

Space News Update – July 2016

By Pat Williams

IN THIS EDITION:

- Juno spacecraft in orbit around mighty Jupiter.
- NASA sends trailblazing science cargo to ISS aboard SpaceX resupply mission.
- NASA's next planet hunter will look closer to home.
- Apollo astronauts experiencing higher rates of cardiovascular-related deaths.
- Scottish manned space launches a step closer after strategic partnership.
- UK National Space Propulsion Facility.
- Links to other space and astronomy news published in July 2016.

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

JUNO SPACECRAFT IN ORBIT AROUND MIGHTY JUPITER



This artist's concept depicts the Juno spacecraft above Jupiter. The spacecraft will next fly by the planet on Aug. 27, in the mission's first up-close science pass. Credit: NASA/JPL-Caltech

After an almost five-year journey to the solar system's largest planet, NASA's Juno spacecraft successfully entered Jupiter's orbit during a 35-minute engine burn. Confirmation that the burn had completed was received on Earth at 8:53 pm. PDT (11:53 p.m. EDT) Monday, July 4.

The official science collection phase begins in October. Juno's principal goal is to understand the origin and evolution of Jupiter. With its suite of nine science instruments, Juno will investigate the existence of a solid planetary core, map Jupiter's intense magnetic field, measure the amount of water and ammonia in the deep atmosphere, and observe the planet's auroras. The mission also will take a giant step forward in understanding how giant planets form and the role these titans played in putting together the rest of the solar system. As primary example of a giant planet, Jupiter also can provide critical knowledge for understanding the planetary systems being discovered around other stars.

[Juno spacecraft in orbit around mighty Jupiter](#) (4 July 2016)

NASA SENDS TRAILBLAZING SCIENCE, CARGO TO INTERNATIONAL SPACE STATION ABOARD SPACEX RESUPPLY MISSION



SpaceX's Dragon cargo craft launched at 12:45 a.m. EDT on a Falcon 9 rocket from Space Launch Complex 40 at Cape Canaveral Air Force Station in Florida with almost 5,000 pounds of cargo. Credits: NASA/Tony Gray

Instruments to perform the first-ever DNA sequencing in space, and the first international docking adapter for commercial spacecraft, are among the cargo scheduled to arrive at the International Space Station after Monday's launch of the SpaceX Commercial Resupply Services-9 (CRS-9) mission.

SpaceX's Dragon cargo craft launched at 12:45 a.m. EDT on a Falcon 9 rocket from Space Launch Complex 40 at Cape Canaveral Air Force Station in Florida with almost 5,000 pounds of cargo. The spacecraft will be grappled to the space station at 7 a.m. Wednesday, July 20, by NASA astronaut Jeff Williams, supported by NASA astronaut Kate Rubins.

"Each commercial resupply flight to the space station is a significant event. Everything, from the science to the spare hardware and crew supplies, is vital for sustaining our mission," said Kirk Shireman, NASA's International Space Station Program manager. "With equipment to enable novel experiments never attempted before in space, and an international docking adapter vital to the future of U.S. commercial crew spacecraft, we're thrilled this Dragon has successfully taken flight."

The mission is the company's ninth cargo flight to the station under NASA's CRS contract. [Dragon's cargo](#) will support dozens of the more than 250 science and research investigations during the station's Expeditions 48 and 49.

DNA testing aboard the space station typically requires collecting samples and returning them to Earth. The [Biomolecule Sequencer](#) seeks to demonstrate, for the first time, that DNA sequencing is feasible in microgravity using a crew-operated, miniaturized device to identify microbes, diagnose diseases, monitor crew health and possibly help detect DNA-based life off the Earth.

Maintaining safe temperatures is difficult in space where there is no atmosphere to moderate the extreme heat and cold provided by direct, unfiltered sunlight. The [Phase Change Heat Exchanger](#), a NASA investigation to test temperature control technology for future spacecraft, uses a continual process of freezing and thawing to maintain temperatures inside a spacecraft, thereby protecting crews and equipment. The crew also will test a new [efficient, three-dimensional solar cell](#).

Millions of Americans experience bone loss resulting from disease or the reduced effects of gravity that can occur in immobilized patients. New ground-based studies are using magnetic levitation equipment to simulate these gravity-related changes. Research delivered under the station's role as a [U.S. National Laboratory](#) includes [OsteoOmics](#), a test to determine whether magnetic levitation accurately simulates the free-fall conditions of microgravity by comparing genetic expression in

different types of bone cells. Improved understanding of the mechanisms behind bone loss could lead to better ways to prevent it during space missions. This also could contribute to better prevention of, and treatments for, bone loss as a result of diseases like osteopenia and osteoporosis, or from prolonged bed rest.

