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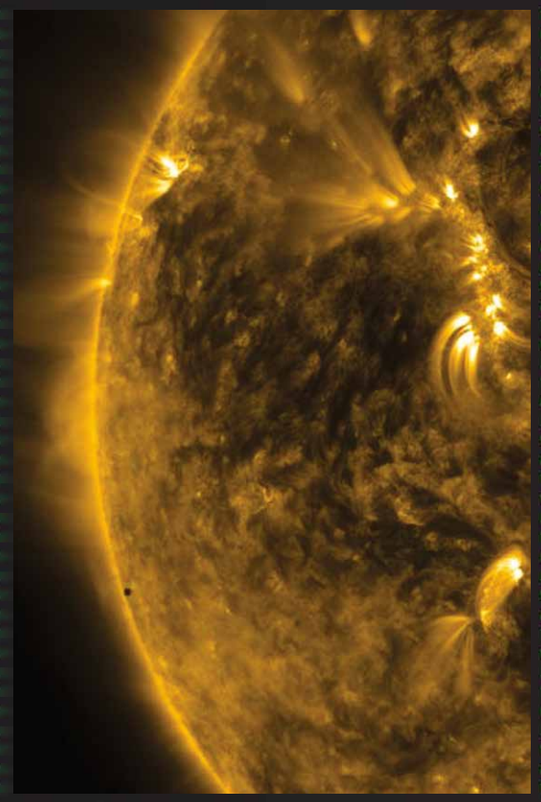
National Aeronautics and Space Administration

EARTH

HELIOPHYSICS



ASTROPHYSICS

PLANETARY

01.01.2017

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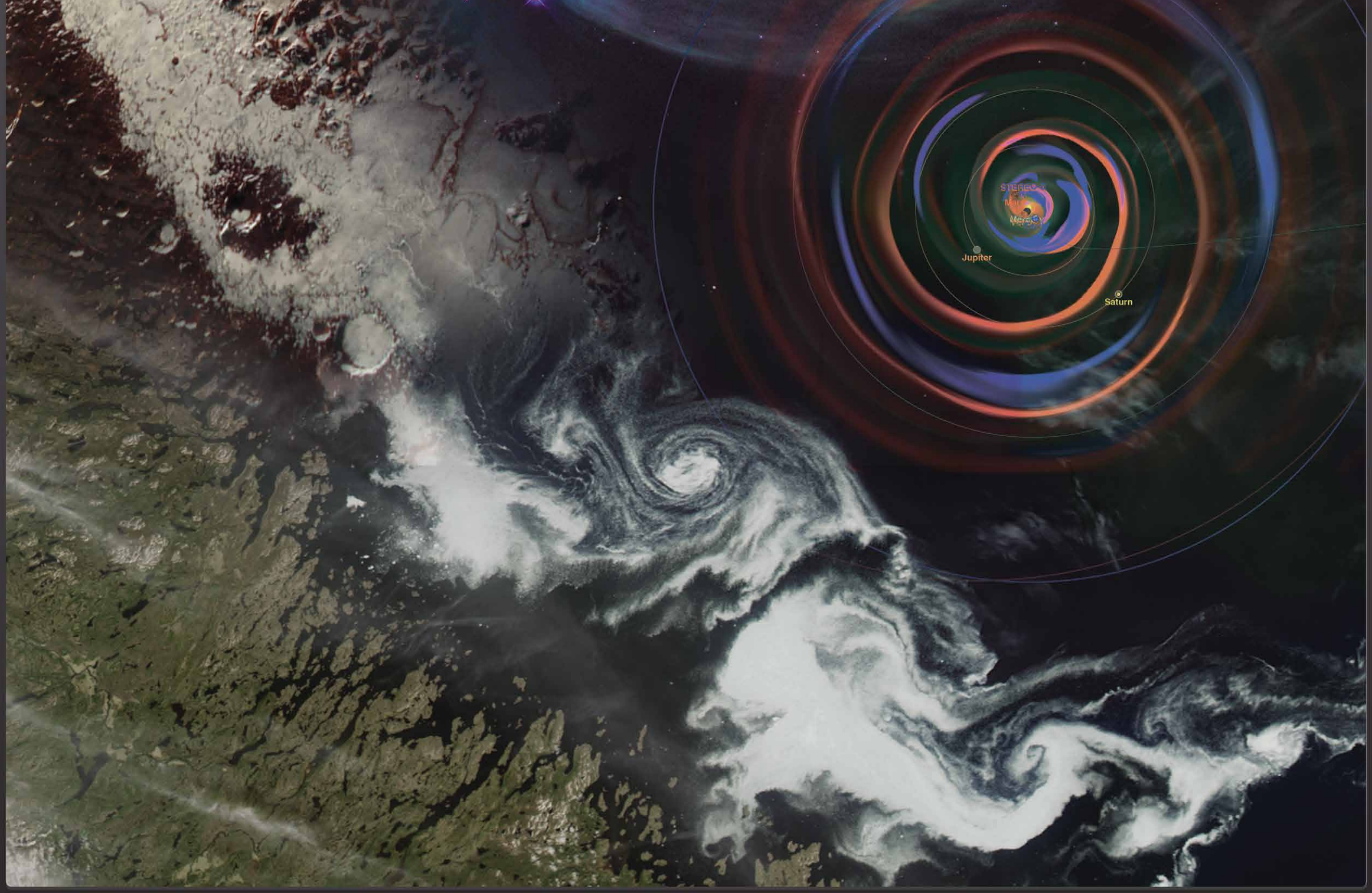


01.01.2017

www.nasa.gov

JANUARY 2017

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 Birthday of Martin Luther King, Jr. (observed date)	17	18	19	20 Inauguration Day	21
22	23	24	25	26	27	28
29	30	31				

Jupiter's North Pole Unlike Anything Encountered in Our Solar System

NASA's Juno spacecraft has sent back the first-ever images of Jupiter's north pole, taken during the spacecraft's first flyby of the planet with its instruments switched on. The images show storm systems and weather activity unlike anything previously seen on any of our solar system's gas-giant planets. One of the most notable findings of these first-ever images of Jupiter's north and south poles is something that the JunoCam imager did not see. Unlike Saturn, which has a persistent hexagonal feature at the north pole, there is nothing on Jupiter that anywhere near resembles that.

Juno successfully executed the first of 36 orbital flybys on August 27, 2016, when the spacecraft came about 2,500 miles (4,200 kilometers) above Jupiter's swirling clouds. The download of six megabytes of data collected during the six-hour transit, from above Jupiter's north pole to above its south pole, took one-and-a-half days. While analysis of this first data collection is ongoing, some unique discoveries have already been made. First glimpse of Jupiter's north pole shows it to be bluer in color than other parts of the planet, and there are a lot of storms. The image here is one example illustrating how the largest planet in our solar system is truly unique.

Image and text credit: NASA/Jet Propulsion Laboratory-California Institute of Technology, Southwest Research Institute, Malin Space Science Systems

For more information:
www.nasa.gov/juno

Artist's rendering of NASA's Juno spacecraft at Jupiter, with its solar arrays and main antenna pointed toward the distant sun and Earth. Image credit: NASA/Jet Propulsion Laboratory-California Institute of Technology

December 2016

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 2017

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				

FEBRUARY 2017

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				

Hubble Sees a Star 'Inflating' a Giant Bubble

This Hubble Space Telescope image of the Bubble Nebula, or NGC 7635, was taken by Hubble's Wide Field Camera 3. The Bubble Nebula resides 7,100 light-years from Earth in the constellation Cassiopeia. It is about 7 light-years across.

The star forming this nebula is 45 times more massive than our sun. Gas on the star gets so hot that it escapes away into space as a "stellar wind" moving at over 4 million miles per hour (~6.4 million kilometers per hour). This outflow sweeps up the cold, interstellar gas in front of it, forming the outer edge of the bubble. As the bubble's shell expands outwards, it slams into dense regions of cold gas on one side of the bubble. This makes the star appear off-center from the bubble, with its location in the 10 o'clock position.

Dense pillars of cool hydrogen gas laced with dust appear at the upper left of the picture. The gases heated to varying temperatures emit different colors: oxygen is hot enough to emit blue light in the bubble near the star, while the cooler pillars are yellow from the combined light of hydrogen (green) and nitrogen (red).

