Space News Update

— October 11, 2019 —

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1. **NASA Spacecraft Launches on Mission to Explore Frontier of Space**

After successfully launching Thursday night, NASA's Ionospheric Connection Explorer (ICON) spacecraft is in orbit for a first-of-its-kind mission to study a region of space where changes can disrupt communications and satellite orbits, and even increase radiation risks to astronauts.

A Northrop Grumman Stargazer L-1011 aircraft took off at 8:31 p.m. EDT from Cape Canaveral Air Force Station in Florida carrying ICON, on a Northrop Grumman Pegasus XL rocket, to launch altitude of about 39,000 feet. The first launch opportunity around 9:30 was skipped due to communication issues between the ground team at Cape Canaveral and the aircraft. On the second attempt, the aircraft crew released its payload at 9:59 p.m. EDT and automated systems on the Pegasus rocket launched ICON, a spacecraft roughly the size of a refrigerator, into space.

The spacecraft's solar panels successfully deployed, indicating it has power with all systems operating. After an approximately month-long commissioning period, ICON will begin sending back its first science data in November.

ICON will study changes in a region of the upper atmosphere called the ionosphere. In addition to interfering with communications signals, space weather in the ionosphere can also prematurely decay spacecraft orbits and expose astronauts to radiation-borne health risks. Historically, this critical region of near-Earth space has been difficult to observe. Spacecraft can't travel through the low parts of the ionosphere and balloons can't travel high enough.

"ICON has an important job to do – to help us understand the dynamic space environment near our home," said Nicola Fox, director for heliophysics at NASA Headquarters in Washington. "ICON will be the first mission to simultaneously track what's happening in Earth's upper atmosphere and in space to see how the two interact, causing the kind of changes that can disrupt our communications systems."

ICON explores the connections between the neutral atmosphere and the electrically charged ionosphere with four instruments. Three of the instruments rely on one of the upper atmosphere's more spectacular phenomena: colorful bands called airglow.

Airglow is created by a similar process that creates the aurora – gas is excited by radiation from the Sun and emits light. Though aurora are typically confined to extreme northern and southern latitudes, airglow happens constantly across the globe, and is much fainter. But it's still bright enough for ICON's instruments to build up a picture of the ionosphere's density, composition and structure. By way of airglow, ICON can observe how particles throughout the upper atmosphere are moving.

ICON's fourth instrument provides direct measurements of the ionosphere around it. This instrument characterizes the charged gases immediately surrounding the spacecraft.

"We put as much capability on this satellite that could possibly fit on the payload deck," said Thomas Immel, the principal investigator for ICON at the University of California, Berkeley. "All those instruments are focused on the ionosphere in a completely new science mission that starts now."