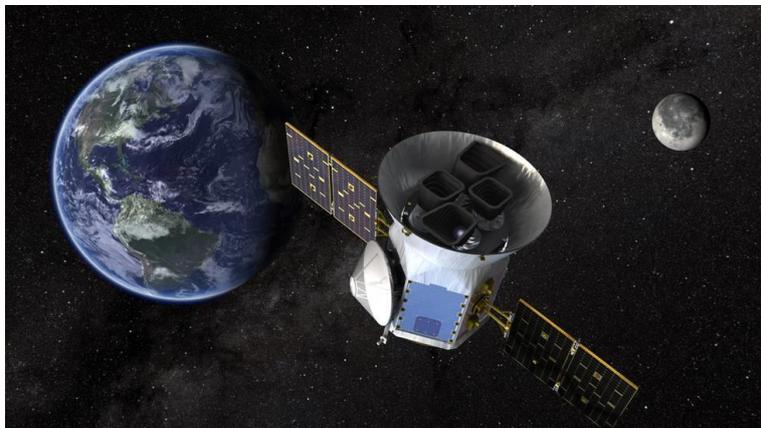
Another National Lab investigation called [Heart Cells](#) studies how microgravity changes the human heart, and how those changes vary from one individual to another. Future exploration of the moon, asteroids or Mars will require long periods of space travel, which creates increased risk of health problems such as muscle atrophy, including possible atrophy of heart muscle. Heart cells cultured aboard the space station for one month will be analyzed for cellular and molecular changes. Results could advance the study of heart disease and the development of drugs and cell replacement therapy.

Dragon is scheduled to depart the space station Monday, Aug. 29. After splashdown in the Pacific Ocean, west of Baja California, more than 3,300 pounds of science, hardware, crew supplies and spacewalk tools will be returned to shore.

For more than 15 years, humans have lived and worked continuously aboard the International Space Station, advancing scientific knowledge and demonstrating new technologies, making research breakthroughs not possible on Earth that will enable long-duration human and robotic exploration into deep space. A truly global endeavor, more than 200 people from 18 countries have visited the unique microgravity laboratory that has hosted more than 1,900 research investigations from researchers in more than 95 countries.

[NASA sends trailblazing science, cargo to International Space Station aboard SpaceX resupply mission](#) (18 July 2016)

NASA'S NEXT PLANET HUNTER WILL LOOK CLOSER TO HOME



TESS will look at the nearest, brightest stars to find planetary candidates that scientists will observe for years to come. Credits: NASA's Goddard Space Flight Center

As the search for life on distant planets heats up, NASA's Transiting Exoplanet Survey Satellite (TESS) is bringing this hunt closer to home. Launching in 2017-2018, TESS will identify planets orbiting the brightest stars just outside our solar system using what's known as the transit method. When a planet passes in front of, or transits, its parent star, it blocks some of the star's light. TESS searches for these telltale dips in brightness, which can reveal the planet's presence and provide additional information about it. TESS will be able to learn the sizes of the planets it sees and how long it takes them to complete an orbit. These two pieces of information are critical to understanding whether a planet is capable of supporting life. Nearly all other planet classifications will come from follow up observations, by both TESS team ground telescopes as well as ground- and space-based observations, including [NASA's James Webb Space Telescope](#) launching in 2018.

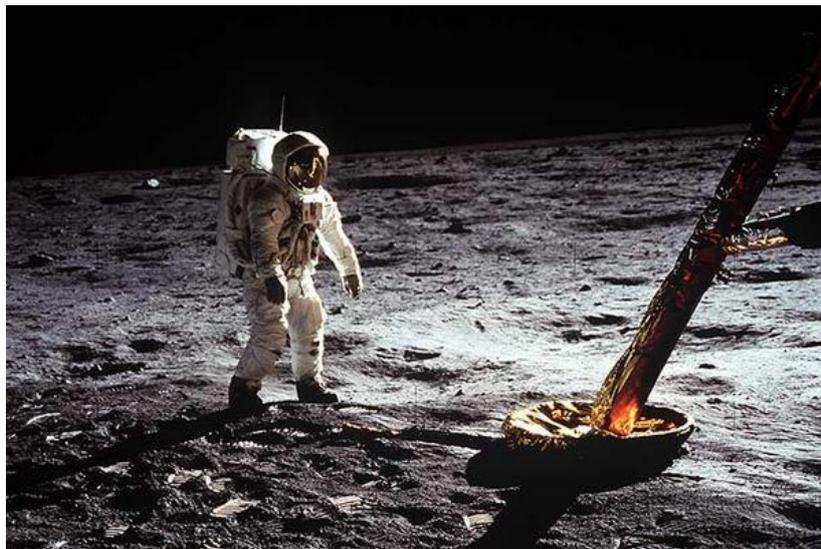
Compared to the [Kepler mission](#), which has searched for exoplanets thousands to tens of thousands of light-years away from Earth towards the constellation Cygnus, TESS will search for exoplanets

