

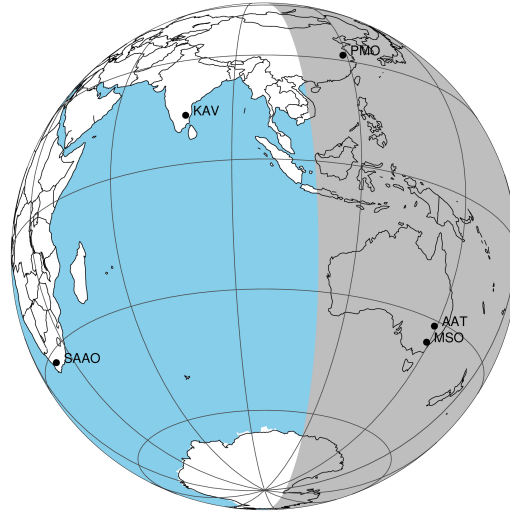
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-10-04T10:32:52.350  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 4070223923834118528  
 2Mass ID (if available) : 17520612-223557

Saturn 2047-10-04T10:32:52 K9.52 G14.97 PgtRgt

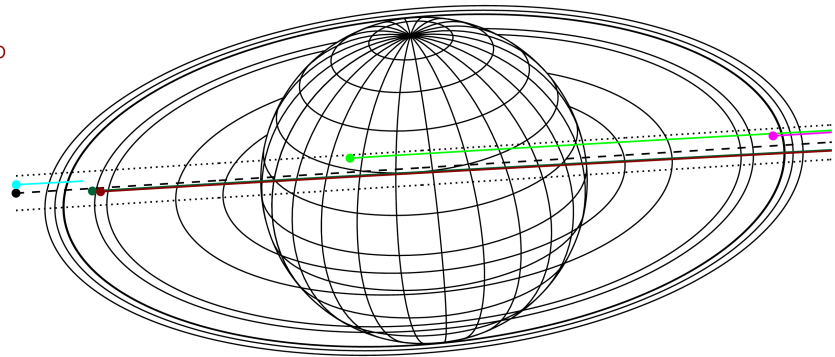
ICRS Star Coord at Epoch: 17h 52m 06.10820s -22:35:55.86237s

RUWE (>1.4 is poor) : 1.06  
 K magnitude : 9.517  
 G magnitude : 14.974  
 RP magnitude : 13.618  
 BP magnitude : 17.020  
 DUPflag : 0  
 Distance (au) : 10.211  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 15.93  
 Sun-Target sep (deg) : 77.71  
 Sun-Moon sep (deg) : 107.18  
 B (ring opening deg) : 26.91  
 PA of pole (deg) : 5.37

Saturn 2047-10-04T10:32:52 K9.52 G14.97  
 PgtRgt



Earth  
 PMO  
 IRTF  
 KAV  
 AAT  
 MSO

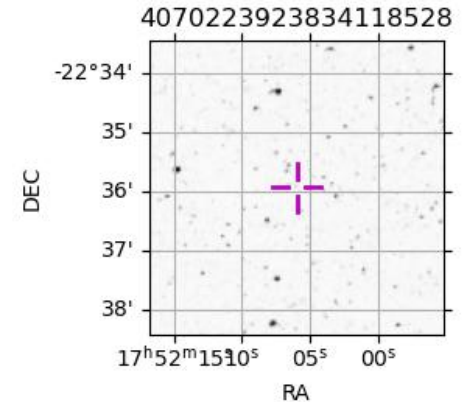


2047-10-04T10:32:52.3500 α: 17 52 06.1082 δ: -22 35 55.862 C/A 0.641° PA 183.58 deg v\_sky +15.93 km/s D 10.21 AU  
 Credit: Styled after SORA/Lucky Star

