

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-03-21T22:19:02.540
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 4090687901106088320
 2Mass ID (if available) : 18151658-2218501

Saturn 2047-03-21T22:19:02 K8.80 G14.15 PgtRgt

ICRS Star Coord at Epoch: 18h 15m 16.58002s -22:18:50.21276s

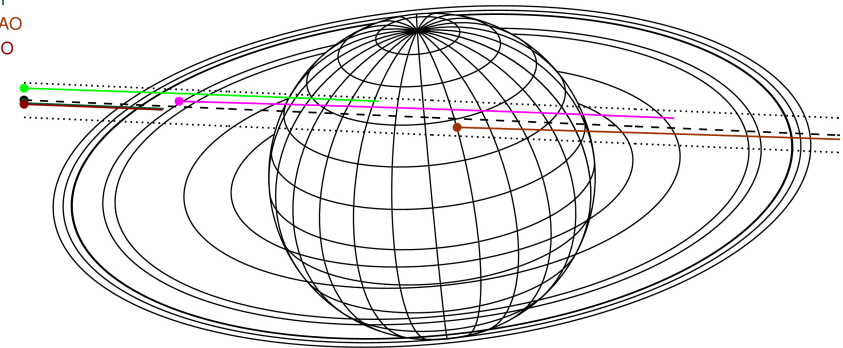
RUWE (>1.4 is poor) : 1.09
 K magnitude : 8.799
 G magnitude : 14.154
 RP magnitude : 12.763
 BP magnitude : 16.313
 DUPflag : 0
 Distance (au) : 10.047
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 11.13
 Sun-Target sep (deg) : 87.03
 Sun-Moon sep (deg) : 35.99
 B (ring opening deg) : 26.10
 PA of pole (deg) : 5.80

#	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



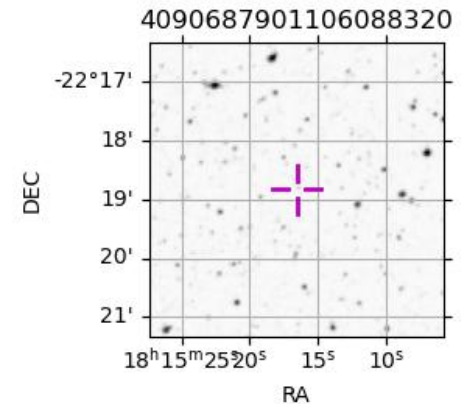
2047-03-21T22:19:02.5400 xi: 18 15 16.5800 s: -22 18 50.213 C/A 2.980° PA 177.53 deg v_sky +11.13 km/s D 10.05 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PMO
 KAV
 AAT
 SAO
 MSO

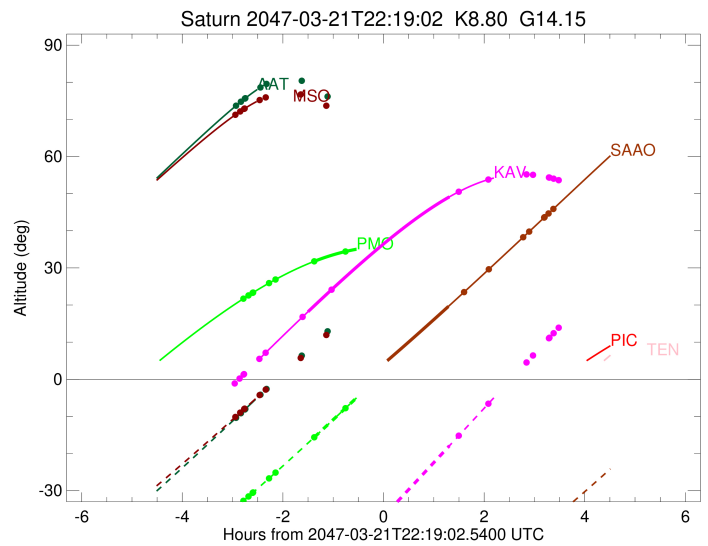
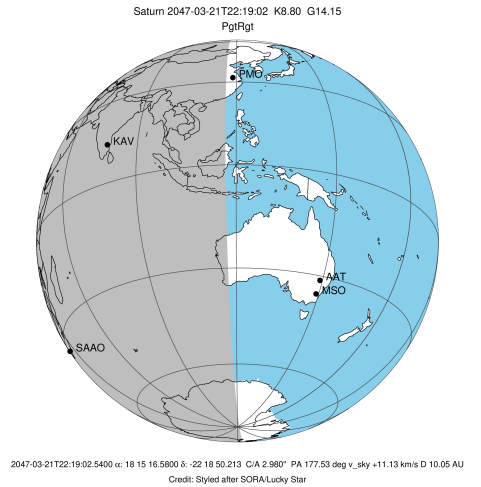


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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 21 19:32 - MAR 21 20:56	PinRin
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					PnnRnn
KAV	Kavalur Observ	12.6	78.8	+	+	+	MAR 21 19:51 - MAR 22 00:24	PieRie
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 21 19:23 - MAR 21 19:34	PnnRin
SAO	So. Afr. Astro	-32.4	20.8		+	+	MAR 21 23:36 - MAR 22 01:41	PneRne
MSO	Mt. Stromlo Ob	-35.3	149.0	+	+	+	MAR 21 19:22 - MAR 21 19:33	PnnRin



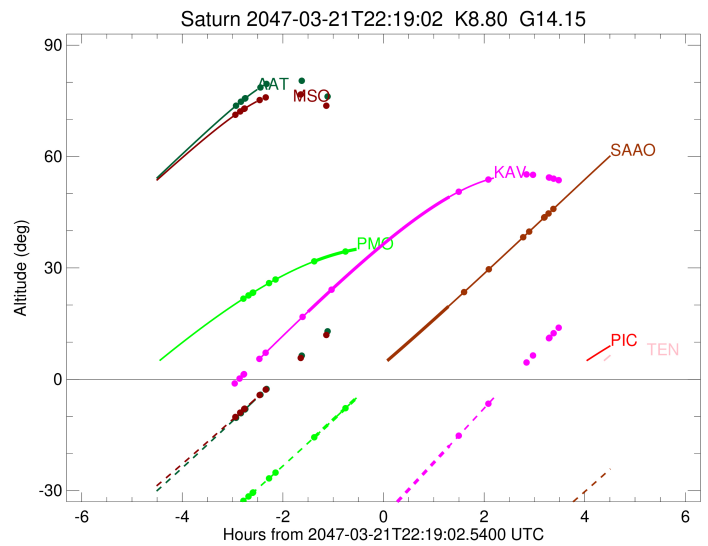
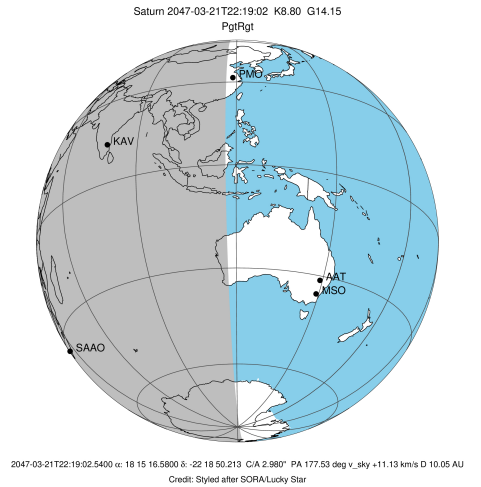
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-03-21T22:19:15.480
