

2023

SKY GUIDE

**DIGITAL SUPPLEMENT
JOHANNESBURG, SOUTH AFRICA**

**Astronomical Handbook
for Southern Africa**

Table of contents

<i>page</i>	<i>contents</i>
01 – 08	Sun rise/set time, astronomical twilight, Moon rise/set time, Moon phases
09 – 14	Star charts for the planets
15 – 17	Galilean moons of Jupiter

Johannesburg

Date	Sun				Astron. Twilight		Moon					
2023	rise	culm.	set	con	ends	starts	rise	culm.	set	age	phase	con
Jan 01	05:16	12:09	19:03	Sgr	20:34	03:45	14:23	20:04	01:40	09	69.9	Ari
Jan 02	05:16	12:10	19:03	Sgr	20:34	03:46	15:20	20:50	02:17	10	78.7	Ari
Jan 03	05:17	12:10	19:03	Sgr	20:34	03:46	16:17	21:39	02:58	11	86.2	Tau
Jan 04	05:18	12:11	19:04	Sgr	20:34	03:47	17:14	22:29	03:43	12	92.1	Tau
Jan 05	05:18	12:11	19:04	Sgr	20:34	03:48	18:08	23:21	04:33	13	96.5	Tau
Jan 06	05:19	12:12	19:04	Sgr	20:34	03:49	18:08	--:--	04:33	14	99.0	Gem
Jan 07	05:20	12:12	19:04	Sgr	20:34	03:50	19:00	00:12	05:25	15	99.8	Gem
Jan 08	05:20	12:12	19:04	Sgr	20:34	03:51	19:47	01:02	06:20	16	98.9	Cnc
Jan 09	05:21	12:13	19:04	Sgr	20:34	03:52	20:29	01:50	07:15	17	96.2	Cnc
Jan 10	05:22	12:13	19:04	Sgr	20:34	03:52	21:06	02:36	08:10	18	91.8	Leo
Jan 11	05:23	12:14	19:04	Sgr	20:34	03:53	21:40	03:19	09:03	19	86.0	Leo
Jan 12	05:23	12:14	19:04	Sgr	20:33	03:54	22:11	04:01	09:56	20	78.8	Leo
Jan 13	05:24	12:14	19:04	Sgr	20:33	03:55	22:40	04:41	10:48	21	70.4	Vir
Jan 14	05:25	12:15	19:04	Sgr	20:33	03:56	23:09	05:23	11:42	22	61.1	Vir
Jan 15	05:26	12:15	19:04	Sgr	20:33	03:57	23:40	06:05	12:38	23	51.1	Vir
Jan 16	05:27	12:16	19:04	Sgr	20:32	03:58	00:13	06:51	13:37	24	40.7	Vir
Jan 17	05:27	12:16	19:04	Sgr	20:32	03:59	00:50	07:42	14:41	25	30.3	Lib
Jan 18	05:28	12:16	19:04	Sgr	20:32	04:00	01:34	08:38	15:48	26	20.6	Sco
Jan 19	05:29	12:17	19:04	Sgr	20:31	04:01	02:26	09:40	16:58	27	12.1	Oph
Jan 20	05:30	12:17	19:04	Sgr	20:31	04:02	03:27	10:46	18:05	28	05.4	Sgr
Jan 21	05:31	12:17	19:03	Cap	20:31	04:03	04:36	11:53	19:06	29	01.4	Sgr
Jan 22	05:31	12:17	19:03	Cap	20:30	04:04	05:49	12:57	19:59	01	00.2	Cap
Jan 23	05:32	12:18	19:03	Cap	20:30	04:05	07:02	13:57	20:45	02	02.2	Cap
Jan 24	05:33	12:18	19:03	Cap	20:29	04:06	08:11	14:51	21:24	03	07.0	Aqr
Jan 25	05:34	12:18	19:02	Cap	20:29	04:07	09:16	15:42	22:00	04	14.2	Aqr
Jan 26	05:35	12:18	19:02	Cap	20:28	04:08	10:18	16:29	22:33	05	23.1	Psc
Jan 27	05:35	12:19	19:02	Cap	20:27	04:09	11:18	17:15	23:06	06	33.1	Psc
Jan 28	05:36	12:19	19:01	Cap	20:27	04:10	12:16	18:01	23:40	07	43.5	Ari
Jan 29	05:37	12:19	19:01	Cap	20:26	04:11	13:14	18:47	00:17	08	53.8	Ari
Jan 30	05:38	12:19	19:00	Cap	20:25	04:12	14:12	19:36	00:56	09	63.7	Tau
Jan 31	05:38	12:19	19:00	Cap	20:25	04:13	15:09	20:25	01:40	10	72.8	Tau
Feb 01	05:39	12:19	18:59	Cap	20:24	04:14	16:04	21:17	02:29	11	80.9	Tau
Feb 02	05:40	12:20	18:59	Cap	20:23	04:15	16:56	22:08	03:20	12	87.7	Gem
Feb 03	05:41	12:20	18:58	Cap	20:23	04:16	17:44	22:58	04:15	13	93.2	Gem
Feb 04	05:41	12:20	18:58	Cap	20:22	04:17	18:28	23:47	05:10	14	97.1	Gem
Feb 05	05:42	12:20	18:57	Cap	20:21	04:18	19:06	00:32	06:05	15	99.3	Cnc
Feb 06	05:43	12:20	18:57	Cap	20:20	04:19	19:06	00:34	06:05	16	99.8	Leo
Feb 07	05:44	12:20	18:56	Cap	20:19	04:20	19:41	01:18	06:59	17	98.5	Leo
Feb 08	05:44	12:20	18:55	Cap	20:18	04:21	20:13	02:00	07:52	18	95.4	Leo
Feb 09	05:45	12:20	18:55	Cap	20:18	04:22	20:43	02:41	08:44	19	90.6	Vir
Feb 10	05:46	12:20	18:54	Cap	20:17	04:23	21:12	03:22	09:37	20	84.3	Vir
Feb 11	05:47	12:20	18:53	Cap	20:16	04:24	21:41	04:03	10:31	21	76.4	Vir
Feb 12	05:47	12:20	18:53	Cap	20:15	04:25	22:12	04:47	11:28	22	67.3	Vir
Feb 13	05:48	12:20	18:52	Cap	20:14	04:26	22:47	05:34	12:28	23	57.2	Lib
Feb 14	05:49	12:20	18:51	Cap	20:13	04:27	23:26	06:26	13:32	24	46.5	Lib
Feb 15	05:49	12:20	18:51	Cap	20:12	04:28	00:13	07:23	14:38	25	35.7	Sco
Feb 16	05:50	12:20	18:50	Cap	20:11	04:29	01:08	08:25	15:44	26	25.2	Sgr
Feb 17	05:51	12:20	18:49	Aqr	20:10	04:29	02:12	09:30	16:47	27	15.7	Sgr
Feb 18	05:51	12:20	18:48	Aqr	20:09	04:30	03:21	10:35	17:43	28	08.1	Sgr
Feb 19	05:52	12:20	18:47	Aqr	20:08	04:31	04:34	11:36	18:32	29	02.8	Cap
Feb 20	05:53	12:20	18:46	Aqr	20:07	04:32	05:45	12:34	19:15	30	00.3	Aqr

Date	Sun				Astron. Twilight		Moon					
2023	rise	culm.	set	con	ends	starts	rise	culm.	set	age	phase	con
Feb 21	05:53	12:20	18:46	Aqr	20:06	04:33	06:54	13:27	19:53	01	00.9	Aqr
Feb 22	05:54	12:20	18:45	Aqr	20:05	04:34	07:59	14:17	20:28	02	04.3	Aqr
Feb 23	05:55	12:19	18:44	Aqr	20:04	04:34	09:01	15:05	21:02	03	10.2	Cet
Feb 24	05:55	12:19	18:43	Aqr	20:03	04:35	10:02	15:53	21:37	04	18.0	Psc
Feb 25	05:56	12:19	18:42	Aqr	20:02	04:36	11:03	16:40	22:13	05	27.0	Ari
Feb 26	05:56	12:19	18:41	Aqr	20:01	04:37	12:02	17:29	22:53	06	36.8	Ari
Feb 27	05:57	12:19	18:40	Aqr	19:59	04:38	13:01	18:20	23:36	07	46.8	Tau
Feb 28	05:58	12:19	18:39	Aqr	19:58	04:38	13:58	19:11	00:23	08	56.6	Tau
Mar 01	05:58	12:18	18:38	Aqr	19:57	04:39	14:52	20:03	01:14	09	66.0	Tau
Mar 02	05:59	12:18	18:37	Aqr	19:56	04:40	15:42	20:54	02:08	10	74.6	Gem
Mar 03	05:59	12:18	18:36	Aqr	19:55	04:40	16:26	21:43	03:03	11	82.3	Gem
Mar 04	06:00	12:18	18:35	Aqr	19:54	04:41	17:06	22:30	03:58	12	88.9	Cnc
Mar 05	06:00	12:18	18:34	Aqr	19:53	04:42	17:42	23:15	04:53	13	94.0	Cnc
Mar 06	06:01	12:17	18:33	Aqr	19:52	04:43	18:15	23:58	05:47	14	97.7	Leo
Mar 07	06:02	12:17	18:32	Aqr	19:51	04:43	18:45	00:39	06:40	15	99.6	Leo
Mar 08	06:02	12:17	18:31	Aqr	19:49	04:44	18:45	00:40	06:40	16	99.7	Leo
Mar 09	06:03	12:17	18:30	Aqr	19:48	04:45	19:15	01:21	07:33	17	97.9	Vir
Mar 10	06:03	12:16	18:29	Aqr	19:47	04:45	19:44	02:03	08:27	18	94.1	Vir
Mar 11	06:04	12:16	18:28	Aqr	19:46	04:46	20:15	02:46	09:23	19	88.5	Vir
Mar 12	06:04	12:16	18:27	Aqr	19:45	04:46	20:48	03:32	10:22	20	81.1	Lib
Mar 13	06:05	12:16	18:26	Psc	19:44	04:47	21:25	04:22	11:24	21	72.2	Lib
Mar 14	06:05	12:15	18:25	Psc	19:43	04:48	22:09	05:16	12:29	22	62.1	Oph
Mar 15	06:06	12:15	18:24	Psc	19:41	04:48	22:59	06:15	13:33	23	51.1	Oph
Mar 16	06:06	12:15	18:23	Psc	19:40	04:49	23:58	07:17	14:35	24	39.9	Sgr
Mar 17	06:07	12:15	18:22	Psc	19:39	04:49	01:03	08:19	15:32	25	28.9	Sgr
Mar 18	06:07	12:14	18:21	Psc	19:38	04:50	02:13	09:20	16:22	26	18.9	Cap
Mar 19	06:08	12:14	18:20	Psc	19:37	04:50	03:23	10:18	17:06	27	10.5	Cap
Mar 20	06:08	12:14	18:19	Psc	19:36	04:51	04:31	11:12	17:45	28	04.4	Aqr
Mar 21	06:09	12:13	18:18	Psc	19:35	04:52	05:37	12:03	18:21	29	00.8	Aqr
Mar 22	06:09	12:13	18:17	Psc	19:34	04:52	06:41	12:52	18:56	01	00.2	Psc
Mar 23	06:10	12:13	18:15	Psc	19:32	04:53	07:43	13:40	19:31	02	02.2	Psc
Mar 24	06:10	12:12	18:14	Psc	19:31	04:53	08:45	14:29	20:07	03	06.7	Ari
Mar 25	06:11	12:12	18:13	Psc	19:30	04:54	09:47	15:19	20:46	04	13.2	Ari
Mar 26	06:11	12:12	18:12	Psc	19:29	04:54	10:48	16:10	21:28	05	21.1	Tau
Mar 27	06:12	12:12	18:11	Psc	19:28	04:55	11:47	17:02	22:15	06	30.0	Tau
Mar 28	06:12	12:11	18:10	Psc	19:27	04:55	12:44	17:55	23:06	07	39.5	Tau
Mar 29	06:13	12:11	18:09	Psc	19:26	04:56	13:36	18:47	23:59	08	49.1	Gem
Mar 30	06:13	12:11	18:08	Psc	19:25	04:56	14:23	19:37	00:54	09	58.6	Gem
Mar 31	06:13	12:10	18:07	Psc	19:24	04:57	15:05	20:25	01:50	10	67.7	Cnc
Apr 01	06:14	12:10	18:06	Psc	19:23	04:57	15:42	21:11	02:45	11	76.2	Cnc
Apr 02	06:14	12:10	18:05	Psc	19:22	04:58	16:15	21:54	03:39	12	83.7	Leo
Apr 03	06:15	12:09	18:04	Psc	19:20	04:58	16:46	22:36	04:32	13	90.2	Leo
Apr 04	06:15	12:09	18:03	Psc	19:19	04:58	17:16	23:18	05:26	14	95.2	Leo
Apr 05	06:16	12:09	18:02	Psc	19:18	04:59	17:45	00:00	06:20	15	98.5	Vir
Apr 06	06:16	12:09	18:01	Psc	19:17	04:59	17:45	00:00	06:20	16	99.9	Vir
Apr 07	06:17	12:08	18:00	Psc	19:16	05:00	18:16	00:43	07:16	17	99.3	Vir
Apr 08	06:17	12:08	17:58	Psc	19:15	05:00	18:49	01:29	08:15	18	96.5	Lib
Apr 09	06:18	12:08	17:57	Psc	19:14	05:01	19:25	02:18	09:17	19	91.5	Lib
Apr 10	06:18	12:07	17:56	Psc	19:13	05:01	20:07	03:12	10:22	20	84.5	Sco
Apr 11	06:19	12:07	17:55	Psc	19:12	05:02	20:56	04:10	11:27	21	75.8	Oph
Apr 12	06:19	12:07	17:54	Psc	19:12	05:02	21:52	05:10	12:29	22	65.6	Sgr
Apr 13	06:20	12:07	17:53	Psc	19:11	05:02	22:54	06:12	13:27	23	54.5	Sgr
Apr 14	06:20	12:06	17:52	Psc	19:10	05:03	00:01	07:12	14:18	24	43.1	Cap

