Space News Update

— May 29, 2018 —

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1. New Helium Tank for SpaceX Crew Launches Still Waiting to Fly

SpaceX is still working on a new, safer helium tank design needed for launches with astronauts, and the debut of the company's upgraded Falcon 9 Block 5 rocket earlier this month did not count as one of seven successful missions in "crew configuration" NASA says it requires before putting astronauts aboard the vehicle, officials said Thursday.

The update on the development of the Falcon 9's new helium tank, which is scheduled to fly for the first time later this year, came a week after members of NASA's Aerospace Safety Advisory Panel said they were getting more comfortable with SpaceX's plan to load the rocket with super-chilled, densified propellant with astronauts strapped into their Crew Dragon spacecraft on top of the vehicle.

The inaugural launch of SpaceX's Falcon 9 Block 5 rocket May 11 successfully placed Bangladesh's Bangabandhu 1 communications satellite in orbit, and the launcher featured heat shield improvements, higher-thrust engines, and new landing legs, upgrades aimed at making the Falcon 9's first stage easier to reuse.

But it didn't carry a new helium tank design under development as a fix for the problem that caused a booster to explode during a ground test in 2016, according to a report by Quartz which has been confirmed by Spaceflight Now. NASA says SpaceX needs to introduce that change to the Falcon 9 rocket before it starts counting the seven successful launches before a mission with astronauts.

The new helium bottles are known as composite overwrapped pressure vessels, or COPVs, and they store cold helium at high pressures for injection into the rocket's propellant tanks, maintaining their pressure as the Falcon 9's engines consume kerosene and liquid oxygen in flight.

SpaceX founder and chief executive Elon Musk told reporters before the May 11 that he believed the Falcon 9 Block 5 configuration that was set to debut with the launch of Bangabandhu 1 was the same version that will fly with NASA astronauts, but added that he "could be mistaken."

NASA and SpaceX confirmed Thursday that the modified COPVs were not on the May 11 launch, but will instead be flown for the first time on a test mission of the company's Crew Dragon capsule called Demo-1, currently set for liftoff at the end of August without any astronauts on-board.

Only then will the counter start logging the seven flights of the Falcon 9 in a "frozen" configuration required before a second Crew Dragon demo flight, currently scheduled for December, at the earliest, with two astronauts who will fly to the space station.

"In aerospace, 'testing like we fly' is a long standing tenet for safe operations and understanding of critical systems," said Cheryl Warner, a NASA spokesperson, in response to an inquiry from Spaceflight Now. "We anticipate this configuration will be ready for Demonstration Mission 1.

"NASA will work with SpaceX following each Falcon 9 Block 5 launch to examine data and evaluate the components, systems and operations to add to the rocket heritage," Warner said in a written statement. "Early Falcon 9 Block 5 flights will provide important insight into the rocket, and will contribute to the certification efforts for the Falcon 9 Block 5 configuration for crew."

SpaceX and Boeing won multibillion-dollar contracts in 2014 to develop, build and fly commercial capsules to ferry astronauts between Earth and the International Space Station. Once the vehicles are certified by NASA, they will rotate station crews up and down several times per year, ending U.S. reliance on the Russian Soyuz spacecraft for astronaut transportation.

NASA officials have been cautious in their assessments of Boeing and SpaceX schedules, saying further delays in both vehicles are likely, with the first crew test flights potentially slipping into 2019.

Problems with the Falcon 9's COPVs, or their associated hardware, were blamed for two rocket failures in June 2015 and September 2016.

In 2015, a strut connecting one of the helium vessels inside the Falcon 9's second stage liquid oxygen tank broke a few minutes after liftoff, rupturing the upper stage propellant tank and leading to the destruction of the rocket and a Dragon supply ship en route to the International Space Station.

SpaceX stopped using the type of strut that failed in 2015 when flights resumed later that year with an upgraded "full thrust" version of the Falcon 9 using colder-than-normal kerosene and liquid oxygen propellants, which are chilled and densified to provide extra engine performance.

Another Falcon 9 rocket mishap in September 2016, when a booster exploded during a launch pad test and destroyed a $200 million Israeli-owned commercial telecom satellite, was also blamed on a flaw with the upper stage's helium pressurant tanks.

SpaceX engineers believe that failure most likely started when liquid oxygen propellant froze in a buckle or void between the aluminum liner and carbon overwrap of one of the COPVs. While investigators were unable to pinpoint a "root cause," engineers concluded the solid oxygen likely ignited from friction or breaking fibers on the outside of the helium tank, causing the Falcon 9's upper stage to burst in a ball of flame.

SpaceX modified its fueling and helium loading procedures after the September 2016 accident to prevent solid oxygen from forming, and a new COPV design incorporates changes the company says will eliminate the buckles altogether.

