Space News Update

— December 15, 2017 —

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1. Artificial Intelligence, Kepler Data Used to Discover Eighth Planet Circling Distant Star

ur solar system now is tied for most number of planets around a single star, with the recent discovery of an eighth planet circling Kepler-90, a Sun-like star 2,545 light-years from Earth. The planet was discovered in data from NASA's Kepler Space Telescope.

The newly-discovered Kepler-90i – a sizzling hot, rocky planet that orbits its star once every 14.4 days – was found using machine learning from Google. Machine learning is an approach to artificial intelligence in which computers "learn." In this case, computers learned to identify planets by finding in Kepler data instances where the telescope recorded signals from planets beyond our solar system, known as exoplanets.

"Just as we expected, there are exciting discoveries lurking in our archived Kepler data, waiting for the right tool or technology to unearth them," said Paul Hertz, director of NASA's Astrophysics Division in Washington. "This finding shows that our data will be a treasure trove available to innovative researchers for years to come."

The discovery came about after researchers Christopher Shallue and Andrew Vanderburg trained a computer to learn how to identify exoplanets in the light readings recorded by Kepler – the minuscule change in brightness captured when a planet passed in front of, or transited, a star. Inspired by the way neurons connect in the human brain, this artificial "neural network" sifted through Kepler data and found weak transit signals from a previously-missed eighth planet orbiting Kepler-90, in the constellation Draco.

While machine learning has previously been used in searches of the Kepler database, this research demonstrates that neural networks are a promising tool in finding some of the weakest signals of distant worlds.

Other planetary systems probably hold more promise for life than Kepler-90. About 30 percent larger than Earth, Kepler-90i is so close to its star that its average surface temperature is believed to exceed 800 degrees Fahrenheit, on par with Mercury. Its outermost planet, Kepler-90h, orbits at a similar distance to its star as Earth does to the Sun.

"The Kepler-90 star system is like a mini version of our solar system. You have small planets inside and big planets outside, but everything is scrunched in much closer," said Vanderburg, a NASA Sagan Postdoctoral Fellow and astronomer at the University of Texas at Austin.

Shallue, a senior software engineer with Google's research team Google AI, came up with the idea to apply a neural network to Kepler data. He became interested in exoplanet discovery after learning that astronomy, like other branches of science, is rapidly being inundated with data as the technology for data collection from space advances.

“In my spare time, I started googling for ‘finding exoplanets with large data sets’ and found out about the Kepler mission and the huge data set available,” said Shallue. "Machine learning really shines in situations where there is so much data that humans can't search it for themselves.”

Kepler’s four-year dataset consists of 35,000 possible planetary signals. Automated tests, and sometimes human eyes, are used to verify the most promising signals in the data. However, the weakest signals often are missed using these methods. Shallue and Vanderburg thought there could be more interesting exoplanet discoveries faintly lurking in the data.

First, they trained the neural network to identify transiting exoplanets using a set of 15,000 previously-vetted signals from the Kepler exoplanet catalogue. In the test set, the neural network correctly identified true planets and false positives 96 percent of the time. Then, with the neural network having "learned" to detect the pattern of a transiting exoplanet, the researchers directed their model to search for weaker signals in 670 star systems that already had multiple known planets. Their assumption was that multiple-planet systems would be the best places to look for more exoplanets.

“We got lots of false positives of planets, but also potentially more real planets,” said Vanderburg. “It’s like sifting through rocks to find jewels. If you have a finer sieve then you will catch more rocks but you might catch more jewels, as well.”

Kepler-90i wasn’t the only jewel this neural network sifted out. In the Kepler-80 system, they found a sixth planet. This one, the Earth-sized Kepler-80g, and four of its neighboring planets form what is called a resonant chain – where planets are locked by their mutual gravity in a rhythmic orbital dance. The result is an extremely stable system, similar to the seven planets in the TRAPPIST-1 system.

Their research paper reporting these findings has been accepted for publication in The Astronomical Journal. Shallue and Vanderburg plan to apply their neural network to Kepler’s full set of more than 150,000 stars.

Kepler has produced an unprecedented data set for exoplanet hunting. After gazing at one patch of space for four years, the spacecraft now is operating on an extended mission and switches its field of view every 80 days.

“These results demonstrate the enduring value of Kepler’s mission,” said Jessie Dotson, Kepler’s project scientist at NASA’s Ames Research Center in California’s Silicon Valley. “New ways of looking at the data – such as this early-stage research to apply machine learning algorithms – promises to continue to yield significant advances in our understanding of planetary systems around other stars. I’m sure there are more firsts in the data waiting for people to find them.”