Image and text credit: NASA, European Space Agency (ESA), and the Hubble Heritage Team [Space Telescope Science Institute/ Association of Universities for Research in Astronomy (STScI/AURA)]

For more information:
www.nasa.gov/hubble

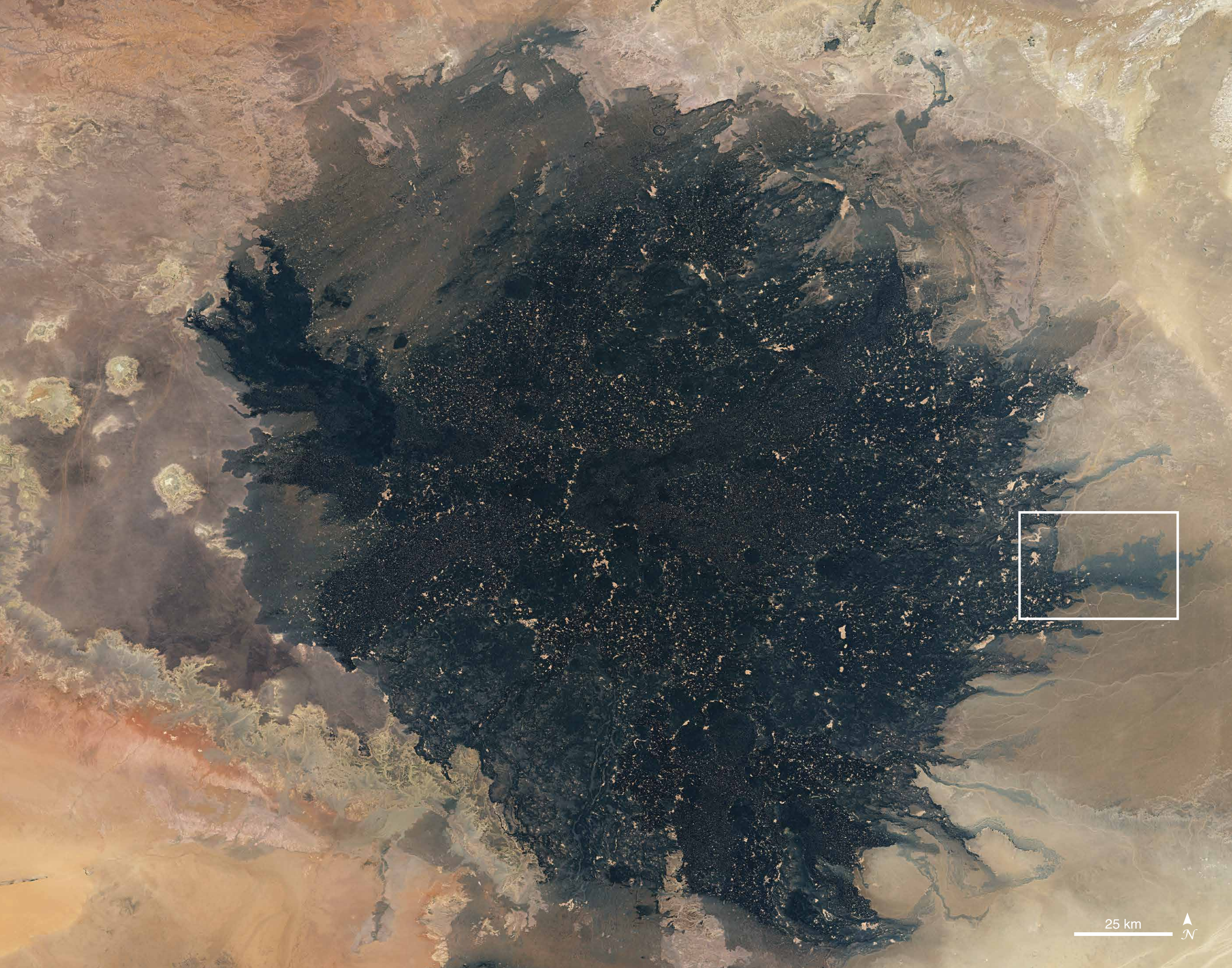
This photo of Hubble was taken from the Space Shuttle *Atlantis* on May 19, 2009. Image credit: NASA

January 2017

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 2017

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	


25 km
N

MARCH 2017

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 Daylight Savings Time Begins	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Libya's Haruj Volcanic Field

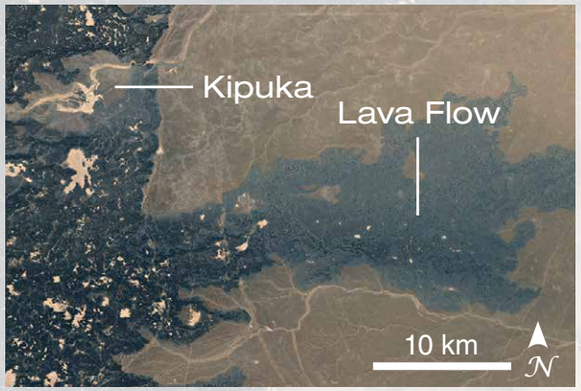
Many picture the Sahara Desert in North Africa to be a vast stretch of uninterrupted sand. However, this true-color image provides a different perspective—a bird's-eye view of an ancient volcanic field.

From above, the Haruj volcanic field in central Libya offers a startling contrast to the brighter sand that dominates the surrounding scene. Jet black layers of volcanic rock, called *basalt*, spread across a ~45,000-square-kilometer (~17,000-square-mile) plateau. The hilly plateau contained roughly 150 individual volcanoes. In most cases, the lava that spilled from these vents was fluid and not explosive, much like the lava produced by ongoing eruptions in Hawaii.

The image is a "best-pixel mosaic" of the region based on data captured by the Operational Land Imager on Landsat 8 between July 24, 2013 and April 13, 2016. An algorithm was used to sort, pixel by pixel, through all the imagery available during that period to select pixels that were not affected by clouds, dust, or other atmospheric phenomena that might alter the appearance of a surface feature. The patches of tan scattered across the basalt are depressions filled with fine-grained sand. Many of these depressions are land that has been completely surrounded, but not covered, by a younger lava flow—called *kipuka*, or *balta* locally. Various animals are attracted to shrubs and grasses that occasionally grow in these depressions following rainfall events. The inset image at right shows a more detailed view of lava flows and kipuka along the eastern edge of the volcanic field.

Images and text credit: NASA's Earth Observatory

For more information:
www.nasa.gov/landsat



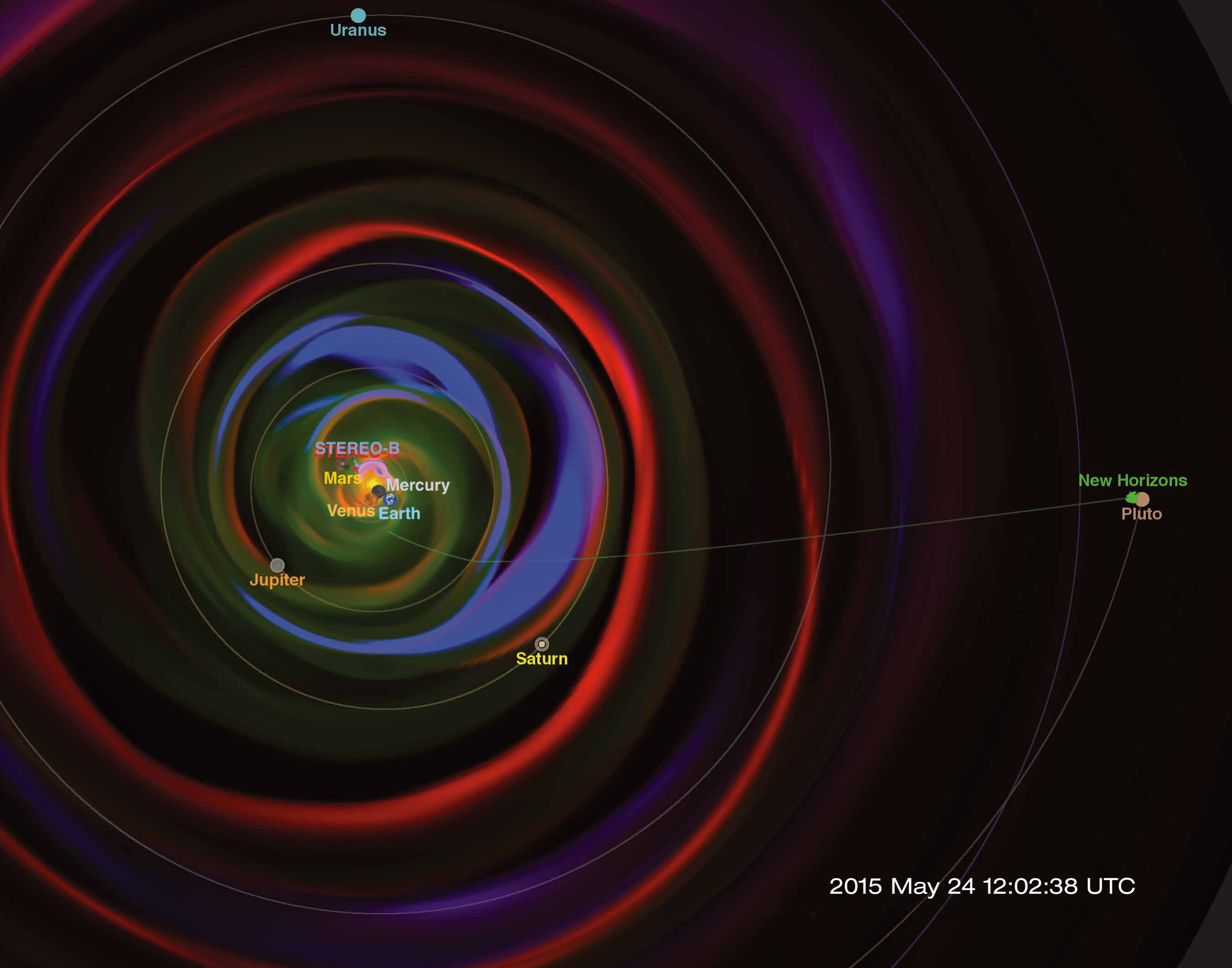
Geological research suggests that the lava flows on the eastern edge, which moved from west to east, were produced during five phases over a five-million-year period in the beginning of the Pliocene. Scientists use detailed satellite images to interpret the relative ages and sequence of different volcanic events based on differences in texture and color.

