

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-04-23T23:39:32.800
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 4090527471194540800
 2Mass ID (if available) : 18163998-2217135

Saturn 2047-04-23T23:39:32 K9.73 G13.54 PgtRgt

ICRS Star Coord at Epoch: 18h 16m 40.00150s -22:17:13.91555s

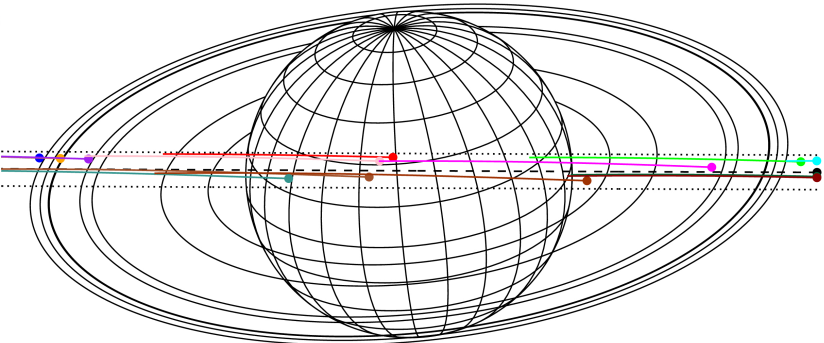
RUWE (>1.4 is poor) : 0.97
 K magnitude : 9.731
 G magnitude : 13.540
 RP magnitude : 12.505
 BP magnitude : 14.652
 DUPflag : 0
 Distance (au) : 9.516
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -4.96
 Sun-Target sep (deg) : 119.23
 Sun-Moon sep (deg) : 105.91
 B (ring opening deg) : 26.04
 PA of pole (deg) : 5.82

#	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



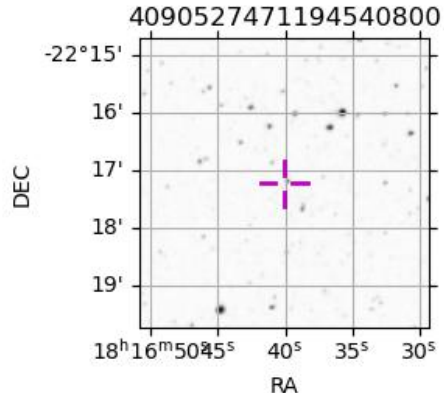
2047-04-23T23:39:32.8000 α: 18 16 40.0015 δ: -22 17 13.916 C/A 0.199° PA 179.74 deg v_sky - 4.96 km/s D 09.52 AU
 Credit: Styled after SORA/Lucky Star

- Earth
- PIC
- PAL
- PMO
- KPNO
- MCD
- TEN
- IRTF
- KAV
- RIO
- ESO
- AAT
- SAAO
- MSO

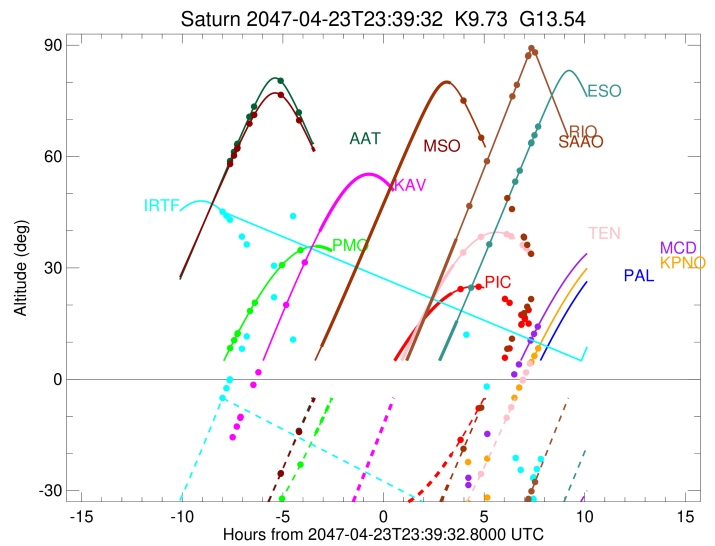
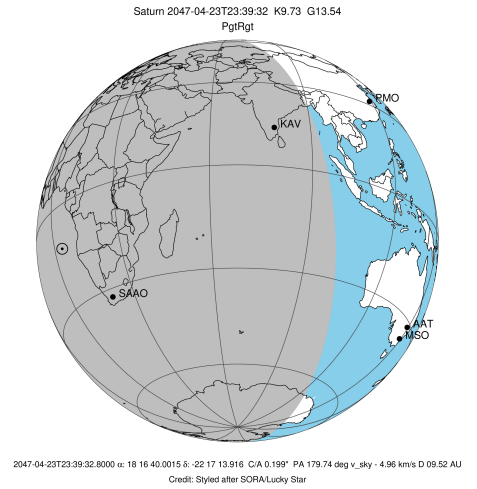


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEncode
PIC	Pic du Midi	42.9	0.1		+	++	APR 24 03:03 - APR 24 04:23	PneRne
PAL	Palomar Mt (20	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs	32.1	118.8	+++++	+		APR 23 16:02 - APR 23 20:16	PinRin
KPNO	Kitt Peak Natl	32.0	248.4			++	APR 24 07:09 - APR 24 07:20	PnnRne
MCD	McDonald Obs.	30.7	256.0			++++	APR 24 06:58 - APR 24 07:19	PnnRne
TEN	Teide Obs./Ten	28.3	343.5		+	++++	APR 24 03:09 - APR 24 06:00	PneRne
IRTF	Mauna Kea/IRTF	19.8	204.5	+			APR 23 15:39 - APR 23 15:39	PnnRin
KAV	Kavalur Observ	12.6	78.8	++	+		APR 23 18:49 - APR 23 20:29	PinRin
RIO	Rio de Janeiro	-22.9	316.8		+	+++++	APR 24 03:16 - APR 24 07:11	PneRne
ESO	European South	-29.3	289.3		+	+++++	APR 24 03:19 - APR 24 07:20	PneRne
AAT	Siding Spring	-31.3	149.1	+++++	+		APR 23 16:02 - APR 23 20:07	PinRin
SAAO	So. Afr. Astro	-32.4	20.8		++	++	APR 23 20:34 - APR 24 04:30	PieRne
MSO	Mt. Stromlo Ob	-35.3	149.0	+++++	+		APR 23 16:02 - APR 23 20:07	PinRin