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 4090687901106088320
 2Mass ID (if available) : 18151658-2218501
 ICRS Star Coord at Epoch: 18h 15m 16.58002s -22:18:50.21276s
 RUWE (>1.4 is poor) : 1.09
 K magnitude : 8.799
 G magnitude : 14.154
 RP magnitude : 12.763
 BP magnitude : 16.313
 DUPflag : 0
 Distance (au) : 10.047
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 11.13
 Sun-Target sep (deg) : 87.03
 Sun-Moon sep (deg) : 36.30
 B (ring opening deg) : 26.10
 PA of pole (deg) : 5.80
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 3.690
 C/A sky separation (km) : 26887.8
 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	2047-03-21T19:32:03.534		21.72	-32.72	140461.00	-10.22		
A (OER)	I	2047-03-21T19:38:05.257		22.59	-31.55	136774.40	-10.16		
Encke (OEG)	I	2047-03-21T19:43:04.349		23.30	-30.57	133744.89	-10.10		
Encke (IEG)	I	2047-03-21T19:43:36.200		23.37	-30.47	133423.31	-10.09		
A (IER)	I	2047-03-21T20:02:37.123		25.91	-26.68	122050.38	-9.83		
B (OER)	I	2047-03-21T20:10:15.461		26.87	-25.14	117571.16	-9.71		
B (IER)	I	2047-03-21T20:56:32.142	b	31.78	-15.61	91984.69	-8.59		
C (IER)	I	2047-03-21T21:33:54.289	b	34.43	-7.75	74490.58	-6.83		
Saturn	I	2047-03-21T20:56:15.284		31.75	-15.67	59903.96		30.87	36.14
Saturn	E	2047-03-21T23:42:56.542		32.70	19.52x	60159.83		16.19	19.60
C (IER)	E	2047-03-21T23:51:08.898		32.03	21.22x	74490.58	6.89		
B (IER)	E	2047-03-22T00:28:17.282		28.30	28.79x	91984.69	8.63		
B (OER)	E	2047-03-22T01:14:20.113		22.32	37.76x	117571.16	9.76		
A (IER)	E	2047-03-22T01:21:56.148		21.22	39.18x	122050.38	9.88		
Encke (IEG)	E	2047-03-22T01:40:51.286		18.34	42.60x	133423.31	10.14		
Encke (OEG)	E	2047-03-22T01:41:22.974		18.26	42.69x	133744.89	10.15		
