

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2045-07-09T01:45:07.680
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 6245607889838125824
 2Mass ID (if available) : 16143841-1918482

Saturn 2045-07-09T01:45:07 K9.49 G13.57 PgtRgt

ICRS Star Coord at Epoch: 16h 14m 38.38860s -19:18:48.28145s

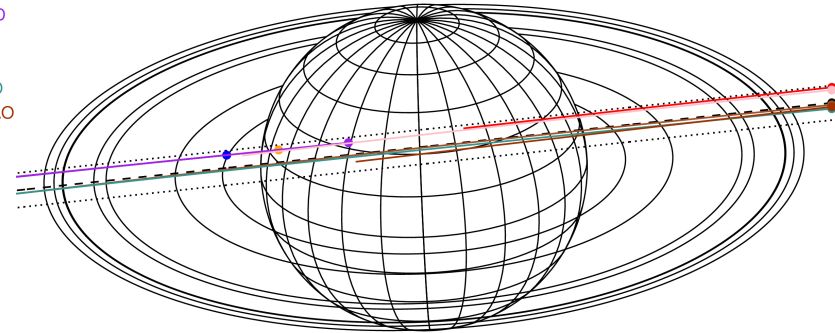
RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.490
 G magnitude : 13.574
 RP magnitude : 12.517
 BP magnitude : 14.729
 DUPflag : 0
 Distance (au) : 9.220
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -12.81
 Sun-Target sep (deg) : 138.54
 Sun-Moon sep (deg) : 149.48
 B (ring opening deg) : 25.27
 PA of pole (deg) : 2.81

#	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



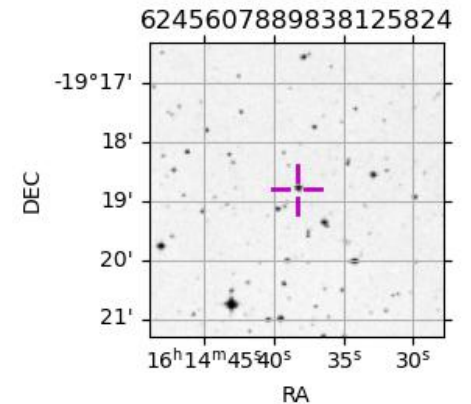
2045-07-09T01:45:07.6800 at: 16 14 38.3886 s: -19 18 48.281 C/A 1.141" PA 186.13 deg v_sky -12.81 km/s D 09.22 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PIC
 PAL
 KPNO
 MCD
 TEN
 RIO
 ESO
 SAAO

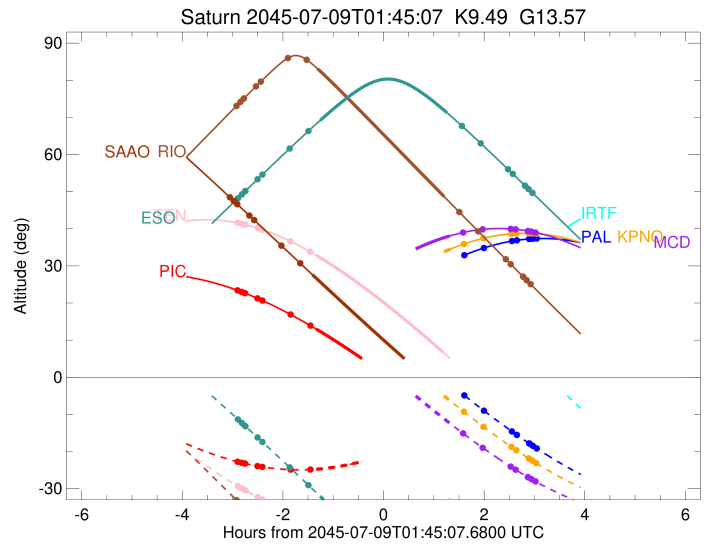
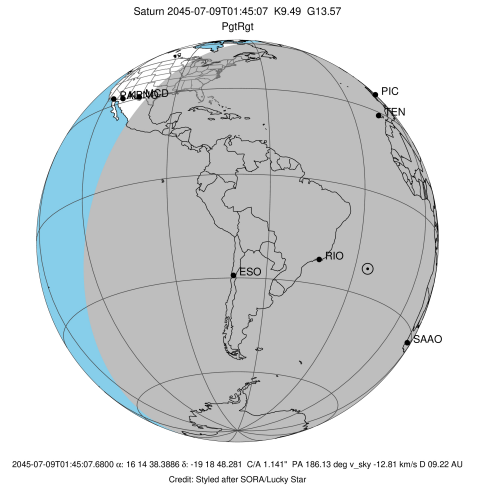


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+	+	+	JUL 08 22:50 - JUL 09 00:24	PinRin
PAL	Palomar Mt (20	33.4	243.1			+	JUL 09 03:44 - JUL 09 04:47	PnnRne
PMO	Purple Mtn Obs	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl	32.0	248.4		+	+	JUL 09 03:05 - JUL 09 04:47	PneRne
MCD	McDonald Obs.	30.7	256.0		+	+	JUL 09 03:04 - JUL 09 04:46	PneRne
TEN	Teide Obs./Ten	28.3	343.5	+	+		JUL 08 22:51 - JUL 09 02:55	PieRin
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observ	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+	+	+	JUL 08 22:49 - JUL 09 04:40	PieRie
ESO	European South	-29.3	289.3	+	+	+	JUL 08 22:51 - JUL 09 04:42	PieRie
AAT	Siding Spring	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro	-32.4	20.8	+	+	+	JUL 08 22:41 - JUL 09 00:20	PinRin
MSO	Mt. Stromlo Ob	-35.3	149.0					PnnRnn



