

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-03-09T18:39:51.750  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 4090699342970404224  
 2Mass ID (if available) : 18125167-2220022

Saturn 2047-03-09T18:39:51 K9.24 G14.77 PgtRgt

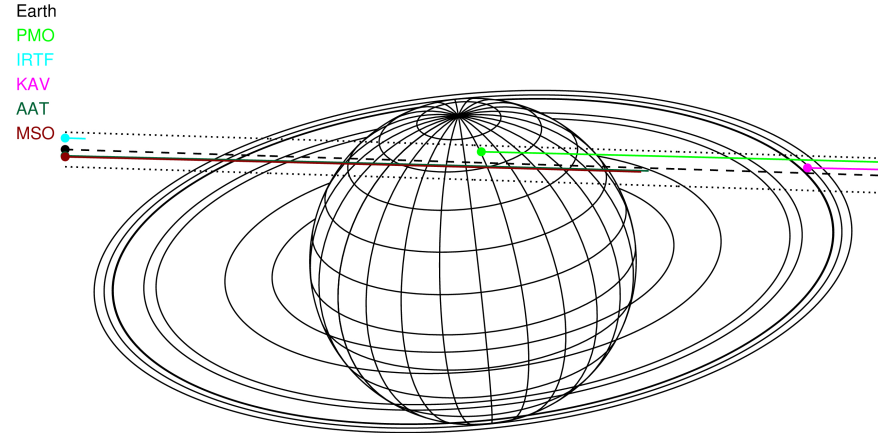
ICRS Star Coord at Epoch: 18h 12m 51.67442s -22:20:02.42320s

RUWE (>1.4 is poor) : 1.03  
 K magnitude : 9.241  
 G magnitude : 14.772  
 RP magnitude : 13.385  
 BP magnitude : 17.112  
 DUPflag : 0  
 Distance (au) : 10.248  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 17.04  
 Sun-Target sep (deg) : 75.48  
 Sun-Moon sep (deg) : 135.89  
 B (ring opening deg) : 26.18  
 PA of pole (deg) : 5.76

#	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

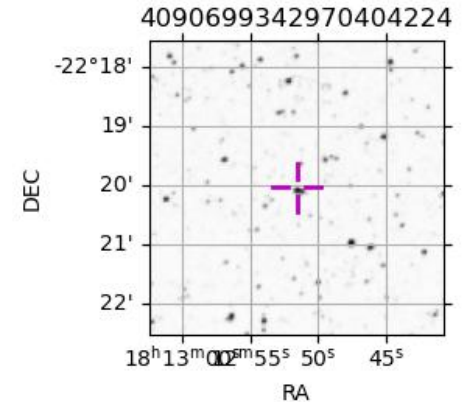


2047-03-09T18:39:51.7500 α: 18 12 51.6744 δ: -22 20 02.423 C/A 4.917° PA 178.17 deg v\_sky +17.04 km/s D 10.25 AU  
 Credit: Styled after SORA/Lucky Star

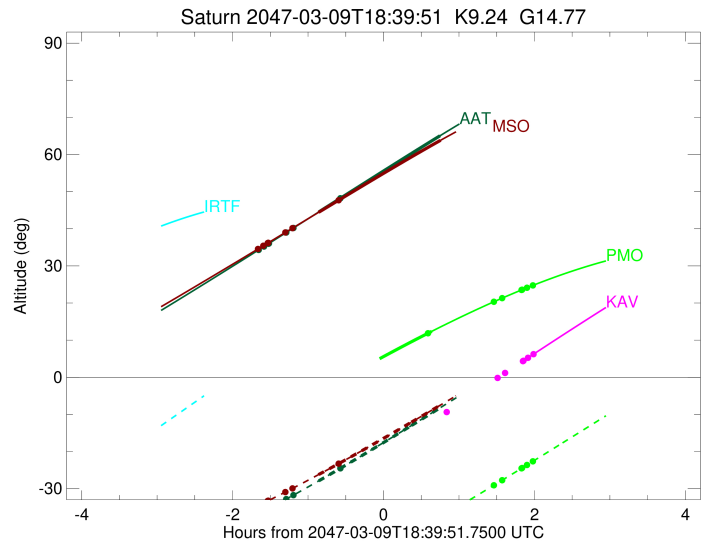
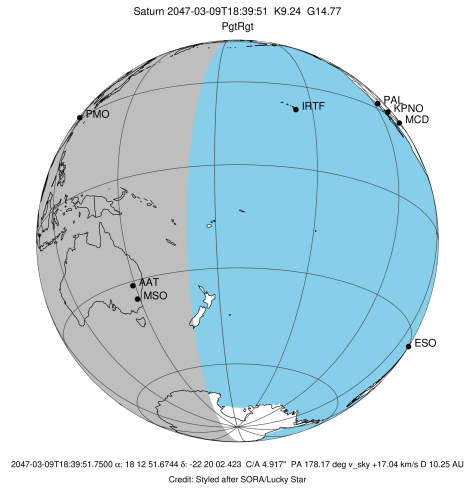


