

Space News Update – March 2016

By Pat Williams

IN THIS EDITION:

- **NASA astronaut Scott Kelly returns safely to Earth after one-year mission.**
- **ExoMars on its way to solve the Red Planet's mysteries.**
- **Rosetta finds magnetic field-free bubble at comet.**
- **Dawn's first year at Ceres: a mountain emerges.**
- **Size matters: NASA measures raindrop sizes from space to understand storms.**
- **Citizen Scientists Help NASA Researchers Understand Auroras.**
- **Links to other space and astronomy news published in March 2016.**

Disclaimer - I claim no authorship for the printed material; except where noted (PW).

NASA ASTRONAUT SCOTT KELLY RETURNS SAFELY TO EARTH AFTER ONE-YEAR MISSION



NASA astronaut and Expedition 46 Commander Scott Kelly and his Russian counterpart Mikhail Kornienko enjoy the cold fresh air back on Earth after their historic 340-day mission aboard the International Space Station.

Credits: NASA T

NASA astronaut and Expedition 46 Commander Scott Kelly and his Russian counterpart Mikhail Kornienko returned to Earth Tuesday after a 340-day mission aboard the International Space Station. NASA astronaut and Expedition 46 Commander Scott Kelly and his Russian counterpart Mikhail Kornienko returned to Earth Tuesday after a historic 340-day mission aboard the International Space Station. They landed in Kazakhstan at 11:26 p.m. EST (10:26 a.m. March 2 Kazakhstan time).

“Scott Kelly’s one-year mission aboard the International Space Station has helped to advance deep space exploration and America’s Journey to Mars,” said NASA Administrator Charles Bolden. “Scott has become the first American astronaut to spend a year in space, and in so doing, helped us take one giant leap toward putting boots on Mars.”

During the record-setting [One-Year mission](#), the station crew conducted almost 400 investigations to advance NASA’s mission and [benefit all of humanity](#). Kelly and Kornienko specifically participated in a number of studies to inform NASA’s [Journey to Mars](#), including research into how the human body adjusts to weightlessness, isolation, radiation and the stress of long-duration spaceflight. Kelly’s identical twin brother, former NASA astronaut Mark Kelly, participated in parallel [twin studies](#) on Earth to help scientists compare the effects of space on the body and mind down to the cellular level. [NASA astronaut Scott Kelly returns safely to Earth after one-year mission](#) (2 March 2016)

EXOMARS ON ITS WAY TO SOLVE THE RED PLANET'S MYSTERIES



ExoMars 2016 liftoff. Credit: ESA

The first of two joint ESA-Roscosmos missions to Mars has begun a seven-month journey to the Red Planet, where it will address unsolved mysteries of the planet's atmosphere that could indicate present-day geological – or even biological – activity.



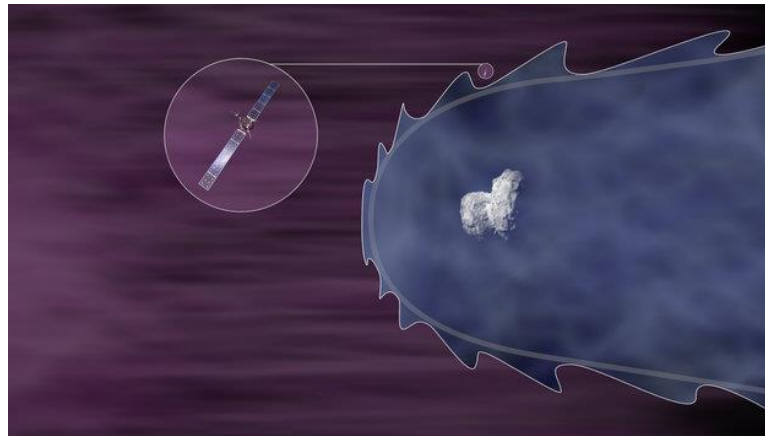
Trace Gas Orbiter at Mars. Credit: ESA

After a year of complex 'aerobraking', manoeuvres during which the spacecraft will use the planet's atmosphere to lower its orbit slowly to a circular 400 km, its scientific mission to analyse rare gases in the atmosphere will begin. Of particular interest is methane, which on Earth, points to active geological or biological processes. One of the mission's key goals is to follow up on the methane detection made by ESA's Mars Express in 2004 to understand the processes at play in its generation and destruction, with an improved accuracy of three orders of magnitude over previous measurements.

