

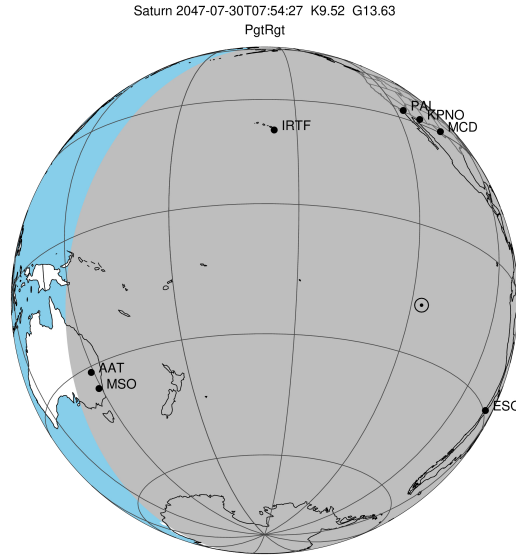
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-07-30T07:54:27.030  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 4070419744383371392  
 2Mass ID (if available) : 17520833-2225246

Saturn 2047-07-30T07:54:27 K9.52 G13.63 PgtRgt

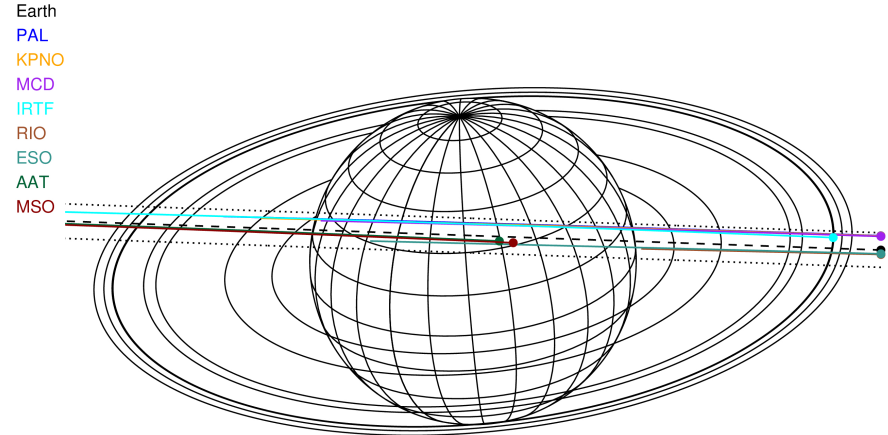
ICRS Star Coord at Epoch: 17h 52m 08.31751s -22:25:24.46324s

RUWE (>1.4 is poor) : 1.64  
 K magnitude : 9.524  
 G magnitude : 13.630  
 RP magnitude : 12.544  
 BP magnitude : 14.850  
 DUPflag : 0  
 Distance (au) : 9.230  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -13.80  
 Sun-Target sep (deg) : 141.71  
 Sun-Moon sep (deg) : 46.58  
 B (ring opening deg) : 26.73  
 PA of pole (deg) : 5.36

#	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

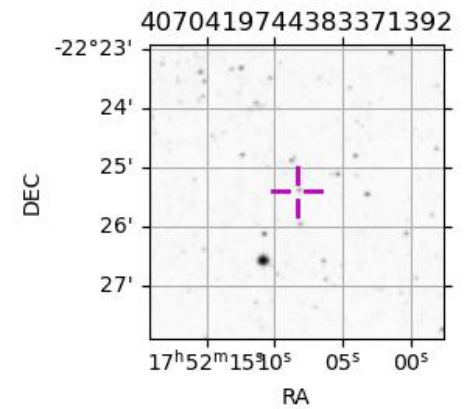


2047-07-30T07:54:27.0300 at: 17 52 08.3175 s; -22 25 24.463 C/A 1.426° PA 177.97 deg v\_sky -13.80 km/s D 09.23 AU  
 Credit: Styled after SORA/Lucky Star

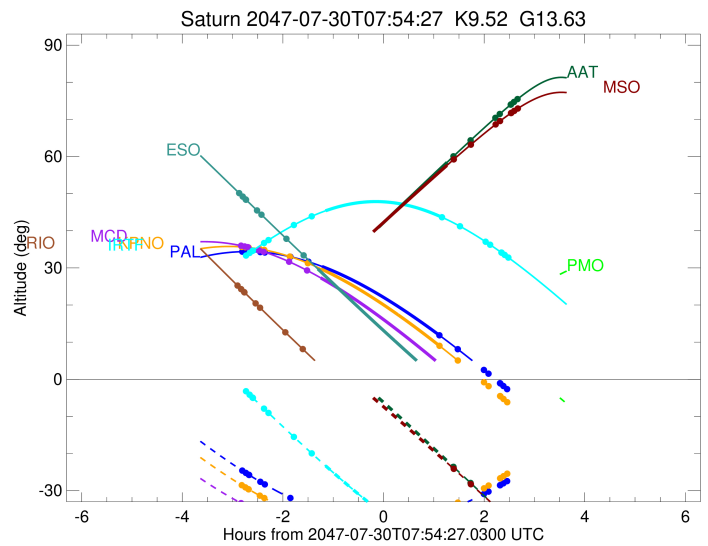
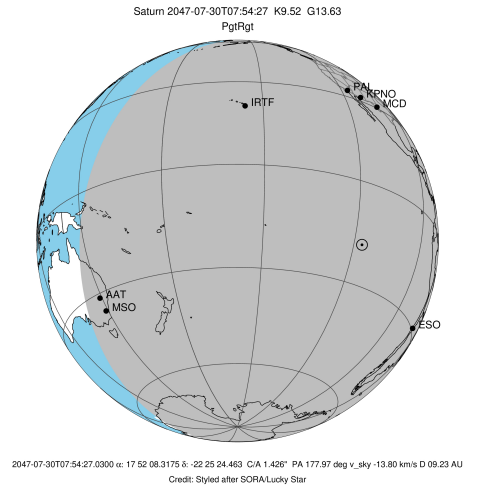


