Phenomena of Jupiter's Moons, January 2019

For telescopic observers, here is the complete list of phenomena involving Jupiter's four bright moons and the planet's disk or shadow. The first columns give the date and midpoint time of the event in Universal Time. Next is the satellite involved: I for Io, II Europa, III Ganymede, or IV Callisto. This is followed by the type of event: Oc for an occultation of the satellite behind Jupiter's limb, Ec for an eclipse by Jupiter's shadow, Tr for a transit of the satellite across the planet's face, or Sh for the satellite casting its tiny black shadow onto Jupiter. An occultation or eclipse begins when the satellite disappears (D) and ends when it reappears (R). A transit or shadow passage begins at ingress (I) and ends at egress (E). Each event is gradual, lasting several minutes. These predictions are courtesy William Thuillot / IMCCE / Paris Observatory.

Jan. 1	4:08	I.Ec.D		16:24	I.Sh.E	**Jan. 10**	0:30	I.Ec.D		4:48	II.Oc.R
	6:55	I.Oc.R		17:04	I.Tr.E		3:25	I.Oc.R		7:55	I.Ec.D
	22:37	III.Ec.D		17:06	III.Tr.E		21:39	I.Sh.I		10:54	I.Oc.R
Jan. 2	0:36	III.Ec.R	**Jan. 6**	4:01	II.Sh.I		22:23	I.Tr.I	**Jan. 16**	5:04	I.Sh.I
	1:01	III.Oc.D		5:19	II.Tr.I		23:49	I.Sh.E		5:52	I.Tr.I
	1:16	I.Sh.I		6:20	II.Sh.E	**Jan. 11**	0:34	I.Tr.E		6:32	III.Ec.D
	1:52	I.Tr.I		7:42	II.Tr.E		11:30	II.Ec.D		7:15	I.Sh.E
	3:09	III.Oc.R		11:33	I.Ec.D		15:24	II.Oc.R		8:04	I.Tr.E
	3:27	I.Sh.E		14:25	I.Oc.R		18:58	I.Ec.D		8:33	III.Ec.R
	4:04	I.Tr.E	**Jan. 7**	8:42	I.Sh.I		21:55	I.Oc.R		9:48	III.Oc.D
	14:43	II.Sh.I		9:23	I.Tr.I	**Jan. 12**	16:07	I.Sh.I		11:56	III.Oc.R
	15:56	II.Tr.I		10:52	I.Sh.E		16:20	III.Sh.I		19:51	II.Sh.I
	17:03	II.Sh.E		11:34	I.Tr.E		16:53	I.Tr.I		21:28	II.Tr.I
	18:18	II.Tr.E		22:12	II.Ec.D		18:18	I.Sh.E		22:11	II.Sh.E
	22:36	I.Ec.D	**Jan. 8**	2:00	II.Oc.R		18:19	III.Sh.E		23:51	II.Tr.E
Jan. 3	1:25	I.Oc.R		6:02	I.Ec.D		19:04	I.Tr.E	**Jan. 17**	2:23	I.Ec.D
	19:45	I.Sh.I		8:55	I.Oc.R		19:23	III.Tr.I		5:24	I.Oc.R
	20:23	I.Tr.I	**Jan. 9**	2:35	III.Ec.D		21:30	III.Tr.E		23:32	I.Sh.I
	21:55	I.Sh.E		3:10	I.Sh.I	**Jan. 13**	6:35	II.Sh.I	**Jan. 18**	0:22	I.Tr.I
	22:34	I.Tr.E		3:53	I.Tr.I		8:05	II.Tr.I		1:43	I.Sh.E
Jan. 4	8:54	II.Ec.D		4:35	III.Ec.R		8:54	II.Sh.E		2:33	I.Tr.E
	12:36	II.Oc.R		5:21	I.Sh.E		10:28	II.Tr.E		14:05	II.Ec.D
	17:05	I.Ec.D		5:25	III.Oc.D		13:27	I.Ec.D		18:12	II.Oc.R
	19:55	I.Oc.R		6:04	I.Tr.E		16:24	I.Oc.R		20:52	I.Ec.D
Jan. 5	12:22	III.Sh.I		7:33	III.Oc.R	**Jan. 14**	10:35	I.Sh.I		23:54	I.Oc.R
	14:13	I.Sh.I		17:18	II.Sh.I		11:23	I.Tr.I	**Jan. 19**	18:01	I.Sh.I
	14:20	III.Sh.E		18:43	II.Tr.I		12:46	I.Sh.E		18:52	I.Tr.I
	14:53	I.Tr.I		19:37	II.Sh.E		13:34	I.Tr.E		20:11	I.Sh.E
	14:59	III.Tr.I		21:05	II.Tr.E	**Jan. 15**	0:48	II.Ec.D		20:17	III.Sh.I

	21:03	I.Tr.E
	22:17	III.Sh.E
	23:44	III.Tr.I
Jan. 20	1:51	III.Tr.E
	9:08	II.Sh.I
	10:50	II.Tr.I
	11:28	II.Sh.E
	13:13	II.Tr.E
	15:20	I.Ec.D
	18:23	I.Oc.R
Jan. 21	12:29	I.Sh.I
	13:22	I.Tr.I
	14:40	I.Sh.E
	15:33	I.Tr.E
Jan. 22	3:23	II.Ec.D
	7:36	II.Oc.R
	9:48	I.Ec.D
	12:53	I.Oc.R
Jan. 23	6:58	I.Sh.I
	7:52	I.Tr.I
	9:08	I.Sh.E
	10:03	I.Tr.E
	10:31	III.Ec.D
	12:33	III.Ec.R
	14:09	III.Oc.D
	16:18	III.Oc.R
	22:25	II.Sh.I
Jan. 24	0:13	II.Tr.I
	0:45	II.Sh.E
	2:35	II.Tr.E
	4:17	I.Ec.D
	7:23	I.Oc.R
Jan. 25	1:26	I.Sh.I
	2:22	I.Tr.I
	3:37	I.Sh.E
	4:33	I.Tr.E
	16:40	II.Ec.D
	20:59	II.Oc.R
	22:45	I.Ec.D
Jan. 26	1:52	I.Oc.R
	19:55	I.Sh.I
	20:51	I.Tr.I
	22:05	I.Sh.E
	23:02	I.Tr.E
Jan. 27	0:14	III.Sh.I
	2:15	III.Sh.E
	4:04	III.Tr.I
	6:11	III.Tr.E
	11:42	II.Sh.I
	13:34	II.Tr.I
	14:02	II.Sh.E
	15:57	II.Tr.E
	17:13	I.Ec.D
	20:22	I.Oc.R
Jan. 28	14:23	I.Sh.I
	15:21	I.Tr.I
	16:34	I.Sh.E
	17:32	I.Tr.E
Jan. 29	5:58	II.Ec.D
	10:22	II.Oc.R
	11:41	I.Ec.D
	14:51	I.Oc.R
Jan. 30	8:51	I.Sh.I
	9:51	I.Tr.I
	11:02	I.Sh.E
	12:02	I.Tr.E
	14:28	III.Ec.D
	16:31	III.Ec.R
	18:27	III.Oc.D
	20:37	III.Oc.R
Jan. 31	0:59	II.Sh.I
	2:56	II.Tr.I
	3:19	II.Sh.E
	5:19	II.Tr.E
	6:10	I.Ec.D
	9:21	I.Oc.R

Phenomena of Jupiter's Moons, February 2019

For telescopic observers, here is the complete list of phenomena involving Jupiter's four bright moons and the planet's disk or shadow. The first columns give the date and midpoint time of the event in Universal Time. Next is the satellite involved: I for Io, II Europa, III Ganymede, or IV Callisto. This is followed by the type of event: Oc for an occultation of the satellite behind Jupiter's limb, Ec for an eclipse by Jupiter's shadow, Tr for a transit of the satellite across the planet's face, or Sh for the satellite casting its tiny black shadow onto Jupiter. An occultation or eclipse begins when the satellite disappears (D) and ends when it reappears (R). A transit or shadow passage begins at ingress (I) and ends at egress (E). Each event is gradual, lasting several minutes. These predictions are courtesy William Thuillot / IMCCE / Paris Observatory.

Feb. 1	3:20	I.Sh.I		16:49	I.Oc.R		12:37	III.Tr.I		13:15	I.Oc.R
	4:20	I.Tr.I	**Feb. 6**	10:45	I.Sh.I		14:45	III.Tr.E	**Feb. 15**	7:07	I.Sh.I
	5:30	I.Sh.E		11:49	I.Tr.I		16:49	II.Sh.I		8:16	I.Tr.I
	6:31	I.Tr.E		12:56	I.Sh.E		18:58	II.Tr.I		9:18	I.Sh.E
	19:16	II.Ec.D		14:00	I.Tr.E		19:09	II.Sh.E		10:27	I.Tr.E
	23:45	II.Oc.R		18:25	III.Ec.D		20:59	I.Ec.D	**Feb. 16**	0:27	II.Ec.D
Feb. 2	0:38	I.Ec.D		20:29	III.Ec.R		21:21	II.Tr.E		4:24	I.Ec.D
	3:50	I.Oc.R		22:43	III.Oc.D	**Feb. 11**	0:17	I.Oc.R		5:13	II.Oc.R
	21:48	I.Sh.I	**Feb. 7**	0:53	III.Oc.R		18:10	I.Sh.I		7:44	I.Oc.R
	22:50	I.Tr.I		3:32	II.Sh.I		19:17	I.Tr.I	**Feb. 17**	1:36	I.Sh.I
	23:59	I.Sh.E		5:38	II.Tr.I		20:21	I.Sh.E		2:45	I.Tr.I
Feb. 3	1:01	I.Tr.E		5:52	II.Sh.E		21:28	I.Tr.E		3:46	I.Sh.E
	4:13	III.Sh.I		8:01	II.Tr.E	**Feb. 12**	11:09	II.Ec.D		4:56	I.Tr.E
	6:14	III.Sh.E		8:03	I.Ec.D		15:28	I.Ec.D		12:09	III.Sh.I
	8:22	III.Tr.I		11:18	I.Oc.R		15:52	II.Oc.R		14:12	III.Sh.E
	10:30	III.Tr.E	**Feb. 8**	5:14	I.Sh.I		18:46	I.Oc.R		16:50	III.Tr.I
	14:15	II.Sh.I		6:18	I.Tr.I	**Feb. 13**	12:39	I.Sh.I		18:59	III.Tr.E
	16:17	II.Tr.I		7:24	I.Sh.E		13:46	I.Tr.I		19:22	II.Sh.I
	16:35	II.Sh.E		8:29	I.Tr.E		14:49	I.Sh.E		21:38	II.Tr.I
	18:40	II.Tr.E		21:51	II.Ec.D		15:57	I.Tr.E		21:42	II.Sh.E
	19:06	I.Ec.D	**Feb. 9**	2:30	II.Oc.R		22:22	III.Ec.D		22:52	I.Ec.D
	22:20	I.Oc.R		2:31	I.Ec.D	**Feb. 14**	0:27	III.Ec.R	**Feb. 18**	0:01	II.Tr.E
Feb. 4	16:17	I.Sh.I		5:48	I.Oc.R		2:56	III.Oc.D		2:13	I.Oc.R
	17:19	I.Tr.I		23:42	I.Sh.I		5:07	III.Oc.R		20:04	I.Sh.I
	18:27	I.Sh.E	**Feb. 10**	0:48	I.Tr.I		6:05	II.Sh.I		21:14	I.Tr.I
	19:30	I.Tr.E		1:53	I.Sh.E		8:18	II.Tr.I		22:15	I.Sh.E
Feb. 5	8:34	II.Ec.D		2:59	I.Tr.E		8:26	II.Sh.E		23:25	I.Tr.E
	13:08	II.Oc.R		8:10	III.Sh.I		9:56	I.Ec.D	**Feb. 19**	13:45	II.Ec.D
	13:35	I.Ec.D		10:12	III.Sh.E		10:41	II.Tr.E		16:08	II.Ec.R

