

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2048-09-21T06:34:30.410  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 4079213603987017600  
 2Mass ID (if available) : 18375488-2244526

Saturn 2048-09-21T06:34:30 K9.48 G13.52 PgtRgt

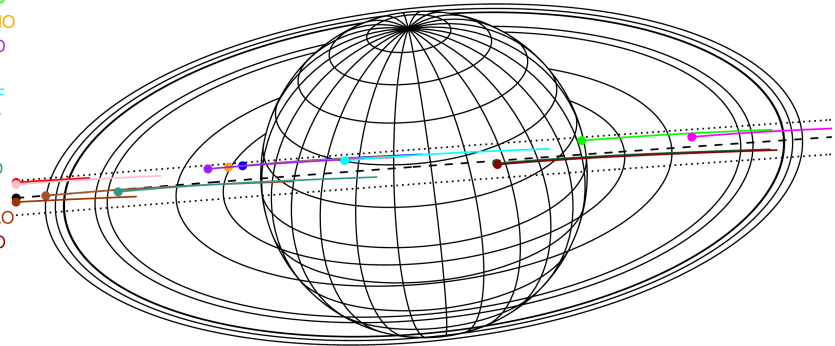
ICRS Star Coord at Epoch: 18h 37m 54.85955s -22:44:52.74859s

RUWE (>1.4 is poor) : 0.90  
 K magnitude : 9.476  
 G magnitude : 13.518  
 RP magnitude : 12.408  
 BP magnitude : 14.800  
 DUPflag : 0  
 Distance (au) : 9.801  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 4.22  
 Sun-Target sep (deg) : 100.45  
 Sun-Moon sep (deg) : 67.99  
 B (ring opening deg) : 25.99  
 PA of pole (deg) : 6.19



2048-09-21T06:34:30.4100 α: 18 37 54.85955 δ: -22 44 52.749 C/A 0.436° PA 184.27 deg v\_sky + 4.22 km/s D 09.80 AU  
 Credit: Styled after SORA/Lucky Star

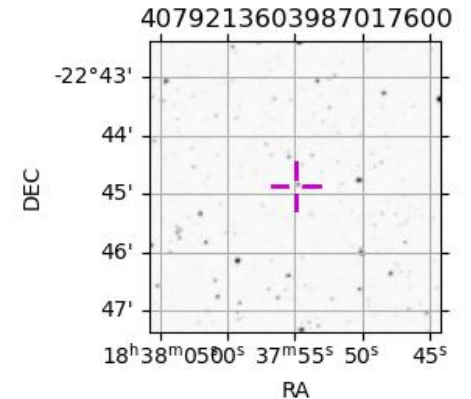
Earth  
 PIC  
 PAL  
 PMO  
 KPNO  
 MCD  
 TEN  
 IRTF  
 KAV  
 RIO  
 ESO  
 AAT  
 SAAO  
 MSO



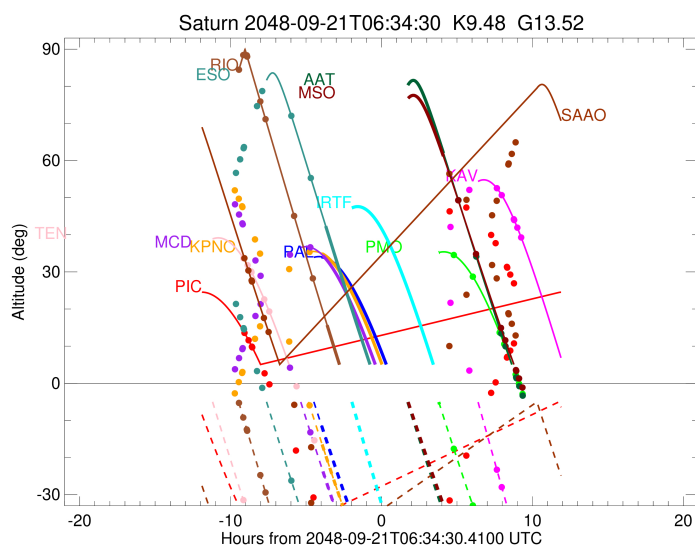
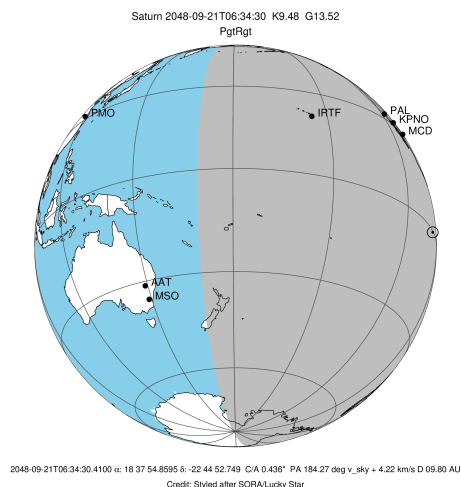
#	a(km)	ring
1	74490.6	C (IER)
2	91984.7	B (IER)
3	117571.2	B (OER)
4	122050.4	A (IER)
5	133423.3	Encke (IEG)
6	133744.9	Encke (OEG)
7	136774.4	A (OER)
8	140461.0	F ring

