Space News Update
— October 11, 2013 —

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Malcolm Scott Carpenter, one of the original seven Mercury astronauts who was forced to take manual control of his Aurora 7 capsule after running low on fuel in one of the scarier moments of the early space program, died early Thursday. He was 88.

No cause of death was given, but sources said he had suffered a stroke recently and family members confirmed his passing in emails to NASA and media outlets. With Carpenter's death, only John Glenn, the first American in orbit, remains of NASA's original seven astronauts.

"Today, the world mourns the passing of Scott Carpenter," NASA Administrator Charles Bolden said in a statement. "As one of the original Mercury 7 astronauts, he was in the first vanguard of our space program -- the pioneers who set the tone for our nation's pioneering efforts beyond Earth and accomplished so much for our nation."

A Navy test pilot and Korean War veteran, Carpenter was chosen for Project Mercury on April 9, 1959, joining six other test pilots -- Alan Shepard, Virgil "Gus" Grissom, John Glenn, Wally Schirra, Gordon Cooper and Deke Slayton -- as America's first class of astronauts.

Following two sub-orbital flights by Shepard and Grissom, Glenn became the first American in orbit in February 1962. Carpenter served as Glenn's backup and then rocketed into space himself on May 24, 1962, riding into orbit atop the Mercury-Atlas 7 rocket.

During three orbits, Carpenter put his Aurora 7 through its paces and reached a maximum altitude of 164 miles, working through a series of science experiments as the flight progressed. He also became the first astronaut to eat solid food in space -- cubes of chocolate, figs and dates mixed in with high-protein cereals, according to collectSPACE.com.

"You have to realize my experience with zero-g, although transcending and more fun than I can tell you about, was, in the light of current space flight accomplishments, very brief," Carpenter said in a 1999 NASA interview. "The zero-g sensation and the visual sensation of space flight are transcending experiences, and I wish everybody could have them."
But the flight turned into a nail-biter when, during a pass over Australia, Carpenter "inadvertently neglected to shut off one attitude control system when switching to another, and doubled, for a time, the fuel expenditure," he later wrote in a third-person account.

"The resulting fuel state became critical during reentry. During the rest of the flight he fell further and further behind the flight plan, which he said later was much too ambitious."

Carpenter thought he had the capsule in the proper orientation for re-entry. As it turned out, the nose of the spacecraft was pointed 25 degrees to one side of where it should have been due to a malfunctioning sensor system. This contributed to missing the planned splashdown point by about 175 miles.

Then, the retro-rockets "did not deliver the full thrust that was expected of them," he wrote. "On top of all this, the three retros fired approximately three seconds late. They were designed to fire automatically, but they did not."

Carpenter said he pressed the rocket ignition button at the correct time, but "two seconds passed before they finally went off and at (an orbital) speed of 5 miles per second, the lapse of three seconds accounted for another 15 miles in the overshoot."

Aurora 7 splashed down in the Atlantic Ocean about 1,000 miles southeast of Cape Canaveral, 250 miles downrange from the planned touchdown point. After a brief scare, search crews found Carpenter about 40 minutes later, safely bobbing in a life raft by his capsule.

"When he became the second American to orbit the Earth, he completed his mission despite challenging circumstances," Bolden said. "We knew then that not only did America have what it took technologically, but our entire astronaut corps would be able to face the challenges ahead that would lead us to the moon and living and working in space."

Some critics later said Carpenter was distracted by the experiments he was carrying out and that he did not properly manage the on-board fuel supply when he took over manual control. A post-flight NASA analysis credited the astronaut with successfully handling a potentially dangerous situation.

But Carpenter's perceived devotion to science at the expense of engineering during the initial stages of the Mercury program rankled some within the agency. In any case, he never flew in space again.

He served as an executive assistant to the director of the Manned Spaceflight Center in Houston, working on the Apollo lunar lander and assisting with underwater training for future flight crews.

During this period, Carpenter "became fascinated by the underwater work being done by the French oceanographer J.Y. Cousteau in his Conshelf program," the astronaut wrote, saying he saw "many parallels between that work and the work being done by the American space program."

He took a leave of absence from NASA to participate in the Navy's SeaLab project. But he broke his arm in a motorcycle crash, which prevented him from participating in a planned underwater stay in a habitat 192 feet down.

In 1965, Carpenter took another leave of absence from NASA to participate in the Navy's Man-in-the-Sea Project, serving as a diver, or aquanaut, in the SeaLab II program in the Pacific Ocean near La Jolla, Calif. He spent a month on the ocean floor leading two teams of divers based in a habitat anchored at a depth of 205 feet.
After another brief stint at NASA, Carpenter resumed work with the Navy's Deep Submergence Systems Project in 1967, serving as director of SEALAB III aquanaut operations, focusing on development of deep sea diving techniques for rescue, salvage and research.