Ames manages the Kepler and K2 missions for NASA’s Science Mission Directorate in Washington. 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. This work was performed through the Carl Sagan Postdoctoral Fellowship Program executed by the NASA Exoplanet Science Institute.

Source: NASA

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2. Meteors Explode from the Inside When They Reach the Atmosphere

Earth is no stranger to meteors. In fact, meteor showers are a regular occurrence, where small objects (meteoroids) enter the Earth's atmosphere and radiate in the night sky. Since most of these objects are smaller than a grain of sand, they never reach the surface and simply burn up in the atmosphere. But every so often, a meteor of sufficient size will make it through and explode above the surface, where it can cause considerable damage.

A good example of this is the Chelyabinsk meteoroid, which exploded in the skies over Russia in February of 2013. This incident demonstrated just how much damage an air burst meteorite can do and highlighted the need for preparedness. Fortunately, a new study from Purdue University indicates that Earth's atmosphere is actually a better shield against meteors than we gave it credit for.

Their study, which was conducted with the support of NASA's Office of Planetary Defense, recently appeared in the scientific journal *Meteoritics and Planetary Science* – titled "Air Penetration Enhances Fragmentation of Entering Meteoroids"*.* The study team consisted of Marshall Tabetah and Jay Melosh, a postdoc research associate and a professor with the department of Earth, Atmospheric and Planetary Sciences (EAPS) at Purdue University, respectively.

In the past, researchers have understood that meteoroids often explode before reaching the surface, but they were at a loss when it came to explaining why. For the sake of their study, Tabetah and Melosh used the Chelyabinsk meteoroid as a case study to determine exactly how meteoroids break up when they hit our atmosphere. At the time, the explosion came as quite the a surprise, which was what allowed for such extensive damage.

When it entered the Earth's atmosphere, the meteoroid created a bright fireball and exploded minutes later, generating the same amount of energy as a small nuclear weapon. The resulting shockwave blasted out windows, injuring almost 1500 people and causing millions of dollars in damages. It also sent fragments hurling towards the surface that were recovered, and some were even used to fashion medals for the 2014 Sochi Winter Games.

But what was also surprising was how much of the meteroid's debris was recovered after the explosion. While the meteoroid itself weighed over 9000 metric tonnes (10,000 US tons), only about 1800 metric tonnes (2,000 US tons) of debris was ever recovered. This meant that something happened in the upper atmosphere that caused it to lose the majority of its mass.

Looking to solve this, Tabetah and Melosh began considering how high-air pressure in front of a meteor would seep into its pores and cracks, pushing the body of the meteor apart and causing it to explode. As Melosh explained in a Purdue University News press release:

"There's a big gradient between high-pressure air in front of the meteor and the vacuum of air behind it. If the air can move through the passages in the meteorite, it can easily get inside and blow off pieces."

To solve the mystery of where the meteoroid's mass went, Tabetah and Melosh constructed models that characterized the entry process of the Chelyabinsk meteoroid that also took into account its original mass and how it broke up upon entry. They then developed a unique computer code that allowed both solid material from the meteoroid's body and air to exist in any part of the calculation. As Melosh indicated:

"I've been looking for something like this for a while. Most of the computer codes we use for simulating impacts can tolerate multiple materials in a cell, but they average everything together. Different materials in the cell use their individual identity, which is not appropriate for this kind of calculation."