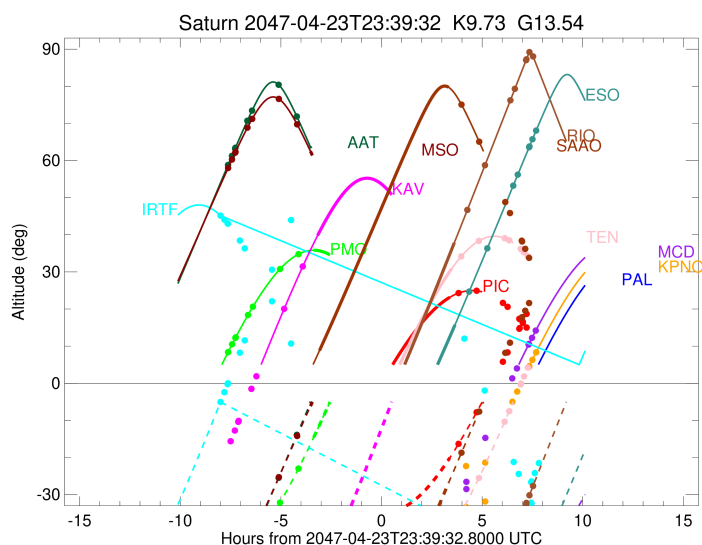
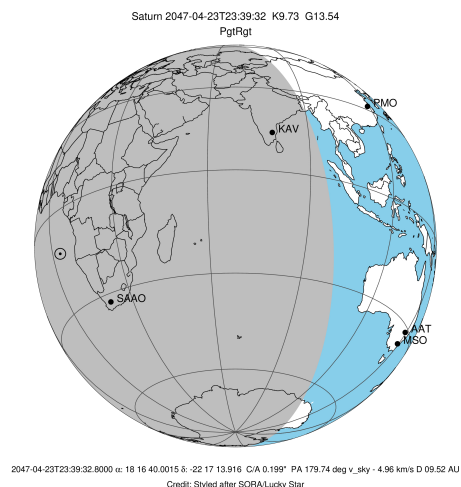
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-04-23T23:53:05.920
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 4090527471194540800
 2Mass ID (if available) : 18163998-2217135
 ICRS Star Coord at Epoch: 18h 16m 40.00150s -22:17:13.91555s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 9.731
 G magnitude : 13.540
 RP magnitude : 12.505
 BP magnitude : 14.652
 DUPflag : 0
 Distance (au) : 9.516
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -4.96
 Sun-Target sep (deg) : 119.23
 Sun-Moon sep (deg) : 105.76
 B (ring opening deg) : 26.04
 PA of pole (deg) : 5.82
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.895
 C/A sky separation (km) : 6179.7
 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	2047-04-23T15:45:21.982	-68.76x	32.66x	140461.00	-4.57			
A (OER)	I	2047-04-23T15:58:48.489	-69.33x	30.25x	136774.40	-4.57			
Encke (OEG)	I	2047-04-23T16:09:50.597	-69.52x	28.26x	133744.89	-4.58			
Encke (IEG)	I	2047-04-23T16:11:00.839	-69.52x	28.05x	133423.31	-4.58			
A (IER)	I	2047-04-23T16:52:19.021	-67.88x	20.51x	122050.38	-4.60			
B (OER)	I	2047-04-23T17:08:31.200	-66.40x	17.53x	117571.16	-4.61			
B (IER)	I	2047-04-23T18:40:08.834	-53.09x	0.97x	91984.69	-4.70			
C (IER)	I	2047-04-23T19:41:45.673	-42.13x	-9.51	74490.58	-4.76			
Saturn	I	2047-04-23T20:30:48.224	-33.13x	-17.13	60267.13		-1.44	-1.77	
Saturn	E	2047-04-24T03:03:22.758	23.17	-20.05	60212.95		11.50	14.02	
C (IER)	E	2047-04-24T03:29:07.776	24.29	-16.35	74490.58	5.39			
B (IER)	E	2047-04-24T04:23:02.409	24.92	-7.83	91984.69	5.43			
B (OER)	E	2047-04-24T05:41:33.473	21.65	5.80x	117571.16	5.43			
A (IER)	E	2047-04-24T05:55:18.971	20.61	8.28x	122050.38	5.42			
Encke (IEG)	E	2047-04-24T06:30:18.890	17.39	14.66x	133423.31	5.41			
Encke (OEG)	E	2047-04-24T06:31:18.369	17.29	14.84x	133744.89	5.41			
A (OER)	E	2047-04-24T06:40:39.037	16.30	16.56x	136774.40	5.40			
F ring	E	2047-04-24T06:52:02.155	15.03	18.65x	140461.00	5.39			