hundreds of light-years or less in all directions surrounding our solar system. TESS will survey most of the sky by segmenting it into 26 different segments known as tiles. The spacecraft's powerful cameras will look continuously at each tile for just over 27 days, measuring visible light from the brightest targets every two minutes. TESS will look at stars classified as twelfth apparent magnitude and brighter, some of which are visible to the naked eye. The higher the apparent magnitude, the fainter the star. For comparison, most people can see stars as faint as sixth magnitude in a clear dark sky and the faintest star in the Big Dipper ranks as third magnitude. Among the stars TESS will observe, small bright dwarf stars are ideal for planet identification, explained Joshua Pepper, co-chair of the TESS Target Selection Working Group. One of the TESS science goals is to find Earth- and super-Earth-sized planets. These are difficult to discover because of their small size compared to their host stars, but focusing TESS on smaller stars makes finding these small planets much easier. This is because the fraction of the host star's light that a planet blocks is proportional to the planet's size. Scientists expect TESS to observe at least 200,000 stars during the two years of its spaceflight mission, resulting in the discovery of thousands of new exoplanets.

While the search for transiting exoplanets is the primary goal of the mission, TESS will also make observations of other astrophysical objects through the Guest Investigator (GI) Program. Because TESS is conducting a near all-sky survey, it has the capability to perform interesting studies on many different types of astronomical target.

[NASA's next planet hunter will look closer to home](#) (27 July 2016)

APOLLO ASTRONAUTS EXPERIENCING HIGHER RATES OF CARDIOVASCULAR-RELATED DEATHS



Astronaut Edwin E. Aldrin Jr., lunar module pilot, walks on the surface of the moon near a leg of the Lunar Module during the Apollo 11 extravehicular activity (EVA). Astronaut Neil A. Armstrong, Apollo 11 commander, took this photograph with a 70mm lunar surface camera. The astronauts' boot prints are clearly visible in the foreground. While astronauts Armstrong and Aldrin descended in the Lunar Module (LM) "Eagle" to explore the Sea of Tranquility region of the moon, astronaut Michael Collins, command module pilot, remained with the Command and Service Modules (CSM) "Columbia" in lunar orbit.

Members of the successful Apollo space program are experiencing higher rates of cardiovascular problems that are thought to be caused by their exposure to deep space radiation, according to a Florida State University researcher. The men who traveled into deep space as part of the lunar missions were exposed to levels of galactic cosmic radiation that have not been experienced by any other astronauts or cosmonauts. That exposure is now manifesting itself as cardiovascular problems. This is the first study looking at the mortality of Apollo astronauts. The Apollo program ran from 1961 to 1972, with 11 manned flights into space between 1968 and 1972. Nine of those flew beyond Earth's orbit into deep space. The program is most notable for landing men on the moon as well as

the failed mission of Apollo. 13 43 percent of deceased Apollo astronauts died from a cardiovascular problem. That is four to five times higher than non-flight astronauts and astronauts who have traveled in low Earth orbit. Of the 24 men who flew into deep space on the Apollo lunar missions, eight have died and seven were included in the study. The eighth — Edgar Mitchell — died after the data analysis had been completed.

Delp and his colleagues also exposed mice to the type of radiation that Apollo astronauts would have experienced. After six months — the equivalent of 20 human years — the mice demonstrated an impairment of arteries that is known to lead to the development of atherosclerotic cardiovascular disease in humans. What the mouse data show is that deep space radiation is harmful to vascular health. Delp is working with NASA to conduct additional studies on the Apollo astronauts regarding their cardiovascular health.