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	+			SEP 20 21:30 - SEP 20 22:00		PnnRin
PAL	Palomar Mt (20	33.4	243.1		+		SEP 21 02:36 - SEP 21 02:36		PinRnn
PMO	Purple Mtn Obs	32.1	118.8		+	+	SEP 21 10:25 - SEP 21 14:42		PneRne
KPNO	Kitt Peak Natl	32.0	248.4		+	+	SEP 21 01:48 - SEP 21 02:38		PinRin
MCD	McDonald Obs.	30.7	256.0		+	+	SEP 21 01:51 - SEP 21 02:41		PinRin
TEN	Teide Obs./Ten	28.3	343.5	+			SEP 20 21:25 - SEP 20 23:08		PnnRin
IRTF	Mauna Kea/IRTF	19.8	204.5						PnnRnn
KAV	Kavalur Observ	12.6	78.8				SEP 21 14:13 - SEP 21 15:49		PnnRne
RIO	Rio de Janeiro	-22.9	316.8	+	+	+	SEP 20 21:08 - SEP 21 02:58		PinRin
ESO	European South	-29.3	289.3		+		SEP 21 00:36 - SEP 21 02:52		PinRin
AAT	Siding Spring	-31.3	149.1		+	+	SEP 21 10:40 - SEP 21 14:47		PneRne
SAAO	So. Afr. Astro	-32.4	20.8	+			SEP 20 21:29 - SEP 20 23:05		PnnRin
MSO	Mt. Stromlo Ob	-35.3	149.0		+	+	SEP 21 10:40 - SEP 21 14:46		PneRne



