

ASTRONOMICAL DIARY

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

ASTRONOMICAL EVENTS, OCTOBER 2023

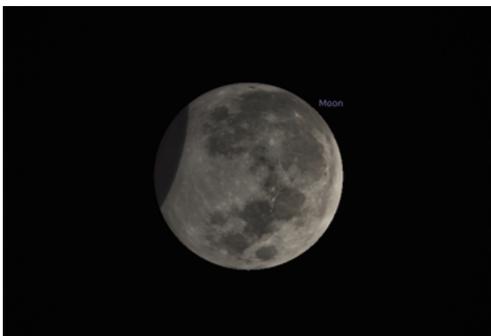
DATE	EVENT	TIME
01-04	100 Hours of Astronomy	
02	Conjunction and close approach of Moon and Jupiter	
04-10	World Space Week	
09	Draconid Meteor Shower (ZHR = 10)	08:00 p.m.
10	Conjunction and close approach of Moon and Venus	
10	Moon at Apogee (Distance = 405,367.692 km)	11:42 a.m.
22	Orionid Meteor Shower (ZHR = 15)	04:00 a.m.
24	Venus at greatest elongation west	08:05 a.m.
25	Venus at highest altitude in the morning sky	
26	Moon at Perigee (Distance = 364,941.650 km)	11:02 a.m.
29	Partial Lunar Eclipse	04:14 a.m.
29	Conjunction and close approach of Moon and Jupiter	

PHASES OF THE MOON

	Last Quarter Oct 06 09:48 p.m.
	New Moon Oct 15 01:55 a.m.
	First Quarter Oct 22 11:29 a.m.
	Full Moon Oct 29 04:24 a.m.

RISE AND SET TIMES OF PLANETS

DATE	MERCURY		VENUS		MARS		JUPITER		SATURN	
	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set
Oct 01	04:49 am	05:04 pm	02:44 am	03:11 pm	06:49 am	06:35 pm	07:48 pm	08:26 am*	03:44 pm	03:25 am*
Oct 11	05:21 am	05:21 pm	02:39 am	03:03 pm	06:37 am	06:18 pm	07:05 pm	07:43 am*	03:04 pm	02:43 am*
Oct 21	05:52 am	05:36 pm	02:39 am	02:58 pm	06:26 am	06:02 pm	06:21 pm	06:58 am*	02:23 pm	02:03 am*
Oct 31	06:21 am	05:52 pm	02:41 am	02:54 pm	06:16 am	05:47 pm	05:37 pm	06:13 am*	01:43 pm	01:23 am*



PARTIAL LUNAR ECLIPSE

ASTRONOMY EVENT OF THE MONTH

A Partial Lunar Eclipse will be visible in Manila and other parts of the Philippines for about 1 hour 19 minutes on 29 October 2023. It will be visible in any location where the Moon is above the horizon, including Europe, most of Asia and Africa, eastern Americas, and Australia.

The penumbral phase will begin in Manila at 02:00 a.m., followed by a Partial Lunar Eclipse beginning at 03:35 a.m., and the Maximum Eclipse occurring at 04:14 a.m. The partial umbral phase lasts until 04:54 a.m. and ends the penumbral phase at 06:28 a.m., at which point it is already below the horizon, having been the Moon set at 05:56 a.m. During the maximum eclipse, the umbral shadow cast by the Earth will obscure 12% of the Moon's disk

Image Credit: Stellarium Software

Notes:

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

[2] *following day

Stars and Constellations

The constellations best observed for the month of October in the northern sky are Cepheus, Lacerta, and Pegasus while Aquarius, Piscis Austrinus, and Grus are best viewed in the southern sky. Figure 1 shows the view of the sky on 15 October 2023 at around 09:00 p.m. [1].



Figure 1: The view of the night sky featuring the prominent October constellations including its artwork at 09:00 p.m. on 15 October 2023 using the Stellarium software

Numerous deep sky objects are observable this October. These include the Stephan's Quintet, the Helix Nebula (NGC 7293), the Saturn Nebula (NGC 7009), the Great Pegasus Cluster (M15), the Spiral Galaxy (NGC 7331), the Sunny Side Up galaxy (NGC 7742), and the Atoms for Peace Galaxy (NGC 7252) (Figure 2,3) [3].

Lacerta, the Lizard is a small and inconspicuous constellation. Neither consists of stars brighter than magnitude 3.00 nor galaxies and luminous globular clusters. This constellation can still be easily located through its surrounding constellations- Cassiopeia, Andromeda, Cepheus, Cygnus, and Pegasus [3].

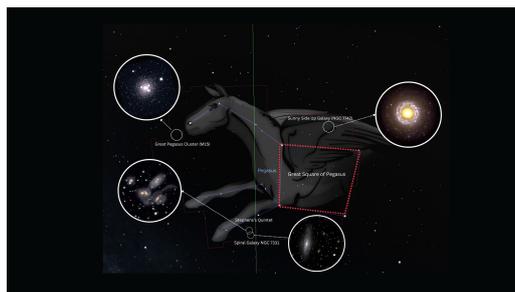


Figure 2: The constellation Pegasus, and the asterism represented by a red line, and showing some deep sky objects that can be found in this constellation

With the Great Square of Pegasus dominating the sky [Figure 2], Pegasus is one of the easiest constellations to recognize. The three prominent stars Scheat (Beta Pegasi), Markab (Alpha Pegasi), and Algenib (Gamma Pegasi), as well as the brightest star in the nearby constellation Andromeda (Alpha Andromedae), make up the Great Square, which symbolizes the body of the horse [3].

