

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-03-13T17:14:09.380
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 4090697311376159872
 2Mass ID (if available) : 18134498-2219410

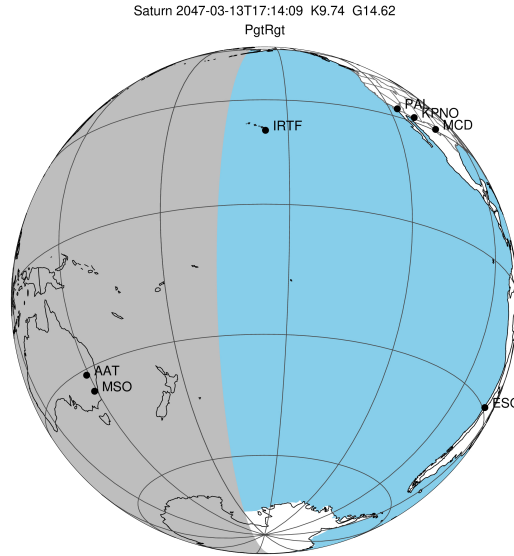
Saturn 2047-03-13T17:14:09 K9.74 G14.62 PgtRgt

ICRS Star Coord at Epoch: 18h 13m 44.98450s -22:19:41.15546s

RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.742
 G magnitude : 14.616
 RP magnitude : 13.370
 BP magnitude : 16.252
 DUPflag : 0
 Distance (au) : 10.183
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 15.16
 Sun-Target sep (deg) : 79.21
 Sun-Moon sep (deg) : 77.61
 B (ring opening deg) : 26.15
 PA of pole (deg) : 5.77

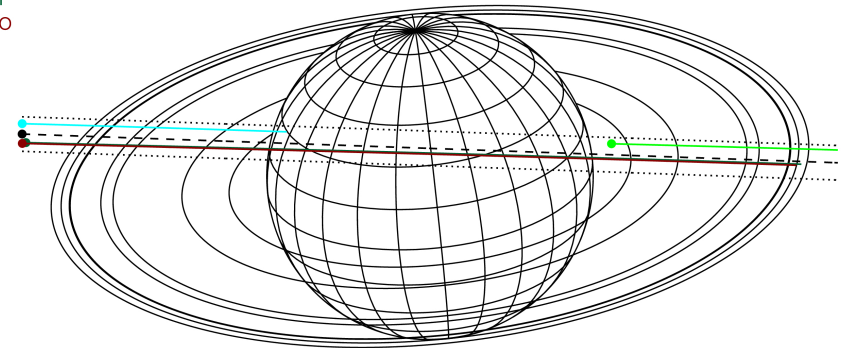
a(km) ring

- 1 74490.6 C (IER)
- 2 91984.7 B (IER)
- 3 117571.2 B (OER)
- 4 122050.4 A (IER)
- 5 133423.3 Encke (IEG)
- 6 133744.9 Encke (OEG)
- 7 136774.4 A (OER)
- 8 140461.0 F ring



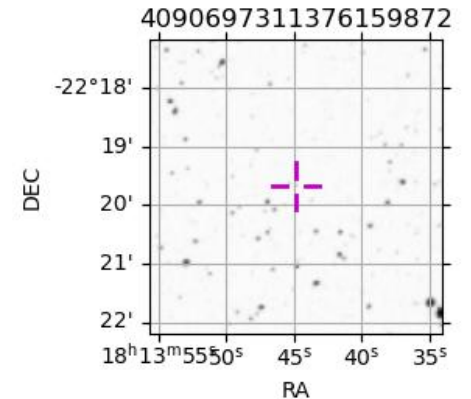
2047-03-13T17:14:09.3800 ra: 18 13 44.9845 s: -22 19 41.155 C/A 1.404* PA 177.98 deg v_sky +15.16 km/s D 10.18 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PMO
 IRTF
 AAT
 MSO