February 2017

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				

April 2017

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


Uranus
STEREO-B
Mars
Mercury
Venus
Earth
Jupiter
Saturn
New Horizons
Pluto
2015 May 24 12:02:38 UTC

APRIL 2017

Uranus

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	25	26	27	28	29

Saturn

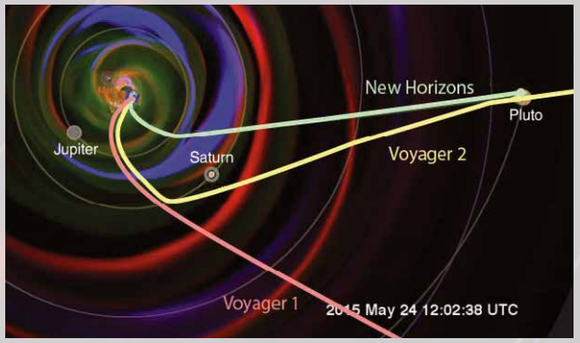
Visualizing Pluto's Space Environment

Whether orbiting Earth or exploring much further away, spacecraft must endure the harsh conditions of space. They are subject to extreme variations in temperature and pressure as well as the continuous flow of charged particles from the sun, which permeate the solar system, called *solar wind*. When conditions are particularly dangerous, such as when the sun suddenly and violently releases bubbles of solar material and magnetic fields called *coronal mass ejections*, or CMEs, spacecraft can operate in *safe mode*, during which all non-essential systems are shut down.

To predict how the sun's radiation will impact spacecraft, scientists rely on computer models. Prior to New Horizons' historic flyby of Pluto in July 2015, a community of scientists who study the effects of the sun on the solar system—a field known as heliophysics—used the Enlil model to simulate the space environment further than ever before, out near Pluto. Named after the Sumerian god of the wind, the Enlil model is regularly used to track how CMEs travel through the inner solar system. This image, created using results from Enlil, shows how CMEs (depicted as bright shades) travel through space. Propelled by the solar wind, particles travel for many months before they reach Pluto. The CMEs eventually spread out and merge with each other to form much larger clouds. Scientists continually work to improve such models to better protect our spacecraft—and eventually humans—as we continue to explore the solar system and beyond.

Images and text credit: NASA's Goddard Space Flight Center, Scientific Visualization Studio; the Space Weather Research Center; and the Community Coordinated Modeling Center

For more information: www.nasa.gov/newhorizons



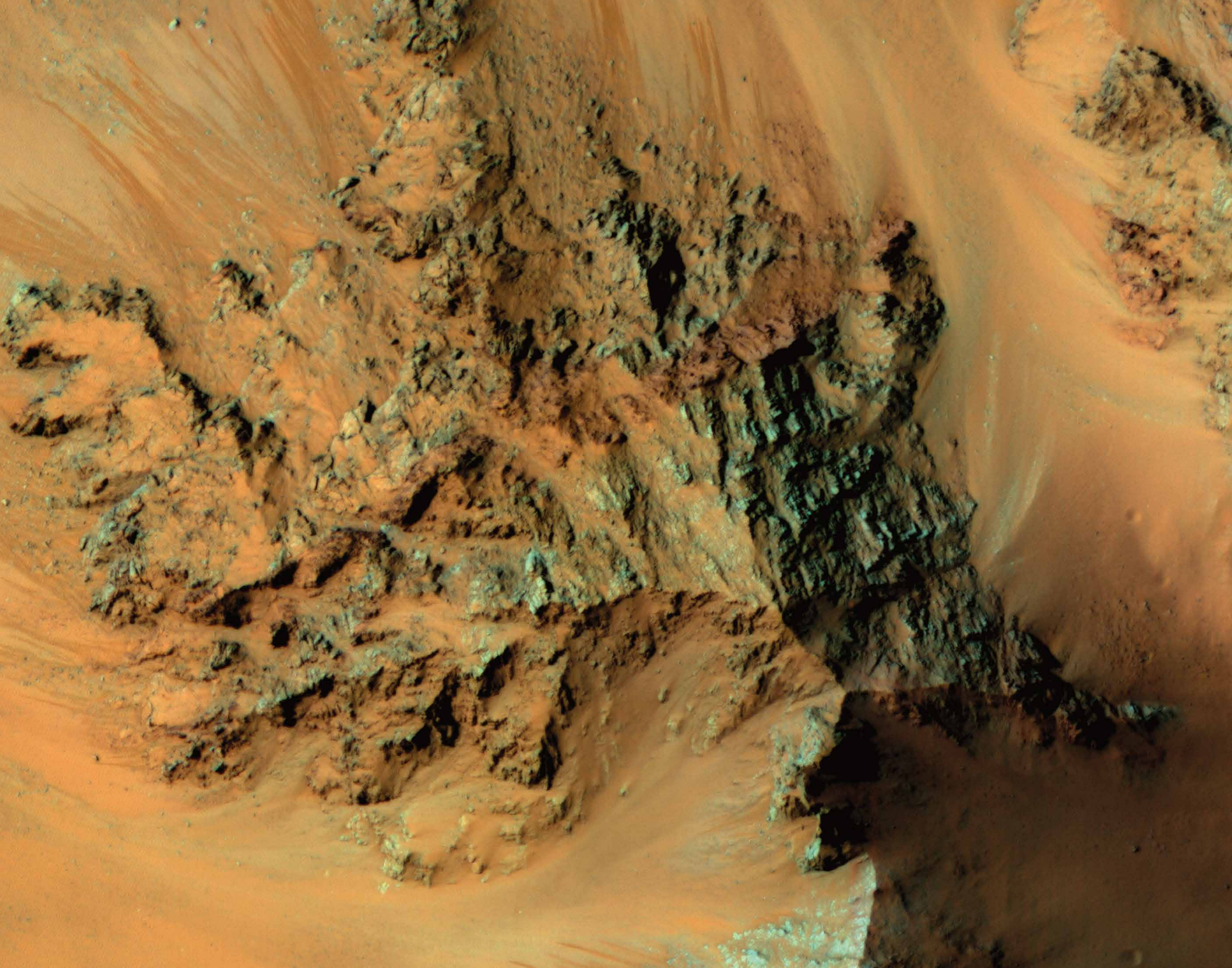
During its billion-mile journey to Pluto, New Horizons collected three years of near-continuous observations of the space environment in a region of space where only a handful of spacecraft have ever flown. These data will play a key role in testing and improving models of the space environment. The image above shows the path of New Horizons from 2012 to 2015, as well as the direction of the two Voyager spacecraft, which are three or four times further from the sun than New Horizons.

March 2017

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 2017

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 2017

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 Mother's Day	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29 Memorial Day	30	31			

Seasonal Flows in the Central Mountains of Hale Crater

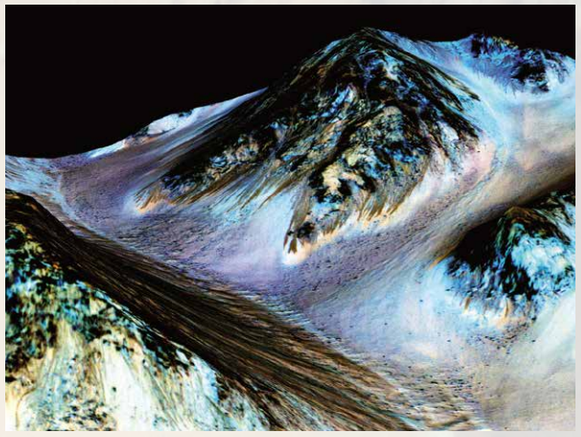
Findings from NASA's Mars Reconnaissance Orbiter (MRO) provide strong evidence that liquid water flows intermittently on present-day Mars. During late spring and summer months on Mars, dark, narrow streaks appear on some Martian slopes, called *recurring slope lineae* (RSL). These active flows might be caused by water seeping out from below the Martian surface.