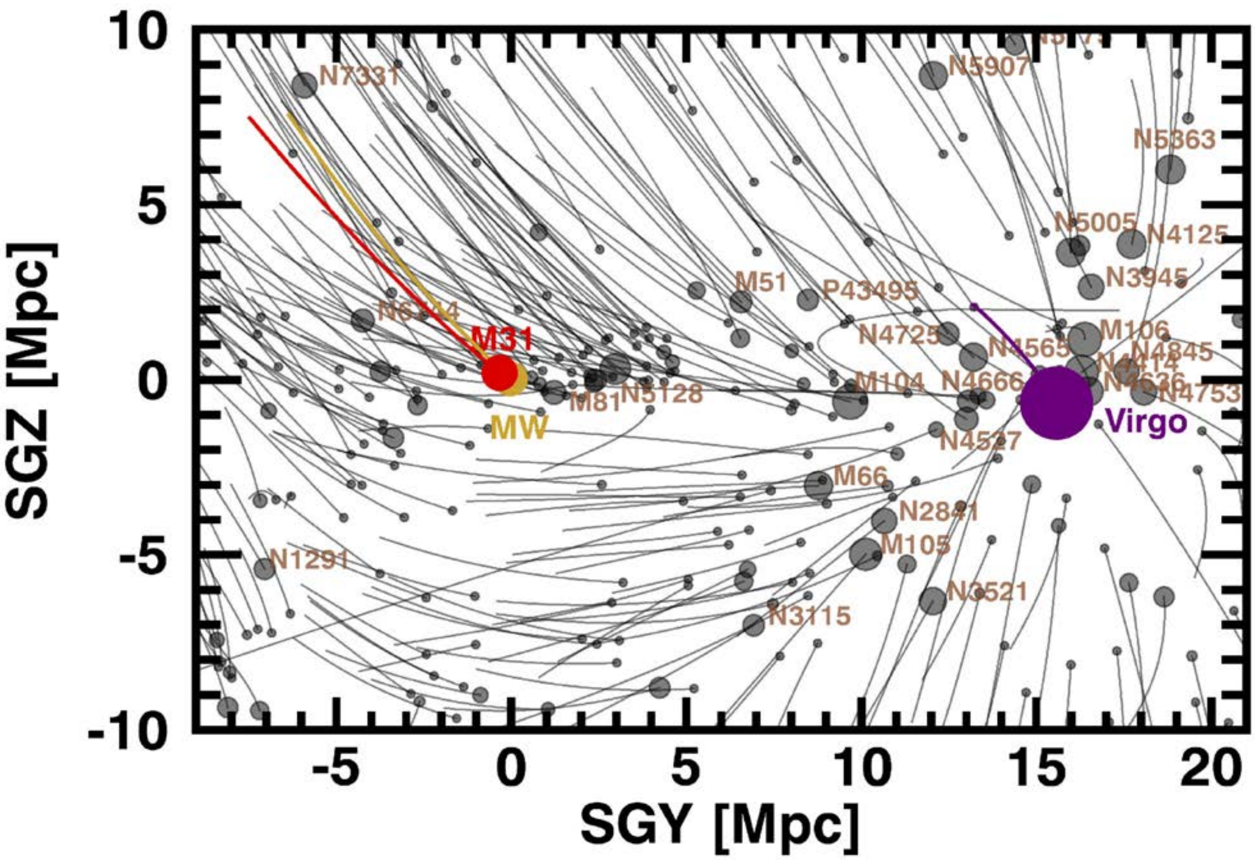
This new code allowed them to fully simulate the exchange of energy and momentum between the entering meteoroid and the interacting atmospheric air. During the simulations, air that was pushed into the meteoroid was allowed to percolate inside, which lowered the strength of the meteoroid significantly. In essence, air was able to reach the insides of the meteoroid and caused it to explode from the inside out.

This not only solved the mystery of where the Chelyabinsk meteoroid's missing mass went, it was also consistent with the air burst effect that was observed in 2013. The study also indicates that when it comes to smaller meteroids, Earth's best defense is its atmosphere. Combined with early warning procedures, which were lacking during the Chelyabinsk meteroid event, injuries can be avoided in the future.

This is certainly good news for people concerned about planetary protection, at least where small meteroids are concerned. Larger ones, however, are not likely to be affected by Earth's atmosphere. Luckily, NASA and other space agencies make it a point to monitor these regularly so that the public can be alerted well in advance if any stray too close to Earth. They are also busy developing counter-measures in the event of a possible collision.