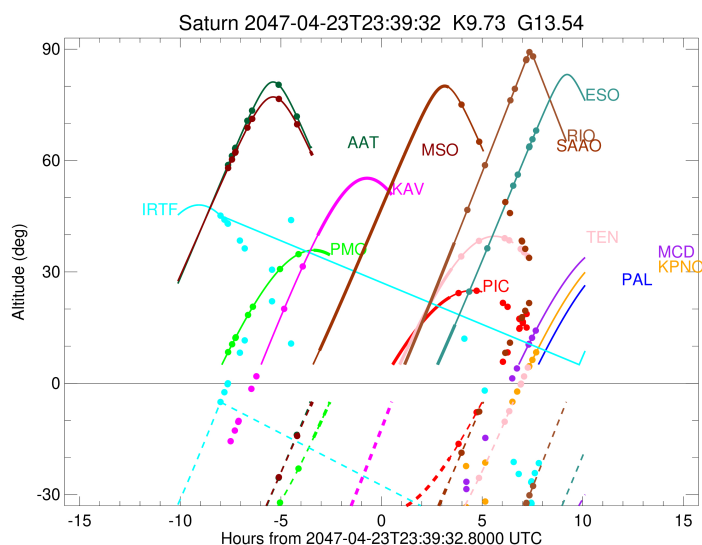
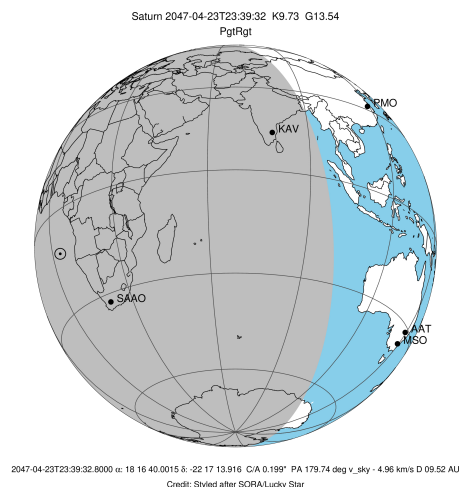
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-04-23T23:26:25.620
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 4090527471194540800
 2Mass ID (if available) : 18163998-2217135
 ICRS Star Coord at Epoch: 18h 16m 40.00150s -22:17:13.91555s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 9.731
 G magnitude : 13.540
 RP magnitude : 12.505
 BP magnitude : 14.652
 DUPflag : 0
 Distance (au) : 9.516
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -4.96
 Sun-Target sep (deg) : 119.23
 Sun-Moon sep (deg) : 106.35
 B (ring opening deg) : 26.04
 PA of pole (deg) : 5.82
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.846
 C/A sky separation (km) : 5836.9
 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	2047-04-23T16:02:20.504		8.42	-45.45	140461.00	-5.12		
A (OER)	I	2047-04-23T16:14:18.677		10.54	-45.36	136774.40	-5.14		
Encke (OEG)	I	2047-04-23T16:24:06.937		12.23	-45.15	133744.89	-5.16		
Encke (IEG)	I	2047-04-23T16:25:09.282		12.41	-45.13	133423.31	-5.16		
A (IER)	I	2047-04-23T17:01:43.044		18.42	-43.26	122050.38	-5.21		
B (OER)	I	2047-04-23T17:16:01.661		20.61	-42.11	117571.16	-5.23		
B (IER)	I	2047-04-23T18:37:04.370		30.78	-32.12	91984.69	-5.29		
C (IER)	I	2047-04-23T19:32:09.462		34.78	-22.96	74490.58	-5.29		
Saturn	I	2047-04-23T20:16:56.725		35.84	-14.66	60267.99		0.18	0.22
Saturn	E	2047-04-24T02:42:07.476		-16.86x	63.40x	60233.86		9.03	11.04
C (IER)	E	2047-04-24T03:17:36.803		-24.19x	68.28x	74490.58	4.90		
B (IER)	E	2047-04-24T04:17:17.460		-36.74x	70.65x	91984.69	4.87		
B (OER)	E	2047-04-24T05:45:24.132		-55.46x	59.74x	117571.16	4.82		
A (IER)	E	2047-04-24T06:00:54.199		-58.72x	56.91x	122050.38	4.81		
Encke (IEG)	E	2047-04-24T06:40:18.534		-66.86x	49.24x	133423.31	4.81		
Encke (OEG)	E	2047-04-24T06:41:25.413		-67.09x	49.02x	133744.89	4.81		
A (OER)	E	2047-04-24T06:51:55.463		-69.18x	46.89x	136774.40	4.81		
F ring	E	2047-04-24T07:04:42.035		-71.65x	44.27x	140461.00	4.81		

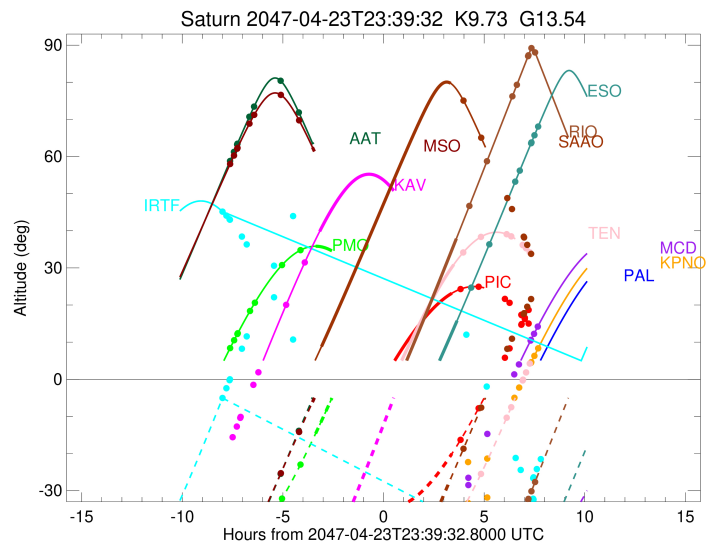
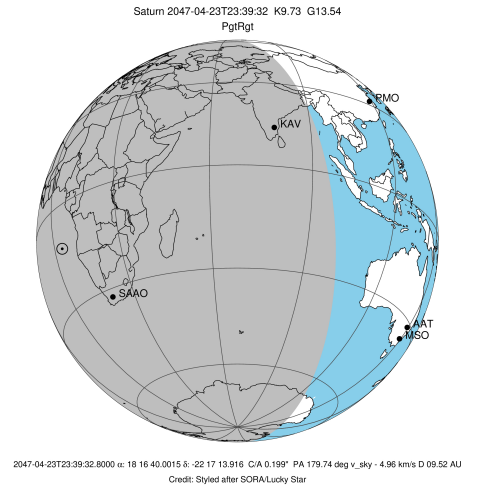
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-04-23T23:39:37.810
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KPNO
 Location : Kitt Peak Natl Obs
 Latitude (deg) : 31.96333
 E. Longitude (deg) : 248.40000
 Altitude (km) : 2.120
 Gaia source ID : 4090527471194540800
 2Mass ID (if available) : 18163998-2217135
 ICRS Star Coord at Epoch: 18h 16m 40.00150s -22:17:13.91555s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 9.731
 G magnitude : 13.540
 RP magnitude : 12.505
 BP magnitude : 14.652
 DUPflag : 0
 Distance (au) : 9.516
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -4.96
 Sun-Target sep (deg) : 119.23
 Sun-Moon sep (deg) : 105.06
 B (ring opening deg) : 26.04
 PA of pole (deg) : 5.82
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.352
 C/A sky separation (km) : 2427.9
 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

