

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-05-01T17:08:15.760  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 4090524000862230656  
 2Mass ID (if available) : 18155328-2217138

Saturn 2047-05-01T17:08:15 K8.49 G14.55 PgtRgt

ICRS Star Coord at Epoch: 18h 15m 53.25133s -22:17:14.27521s

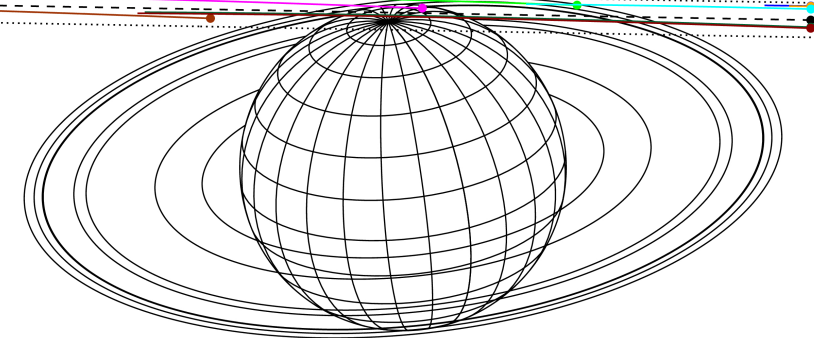
RUWE (>1.4 is poor) : 1.07  
 K magnitude : 8.486  
 G magnitude : 14.548  
 RP magnitude : 13.060  
 BP magnitude : 17.665  
 DUPflag : 0  
 Distance (au) : 9.408  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -8.32  
 Sun-Target sep (deg) : 126.93  
 Sun-Moon sep (deg) : 160.24  
 B (ring opening deg) : 26.06  
 PA of pole (deg) : 5.81  
 # a(km) ring

Saturn 2047-05-01T17:08:15 K8.49 G14.55  
 PgtRgt



2047-05-01T17:08:15.7600 α: 18 15 53.2513 δ: -22 17 14.275 C/A 8.370° PA 178.97 deg v\_sky - 8.32 km/s D 09.41 AU  
 Credit: Styled after SORA/Lucky Star

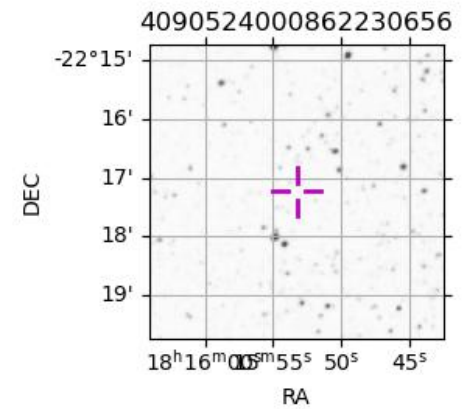
Earth  
 PAL  
 PMO  
 KPNO  
 IRTF  
 KAV  
 AAT  
 SAAO  
 MSO



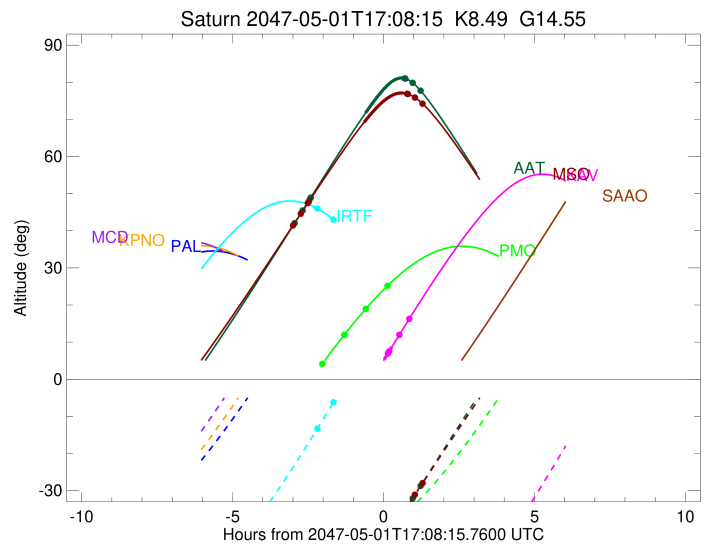
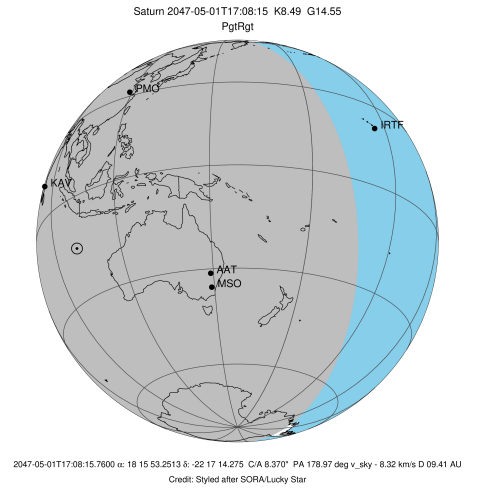
- 1 74490.6 C (IER)
- 2 91984.7 B (IER)
- 3 117571.2 B (OER)
- 4 122050.4 A (IER)
- 5 133423.3 Encke (IEG)
- 6 133744.9 Encke (OEG)
- 7 136774.4 A (OER)
- 8 140461.0 F ring

