October 2011

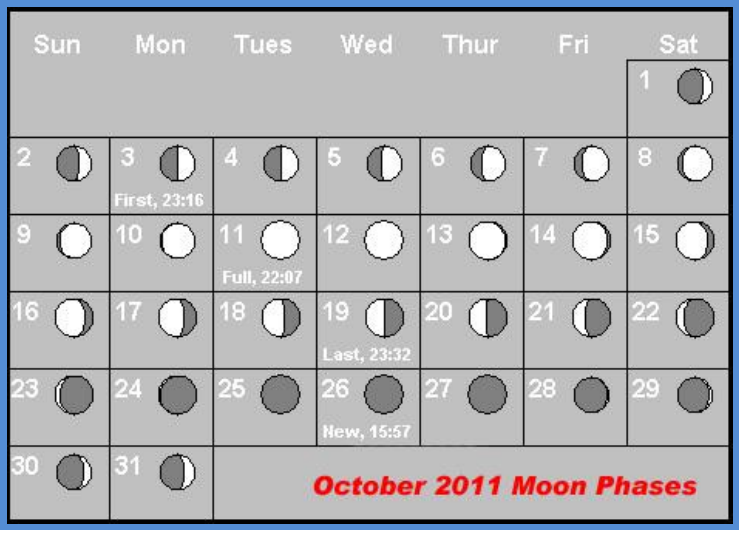
Inside this Issue:

October Meeting

The next meeting of S*T*A*R will be on Thursday, October 6, 2011. The speaker for our meeting will be Ken Garrison, Associate Professor of Physics at Ocean County College and Assistant Director of the Novins Planetarium. Ken's topic will be "Star Formation: What's New?" Star formation is a continuous process within our galaxy, and most others. This presentation will review some of the basic knowledge about how stars form from clouds of interstellar gas and dust and describe some of the recent results and continuing questions in this area. Some objects accessible to modest-sized telescopes will be suggested. Join us for what promises to be a fascinating talk.

Calendar

- October 8th, 2011 – International Observe the Moon Night
- November 3rd, 2011 – Monthly meeting. Speaker TBA
- November 22nd, 2011 - Astronomy Night at Mill Lake Elementary School in Monroe Township



November Issue

Please submit articles and contributions for the next *Spectrogram* by October 27th. Please email to fowler@verizon.net.

Star Parties:

Astronomy Night
November 22, 2011

Mill Lake Elementary School in Monroe Township is holding their annual Astronomy Night on Tuesday, November 22nd. They have asked if we could set up several telescopes for the students and parents. The school is located at 115 Monmouth Road, Monroe Township, NJ 08831.

We can arrive and set up in the rear of the school at 5:30. In the past there was pizza, subs and soda for the astronomers. The students will start to arrive at 6:00 and it should end about 9:00.

This event goes on rain or cloud. There are indoor stations where the students are engaged in hands-on activities supervised by the teachers. There will be a Starlab Planetarium and an exhibit of Moon rocks. There are about 180 students plus parents and siblings but they will come out to observe in class sized groups.

The last two years we were able to observe but the two previous years the skies were overcast and the astronomers did the observations through breaks in the clouds or came inside the gym and showed the students how their telescopes worked and viewed pictures of galaxies across the room.

Please post if you can help.
Please monitor "Events and Observation Plans" link on our web site for updates.

Russ Drum and Dennis O'Leary are contacts for the Club.

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

Name_____

Address_____

City_____State___Zip_____

Phone_____

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

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

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).