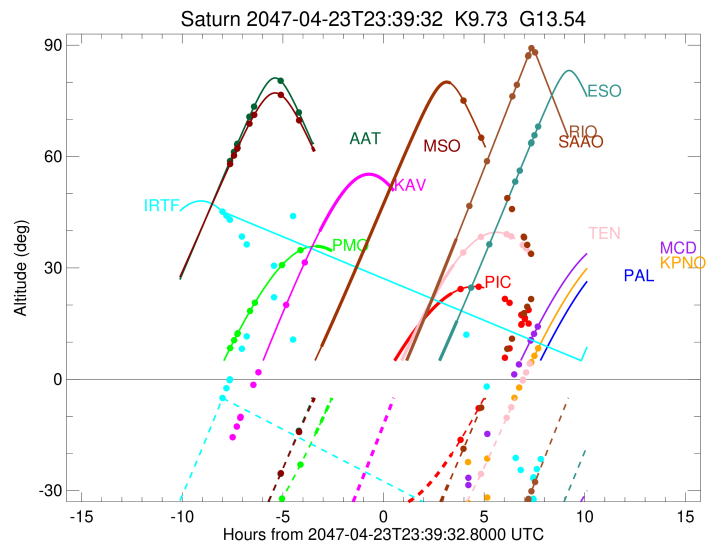
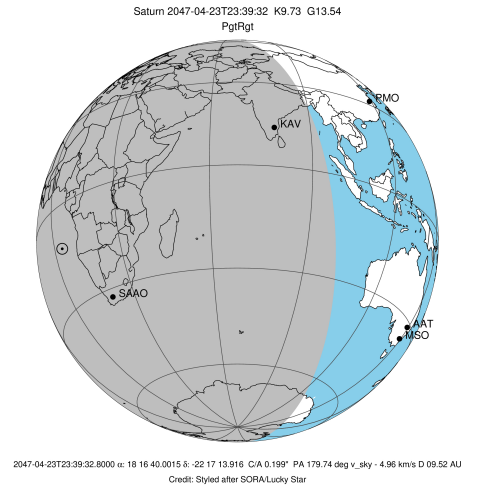
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-04-23T15:29:38.060		12.85	33.07x	140461.00	-5.09		
A (OER)	I	2047-04-23T15:41:43.732		10.76	35.63x	136774.40	-5.07		
Encke (OEG)	I	2047-04-23T15:51:41.751		9.00	37.72x	133744.89	-5.06		
Encke (IEG)	I	2047-04-23T15:52:45.321		8.81	37.95x	133423.31	-5.06		
A (IER)	I	2047-04-23T16:30:25.376		1.89x	45.77x	122050.38	-5.01		
B (OER)	I	2047-04-23T16:45:22.077		-0.95x	48.81x	117571.16	-4.98		
B (IER)	I	2047-04-23T18:12:01.006		-18.22x	64.65x	91984.69	-4.86		
C (IER)	I	2047-04-23T19:12:33.007		-30.83x	70.71x	74490.58	-4.78		
Saturn	I	2047-04-23T20:01:09.934		-41.14x	69.15x	60265.04		-2.65	-3.25
Saturn	E	2047-04-24T03:14:46.796		-41.17x	-15.47	60239.24		8.28	10.14
C (IER)	E	2047-04-24T03:51:32.638		-33.37x	-22.27	74490.58	5.04		
B (IER)	E	2047-04-24T04:48:41.492		-21.40x	-31.83	91984.69	5.16		
B (OER)	E	2047-04-24T06:09:55.204		-4.98x	-41.91	117571.16	5.33		
A (IER)	E	2047-04-24T06:23:52.745		-2.27x	-43.05	122050.38	5.36		
Encke (IEG)	E	2047-04-24T06:59:00.537		4.39x	-44.93	133423.31	5.43		
Encke (OEG)	E	2047-04-24T06:59:59.764		4.57x	-44.96	133744.89	5.43		
A (OER)	E	2047-04-24T07:09:16.777		6.27	-45.19	136774.40	5.45		
F ring	E	2047-04-24T07:20:32.333		8.31	-45.33	140461.00	5.47		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-04-23T23:42:14.270
 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 : 4090527471194540800
 2Mass ID (if available) : 18163998-2217135
 ICRS Star Coord at Epoch: 18h 16m 40.00150s -22:17:13.91555s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 9.731
 G magnitude : 13.540
 RP magnitude : 12.505
 BP magnitude : 14.652
 DUPflag : 0
 Distance (au) : 9.516
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -4.96
 Sun-Target sep (deg) : 119.23
 Sun-Moon sep (deg) : 105.03
 B (ring opening deg) : 26.04
 PA of pole (deg) : 5.82
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.336
 C/A sky separation (km) : 2317.3
 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	2047-04-23T15:28:31.812		8.42	39.43x	140461.00	-5.04		
A (OER)	I	2047-04-23T15:40:44.059		6.17	42.02x	136774.40	-5.03		
Encke (OEG)	I	2047-04-23T15:50:47.664		4.28x	44.15x	133744.89	-5.01		
Encke (IEG)	I	2047-04-23T15:51:51.836		4.08x	44.37x	133423.31	-5.01		
A (IER)	I	2047-04-23T16:29:54.242		-3.28x	52.23x	122050.38	-4.95		
B (OER)	I	2047-04-23T16:45:00.248		-6.28x	55.25x	117571.16	-4.93		
B (IER)	I	2047-04-23T18:12:35.557		-24.33x	69.75x	91984.69	-4.81		
C (IER)	I	2047-04-23T19:13:45.991		-37.36x	71.64x	74490.58	-4.73		
Saturn	I	2047-04-23T20:02:33.601		-47.88x	66.23x	60264.34		-2.94	-3.62
Saturn	E	2047-04-24T03:16:16.668		-34.27x	-22.06	60238.52		8.38	10.26
C (IER)	E	2047-04-24T03:52:24.109		-26.58x	-28.47	74490.58	5.09		
B (IER)	E	2047-04-24T04:48:56.493		-14.75x	-37.22	91984.69	5.22		
B (OER)	E	2047-04-24T06:09:21.405		1.33x	-45.32	117571.16	5.38		
A (IER)	E	2047-04-24T06:23:11.255		3.97x	-46.00	122050.38	5.41		
Encke (IEG)	E	2047-04-24T06:58:00.909		10.40	-46.62	133423.31	5.47		
Encke (OEG)	E	2047-04-24T06:58:59.653		10.57	-46.62	133744.89	5.47		
A (OER)	E	2047-04-24T07:08:12.208		12.21	-46.50	136774.40	5.49		
F ring	E	2047-04-24T07:19:22.549		14.16	-46.21	140461.00	5.51		

