





# ASTRONOMICAL DIARY

PREPARED BY ASTRONOMICAL PUBLICATION AND PLANETARIUM UNIT, SPACE SCIENCE AND ASTRONOMY SECTION

## ASTRONOMICAL EVENTS, DECEMBER 2022

DATE	EVENT	TIME
02	Close Approach of Moon and Jupiter	-
08	Close Approach of Moon and Mars	-
12	Moon at Apogee (Distance = 405,814.335 km)	08:28 AM
14	Geminids (ZHR = 120)	02:00 AM
22	December Solstice	05:48 AM
23	Ursids (ZHR = 4)	04:00 AM
24	Moon at Perigee (Distance = 358,374.232 km)	04:27 PM
29	Conjunction of Mercury and Venus	-
29	Conjunction of Moon and Jupiter	-

## PHASES OF THE MOON

	<b>Full Moon</b> Dec 08 12:08 PM
	<b>Last Quarter</b> Dec 16 04:56 PM
	<b>New Moon</b> Dec 23 06:17 PM
	<b>First Quarter</b> Dec 30 09:21 AM

## RISE AND SET TIMES OF PLANETS

DATE	MERCURY		VENUS		MARS		JUPITER		SATURN	
	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set
Dec 01	07:03 AM	06:13 PM	06:50 AM	06:04 PM	05:55 PM	*06:58 AM	01:14 PM	*01:17 AM	11:02 AM	10:31 PM
Dec 11	07:30 AM	06:39 PM	07:06 AM	06:18 PM	04:59 PM	*06:02 AM	12:36 PM	*12:39 AM	10:25 AM	09:54 PM
Dec 21	07:46 AM	06:58 PM	07:21 AM	06:34 PM	04:05 PM	*05:08 AM	11:59 AM	11:59 PM	09:49 AM	09:18 PM
Dec 31	07:22 AM	06:40 PM	07:34 AM	06:51 PM	03:15 PM	*04:18 AM	11:22 AM	11:24 PM	09:13 AM	08:43 PM



## NASA'S WEBB CATCHES FIERY HOURGLASS AS NEW STAR FORMS ASTRONOMY PICTURE OF THE MONTH

"NASA's James Webb Space Telescope has revealed the once-hidden features of the protostar within the dark cloud L1527, providing insight into the beginnings of a new star. These blazing clouds within the Taurus star-forming region are only visible in infrared light, making it an ideal target for Webb's Near-Infrared Camera (NIRCam).

The protostar itself is hidden from view within the "neck" of this hourglass shape. An edge-on protoplanetary disk is seen as a dark line across the middle of the neck. Light from the protostar leaks above and below this disk, illuminating cavities within the surrounding gas and dust.

The region's most prevalent features, the clouds colored blue and orange in this representative-color infrared image, outline cavities created as material shoots away from the protostar and collides with surrounding matter. The colors themselves are due to layers of dust between Webb and the clouds. The blue areas are where the dust is thinnest. The thicker the layer of dust, the less blue light is able to escape, creating pockets of orange."

Reference and more on this at: <https://www.nasa.gov/feature/goddard/2022/nasa-s-webb-catches-fiery-hourglass-as-new-star-forms>  
 Credits: NASA, ESA, CSA, and STScI. Image processing: J. DePasquale, A. Pagan, and A. Koekemoer (STScI)

Notes:

[1] \* following day

[2] All times displayed are in Philippine Standard Time (PhST)

"tracking the sky...helping the country"

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# Stars and Constellations

The constellations best observed in December are Perseus, Triangulum, Aries, Pisces, Taurus, Gemini, Auriga, Andromeda, Pegasus, Cassiopeia, Cepheus, and Lacerta in the northern sky, while Eradinus, Fornax, Horologium, Lepus, Canis Major, Columba, Caelum, Phoenix, Scupltor, Aquarius, and Carina are located in the southern sky. Located in between the line of equator are the constellation Orion, Monoceros and Cetus. Figure 1 shows the view of the sky on 15 December at around 09:00 PM when the December constellations are situated overhead [1].