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					PnnRnn
PAL	Palomar Mt (20	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs	32.1	118.8	+			MAY 01 15:48 - MAY 01 17:16	PnnRie
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	+			MAY 01 14:56 - MAY 01 15:27	PnnRin
KAV	Kavalur Observ	12.6	78.8		+		MAY 01 17:09 - MAY 01 17:59	PieRne
RIO	Rio de Janeiro	-22.9	316.8					PnnRnn
ESO	European South	-29.3	289.3					PnnRnn
AAT	Siding Spring	-31.3	149.1	+	+		MAY 01 14:11 - MAY 01 18:22	PieRie
SAAO	So. Afr. Astro	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Ob	-35.3	149.0	+	+		MAY 01 14:08 - MAY 01 18:25	PieRie



target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-05-01T17:13:29.130  
 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 : 4090524000862230656  
 2Mass ID (if available) : 18155328-2217138  
 ICRS Star Coord at Epoch: 18h 15m 53.25133s -22:17:14.27521s  
 RUWE (>1.4 is poor) : 1.07  
 K magnitude : 8.486  
 G magnitude : 14.548  
 RP magnitude : 13.060  
 BP magnitude : 17.665  
 DUPflag : 0  
 Distance (au) : 9.408  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -8.32  
 Sun-Target sep (deg) : 126.93  
 Sun-Moon sep (deg) : 160.83  
 B (ring opening deg) : 26.06  
 PA of pole (deg) : 5.81  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 9.075  
 C/A sky separation (km) : 61923.1  
 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



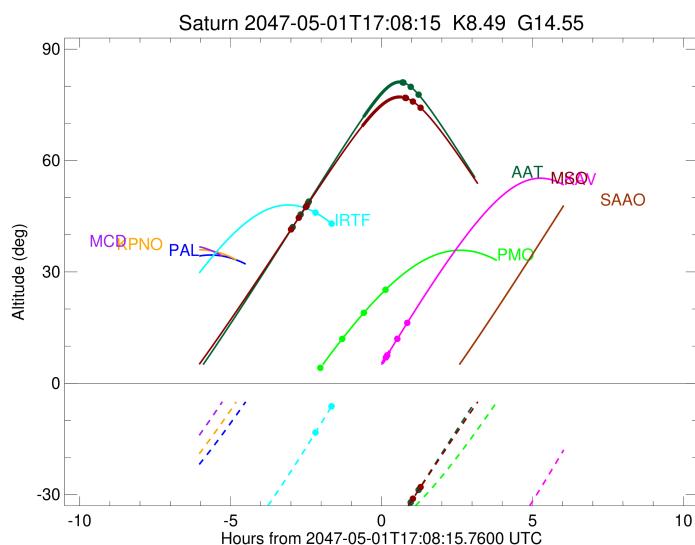
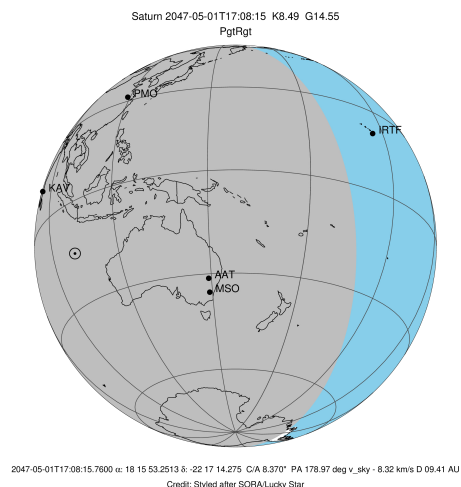
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-05-01T15:05:51.994		4.00x	-41.06	140461.00	-2.10		
A (OER)	I	2047-05-01T15:48:23.749		11.63	-42.81	136774.41	-0.76		