The company has completed development, significant qualification testing and manufacture of the modified helium bottles that will fly inside the Falcon 9 rocket on the Demo-1 mission with the Crew Dragon spacecraft.

“Falcon 9 Block 5’s first flight serves as an important milestone toward flying crew to the International Space Station later this year,” a SpaceX spokesperson said in a statement. “Starting with our first Block 5 launch, and working closely with NASA, SpaceX will evaluate the components, systems and operations from each Falcon 9 Block 5 mission to document the vehicles flight heritage and assure our development of the most advanced, reliable and safest human spaceflight system ever built.”

SpaceX has accomplished 28 consecutive successful rocket launches since the Falcon 9 resumed service in January 2017.

The redesigned helium bottles are one of the top technical issues being tracked by NASA managers and a panel of safety advisors charged with overseeing the agency’s human spaceflight programs.

Some engineers and external reviewers have also raised concerns about SpaceX’s proposal for astronauts to board the Crew Dragon spacecraft before fueling of the Falcon 9 rocket, and those worries were amplified after the 2016 explosion during a countdown for a static fire test at Cape Canaveral.

Brent Jett, a former space shuttle commander and member of the Aerospace Safety Advisory Panel, said May 17 that a recent report completed by the NASA Engineering and Safety Center provided the safety committee and NASA managers “an in-depth analysis of the hazards and controls associated with load-and-go.”

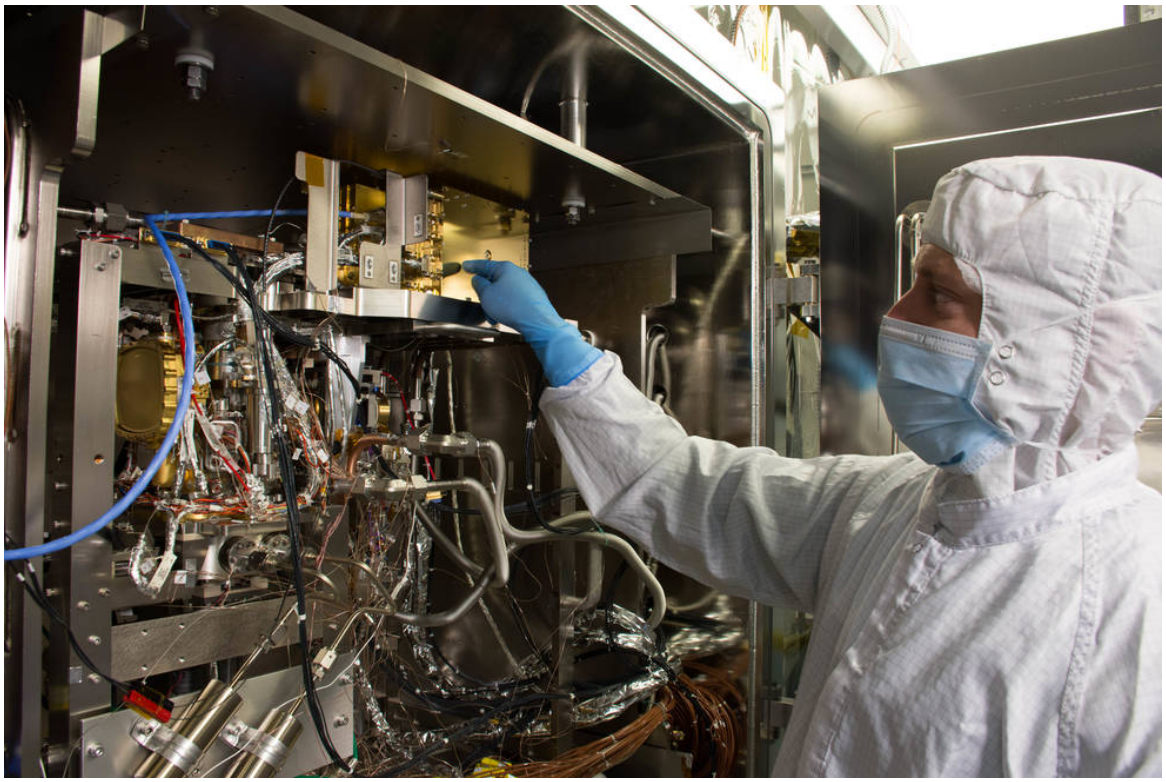
“This report, which identified a few previously unrecognized hazard causes, proved very valuable to the commercial crew program,” Jett said in the safety panel’s May 17 meeting at the Kennedy Space Center in Florida.