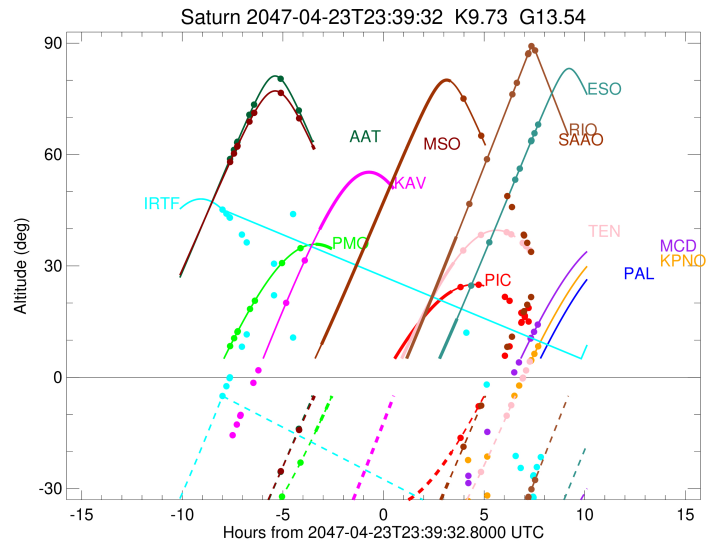
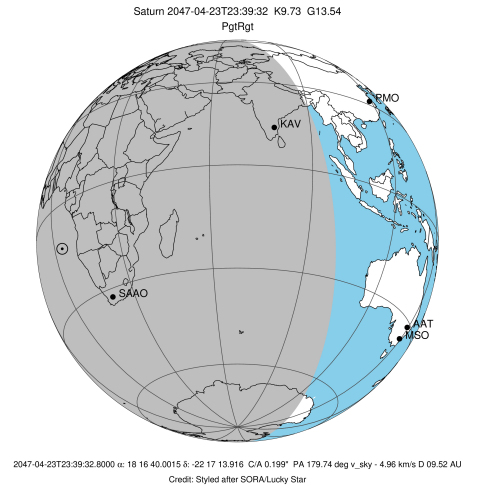
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-04-23T23:57:33.780
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 4090527471194540800
 2Mass ID (if available) : 18163998-2217135
 ICRS Star Coord at Epoch: 18h 16m 40.00150s -22:17:13.91555s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 9.731
 G magnitude : 13.540
 RP magnitude : 12.505
 BP magnitude : 14.652
 DUPflag : 0
 Distance (au) : 9.516
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -4.96
 Sun-Target sep (deg) : 119.23
 Sun-Moon sep (deg) : 105.62
 B (ring opening deg) : 26.04
 PA of pole (deg) : 5.82
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.663
 C/A sky separation (km) : 4579.2
 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	2047-04-23T15:40:47.315	-67.08x	50.41x	140461.00	-4.52			
A (OER)	I	2047-04-23T15:54:23.355	-70.03x	47.49x	136774.40	-4.52			
Encke (OEG)	I	2047-04-23T16:05:34.168	-72.43x	45.08x	133744.89	-4.52			
Encke (IEG)	I	2047-04-23T16:06:45.379	-72.68x	44.82x	133423.31	-4.52			
A (IER)	I	2047-04-23T16:48:42.767	-81.03x	35.65x	122050.38	-4.52			
B (OER)	I	2047-04-23T17:05:12.682	-83.39x	32.03x	117571.16	-4.53			
B (IER)	I	2047-04-23T18:38:45.114	-70.94x	11.47x	91984.69	-4.60			
C (IER)	I	2047-04-23T19:41:38.971	-57.17x	-2.08x	74490.58	-4.67			
Saturn	I	2047-04-23T20:30:17.852	-46.42x	-12.24	60264.06			-3.05	-3.75
Saturn	E	2047-04-24T03:09:13.545	30.92	-39.08	60221.45			10.56	12.89
C (IER)	E	2047-04-24T03:37:08.537	34.14	-34.79	74490.58	5.49			
B (IER)	E	2047-04-24T04:29:59.060	38.35	-25.53	91984.69	5.54			
B (OER)	E	2047-04-24T05:46:48.243	39.08	-10.35	117571.16	5.55			
A (IER)	E	2047-04-24T06:00:14.740	38.51	-7.56	122050.38	5.55			
Encke (IEG)	E	2047-04-24T06:34:24.999	36.21	-0.35x	133423.31	5.54			
Encke (OEG)	E	2047-04-24T06:35:23.047	36.12	-0.14x	133744.89	5.54			
A (OER)	E	2047-04-24T06:44:30.166	35.31	1.81x	136774.40	5.53			
F ring	E	2047-04-24T06:55:36.647	34.21	4.20x	140461.00	5.53			