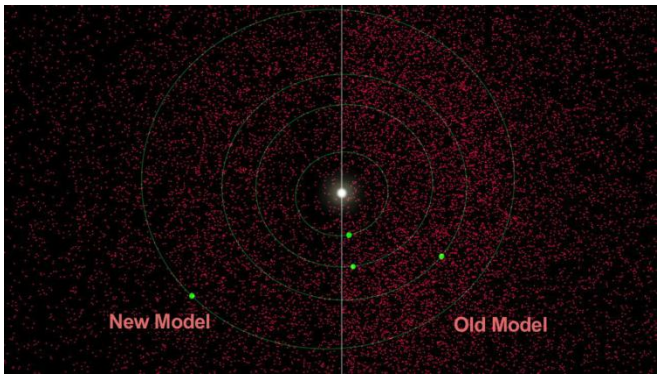
NASA Space Telescope Finds Fewer Asteroids Near Earth

PASADENA, Calif. -- New observations by NASA's Wide-field Infrared Survey Explorer, or WISE, show there are significantly fewer near-Earth asteroids in the mid-size range than previously thought. The findings also indicate NASA has found more than 90 percent of the largest near-Earth asteroids, meeting a goal agreed to with Congress in 1998.

Astronomers now estimate there are roughly 19,500 -- not 35,000 -- mid-size near-Earth asteroids. Scientists say this improved understanding of the population may indicate the hazard to Earth could be somewhat less than previously thought. However, the majority of these mid-size asteroids remain to be discovered. More research also is needed to determine if fewer mid-size objects (between 330 and 3,300-feet wide) also mean fewer potentially hazardous asteroids, those that come closest to Earth.

The results come from the most accurate census to date of near-Earth asteroids, the space rocks that orbit within 120 million miles (195 million kilometers) of the sun into Earth's orbital vicinity. WISE observed infrared light from those in the middle to large-size category. The survey project, called NEOWISE, is the asteroid-hunting portion of the WISE mission. Study results appear in the Astrophysical Journal.

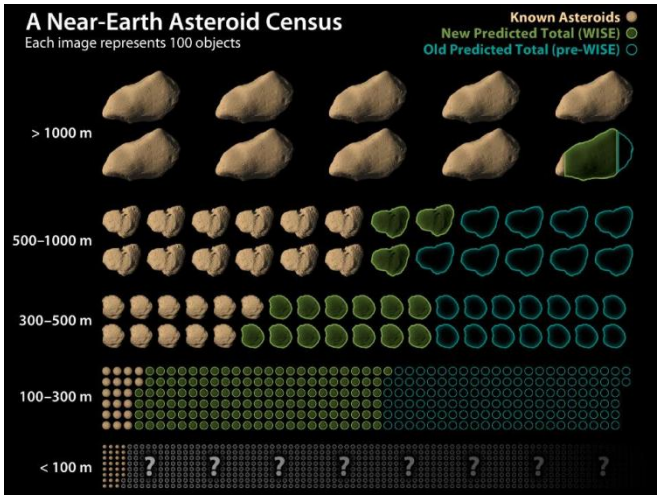
"NEOWISE allowed us to take a look at a more representative slice of the near-Earth asteroid numbers and make better estimates about the whole population," said Amy Mainzer, lead author of the new study and principal investigator for the NEOWISE project at NASA's Jet Propulsion Laboratory in Pasadena, Calif. "It's like a population census, where you poll a small group of people to draw conclusions about the entire country."



NEOWISE observations indicate that there are at least 40 percent fewer near-Earth asteroids in total that are larger than 330 feet, or 100 meters. Our solar system's four inner planets are shown in green, and our sun is in the center. Each red dot represents one asteroid. Object sizes are not to scale. Image credit: NASA/JPL-Caltech

WISE scanned the entire celestial sky twice in infrared light between January 2010 and February 2011, continuously snapping pictures of everything from distant galaxies to near-Earth asteroids and comets. NEOWISE observed more than 100 thousand asteroids in the main belt between Mars and Jupiter, in addition to at least 585 near Earth.

WISE captured a more accurate sample of the asteroid population than previous visible-light surveys because its infrared detectors could see both dark and light objects. It is difficult for visible-light telescopes to see the dim amounts of visible-light reflected by dark asteroids. Infrared-sensing telescopes detect an object's heat, which is dependent on size and not reflective properties.