“My sense is that, assuming there are adequate, verifiable controls idenfitied and implemented for the credible hazard causes, and those which could potentially result in an emergency situation, or worse, loss of crew and vehicle, it appears that load-and-go is a viable option for the program to consider,” Jett said.

Other members of the panel agreed with Jett’s assessment.

Source: Spaceflight Now Return to Contents

2. Scientists Shrink Chemistry Lab to Seek Evidence of Life on Mars



An international team of scientists has created a tiny chemistry lab for a rover that will drill beneath the Martian surface looking for signs of past or present life. The toaster oven-sized lab, called the Mars Organic Molecule Analyzer or MOMA, is a key instrument on the ExoMars Rover, a joint mission between the European Space Agency and the Russian space agency Roscosmos, with a significant contribution to MOMA from NASA. It will be launched toward the Red Planet in July 2020.

“The ExoMars Rover’s two-meter deep drill will provide MOMA with unique samples that may contain complex organic compounds preserved from an ancient era, when life might have gotten started on Mars,” said MOMA Project Scientist Will Brinckerhoff of NASA’s Goddard Space Flight Center in Greenbelt, Maryland.

Although the surface of Mars is inhospitable to known forms of life today, there is evidence that in the distant past, the Martian climate allowed the presence of liquid water – an essential ingredient for life – at the surface. This evidence includes features that resemble dry riverbeds and mineral deposits that only form in the presence of liquid water. NASA has sent rovers to Mars that have found additional signs of past habitable environments, such as the Opportunity and Curiosity rovers both currently exploring the Martian terrain.

The MOMA instrument will be capable of detecting a wide variety of organic molecules. Organic compounds are commonly associated with life, although they can be created by non-biological processes as well. Organic molecules contain carbon and hydrogen, and can include oxygen, nitrogen, and other elements. To find these molecules on Mars, the MOMA team had to take instruments that would normally occupy a couple of workbenches in a chemistry lab and shrink them down to roughly the size of a toaster oven so they would be practical to install on a rover.

While the instrument is complex, MOMA is built around a single, very small mass spectrometer that separates charged atoms and molecules by mass. The basic process for finding Martian organic compounds can be boiled down to two steps: separate organic molecules from the Martian rocks and sediments and give them an electric charge (ionized) so they can be detected and identified by the mass spectrometer. MOMA has two methods for distinguishing as many different kinds of organic molecules as possible. The first method uses an

oven to heat a sample—this baking process vaporizes the organic molecules and sends them to a thin column that separates mixtures of compounds into their individual constituents. The compounds sequentially pass into the mass spectrometer, where they are given an electric charge and sorted by mass using electric fields. Each type of molecule has a set of distinct mass-to-electric-charge ratios. The mass spectrometer instrument uses this pattern called a mass spectrum to identify the molecules.

Some larger organic molecules are fragile and would be broken apart during the high-temperature vaporization in the oven, so MOMA has a second method to find them: It zaps the sample with a laser. Since just a quick burst of laser light is used, it vaporizes some types of larger organic molecules without totally breaking them apart. The laser also gives these molecules an electric charge, so they are sent directly from the sample to the mass spectrometer to be sorted and identified.

Certain organic molecules have a property that could potentially be used as a strong hint that they were created by life: their handedness, or chirality. Some organic molecules used by life come in two varieties that are mirror images of each other, like your hands. On Earth, life uses all left-handed amino acids and all right-handed sugars to build larger molecules needed for life, like proteins from amino acids and DNA from sugars. Life based on right-handed amino acids (and left-handed sugars) could work, but a mix of right- and left-handed for either will not. This is because these molecules need to come together with the correct orientation, like puzzle pieces, to build other molecules necessary for life to function.

MOMA is capable of detecting the chirality of organic molecules. If it finds an organic molecule is primarily of the left-hand or right-hand variety (called “homochirality”) that can be evidence that life produced the molecules, since non-biological processes tend to make an equal mix of varieties. This is known as a biosignature.

Mars rovers face another challenge when searching for evidence of life: Contamination. Earth is saturated with life, and scientists have to be very careful that the organic material they detect wasn’t simply carried with the instrument from Earth. To ensure this, the MOMA team has taken great care to make sure that the instrument is as free as possible from terrestrial molecules that are signatures of life.