This image, captured by MRO's High Resolution Imaging Science Experiment (HiRISE), shows RSL extending downhill from bedrock cliffs, mostly towards the northwest [*upper left*], located in the central peaks of Hale Crater—one of the most active sites known on Mars. The image was acquired in the middle of summer when RSL are most active in the middle southern latitudes, where Hale is located.

In general, RSL darken and appear to flow down several Martian slopes during warm seasons, and then fade in cooler seasons. The RSL in Hale—roughly the length of a football field—have an unusually "reddish" color compared to most RSL, perhaps due to oxidized iron compounds, like rust. The Hale RSL are also unusual because they began activity much earlier than most RSL sites in the middle southern latitudes and were well-developed in the early spring. Planetary scientists using observations from MRO's Compact Reconnaissance Imaging Spectrometer detected hydrated salts on these slopes at Hale Crater, corroborating the hypothesis that the streaks are formed by briny (i.e., salty) liquid water. If seeping water does in fact cause RSL in Hale Crater, the water must be rich enough in salts to lower its freezing point significantly below the freezing point of pure water to avoid freezing during the early spring months on Mars. These results may point to more habitable conditions on the near surface of Mars than previously thought.

Images and text credit: NASA/Jet Propulsion Laboratory-California Institute of Technology, University of Arizona

For more information:
www.nasa.gov/mro



This false-color image, generated using imaging and topographical information from the High Resolution Imaging Science Experiment (HiRISE) camera on NASA's Mars Reconnaissance Orbiter (MRO), shows a different view of RSL (dark streaks) on Hale Crater.

April 2017

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

June 2017

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	

JUNE 2017

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
18 Father's Day	19	20	21	22	23	24
25	26	27	28	29	30	

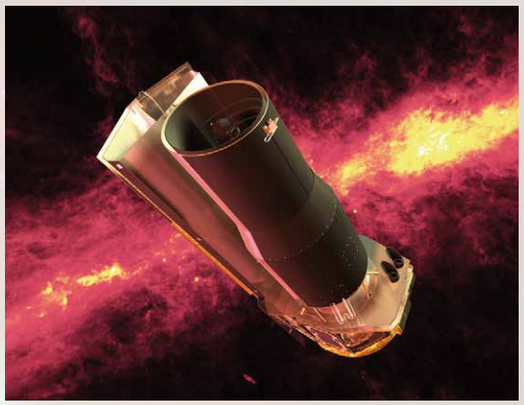
Seeing Beyond the 'Monkey Head'

Scores of baby stars shrouded by dust are revealed in this infrared image of the star-forming region NGC 2174, as seen by NASA's Spitzer Space Telescope. Some of the clouds in the region resemble the face of a monkey in visible-light images, hence the nebula's nickname: the "Monkey Head." However, in infrared images such as this, the monkey disappears. That's because different clouds are highlighted in infrared and visible-light images. Found in the northern reaches of the constellation Orion, NGC 2174 is located around 6,400 light-years away.

In this image, light with a wavelength of 3.5 microns is shown in blue, 8.0 microns in green, and 24 microns in red. The greens show the organic molecules in the dust clouds. Reds are caused by the thermal radiation emitted from the very hottest areas of dust. Areas around the edges that were not observed by Spitzer have been filled in using infrared observations from NASA's Wide-field Infrared Survey Explorer, or WISE.

Images and text credit: NASA/Jet Propulsion Laboratory-California Institute of Technology

For more information:
www.nasa.gov/spitzer



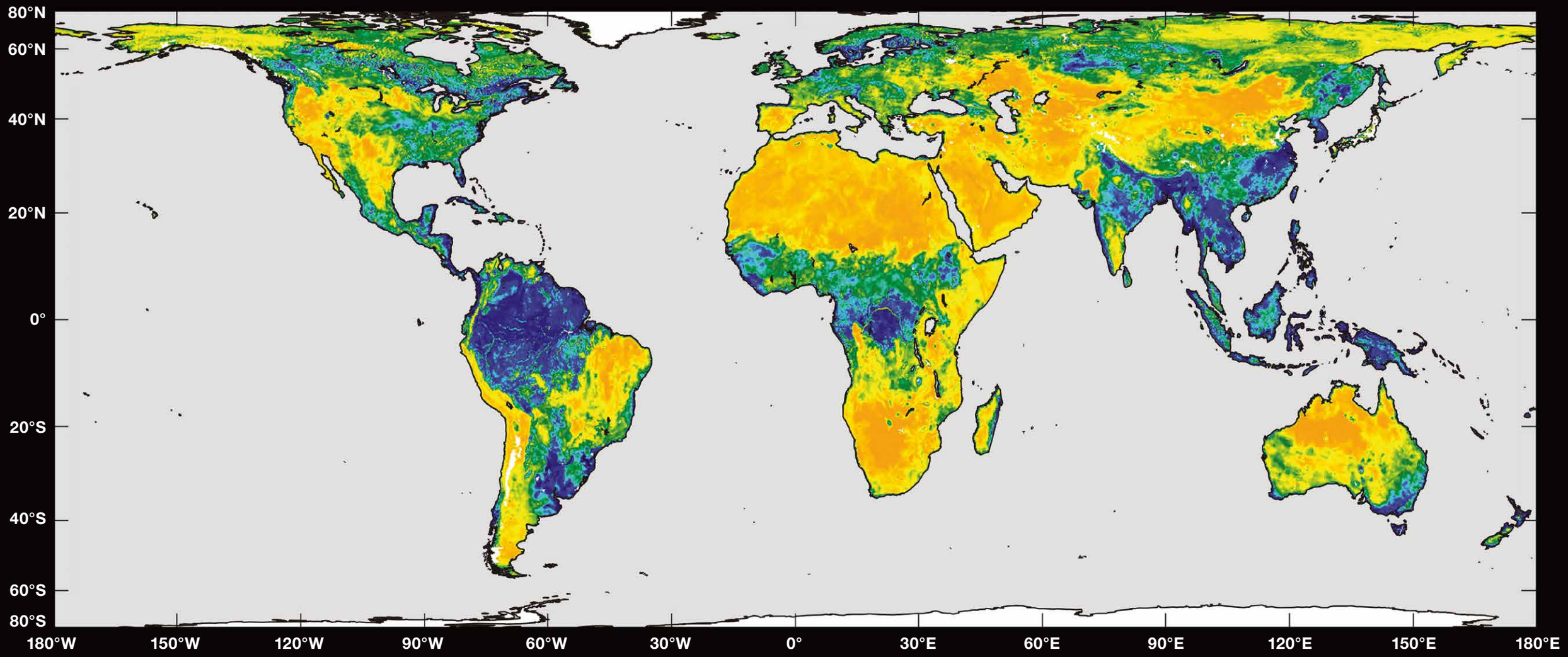
Artist's rendering of the Spitzer Space Telescope.

May 2017

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 2017

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



volumetric water content (cm^3/cm^3)

dry — moist

0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50 0.55 0.60 0.65

JULY 2017

New Moon · First Quarter · Full Moon · Last Quarter

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3	4 Independence Day	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

Mapping Global Soil Moisture from Space

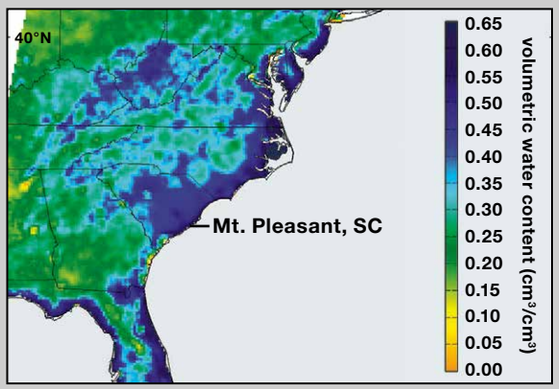
Water is one of the most important components of soil. The volume of water contained within a given volume of soil, or *soil moisture*, can fluctuate annually, seasonally, daily, and even hourly, due to changes in water availability from precipitation, irrigation, and evaporation from the soil and plants. The Soil Moisture Active Passive (SMAP) mission, launched on January 31, 2015, is NASA's first Earth-observing satellite designed to collect continuous global observations of surface soil moisture conditions.

Specifically, the radiometer onboard SMAP measures the intensity of microwave radiation emitted from the Earth's surface to provide estimates of soil moisture at a spatial resolution of approximately 40 kilometers (~25 miles) every three days. The image above shows a three-day composite of soil moisture conditions centered on July 3, 2016, as observed by the radiometer. The colors indicate volumetric water content (cm^3/cm^3) in the top 5 centimeters (~2 inches) of soil. Blue shades indicate wet areas, while orange shades indicate dry areas. Dry conditions are clearly evident across the Sahel region in Africa, Middle East, Western United States, and Australia's interior. Conversely, moist soil conditions, mostly due to precipitation, are evident in the Midwest and Eastern United States, Central Africa, Western Europe, and Southeast Asia.

Data from SMAP enable scientists to better understand processes that link the terrestrial water, energy, and carbon cycles; reduce uncertainties in predicting weather and climate; enhance our ability to monitor and predict natural hazards like floods and drought; and improve crop yield predictions.