	16:09	II.Oc.D		15:11	I.Oc.R		20:59	III.Tr.I		22:38	I.Oc.R
	17:21	I.Ec.D	**Feb. 22**	9:01	I.Sh.I		21:55	II.Sh.I	**Feb. 27**	16:26	I.Sh.I
	18:35	II.Oc.R		10:12	I.Tr.I		23:08	III.Tr.E		17:39	I.Tr.I
	20:42	I.Oc.R		11:11	I.Sh.E	**Feb. 25**	0:15	II.Sh.E		18:37	I.Sh.E
Feb. 20	14:32	I.Sh.I		12:23	I.Tr.E		0:17	II.Tr.I		19:50	I.Tr.E
	15:43	I.Tr.I	**Feb. 23**	3:02	II.Ec.D		0:45	I.Ec.D	**Feb. 28**	6:16	III.Ec.D
	16:43	I.Sh.E		5:25	II.Ec.R		2:39	II.Tr.E		8:23	III.Ec.R
	17:54	I.Tr.E		5:29	II.Oc.D		4:09	I.Oc.R		11:11	II.Sh.I
Feb. 21	2:19	III.Ec.D		6:17	I.Ec.D		21:58	I.Sh.I		11:13	III.Oc.D
	4:24	III.Ec.R		7:55	II.Oc.R		23:10	I.Tr.I		13:25	III.Oc.R
	7:06	III.Oc.D		9:40	I.Oc.R	**Feb. 26**	0:08	I.Sh.E		13:32	II.Sh.E
	8:38	II.Sh.I	**Feb. 24**	3:29	I.Sh.I		1:21	I.Tr.E		13:35	II.Tr.I
	9:17	III.Oc.R		4:41	I.Tr.I		16:20	II.Ec.D		13:42	I.Ec.D
	10:58	II.Tr.I		5:40	I.Sh.E		18:44	II.Ec.R		15:58	II.Tr.E
	10:59	II.Sh.E		6:52	I.Tr.E		18:50	II.Oc.D		17:07	I.Oc.R
	11:49	I.Ec.D		16:06	III.Sh.I		19:14	I.Ec.D			
	13:20	II.Tr.E		18:10	III.Sh.E		21:16	II.Oc.R			

Phenomena of Jupiter's Moons, March 2019

For telescopic observers, here is the complete list of phenomena involving Jupiter's four bright moons and the planet's disk or shadow. The first columns give the date and midpoint time of the event in Universal Time. Next is the satellite involved: I for Io, II Europa, III Ganymede, or IV Callisto. This is followed by the type of event: Oc for an occultation of the satellite behind Jupiter's limb, Ec for an eclipse by Jupiter's shadow, Tr for a transit of the satellite across the planet's face, or Sh for the satellite casting its tiny black shadow onto Jupiter. An occultation or eclipse begins when the satellite disappears (D) and ends when it reappears (R). A transit or shadow passage begins at ingress (I) and ends at egress (E). Each event is gradual, lasting several minutes. These predictions are courtesy William Thuillot / IMCCE / Paris Observatory.

Mar. 1	10:54	I.Sh.I		21:07	I.Ec.D	**Mar. 10**	7:16	I.Sh.I		16:17	II.Sh.I
	12:08	I.Tr.I		21:20	II.Ec.R		8:32	I.Tr.I		16:20	III.Ec.R
	13:05	I.Sh.E		21:29	II.Oc.D		9:27	I.Sh.E		17:28	I.Ec.D
	14:19	I.Tr.E		23:56	II.Oc.R		10:43	I.Tr.E		18:38	II.Sh.E
Mar. 2	5:38	II.Ec.D	**Mar. 6**	0:32	I.Oc.R	**Mar. 11**	0:01	III.Sh.I		18:45	II.Tr.I
	8:01	II.Ec.R		18:20	I.Sh.I		2:07	III.Sh.E		19:18	III.Oc.D
	8:09	II.Oc.D		19:34	I.Tr.I		3:00	II.Sh.I		20:54	I.Oc.R
	8:10	I.Ec.D		20:30	I.Sh.E		4:31	I.Ec.D		21:08	II.Tr.E
	10:36	II.Oc.R		21:45	I.Tr.E		5:07	III.Tr.I		21:30	III.Oc.R
	11:35	I.Oc.R	**Mar. 7**	10:13	III.Ec.D		5:21	II.Sh.E	**Mar. 15**	14:42	I.Sh.I
Mar. 3	5:23	I.Sh.I		12:21	III.Ec.R		5:28	II.Tr.I		15:57	I.Tr.I
	6:37	I.Tr.I		13:44	II.Sh.I		7:16	III.Tr.E		16:52	I.Sh.E
	7:33	I.Sh.E		15:17	III.Oc.D		7:51	II.Tr.E		18:08	I.Tr.E
	8:48	I.Tr.E		15:35	I.Ec.D		7:58	I.Oc.R	**Mar. 16**	10:49	II.Ec.D
	20:04	III.Sh.I		16:05	II.Sh.E	**Mar. 12**	1:45	I.Sh.I		11:56	I.Ec.D
	22:09	III.Sh.E		16:11	II.Tr.I		3:00	I.Tr.I		13:14	II.Ec.R
Mar. 4	0:28	II.Sh.I		17:29	III.Oc.R		3:55	I.Sh.E		13:24	II.Oc.D
	1:05	III.Tr.I		18:34	II.Tr.E		5:11	I.Tr.E		15:23	I.Oc.R
	2:38	I.Ec.D		19:01	I.Oc.R		21:32	II.Ec.D		15:51	II.Oc.R
	2:48	II.Sh.E	**Mar. 8**	12:48	I.Sh.I		22:59	I.Ec.D	**Mar. 17**	9:10	I.Sh.I
	2:53	II.Tr.I		14:03	I.Tr.I		23:56	II.Ec.R		10:25	I.Tr.I
	3:14	III.Tr.E		14:59	I.Sh.E	**Mar. 13**	0:07	II.Oc.D		11:21	I.Sh.E
	5:16	II.Tr.E		16:14	I.Tr.E		2:26	I.Oc.R		12:36	I.Tr.E
	6:04	I.Oc.R	**Mar. 9**	8:14	II.Ec.D		2:33	II.Oc.R	**Mar. 18**	3:58	III.Sh.I
	23:51	I.Sh.I		10:03	I.Ec.D		20:13	I.Sh.I		5:33	II.Sh.I
Mar. 5	1:06	I.Tr.I		10:37	II.Ec.R		21:29	I.Tr.I		6:05	III.Sh.E
	2:02	I.Sh.E		10:48	II.Oc.D		22:24	I.Sh.E		6:24	I.Ec.D
	3:17	I.Tr.E		13:14	II.Oc.R		23:40	I.Tr.E		7:55	II.Sh.E
	18:56	II.Ec.D		13:29	I.Oc.R	**Mar. 14**	14:11	III.Ec.D		8:01	II.Tr.I

	9:05	III.Tr.I		21:17	II.Tr.I		10:28	II.Sh.E		23:44	II.Sh.E
	9:51	I.Oc.R		22:47	I.Oc.R		10:32	II.Tr.I		23:47	II.Tr.I
	10:24	II.Tr.E		23:13	III.Oc.D		11:43	I.Oc.R	**Mar. 29**	0:16	III.Ec.R
	11:14	III.Tr.E		23:40	II.Tr.E		12:55	II.Tr.E		0:38	I.Oc.R
Mar. 19	3:38	I.Sh.I	**Mar. 22**	1:26	III.Oc.R		12:59	III.Tr.I		2:10	II.Tr.E
	4:54	I.Tr.I		16:35	I.Sh.I		15:09	III.Tr.E		3:05	III.Oc.D
	5:49	I.Sh.E		17:50	I.Tr.I	**Mar. 26**	5:32	I.Sh.I		5:17	III.Oc.R
	7:05	I.Tr.E		18:46	I.Sh.E		6:46	I.Tr.I		18:29	I.Sh.I
Mar. 20	0:08	II.Ec.D		20:01	I.Tr.E		7:43	I.Sh.E		19:42	I.Tr.I
	0:52	I.Ec.D	**Mar. 23**	13:25	II.Ec.D		8:57	I.Tr.E		20:39	I.Sh.E
	2:32	II.Ec.R		13:49	I.Ec.D	**Mar. 27**	2:43	II.Ec.D		21:53	I.Tr.E
	2:42	II.Oc.D		15:50	II.Ec.R		2:45	I.Ec.D	**Mar. 30**	15:42	I.Ec.D
	4:19	I.Oc.R		15:59	II.Oc.D		5:08	II.Ec.R		16:01	II.Ec.D
	5:09	II.Oc.R		17:15	I.Oc.R		5:16	II.Oc.D		18:26	II.Ec.R
	22:07	I.Sh.I		18:25	II.Oc.R		6:11	I.Oc.R		18:31	II.Oc.D
	23:22	I.Tr.I	**Mar. 24**	11:04	I.Sh.I		7:42	II.Oc.R		19:06	I.Oc.R
Mar. 21	0:17	I.Sh.E		12:18	I.Tr.I	**Mar. 28**	0:00	I.Sh.I		20:58	II.Oc.R
	1:33	I.Tr.E		13:14	I.Sh.E		1:14	I.Tr.I	**Mar. 31**	12:57	I.Sh.I
	18:08	III.Ec.D		14:29	I.Tr.E		2:11	I.Sh.E		14:10	I.Tr.I
	18:50	II.Sh.I	**Mar. 25**	7:56	III.Sh.I		3:25	I.Tr.E		15:08	I.Sh.E
	19:21	I.Ec.D		8:06	II.Sh.I		21:13	I.Ec.D		16:21	I.Tr.E
	20:18	III.Ec.R		8:17	I.Ec.D		21:22	II.Sh.I			
	21:11	II.Sh.E		10:04	III.Sh.E		22:05	III.Ec.D			

Phenomena of Jupiter's Moons, April 2019

For telescopic observers, here is the complete list of phenomena involving Jupiter's four bright moons and the planet's disk or shadow. The first columns give the date and midpoint time of the event in Universal Time. Next is the satellite involved: I for Io, II Europa, III Ganymede, or IV Callisto. This is followed by the type of event: Oc for an occultation of the satellite behind Jupiter's limb, Ec for an eclipse by Jupiter's shadow, Tr for a transit of the satellite across the planet's face, or Sh for the satellite casting its tiny black shadow onto Jupiter. An occultation or eclipse begins when the satellite disappears (D) and ends when it reappears (R). A transit or shadow passage begins at ingress (I) and ends at egress (E). Each event is gradual, lasting several minutes. These predictions are courtesy William Thuillot / IMCCE / Paris Observatory.