Source: Universe Today Return to Contents

3. Galaxy Orbits in the Local Supercluster

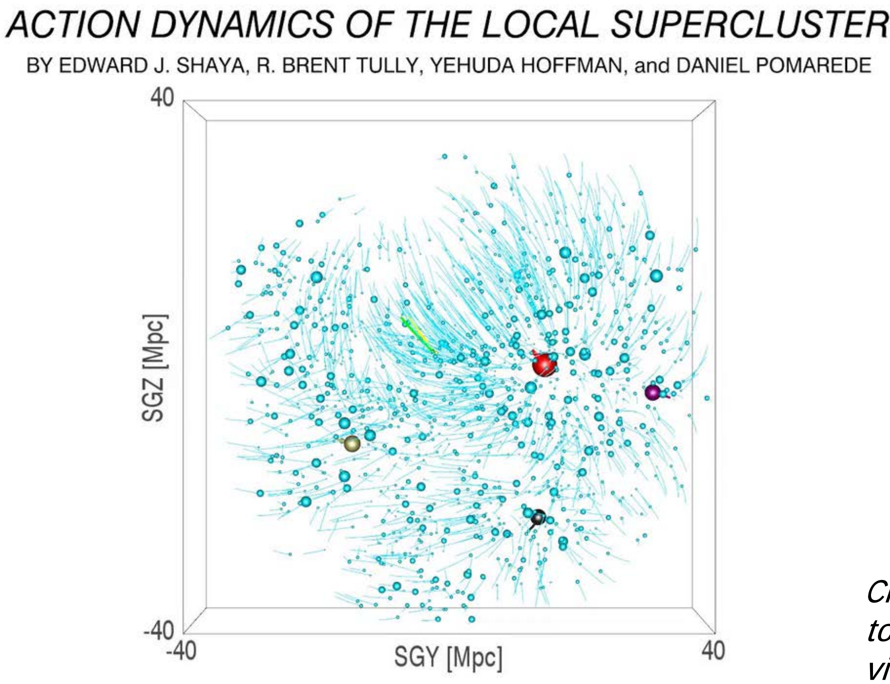


A team of astronomers from Maryland, Hawaii, Israel, and France has produced the most detailed map ever of the orbits of galaxies in our extended local neighborhood, showing the past motions of almost 1400 galaxies within 100 million light years of the Milky Way.

The team reconstructed the galaxies' motions from 13 billion years in the past to the present day. The main gravitational attractor in the mapped area is the Virgo Cluster, with 600 trillion times the mass of the Sun, 50 million light years from us. Over a thousand galaxies have already fallen into the Virgo Cluster, while in the future all galaxies that are currently within 40 million light years of the cluster will be captured. Our Milky Way galaxy lies just outside this capture zone. However the Milky Way and Andromeda galaxies, each with 2 trillion times the mass of the Sun, are destined to collide and merge in 5 billion years.

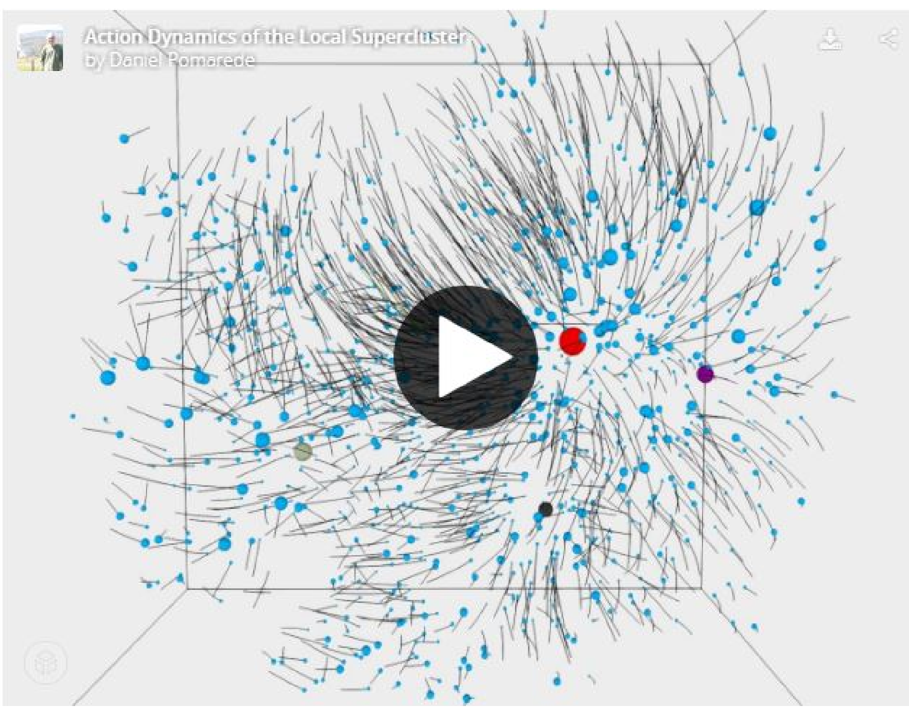
"For the first time, we are not only visualizing the detailed structure of our Local Supercluster of galaxies but we are seeing how the structure developed over the history of the universe. An analogy is the study of the current geography of the Earth from the movement of plate tectonics," said co-author Brent Tully, from the University of Hawaii Institute for Astronomy.

These dramatic merger events are only part of a larger show. There are two overarching flow patterns within this volume of the universe. All galaxies in one hemisphere of the region - including our own Milky Way - are streaming toward a single flat sheet. In addition, essentially every galaxy over the whole volume is flowing, as a leaf would in a river, toward gravitational attractors at far greater distances.