[Apollo astronauts experiencing higher rates of cardiovascular-related deaths](#) (28 July 2016)

SCOTTISH MANNED SPACE LAUNCH A STEP CLOSER AFTER STRATEGIC PARTNERSHIP

Glasgow Prestwick Spaceport, XCOR and Orbital Access Limited cement partnership by signing strategic Memorandum of Understanding

Farnborough, UK, July 12, 2016 - US manned space launch vehicle designer XCOR Aerospace has signed a strategic Memorandum of Understanding (MoU) with spaceplane design and operating company Orbital Access Limited and Glasgow Prestwick Spaceport. This partnership is supported by Scottish Enterprise, the Scottish Government's economic development agency.

The MoU paves the way for the establishment of manned launch services at Prestwick using XCOR's Lynx spacecraft with support from existing Scottish aerospace organisations.

XCOR would also collaborate to establish new industrial and support activities at Prestwick, and within the wider Scottish space and aerospace sector.

The space launch service would be run by Orbital Access Limited as the first of a network of similar services at emerging horizontal launch spaceports worldwide.

Announcing the strategic collaboration at Farnborough International Airshow, Orbital Access CEO Stuart McIntyre set out the vision for a global launch service using the XCOR Lynx spacecraft, working alongside the unique aerospace industrial capabilities found in the Scottish aerospace sector.

He said:

"The Lynx represents a highly versatile manned spacecraft to service space research missions in zero gravity, and provide academics and industry with a unique and responsive research environment. It can also support leisure sub-orbital flights. This will complement our satellite launch systems, which are in development, and complete the suite of launch services Orbital Access will be offering at spaceports globally."

Mike Stewart, Business Development Director at Glasgow Prestwick Spaceport, said:

"Glasgow Prestwick Spaceport is fortunate enough to already have the UK's only space launch company, Orbital Access Limited, based right on its doorstep. Signing the Memorandum of Understanding with Orbital Access and XCOR is a further step forward in our work to make space launches from our site a reality.

"We already have the vast majority of the infrastructure in place and with as little as £1million investment we could be up and running. Having a pipeline of partners, customers and suppliers in place will be hugely helpful in pulling together the business case for the investment required to get up and running.

"The progress that we are making now that the UK Government has decided to make this a licensing regime rather than a bidding process demonstrates that this was the right decision for the industry and the UK economy. This has allowed the market to accelerate the process and decide where it feels that launches can be best delivered. We are delighted that Orbital Access and XCOR have decided that the best place for them is Glasgow Prestwick Spaceport and that they are establishing operational bases onsite."

Jay Gibson CEO President of XCOR added:

“Strategic aerospace industrial partnerships and strong routes to market characterise our approach to bringing this ground breaking system to fruition.

“Our unique reusable rocket motor technology is at the core of the Lynx and we are looking forward to working with partners in the Scottish aerospace and space sector.”

The MoU sets out an action plan for defining operations at Prestwick and establishing a global operational deployment model for Orbital Access Limited.

Speaking at the Farnborough event, Dr Philippa Whiteford MP commented on this new partnership, saying:

"I was delighted to have been able to play my part in Prestwick's future by convincing the UK Government to abandon their plan for a single Spaceport site, rumoured to be Newquay, and instead establish a licensing system to allow all sites to compete on their merits. Prestwick is now leading the race as it already has the key requisites for a Spaceport in its long runway, clear weather and associated aerospace expertise."

"I applaud the enthusiasm and determination of our Spaceport Team and welcome the agreements established this week between the Airport, local aerospace companies and space launch businesses. This, along with their links to Glasgow and Strathclyde Universities, is turning Prestwick into a real Aero-Space Campus."

About Orbital Access

Orbital Access Limited is the UK's first specialist spaceplane design and operating company. As such it will lead the development of UK designed and manufactured horizontal take off space launch systems. It occupies the iconic Palace of Engineering at Glasgow Prestwick Airport and is embarking on the development of a series of vehicles tailored to launch space payloads and satellites manufactured by the burgeoning UK satellite industry. More Information available at www.orbital-access.com

About XCOR

XCOR Aerospace is based in Mojave, California and is currently creating a Research and Development Center in Midland, Texas and an operational and manufacturing site at the Kennedy Space Center in Florida with the assistance of Space Florida. XCOR builds safer, more reliable, and reusable rocket-powered vehicles, propulsion systems, advanced non-flammable composites and rocket piston pumps. Through Amsterdam based XCOR Space Expeditions, a wholly owned subsidiary of XCOR, the company offers space-focused training programs with a variety of medical screening and specialty training missions for future XCOR Lynx flight participants. Learn more at www.xcor.com

About Glasgow Prestwick Spaceport

Glasgow Prestwick Spaceport is set to become one of the UK and Europe's first spaceports. The development of a spaceport at Prestwick is being led by Glasgow Prestwick Airport, an operational airport on the west coast of Scotland. The airport is in the process of developing a business plan for the spaceport and is building a network of potential partners, suppliers and customers.