Apr. 1	10:10	I.Ec.D		2:29	I.Oc.R		11:30	I.Sh.E		17:50	I.Tr.I
	10:39	II.Sh.I		4:14	III.Ec.R		12:39	I.Tr.E		18:55	I.Sh.E
	11:54	III.Sh.I		4:38	II.Tr.E	**Apr. 10**	6:31	I.Ec.D		20:01	I.Tr.E
	13:01	II.Sh.E		6:51	III.Oc.D		7:55	II.Ec.D	**Apr. 15**	13:56	I.Ec.D
	13:01	II.Tr.I		9:04	III.Oc.R		9:51	I.Oc.R		15:44	II.Sh.I
	13:34	I.Oc.R		20:22	I.Sh.I		12:43	II.Oc.R		17:13	I.Oc.R
	14:03	III.Sh.E		21:33	I.Tr.I	**Apr. 11**	3:47	I.Sh.I		17:53	II.Tr.I
	15:24	II.Tr.E		22:33	I.Sh.E		4:56	I.Tr.I		18:07	II.Sh.E
	16:49	III.Tr.I		23:44	I.Tr.E		5:58	I.Sh.E		19:50	III.Sh.I
	18:59	III.Tr.E	**Apr. 6**	17:35	I.Ec.D		7:07	I.Tr.E		20:16	II.Tr.E
Apr. 2	7:25	I.Sh.I		18:37	II.Ec.D	**Apr. 12**	0:59	I.Ec.D		22:01	III.Sh.E
	8:38	I.Tr.I		20:56	I.Oc.R		2:28	II.Sh.I	**Apr. 16**	0:16	III.Tr.I
	9:36	I.Sh.E		23:28	II.Oc.R		4:18	I.Oc.R		2:26	III.Tr.E
	10:49	I.Tr.E	**Apr. 7**	14:51	I.Sh.I		4:40	II.Tr.I		11:12	I.Sh.I
Apr. 3	4:38	I.Ec.D		16:01	I.Tr.I		4:50	II.Sh.E		12:17	I.Tr.I
	5:19	II.Ec.D		17:02	I.Sh.E		5:59	III.Ec.D		13:24	I.Sh.E
	7:44	II.Ec.R		18:12	I.Tr.E		7:04	II.Tr.E		14:28	I.Tr.E
	7:47	II.Oc.D	**Apr. 8**	12:03	I.Ec.D		8:12	III.Ec.R	**Apr. 17**	8:24	I.Ec.D
	8:01	I.Oc.R		13:11	II.Sh.I		10:34	III.Oc.D		10:31	II.Ec.D
	10:14	II.Oc.R		15:24	I.Oc.R		12:46	III.Oc.R		11:40	I.Oc.R
Apr. 4	1:54	I.Sh.I		15:28	II.Tr.I		22:16	I.Sh.I		15:09	II.Oc.R
	3:05	I.Tr.I		15:34	II.Sh.E		23:23	I.Tr.I	**Apr. 18**	5:41	I.Sh.I
	4:05	I.Sh.E		15:52	III.Sh.I	**Apr. 13**	0:27	I.Sh.E		6:45	I.Tr.I
	5:16	I.Tr.E		17:51	II.Tr.E		1:34	I.Tr.E		7:52	I.Sh.E
	23:06	I.Ec.D		18:02	III.Sh.E		19:28	I.Ec.D		8:56	I.Tr.E
	23:55	II.Sh.I		20:35	III.Tr.I		21:13	II.Ec.D	**Apr. 19**	2:52	I.Ec.D
Apr. 5	2:02	III.Ec.D		22:45	III.Tr.E		22:45	I.Oc.R		5:00	II.Sh.I
	2:15	II.Tr.I	**Apr. 9**	9:19	I.Sh.I	**Apr. 14**	1:56	II.Oc.R		6:07	I.Oc.R
	2:17	II.Sh.E		10:28	I.Tr.I		16:44	I.Sh.I		7:04	II.Tr.I

	7:24	II.Sh.E		18:17	II.Sh.I		9:46	I.Sh.E		6:45	II.Oc.R
	9:28	II.Tr.E		19:00	I.Oc.R		10:44	I.Tr.E		20:31	I.Sh.I
	9:57	III.Ec.D		20:15	II.Tr.I	**Apr. 26**	4:45	I.Ec.D		21:26	I.Tr.I
	12:10	III.Ec.R		20:40	II.Sh.E		7:33	II.Sh.I		22:43	I.Sh.E
	14:12	III.Oc.D		22:39	II.Tr.E		7:54	I.Oc.R		23:37	I.Tr.E
	16:24	III.Oc.R		23:47	III.Sh.I		9:26	II.Tr.I	**Apr. 29**	17:42	I.Ec.D
Apr. 20	0:09	I.Sh.I	**Apr. 23**	2:00	III.Sh.E		9:57	II.Sh.E		20:47	I.Oc.R
	1:12	I.Tr.I		3:52	III.Tr.I		11:50	II.Tr.E		20:50	II.Sh.I
	2:20	I.Sh.E		6:02	III.Tr.E		13:54	III.Ec.D		22:36	II.Tr.I
	3:23	I.Tr.E		13:06	I.Sh.I		16:09	III.Ec.R		23:14	II.Sh.E
	21:21	I.Ec.D		14:06	I.Tr.I		17:46	III.Oc.D	**Apr. 30**	1:00	II.Tr.E
	23:48	II.Ec.D		15:17	I.Sh.E		19:58	III.Oc.R		3:44	III.Sh.I
Apr. 21	0:34	I.Oc.R		16:17	I.Tr.E	**Apr. 27**	2:03	I.Sh.I		5:58	III.Sh.E
	4:21	II.Oc.R	**Apr. 24**	10:17	I.Ec.D		2:59	I.Tr.I		7:23	III.Tr.I
	18:38	I.Sh.I		13:07	II.Ec.D		4:14	I.Sh.E		9:33	III.Tr.E
	19:39	I.Tr.I		13:27	I.Oc.R		5:11	I.Tr.E		15:00	I.Sh.I
	20:49	I.Sh.E		17:34	II.Oc.R		23:14	I.Ec.D		15:53	I.Tr.I
	21:50	I.Tr.E	**Apr. 25**	7:35	I.Sh.I	**Apr. 28**	2:21	I.Oc.R		17:11	I.Sh.E
Apr. 22	15:49	I.Ec.D		8:33	I.Tr.I		2:24	II.Ec.D		18:04	I.Tr.E

Phenomena of Jupiter's Moons, May 2019

For telescopic observers, here is the complete list of phenomena involving Jupiter's four bright moons and the planet's disk or shadow. The first columns give the date and midpoint time of the event in Universal Time. Next is the satellite involved: I for Io, II Europa, III Ganymede, or IV Callisto. This is followed by the type of event: Oc for an occultation of the satellite behind Jupiter's limb, Ec for an eclipse by Jupiter's shadow, Tr for a transit of the satellite across the planet's face, or Sh for the satellite casting its tiny black shadow onto Jupiter. An occultation or eclipse begins when the satellite disappears (D) and ends when it reappears (R). A transit or shadow passage begins at ingress (I) and ends at egress (E). Each event is gradual, lasting several minutes. These predictions are courtesy William Thuillot / IMCCE / Paris Observatory.

May 1	12:10	I.Ec.D		1:24	I.Tr.E		21:50	III.Ec.D		21:36	I.Tr.E
	15:14	I.Oc.R		19:35	I.Ec.D	**May 11**	0:07	III.Ec.R	**May 15**	15:57	I.Ec.D
	15:43	II.Ec.D		22:33	I.Oc.R		0:42	III.Oc.D		18:45	I.Oc.R
	19:56	II.Oc.R		23:23	II.Sh.I		2:54	III.Oc.R		20:55	II.Ec.D
May 2	9:28	I.Sh.I	**May 7**	0:55	II.Tr.I		5:50	I.Sh.I	**May 16**	0:35	II.Oc.R
	10:20	I.Tr.I		1:48	II.Sh.E		6:32	I.Tr.I		13:16	I.Sh.I
	11:40	I.Sh.E		3:19	II.Tr.E		8:02	I.Sh.E		13:51	I.Tr.I
	12:31	I.Tr.E		7:42	III.Sh.I		8:43	I.Tr.E		15:28	I.Sh.E
May 3	6:39	I.Ec.D		9:57	III.Sh.E	**May 12**	3:00	I.Ec.D		16:02	I.Tr.E
	9:40	I.Oc.R		10:51	III.Tr.I		5:52	I.Oc.R	**May 17**	10:25	I.Ec.D
	10:06	II.Sh.I		13:01	III.Tr.E		7:36	II.Ec.D		13:11	I.Oc.R
	11:46	II.Tr.I		16:53	I.Sh.I		11:25	II.Oc.R		15:13	II.Sh.I
	12:31	II.Sh.E		17:39	I.Tr.I	**May 13**	0:19	I.Sh.I		16:20	II.Tr.I
	14:10	II.Tr.E		19:05	I.Sh.E		0:58	I.Tr.I		17:39	II.Sh.E
	17:52	III.Ec.D		19:51	I.Tr.E		2:31	I.Sh.E		18:44	II.Tr.E
	20:08	III.Ec.R	**May 8**	14:04	I.Ec.D		3:10	I.Tr.E	**May 18**	1:47	III.Ec.D
	21:17	III.Oc.D		17:00	I.Oc.R		21:29	I.Ec.D		6:16	III.Oc.R
	23:28	III.Oc.R		18:19	II.Ec.D	**May 14**	0:18	I.Oc.R		7:44	I.Sh.I
May 4	3:57	I.Sh.I		22:16	II.Oc.R		1:56	II.Sh.I		8:17	I.Tr.I
	4:46	I.Tr.I	**May 9**	11:22	I.Sh.I		3:12	II.Tr.I		9:56	I.Sh.E
	6:08	I.Sh.E		12:06	I.Tr.I		4:22	II.Sh.E		10:29	I.Tr.E
	6:57	I.Tr.E		13:34	I.Sh.E		5:36	II.Tr.E	**May 19**	4:54	I.Ec.D
May 5	1:07	I.Ec.D		14:17	I.Tr.E		11:40	III.Sh.I		7:37	I.Oc.R
	4:07	I.Oc.R	**May 10**	8:32	I.Ec.D		13:56	III.Sh.E		10:12	II.Ec.D
	5:00	II.Ec.D		11:26	I.Oc.R		14:15	III.Tr.I		13:43	II.Oc.R
	9:06	II.Oc.R		12:40	II.Sh.I		16:25	III.Tr.E	**May 20**	2:13	I.Sh.I
	22:25	I.Sh.I		14:04	II.Tr.I		18:47	I.Sh.I		2:43	I.Tr.I
	23:13	I.Tr.I		15:05	II.Sh.E		19:25	I.Tr.I		4:25	I.Sh.E
May 6	0:37	I.Sh.E		16:28	II.Tr.E		20:59	I.Sh.E		4:55	I.Tr.E