Date	Sun				Astron. Twilight		Moon					
2023	rise	culm.	set	con	ends	starts	rise	culm.	set	age	phase	con
Apr 15	06:21	12:06	17:52	Psc	19:09	05:03	01:09	08:09	15:02	25	31.9	Cap
Apr 16	06:21	12:06	17:51	Psc	19:08	05:04	02:16	09:03	15:42	26	21.6	Aqr
Apr 17	06:21	12:06	17:50	Psc	19:07	05:04	03:21	09:53	16:18	27	12.8	Aqr
Apr 18	06:22	12:05	17:49	Psc	19:06	05:04	04:24	10:41	16:52	28	06.1	Psc
Apr 19	06:22	12:05	17:48	Psc	19:05	05:05	05:26	11:29	17:26	29	01.8	Psc
Apr 20	06:23	12:05	17:47	Ari	19:04	05:05	06:27	12:17	18:01	30	00.0	Psc
Apr 21	06:23	12:05	17:46	Ari	19:04	05:06	07:29	13:07	18:39	01	00.8	Ari
Apr 22	06:24	12:05	17:45	Ari	19:03	05:06	08:31	13:58	19:20	02	04.0	Ari
Apr 23	06:24	12:04	17:44	Ari	19:02	05:07	09:33	14:50	20:05	03	09.1	Tau
Apr 24	06:25	12:04	17:43	Ari	19:01	05:07	10:32	15:44	20:55	04	15.8	Tau
Apr 25	06:25	12:04	17:42	Ari	19:00	05:07	11:27	16:37	21:48	05	23.7	Gem
Apr 26	06:26	12:04	17:42	Ari	19:00	05:08	12:17	17:29	22:44	06	32.5	Gem
Apr 27	06:26	12:04	17:41	Ari	18:59	05:08	13:01	18:18	23:39	07	41.7	Gem
Apr 28	06:27	12:04	17:40	Ari	18:58	05:09	13:40	19:05	00:35	08	51.2	Cnc
Apr 29	06:27	12:03	17:39	Ari	18:57	05:09	14:14	19:49	01:29	09	60.6	Leo
Apr 30	06:28	12:03	17:38	Ari	18:57	05:09	14:46	20:31	02:22	10	69.7	Leo
May 01	06:28	12:03	17:38	Ari	18:56	05:10	15:16	21:13	03:15	11	78.1	Leo
May 02	06:29	12:03	17:37	Ari	18:55	05:10	15:45	21:54	04:09	12	85.7	Vir
May 03	06:30	12:03	17:36	Ari	18:55	05:11	16:15	22:37	05:05	13	91.9	Vir
May 04	06:30	12:03	17:35	Ari	18:54	05:11	16:47	23:22	06:04	14	96.6	Vir
May 05	06:31	12:03	17:35	Ari	18:54	05:12	16:47	--:--	06:04	15	99.4	Vir
May 06	06:31	12:03	17:34	Ari	18:53	05:12	17:22	00:11	07:06	16	99.9	Lib
May 07	06:32	12:03	17:33	Ari	18:52	05:12	18:03	01:04	08:11	17	98.0	Sco
May 08	06:32	12:03	17:33	Ari	18:52	05:13	18:50	02:02	09:17	18	93.7	Oph
May 09	06:33	12:02	17:32	Ari	18:51	05:13	19:45	03:03	10:23	19	87.0	Sgr
May 10	06:33	12:02	17:31	Ari	18:51	05:14	20:47	04:06	11:23	20	78.4	Sgr
May 11	06:34	12:02	17:31	Ari	18:50	05:14	21:54	05:07	12:16	21	68.2	Sgr
May 12	06:34	12:02	17:30	Ari	18:50	05:14	23:02	06:05	13:02	22	57.1	Cap
May 13	06:35	12:02	17:30	Ari	18:49	05:15	00:08	06:59	13:42	23	45.6	Aqr
May 14	06:35	12:02	17:29	Ari	18:49	05:15	01:13	07:49	14:18	24	34.4	Aqr
May 15	06:36	12:02	17:29	Tau	18:49	05:16	02:15	08:37	14:52	25	24.0	Aqr
May 16	06:36	12:02	17:28	Tau	18:48	05:16	03:15	09:23	15:25	26	15.1	Cet
May 17	06:37	12:02	17:28	Tau	18:48	05:17	04:15	10:10	15:59	27	08.1	Psc
May 18	06:37	12:02	17:27	Tau	18:48	05:17	05:15	10:58	16:35	28	03.1	Ari
May 19	06:38	12:02	17:27	Tau	18:47	05:17	06:17	11:47	17:14	29	00.5	Ari
May 20	06:39	12:02	17:26	Tau	18:47	05:18	07:18	12:39	17:57	01	00.2	Tau
May 21	06:39	12:03	17:26	Tau	18:47	05:18	08:18	13:33	18:45	02	02.0	Tau
May 22	06:40	12:03	17:25	Tau	18:46	05:19	09:16	14:27	19:38	03	05.8	Tau
May 23	06:40	12:03	17:25	Tau	18:46	05:19	10:08	15:20	20:33	04	11.3	Gem
May 24	06:41	12:03	17:25	Tau	18:46	05:20	10:55	16:11	21:29	05	18.1	Gem
May 25	06:41	12:03	17:24	Tau	18:46	05:20	11:36	16:58	22:24	06	26.1	Cnc
May 26	06:42	12:03	17:24	Tau	18:45	05:20	12:13	17:43	23:19	07	34.8	Cnc
May 27	06:42	12:03	17:24	Tau	18:45	05:21	12:45	18:26	00:12	08	44.0	Leo
May 28	06:43	12:03	17:24	Tau	18:45	05:21	13:15	19:07	01:05	09	53.6	Leo
May 29	06:43	12:03	17:23	Tau	18:45	05:22	13:44	19:48	01:58	10	63.1	Leo
May 30	06:44	12:03	17:23	Tau	18:45	05:22	14:13	20:29	02:52	11	72.3	Vir
May 31	06:44	12:04	17:23	Tau	18:45	05:22	14:44	21:13	03:48	12	80.8	Vir
Jun 01	06:45	12:04	17:23	Tau	18:45	05:23	15:17	22:00	04:49	13	88.3	Vir
Jun 02	06:45	12:04	17:23	Tau	18:44	05:23	15:56	22:51	05:53	14	94.2	Lib
Jun 03	06:45	12:04	17:22	Tau	18:44	05:24	16:40	23:48	07:01	15	98.2	Lib
Jun 04	06:46	12:04	17:22	Tau	18:44	05:24	17:33	00:47	08:08	16	99.9	Sco
Jun 05	06:46	12:04	17:22	Tau	18:44	05:24	17:33	00:50	08:08	17	98.9	Oph
Jun 06	06:47	12:05	17:22	Tau	18:44	05:25	18:34	01:54	09:13	18	95.2	Sgr

