Events featuring the natural satellites of Jupiter, January 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 (^{o})	Objet	Event
(1)	(2)	(3)	(4)	(5)
01	21:05	68.8	Eur	Eclipse ends
01	22:36	74.5	GRS	Crosses central meridian
02	00:55	52.4	Io	Occultation begins
02	03:44	18.7	Io	Eclipse ends
02	18:28	39.7	GRS	Crosses central meridian
02	21:55	74.8	Gan	Occultation begins
02	22:03	75.1	Io	Transit begins
02	22:41	73.9	Io	Shadow transit begins
03	00:00	62.1	Gan	Occultation ends
03	00:14	59.6	Io	Transit ends
03	00:28	56.9	Gan	Eclipse begins
03	00:54	51.7	Io	Shadow transit ends
03	02:44	29.8	Gan	Eclipse ends
03	04:23	10.4	GRS	Crosses central meridian
03	19:22	51.2	Io	Occultation begins
03	22:14	75.1	Io	Eclipse ends
04	00:15	58.7	GRS	Crosses central meridian
04	18:41	44.0	Io	Transit ends
04	19:22	52.1	Io	Shadow transit ends
04	20:06	60.6	GRS	Crosses central meridian
06	01:53	37.7	GRS	Crosses central meridian
06	21:44	75.0	GRS	Crosses central meridian
07	01:26	42.2	Eur	Transit begins
07	02:53	24.8	Eur	Shadow transit begins
07	03:58	12.3	Eur	Transit ends
07	17:35	33.1	GRS	Crosses central meridian
08	03:31	16.7	GRS	Crosses central meridian
08	19:34	57.6	Eur	Occultation begins
08	23:22	64.7	GRS	Crosses central meridian
08	23:43	60.9	Eur	Eclipse ends
09	02:41	25.8	Io	Occultation begins
09	19:14	54.3	GRS	Crosses central meridian
09	23:48	59.3	Io	Transit begins
10	00:37	49.8	Io	Shadow transit begins
10	01:18	41.5	Gan	Occultation begins
10	02:01	33.0	Io	Transit ends
10	02:48	23.6	Io	Shadow transit ends
10	03:26	16.2	Gan	Occultation ends
10	04:28	4.3	Gan	Eclipse begins
10	18:45	49.5	Eur	Shadow transit ends
10	21:08	73.6	Io	Occultation begins
11	00:09	54.5	Io	Eclipse ends
11	01:01	44.2	GRS	Crosses central meridian
11	18:15	44.2	Io	Transit begins
11	19:05	54.2	Io	Shadow transit begins

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Day	Time (TU)	Altitude (^{o})	Objet	Event
(1)	(2)	(3)	(4)	(5)
11	20:28	69.1	Io	Transit ends
11	20:52	72.4	GRS	Crosses central meridian
11	21:18	74.7	Io	Shadow transit ends
12	18:38	49.6	Io	Eclipse ends
13	02:39	23.0	GRS	Crosses central meridian
13	18:38	50.4	Gan	Shadow transit begins
13	20:56	73.7	Gan	Shadow transit ends
13	22:30	69.9	GRS	Crosses central meridian
14	03:46	9.4	Eur	Transit begins
14	18:22	47.9	GRS	Crosses central meridian
15	21:55	73.3	Eur	Occultation begins
16	00:09	50.7	GRS	Crosses central meridian
16	02:21	24.2	Eur	Eclipse ends
16	20:00	67.8	GRS	Crosses central meridian
17	01:35	32.5	Io	Transit begins
17	02:32	21.3	Io	Shadow transit begins
17	03:48	6.7	Io	Transit ends
17	18:47	55.2	Eur	Shadow transit begins
17	19:28	62.9	Eur	Transit ends
17	21:22	75.1	Eur	Shadow transit ends
17	22:55	63.3	Io	Occultation begins
18	01:47	29.4	GRS	Crosses central meridian
18	02:04	26.0	Io	Eclipse ends
18	20:03	69.4	Io	Transit begins
18	21:00	75.1	Io	Shadow transit begins
18	21:38	73.8	GRS	Crosses central meridian
18	22:16	69.2	Io	Transit ends
18	23:14	59.1	Io	Shadow transit ends
19	20:31	73.5	Io	Eclipse ends
20	03:25	8.7	GRS	Crosses central meridian
20	17:43	44.9	Io	Shadow transit ends
20	18:40	56.3	Gan	Transit begins
20	20:51	75.1	Gan	Transit ends
20	22:38	64.1	Gan	Shadow transit begins
20	23:17	57.0	GRS	Crosses central meridian
21	00:58	36.9	Gan	Shadow transit ends
21	19:08	62.2	GRS	Crosses central meridian
23	00:19	43.2	Eur	Occultation begins
23	00:55	35.9	GRS	Crosses central meridian
23	20:47	75.2	GRS	Crosses central meridian
24	03:24	6.1	Io	Transit begins
24	19:18	66.1	Eur	Transit begins
24	21:23	73.1	Eur	Shadow transit begins
24	21:50	69.5	Eur	Transit ends
24	23:57	45.9	Eur	Shadow transit ends

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Day	Time (TU)	Altitude (^{o})	Objet	Event
(1)	(2)	(3)	(4)	(5)
25	00:43	36.7	Io	Occultation begins
25	02:34	14.8	GRS	Crosses central meridian
25	21:51	68.7	Io	Transit begins
25	22:25	63.0	GRS	Crosses central meridian
25	22:56	57.2	Io	Shadow transit begins
26	00:05	43.6	Io	Transit ends
26	01:10	30.6	Io	Shadow transit ends
26	18:17	56.2	GRS	Crosses central meridian
26	18:19	56.7	Eur	Eclipse ends
26	19:10	66.0	Io	Occultation begins
26	22:27	62.0	Io	Eclipse ends
27	18:32	59.9	Io	Transit ends
27	19:39	71.1	Io	Shadow transit ends
27	22:15	63.3	Gan	Transit begins
28	00:04	42.3	GRS	Crosses central meridian
28	00:28	37.4	Gan	Transit ends
28	02:39	11.5	Gan	Shadow transit begins
28	19:55	73.5	GRS	Crosses central meridian
30	01:42	21.0	GRS	Crosses central meridian
30	02:45	9.0	Eur	Occultation begins
30	21:34	68.4	GRS	Crosses central meridian
31	18:51	66.1	Gan	Eclipse ends
31	21:43	66.2	Eur	Transit begins
31	23:58	40.2	Eur	Shadow transit begins

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