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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 09 19:18 - MAR 09 20:38	PneRne
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 09 20:34 - MAR 09 20:39	PnnRne
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 09 17:00 - MAR 09 19:24	PieRin
SAAO	So. Afr. Astro	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Ob	-35.3	149.0	+ + + + +	+ +		MAR 09 17:00 - MAR 09 19:25	PieRin



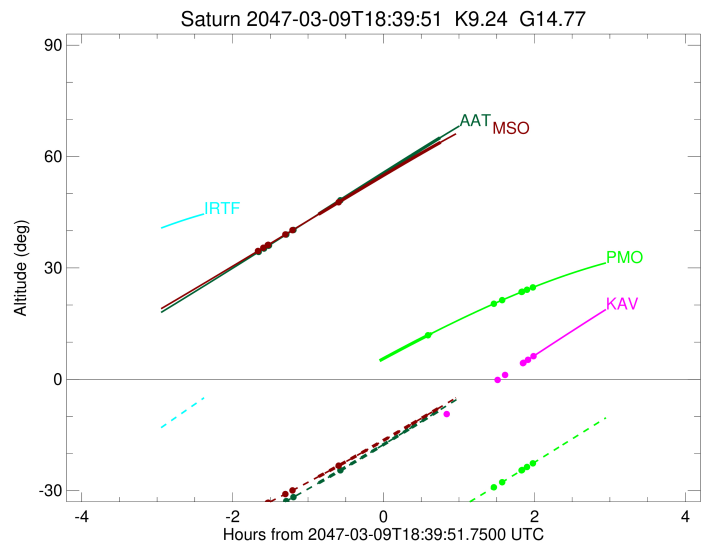
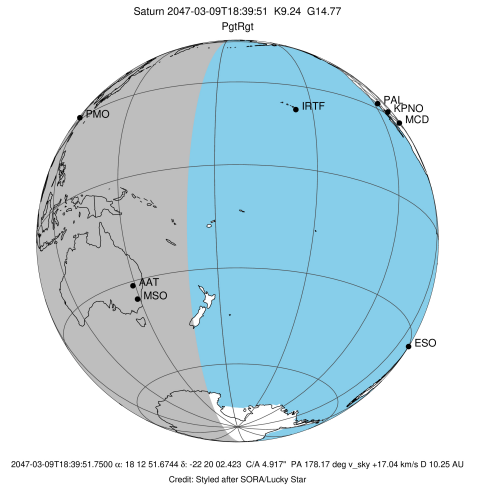
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-03-09T18:34:44.930  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PMO  
 Location : Purple Mtn Obs. Nanking  
 Latitude (deg) : 32.06667  
 E. Longitude (deg) : 118.82089  
 Altitude (km) : 0.364  
 Gaia source ID : 4090699342970404224  
 2Mass ID (if available) : 18125167-2220022  
 ICRS Star Coord at Epoch: 18h 12m 51.67442s -22:20:02.42320s  
 RUWE (>1.4 is poor) : 1.03  
 K magnitude : 9.241  
 G magnitude : 14.772  
 RP magnitude : 13.385  
 BP magnitude : 17.112  
 DUPflag : 0  
 Distance (au) : 10.248  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 17.04  
 Sun-Target sep (deg) : 75.48  
 Sun-Moon sep (deg) : 136.49  
 B (ring opening deg) : 26.18  
 PA of pole (deg) : 5.76  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 5.461  
 C/A sky separation (km) : 40585.4  
 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	2047-03-09T17:10:32.605		-11.67x	-59.52	140461.00	-13.57		
A (OER)	I	2047-03-09T17:15:06.835		-10.75x	-59.05	136774.40	-13.31		
Encke (OEG)	I	2047-03-09T17:18:56.450		-9.99x	-58.63	133744.89	-13.07		
Encke (IEG)	I	2047-03-09T17:19:21.070		-9.91x	-58.58	133423.31	-13.05		
A (IER)	I	2047-03-09T17:34:29.473		-6.90x	-56.73	122050.38	-11.94		
B (OER)	I	2047-03-09T17:40:53.328		-5.64x	-55.87	117571.16	-11.38		
B (IER)	I	2047-03-09T18:32:59.186	b	4.30x	-47.52	91984.69	-4.16		
Saturn	I	2047-03-09T17:51:46.720		-3.52x	-54.30	59614.82		43.43	49.02
Saturn	E	2047-03-09T19:18:18.447		12.38	-39.02	59889.09		31.45	36.76
B (IER)	E	2047-03-09T19:15:21.097	b	11.88	-39.60	91984.69	4.16		
B (OER)	E	2047-03-09T20:07:46.982		20.36	-29.06	117571.16	11.22		
A (IER)	E	2047-03-09T20:14:16.816		21.33	-27.72	122050.38	11.75		
Encke (IEG)	E	2047-03-09T20:29:41.924		23.53	-24.52	133423.31	12.79		
Encke (OEG)	E	2047-03-09T20:30:07.044		23.59	-24.43	133744.89	12.81		
A (OER)	E	2047-03-09T20:34:01.438		24.12	-23.61	136774.40	13.03		
F ring	E	2047-03-09T20:38:41.646		24.75	-22.64	140461.00	13.28		