TGO will also image features on the Martian surface that may be related to trace-gas sources such as volcanoes. In addition, it will be able to detect buried water-ice deposits, which, along with locations identified as sources of the trace gases, could influence the choice of landing sites of future missions.

The orbiter will also act as a data relay for the second ExoMars mission, comprising a rover and stationary surface science platform, which is scheduled for launch in May 2018, arriving in early 2019. [ExoMars on its way to solve the Red Planet's mysteries](#) (14 March 2016)

ROSETTA FINDS MAGNETIC FIELD-FREE BUBBLE AT COMET



Magnetic field-free cavity at comet

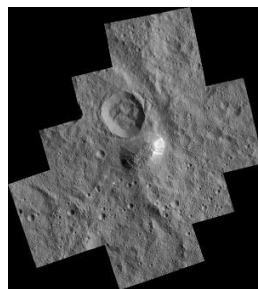
ESA's Rosetta spacecraft has revealed a surprisingly large region around its host comet devoid of any magnetic field. Interplanetary space is pervaded by the solar wind, a flow of electrically charged particles streaming from the Sun and carrying its magnetic field across the Solar System. But a comet pouring lots of gas into space obstructs the solar wind. At the interface between the solar wind and the coma of gas around the active comet, particle collisions as well as sunlight can [knock out electrons from the molecules in the coma](#), which are ionised and picked up by the solar wind. This process slows the solar wind, diverting its flow around the comet and preventing it from directly impacting the nucleus. Along with the solar wind, its magnetic field is unable to penetrate the environment around the comet, creating a region devoid of magnetic field called a diamagnetic cavity.

Scientists are now busy analysing all the magnetic field-free events recorded by Rosetta, to learn more about the properties of the plasma in the comet environment and its interaction with the solar wind. After perihelion, as the comet moved away from the Sun and its outgassing and dust production rate declined, the spacecraft was able to move closer to the nucleus, and the magnetometer continued detecting magnetic field-free regions for several months, until the latest detection in February 2016.

[Rosetta finds magnetic field-free bubble at comet](#) (11 March 2016)

DAWN'S FIRST YEAR AT CERES: A MOUNTAIN EMERGES

One year ago, on March 6, 2015, NASA's Dawn spacecraft slid gently into orbit around Ceres, the largest body in the asteroid belt between Mars and Jupiter.



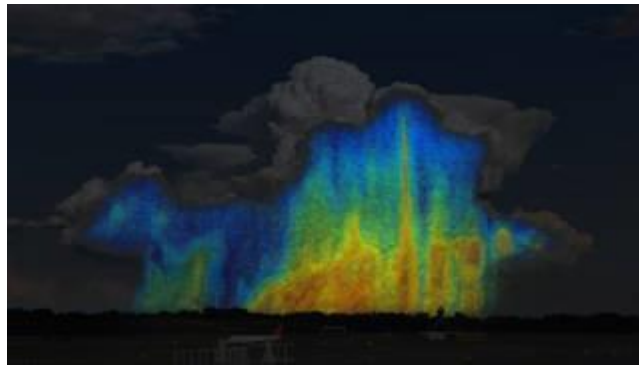
Credit: NASA

Ceres' mysterious mountain Ahuna Mons is seen in this mosaic of images from NASA's Dawn spacecraft. Dawn took these images from its low-altitude mapping orbit, 240 miles (385 kilometers) above the surface, in December 2015. The resolution of the component images is 120 feet (35 meters) per pixel.

On its steepest side, this mountain is about 3 miles (5 kilometers) high. Its average overall height is 2.5 miles (4 kilometers). These figures are slightly lower than what scientists estimated from Dawn's higher orbits because researchers now have a better sense of Ceres' topography. The diameter of the mountain is about 12 miles (20 kilometers). Researchers are exploring the processes that could have led to this feature's formation.

[Dawn's first year at Ceres: a mountain emerges](#) (7 March 2016)

NASA MEASURES RAINDROP SIZES FROM SPACE TO UNDERSTAND STORMS



This is a conceptual image showing how the size and distribution of raindrops varies within a storm. Blues and greens represent small raindrops that are 0.5-3mm in size. Yellows, oranges, and reds represent larger raindrops that are 4-6mm in size. A storm with a higher ratio of yellows, oranges, and reds will contain more water than a storm with a higher ratio of blues and greens. Credits: NASA/Goddard

Not all raindrops are created equal. The size of falling raindrops depends on several factors, including where the cloud producing the drops is located on the globe and where the drops originate in the cloud.