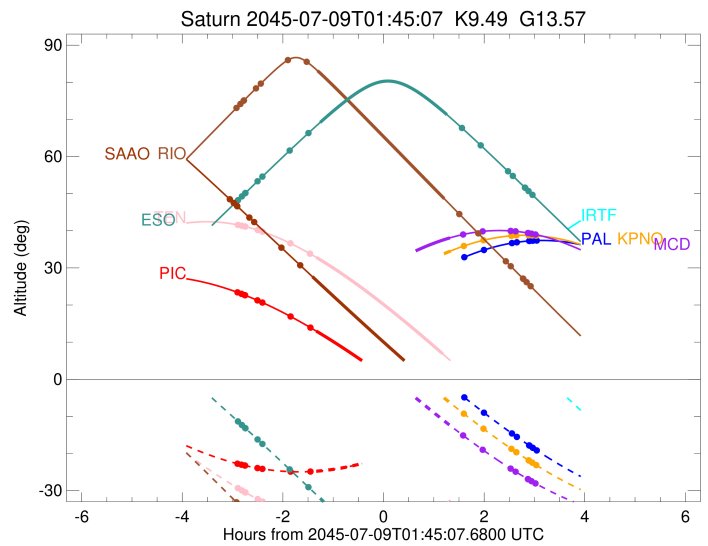
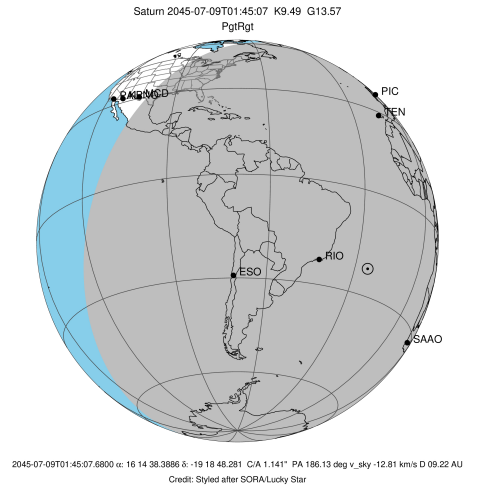
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2045-07-09T01:40:14.330
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 6245607889838125824
 2Mass ID (if available) : 16143841-1918482
 ICRS Star Coord at Epoch: 16h 14m 38.38860s -19:18:48.28145s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.490
 G magnitude : 13.574
 RP magnitude : 12.517
 BP magnitude : 14.729
 DUPflag : 0
 Distance (au) : 9.220
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -12.81
 Sun-Target sep (deg) : 138.54
 Sun-Moon sep (deg) : 150.08
 B (ring opening deg) : 25.27
 PA of pole (deg) : 2.81
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.900
 C/A sky separation (km) : 12708.8
 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	2045-07-08T22:50:57.246		23.42	-22.75	140461.00	-12.94		
A (OER)	I	2045-07-08T22:55:42.273		23.01	-23.01	136774.40	-12.92		
Encke (OEG)	I	2045-07-08T22:59:36.833		22.67	-23.22	133744.89	-12.91		
Encke (IEG)	I	2045-07-08T23:00:01.749		22.64	-23.24	133423.31	-12.91		
A (IER)	I	2045-07-08T23:14:45.536		21.26	-23.92	122050.38	-12.83		
B (OER)	I	2045-07-08T23:20:35.173		20.68	-24.14	117571.17	-12.79		
B (IER)	I	2045-07-08T23:54:16.827		16.91	-24.89	91984.69	-12.48		
C (IER)	I	2045-07-09T00:17:59.054		13.91	-24.86	74490.58	-12.08		
Saturn	I	2045-07-09T00:24:48.241		13.00	-24.77	60189.14		14.32	17.39
Saturn	E	2045-07-09T02:56:26.545		-11.22x	-13.87	60245.50		7.59	9.29
C (IER)	E	2045-07-09T03:12:43.300		-14.12x	-11.86	74490.58	11.85		
B (IER)	E	2045-07-09T03:36:56.743		-18.49x	-8.66	91984.69	12.19		
B (OER)	E	2045-07-09T04:11:35.288		-24.81x	-3.68x	117571.16	12.40		
A (IER)	E	2045-07-09T04:17:36.188		-25.92x	-2.77x	122050.38	12.42		
Encke (IEG)	E	2045-07-09T04:32:50.238		-28.72x	-0.43x	133423.31	12.46		
Encke (OEG)	E	2045-07-09T04:33:16.045		-28.80x	-0.36x	133744.89	12.46		
A (OER)	E	2045-07-09T04:37:19.078		-29.55x	0.28x	136774.40	12.47		
F ring	E	2045-07-09T04:42:14.635		-30.46x	1.06x	140461.00	12.48		

