

# Astronomy News

## Night Sky 2022 - September

| Sunrise                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Sunset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Mercury Sets/Rises                                                                                                                                                                                                                                                                                                                                                                              | Venus Rises                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
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| 1 <sup>st</sup> – 6:24am<br>10 <sup>th</sup> – 6:38am<br>20 <sup>th</sup> – 6:54am<br>30 <sup>th</sup> – 7:10am                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1 <sup>st</sup> – 7:57pm<br>10 <sup>th</sup> – 7:37pm<br>20 <sup>th</sup> – 7:14pm<br>30 <sup>th</sup> – 6:51pm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1 <sup>st</sup> – 8:18pm<br>5 <sup>th</sup> – 8:02pm<br>25 <sup>th</sup> – 6:50am<br>30 <sup>th</sup> – 6:05am                                                                                                                                                                                                                                                                                  | 1 <sup>st</sup> – 5:06am<br>10 <sup>th</sup> – 5:34am<br>20 <sup>th</sup> – 6:05am<br>30 <sup>th</sup> – 6:36am                                                                                                                                                                                                                                                                                                                                                             |
| Moon Rise                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Moon Set                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Moon Rise                                                                                                                                                                                                                                                                                                                                                                                       | Moon Set                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 1 <sup>st</sup> – 12:14pm (ESE)<br>2 <sup>nd</sup> – 1:37pm<br>3 <sup>rd</sup> – 3:01pm<br>4 <sup>th</sup> – 4:21pm (SE)<br>5 <sup>th</sup> – 5:30pm (SE)<br>6 <sup>th</sup> – 6:24pm<br>7 <sup>th</sup> – 7:02pm<br>8 <sup>th</sup> – 7:29pm<br>9 <sup>th</sup> – 7:49pm (ESE)<br>10 <sup>th</sup> – 8:06pm<br>11 <sup>th</sup> – 8:20pm (E)<br>12 <sup>th</sup> – 8:34pm<br>13 <sup>th</sup> – 8:49pm (ENE)<br>14 <sup>th</sup> – 9:06pm<br>15 <sup>th</sup> – 9:26pm<br>16 <sup>th</sup> – 9:53pm<br>17 <sup>th</sup> – 10:27pm (NE)<br>18 <sup>th</sup> – 11:13pm (NE)<br>20 <sup>th</sup> – 12:09am (NE) | 1 <sup>st</sup> – 9:52pm (WSW)<br>2 <sup>nd</sup> – 10:14pm<br>3 <sup>rd</sup> – 10:45pm<br>4 <sup>th</sup> – 11:29pm (SW)<br>6 <sup>th</sup> – 12:30am (SW)<br>7 <sup>th</sup> – 1:48am<br>8 <sup>th</sup> – 3:16am<br>9 <sup>th</sup> – 4:46am (WSW)<br>10 <sup>th</sup> – 6:13am<br>11 <sup>th</sup> – 7:38am (W)<br>12 <sup>th</sup> – 8:59am<br>13 <sup>th</sup> – 10:18am<br>14 <sup>th</sup> – 11:36am (WNW)<br>15 <sup>th</sup> – 12:53pm<br>16 <sup>th</sup> – 2:06pm<br>17 <sup>th</sup> – 3:15pm<br>18 <sup>th</sup> – 4:15pm (NW)<br>19 <sup>th</sup> – 5:03pm (NW)<br>20 <sup>th</sup> – 5:41pm | 21 <sup>st</sup> – 1:15am<br>22 <sup>nd</sup> – 2:26am<br>23 <sup>rd</sup> – 3:40am<br>24 <sup>th</sup> – 4:54am (ENE)<br>25 <sup>th</sup> – 6:09am<br>26 <sup>th</sup> – 7:24am (E)<br>27 <sup>th</sup> – 8:42am<br>28 <sup>th</sup> – 10:02am (ESE)<br>29 <sup>th</sup> – 11:25am<br>30 <sup>th</sup> – 12:50pm<br>-----<br>All times in notes<br>are set<br>for<br>Somerton<br>unless stated | 21 <sup>st</sup> – 6:09pm<br>22 <sup>nd</sup> – 6:30pm<br>23 <sup>rd</sup> – 6:48pm (WNW)<br>24 <sup>th</sup> – 7:02pm<br>25 <sup>th</sup> – 7:15pm<br>26 <sup>th</sup> – 7:28pm (W)<br>27 <sup>th</sup> – 7:42pm<br>28 <sup>th</sup> – 7:58pm (WSW)<br>29 <sup>th</sup> – 8:18pm<br>30 <sup>th</sup> – 8:46pm<br>-----<br>Moon Phases<br>First Quarter – 3 <sup>rd</sup><br>Full Moon – 10 <sup>th</sup><br>Last Quarter – 17 <sup>th</sup><br>New Moon – 25 <sup>th</sup> |
| A useful site:<br><a href="http://www.heavens-above.com">www.heavens-above.com</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | A S Zielonka                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

On the 1<sup>st</sup> at 9:00pm the crescent Moon is low in the south west with the star Zubenelgenubi (2.7 mag) in Libra just 1¼ degrees above it.

