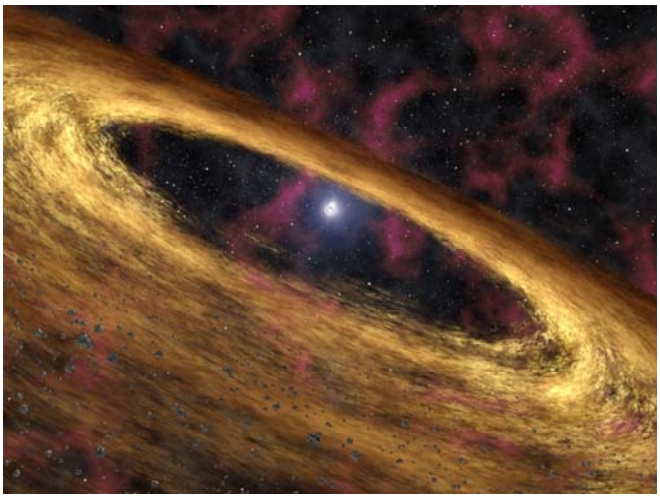
Astronomer Alex Wolszczan discovered planets around PSR 1257+12 in the 1990s using Puerto Rico's giant Arecibo radio telescope. At first, no one believed worlds could form around pulsars—it was too bizarre. Supernovas were supposed to destroy planets, not create them. Where did these worlds come from?

NASA's Spitzer Space Telescope may have found the solution. In 2005, a group of astronomers led by Deepto Chakrabarty of MIT pointed the infrared telescope toward pulsar 4U 0142+61. Data revealed a disk of gas and dust surrounding the central star, probably wreckage from the supernova. It was just the sort of disk that could coalesce to form planets!

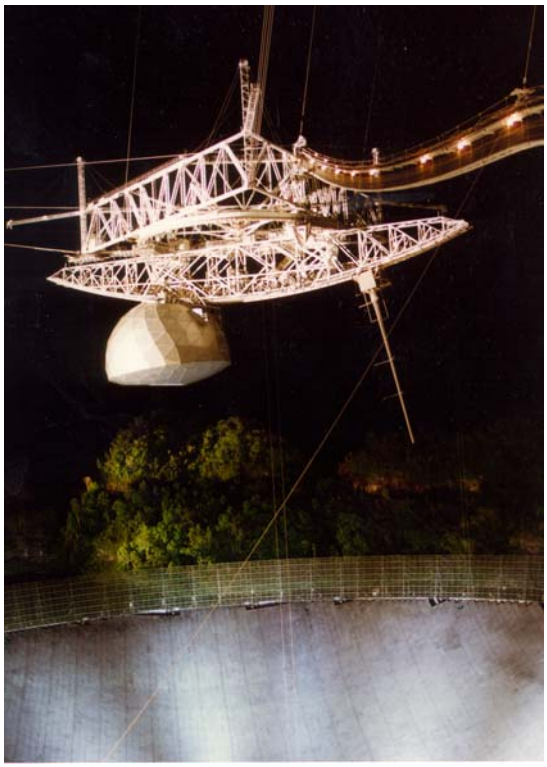
As deadly as pulsar planets are, they might also be hauntingly beautiful. The vaporized matter rising from the planets' surfaces could be ionized by the incoming radiation, creating colorful auroras across the sky. And though the pulsar would only appear as a tiny dot in the sky (the pulsar itself is only 20-40 km across), it would be enshrouded in a hazy glow of light emitted by radiation particles as they curve in the pulsar's strong magnetic field.

Wasted beauty? Maybe. Beichman points out the positive: "It's an awful place to try and form planets, but if you can do it there, you can do it anywhere."

Find more news and images from Spitzer at http://www.spitzer.caltech.edu/ .



Artist's concept of a pulsar and surrounding disk of rubble called a "fallback" disk, out of which new planets could form.



Arecibo Observatory at Night
courtesy of the NAIC - Arecibo Observatory, a facility of the NSF

In the Eyepiece

Here is a list of objects for this month. This is reproduced from www.skyhound.com with the kind permission of its creator and author of SkyTools Greg Crinklaw.