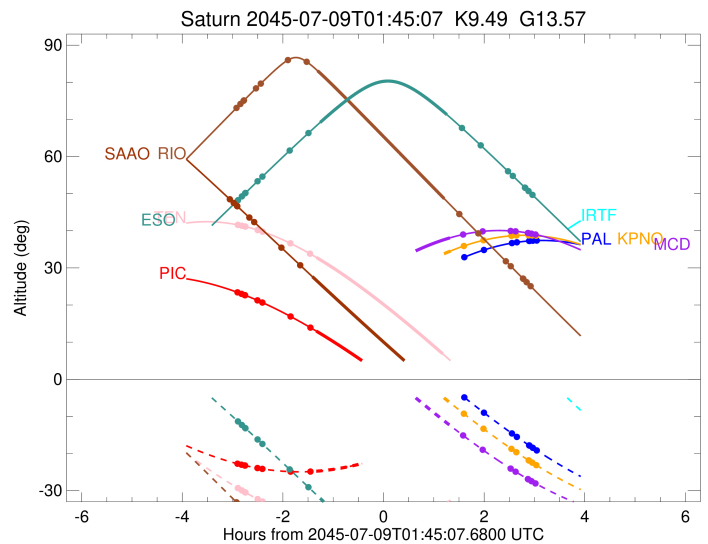
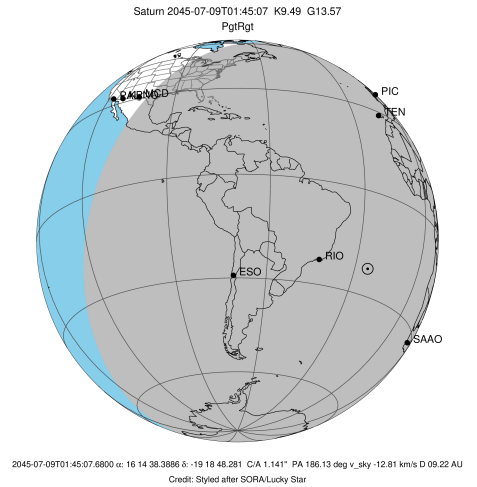
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2045-07-09T01:50:34.000
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 6245607889838125824
 2Mass ID (if available) : 16143841-1918482
 ICRS Star Coord at Epoch: 16h 14m 38.38860s -19:18:48.28145s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.490
 G magnitude : 13.574
 RP magnitude : 12.517
 BP magnitude : 14.729
 DUPflag : 0
 Distance (au) : 9.220
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -12.81
 Sun-Target sep (deg) : 138.54
 Sun-Moon sep (deg) : 149.18
 B (ring opening deg) : 25.27
 PA of pole (deg) : 2.81
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.755
 C/A sky separation (km) : 11735.7
 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

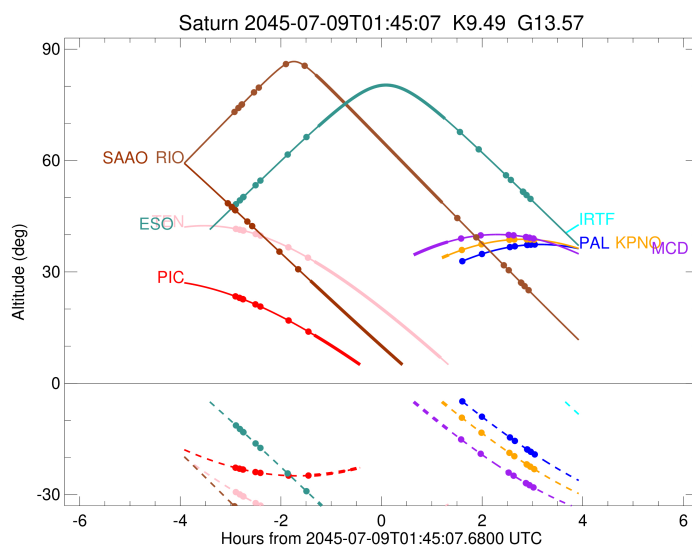
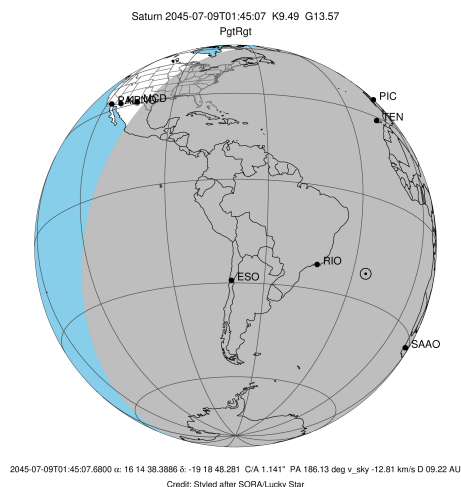
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2045-07-08T22:57:28.018	-10.09x	48.05x	140461.00	-12.65			
A (OER)	I	2045-07-08T23:02:19.424	-9.11x	47.03x	136774.40	-12.65			
Encke (OEG)	I	2045-07-08T23:06:19.025	-8.31x	46.20x	133744.89	-12.64			
Encke (IEG)	I	2045-07-08T23:06:44.466	-8.23x	46.11x	133423.31	-12.64			
A (IER)	I	2045-07-08T23:21:45.380	-5.25x	42.97x	122050.38	-12.61			
B (OER)	I	2045-07-08T23:27:40.974	-4.08x	41.73x	117571.16	-12.59			
B (IER)	I	2045-07-09T00:01:46.648	2.51x	34.61x	91984.69	-12.40			
C (IER)	I	2045-07-09T00:25:32.502	6.95	29.68x	74490.58	-12.10			
Saturn	I	2045-07-09T00:34:58.622	8.68	27.73x	60206.16			12.65	15.40
Saturn	E	2045-07-09T03:05:46.050	31.31	-2.01x	60245.58			7.57	9.28
C (IER)	E	2045-07-09T03:21:28.581	32.88	-4.87x	74490.58	12.27			
B (IER)	E	2045-07-09T03:44:53.160	34.82	-9.00	91984.69	12.61			
B (OER)	E	2045-07-09T04:18:20.775	36.69	-14.60	117571.16	12.85			
A (IER)	E	2045-07-09T04:24:08.900	36.90	-15.52	122050.38	12.88			
Encke (IEG)	E	2045-07-09T04:38:49.837	37.26	-17.81	133423.31	12.94			
Encke (OEG)	E	2045-07-09T04:39:14.692	37.27	-17.87	133744.89	12.94			
A (OER)	E	2045-07-09T04:43:08.723	37.32	-18.46	136774.40	12.95			
F ring	E	2045-07-09T04:47:53.223	37.37	-19.17	140461.00	12.97			