No planet occultations

A (OER)	E	2047-05-01T16:34:18.907		19.17	-42.26	136774.40	0.77		
F ring	E	2047-05-01T17:16:27.114		25.21	-39.61	140461.00	2.13		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-05-01T17:01:22.180  
 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 : 4090524000862230656  
 2Mass ID (if available) : 18155328-2217138  
 ICRS Star Coord at Epoch: 18h 15m 53.25133s -22:17:14.27521s  
 RUWE (>1.4 is poor) : 1.07  
 K magnitude : 8.486  
 G magnitude : 14.548  
 RP magnitude : 13.060  
 BP magnitude : 17.665  
 DUPflag : 0  
 Distance (au) : 9.408  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -8.32  
 Sun-Target sep (deg) : 126.93  
 Sun-Moon sep (deg) : 159.79  
 B (ring opening deg) : 26.06  
 PA of pole (deg) : 5.81  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 8.885  
 C/A sky separation (km) : 60626.5  
 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



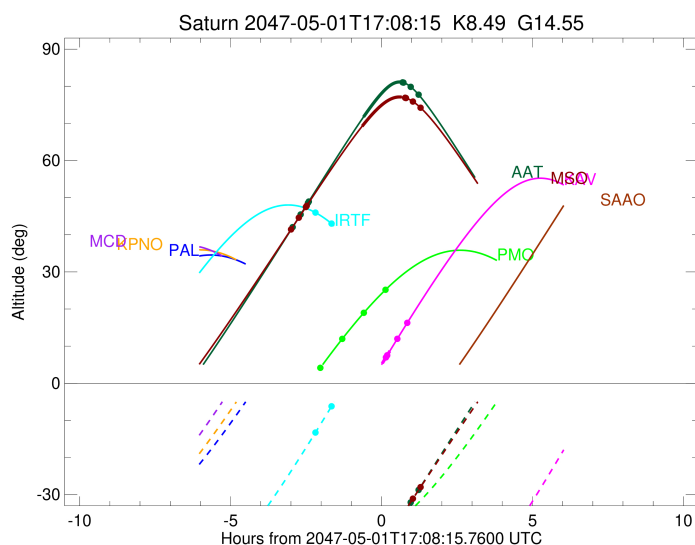
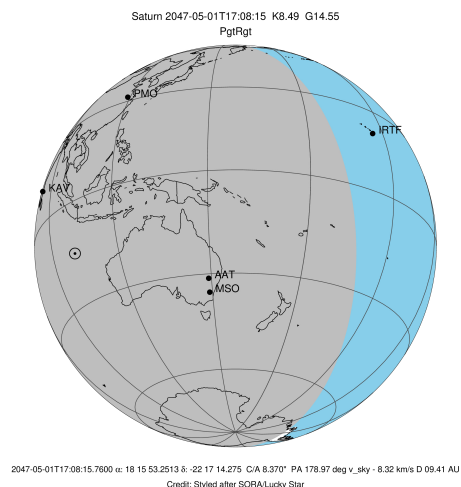
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-05-01T14:56:16.860		46.03	-13.43	140461.00	-2.43		
A (OER)	I	2047-05-01T15:27:57.858		43.13	-6.43	136774.40	-1.43		