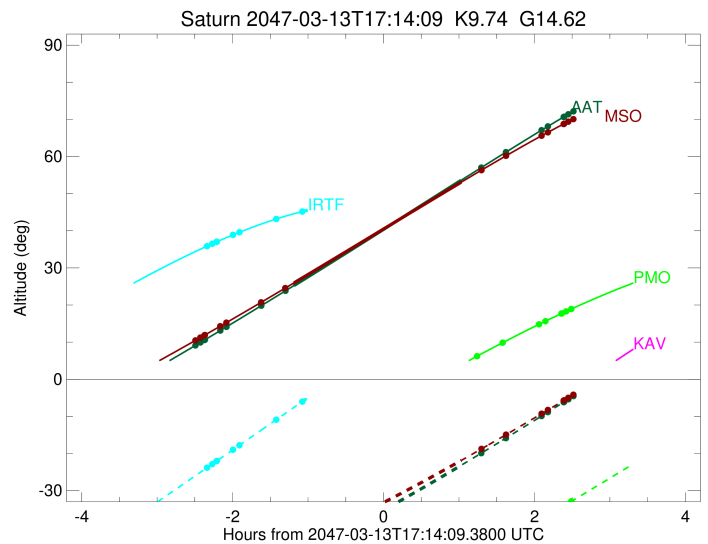
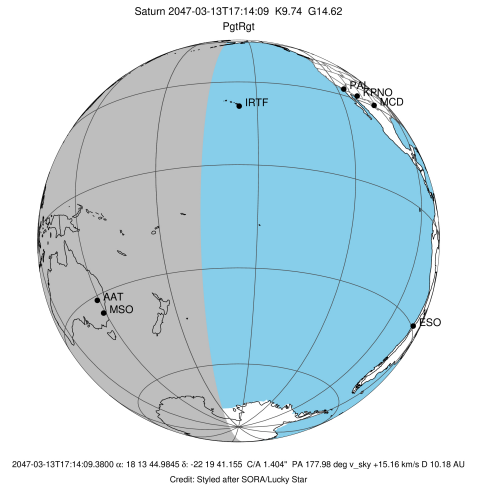


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (20	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs	32.1	118.8			+	MAR 13 18:28 - MAR 13 19:43	PnnRne
KPNO	Kitt Peak Natl	32.0	248.4					PnnRnn
MCD	McDonald Obs.	30.7	256.0					PnnRnn
TEN	Teide Obs./Ten	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+	+		MAR 13 14:53 - MAR 13 16:08	PinRin
KAV	Kavalur Observ	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8					PnnRnn
ESO	European South	-29.3	289.3					PnnRnn
AAT	Siding Spring	-31.3	149.1	+	+	+	MAR 13 14:44 - MAR 13 19:41	PieRie
SAAO	So. Afr. Astro	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Ob	-35.3	149.0	+	+	+	MAR 13 14:44 - MAR 13 19:37	PieRie



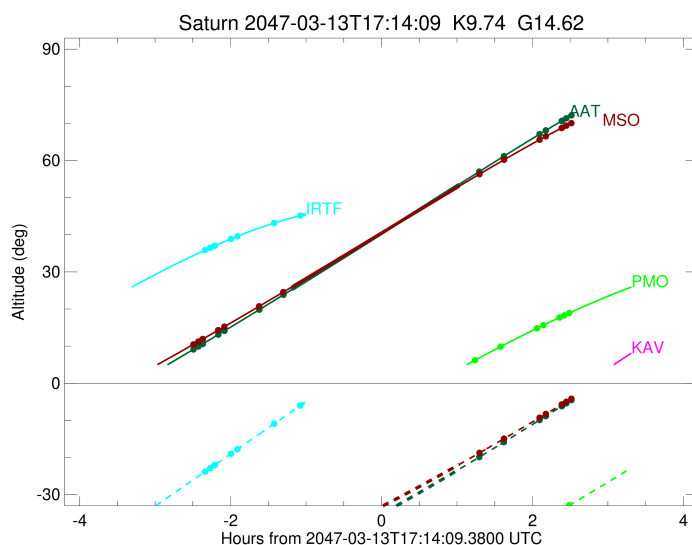
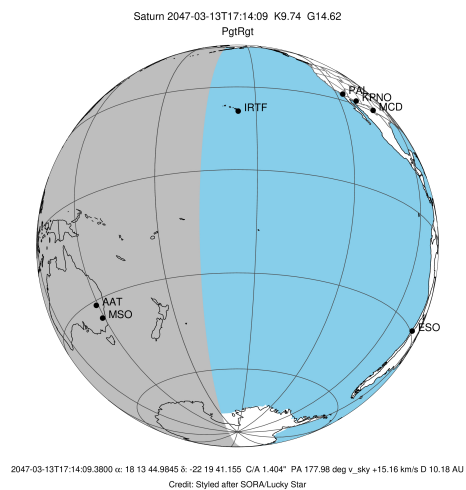
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-03-13T17:08:12.910
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 4090697311376159872
 2Mass ID (if available) : 18134498-2219410
 ICRS Star Coord at Epoch: 18h 13m 44.98450s -22:19:41.15546s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.742
 G magnitude : 14.616
 RP magnitude : 13.370
 BP magnitude : 16.252
 DUPflag : 0
 Distance (au) : 10.184
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 15.16
 Sun-Target sep (deg) : 79.21
 Sun-Moon sep (deg) : 77.30
 B (ring opening deg) : 26.15
 PA of pole (deg) : 5.77
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.870
 C/A sky separation (km) : 13812.7
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 Saturn_ring_plane.tf
 sat378.bsp
 sat286.bsp
 vgr1.sat286.bsp
 vgr2.sat286.bsp
 HST1081HSPephemUTC.bsp
 pfb10000r.bsp
 cassini.bsp
 earthstns_itrf93_040916.bsp
 earth_200101_990628_predict.bpc
 earth_720101_070426.bpc
 cpck28Mar2008.tpc
 pck.sat440.tpc
 IAU_SATURN_for_RINGFIT.tpc
 naif0012.tls
 earth_flat_IAU.spk