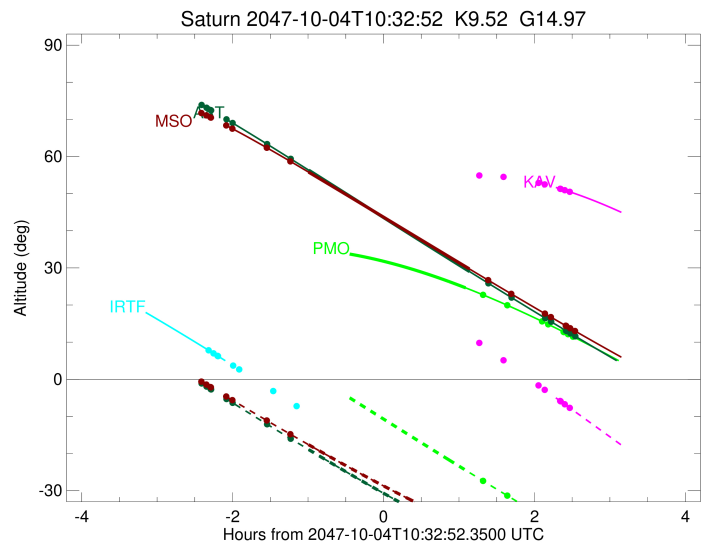
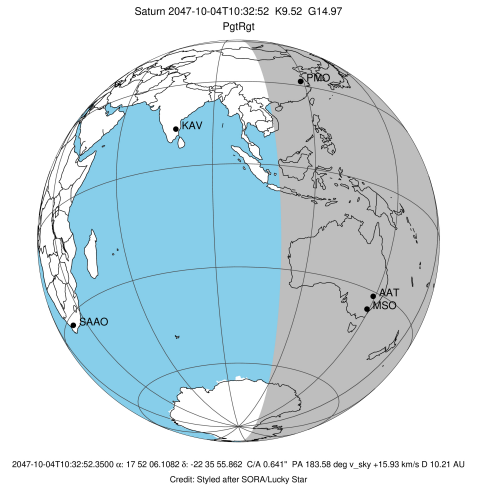
#	a(km)	ring
1	74490.6	C (IER)
2	91984.7	B (IER)
3	117571.2	B (OER)
4	122050.4	A (IER)
5	133423.3	Encke (IEG)
6	133744.9	Encke (OEG)
7	136774.4	A (OER)
8	140461.0	F ring

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		+	+	OCT 04 11:38 - OCT 04 13:03	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	+			OCT 04 08:13 - OCT 04 08:21	PnnRin
KAV	Kavalur Observ	12.6	78.8			+	OCT 04 12:53 - OCT 04 13:00	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	+	+	+	OCT 04 08:28 - OCT 04 13:05	PieRie
SAAO	So. Afr. Astro	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Ob	-35.3	149.0	+	+	+	OCT 04 08:32 - OCT 04 13:05	PieRie