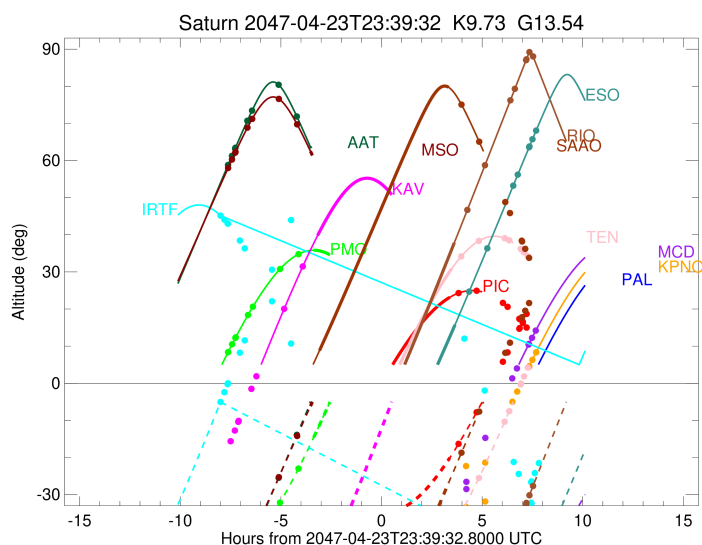
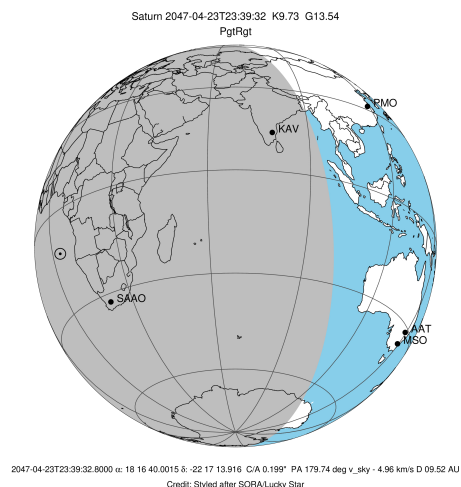
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-04-23T23:24:53.290
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : IRTF
 Location : Mauna Kea/IRTF
 Latitude (deg) : 19.82622
 E. Longitude (deg) : 204.52800
 Altitude (km) : 4.168
 Gaia source ID : 4090527471194540800
 2Mass ID (if available) : 18163998-2217135
 ICRS Star Coord at Epoch: 18h 16m 40.00150s -22:17:13.91555s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 9.731
 G magnitude : 13.540
 RP magnitude : 12.505
 BP magnitude : 14.652
 DUPflag : 0
 Distance (au) : 9.516
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -4.96
 Sun-Target sep (deg) : 119.23
 Sun-Moon sep (deg) : 105.40
 B (ring opening deg) : 26.04
 PA of pole (deg) : 5.82
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.257
 C/A sky separation (km) : 1775.6
 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



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	2047-04-23T15:39:40.151		45.14	-5.01	140461.00	-5.32		
A (OER)	I	2047-04-23T15:51:13.135		44.07	-2.39x	136774.40	-5.32		
Encke (OEG)	I	2047-04-23T16:00:43.204		43.08	-0.21x	133744.89	-5.31		
Encke (IEG)	I	2047-04-23T16:01:43.750		42.97	0.02x	133423.31	-5.31		
A (IER)	I	2047-04-23T16:37:30.255		38.42	8.26x	122050.38	-5.28		
B (OER)	I	2047-04-23T16:51:38.921		36.33	11.54x	117571.16	-5.27		
B (IER)	I	2047-04-23T18:13:15.332		22.06	30.62x	91984.69	-5.17		
C (IER)	I	2047-04-23T19:10:04.532		10.67	43.99x	74490.58	-5.09		
Saturn	I	2047-04-23T19:56:03.684		0.94x	54.80x	60265.83		-2.27	-2.79
Saturn	E	2047-04-24T03:03:11.175		-82.50x	22.13x	60250.81		6.39	7.84
C (IER)	E	2047-04-24T03:46:26.230		-72.64x	12.05x	74490.58	4.76		
B (IER)	E	2047-04-24T04:47:10.056		-58.56x	-1.93x	91984.69	4.85		
B (OER)	E	2047-04-24T06:13:38.899		-38.59x	-21.21	117571.16	5.02		
A (IER)	E	2047-04-24T06:28:28.525		-35.18x	-24.39	122050.38	5.05		
Encke (IEG)	E	2047-04-24T07:05:41.696		-26.69x	-32.16	133423.31	5.13		
Encke (OEG)	E	2047-04-24T07:06:44.308		-26.45x	-32.37	133744.89	5.14		
A (OER)	E	2047-04-24T07:16:32.738		-24.23x	-34.34	136774.40	5.16		
F ring	E	2047-04-24T07:28:25.342		-21.54x	-36.68	140461.00	5.19		