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2045-07-09T01:50:11.510
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KPNO
 Location : Kitt Peak Natl Obs
 Latitude (deg) : 31.96333
 E. Longitude (deg) : 248.40000
 Altitude (km) : 2.120
 Gaia source ID : 6245607889838125824
 2Mass ID (if available) : 16143841-1918482
 ICRS Star Coord at Epoch: 16h 14m 38.38860s -19:18:48.28145s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.490
 G magnitude : 13.574
 RP magnitude : 12.517
 BP magnitude : 14.729
 DUPflag : 0
 Distance (au) : 9.220
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -12.81
 Sun-Target sep (deg) : 138.54
 Sun-Moon sep (deg) : 149.25
 B (ring opening deg) : 25.27
 PA of pole (deg) : 2.81
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.761
 C/A sky separation (km) : 11774.6
 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



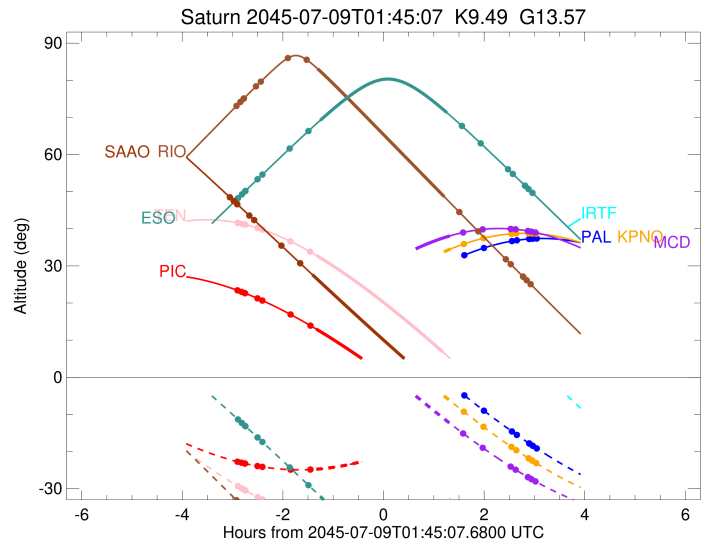
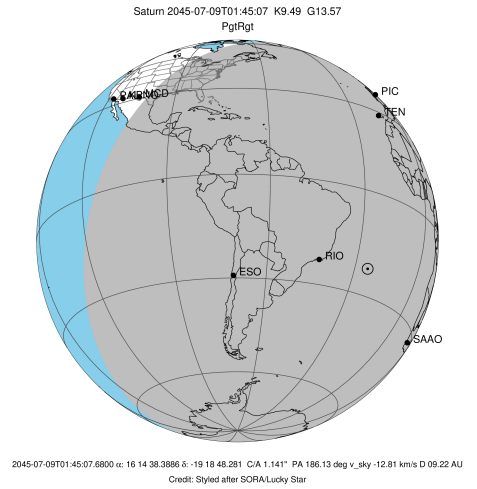
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2045-07-08T22:57:34.668	-5.41x	43.60x	140461.00	-12.69			
A (OER)	I	2045-07-08T23:02:25.365	-4.44x	42.57x	136774.40	-12.68			
Encke (OEG)	I	2045-07-08T23:06:24.382	-3.65x	41.73x	133744.89	-12.67			
Encke (IEG)	I	2045-07-08T23:06:49.760	-3.56x	41.64x	133423.31	-12.67			
A (IER)	I	2045-07-08T23:21:48.483	-0.60x	38.46x	122050.38	-12.64			
B (OER)	I	2045-07-08T23:27:43.216	0.56x	37.21x	117571.16	-12.62			
B (IER)	I	2045-07-09T00:01:44.070	7.09	30.04x	91984.69	-12.43			
C (IER)	I	2045-07-09T00:25:26.834	11.47	25.08x	74490.58	-12.13			
Saturn	I	2045-07-09T00:34:47.858	13.15	23.14x	60205.73	12.69	15.46		
Saturn	E	2045-07-09T03:05:14.324	34.57	-6.45	60245.52	7.58	9.29		
C (IER)	E	2045-07-09T03:20:55.401	35.90	-9.27	74490.58	12.28			
B (IER)	E	2045-07-09T03:44:18.627	37.44	-13.32	91984.69	12.62			
B (OER)	E	2045-07-09T04:17:44.541	38.64	-18.75	117571.16	12.86			
A (IER)	E	2045-07-09T04:23:32.418	38.73	-19.65	122050.38	12.89			
Encke (IEG)	E	2045-07-09T04:38:12.799	38.77	-21.83	133423.31	12.94			
Encke (OEG)	E	2045-07-09T04:38:37.640	38.77	-21.89	133744.89	12.95			
A (OER)	E	2045-07-09T04:42:31.544	38.74	-22.46	136774.40	12.96			
F ring	E	2045-07-09T04:47:15.899	38.67	-23.13	140461.00	12.97			