From the 1<sup>st</sup> – 6<sup>th</sup> Mars passes close to the star Ain (3.5 mag) in Taurus. On the 3<sup>rd</sup> at midnight Ain is 1¼ degrees below Mars and a ¼ of a degree to the right low in the ENE. Mars is 9 degrees above the horizon at 68 degrees azimuth.

At 9:00pm on the 2<sup>nd</sup> the star Dschubba (2.2 mag) in Scorpius is 4¼ degrees to the left of the crescent Moon and 1 degree above.

From the 3<sup>rd</sup> – 6<sup>th</sup> Venus passes close to the star Regulus (1.3 mag) in Leo. On the 5<sup>th</sup> at 6:00am Regulus is ¾ of a degree to the right of Venus low in the east. Venus is 6 degrees above the horizon at 77 degrees azimuth.

On the 3<sup>rd</sup> at 9:00pm the star Antares (1 mag) in Scorpius is 2½ degrees to the lower right of the Moon. The star Tau Scorpii (2.8 mag) is 3 degrees below the Moon.

Venus is at perihelion on the 4<sup>th</sup>.

At 9:00pm on the 4<sup>th</sup> the Moon is midway between the star numbered 85340 “Hipparcos Catalogue ID” (4.1 mag) in Ophiuchi and the star Alnasl (2.9 mag) in Sagittarius. Alnasl is 5¼ degrees to the left of the Moon and 2 degrees below.

On the 5<sup>th</sup> at 8:45pm the star Phi Sagittarii (3.1 mag) is 1¼ degrees above right of the Moon.

The Parker Solar Probe reaches its 13<sup>th</sup> perihelion on the 6<sup>th</sup>.

At midnight on the 6<sup>th</sup> the star numbered 68988 “Hipparcos Catalogue ID” (4.4 mag) in Sagittarius is 1½ degrees lower left of the Moon.

The Moon is at perigee (364,492km) on the 7<sup>th</sup> at 7:19pm. On the 7<sup>th</sup> at 11:45pm the star numbered 104234 “Hipparcos Catalogue ID” (4.4 mag) in Capricornus is 2¼ degrees lower left of the Moon. Saturn is 10 degrees upper left of the Moon.

At 8:30pm on the 8<sup>th</sup> the star Delta Capricorni (2.8 mag) is 3½ degrees above the Moon and ½ a degree to the right. Saturn is 6½ degrees to the upper right of the Moon.

On the 9<sup>th</sup> at 8:30pm the star Tau Aquarii (4 mag) is just ½ a degree to the right of the Moon.

At 10:25pm on the 10<sup>th</sup> Neptune (7.8 mag) is 3¾ degrees above the Moon. Jupiter is 13 degrees to the left of the Full Moon.

On the 11<sup>th</sup> at 9:00pm Jupiter is 3½ degrees above right of the Moon.

At midnight on the 12<sup>th</sup> the star Nu Piscium (4.4 mag) is 3 degrees below left of the Moon.

There is an occultation of the planet Uranus (5.7 mag) on the 14<sup>th</sup>. At 11:18:59pm Uranus will reappear from the two o'clock position of the moon's disc. At midnight Uranus is ½ a degree to the upper right of the Moon. (The times for this event are set for Yeovilton, so there will be minor differences from other locations). Here are a few other times from around Great Britain when Uranus will reappear: Edinburgh – 11:26:54pm, Leeds – 11:23:52pm, London – 11:20:16pm, Oxford – 11:20:37pm, Plymouth – 11:17:45pm, Southampton – 11:19:10pm, Swansea – 11:19:38pm. At midnight Uranus is ½ a degree to the upper right of the Moon.

At midnight on the 15<sup>th</sup> the Pleiades star cluster is 4 degrees above the Moon. The star Gamma Tauri (3.6 mag) is 7½ degrees below the Moon.

Neptune is at opposition on the 16<sup>th</sup>.

On the 16<sup>th</sup> at 11:00pm Mars is 3 degrees below the Moon and ½ a degree to the right low in the ENE.

At midnight on the 17<sup>th</sup> the star Elnath (1.6 mag) in Taurus is 4½ degrees above the Moon and 1 degree to the right.