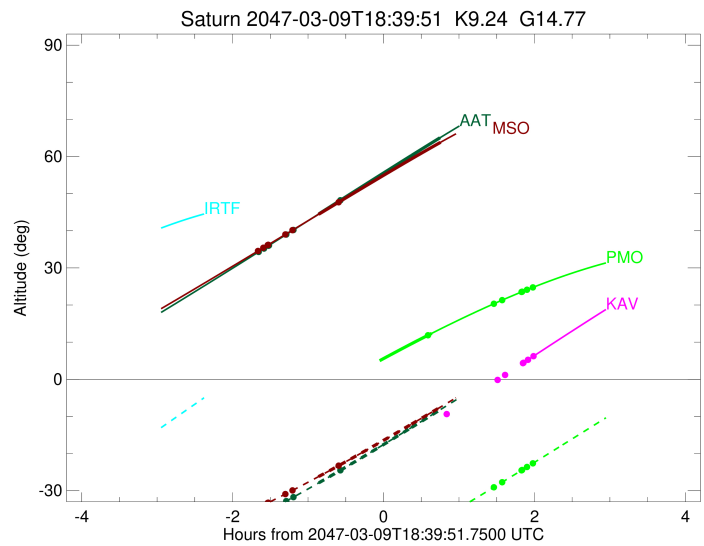
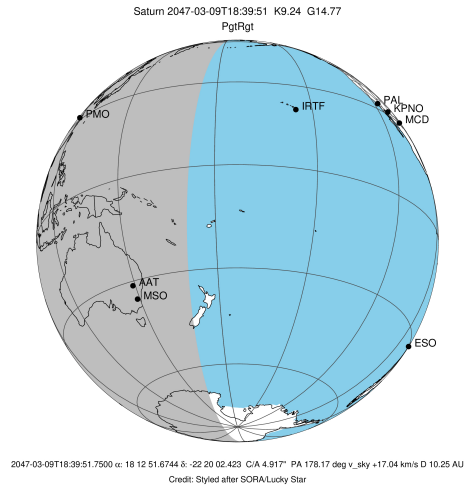
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-03-09T18:33:46.740  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : KAV  
 Location : Kavalur Observatory  
 Latitude (deg) : 12.57556  
 E. Longitude (deg) : 78.83167  
 Altitude (km) : 0.722  
 Gaia source ID : 4090699342970404224  
 2Mass ID (if available) : 18125167-2220022  
 ICRS Star Coord at Epoch: 18h 12m 51.67442s -22:20:02.42320s  
 RUWE (>1.4 is poor) : 1.03  
 K magnitude : 9.241  
 G magnitude : 14.772  
 RP magnitude : 13.385  
 BP magnitude : 17.112  
 DUPflag : 0  
 Distance (au) : 10.248  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 17.04  
 Sun-Target sep (deg) : 75.48  
 Sun-Moon sep (deg) : 136.30  
 B (ring opening deg) : 26.18  
 PA of pole (deg) : 5.76  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 5.014  
 C/A sky separation (km) : 37265.2  
 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	2047-03-09T17:04:13.326		-43.07x	-61.44	140461.00	-14.56		
A (OER)	I	2047-03-09T17:08:28.310		-42.09x	-62.45	136774.40	-14.35		
Encke (OEG)	I	2047-03-09T17:12:00.859		-41.27x	-63.28	133744.89	-14.16		
Encke (IEG)	I	2047-03-09T17:12:23.594		-41.18x	-63.37	133423.31	-14.13		
A (IER)	I	2047-03-09T17:26:13.332		-37.97x	-66.60	122050.38	-13.24		
B (OER)	I	2047-03-09T17:31:57.273		-36.64x	-67.92	117571.16	-12.80		
B (IER)	I	2047-03-09T18:11:54.054	b	-27.39x	-76.57	91984.69	-7.99		
Saturn	I	2047-03-09T17:48:41.978		-32.76x	-71.69	59697.67		39.92	45.53
Saturn	E	2047-03-09T19:19:27.433		-11.81x	-79.81	59962.30		27.92	32.94
B (IER)	E	2047-03-09T19:30:11.991		-9.35x	-78.04	91984.69	7.94		
B (OER)	E	2047-03-09T20:10:43.403		-0.15x	-69.56	117571.16	12.52		
A (IER)	E	2047-03-09T20:16:35.245		1.17x	-68.23	122050.38	12.93		
Encke (IEG)	E	2047-03-09T20:30:46.621		4.35x	-64.95	133423.31	13.75		
Encke (OEG)	E	2047-03-09T20:31:09.998		4.44x	-64.85	133744.89	13.77		
A (OER)	E	2047-03-09T20:34:48.679		5.25	-64.00	136774.40	13.94		
F ring	E	2047-03-09T20:39:11.314		6.23	-62.97	140461.00	14.13		