	23:22	I.Ec.D		15:10	I.Sh.I		12:48	II.Ec.D	**May 29**	0:47	I.Sh.E
May 21	2:03	I.Oc.R		15:36	I.Tr.I		16:00	II.Oc.R		1:05	I.Tr.E
	4:30	II.Sh.I		17:22	I.Sh.E	**May 27**	4:07	I.Sh.I		19:44	I.Ec.D
	5:28	II.Tr.I		17:47	I.Tr.E		4:28	I.Tr.I		22:13	I.Oc.R
	6:56	II.Sh.E	**May 24**	12:19	I.Ec.D		6:19	I.Sh.E	**May 30**	2:07	II.Ec.D
	7:52	II.Tr.E		14:55	I.Oc.R		6:39	I.Tr.E		5:08	II.Oc.R
	15:38	III.Sh.I		17:47	II.Sh.I	**May 28**	1:16	I.Ec.D		17:04	I.Sh.I
	17:37	III.Tr.I		18:35	II.Tr.I		3:47	I.Oc.R		17:20	I.Tr.I
	17:55	III.Sh.E		20:13	II.Sh.E		7:04	II.Sh.I		19:16	I.Sh.E
	19:47	III.Tr.E		21:00	II.Tr.E		7:43	II.Tr.I		19:31	I.Tr.E
	20:41	I.Sh.I	**May 25**	5:45	III.Ec.D		9:30	II.Sh.E	**May 31**	14:13	I.Ec.D
	21:09	I.Tr.I		9:35	III.Oc.R		10:07	II.Tr.E		16:39	I.Oc.R
	22:53	I.Sh.E		9:38	I.Sh.I		19:37	III.Sh.I		20:21	II.Sh.I
	23:21	I.Tr.E		10:02	I.Tr.I		20:56	III.Tr.I		20:50	II.Tr.I
May 22	17:51	I.Ec.D		11:50	I.Sh.E		21:55	III.Sh.E		22:47	II.Sh.E
	20:29	I.Oc.R		12:13	I.Tr.E		22:35	I.Sh.I		23:14	II.Tr.E
	23:31	II.Ec.D	**May 26**	6:47	I.Ec.D		22:54	I.Tr.I			
May 23	2:52	II.Oc.R		9:21	I.Oc.R		23:06	III.Tr.E			

Phenomena of Jupiter's Moons, June 2019

For telescopic observers, here is the complete list of phenomena involving Jupiter's four bright moons and the planet's disk or shadow. The first columns give the date and midpoint time of the event in Universal Time. Next is the satellite involved: I for Io, II Europa, III Ganymede, or IV Callisto. This is followed by the type of event: Oc for an occultation of the satellite behind Jupiter's limb, Ec for an eclipse by Jupiter's shadow, Tr for a transit of the satellite across the planet's face, or Sh for the satellite casting its tiny black shadow onto Jupiter. An occultation or eclipse begins when the satellite disappears (D) and ends when it reappears (R). A transit or shadow passage begins at ingress (I) and ends at egress (E). Each event is gradual, lasting several minutes. These predictions are courtesy William Thuillot / IMCCE / Paris Observatory.

June 1	9:42	III.Ec.D		23:57	I.Oc.R		12:11	II.Tr.I		17:25	I.Tr.E
	11:32	I.Sh.I	**June 6**	4:43	II.Ec.D		12:12	II.Sh.I		17:33	I.Sh.E
	11:46	I.Tr.I		7:23	II.Oc.R		14:36	II.Tr.E		20:02	III.Ec.R
	12:53	III.Oc.R		18:58	I.Sh.I		14:40	II.Sh.E	**June 16**	12:21	I.Oc.D
	13:44	I.Sh.E		19:04	I.Tr.I	**June 12**	2:22	I.Tr.I		14:41	I.Ec.R
	13:57	I.Tr.E		21:10	I.Sh.E		2:24	I.Sh.I		20:20	II.Oc.D
June 2	8:41	I.Ec.D		21:15	I.Tr.E		3:28	III.Tr.I		23:05	II.Ec.R
	11:05	I.Oc.R	**June 7**	16:06	I.Ec.D		3:33	III.Sh.I	**June 17**	9:40	I.Tr.I
	15:25	II.Ec.D		18:23	I.Oc.R		4:33	I.Tr.E		9:49	I.Sh.I
	18:15	II.Oc.R		22:55	II.Sh.I		4:36	I.Sh.E		11:51	I.Tr.E
June 3	6:01	I.Sh.I		23:04	II.Tr.I		5:40	III.Tr.E		12:02	I.Sh.E
	6:12	I.Tr.I	**June 8**	1:22	II.Sh.E		5:54	III.Sh.E	**June 18**	6:47	I.Oc.D
	8:13	I.Sh.E		1:29	II.Tr.E		23:29	I.Oc.D		9:10	I.Ec.R
	8:23	I.Tr.E		13:26	I.Sh.I	**June 13**	1:44	I.Ec.R		14:25	II.Tr.I
June 4	3:10	I.Ec.D		13:30	I.Tr.I		7:12	II.Oc.D		14:47	II.Sh.I
	5:31	I.Oc.R		13:41	III.Ec.D		9:47	II.Ec.R		16:50	II.Tr.E
	9:38	II.Sh.I		15:39	I.Sh.E		20:48	I.Tr.I		17:15	II.Sh.E
	9:57	II.Tr.I		15:41	I.Tr.E		20:52	I.Sh.I	**June 19**	4:06	I.Tr.I
	12:05	II.Sh.E		16:10	III.Oc.R		22:59	I.Tr.E		4:18	I.Sh.I
	12:22	II.Tr.E	**June 9**	10:35	I.Ec.D		23:05	I.Sh.E		6:17	I.Tr.E
	23:35	III.Sh.I		12:48	I.Oc.R	**June 14**	17:55	I.Oc.D		6:30	I.Sh.E
June 5	0:13	III.Tr.I		18:01	II.Ec.D		20:13	I.Ec.R		6:44	III.Tr.I
	0:29	I.Sh.I		20:30	II.Oc.R	**June 15**	1:18	II.Tr.I		7:31	III.Sh.I
	0:38	I.Tr.I	**June 10**	7:55	I.Sh.I		1:30	II.Sh.I		8:57	III.Tr.E
	1:55	III.Sh.E		7:56	I.Tr.I		3:43	II.Tr.E		9:53	III.Sh.E
	2:23	III.Tr.E		10:07	I.Tr.E		3:57	II.Sh.E	**June 20**	1:13	I.Oc.D
	2:42	I.Sh.E		10:07	I.Sh.E		15:14	I.Tr.I		3:38	I.Ec.R
	2:49	I.Tr.E	**June 11**	5:03	I.Oc.D		15:21	I.Sh.I		9:27	II.Oc.D
	21:38	I.Ec.D		7:15	I.Ec.R		17:14	III.Oc.D		12:24	II.Ec.R

	22:32	I.Tr.I	**June 23**	0:02	III.Ec.R	**June 26**	5:50	I.Tr.I		2:53	I.Sh.E
	22:47	I.Sh.I		14:05	I.Oc.D		6:13	I.Sh.I		21:23	I.Oc.D
June 21	0:43	I.Tr.E		16:35	I.Ec.R		8:02	I.Tr.E	**June 29**	0:01	I.Ec.R
	0:59	I.Sh.E		22:35	II.Oc.D		8:25	I.Sh.E		5:48	II.Tr.I
	19:39	I.Oc.D	**June 24**	1:42	II.Ec.R		10:02	III.Tr.I		6:40	II.Sh.I
	22:07	I.Ec.R		11:24	I.Tr.I		11:30	III.Sh.I		8:13	II.Tr.E
June 22	3:32	II.Tr.I		11:44	I.Sh.I		12:15	III.Tr.E		9:08	II.Sh.E
	4:04	II.Sh.I		13:36	I.Tr.E		13:53	III.Sh.E		18:43	I.Tr.I
	5:57	II.Tr.E		13:56	I.Sh.E	**June 27**	2:57	I.Oc.D		19:10	I.Sh.I
	6:32	II.Sh.E	**June 25**	8:31	I.Oc.D		5:33	I.Ec.R		20:54	I.Tr.E
	16:58	I.Tr.I		11:04	I.Ec.R		11:43	II.Oc.D		21:22	I.Sh.E
	17:15	I.Sh.I		16:40	II.Tr.I		15:00	II.Ec.R		23:49	III.Oc.D
	19:10	I.Tr.E		17:22	II.Sh.I	**June 28**	0:16	I.Tr.I	**June 30**	4:02	III.Ec.R
	19:28	I.Sh.E		19:05	II.Tr.E		0:41	I.Sh.I		15:49	I.Oc.D
	20:31	III.Oc.D		19:50	II.Sh.E		2:28	I.Tr.E		18:30	I.Ec.R

Phenomena of Jupiter's Moons, July 2019

For telescopic observers, here is the complete list of phenomena involving Jupiter's four bright moons and the planet's disk or shadow. The first columns give the date and midpoint time of the event in Universal Time. Next is the satellite involved: I for Io, II Europa, III Ganymede, or IV Callisto. This is followed by the type of event: Oc for an occultation of the satellite behind Jupiter's limb, Ec for an eclipse by Jupiter's shadow, Tr for a transit of the satellite across the planet's face, or Sh for the satellite casting its tiny black shadow onto Jupiter. An occultation or eclipse begins when the satellite disappears (D) and ends when it reappears (R). A transit or shadow passage begins at ingress (I) and ends at egress (E). Each event is gradual, lasting several minutes. These predictions are courtesy William Thuillot / IMCCE / Paris Observatory.