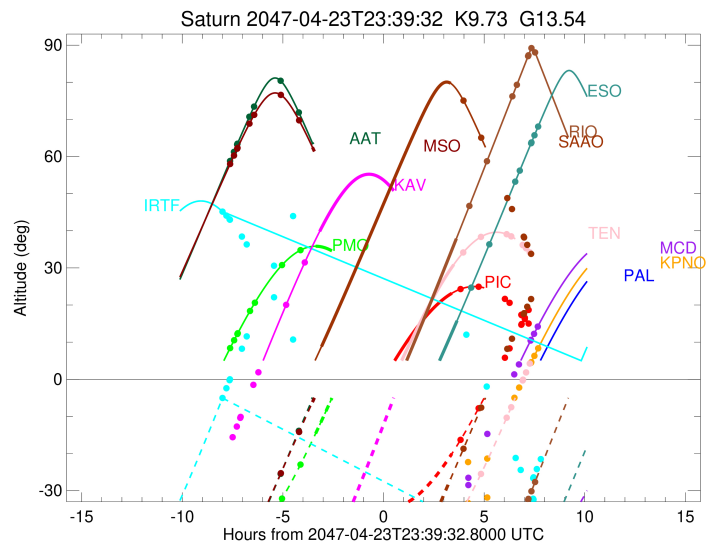
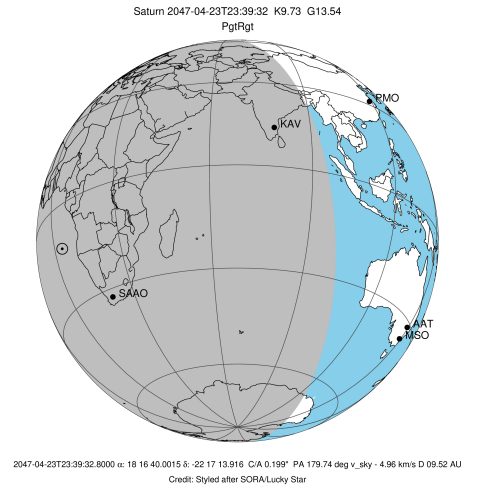
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-04-23T23:21:40.540
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : AAT
 Location : Siding Spring (AAT)
 Latitude (deg) : -31.27703
 E. Longitude (deg) : 149.06608
 Altitude (km) : 1.164
 Gaia source ID : 4090527471194540800
 2Mass ID (if available) : 18163998-2217135
 ICRS Star Coord at Epoch: 18h 16m 40.00150s -22:17:13.91555s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 9.731
 G magnitude : 13.540
 RP magnitude : 12.505
 BP magnitude : 14.652
 DUPflag : 0
 Distance (au) : 9.516
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -4.96
 Sun-Target sep (deg) : 119.23
 Sun-Moon sep (deg) : 106.38
 B (ring opening deg) : 26.04
 PA of pole (deg) : 5.82
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.180
 C/A sky separation (km) : 1244.5
 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	2047-04-23T16:02:10.676		58.83	-56.75	140461.00	-5.31		
A (OER)	I	2047-04-23T16:13:44.718		61.28	-54.52	136774.40	-5.32		
Encke (OEG)	I	2047-04-23T16:23:13.962		63.27	-52.64	133744.89	-5.33		
Encke (IEG)	I	2047-04-23T16:24:14.331		63.48	-52.44	133423.31	-5.33		
A (IER)	I	2047-04-23T16:59:43.502		70.75	-45.21	122050.38	-5.35		
B (OER)	I	2047-04-23T17:13:39.447		73.45	-42.31	117571.16	-5.36		
B (IER)	I	2047-04-23T18:33:00.076		80.40	-25.44	91984.69	-5.38		
C (IER)	I	2047-04-23T19:27:16.302		71.84	-13.86	74490.58	-5.36		
Saturn	I	2047-04-23T20:07:18.718		63.69	-5.40	60256.14		-5.31	-6.51
Saturn	E	2047-04-24T02:46:14.127		-16.88x	44.81x	60264.47		2.89	3.55
C (IER)	E	2047-04-24T03:33:57.503		-24.17x	40.82x	74490.58	4.80		
B (IER)	E	2047-04-24T04:34:56.870		-31.53x	32.72x	91984.69	4.77		
B (OER)	E	2047-04-24T06:04:20.948		-36.57x	17.13x	117571.16	4.78		
A (IER)	E	2047-04-24T06:19:56.999		-36.61x	14.12x	122050.38	4.79		
Encke (IEG)	E	2047-04-24T06:59:24.427		-35.53x	6.29x	133423.31	4.82		
Encke (OEG)	E	2047-04-24T07:00:31.134		-35.48x	6.06x	133744.89	4.82		
A (OER)	E	2047-04-24T07:10:58.846		-34.91x	3.93x	136774.40	4.83		
F ring	E	2047-04-24T07:23:40.833		-34.08x	1.33x	140461.00	4.84		

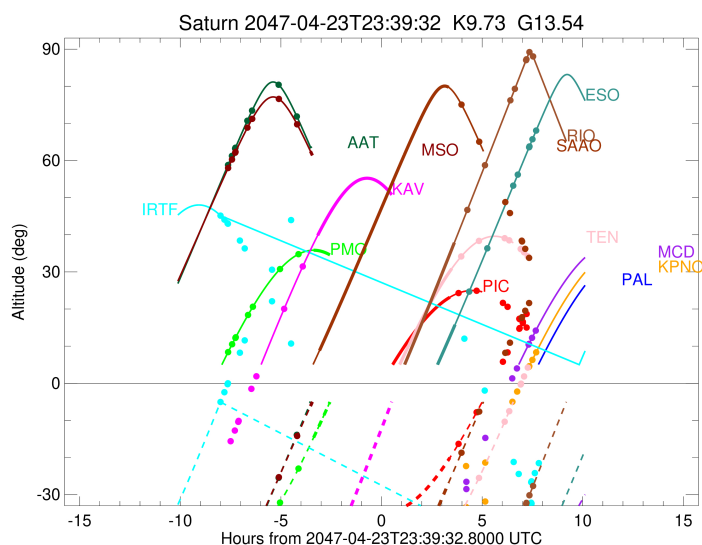
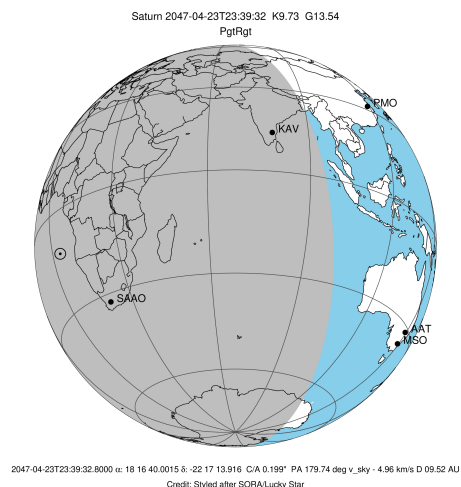
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-04-23T23:52:12.030
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : SAAO
 Location : So. Afr. Astro. Obs. (Sutherland)
 Latitude (deg) : -32.37953
 E. Longitude (deg) : 20.81070
 Altitude (km) : 1.768
 Gaia source ID : 4090527471194540800
 2Mass ID (if available) : 18163998-2217135
 ICRS Star Coord at Epoch: 18h 16m 40.00150s -22:17:13.91555s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 9.731
 G magnitude : 13.540
 RP magnitude : 12.505
 BP magnitude : 14.652
 DUPflag : 0
 Distance (au) : 9.516
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -4.96
 Sun-Target sep (deg) : 119.23
 Sun-Moon sep (deg) : 106.38
 B (ring opening deg) : 26.04
 PA of pole (deg) : 5.82
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.039
 C/A sky separation (km) : 270.0
 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