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2045-07-09T01:49:32.310
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MCD
 Location : McDonald Obs. 2.7m
 Latitude (deg) : 30.67158
 E. Longitude (deg) : 255.97844
 Altitude (km) : 2.075
 Gaia source ID : 6245607889838125824
 2Mass ID (if available) : 16143841-1918482
 ICRS Star Coord at Epoch: 16h 14m 38.38860s -19:18:48.28145s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.490
 G magnitude : 13.574
 RP magnitude : 12.517
 BP magnitude : 14.729
 DUPflag : 0
 Distance (au) : 9.220
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -12.81
 Sun-Target sep (deg) : 138.54
 Sun-Moon sep (deg) : 149.35
 B (ring opening deg) : 25.27
 PA of pole (deg) : 2.81
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.776
 C/A sky separation (km) : 11873.4
 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



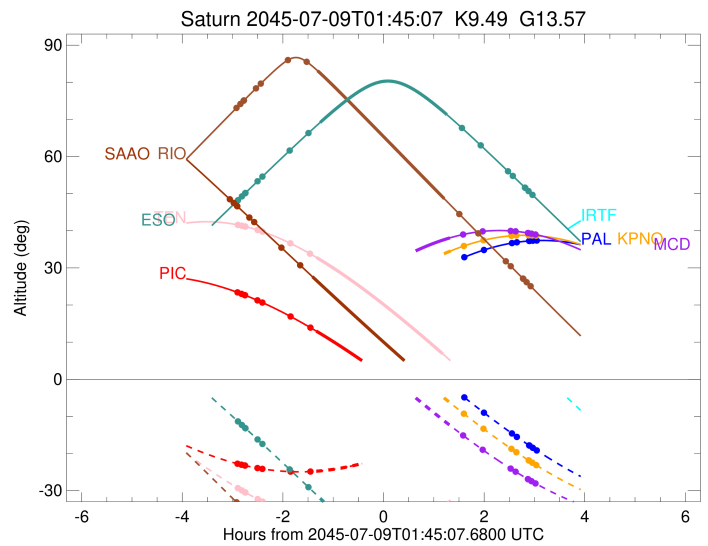
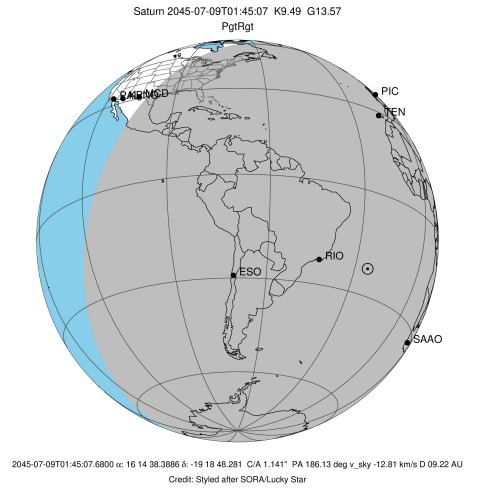
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2045-07-08T22:57:38.713	1.10x	37.03x	140461.00	-12.73			
A (OER)	I	2045-07-08T23:02:28.411	2.06x	36.00x	136774.40	-12.72			
Encke (OEG)	I	2045-07-08T23:06:26.611	2.84x	35.15x	133744.89	-12.71			
Encke (IEG)	I	2045-07-08T23:06:51.903	2.92x	35.06x	133423.31	-12.71			
A (IER)	I	2045-07-08T23:21:47.606	5.83	31.87x	122050.38	-12.68			
B (OER)	I	2045-07-08T23:27:41.173	6.97	30.62x	117571.16	-12.66			
B (IER)	I	2045-07-09T00:01:35.776	13.31	23.45x	91984.69	-12.46			
C (IER)	I	2045-07-09T00:25:14.941	17.53	18.52x	74490.58	-12.16			
Saturn	I	2045-07-09T00:34:24.595	19.12	16.62x	60204.64			12.81	15.59
Saturn	E	2045-07-09T03:04:23.497	38.09	-12.43	60245.27			7.63	9.34
C (IER)	E	2045-07-09T03:20:01.964	39.00	-15.13	74490.58	12.28			
B (IER)	E	2045-07-09T03:43:24.658	39.84	-18.99	91984.69	12.62			
B (OER)	E	2045-07-09T04:16:49.850	39.96	-24.07	117571.16	12.87			
A (IER)	E	2045-07-09T04:22:37.649	39.85	-24.90	122050.38	12.89			
Encke (IEG)	E	2045-07-09T04:37:17.926	39.40	-26.89	133423.31	12.95			
Encke (OEG)	E	2045-07-09T04:37:42.766	39.38	-26.94	133744.89	12.95			
A (OER)	E	2045-07-09T04:41:36.666	39.22	-27.45	136774.40	12.96			
F ring	E	2045-07-09T04:46:21.032	39.00	-28.05	140461.00	12.97			