This chart shows how data from NASA's Wide-field Infrared Survey Explorer, or WISE, has led to revisions in the estimated population of near-Earth asteroids. The infrared-sensing telescope performed the most accurate survey to date of a slice of this population as part of project called NEOWISE. This allowed the science team to make new estimates of the total numbers of the objects in different size categories. NEOWISE observed more than 500 objects larger than 100-meters (330-feet) wide -- what can be thought of as medium to large-size asteroids. Near-Earth asteroids smaller than this size range were not studied, and near-Earth comets will be analyzed at a later time. Asteroid sizes are not drawn to scale in the chart. Image credit: NASA/JPL-CaltechThough

The WISE data reveal only a small decline in the estimated numbers for the largest near-Earth asteroids, which are 3,300 feet (1 kilometer) and larger, they show 93 percent of the estimated population have been found. This fulfills the initial "Spaceguard" goal agreed to with Congress. These large asteroids are about the size of a small mountain and would have global consequences if they were to strike Earth. The new data revise their total numbers from about 1,000 down to 981, of which 911 already have been found. None of them represents a threat to Earth in the next few centuries. It is believed that all near-Earth asteroids approximately 6 miles (10 kilometers) across, as big as the one thought to have wiped out the dinosaurs, have been found.

"The risk of a really large asteroid impacting the Earth before we could find and warn of it has been substantially reduced," said Tim Spahr, the director of the Minor Planet Center at the Harvard Smithsonian Center for Astrophysics in Cambridge, Mass.

The situation is different for the mid-size asteroids, which could destroy a metropolitan area if they were to impact in the wrong place. The NEOWISE results find a larger decline in the estimated population for these bodies than what was observed for the largest asteroids. So far, the Spaceguard effort has found and is tracking more than 5,200 near-Earth asteroids 330 feet or larger, leaving more than an estimated 15,000 still to discover. In addition, scientists estimate there are more than a million unknown smaller near-Earth asteroids that could cause damage if they were to impact Earth.

"NEOWISE was just the latest asset NASA has used to find Earth's nearest neighbors," said Lindley Johnson, program executive for the Near Earth Object Observation Program at NASA Headquarters in Washington. "The results complement ground-based observer efforts over the past 12 years. These observers continue to track these objects and find even more."

WISE is managed and operated by JPL for NASA's Science Mission Directorate in Washington. The principal investigator, Edward Wright, is at the University of California, Los Angeles. The WISE science instrument was built by the Space Dynamics Laboratory in Logan, Utah, and the spacecraft was built by Ball Aerospace and Technologies Corp. in Boulder, Colo. Science operations and data processing occur at the Infrared Processing and Analysis Center at the California Institute of Technology.

For more information about the mission, visit: http://www.nasa.gov/wise .