July 1	0:51	II.Oc.D	**July 6**	1:56	I.Ec.R		11:33	I.Tr.E		22:19	I.Ec.R
	4:18	II.Ec.R		8:04	II.Tr.I		12:14	I.Sh.E	**July 15**	5:28	II.Oc.D
	13:09	I.Tr.I		9:15	II.Sh.I		16:44	III.Tr.I		9:31	II.Ec.R
	13:39	I.Sh.I		10:30	II.Tr.E		19:00	III.Tr.E		16:41	I.Tr.I
	15:21	I.Tr.E		11:44	II.Sh.E		19:28	III.Sh.I		17:28	I.Sh.I
	15:51	I.Sh.E		20:28	I.Tr.I		21:53	III.Sh.E		18:52	I.Tr.E
July 2	10:16	I.Oc.D		21:04	I.Sh.I	**July 11**	6:28	I.Oc.D		19:40	I.Sh.E
	12:58	I.Ec.R		22:40	I.Tr.E		9:22	I.Ec.R	**July 16**	13:47	I.Oc.D
	18:56	II.Tr.I		23:17	I.Sh.E		16:18	II.Oc.D		16:48	I.Ec.R
	19:57	II.Sh.I	**July 7**	3:10	III.Oc.D		20:13	II.Ec.R		23:33	II.Tr.I
	21:21	II.Tr.E		5:27	III.Oc.R	**July 12**	3:48	I.Tr.I	**July 17**	1:09	II.Sh.I
	22:26	II.Sh.E		5:35	III.Ec.D		4:31	I.Sh.I		1:58	II.Tr.E
July 3	7:35	I.Tr.I		8:01	III.Ec.R		5:59	I.Tr.E		3:38	II.Sh.E
	8:07	I.Sh.I		17:35	I.Oc.D		6:43	I.Sh.E		11:08	I.Tr.I
	9:47	I.Tr.E		20:25	I.Ec.R	**July 13**	0:54	I.Oc.D		11:57	I.Sh.I
	10:19	I.Sh.E	**July 8**	3:09	II.Oc.D		3:51	I.Ec.R		13:19	I.Tr.E
	13:21	III.Tr.I		6:54	II.Ec.R		10:23	II.Tr.I		14:09	I.Sh.E
	15:29	III.Sh.I		14:55	I.Tr.I		11:51	II.Sh.I		20:10	III.Tr.I
	15:36	III.Tr.E		15:33	I.Sh.I		12:48	II.Tr.E		22:27	III.Tr.E
	17:53	III.Sh.E		17:06	I.Tr.E		14:20	II.Sh.E		23:27	III.Sh.I
July 4	4:42	I.Oc.D		17:45	I.Sh.E		22:14	I.Tr.I	**July 18**	1:54	III.Sh.E
	7:27	I.Ec.R	**July 9**	12:01	I.Oc.D		22:59	I.Sh.I		8:14	I.Oc.D
	14:00	II.Oc.D		14:53	I.Ec.R	**July 14**	0:26	I.Tr.E		11:17	I.Ec.R
	17:36	II.Ec.R		21:13	II.Tr.I		1:11	I.Sh.E		18:38	II.Oc.D
July 5	2:02	I.Tr.I		22:33	II.Sh.I		6:33	III.Oc.D		22:49	II.Ec.R
	2:36	I.Sh.I		23:39	II.Tr.E		8:51	III.Oc.R	**July 19**	5:35	I.Tr.I
	4:13	I.Tr.E	**July 10**	1:02	II.Sh.E		9:34	III.Ec.D		6:25	I.Sh.I
	4:48	I.Sh.E		9:21	I.Tr.I		12:01	III.Ec.R		7:46	I.Tr.E
	23:08	I.Oc.D		10:02	I.Sh.I		19:21	I.Oc.D		8:37	I.Sh.E

July 20	2:41	I.Oc.D		19:23	I.Sh.I		21:00	II.Oc.D		20:01	III.Ec.R
	5:45	I.Ec.R		20:40	I.Tr.E	**July 26**	1:25	II.Ec.R		22:56	I.Oc.D
	12:43	II.Tr.I		21:35	I.Sh.E		7:23	I.Tr.I	**July 29**	2:09	I.Ec.R
	14:27	II.Sh.I	**July 23**	15:35	I.Oc.D		8:20	I.Sh.I		10:12	II.Oc.D
	15:09	II.Tr.E		18:43	I.Ec.R		9:34	I.Tr.E		14:43	II.Ec.R
	16:56	II.Sh.E	**July 24**	1:54	II.Tr.I		10:32	I.Sh.E		20:17	I.Tr.I
July 21	0:02	I.Tr.I		3:45	II.Sh.I	**July 27**	4:29	I.Oc.D		21:18	I.Sh.I
	0:54	I.Sh.I		4:20	II.Tr.E		7:40	I.Ec.R		22:28	I.Tr.E
	2:13	I.Tr.E		6:14	II.Sh.E		15:05	II.Tr.I		23:29	I.Sh.E
	3:06	I.Sh.E		12:56	I.Tr.I		17:03	II.Sh.I	**July 30**	17:23	I.Oc.D
	10:00	III.Oc.D		13:51	I.Sh.I		17:32	II.Tr.E		20:38	I.Ec.R
	12:20	III.Oc.R		15:07	I.Tr.E		19:32	II.Sh.E	**July 31**	4:17	II.Tr.I
	13:33	III.Ec.D		16:03	I.Sh.E	**July 28**	1:50	I.Tr.I		6:21	II.Sh.I
	16:01	III.Ec.R		23:39	III.Tr.I		2:49	I.Sh.I		6:44	II.Tr.E
	21:08	I.Oc.D	**July 25**	1:58	III.Tr.E		4:01	I.Tr.E		8:51	II.Sh.E
July 22	0:14	I.Ec.R		3:26	III.Sh.I		5:01	I.Sh.E		14:44	I.Tr.I
	7:49	II.Oc.D		5:54	III.Sh.E		13:32	III.Oc.D		15:46	I.Sh.I
	12:07	II.Ec.R		10:02	I.Oc.D		15:53	III.Oc.R		16:56	I.Tr.E
	18:29	I.Tr.I		13:12	I.Ec.R		17:32	III.Ec.D		17:58	I.Sh.E

Phenomena of Jupiter's Moons, August 2019

For telescopic observers, here is the complete list of phenomena involving Jupiter's four bright moons and the planet's disk or shadow. The first columns give the date and midpoint time of the event in Universal Time. Next is the satellite involved: I for Io, II Europa, III Ganymede, or IV Callisto. This is followed by the type of event: Oc for an occultation of the satellite behind Jupiter's limb, Ec for an eclipse by Jupiter's shadow, Tr for a transit of the satellite across the planet's face, or Sh for the satellite casting its tiny black shadow onto Jupiter. An occultation or eclipse begins when the satellite disappears (D) and ends when it reappears (R). A transit or shadow passage begins at ingress (I) and ends at egress (E). Each event is gradual, lasting several minutes. These predictions are courtesy William Thuillot / IMCCE / Paris Observatory.

Aug. 1	3:13	III.Tr.I		17:19	II.Ec.R		19:57	II.Tr.I		21:48	I.Sh.E
	5:33	III.Tr.E		22:07	I.Tr.I		22:16	II.Sh.I	**Aug. 15**	10:33	III.Tr.I
	7:25	III.Sh.I		23:12	I.Sh.I		22:24	II.Tr.E		12:57	III.Tr.E
	9:53	III.Sh.E	**Aug. 6**	0:18	I.Tr.E	**Aug. 11**	0:46	II.Sh.E		15:23	III.Sh.I
	11:51	I.Oc.D		1:24	I.Sh.E		5:30	I.Tr.I		15:32	I.Oc.D
	15:07	I.Ec.R		19:13	I.Oc.D		6:39	I.Sh.I		17:53	III.Sh.E
	23:24	II.Oc.D		22:33	I.Ec.R		7:41	I.Tr.E		18:57	I.Ec.R
Aug. 2	4:01	II.Ec.R	**Aug. 7**	6:43	II.Tr.I		8:50	I.Sh.E	**Aug. 16**	4:18	II.Oc.D
	9:12	I.Tr.I		8:58	II.Sh.I		20:49	III.Oc.D		9:13	II.Ec.R
	10:15	I.Sh.I		9:10	II.Tr.E		23:14	III.Oc.R		12:53	I.Tr.I
	11:23	I.Tr.E		11:28	II.Sh.E	**Aug. 12**	1:31	III.Ec.D		14:05	I.Sh.I
	12:27	I.Sh.E		16:34	I.Tr.I		2:36	I.Oc.D		15:04	I.Tr.E
Aug. 3	6:18	I.Oc.D		17:41	I.Sh.I		4:03	III.Ec.R		16:16	I.Sh.E
	9:36	I.Ec.R		18:45	I.Tr.E		6:00	I.Ec.R	**Aug. 17**	10:00	I.Oc.D
	17:30	II.Tr.I		19:53	I.Sh.E		15:04	II.Oc.D		13:26	I.Ec.R
	19:39	II.Sh.I	**Aug. 8**	6:51	III.Tr.I		19:55	II.Ec.R		22:26	II.Tr.I
	19:57	II.Tr.E		9:13	III.Tr.E		23:57	I.Tr.I	**Aug. 18**	0:53	II.Sh.I
	22:09	II.Sh.E		11:24	III.Sh.I	**Aug. 13**	1:07	I.Sh.I		0:54	II.Tr.E
Aug. 4	3:39	I.Tr.I		13:41	I.Oc.D		2:09	I.Tr.E		3:23	II.Sh.E
	4:44	I.Sh.I		13:53	III.Sh.E		3:19	I.Sh.E		7:21	I.Tr.I
	5:50	I.Tr.E		17:02	I.Ec.R		21:04	I.Oc.D		8:34	I.Sh.I
	6:55	I.Sh.E	**Aug. 9**	1:50	II.Oc.D	**Aug. 14**	0:28	I.Ec.R		9:32	I.Tr.E
	17:08	III.Oc.D		6:37	II.Ec.R		9:12	II.Tr.I		10:45	I.Sh.E
	19:31	III.Oc.R		11:02	I.Tr.I		11:35	II.Sh.I	**Aug. 19**	0:34	III.Oc.D
	21:31	III.Ec.D		12:10	I.Sh.I		11:39	II.Tr.E		3:00	III.Oc.R
Aug. 5	0:02	III.Ec.R		13:13	I.Tr.E		14:05	II.Sh.E		4:28	I.Oc.D
	0:45	I.Oc.D		14:21	I.Sh.E		18:25	I.Tr.I		5:31	III.Ec.D
	4:04	I.Ec.R	**Aug. 10**	8:08	I.Oc.D		19:36	I.Sh.I		7:55	I.Ec.R
	12:37	II.Oc.D		11:31	I.Ec.R		20:36	I.Tr.E		8:04	III.Ec.R