[Size matters: NASA measures raindrop sizes from space to understand storms](#) (31 March 2016)

CITIZEN SCIENTISTS HELP NASA RESEARCHERS UNDERSTAND AURORAS



The above picture shows a screenshot of the Aurorasaurus map that the public can see by logging onto [aurorasaurus.org](#). The map shows an aurora storm on March 6, 2016. Citizen scientists reported seeing aurora in the midlands of England, the north coast of the Netherlands, and areas in the United States such as Maine, New York, Minnesota and North Dakota. The green, yellow and red areas show the current oval estimate. Green plus signs mean positive sightings. Blue Twitter icons mean verified tweets. Credits: Aurorasaurus

Space weather scientist Liz MacDonald founded Aurorasaurus — a citizen science project that tracks auroras through the project's website, mobile apps and Twitter. For the first time, citizen science

observations are being used in a concerted effort to track auroras in real-time.
[Citizen Scientists Help NASA Researchers Understand Auroras](#) (7 March 2016)

LINKS TO OTHER SPACE AND ASTRONOMY NEWS PUBLISHED IN MARCH 2016

ASTEROIDS

[The art of landing on an asteroid](#) (2 March 2016)

Researchers in France have customised a drop tower to simulate landing a CubeSat on an asteroid in the near-absence of gravity – part of the preparations for ESA's Asteroid Impact Mission.

ASTROPHYSICS

[Cosmochemists find evidence of rare element in early solar system](#) (4 March 2016) UChicago scientists have discovered evidence in a meteorite that a rare element, curium, was present during the formation of the solar system.

[Mysterious infrared light from space resolved perfectly](#) (10 March 2016)

A research team using the Atacama Large Millimeter/submillimeter Array (ALMA) has detected the faintest millimetre-wave source ever observed.

[A new view of the X-ray sky](#) (22 March 2016)

Scientists at the Max Planck Institute for Extra-terrestrial Physics (MPE) have revisited the all-sky survey carried out by the ROSAT satellite, to create a new image of the sky at X-ray wavelengths.

[NSF continues support of IceCube Neutrino Observatory](#) (30 March 2016)

The National Science Foundation (NSF) today announced that it has renewed a cooperative agreement with the University of Wisconsin-Madison (UW-Madison) to operate the IceCube Neutrino Observatory, a massive particle detector buried deep in the ice beneath the South Pole.

BLACK HOLES

[Black hole raging red](#) (16 March 2016)

Violent red flashes, lasting just fractions of a second, have been observed during one of the brightest black hole outbursts in recent years.

[Ultra-fast winds near supermassive black hole](#) (21 March 2016)

New research led by astrophysicists at York University has revealed the fastest winds ever seen at ultraviolet wavelengths near a supermassive black hole.

[Simulating supermassive black holes](#) (30 March 2016)

Near the edge of the visible Universe are some of the brightest objects ever observed, known as quasars, which are believed to contain supermassive black holes of more than a billion times the mass of our Sun.

COMET

[Close comet flyby threw Mars' magnetic field into chaos](#) (9 March 2016)

Just weeks before the historic encounter of comet C/2013 A1 (Siding Spring) with Mars in October 2014, NASA's Mars Atmosphere and Volatile Evolution (MAVEN) spacecraft entered orbit around the Red Planet.

[A 'tail' of two comets](#) (18 March 2016)

Two comets that will safely fly past Earth later this month may have more in common than their intriguingly similar orbits. They may be twins of a sort.

DWARF PLANET

[Unexpected changes of bright spots on Ceres discovered](#) (16 March 2016)

Observations made using the HARPS spectrograph at ESO's La Silla Observatory in Chile have revealed unexpected changes in the bright spots on the dwarf planet Ceres.

[Bright spots and colour differences revealed on Ceres](#) (22 March 2016)

Scientists from NASA's Dawn mission unveiled new images from the spacecraft's lowest orbit at Ceres, including highly anticipated views of Occator Crater, at the 47th annual Lunar and Planetary Science Conference in The Woodlands, Texas, on Tuesday.

DWARF STARS

[Mapping the Milky Way with dwarf stars](#) (16 March 2016)

Two astronomy students from Leiden University have mapped the entire Milky Way galaxy in dwarf stars for the first time.