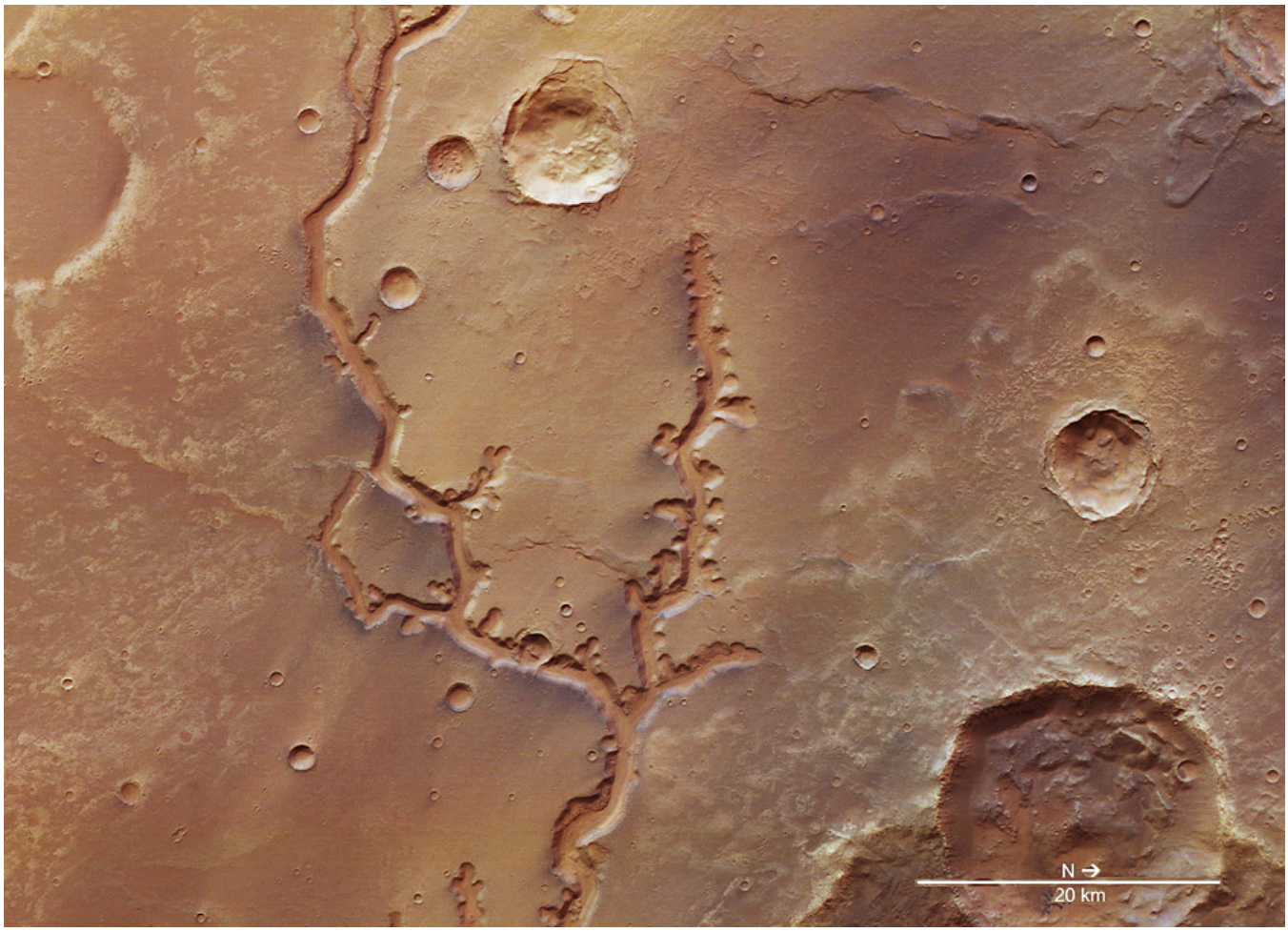
ICON's orbit around Earth places it at a 27-degree inclination and altitude of about 360 miles. From there, it can observe the ionosphere around the equator. ICON will aim its instruments for a view of what's happening at the lowest boundary of space, from about 55 miles up to 360 miles above the surface. This rapid orbit circles Earth in 97 minutes while precessing around the equator, allowing ICON to sample a wide range of latitude, longitude and local times.

ICON is an Explorer-class mission. NASA's Goddard Space Flight Center in Greenbelt, Maryland, manages the Explorer Program for NASA's Science Mission Directorate in Washington. The University of California at Berkeley developed the ICON mission and the two ultraviolet imaging spectrographs, Extreme Ultra-Violet instrument and the Far Ultra-Violet instrument. The Naval Research Laboratory in Washington developed the Michelson Interferometer for Global High-resolution Thermospheric Imaging instrument. The University of Texas in Dallas developed the Ion Velocity Meter. The spacecraft was built by Northrop Grumman in Dulles, Virginia. The Mission Operations Center at UC Berkeley's Space Sciences Laboratory is tasked with operating the ICON mission.

For more information on ICON, visit https://www.nasa.gov/icon.

Source: NASA Return to Contents

2. River Relic Spied by Mars Express



Mars may seem to be an alien world, but many of its features look eerily familiar - such as this ancient, dried-up river system that stretches out for nearly 700 kilometres across the surface, making it one of the longest valley networks on the planet.

The area of Mars shown in these new images from ESA's Mars Express spacecraft lies just south of the planet's equator, and is known to have been shaped by a mix of flowing water and impacts: events where rocks sped inwards from space to collide with the martian surface.

Both of these mechanisms are visible here: a number of impact craters, some large and some small, can be seen speckled across the ochre, caramel-hued surface, and a tree-like, forked channel cuts prominently through the centre of the frame.

This ancient valley system is named Nirgal Vallis, and was once filled with running water that spread across Mars. By exploring the characteristics of the surrounding craters, scientists estimate the system's age to be between 3.5 and 4 billion years old.

The part of Nirgal Vallis captured in these images lies towards the western end of the river system, where it is slowly spreading out and dissipating; the eastern end is far less branched and more clearly defined as a single valley, and opens out into the large Uzboi Vallis - the suspected location of a large, ancient lake that has long since dried up.