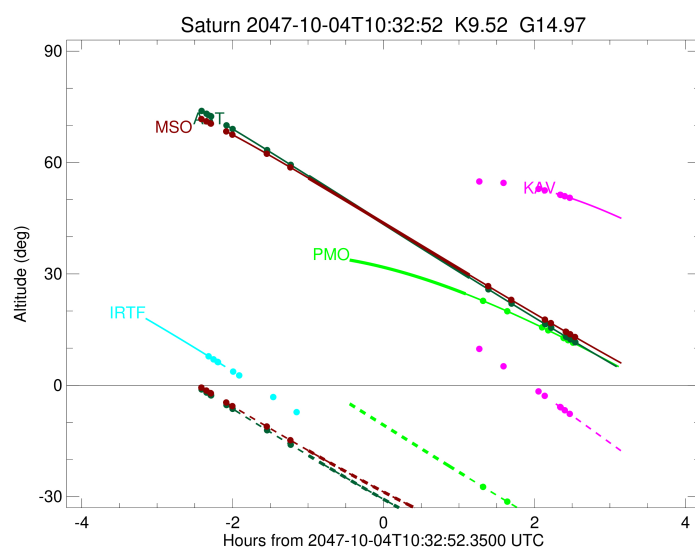
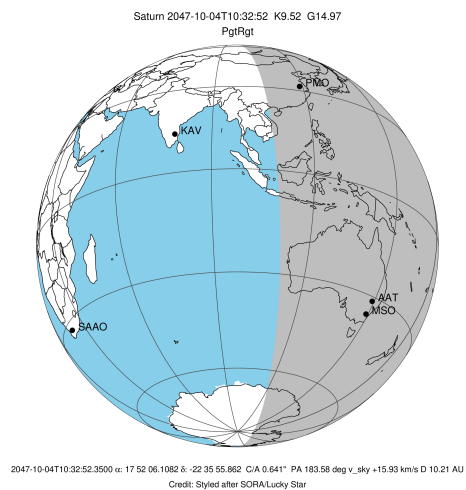
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-10-04T10:34:41.680  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PMO  
 Location : Purple Mtn Obs. Nanking  
 Latitude (deg) : 32.06667  
 E. Longitude (deg) : 118.82089  
 Altitude (km) : 0.364  
 Gaia source ID : 4070223923834118528  
 2Mass ID (if available) : 17520612-2235557  
 ICRS Star Coord at Epoch: 17h 52m 06.10820s -22:35:55.86237s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 9.517  
 G magnitude : 14.974  
 RP magnitude : 13.618  
 BP magnitude : 17.020  
 DUPflag : 0  
 Distance (au) : 10.211  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 15.93  
 Sun-Target sep (deg) : 77.71  
 Sun-Moon sep (deg) : 107.74  
 B (ring opening deg) : 26.91  
 PA of pole (deg) : 5.37  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.335  
 C/A sky separation (km) : 9887.6  
 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	2047-10-04T08:07:07.890		33.60	19.77x	140461.00	-15.31		
A (OER)	I	2047-10-04T08:11:08.717		33.84	18.96x	136774.40	-15.30		
Encke (OEG)	I	2047-10-04T08:14:26.750		34.03	18.30x	133744.89	-15.29		
Encke (IEG)	I	2047-10-04T08:14:47.778		34.05	18.23x	133423.31	-15.29		
A (IER)	I	2047-10-04T08:27:12.448		34.64	15.70x	122050.38	-15.25		
B (OER)	I	2047-10-04T08:32:06.332		34.84	14.69x	117571.16	-15.23		
B (IER)	I	2047-10-04T09:00:14.418		35.47	8.87x	91984.69	-15.06		
C (IER)	I	2047-10-04T09:19:43.986		35.42	4.78x	74490.58	-14.83		
Saturn	I	2047-10-04T09:30:56.429		35.21	2.42x	60222.58		10.03	12.25
Saturn	E	2047-10-04T11:38:13.751		24.62	-24.51	60247.78		6.67	8.18
C (IER)	E	2047-10-04T11:52:00.526		22.74	-27.37	74490.58	14.98		
B (IER)	E	2047-10-04T12:11:16.665		19.94	-31.34	91984.69	15.26		
B (OER)	E	2047-10-04T12:39:00.448		15.59	-36.94	117571.16	15.48		
A (IER)	E	2047-10-04T12:43:49.522		14.80	-37.89	122050.38	15.51		
Encke (IEG)	E	2047-10-04T12:56:01.264		12.76	-40.28	133423.31	15.57		
Encke (OEG)	E	2047-10-04T12:56:21.911		12.70	-40.35	133744.89	15.58		
A (OER)	E	2047-10-04T12:59:36.322		12.15	-40.97	136774.40	15.59		
F ring	E	2047-10-04T13:03:32.644		11.48	-41.73	140461.00	15.61		