Date	Sun				Astron. Twilight		Moon					
2023	rise	culm.	set	con	ends	starts	rise	culm.	set	age	phase	con
Jun 07	06:47	12:05	17:22	Tau	18:44	05:25	19:41	02:58	10:10	19	88.9	Sgr
Jun 08	06:48	12:05	17:22	Tau	18:44	05:25	20:51	03:59	11:00	20	80.5	Cap
Jun 09	06:48	12:05	17:22	Tau	18:44	05:26	22:00	04:55	11:43	21	70.4	Cap
Jun 10	06:48	12:05	17:22	Tau	18:44	05:26	23:06	05:47	12:20	22	59.4	Aqr
Jun 11	06:49	12:05	17:22	Tau	18:45	05:26	00:09	06:35	12:54	23	48.0	Aqr
Jun 12	06:49	12:06	17:22	Tau	18:45	05:27	01:10	07:22	13:27	24	36.9	Psc
Jun 13	06:50	12:06	17:22	Tau	18:45	05:27	02:09	08:07	14:00	25	26.7	Psc
Jun 14	06:50	12:06	17:22	Tau	18:45	05:27	03:08	08:54	14:34	26	17.7	Ari
Jun 15	06:50	12:06	17:22	Tau	18:45	05:28	04:08	09:42	15:12	27	10.4	Ari
Jun 16	06:51	12:07	17:23	Tau	18:45	05:28	05:08	10:32	15:53	28	05.0	Tau
Jun 17	06:51	12:07	17:23	Tau	18:45	05:28	06:08	11:25	16:39	29	01.5	Tau
Jun 18	06:51	12:07	17:23	Tau	18:45	05:28	07:06	12:18	17:30	30	00.2	Tau
Jun 19	06:51	12:07	17:23	Tau	18:46	05:29	08:01	13:12	18:24	01	00.8	Gem
Jun 20	06:52	12:07	17:23	Tau	18:46	05:29	08:50	14:03	19:20	02	03.3	Gem
Jun 21	06:52	12:08	17:23	Tau	18:46	05:29	09:33	14:53	20:16	03	07.6	Cnc
Jun 22	06:52	12:08	17:24	Tau	18:46	05:29	10:11	15:39	21:10	04	13.4	Cnc
Jun 23	06:52	12:08	17:24	Gem	18:47	05:30	10:45	16:22	22:04	05	20.4	Leo
Jun 24	06:52	12:08	17:24	Gem	18:47	05:30	11:15	17:03	22:56	06	28.5	Leo
Jun 25	06:53	12:08	17:24	Gem	18:47	05:30	11:44	17:43	23:48	07	37.4	Leo
Jun 26	06:53	12:09	17:25	Gem	18:47	05:30	12:13	18:23	00:40	08	46.9	Vir
Jun 27	06:53	12:09	17:25	Gem	18:48	05:30	12:42	19:05	01:35	09	56.7	Vir
Jun 28	06:53	12:09	17:25	Gem	18:48	05:30	13:13	19:49	02:32	10	66.5	Vir
Jun 29	06:53	12:09	17:26	Gem	18:48	05:31	13:48	20:38	03:34	11	75.9	Vir
Jun 30	06:53	12:10	17:26	Gem	18:48	05:31	14:29	21:31	04:39	12	84.4	Lib
Jul 01	06:53	12:10	17:26	Gem	18:49	05:31	15:18	22:30	05:47	13	91.6	Sco
Jul 02	06:53	12:10	17:27	Gem	18:49	05:31	16:15	23:35	06:55	14	96.8	Oph
Jul 03	06:53	12:10	17:27	Gem	18:49	05:31	17:21	00:38	07:57	15	99.5	Sgr
Jul 04	06:53	12:10	17:27	Gem	18:50	05:31	17:21	00:41	07:57	16	99.4	Sgr
Jul 05	06:53	12:10	17:28	Gem	18:50	05:31	18:32	01:45	08:51	17	96.4	Cap
Jul 06	06:53	12:11	17:28	Gem	18:50	05:31	19:44	02:45	09:38	18	90.7	Cap
Jul 07	06:53	12:11	17:29	Gem	18:51	05:31	20:54	03:40	10:19	19	82.6	Aqr
Jul 08	06:53	12:11	17:29	Gem	18:51	05:31	22:00	04:31	10:55	20	72.8	Aqr
Jul 09	06:53	12:11	17:29	Gem	18:51	05:31	23:03	05:19	11:29	21	62.1	Psc
Jul 10	06:53	12:11	17:30	Gem	18:52	05:31	00:03	06:06	12:02	22	51.0	Psc
Jul 11	06:53	12:11	17:30	Gem	18:52	05:31	01:03	06:52	12:36	23	40.1	Ari
Jul 12	06:53	12:12	17:31	Gem	18:52	05:31	02:03	07:40	13:12	24	30.0	Ari
Jul 13	06:52	12:12	17:31	Gem	18:53	05:31	03:03	08:29	13:52	25	21.0	Tau
Jul 14	06:52	12:12	17:32	Gem	18:53	05:30	04:02	09:20	14:36	26	13.3	Tau
Jul 15	06:52	12:12	17:32	Gem	18:54	05:30	05:00	10:13	15:25	27	07.3	Tau
Jul 16	06:52	12:12	17:32	Gem	18:54	05:30	05:55	11:06	16:17	28	03.1	Gem
Jul 17	06:51	12:12	17:33	Gem	18:54	05:30	06:46	11:58	17:13	29	00.7	Gem
Jul 18	06:51	12:12	17:33	Gem	18:55	05:30	07:31	12:48	18:09	01	00.2	Cnc
Jul 19	06:51	12:12	17:34	Gem	18:55	05:30	08:10	13:35	19:04	02	01.6	Cnc
Jul 20	06:50	12:12	17:34	Gem	18:55	05:29	08:45	14:19	19:58	03	04.7	Leo
Jul 21	06:50	12:12	17:35	Gem	18:56	05:29	09:17	15:01	20:50	04	09.4	Leo
Jul 22	06:50	12:12	17:35	Cnc	18:56	05:29	09:46	15:41	21:41	05	15.5	Leo
Jul 23	06:49	12:12	17:36	Cnc	18:57	05:28	10:14	16:20	22:33	06	23.0	Vir
Jul 24	06:49	12:12	17:36	Cnc	18:57	05:28	10:42	17:01	23:25	07	31.5	Vir
Jul 25	06:48	12:13	17:37	Cnc	18:57	05:28	11:12	17:43	00:20	08	40.9	Vir
Jul 26	06:48	12:13	17:37	Cnc	18:58	05:27	11:44	18:28	01:19	09	50.9	Vir
Jul 27	06:47	12:13	17:38	Cnc	18:58	05:27	12:21	19:18	02:21	10	61.2	Lib
Jul 28	06:47	12:13	17:38	Cnc	18:59	05:27	13:05	20:13	03:26	11	71.3	Lib
Jul 29	06:46	12:12	17:39	Cnc	18:59	05:26	13:57	21:14	04:33	12	80.7	Sco

Date	Sun				Astron. Twilight		Moon					
2023	rise	culm.	set	con	ends	starts	rise	culm.	set	age	phase	con
Jul 30	06:46	12:12	17:39	Cnc	18:59	05:26	14:58	22:18	05:37	13	88.9	Sgr
Jul 31	06:45	12:12	17:40	Cnc	19:00	05:25	16:07	23:24	06:36	14	95.1	Sgr
Aug 01	06:45	12:12	17:40	Cnc	19:00	05:25	16:07	--:--	06:36	15	98.9	Sgr
Aug 02	06:44	12:12	17:41	Cnc	19:00	05:24	17:20	00:27	07:28	16	99.7	Cap
Aug 03	06:43	12:12	17:41	Cnc	19:01	05:24	18:33	01:27	08:12	17	97.5	Aqr
Aug 04	06:43	12:12	17:42	Cnc	19:01	05:23	19:43	02:21	08:51	18	92.5	Aqr
Aug 05	06:42	12:12	17:42	Cnc	19:02	05:23	20:49	03:12	09:27	19	85.0	Psc
Aug 06	06:41	12:12	17:43	Cnc	19:02	05:22	21:53	04:00	10:01	20	75.8	Psc
Aug 07	06:41	12:12	17:43	Cnc	19:02	05:22	22:54	04:48	10:36	21	65.5	Psc
Aug 08	06:40	12:12	17:44	Cnc	19:03	05:21	23:56	05:36	11:12	22	54.8	Ari
Aug 09	06:39	12:12	17:44	Cnc	19:03	05:20	00:57	06:26	11:51	23	44.2	Ari
Aug 10	06:39	12:11	17:45	Cnc	19:03	05:20	01:57	07:17	12:34	24	34.2	Tau
Aug 11	06:38	12:11	17:45	Cnc	19:04	05:19	02:56	08:09	13:21	25	25.0	Tau
Aug 12	06:37	12:11	17:46	Leo	19:04	05:18	03:52	09:02	14:13	26	17.0	Gem
Aug 13	06:36	12:11	17:46	Leo	19:05	05:18	04:43	09:55	15:07	27	10.4	Gem
Aug 14	06:35	12:11	17:46	Leo	19:05	05:17	05:30	10:45	16:03	28	05.4	Gem
Aug 15	06:35	12:11	17:47	Leo	19:05	05:16	06:10	11:33	16:59	29	02.0	Cnc
Aug 16	06:34	12:10	17:47	Leo	19:06	05:15	06:46	12:17	17:53	30	00.3	Leo
Aug 17	06:33	12:10	17:48	Leo	19:06	05:15	07:19	13:00	18:46	01	00.5	Leo
Aug 18	06:32	12:10	17:48	Leo	19:06	05:14	07:49	13:40	19:37	02	02.4	Leo
Aug 19	06:31	12:10	17:49	Leo	19:07	05:13	08:17	14:20	20:29	03	06.1	Vir
Aug 20	06:30	12:10	17:49	Leo	19:07	05:12	08:45	14:59	21:20	04	11.4	Vir
Aug 21	06:29	12:09	17:50	Leo	19:07	05:11	09:13	15:40	22:14	05	18.2	Vir
Aug 22	06:28	12:09	17:50	Leo	19:08	05:11	09:44	16:23	23:10	06	26.3	Vir
Aug 23	06:27	12:09	17:50	Leo	19:08	05:10	10:18	17:10	00:09	07	35.6	Lib
Aug 24	06:26	12:09	17:51	Leo	19:08	05:09	10:58	18:02	01:11	08	45.8	Lib
Aug 25	06:25	12:08	17:51	Leo	19:09	05:08	11:45	18:58	02:16	09	56.4	Sco
Aug 26	06:25	12:08	17:52	Leo	19:09	05:07	12:40	20:00	03:20	10	67.0	Oph
Aug 27	06:24	12:08	17:52	Leo	19:10	05:06	13:44	21:03	04:20	11	77.2	Sgr
Aug 28	06:23	12:07	17:53	Leo	19:10	05:05	14:54	22:07	05:14	12	86.2	Sgr
Aug 29	06:22	12:07	17:53	Leo	19:10	05:04	16:06	23:07	06:01	13	93.4	Cap
Aug 30	06:21	12:07	17:53	Leo	19:11	05:03	16:06	--:--	06:01	14	98.1	Cap
Aug 31	06:19	12:06	17:54	Leo	19:11	05:02	17:18	00:05	06:43	15	99.9	Aqr
Sep 01	06:18	12:06	17:54	Leo	19:11	05:01	18:27	00:58	07:21	16	98.6	Aqr
Sep 02	06:17	12:06	17:55	Leo	19:12	05:00	19:34	01:49	07:56	17	94.5	Psc
Sep 03	06:16	12:06	17:55	Leo	19:12	04:59	20:38	02:39	08:32	18	87.9	Psc
Sep 04	06:15	12:05	17:55	Leo	19:12	04:58	21:42	03:28	09:08	19	79.5	Ari
Sep 05	06:14	12:05	17:56	Leo	19:13	04:57	22:45	04:19	09:47	20	69.9	Ari
Sep 06	06:13	12:05	17:56	Leo	19:13	04:56	23:47	05:10	10:30	21	59.7	Tau
Sep 07	06:12	12:04	17:57	Leo	19:14	04:55	00:49	06:04	11:17	22	49.4	Tau
Sep 08	06:11	12:04	17:57	Leo	19:14	04:54	01:47	06:57	12:08	23	39.5	Tau
Sep 09	06:10	12:04	17:58	Leo	19:14	04:53	02:40	07:50	13:02	24	30.2	Gem
Sep 10	06:09	12:03	17:58	Leo	19:15	04:52	03:28	08:42	13:57	25	21.8	Gem
Sep 11	06:08	12:03	17:58	Leo	19:15	04:51	04:11	09:30	14:53	26	14.5	Cnc
Sep 12	06:07	12:02	17:59	Leo	19:16	04:50	04:48	10:16	15:48	27	08.5	Cnc
Sep 13	06:05	12:02	17:59	Leo	19:16	04:49	05:21	10:59	16:41	28	04.0	Leo
Sep 14	06:04	12:02	18:00	Leo	19:16	04:48	05:52	11:40	17:33	29	01.2	Leo
Sep 15	06:03	12:01	18:00	Leo	19:17	04:46	06:20	12:20	18:25	30	00.1	Leo
Sep 16	06:02	12:01	18:00	Leo	19:17	04:45	06:48	12:59	19:17	01	00.8	Vir
Sep 17	06:01	12:01	18:01	Leo	19:18	04:44	07:16	13:40	20:10	02	03.5	Vir
Sep 18	06:00	12:00	18:01	Vir	19:18	04:43	07:46	14:22	21:05	03	07.9	Vir
Sep 19	05:59	12:00	18:02	Vir	19:19	04:42	08:19	15:08	22:02	04	14.1	Lib
Sep 20	05:58	12:00	18:02	Vir	19:19	04:41	08:57	15:57	23:03	05	21.9	Lib