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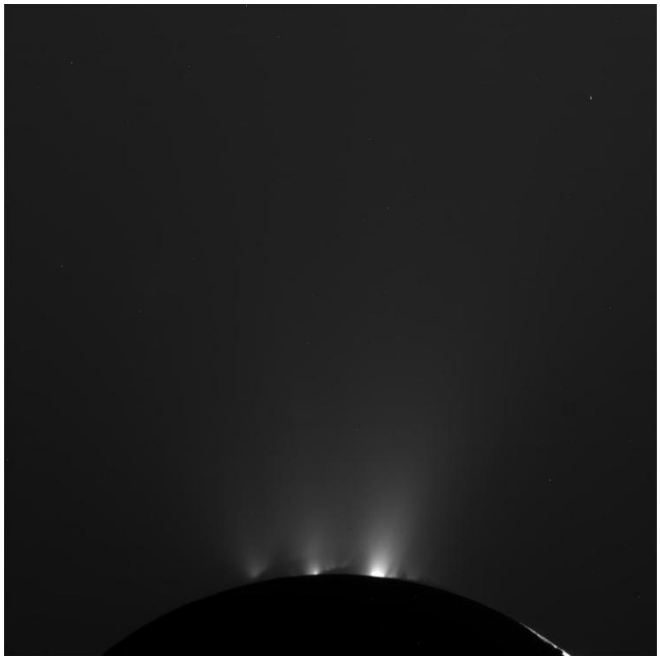
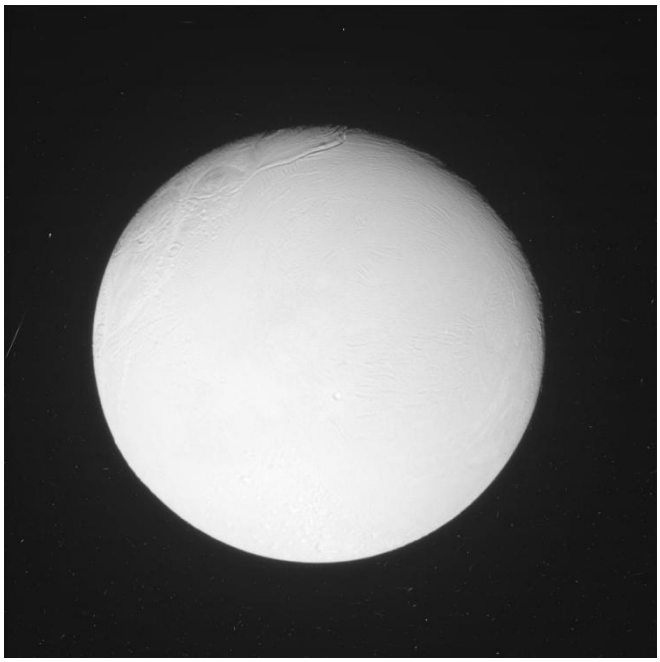
Saturn's Geyser Moon Enceladus Shows off for NASA's Cassini

PASADENA, Calif. -- NASA's Cassini spacecraft successfully completed its Oct. 1 flyby of Saturn's moon Enceladus and its jets of water vapor and ice. At its closest approach, the spacecraft flew approximately 62 miles (100 kilometers) above the moon's surface. The close approach was designed to give some of Cassini's instruments, including the ion and neutral mass spectrometer, the chance to "taste" the jets themselves.



Cassini sees jets of water vapor and ice from Enceladus. Image credit: NASA/JPL-Caltech/Space Science Institute



During Cassini's Oct. 1, 2011 flyby, Saturn's moon Enceladus was in full view. Image credit: NASA/JPL-Caltech/Space Science Institute

At a higher vantage point during the encounter, Cassini's high-resolution camera captured pictures of the jets

emanating from the moon's south polar region. The latest raw images of Enceladus are online at: http://saturn.jpl.nasa.gov/photos/raw/ .

The images of the surface include previously seen leading-hemisphere terrain. However, during this encounter, multi-spectral imaging of these terrains extended farther into the ultraviolet region of the electromagnetic spectrum than had previously been achieved at this resolution. By looking at the surface at ultraviolet wavelengths, scientists can better detect the difference between surface materials and shadows than they can at visible wavelengths, where icy materials are highly reflective and shadows are washed out. With both ultraviolet and visible images of the same terrain available to them, scientists will better understand how the surface coverage of icy particles coming from the vents and plumes changes with terrain type and age.

Cassini's next pass of this fascinating moon will be Oct. 19, when the spacecraft flies by at an altitude of approximately 765 miles (1231 kilometers).

The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. The Jet Propulsion Laboratory, a division of the California Institute of Technology in Pasadena, manages the mission for NASA's Science Mission Directorate, Washington. The Cassini orbiter and its two onboard cameras were designed, developed and assembled at JPL. The imaging operations center is based at the Space Science Institute in Boulder, Colo. The Ion and Neutral Mass Spectrometer science team is based at the Southwest Research Institute, San Antonio, Texas.