Images and text credit: NASA/Jet Propulsion Laboratory

For more information:
www.nasa.gov/smap



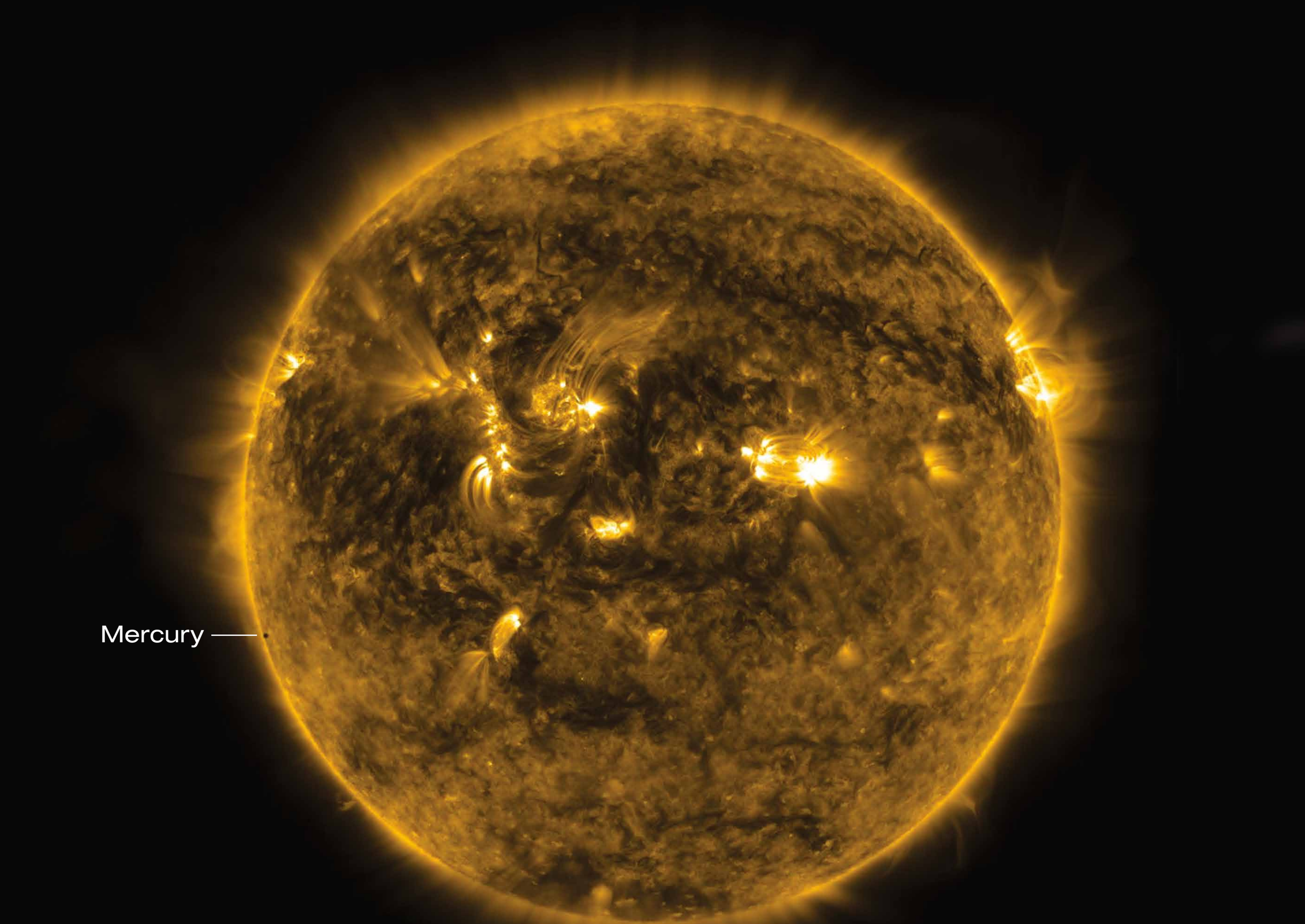
This image shows soil moisture conditions in the southeastern United States on October 5, 2015, as observed by SMAP's radiometer instrument. Most of South Carolina appears dark blue, due to widespread flooding caused by heavy tropical rainfall across the region. A record five-day (October 1-5) rainfall total of 27 inches (69 centimeters) was recorded in Mount Pleasant, SC.

June 2017

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 2017

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		


Mercury

AUGUST 2017

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		

A Special Kind of Transit

On occasion, if viewed from the right direction, a celestial body appears to pass in front of another celestial body. Such a configuration is called a *transit*. On May 9, 2016, the planet Mercury passed in front of the sun for over seven and a half hours. The planet is so small compared to the sun that it appears as a tiny black dot [*left*] in this image captured by NASA's Solar Dynamics Observatory, which shows the beginning of the Mercury transit. Transits provide an opportunity to study the way planets and stars move in space—information that has been used throughout the ages to better understand the solar system.

Observers in North America will have a rare opportunity to witness a special kind of transit on August 21, 2017—a *solar eclipse*, during which the moon will pass between the sun and Earth. Every contiguous state in the United States will have a view of either a fully or partially blocked sun—see inset image at right—the first time that's happened in 38 years. The moon's shadow can be divided into areas called the *umbra* (red line) and the *penumbra* (larger shaded bullseye pattern). The much smaller umbra lies at the very center of the shadow cone, and anyone there sees the moon entirely cover the sun in a total solar eclipse. Within the penumbra, the sun is only partially blocked, and observers experience a partial eclipse. Steps in the shading denote different percentages of sun coverage (eclipse magnitude), at levels of 90%, 75%, 50%, and 25%. Scientists around the country will take advantage of the total eclipse to observe the dim solar atmosphere, or *corona*, which is otherwise obscured by the sun's bright light.

Image and text credit: NASA's Goddard Space Flight Center, NASA's Solar Dynamics Observatory

For more information:
www.nasa.gov/eclipse

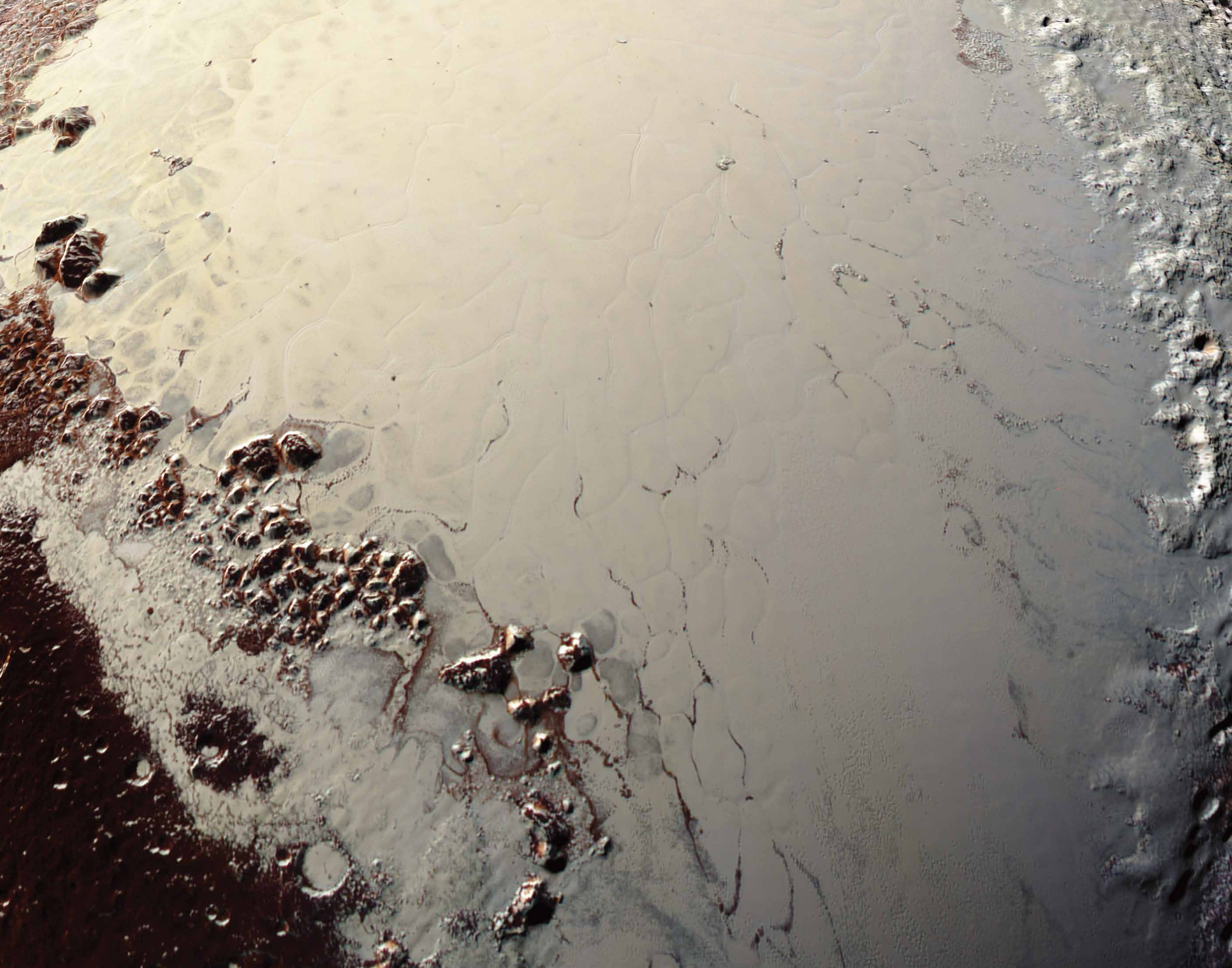
This artist's concept shows the path of the solar eclipse across the United States on August 21, 2017. The red line denotes the path of totality, the area where a total eclipse will be seen. Image credit: NASA's Goddard Space Flight Center, Scientific Visualization Studio