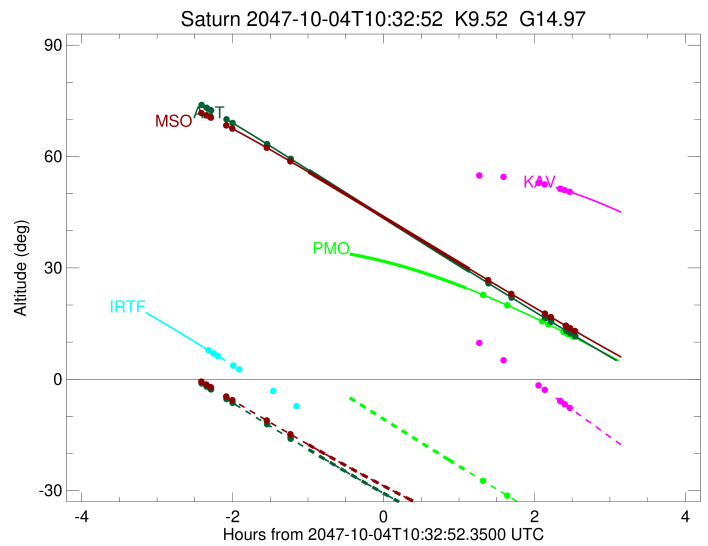
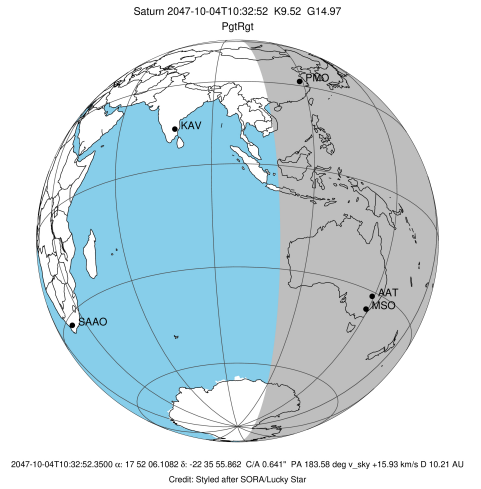
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-10-04T10:38:48.860  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : IRTF  
 Location : Mauna Kea/IRTF  
 Latitude (deg) : 19.82622  
 E. Longitude (deg) : 204.52800  
 Altitude (km) : 4.168  
 Gaia source ID : 4070223923834118528  
 2Mass ID (if available) : 17520612-2235557  
 ICRS Star Coord at Epoch: 17h 52m 06.10820s -22:35:55.86237s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 9.517  
 G magnitude : 14.974  
 RP magnitude : 13.618  
 BP magnitude : 17.020  
 DUPflag : 0  
 Distance (au) : 10.211  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 15.93  
 Sun-Target sep (deg) : 77.71  
 Sun-Moon sep (deg) : 107.09  
 B (ring opening deg) : 26.91  
 PA of pole (deg) : 5.37  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 0.853  
 C/A sky separation (km) : 6317.1  
 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	2047-10-04T08:13:51.310		7.79	-57.71	140461.00	-15.71		
A (OER)	I	2047-10-04T08:17:46.014		6.97	-58.54	136774.40	-15.71		
Encke (OEG)	I	2047-10-04T08:20:58.838		6.30	-59.22	133744.89	-15.71		
Encke (IEG)	I	2047-10-04T08:21:19.304		6.22	-59.29	133423.31	-15.71		
A (IER)	I	2047-10-04T08:33:22.836		3.67x	-61.80	122050.38	-15.72		
B (OER)	I	2047-10-04T08:38:07.692		2.66x	-62.76	117571.16	-15.73		
B (IER)	I	2047-10-04T09:05:14.857		-3.19x	-67.91	91984.69	-15.71		
C (IER)	I	2047-10-04T09:23:49.784		-7.25x	-70.92	74490.58	-15.66		
Saturn	I	2047-10-04T09:36:22.383		-10.01x	-72.57	60242.67		7.47	9.15
Saturn	E	2047-10-04T11:40:45.303		-38.08x	-63.23	60263.08		3.29	4.03
C (IER)	E	2047-10-04T11:55:07.699		-41.38x	-60.29	74490.58	15.98		
B (IER)	E	2047-10-04T12:13:17.658		-45.56x	-56.43	91984.69	16.11		
B (OER)	E	2047-10-04T12:39:39.379		-51.64x	-50.61	117571.16	16.23		
A (IER)	E	2047-10-04T12:44:15.213		-52.70x	-49.58	122050.38	16.25		
Encke (IEG)	E	2047-10-04T12:55:54.448		-55.39x	-46.95	133423.31	16.28		
Encke (OEG)	E	2047-10-04T12:56:14.197		-55.47x	-46.87	133744.89	16.28		
A (OER)	E	2047-10-04T12:59:20.202		-56.18x	-46.17	136774.40	16.29		
F ring	E	2047-10-04T13:03:06.421		-57.06x	-45.31	140461.00	16.30		