Figure 1: The view of the night sky featuring the prominent December constellations showing the Northern and the Southern Hemisphere on 15 December at 09:00 PM using the Stellarium software

**Aries, the Ram** is one of the zodiac constellations that lie along the ecliptic, or the apparent path of the Sun across the sky, as seen from Earth. Aries has six officially named stars: Bharani, Botein, Hamal, Lili Borea, Mesarthim, and Sheratan. Its brightest star, Hamal, with an apparent magnitude of 2.00, is one of the 58 navigational stars that have a special role in the field of celestial navigation. Aries stars make up the recognizable "flat triangle" asterism along with the stars Hamal, Sheratan, and Mesarthim (Figure 2a). There are several noteworthy deep sky objects that can be found in Aries, including the unbarred spiral galaxy NGC 772 and its satellite galaxy, NGC 1156 (Figure 2b) [2,3,4,5].

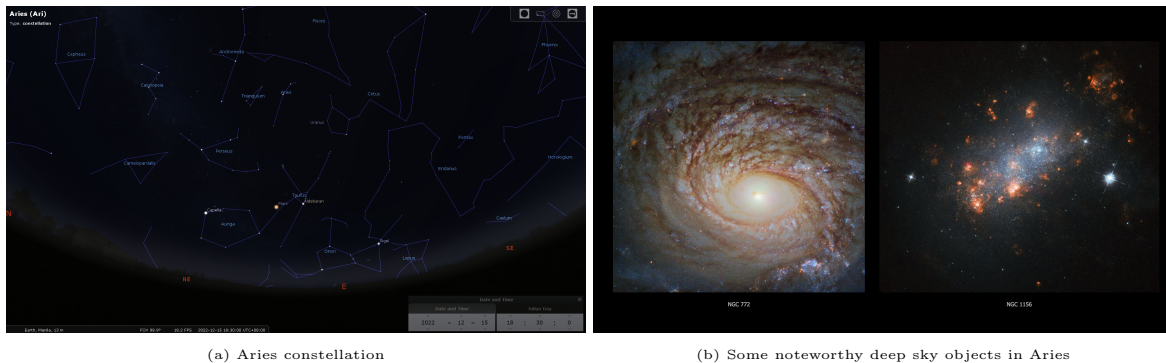


Figure 2: (a) The view of the north-eastern sky on 15 December 2022 at 06:30 PM showing the constellation Aries, using the Stellarium software. (b) Some noteworthy deep sky objects that can be found in Aries: NGC 772 and NGC 1156 (Credits:ESA/Hubble, NASA)

**Eridanus** is the sixth largest modern constellation and belongs to the Heavenly Waters family of constellations, which are associated with water in some form, along with the constellations Carina, Columba, Delphinus, Equuleus, Piscis Austrinus, Puppis, Pyxis, and Vela. Eridanus is represented as the celestial river that flows from Cursa, Eridanus' second brightest star, which is located near Rigel in the constellation Orion, then meanders back toward the south, at the border of the constellation Hydrus, where Eridanus' brightest star, Achernar, can also be found (Figure 3a) [6].

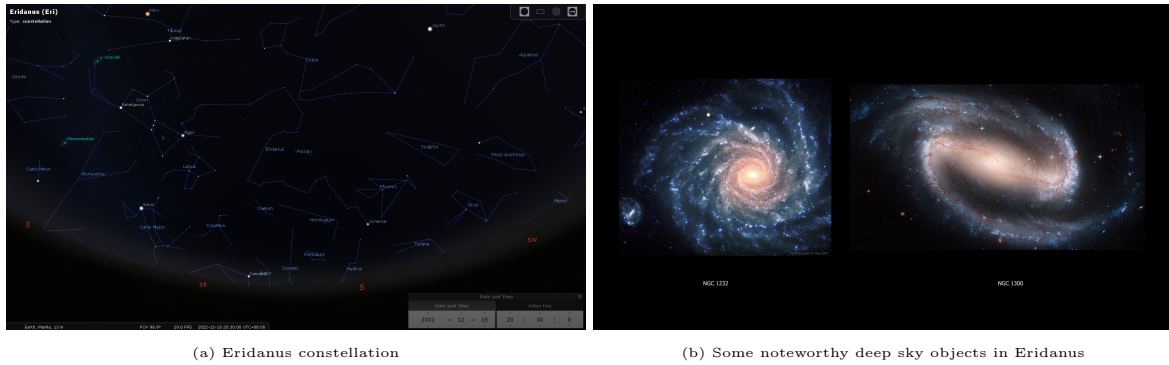


Figure 3: (a) The view of the south-eastern sky on 15 December 2022 at 08:30 PM showing the constellation Eridanus, Fornax, and Horologium, using the Stellarium software. (b) Some noteworthy deep sky objects that can be found in Eridanus: NGC 1300 and NGC 1232 (Credits: NASA, ESA, and The Hubble Heritage Team (STScI/AURA), FORS, 8.2-meter VLT Antu, ESO)