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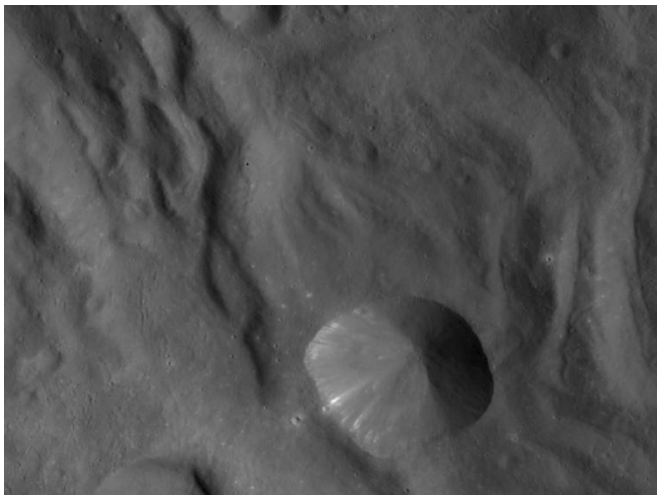
NASA's Dawn Spacecraft Begins New Vesta Mapping Orbit

PASADENA, Calif. – NASA's Dawn spacecraft has completed a gentle spiral into its new science orbit for an even closer view of the giant asteroid Vesta. Dawn began sending science data on Sept. 29 from this new orbit, known as the high altitude mapping orbit (HAMO).

In this orbit, the average distance from the spacecraft to the Vesta surface is 420 miles (680 kilometers), which is four times closer than the previous survey orbit. The spacecraft will operate in the same basic manner as it did in the survey orbit. When Dawn is over Vesta's dayside, it will point its science instruments to the giant asteroid and acquire data, and when the spacecraft flies over the nightside, it will beam that data back to Earth.

Perhaps the most notable difference in the new orbit is the frequency with which Dawn circles Vesta. In survey orbit, it took Dawn three days to make its way around the asteroid. Now in HAMO, the spacecraft completes the same task in a little over 12 hours. HAMO is scheduled to last about 30 Earth days, during which Dawn will circle Vesta more than 60 times. For about 10 of those 30 days, Dawn will peer straight down at the exotic landscape below it during the dayside passages. For about 20 days, the spacecraft will view the surface at multiple angles.



In this image of Vesta, taken by NASA's Dawn spacecraft just shortly before the beginning of high altitude mapping orbit, north is up and the upper right corner is to the northeast. The spacecraft's distance to Vesta's center is about 420 miles (680 kilometers), and the image resolution is approximately 65 meters per pixel.

Scientists will combine the pictures to create topographic maps, revealing the heights of mountains, the depths of craters and the slopes of plains. This will help scientists understand the geological processes that shaped Vesta.

HAMO, the most complex and intensive science campaign at Vesta, has three primary goals: to map Vesta's illuminated surface in color, provide stereo data, and acquire visible and infrared mapping spectrometer data. In addition, it will allow improved measurements of Vesta's gravity.

Dawn launched in September 2007 and arrived at Vesta in July 2011. Since beginning its first survey orbit in August, Dawn has been extensively imaging this intriguing world, sending back a bounty of images and other data. NASA-funded scientists and European scientists on the Dawn mission team will present a wealth of new findings at the joint meeting of the American Astronomical Society's Division for Planetary Sciences and the European Planetary

Science Congress next week at La Cite Internationale des Congres Nantes Metropole, Nantes, France.

These findings about the giant asteroid Vesta will include information about the new coordinate system and official names of Vesta's prominent features.

A Dawn mission news conference will be held Monday, Oct. 3, 2011 at 12:15 p.m. CEST (3:15 a.m. PDT/6:15 a.m. EDT). The Division for Planetary Sciences will provide live Web streaming of this news conference, at: http://meetings.copernicus.org/epsc-dps2011/webstreaming/monday.html

"The team has been in awe of what they have seen on the surface of Vesta," said Christopher Russell, Dawn principal investigator, at UCLA. "We are sharing those discoveries with the greater scientific community and with the public."

