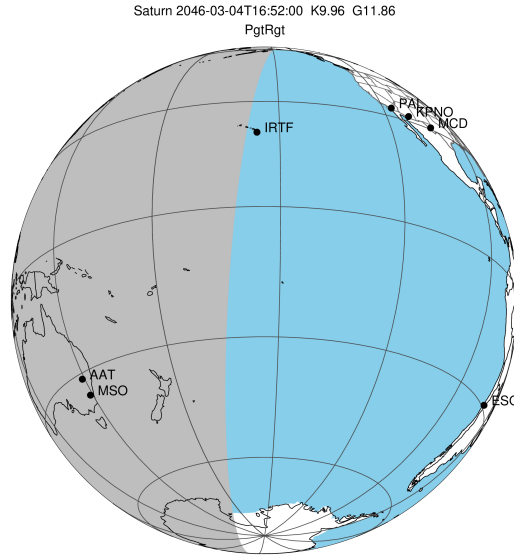


target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-03-04T16:52:00.170  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 4120816473911221248  
 2Mass ID (if available) : 17251737-2142218

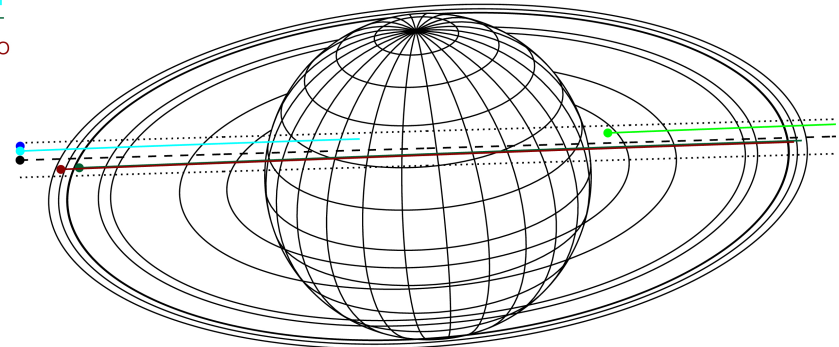
Saturn 2046-03-04T16:52:00 K9.96 G11.86 PgtRgt

ICRS Star Coord at Epoch: 17h 25m 17.36710s -21:42:22.31044s

RUWE (>1.4 is poor) : 1.23  
 K magnitude : 9.962  
 G magnitude : 11.863  
 RP magnitude : 11.210  
 BP magnitude : 12.338  
 DUPflag : 0  
 Distance (au) : 10.122  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 13.89  
 Sun-Target sep (deg) : 81.69  
 Sun-Moon sep (deg) : 48.65  
 B (ring opening deg) : 26.56  
 PA of pole (deg) : 4.74



Earth  
 PAL  
 PMO  
 IRTF  
 AAT  
 MSO

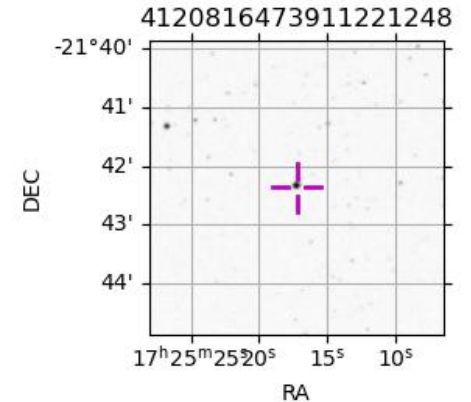


2046-03-04T16:52:00.1700 α: 17 25 17.3671 δ: -21 42 22.310 C/A 1.419° PA 181.67 deg v\_sky +13.89 km/s D 10.12 AU  
 Credit: Styled after SORA/Lucky Star