The airport commissioned a technical feasibility study, using the FAA spaceport regulations as a guideline. The results of this indicated that Glasgow Prestwick Spaceport could be operational with as little as £1million of investment. The airport benefits from a 2,986 metre concrete base runway, coastal take offs, favourable weather conditions, excellent transport connections, easy access to world class academics in the space sector and a knowledgeable and skilled workforce. If Glasgow Prestwick Airport is successful in securing a spaceport operator's license, it could lead to the creation of 2,000 additional jobs and generate a further £320 million for the UK economy. The airport also offers passenger, executive, military and cargo aviation services and it sits at the heart of a hub for aviation and aerospace companies. Find out more at glasgowprestwick.com/spaceport. Pictures available upon request – please email communications@glasgowprestwick.com
[Scottish manned space launch a step closer after strategic partnership](#) (12 July 2016)

UK NATIONAL SPACE PROPULSION FACILITY



Aerial view of Westcott Venture Park. Credit: Westcott Venture Park.

The UK Space Agency is investing £4.12m in a National Propulsion Test Facility, giving the UK a new facility for space technology testing. The facility will allow UK companies and academia to test and develop space propulsion engines. The planned facility will be based at Westcott in Buckinghamshire, with its strong history of rocketry research for defence and space development, building on existing facilities.

The UK Space Agency investment will add new capabilities for the UK space sector. Government funding will:

- create a new vacuum facility at the Westcott propulsion test site. When used together with the existing industry owned rocket firing test cells, this will allow the simulation of high altitude testing of thrusters up to 2kN
- upgrade an existing industry owned test chamber to improve capabilities in the 25N thrust range
- open the facilities, alongside a smaller 1N thruster test chamber at the site, for the community to use

The UK's Science and Technology Facilities Council (STFC), through its RAL Space facility will act as an independent broker for facility access. The European Space Agency (ESA) will be advising and overseeing the initial detailed design phase before a review in the autumn to move to full implementation.

This investment builds on what is already a world-class UK space propulsion sector. One of the industry stakeholders in the project, offering their facilities as part of the National Propulsion Test Facility, is Moog-UK. Moog-UK's LEROS 1b engine recently placed the NASA Juno spacecraft into orbit around Jupiter following a 5-year journey to the gas giant. Opening these facilities up to UK companies and academia will allow them to develop and test future propulsion engines. We hope this will develop the UK's competitive edge in space propulsion and produce the next generation of propulsion engines. We hope that UK companies will continue to make successful contributions to international missions, such as the LEROS 1b engine involved in JUNO. The new capability will allow cost-effective development and testing of even more impressive engines for interplanetary travel, as well as for the significant commercial telecommunications satellite market. Other UK users of the facility, via the Airborne Engineering test chamber, are expected to include Reaction Engines Limited, who are currently testing advanced rocket nozzle technology for the SABRE engine. Additional to this, Buckinghamshire Thames Valley LEP are investing their own funding in an Innovation / Incubation Centre and a skills training hub – both of which will support the space sector. These investments have come about as a result of the commitment that Buckinghamshire Thames Valley LEP has demonstrated to support the growth of the space sector and is consistent with the Innovation and Growth Strategy aspiration for LEPs to use local funding to support the space sector.

[UK National Space Propulsion Facility](#) (12 July 2016)

LINKS TO OTHER SPACE AND ASTRONOMY NEWS PUBLISHED IN JULY 2016

ASTEROIDS

[Health check for asteroid lander MASCOT](#) (14 July 2016)

Space travel is no easy task – first comes the stressful launch with vibrations, then the long flight through the bitter cold and the vacuum. (DLR)

ASTROPHYSICS

[PPPL researchers combine quantum mechanics and Einstein's theory of special relativity to clear up puzzles in plasma physics](#) (29 July 2016)

Among the intriguing issues in plasma physics are those surrounding X-ray pulsars — collapsed stars that orbit around a cosmic companion and beam light at regular intervals, like lighthouses in the sky. (Princeton Plasma Physics Laboratory)

BLACK HOLES

[Evidence for 'direct collapse' black hole](#) (7 July 2016)

Astronomers Aaron Smith and Volker Bromm of The University of Texas at Austin, working with Avi Loeb of the Harvard-Smithsonian Center for Astrophysics, have discovered evidence for an unusual kind of black hole born extremely early in the universe.