EARTH

[1,250 athletes in the 2016 Marathon des Sables to use Globalstar's SPOT Gen3](#) (7 March 2016)

Globalstar Europe Satellite Services today announced that its SPOT Gen3 safety device will be integral to the safety and security of 1,250 athletes competing in the Marathon des Sables 2016 (MDS), the world's most extreme running race taking place 8-18 April 2016 in Morocco.

[DigitalGlobe providing rapid assessment of cyclone damage for government of Fiji](#) (7 March 2016)

DigitalGlobe is delivering crowdsourced damage assessments derived from satellite imagery to the government of Fiji in response to the devastating cyclone that struck the island nation on Feb. 20.

[NASA selects instruments to study air pollution, tropical cyclones](#) (10 March 2016)

NASA has selected two proposals for new Earth science investigations that will put new instruments in low-Earth orbit to track harmful particulate air pollutants and study the development of tropical cyclones.

[NASA station leads way for improved measurements of Earth orientation, shape](#) (10 March 2016)

NASA has demonstrated the success of advanced technology for making precise measurements of Earth's orientation and rotation – information that helps provide a foundation for navigation of all space missions and for geophysical studies of our planet.

[Jason-3 begins mapping oceans, sees ongoing El Niño](#) (16 March 2016)

Jason-3, a new U.S.-European oceanography satellite mission with NASA participation, has produced its first complete science map of global sea surface height, capturing the current signal of the 2015-16 El Niño.

[GOES-R satellite could provide better data for hurricane prediction](#) (24 March 2016)

The launch of the GOES-R geostationary satellite in October 2016 could herald a new era for predicting hurricanes, according to Penn State researchers.

[Program aims to facilitate robotic servicing of geosynchronous satellites](#) (25 March 2016)

Hundreds of military, government and commercial satellites reside today in geosynchronous Earth orbit (GEO) some 36,000 kilometers above the Earth—a perch ideal for providing communications, meteorology and national security services, but one so remote as to preclude inspection and diagnosis of malfunctioning components, much less upgrades or repairs.

[NASA satellite images uncover underground forest fungi](#) (31 March 2016)

A NASA-led team of scientists has developed the first-ever method for detecting the presence of different types of underground forest fungi from space, information that may help researchers predict how climate change will alter forest habitats.

EXOPLANETS

[Avoiding 'false positives' in the search for living worlds](#) (29 February 2016)

Research from the University of Washington-based Virtual Planetary Laboratory published Feb. 26 in Astrophysical Journal Letters will help astronomers better identify — and thus rule out — “false positives” in the search for life beyond Earth.

[VLA shows earliest stages of planet formation](#) (17 March 2016)

New images of a young star made with the Karl G. Jansky Very Large Array (VLA) reveal what scientists think may be the very earliest stages in the formation of planets.

[Most eccentric planet known flashes astronomers with reflected light](#) (16 March 2016)

Led by SF State astronomer Stephen Kane, a team of researchers has spotted an extrasolar planet about 117 light-years from earth that boasts the most eccentric orbit yet seen.

[Investigating the mystery of migrating 'hot Jupiters'](#) (28 March 2016)

The last decade has seen a bonanza of exoplanet discoveries. Nearly 2,000 exoplanets -- planets outside our solar system -- have been confirmed so far, and more than 5,000 candidate exoplanets have been identified.

[NASA selects instrument team to build next-gen planet hunter](#) (29 March 2016)

NASA has selected a team to build a new, cutting-edge instrument that will detect planets outside our solar system, known as exoplanets, by measuring the miniscule “wobbling” of stars.

[Spitzer maps climate patterns on a super-Earth](#) (30 March 2016)

Observations from NASA's Spitzer Space Telescope have led to the first temperature map of a super-Earth planet -- a rocky planet nearly two times as big as ours.

GALAXIES

[Hubble team breaks cosmic distance record](#) (3 March 2016)

By pushing NASA's Hubble Space Telescope to its limits, an international team of astronomers has shattered the cosmic distance record by measuring the farthest galaxy ever seen in the universe.

[Deciphering compact galaxies in the young universe](#) (7 March 2016)

A group of researchers using the Suprime-Cam instrument on the Subaru Telescope has discovered about 80 young galaxies that existed in the early universe about 1.2 billion years after the Big Bang.