Nirgal Vallis is a typical example of a feature known as an amphitheatre-headed valley. As the name suggests, rather than ending bluntly or sharply, the ends of these tributaries have the characteristic semi-circular, rounded shape of an Ancient Greek amphitheatre. Such valleys also typically have steep walls, smooth floors, and, if sliced through at a cross-section, adopt a 'U' shape. The valleys pictured here are about 200 m deep and 2 km wide, and their floors are covered in sandy dunes; the appearance of these dunes indicates that martian winds tend to blow roughly parallel to the valley walls.

We see valleys like this often on Earth, including valleys found in the Chilean Atacama Desert, the Colorado Plateau, and on the islands of Hawaii. Mars also hosts a few of them, with Nanedi Valles and Echus Chasma joining Nirgal Vallis as clear examples of this intriguing feature. Both of these features also resemble terrestrial drainage systems, where meandering, steep-sided valleys - thought to have been formed by free-flowing water - have carved their way through hundreds of kilometres of martian rock, forging through old volcanic plains, lava flows, and material deposited by strong martian winds over time.

Valleys such as Nirgal Vallis are ubiquitous in the low-latitude regions surrounding the martian equator, indicating that these areas once experienced a far milder and more Earth-like climate. Despite the arid, hostile world we see today, Mars is thought to have once been a far warmer and wetter planet - and we see signs of this in the diverse mix of features and minerals found across its surface.

Scientists believe that Nirgal Vallis formed in a similar way to morphologically similar valleys we see on Earth. As there appear to be no branching, tree-like tributaries feeding into the main valley of Nirgal Vallis, it is likely that water was replenished on ancient Mars by a mix of precipitation and overland flow from the surrounding terrain.

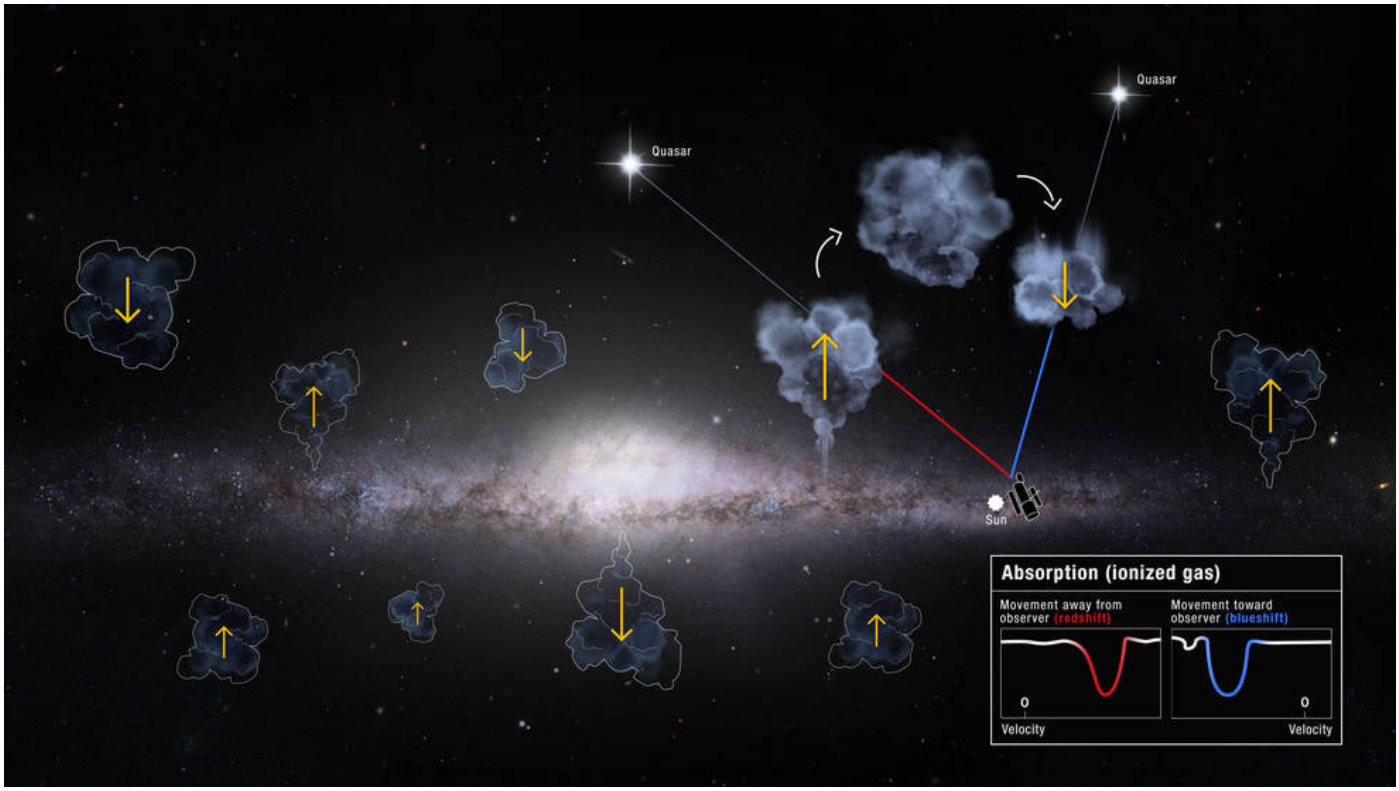
The system may also have its roots in a process known as groundwater sapping: when water struggles to travel vertically through a medium, and so instead continually seeps laterally through material in layers beneath the surface. We see this kind of mechanism on Earth in environments where surface material is very fine and loose and thus difficult for water to penetrate - largely silty, sandy, unconsolidated, and fine-grained environments, where lower layers of the surface are permeable and friendlier to water than those above.