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2045-07-09T01:40:03.110
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 6245607889838125824
 2Mass ID (if available) : 16143841-1918482
 ICRS Star Coord at Epoch: 16h 14m 38.38860s -19:18:48.28145s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.490
 G magnitude : 13.574
 RP magnitude : 12.517
 BP magnitude : 14.729
 DUPflag : 0
 Distance (au) : 9.220
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -12.81
 Sun-Target sep (deg) : 138.54
 Sun-Moon sep (deg) : 150.25
 B (ring opening deg) : 25.27
 PA of pole (deg) : 2.81
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.804
 C/A sky separation (km) : 12061.0
 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	2045-07-08T22:51:24.708		41.59	-29.31	140461.00	-13.05		
A (OER)	I	2045-07-08T22:56:07.331		41.36	-29.94	136774.40	-13.04		
Encke (OEG)	I	2045-07-08T22:59:59.856		41.16	-30.44	133744.89	-13.02		
Encke (IEG)	I	2045-07-08T23:00:24.553		41.13	-30.49	133423.31	-13.02		
A (IER)	I	2045-07-08T23:15:00.152		40.20	-32.28	122050.38	-12.95		
B (OER)	I	2045-07-08T23:20:46.318		39.77	-32.94	117571.16	-12.92		
B (IER)	I	2045-07-08T23:54:04.641		36.62	-36.22	91984.69	-12.65		
C (IER)	I	2045-07-09T00:17:25.544		33.83	-37.90	74490.58	-12.29		
Saturn	I	2045-07-09T00:25:08.884		32.81	-38.34	60195.91		13.68	16.63
Saturn	E	2045-07-09T02:55:42.182		6.86	-33.61	60248.61		7.04	8.63
C (IER)	E	2045-07-09T03:12:12.102		3.56x	-31.72	74490.58	12.06		
B (IER)	E	2045-07-09T03:36:02.790		-1.29x	-28.64	91984.69	12.36		
B (OER)	E	2045-07-09T04:10:15.498		-8.42x	-23.60	117571.16	12.54		
A (IER)	E	2045-07-09T04:16:12.448		-9.68x	-22.66	122050.38	12.56		
Encke (IEG)	E	2045-07-09T04:31:17.060		-12.88x	-20.20	133423.31	12.59		
Encke (OEG)	E	2045-07-09T04:31:42.611		-12.97x	-20.13	133744.89	12.59		
A (OER)	E	2045-07-09T04:35:43.268		-13.83x	-19.46	136774.40	12.59		
F ring	E	2045-07-09T04:40:36.001		-14.87x	-18.63	140461.00	12.60		

