

Events featuring the natural satellites of Jupiter, September 2025

The satellites (also known as Galilean satellites in honor of the first person to observe them) of Jupiter provide some of the most striking phenomena observable with basic instrumentation. With a good pair of binoculars mounted on a tripod or a small telescope, we may be able to observe eclipses, occultations and transits of the Galilean satellites or their shadows over Jupiter. Similarly, telescopic observation of Jupiter's Great Red Spot (GRS) allows us to enjoy one of the largest storms in the entire Solar System. The following table summarizes all the events featuring Jupiter's satellites and observable from Granada.

- Column 1: Day of the month
- Column 2: Time in Coordinated Universal Time (to transform to local time add one hour in winter time and two in summer time)
- Column 3: Jupiter's altitude above the horizon
- Column 4: Main object: GMR, Great Red Spot; Gan, Ganymede; Cal, Callisto; Io, Io; Eur: Europa.
- Column 5: Event

For those unfamiliar with astronomical language, here we indicate what each of the phenomena tabulated below consists of:

- Transit: This occurs when one of Jupiter's satellites is between us and the planet, i.e. it is (in projection) over Jupiter's disk.

- Transit of the shadow: Based on the previous definition, you can get an idea of what I'm referring to here. Both Jupiter and its satellites are illuminated by the Sun and they all project a shadow in turn. This shadow, if projected by a satellite, can be lost in space or can fall on Jupiter's surface. If this is the case, we will be able to see a dark spot moving across the surface of the planet. For an observer located on Jupiter's surface, it would be a solar eclipse.

- Occultation: If the shadow, instead of being projected by the satellite onto Jupiter's surface, is projected by Jupiter onto the satellite, an eclipse will occur. What we can observe is that a given satellite goes from being visible to not being visible, because it is in the shadow projected by Jupiter and therefore does not receive any light to reflect and be visible. It would be the equivalent phenomenon to a lunar eclipse on Earth.

- Regarding the Great Red Spot (GRS), what we tabulate in this table is the moment when it passes through the central meridian, i.e. when the spot is in front of us.

Day	Time (UT)	Altitude (°)	Objet	Event
(1)	(2)	(3)	(4)	(5)
02	05:25	37.4	GRS	Crosses central meridian
04	04:48	31.4	Io	Shadow transit begins
04	05:34	40.7	Eur	Occultation ends
05	02:56	10.2	GRS	Crosses central meridian
05	05:20	38.7	Io	Occultation ends
06	02:37	7.3	Io	Transit ends
07	03:47	21.6	Cal	Occultation ends
07	04:34	31.1	GRS	Crosses central meridian
10	02:05	4.3	GRS	Crosses central meridian
11	03:15	18.5	Eur	Eclipse begins
11	04:01	27.6	Gan	Occultation ends
12	03:43	24.8	GRS	Crosses central meridian
12	03:52	26.5	Io	Eclipse begins
13	02:18	9.0	Io	Transit begins
13	02:50	15.1	Eur	Transit ends
13	03:24	21.8	Io	Shadow transit ends
13	04:34	35.8	Io	Transit ends
14	01:47	4.0	Io	Occultation ends
14	05:22	46.2	GRS	Crosses central meridian
15	04:03	31.1	Cal	Shadow transit ends
17	02:52	18.6	GRS	Crosses central meridian
18	03:20	24.9	Gan	Eclipse ends
18	05:05	45.9	Gan	Occultation begins
18	05:48	54.5	Eur	Eclipse begins
19	04:31	39.9	GRS	Crosses central meridian
19	05:46	54.7	Io	Eclipse begins
20	03:03	23.0	Io	Shadow transit begins
20	03:04	23.3	Eur	Shadow transit ends
20	04:15	37.4	Io	Transit begins
20	05:18	50.0	Io	Shadow transit ends
20	05:34	53.2	Eur	Transit ends
21	03:45	32.2	Io	Occultation ends
22	02:01	12.5	GRS	Crosses central meridian
24	03:40	33.5	GRS	Crosses central meridian
25	04:17	41.8	Gan	Eclipse begins
26	05:18	54.7	GRS	Crosses central meridian
27	01:10	6.5	GRS	Crosses central meridian
27	02:52	26.4	Eur	Shadow transit begins
27	04:56	51.1	Io	Shadow transit begins
27	05:25	56.7	Eur	Transit begins
27	05:40	59.7	Eur	Shadow transit ends
28	02:09	18.6	Io	Eclipse begins
28	05:42	60.6	Io	Occultation ends
29	01:40	13.8	Io	Shadow transit ends
29	02:41	25.8	Gan	Transit ends

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Day	Time (TU)	Altitude ($^{\circ}$)	Objet	Event
(1)	(2)	(3)	(4)	(5)
29	02:48	27.2	GRS	Crosses central meridian
29	02:55	28.5	Io	Transit ends
29	02:56	28.7	Eur	Occultation ends

Table 1: Phenomena Featuring Jupiter’s Satellites and the Great Red Spot (GRS)