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEncode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (20	33.4	243.1	+	+	+	JUL 30 05:06 - JUL 30 09:22	PieRie
PMO	Purple Mtn Obs	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl	32.0	248.4	+	+	+	JUL 30 05:05 - JUL 30 09:23	PieRie
MCD	McDonald Obs.	30.7	256.0	+	+	+	JUL 30 05:04 - JUL 30 06:39	PinRin
TEN	Teide Obs./Ten	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+	+	+	JUL 30 05:18 - JUL 30 10:23	PieRie
KAV	Kavalur Observ	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+	+	+	JUL 30 05:00 - JUL 30 06:18	PnnRin
ESO	European South	-29.3	289.3	+	+	+	JUL 30 05:02 - JUL 30 06:36	PinRin
AAT	Siding Spring	-31.3	149.1		+	+	JUL 30 09:10 - JUL 30 10:34	PneRne
SAAO	So. Afr. Astro	-32.4	20.8			+		PnnRnn
MSO	Mt. Stromlo Ob	-35.3	149.0		+	+	JUL 30 09:10 - JUL 30 10:34	PneRne



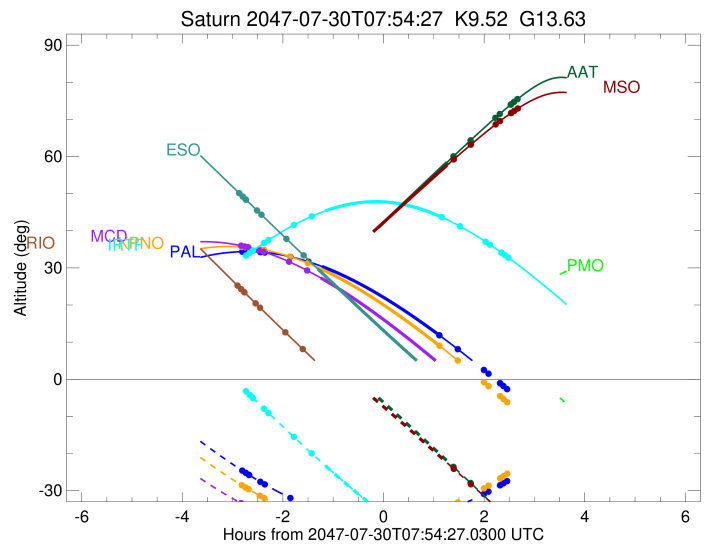
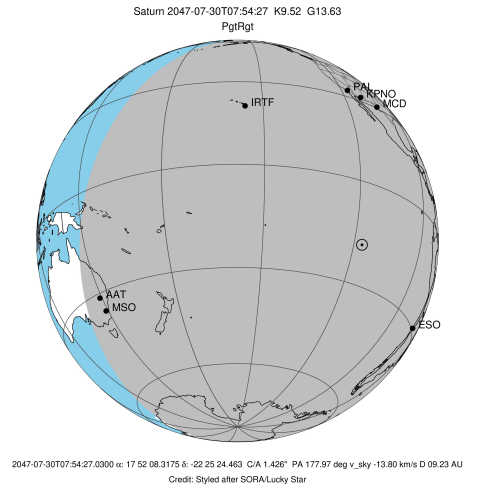
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-07-30T07:50:13.290  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PAL  
 Location : Palomar Mt (200")  
 Latitude (deg) : 33.35622  
 E. Longitude (deg) : 243.13601  
 Altitude (km) : 1.706  
 Gaia source ID : 4070419744383371392  
 2Mass ID (if available) : 17520833-2225246  
 ICRS Star Coord at Epoch: 17h 52m 08.31751s -22:25:24.46324s  
 RUWE (>1.4 is poor) : 1.64  
 K magnitude : 9.524  
 G magnitude : 13.630  
 RP magnitude : 12.544  
 BP magnitude : 14.850  
 DUPflag : 0  
 Distance (au) : 9.229  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -13.80  
 Sun-Target sep (deg) : 141.71  
 Sun-Moon sep (deg) : 47.28  
 B (ring opening deg) : 26.73  
 PA of pole (deg) : 5.36  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 2.120  
 C/A sky separation (km) : 14193.1  
 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

