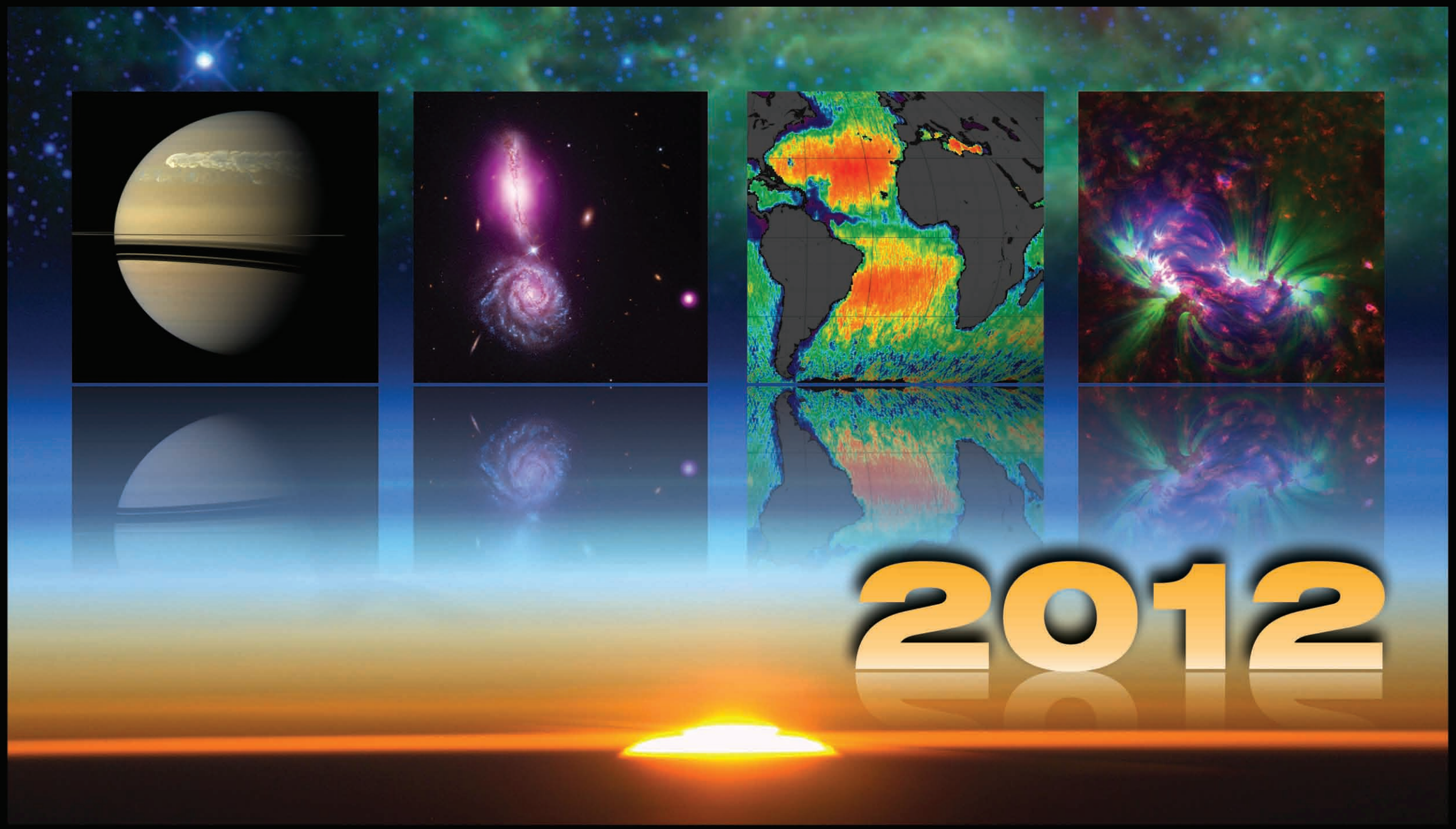
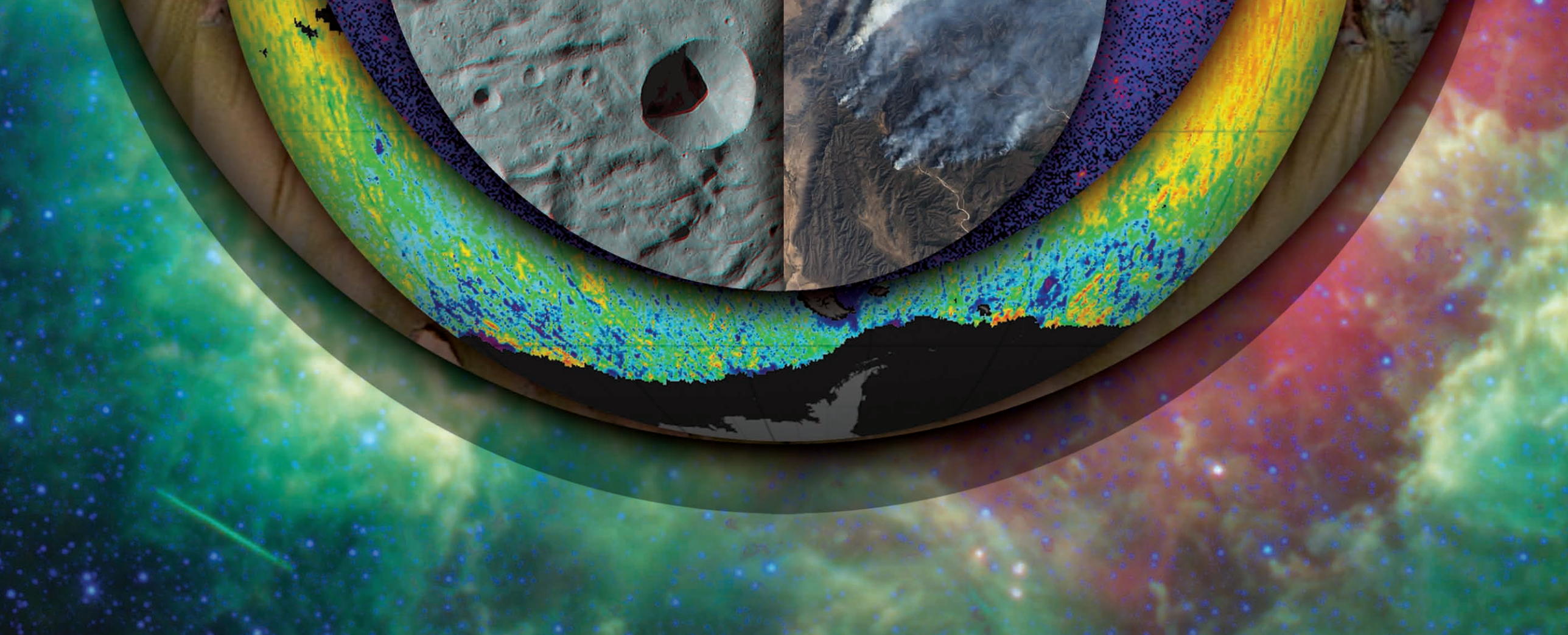
NASA Science

National Aeronautics and
Space Administration



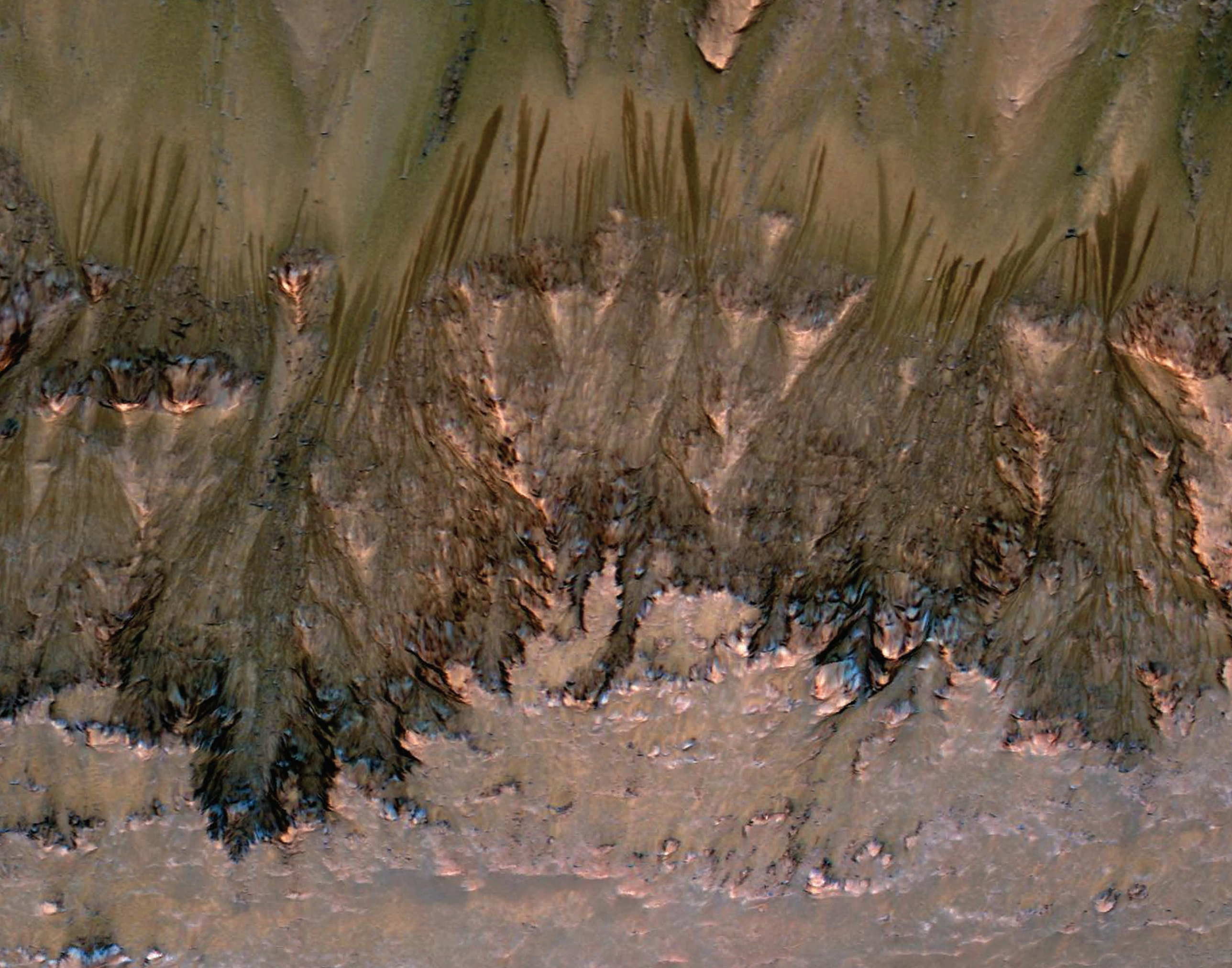
To reach for new heights and reveal the unknown,
so that what we do and learn will benefit all humankind.

www.nasa.gov



NASA Mission

Drive advances in science, technology, and exploration to enhance knowledge, education, innovation, economic vitality, and stewardship of Earth.