Date	Sun				Astron. Twilight		Moon					
2023	rise	culm.	set	con	ends	starts	rise	culm.	set	age	phase	con
Sep 21	05:57	11:59	18:02	Vir	19:19	04:40	09:40	16:51	00:06	06	31.1	Sco
Sep 22	05:55	11:59	18:03	Vir	19:20	04:38	10:31	17:49	01:09	07	41.3	Oph
Sep 23	05:54	11:59	18:03	Vir	19:20	04:37	11:30	18:50	02:08	08	52.2	Sgr
Sep 24	05:53	11:58	18:04	Vir	19:21	04:36	12:35	19:51	03:03	09	63.3	Sgr
Sep 25	05:52	11:58	18:04	Vir	19:21	04:35	13:45	20:51	03:51	10	73.9	Cap
Sep 26	05:51	11:58	18:04	Vir	19:22	04:34	14:55	21:48	04:34	11	83.6	Cap
Sep 27	05:50	11:57	18:05	Vir	19:22	04:33	16:03	22:42	05:13	12	91.5	Aqr
Sep 28	05:49	11:57	18:05	Vir	19:23	04:31	17:11	23:34	05:49	13	97.0	Aqr
Sep 29	05:48	11:57	18:06	Vir	19:23	04:30	17:11	--:--	05:49	14	99.7	Psc
Sep 30	05:47	11:56	18:06	Vir	19:24	04:29	18:16	00:24	06:25	15	99.5	Psc
Oct 01	05:45	11:56	18:07	Vir	19:24	04:28	19:21	01:15	07:01	16	96.5	Ari
Oct 02	05:44	11:56	18:07	Vir	19:25	04:27	20:26	02:06	07:40	17	91.1	Ari
Oct 03	05:43	11:55	18:08	Vir	19:25	04:26	21:31	02:59	08:22	18	83.7	Tau
Oct 04	05:42	11:55	18:08	Vir	19:26	04:24	22:35	03:53	09:08	19	75.1	Tau
Oct 05	05:41	11:55	18:08	Vir	19:27	04:23	23:36	04:48	09:59	20	65.6	Tau
Oct 06	05:40	11:54	18:09	Vir	19:27	04:22	00:33	05:43	10:53	21	55.8	Aur
Oct 07	05:39	11:54	18:09	Vir	19:28	04:21	01:24	06:36	11:49	22	46.0	Gem
Oct 08	05:38	11:54	18:10	Vir	19:28	04:20	02:09	07:26	12:46	23	36.5	Cnc
Oct 09	05:37	11:53	18:10	Vir	19:29	04:18	02:48	08:12	13:41	24	27.7	Cnc
Oct 10	05:36	11:53	18:11	Vir	19:30	04:17	03:23	08:56	14:35	25	19.7	Leo
Oct 11	05:35	11:53	18:11	Vir	19:30	04:16	03:54	09:38	15:27	26	12.7	Leo
Oct 12	05:34	11:53	18:12	Vir	19:31	04:15	04:23	10:18	16:19	27	07.1	Leo
Oct 13	05:33	11:52	18:12	Vir	19:31	04:14	04:51	10:58	17:11	28	02.9	Vir
Oct 14	05:32	11:52	18:13	Vir	19:32	04:13	05:19	11:38	18:04	29	00.6	Vir
Oct 15	05:31	11:52	18:13	Vir	19:33	04:12	05:49	12:21	18:59	01	00.1	Vir
Oct 16	05:30	11:52	18:14	Vir	19:34	04:10	06:21	13:05	19:57	02	01.6	Vir
Oct 17	05:29	11:51	18:15	Vir	19:34	04:09	06:57	13:54	20:57	03	05.2	Lib
Oct 18	05:28	11:51	18:15	Vir	19:35	04:08	07:39	14:47	22:00	04	10.7	Sco
Oct 19	05:27	11:51	18:16	Vir	19:36	04:07	08:27	15:43	23:02	05	18.1	Oph
Oct 20	05:26	11:51	18:16	Vir	19:36	04:06	09:23	16:43	00:02	06	27.1	Sgr
Oct 21	05:25	11:51	18:17	Vir	19:37	04:05	10:26	17:43	00:58	07	37.4	Sgr
Oct 22	05:24	11:51	18:17	Vir	19:38	04:04	11:32	18:42	01:47	08	48.5	Sgr
Oct 23	05:23	11:50	18:18	Vir	19:39	04:03	12:40	19:38	02:30	09	59.8	Cap
Oct 24	05:22	11:50	18:18	Vir	19:39	04:02	13:47	20:31	03:09	10	70.8	Cap
Oct 25	05:22	11:50	18:19	Vir	19:40	04:01	14:52	21:22	03:44	11	80.8	Aqr
Oct 26	05:21	11:50	18:20	Vir	19:41	04:00	15:56	22:11	04:19	12	89.2	Aqr
Oct 27	05:20	11:50	18:20	Vir	19:42	03:59	17:00	23:01	04:54	13	95.4	Cet
Oct 28	05:19	11:50	18:21	Vir	19:43	03:58	18:05	23:51	05:31	14	99.0	Psc
Oct 29	05:18	11:50	18:22	Vir	19:44	03:57	19:10	00:42	06:12	15	100.0	Ari
Oct 30	05:18	11:50	18:22	Vir	19:44	03:56	19:10	00:44	06:12	16	98.3	Ari
Oct 31	05:17	11:50	18:23	Vir	19:45	03:55	20:16	01:39	06:57	17	94.2	Tau
Nov 01	05:16	11:50	18:23	Lib	19:46	03:54	21:20	02:35	07:47	18	88.2	Tau
Nov 02	05:15	11:50	18:24	Lib	19:47	03:53	22:20	03:31	08:41	19	80.7	Aur
Nov 03	05:15	11:50	18:25	Lib	19:48	03:52	23:15	04:26	09:38	20	72.2	Gem
Nov 04	05:14	11:50	18:25	Lib	19:49	03:51	00:03	05:18	10:35	21	63.0	Gem
Nov 05	05:13	11:50	18:26	Lib	19:50	03:50	00:45	06:06	11:32	22	53.6	Cnc
Nov 06	05:13	11:50	18:27	Lib	19:51	03:49	01:22	06:52	12:26	23	44.1	Leo
Nov 07	05:12	11:50	18:28	Lib	19:52	03:48	01:54	07:34	13:19	24	34.9	Leo
Nov 08	05:11	11:50	18:28	Lib	19:52	03:47	02:24	08:15	14:11	25	26.2	Leo
Nov 09	05:11	11:50	18:29	Lib	19:53	03:47	02:52	08:54	15:03	26	18.2	Vir
Nov 10	05:10	11:50	18:30	Lib	19:54	03:46	03:20	09:34	15:55	27	11.4	Vir
Nov 11	05:10	11:50	18:30	Lib	19:55	03:45	03:49	10:16	16:50	28	05.9	Vir
Nov 12	05:09	11:50	18:31	Lib	19:56	03:44	04:20	11:00	17:47	29	02.1	Vir