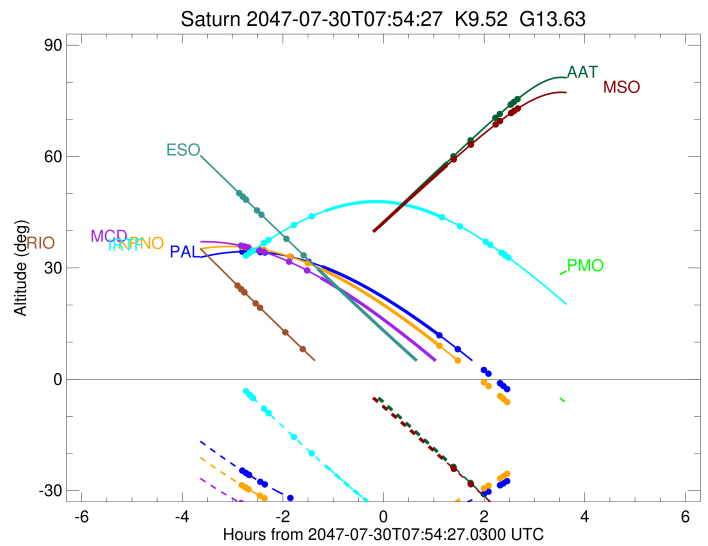
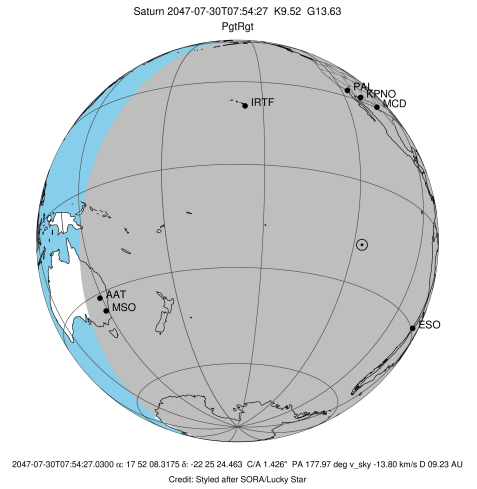
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-07-30T05:06:02.119		34.37	-24.61	140461.00	-14.29		
A (OER)	I	2047-07-30T05:10:20.248		34.39	-25.23	136774.40	-14.27		
Encke (OEG)	I	2047-07-30T05:13:52.675		34.38	-25.74	133744.89	-14.25		
Encke (IEG)	I	2047-07-30T05:14:15.241		34.38	-25.79	133423.31	-14.25		
A (IER)	I	2047-07-30T05:27:35.678		34.25	-27.62	122050.38	-14.16		
B (OER)	I	2047-07-30T05:32:52.374		34.15	-28.32	117571.16	-14.12		
B (IER)	I	2047-07-30T06:03:24.457		33.01	-31.98	91984.69	-13.77		
C (IER)	I	2047-07-30T06:24:55.467		31.67	-34.13	74490.58	-13.29		
Saturn	I	2047-07-30T06:41:09.026		30.38	-35.48	60252.28		5.92	7.26
Saturn	E	2047-07-30T08:59:34.742		12.11	-36.02	60123.74		18.25	22.01
C (IER)	E	2047-07-30T09:01:03.392		11.86	-35.92	74490.58	13.07		
B (IER)	E	2047-07-30T09:22:58.109		8.11	-34.14	91984.69	13.49		
B (OER)	E	2047-07-30T09:54:12.751		2.51x	-30.91	117571.16	13.76		
A (IER)	E	2047-07-30T09:59:37.859		1.51x	-30.27	122050.38	13.79		
Encke (IEG)	E	2047-07-30T10:13:20.916		-1.04x	-28.56	133423.31	13.84		
Encke (OEG)	E	2047-07-30T10:13:44.147		-1.12x	-28.51	133744.89	13.84		
A (OER)	E	2047-07-30T10:17:22.915		-1.80x	-28.04	136774.40	13.85		
F ring	E	2047-07-30T10:21:48.927		-2.64x	-27.45	140461.00	13.86		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-07-30T07:49:44.700  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : KPNO  
 Location : Kitt Peak Natl Obs  
 Latitude (deg) : 31.96333  
 E. Longitude (deg) : 248.40000  
 Altitude (km) : 2.120  
 Gaia source ID : 4070419744383371392  
 2Mass ID (if available) : 17520833-2225246  
 ICRS Star Coord at Epoch: 17h 52m 08.31751s -22:25:24.46324s  
 RUWE (>1.4 is poor) : 1.64  
 K magnitude : 9.524  
 G magnitude : 13.630  
 RP magnitude : 12.544  
 BP magnitude : 14.850  
 DUPflag : 0  
 Distance (au) : 9.229  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -13.80  
 Sun-Target sep (deg) : 141.71  
 Sun-Moon sep (deg) : 47.30  
 B (ring opening deg) : 26.73  
 PA of pole (deg) : 5.36  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 2.085  
 C/A sky separation (km) : 13956.0  
 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