No planet occultations

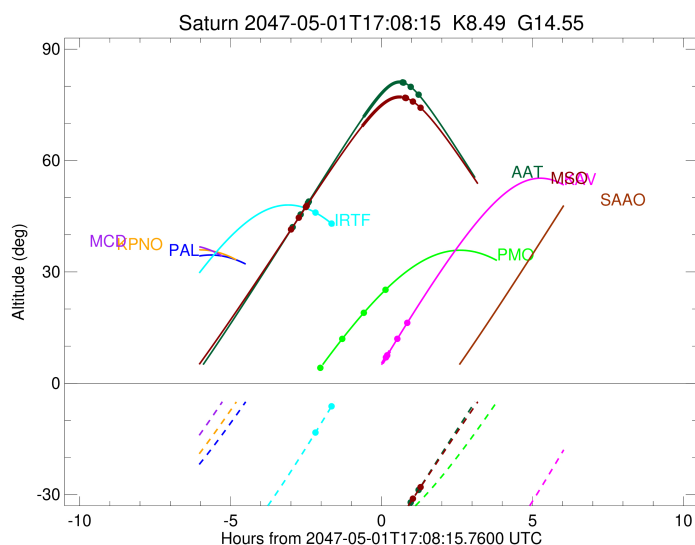
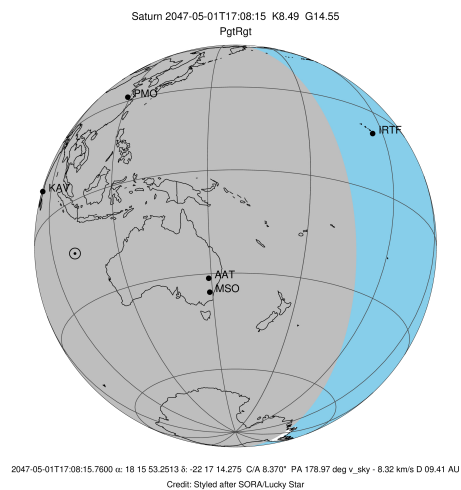
A (OER)	E	2047-05-01T16:53:47.494		30.71	13.07x	136774.40	1.42		
F ring	E	2047-05-01T17:25:51.404		24.94	20.49x	140461.00	2.40		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-05-01T17:18:00.080  
 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 : 4090524000862230656  
 2Mass ID (if available) : 18155328-2217138  
 ICRS Star Coord at Epoch: 18h 15m 53.25133s -22:17:14.27521s  
 RUWE (>1.4 is poor) : 1.07  
 K magnitude : 8.486  
 G magnitude : 14.548  
 RP magnitude : 13.060  
 BP magnitude : 17.665  
 DUPflag : 0  
 Distance (au) : 9.408  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -8.32  
 Sun-Target sep (deg) : 126.93  
 Sun-Moon sep (deg) : 161.12  
 B (ring opening deg) : 26.06  
 PA of pole (deg) : 5.81  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 8.658  
 C/A sky separation (km) : 59078.7  
 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



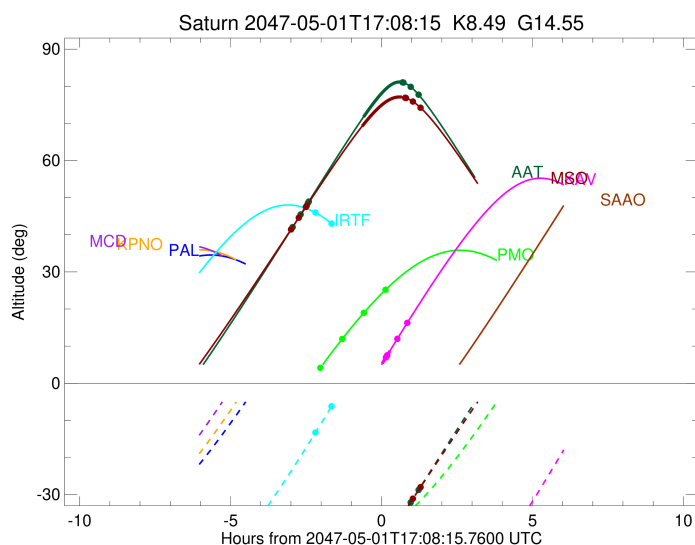
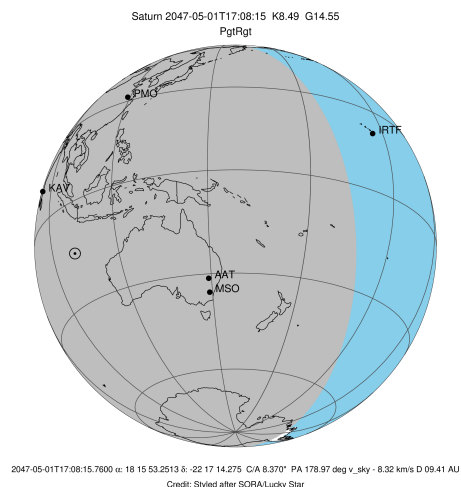
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-05-01T14:27:47.518		-31.73x	-21.36	140461.00	-3.28		
A (OER)	I	2047-05-01T14:48:11.773		-27.00x	-25.94	136774.40	-2.74		
Encke (OEG)	I	2047-05-01T15:08:50.293		-22.23x	-30.50	133744.89	-2.15		
Encke (IEG)	I	2047-05-01T15:11:22.884		-21.64x	-31.06	133423.31	-2.07		
Saturn	I	2047-05-01T17:09:51.455		5.36	-54.17	59221.34		61.54	65.87
Saturn	E	2047-05-01T17:24:56.400		8.72	-56.41	59182.68		63.60	67.69
Encke (IEG)	E	2047-05-01T17:17:14.184	b	7.01	-55.30	133423.31	2.12		
Encke (OEG)	E	2047-05-01T17:19:43.301	b	7.56	-55.67	133744.89	2.20		
A (OER)	E	2047-05-01T17:39:48.549		11.99	-58.34	136774.40	2.82		
F ring	E	2047-05-01T17:59:31.030		16.29	-60.39	140461.00	3.40		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-05-01T17:09:46.050  
 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 : 4090524000862230656  
 2Mass ID (if available) : 18155328-2217138  
 ICRS Star Coord at Epoch: 18h 15m 53.25133s -22:17:14.27521s  
 RUWE (>1.4 is poor) : 1.07  
 K magnitude : 8.486  
 G magnitude : 14.548  
 RP magnitude : 13.060  
 BP magnitude : 17.665  
 DUPflag : 0  
 Distance (au) : 9.408  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -8.32  
 Sun-Target sep (deg) : 126.93  
 Sun-Moon sep (deg) : 160.67  
 B (ring opening deg) : 26.06  
 PA of pole (deg) : 5.81  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 8.226  
 C/A sky separation (km) : 56128.1  
 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