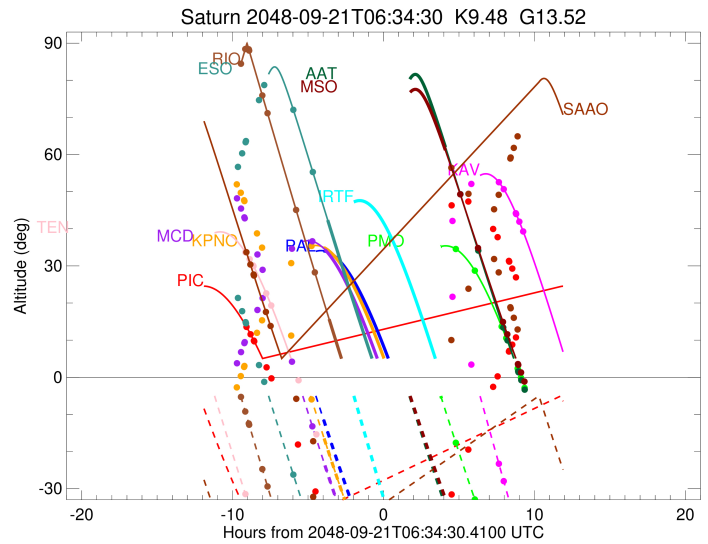
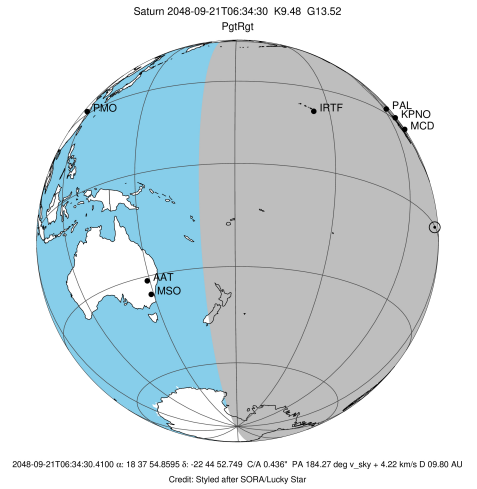
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2048-09-21T06:34:14.250  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PIC  
 Location : Pic du Midi  
 Latitude (deg) : 42.93656  
 E. Longitude (deg) : 0.14231  
 Altitude (km) : 2.890  
 Gaia source ID : 4079213603987017600  
 2Mass ID (if available) : 18375488-2244526  
 ICRS Star Coord at Epoch: 18h 37m 54.85955s -22:44:52.74859s  
 RUWE (>1.4 is poor) : 0.90  
 K magnitude : 9.476  
 G magnitude : 13.518  
 RP magnitude : 12.408  
 BP magnitude : 14.800  
 DUPflag : 0  
 Distance (au) : 9.801  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 4.22  
 Sun-Target sep (deg) : 100.45  
 Sun-Moon sep (deg) : 67.14  
 B (ring opening deg) : 25.99  
 PA of pole (deg) : 6.19  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 0.741  
 C/A sky separation (km) : 5263.7  
 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	2048-09-20T21:30:01.193		13.55	-36.20	140461.00	-3.78		
A (OER)	I	2048-09-20T21:46:14.158		11.55	-38.27	136774.40	-3.80		
Encke (OEG)	I	2048-09-20T21:59:28.919		9.83	-39.84	133744.89	-3.82		
Encke (IEG)	I	2048-09-20T22:00:53.024		9.65	-39.99	133423.31	-3.82		
A (IER)	I	2048-09-20T22:49:55.284		2.65x	-44.50	122050.38	-3.91		
B (OER)	I	2048-09-20T23:08:56.772		-0.29x	-45.64	117571.16	-3.94		
B (IER)	I	2048-09-21T00:54:36.672		-18.15x	-44.54	91984.69	-4.13		
C (IER)	I	2048-09-21T02:04:15.843		-30.80x	-37.61	74490.58	-4.24		
Saturn	I	2048-09-21T02:50:33.587		-39.31x	-31.17	60247.10		7.07	8.66
Saturn	E	2048-09-21T10:13:36.096		-41.07x	42.19x	60263.80		3.16	3.88
C (IER)	E	2048-09-21T11:05:13.845		-31.58x	46.30x	74490.58	4.42		
B (IER)	E	2048-09-21T12:11:38.318		-19.50x	47.35x	91984.69	4.36		
B (OER)	E	2048-09-21T13:50:33.614		-2.56x	39.93x	117571.16	4.26		
A (IER)	E	2048-09-21T14:08:07.510		0.23x	37.75x	122050.38	4.24		
Encke (IEG)	E	2048-09-21T14:53:03.041		6.93	31.36x	133423.31	4.20		
Encke (OEG)	E	2048-09-21T14:54:19.653		7.11	31.16x	133744.89	4.20		
A (OER)	E	2048-09-21T15:06:22.423		8.77	29.28x	136774.40	4.19		
F ring	E	2048-09-21T15:21:04.360		10.72	26.92x	140461.00	4.17		