The spacecraft captured these observations using its High Resolution Stereo Camera, an instrument that is mapping the whole surface Mars in full colour and at high resolution. Its aim - of characterising and understanding the Red Planet in its entirety - will be supported and continued by the ESA-Roscosmos ExoMars Trace Gas Orbiter, which arrived at Mars in 2016, and the ExoMars Rosalind Franklin rover and its accompanying surface science platform, which will arrive next year. Together, this ground-breaking fleet will help unlock the mysteries of Mars.

Additional imagery

Source: Spaceref.com Return to Contents

3. **Milky Way Raids Intergalactic 'Bank Accounts,' Hubble Study Finds**



Our Milky Way is a frugal galaxy. Supernovas and violent stellar winds blow gas out of the galactic disk, but that gas falls back onto the galaxy to form new generations of stars. In an ambitious effort to conduct a full accounting of this recycling process, astronomers were surprised to find a surplus of incoming gas.

"We expected to find the Milky Way's books balanced, with an equilibrium of gas inflow and outflow, but 10 years of Hubble ultraviolet data has shown there is more coming in than going out," said astronomer Andrew Fox of the Space Telescope Science Institute, Baltimore, Maryland, lead author of the study to be published in The Astrophysical Journal.

Fox said that, for now, the source of the excess inflowing gas remains a mystery.

One possible explanation is that new gas could be coming from the intergalactic medium. But Fox suspects the Milky Way is also raiding the gas "bank accounts" of its small satellite galaxies, using its considerably greater gravitational pull to siphon away their resources. Additionally, this survey, while galaxy-wide, looked only at cool gas, and hotter gas could play a role, too.

The new study reports the best measurements yet for how fast gas flows in and out of the Milky Way. Prior to this study, astronomers knew that the galactic gas reserves are replenished by inflow and depleted by outflow, but they did not know the relative amounts of gas coming in compared to going out. The balance between these two processes is important because it regulates the formation of new generations of stars and planets.

Astronomers accomplished this survey by collecting archival observations from Hubble's Cosmic Origins Spectrograph (COS), which was installed on the telescope by astronauts in 2009 during its last servicing mission. Researchers combed through the Hubble archives, analyzing 200 past ultraviolet observations of the diffuse halo that surrounds the disk of our galaxy. The decade's worth of detailed ultraviolet data provided an unprecedented look at gas flow across the galaxy and allowed for the first galaxy-wide inventory. The gas

clouds of the galactic halo are only detectable in ultraviolet light, and Hubble is specialized to collect detailed data about the ultraviolet universe.

"The original Hubble COS observations were taken to study the universe far beyond our galaxy, but we went back to them and analyzed the Milky Way gas in the foreground. It's a credit to the Hubble archive that we can use the same observations to study both the near and the more distant universe. Hubble's resolution allows us to simultaneously study local and remote celestial objects," noted Rongmon Bordoloi of North Carolina State University in Raleigh, North Carolina, a co-author on the paper.

Because the galaxy's gas clouds are invisible, Fox's team used light from background quasars to detect these clouds and their motion. Quasars, the cores of active galaxies powered by well-fed black holes, shine like brilliant beacons across billions of light-years. When the quasar's light reaches the Milky Way, it passes through the invisible clouds.

The gas in the clouds absorbs certain frequencies of light, leaving telltale fingerprints in the quasar light. Fox singled out the fingerprint of silicon and used it to trace the gas around the Milky Way. Outflowing and inflowing gas clouds were distinguished by the Doppler shift of the light passing through them — approaching clouds are bluer, and receding clouds are redder.

Currently, the Milky Way is the only galaxy for which we have enough data to provide such a full accounting of gas inflow and outflow.

