

Space Science News Digest

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Space Science News Digest summarizes significant recent developments and discoveries in the space sciences from all over the world. The range of subjects include astronomy, planetary science, and space flight, both manned and robotic.

SPACE FLIGHT

Space Shuttle Atlantis (flight STS-117) to launch June 8

http://www.nasa.gov/mission_pages/shuttle/shuttlemissions/sts117/index.html

NASA plans to roll the Space Shuttle Atlantis out to the launch pad May 12 in preparation for a launch planned for June 8. Atlantis was on the launch pad previously, but a hailstorm damaged the foam insulation of the shuttle's large external fuel tank, which needed to be repaired. After launch, Atlantis and its crew http://www.nasa.gov/mission_pages/shuttle/shuttlemissions/sts117/index.html will travel to the International Space Station, where they will deliver solar panels and other hardware to the station. STS-117 will also deliver flight engineer Clayton Anderson <http://www.jsc.nasa.gov/Bios/htmlbios/anderson-c.html> to the station and pick up flight engineer Sunita Williams <http://www.jsc.nasa.gov/Bios/htmlbios/williams-s.html> for return to Earth. The mission will last 11 days.

Image:

http://www.nasa.gov/images/content/166625main_sts117s002_small.jpg

caption: The crew of STS-117 are (from left) mission specialists James Reilly II and Steven Swanson, Commander Frederick Sturckow, Pilot Lee Archambault, and mission specialists Patrick Forrester and John D. Olivas. Space Station Expedition 15/16 flight engineer Clayton

Anderson (not pictured) joined the STS-117 crew on April 26, 2007.
Image credit: NASA.

THE SUN AND SOLAR SYSTEM

Your Sun in three dimensions

http://www.nasa.gov/mission_pages/stereo/main/index.html

A pair of Sun-watching NASA space observatories dubbed STEREO (<http://www.nasa.gov/stereo>) (for Solar TERrestrial RELations Observatory) have delivered the first three-dimensional images of the Sun and its activity. The mission uses two separate spacecraft, one ahead of Earth in its orbit, the other behind Earth, to take images of the Sun at the same time. The separation between the two spacecraft works much like human eyes do, where the brain interprets the different views from each eye to tell how far away objects are. The goal of the STEREO mission is to help scientists understand better what happens when the Sun's surface erupts in a Coronal Mass Ejection. These eruptions can blow up to 10 billion tons of the Sun's atmosphere into interplanetary space. Traveling at speeds of about 1.5 million kilometers per hour, they can cause severe magnetic storms when they collide with Earth's magnetosphere and also endanger astronauts with particle radiation.

image 1:

http://www.nasa.gov/images/content/174607main_Image1.jpg

caption: This 2-D image compresses all of STEREO's images at several wavelengths into a single image. Image credit: NASA.

image 2:

http://www.nasa.gov/images/content/174733main_AnaglyphGreenCenter284.jpg

caption: With red and green 3-D glasses, the Sun's active areas stand out. Image credit: NASA.

Mercury has a molten outer core like Earth

<http://www.jpl.nasa.gov/news/news.cfm?release=2007-050>

<http://www.news.cornell.edu/stories/May07/margot.mercury.html>

More than 30 years ago, NASA's Mariner 10 mission discovered that the innermost planet Mercury, which orbits the Sun every 88 days, has a weak magnetic field. The discovery surprised planetary scientists at the time, but Mariner's data was not good enough to identify a cause.

Now, new observations using high-precision radar have let a team of scientists led by [Jean-Luc Margot](http://www.astro.cornell.edu/~jlm) of Cornell University measure very small variations in the spin of Mercury. These provide an important piece of evidence for the planet's having a liquid outer core of iron. As Mercury spins slowly, currents in the liquid iron generate a small magnetic field, using the same process as Earth does to make its magnetic field. The Margot team's report is in the journal *Science* (May 4, 2007). Mercury is one of the least-studied planets. Only one spacecraft has visited — Mariner 10 in 1974-75 — but luckily, we don't have long to wait for another. The [MESSENGER](http://messenger.jhuapl.edu) spacecraft will fly past Mercury in January 2008, and it will make two more flybys (October 2008 and September 2009) before going into Mercury orbit in March 2011.