A (OER)	E	2047-03-22T01:46:20.542		17.47	43.56x	136774.40	10.21		
F ring	E	2047-03-22T01:52:20.422		16.51	44.59x	140461.00	10.28		

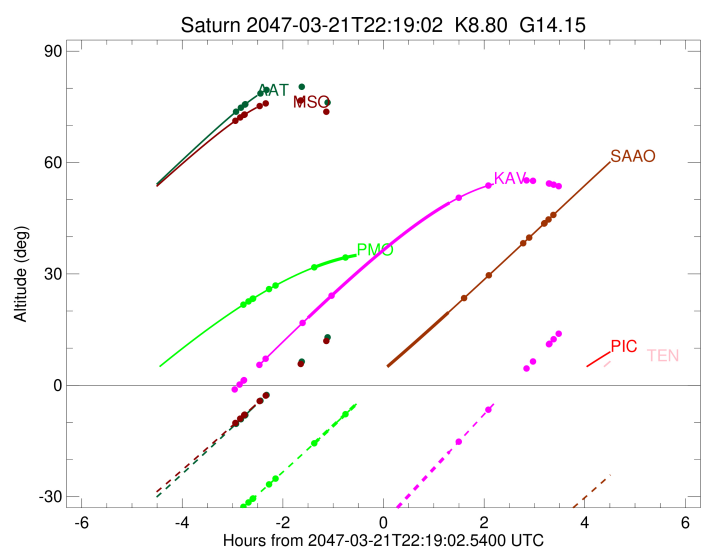
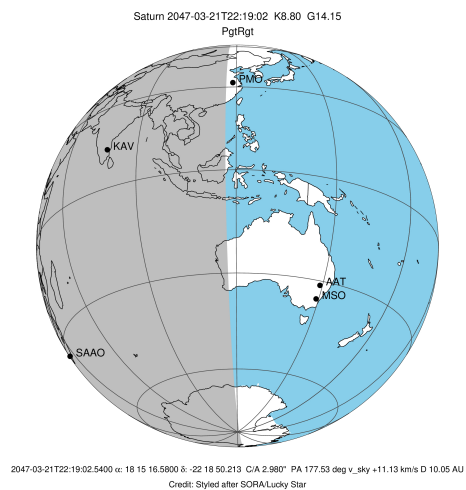
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-03-21T22:12:32.100
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KAV
 Location : Kavalur Observatory
 Latitude (deg) : 12.57556
 E. Longitude (deg) : 78.83167
 Altitude (km) : 0.722
 Gaia source ID : 4090687901106088320
 2Mass ID (if available) : 18151658-2218501
 ICRS Star Coord at Epoch: 18h 15m 16.58002s -22:18:50.21276s
 RUWE (>1.4 is poor) : 1.09
 K magnitude : 8.799
 G magnitude : 14.154
 RP magnitude : 12.763
 BP magnitude : 16.313
 DUPflag : 0
 Distance (au) : 10.047
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 11.13
 Sun-Target sep (deg) : 87.03
 Sun-Moon sep (deg) : 36.78
 B (ring opening deg) : 26.10
 PA of pole (deg) : 5.80
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 3.420
 C/A sky separation (km) : 24921.7
 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	2047-03-21T19:21:39.567		-1.10x	-75.08	140461.00	-10.60		
A (OER)	I	2047-03-21T19:27:28.448		0.21x	-74.31	136774.40	-10.53		
Encke (OEG)	I	2047-03-21T19:32:16.822		1.29x	-73.60	133744.89	-10.48		
Encke (IEG)	I	2047-03-21T19:32:47.525		1.40x	-73.52	133423.31	-10.47		
A (IER)	I	2047-03-21T19:51:06.361		5.51	-70.38	122050.38	-10.22		
B (OER)	I	2047-03-21T19:58:27.076		7.14	-68.97	117571.16	-10.10		
B (IER)	I	2047-03-21T20:42:38.230		16.82	-59.57	91984.69	-9.09		
C (IER)	I	2047-03-21T21:17:15.995	b	24.17	-51.62	74490.58	-7.60		
Saturn	I	2047-03-21T20:48:54.255		18.17	-58.15	59951.94		28.54	33.62
Saturn	E	2047-03-21T23:37:40.254		49.15	-17.91	60176.13		14.89	18.06