"Studying our own galaxy in detail provides the basis for understanding galaxies across the universe, and we have realized that our galaxy is more complicated than we imagined," said Philipp Richter of the University of Potsdam in Germany, another co-author on the study.

Future studies will explore the source of the inflowing gas surplus, as well as whether other large galaxies behave similarly. Fox noted that there are now enough COS observations to conduct an audit of the Andromeda galaxy (M31), the closest large galaxy to the Milky Way.

The Hubble Space Telescope is a project of international cooperation between ESA (the European Space Agency) and NASA. NASA's Goddard Space Flight Center in Greenbelt, Maryland, manages the telescope. The Space Telescope Science Institute (STScI) in Baltimore, Maryland, conducts Hubble science operations. STScI is operated for NASA by the Association of Universities for Research in Astronomy in Washington, D.C.

Source: NASA Return to Contents

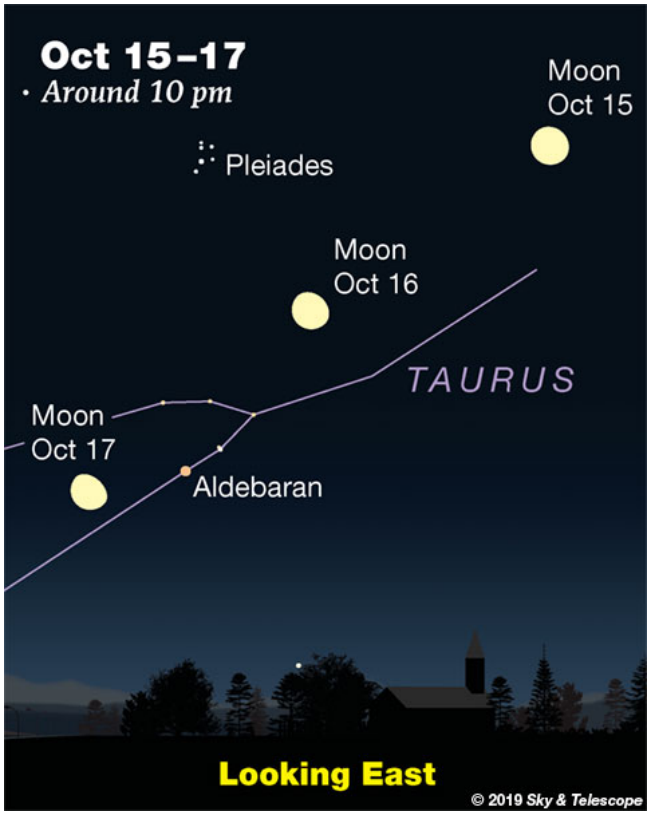
The Night Sky

Friday, Oct. 11

• Soon after dark, you'll find zero-magnitude Arcturus low in the west-northwest at the same height as zero-magnitude Capella shining in the northeast.

When this happens, turn to the south-southeast, and there will be 1st-magnitude Fomalhaut at the same height — if you're at latitude 43° north. Seen from south of that latitude Fomalhaut will appear higher; from north of there it will be lower.

Now turn southwest. Whatever your latitude, you'll find bright Jupiter about as high as Fomalhaut.



Saturday, Oct. 12

• Look above the nearly-full Moon this evening for the Great Square of Pegasus through the moonlight. It's balancing on one corner, and your fist at arm's length fits inside it. For your point on Earth, when it is *exactly* balanced? That is, when is the Square's top corner exactly above its bottom corner? This will probably by sometime soon after the end of twilight, depending quite a lot on your latitude. Try lining up the stars with the vertical edge of a building as a measuring tool.

Sunday, Oct. 13

• Full Moon (exact at 5:08 p.m. EDT). After dark, look high above the Moon for the Great Square of Pegasus standing on one corner.

• Cygnus the Swan flies nearly straight overhead these evenings. Its brightest stars form the big Northern Cross, usually visible even through bright moonlight. When you face southwest and crane your head up, the cross appears to stand upright. It's about two fists at arm's length tall, with Deneb as its top. Or to put it another way, the Swan is diving straight down.

Lower right of it, when you're facing southwest, shines bright Vega. Farther lower left is Altair.

Monday, Oct. 14

• This is the time of year when, in early to mid-evening, W-shaped Cassiopeia stands on end halfway up the northeastern sky — and when, off to its left, the dim Little Dipper extends leftward from Polaris in the north. Through the bright moonlight, 2nd-magnitude Polaris and Kochab (the Little Dipper's other end) may be all the stars of the Little Dipper you see... at first....