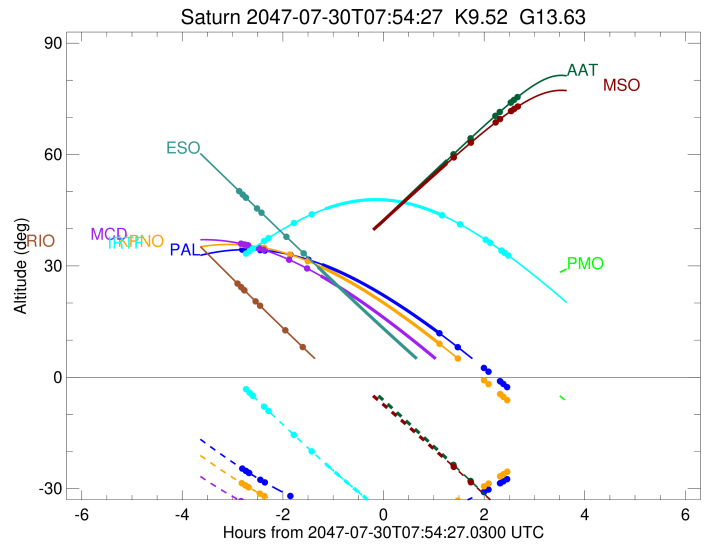
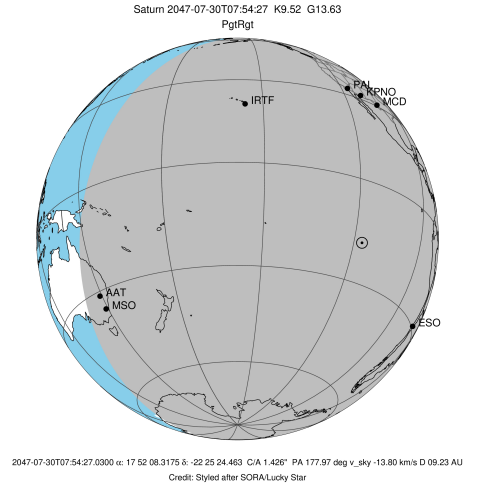
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-07-30T05:05:27.475		35.65	-28.54	140461.00	-14.30		
A (OER)	I	2047-07-30T05:09:45.408		35.58	-29.13	136774.40	-14.28		
Encke (OEG)	I	2047-07-30T05:13:17.673		35.50	-29.60	133744.89	-14.26		
Encke (IEG)	I	2047-07-30T05:13:40.222		35.49	-29.65	133423.31	-14.26		
A (IER)	I	2047-07-30T05:27:00.027		35.07	-31.35	122050.38	-14.18		
B (OER)	I	2047-07-30T05:32:16.458		34.85	-31.99	117571.16	-14.13		
B (IER)	I	2047-07-30T06:02:46.587		33.05	-35.27	91984.69	-13.79		
C (IER)	I	2047-07-30T06:24:15.210		31.27	-37.09	74490.58	-13.32		
Saturn	I	2047-07-30T06:40:32.131		29.67	-38.17	60253.14		5.76	7.06
Saturn	E	2047-07-30T08:59:17.460		9.36	-35.63	60127.37		18.01	21.73
C (IER)	E	2047-07-30T09:01:08.868		9.03	-35.46	74490.58	13.09		
B (IER)	E	2047-07-30T09:23:03.093		5.07	-33.22	91984.69	13.49		
B (OER)	E	2047-07-30T09:54:19.228		-0.80x	-29.38	117571.16	13.75		
A (IER)	E	2047-07-30T09:59:44.752		-1.84x	-28.64	122050.38	13.77		
Encke (IEG)	E	2047-07-30T10:13:29.006		-4.51x	-26.70	133423.31	13.82		
Encke (OEG)	E	2047-07-30T10:13:52.274		-4.58x	-26.64	133744.89	13.82		
A (OER)	E	2047-07-30T10:17:31.390		-5.30x	-26.11	136774.40	13.83		
F ring	E	2047-07-30T10:21:57.841		-6.17x	-25.45	140461.00	13.84		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-07-30T07:49:08.510  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : MCD  
 Location : McDonald Obs. 2.7m  
 Latitude (deg) : 30.67158  
 E. Longitude (deg) : 255.97844  
 Altitude (km) : 2.075  
 Gaia source ID : 4070419744383371392  
 2Mass ID (if available) : 17520833-2225246  
 ICRS Star Coord at Epoch: 17h 52m 08.31751s -22:25:24.46324s  
 RUWE (>1.4 is poor) : 1.64  
 K magnitude : 9.524  
 G magnitude : 13.630  
 RP magnitude : 12.544  
 BP magnitude : 14.850  
 DUPflag : 0  
 Distance (au) : 9.229  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -13.80  
 Sun-Target sep (deg) : 141.71  
 Sun-Moon sep (deg) : 47.30  
 B (ring opening deg) : 26.73  
 PA of pole (deg) : 5.36  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 2.037  
 C/A sky separation (km) : 13638.2  
 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



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-07-30T05:04:36.839		35.99	-33.37	140461.00	-14.31		
A (OER)	I	2047-07-30T05:08:54.669		35.77	-33.89	136774.40	-14.29		
Encke (OEG)	I	2047-07-30T05:12:26.849		35.58	-34.29	133744.89	-14.27		
Encke (IEG)	I	2047-07-30T05:12:49.388		35.56	-34.34	133423.31	-14.27		
A (IER)	I	2047-07-30T05:26:08.855		34.73	-35.78	122050.38	-14.18		
B (OER)	I	2047-07-30T05:31:25.134		34.35	-36.31	117571.16	-14.14		
B (IER)	I	2047-07-30T06:01:53.862		31.66	-38.87	91984.69	-13.80		
C (IER)	I	2047-07-30T06:23:20.203		29.31	-40.10	74490.58	-13.35		
Saturn	I	2047-07-30T06:39:42.127		27.30	-40.69	60254.26		5.54	6.79
Saturn	E	2047-07-30T08:58:58.991		4.56x	-33.58	60132.08		17.69	21.36
C (IER)	E	2047-07-30T09:01:20.097		4.12x	-33.30	74490.58	13.10		
B (IER)	E	2047-07-30T09:23:14.406		-0.07x	-30.48	91984.69	13.48		
B (OER)	E	2047-07-30T09:54:33.430		-6.24x	-25.90	117571.16	13.72		
A (IER)	E	2047-07-30T09:59:59.649		-7.32x	-25.05	122050.38	13.74		
Encke (IEG)	E	2047-07-30T10:13:45.832		-10.10x	-22.84	133423.31	13.79		
Encke (OEG)	E	2047-07-30T10:14:09.157		-10.18x	-22.77	133744.89	13.79		
A (OER)	E	2047-07-30T10:17:48.821		-10.92x	-22.17	136774.40	13.80		
F ring	E	2047-07-30T10:22:15.955		-11.83x	-21.43	140461.00	13.81		