	17:33	II.Oc.D
	22:31	II.Ec.R
Aug. 20	1:49	I.Tr.I
	3:02	I.Sh.I
	4:00	I.Tr.E
	5:14	I.Sh.E
	22:56	I.Oc.D
Aug. 21	2:24	I.Ec.R
	11:42	II.Tr.I
	14:10	II.Tr.E
	14:12	II.Sh.I
	16:42	II.Sh.E
	20:17	I.Tr.I
	21:31	I.Sh.I
	22:28	I.Tr.E
	23:42	I.Sh.E
Aug. 22	14:21	III.Tr.I
	16:46	III.Tr.E
	17:24	I.Oc.D
	19:23	III.Sh.I
	20:53	I.Ec.R
	21:54	III.Sh.E
Aug. 23	6:48	II.Oc.D
	9:17	II.Oc.R
	9:17	II.Ec.D
	11:49	II.Ec.R
	14:46	I.Tr.I
	16:00	I.Sh.I
	16:57	I.Tr.E
	18:11	I.Sh.E
Aug. 24	11:52	I.Oc.D
	15:21	I.Ec.R
Aug. 25	0:58	II.Tr.I
	3:26	II.Tr.E
	3:30	II.Sh.I
	6:01	II.Sh.E
	9:14	I.Tr.I
	10:28	I.Sh.I
	11:25	I.Tr.E
	12:40	I.Sh.E
Aug. 26	4:23	III.Oc.D
	6:21	I.Oc.D
	6:51	III.Oc.R
	9:30	III.Ec.D
	9:50	I.Ec.R
	12:04	III.Ec.R
	20:04	II.Oc.D
	22:33	II.Oc.R
	22:35	II.Ec.D
Aug. 27	1:07	II.Ec.R
	3:42	I.Tr.I
	4:57	I.Sh.I
	5:53	I.Tr.E
	7:09	I.Sh.E
Aug. 28	0:49	I.Oc.D
	4:19	I.Ec.R
	14:15	II.Tr.I
	16:43	II.Tr.E
	16:49	II.Sh.I
	19:20	II.Sh.E
	22:10	I.Tr.I
	23:26	I.Sh.I
Aug. 29	0:22	I.Tr.E
	1:37	I.Sh.E
	18:13	III.Tr.I
	19:17	I.Oc.D
	20:39	III.Tr.E
	22:48	I.Ec.R
	23:22	III.Sh.I
Aug. 30	1:54	III.Sh.E
	9:20	II.Oc.D
	11:50	II.Oc.R
	11:53	II.Ec.D
	14:25	II.Ec.R
	16:39	I.Tr.I
	17:55	I.Sh.I
	18:50	I.Tr.E
	20:06	I.Sh.E
Aug. 31	13:46	I.Oc.D
	17:17	I.Ec.R

Phenomena of Jupiter's Moons, September 2019

For telescopic observers, here is the complete list of phenomena involving Jupiter's four bright moons and the planet's disk or shadow. The first columns give the date and midpoint time of the event in Universal Time. Next is the satellite involved: I for Io, II Europa, III Ganymede, or IV Callisto. This is followed by the type of event: Oc for an occultation of the satellite behind Jupiter's limb, Ec for an eclipse by Jupiter's shadow, Tr for a transit of the satellite across the planet's face, or Sh for the satellite casting its tiny black shadow onto Jupiter. An occultation or eclipse begins when the satellite disappears (D) and ends when it reappears (R). A transit or shadow passage begins at ingress (I) and ends at egress (E). Each event is gradual, lasting several minutes. These predictions are courtesy William Thuillot / IMCCE / Paris Observatory.

Sept. 1	3:32	II.Tr.I		1:21	I.Sh.I		13:41	I.Ec.R		17:01	II.Oc.R
	6:01	II.Tr.E		2:16	I.Tr.E		14:46	III.Oc.R		17:04	II.Ec.D
	6:07	II.Sh.I		3:32	I.Sh.E		17:28	III.Ec.D		19:36	II.Ec.R
	8:38	II.Sh.E		21:12	I.Oc.D		20:04	III.Ec.R		20:29	I.Tr.I
	11:07	I.Tr.I		22:09	III.Tr.I	**Sept. 10**	1:12	II.Oc.D		21:45	I.Sh.I
	12:23	I.Sh.I	**Sept. 6**	0:38	III.Tr.E		3:42	II.Oc.R		22:40	I.Tr.E
	13:18	I.Tr.E		0:44	I.Ec.R		3:46	II.Ec.D		23:56	I.Sh.E
	14:35	I.Sh.E		3:22	III.Sh.I		6:18	II.Ec.R	**Sept. 14**	17:36	I.Oc.D
Sept. 2	8:15	I.Oc.D		5:56	III.Sh.E		7:31	I.Tr.I		21:08	I.Ec.R
	8:17	III.Oc.D		11:55	II.Oc.D		8:47	I.Sh.I	**Sept. 15**	8:47	II.Tr.I
	10:47	III.Oc.R		14:24	II.Oc.R		9:42	I.Tr.E		11:16	II.Tr.E
	11:46	I.Ec.R		14:28	II.Ec.D		10:59	I.Sh.E		11:22	II.Sh.I
	13:29	III.Ec.D		17:00	II.Ec.R	**Sept. 11**	4:38	I.Oc.D		13:54	II.Sh.E
	16:04	III.Ec.R		18:33	I.Tr.I		8:10	I.Ec.R		14:58	I.Tr.I
	22:37	II.Oc.D		19:50	I.Sh.I		19:28	II.Tr.I		16:13	I.Sh.I
Sept. 3	1:07	II.Oc.R		20:44	I.Tr.E		21:57	II.Tr.E		17:09	I.Tr.E
	1:11	II.Ec.D		22:01	I.Sh.E		22:03	II.Sh.I		18:25	I.Sh.E
	3:43	II.Ec.R	**Sept. 7**	15:41	I.Oc.D	**Sept. 12**	0:36	II.Sh.E	**Sept. 16**	12:06	I.Oc.D
	5:36	I.Tr.I		19:12	I.Ec.R		2:00	I.Tr.I		15:37	I.Ec.R
	6:52	I.Sh.I	**Sept. 8**	6:08	II.Tr.I		3:16	I.Sh.I		16:18	III.Oc.D
	7:47	I.Tr.E		8:37	II.Tr.E		4:11	I.Tr.E		18:50	III.Oc.R
	9:04	I.Sh.E		8:44	II.Sh.I		5:27	I.Sh.E		21:28	III.Ec.D
Sept. 4	2:43	I.Oc.D		11:16	II.Sh.E		23:07	I.Oc.D	**Sept. 17**	0:06	III.Ec.R
	6:15	I.Ec.R		13:02	I.Tr.I	**Sept. 13**	2:10	III.Tr.I		3:49	II.Oc.D
	16:50	II.Tr.I		14:18	I.Sh.I		2:39	I.Ec.R		6:20	II.Oc.R
	19:19	II.Tr.E		15:13	I.Tr.E		4:39	III.Tr.E		6:21	II.Ec.D
	19:26	II.Sh.I		16:30	I.Sh.E		7:21	III.Sh.I		8:54	II.Ec.R
	21:58	II.Sh.E	**Sept. 9**	10:10	I.Oc.D		9:56	III.Sh.E		9:27	I.Tr.I
Sept. 5	0:05	I.Tr.I		12:15	III.Oc.D		14:31	II.Oc.D		10:42	I.Sh.I

	11:38	I.Tr.E		22:25	I.Tr.I		6:28	II.Oc.D		15:19	III.Sh.I
	12:54	I.Sh.E		23:39	I.Sh.I		11:23	I.Tr.I		17:56	III.Sh.E
Sept. 18	6:35	I.Oc.D	**Sept. 21**	0:36	I.Tr.E		11:29	II.Ec.R		19:48	II.Oc.D
	10:06	I.Ec.R		1:51	I.Sh.E		12:37	I.Sh.I	**Sept. 28**	0:22	I.Tr.I
	22:07	II.Tr.I		19:33	I.Oc.D		13:34	I.Tr.E		0:47	II.Ec.R
Sept. 19	0:37	II.Tr.E		23:03	I.Ec.R		14:49	I.Sh.E		1:34	I.Sh.I
	0:41	II.Sh.I	**Sept. 22**	11:27	II.Tr.I	**Sept. 25**	8:32	I.Oc.D		2:33	I.Tr.E
	3:14	II.Sh.E		13:57	II.Tr.E		12:01	I.Ec.R		3:46	I.Sh.E
	3:56	I.Tr.I		13:59	II.Sh.I	**Sept. 26**	0:48	II.Tr.I		21:31	I.Oc.D
	5:11	I.Sh.I		16:32	II.Sh.E		3:19	II.Tr.E	**Sept. 29**	0:59	I.Ec.R
	6:07	I.Tr.E		16:54	I.Tr.I		3:19	II.Sh.I		14:09	II.Tr.I
	7:22	I.Sh.E		18:08	I.Sh.I		5:52	II.Sh.E		16:37	II.Sh.I
Sept. 20	1:04	I.Oc.D		19:05	I.Tr.E		5:52	I.Tr.I		16:40	II.Tr.E
	4:35	I.Ec.R		20:20	I.Sh.E		7:06	I.Sh.I		18:51	I.Tr.I
	6:13	III.Tr.I	**Sept. 23**	14:03	I.Oc.D		8:04	I.Tr.E		19:11	II.Sh.E
	8:44	III.Tr.E		17:32	I.Ec.R		9:17	I.Sh.E		20:03	I.Sh.I
	11:20	III.Sh.I		20:24	III.Oc.D	**Sept. 27**	3:01	I.Oc.D		21:02	I.Tr.E
	13:56	III.Sh.E		22:58	III.Oc.R		6:30	I.Ec.R		22:15	I.Sh.E
	17:08	II.Oc.D	**Sept. 24**	1:28	III.Ec.D		10:20	III.Tr.I	**Sept. 30**	16:00	I.Oc.D
	22:12	II.Ec.R		4:06	III.Ec.R		12:53	III.Tr.E		19:28	I.Ec.R

Phenomena of Jupiter's Moons, October 2019

For telescopic observers, here is the complete list of phenomena involving Jupiter's four bright moons and the planet's disk or shadow. The first columns give the date and midpoint time of the event in Universal Time. Next is the satellite involved: I for Io, II Europa, III Ganymede, or IV Callisto. This is followed by the type of event: Oc for an occultation of the satellite behind Jupiter's limb, Ec for an eclipse by Jupiter's shadow, Tr for a transit of the satellite across the planet's face, or Sh for the satellite casting its tiny black shadow onto Jupiter. An occultation or eclipse begins when the satellite disappears (D) and ends when it reappears (R). A transit or shadow passage begins at ingress (I) and ends at egress (E). Each event is gradual, lasting several minutes. These predictions are courtesy William Thuillot / IMCCE / Paris Observatory.