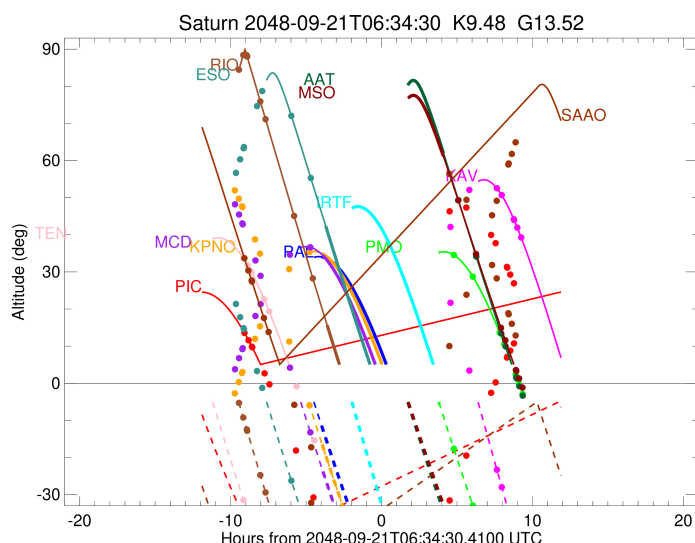
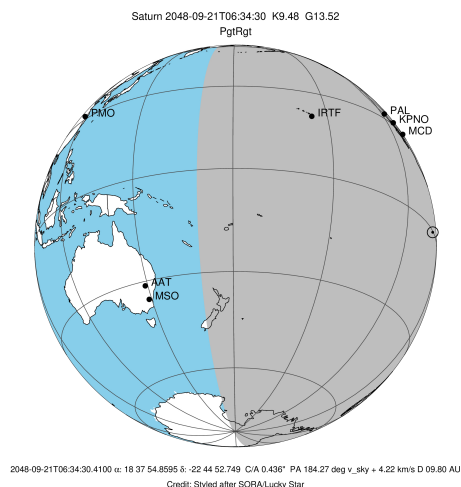
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2048-09-21T06:53:40.950  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PAL  
 Location : Palomar Mt (200")  
 Latitude (deg) : 33.35622  
 E. Longitude (deg) : 243.13601  
 Altitude (km) : 1.706  
 Gaia source ID : 4079213603987017600  
 2Mass ID (if available) : 18375488-2244526  
 ICRS Star Coord at Epoch: 18h 37m 54.85955s -22:44:52.74859s  
 RUWE (>1.4 is poor) : 0.90  
 K magnitude : 9.476  
 G magnitude : 13.518  
 RP magnitude : 12.408  
 BP magnitude : 14.800  
 DUPflag : 0  
 Distance (au) : 9.801  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 4.22  
 Sun-Target sep (deg) : 100.45  
 Sun-Moon sep (deg) : 67.82  
 B (ring opening deg) : 25.99  
 PA of pole (deg) : 6.19  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.045  
 C/A sky separation (km) : 7431.1  
 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	2048-09-20T20:51:24.139	-7.32x	53.37x	140461.00	-3.92			
A (OER)	I	2048-09-20T21:07:07.307	-4.29x	51.54x	136774.40	-3.90			
Encke (OEG)	I	2048-09-20T21:20:06.933	-1.83x	49.84x	133744.89	-3.88			
Encke (IEG)	I	2048-09-20T21:21:29.932	-1.57x	49.65x	133423.31	-3.87			
A (IER)	I	2048-09-20T22:10:55.329	7.43	41.91x	122050.38	-3.80			
B (OER)	I	2048-09-20T22:30:39.133	10.82	38.42x	117571.16	-3.77			
B (IER)	I	2048-09-21T00:25:56.801	27.23	15.77x	91984.69	-3.64			
C (IER)	I	2048-09-21T01:46:43.044	33.35	-1.07x	74490.58	-3.59			
Saturn	I	2048-09-21T02:36:15.152	34.06	-11.41	60235.75		8.79	10.76	
Saturn	E	2048-09-21T10:45:29.042	-41.11x	-35.08	60264.59		2.85	3.50	
C (IER)	E	2048-09-21T11:36:57.350	-51.90x	-25.18	74490.58	4.54			
B (IER)	E	2048-09-21T12:40:16.605	-64.92x	-12.31	91984.69	4.66			
B (OER)	E	2048-09-21T14:10:40.081	-79.14x	6.54x	117571.16	4.76			
A (IER)	E	2048-09-21T14:26:20.260	-79.50x	9.80x	122050.38	4.77			
Encke (IEG)	E	2048-09-21T15:06:01.631	-75.95x	18.00x	133423.31	4.78			
Encke (OEG)	E	2048-09-21T15:07:08.893	-75.79x	18.23x	133744.89	4.78			
A (OER)	E	2048-09-21T15:17:42.476	-74.12x	20.38x	136774.40	4.78			
F ring	E	2048-09-21T15:30:33.409	-71.89x	22.98x	140461.00	4.78			