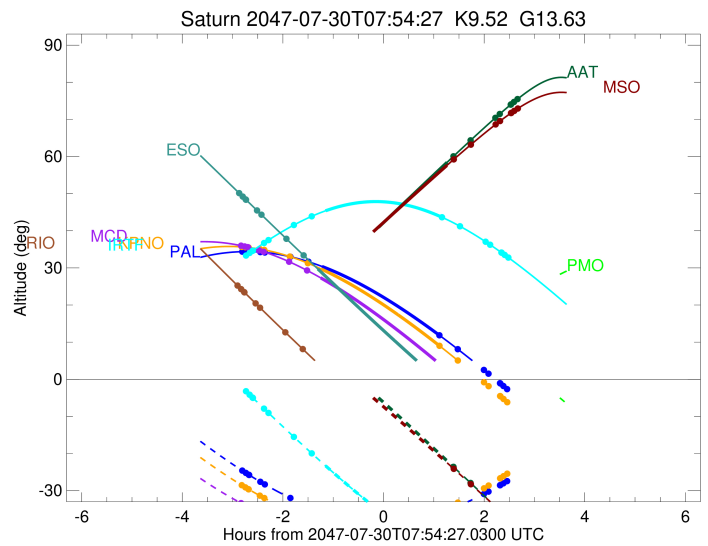
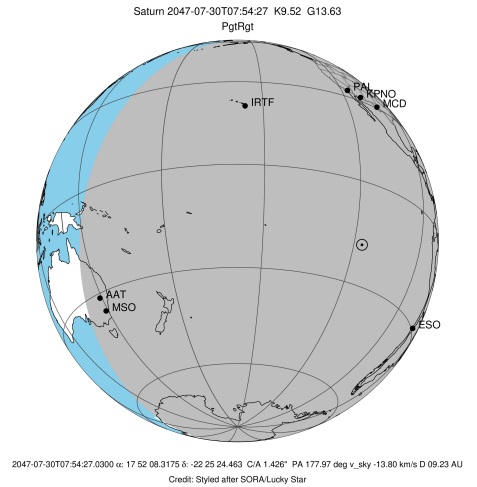
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-07-30T07:53:59.580  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : IRTF  
 Location : Mauna Kea/IRTF  
 Latitude (deg) : 19.82622  
 E. Longitude (deg) : 204.52800  
 Altitude (km) : 4.168  
 Gaia source ID : 4070419744383371392  
 2Mass ID (if available) : 17520833-2225246  
 ICRS Star Coord at Epoch: 17h 52m 08.31751s -22:25:24.46324s  
 RUWE (>1.4 is poor) : 1.64  
 K magnitude : 9.524  
 G magnitude : 13.630  
 RP magnitude : 12.544  
 BP magnitude : 14.850  
 DUPflag : 0  
 Distance (au) : 9.230  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -13.80  
 Sun-Target sep (deg) : 141.71  
 Sun-Moon sep (deg) : 47.20  
 B (ring opening deg) : 26.73  
 PA of pole (deg) : 5.36  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 2.064  
 C/A sky separation (km) : 13813.9  
 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	2047-07-30T05:10:30.275		33.33	-3.23x	140461.00	-14.32		
A (OER)	I	2047-07-30T05:14:47.905		34.03	-4.17x	136774.40	-14.30		
Encke (OEG)	I	2047-07-30T05:18:19.840		34.60	-4.95x	133744.89	-14.29		
Encke (IEG)	I	2047-07-30T05:18:42.349		34.66	-5.03	133423.31	-14.29		
A (IER)	I	2047-07-30T05:32:00.214		36.71	-7.93	122050.38	-14.22		
B (OER)	I	2047-07-30T05:37:15.583		37.49	-9.06	117571.16	-14.19		
B (IER)	I	2047-07-30T06:07:36.127		41.55	-15.53	91984.69	-13.88		
C (IER)	I	2047-07-30T06:28:54.098		43.90	-19.96	74490.58	-13.45		
Saturn	I	2047-07-30T06:45:18.719		45.38	-23.30	60255.59		5.26	6.46
Saturn	E	2047-07-30T09:02:37.208		43.80	-46.42	60124.72		18.18	21.94
C (IER)	E	2047-07-30T09:04:09.969		43.65	-46.60	74490.58	13.36		
B (IER)	E	2047-07-30T09:25:37.554		41.22	-48.85	91984.69	13.77		
B (OER)	E	2047-07-30T09:56:15.130		37.05	-51.03	117571.16	14.04		
A (IER)	E	2047-07-30T10:01:33.864		36.25	-51.27	122050.38	14.07		
Encke (IEG)	E	2047-07-30T10:15:00.795		34.15	-51.70	133423.31	14.12		
Encke (OEG)	E	2047-07-30T10:15:23.571		34.08	-51.70	133744.89	14.12		
A (OER)	E	2047-07-30T10:18:58.051		33.51	-51.77	136774.40	14.13		
F ring	E	2047-07-30T10:23:18.850		32.79	-51.82	140461.00	14.14		