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-05-01T14:11:13.729		41.97	-73.89	140461.00	-4.08		
A (OER)	I	2047-05-01T14:27:03.919		45.37	-72.97	136774.40	-3.67		
Encke (OEG)	I	2047-05-01T14:41:36.226		48.49	-71.54	133744.89	-3.27		
Encke (IEG)	I	2047-05-01T14:43:15.366		48.84	-71.34	133423.31	-3.22		
Saturn	I	2047-05-01T16:32:28.763		71.73	-51.92	59381.67		53.84	58.92
Saturn	E	2047-05-01T17:46:00.891		81.15	-36.43	59220.44		61.59	65.92
Encke (IEG)	E	2047-05-01T17:50:16.124		81.05	-35.52	133423.31	3.24		
Encke (OEG)	E	2047-05-01T17:51:54.542		80.99	-35.17	133744.89	3.29		
A (OER)	E	2047-05-01T18:06:19.603		79.85	-32.09	136774.40	3.71		
F ring	E	2047-05-01T18:22:00.036		77.75	-28.73	140461.00	4.13		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-05-01T17:09:43.940  
 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 : 4090524000862230656  
 2Mass ID (if available) : 18155328-2217138  
 ICRS Star Coord at Epoch: 18h 15m 53.25133s -22:17:14.27521s  
 RUWE (>1.4 is poor) : 1.07  
 K magnitude : 8.486  
 G magnitude : 14.548  
 RP magnitude : 13.060  
 BP magnitude : 17.665  
 DUPflag : 0  
 Distance (au) : 9.408  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -8.32  
 Sun-Target sep (deg) : 126.93  
 Sun-Moon sep (deg) : 160.66  
 B (ring opening deg) : 26.06  
 PA of pole (deg) : 5.81  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 8.161  
 C/A sky separation (km) : 55688.2  
 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	2047-05-01T14:08:04.506		41.36	-69.97	140461.00	-4.19		
A (OER)	I	2047-05-01T14:23:27.567		44.51	-69.41	136774.40	-3.80		
Encke (OEG)	I	2047-05-01T14:37:27.273		47.38	-68.43	133744.89	-3.41		
Encke (IEG)	I	2047-05-01T14:39:02.093		47.70	-68.29	133423.31	-3.37		
Saturn	I	2047-05-01T16:29:53.608		69.26	-51.19	59401.37		52.95	58.10
Saturn	E	2047-05-01T17:48:31.635		77.10	-35.60	59230.80		61.05	65.44
Encke (IEG)	E	2047-05-01T17:55:14.183		76.91	-34.24	133423.31	3.39		
Encke (OEG)	E	2047-05-01T17:56:48.278		76.84	-33.92	133744.89	3.44		
A (OER)	E	2047-05-01T18:10:40.727		75.89	-31.09	136774.40	3.83		
F ring	E	2047-05-01T18:25:54.063		74.23	-27.98	140461.00	4.23		