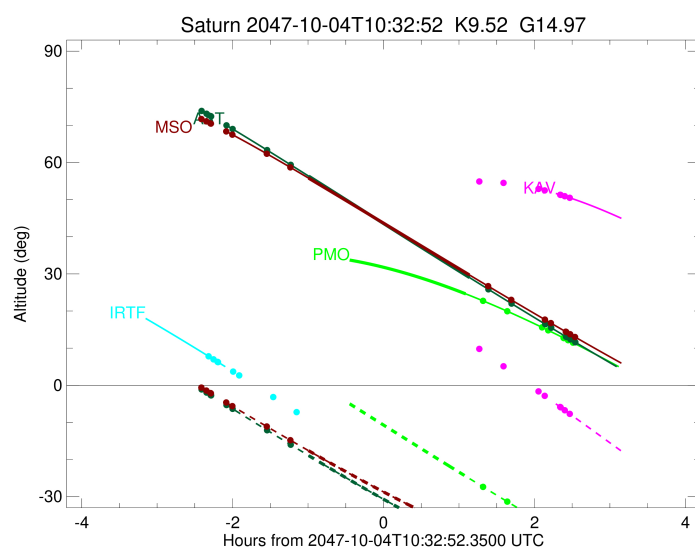
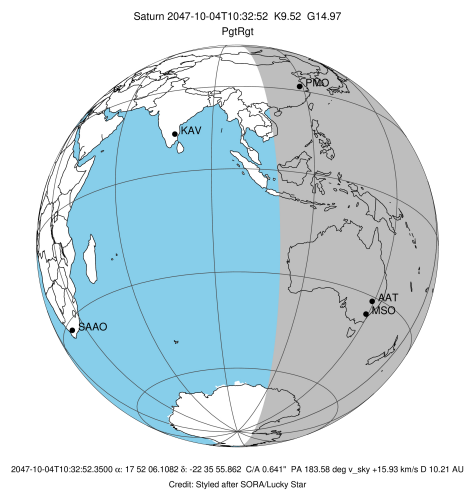
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-10-04T10:30:28.400  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : KAV  
 Location : Kavalur Observatory  
 Latitude (deg) : 12.57556  
 E. Longitude (deg) : 78.83167  
 Altitude (km) : 0.722  
 Gaia source ID : 4070223923834118528  
 2Mass ID (if available) : 17520612-2235557  
 ICRS Star Coord at Epoch: 17h 52m 06.10820s -22:35:55.86237s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 9.517  
 G magnitude : 14.974  
 RP magnitude : 13.618  
 BP magnitude : 17.020  
 DUPflag : 0  
 Distance (au) : 10.211  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 15.93  
 Sun-Target sep (deg) : 77.71  
 Sun-Moon sep (deg) : 107.77  
 B (ring opening deg) : 26.91  
 PA of pole (deg) : 5.37  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.101  
 C/A sky separation (km) : 8152.1  
 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	2047-10-04T08:02:08.718		24.56	62.23x	140461.00	-15.51		
A (OER)	I	2047-10-04T08:06:06.574		25.38	61.44x	136774.40	-15.49		
Encke (OEG)	I	2047-10-04T08:09:22.182		26.05	60.78x	133744.89	-15.48		
Encke (IEG)	I	2047-10-04T08:09:42.953		26.12	60.71x	133423.31	-15.48		
A (IER)	I	2047-10-04T08:21:58.600		28.61	58.17x	122050.38	-15.44		
B (OER)	I	2047-10-04T08:26:48.938		29.58	57.15x	117571.17	-15.42		
B (IER)	I	2047-10-04T08:54:35.886		34.98	51.06x	91984.69	-15.27		
C (IER)	I	2047-10-04T09:13:47.995		38.52	46.71x	74490.58	-15.09		
Saturn	I	2047-10-04T09:26:21.689		40.73	43.82x	60237.83		8.16	9.99
Saturn	E	2047-10-04T11:34:41.784		54.77	13.27x	60253.93		5.56	6.82
C (IER)	E	2047-10-04T11:49:01.221		54.90	9.80x	74490.58	15.04		
B (IER)	E	2047-10-04T12:08:16.943		54.52	5.12x	91984.69	15.21		
B (OER)	E	2047-10-04T12:36:10.327		52.89	-1.66x	117571.16	15.35		
A (IER)	E	2047-10-04T12:41:01.914		52.49	-2.85x	122050.38	15.37		
Encke (IEG)	E	2047-10-04T12:53:20.879		51.32	-5.85	133423.31	15.41		
Encke (OEG)	E	2047-10-04T12:53:41.747		51.28	-5.93	133744.89	15.41		
A (OER)	E	2047-10-04T12:56:58.273		50.93	-6.73	136774.40	15.42		
F ring	E	2047-10-04T13:00:57.264		50.50	-7.70	140461.00	15.43		