Source: Sky & Telescope

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ISS Sighting Opportunities

For Denver:

Date	Visible	Max Height	Appears	Disappears
Fri Oct 11, 6:47 PM	1 min	22°	22° above SSE	10° above SE
Sun Oct 13, 6:45 PM	2 min	16°	16° above SW	10° above S

Sighting information for other cities can be found at NASA's Satellite Sighting Information

NASA-TV Highlights

(all times Eastern Daylight Time)

No Special Programming

Watch NASA TV on the Net by going to the NASA website.

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Space Calendar

- Oct 11 -  [Oct 11] RIP Alexei Leonov (1934-2011)
- Oct 11 - Comet 384P/Kowalski Perihelion (1.116 AU)
- Oct 11 - Comet 133P/Elst-Pizarro At Opposition (2.046 AU)
- Oct 11 - Comet P/2017 P1 (PANSTARRS) Closest Approach To Earth (4.784 AU)
- Oct 11 - Amor Asteroid 477719 (2010 SG15) Near-Earth Flyby (0.092 AU)
- Oct 11 - Asteroid 2625 Jack London Closest Approach To Earth (1.131 AU)
- Oct 11 - Asteroid 5231 Verne Closest Approach To Earth (1.340 AU)
- Oct 11 - Asteroid 6442 Salzburg Closest Approach To Earth (1.715 AU)
- Oct 11 - Asteroid 12002 Suess Closest Approach To Earth (1.855 AU)
- Oct 11 - 25th Anniversary (1994), Magellan Burnup in Venus' Atmosphere
- Oct 12 - Moon Occults Asteroid 21 Lutetia
- Oct 12 -  [Oct 05] Comet P/2019 S3 (PANSTARRS) Closest Approach To Earth (0.886 AU)
- Oct 12 - Comet P/2006 R1 (Siding Spring) Closest Approach To Earth (0.904 AU)
- Oct 12 - Comet C/2018 Y1 (Iwamoto) Closest Approach To Earth (2.671 AU)
- Oct 12 - Apollo Asteroid 2019 SV9 Near-Earth Flyby (0.022 AU)
- Oct 12 - Apollo Asteroid 2019 SK8 Near-Earth Flyby (0.027 AU)
- Oct 12 -  [Oct 06] Apollo Asteroid 2019 TN1 Near-Earth Flyby (0.033 AU)
- Oct 12 - Apollo Asteroid 2019 SE2 Near-Earth Flyby (0.049 AU)
- Oct 12 - Amor Asteroid 2059 Baboquivari Closest Approach To Earth (0.474 AU)
- Oct 12 - Asteroid 6982 Cesarchavez Closest Approach To Earth (1.318 AU)
- Oct 12 - Asteroid 8277 Machu-Picchu Closest Approach To Earth (1.604 AU)
- Oct 12 - 40th Anniversary (1979), "The Hitchhiker's Guide to the Galaxy" Book 1st Published
- Oct 12 - 55th Anniversary (1964), Voskhod 1 Launch
- Oct 13 - Comet P/2012 O2 (McNaught) At Opposition (1.386 AU)
- Oct 13 - Comet P/2006 F1 (Kowalski) At Opposition (3.493 AU)
- Oct 13 - Comet 41P/Tuttle-Giacobini-Kresak At Opposition (4.116 AU)
- Oct 13 - Asteroid 16 Psyche Occults TYC 6335-00807-1 (11.1 Magnitude Star)
- Oct 13 -  [Oct 06] Apollo Asteroid 2019 TT1 Near-Earth Flyby (0.007 AU)
- Oct 13 -  [Oct 08] Apollo Asteroid 2019 TH2 Near-Earth Flyby (0.024 AU)
- Oct 13 -  [Oct 09] Apollo Asteroid 2019 TQ3 Near-Earth Flyby (0.027 AU)
- Oct 13 - Asteroid 17059 Elvis Closest Approach To Earth (1.225 AU)
- Oct 13 - Asteroid 5816 Potsdam Closest Approach To Earth (1.836 AU)
- Oct 13 - 10th Anniversary (2009), Mars Rover Opportunity Discovery of Mackinac Island Meteorite on Mars
- Oct 13 - 60th Anniversary (1959), Explorer 7 Launch
- Oct 13 - 60th Anniversary (1959), Hamlet Meteorite Fall (Hit House in Indiana)
- Oct 14 -  [Oct 06] "As The Crows Flies" Electron Launch
- Oct 14 - Comet 293P/Spacewatch Closest Approach To Earth (2.555 AU)
- Oct 14 - Atira Asteroid 2015 DR215 Closest Approach To Earth (0.637 AU)
- Oct 14 - Asteroid 128523 Johnmuir Closest Approach To Earth (0.923 AU)
- Oct 14 - Amor Asteroid 154991 Vinciguerra Closest Approach To Earth (1.061 AU)
- Oct 14 - Asteroid 2709 Sagan Closest Approach To Earth (1.348 AU)
- Oct 14 - Asteroid 3866 Langley Closest Approach To Earth (1.655 AU)
- Oct 14 - Amor Asteroid 3352 McAuliffe Closest Approach To Earth (1.918 AU)
- Oct 14 - Asteroid 7231 Porco Closest Approach To Earth (1.990 AU)
- Oct 14 - Kuiper Belt Object 303775 (2005 QU182) At Opposition (52.381 AU)