July 2017

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

September 2017

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



SEPTEMBER 2017

New Moon · First Quarter · Full Moon · Last Quarter

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

Pluto's Heart: A Cosmic 'Lava Lamp'

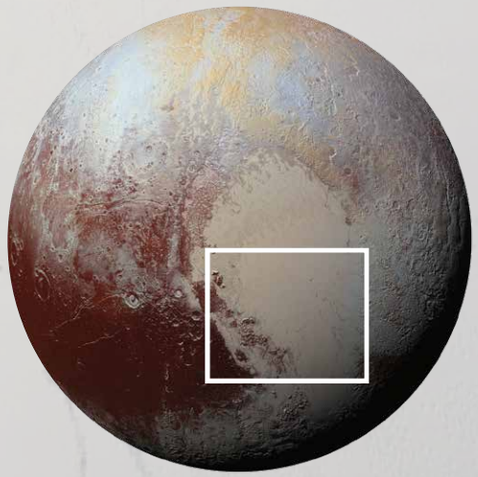
Like a cosmic lava lamp, a large section of Pluto's icy surface is being constantly renewed by a process called *convection*, replacing older surface ices with fresher material.

Combining computer models with topographic and compositional data gathered by NASA's New Horizons spacecraft in summer 2015, New Horizons team members have determined the depth of this layer of solid nitrogen ice within Pluto's distinctive "heart" feature—a large plain informally known as *Sputnik Planitia* (informal name)—and how fast that ice is flowing.

The New Horizons science team used state-of-the-art computer simulations to show that the surface of Sputnik Planitia is covered with icy, churning, convective "cells" 10 to 30 miles (16 to 48 kilometers) across, and less than one million years old. The team believes the pattern of these cells stems from the slow thermal convection of the nitrogen-dominated ices that fill Sputnik Planitia. A reservoir that's likely several miles deep in some places, the solid nitrogen is warmed by Pluto's modest internal heat, becomes buoyant and rises up in great blobs—like a lava lamp—before cooling off and sinking again to renew the cycle. The findings offer additional insight into the unusual and highly active geology on Pluto and, perhaps, other bodies like it on the outskirts of the solar system.

Images and text credit: NASA, Johns Hopkins Applied Physics Laboratory, Southwest Research Institute

For more information: www.nasa.gov/newhorizons



NASA's New Horizons spacecraft captured this enhanced color view of Pluto on July 14, 2015.

August 2017

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
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27	28	29	30	31		

October 2017

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

X-Ray

Ultraviolet

OCTOBER 2017

New Moon · First Quarter · Full Moon · Last Quarter

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

Andromeda Galaxy Scanned with High-Energy X-Ray Vision

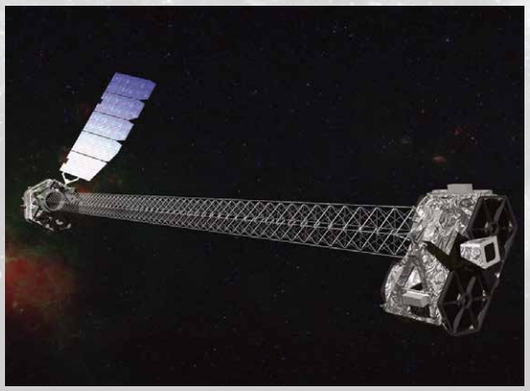
NASA's Nuclear Spectroscopic Telescope Array, or NuSTAR, has imaged a swath of the Andromeda galaxy—the nearest large galaxy to our own Milky Way galaxy. Andromeda is a spiral galaxy like the Milky Way but larger in size. It lies 2.5 million light-years away in the Andromeda constellation.

NuSTAR's view (inset) shows high-energy X-rays coming mostly from X-ray binaries, which are pairs of stars in which one "dead" member feeds off its companion. The dead member of the pair is either a black hole or neutron star. NuSTAR can pick up even the faintest of these objects, providing a better understanding of their population, as a whole, in Andromeda. The findings ultimately help astronomers gather clues about similar objects in the very distant universe.

The background image of Andromeda was taken by NASA's Galaxy Evolution Explorer in ultraviolet light.

Images and text credit: NASA/Jet Propulsion Laboratory-California Institute of Technology, NASA's Goddard Space Flight Center

For more information:
www.nasa.gov/nustar



Artist's concept of NuSTAR on orbit.

September 2017

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

November 2017

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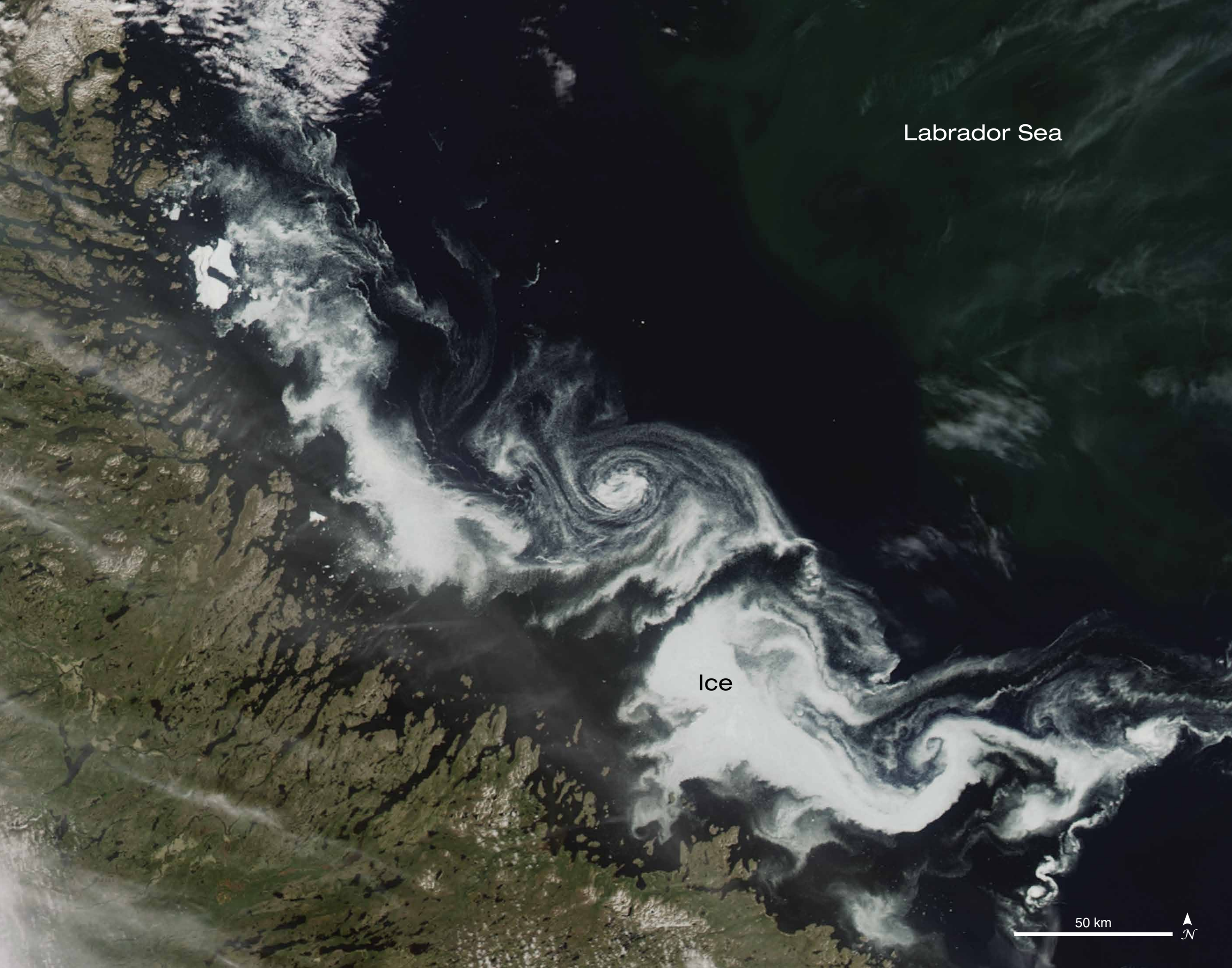
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		


Labrador Sea
Ice
50 km
N

NOVEMBER 2017

New Moon · First Quarter · Full Moon · Last Quarter

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

Swirls of Ice in the Labrador Sea

The delicate swirls of white running along Canada's Labrador Coast in the image above are not swirls of clouds—but *sea ice* (and perhaps some icebergs). Sea ice is frozen seawater that floats on the ocean surface. During the depths of Northern Hemisphere winter months, ice extends all along the Labrador Coast. With the onset of spring and warmer temperatures, ice begins to melt and break into smaller *ice floes*—large areas of ice floating in the ocean. These floes move in response to winds, waves, and currents, occasionally getting caught up in circular currents of water called *eddies*. Aircraft photography confirms that the swirls in the image are ice eddies—see photo at right. Ice eddies in this region can cover hundreds of square kilometers. Such formations can be hazardous to maritime vessels traveling along the Labrador Coast.