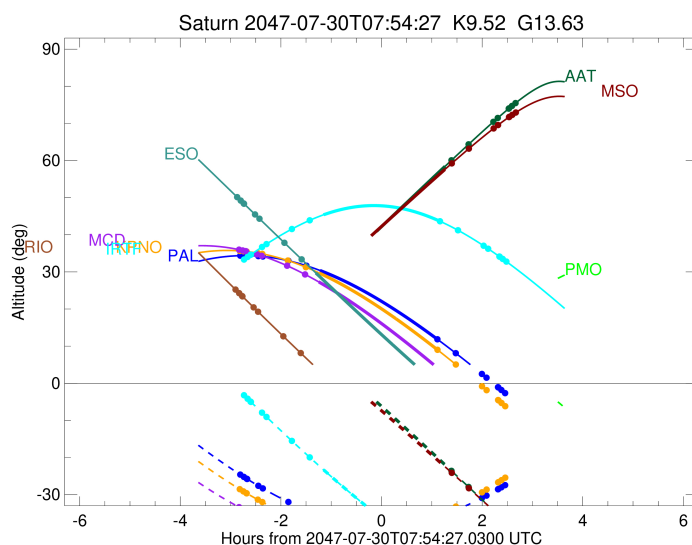
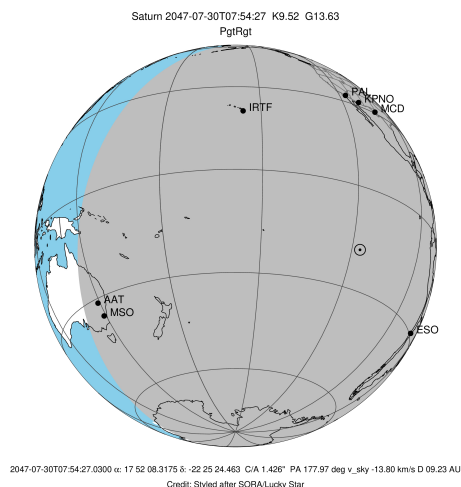
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-07-30T07:48:09.050  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : RIO  
 Location : Rio de Janeiro  
 Latitude (deg) : -22.89506  
 E. Longitude (deg) : 316.77708  
 Altitude (km) : 0.033  
 Gaia source ID : 4070419744383371392  
 2Mass ID (if available) : 17520833-2225246  
 ICRS Star Coord at Epoch: 17h 52m 08.31751s -22:25:24.46324s  
 RUWE (>1.4 is poor) : 1.64  
 K magnitude : 9.524  
 G magnitude : 13.630  
 RP magnitude : 12.544  
 BP magnitude : 14.850  
 DUPflag : 0  
 Distance (au) : 9.229  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -13.80  
 Sun-Target sep (deg) : 141.71  
 Sun-Moon sep (deg) : 46.95  
 B (ring opening deg) : 26.73  
 PA of pole (deg) : 5.36  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 0.923  
 C/A sky separation (km) : 6177.3  
 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

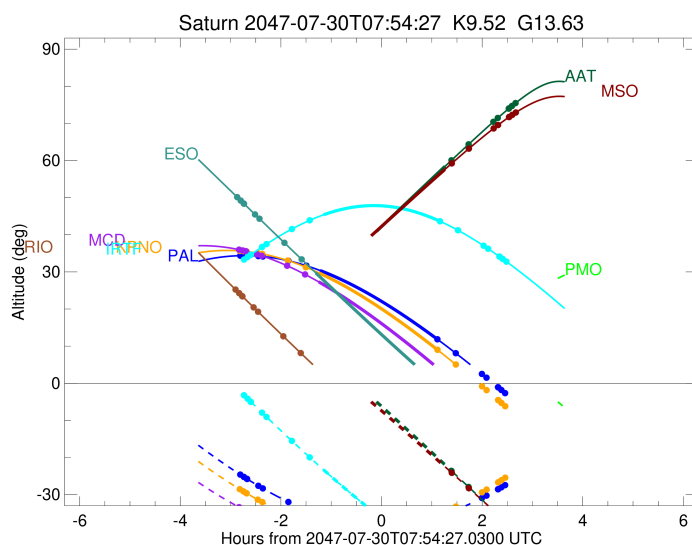
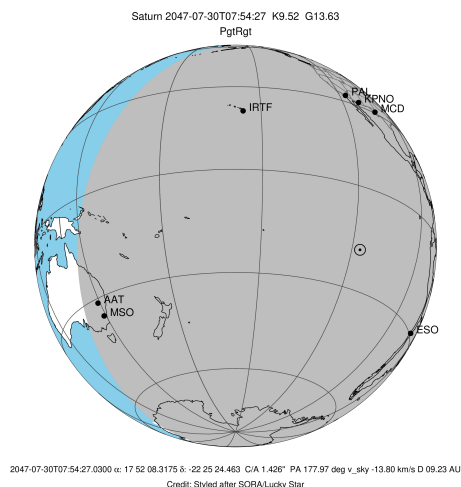
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-07-30T05:00:24.851		25.23	-61.41	140461.00	-14.27		
A (OER)	I	2047-07-30T05:04:43.227		24.27	-60.41	136774.40	-14.26		
Encke (OEG)	I	2047-07-30T05:08:15.724		23.48	-59.60	133744.89	-14.25		
Encke (IEG)	I	2047-07-30T05:08:38.289		23.40	-59.51	133423.31	-14.25		
A (IER)	I	2047-07-30T05:21:57.543		20.44	-56.44	122050.38	-14.21		
B (OER)	I	2047-07-30T05:27:13.000		19.27	-55.23	117571.16	-14.19		
B (IER)	I	2047-07-30T05:57:23.539		12.64	-48.27	91984.69	-14.07		
C (IER)	I	2047-07-30T06:18:12.369		8.12	-43.48	74490.58	-13.94		
Saturn	I	2047-07-30T06:35:13.027		4.47x	-39.58	60267.75		-0.74	-0.91
Saturn	E	2047-07-30T09:01:46.043		-24.61x	-6.50	60211.09		11.33	13.82
C (IER)	E	2047-07-30T09:12:26.875		-26.47x	-4.16x	74490.58	13.64		
B (IER)	E	2047-07-30T09:33:46.827		-30.01x	0.48x	91984.69	13.69		
B (OER)	E	2047-07-30T10:04:53.382		-34.70x	7.14x	117571.16	13.72		
A (IER)	E	2047-07-30T10:10:19.872		-35.46x	8.29x	122050.38	13.72		
Encke (IEG)	E	2047-07-30T10:24:08.698		-37.27x	11.18x	133423.31	13.72		
Encke (OEG)	E	2047-07-30T10:24:32.131		-37.32x	11.26x	133744.89	13.72		
A (OER)	E	2047-07-30T10:28:12.890		-37.78x	12.02x	136774.40	13.72		
F ring	E	2047-07-30T10:32:41.524		-38.31x	12.95x	140461.00	13.72		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-07-30T07:47:58.220  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : ESO  
 Location : European Southern Obs. (3.6m)  
 Latitude (deg) : -29.26097  
 E. Longitude (deg) : 289.26831  
 Altitude (km) : 2.400  
 Gaia source ID : 4070419744383371392  
 2Mass ID (if available) : 17520833-2225246  
 ICRS Star Coord at Epoch: 17h 52m 08.31751s -22:25:24.46324s  
 RUWE (>1.4 is poor) : 1.64  
 K magnitude : 9.524  
 G magnitude : 13.630  
 RP magnitude : 12.544  
 BP magnitude : 14.850  
 DUPflag : 0  
 Distance (au) : 9.229  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -13.80  
 Sun-Target sep (deg) : 141.71  
 Sun-Moon sep (deg) : 47.29  
 B (ring opening deg) : 26.73  
 PA of pole (deg) : 5.36  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 0.991  
 C/A sky separation (km) : 6630.3  
 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