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	2047-04-23T16:04:04.591		-32.70x	-0.34x	140461.00	-4.57		
A (OER)	I	2047-04-23T16:17:29.479		-31.62x	-3.10x	136774.40	-4.59		
Encke (OEG)	I	2047-04-23T16:28:28.620		-30.62x	-5.37	133744.89	-4.60		
Encke (IEG)	I	2047-04-23T16:29:38.461		-30.51x	-5.61	133423.31	-4.61		
A (IER)	I	2047-04-23T17:10:32.011		-25.94x	-14.16	122050.38	-4.67		
B (OER)	I	2047-04-23T17:26:29.058		-23.85x	-17.52	117571.16	-4.69		
B (IER)	I	2047-04-23T18:55:46.624		-9.78x	-36.38	91984.69	-4.86		
C (IER)	I	2047-04-23T19:54:59.752		1.09x	-48.57	74490.58	-4.99		
Saturn	I	2047-04-23T20:34:27.736		8.78	-56.23	60247.41		-7.00	-8.58
Saturn	E	2047-04-24T02:59:42.914		79.72	-26.81	60254.47		5.67	6.95
C (IER)	E	2047-04-24T03:37:53.733		75.09	-18.74	74490.58	5.53		
B (IER)	E	2047-04-24T04:30:44.535		65.09	-7.66	91984.69	5.50		
B (OER)	E	2047-04-24T05:48:42.023		48.80	8.20x	117571.16	5.43		
A (IER)	E	2047-04-24T06:02:27.737		45.88	10.90x	122050.38	5.42		
Encke (IEG)	E	2047-04-24T06:37:35.501		38.44	17.59x	133423.31	5.37		
Encke (OEG)	E	2047-04-24T06:38:35.349		38.23	17.78x	133744.89	5.37		
A (OER)	E	2047-04-24T06:47:59.870		36.24	19.51x	136774.40	5.36		
F ring	E	2047-04-24T06:59:28.595		33.82	21.59x	140461.00	5.35		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-04-23T23:22:27.250
 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 : 4090527471194540800
 2Mass ID (if available) : 18163998-2217135
 ICRS Star Coord at Epoch: 18h 16m 40.00150s -22:17:13.91555s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 9.731
 G magnitude : 13.540
 RP magnitude : 12.505
 BP magnitude : 14.652
 DUPflag : 0
 Distance (au) : 9.516
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -4.96
 Sun-Target sep (deg) : 119.23
 Sun-Moon sep (deg) : 106.38
 B (ring opening deg) : 26.04
 PA of pole (deg) : 5.82
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.234
 C/A sky separation (km) : 1615.4
 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	2047-04-23T16:02:20.886		58.01	-54.77	140461.00	-5.29		
A (OER)	I	2047-04-23T16:13:57.029		60.30	-52.73	136774.40	-5.30		
Encke (OEG)	I	2047-04-23T16:23:28.026		62.15	-51.00	133744.89	-5.31		
Encke (IEG)	I	2047-04-23T16:24:28.583		62.34	-50.82	133423.31	-5.31		
A (IER)	I	2047-04-23T17:00:04.524		68.90	-44.07	122050.38	-5.34		
B (OER)	I	2047-04-23T17:14:03.198		71.22	-41.34	117571.16	-5.34		
B (IER)	I	2047-04-23T18:33:39.796		76.59	-25.28	91984.69	-5.36		
C (IER)	I	2047-04-23T19:28:07.063		69.72	-14.16	74490.58	-5.34		
Saturn	I	2047-04-23T20:07:42.788		62.50	-6.16	60254.45		-5.67	-6.96
Saturn	E	2047-04-24T02:46:51.669		-14.31x	40.89x	60265.05		2.64	3.25
C (IER)	E	2047-04-24T03:34:42.299		-21.17x	37.26x	74490.58	4.81		
B (IER)	E	2047-04-24T04:35:31.054		-27.96x	29.82x	91984.69	4.78		
B (OER)	E	2047-04-24T06:04:36.807		-32.55x	15.24x	117571.16	4.80		
A (IER)	E	2047-04-24T06:20:09.602		-32.58x	12.41x	122050.38	4.81		
Encke (IEG)	E	2047-04-24T06:59:29.027		-31.61x	4.98x	133423.31	4.84		
Encke (OEG)	E	2047-04-24T07:00:35.516		-31.56x	4.77x	133744.89	4.84		
A (OER)	E	2047-04-24T07:11:01.199		-31.04x	2.74x	136774.40	4.85		
F ring	E	2047-04-24T07:23:40.790		-30.28x	0.27x	140461.00	4.86		