January 2012

New Moon · First Quarter · Full Moon · Last Quarter

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2 New Year's Day (observed date)	3	4	5	6	7
8	9	10	11	12	13	14
15	16 Martin Luther King, Jr. Day	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Trickles of Water Flowing on Mars

Scientists have long speculated that Mars once had water flowing on its surface. Around the beginning of the 20th century, a few scientists even thought they found evidence of canals on Mars. The theory never really gained wide scientific acceptance but it certainly captured the imagination of science fiction writers of that era. Since the mid-1960s, NASA has sent a series of probes and orbiting observatories to Mars that have conclusively shown that the current landscape is dry and barren and has no apparent liquid water on its surface.

Nevertheless, scientists continue to compile images of surface features on Mars that strongly imply the presence of flowing water at some point in the distant past. More recently the *Spirit* and *Opportunity* rovers and the *Phoenix* lander have compiled some direct physical evidence that there is water near the Martian surface. Similarly, the Mars Reconnaissance Orbiter (MRO) collects evidence daily that the Red Planet was once a world of water not unlike our own, and also helps identify points of interest on the surface worthy of future investigation by robots and possibly humans.

Shown here is an image that combines imagery from MRO's High Resolution Imaging Science Experiment with a three-dimensional model to show flows that appear on the steep slopes of Newton Crater each spring and summer. It attempts to recreate what a helicopter would see if it flew through the crater. A series of these images showing similar flows in successive years gives some of the best evidence yet that there is water actively flowing on Mars today.

Image and Partial Text Credit: NASA/JPL-Caltech/University of Arizona

Gale Crater located near the Martian equator (4.6°S, 137.2°E) will be the landing site for the Mars Science Lander—planned arrival in August 2012. The channels eroded into the flanks of the crater's prominent central mound may reveal surface layers and will be sites of interest. Credit: NASA

DECEMBER 2011

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

FEBRUARY 2012

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29			

February 2012

New Moon · First Quarter · Full Moon · Last Quarter

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20 Washington's Birthday (observed date)	21	22	23	24	25
26	27	28	29			

Chandra and Hubble Capture an Emphatic Galactic Collision

Our planet is one of eight that orbits the Sun, one of many stars that make up a galaxy called the *Milky Way*—one of billions of galaxies in our Universe. Scientists now understand that these galaxies are not isolated entities. As they continue to spin and expand outward, galaxies often *collide* with one another. Collision in this context does not mean the same as it would mean for two cars on a freeway. The galaxies do not necessarily have to impact one another directly; they only need to come close enough to each other to allow the gravitational fields of these immense objects to interact.

The image shown here combines data from the Chandra X-ray Observatory [*purple*] with optical data from the Hubble Space Telescope [*red, green, blue*] to give us a glimpse of the early stages of a galactic collision occurring at VV 340, which is located about 450 million light years from Earth. VV 340 North [*top*] is viewed edge-on while VV 340 South [*bottom*] is viewed face-on. The image resembles an exclamation point and seems to place a cosmic point of emphasis on this collision.

If we could come back several million years from now, we would see that these two galaxies will have merged into one. Scientists believe that VV 340 may offer a preview of the fate of our own galaxy when it comes into contact with its nearest neighbor—the Andromeda Galaxy—in a few billion years.

Image and Partial Text Credit: X-ray–NASA/CXC/IfA/D. Sanders *et al*. Optical–NASA/STScI/NRAO/A. Evans *et al*.

X-ray

Optical

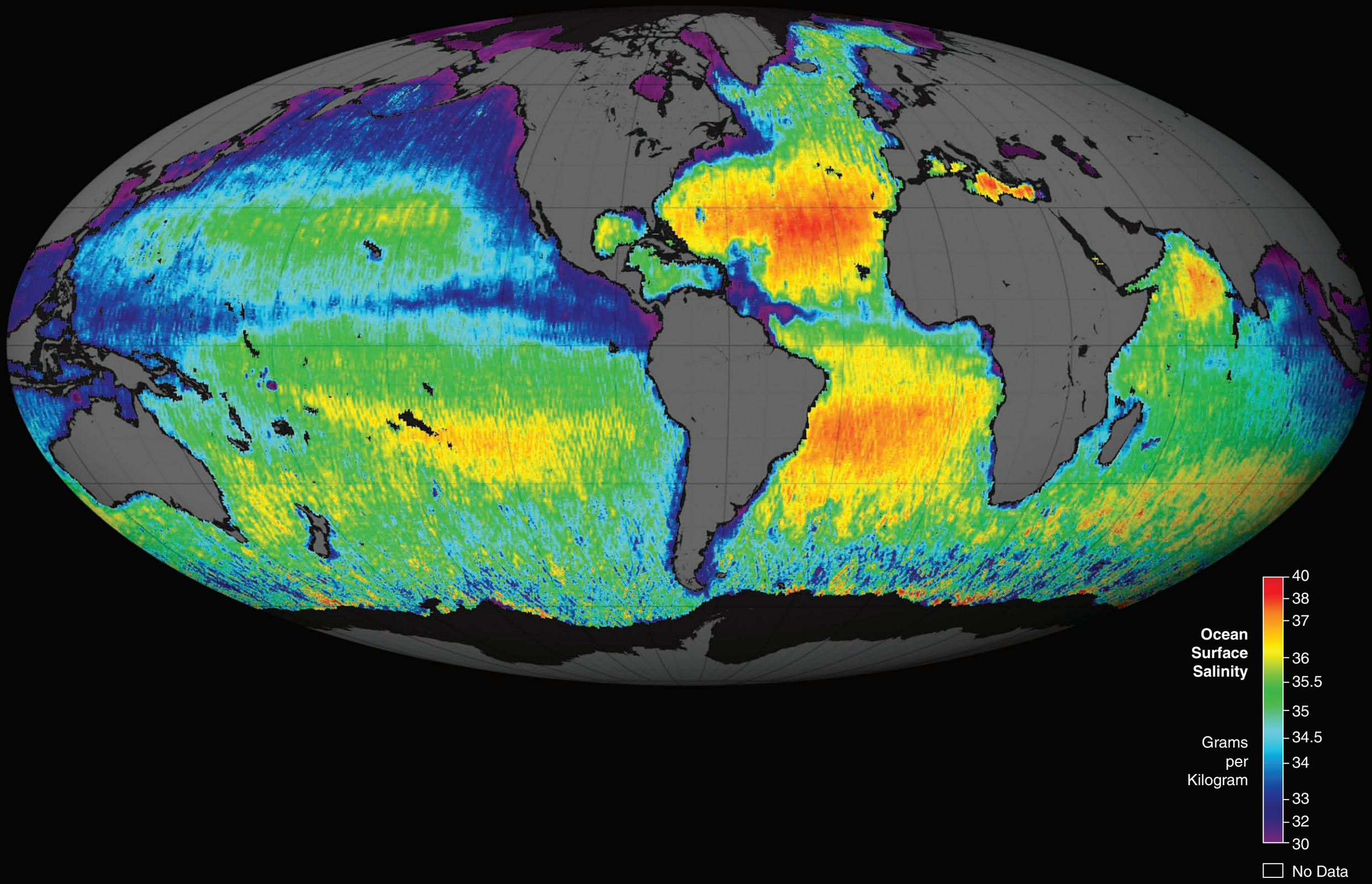
Credit: X-ray–NASA/CXC/IfA/D. Sanders *et al*.
Optical–NASA/STScI/NRAO/A. Evans *et al*.

JANUARY 2012

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

MARCH 2012

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31


Ocean
Surface
Salinity
Grams
per
Kilogram
40
38
37
36
35.5
35
34.5
34
33
32
30
No Data

March 2012

New Moon · First Quarter · Full Moon · Last Quarter

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
4	5	6	7	8	9	10
11 Daylight Saving Time Begins	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

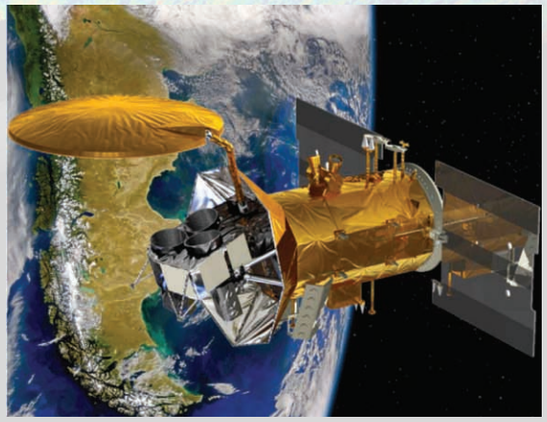
Aquarius Provides New Global Glimpse of Earth's Salty Seas

Salinity—saltiness—is a defining characteristic of ocean water, one that varies from place to place over Earth's surface in response to differences in ocean circulation, fresh water input, evaporation, and precipitation. It turns out that the small changes in the salinity of the ocean can have dramatic impacts on ocean circulation, which in turn effects weather and climate.