Source: JPL Space Calendar

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Food for Thought

First Man to Conduct Spacewalk, Alexei Leonov, Dies

Alexei Leonov, a Soviet-era cosmonaut who was the first man to conduct a spacewalk in 1965, died in Moscow on Friday aged 85 after a long illness.

The Russian space agency Roscosmos said it was saddened to announce the death of "cosmonaut No 11" who was twice decorated with the country's top honour, the Hero of the Soviet Union. Leonov was a close friend of Yury Gagarin, the first human to go to outer space in 1961. Leonov trained together with Gagarin and was selected to perform the first spacewalk as the Soviet Union and United States, Cold War foes on Earth, were locked in a frantic race to conquer space.

In 1965, Leonov made history when he left a spacecraft during the Voskhod 2 mission for a spacewalk that lasted 12 minutes and nine seconds. "I gently pulled myself out and kicked off from the vessel," Leonov, then a sprightly 80-year-old, told AFP in 2015. "(There was) an inky black, stars everywhere and the sun so bright I could barely stand it," he added.

Tethered to the craft with a five-metre (16-foot) long cord, he gazed in wonder at Earth's geography laid out sweepingly below him, his motherland perfectly visible. "I filmed the Earth, perfectly round, the Caucasus, Crimea, the Volga. It was beautiful," he said.

Leonov and another cosmonaut, pilot Pavel Belyayev, (codenames Almaz-1 and Almaz-2) were rocketed almost 500 kilometres (310 miles) into orbit. Back on the surface, millions followed the mission as it was beamed live on radio and television.

The mission was successful on the whole but the men's return to Earth nearly ended in tragedy when Leonov and Belyayev crash-landed deep in the Russian woods.

They completed man's first spacewalk 10 weeks before the United States.

The spacewalk and the crash-landing were featured in a 2017 film, the Spacewalker. Leonov, who was played by Russian movie star Yevgeny Mironov, was a consultant on the project.

'Huge tragedy'

A decade later in 1975 Leonov commanded the Soyuz 19 in the first joint space mission between the Soviet Union and the United States.

Leonov, who became a legend in Russia, celebrated his 85th birthday in May. Putin congratulated the Soviet-era cosmonaut at the time, calling him "a worthy representative of the legendary team of Soviet cosmonauts". "You have made a great contribution to Russian cosmonautics and have promoted its outstanding achievements," Putin has said.

Leonov's assistant Natalia Filimonova told AFP that he died at Moscow's Burdenko hospital after a long illness. "It's a huge tragedy for us all," said the wife of cosmonaut Boris Volynov, Tamara Volynova, who wrote a book about cosmonauts. "Alexei is a unique person," she told AFP.

He will be laid to rest at a memorial cemetery just outside Moscow on Tuesday, officials said.

Awe and fear: how Russian cosmonaut recalled first spacewalk

Here AFP republishes an interview with the cosmonaut from 2015, conducted on the 50th anniversary of his extraordinary achievement:

Fifty years after Alexei Leonov carried out the first spacewalk, he still vividly recalls the moment he emerged from the capsule to become the only human to have floated in the cosmos. "I gently pulled myself out and kicked off from the vessel," former cosmonaut Leonov, a sprightly 80-year-old working for a Moscow bank, told AFP.

"(There was) an inky black, stars everywhere and the sun so bright I could barely stand it." Tethered to the craft with a five-metre (16-foot) long cord, he gazed in wonder at Earth's geography laid out sweepingly below him, his motherland perfectly visible. "I filmed the Earth, perfectly round, the Caucasus, Crimea, the Volga. It was beautiful."

The historic moment on March 18, 1965 came as the Soviet Union and United States, Cold War foes on Earth, were locked in a frantic race to conquer space. With the Americans preparing for their own spacewalk, Leonov and pilot Pavel Belyayev (codenames Almaz-1 and Almaz-2) were rocketed almost 500 kilometres (310 miles) into orbit.