b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-03-13T14:50:39.058	-37.63x	-54.92	140461.00	-15.54			
A (OER)	I	2047-03-13T14:54:36.447	-36.79x	-55.43	136774.40	-15.52			
Encke (OEG)	I	2047-03-13T14:57:51.868	-36.10x	-55.83	133744.89	-15.49			
Encke (IEG)	I	2047-03-13T14:58:12.631	-36.03x	-55.88	133423.31	-15.49			
A (IER)	I	2047-03-13T15:10:29.493	-33.43x	-57.29	122050.38	-15.38			
B (OER)	I	2047-03-13T15:15:21.236	-32.41x	-57.79	117571.16	-15.33			
B (IER)	I	2047-03-13T15:43:30.944	-26.49x	-60.02	91984.69	-14.91			
C (IER)	I	2047-03-13T16:03:23.263	-22.36x	-60.78	74490.58	-14.38			
Saturn	I	2047-03-13T16:04:03.570	-22.22x	-60.79	60130.33			18.30	22.07
Saturn	E	2047-03-13T18:13:04.998	3.36x	-49.59	60255.49			5.42	6.65
C (IER)	E	2047-03-13T18:28:33.959	6.22	-46.99	74490.58	14.11			
B (IER)	E	2047-03-13T18:48:52.678	9.85	-43.38	91984.69	14.55			
B (OER)	E	2047-03-13T19:17:50.957	14.81	-37.92	117571.16	14.85			
A (IER)	E	2047-03-13T19:22:52.352	15.64	-36.95	122050.38	14.88			
Encke (IEG)	E	2047-03-13T19:35:35.193	17.69	-34.45	133423.31	14.94			
Encke (OEG)	E	2047-03-13T19:35:56.720	17.74	-34.37	133744.89	14.94			
A (OER)	E	2047-03-13T19:39:19.427	18.28	-33.70	136774.40	14.95			
F ring	E	2047-03-13T19:43:25.877	18.92	-32.88	140461.00	14.97			