C (IER)	E	2047-03-21T23:48:48.430		50.51	-15.20	74490.58	7.49		
B (IER)	E	2047-03-22T00:24:09.078		53.80	-6.58	91984.69	8.86		
B (OER)	E	2047-03-22T01:09:42.832		55.19	4.54x	117571.16	9.75		
A (IER)	E	2047-03-22T01:17:19.850		55.07	6.40x	122050.38	9.85		
Encke (IEG)	E	2047-03-22T01:36:22.233		54.36	11.05x	133423.31	10.05		
Encke (OEG)	E	2047-03-22T01:36:54.211		54.33	11.18x	133744.89	10.06		
A (OER)	E	2047-03-22T01:41:54.700		54.03	12.40x	136774.40	10.10		
F ring	E	2047-03-22T01:47:58.589		53.63	13.88x	140461.00	10.16		

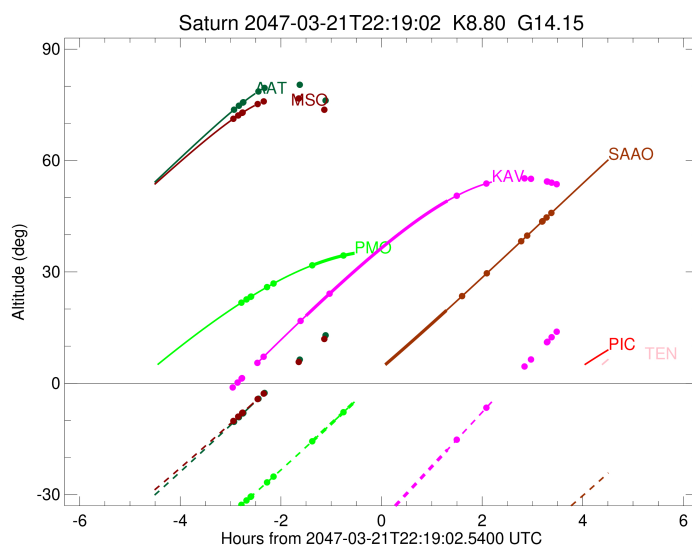
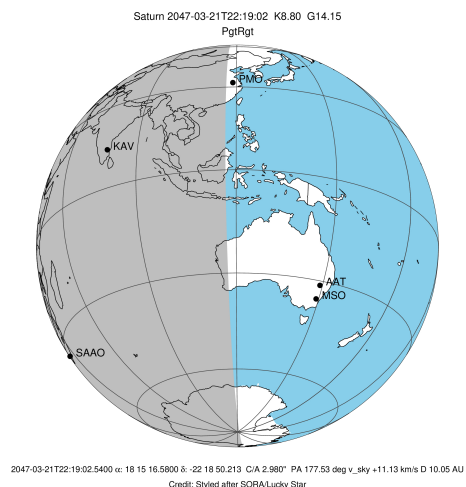
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-03-21T22:23:15.520
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : AAT
 Location : Siding Spring (AAT)
 Latitude (deg) : -31.27703
 E. Longitude (deg) : 149.06608
 Altitude (km) : 1.164
 Gaia source ID : 4090687901106088320
 2Mass ID (if available) : 18151658-2218501
 ICRS Star Coord at Epoch: 18h 15m 16.58002s -22:18:50.21276s
 RUWE (>1.4 is poor) : 1.09
 K magnitude : 8.799
 G magnitude : 14.154
 RP magnitude : 12.763
 BP magnitude : 16.313
 DUPflag : 0
 Distance (au) : 10.047
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 11.13
 Sun-Target sep (deg) : 87.03
 Sun-Moon sep (deg) : 36.18
 B (ring opening deg) : 26.10
 PA of pole (deg) : 5.80
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 2.792
 C/A sky separation (km) : 20342.7
 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_itr93_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	2047-03-21T19:23:15.679		73.71	-10.37	140461.00	-10.64		
A (OER)	I	2047-03-21T19:29:02.838		74.78	-9.13	136774.40	-10.60		