Image:

<http://www.jpl.nasa.gov/images/mercury/mercury-nsf-browse.jpg>
http://messenger.jhuapl.edu/the_mission/artistimpression/atmercury_br.html

caption: A thin layer of molten iron forms the outer core of the planet Mercury in this artist's view. Small variations in Mercury's spin cause currents in the molten iron that create a weak magnetic field. Image credit: Nicolle Rager Fuller, NSF

Mars ground ice is patchy and variable

<http://themis.asu.edu/news-groundice>

Using data from the [THEMIS](http://themis.asu.edu/about) instrument on NASA's Mars Odyssey orbiter, scientists have discovered that water ice lies at variable depths over small-scale patches on Mars. The discovery draws a much more detailed picture of underground ice on Mars than was previously available. Writing in the journal *Nature* (May 3, 2007), Joshua Bandfield of Arizona State University reports that he found the amount of rock and dust in the surface soil has a big effect on how deep ground ice is at Martian latitudes higher than 60° north and south. The more dust, the shallower the ice; in some places it lies only a few centimeters deep. The porous surface also suggests that ground ice is part of an ongoing water cycle, where water in the atmosphere can migrate into the soil and vice-versa.

Image:

http://themis.asu.edu/images/subpage/news/groundice1_330

caption: How deep you would have to dig to find water ice on Mars is shown by false colors in this map made using THEMIS temperature measurements. Blue shows where ice would be 5 centimeters deep, while red shows an ice depth of more than 18 centimeters. Image credit: NASA/JPL/Arizona State University.

Remains of ancient volcanic explosion found on Mars

<http://www.jpl.nasa.gov/news/news.cfm?release=2007-051>

NASA's Mars Exploration Rover Spirit has discovered evidence of an ancient volcanic explosion at "Home Plate," a small plateau of layered bedrock about 2 meters high. The feature lies within the "Inner Basin" of the Columbia Hills in Gusev Crater. This is the first explosive volcanic deposit identified by Spirit or its twin, Opportunity. Scientists suspect the feature formed when molten basaltic lava interacted with briny water and steam caused an explosion that threw rocks high in the air. One of these rocks (see photo) appears to have landed forcefully on soft sediments. The report appears in *Science* (May 4, 2007).

Image: <http://www.jpl.nasa.gov/images/mer/mer-20070503-c-browse.jpg>

caption: Coarse-grained layers with granular textures show in this false-color image of part of Home Plate. The arrow points to a 4-centimeter-size volcanic "bomb" made of rock that deformed the layers when it landed. Image Credit: NASA/JPL-Caltech/USGS/Cornell
Image credit: NASA/JPL/USGS/Cornell

Hayabusa asteroid mission heads back to Earth

<http://www.hayabusa.isas.jaxa.jp/e/index.html>

The Japanese asteroid mission Hayabusa <http://hayabusa.sci.isas.jaxa.jp> has begun a three-year trip back to Earth using its ion drive because its thrusters have run out of fuel. The drive ionizes xenon gas and uses electric fields to accelerate the ions, providing a weak but steady thrust. The spacecraft made a rendezvous with the asteroid Itokawa http://en.wikipedia.org/wiki/25143_Itokawa in September 2005 and made two landings on the asteroid in November 2005, attempting to collect samples from the surface. But mission controllers are unsure whether the spacecraft successfully captured any soil samples. They

hope to get an answer when the spacecraft's sample capsule returns to Earth in June 2010.

Image:

http://jda.jaxa.jp/jda/p4_download_e.php?mode=level&f_id=12077&time=N&genre=5&category=5025

caption: Asteroid Itokawa shows a mixture of smooth plains covered with dust and rocks of all sizes. The asteroid is 535 meters long.

Image credit: JAXA

New Horizons spacecraft looks at Jupiter

http://pluto.jhuapl.edu/news_center/news/050107.htm

On its way to Pluto (arrival in 2015), NASA's New Horizons spacecraft flew past Jupiter on February 28, 2007. The maneuver gave New Horizons a boost in speed — and allowed scientists a "free" look at Jupiter and its family of moons and rings. The results include the closest look so far at the Earth-sized "Little Red Spot" storm in Jupiter's cloud tops, detailed images of small satellites herding dust and boulders through Jupiter's faint rings, and volcanic eruptions and circular grooves on the planet's largest moons.