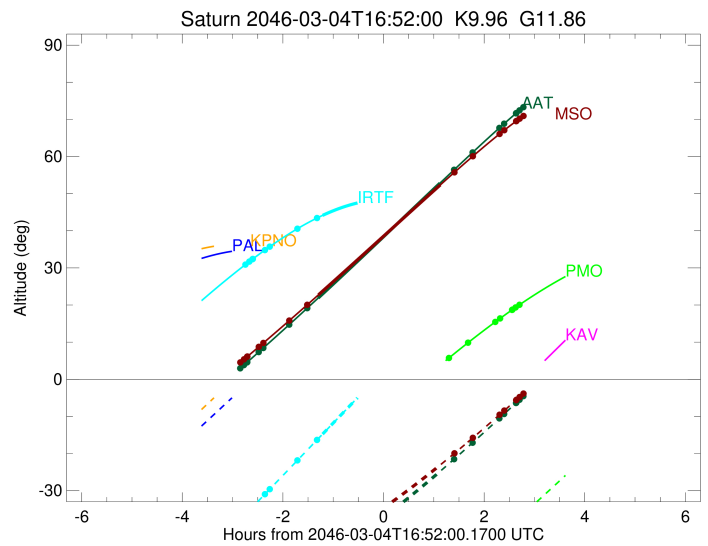
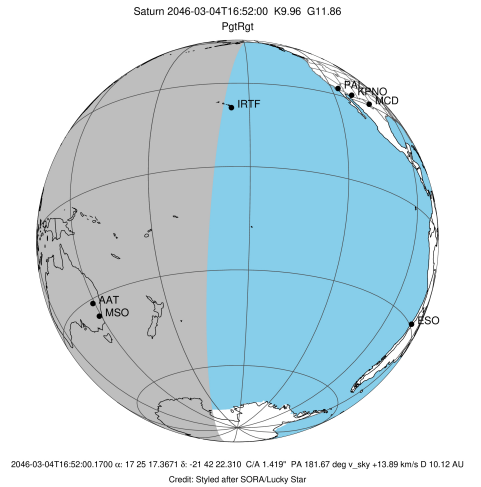
#	a(km)	ring
1	74490.6	C (IER)
2	91984.7	B (IER)
3	117571.2	B (OER)
4	122050.4	A (IER)
5	133423.3	Encke (IEG)
6	133744.9	Encke (OEG)
7	136774.4	A (OER)
8	140461.0	F ring

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	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 04 18:10 - MAR 04 19:34	PnnRne
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	+			MAR 04 14:07 - MAR 04 15:39	PinRin
KAV	Kavalur Observ	12.6	78.8					PnnRnn
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 04 14:23 - MAR 04 19:34	PieRie
SAAO	So. Afr. Astro	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Ob	-35.3	149.0	+	+	+	MAR 04 14:05 - MAR 04 19:30	PieRie