The image shown here is the "first-light" from NASA's Aquarius instrument on the Argentinian Satélite de Aplicaciones Cientificas-D (SAC-D) satellite. Based on the first two and a half weeks of data collected, the image provided a picture of the large-scale salinity features of Earth's oceans and whet scientists' appetite for the discoveries that lie ahead. Yellow and red colors represent areas of higher salinity, with blues and purples indicating areas of lower salinity. Areas colored black are gaps in the data. The average salinity on the map is about 35 parts per thousand (grams of salt per kilogram of sea water).

The map shows well-known ocean salinity features in the Atlantic and Pacific but also reveals finer details. Important regional features are clearly evident, including a sharp contrast between the high-salinity Arabian Sea west of the Indian subcontinent, and the low-salinity Bay of Bengal to the east, which is dominated by outflow from the Ganges River and south Asia monsoon rains. The data also show important smaller details, such as the low-salinity water associated with outflow from the Amazon River. Aquarius will monitor how these large- and small-scale features change over time and study their link to climate and weather variations.

Image and Partial Text Credit: NASA/GSFC/JPL-Caltech



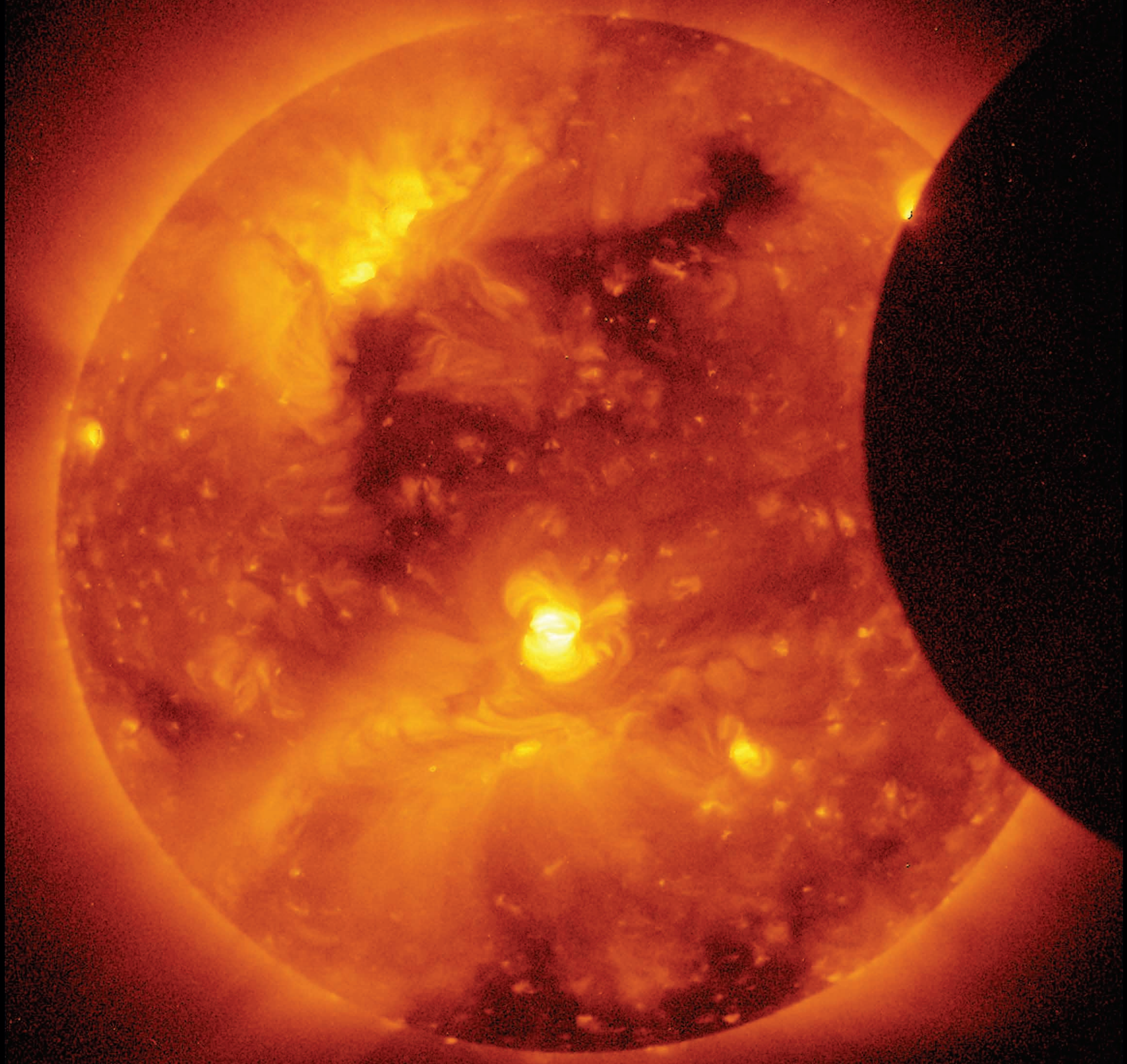
Artist's illustration of the Aquarius/SAC-D. Credit: NASA

FEBRUARY 2012

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29			

APRIL 2012

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					



April 2012

New Moon · First Quarter · Full Moon · Last Quarter

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

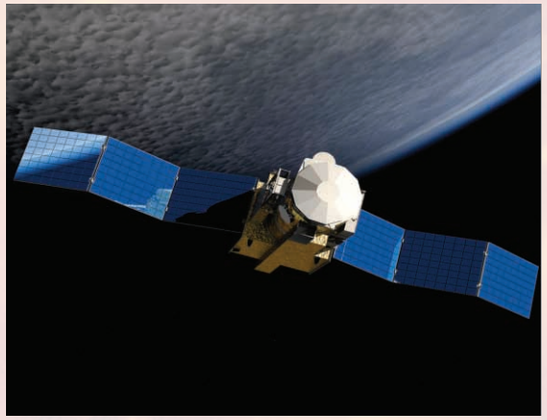
Hinode Views Annular Solar Eclipse

A solar eclipse happens when the Moon passes between the Sun and Earth, and fully or partially blocks the Sun when observed by viewers on some portion of Earth's surface. Such a phenomena only happens during a new Moon phase when the Sun and Earth are in *conjunction*—meaning they appear to be in the same, or nearly the same, place in the sky. There are at least two solar eclipses each year, and there can be as many as five.

There are four kinds of eclipses. During a *total eclipse*, the dark shadow of the Moon completely covers the bright light of the Sun and exposes the faint solar corona—rarely seen from Earth—over a narrow track of Earth's surface called the path of totality. An *annular eclipse* takes place when the Sun and Moon are lined up exactly, but the Moon appears smaller than the disc of the Sun and the result is an *annulus*—a bright ring of light around the Moon's shadow. Occasionally, a *hybrid eclipse* occurs where both of the forms described above occur at once, depending on where one is located on Earth. *Partial eclipses* can be seen outside the path of totality for total and annular eclipses where the Sun and Moon are not completely aligned.

This image from the X-Ray Telescope (XRT) on the Japanese Hinode satellite captures the Sun's surface during an annular eclipse that took place on January 4, 2011 and was visible after sunrise over most of Europe, northwestern and South Asia. It ended at sunset over eastern Asia. It was visible as a minor partial eclipse over northern Africa and the Arabian peninsula.

Image and Partial Text Credit: Hinode/XRT



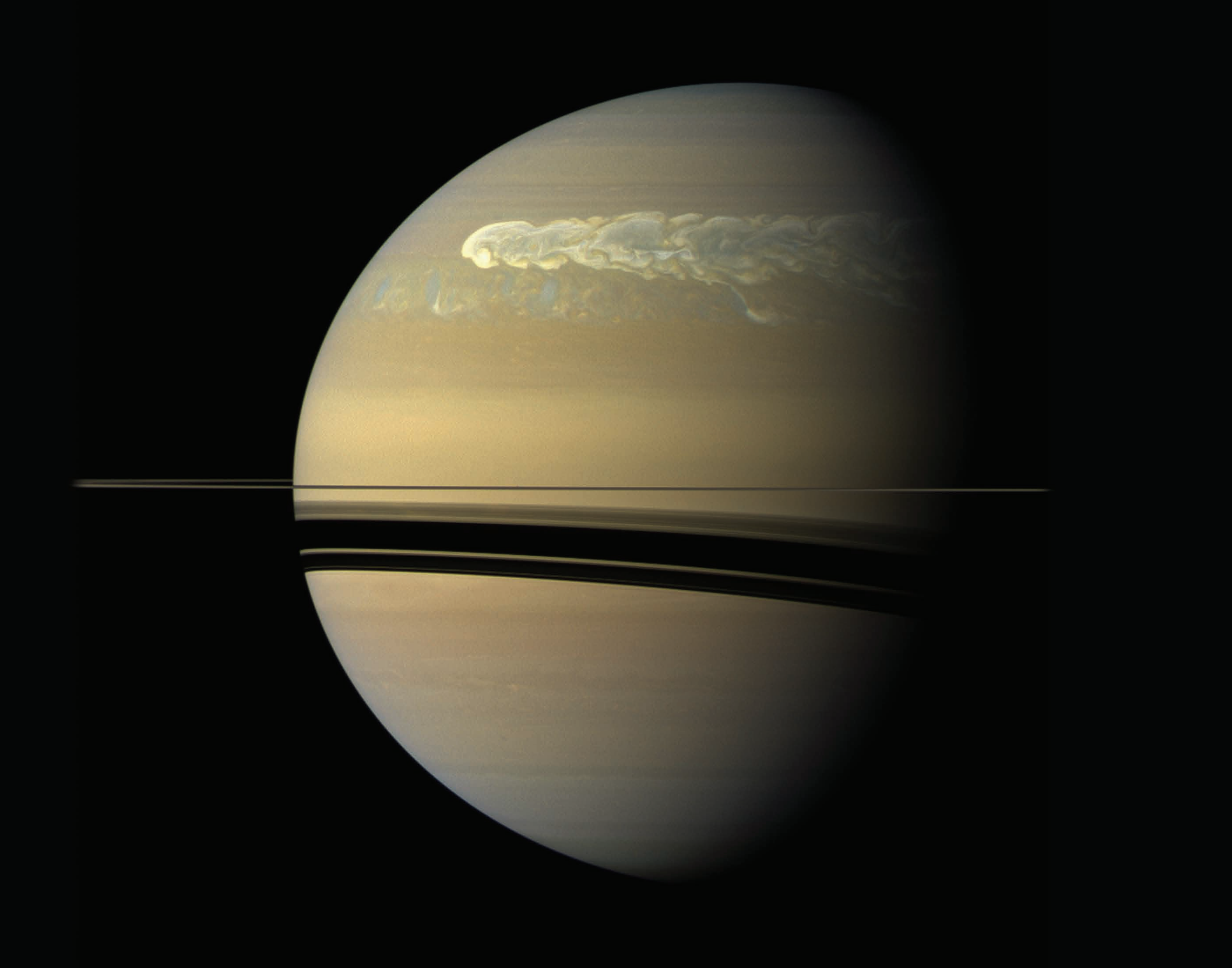
Artist's illustration of the Hinode spacecraft. Credit: NASA