[Gravitational vortex provides new way to study matter close to a black hole](#) (12 July 2016)

ESA's orbiting X-ray observatory, XMM-Newton, has proved the existence of a 'gravitational vortex' around a black hole. (ESA)

COMET

[How comets are born](#) (28 July 2016)

Detailed analysis of data collected by Rosetta show that comets are the ancient leftovers of early Solar System formation, and not younger fragments resulting from subsequent collisions between other, larger bodies. (ESA)

DARK ENERGY

[Astronomers map a record-breaking 1.2 million galaxies to study the properties of dark energy](#)

(14 July 2016)

Astronomers announced this week the sharpest results yet on the properties of dark energy. (SDSS)

DWARF PLANET

[Dawn maps Ceres craters where ice can accumulate](#) (8 July 2016)

Scientists with NASA's Dawn mission have identified permanently shadowed regions on the dwarf planet Ceres. (NASA Jet Propulsion Laboratory)

[New distant dwarf planet beyond Neptune](#) (11 July 2016)

An international team of astronomers including researchers from the University of British Columbia have discovered a new dwarf planet orbiting in the disk of small icy worlds beyond Neptune. (University of British Columbia).

[The case of the missing Ceres craters](#) (26 July 2016)

Ceres is covered in countless small, young craters, but none are larger than 175 miles (280 kilometers) in diameter. (NASA Jet Propulsion Laboratory)

EARTH

[The curious case of Earth's leaking atmosphere](#)

(7 July 2016) Earth's atmosphere is leaking. Every day, around 90 tonnes of material escapes from our planet's upper atmosphere and streams out into space. (ESA)

[ESA'S Dragon cooperation with China extended to 2020](#) (18 July 2016)

ESA and China have launched the fourth phase of the collaborative Dragon programme in Wuhan City, on the Yangtze River, which recently experienced major floods witnessed by Europe's Sentinel-1 satellite. (ESA)

[Setting a satellite to catch a satellite](#) (8 July 2016)

The target is set: a large derelict satellite currently silently tumbling its way through low orbit. If all goes to plan, in 2023 it will vanish – and efforts against space debris will have made a giant leap forward. (ESA)

[GOES-3 satellite decommissioned after linking Antarctica to the world for more than 20 years](#)

(19 July 2016)

The National Science Foundation (NSF) late last month decommissioned a 38-year-old communications satellite that for 21 years had helped to link NSF's Amundsen-Scott South Pole Station with the outside world. It was among the oldest, continuously operating satellites in the skies.

[Cryosat sets new standard for measuring sea levels](#) (26 July 2016)

Trying to measure sea levels around rugged coastlines is not always an easy task. ESA's CryoSat satellite is making a difference with its radar altimeter. (ESA)

EXOPLANETS

[Weird system of star CVSO 30: two planets at extreme distances](#) (7 July 2016)

A direct image has been taken of a planet so far away from his star that it takes twenty-seven thousand years for completing one orbit, and it shares the system with another planet which completes its orbit in just eleven hours.

[Surprising planet with three suns](#) (7 July 2016)

A team of astronomers have used the SPHERE instrument on ESO's Very Large Telescope to image the first planet ever found in a wide orbit inside a triple-star system.

[Stellar outburst brings water snow line into view](#) (13 July 2016)

The Atacama Large Millimeter/submillimeter Array (ALMA) has made the first ever resolved observation of a water snow line within a protoplanetary disc. (European Southern Observatory)

[Surface composition determines temperature and habitability of a planet](#) (14 July 2016)

KU Leuven astronomers have shown that the interaction between the surface and the atmosphere of an exoplanet has major consequences for the temperature on the planet. (KU Leuven)

[Warm Jupiters not as lonely as expected](#) (14 July 2016)

After analysing four years of Kepler space telescope observations, astronomers from the University of Toronto have given us our clearest understanding yet of a class of exoplanets called "Warm Jupiters", showing that many have unexpected planetary companions. (University of Toronto)