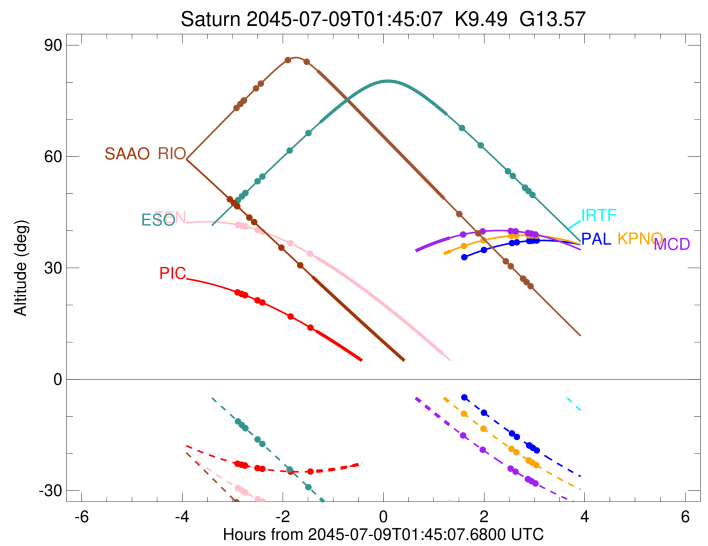
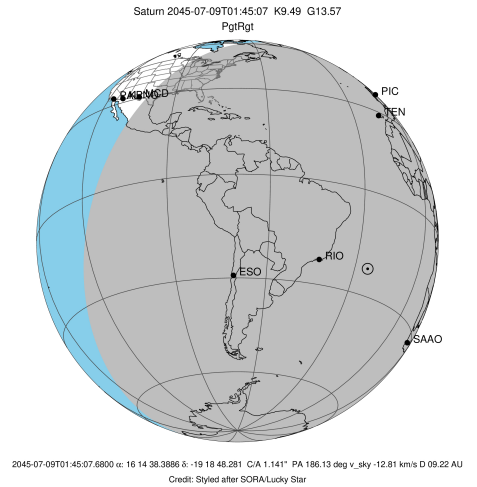
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2045-07-09T01:41:48.680
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : RIO
 Location : Rio de Janeiro
 Latitude (deg) : -22.89506
 E. Longitude (deg) : 316.77708
 Altitude (km) : 0.033
 Gaia source ID : 6245607889838125824
 2Mass ID (if available) : 16143841-1918482
 ICRS Star Coord at Epoch: 16h 14m 38.38860s -19:18:48.28145s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.490
 G magnitude : 13.574
 RP magnitude : 12.517
 BP magnitude : 14.729
 DUPflag : 0
 Distance (au) : 9.220
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -12.81
 Sun-Target sep (deg) : 138.54
 Sun-Moon sep (deg) : 150.24
 B (ring opening deg) : 25.27
 PA of pole (deg) : 2.81
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.097
 C/A sky separation (km) : 7336.5
 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	2045-07-08T22:49:48.076		73.09	-33.13	140461.00	-13.21		
A (OER)	I	2045-07-08T22:54:27.129		74.15	-34.18	136774.40	-13.21		
Encke (OEG)	I	2045-07-08T22:58:16.500		75.03	-35.04	133744.89	-13.21		
Encke (IEG)	I	2045-07-08T22:58:40.850		75.12	-35.13	133423.31	-13.21		
A (IER)	I	2045-07-08T23:13:02.537		78.36	-38.37	122050.38	-13.19		
B (OER)	I	2045-07-08T23:18:42.244		79.63	-39.65	117571.16	-13.18		
B (IER)	I	2045-07-08T23:51:08.840		85.99	-47.02	91984.69	-13.09		
C (IER)	I	2045-07-09T00:13:30.578		85.52	-52.12	74490.58	-12.97		
Saturn	I	2045-07-09T00:26:28.176		83.12	-55.09	60234.14		9.32	11.40
Saturn	E	2045-07-09T02:57:36.381		48.64	-89.54	60264.14		3.14	3.85
C (IER)	E	2045-07-09T03:15:29.737		44.52	-85.96	74490.58	12.83		
B (IER)	E	2045-07-09T03:38:08.135		39.31	-80.75	91984.69	12.92		
B (OER)	E	2045-07-09T04:11:05.244		31.77	-73.15	117571.16	12.95		
A (IER)	E	2045-07-09T04:16:51.022		30.46	-71.83	122050.38	12.95		
Encke (IEG)	E	2045-07-09T04:31:29.075		27.13	-68.46	133423.31	12.95		
Encke (OEG)	E	2045-07-09T04:31:53.908		27.04	-68.36	133744.89	12.95		
A (OER)	E	2045-07-09T04:35:47.876		26.15	-67.47	136774.40	12.95		
F ring	E	2045-07-09T04:40:32.651		25.08	-66.37	140461.00	12.94		