"SeaLab III was a very ambitious experiment which would have repeated much of the work done by the previous two SeaLab experiments but at the much greater depth of 600 feet," Carpenter wrote. "After many delays, equipment failures, and other major difficulties, including flooding of the habitat, and finally, the loss of Barry Canon, one of the divers, the troublesome project was canceled."

Carpenter retired from the Navy in 1969 and founded Sea Sciences Inc., a venture capital firm devoted to development of programs "aimed at enhanced utilization of ocean resources and improved health of the planet," according to his NASA biography.

"In pursuit of these and other objectives, he worked closely with the French oceanographer J.Y. Cousteau and members of his Calypso team," the biography says. "He has dived in most of the worlds oceans, including the Arctic under ice."

Born in Boulder, Colorado, on May 1, 1925, Carpenter was the son of a research chemist and attended the University of Colorado from 1945 to 1949, graduating with a bachelor's degree in aeronautical engineering.

He joined the U.S. Navy in 1949 and was designated a naval aviator in 1951. During the Korean conflict, Carpenter flew anti-submarine and ship surveillance missions before training at the Navy Test Pilot School in Patuxent River, Md., in 1954. He then served in the Electronics Test Division of the Naval Air Test Center, flying a wide variety of jets and propeller-driven aircraft.

Carpenter was servicing as Air Intelligence Officer aboard the USS Hornet aircraft carrier when he was selected by NASA to become one of the first seven astronauts.

Carpenter was awarded the Navy's Legion of Merit, the Distinguished Flying Cross, the NASA Distinguished Service Medal, U.S. Navy Astronaut Wings and the Collier Trophy. He held seven honorary degrees.

"His accomplishments truly helped our nation progress in space from the earliest days to the world leadership we enjoy today," Bolden said. "We will miss his passion, his talent and his lifelong commitment to exploration."

Source: CBS News
NASA's Juno spacecraft went into safe mode Wednesday as it flew by Earth to gain speed on its five-year journey to Jupiter, but the mission's lead scientist said the flyby achieved its objective of putting the probe on the correct course toward the solar system's largest planet.

The Jupiter-bound probe flew about 350 miles over the Indian Ocean near South Africa at 3:21 p.m. EDT (1921 GMT), and all data indicate the spacecraft obtained the predicted gravity boost from the flyby, according to Scott Bolton, Juno's principal investigator from the Southwest Research Institute in San Antonio.

But the spacecraft, stretching the size of a basketball court with its solar panels extended, experienced a fault some time during the flyby, going into a safe mode to protect the probe's systems and instruments while engineers on the ground scramble to diagnose the problem.

Bolton said Juno is designed to downlink data at a slower rate than normal during a safe mode, but telemetry from the spacecraft shows all its systems and instruments are fine.

The solar-powered spacecraft zoomed over the Indian Ocean on the night side of the Earth, putting the probe's expansive solar arrays in eclipse for the first time since its launch in August 2011.

Juno also passed out of range of ground antennas around the time of closest approach, and a European Space Agency ground station in Perth, Australia, acquired the first radio signals from Juno a few minutes later.

"When we came out of the eclipse, we realized that the spacecraft was in safe mode," Bolton said. "What we do know is that all the subsystems and instruments are nominal and behaving OK."

Juno was programmed to collect data during the flyby with its science payload. The research activities - considered a bonus by the Juno science team - included gathering observations of the Earth's magnetic field and auroras and snapping a series of images of Earth with the spacecraft's primary camera.

See our flyby story for more details

"This did not affect the main purpose of the flyby, which was to put Juno on the right course to Jupiter," Bolton said.

Bolton said ground controllers see some indications Juno gathered data and images during the flyby, but it may take more time to confirm whether the craft took the images as planned. If the imagery was collected, it could take extra time recover the information from the probe's on-board computer while engineers focus their work on putting Juno back into its normal operating mode.

Juno is set to arrive in orbit around Jupiter on July 4, 2016, beginning a one-year science mission studying the gas giant's crushing atmosphere, powerful magnetic field and enigmatic core. Juno's discoveries could help scientists unravel how Jupiter, likely the solar system's oldest planet, formed and evolved in the early solar system.

Source: Spaceflight Now
Comet ISON refuses to show its hand. Scientific pundits’ predictions have ranged from two pair to a straight flush, but for now the comet is playing it close to the vest.

Work presented at this week’s American Astronomical Society’s Division for Planetary Sciences meeting in Denver adds to speculations about the comet’s upcoming performance. These new observational and theoretical studies suggest that the comet’s nucleus has a good chance of surviving its sungrazing pass but hint that, like a sneaky card player, it might have a trick up its sleeve.