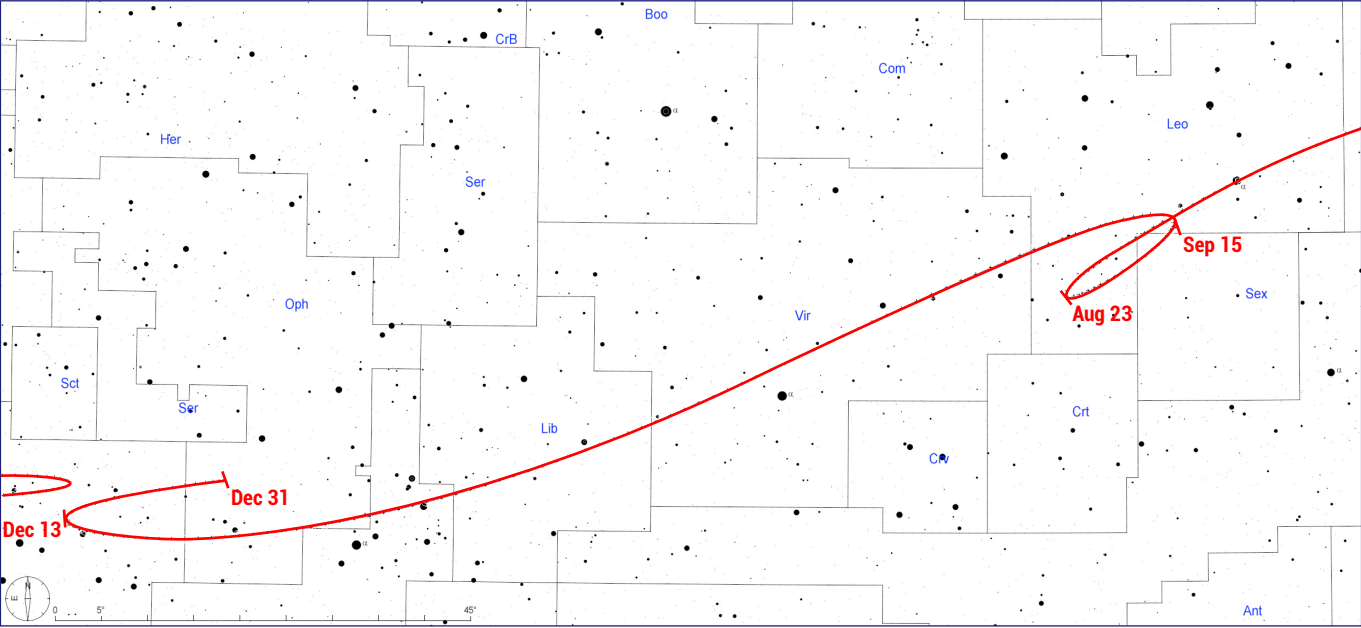
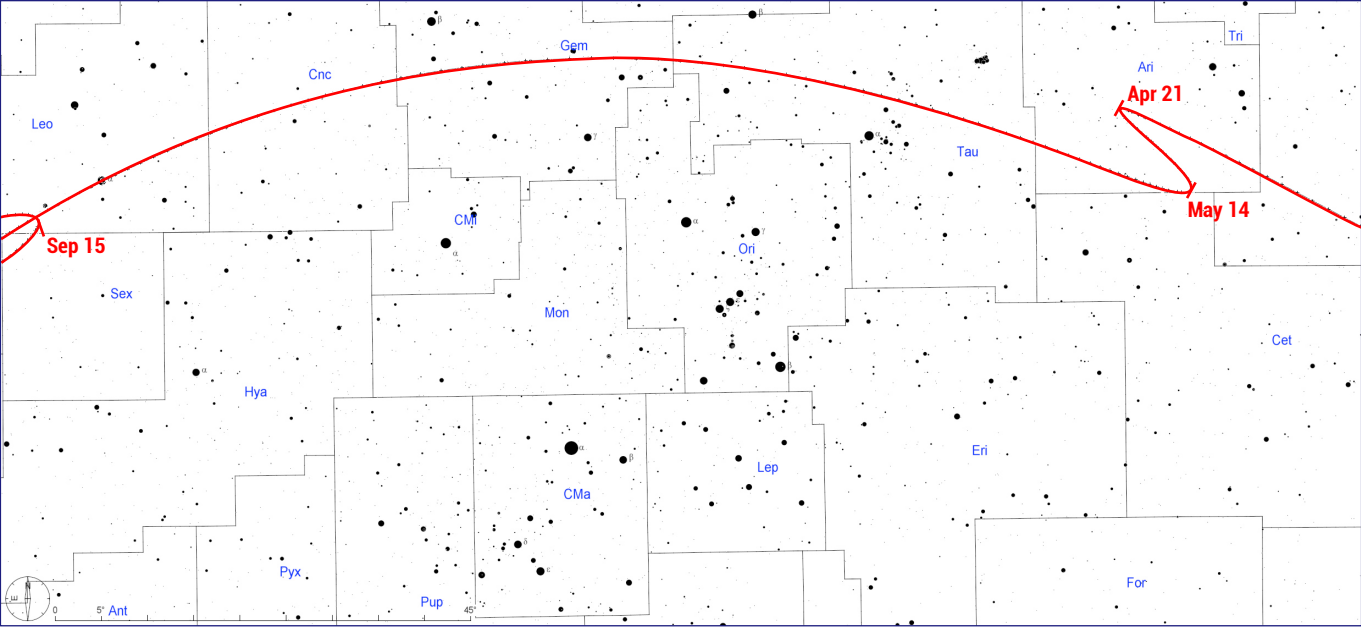
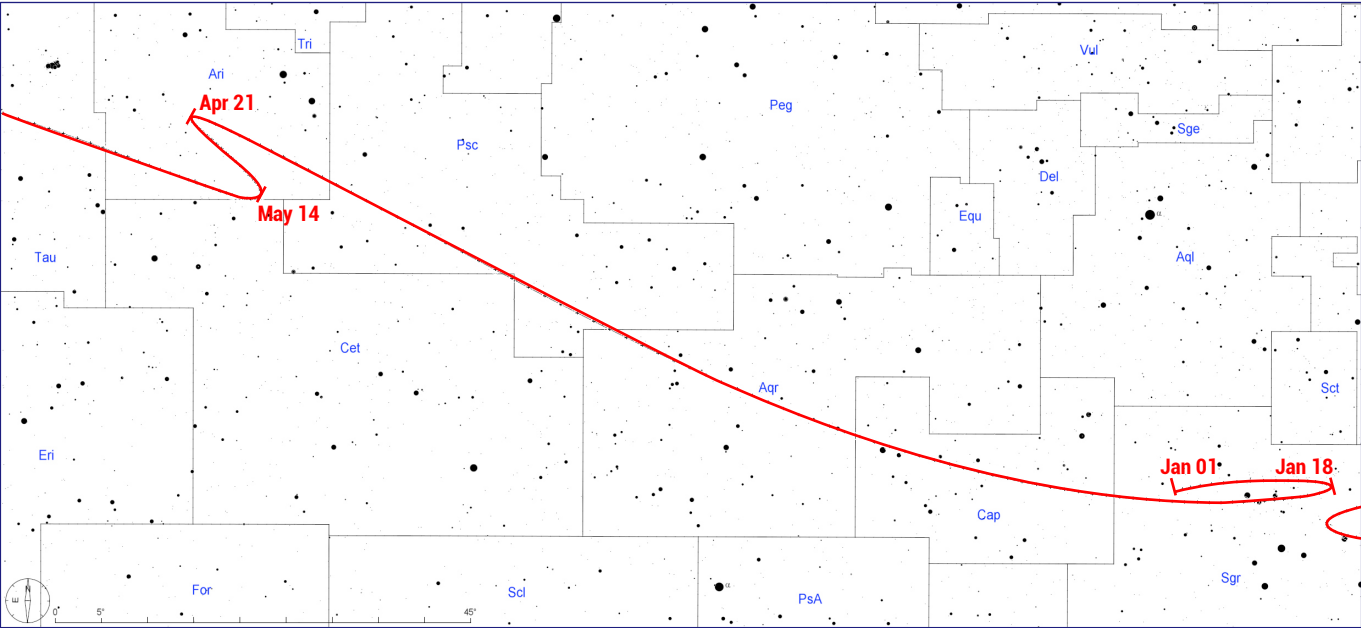
Date	Sun				Astron. Twilight		Moon					
2023	rise	culm.	set	con	ends	starts	rise	culm.	set	age	phase	con
Nov 13	05:09	11:50	18:32	Lib	19:57	03:44	04:55	11:48	18:47	30	00.2	Lib
Nov 14	05:08	11:50	18:33	Lib	19:58	03:43	05:36	12:40	19:50	01	00.5	Lib
Nov 15	05:08	11:50	18:33	Lib	19:59	03:42	06:23	13:37	20:54	02	03.0	Sco
Nov 16	05:07	11:51	18:34	Lib	20:00	03:42	07:18	14:37	21:57	03	07.9	Oph
Nov 17	05:07	11:51	18:35	Lib	20:01	03:41	08:19	15:38	22:54	04	14.8	Sgr
Nov 18	05:07	11:51	18:36	Lib	20:02	03:40	09:25	16:37	23:45	05	23.6	Sgr
Nov 19	05:06	11:51	18:36	Lib	20:03	03:40	10:32	17:34	00:29	06	33.9	Cap
Nov 20	05:06	11:51	18:37	Lib	20:04	03:39	11:38	18:27	01:08	07	45.0	Cap
Nov 21	05:06	11:52	18:38	Lib	20:05	03:39	12:42	19:17	01:44	08	56.4	Aqr
Nov 22	05:06	11:52	18:39	Lib	20:06	03:38	13:45	20:05	02:18	09	67.5	Aqr
Nov 23	05:05	11:52	18:39	Lib	20:07	03:38	14:47	20:53	02:52	10	77.7	Psc
Nov 24	05:05	11:52	18:40	Sco	20:08	03:37	15:49	21:41	03:27	11	86.4	Psc
Nov 25	05:05	11:53	18:41	Sco	20:09	03:37	16:52	22:31	04:05	12	93.2	Ari
Nov 26	05:05	11:53	18:42	Sco	20:10	03:37	17:57	23:24	04:47	13	97.7	Ari
Nov 27	05:05	11:53	18:42	Sco	20:11	03:36	17:57	--:--	04:47	14	99.8	Tau
Nov 28	05:04	11:54	18:43	Sco	20:12	03:36	19:01	00:20	05:35	15	99.4	Tau
Nov 29	05:04	11:54	18:44	Sco	20:13	03:36	20:04	01:17	06:28	16	96.9	Tau
Nov 30	05:04	11:54	18:45	Sco	20:14	03:36	21:02	02:13	07:24	17	92.4	Gem
Dec 01	05:04	11:55	18:45	Oph	20:15	03:35	21:54	03:07	08:22	18	86.3	Gem
Dec 02	05:04	11:55	18:46	Oph	20:15	03:35	22:39	03:58	09:20	19	79.0	Cnc
Dec 03	05:04	11:56	18:47	Oph	20:16	03:35	23:19	04:45	10:16	20	70.7	Cnc
Dec 04	05:04	11:56	18:48	Oph	20:17	03:35	23:53	05:29	11:10	21	61.7	Leo
Dec 05	05:04	11:56	18:48	Oph	20:18	03:35	00:23	06:10	12:02	22	52.4	Leo
Dec 06	05:05	11:57	18:49	Oph	20:19	03:35	00:52	06:50	12:53	23	43.0	Leo
Dec 07	05:05	11:57	18:50	Oph	20:20	03:35	01:20	07:29	13:44	24	33.8	Vir
Dec 08	05:05	11:58	18:50	Oph	20:21	03:35	01:48	08:09	14:37	25	25.0	Vir
Dec 09	05:05	11:58	18:51	Oph	20:21	03:35	02:18	08:52	15:33	26	16.9	Vir
Dec 10	05:05	11:58	18:52	Oph	20:22	03:35	02:51	09:38	16:32	27	10.1	Lib
Dec 11	05:05	11:59	18:52	Oph	20:23	03:35	03:29	10:29	17:34	28	04.7	Lib
Dec 12	05:06	11:59	18:53	Oph	20:24	03:35	04:14	11:24	18:39	29	01.3	Sco
Dec 13	05:06	12:00	18:54	Oph	20:25	03:35	05:06	12:24	19:44	01	00.1	Oph
Dec 14	05:06	12:00	18:54	Oph	20:25	03:36	06:07	13:27	20:45	02	01.5	Sgr
Dec 15	05:07	12:01	18:55	Oph	20:26	03:36	07:14	14:29	21:40	03	05.5	Sgr
Dec 16	05:07	12:01	18:56	Oph	20:27	03:36	08:23	15:28	22:27	04	11.8	Cap
Dec 17	05:07	12:02	18:56	Oph	20:27	03:36	09:31	16:23	23:09	05	20.3	Cap
Dec 18	05:08	12:02	18:57	Oph	20:28	03:37	10:36	17:15	23:46	06	30.3	Aqr
Dec 19	05:08	12:03	18:57	Sgr	20:28	03:37	11:39	18:03	00:20	07	41.3	Aqr
Dec 20	05:09	12:03	18:58	Sgr	20:29	03:38	12:40	18:50	00:53	08	52.6	Psc
Dec 21	05:09	12:04	18:58	Sgr	20:30	03:38	13:41	19:37	01:27	09	63.7	Psc
Dec 22	05:10	12:04	18:59	Sgr	20:30	03:38	14:43	20:25	02:03	10	74.0	Psc
Dec 23	05:10	12:05	18:59	Sgr	20:31	03:39	15:45	21:16	02:43	11	82.9	Ari
Dec 24	05:11	12:05	19:00	Sgr	20:31	03:39	16:48	22:09	03:27	12	90.2	Ari
Dec 25	05:11	12:06	19:00	Sgr	20:31	03:40	17:51	23:05	04:17	13	95.5	Tau
Dec 26	05:12	12:06	19:01	Sgr	20:32	03:41	17:51	--:--	04:17	14	98.7	Tau
Dec 27	05:12	12:07	19:01	Sgr	20:32	03:41	18:50	00:01	05:12	15	99.8	Aur
Dec 28	05:13	12:07	19:01	Sgr	20:32	03:42	19:45	00:57	06:10	16	98.8	Gem
Dec 29	05:13	12:08	19:02	Sgr	20:33	03:43	20:33	01:49	07:08	17	95.9	Cnc
Dec 30	05:14	12:08	19:02	Sgr	20:33	03:43	21:14	02:38	08:05	18	91.3	Cnc
Dec 31	05:15	12:09	19:03	Sgr	20:33	03:44	21:50	03:23	09:00	19	85.3	Leo

Column headings: Column 1 = Date. Columns 2-5 = local time of Sun rise, culmination, set; and constellation in which the Sun is located. Columns 6-7 = local time of the end and start of astronomical twilight. Columns 8-13 = local time of Moon rise, culmination, set; age of the Moon in days; phase of the Moon expressed as a percentage; and constellation in which the Moon is located.