MARCH 2012

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

MAY 2012

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		



May 2012

New Moon · First Quarter · Full Moon · Last Quarter

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2	3	4	5
6	7	8	9	10	11	12
13 Mother's Day	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28 Memorial Day	29	30	31		

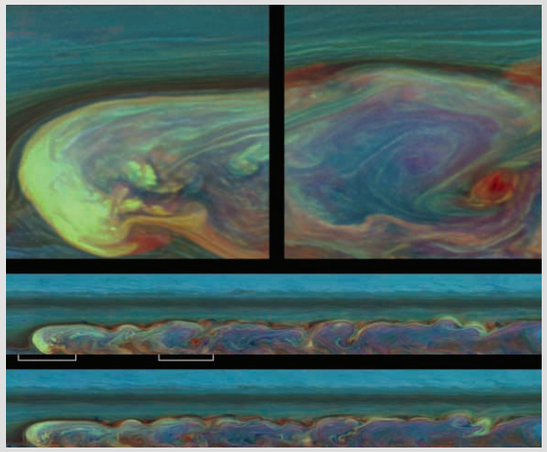
Is This Saturn's "Big One"?

On Earth we fear getting hit by the "big" one—i.e., the superstorm. On Saturn, "big" takes on a whole new meaning—Saturn is 9.41 times larger than Earth. Storms constantly move across Earth's surface and distribute and dissipate energy across the planet, the same thing happens on Jupiter. However, for reasons not entirely understood, Saturn is different. The planet seems to store up energy for long periods of time and then release it all at once in huge storms called *Great White Spots*.

On February 25, 2011, NASA's Cassini spacecraft was pointed toward the sunlit side of the rings viewing the surface from just above the ring plane when it obtained this true-color image of a huge storm that had been moving across Saturn's northern hemisphere for 12 weeks. We may be witnessing the birth of another Great White Spot, but if so, it seems to be happening earlier in the Saturnian year (30 Earth years) than usual—it's early spring on Saturn in this image and the storms usually don't form until late summer. Cassini, or its predecessor Voyager, have never had the opportunity to observe such a large and intense storm. Cassini has tracked some good-sized storms in Saturn's Southern Hemisphere before but this one is 500 times the size of those storms, and rivals the size of the largest Great White Spot ever observed. It is "big" even by Saturn standards. Scientists think the shift in activity from south to north could be a response to seasonal changes in location of the shadow cast by Saturn's rings. In this image, shadows from the rings are cast on the Southern Hemisphere of the planet.

The inset [*right*] shows false color images from Cassini that chronicle one day of the "superstorm." Clouds that appear blue are the highest and are semitransparent, or optically thin. Those that are yellow and white are optically thick clouds at high altitudes. Those shown in green are intermediate clouds. Red and brown colors are clouds at low altitude unobscured by high clouds, and the deep blue color is a thin haze with no clouds below.

Image and Partial Text Credit: NASA/JPL-Caltech/Space Science Institute



Credit: NASA/JPL-Caltech/Space Science Institute

APRIL 2012

S	M	T	W	T	F	S
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15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

JUNE 2012

S	M	T	W	T	F	S
					1	2
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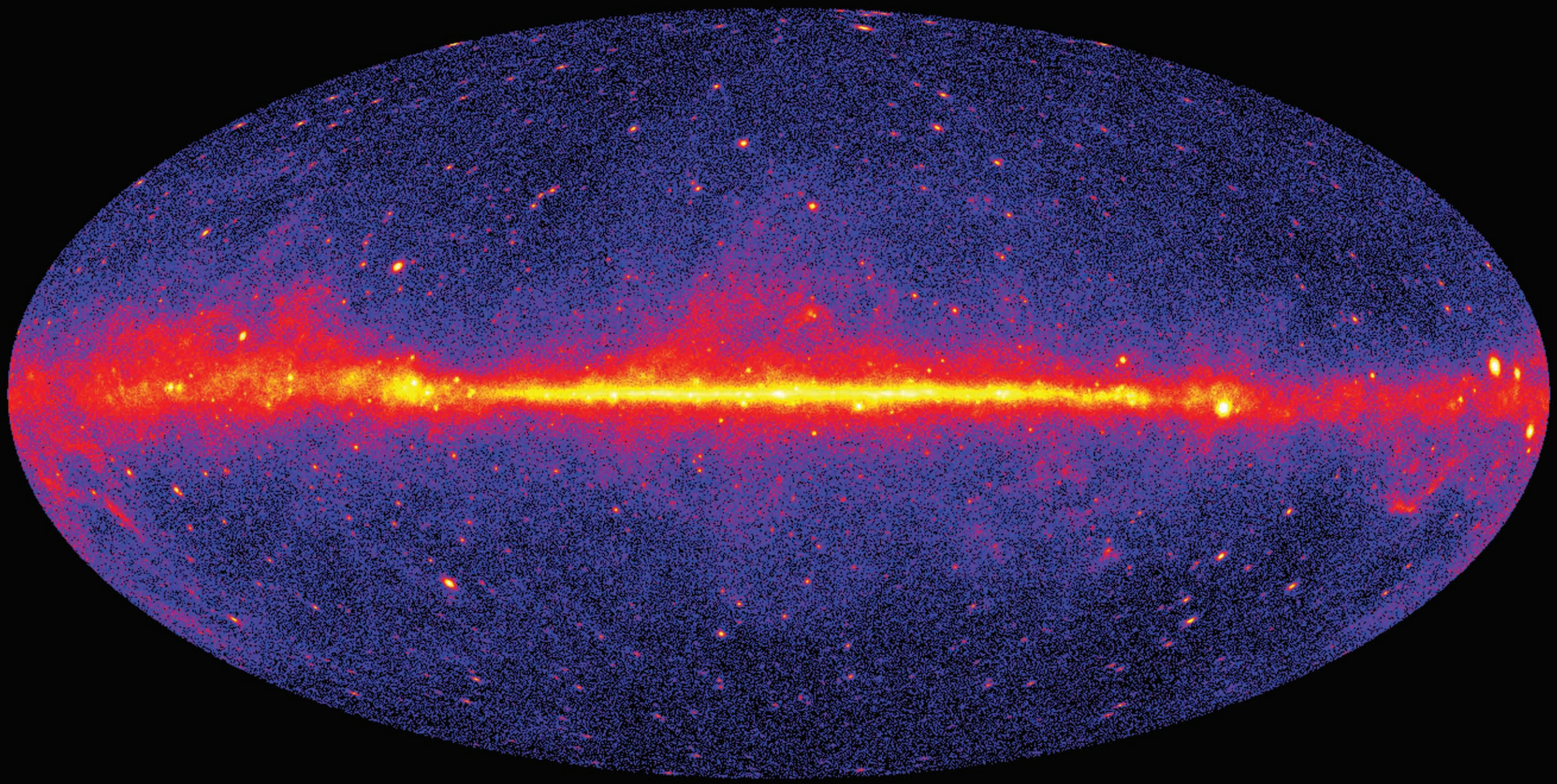
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30


1.5
2.5
4.5
8.4
16.3
32.0
63.3
126.4
251.1

June 2012

New Moon · First Quarter · Full Moon · Last Quarter

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
3	4	5	6	7	8	9
10	11	12	13	14 Flag Day	15	16
17 Father's Day	18	19	20	21	22	23
24	25	26	27	28	29	30

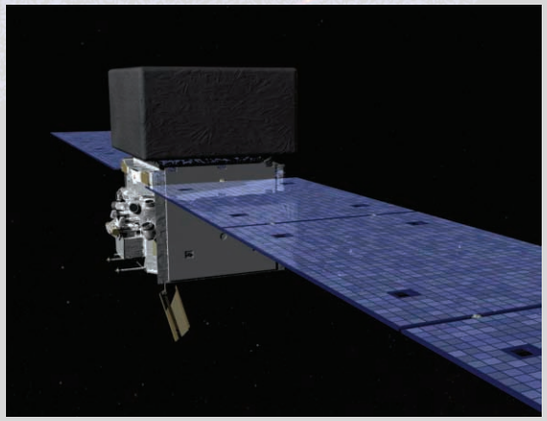
Fermi Gamma-ray Space Telescope Sheds Light on Cosmic Mysteries

At the heart of most, if not all, galaxies lie objects known as *supermassive black holes*, bodies so dense that even light cannot escape them. Yet, through mechanisms not fully understood, these distant objects also periodically fling jets of stellar matter outward at nearly the speed of light.