Clicking on the images will take you to the Phys.org page where you can view the videos.

Representations of the orbits can be seen in a video (above) and, alternatively, with an interactive model (below). With the interactive model, a viewer can pan, zoom, rotate, and pause/activate the time evolution of movement along orbits. The orbits are shown in a reference frame that removes the overall expansion of the universe. What we are seeing are the deviations from cosmic expansion caused by the interactions of local sources of gravity.



The study, Action Dynamics of the Local Supercluster is published in the December 4 issue of The *Astrophysical Journal*.

Source: Phys.org

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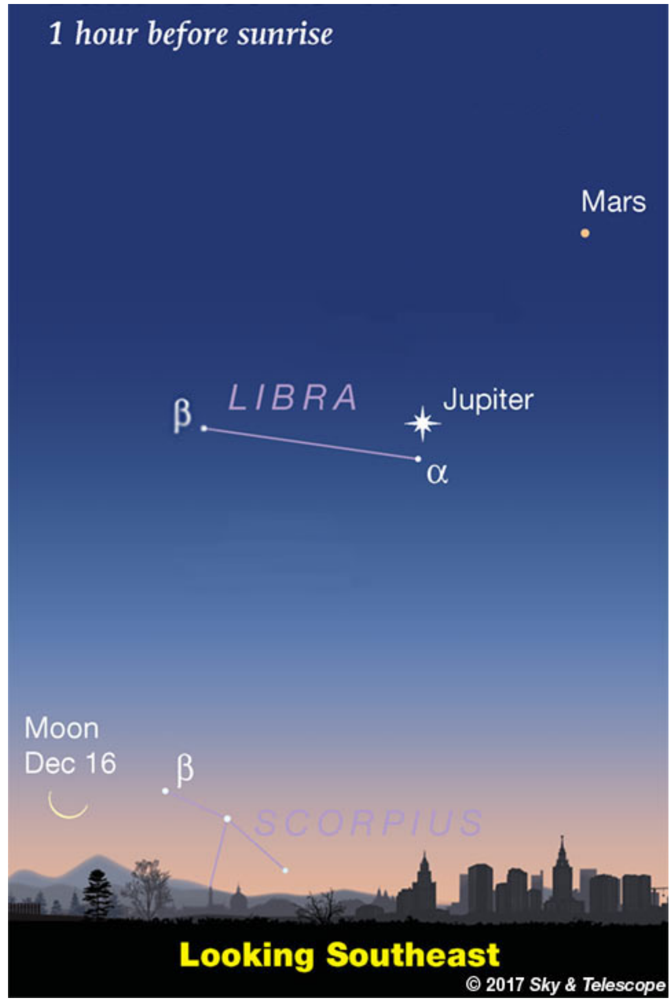
The Night Sky

Friday, December 15

• As the Summer Triangle sinks lower in the west, Altair is the first of its stars to go. Start by spotting bright Vega in the northwest right after dark. The brightest star above Vega is Deneb. Altair, the Triangle's third star, is farther to Vega's left or lower left. How late into the evening, and into the advancing season, can you keep it in view?

By December 23rd, Mercury is emerging low into dawn view where the Moon was a week before.

• As dawn begins to brighten on the morning of Saturday the 16th, look very low in the southeast to try to spot the thinning crescent Moon. It's far lower left of the diagonal line of Jupiter, Mars, and Spica (which is off the upper right edge here).



Jupiter shines birth in early dawn all month.

Saturday, December 16

• Have you ever watched a Sirius-rise? Find a spot with an open view right down to the east-southeast horizon, and watch for Sirius to come up about two fists at arm's length below Orion's vertical Belt. Sirius rises sometime around 8 p.m. now, depending on your location.

When a star is very low, it tends to twinkle quite slowly and often in vivid colors. Sirius is bright enough to show these effects well, especially with binoculars.

Sunday, December 17

• At this time of year the Big Dipper lies down lowest just after dark, due north. It's entirely below the north horizon if you're as far south as Miami. By 11 or midnight the Dipper wheels around to stand straight up on its handle, in fine view in the northeast.

Monday, December 18

• The Pleiades star cluster, the size of your fingertip at arm's length, shines very high in the southeast after dinnertime. How many Pleiads can you count with your unaided eye? Take your time and keep looking. Most people can count 6. With sharp eyesight, a dark sky, and a steady gaze, you may be able to make out 8 or 9.

• New Moon (exactly new at 1:30 a.m. on the 18th EST).