Seasonal sea ice melt was well underway when the Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's Aqua satellite acquired the above image on July 2, 2016. Clouds often hover over this region, making nearly-cloud-free images such as this one relatively rare. Note that a few wispy clouds over the Labrador land area and further out at sea are visible.

Image and text credit: NASA's Earth Observatory

For more information:
www.nasa.gov/aqua

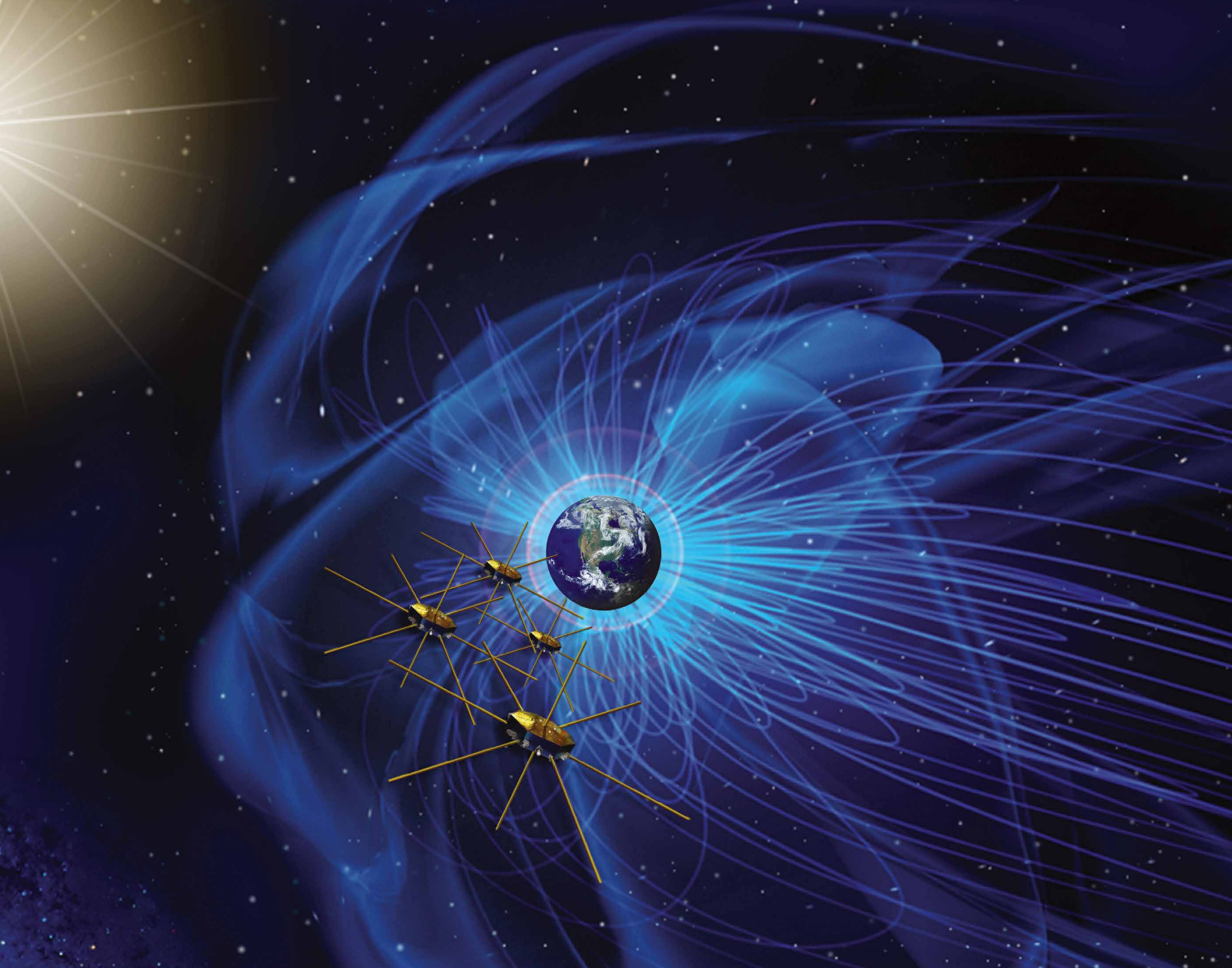
Pilot Jeff Davis took this photo of one of the ice eddies near the Labrador Coast on July 2, 2016, from a Boeing 777. "At first sight I thought it was a hurricane-type low-pressure system but quickly realized what I was seeing was not clouds but surface ice," said Davis. Photo credit: Jeff Davis

October 2017

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				

December 2017

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
24/31	25	26	27	28	29	30



DECEMBER 2017

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 31	25 Christmas Day	26	27	28	29	30

NASA Directly Observes Magnetic Reconnection for the First Time

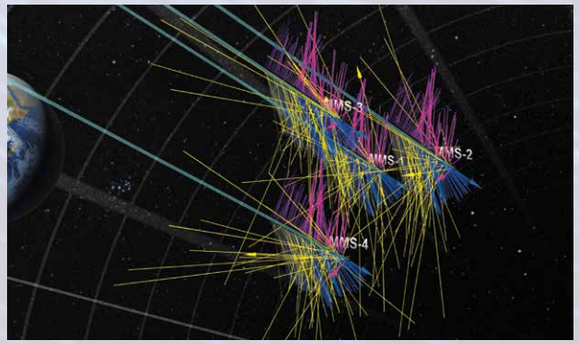
Space is a better vacuum than any we can create on Earth, but it does contain some particles—and it's bustling with activity. It overflows with energy and a complex system of magnetic fields. Depicted as an artist's concept above, the four Magnetospheric Multiscale, or MMS, spacecraft study *magnetic reconnection*—powerful explosions that occur when magnetic fields collide and realign.

For the first time ever, on October 16, 2015, MMS traveled straight through a magnetic reconnection event at the boundary where Earth's magnetic field bumps up against the sun's magnetic field. In only a few seconds, MMS collected hundreds of observations about the way the magnetic fields and particles were moving—see inset image at right. As the magnetic fields realigned, they sent particles zooming off in jets. This fundamental process occurs regularly throughout the universe and is one of the key forces driving particles to accelerate through space.

MMS made more than 4,000 trips through the boundaries of Earth's magnetic field during its first year in space. Observations from the mission show that magnetic reconnection is dominated by the physics of electrons. As we rely more on satellites and prepare for a journey to Mars, it is important to understand this complex system to better protect our spacecraft and astronauts.

Images and text credit: NASA's Goddard Space Flight Center, Scientific Visualization Studio

For more information:
www.nasa.gov/mms



The image above was created using data collected by MMS near the height of the reconnection event. The arrows denote the direction of the magnetic field (magenta), electrons (yellow), and protons (blue) relative to the spacecraft position. The length of the blue and yellow vectors represent the particles' speed, while the length of the magenta vectors represent the strength of the magnetic fields. Note that the electrons (yellow arrows) are flying in all directions.