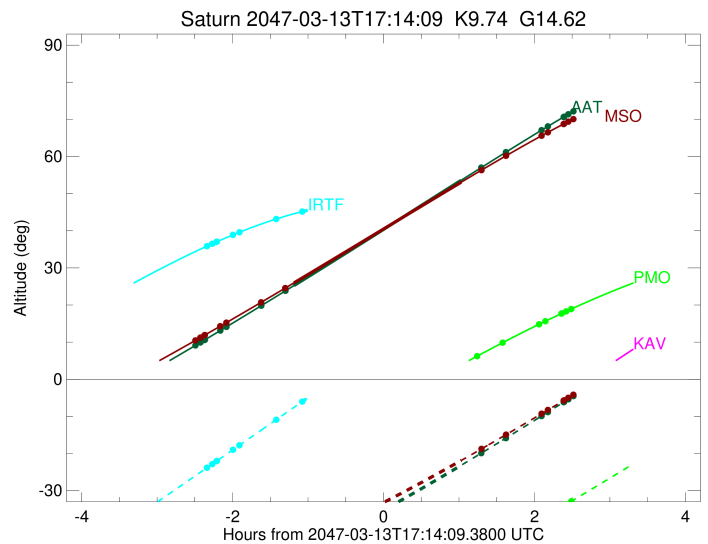
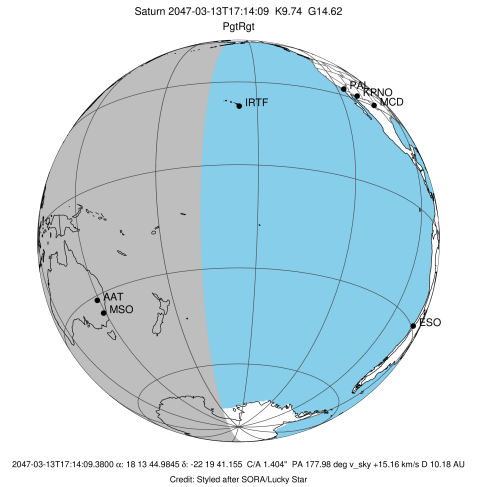
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-03-13T17:14:23.770
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : IRTF
 Location : Mauna Kea/IRTF
 Latitude (deg) : 19.82622
 E. Longitude (deg) : 204.52800
 Altitude (km) : 4.168
 Gaia source ID : 4090697311376159872
 2Mass ID (if available) : 18134498-2219410
 ICRS Star Coord at Epoch: 18h 13m 44.98450s -22:19:41.15546s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.742
 G magnitude : 14.616
 RP magnitude : 13.370
 BP magnitude : 16.252
 DUPflag : 0
 Distance (au) : 10.183
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 15.16
 Sun-Target sep (deg) : 79.21
 Sun-Moon sep (deg) : 78.37
 B (ring opening deg) : 26.15
 PA of pole (deg) : 5.77
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.982
 C/A sky separation (km) : 14640.4
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 Saturn_ring_plane.tf
 sat378.bsp
 sat286.bsp
 vgr1.sat286.bsp
 vgr2.sat286.bsp
 HST1081HSPephemUTC.bsp
 pfb10000r.bsp
 cassini.bsp
 earthstns_itrf93_040916.bsp
 earth_200101_990628_predict.bpc
 earth_720101_070426.bpc
 cpck28Mar2008.tpc
 pck.sat440.tpc
 IAU_SATURN_for_RINGFIT.tpc
 naif0012.tls
 earth_flat_IAU.spk