Eridanus is home to a few faint galaxies and nebulas, including a reflection nebula called the Witch Head Nebula, and a group of about 200 galaxies known as the Eridanus Cloud. Within this group are some notable galaxies, such as the barred spiral galaxy NGC 1300 and the spiral galaxy NGC 1232 (Figure 3b) [2,6].

**Fornax, the Furnace**, a faint constellation that is surrounded by Eridanus, is home to the Fornax Galaxy Cluster, which is the second richest galaxy cluster within 100 million light years. Some notable members include the Great Barred Spiral Galaxy NGC 1365 and the barred spiral galaxy NGC 1398. Other noteworthy deep sky objects in this constellation are the planetary nebula NGC 1360, also known as the Robin's Egg Nebula, and the Seyfert barred spiral galaxy NGC 1097 (Figure 4) [2,7].



Figure 4: Some noteworthy deep sky objects that can be found in Fornax: NGC 1365 and NGC 1398 (Credits: ESO, Mike Selby, Leonardo Orzi)

Fornax and the constellation Horologium belong to the La Caille Family of constellations along with Antlia, Caelum, Circinus, Mensa, Microscopium, Norma, Octans, Pictor, Reticulum, Sculptor, and Telescopium. These 13 constellations were introduced by French astronomer Nicolas Louis de Lacaille in 1756, and due to their location in the far southern sky, these constellations were not visible then for the ancient Greeks and Romans [8]. Horologium, the Clock, is a relatively faint constellation, yet it is home to the Horologium Supercluster, a massive supercluster about 550 million light-years across that has about 5,000 galaxy groups [9].

## Planetary Location

Catch a glimpse of **Mercury** and **Venus** on the southwestern horizon a few minutes after sunset. Both of these planets may be challenging to observe due to their low position in the sky. On 29 December, a conjunction of Venus and Mercury will occur, with Venus passing  $1^{\circ}24'$  to the south of Mercury. The pair will start to be visible in the southwestern horizon around 05:59 PM (PhST). Figure 5 shows the position of the two planets at 06:15 PM. The pair will be too widely separated to fit within the field of view of a telescope, but will be visible to the naked eye or through a pair of binoculars [10].

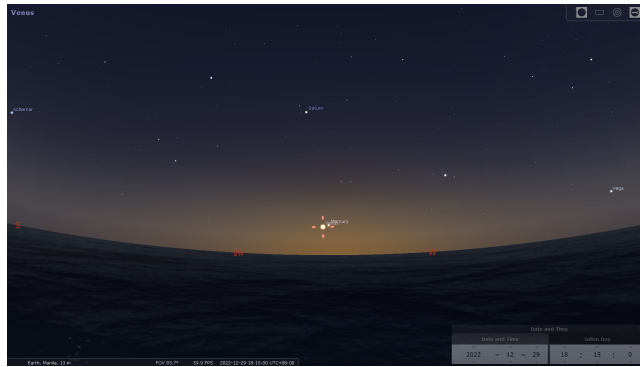


Figure 5: The view of the southwestern sky on 29 December at 06:15 PM during the conjunction of Venus and Mercury, using a Stellarium software

**Mars** is readily visible in the evening sky among the background stars of the constellation Taurus, the Bull. On 08 December, a conjunction of Moon and Mars will occur, with the Moon passing  $0^{\circ}32'$  to the north of Mars; however, this exact event will not be visible since it is below the horizon. Around the same time, these two celestial objects will make a close approach that will be visible in the night sky. (Figure 6) [11].