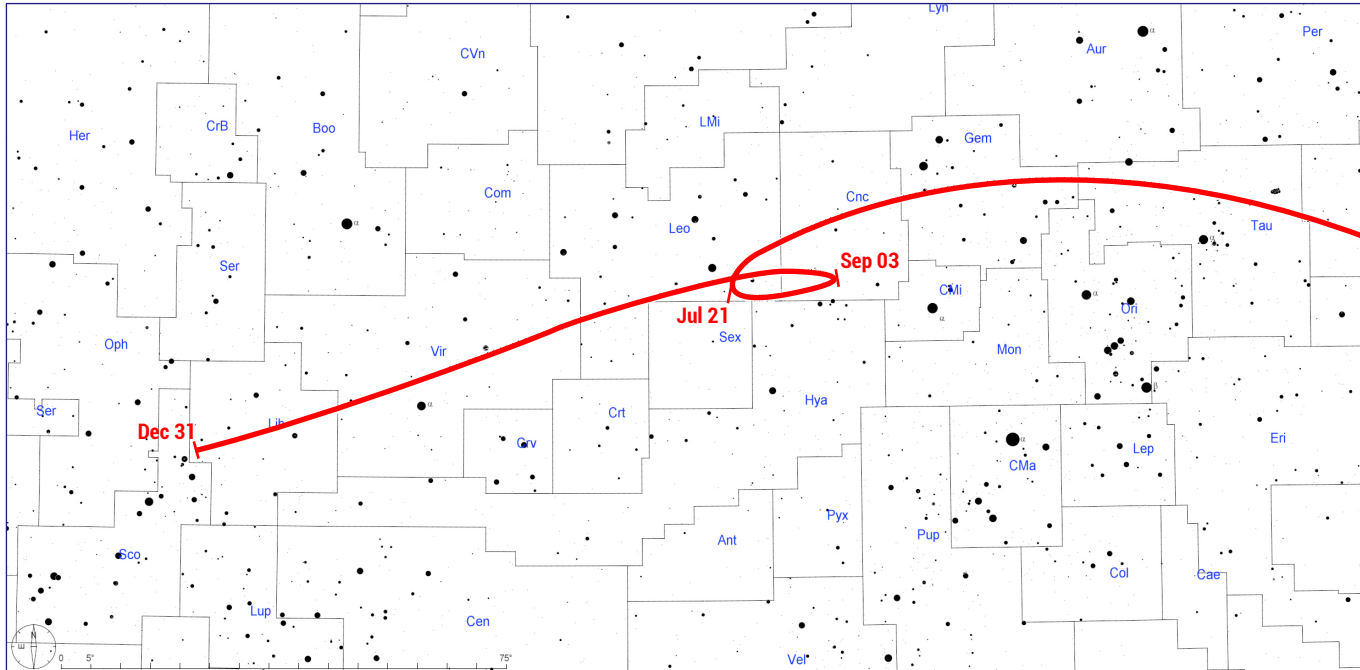
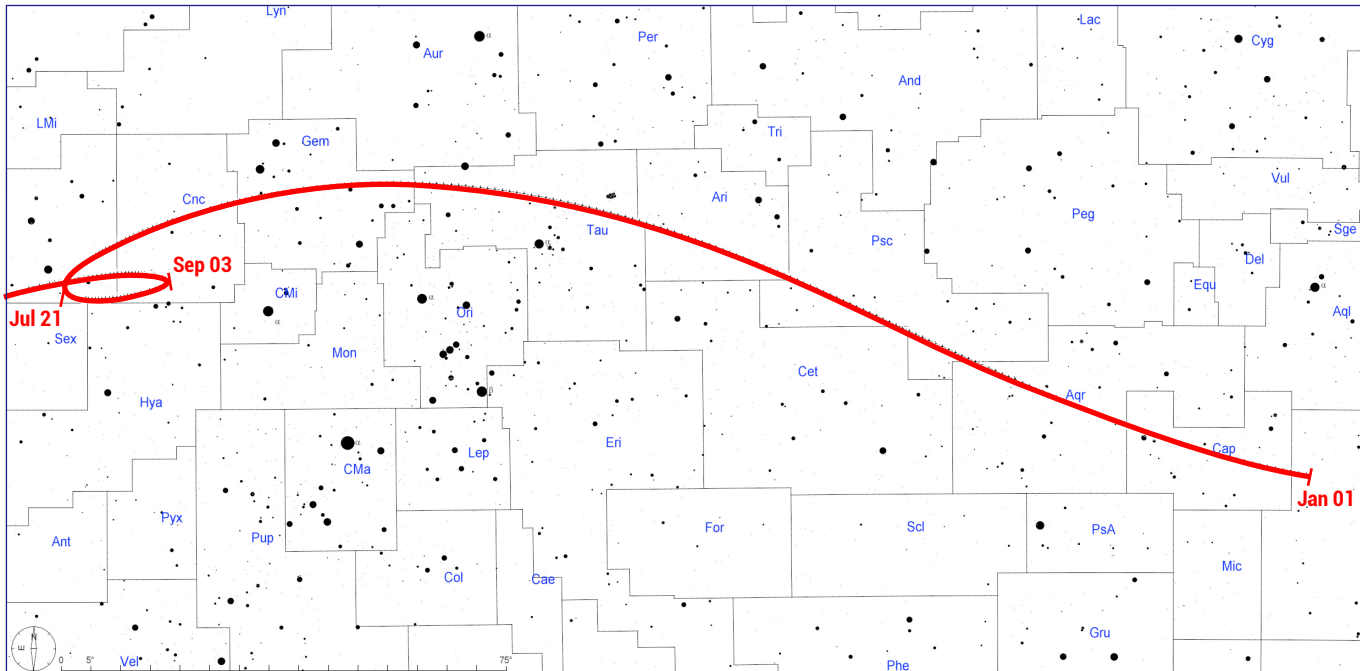
The Moon during 2023

Jan 07	Mantis Full Moon (01:10)	Jul 03	Meerkat Full SuperMoon (13:39)
Jan 15	Last Quarter Moon	Jul 10	Last Quarter Moon
Jan 21	New Moon (22:56)	Jul 17	New Moon (20:33)
Jan 28	First Quarter Moon	Jul 26	First Quarter Moon
Feb 05	Dassie Full Moon (20:31)	Aug 01	Peace Full Supermoon (20:32)
Feb 13	Last Quarter Moon	Aug 08	Last Quarter Moon
Feb 20	New Moon (09:09)	Aug 16	New Moon (11:39)
Feb 27	First Quarter Moon	Aug 24	First Quarter Moon
Mar 07	Harvest Full Moon (14:43)	Aug 31	Dusty Blue Full SuperMoon (03:35)
Mar 15	Last Quarter Moon	Sep 07	Last Quarter Moon
Mar 21	New Moon (19:27)	Sep 15	New Moon (03:40)
Mar 29	First Quarter Moon	Sep 22	First Quarter Moon
Apr 06	Diamond Full Moon (06:37)	Sep 29	Spring Full Moon (11:58)
Apr 13	Last Quarter Moon	Oct 06	Last Quarter Moon
Apr 20	New Moon (06:16, annular total eclipse)	Oct 14	New Moon (19:55, annular eclipse)
Apr 27	First Quarter Moon	Oct 22	First Quarter Moon
May 05	Frost Full Moon (19:37, eclipse)	Oct 28	Whale Full Moon (22:24, umbral eclipse)
May 12	Last Quarter Moon	Nov 05	Last Quarter Moon
May 19	New Moon (17:56)	Nov 13	New Moon (11:27)
May 27	First Quarter Moon	Nov 20	First Quarter Moon
Jun 04	Sisters Full Moon (05:44)	Nov 27	Milk Full Moon (11:17)
Jun 10	Last Quarter Moon	Dec 05	Last Quarter Moon
Jun 18	New Moon (06:39)	Dec 13	New Moon (01:32)
Jun 26	First Quarter Moon	Dec 19	First Quarter Moon
		Dec 27	Springbok Full Moon (02:34)