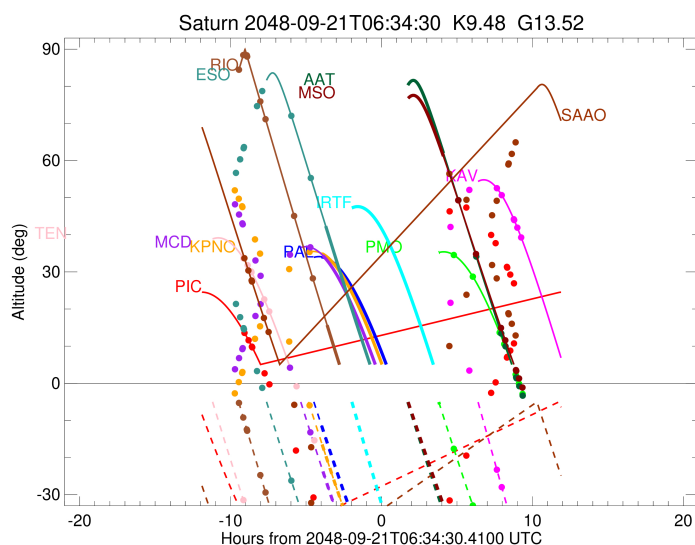
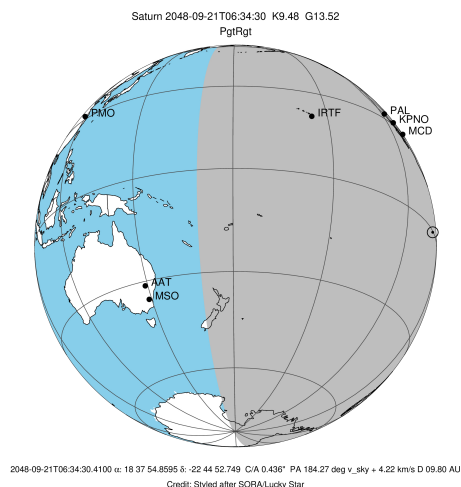
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2048-09-21T06:12:46.780  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PMO  
 Location : Purple Mtn Obs. Nanking  
 Latitude (deg) : 32.06667  
 E. Longitude (deg) : 118.82089  
 Altitude (km) : 0.364  
 Gaia source ID : 4079213603987017600  
 2Mass ID (if available) : 18375488-2244526  
 ICRS Star Coord at Epoch: 18h 37m 54.85955s -22:44:52.74859s  
 RUWE (>1.4 is poor) : 0.90  
 K magnitude : 9.476  
 G magnitude : 13.518  
 RP magnitude : 12.408  
 BP magnitude : 14.800  
 DUPflag : 0  
 Distance (au) : 9.801  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 4.22  
 Sun-Target sep (deg) : 100.45  
 Sun-Moon sep (deg) : 68.37  
 B (ring opening deg) : 25.99  
 PA of pole (deg) : 6.19  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 0.934  
 C/A sky separation (km) : 6639.4  
 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	2048-09-20T21:19:40.275	-69.25x	-7.75	140461.00	-4.41			
A (OER)	I	2048-09-20T21:33:34.573	-71.96x	-4.81x	136774.40	-4.42			
Encke (OEG)	I	2048-09-20T21:44:58.730	-74.09x	-2.40x	133744.89	-4.43			
Encke (IEG)	I	2048-09-20T21:46:11.283	-74.30x	-2.14x	133423.31	-4.43			
A (IER)	I	2048-09-20T22:28:50.713	-80.25x	6.90x	122050.38	-4.45			
B (OER)	I	2048-09-20T22:45:36.433	-80.79x	10.45x	117571.16	-4.46			
B (IER)	I	2048-09-21T00:21:29.571	-66.38x	30.22x	91984.69	-4.43			
C (IER)	I	2048-09-21T01:27:52.458	-52.47x	42.74x	74490.58	-4.35			
Saturn	I	2048-09-21T02:17:02.049	-42.02x	50.62x	60254.92			5.59	6.85
Saturn	E	2048-09-21T10:25:03.114	35.26	-5.67	60256.26			5.29	6.49
C (IER)	E	2048-09-21T11:21:54.475	34.55	-17.63	74490.58	3.81			
B (IER)	E	2048-09-21T12:37:33.394	28.72	-32.91	91984.69	3.91			
B (OER)	E	2048-09-21T14:24:16.939	13.64	-51.02	117571.16	4.10			
A (IER)	E	2048-09-21T14:42:25.599	10.55	-53.27	122050.38	4.13			
Encke (IEG)	E	2048-09-21T15:27:44.840	2.37x	-57.09	133423.31	4.23			
Encke (OEG)	E	2048-09-21T15:29:00.794	2.13x	-57.15	133744.89	4.24			
A (OER)	E	2048-09-21T15:40:53.849	-0.11x	-57.61	136774.40	4.26			
F ring	E	2048-09-21T15:55:15.515	-2.85x	-57.85	140461.00	4.29			