Figure 6: The view of the northeastern sky on 08 December at 07:15 PM during the close approach of Moon and Mars, using a Stellarium software

Shortly after sunset, **Jupiter** is well-placed in the southeastern sky and easily noticeable, while **Saturn** is well-positioned in the south-southwestern sky. On 02 December, Jupiter and the Moon will make a close approach, making the pair visible in the evening sky among the background stars of the constellation Pisces. On 29 December at 06:34 PM, a conjunction of Moon and Jupiter will occur, with the Moon passing  $2^{\circ}18'$  to the south of Jupiter (Figure 7) [12, 13].



Figure 7: The view of the southwestern sky on 29 December at 06:34 PM during the conjunction of Moon and Jupiter, using a Stellarium software

## Meteor Shower

The **Geminid meteor shower**, produced by asteroid 3200 Phaethon, is active from 04 December to 17 December, with peak activity occurring on 14 December (Figure 8). At its peak, Geminids is estimated to produce a nominal rate of about 120 meteors per hour. It is visible after around 7:12 PM, when its radiant point, constellation Gemini, the Twins rises above the eastern horizon, and is likely to produce its best displays around 02:00 AM, when its radiant point is highest in the sky. The presence of a last quarter Moon in Leo may present a significant interference with the meteor shower observation [14].

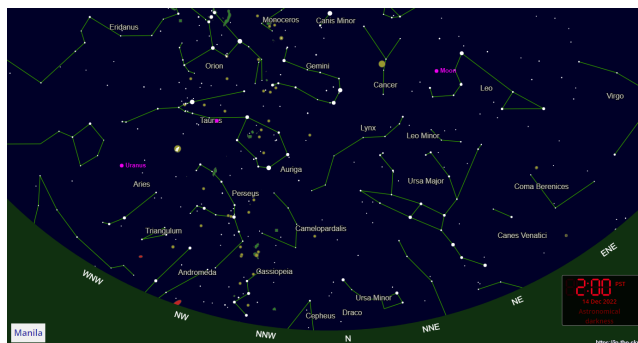


Figure 8: The view of the southeastern sky during the peak of Geminids on 14 December at 02:00 AM when the shower's radiant represented by the green solid circle.

The **Ursid meteor shower**, produced by comet 8P/Tuttle, is active from 17 December to 26 December, with peak activity occurring on 23 December (Figure 9). Ursid's radiant, constellation Ursa Minor, will be low in the sky, thus even at its peak, it is estimated to only observe about 4 meteors per hour [15].

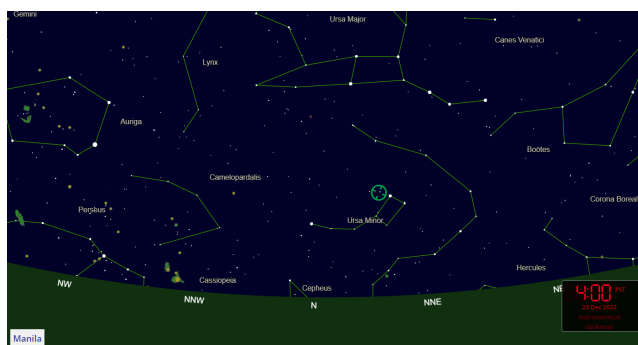


Figure 9: The view of the southeastern sky during the peak of Ursids on 23 December at 04:00 AM when the shower's radiant represented by the green solid circle.

The finest display of meteor shower is visible whenever the shower's radiant point is above the horizon, with the number of visible meteors increases as the radiant point ascends higher in the sky. Meteor showers are observable through the naked eye, and no special equipment such as telescopes or binoculars is needed. Maximize the viewing experience by choosing a dark observation site away from the city lights under clear and moonless sky conditions.

## December Solstice

The **December Solstice** will be on 22 December at 05:48 AM (PhST) [12]. By then, the Sun will reach its most southerly point in the sky, in Capricornus, at a declination of  $23.5^\circ$  S. During the December Solstice, the northern hemisphere will experience the shortest day and longest night, this day also marks the first day of winter. Consequently, in the southern hemisphere, this day marks the first day of summer [16].


## Calendar of Astronomical Events for December 2022

Table 1 shows summary of the astronomical events for the month of December 2022. All times displayed are in Philippines Standard Time (PhST).

Table 1: The summary of astronomical events for the month of December 2022

Date	Event	Time
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29	Conjunction of Mercury and Venus	—
29	Conjunction of Moon and Jupiter	—

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22 November 2022

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