b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

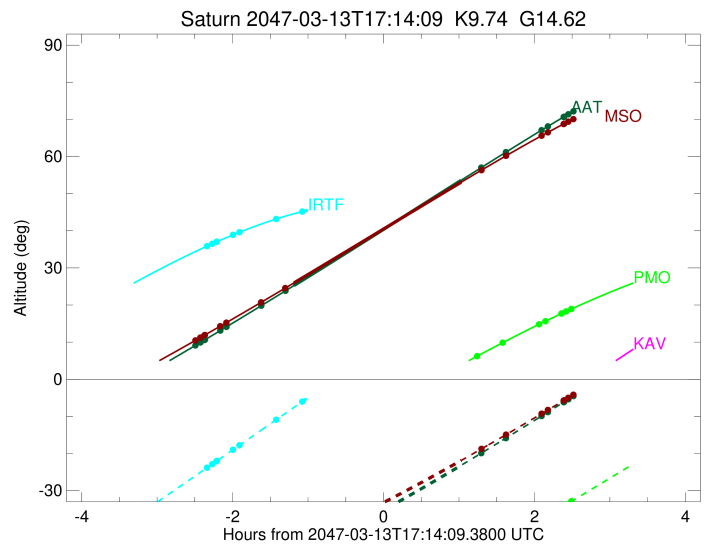
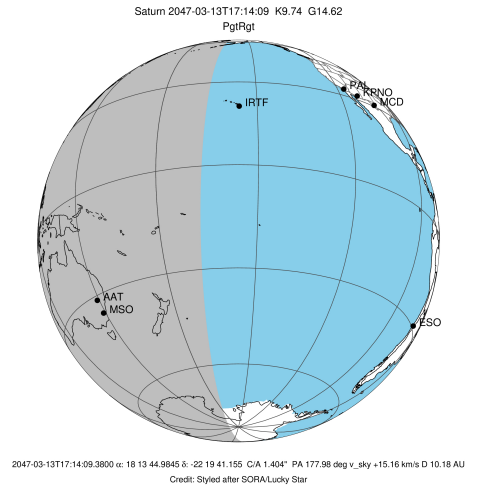
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-03-13T14:53:53.780		35.87	-23.82	140461.00	-14.93		
A (OER)	I	2047-03-13T14:58:00.976		36.50	-22.85	136774.40	-14.90		
Encke (OEG)	I	2047-03-13T15:01:24.461		37.01	-22.06	133744.89	-14.88		
Encke (IEG)	I	2047-03-13T15:01:46.079		37.06	-21.97	133423.31	-14.87		
A (IER)	I	2047-03-13T15:14:33.266		38.91	-18.97	122050.38	-14.77		
B (OER)	I	2047-03-13T15:19:36.991		39.60	-17.78	117571.16	-14.72		
B (IER)	I	2047-03-13T15:48:56.318		43.18	-10.88	91984.69	-14.32		
C (IER)	I	2047-03-13T16:09:39.513	b	45.19	-6.00	74490.58	-13.77		
Saturn	I	2047-03-13T16:08:26.633		45.08	-6.29	60112.43		19.50	23.46
Saturn	E	2047-03-13T18:20:36.403		44.87	24.59x	60255.07		5.51	6.76
C (IER)	E	2047-03-13T18:36:26.735		43.31	28.21x	74490.58	13.80		
B (IER)	E	2047-03-13T18:57:07.287		40.90	32.90x	91984.69	14.35		
B (OER)	E	2047-03-13T19:26:22.762		36.83	39.42x	117571.16	14.76		
A (IER)	E	2047-03-13T19:31:25.788		36.07	40.52x	122050.38	14.81		
Encke (IEG)	E	2047-03-13T19:44:11.161		34.06	43.29x	133423.31	14.91		
Encke (OEG)	E	2047-03-13T19:44:32.728		34.00	43.37x	133744.89	14.91		
A (OER)	E	2047-03-13T19:47:55.721		33.45	44.10x	136774.40	14.94		
F ring	E	2047-03-13T19:52:02.316		32.77	44.97x	140461.00	14.96		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-03-13T17:08:59.800
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : AAT
 Location : Siding Spring (AAT)
 Latitude (deg) : -31.27703
 E. Longitude (deg) : 149.06608
 Altitude (km) : 1.164
 Gaia source ID : 4090697311376159872
 2Mass ID (if available) : 18134498-2219410
 ICRS Star Coord at Epoch: 18h 13m 44.98450s -22:19:41.15546s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.742
 G magnitude : 14.616
 RP magnitude : 13.370
 BP magnitude : 16.252
 DUPflag : 0
 Distance (au) : 10.184
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 15.16
 Sun-Target sep (deg) : 79.21
 Sun-Moon sep (deg) : 78.10
 B (ring opening deg) : 26.15
 PA of pole (deg) : 5.77
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.172
 C/A sky separation (km) : 8655.3
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 Saturn_ring_plane.tf
 sat378.bsp
 sat286.bsp
 vgr1.sat286.bsp
 vgr2.sat286.bsp
 HST1081HSPephemUTC.bsp
 pfb10000r.bsp
 cassini.bsp
 earthstns_itrf93_040916.bsp
 earth_200101_990628_predict.bpc
 earth_720101_070426.bpc
 cpck28Mar2008.tpc
 pck.sat440.tpc
 IAU_SATURN_for_RINGFIT.tpc
 naif0012.tls
 earth_flat_IAU.spk