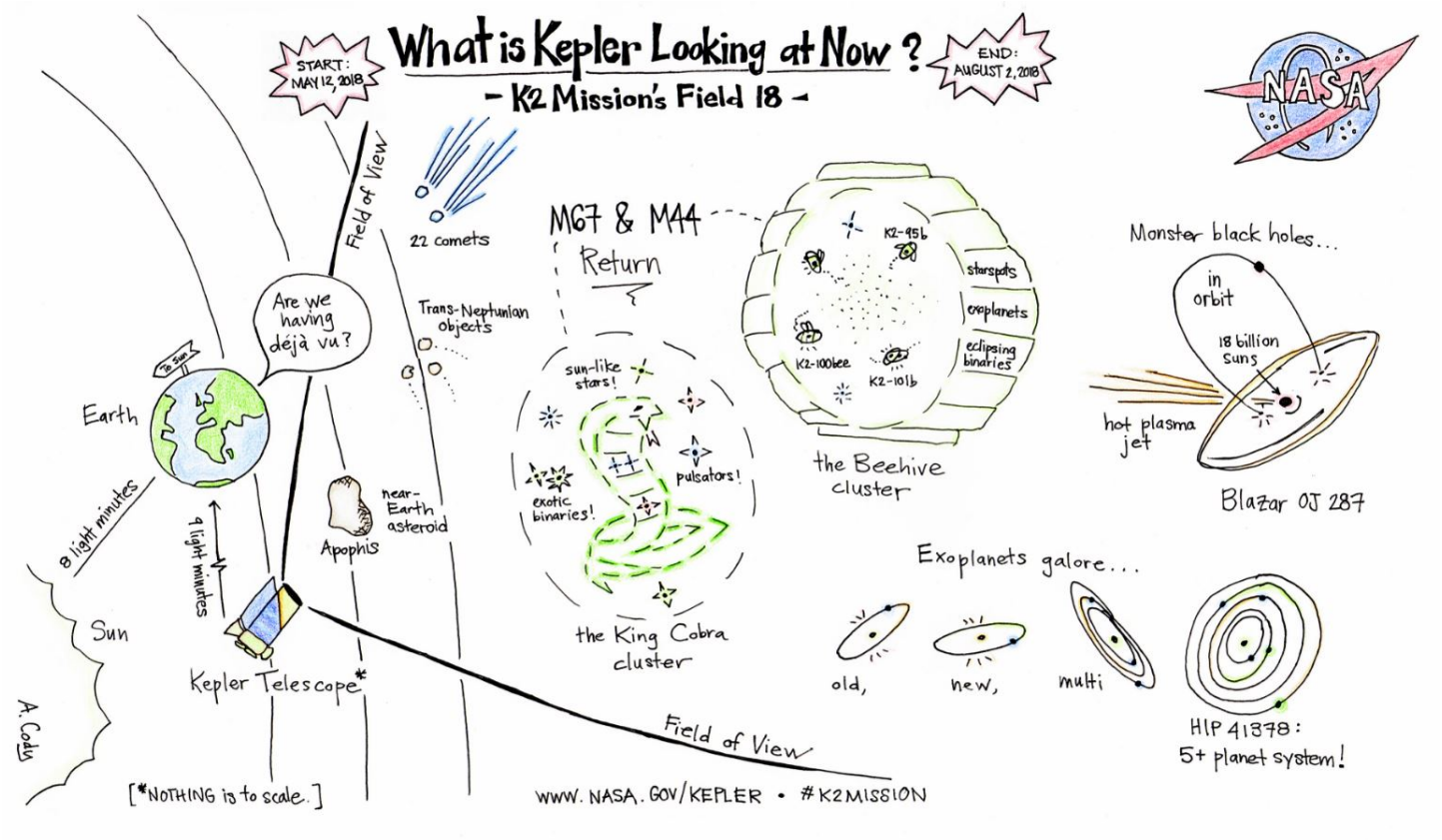
The ExoMars rover will be the first to explore deep beneath the surface, with a drill capable of taking samples from as deep as two meters (over six feet). This is important because Mars’ thin atmosphere and spotty magnetic field offer insufficient protection from space radiation, which can gradually destroy organic molecules left exposed on the surface. However, Martian sediment is an effective shield, and the team expects to find greater abundances of organic molecules in samples from beneath the surface.

NASA Goddard is developing the mass spectrometer and electronics boxes for MOMA, while LATMOS (Laboratory for Atmospheres, Environments, and Space Observations), Guyancourt, France and Laboratoire Interuniversitaire des Systèmes Atmosphériques (LISA or Interuniversity Laboratory of Atmospheric Systems) Paris, France, make MOMA’s gas chromatograph, and the Max Plank Institute for Solar System Research, Gottingen, Germany and Laser Zentrum Hannover, Hannover, Germany, build the instrument’s laser, ovens, and tapping (oven sealing) station.