On the night of the 18<sup>th</sup> at 12:30am the star Mabsuta (3 mag) in Gemini is 2¼ degrees below the crescent Moon and ½ a degree to the left... .. then at 6:00am on the 19<sup>th</sup> Mabsuta is 2 degrees to the lower right of the Moon.

From the 18<sup>th</sup> – 25<sup>th</sup> the asteroid 3 Juno (8 mag) will pass close to the star Lambda Aquarii (3.7 mag) in Aquarius. Looking south on the 21<sup>st</sup> at midnight Juno will be just ¾ of a degree upper right of Lambda

Aquarii. (For further information on this asteroid or others please see the “Asteroid“ section in the website above).

The Moon is at apogee (404,556km) on the 19th at 3:44pm.

At 5:00am on the 20th the crescent Moon lies approximately midway between the stars Upsilon Geminorum (4 mag) and Kappa Geminorum (3.5 mag), with Upsilon Geminorum  $2\frac{1}{4}$  degrees above the Moon.

On the 21st at 5:00am the Beehive star cluster is  $4\frac{1}{2}$  degrees below the crescent Moon and 1 degree to the right.

At 5:00am on the 22nd the star Lambda Leonis (4.3 mag) in Leo is  $3\frac{1}{2}$  degrees to the left of the crescent Moon and  $\frac{1}{2}$  a degree above.

Mercury is at inferior conjunction on the 23rd.

On the 23rd at 5:00am the star Eta Leonis (3.4 mag) is 1 degree above the crescent Moon.

At 6:00am on the 24th a thin crescent Moon will be low in the east. It will be  $8\frac{1}{2}$  degrees above the horizon at 83 degrees azimuth.

On the 25th at 6:30am a very thin crescent Moon is  $2\frac{1}{2}$  degrees above the eastern horizon at 84.5 degrees azimuth. Venus is just 2 degrees to the lower right of the Moon at 86.5 degrees azimuth and just  $1\frac{1}{4}$  degrees above the horizon.

Jupiter is at opposition on the 26th.

On the 27th from 5:30am the asteroid Ceres (8.7 mag) lies approximately midway between the stars Algieba (2 mag) and Eta Leonis (3.4 mag) in Leo. Ceres is 2 degrees from Eta Leonis and  $2\frac{1}{2}$  degrees from Algieba.

At 7:00pm on the 27th a thin crescent Moon is  $5\frac{1}{4}$  degrees above the horizon at 247 degrees azimuth. The star Spica (1 mag) in Virgo is 4 degrees to the lower right of the crescent Moon and 2 degrees above the horizon at 249 degrees azimuth.

On the 28th at 7:30pm the star Zubenelgenubi (2.7 mag) in Libra is 4 degrees to the left of the crescent Moon and  $2\frac{1}{4}$  degrees above. The Moon is 3 degrees above the horizon at 240.5 degrees azimuth.

At 7:30pm on the 30th the star Sigma Scorpii (2.9 mag) is 1 degree below the crescent Moon. The star Antares (1 mag) is 2 degrees to the left of the Moon and 1 degree below.

\*= Dates and times are subject to change.

News: NASA’s Orbital Debris Program Office is to work with U.S. Space Command in detecting asteroids that come very near Earth. Ground-based radar and other tracking offers a chance to characterize small near-Earth asteroids, including the upcoming close pass of 99942 Apophis on April 13th 2029. The recent loss of Arecibo makes the need to upgrade tracking and the Deep Space Network, especially urgent.

Deployed on April 25th, 1990, from the cargo bay of the U.S. space shuttle Discovery, the Hubble telescope got off to a rocky start. A defective mirror wasn’t discovered until after deployment and calibration. Three years later, astronauts repaired the defect with “corrective lenses”, named the Corrective Optics Space Telescope Axial Replacement (COSTAR) package, which they placed in the telescope during the STS-61/Servicing Mission One. Four servicing missions followed, each one deploying upgrades and new instruments, but the Atlantis STS-125 mission would be the last. Hubble is now on its own. Despite some scares, including a brief computer glitch last year, Hubble’s doing just fine. In its most recent review of Hubble operations, NASA announced that it would support the observatory through to June 2026. In fact,

current estimates suggest the observatory can stay in a high-enough orbit for operations to continue until the mid-2030's and beyond as its solar arrays and batteries are also in great shape.

South Korea's lunar orbiter '**DANURI**' has launched successfully to the Moon, joining a growing number of missions there. The mission's name, Danuri, is a portmanteau of the Korean words dal and nurida, collectively meaning "enjoy the Moon". The **Korea Pathfinder Lunar Orbiter (KPLLO)** mission is South Korea's first lunar orbiter and was launched on the 4<sup>th</sup> August. KPLLO carries six science instruments with a total mass of 40kg. Five instruments are from South Korea and one is from NASA. The mission will scout the lunar surface for minerals and elements, including aluminium, helium-3, and surface water ice.