November 2017

S	M	T	W	T	F	S
			1	2	3	4
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26	27	28	29	30		

January 2018

S	M	T	W	T	F	S
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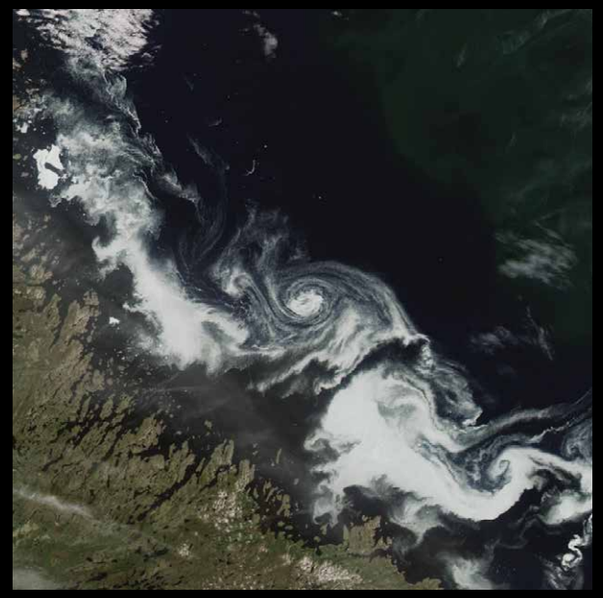

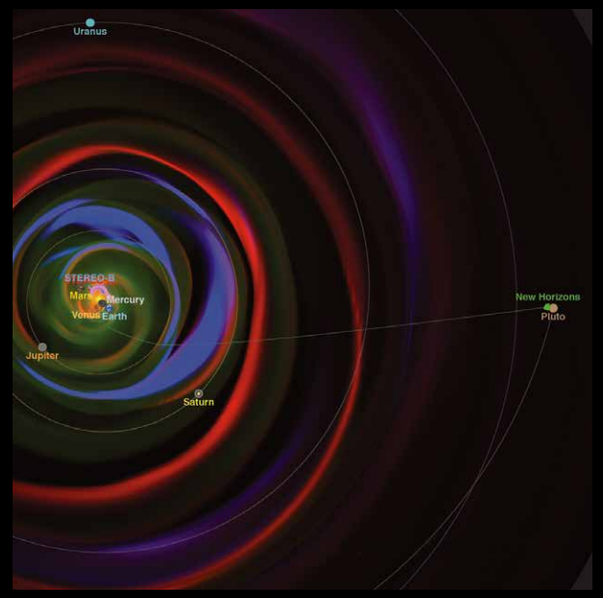

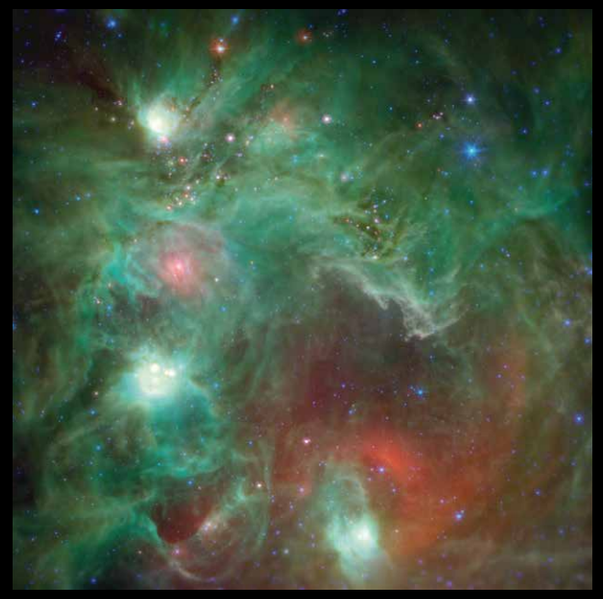

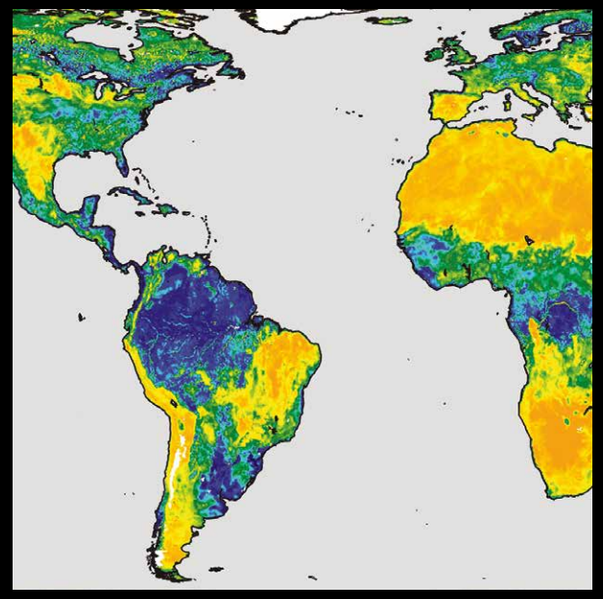

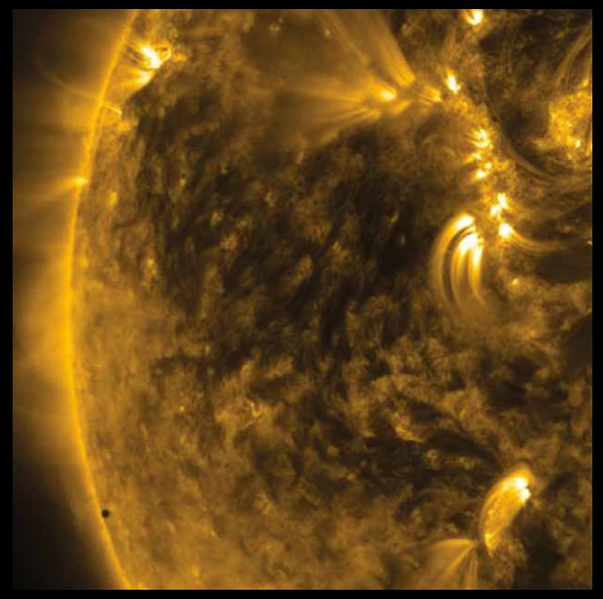

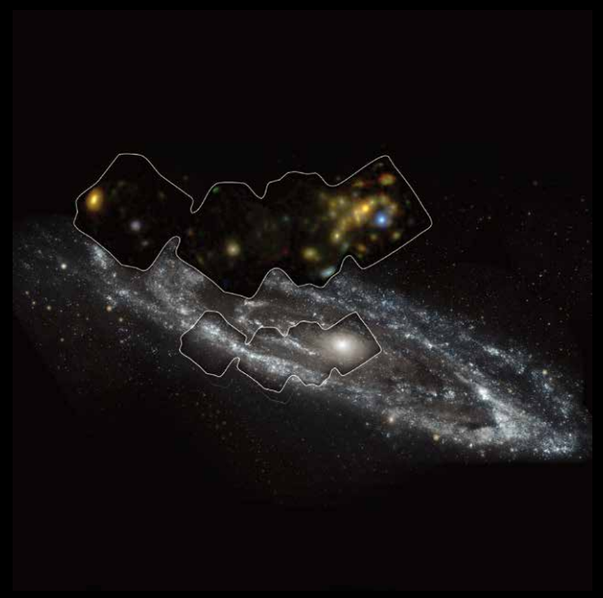

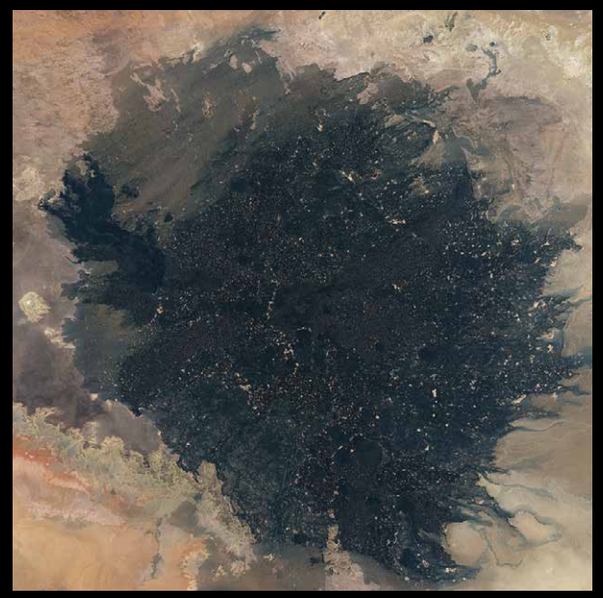

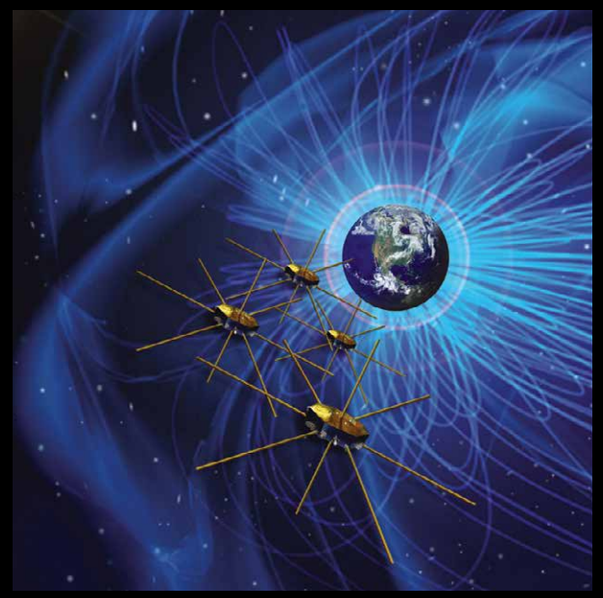

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