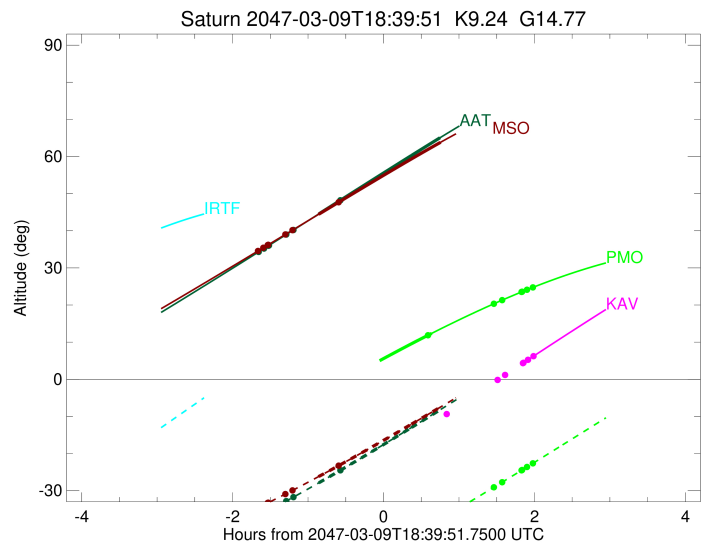
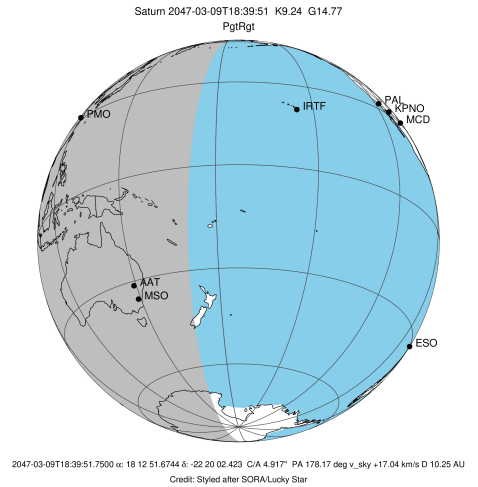
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-03-09T18:36:19.870  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : AAT  
 Location : Siding Spring (AAT)  
 Latitude (deg) : -31.27703  
 E. Longitude (deg) : 149.06608  
 Altitude (km) : 1.164  
 Gaia source ID : 4090699342970404224  
 2Mass ID (if available) : 18125167-2220022  
 ICRS Star Coord at Epoch: 18h 12m 51.67442s -22:20:02.42320s  
 RUWE (>1.4 is poor) : 1.03  
 K magnitude : 9.241  
 G magnitude : 14.772  
 RP magnitude : 13.385  
 BP magnitude : 17.112  
 DUPflag : 0  
 Distance (au) : 10.248  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 17.04  
 Sun-Target sep (deg) : 75.48  
 Sun-Moon sep (deg) : 136.83  
 B (ring opening deg) : 26.18  
 PA of pole (deg) : 5.76  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 4.743  
 C/A sky separation (km) : 35254.8  
 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	2047-03-09T17:00:39.189		34.32	-36.80	140461.00	-14.50		
A (OER)	I	2047-03-09T17:04:54.960		35.22	-36.04	136774.40	-14.32		
Encke (OEG)	I	2047-03-09T17:08:27.677		35.98	-35.40	133744.89	-14.16		
Encke (IEG)	I	2047-03-09T17:08:50.401		36.06	-35.33	133423.31	-14.14		
A (IER)	I	2047-03-09T17:22:35.265		39.00	-32.81	122050.38	-13.40		
B (OER)	I	2047-03-09T17:28:14.033		40.21	-31.76	117571.16	-13.04		
B (IER)	I	2047-03-09T18:05:41.847	b	48.24	-24.50	91984.69	-9.28		
Saturn	I	2047-03-09T17:48:21.538		44.52	-27.91	59740.74		38.07	43.66
Saturn	E	2047-03-09T19:24:49.979		65.07	-8.24	60009.29		25.50	30.26
B (IER)	E	2047-03-09T19:41:47.843		68.56	-4.65x	91984.69	9.27		
B (OER)	E	2047-03-09T20:19:30.206		75.80	3.38x	117571.16	12.91		
A (IER)	E	2047-03-09T20:25:12.575		76.78	4.60x	122050.38	13.25		
Encke (IEG)	E	2047-03-09T20:39:07.401		78.91	7.57x	133423.31	13.96		
Encke (OEG)	E	2047-03-09T20:39:30.422		78.96	7.65x	133744.89	13.98		