Sometimes, when a star collapses upon itself it leaves behind a super-dense object called a *neutron star.* In rare instances two of these bodies will merge together and the resulting collision release immense amounts of energy. These immense black holes and merging neutron stars are sources of gamma radiation—the most energetic form of electromagnetic energy. *Gamma-ray bursts* are the most luminous and energetic phenomena ever observed—a billion times more energetic than visible light. The radiation from these and similar distant events eventually reaches Earth and scientists can study the patterns of gamma radiation to learn more about these extreme environments as they strive to understand the primordial past of our Universe.

The image above shows how the sky appears when viewed with "gamma-ray lenses"—energies greater than 1 billion electron volts (1 GeV). Located in low Earth orbit, the Fermi Gamma-ray Space Telescope scans the entire sky every three hours and the data returned is giving scientists the most detailed and best-resolved map of the *gamma-ray sky* that has ever been created. The colors map the number of gamma rays above 1 GeV per 0.01 square degree and show clearly that the entire sky is filled with gamma rays and is brightest along the plane of our galaxy—the *Milky Way* [bright yellow "bar" in the middle].

Image and Partial Text Credit: NASA/DOE/Fermi LAT Collaboration



Artist's illustration of the Fermi Gamma-ray Space Telescope. Credit: NASA/Goddard Space Flight Center Conceptual Image Lab

MAY 2012

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

JULY 2012

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

July 2012

New Moon · First Quarter · Full Moon · Last Quarter

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
			Independence Day			
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

A Venerable Landsat Observes Large Fires In Mexico

July 23 marks the 40th anniversary of the launch of the first of seven Landsat satellites that have provided high-resolution views of Earth's land surface since 1972. The next satellite in the series is the Landsat Data Continuity Mission, which is scheduled to launch in December 2012 and will be renamed Landsat 8 after launch. Landsat is one of several different tools that scientists use to monitor fires from space. The images are used to assess the extent and severity of fire damage, sometimes while the fires are still burning, and to help fire management agencies and property owners plan burned area recovery programs to protect homes, property, wildlife, soils, and water resources from further damage in the impacted area.

The venerable U.S. Geological Survey–NASA Landsat 5 satellite captured this image of fires burning in Northern Mexico on April 9, 2011. The map gives an idea of the challenging terrain that hundreds of firefighters confronted as they battled these fires. The steep mountain slopes were difficult, and at times, impossible to access on the ground. Assistance from the air played a vital role in extinguishing the flames.

The fires, called *El Bonito* and *La Sabina*, were caused by lightning strikes in mid-March, and were among the largest in Mexico's history. Once the fires are out, the grass and shrub ecosystems should return quickly. In such ecosystems, fire usually destroys the above-ground plants while sparing the roots. This means that the burned area should begin to recover in this year's rainy season.

Image and Partial Text Credit: NASA Earth Observatory

JUNE 2012

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

AUGUST 2012

S	M	T	W	T	F	S
			1	2	3	4
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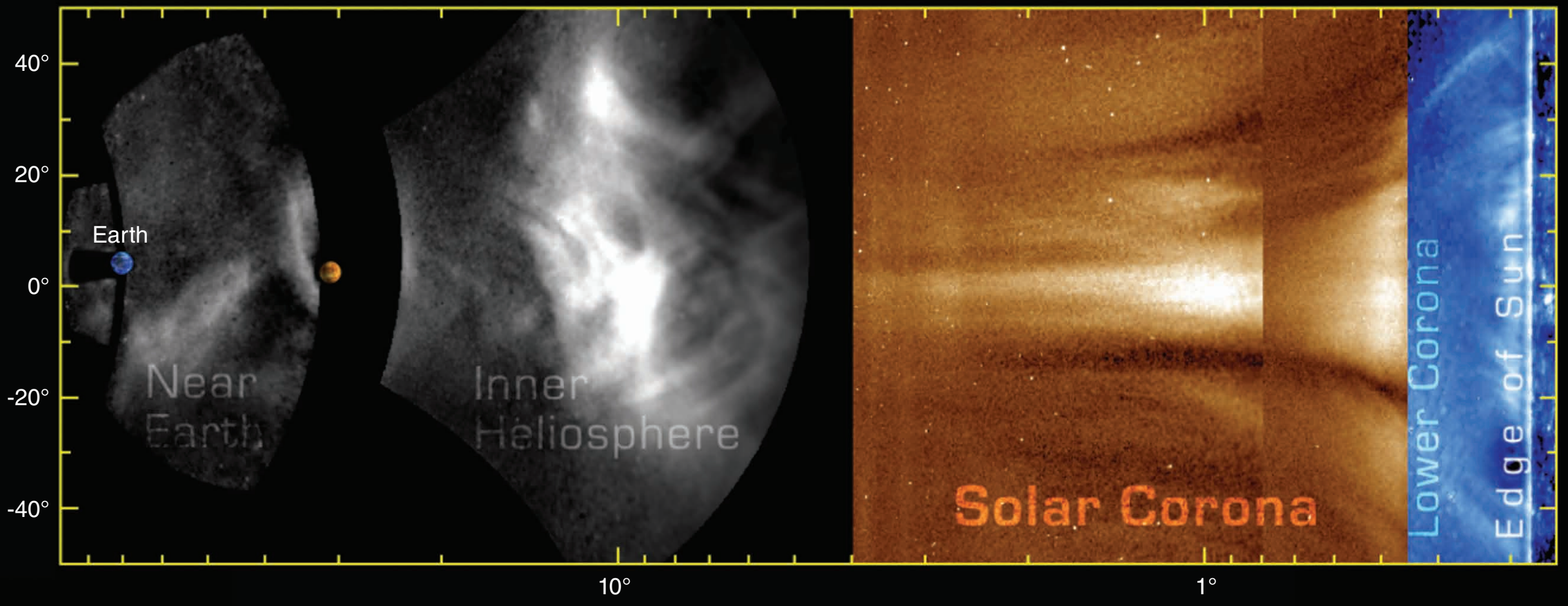
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	



STEREO-A : 12/13/08 6:38:00 AM

August 2012

New Moon · First Quarter · Full Moon · Last Quarter

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

STEREO Tracks a Coronal Mass Ejection From Origin to Earth Impact

Every so often a massive balloon-shaped burst of superhot plasma rises up from the Sun's corona, expanding outward as it rises. Sometimes this *coronal mass ejection (CME)* makes it into space, reaching Earth and beyond. When a CME reaches Earth, the shockwave unleashes a geomagnetic storm that impacts Earth's magnetosphere, causing brilliant aurorae. If powerful enough, CMEs can damage orbiting satellites, disrupt radio communications, and even cause power outages. *Space weather* is the discipline dedicated to predicting when these CMEs will occur, how strong they will be, and what impact they might have on Earth. Until recently this kind of "forecasting" has been difficult because the links between activity on the surface of the Sun and the potential impacts on Earth have been tenuously understood at best.

NASA's Solar Terrestrial Relations Observatory (STEREO) spacecraft consists of two satellites—STEREO A and STEREO B, one positioned on each side of the Sun, and thus "sees" a much more complete picture of the space between the Sun and Earth than any previous mission. When this "large angle" perspective is combined with cutting edge image processing techniques that effectively eliminates the much brighter light sources like the Moon and "background" galaxy, the elusive CME comes into focus as never before! For the first time, scientists can monitor developing space weather, track its entire transit from the Sun and better predict when, and how future CMEs will impact Earth. Shown here is reprocessed data from the very first CME that STEREO-A tracked in December 2008. The data shows how the original magnetic structure morphed as it traveled outward, impacting Earth's magnetosphere three days later, and continued to expand as it traversed our Solar System.

Image and Partial Text Credit: NASA/STEREO

Artist's rendition of the pair of STEREO spacecraft. Credit: NASA and the Johns Hopkins University Applied Physics Laboratory.

JULY 2012

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

SEPTEMBER 2012

S	M	T	W	T	F	S
						1
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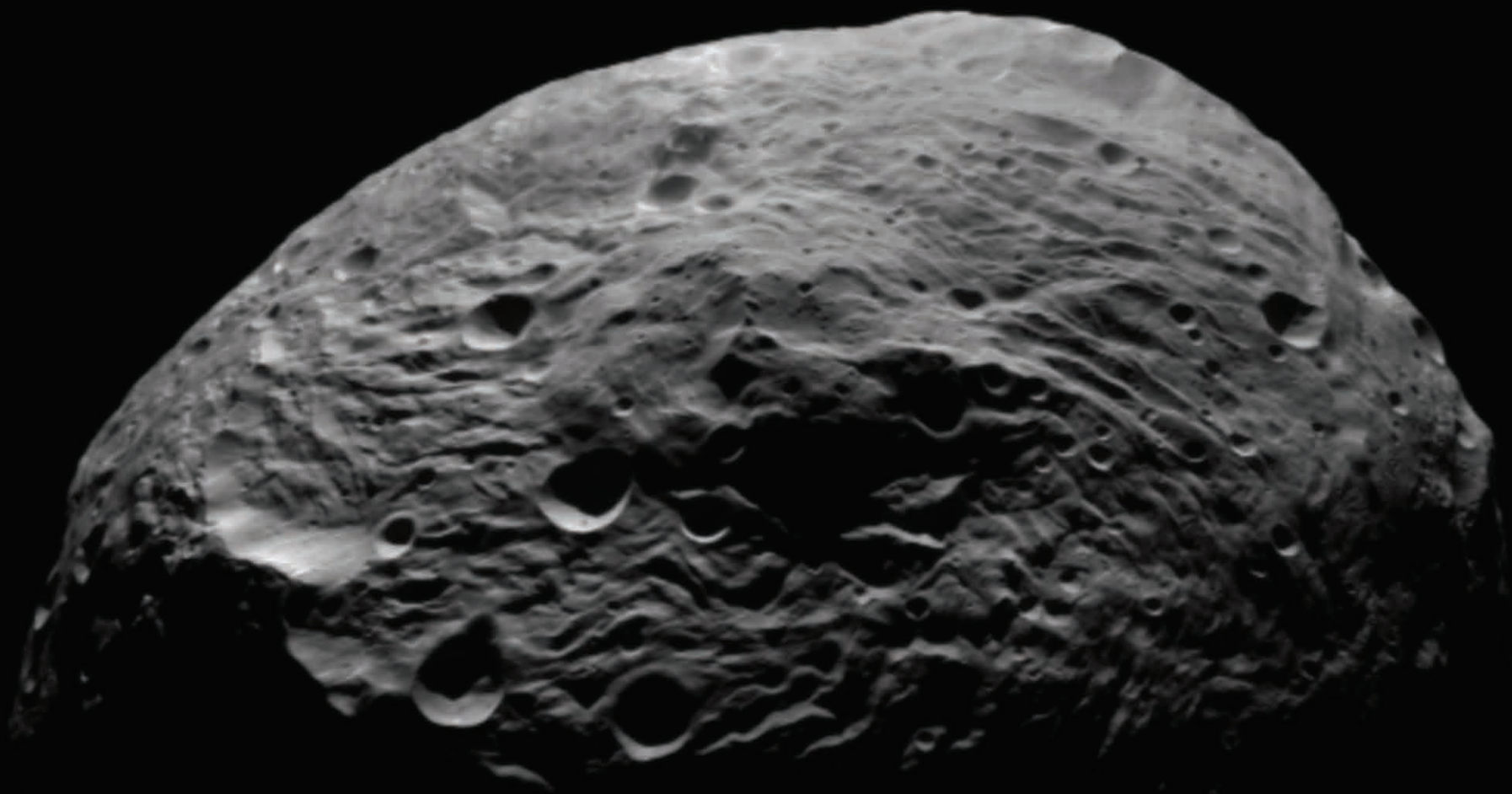
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23/30	24	25	26	27	28	29