Following the chain of stars that begins with Alpheratz to Mirach, the middle star in the chain, will lead you to the Andromeda Galaxy (M31) and Triangulum Galaxy (M33), both located in the constellations Andromeda and Triangulum, respectively [3].

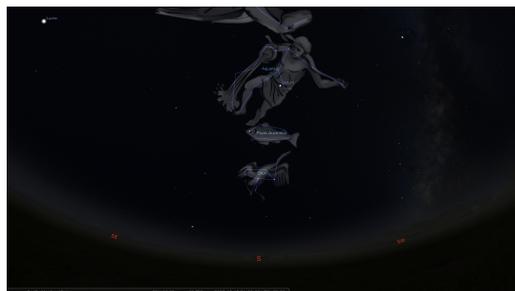


Figure 3: The view of the southern sky showing the position of the southern constellations Aquarius, Piscis Austrinus and Grus at 09:00 p.m. on 15 October 2023 using the Stellarium software

Lying south of Pegasus is the zodiac constellation Aquarius, The Water-Bearer. The stars Eta, Zeta, Pi, and Gamma Aquarii combine to form the asterism Water Jar. Aquarius is also the location of the prominent messier objects- the Saturn Nebula (NGC 7009) and the planetary nebulae NGC 7293 (sometimes called the Helix Nebula or the Eye of God) (Figure 3) [3].

Another constellation to look forward to is the "southern fish" or Piscis Austrinus. Located adjacent to Aquarius, this constellation is occasionally known as Piscis Australis. Its brilliant star, Fomalhaut (Alpha Piscis Austrini), is the 18th brightest star in the sky with an apparent magnitude of 1.16 [3]. Grus, the Crane is a constellation near Aquarius and Piscis Austrinus. The stars in the constellation Piscis Austrinus were previously separated to create the constellation Grus. Its brightest star, Alnair (Alpha Gruis), has an apparent magnitude of 1.74 [3].

Planetary Location

Due to their proximity to the Sun, **Mercury** and **Mars** will be unobservable for the whole month [4]. Meanwhile, **Venus** will be a morning planet observable in the eastern sky before sunrise.

On 10 October at 05:44 p.m., the Waning Crescent Moon and Venus will be in conjunction, where Venus is separated 6°30' south of the Moon. However, this phenomenon will not be visible since the pair will set below the horizon at around 02:40 p.m. A close pairing of Moon and Venus will be seen rising the eastern horizon at 02:39 a.m. and will be best observed at around 05:00 a.m. when they reach their highest point in the sky before sunrise. Both of these objects are located in the constellation Leo [2,5,6]. On 23 October at 05:36 a.m., Venus will be in its half phase or dichotomy. On 24 October at 08:05 a.m., Venus will reach its farthest distance from the Sun at 46.6°, sometimes referred to as Greatest Elongation West (Figure 4), and on 25 October, Venus will be at the highest altitude in the morning sky, it will be shining at the magnitude of -4.4. [2,7,8,9].



Figure 4: The view of the eastern sky on 24 October 2023 showing the position of Venus, 3 hours before the occurrence of greatest elongation west at 08:05 a.m. using the Stellarium application

The Waning Gibbous Moon will make a close approach with **Jupiter**, passing within 3°08' of each other on 02 October at 09:08 a.m. The pair will be visible on the east-southeastern horizon among the background stars of the constellation Aries when they are already high in the sky at around 09:08 p.m., [Figure 5]. Likewise, they will be in conjunction at 11:20 a.m., where Jupiter will be separated 2°23' to the south of the Moon. The same scenario repeats on 29 October at 02:10 p.m., when the pair will pass to each other by 2°53'. After two (2) hours, at 04:14 p.m., the two will be in conjunction, where Jupiter is separated 3°08' to the south of the Moon. However, the best time to view this pairing is at 09:00 p.m., when both were already high in the sky as seen in Figure 6 [2,10,11,12,13].



Figure 5: The view of the north-northeastern sky on 02 October 2023 showing the close approach of the Moon and Jupiter at 09:08 p.m., 12 hours after the exact event at 09:08 a.m., using the Stellarium application.



Figure 6: The view of the eastern sky on 29 October 2023 at 09:00 p.m. showing both the conjunction and close approach of the Moon and Venus, after the exact event at 02:10 p.m. and 04:14 p.m., respectively using the Stellarium application

Saturn will be spotted high in the eastern sky after sunset. The Moon and Saturn will be in conjunction on 24 October at 03:56 p.m., where Saturn will be separated by $2^{\circ}47'$ to the north of the Moon. Followed by a close approach at 05:47 p.m., where the Moon and Saturn pass $2^{\circ}32'$ of each other [2,14,15].