Oct. 1	0:34	III.Oc.D		3:29	I.Sh.I		8:48	II.Tr.E		23:19	I.Ec.R
	3:09	III.Oc.R		4:31	I.Tr.E		9:48	I.Tr.I	**Oct. 15**	9:02	III.Oc.D
	5:28	III.Ec.D		5:41	I.Sh.E		10:55	I.Sh.I		11:40	III.Oc.R
	8:08	III.Ec.R		23:29	I.Oc.D		11:09	II.Sh.E		13:27	III.Ec.D
	9:08	II.Oc.D	**Oct. 6**	2:54	I.Ec.R		12:00	I.Tr.E		14:32	II.Oc.D
	13:20	I.Tr.I		16:53	II.Tr.I		13:07	I.Sh.E		16:09	III.Ec.R
	14:05	II.Ec.R		19:15	II.Sh.I	**Oct. 11**	6:58	I.Oc.D		17:17	I.Tr.I
	14:32	I.Sh.I		19:24	II.Tr.E		10:21	I.Ec.R		18:21	I.Sh.I
	15:32	I.Tr.E		20:49	I.Tr.I		18:45	III.Tr.I		19:15	II.Ec.R
	16:44	I.Sh.E		21:49	II.Sh.E		21:20	III.Tr.E		19:29	I.Tr.E
Oct. 2	10:30	I.Oc.D		21:58	I.Sh.I		23:18	III.Sh.I		20:33	I.Sh.E
	13:57	I.Ec.R		23:00	I.Tr.E	**Oct. 12**	1:11	II.Oc.D	**Oct. 16**	14:28	I.Oc.D
Oct. 3	3:31	II.Tr.I	**Oct. 7**	0:10	I.Sh.E		1:57	III.Sh.E		17:48	I.Ec.R
	5:56	II.Sh.I		17:59	I.Oc.D		4:18	I.Tr.I	**Oct. 17**	9:01	II.Tr.I
	6:02	II.Tr.E		21:23	I.Ec.R		5:24	I.Sh.I		11:12	II.Sh.I
	7:50	I.Tr.I	**Oct. 8**	4:46	III.Oc.D		5:57	II.Ec.R		11:34	II.Tr.E
	8:30	II.Sh.E		7:23	III.Oc.R		6:29	I.Tr.E		11:47	I.Tr.I
	9:00	I.Sh.I		9:28	III.Ec.D		7:36	I.Sh.E		12:50	I.Sh.I
	10:01	I.Tr.E		11:49	II.Oc.D	**Oct. 13**	1:28	I.Oc.D		13:47	II.Sh.E
	11:12	I.Sh.E		12:09	III.Ec.R		4:50	I.Ec.R		13:59	I.Tr.E
Oct. 4	4:59	I.Oc.D		15:18	I.Tr.I		19:38	II.Tr.I		15:02	I.Sh.E
	8:26	I.Ec.R		16:27	I.Sh.I		21:53	II.Sh.I	**Oct. 18**	8:58	I.Oc.D
	14:31	III.Tr.I		16:40	II.Ec.R		22:10	II.Tr.E		12:17	I.Ec.R
	17:05	III.Tr.E		17:30	I.Tr.E		22:47	I.Tr.I		23:01	III.Tr.I
	19:18	III.Sh.I		18:38	I.Sh.E		23:53	I.Sh.I	**Oct. 19**	1:38	III.Tr.E
	21:56	III.Sh.E	**Oct. 9**	12:29	I.Oc.D	**Oct. 14**	0:27	II.Sh.E		3:17	III.Sh.I
	22:29	II.Oc.D		15:52	I.Ec.R		0:59	I.Tr.E		3:54	II.Oc.D
Oct. 5	2:19	I.Tr.I	**Oct. 10**	6:15	II.Tr.I		2:05	I.Sh.E		5:58	III.Sh.E
	3:22	II.Ec.R		8:34	II.Sh.I		19:58	I.Oc.D		6:16	I.Tr.I

	7:19	I.Sh.I		19:16	I.Tr.I		6:38	II.Oc.D		17:39	III.Oc.D
	8:28	I.Tr.E		20:09	III.Ec.R		7:17	III.Sh.I		20:01	II.Oc.D
	8:33	II.Ec.R		20:16	I.Sh.I		8:16	I.Tr.I		20:21	III.Oc.R
	9:31	I.Sh.E		21:28	I.Tr.E		9:13	I.Sh.I		21:16	I.Tr.I
Oct. 20	3:28	I.Oc.D		21:50	II.Ec.R		9:59	III.Sh.E		21:25	III.Ec.D
	6:45	I.Ec.R		22:28	I.Sh.E		10:28	I.Tr.E		22:11	I.Sh.I
	22:24	II.Tr.I	**Oct. 23**	16:28	I.Oc.D		11:08	II.Ec.R		23:28	I.Tr.E
Oct. 21	0:30	II.Sh.I		19:43	I.Ec.R		11:26	I.Sh.E	**Oct. 30**	0:10	III.Ec.R
	0:46	I.Tr.I	**Oct. 24**	11:49	II.Tr.I	**Oct. 27**	5:28	I.Oc.D		0:23	I.Sh.E
	0:57	II.Tr.E		13:46	I.Tr.I		8:41	I.Ec.R		0:25	II.Ec.R
	1:47	I.Sh.I		13:50	II.Sh.I	**Oct. 28**	1:12	II.Tr.I		18:28	I.Oc.D
	2:58	I.Tr.E		14:22	II.Tr.E		2:46	I.Tr.I		21:38	I.Ec.R
	3:06	II.Sh.E		14:45	I.Sh.I		3:08	II.Sh.I	**Oct. 31**	14:37	II.Tr.I
	4:00	I.Sh.E		15:58	I.Tr.E		3:42	I.Sh.I		15:46	I.Tr.I
	21:58	I.Oc.D		16:25	II.Sh.E		3:46	II.Tr.E		16:27	II.Sh.I
Oct. 22	1:14	I.Ec.R		16:57	I.Sh.E		4:58	I.Tr.E		16:39	I.Sh.I
	13:19	III.Oc.D	**Oct. 25**	10:58	I.Oc.D		5:44	II.Sh.E		17:11	II.Tr.E
	15:59	III.Oc.R		14:12	I.Ec.R		5:54	I.Sh.E		17:58	I.Tr.E
	17:16	II.Oc.D	**Oct. 26**	3:21	III.Tr.I		23:58	I.Oc.D		18:52	I.Sh.E
	17:26	III.Ec.D		5:59	III.Tr.E	**Oct. 29**	3:10	I.Ec.R		19:03	II.Sh.E

Phenomena of Jupiter's Moons, November 2019

For telescopic observers, here is the complete list of phenomena involving Jupiter's four bright moons and the planet's disk or shadow. The first columns give the date and midpoint time of the event in Universal Time. Next is the satellite involved: I for Io, II Europa, III Ganymede, or IV Callisto. This is followed by the type of event: Oc for an occultation of the satellite behind Jupiter's limb, Ec for an eclipse by Jupiter's shadow, Tr for a transit of the satellite across the planet's face, or Sh for the satellite casting its tiny black shadow onto Jupiter. An occultation or eclipse begins when the satellite disappears (D) and ends when it reappears (R). A transit or shadow passage begins at ingress (I) and ends at egress (E). Each event is gradual, lasting several minutes. These predictions are courtesy William Thuillot / IMCCE / Paris Observatory.

Nov. 1	1:15	IV.Sh.I	**Nov. 6**	0:05	I.Sh.I		16:18	II.Ec.R		21:43	II.Sh.I
	1:51	IV.Sh.E		0:45	III.Oc.R		17:59	III.Sh.E		21:59	I.Tr.E
	12:59	I.Oc.D		1:25	III.Ec.D	**Nov. 10**	9:30	I.Oc.D		22:41	I.Sh.E
	16:07	I.Ec.R		1:28	I.Tr.E		12:31	I.Ec.R		22:52	II.Tr.E
Nov. 2	7:41	III.Tr.I		2:18	I.Sh.E	**Nov. 11**	6:46	I.Tr.I	**Nov. 15**	0:20	II.Sh.E
	9:23	II.Oc.D		3:00	II.Ec.R		6:50	II.Tr.I		17:01	I.Oc.D
	10:16	I.Tr.I		4:11	III.Ec.R		7:31	I.Sh.I		19:58	I.Ec.R
	10:22	III.Tr.E		20:29	I.Oc.D		8:23	II.Sh.I	**Nov. 16**	14:16	I.Tr.I
	11:08	I.Sh.I		23:34	I.Ec.R		8:59	I.Tr.E		14:56	II.Oc.D
	11:16	III.Sh.I	**Nov. 7**	17:26	II.Tr.I		9:26	II.Tr.E		14:57	I.Sh.I
	12:28	I.Tr.E		17:46	I.Tr.I		9:44	I.Sh.E		16:28	III.Tr.I
	13:20	I.Sh.E		18:34	I.Sh.I		11:00	II.Sh.E		16:29	I.Tr.E
	13:43	II.Ec.R		19:05	II.Sh.I	**Nov. 12**	4:00	I.Oc.D		17:10	I.Sh.E
	13:59	III.Sh.E		19:58	I.Tr.E		7:00	I.Ec.R		18:53	II.Ec.R
Nov. 3	7:29	I.Oc.D		20:01	II.Tr.E	**Nov. 13**	1:16	I.Tr.I		19:12	III.Tr.E
	10:36	I.Ec.R		20:47	I.Sh.E		1:33	II.Oc.D		19:13	III.Sh.I
Nov. 4	4:01	II.Tr.I		21:42	II.Sh.E		2:00	I.Sh.I		21:59	III.Sh.E
	4:46	I.Tr.I	**Nov. 8**	15:00	I.Oc.D		2:26	III.Oc.D	**Nov. 17**	11:32	I.Oc.D
	5:36	I.Sh.I		18:03	I.Ec.R		3:29	I.Tr.E		14:27	I.Ec.R
	5:46	II.Sh.I	**Nov. 9**	11:54	IV.Ec.D		4:13	I.Sh.E		19:01	IV.Sh.I
	6:36	II.Tr.E		12:04	III.Tr.I		5:11	III.Oc.R		20:15	IV.Sh.E
	6:58	I.Tr.E		12:09	II.Oc.D		5:25	III.Ec.D	**Nov. 18**	8:46	I.Tr.I
	7:49	I.Sh.E		12:16	I.Tr.I		5:35	II.Ec.R		9:25	I.Sh.I
	8:22	II.Sh.E		12:58	IV.Ec.R		8:11	III.Ec.R		9:41	II.Tr.I
Nov. 5	1:59	I.Oc.D		13:02	I.Sh.I		22:31	I.Oc.D		10:59	I.Tr.E
	5:05	I.Ec.R		14:28	I.Tr.E	**Nov. 14**	1:29	I.Ec.R		11:01	II.Sh.I
	22:02	III.Oc.D		14:46	III.Tr.E		19:46	I.Tr.I		11:39	I.Sh.E
	22:46	II.Oc.D		15:15	III.Sh.I		20:16	II.Tr.I		12:17	II.Tr.E
	23:16	I.Tr.I		15:15	I.Sh.E		20:28	I.Sh.I		13:38	II.Sh.E