September 2012

New Moon · First Quarter · Full Moon · Last Quarter

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3 Labor Day	4	5	6	7	8
9	10	11	12	13	14	15
16	17 Constitution Day	18	19	20	21	22
23 30	24	25	26	27	28	29

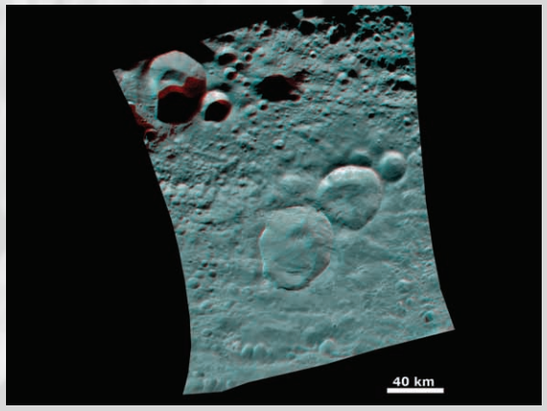
Probing the Dawn of the Solar System

Vesta is not your typical asteroid; at 329 miles (530 kilometers) in diameter, it's much larger than most of its neighbors in the Asteroid Belt—a ring of debris orbiting between Mars and Jupiter—most of which are about 62 miles (100 kilometers) in diameter. Vesta also possesses a layered structure (i.e., it has a core, mantle, and crust) making it more similar to Venus, Earth, and Mars than it is to the hunks of space rock that surround it. Scientists debate just how to classify Vesta but most have settled on *protoplanet*—a planet-like body that for whatever reason, never fully developed the way the others have.

In August 2011, NASA's Dawn spacecraft began conducting a close-up investigation 1,700 miles (2,700 kilometers) above the surface of Vesta. Scientists hope that the information they obtain will help them answer fundamental questions about planetary formation. Dawn is the first mission to orbit objects in the main asteroid belt. It will also be the first mission to orbit two different extraterrestrial (and non-solar) bodies. After concluding its study of Vesta, Dawn will move on to Ceres, another large asteroid.

Dawn's Framing Camera obtained this image as it approached Vesta on July 18, 2011, from a distance of 6,500 miles (10,500 kilometers). Framing Camera images are used for navigation purposes and as preparation for science investigations but they also give an intriguing first glimpse at the rocky surface of the largest asteroid.

Image and Partial Text Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA



The inset image depicts the topography of Vesta's three craters, informally named the "Snowman," obtained by the framing camera instrument aboard NASA's Dawn spacecraft on August 6, 2011. Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA

AUGUST 2012

S	M	T	W	T	F	S
			1	2	3	4
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12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

OCTOBER 2012

S	M	T	W	T	F	S
	1	2	3	4	5	6
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14	15	16	17	18	19	20
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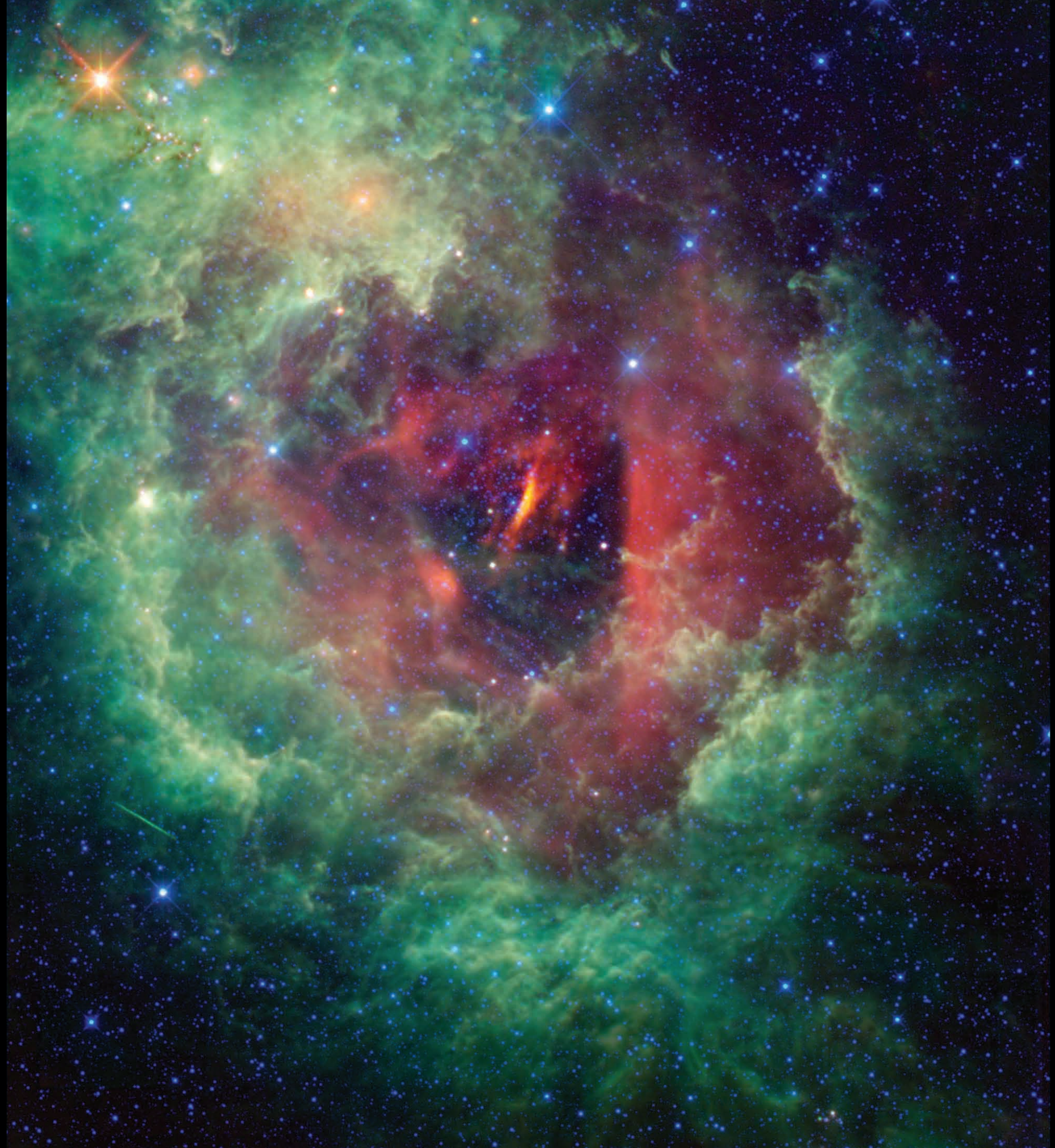
28	29	30	31			



October 2012

New Moon · First Quarter · Full Moon · Last Quarter

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4	5	6
7	8	9	10	11	12	13
	Columbus Day					
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			
			Halloween			

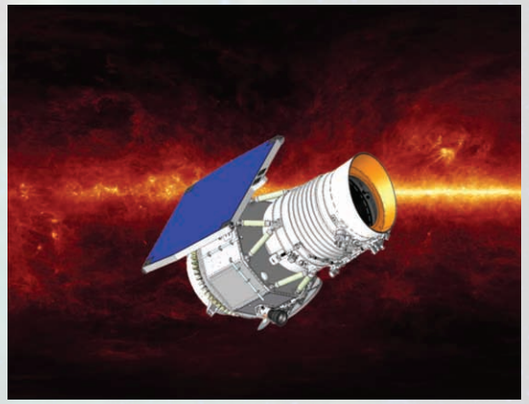
Only WISE Eyes Can See the Unicorn

The visible wavelengths that the human eye can detect will not penetrate thick cloud cover. To *see* through clouds scientists have to rely on other electromagnetic wavelengths. Astronomers often use infrared telescopes to peer through dark clouds. Regions that appear dark or as blurry masses of stars through a backyard telescope light up with color when seen through infrared *eyes*.

For two years, the Wide-field Infrared Explorer (WISE) scanned the entire sky in infrared light, picking up the glow cast by countless objects not visible to the naked eye. The survey revealed the coolest stars ever found, the universe's most luminous galaxies, and some of the darkest near-Earth asteroids and comets. The data are all being meticulously analyzed and cataloged. This will help scientists answer fundamental questions about the origins of planets, stars, and galaxies.