MOMA recently completed both ESA and NASA pre-delivery reviews that cleared the path for the flight instrument to be delivered to the mission. On Wednesday, May 16, the MOMA mass spectrometer team gathered at Goddard to see off their one-of-a-kind science instrument on the first leg of its journey to Mars: delivery to Thales Alenia Space, in Turin, Italy, where it will be integrated into the rover’s analytical laboratory drawer during upcoming mission-level activities this summer. Following subsequent higher-level rover and spacecraft-level integration activities in 2019, the ExoMars Rover is scheduled to launch to Mars in July, 2020 from the Baikonur Cosmodrome in Kazakhstan.

Source: NASA Return to Contents

3. With fuel running low, Kepler begins 18th observing campaign



NASA's planet-hunting Kepler spacecraft began the 18th observing campaign of its extended mission, K2, on May 12. For the next 82 days, Kepler will stare at clusters of stars, faraway galaxies, and a handful of solar system objects, including comets, objects beyond Neptune, and an asteroid. The Kepler spacecraft is expected to run out of fuel within several months.

Campaign 18 is a familiar patch of space, as it's approximately the same region of sky that Kepler observed during Campaign 5 in 2015. One of the advantages of observing a field over again is that planets outside the solar system, called exoplanets, may be found orbiting farther from their stars. Astronomers hope to not only discover new exoplanets during this campaign, but also to confirm candidates that were previously identified.

Open clusters are regions where stars formed at roughly the same age, including Messier 67 and Messier 44, otherwise known as Praesepe or the Beehive cluster. Home to six known exoplanets, the Praesepe cluster will be searched anew for objects that are transiting, or crossing, around these and other stars.

At approximately 800 million years old, the stars in Praesepe are in their teenage years compared to our Sun. Many of these youthful stars are active and have large spots that can reveal information about a star's magnetic field, a fundamental component of a star that drives flaring and other activity that may have influence over habitability. By comparing brightness data collected in Campaign 18 and 5, scientists can learn more about how a star's spots cycle over time.

At several billion years, the Messier 67 cluster is much older and has many Sun-like stars. It is one of the best-studied open clusters in the sky. Astronomers will continue their studies of stellar astrophysics by analysing Messier 67's stars for changes in brightness. They will search for the signatures of exoplanets, observe the pulsations of evolved stars, and measure the rotation rates of many other stars in the cluster.

Beyond these clusters, Kepler will observe blazars, the energetic nuclei of faraway galaxies with black holes in their centres. These objects propel jets of hot plasma toward Earth (though they are far too distant to affect us). The most notable of these targets is OJ 287, a system hosting two black holes in orbit around each other, one of which weighs 18 billion times the mass of the Sun!

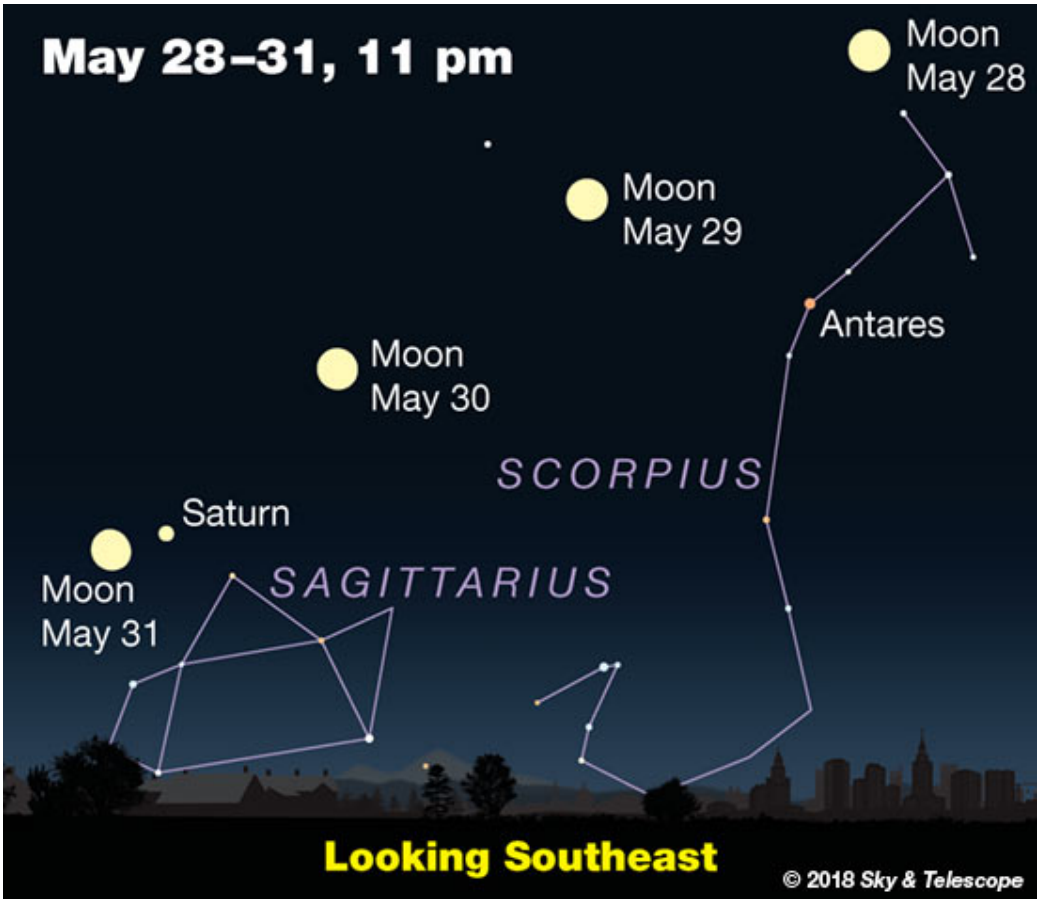
Even closer to home, Kepler will look at solar system objects, including comets, trans-Neptunian objects, and the near-Earth asteroid 99942 Apophis. This 1,000-foot chunk of rock will pass within 20,000 miles of Earth in the year 2029 — close but still comfortably far enough to not pose any danger to Earthlings.