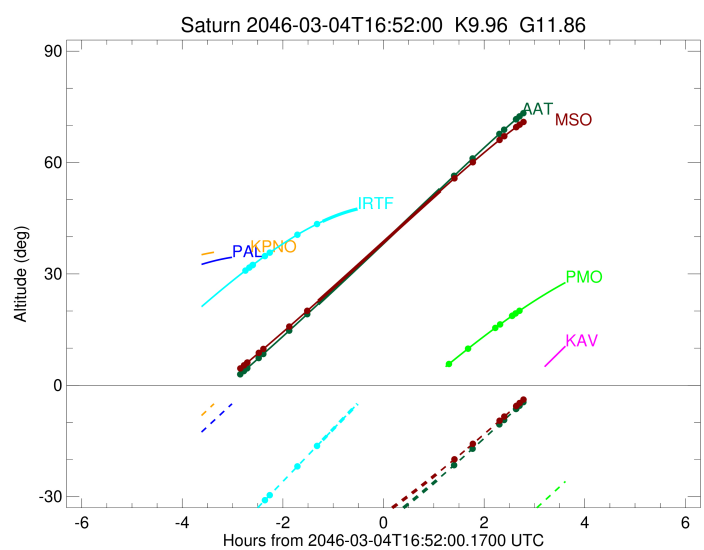
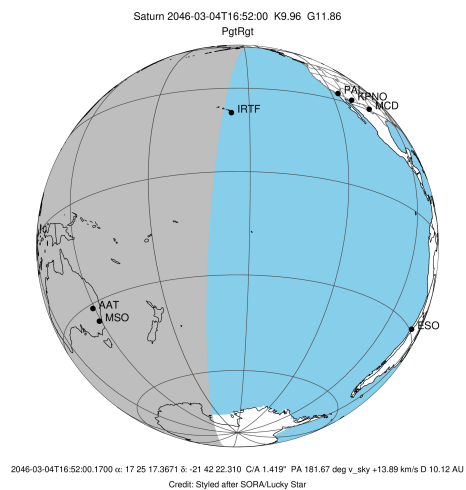
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-03-04T16:45:15.010  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PMO  
 Location : Purple Mtn Obs. Nanking  
 Latitude (deg) : 32.06667  
 E. Longitude (deg) : 118.82089  
 Altitude (km) : 0.364  
 Gaia source ID : 4120816473911221248  
 2Mass ID (if available) : 17251737-2142218  
 ICRS Star Coord at Epoch: 17h 25m 17.36710s -21:42:22.31044s  
 RUWE (>1.4 is poor) : 1.23  
 K magnitude : 9.962  
 G magnitude : 11.863  
 RP magnitude : 11.210  
 BP magnitude : 12.338  
 DUPflag : 0  
 Distance (au) : 10.122  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 13.89  
 Sun-Target sep (deg) : 81.69  
 Sun-Moon sep (deg) : 49.07  
 B (ring opening deg) : 26.56  
 PA of pole (deg) : 4.74  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.831  
 C/A sky separation (km) : 13443.5  
 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\_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	2046-03-04T14:05:53.435		-43.95x	-50.22	140461.00	-13.94		
A (OER)	I	2046-03-04T14:10:18.146		-43.01x	-51.00	136774.40	-13.91		
Encke (OEG)	I	2046-03-04T14:13:56.058		-42.24x	-51.63	133744.89	-13.89		
Encke (IEG)	I	2046-03-04T14:14:19.211		-42.15x	-51.70	133423.31	-13.89		
A (IER)	I	2046-03-04T14:28:00.882		-39.24x	-54.00	122050.38	-13.79		
B (OER)	I	2046-03-04T14:33:26.202		-38.09x	-54.87	117571.16	-13.75		
B (IER)	I	2046-03-04T15:04:50.226		-31.44x	-59.39	91984.69	-13.38		
C (IER)	I	2046-03-04T15:26:59.049		-26.79x	-61.86	74490.58	-12.91		
Saturn	I	2046-03-04T15:35:12.864		-25.06x	-62.59	60186.46		13.71	16.67
Saturn	E	2046-03-04T17:56:05.047		3.13x	-55.28	60229.74		9.34	11.42
C (IER)	E	2046-03-04T18:10:02.759		5.73	-53.02	74490.58	12.59		
B (IER)	E	2046-03-04T18:32:49.488		9.85	-49.04	91984.69	12.96		
B (OER)	E	2046-03-04T19:05:22.420		15.45	-42.92	117571.16	13.20		
A (IER)	E	2046-03-04T19:11:01.375		16.39	-41.82	122050.38	13.23		
Encke (IEG)	E	2046-03-04T19:25:19.684		18.69	-38.99	133423.31	13.27		
Encke (OEG)	E	2046-03-04T19:25:43.913		18.75	-38.91	133744.89	13.27		
A (OER)	E	2046-03-04T19:29:32.085		19.35	-38.15	136774.40	13.28		
F ring	E	2046-03-04T19:34:09.544		20.06	-37.22	140461.00	13.29		