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-07-30T05:02:22.104		50.13	-79.01	140461.00	-14.44		
A (OER)	I	2047-07-30T05:06:37.595		49.20	-78.71	136774.40	-14.42		
Encke (OEG)	I	2047-07-30T05:10:07.702		48.43	-78.40	133744.89	-14.41		
Encke (IEG)	I	2047-07-30T05:10:30.012		48.35	-78.37	133423.31	-14.41		
A (IER)	I	2047-07-30T05:23:40.145		45.47	-76.83	122050.38	-14.37		
B (OER)	I	2047-07-30T05:28:51.959		44.33	-76.10	117571.16	-14.36		
B (IER)	I	2047-07-30T05:58:41.401		37.83	-70.97	91984.69	-14.23		
C (IER)	I	2047-07-30T06:19:16.014		33.37	-66.93	74490.58	-14.10		
Saturn	I	2047-07-30T06:36:07.351		29.73	-63.46	60267.94		-0.36	-0.45
Saturn	E	2047-07-30T09:00:29.156		-0.25x	-32.22	60208.05		11.63	14.19
C (IER)	E	2047-07-30T09:10:43.758		-2.26x	-29.99	74490.58	13.77		
B (IER)	E	2047-07-30T09:31:51.531		-6.32x	-25.41	91984.69	13.82		
B (OER)	E	2047-07-30T10:02:40.844		-12.03x	-18.76	117571.16	13.84		
A (IER)	E	2047-07-30T10:08:04.478		-13.00x	-17.61	122050.38	13.84		
Encke (IEG)	E	2047-07-30T10:21:46.339		-15.42x	-14.69	133423.31	13.84		
Encke (OEG)	E	2047-07-30T10:22:09.582		-15.49x	-14.60	133744.89	13.84		
A (OER)	E	2047-07-30T10:25:48.566		-16.12x	-13.83	136774.40	13.83		
F ring	E	2047-07-30T10:30:15.085		-16.88x	-12.89	140461.00	13.83		