NASA's Ames Research Center in California's Silicon Valley manages the Kepler and K2 missions for NASA's Science Mission Directorate. NASA's Jet Propulsion Laboratory in Pasadena, California, managed Kepler mission development. Ball Aerospace & Technologies Corporation operates the flight system with support from the Laboratory for Atmospheric and Space Physics at the University of Colorado in Boulder.

Source: Astronomy Now Return to Contents

The Night Sky

Tuesday, May 29



• For the next 12 days, Jupiter stays 1° or less from 3rd-magnitude Alpha Librae (Zubenelgenubi): a fine, wide double star for binoculars. Its two components, magnitudes 2.8 and 5.1, are a generous 231 arcseconds apart. Nevertheless they form a real, gravitationally bound pair; they're both measured to be 77 light-years away. They're bigger and brighter that our Sun, shining with 36 and 4 times the Sun's light.

• Shining in the east-northeast after dark is Vega, the brightest and currently highest star of the Summer Triangle. But with summer still three weeks away, the Triangle's final star doesn't rise above the eastern horizon until about 10 p.m. That's Altair, the Triangle's lower right corner. The third star is Deneb, sparkling less far to Vega's lower left.

Wednesday, May 30

• Vega is the brightest star in the east-northeast after dark. The other main stars of its constellation, Lyra, currently dangle down from it.

Thursday, May 31

• The waning gibbous Moon rises around the end of twilight. Once it's up you'll find Saturn glowing to its right (for North America). Companions? Nope, Saturn is 3,400 times farther away!

Friday, June 1

• Constellations seem to twist around fast when they pass your zenith — if you're comparing them to the direction "down." Just a week and a half ago, the Big Dipper was floating horizontally in late twilight an hour after sunset (as seen from 40° N latitude). Now it's angled diagonally at that time. Another week and a half and it will be hanging straight down by its handle!

Source: Sky & Telescope

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ISS Sighting Opportunities

For Denver:

Date	Visible	Max Height	Appears	Disappears
Tue May 29, 00:00 AM	< 1 min	19°	18° above N	19° above N
Tue May 29, 9:31 PM	< 1 min	10°	10° above N	10° above N
Tue May 29, 11:08 PM	2 min	15°	14° above N	14° above NE
Wed May 30, 00:42 AM	< 1 min	10°	10° above NW	10° above NW
Wed May 30, 10:16 PM	2 min	12°	12° above N	10° above NE
Wed May 30, 11:51 PM	< 1 min	21°	18° above NNW	21° above NNW
Thu May 31, 9:23 PM	1 min	10°	10° above N	10° above NNE
Thu May 31, 11:00 PM	1 min	23°	19° above N	23° above NNE
Fri Jun 1, 10:07 PM	3 min	17°	14° above N	10° above ENE
Fri Jun 1, 11:42 PM	1 min	19°	10° above NW	19° above NW

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

NASA-TV Highlights

(all times Eastern Daylight Time)

May 29, Tuesday
7:30 a.m. – Space Station In-Flight Event with the Gifu Prefecture and astronaut Norishige Kanai of the Japan Aerospace Exploration Agency (JAXA) – (English interpretation on Public Channel, native language on Media)
4 p.m. - Pre-launch Space Station crew activities at the Baikonur Cosmodrome in Kazakhstan, including material recorded from May 19-29 (Media Channel)