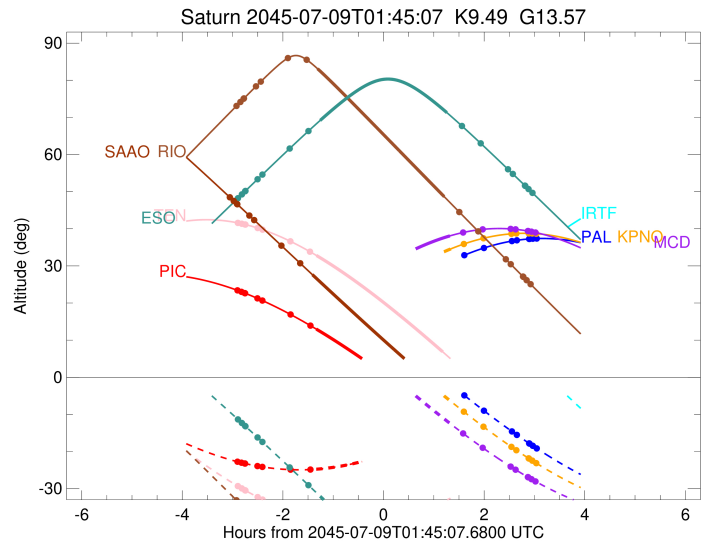
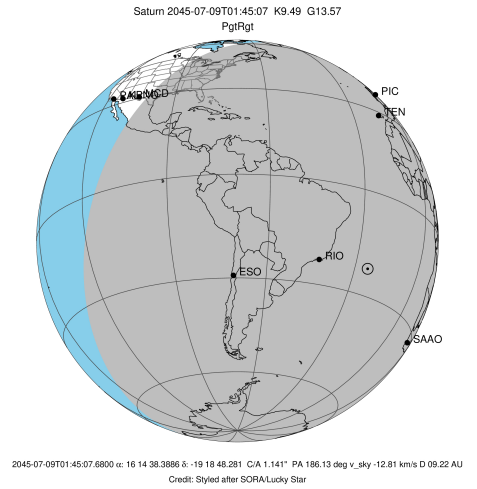
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2045-07-09T01:45:07.450
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : ESO
 Location : European Southern Obs. (3.6m)
 Latitude (deg) : -29.26097
 E. Longitude (deg) : 289.26831
 Altitude (km) : 2.400
 Gaia source ID : 6245607889838125824
 2Mass ID (if available) : 16143841-1918482
 ICRS Star Coord at Epoch: 16h 14m 38.38860s -19:18:48.28145s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.490
 G magnitude : 13.574
 RP magnitude : 12.517
 BP magnitude : 14.729
 DUPflag : 0
 Distance (au) : 9.220
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -12.81
 Sun-Target sep (deg) : 138.54
 Sun-Moon sep (deg) : 149.93
 B (ring opening deg) : 25.27
 PA of pole (deg) : 2.81
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.980
 C/A sky separation (km) : 6554.7
 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	2045-07-08T22:51:31.417		48.23	-11.35	140461.00	-13.10		
A (OER)	I	2045-07-08T22:56:12.736		49.26	-12.32	136774.40	-13.11		
Encke (OEG)	I	2045-07-08T23:00:03.905		50.10	-13.12	133744.89	-13.11		
Encke (IEG)	I	2045-07-08T23:00:28.443		50.19	-13.20	133423.31	-13.11		
A (IER)	I	2045-07-08T23:14:56.317		53.35	-16.21	122050.38	-13.10		
B (OER)	I	2045-07-08T23:20:38.210		54.59	-17.40	117571.16	-13.10		
B (IER)	I	2045-07-08T23:53:14.057		61.61	-24.29	91984.69	-13.05		
C (IER)	I	2045-07-09T00:15:37.946		66.33	-29.07	74490.58	-12.97		
Saturn	I	2045-07-09T00:29:32.882		69.18	-32.07	60240.44		8.40	10.28
Saturn	E	2045-07-09T03:00:47.236		71.27	-64.95	60265.08		2.72	3.35
C (IER)	E	2045-07-09T03:18:37.524		67.70	-68.77	74490.58	12.97		
B (IER)	E	2045-07-09T03:41:01.851		63.02	-73.45	91984.69	13.05		
B (OER)	E	2045-07-09T04:13:38.762		56.02	-79.68	117571.16	13.09		
A (IER)	E	2045-07-09T04:19:20.899		54.78	-80.61	122050.38	13.09		
Encke (IEG)	E	2045-07-09T04:33:49.480		51.63	-82.48	133423.31	13.09		
Encke (OEG)	E	2045-07-09T04:34:14.040		51.54	-82.52	133744.89	13.09		
A (OER)	E	2045-07-09T04:38:05.422		50.70	-82.84	136774.40	13.09		
F ring	E	2045-07-09T04:42:47.012		49.67	-83.10	140461.00	13.09		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2045-07-09T01:37:47.700
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : SAAO
 Location : So. Afr. Astro. Obs. (Sutherland)
 Latitude (deg) : -32.37953
 E. Longitude (deg) : 20.81070
 Altitude (km) : 1.768
 Gaia source ID : 6245607889838125824
 2Mass ID (if available) : 16143841-1918482
 ICRS Star Coord at Epoch: 16h 14m 38.38860s -19:18:48.28145s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.490
 G magnitude : 13.574
 RP magnitude : 12.517
 BP magnitude : 14.729
 DUPflag : 0
 Distance (au) : 9.220
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -12.81
 Sun-Target sep (deg) : 138.54
 Sun-Moon sep (deg) : 150.23
 B (ring opening deg) : 25.27
 PA of pole (deg) : 2.81
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.755
 C/A sky separation (km) : 5051.3
 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



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	2045-07-08T22:41:51.427		48.48	-80.13	140461.00	-13.20		
A (OER)	I	2045-07-08T22:46:30.835		47.50	-80.08	136774.40	-13.19		
Encke (OEG)	I	2045-07-08T22:50:20.577		46.69	-79.95	133744.89	-13.18		
Encke (IEG)	I	2045-07-08T22:50:44.971		46.61	-79.94	133423.31	-13.18		
A (IER)	I	2045-07-08T23:05:08.653		43.56	-78.87	122050.38	-13.15		
B (OER)	I	2045-07-08T23:10:49.361		42.36	-78.23	117571.16	-13.14		
B (IER)	I	2045-07-08T23:43:22.811		35.45	-73.18	91984.69	-13.05		
C (IER)	I	2045-07-09T00:05:47.905		30.71	-68.97	74490.58	-12.96		
Saturn	I	2045-07-09T00:20:16.478		27.65	-66.10	60243.98		7.84	9.60
Saturn	E	2045-07-09T02:56:15.135		-4.01x	-33.42	60267.75		0.79	0.98
C (IER)	E	2045-07-09T03:14:58.959		-7.54x	-29.50	74490.58	12.62		
B (IER)	E	2045-07-09T03:38:04.485		-11.76x	-24.70	91984.69	12.63		
B (OER)	E	2045-07-09T04:11:51.124		-17.63x	-17.75	117571.16	12.61		
A (IER)	E	2045-07-09T04:17:46.281		-18.62x	-16.55	122050.38	12.61		
Encke (IEG)	E	2045-07-09T04:32:48.736		-21.06x	-13.51	133423.31	12.59		
Encke (OEG)	E	2045-07-09T04:33:14.268		-21.12x	-13.42	133744.89	12.59		
A (OER)	E	2045-07-09T04:37:14.853		-21.76x	-12.62	136774.40	12.59		
F ring	E	2045-07-09T04:42:07.727		-22.51x	-11.64	140461.00	12.59		