

Events featuring the natural satellites of Jupiter, March 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 ($^{\circ}$)	Objet	Event
(1)	(2)	(3)	(4)	(5)
02	22:15	45.6	GRS	Crosses central meridian
04	01:44	4.1	Io	Transit begins
04	19:46	71.7	Gan	Transit ends
04	21:02	58.4	Eur	Transit begins
04	22:43	38.5	Gan	Shadow transit begins
04	23:00	34.9	Io	Occultation begins
04	23:37	27.6	Eur	Transit ends
04	23:38	27.4	Eur	Shadow transit begins
04	23:54	24.2	GRS	Crosses central meridian
05	01:10	9.6	Gan	Shadow transit ends
05	19:46	71.2	GRS	Crosses central meridian
05	20:13	66.8	Io	Transit begins
05	21:33	51.6	Io	Shadow transit begins
05	22:26	40.9	Io	Transit ends
05	23:45	25.2	Io	Shadow transit ends
06	20:52	58.8	Eur	Eclipse ends
06	21:01	57.1	Io	Eclipse ends
07	01:33	3.9	GRS	Crosses central meridian
07	21:25	51.7	GRS	Crosses central meridian
09	23:04	30.3	GRS	Crosses central meridian
10	18:55	74.9	GRS	Crosses central meridian
11	21:27	48.2	Gan	Transit begins
11	23:39	21.7	Eur	Transit begins
11	23:51	19.5	Gan	Transit ends
12	00:43	9.5	GRS	Crosses central meridian
12	00:56	7.1	Io	Occultation begins
12	20:34	57.7	GRS	Crosses central meridian
12	22:10	38.7	Io	Transit begins
12	23:29	23.1	Io	Shadow transit begins
13	00:23	12.6	Io	Transit ends
13	19:26	69.5	Io	Occultation begins
13	20:49	54.0	Eur	Occultation ends
13	20:52	53.6	Eur	Eclipse begins
13	22:57	28.6	Io	Eclipse ends
13	23:31	21.9	Eur	Eclipse ends
14	18:53	73.5	Io	Transit ends
14	20:11	60.6	Io	Shadow transit ends
14	22:14	36.4	GRS	Crosses central meridian
15	19:01	72.0	Gan	Eclipse ends
16	23:53	15.3	GRS	Crosses central meridian
17	19:44	63.5	GRS	Crosses central meridian
19	21:23	42.6	GRS	Crosses central meridian
20	00:07	10.4	Io	Transit begins
20	20:55	47.6	Eur	Occultation begins
20	21:23	41.9	Io	Occultation begins

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Day	Time (TU)	Altitude ($^{\circ}$)	Objet	Event
(1)	(2)	(3)	(4)	(5)
21	19:53	58.9	Io	Shadow transit begins
21	20:51	47.5	Io	Transit ends
21	22:08	32.1	Io	Shadow transit ends
21	23:02	21.3	GRS	Crosses central meridian
22	18:54	68.8	GRS	Crosses central meridian
22	19:19	64.5	Io	Eclipse ends
22	20:32	50.6	Gan	Eclipse begins
22	20:44	48.1	Eur	Shadow transit ends
22	23:02	20.5	Gan	Eclipse ends
24	20:33	48.7	GRS	Crosses central meridian
26	22:12	27.2	GRS	Crosses central meridian
27	23:21	13.2	Io	Occultation begins
27	23:38	9.9	Eur	Occultation begins
28	20:35	45.2	Io	Transit begins
28	21:49	30.4	Io	Shadow transit begins
28	22:49	18.4	Io	Transit ends
28	23:51	6.7	GRS	Crosses central meridian
29	00:04	4.5	Io	Shadow transit ends
29	19:38	55.7	Gan	Occultation begins
29	19:43	54.7	GRS	Crosses central meridian
29	20:42	43.1	Eur	Shadow transit begins
29	20:55	40.4	Eur	Transit ends
29	21:15	36.3	Io	Eclipse ends
29	22:06	26.1	Gan	Occultation ends
29	23:20	11.9	Eur	Shadow transit ends
31	21:22	33.3	GRS	Crosses central meridian

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