[Colossal 'super spiral' galaxies](#) (17 March 2016)

A strange new kind of galactic beast has been spotted in the cosmic wilderness

GRAVITATIONAL WAVES

[INTEGRAL sets limits on gamma rays from merging black holes](#) (30 March 2016)

Following the discovery of gravitational waves from the merging of two black holes, ESA's INTEGRAL satellite has revealed no simultaneous gamma rays, just as models predict.

INTERNATIONAL SPACE STATION

[Launch returns International Space Station crew to full strength](#) (19 March 2016)

NASA astronaut Jeff Williams is now the first American to become a three-time, long-term resident of the International Space Station.

[On its way to the ISS: the E-nose gets a trunk](#) (17 March 2016)

Electronic artificial nose will 'flexibly' search for bacterial contamination on board the International Space Station.

[United Launch Alliance launches cargo to International Space Station](#) (22 March 2016)

A United Launch Alliance (ULA) Atlas V rocket carrying the OA-6 Cygnus resupply craft to the International Space Station (ISS) lifted off from Space Launch Complex-41 on March 22 at 11:05 p.m. EDT.

[NASA sends fire, meteor experiments to International Space Station on commercial cargo spacecraft](#)

(23 March 2016) Scientific investigations of fire in microgravity and grippers inspired by geckos are among the nearly 7,500 pounds of cargo headed to the International Space Station aboard an Orbital ATK Cygnus spacecraft, along with equipment to support some 250 other experiments and studies aboard the world's only orbital laboratory.

JAMES WEBB SPACE TELESCOPE

[James Webb Space Telescope secondary mirror installed](#) (7 March 2016)

The sole secondary mirror that will fly aboard NASA's James Webb Space Telescope was installed onto the telescope at NASA's Goddard Space Flight Center in Greenbelt, Maryland, on March 3, 2016.

[Major milestones for the James Webb Space Telescope](#) (21 March 2016)

NASA's James Webb Space Telescope just got a little closer to launch with the completion of cryogenic testing on its science cameras and spectrographs and the installation of the final flight mirrors.

[Airbus Defence and Space instruments for the James Webb Space Telescope get thumbs-up](#)

(22 March 2016)

Near Infrared Spectrograph NIRSpec and Mid-Infrared Instrument MIRI are installed with two other instruments in JWST's payload module called the Integrated Science Instrument Module (ISIM).

JUPITER AND MOONS

[Solar storms trigger Jupiter's 'Northern Lights'](#) (23 March 2016)

Solar storms trigger Jupiter's intense 'Northern Lights' by generating a new X-ray aurora that is eight times brighter than normal and hundreds of times more energetic than Earth's aurora borealis, finds new UCL-led research using NASA's Chandra X-Ray Observatory.

MANNED SPACE

[Unpacking space radiation key to controlling cancer risk](#) (10 March 2016)

NASA limits an astronaut's radiation exposures to doses that keep their added risk of fatal cancer below 3 percent.

[NASA's 'Spaceport of the Future' reaches another milestone](#) (29 March 2016)

NASA has completed a major milestone on its journey to Mars and is ready to begin another phase of work on its spaceport of the future, where the next generation of astronauts will launch to Mars and other deep-space destinations.

MARS

[Great tilt gave Mars a new face](#) (2 March 2016)

The surface of the planet Mars tilted by 20 to 25 degrees 3 to 3.5 billion years ago.

[The countdown has started for ExoMars mission](#) (11 March 2016)

The countdown has started for ExoMars mission now ready to be launched on March 14 from the Baikonur Cosmodrome in Kazakhstan with a Proton Breeze M rocket.

[e2v aboard ExoMars Trace Gas Orbiter mission to Mars](#) (14 March 2016)

The ESA and Roscosmos mission to investigate trace gases in the Martian atmosphere has been launched today.

[New gravity map gives best view yet inside Mars](#) (21 March 2016)

A new map of Mars' gravity made with three NASA spacecraft is the most detailed to date, providing a revealing glimpse into the hidden interior of the Red Planet.

[ExoMars performing flawlessly](#) (23 March 2016)

Following a spectacular liftoff, ESA's ExoMars Trace Gas Orbiter is performing flawlessly en route to the Red Planet.

[Mile-high Mars mounds built by wind and climate change](#) (31 March 2016)

New research has found that wind carved massive mounds of more than a mile high on Mars over billions of years. Their location helps pin down when water on the Red Planet dried up during a global climate change event.