1) **Lunar Terrain Imager (LUTI)** will take sharp images of probable landing sites for the second stage lunar exploration mission and special target sites of the lunar surfaces with a high spatial resolution.

2) **Wide-Angle Polarimetric Camera (PolCam)** will image and analyze the lunar regolith in polarized light. Though Earth-observing satellites have long used this technique, this is the first time a polarized-light imager has flown to the Moon. Bill Farrand (Space Science Institute) says that he will use PolCam to explore the nature of pyroclastic deposits, which formed early in the Moon's history during explosive volcanic activity. 3) **KPLLO Magnetometer (KMAG)** contains three sensors that will characterize the magnetic field lines frozen into lunar rocks.

4) **KPLLO Gamma Ray Spectrometer (KGRS)** is a gamma-ray spectrometer that works in the 10 kilo-electron volt (keV) to 10 mega-electron volt (MeV) range to probe the surface of the Moon in search of key chemicals and elements.

5) **Delay-Tolerant Networking experiment (DTNPL)** will test a sort of "interplanetary Internet" by addressing the technical issues that arise in a communications network that lacks continuous connectivity.

6) Nasa's **ShadowCam** will hunt for lunar water ice in permanently shadowed regions of the Moon. ShadowCam is 800 times more sensitive than a similar camera on the Lunar Reconnaissance Orbiter.

KPLLO will take a slow, looping Ballistic Lunar Transfer (BLT) orbit to the Moon. The spacecraft will take a so-called 'low-energy transfer orbit' or 'weak stability boundary orbit' says Sungsoo Kim. This path will take it towards the L1 Lagrange point, 1.5 million kilometers from Earth in the sunward direction (the complete opposite direction of where the James Webb Space Telescope is situated), before the spacecraft enters a capture orbit around the Moon on December 16<sup>th</sup>. On December 31<sup>st</sup>, it will enter a circular orbit at 100km around the Moon. NASA's recently launched Capstone mission is taking a similar low-energy path to the Moon. Danuri will start one year of science operations in early 2023. If the mission performs well, an extended science phase could take it into an elliptical orbit that would have it skimming just 20km over the lunar surface.

The very first results from the James Webb Space Telescope (JWST) seem to indicate that massive, luminous galaxies had already formed within the first 250 million years after the Big Bang. If confirmed, this would seriously challenge current cosmological thinking. For now, however, that's still a big "if". Shortly after NASA published Webb's first batch of scientific data, the astronomical preprint server arXiv was flooded with papers claiming the detection of galaxies that are so remote that their light took some 13.5 billion years to reach us. Many of these appear to be more massive than the standard cosmological model that describes the universe's composition and evolution.

A chance alignment between Earth and a Mars-bound spacecraft has given us a rare glimpse into the movement of high-energy particles from the Sun. The data from this event can help researchers understand the radiation environment near Mars – a key factor in planning crewed missions to our neighbouring planet and beyond.

A team of U.S. planetary scientists has shown that unexpected surface features on the dwarf planet Ceres can be explained by radioactive decay in its interior long ago. If they are right, their model could explain features not just on other dwarf planets, but also on some of the icy moons in the outer solar system.

As the top-priority new flagship mission, which by definition has a budget more than \$1 billion, the report recommends the Uranus Orbiter and Probe. This would be a large, Cassini-style mission to the ice giant and its moons and will include a probe that will enter the atmosphere. To date, we've only seen Uranus up close once, during the brief Voyager 2 flyby in 1986. Uranus won out over Neptune due to the flexibility of existing launch vehicles and technology for a 2031 to 2038 launch window, with a Jupiter-flyby assist.

The second-highest priority among flagships is a combination orbiter-and-lander that would head to Saturn's moon Enceladus, referred to in the report as the Enceladus Orbilander. This moon is a dynamic world with a subsurface ocean that may contain the complex processes to host life. Cassini caught sight of plumes emanating from ice geysers during several flybys, and Enceladus Orbilander could sample these and study the moon's surface up close. Four other flagship concepts that were in the running were a Europa lander, a Mercury lander, a Neptune/Triton mission, and a large mission to Venus.

Facts: Ceres is the largest object in the asteroid belt and was classified as a dwarf planet back in 2006. Given its distance and size, Ceres is about 50 times smaller than the Moon. Our knowledge of its surface features was sketchy until NASA's Dawn mission arrived in 2015.