[Kepler confirms 100+ exoplanets during its K2 mission](#) (18 July 2016)

An international team of astronomers has discovered and confirmed a treasure trove of new worlds using NASA's Kepler spacecraft on its K2 mission. (NASA Jet Propulsion Laboratory)

GALAXIES

[Galaxy cluster keeps calm and carries on radiating X-rays](#) (6 July 2016)

With its very first observation, the Hitomi X-ray observatory has discovered that the gas in the Perseus cluster of galaxies is much less turbulent than expected. (ESA)

[Frankenstein' galaxy surprises astronomers](#) (11 July 2016)

About 250 million light-years away, there's a neighbourhood of our universe that astronomers had considered quiet and unremarkable. (NASA Jet Propulsion Laboratory).

[Ancient eye in the sky](#) (25 July 2016)

Light from a distant galaxy can be strongly bent by the gravitational influence of a foreground galaxy. (Subaru Telescope)

[Dizzying spin of the Milky Way galaxy's "halo"](#) (25 July 2016)

Astronomers at the University of Michigan's College of Literature, Science, and the Arts (LSA) discovered for the first time that the hot gas in the halo of the Milky Way galaxy is spinning in the same direction and at comparable speed as the galaxy's disk, which contains our stars, planets, gas, and dust. (NASA)

INTERNATIONAL SPACE STATION

[Back from space](#) (4 July 2016)

The small containers that are currently being disassembled at the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) are rather inconspicuous, yet they may contain organisms that have endured the conditions of space for over 530 days. (DLR)

[New crew members launch to space station](#) (7 July 2016)

Three crew members representing the United States, Russia and Japan are on their way to the International Space Station after launching from the Baikonur Cosmodrome in Kazakhstan at 9:36 p.m. EDT Wednesday, July 6 (7:36 a.m. Baikonur time, July 7).

[NASA orders second SpaceX crew mission to International Space Station](#) (29 July 2016)

NASA took another important step Friday in returning U.S. astronaut launches from U.S. soil with the order of a second post-certification mission from commercial provider SpaceX in Hawthorne, California.

JUPITER AND MOONS

[Jupiter's Great Red Spot heats planet's upper atmosphere](#) (27 July 2016)

Researchers from Boston University's (BU) Center for Space Physics report today (27 July) in Nature that Jupiter's Great Red Spot may provide the mysterious source of energy required to heat the planet's upper atmosphere to the unusually high values observed. (Royal Astronomical Society)

[Five years post-launch, Juno is at a turning point](#) (29 July 2016)

Five years after departing Earth, and a month after slipping into orbit around Jupiter, NASA's Juno spacecraft is nearing a turning point. (NASA Jet Propulsion Laboratory)

KUIPER BELT AND BEYOND

[New Horizons receives mission extension to Kuiper Belt](#) (1 July 2016)

Following its historic first-ever flyby of Pluto, NASA's New Horizons mission has received the green light to fly onward to an object deeper in the Kuiper Belt, known as 2014 MU69.

[Newly discovered solar system objects resonate with Neptune](#) (20 July 2016)

The search for distant solar system objects has found two more small worlds far outside the orbit of Neptune. (Subaru Telescope)

MARS

[Curiosity Rover enters precautionary safe mode](#) (6 July 2016)

The team operating NASA's Curiosity Mars rover is taking steps to return the rover to full activity following a precautionary stand-down over the Fourth of July weekend.

[Frosty cold nights year-round on Mars may stir dust](#) (8 July 2016)

Some dusty parts of Mars get as cold at night year-round as the planet's poles do in winter, even regions near the equator in summer, according to new NASA findings based on Mars Reconnaissance Orbiter observations. (NASA Jet Propulsion Laboratory)

[NASA's next Mars rover progresses toward 2020 launch](#) (15 July 2016)

After an extensive review process and passing a major development milestone, NASA is ready to proceed with final design and construction of its next Mars rover, currently targeted to launch in the summer of 2020 and arrive on the Red Planet in February 2021. (NASA)

[NASA selects five Mars orbiter concept studies](#) (18 July 2016)

NASA has selected five U.S. aerospace companies to conduct concept studies for a potential future Mars orbiter mission.