MISCELLANEOUS

[Mysterious cosmic radio bursts found to repeat](#) (2 March 2016)

Astronomers for the first time have detected repeating short bursts of radio waves from an enigmatic source that is likely located well beyond the edge of our Milky Way galaxy.

MOON

[Tales of a tilting moon hidden in its polar ice](#) (22 March 2016)

A new study published Wednesday in Nature reports that the moon may not have always had the same face pointed toward the Earth.

[Moon thought to play a major role in maintaining Earth's magnetic field](#) (31 March 2016)

The Earth's magnetic field permanently protects us from the charged particles and radiation that originate in the Sun.

NOVAE

[Star eruptions create and scatter elements with Earth-like composition](#) (8 March 2016)

Observations made with NASA's flying observatory, the Stratospheric Observatory for Infrared Astronomy (SOFIA) indicate that nova eruptions create elements that can form rocky planets, much like Earth.

PLUTO

[CU-Boulder student-built dust counter got few "hits" on Pluto flyby](#) (17 March 2016)

A student-built University of Colorado Boulder instrument riding on NASA's New Horizons spacecraft found only a handful of dust grains, the building blocks of planets, when it whipped by Pluto at 31,000 miles per hour last July.

QUASARS

[Quasars slowed star formation](#) (23 March 2016)

Research led by Johns Hopkins University scientists has found new persuasive evidence that could help solve a long-standing mystery in astrophysics: why did the pace of star formation in the universe slow down some 11 billion years ago?

SATURN AND MOONS

[Moons of Saturn may be younger than the dinosaurs](#) (24 March 2016)

New research suggests that some of Saturn's icy moons, as well as its famous rings, might be modern adornments.

[Computer model explains sustained eruptions on icy moon of Saturn](#) (28 March 2016)

The Cassini spacecraft has observed geysers erupting on Saturn's moon Enceladus since 2005, but the process that drives and sustains these eruptions has remained a mystery.

STARS AND STAR CLUSTERS

[Young Sun-like star shows a magnetic field was critical for life on the early Earth](#) (16 March 2016)

Nearly four billion years ago, life arose on Earth. Life appeared because our planet had a rocky surface, liquid water, and a blanketing atmosphere.

[Hubble unveils monster stars](#) (17 March 2016)

Astronomers using the unique ultraviolet capabilities of the NASA/ESA Hubble Space Telescope have identified nine monster stars with masses over 100 times the mass of the Sun in the star cluster R136.

[Deadly stars](#) (24 March 2016)

The Earth is often struck by solar eruptions. These eruptions consist of energetic particles that are hurled away from the Sun into space, where those directed towards Earth encounter the magnetic field around our planet.

[Andromeda's first spinning neutron star](#) (31 March 2016)

Decades of searching in the Milky Way's nearby 'twin' galaxy Andromeda have finally paid off, with the discovery of an elusive breed of stellar corpse, a neutron star, by ESA's XMM-Newton space telescope.

SUPERNOVA

[Magnetar could have boosted explosion of extremely bright supernova](#) (24 March 2016)

Calculations by scientists have found highly magnetized, rapidly spinning neutron stars called magnetars could explain the energy source behind two extremely unusual stellar explosions.

[Trigger for Milky Way's youngest supernova identified](#) (30 March 2016)

Scientists have used data from NASA's Chandra X-ray Observatory and the NSF's Jansky Very Large Array to determine the likely trigger for the most recent supernova in the Milky Way.

TECHNOLOGY

[Versatile instrument to scout for Kuiper Belt objects](#) (3 March 2016)

At the Palomar Observatory near San Diego, astronomers are busy tinkering with a high-tech instrument that could discover a variety of objects both far from Earth and closer to home.

[Earth-space telescope system produces hot surprise](#) (29 March 2016)

Astronomers using an orbiting radio telescope in conjunction with four ground-based radio telescopes have achieved the highest resolution, or ability to discern fine detail, of any astronomical observation ever made.

[Status of Hitomi \(ASTRO-H\) X-ray astronomy satellite](#) (29 March 2016)

Communication with the JAXA's X-ray Astronomy Satellite "Hitomi" (ASTRO-H), launched on February 17, 2016 (JST), failed at 16:40, Saturday March 26 (JST).

[Atlas V OA-6 anomaly status](#) (31 March 2016)

ULA successfully launched and deployed the OA-6 Cygnus spacecraft to its desired orbit on Tuesday, March 22.

Pat Williams. March 2016