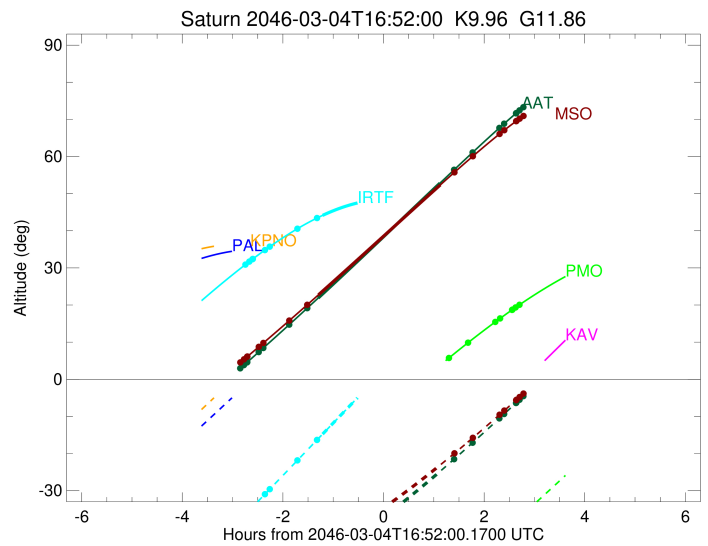
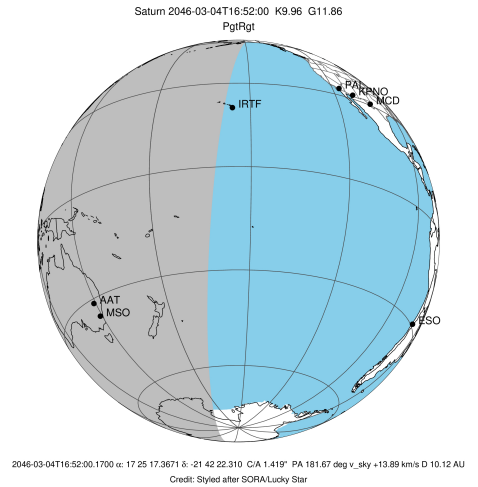
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-03-04T16:51:36.890  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : IRTF  
 Location : Mauna Kea/IRTF  
 Latitude (deg) : 19.82622  
 E. Longitude (deg) : 204.52800  
 Altitude (km) : 4.168  
 Gaia source ID : 4120816473911221248  
 2Mass ID (if available) : 17251737-2142218  
 ICRS Star Coord at Epoch: 17h 25m 17.36710s -21:42:22.31044s  
 RUWE (>1.4 is poor) : 1.23  
 K magnitude : 9.962  
 G magnitude : 11.863  
 RP magnitude : 11.210  
 BP magnitude : 12.338  
 DUPflag : 0  
 Distance (au) : 10.122  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 13.89  
 Sun-Target sep (deg) : 81.69  
 Sun-Moon sep (deg) : 49.22  
 B (ring opening deg) : 26.56  
 PA of pole (deg) : 4.74  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.994  
 C/A sky separation (km) : 14637.0  
 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	2046-03-04T14:07:22.538		30.90	-36.39	140461.00	-13.28		
A (OER)	I	2046-03-04T14:12:00.384		31.70	-35.31	136774.40	-13.25		
Encke (OEG)	I	2046-03-04T14:15:49.160		32.35	-34.42	133744.89	-13.23		
Encke (IEG)	I	2046-03-04T14:16:13.469		32.42	-34.32	133423.31	-13.23		
A (IER)	I	2046-03-04T14:30:36.555		34.81	-30.95	122050.38	-13.12		
B (OER)	I	2046-03-04T14:36:18.479		35.72	-29.61	117571.16	-13.08		
B (IER)	I	2046-03-04T15:09:21.901		40.56	-21.84	91984.69	-12.68		
C (IER)	I	2046-03-04T15:32:46.912		43.44	-16.32	74490.58	-12.17		
Saturn	I	2046-03-04T15:39:22.711		44.15	-14.77	60169.35		15.12	18.34
Saturn	E	2046-03-04T18:04:05.725		45.62	18.95x	60225.84		9.81	11.99
C (IER)	E	2046-03-04T18:18:07.424		44.28	22.14x	74490.58	12.13		
B (IER)	E	2046-03-04T18:41:37.509		41.56	27.44x	91984.69	12.63		
B (OER)	E	2046-03-04T19:14:50.588		36.90	34.77x	117571.16	13.00		
A (IER)	E	2046-03-04T19:20:34.459		36.01	36.01x	122050.38	13.05		
Encke (IEG)	E	2046-03-04T19:35:02.827		33.67	39.10x	133423.31	13.14		
Encke (OEG)	E	2046-03-04T19:35:27.292		33.60	39.19x	133744.89	13.15		
A (OER)	E	2046-03-04T19:39:17.560		32.96	40.00x	136774.40	13.17		
F ring	E	2046-03-04T19:43:57.266		32.17	40.98x	140461.00	13.19		