A (OER)	E	2047-03-09T20:43:05.979		79.43	8.42x	136774.40	14.13		
F ring	E	2047-03-09T20:47:25.299		79.93	9.35x	140461.00	14.30		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-03-09T18:36:28.420  
 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 : 4090699342970404224  
 2Mass ID (if available) : 18125167-2220022  
 ICRS Star Coord at Epoch: 18h 12m 51.67442s -22:20:02.42320s  
 RUWE (>1.4 is poor) : 1.03  
 K magnitude : 9.241  
 G magnitude : 14.772  
 RP magnitude : 13.385  
 BP magnitude : 17.112  
 DUPflag : 0  
 Distance (au) : 10.248  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 17.04  
 Sun-Target sep (deg) : 75.48  
 Sun-Moon sep (deg) : 136.81  
 B (ring opening deg) : 26.18  
 PA of pole (deg) : 5.76  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 4.686  
 C/A sky separation (km) : 34829.2  
 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	2047-03-09T17:00:06.900		34.57	-34.59	140461.00	-14.59		
A (OER)	I	2047-03-09T17:04:21.055		35.43	-33.89	136774.40	-14.42		
Encke (OEG)	I	2047-03-09T17:07:52.338		36.15	-33.30	133744.89	-14.26		
Encke (IEG)	I	2047-03-09T17:08:14.904		36.23	-33.24	133423.31	-14.24		
A (IER)	I	2047-03-09T17:21:53.218		39.02	-30.92	122050.38	-13.52		
B (OER)	I	2047-03-09T17:27:28.744		40.17	-29.94	117571.16	-13.17		
B (IER)	I	2047-03-09T18:04:17.790	b	47.71	-23.26	91984.69	-9.57		
Saturn	I	2047-03-09T17:48:13.364		44.42	-26.23	59750.26		37.66	43.24
Saturn	E	2047-03-09T19:25:14.740		63.84	-7.47	60017.74		25.05	29.76
B (IER)	E	2047-03-09T19:43:04.340		67.14	-3.88x	91984.69	9.55		
B (OER)	E	2047-03-09T20:20:07.630		73.21	3.66x	117571.16	13.04		
A (IER)	E	2047-03-09T20:25:46.640		73.98	4.81x	122050.38	13.38		
Encke (IEG)	E	2047-03-09T20:39:34.589		75.59	7.63x	133423.31	14.06		
Encke (OEG)	E	2047-03-09T20:39:57.442		75.63	7.71x	133744.89	14.08		
A (OER)	E	2047-03-09T20:43:31.471		75.96	8.43x	136774.40	14.23		
F ring	E	2047-03-09T20:47:49.058		76.32	9.31x	140461.00	14.39		