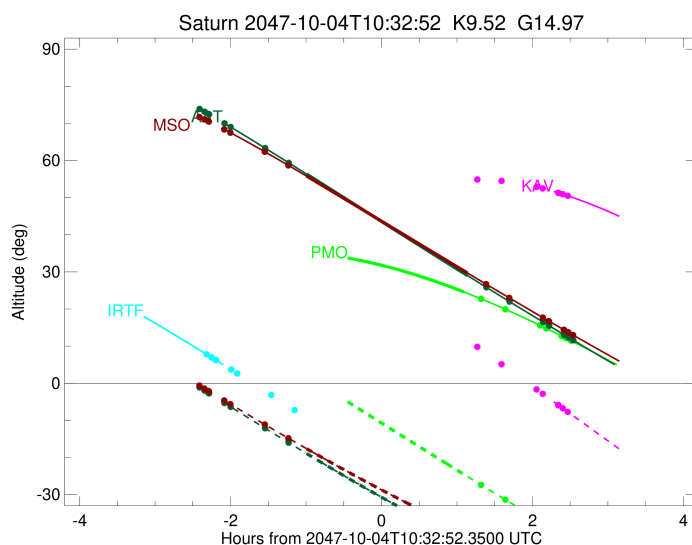
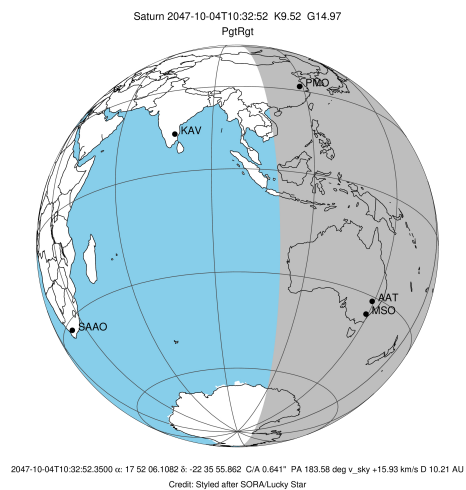
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-10-04T10:37:32.510  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : AAT  
 Location : Siding Spring (AAT)  
 Latitude (deg) : -31.27703  
 E. Longitude (deg) : 149.06608  
 Altitude (km) : 1.164  
 Gaia source ID : 4070223923834118528  
 2Mass ID (if available) : 17520612-2235557  
 ICRS Star Coord at Epoch: 17h 52m 06.10820s -22:35:55.86237s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 9.517  
 G magnitude : 14.974  
 RP magnitude : 13.618  
 BP magnitude : 17.020  
 DUPflag : 0  
 Distance (au) : 10.211  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 15.93  
 Sun-Target sep (deg) : 77.71  
 Sun-Moon sep (deg) : 107.95  
 B (ring opening deg) : 26.91  
 PA of pole (deg) : 5.37  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 0.435  
 C/A sky separation (km) : 3223.1  
 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	2047-10-04T08:08:16.126		73.89	-1.13x	140461.00	-15.50		
A (OER)	I	2047-10-04T08:12:14.024		73.14	-1.97x	136774.40	-15.50		
Encke (OEG)	I	2047-10-04T08:15:29.494		72.51	-2.67x	133744.89	-15.50		
Encke (IEG)	I	2047-10-04T08:15:50.242		72.44	-2.74x	133423.31	-15.50		
A (IER)	I	2047-10-04T08:28:03.822		70.01	-5.33	122050.38	-15.51		
B (OER)	I	2047-10-04T08:32:52.651		69.04	-6.35	117571.16	-15.51		
B (IER)	I	2047-10-04T09:00:21.688		63.34	-12.12	91984.69	-15.52		
C (IER)	I	2047-10-04T09:19:08.833		59.37	-16.02	74490.58	-15.52		
Saturn	I	2047-10-04T09:33:22.605		56.34	-18.94	60258.37		4.60	5.64
Saturn	E	2047-10-04T11:41:16.388		29.01	-42.68	60267.73		0.77	0.94
C (IER)	E	2047-10-04T11:56:14.355		25.86	-44.95	74490.58	15.80		
B (IER)	E	2047-10-04T12:14:39.528		22.01	-47.50	91984.69	15.86		
B (OER)	E	2047-10-04T12:41:28.708		16.46	-50.64	117571.16	15.94		
A (IER)	E	2047-10-04T12:46:09.648		15.50	-51.10	122050.38	15.95		
Encke (IEG)	E	2047-10-04T12:58:02.019		13.07	-52.16	133423.31	15.98		
Encke (OEG)	E	2047-10-04T12:58:22.143		13.01	-52.19	133744.89	15.98		