Tuesday, December 19

• The five brightest stars of Cassiopeia are usually called a W. At dusk the W stands nearly on end very high in the northeast. It soon turns over to become a flattened M even higher in the north.

Source: Sky & Telescope

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ISS Sighting Opportunities

For Denver:

Date	Visible	Max Height	Appears	Disappears
Fri Dec 15, 5:40 PM	6 min	88°	10° above NW	10° above SE
Sat Dec 16, 6:27 PM	2 min	17°	17° above SW	10° above S
Sun Dec 17, 5:32 PM	6 min	34°	12° above WNW	10° above SSE
Tue Dec 19, 5:28 PM	< 1 min	11°	11° above SSW	10° above SSW

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

NASA-TV Highlights

(all times Eastern Daylight Time)

Friday, December 15

- **1 p.m., 5 p.m., 9 p.m.** - SpaceCast Weekly (all channels)
- **1:30 p.m.,** - Video File of the ISS Expedition 54-55 Crew Activities in Baikonur, Kazakhstan, Soyuz MS-07 Rollout to the Launch Pad and Pad Interviews at the Baikonur Cosmodrome in Kazakhstan (all channels)
- **2 p.m., 6 p.m., 10 p.m. -** Replay of the Launch of the SpaceX/Dragon CRS-13 Mission (all channels)
- **3 p.m., 7 p.m. -** Replay of the SpaceX/Dragon CRS-13 Post-Launch News Conference (all channels)
- **4 p.m., 8 p.m., 11 p.m. -** ISS Expedition 54-55 Crew Activities in Baikonur, Kazakhstan, Soyuz MS-07 Rollout to the Launch Pad and Pad Interviews at the Baikonur Cosmodrome in Kazakhstan (NTV-1 (Public))

Saturday, December 16

- **12 p.m. -** Replay of the Russian State Commission Meeting and Final ISS Expedition 54-55 Pre-Launch Crew News Conference in Baikonur, Kazakhstan (Shkaplerov, Tingle, Kanai) (all channels)

Sunday, December 17

- **1 a.m. -** ISS Expedition 54-55/Soyuz MS-07 Launch Coverage (Shkaplerov, Tingle, Kanai; includes video B-roll of the crew's launch day pre-launch activities at 1:25 a.m. ET; launch scheduled at 2:21 a.m. ET) (starts at 1:15 a.m.) (all channels)
- **4:30 a.m.** - Coverage of the Rendezvous and Capture of the SpaceX/Dragon CRS-13 Cargo Craft at the ISS (Capture scheduled for approximately 6 a.m. ET) (all channels)
- **7:30 a.m.** - Coverage of the Installation of the SpaceX/Dragon CRS-13 Cargo Craft to the ISS (all channels)

Tuesday, December 19

- **3 a.m**. - ISS Expedition 54-55/Soyuz MS-07 Docking to the ISS Coverage (Shkaplerov, Tingle, Kanai; docking scheduled at 3:43 a.m. ET) (all channels)

- **5 a.m. -** ISS Expedition 54-55/Soyuz MS-07 Hatch Opening and Welcoming Ceremony (Shkaplerov, Tingle, Kanai; hatch opening scheduled at appx. 5:35 a.m. ET) (all channels)
- **1:30 p.m.** - Facebook Live: "Hubble Holiday Lights: Seeing the Winter Sky via Both Space and Backyard Telescopes" (NTV-1 (Public))