Following a year at Vesta, the spacecraft will depart in July 2012 for Ceres, where it will arrive in 2015. Dawn's mission to Vesta and Ceres is managed by the Jet Propulsion Laboratory, Pasadena, Calif., for NASA's Science Mission Directorate in Washington. JPL is a division of the California Institute of Technology in Pasadena. Dawn is a project of the directorate's Discovery Program, managed by NASA's Marshall Space Flight Center in Huntsville, Ala. UCLA is responsible for overall Dawn mission science. Orbital Sciences Corp. in Dulles, Va., designed and built the spacecraft. The German Aerospace Center, the Max Planck Institute for Solar System Research, the Italian Space Agency and the Italian National Astrophysical Institute are international partners on the mission team.

The image and more information about the Dawn mission are online at: http://www.nasa.gov/dawn . To follow the mission on Twitter, visit: http://www.twitter.com/NASA_Dawn

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Space Observatory Provides Clues To Creation Of Earth's Oceans

WASHINGTON -- Astronomers have found a new cosmic source for the same kind of water that appeared on Earth billions of years ago and created the oceans. The findings may help explain how Earth's surface ended up covered in water.

New measurements from the Herschel Space Observatory show that comet Hartley 2, which comes from the distant Kuiper Belt, contains water with the same chemical signature as Earth's oceans. This remote region of the solar system, some 30 to 50 times as far away as the distance between Earth and the sun, is home to icy, rocky bodies including Pluto, other dwarf planets and innumerable comets.

"Our results with Herschel suggest that comets could have played a major role in bringing vast amounts of water to an early Earth," said Dariusz Lis, senior research associate in physics at the California Institute of Technology in Pasadena and co-author of a new paper in the journal Nature, published online Oct. 5. "This finding substantially expands the reservoir of Earth ocean-like water in the solar system to now include icy bodies originating in the Kuiper Belt."

Scientists theorize Earth started out hot and dry, so that water critical for life must have been delivered millions of years later by asteroid and comet impacts. Until now, none of the comets previously studied contained water like Earth's. However, Herschel's observations of Hartley 2, the first in-depth look at water in a comet from the Kuiper Belt, paint a different picture.

Herschel peered into the comet's coma, or thin, gaseous atmosphere. The coma develops as frozen materials inside a comet vaporize while on approach to the sun. This glowing envelope surrounds the comet's "icy dirtball"-like core and streams behind the object in a characteristic tail.

Herschel detected the signature of vaporized water in this coma and, to the surprise of the scientists, Hartley 2 possessed half as much "heavy water" as other comets analyzed to date. In heavy water, one of the two normal hydrogen atoms has been replaced by the heavy hydrogen isotope known as deuterium. The ratio between heavy water and light, or regular, water in Hartley 2 is the same as the water on Earth's surface. The amount of heavy water in a comet is related to the environment where the comet formed.

By tracking the path of Hartley 2 as it swoops into Earth's neighborhood in the inner solar system every six and a half years, astronomers know that it comes from the Kuiper Belt. The five comets besides Hartley 2 whose heavy-water-to-regular-water ratios have been obtained all come from an even more distant region in the solar system called the Oort Cloud. This swarm of bodies, 10,000 times farther afield than the Kuiper Belt, is the wellspring for most documented comets.

Given the higher ratios of heavy water seen in Oort Cloud comets compared to Earth's oceans, astronomers had concluded that the contribution by comets to Earth's total water volume stood at approximately 10 percent. Asteroids, which are found mostly in a band between Mars and Jupiter but occasionally stray into Earth's vicinity, looked like the major depositors. The new results, however, point to Kuiper Belt comets having performed a previously underappreciated service in bearing water to Earth.

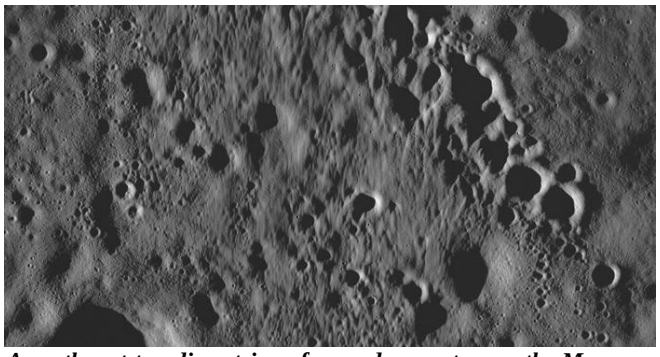
How these objects ever came to possess the tell-tale oceanic water is puzzling. Astronomers had expected Kuiper Belt comets to have even more heavy water than Oort Cloud comets because the latter are thought to have formed closer to the sun than those in the Kuiper Belt. Therefore, Oort Cloud bodies should have had less frozen heavy water locked in them prior to their ejection to the fringes as the solar system evolved.