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-03-13T14:44:42.275		9.13	-55.27	140461.00	-15.57		
A (OER)	I	2047-03-13T14:48:39.229		9.93	-55.05	136774.40	-15.55		
Encke (OEG)	I	2047-03-13T14:51:54.141		10.58	-54.86	133744.89	-15.54		
Encke (IEG)	I	2047-03-13T14:52:14.841		10.65	-54.84	133423.31	-15.53		
A (IER)	I	2047-03-13T15:04:28.303		13.13	-53.96	122050.38	-15.48		
B (OER)	I	2047-03-13T15:09:17.969		14.12	-53.55	117571.16	-15.45		
B (IER)	I	2047-03-13T15:37:03.514		19.83	-50.65	91984.69	-15.26		
C (IER)	I	2047-03-13T15:56:17.771		23.85	-48.14	74490.58	-15.04		
Saturn	I	2047-03-13T16:02:48.823		25.21	-47.22	60187.20		13.91	16.90
Saturn	E	2047-03-13T18:15:47.979		53.58	-23.20	60267.73		0.80	0.98
C (IER)	E	2047-03-13T18:31:51.786		57.01	-19.92	74490.58	14.80		
B (IER)	E	2047-03-13T18:51:27.103		61.17	-15.86	91984.69	14.95		
B (OER)	E	2047-03-13T19:19:51.119		67.10	-9.90	117571.16	15.06		
A (IER)	E	2047-03-13T19:24:48.410		68.11	-8.86	122050.38	15.07		
Encke (IEG)	E	2047-03-13T19:37:22.379		70.64	-6.19	133423.31	15.09		
Encke (OEG)	E	2047-03-13T19:37:43.682		70.72	-6.12	133744.89	15.10		
A (OER)	E	2047-03-13T19:41:04.340		71.38	-5.41	136774.40	15.10		
F ring	E	2047-03-13T19:45:08.436		72.17	-4.54x	140461.00	15.11		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-03-13T17:09:12.690
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MSO
 Location : Mt. Stromlo Observatory
 Latitude (deg) : -35.32000
 E. Longitude (deg) : 149.00833
 Altitude (km) : 0.770
 Gaia source ID : 4090697311376159872
 2Mass ID (if available) : 18134498-2219410
 ICRS Star Coord at Epoch: 18h 13m 44.98450s -22:19:41.15546s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.742
 G magnitude : 14.616
 RP magnitude : 13.370
 BP magnitude : 16.252
 DUPflag : 0
 Distance (au) : 10.184
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 15.16
 Sun-Target sep (deg) : 79.21
 Sun-Moon sep (deg) : 78.11
 B (ring opening deg) : 26.15
 PA of pole (deg) : 5.77
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.117
 C/A sky separation (km) : 8249.1
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 Saturn_ring_plane.tf
 sat378.bsp
 sat286.bsp
 vgr1.sat286.bsp
 vgr2.sat286.bsp
 HST1081HSPephemUTC.bsp
 pfb10000r.bsp
 cassini.bsp
 earthstns_itrf93_040916.bsp
 earth_200101_990628_predict.bpc
 earth_720101_070426.bpc
 cpck28Mar2008.tpc
 pck.sat440.tpc
 IAU_SATURN_for_RINGFIT.tpc
 naif0012.tls
 earth_flat_IAU.spk



b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-03-13T14:44:39.916		10.48	-51.36	140461.00	-15.58		
A (OER)	I	2047-03-13T14:48:36.604		11.24	-51.17	136774.40	-15.57		
Encke (OEG)	I	2047-03-13T14:51:51.286		11.87	-51.00	133744.89	-15.55		
Encke (IEG)	I	2047-03-13T14:52:11.961		11.93	-50.98	133423.31	-15.55		
A (IER)	I	2047-03-13T15:04:24.435		14.31	-50.22	122050.38	-15.50		
B (OER)	I	2047-03-13T15:09:13.655		15.25	-49.87	117571.16	-15.48		
B (IER)	I	2047-03-13T15:36:55.817		20.74	-47.31	91984.69	-15.30		
C (IER)	I	2047-03-13T15:56:06.458		24.58	-45.07	74490.58	-15.09		
Saturn	I	2047-03-13T16:02:59.726		25.97	-44.19	60190.89		13.58	16.51
Saturn	E	2047-03-13T18:16:01.449		53.10	-21.86	60267.92		0.43	0.53
C (IER)	E	2047-03-13T18:32:01.650		56.32	-18.76	74490.58	14.86		
B (IER)	E	2047-03-13T18:51:32.551		60.19	-14.93	91984.69	15.00		
B (OER)	E	2047-03-13T19:19:51.726		65.60	-9.27	117571.16	15.10		
A (IER)	E	2047-03-13T19:24:48.284		66.51	-8.28	122050.38	15.11		
Encke (IEG)	E	2047-03-13T19:37:20.495		68.75	-5.74	133423.31	15.13		
Encke (OEG)	E	2047-03-13T19:37:41.750		68.81	-5.67	133744.89	15.13		
A (OER)	E	2047-03-13T19:41:01.962		69.39	-5.00x	136774.40	15.13		
F ring	E	2047-03-13T19:45:05.525		70.07	-4.17x	140461.00	15.14		