Object(s)	Class	Con	RA	Dec	Mag
Y CVn	Variable Star	Canes Venatici	12h45m07.8s	+45°26'25"	4.9
Black Eye	Galaxy	Coma Berenices	12h56m43.9s	+21°41'00"	9.3
Sombrero	Galaxy	Virgo	12h39m59.3s	-11°37'22"	9.1
Downtown Virgo & the M87 Jet!	Galaxy Cluster	Virgo	12h26m12.2s	+12°56'45"	9+
M 106	Galaxy	Canes Venatici	12h18m57.5s	+47°18'14"	9.1
M 108	Galaxy	Ursa Major	11h11m31.3s	+55°40'31"	10.9
M65	Galaxy	Leo	11h18m55.8s	+13°05'32"	10.2
M 66	Galaxy	Leo	11h20m15.1s	+12°59'22"	9.6
Owl	Planetary Nebula	Ursa Major	11h14m46.1s	+55°01'07"	12.0
NGC 4631 (The Whale)	Galaxy	Canes Venatici	12h42m07.8s	+32°32'27"	9.7
NGC 4656	Galaxy	Canes Venatici	12h43m58.2s	+32°10'09"	11.4
NGC 4244	Galaxy	Canes Venatici	12h17m29.5s	+37°48'26"	10.8
NGC 4762	Galaxy	Virgo	12h52m55.9s	+11°13'57"	11.3
NGC 4236	Galaxy	Draco	12h16m41.8s	+69°28'10"	10.1
Hickson 61	Galaxy Group	Coma Berenices	12h12m23.9s	+29°10'40"	11.1
NGC 3607	Galaxy	Leo	11h16m54.8s	+18°03'06"	10.9
Antennae/Ring Tail	Galaxy	Corvus	12h01m52.8s	-18°51'54"	10.9
NGC 4490	Galaxy	Canes Venatici	12h30m36.7s	+41°38'27"	10.1
NGC 4361	Planetary Nebula	Corvus	12h24m30.8s	-18°47'05"	10.3
NGC 4027	Galaxy	Corvus	11h59m30.1s	-19°16'05"	11.7
NGC 4094	Galaxy	Corvus	12h05m53.9s	-14°31'36"	12.7
NGC 4782 & 4783	Galaxy	Corvus	12h54m35.8s	-12°34'06"	12.4
NGC 3987	Galaxy	Leo	11h57m20.9s	+25°11'42"	13.8
NGC 3628	Galaxy	Leo	11h20m16.9s	+13°35'14"	10.3
NGC 4565	Galaxy	Coma Berenices	12h36m21.1s	+25°59'13"	10.6

Coordinates are epoch 2000.0

April 2010 Celestial Events: supplied by J. Randolph Walton (Randy)

Day	Date	Time (EDT)	Event
Fri	2	After 20:15	**Zodiacal Light** visible in W after evening twilight for next two weeks
Sat	3	04:05	Mars Sets
		05:45	Jupiter Rises
		06:30	Saturn Sets
		06:41	Sunrise
		09:17	Moon Set
		19:26	Sunset
		21:00	Mercury Sets
		21:10	Venus Sets
Sun	4	05:45	Jupiter Rises
		06:39	Sunrise
		07:28	**Double-shadow transit on Jupiter**
Tue	6	02:30	Moon Rise
		05:37	**Last Quarter Moon**
Thu	8	19:00	**Mercury greatest elongation E (19°)**
Sat	10	03:40	Mars Sets
		04:25	Moon Rise
		05:25	Jupiter Rises
		06:00	Saturn Sets
		06:30	Sunrise
		19:33	Sunset
		21:15	Mercury Sets
		21:25	Venus Sets
Wed	14	06:02	Moon Rise
		08:29	**New Moon**
Fri	16	19:50	Moon close to Pleiades (M45) with Venus and Mercury below
Sat	17	03:20	Mars Sets
		05:00	Jupiter Rises
		05:30	Saturn Sets
		06:19	Sunrise
		19:40	Sunset
		21:00	Mercury Sets
		21:37	Venus Sets
		23:26	Moon Set
Wed	21	12:04	Moon Rise
		14:20	**First Quarter Moon**
Thu	22	13:00	Lyrid meteors peak (ZHR=20)
		19:00	**Lunar Straight Wall visible**
Sat	24	03:00	Mars Sets
		04:35	Jupiter Rises
		05:05	Saturn Sets
		06:09	Sunrise
		15:43	Moon Rise
		19:48	Sunset
		20:20	Mercury Sets
		21:55	Venus Sets
Wed	28	08:18	**Full Moon**
		20:32	Moon Rise