"Our study indicates that our understanding of the distribution of the lightest elements and their isotopes, as well as the dynamics of the early solar system, is incomplete," said co-author Geoffrey Blake, professor of planetary science and chemistry at Caltech. "In the early solar system, comets and asteroids must have been moving all over the place, and it appears that some of them crash-landed on our planet and made our oceans."

Herschel is a European Space Agency cornerstone mission, with science instruments provided by consortia of European institutes. NASA's Herschel Project Office is based at the agency's Jet Propulsion Laboratory in Pasadena, Calif., which contributed mission-enabling technology for two of Herschel's three science instruments. The NASA Herschel Science Center, part of the Infrared Processing and Analysis Center at Caltech in Pasadena, supports the U.S. astronomical community.

For NASA's Herschel website, visit:
http://www.nasa.gov/herschel
For ESA's Herschel website, visit:
http://www.esa.int/SPECIALS/Herschel/index.html

Year of the Solar System Moons and Rings: Our Favorite Things



A northwest-trending string of secondary craters on the Moon formed by debris thrown out from a larger impact. Image taken by the Lunar Reconnaissance Orbiter. Credit: NASA/Goddard Space Flight Center/ Arizona State University.

We find beauty in the night sky. Objects that attract the most attention include our brilliant Moon, and Saturn with its delicate rings. Our attraction to these objects has led many to study them in greater detail, and discover the beauty in scientific exploration.

As we've studied the moons, we've revolutionized our understanding of Earth and its place in the solar system. Craters on our Moon have demonstrated that, far from being perfect and unchanging, the planets and moons have undergone violent transformations over time. Galileo's observations of the Earth's moon and the moons orbiting Jupiter helped overturn the Earth-centered universe, and gave birth to the modern process of science.

But discoveries didn't end there. Today, the Lunar Reconnaissance Orbiter studying the Moon and the Cassini mission in orbit around Saturn are uncovering new evidence that challenges our current views of Earth and the solar system. We've found signs of volcanic pits beneath the lunar surface, and oceans beneath the icy surface of distant Enceladus. Scientists are amazed at ice volcanoes on Titan, and delighted by new models showing how a large moon may have shed its outer icy layers to form the rings of Saturn. *(For further information, check out the May 2011 theme, Volcanism).*

Join us this month as we celebrate International Observe the Moon Night, and study the beauty of our own Moon, the timeless dance of the Galilean moons as they orbit Jupiter, and the dazzling rings of Saturn. Learn more about these fascinating objects through multimedia resources, conduct hands-on activities to model their properties, and discover how beautiful science can be!

October 8th, 2011 is International Observe the Moon Night

Group Purchase of Royal Astronomical Society Items

The ASTRA astronomy club is taking orders to try to make a bulk purchase of the Royal Astronomical Society of Canada (RASC) Observer's Handbook and Calendar for the coming year at a discount. The RASC has just set the prices. We will collect the discount price, which includes shipping and handling to ASTRA. If we do not meet the minimum order for discount, the money collected will be refunded.

The ***Observer's Handbook*** is a 320+ page guide published annually. The sections in the ***Observer's Handbook*** are of two kinds: **Sections dealing with astronomical events** that occur during the year, e.g. times of sunrise, sunset, moonrise, moonset, eclipses, meteor showers, star occultations by the Moon and by asteroids and a section called "The Sky Month By Month"; and **Sections dealing with astronomical data** and information that does not change from year to year

The ***Observer's Calendar*** has an astronomical photo for each month, times of sunrise, sunset, moonrise, moonset, phases of the moon, and the most important astronomical events that occur during the year.