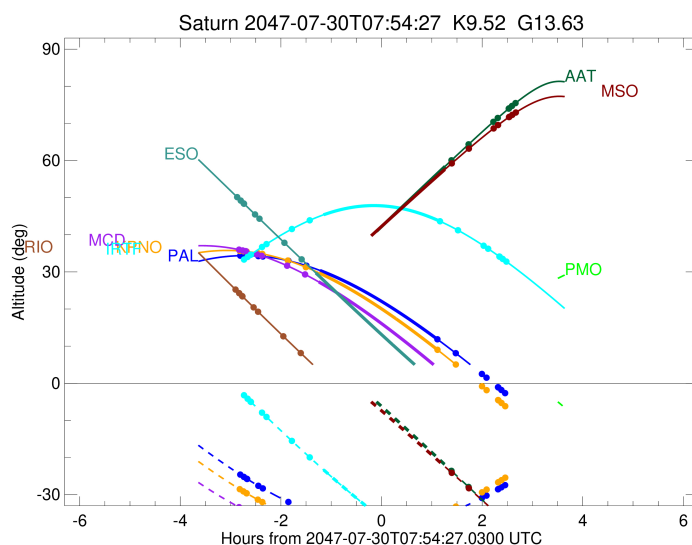
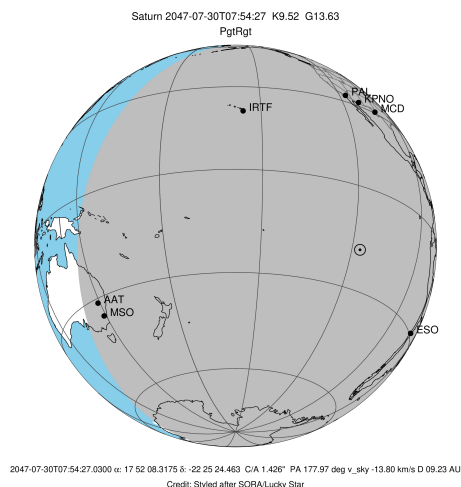
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-07-30T07:59:38.520  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : AAT  
 Location : Siding Spring (AAT)  
 Latitude (deg) : -31.27703  
 E. Longitude (deg) : 149.06608  
 Altitude (km) : 1.164  
 Gaia source ID : 4070419744383371392  
 2Mass ID (if available) : 17520833-2225246  
 ICRS Star Coord at Epoch: 17h 52m 08.31751s -22:25:24.46324s  
 RUWE (>1.4 is poor) : 1.64  
 K magnitude : 9.524  
 G magnitude : 13.630  
 RP magnitude : 12.544  
 BP magnitude : 14.850  
 DUPflag : 0  
 Distance (au) : 9.230  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -13.80  
 Sun-Target sep (deg) : 141.71  
 Sun-Moon sep (deg) : 46.58  
 B (ring opening deg) : 26.73  
 PA of pole (deg) : 5.36  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.190  
 C/A sky separation (km) : 7965.9  
 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	2047-07-30T05:14:04.802		8.67	23.59x	140461.00	-14.22		
A (OER)	I	2047-07-30T05:18:24.008		9.53	22.90x	136774.40	-14.22		
Encke (OEG)	I	2047-07-30T05:21:57.009		10.25	22.32x	133744.89	-14.22		
Encke (IEG)	I	2047-07-30T05:22:19.619		10.32	22.26x	133423.31	-14.22		
A (IER)	I	2047-07-30T05:35:39.307		13.02	20.05x	122050.38	-14.22		
B (OER)	I	2047-07-30T05:40:54.353		14.09	19.16x	117571.16	-14.22		
B (IER)	I	2047-07-30T06:10:56.995		20.28	13.86x	91984.69	-14.16		
C (IER)	I	2047-07-30T06:31:36.613		24.60	10.05x	74490.58	-14.05		
Saturn	I	2047-07-30T06:48:31.688		28.16	6.85x	60267.97		-0.24	-0.30
Saturn	E	2047-07-30T09:10:15.469		58.44	-21.98	60185.74		13.67	16.62
C (IER)	E	2047-07-30T09:17:50.283		60.05	-23.58	74490.58	14.20		
B (IER)	E	2047-07-30T09:38:15.727		64.35	-27.92	91984.69	14.34		
B (OER)	E	2047-07-30T10:07:52.505		70.43	-34.24	117571.16	14.45		
A (IER)	E	2047-07-30T10:13:02.434		71.45	-35.35	122050.38	14.46		
Encke (IEG)	E	2047-07-30T10:26:08.383		73.98	-38.15	133423.31	14.48		
Encke (OEG)	E	2047-07-30T10:26:30.589		74.04	-38.23	133744.89	14.48		
A (OER)	E	2047-07-30T10:29:59.747		74.69	-38.97	136774.40	14.49		
F ring	E	2047-07-30T10:34:14.179		75.46	-39.88	140461.00	14.49		



target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-07-30T07:59:26.520  
 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 : 4070419744383371392  
 2Mass ID (if available) : 17520833-2225246  
 ICRS Star Coord at Epoch: 17h 52m 08.31751s -22:25:24.46324s  
 RUWE (>1.4 is poor) : 1.64  
 K magnitude : 9.524  
 G magnitude : 13.630  
 RP magnitude : 12.544  
 BP magnitude : 14.850  
 DUPflag : 0  
 Distance (au) : 9.230  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -13.80  
 Sun-Target sep (deg) : 141.71  
 Sun-Moon sep (deg) : 46.59  
 B (ring opening deg) : 26.73  
 PA of pole (deg) : 5.36  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.128  
 C/A sky separation (km) : 7551.3  
 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	2047-07-30T05:13:54.775		10.02	20.92x	140461.00	-14.23		
A (OER)	I	2047-07-30T05:18:13.838		10.85	20.27x	136774.40	-14.23		
Encke (OEG)	I	2047-07-30T05:21:46.718		11.53	19.74x	133744.89	-14.23		
Encke (IEG)	I	2047-07-30T05:22:09.314		11.60	19.68x	133423.31	-14.23		
A (IER)	I	2047-07-30T05:35:28.501		14.19	17.60x	122050.38	-14.23		
B (OER)	I	2047-07-30T05:40:43.325		15.22	16.77x	117571.16	-14.23		
B (IER)	I	2047-07-30T06:10:44.224		21.16	11.78x	91984.69	-14.18		
C (IER)	I	2047-07-30T06:31:21.748		25.30	8.17x	74490.58	-14.08		
Saturn	I	2047-07-30T06:48:12.969		28.71	5.14x	60267.85		-0.58	-0.71
Saturn	E	2047-07-30T09:10:11.663		57.63	-22.49	60190.01		13.30	16.18
C (IER)	E	2047-07-30T09:18:12.421		59.22	-24.11	74490.58	14.22		
B (IER)	E	2047-07-30T09:38:36.484		63.19	-28.27	91984.69	14.35		
B (OER)	E	2047-07-30T10:08:12.831		68.65	-34.31	117571.16	14.45		
A (IER)	E	2047-07-30T10:13:22.800		69.54	-35.37	122050.38	14.46		
Encke (IEG)	E	2047-07-30T10:26:28.954		71.70	-38.04	133423.31	14.48		
Encke (OEG)	E	2047-07-30T10:26:51.168		71.76	-38.12	133744.89	14.48		
A (OER)	E	2047-07-30T10:30:20.403		72.30	-38.83	136774.40	14.48		
F ring	E	2047-07-30T10:34:34.939		72.93	-39.70	140461.00	14.49		