A (OER)	E	2047-10-04T13:01:31.671		12.36	-52.44	136774.40	15.99		
F ring	E	2047-10-04T13:05:22.182		11.59	-52.72	140461.00	16.00		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-10-04T10:37:21.050  
 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 : 4070223923834118528  
 2Mass ID (if available) : 17520612-2235557  
 ICRS Star Coord at Epoch: 17h 52m 06.10820s -22:35:55.86237s  
 RUWE (>1.4 is poor) : 1.06  
 K magnitude : 9.517  
 G magnitude : 14.974  
 RP magnitude : 13.618  
 BP magnitude : 17.020  
 DUPflag : 0  
 Distance (au) : 10.211  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 15.93  
 Sun-Target sep (deg) : 77.71  
 Sun-Moon sep (deg) : 107.94  
 B (ring opening deg) : 26.91  
 PA of pole (deg) : 5.37  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 0.380  
 C/A sky separation (km) : 2811.8  
 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	2047-10-04T08:08:06.274		71.72	-0.64x	140461.00	-15.52		
A (OER)	I	2047-10-04T08:12:03.823		71.08	-1.44x	136774.40	-15.52		
Encke (OEG)	I	2047-10-04T08:15:19.004		70.54	-2.10x	133744.89	-15.52		
Encke (IEG)	I	2047-10-04T08:15:39.721		70.48	-2.17x	133423.31	-15.52		
A (IER)	I	2047-10-04T08:27:52.199		68.38	-4.65x	122050.38	-15.53		
B (OER)	I	2047-10-04T08:32:40.586		67.52	-5.62	117571.16	-15.53		
B (IER)	I	2047-10-04T09:00:06.938		62.36	-11.11	91984.69	-15.55		
C (IER)	I	2047-10-04T09:18:51.960		58.69	-14.81	74490.58	-15.55		
Saturn	I	2047-10-04T09:33:12.829		55.82	-17.60	60259.83		4.23	5.20
Saturn	E	2047-10-04T11:41:04.186		29.74	-39.82	60267.91		0.44	0.54
C (IER)	E	2047-10-04T11:56:01.716		26.71	-41.89	74490.58	15.82		
B (IER)	E	2047-10-04T12:14:25.655		23.01	-44.20	91984.69	15.88		
B (OER)	E	2047-10-04T12:41:13.753		17.68	-47.02	117571.16	15.95		
A (IER)	E	2047-10-04T12:45:54.566		16.76	-47.43	122050.38	15.96		
Encke (IEG)	E	2047-10-04T12:57:46.683		14.43	-48.37	133423.31	15.98		
Encke (OEG)	E	2047-10-04T12:58:06.800		14.37	-48.40	133744.89	15.99		
A (OER)	E	2047-10-04T13:01:16.276		13.75	-48.62	136774.40	15.99		
F ring	E	2047-10-04T13:05:06.731		13.00	-48.87	140461.00	16.00		