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

Space Calendar

- Dec 15 - [Dec 14] CRS-13/ TSIS/ MISSE-FF 1/ SDS Falcon 9 Launch (International Space Station)
- Dec 15 - Mercury Passes 2.2 Degrees From Venus
- Dec 15 - [Dec 13] Comet 363P/Lemmon Closest Approach To Earth (0.897 AU)
- Dec 15 - Comet 217P/LINEAR Closest Approach To Earth (1.303 AU)
- Dec 15 - Comet 229P/Gibbs At Opposition (1.965 AU)
- Dec 15 - [Dec 15] Apollo Asteroid 2017 XY2 Near-Earth Flyby (0.012 AU)
- Dec 15 - [Dec 12] Apollo Asteroid 2017 XK1 Near-Earth Flyby (0.016 AU)
- Dec 15 - [Dec 15] Apollo Asteroid 2017 XR2 Near-Earth Flyby (0.031 AU)
- Dec 15 - [Dec 15] Apollo Asteroid 2017 XD2 Near-Earth Flyby (0.037 AU)
- Dec 15 - Aten Asteroid 2014 BA3 Closest Approach To Earth (1.745 AU)
- Dec 15 - Kuiper Belt Object 19521 Chaos At Opposition (40.357 AU)
- Dec 15 - Henri Becquerel's 165th Birthday (1852)
- Dec 15 - 405th Anniversary (1612), 1st Observation of the Andromeda Galaxy Through a Telescope (Simon Marius)
- Dec 16 - [Dec 09] Arthur C. Clarke's 100th Birthday (1917)
- Dec 16 - Comet 176P/LINEAR Closest Approach To Earth (1.885 AU)
- Dec 16 - Apollo Asteroid 3200 Phaethon Near-Earth Flyby (0.069 AU)
- Dec 16 - [Dec 09] Apollo Asteroid 2017 XF Near-Earth Flyby (0.072 AU)
- Dec 16 - Asteroid 46977 Krakow Closest Approach To Earth (1.215 AU)
- Dec 16 - Asteroid 215423 Winnecke Closest Approach To Earth (1.468 AU)
- Dec 16 - Asteroid 118401 LINEAR Closest Approach To Earth (1.885 AU)
- Dec 16 - Asteroid 34419 Corning Closest Approach To Earth (1.912 AU)
- Dec 16 - 20th Anniversary (1997), Galileo, Europa 12 Flyby
- Dec 16 - 55th Anniversary (1962), Explorer 16 Launch (1st Meteroids Mission)
- Dec 16 - 105th Anniversary (1912), 1st Stamp Issued Depicting an Airplane
- Dec 16 - Edward Barnard's 160th Birthday (1857)
- Dec 17 - [Dec 12] Soyuz MS-7 Soyuz-FG Launch (International Space Station 53S)
- Dec 17 - Comet C/2017 K6 (Jacques) Closest Approach To Earth (1.822 AU)
- Dec 17 - Comet 356P/WISE Perihelion (2.689 AU)
- Dec 17 - Comet 208P/McMillan Closest Approach To Earth (2.976 AU)
- Dec 17 - Comet 264P/Larsen At Opposition (3.169 AU)
- Dec 17 - Comet 296P/Garradd At Opposition (4.094 AU)
- Dec 17 - Comet C/2015 V1 (PANSTARRS) Perihelion (4.267 AU)
- Dec 17 - Apollo Asteroid 2017 VT14 Near-Earth Flyby (0.010 AU)
- Dec 17 - Apollo Asteroid 2015 GF1 Near-Earth Flyby (0.074 AU)
- Dec 17 - Asteroid 9998 ISO Closest Approach To Earth (1.097 AU)
- Dec 17 - Asteroid 12426 Racquetball Closest Approach To Earth (1.262 AU)
- Dec 17 - Asteroid 13123 Tyson Closest Approach To Earth (1.732 AU)
- Dec 17 - Centaur Object 154783 (2004 PA44) At Opposition (19.719 AU)
- Dec 17 - 5th Anniversary (2012), GRAIL, Moon Impacts
- Dec 17 - Theodore Dunham's 120th Birthday (1897)
- Dec 18 - Comet 91P/Russell At Opposition (3.983 AU)
- Dec 18 - CComet C/2017 U5 (PANSTARRS) Perihelion (4.327 AU)
- Dec 18 - Amor Asteroid 9950 ESA Closest Approach To Earth (1.207 AU)
- Dec 18 - Asteroid 54522 Menaechmus Closest Approach To Earth (2.260 AU)
- Dec 19 - Comet C/2017 A3 (Elenin) Closest Approach To Earth (3.720 AU)
- Dec 19 - Asteroid 4149 Harrison Occults HIP 29509 (6.5 Magnitude Star)

- Dec 19 - Aten Asteroid 2011 YD29 Near-Earth Flyby (0.045 AU)
- Dec 19 - Asteroid 67085 Oppenheimer Closest Approach To Earth (0.974 AU)
- Dec 19 - Asteroid 20 Massalia Closest Approach To Earth (1.093 AU)
- Dec 19 - Asteroid 10001 Palermo Closest Approach To Earth (1.190 AU)
- Dec 19 - Asteroid 1816 Liberia Closest Approach To Earth (1.200 AU)
- Dec 19 - Asteroid 12608 Aesop Closest Approach To Earth (1.213 AU)
- Dec 19 - Asteroid 27320 Vellinga Closest Approach To Earth (1.617 AU)
- Dec 19 - Asteroid 780 Armenia Closest Approach To Earth (2.148 AU)
- Dec 19 - Albert Michelson's 165th Birthday (1852)

Source: JPL Space Calendar Return to Contents

Food for Thought

Does eclipse equal night in plant life?