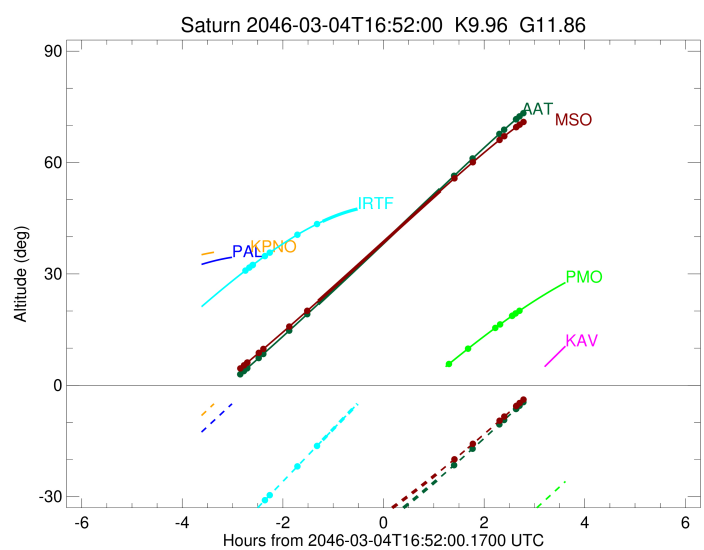
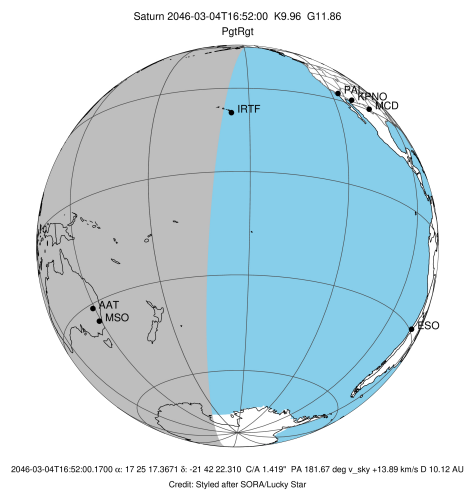
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-03-04T16:46:22.230  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : AAT  
 Location : Siding Spring (AAT)  
 Latitude (deg) : -31.27703  
 E. Longitude (deg) : 149.06608  
 Altitude (km) : 1.164  
 Gaia source ID : 4120816473911221248  
 2Mass ID (if available) : 17251737-2142218  
 ICRS Star Coord at Epoch: 17h 25m 17.36710s -21:42:22.31044s  
 RUWE (>1.4 is poor) : 1.23  
 K magnitude : 9.962  
 G magnitude : 11.863  
 RP magnitude : 11.210  
 BP magnitude : 12.338  
 DUPflag : 0  
 Distance (au) : 10.122  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 13.89  
 Sun-Target sep (deg) : 81.69  
 Sun-Moon sep (deg) : 49.49  
 B (ring opening deg) : 26.56  
 PA of pole (deg) : 4.74  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.131  
 C/A sky separation (km) : 8300.4  
 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\_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	2046-03-04T14:01:09.381		2.96x	-52.51	140461.00	-13.95		
A (OER)	I	2046-03-04T14:05:33.810		3.82x	-52.59	136774.40	-13.93		
Encke (OEG)	I	2046-03-04T14:09:11.343		4.54x	-52.64	133744.89	-13.92		
Encke (IEG)	I	2046-03-04T14:09:34.446		4.62x	-52.64	133423.31	-13.92		
A (IER)	I	2046-03-04T14:23:13.185		7.34	-52.62	122050.38	-13.86		
B (OER)	I	2046-03-04T14:28:36.593		8.42	-52.53	117571.16	-13.84		
B (IER)	I	2046-03-04T14:59:36.775		14.72	-51.20	91984.69	-13.66		
C (IER)	I	2046-03-04T15:21:06.271		19.17	-49.50	74490.58	-13.46		
Saturn	I	2046-03-04T15:34:04.917		21.87	-48.20	60230.23		9.28	11.35
Saturn	E	2046-03-04T17:59:24.443		52.84	-24.83	60257.82		4.80	5.89
C (IER)	E	2046-03-04T18:16:10.522		56.42	-21.53	74490.58	13.15		
B (IER)	E	2046-03-04T18:38:13.578		61.09	-17.11	91984.69	13.28		
B (OER)	E	2046-03-04T19:10:14.486		67.72	-10.53	117571.16	13.35		
A (IER)	E	2046-03-04T19:15:49.878		68.84	-9.36	122050.38	13.36		
Encke (IEG)	E	2046-03-04T19:30:00.769		71.63	-6.40	133423.31	13.37		
Encke (OEG)	E	2046-03-04T19:30:24.817		71.71	-6.31	133744.89	13.37		