The pairings mentioned above 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.

Meteor Shower

The **Draconid Meteor Shower** is active from 06 October to 10 October, with peak activity occurring on 09 October. At its peak activity, the Draconid meteor shower will produce around ten (10) meteors per hour. The Draconids' best display is before its radiant constellation Draco is above the horizon, with the number of visible meteors increasing the higher the radiant point is in the sky (Figure 7) [16]. The shower will be active after sunset until 11:41 p.m. when its radiant point sets below the western horizon. The shower will peak close to the new moon, and so moonlight will present minimal interference.

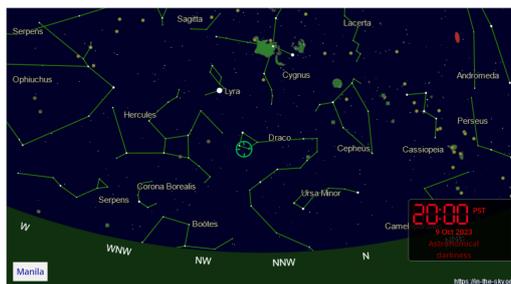


Figure 7: The view of the northwestern sky during the peak of Draconids on 09 October 2023 at 08:00 p.m. when the shower's radiant is represented by the green solid circle.

The **Orionid Meteor Shower**, produced by comet 1P/Halley, is active from 02 October to 07 November, with peak activity occurring on 22 October, and is estimated to have 15 meteors per hour. The Orionids' best display will be after its radiant constellation Orion fully rises around 9:56 p.m. on 21 October to the dawn of the following day (Figure 8). At its peak, the Moon in Sagittarius will be in the first quarter phase; however, it will set before midnight and cause no further interference later in the night [17].



Figure 8: The view of the southern sky during the peak of Orionids on 22 October 2023 at 04:00 a.m. when the shower's radiant is represented by the green solid circle.

Special tools, such as binoculars or telescopes will not be necessary to view the meteor showers this month as they can be observed with the naked eye. However, choose a dark location away from city lights with a clear sky and no moon to maximize the viewing experience.

Partial Lunar Eclipse

A **Partial Lunar Eclipse** will be visible in Manila and other parts of the Philippines for about 1 hour 19 minutes on 29 October 2023. It will be visible in any location where the Moon is above the horizon, including Europe, most of Asia and Africa, eastern Americas, and Australia. [2,18].

Table 1: The predicted time of occurrences of the major phases of the Partial Lunar Eclipse in Manila on 29 October 2023

Phase	Contact	Time (PhST)	Visible in Manila/Altitude
Moon enters Penumbra	P1	02:00 a.m.	Yes, 54 ^o
Moon enters Umbra	U1	03:35 a.m.	Yes, 31.8 ^o
Maximum Eclipse	Mid	04:14 a.m.	Yes, 22.6 ^o
Moon exits Umbra	U4	04:54 a.m.	Yes, 13.5 ^o
Moonset		05:56 a.m.	In the horizon
Moon exit Penumbra	P4	06:28 a.m.	No, below the horizon

Weather permitting, we recommend to look at the western sky in the early morning hours of 29 October. The penumbral phase will begin in Manila at 02:00 a.m., followed by a Partial Lunar Eclipse beginning at 03:35 a.m., and the Maximum Eclipse occurring at 04:14 a.m. The partial umbral phase lasts until 04:54 a.m. and ends the penumbral phase at 06:28 a.m., at which point it is already below the horizon, having been the Moon set at 05:56 a.m. During the maximum eclipse, the umbral shadow cast by the Earth will obscure 12% of the Moon's disk (Figure 9, 10) [2,17,18]

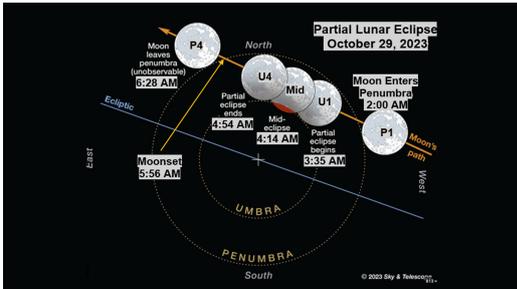


Figure 9: Partial Lunar Eclipse circumstances in Manila on 29 October 2023. (2023 Sky and Telescope)



Figure 10: The umbral shadow during the maximum eclipse using Stellarium Software.

The Lunar Eclipse is very easy to observe. A modest pair of binoculars will provide an excellent view of the Moon's surface but is not required. Contrary to solar eclipses, observing a lunar eclipse is safe and requires no protective eyewear.

Calendar of Astronomical Events for October 2023

Table 2 shows a summary of the astronomical events for October 2023. All times displayed are in Philippines Standard Time (PhST).

Table 2: The summary of astronomical events for October 2023

Date	Event	Time
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29	Partial Lunar Eclipse	-refer to Table 1-
29	Conjunction and close approach of Moon and Jupiter	

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25 September 2023

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