On August 21, 2017, about 215 million American adults watched one of nature's most dramatic events: a total solar eclipse. However, most of the country could only see a partial eclipse. The path of the total eclipse was a strip just 70 miles wide, arcing across the country from Oregon to South Carolina.

The University of Missouri-Columbia lies directly on that path of totality. Scientists there knew they had a once-in-a-generation opportunity to study how a total eclipse affects plants. During the event, there would be 45 minutes of gradually decreasing light. Temperatures would also fall. Next would be two minutes and 36 seconds of total eclipse: a span as dark as night and noticeably cooler. Light and warmth would then gradually return.

Tim Reinbott and colleagues at the university's South Farm Research Center were curious to see how plants would react when night conditions interrupted the day. Would leaves fold up for the night? Would plants respond more to the change in light or the change in temperature? Would different kinds of plants respond differently?

"We were wondering if plants had a circadian rhythm--meaning that they have sensed when sunup and sundown are and have developed an internal clock, separate from sensing changes in light," Reinbott said. "So when we have totality of the eclipse in the middle of the day, would they even react?"

The team chose to observe four types of plants with different habits:

- Mimosa close their leaves at night and when they are touched.
- Oxalis (purple clover) close their leaves and fold their flowers at night.
- Drought-stressed soybeans fold up their leaves during the day and open them at night.
- Drought-stressed corn curls during the day and uncurls at night.

The research team prepared two mimosa plants in advance by exposing them to either 72 hours of light or 72 hours of darkness. One mimosa was exposed to a normal light/dark cycle.

The varied results have left the researchers with interesting questions.

Reinbott reported, "The regular mimosa responded to the eclipse by closing up its leaves, just like at sundown. But when we first exposed the mimosa plants to 72 hours of light or dark, they did not respond to the eclipse." Reinbott thinks it may be because the light spectrum, some of which is undetectable to the human eye, had changes the plants may have responded to. "We have data that show slight differences in the light spectrum during totality and sundown. Possibly those plants exposed to 72 hours of light or darkness lost some of their photoreceptors for one of these wavelengths (blue and red/far-red)."

The oxalis responded very differently. It was a hot day, so the oxalis leaves were folded up to reduce sun exposure and retain water. As the eclipse started, the oxalis leaves opened up. After totality passed, the leaves closed again. But the oxalis did not fold its flowers as they do at dusk. "This shows that they have a circadian rhythm and were not fooled by the change in light from the eclipse. They only responded to the temperature change," Reinbott concluded.

The drought-stressed corn did not visibly change much in response to the eclipse. Drought-stressed soybeans unfolded during the eclipse and then folded back up afterward, but it was unclear whether this was due to the temperature change or the light change. These soybeans behaved the same during totality as they do at sundown, showing they did not have a circadian rhythm.

Reinbott is looking forward to the next total eclipse over the same area in just seven years. In 2024 Reinbott and his team want to look more closely at plants' photosynthesis and water management. They also hope to learn more about the role of the light spectrum and what triggers the circadian rhythm in plants.

Source: EurekAlert Return to Contents

Space Image of the Week

Dawn of a galactic collision

NGC 5256, also known as Markarian 266, is about 350 million light-years away from Earth, in the constellation of Ursa Major (The Great Bear) [1]. It is composed of two disc galaxies whose nuclei are currently just 13 000 light-years apart. Their constituent gas, dust, and stars are swirling together in a vigorous cosmic blender, igniting newborn stars in bright star formation regions across the galaxy.

While interacting galaxies are destructive on a galactic scale, stars very rarely collide with each other in this process because the distances between them are so vast. But as the galaxies entangle themselves, strong tidal effects produce new structures — like the chaotic-looking plumes of NGC 5256 — before settling into a stable arrangement after millions of years.

In addition to the bright and chaotic features, each merging galaxy of NGC 5256 contains an active galactic nucleus, where gas and other debris are fed into a hungry supermassive black hole. Observations from NASA's Chandra X-ray Observatory show that both of these nuclei — and the region of hot gas between them — have been heated by shock waves created as gas clouds collide at high velocities.

Also in this Hubble image is another pair of probably interacting galaxies — they are hiding to the right of NGC 5256 in the far distance, and have not yet been explored by any astronomer. From our perspective here on Earth, NGC 5256 is also just a few degrees away from another famous pair of interacting galaxies, Messier 51, which was observed by Hubble in 2005 (heic0506).

Source: SpaceTelescope.org

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