A (OER)	E	2046-03-04T19:34:11.339		72.43	-5.52	136774.40	13.38		
F ring	E	2046-03-04T19:38:46.932		73.29	-4.55x	140461.00	13.38		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-03-04T16:46:38.640  
 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 : 4120816473911221248  
 2Mass ID (if available) : 17251737-2142218  
 ICRS Star Coord at Epoch: 17h 25m 17.36710s -21:42:22.31044s  
 RUWE (>1.4 is poor) : 1.23  
 K magnitude : 9.962  
 G magnitude : 11.863  
 RP magnitude : 11.210  
 BP magnitude : 12.338  
 DUPflag : 0  
 Distance (au) : 10.122  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 13.89  
 Sun-Target sep (deg) : 81.69  
 Sun-Moon sep (deg) : 49.47  
 B (ring opening deg) : 26.56  
 PA of pole (deg) : 4.74  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.078  
 C/A sky separation (km) : 7910.7  
 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	2046-03-04T14:01:16.897		4.55x	-48.50	140461.00	-13.96		
A (OER)	I	2046-03-04T14:05:41.144		5.38	-48.57	136774.40	-13.94		
Encke (OEG)	I	2046-03-04T14:09:18.512		6.07	-48.61	133744.89	-13.93		
Encke (IEG)	I	2046-03-04T14:09:41.597		6.14	-48.61	133423.31	-13.93		
A (IER)	I	2046-03-04T14:23:19.583		8.74	-48.59	122050.38	-13.88		
B (OER)	I	2046-03-04T14:28:42.631		9.78	-48.52	117571.16	-13.85		
B (IER)	I	2046-03-04T14:59:39.826		15.82	-47.35	91984.69	-13.69		
C (IER)	I	2046-03-04T15:21:05.862		20.07	-45.86	74490.58	-13.50		
Saturn	I	2046-03-04T15:34:19.355		22.72	-44.67	60232.69		8.97	10.97
Saturn	E	2046-03-04T17:59:41.165		52.35	-23.08	60259.27		4.44	5.46
C (IER)	E	2046-03-04T18:16:33.508		55.73	-19.95	74490.58	13.21		
B (IER)	E	2046-03-04T18:38:31.771		60.07	-15.78	91984.69	13.32		
B (OER)	E	2046-03-04T19:10:27.299		66.09	-9.54	117571.16	13.39		
A (IER)	E	2046-03-04T19:16:01.861		67.09	-8.44	122050.38	13.39		
Encke (IEG)	E	2046-03-04T19:30:10.743		69.52	-5.62	133423.31	13.40		
Encke (OEG)	E	2046-03-04T19:30:34.736		69.59	-5.54	133744.89	13.40		
A (OER)	E	2046-03-04T19:34:20.744		70.20	-4.78x	136774.40	13.41		
F ring	E	2046-03-04T19:38:55.722		70.93	-3.86x	140461.00	13.41		