Back on the surface, millions followed the mission as it was beamed live on radio and television. As the minutes passed outside the spacecraft Leonov heard his pilot report back to Earth: "This is Almaz-1: Man has gone out into space." Then he heard Yuri Levitan, a famous Soviet radio presenter, saying the same thing. "But who are they talking about?" he thought to himself.

'It had to be done'

Leonov's 12 minutes in space were the result of years of frantic work as the USSR struggled feverishly to keep ahead of America in the contest for outer space. In 1962, some 12 months after cosmonaut Yuri Gagarin became the first person to orbit Earth, the Soviets had set themselves a new objective: "Swimming in space like a sailor in the ocean".

Eventually space chief Sergei Korolyov saw in Leonov the qualities he wanted and handpicked the cosmonaut to carry out the historic mission. "Korolyov chose me because I had already piloted several aircraft, I scored highly and I could paint, which is rare among cosmonauts," smiled the man who would go on to draw sought-after works of art depicting outer space.

After 18 months of intensive training Leonov was finally ready to become the first man to drift through space. However the Voskhod 2 spacecraft that was to take him there was not. "The spacecraft had no ejection system," he said. "We would either have to wait nine months to revamp it or use this model. We chose the second option."

But with the Americans hot on their heels—NASA was hard at work preparing astronaut Ed White for a spacewalk—there was no time to waste. "It wasn't about courage. We just knew it had to be done," said Leonov.

Near disaster

But after the initial triumph nearly came disaster. As he floated in the cosmos, Leonov said the euphoria of making man's first spacewalk quickly gave way to anxiety.

With their orbit quickly taking them away from the sun and into darkness, it was soon time to get back into the vessel, but Leonov realised his spacesuit had inflated and become deformed due to the lack of atmospheric pressure, which could prevent him from slipping back inside the airlock.

Leonov didn't wait to discuss the problem with the control centre, but decided to reduce pressure by bleeding off some of the oxygen in his suit, risking oxygen starvation. With great difficulty he managed to pull himself into the airlock head first, instead of feet first. The complicated manoeuvres left him drenched in sweat and he lost six kilos (13 pounds) in the 12-minute outing.

But it was only the start of the daunting challenges that awaited them. Back in the cabin the team realised the automatic guidance system for reentry was not working properly and they would have to manually guide the spacecraft back to Earth.

In his book on the space race, Leonov described in more detail how the landing module failed to separate from the orbital module, creating massive G-forces as they spun wildly around the cable, hurtling towards Earth. They landed safely but they were 2,000 kilometres from Kazakhstan where they were supposed to end up, in deep snow in a taiga forest in the Ural Mountains, home to wolves and bears.

"We waited three days in the forest to be rescued, and Soviet radio reported we were on holiday after the flight," Leonov said, laughing. Rescuers lowered a large cauldron in a helicopter to be filled with snow and heated to provide a hot bath for the space adventurers.

Welcomed back as heroes, Leonov and Belyayev completed man's first spacewalk 10 weeks before the United States. A decade later in 1975 Leonov commanded the Soyuz 19 in the first joint space mission between the Soviet Union and the United States.

As ties between Moscow and Washington have again frayed over the Ukraine conflict, Leonov offered a few solemn words of wisdom. "There have never been frontiers between astronauts. The day that this notion sinks into the minds of politicians, our planet will be different."

Explore further: Apollo-Soyuz cosmonaut Valery Kubasov dies at 79

Source: Phys.org Return to Contents

Space Image of the Week

NGC 7714: Starburst after Galaxy Collision

Explanation Is this galaxy jumping through a giant ring of stars? Probably not. Although the precise dynamics behind the featured image is yet unclear, what is clear is that the pictured galaxy, NGC 7714, has been stretched and distorted by a recent collision with a neighboring galaxy. This smaller neighbor, NGC 7715, situated off to the left of the featured frame, is thought to have charged right through NGC 7714. Observations indicate that the golden ring pictured is composed of millions of older Sun-like stars that are likely co-moving with the interior bluer stars. In contrast, the bright center of NGC 7714 appears to be undergoing a burst of new star formation. The featured image was captured by the Hubble Space Telescope. NGC 7714 is located about 130 million light years away toward the constellation of the Two Fish (Pisces). The interactions between these galaxies likely started about 150 million years ago and should continue for several hundred million years more, after which a single central galaxy may result.

Image Credit: NASA, ESA, Hubble Legacy Archive;

Processing & Copyright: Rudy Pohl

Source: APOD

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