Matthew Knight (Lowell Observatory) and Kevin Walsh (Southwest Research Institute) took two approaches in their attempt to determine whether ISON will survive perihelion. First, they looked at the nucleus’s size. Both theoretical calculations and observations of sungrazing comets by the SOHO and STEREO spacecraft show that comets smaller than about 400 meters (>1,000 feet) across should disintegrate. The best estimate for ISON’s size is between 1,000 and 4,000 meters, so it shouldn’t completely evaporate, even in the 2,800° C (5,000° F) it will feel at its closest approach on November 28th, Knight said in a press conference on October 9th.

But the comet also has to contend with tidal forces. Close to the Sun, the comet will experience a stronger gravitational pull on the Sun-facing side than on its far side. These tidal forces could stretch the nucleus out like a cigar and, if the pull is strong enough, break the nucleus apart. Solar radiation will erode these smaller pieces more effectively, lowering the comet’s chances for survival.

The nucleus’s density and rotation have a big say in what the tidal forces will do to ISON, Knight explained. He and Walsh ran simulations using likely densities and spin speeds for comets and found that, in most scenarios, ISON should survive. But survival is less likely if the nucleus is spinning very fast or prograde (i.e. forward toward the Sun). He puts the odds of survival above 50%, but jokes that the error bars on that estimate are “plus or minus 100%.”

The prediction is so uncertain in part because astronomers don’t know ISON’s spin. Hubble observations by Jian-Yang Li (Planetary Science Institute) and his colleagues indicate that the comet’s rotational axis is pointing at the Sun. The team detected a slight uptick in brightness that they interpret as a jet from the nucleus, and because this jet appears in all the images they took over 19 hours (and in ground-based observations over a two-month period), its stationary-ness suggests it’s quite near the nucleus’s pole. But no one’s seen changes associated with which way the nucleus is spinning.

The sunward-pointing pole is where ISON’s mystery deepens. The comet is following a parabolic orbit, meaning that, thus far, it’s basically been on a straight-shot trajectory toward the Sun. If it’s pointing only one hemisphere at the Sun, the other hasn’t been heated yet — and won’t be until maybe a week before perihelion, when the comet passes within Mercury’s orbit. When that happens, pristine surface material such as carbon dioxide ice could “sublimate like crazy,” releasing a lot of dust and causing an outburst, Li said. But he cautions that his team determined the pole’s location from only one set of observations in April, and the result could change with follow-up. Hubble observed ISON this week, so that follow-up is imminent.

Any outburst could wreak havoc with the nucleus’s spin, making its survival even harder to predict.

Of course there’s always the wild card. Knight noted that comets in the solar system spontaneously disrupt for unknown reasons maybe 1% of the time. That’s beyond researchers’ ability to simulate.
In other words, we’ll have to wait and see what we’re dealt.

Source: Sky & Telescope
The Night Sky

Friday, October 11

- First-quarter Moon (exact at 7:02 p.m. Eastern Daylight Time). The Moon, half lit, shines above the tilting Sagittarius Teapot in early evening.

- **Triple shadow transit on Jupiter.** A rare case of three moons — Io, Europa, and Callisto — casting their tiny black shadows onto Jupiter at once happens late tonight, from 4:32 to 5:37 Universal Time October 12th (12:32 to 1:37 a.m. Saturday morning Eastern Daylight Time). Jupiter will be high and best placed for telescope users in Europe and Africa, and low in the eastern sky for eastern North America.

- **Algol** in Perseus, the prototype eclipsing binary star, should be in one of its periodic dimmings, magnitude 3.4 instead of its usual 2.1, for a couple hours centered on 8:53 p.m. EDT. Algol takes several additional hours to fade and to rebrighten. Here's a [comparison-star chart](#) giving the magnitudes of three stars near Algol. Use them to judge its changing brightness.

Saturday, October 12

- Venus has been approaching much dimmer Antares, which twinkles to Venus's left in the southwest in evening twilight. They're now 4½° apart. They'll pass 1½° from each other on Wednesday.

Sunday, October 13

- The zenith star soon after dark (for skywatchers at mid-northern latitudes) is no longer Vega but Deneb. It will remain there for weeks to come, since night is falling earlier and earlier all the time — counteracting the westward turning of the constellations if you observe at nightfall.

Monday, October 14

- Before dawn Tuesday morning, look for orange-yellow Mars just 1° from blue-white Regulus in the eastern sky. They're far lower left of bright, high Jupiter.

Source: [Sky & Telescope](#)  

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ISS Sighting Opportunities

For Denver:

Sighting information is unavailable.

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

NASA-TV Highlights

(all times Eastern Daylight Time)

NASA-TV is unavailable.