Encke (OEG)	I	2047-03-21T19:33:48.991		75.63	-8.12	133744.89	-10.57		
Encke (IEG)	I	2047-03-21T19:34:19.413		75.72	-8.01	133423.31	-10.57		
A (IER)	I	2047-03-21T19:52:22.057		78.62	-4.15x	122050.38	-10.44		
B (OER)	I	2047-03-21T19:59:32.548		79.56	-2.62x	117571.16	-10.37		
B (IER)	I	2047-03-21T20:41:39.105		80.40	6.38x	91984.69	-9.81		
C (IER)	I	2047-03-21T21:12:29.890	b	76.14	12.94x	74490.58	-9.00		
Saturn	I	2047-03-21T20:55:51.160		78.76	9.41x	60014.95		25.29	30.03
Saturn	E	2047-03-21T23:50:37.716		43.44	44.16x	60227.74		9.79	11.96
C (IER)	E	2047-03-22T00:09:29.006		39.40	47.28x	74490.58	9.17		
B (IER)	E	2047-03-22T00:39:43.077		32.95	51.71x	91984.69	10.03		
B (OER)	E	2047-03-22T01:20:48.012		24.28	56.22x	117571.16	10.66		
A (IER)	E	2047-03-22T01:27:46.730		22.82	56.76x	122050.38	10.73		
Encke (IEG)	E	2047-03-22T01:45:18.304		19.17	57.78x	133423.31	10.89		
Encke (OEG)	E	2047-03-22T01:45:47.825		19.07	57.80x	133744.89	10.90		
A (OER)	E	2047-03-22T01:50:25.426		18.11	57.99x	136774.40	10.93		
F ring	E	2047-03-22T01:56:02.041		16.95	58.16x	140461.00	10.97		

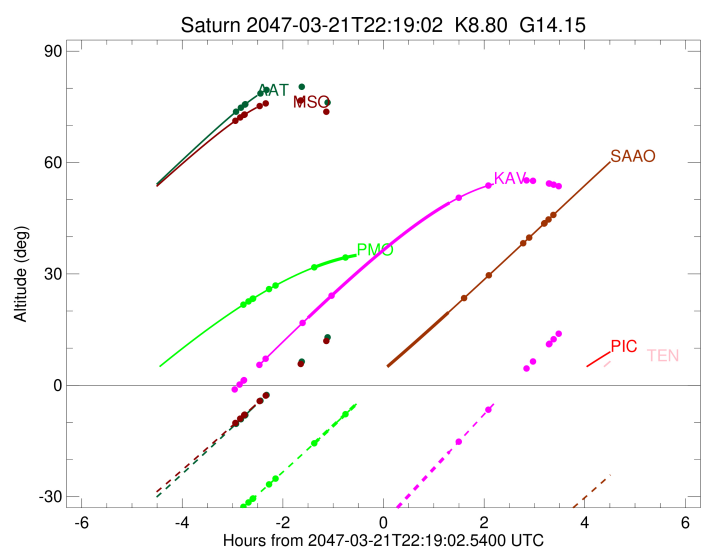
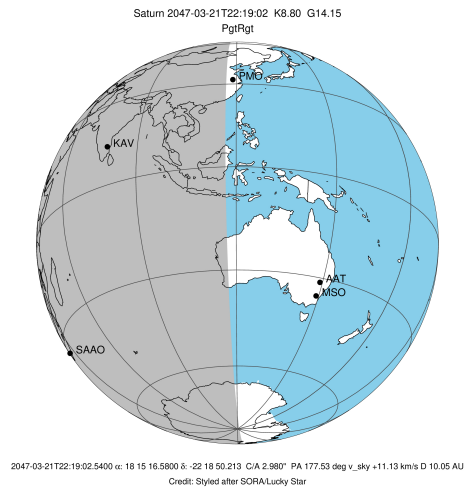
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-03-21T22:10:31.310
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : SAAO
 Location : So. Afr. Astro. Obs. (Sutherland)
 Latitude (deg) : -32.37953
 E. Longitude (deg) : 20.81070
 Altitude (km) : 1.768
 Gaia source ID : 4090687901106088320
 2Mass ID (if available) : 18151658-2218501
 ICRS Star Coord at Epoch: 18h 15m 16.58002s -22:18:50.21276s
 RUWE (>1.4 is poor) : 1.09
 K magnitude : 8.799
 G magnitude : 14.154
 RP magnitude : 12.763
 BP magnitude : 16.313
 DUPflag : 0
 Distance (au) : 10.047
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 11.13