[Mars rover can choose laser targets on its own](#) (21 July 2016)

NASA's Mars rover Curiosity is now selecting rock targets for its laser spectrometer -- the first time autonomous target selection is available for an instrument of this kind on any robotic planetary mission. (NASA Jet Propulsion Laboratory)

[Digging deeper into Mars](#) (25 July 2016)

Water is the key to life on Earth. Scientists continue to unravel the mystery of life on Mars by investigating evidence of water in the planet's soil. (Louisiana State University)

[Mars gullies likely not formed by liquid water](#) (29 July 2016)

New findings using data from NASA's Mars Reconnaissance Orbiter show that gullies on modern Mars are likely not being formed by flowing liquid water. (NASA Jet Propulsion Laboratory)

MOON

[SSTL and Goonhilly announce partnership and a call for lunar orbit payloads](#) (12 July 2016)

Surrey Satellite Technology and Goonhilly Earth Station (GES) have today announced a new partnership to go beyond Earth's orbit and provide a new model of low cost, high value, space exploration and science.

[Asteroid that formed Moon's Imbrium Basin may have been protoplanet-sized](#) (20 July 2016)

Around 3.8 billion years ago, an asteroid more than 150 miles across, roughly equal to the length of New Jersey, slammed into the Moon and created the Imbrium Basin — the right eye of the fabled Man in the Moon. (Brown University)

NEBULAE

[Deepest ever look into Orion](#) (12 July 2016)

ESO's HAWK-I infrared instrument on the Very Large Telescope (VLT) in Chile has been used to peer deeper into the heart of Orion Nebula than ever before. (European Southern Observatory)

STARS AND STAR CLUSTERS

[Evidence of water clouds in first spectrum of coldest brown dwarf](#) (6 July 2016)

Since its detection in 2014, the brown dwarf known as WISE 0855 has fascinated astronomers. Only 7.2 light-years from Earth, it is the coldest known object outside of our solar system and is just barely visible at infrared wavelengths with the largest ground-based telescopes.

[Stars ignite in new supercomputer simulation](#) (8 July 2016)

Like fireworks bursting through a smoky haze, protostars ignite within colossal filaments of gas in a new supercomputer simulation of stars forming inside molecular clouds.

[Loneliest young star seen by Spitzer and WISE](#) (27 July 2016)

Alone on the cosmic road, far from any known celestial object, a young, independent star is going through a tremendous growth spurt. (NASA Jet Propulsion Laboratory)

[White dwarf lashes red dwarf with mystery ray](#) (27 July 2016)

Astronomers using ESO's Very Large Telescope, along with other telescopes on the ground and in space, have discovered a new type of exotic binary star. (European Southern Observatory)

SUN

[NASA's Solar Probe Plus mission moves one step closer to launch](#) (29 July 2016)

NASA's Solar Probe Plus – the first mission that will fly into sun's upper atmosphere and “touch” the sun – has passed a design review, an important milestone leading to its anticipated summer 2018 launch. (NASA Goddard Space Flight Center)

SUPERNOVA

[Blue is an indicator of first star's supernova explosions](#) 11 July 2016)

An international collaboration led by the Kavli Institute for the Physics and Mathematics of the Universe (Kavli IPMU) have discovered that the colour of supernovae during a specific phase could be an indicator for detecting the most distant and oldest supernovae in the Universe - more than 13 billion years old. (Kavli IPMU)

TECHNOLOGY

[Marlink introduces Smalltrack, a new compact mobile satellite tracking solution](#) (5 July 2016)

Marlink has launched Smalltrack, a next generation location-based tracking device.

[NASA eyes first-ever carbon-nanotube mirrors for CubeSat telescope](#) (12 July 2016)

A lightweight telescope that a team of NASA scientists and engineers is developing specifically for CubeSat scientific investigations could become the first to carry a mirror made of carbon nanotubes in an epoxy resin. (NASA).

[Chilly summer for Sentinel-2B](#) (18 July 2016)

While most of us may be looking forward to spending some time in the sunshine this summer, the Sentinel-2B satellite is being subjected to the extreme cold of space to make sure it is fit for life in orbit. (ESA)

[NASA team begins testing of a new-fangled optic](#) (26 July 2016)

It's an age-old astronomical truth: To resolve smaller and smaller physical details of distant celestial objects, scientists need larger and larger light-collecting mirrors. (NASA Goddard Space Flight Center)

VENUS

[Venus' surface revealed through the clouds](#) (18 July 2016)

Using observations from ESA's Venus Express satellite, scientists have shown for the first time how weather patterns seen in Venus' thick cloud layers are directly linked to the topography of the surface below. (ESA).

Pat Williams. July 2016