Image:

<http://pluto.jhuapl.edu/gallery/missionPhotos/images/HighRes/030107.jpg>

caption: Volcanic plumes rise over the edge of the moon Io in this image taken by New Horizons. The largest plume (11 o'clock) is from the volcano Tvashtar; the plume rises 290 kilometers above the surface. At 9 o'clock is a much smaller plume, about 60 kilometers high, from the volcano Prometheus. On the night side (right), a plume from the volcano Masubi appears as a bright patch; the top of the plume has risen high enough to catch the sunlight. Io is the most volcanically active object in the solar system. The tides raised by Jupiter and other moons regularly squeeze Io, keeping part of its interior molten. Image credit: NASA/JPL/JHUAPL

STARS, GALAXIES, AND THE UNIVERSE

Alien "Earth" found?

<http://www.eso.org/outreach/press-rel/pr-2007/pr-22-07.html>

A team of European astronomers led by Stéphane Udry of the Geneva Observatory has used a 3.6-meter telescope at the European Southern Observatory <<http://www.eso.org>> to discover the most Earth-like planet outside our solar system to date. The planet has about 5 times the mass of Earth and a diameter only 50 percent larger than Earth. It orbits a red dwarf star, Gliese 581, already known to have one other larger planet, and possibly a third planet. The new Earth-like planet orbits Gliese 581 every 13 days at a distance where water could exist as a liquid. The team's report has been submitted to the journal <i>Astronomy and Astrophysics</i>.

Image:

<http://www.eso.org/outreach/press-rel/pr-2007/images/phot-22b-07-preview.jpg>

caption: This artist's view shows the red dwarf star Gliese 581 in the background, with the newly found Earth-like planet in the foreground. Gliese 581 lies only 21 light-years from Earth. Image credit: ESO.

COROT space observatory finds its first exoplanet

<http://www.esa.int/esaCP/SEMCKNU681F_index_0.html>

Astronomers using the COROT space observatory <http://www.cnes-tv.com/corot_en/>, launched in December 2006, have discovered its first extrasolar planet. COROT astronomers are pleased that the satellite telescope appears to be about 10 times more sensitive than predicted. COROT's new planet is a gas giant, probably similar to Jupiter in our own solar system. COROT's new planet has about 1.8 times Jupiter's diameter and about 1.3 times its mass. The planet orbits its star, which is similar to our Sun, about every 1.5 days. This star system lies about 1,500 light-years away. COROT also measured tiny variations in a different star's brightness, which astronomers believe are produced by magnetic activity within the star.

Image: http://www.esa.int/images/heic0612b_L.jpg

caption: An artist's view shows a Jupiter-like planet passing in front of its parent star. When the planet passes in front of the star, the star's apparent brightness drops by a few percent for a short time. This technique lets astronomers search for planets by measuring periodic changes in the luminosity of stars. Image credit: NASA, ESA and G. Bacon.

Three generations of stars in one globular star cluster

<http://hubblesite.org/newscenter/archive/releases/2007/18/full/>

Globular star clusters create only one generation of stars early in their lives, or so astronomers thought. But new observations with the Hubble Space Telescope <http://hubblesite.org> have identified a massive, ancient globular star cluster, NGC 2808, which shows evidence for *three* stellar generations, all forming within the cluster's first 200 million years. A team of astronomers led by Giampaolo Piotto, <http://dipastro.pd.astro.it/globulars/> of the University of Padua in Italy, used Hubble's Advanced Camera for Surveys (ACS) to identify the three populations of stars by their distinctive colors and brightnesses. While the origin for the three generations is unknown, the astronomers think the cluster was massive enough to hold onto a lot of gas when it formed. Then when the first generation of stars aged and exploded as supernovae, the shock waves created a second generation of stars in the remaining gas. Then a third population formed similarly before the gas was used up. NGC 2808 is one of the Milky Way Galaxy's largest clusters, with more than a million stars, and it is about 12.5 billion years old. The team's report will appear in *The Astrophysical Journal Letters*.

Image:

<http://imgsrc.hubblesite.org/hu/db/2007/18/images/a/formats/web.jpg>

caption: More than a million stars swarm inside the giant globular star cluster NGC 2808, in this Hubble Space Telescope image. Astronomers were surprised recently to find three distinct populations of stars within the cluster; globular clusters such as this were believed to have only one generation of stars. Image credit: NASA/ESA.

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