 Sun-Target sep (deg) : 87.03
 Sun-Moon sep (deg) : 36.67
 B (ring opening deg) : 26.10
 PA of pole (deg) : 5.80
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 2.528
 C/A sky separation (km) : 18421.4
 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	2047-03-21T19:14:05.501		-26.51x	-31.35	140461.00	-11.46		
A (OER)	I	2047-03-21T19:19:27.598		-25.84x	-32.40	136774.40	-11.43		
Encke (OEG)	I	2047-03-21T19:23:53.104		-25.27x	-33.26	133744.89	-11.39		
Encke (IEG)	I	2047-03-21T19:24:21.332		-25.21x	-33.35	133423.31	-11.39		
A (IER)	I	2047-03-21T19:41:05.901		-22.96x	-36.55	122050.38	-11.25		
B (OER)	I	2047-03-21T19:47:45.318		-22.02x	-37.80	117571.16	-11.18		
B (IER)	I	2047-03-21T20:26:46.393		-16.06x	-44.73	91984.69	-10.62		
C (IER)	I	2047-03-21T20:55:08.436	b	-11.32x	-49.23	74490.58	-9.87		
Saturn	I	2047-03-21T20:46:10.126		-12.85x	-47.87	60062.51		22.63	27.04
Saturn	E	2047-03-21T23:36:28.075		19.63	-55.94	60231.80		9.27	11.34
C (IER)	E	2047-03-21T23:55:07.997		23.48	-54.10	74490.58	9.54		
B (IER)	E	2047-03-22T00:24:37.866		29.62	-50.37	91984.69	10.16		
B (OER)	E	2047-03-22T01:05:42.809		38.28	-43.92	117571.16	10.55		
A (IER)	E	2047-03-22T01:12:46.661		39.77	-42.70	122050.38	10.59		
Encke (IEG)	E	2047-03-22T01:30:36.704		43.55	-39.52	133423.31	10.67		
Encke (OEG)	E	2047-03-22T01:31:06.853		43.66	-39.43	133744.89	10.67		
A (OER)	E	2047-03-22T01:35:50.637		44.66	-38.56	136774.40	10.68		
F ring	E	2047-03-22T01:41:35.417		45.88	-37.49	140461.00	10.70		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-03-21T22:23:00.800
 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 : 4090687901106088320
 2Mass ID (if available) : 18151658-2218501