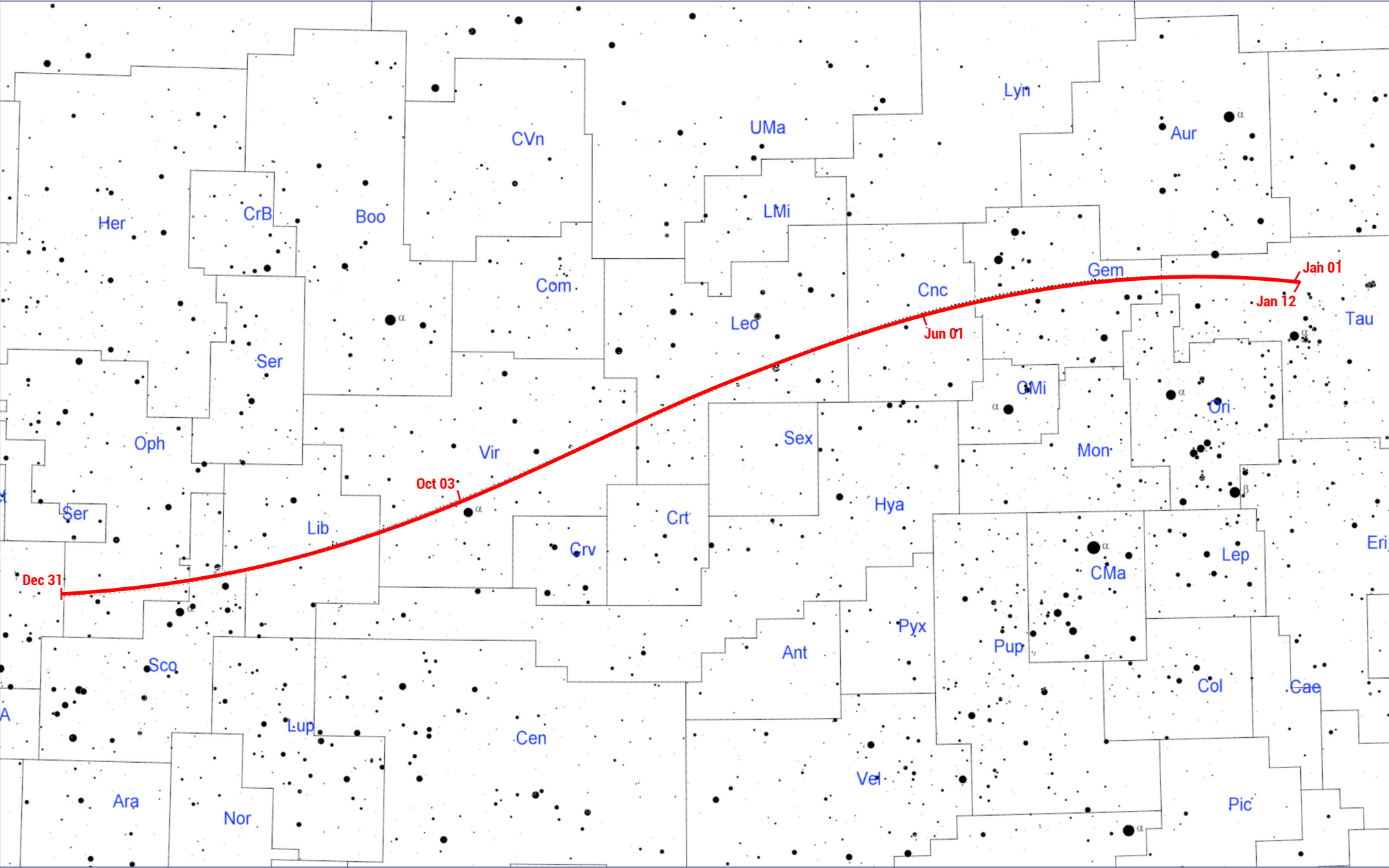
Path of Mercury during 2023



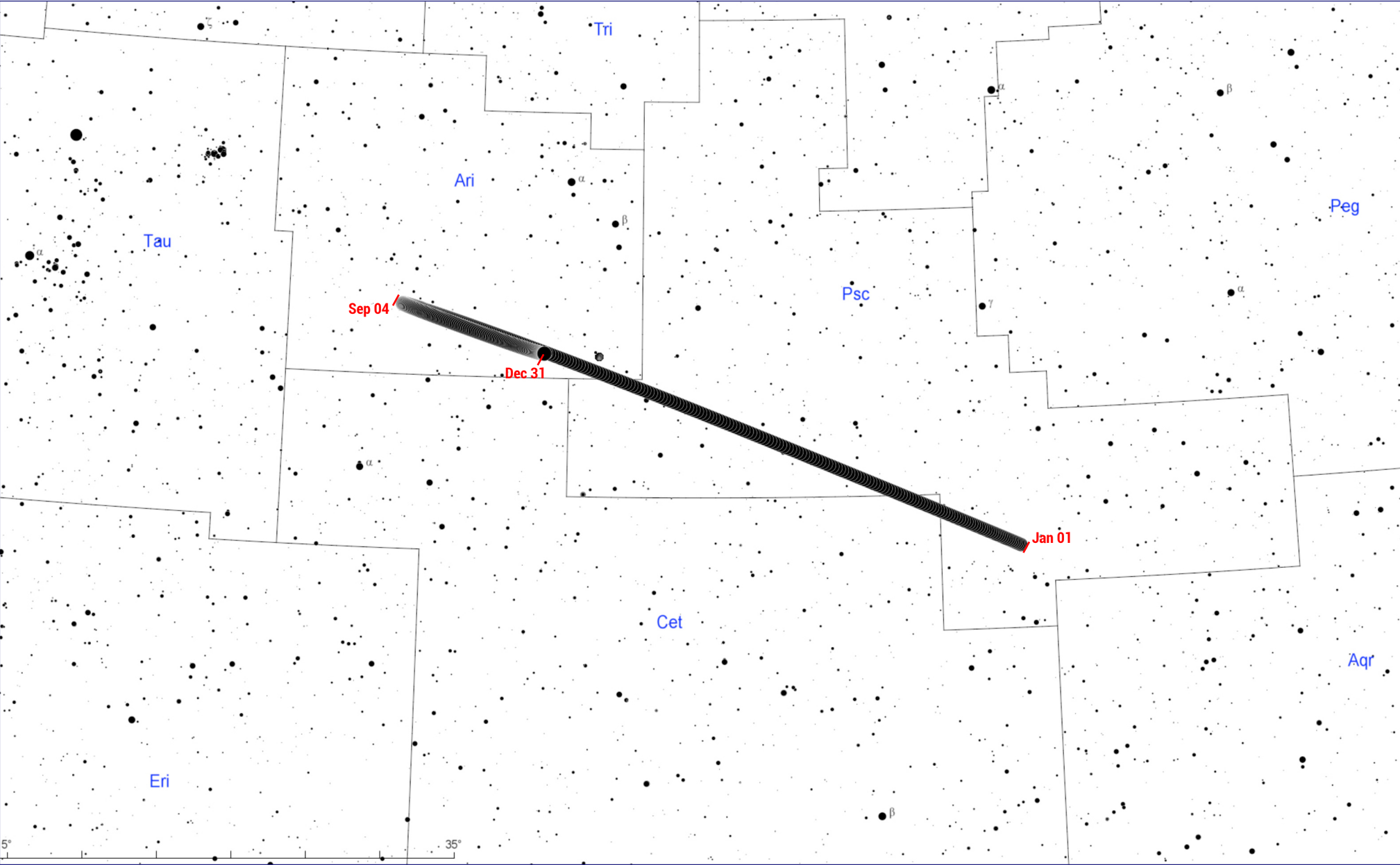
Path of Venus during 2023



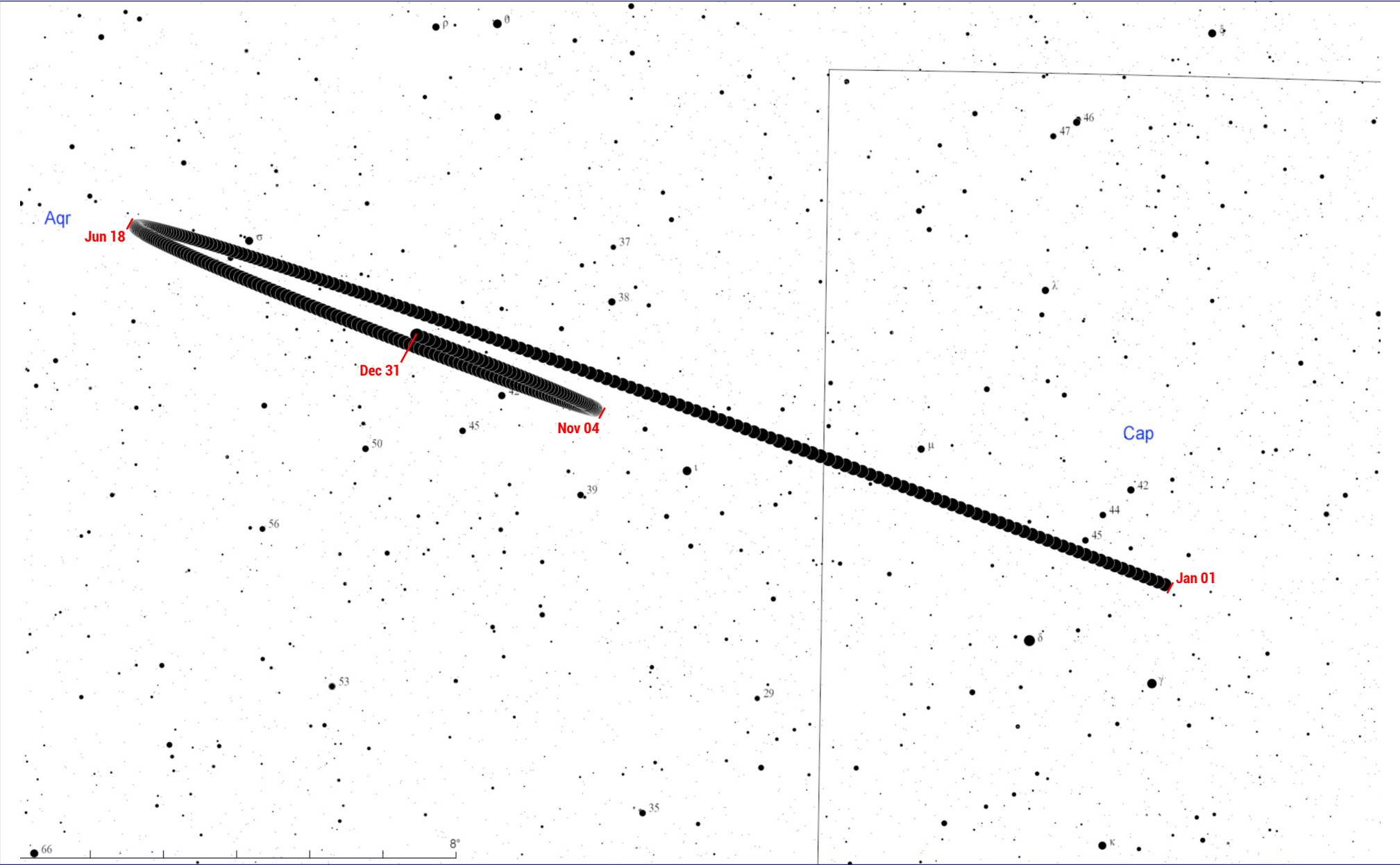
Path of Mars during 2023



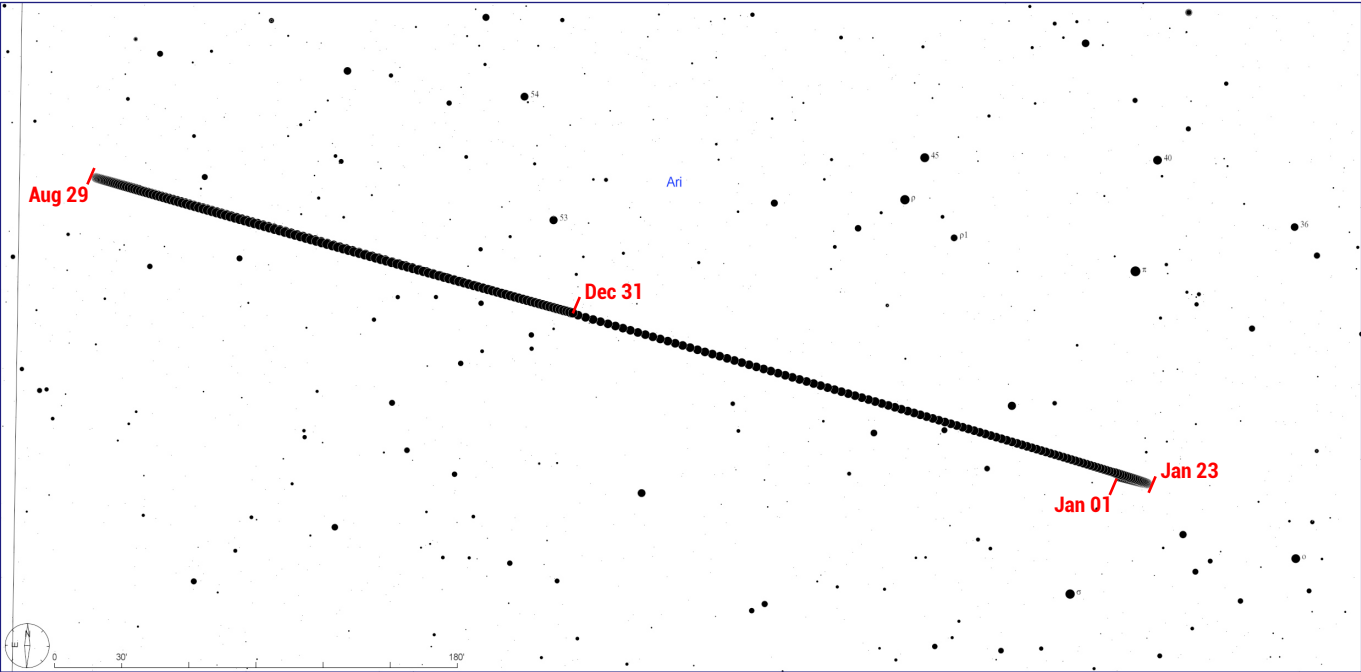
Path of Jupiter during 2023



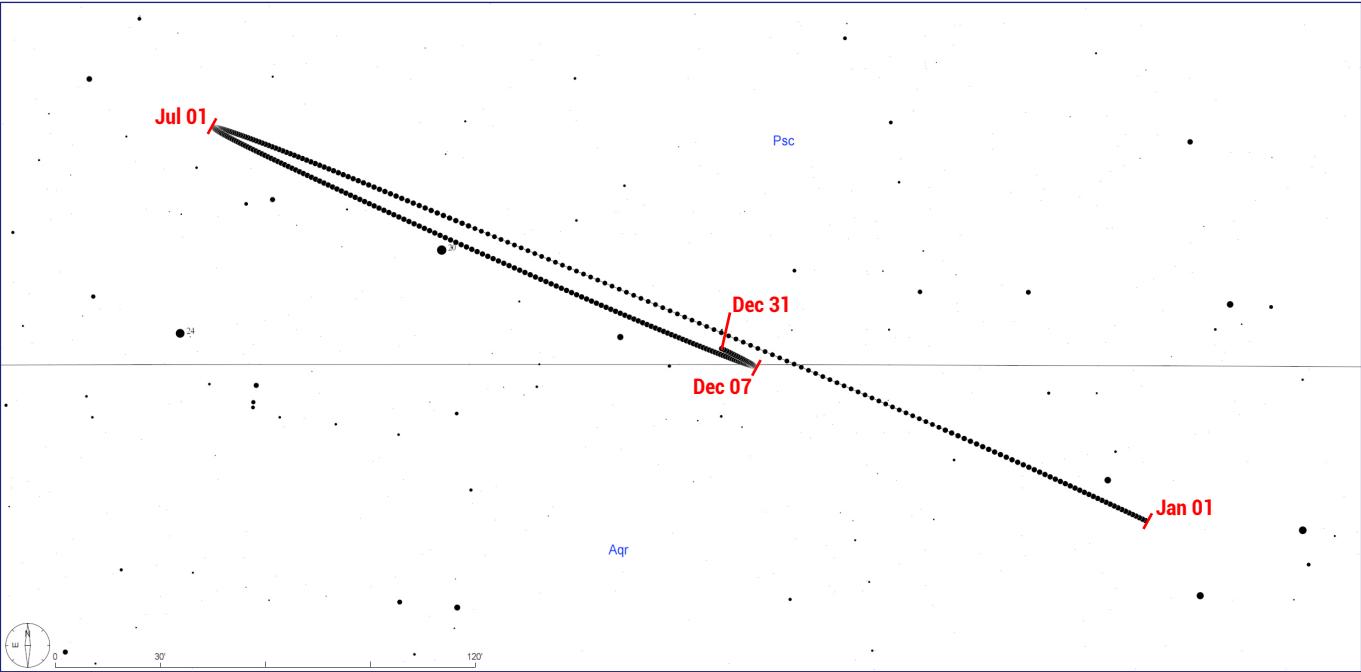
Path of Saturn during 2023



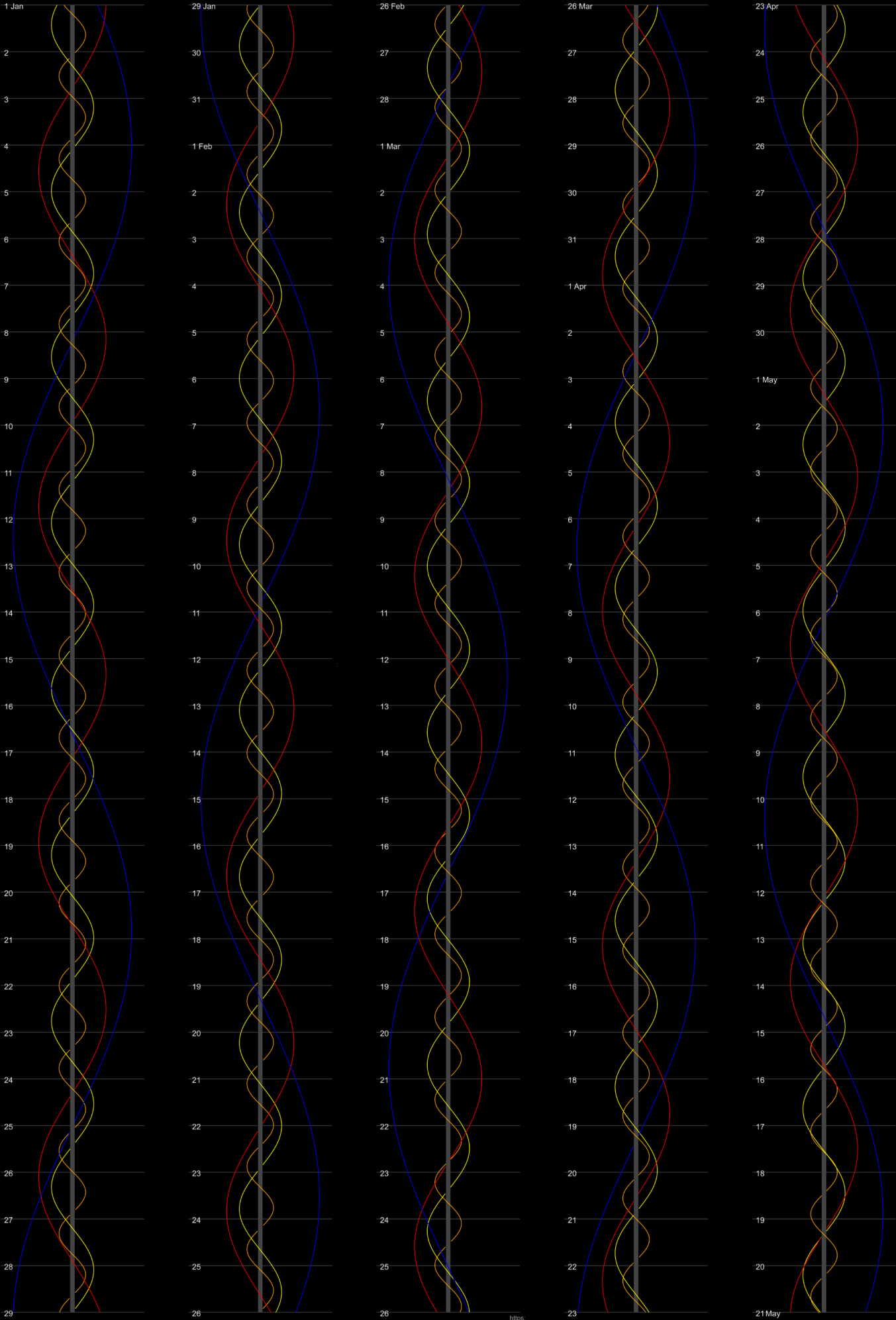
Path of Uranus during 2023



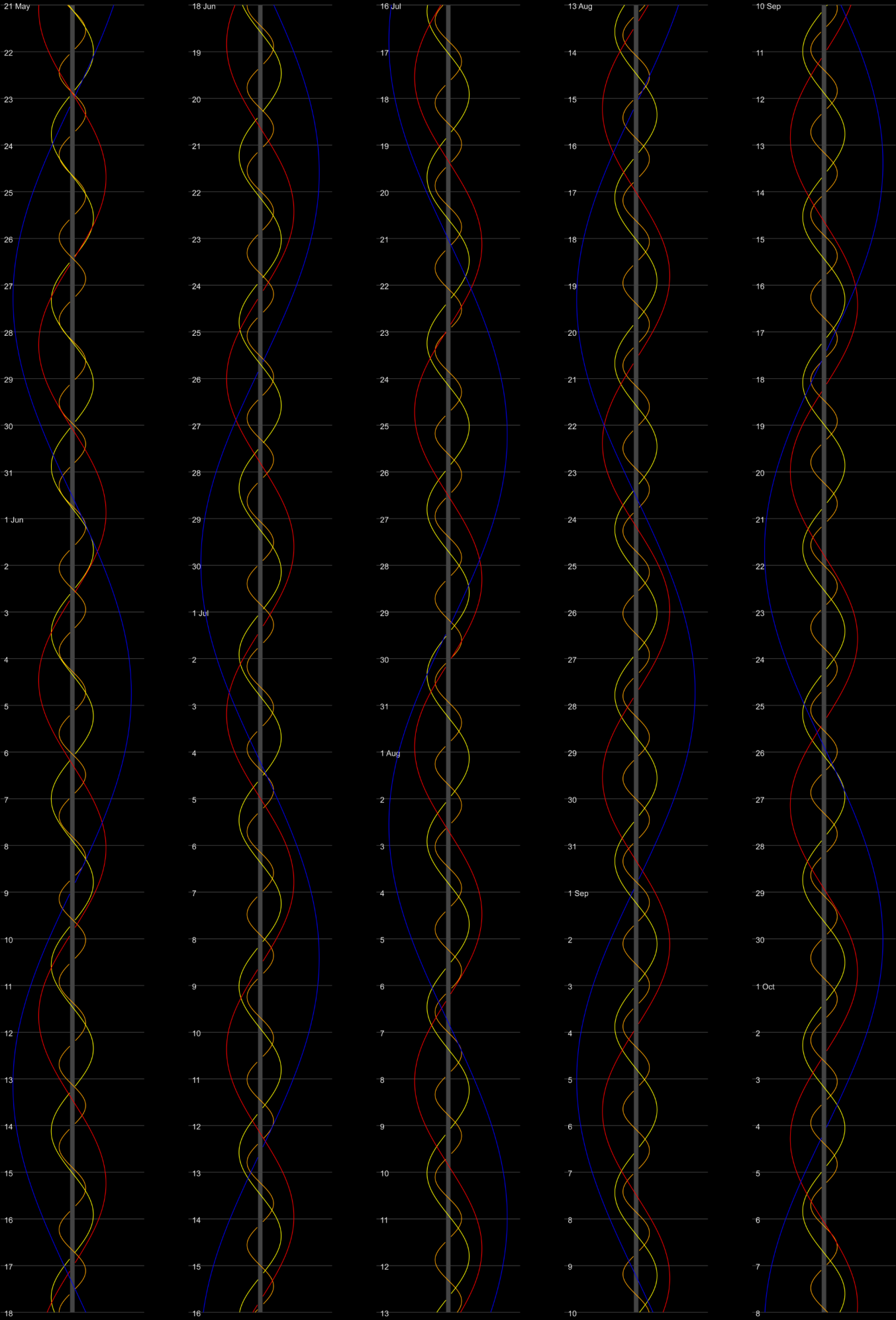
Path of Neptune during 2023



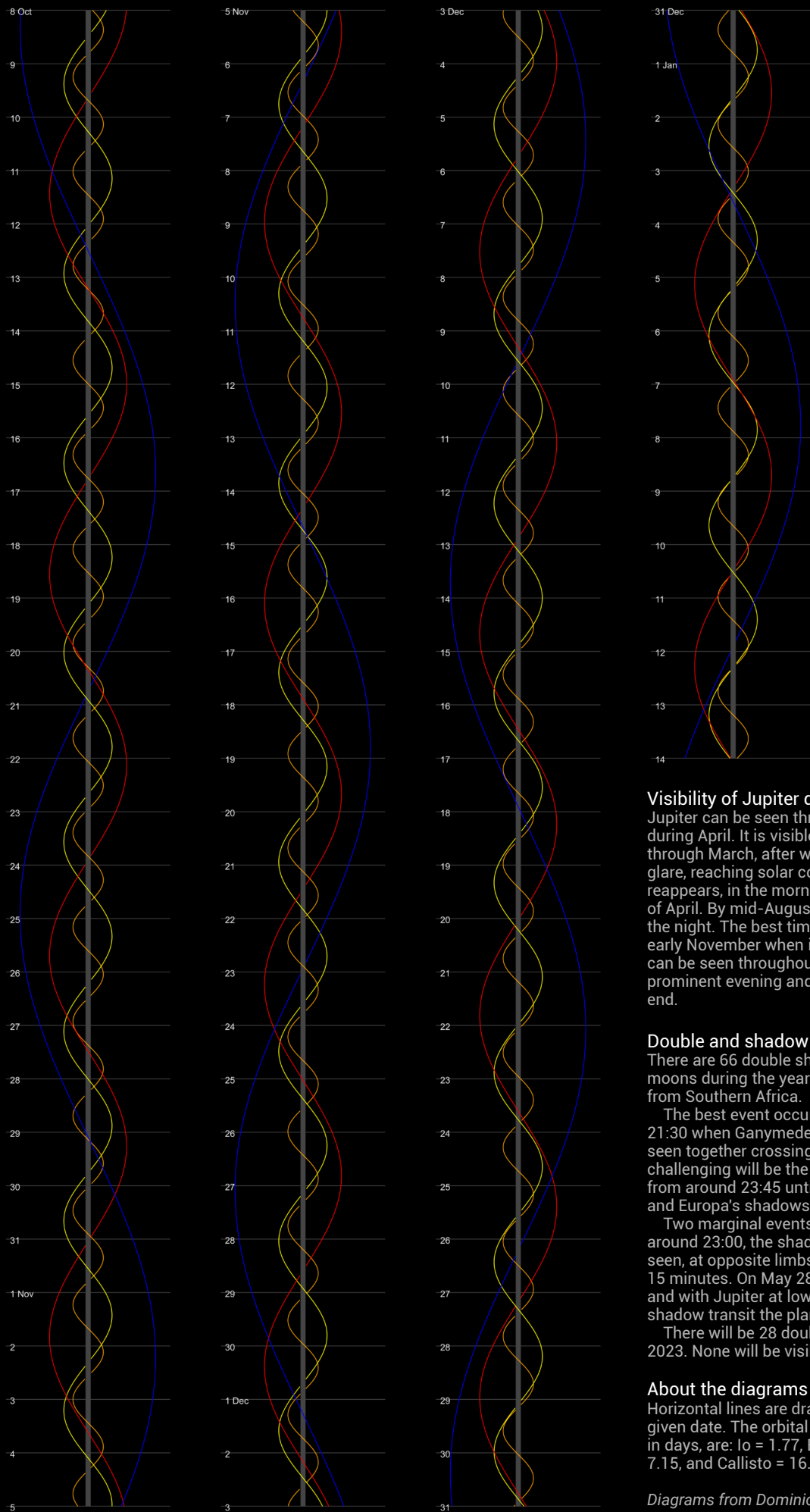
Jupiter's moons during 2023



Jupiter's moons during 2023



Jupiter's moons during 2023



Visibility of Jupiter during 2023

Jupiter can be seen throughout the year except during April. It is visible at dusk from January through March, after which it slips into the solar glare, reaching solar conjunction on Apr 12. Jupiter reappears, in the morning sky, during the second half of April. By mid-August it is visible for more than half the night. The best time to see Jupiter this year is in early November when it is at opposition (Nov 03) and can be seen throughout the night. Jupiter remains a prominent evening and late-night object until year's end.

Double and shadow transits during 2023

There are 66 double shadow transits of Galilean moons during the year. Only 4 will be observable from Southern Africa.

The best event occurs on 2023 Dec 23 around 21:30 when Ganymede and Europa's shadows can be seen together crossing the Jovian disc. More challenging will be the event on 2023 Dec 30, when from around 23:45 until past midnight to Ganymede and Europa's shadows are visible.

Two marginal events occur in May. On May 06 at around 23:00, the shadows of Europa and Io can be seen, at opposite limbs of the planet, for only about 15 minutes. On May 28 around 04:45, near sunrise and with Jupiter at low altitude, Europa and Io's shadow transit the planet.

There will be 28 double transits of moons during 2023. None will be visible from Southern Africa.

About the diagrams

Horizontal lines are drawn at midnight (UTC) for the given date. The orbital periods of the Galilean moons, in days, are: Io = 1.77, Europa = 3.55, Ganymede = 7.15, and Callisto = 16.69.

Diagrams from Dominic Ford <https://in-the-sky.org>