Item	Reg. Price & Shipping	Disc. Price & Shipping
Observer's Handbook	$34.95	$24.00
Observer's Calendar	$24.95	$17.00

Name:
Phone: ( )
Member of which club:

Qty.	Item	Price each	Sub-Total
		$	$
		$	$
		Total	**$**

Please use this form to list what you want, make a check out to ASTRA, and give it to Randy Walton at an astronomy club meeting, or mail it to ASTRA c/o Robert J. Novins Planetarium, Ocean County College, P.O. Box 2001, Toms River NJ 08754-2001 to arrive by Oct. 14, 2011. Items will need to be picked up from Randy Walton at a club meeting, hopefully in November.

October 2011 Celestial Events: supplied by J. Randolph Walton (Randy)

Day	Date	Time (EDT)	Event
Sat	8	01:45	Mars Rises
		16:41	Moon rise
		18:32	Sunset
		18:50	Saturn Sets
		18:50	Mercury Sets
		19:10	Venus Sets
		19:30	Jupiter Rises
Tue	11	17:58	Moon rise
		22:06	**Full Moon**
Sat	15	01:35	Mars Rises
		07:10	Sunrise
		18:21	Sunset
		18:25	Saturn Sets
		18:46	Mercury Sets
		19:00	Jupiter Rises
		19:03	Venus Sets
		20:16	Moon rise
Wed	19	23:30	**Last Quarter Moon**
		23:58	Moon rise
Fri	21	18:00	**Orionid meteors (ZHR=20)**
Sat	22	01:27	Mars Rises
		06:35	Saturn Rises
		07:18	Sunrise
		15:27	Moon Set
		18:11	Sunset
		18:30	Jupiter Rises
		18:45	Mercury Sets
		19:00	Venus Sets
Tue	25	Before 06:00	**Zodiacal Light** visible in E before morning twilight for next week
Wed	26	15:56	**New Moon**
		17:46	Moon Set
Sat	29	01:20	Mars Rises
		06:10	Saturn Rises
		07:25	Sunrise
		17::55	Jupiter Rises
		18:02	Sunset
		18:45	Mercury Sets
		18:55	Venus Sets
		20:24	Moon Set

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
Garnet Star	Multiple Star	Cepheus	21h43m30.5s	+58°46'48"	4.2
Zeta Aqr	Multiple Star	Aquarius	22h28m49.9s	-00°01'12"	3.7
LW Cyg	Multiple Star	Cygnus	21h55m13.8s	+50°29'50"	9.2
M2	Globular Cluster	Aquarius	21h33m28.4s	-00°49'39"	7.3
M15	Globular Cluster	Pegasus	21h30m01.0s	+12°10'12"	7.3
Helix	Planetary Nebula	Aquarius	22h29m38.4s	-20°50'13"	7.6
Humason 1-2	Planetary Nebula	Cygnus	21h33m06.6s	+39°38'17"	12.7
NGC 7139	Planetary Nebula	Cepheus	21h46m08.2s	+63°47'59"	13.0
NGC 7139	Planetary Nebula	Cepheus	21h46m08.2s	+63°47'59"	13.0
Cocoon	Diffuse Nebula	Cygnus	21h53m24.0s	+47°16'00"	10.0
IC 5217	Planetary Nebula	Lacerta	22h23m55.7s	+50°58'00"	12.6
NGC 7094	Planetary Nebula	Pegasus	21h36m53.0s	+12°47'19"	13.7
Stephan's Quintet	Galaxy Group	Pegasus	22h36m00.5s	+33°57'57"	12.0
NGC 7354	Planetary Nebula	Cepheus	22h40m20.9s	+61°17'39"	12.9
NGC 7354	Planetary Nebula	Cepheus	22h40m20.9s	+61°17'39"	12.9
Einstein's Cross	Gravitational Lens	Pegasus	22h40m32.5s	+03°21'48"	17.4