 ICRS Star Coord at Epoch: 18h 15m 16.58002s -22:18:50.21276s
 RUWE (>1.4 is poor) : 1.09
 K magnitude : 8.799
 G magnitude : 14.154
 RP magnitude : 12.763
 BP magnitude : 16.313
 DUPflag : 0
 Distance (au) : 10.047
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 11.13
 Sun-Target sep (deg) : 87.03
 Sun-Moon sep (deg) : 36.19
 B (ring opening deg) : 26.10
 PA of pole (deg) : 5.80
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 2.734
 C/A sky separation (km) : 19923.8
 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	2047-03-21T19:22:28.440		71.26	-10.14	140461.00	-10.68		
A (OER)	I	2047-03-21T19:28:14.127		72.16	-8.97	136774.40	-10.65		
Encke (OEG)	I	2047-03-21T19:32:59.032		72.86	-8.00	133744.89	-10.62		
Encke (IEG)	I	2047-03-21T19:33:29.320		72.94	-7.90	133423.31	-10.62		
A (IER)	I	2047-03-21T19:51:26.889		75.22	-4.24x	122050.38	-10.49		
B (OER)	I	2047-03-21T19:58:35.188		75.93	-2.78x	117571.16	-10.43		
B (IER)	I	2047-03-21T20:40:25.759		76.71	5.76x	91984.69	-9.89		
C (IER)	I	2047-03-21T21:10:58.358	b	73.66	11.95x	74490.58	-9.12		
Saturn	I	2047-03-21T20:55:30.246		75.51	8.83x	60022.13		24.90	29.60
Saturn	E	2047-03-21T23:50:30.532		43.54	41.60x	60230.57		9.43	11.53
C (IER)	E	2047-03-22T00:09:40.215		39.61	44.49x	74490.58	9.28		
B (IER)	E	2047-03-22T00:39:38.766		33.48	48.46x	91984.69	10.10		
B (OER)	E	2047-03-22T01:20:32.206		25.18	52.44x	117571.16	10.70		
A (IER)	E	2047-03-22T01:27:29.594		23.78	52.91x	122050.38	10.77		
Encke (IEG)	E	2047-03-22T01:44:58.380		20.28	53.81x	133423.31	10.92		
Encke (OEG)	E	2047-03-22T01:45:27.834		20.18	53.83x	133744.89	10.92		
A (OER)	E	2047-03-22T01:50:04.817		19.26	53.99x	136774.40	10.95		
F ring	E	2047-03-22T01:55:40.741		18.15	54.14x	140461.00	10.99		