As it scanned the *infrared sky*, WISE captured this image of the Rosette nebula (also called NGC 2237) located within the constellation Monoceros—known as the "Unicorn." This huge cloud in the heart of the *Milky Way* is a place where stars are born. At the center of the nebula is a cluster of young stars called NGC 2244. Blue and cyan represent infrared light at wavelengths of 3.4 and 4.6 microns, which is dominated by light from stars, while green and red represent light at 12 and 22 microns, which is mostly light from warm dust. The streak seen at lower left is the trail of a satellite, captured as WISE snapped the multiple frames that make up this view.

Image and Partial Text Credit: NASA/JPL-Caltech/WISE Team



Artist's concept of the Wide-field Infrared Survey Explorer.
Credit: NASA/JPL-Caltech/WISE Team

SEPTEMBER 2012

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23/30	24	25	26	27	28	29

NOVEMBER 2012

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

500 km

Antarctic Ice Sheet Velocities

1 3 10 30 100 300 1000 3000

meters per year

November 2012

New Moon · First Quarter · Full Moon · Last Quarter

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
4 Daylight Saving Time Ends	5	6 Election Day	7	8	9	10
11	12 Veterans Day (observed date)	13	14	15	16	17
18	19	20	21	22 Thanksgiving Day	23	24
25	26	27	28	29	30	

International Effort Yields First Complete Map of Antarctic Ice Flow

During the International Polar Year (IPY) (2007–08) NASA joined with the European Space Agency (ESA); Japanese Space Exploration Agency (JAXA); and Canadian Space Agency (CSA) in a first-of-its kind, large-scale scientific collaboration. The goal was to collect the data necessary to create the first complete map of the speed and direction of ice flow in the Antarctic. The pieces needed to assemble this complex jigsaw puzzle came from integrated radar interferometric observations obtained from a consortium of international satellites and distributed by ESA's European Space Research Institute at Frascatti, Italy, NASA's Alaska Satellite Facility in Fairbanks, and MacDonald, Dettwiler and Associates of Canada. Researchers at the UC Irvine and NASA's Jet Propulsion Laboratory painstakingly worked for several years to assemble the puzzle.

The result of those efforts is the map shown here that displays the motion of the ice over the entire Antarctic. The interferometric ice velocity data are color-coded and superimposed over a Landsat satellite image mosaic of the region. Because the velocity [measured in meters per year] varies over a wide range from the interior to the coast, the scale used is logarithmic. The lowest velocities [oranges and yellows] are about 1000 times slower than the fastest ones [purples and reds]. The flowlines shown here are an artifact of the scale used. The actual flowlines would not be dramatically different but would smooth out spatial inconsistencies that a sharp eye might detect.

The completed puzzle reveals a much clearer division of the ice flow origin between East and West Antarctica. The team also found unnamed rivers of ice or ice streams moving up to 800 feet (244 meters) annually across immense plains sloping toward the Antarctic Ocean. They also believe they have discovered a new mechanism for ice movement. Some ice appears to “slip” across the surface that it rests on moving much further inland than had previously been known. This has vast implications for future sea level rise. Loss of ice along the coast resulting from the warming ocean could initiate rapid ice loss in the interior.

Image and Partial Text Credit: NASA/GSFC Scientific Visualization Studio

The photo shows the exposed margin of the Dotson Ice Shelf as it is about to calve another large iceberg. Dotson is fed by Kohler and Smith Glaciers, and is adjacent to the Pine Island and Thwaites Glaciers that are all flowing into the Amundsen Sea Embayment. This region is known as the “weak underbelly” of the West Antarctic Ice Sheet because all these glaciers are rapidly losing elevation and mass. Credit: Christopher Shuman [UMBC JCET] obtained the photo during an Operation IceBridge flight on October 28, 2009.

OCTOBER 2012

S	M	T	W	T	F	S
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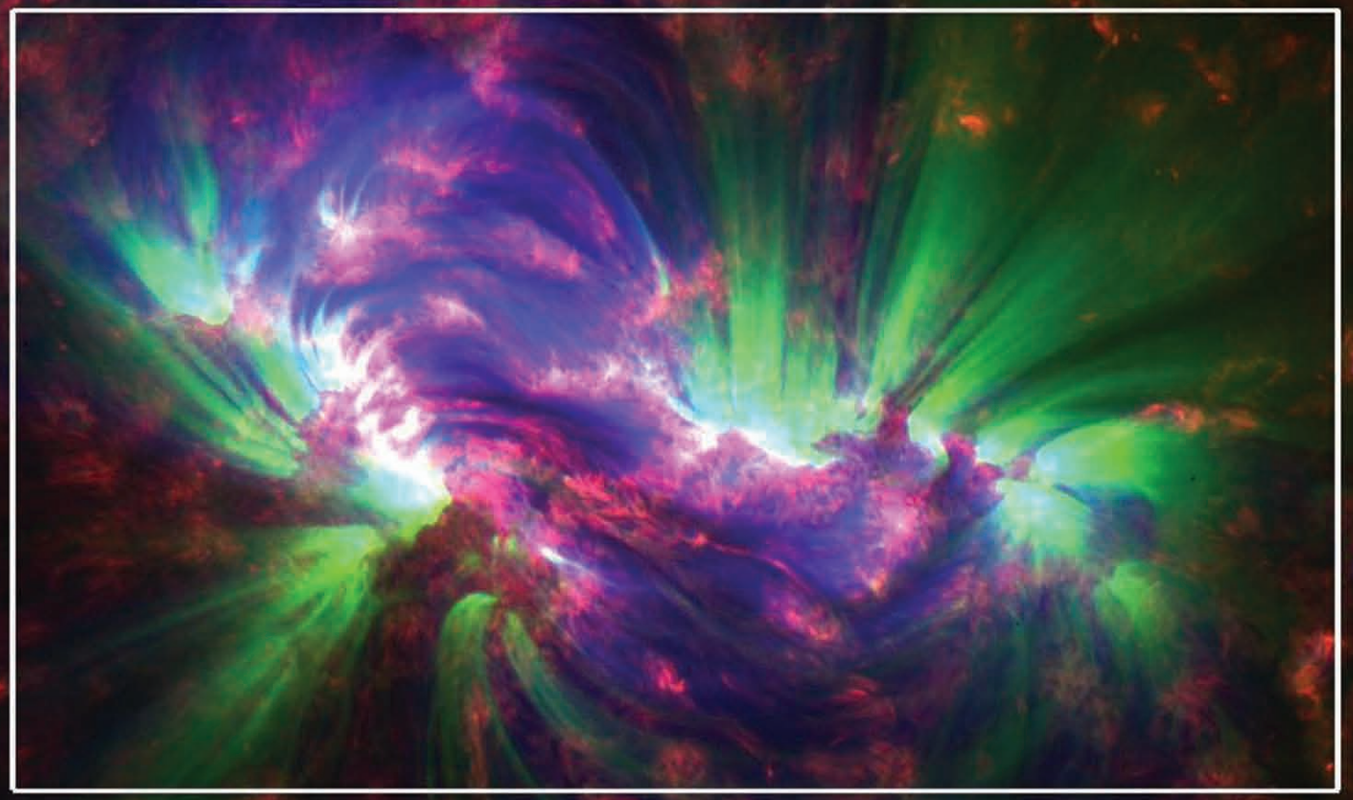
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

DECEMBER 2012

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23/30	24/31	25	26	27	28	29



December 2012

New Moon · First Quarter · Full Moon · Last Quarter

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23 / 30	24 / 31	25 Christmas Day	26	27	28	29

SDO Views "Solar Seaweed" That Feeds the Solar Wind

The Sun periodically releases bursts of high-energy particles known as spicules that eject material from the Sun's surface some 32,000 miles (51,499 kilometers) into the atmosphere, where they sway back and forth in the Sun's atmosphere like giant strands of seaweed. Strands of seaweed in Earth's oceans ripple in response to the movement of currents of water. Here, the rippling motion of the spicules is in response to "currents" in the Sun's magnetic field known as *Alfvén waves*. Scientists believe that the energy released as spicules interact with Alfvén waves and may be a primary source of the *solar wind* that continuously streams from the Sun toward Earth at 1.5 million miles per hour.

For years, scientists speculated about the existence and nature of spicules and Alfvén waves; now, for the first time, they have the capability to detect them directly. Using data returned from NASA's Solar Dynamics Observatory (SDO), scientists can track the movement of spicules and measure how much energy Alfvén waves carry. Shown here is an image of the Sun's surface from the Atmospheric Imaging Assembly (AIA) on SDO obtained on April 25, 2010. The close-up focuses on a spicule shown in several different wavelengths of extreme ultraviolet light that spans a range of temperatures.

Alfvén waves are part of a much more complex system of magnetic fields and plasma that surrounds the Sun. Scientists are using data from SDO to help them understand this system so that they can answer questions about the mechanisms that give rise to geomagnetic storms near Earth. They also want to tackle more focused questions about the processes that give rise to the solar wind and regulate its speed.