May 31, Thursday
8:15 a.m. - Space Station Expedition 55 In-Flight VIP Event for the Japan Aerospace Exploration Agency (JAXA) and JAXA astronaut Norishige Kanai (English interpretation on Public Channel, native language on Media Channel)
4 p.m. - Pre-launch Space Station crew activities at the Baikonur Cosmodrome in Kazakhstan and Soyuz spacecraft, including material recorded from May 30-31 (Media Channel)

JUNE 1

June 1, Friday
2:25 p.m. - Expedition 55-56 Change of Command Ceremony (Shkaplerov hands over ISS command to Feustel) - (All Channels)

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

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Space Calendar

- May 29 - Comet 357P/Hill Perihelion (2.527 AU)
- May 29 - NEW [May 26] Apollo Asteroid 2018 KN2 Near-Earth Flyby (0.016 AU)
- May 29 - Aten Asteroid 68347 (2001 KB67) Near-Earth Flyby (0.024 AU)
- May 29 - Apollo Asteroid 2014 WG365 Near-Earth Flyby (0.061 AU)
- May 29 - Apollo Asteroid 2018 JZ1 Near-Earth Flyby (0.062 AU)
- May 29 - Asteroid 3131 Mason-Dixon Closest Approach To Earth (1.835 AU)
- May 29 - Kuiper Belt Object 2010 JO179 At Opposition (57.435 AU)
- May 30 - Comet C/2017 B3 (LINEAR) Closest Approach To Earth (3.873 AU)
- May 30 - Comet 144P/Kushida At Opposition (3.888 AU)
- May 30 - Asteroid 4 Vesta Occults UCAC4-358-128730 (12.2 Magnitude Star)
- May 30 - Centaur Object 10199 Chariklo Occults 2UCAC 20036612 (14.9 Magnitude Star)
- May 30 - Amor Asteroid 2018 JJ2 Near-Earth Flyby (0.053 AU)
- May 30 - Apollo Asteroid 2018 JJ3 Near-Earth Flyby (0.055 AU)
- May 30 - Apollo Asteroid 2018 KD1 Near-Earth Flyby (0.093 AU)
- May 30 - Asteroid 12325 Bogota Closest Approach To Earth (1.354 AU)
- May 30 - Neptune Trojan 2010 TT191 At Opposition (33.184 AU)
- May 30 - Michael Lopez-Alegria's 60th Birthday (1958)
- May 30 - Hannes Alfven's 100th Birthday (1908)
- May 30 - Raymond Dugan's 140th Birthday (1878)
- May 31 - BlackSky Global 1 PSLV Launch
- May 31 - Comet 164P/Christensen Perihelion (1.685 AU)
- May 31 - Comet 227P/Catalina-LINEAR At Opposition (2.195 AU)
- May 31 - Asteroid 4 Vesta Occults TYC 6268-00025-1 (10.7 Magnitude Star)
- May 31 - Asteroid 4 Vesta Occults TYC 6268-00036-1 (11.0 Magnitude Star)
- May 31 - Amor Asteroid 2013 LE7 Near-Earth Flyby (0.046 AU)
- May 31 - NEW [May 22] Apollo Asteroid 2018 KL1 Near-Earth Flyby (0.086 AU)
- May 31 - Aten Asteroid 5381 Sekmet Closest Approach To Earth (1.081 AU)
- May 31 - Asteroid 13599 Lisbon Closest Approach To Earth (1.901 AU)
- May 31 - Asteroid 24102 Jacquecassini Closest Approach To Earth (1.916 AU)
- May 31 - Asteroid 589 Croatia Closest Approach To Earth (2.255 AU)
- May 31 - Kuiper Belt Object 470308 (2007 JH43) At Opposition (39.551 AU)
- May 31 - 10th Anniversary (2008), STS-124 Launch (Space Shuttle Discovery, International Space Station)
- May 31 - 20th Anniversary (1998), Galileo, Europa 15 Flyby

- Jun 01 - UPDATED [May 29] SES-12 Falcon 9 Launch
- Jun 01 - Comet 168P/Hergenrother Closest Approach To Earth (2.988 AU)
- Jun 01 - Asteroid 4 Vesta Occults 2UCAC 24660991 (12.1 Magnitude Star)
- Jun 01 - Apollo Asteroid 2018 KE1 Near-Earth Flyby (0.028 AU)
- Jun 01 - Asteroid 8837 London Closest Approach To Earth (0.983 AU)
- Jun 01 - Asteroid 61342 Lovejoy Closest Approach To Earth (1.165 AU)
- Jun 01 - Asteroid 5891 Gehrig Closest Approach To Earth (1.727 AU)
- Jun 01 - Georgy Dobrovolsky's 90th birthday (1928)
- Jun 01 - Geminiano Montanari's 385th Birthday (1633)

Source: JPL Space Calendar

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Food for Thought

Alan Bean, Apollo Moonwalker and Artist, Dies at 86

Alan Bean walked on the moon on Apollo 12, commanded the second Skylab crew and then resigned after 18 years as an astronaut to paint the remarkable worlds and sights he had seen.