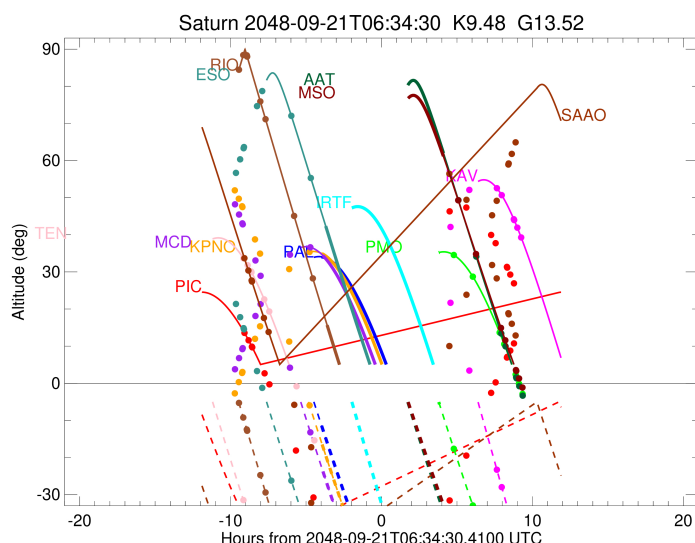
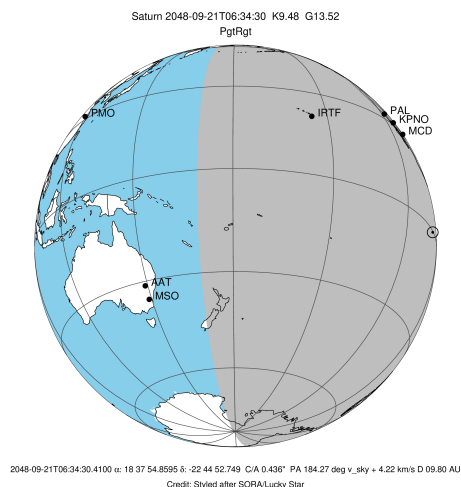
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2048-09-21T06:54:47.780  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : KPNO  
 Location : Kitt Peak Natl Obs  
 Latitude (deg) : 31.96333  
 E. Longitude (deg) : 248.40000  
 Altitude (km) : 2.120  
 Gaia source ID : 4079213603987017600  
 2Mass ID (if available) : 18375488-2244526  
 ICRS Star Coord at Epoch: 18h 37m 54.85955s -22:44:52.74859s  
 RUWE (>1.4 is poor) : 0.90  
 K magnitude : 9.476  
 G magnitude : 13.518  
 RP magnitude : 12.408  
 BP magnitude : 14.800  
 DUPflag : 0  
 Distance (au) : 9.801  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 4.22  
 Sun-Target sep (deg) : 100.45  
 Sun-Moon sep (deg) : 67.76  
 B (ring opening deg) : 25.99  
 PA of pole (deg) : 6.19  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.006  
 C/A sky separation (km) : 7152.5  
 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	2048-09-20T20:51:27.703	-2.69x	51.94x	140461.00	-3.88			
A (OER)	I	2048-09-20T21:07:20.206	0.35x	49.68x	136774.40	-3.86			
Encke (OEG)	I	2048-09-20T21:20:27.570	2.81x	47.65x	133744.89	-3.84			
Encke (IEG)	I	2048-09-20T21:21:51.392	3.07x	47.43x	133423.31	-3.84			
A (IER)	I	2048-09-20T22:11:45.769	12.00	38.72x	122050.38	-3.76			
B (OER)	I	2048-09-20T22:31:40.641	15.34	34.94x	117571.16	-3.74			
B (IER)	I	2048-09-21T00:27:49.106	30.77	11.18x	91984.69	-3.62			
C (IER)	I	2048-09-21T01:48:47.711	35.38	-6.01	74490.58	-3.59			
Saturn	I	2048-09-21T02:38:27.313	34.91	-16.48	60236.18		8.73	10.69	
Saturn	E	2048-09-21T10:44:47.204	-45.36x	-31.80	60265.17		2.59	3.19	
C (IER)	E	2048-09-21T11:36:01.871	-56.26x	-21.50	74490.58	4.57			
B (IER)	E	2048-09-21T12:38:56.194	-69.30x	-8.36	91984.69	4.69			
B (OER)	E	2048-09-21T14:09:00.457	-80.80x	10.74x	117571.16	4.77			
A (IER)	E	2048-09-21T14:24:39.137	-79.68x	14.03x	122050.38	4.77			
Encke (IEG)	E	2048-09-21T15:04:19.026	-73.55x	22.29x	133423.31	4.78			
Encke (OEG)	E	2048-09-21T15:05:26.294	-73.34x	22.52x	133744.89	4.78			
A (OER)	E	2048-09-21T15:16:00.055	-71.34x	24.68x	136774.40	4.78			
F ring	E	2048-09-21T15:28:51.508	-68.80x	27.29x	140461.00	4.78			