Image and Partial Text Credit: NASA/SDO/AIA

Artist's rendition of the Solar Dynamics Observatory.
Credit: NASA/GSFC Conceptual Image Lab

NOVEMBER 2012

S	M	T	W	T	F	S
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18	19	20	21	22	23	24
25	26	27	28	29	30	

JANUARY 2013

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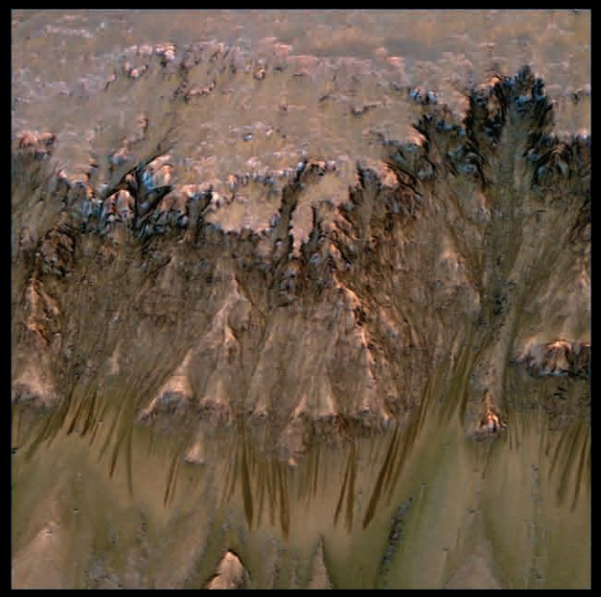
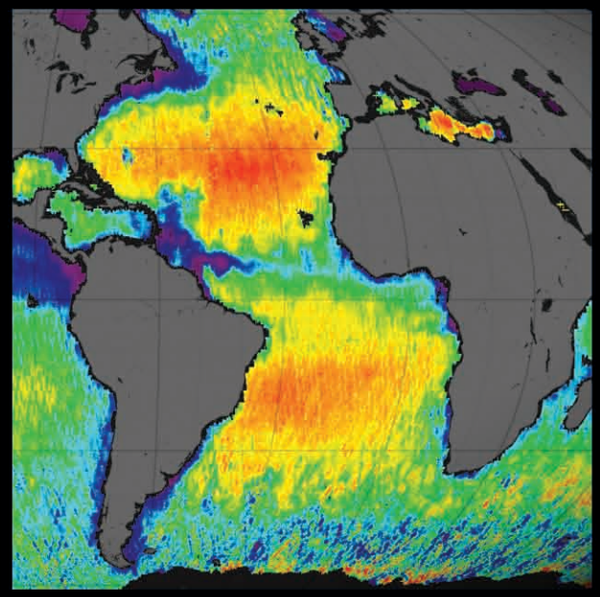
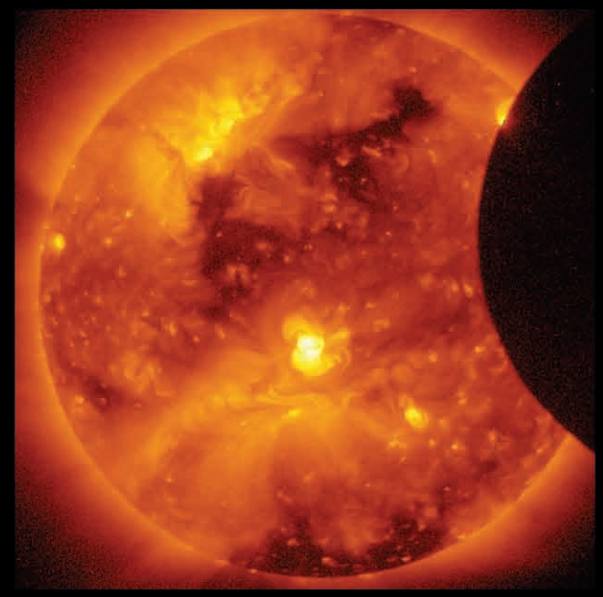
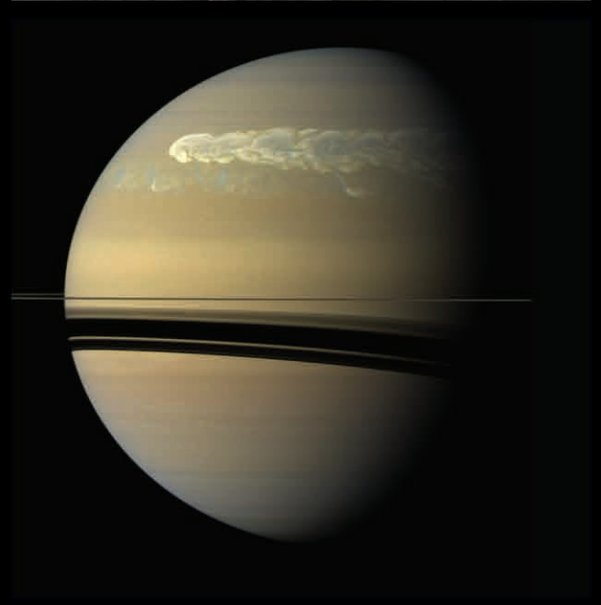
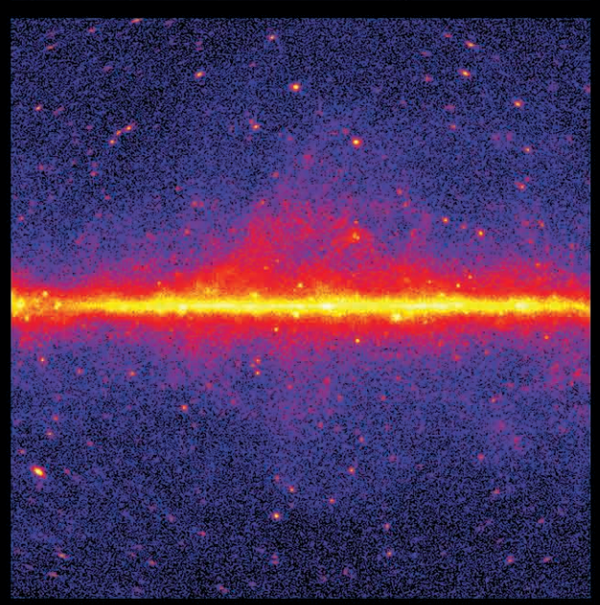
27	28	29	30	31		

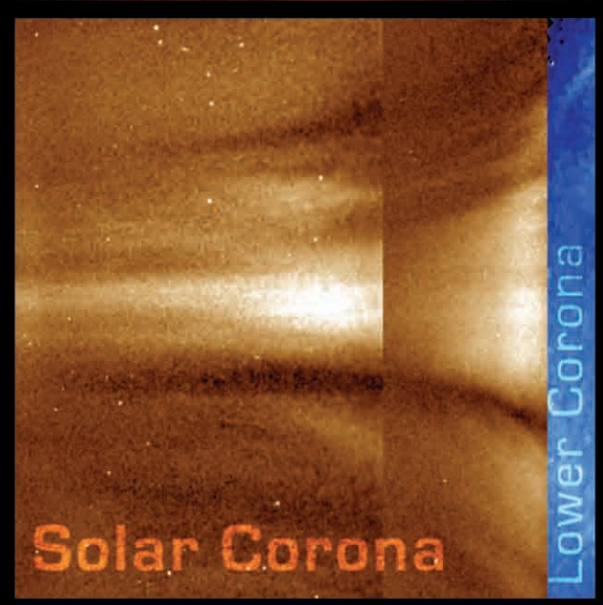


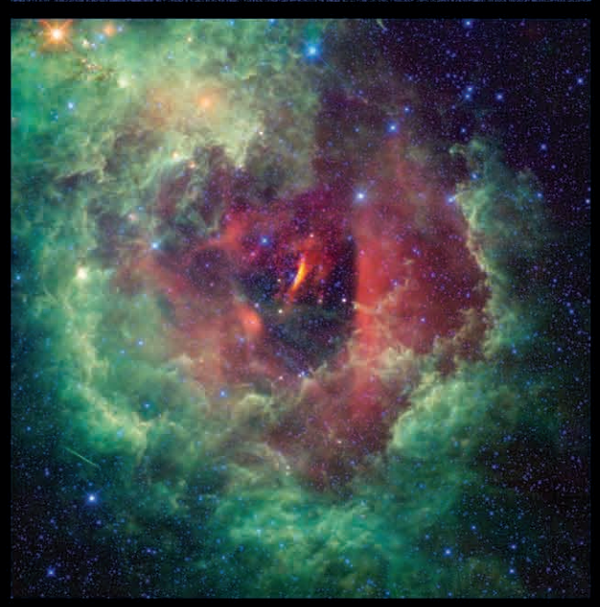


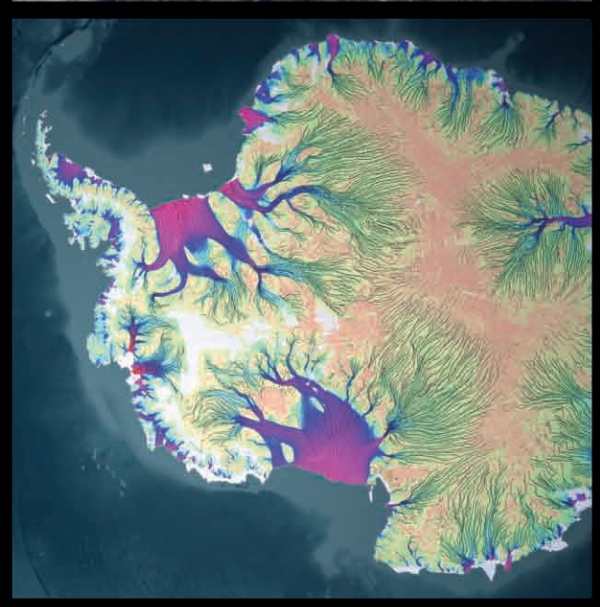


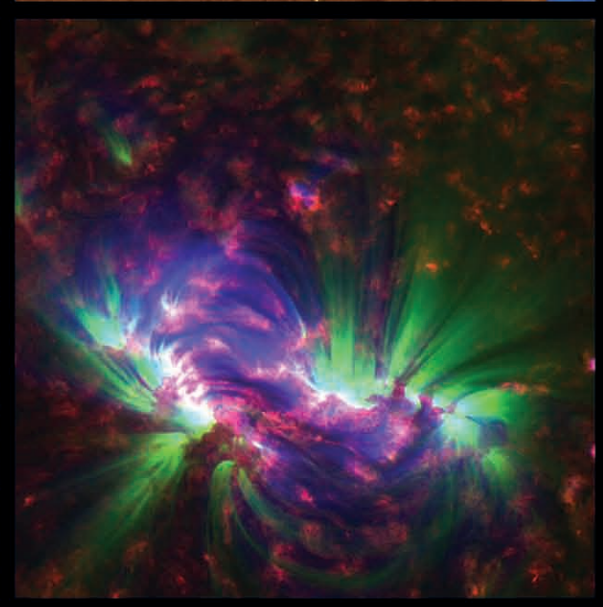












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