Bean was lunar module pilot on the November 1969 Apollo 12 mission, the second moon landing. He and mission commander Pete Conrad explored on the lunar Ocean of Storms and set up several experiments powered by a small nuclear generator.

“As all great explorers are, Alan was a boundary pusher," NASA Administrator Jim Bridenstine said in a statement. "Rather than accepting the limits of technology, science, and even imagination, he sought to advance those lines -- in all his life’s endeavors.

In an interview for NASA's 50th anniversary in 2008, Bean said walking on the moon was one of the most fun things he had done.

"At one-sixth gravity in that suit, you have to move in a different way," he said. "One of the paintings that I did was called 'Tip Toeing on The Ocean of Storms.' And it shows that I'm up on my tip toes as I'm moving around. And we did that a lot. On Earth, I weighed 150 pounds; my suit and backpack weighed another 150. 300 pounds. Up there, I weighed only 50. So I could prance around on my toes. It was quite easy to do. And if you remember back to some of the television we saw, Buzz and Neil on the Moon with Apollo 11. Black and

white. They were bouncing around a lot. They were really bouncing on their tip toes. Quite fun to do. Someday maybe be a great place for a vacation."

As spacecraft commander of the Skylab II mission II, from July 19 to Sept. 25, 1973, Bean and fellow crewmembers Owen K. Garriott and Jack R. Lousma accomplished half again as much as pre-mission goals. Their 59-day, 24.4-million-mile flight was a world record.

Alan L. Bean was born in Wheeler, Texas. He graduated from Paschal High School in Fort Worth, Texas. In 1955, Bean was awarded an aeronautical engineering degree from the University of Texas.

Video: Remembering Alan Bean

He was a Navy ROTC student there and was commissioned when he graduated. After he finished flight training, he spent four years with a jet attack squadron and then attended Navy test pilot school.

Bean flew as a test pilot on several types of aircraft before he was selected with the third group of NASA astronauts in October 1963. He served as a backup for crewmembers on Gemini 10 and Apollo 9.

After his Apollo and Skylab flights, Bean remained with NASA while many of his astronaut colleagues went elsewhere as the Apollo program wound down. He served as a backup spacecraft commander for the last Apollo flight, the Apollo-Soyuz Test Project in July 1975.

He retired from the Navy as a captain in October 1975 but continued to work with NASA as a civilian. He headed the Astronaut Office's Astronaut Candidate Operations and Training Group at Johnson Space Center.

Bean logged 1,672 hours in space, including more than 10 hours of spacewalks on the moon and in Earth orbit. He flew 27 aircraft types and accumulated more than 7,145 hours of flight time, 4,890 hours of it in jets.

Link: Alan Bean interviews with the JSC Oral History project.

During his career he established 11 records in space and aeronautics, and received many awards and honors.

Among those awards were two NASA distinguished service medals, two Navy Distinguished Service Medals, the Rear Admiral William S. Parsons Award for Scientific and Technical Progress, the Robert J. Collier Trophy, the Federation Aeronautique Internationale's Yuri Gagarin Gold Medal, the V.M. Komarov diploma, the Robert H. Patuxent River Goddard Gold Medal, the AIAA Octave Chanute Award and the ASA Flight Achievement Award.

His decision to retire from NASA to devote full time to painting was, he said, based on his 18 years as an astronaut, during which he visited places and saw things no artist's eye had ever seen firsthand. He said he hoped to capture those experiences through his art.

He followed that dream for many years at his home studio in Houston, with considerable success. His paintings were particularly popular among space enthusiasts.

Video: Alan Bean the artist

Source: NASA Return to Contents

Space Image of the Week

Aurora and Manicouagan Crater from the Space Station
Image Credit: NASA

Explanation: How many of these can you find in today's featured photograph: an aurora, airglow, one of the oldest impact craters on the Earth, snow and ice, stars, city lights, and part of the International Space Station? Most of these can be identified by their distinctive colors. The aurora here appears green at the bottom, red at the top, and is visible across the left of image. Airglow appears orange and can be seen hovering over the curve of the Earth. The circular Manicouagan Crater in Canada, about 100 kilometers across and 200 million years old, is visible toward the lower right and is covered in white snow and ice. Stars, light in color, dot the dark background of space. City lights appear a bright yellow and dot the landscape. Finally, across the top, part of the International Space Station (ISS) appears mostly tan. The featured image was taken from the ISS in 2012.

Source: APOD

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