Nov. 19	6:02	I.Oc.D		2:58	II.Sh.E		13:33	I.Sh.E		5:19	I.Ec.R
	8:55	I.Ec.R		19:03	I.Oc.D		13:38	II.Sh.I		23:48	I.Tr.I
Nov. 20	3:17	I.Tr.I		21:53	I.Ec.R		15:09	II.Tr.E	**Nov. 29**	0:17	I.Sh.I
	3:54	I.Sh.I	**Nov. 23**	16:17	I.Tr.I		16:16	II.Sh.E		1:58	II.Tr.I
	4:20	II.Oc.D		16:51	I.Sh.I	**Nov. 26**	0:48	IV.Oc.D		2:01	I.Tr.E
	5:30	I.Tr.E		17:44	II.Oc.D		1:59	IV.Oc.R		2:30	I.Sh.E
	6:07	I.Sh.E		18:30	I.Tr.E		5:45	IV.Ec.D		2:58	II.Sh.I
	6:53	III.Oc.D		19:04	I.Sh.E		7:16	IV.Ec.R		4:35	II.Tr.E
	8:10	II.Ec.R		20:53	III.Tr.I		8:04	I.Oc.D		5:36	II.Sh.E
	12:13	III.Ec.R		21:27	II.Ec.R		10:51	I.Ec.R		21:05	I.Oc.D
Nov. 21	0:32	I.Oc.D		23:12	III.Sh.I	**Nov. 27**	5:18	I.Tr.I		23:48	I.Ec.R
	3:24	I.Ec.R		23:39	III.Tr.E		5:48	I.Sh.I	**Nov. 30**	18:18	I.Tr.I
	21:47	I.Tr.I	**Nov. 24**	1:59	III.Sh.E		7:08	II.Oc.D		18:46	I.Sh.I
	22:23	I.Sh.I		13:33	I.Oc.D		7:31	I.Tr.E		20:32	I.Tr.E
	23:07	II.Tr.I		16:22	I.Ec.R		8:02	I.Sh.E		20:32	II.Oc.D
Nov. 22	0:00	I.Tr.E	**Nov. 25**	10:47	I.Tr.I		10:45	II.Ec.R		20:59	I.Sh.E
	0:20	II.Sh.I		11:20	I.Sh.I		11:19	III.Oc.D			
	0:36	I.Sh.E		12:32	II.Tr.I		16:13	III.Ec.R			
	1:43	II.Tr.E		13:01	I.Tr.E	**Nov. 28**	2:34	I.Oc.D			

Phenomena of Jupiter's Moons, December 2019

For telescopic observers, here is the complete list of phenomena involving Jupiter's four bright moons and the planet's disk or shadow. The first columns give the date and midpoint time of the event in Universal Time. Next is the satellite involved: I for Io, II Europa, III Ganymede, or IV Callisto. This is followed by the type of event: Oc for an occultation of the satellite behind Jupiter's limb, Ec for an eclipse by Jupiter's shadow, Tr for a transit of the satellite across the planet's face, or Sh for the satellite casting its tiny black shadow onto Jupiter. An occultation or eclipse begins when the satellite disappears (D) and ends when it reappears (R). A transit or shadow passage begins at ingress (I) and ends at egress (E). Each event is gradual, lasting several minutes. These predictions are courtesy William Thuillot / IMCCE / Paris Observatory.

Dec. 1	0:02	II.Ec.R	**Dec. 5**	4:36	I.Oc.D		18:53	II.Sh.I		22:21	I.Tr.I
	1:21	III.Tr.I		7:14	I.Ec.R		20:53	II.Tr.E		22:34	I.Sh.I
	3:11	III.Sh.I	**Dec. 6**	1:49	I.Tr.I		21:32	II.Sh.E	**Dec. 15**	0:35	I.Tr.E
	4:08	III.Tr.E		2:11	I.Sh.I	**Dec. 10**	12:08	I.Oc.D		0:48	I.Sh.E
	6:00	III.Sh.E		4:03	I.Tr.E		14:40	I.Ec.R		2:09	II.Oc.D
	15:35	I.Oc.D		4:25	I.Sh.E	**Dec. 11**	9:20	I.Tr.I		5:12	II.Ec.R
	18:17	I.Ec.R		4:49	II.Tr.I		9:37	I.Sh.I		10:18	III.Tr.I
Dec. 2	12:48	I.Tr.I		5:35	II.Sh.I		11:34	I.Tr.E		11:10	III.Sh.I
	13:14	I.Sh.I		7:28	II.Tr.E		11:51	I.Sh.E		13:09	III.Tr.E
	15:02	I.Tr.E		8:13	II.Sh.E		12:44	II.Oc.D		14:01	III.Sh.E
	15:23	II.Tr.I		23:07	I.Oc.D		15:55	II.Ec.R		19:39	I.Oc.D
	15:28	I.Sh.E	**Dec. 7**	1:43	I.Ec.R		20:15	III.Oc.D		22:07	I.Ec.R
	16:16	II.Sh.I		20:19	I.Tr.I	**Dec. 12**	0:13	III.Ec.R	**Dec. 16**	16:51	I.Tr.I
	18:01	II.Tr.E		20:40	I.Sh.I		6:38	I.Oc.D		17:03	I.Sh.I
	18:54	II.Sh.E		22:33	I.Tr.E		9:09	I.Ec.R		19:05	I.Tr.E
Dec. 3	10:06	I.Oc.D		22:53	I.Sh.E		21:15	IV.Oc.D		19:16	I.Sh.E
	12:46	I.Ec.R		23:20	II.Oc.D		23:02	IV.Oc.R		21:07	II.Tr.I
Dec. 4	7:19	I.Tr.I	**Dec. 8**	2:37	II.Ec.R		23:40	IV.Ec.D		21:30	II.Sh.I
	7:43	I.Sh.I		5:49	III.Tr.I	**Dec. 13**	1:31	IV.Ec.R		23:46	II.Tr.E
	9:10	IV.Tr.I		7:10	III.Sh.I		3:50	I.Tr.I	**Dec. 17**	0:09	II.Sh.E
	9:32	I.Tr.E		8:38	III.Tr.E		4:06	I.Sh.I		14:10	I.Oc.D
	9:56	II.Oc.D		10:00	III.Sh.E		6:04	I.Tr.E		16:35	I.Ec.R
	9:56	I.Sh.E		17:37	I.Oc.D		6:19	I.Sh.E	**Dec. 18**	11:21	I.Tr.I
	10:37	IV.Tr.E		20:12	I.Ec.R		7:41	II.Tr.I		11:31	I.Sh.I
	12:53	IV.Sh.I	**Dec. 9**	14:50	I.Tr.I		8:12	II.Sh.I		13:35	I.Tr.E
	13:20	II.Ec.R		15:08	I.Sh.I		10:20	II.Tr.E		13:45	I.Sh.E
	14:31	IV.Sh.E		17:03	I.Tr.E		10:51	II.Sh.E		15:33	II.Oc.D
	15:47	III.Oc.D		17:22	I.Sh.E	**Dec. 14**	1:09	I.Oc.D		18:29	II.Ec.R
	20:13	III.Ec.R		18:15	II.Tr.I		3:38	I.Ec.R	**Dec. 19**	0:43	III.Oc.D

	4:12	III.Ec.R
	8:40	I.Oc.D
	11:04	I.Ec.R
Dec. 20	5:52	I.Tr.I
	6:00	I.Sh.I
	8:06	I.Tr.E
	8:13	I.Sh.E
	10:33	II.Tr.I
	10:49	II.Sh.I
	13:12	II.Tr.E
	13:28	II.Sh.E
Dec. 21	3:11	I.Oc.D
	5:33	I.Ec.R
	5:42	IV.Tr.I
	6:48	IV.Sh.I
	7:41	IV.Tr.E
	8:45	IV.Sh.E
Dec. 22	0:22	I.Tr.I
	0:28	I.Sh.I
	2:36	I.Tr.E
	2:42	I.Sh.E
	4:57	II.Oc.D
	7:47	II.Ec.R
	14:46	III.Tr.I
	15:08	III.Sh.I
	17:39	III.Tr.E
	18:01	III.Sh.E
	21:41	I.Oc.D
Dec. 23	0:01	I.Ec.R
	18:52	I.Tr.I
	18:57	I.Sh.I
	21:07	I.Tr.E
	21:11	I.Sh.E
	23:58	II.Tr.I
Dec. 24	0:07	II.Sh.I
	2:38	II.Tr.E
	2:46	II.Sh.E
	16:12	I.Oc.D
	18:30	I.Ec.R
Dec. 25	13:23	I.Tr.I
	13:25	I.Sh.I
	15:37	I.Tr.E
	15:39	I.Sh.E
	18:22	II.Oc.D
	21:04	II.Ec.R
Dec. 26	5:13	III.Oc.D
	8:13	III.Ec.R
	10:42	I.Oc.D
	12:59	I.Ec.R
Dec. 27	7:53	I.Tr.I
	7:54	I.Sh.I
	10:07	I.Tr.E
	10:08	I.Sh.E
	13:25	II.Tr.I
	13:25	II.Sh.I
	16:05	II.Tr.E
	16:05	II.Sh.E
Dec. 28	5:12	I.Ec.D
	7:28	I.Oc.R
Dec. 29	2:22	I.Sh.I
	2:24	I.Tr.I
	4:36	I.Sh.E
	4:38	I.Tr.E
	7:43	II.Ec.D
	10:25	II.Oc.R
	17:35	IV.Ec.D
	19:07	III.Sh.I
	19:15	III.Tr.I
	20:07	IV.Oc.R
	22:00	III.Sh.E
	22:10	III.Tr.E
	23:41	I.Ec.D
Dec. 30	1:58	I.Oc.R
	20:51	I.Sh.I
	20:54	I.Tr.I
	23:05	I.Sh.E
	23:08	I.Tr.E
Dec. 31	2:43	II.Sh.I
	2:50	II.Tr.I
	5:23	II.Sh.E
	5:31	II.Tr.E
	18:10	I.Ec.D
	20:29	I.Oc.R