Watch NASA TV online by going to the NASA website.  

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Space Calendar

- Oct 11 - Comet 292P/Li At Opposition (1.828 AU)
- Oct 11 - Asteroid 2085 Henan Occults HIP 154 (4.4 Magnitude Star)
- Oct 11 - [NEW][Oct 10] Asteroid 2013 TH69 Near-Earth Flyby (0.092 AU)
- Oct 11 - Asteroid 5641 McCleese Closest Approach To Earth (1.137 AU)
- Oct 11 - Asteroid 30439 Moe Closest Approach To Earth (1.694 AU)
- Oct 11 - Asteroid 10552 Stockholm Closest Approach To Earth (2.144 AU)
- Oct 11 - Asteroid 8991 Solidarity Closest Approach To Earth (2.171 AU)
- Oct 11 - 45th Anniversary (1968), Apollo 7 Launch (1st Manned Apollo Mission)
- Oct 11 - Wilhelm Olbers' 255th Birthday (1758)
- Oct 12 - [Oct 05] Astronomy Day
- Oct 12 - International Observe The Moon Night
- Oct 12 - [UPDATED][Oct 06] Lunar Atmosphere and Dust Environment Explorer (LADEE), Lunar Orbit Insertion Maneuver 3 (LOI-3)
- Oct 12 - Asteroid 2013 SR Near-Earth Flyby (0.070 AU)
- Oct 12 - Asteroid 2013 SE21 Near-Earth Flyby (0.076 AU)
- Oct 12 - Asteroid 2013 RN9 Near-Earth Flyby (0.083 AU)
- Oct 12 - Asteroid 27500 Mandelbrot Closest Approach To Earth (1.546 AU)
- Oct 12 - Kuiper Belt Object 202421 (2005 UQ513) At Opposition (47.544 AU)
- Oct 13 - Moon Occults Asteroid 3 Juno
- Oct 13 - [NEW][Oct 09] Asteroid 2013 TX68 Near-Earth Flyby (0.014 AU)
- Oct 13 - Asteroid 3728 IRAS Closest Approach To Earth (1.401 AU)
- Oct 13 - Asteroid 44597 Thoreau Closest Approach To Earth (1.514 AU)
- Oct 13 - Asteroid 10111 Frensel Closest Approach To Earth (1.635 AU)
- Oct 13 - British Interplanetary Society's 80th Birthday (1933)
- Oct 14 - Comet 197P/LINEAR At Opposition (1.550 AU)
- Oct 14 - Asteroid 2004 HX53 Near-Earth Flyby (0.076 AU)
- Oct 14 - [NEW][Oct 04] Asteroid 2013 TL Near-Earth Flyby (0.085 AU)
- Oct 14 - Asteroid 1877 Marsden Closest Approach To Earth (2.786 AU)
- Oct 14 - 10th Anniversary (2003), Shenzhou V Launch (1st Chinese Manned Space Mission)

Source: JPL Space Calendar
It appears that the Russian government wants to take action over the string of unmanned mission failures beleaguering Roscosmos, or the Russian Federal Space Agency. A recent example includes the loss in June of three GLONASS navigation/positioning satellites in a launch failure. In 2011, Roscosmos lost four major missions, including the Phobos-Grunt spacecraft that was bound for the Martian moon Phobos.

RIA Novosti reports that Dmitry Rogozin, Russia’s deputy prime minister, plans to create a new state entity to take over space manufacturing. The proposed United Rocket and Space Corporation, the report says, will reduce the reliance on imported parts to get missions off the ground, among other aims.

“A new state corporation will be created to take over manufacturing facilities from the Federal Space Agency, whose prestige has been severely dented in recent years by a string of failed rocket launches,” the report says. ”The proposed United Rocket and Space Corporation will enable the trimming away of redundant departments replicated elsewhere in the space industry.”

As for Roscosmos itself, the report hints that other changes could be on the way. Its envisioned role is to “act as a federal executive body and contracting authority for programs to be implemented by the industry.” There are expected to be changes in management, among other measures.

The agency was formed after the breakup of the Soviet Union in 1991 and is responsible for most of Russia’s space activities. Russia’s heritage in space actually stretches back to the dawn of the space age in the 1950s and 1960s, when the country became the first nation to launch a satellite (Sputnik) and a human (Yuri Gagarin), among other milestones.

Read the whole report in Roscosmos.

Source: Universe Today
The beautiful, petal-like shells of galaxy PGC 6240 are captured here in intricate detail by the NASA/ESA Hubble Space Telescope, set against a sky full of distant background galaxies. This cosmic bloom is of great interest to astronomers due to both its uneven structure, and the unusual clusters of stars that orbit around it — two strong indications of a galactic merger in the recent past.

Source: SpaceTelescope.org