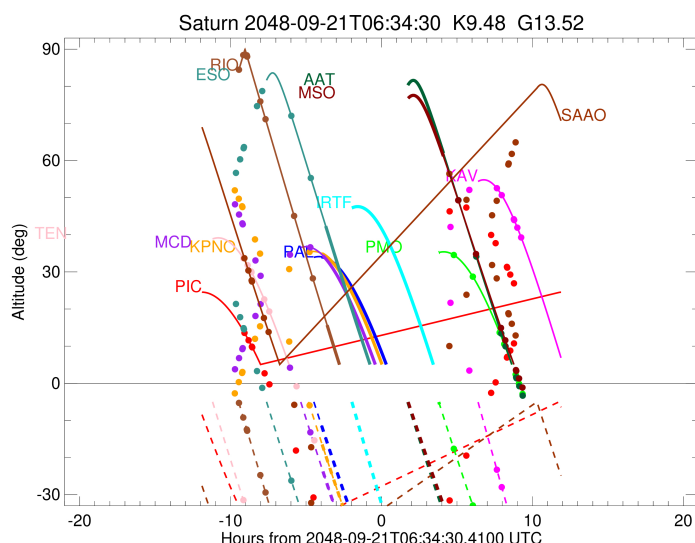
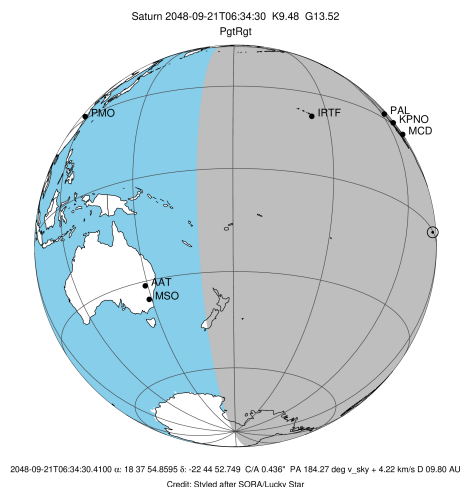
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2048-09-21T06:55:52.210  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : MCD  
 Location : McDonald Obs. 2.7m  
 Latitude (deg) : 30.67158  
 E. Longitude (deg) : 255.97844  
 Altitude (km) : 2.075  
 Gaia source ID : 4079213603987017600  
 2Mass ID (if available) : 18375488-2244526  
 ICRS Star Coord at Epoch: 18h 37m 54.85955s -22:44:52.74859s  
 RUWE (>1.4 is poor) : 0.90  
 K magnitude : 9.476  
 G magnitude : 13.518  
 RP magnitude : 12.408  
 BP magnitude : 14.800  
 DUPflag : 0  
 Distance (au) : 9.801  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 4.22  
 Sun-Target sep (deg) : 100.45  
 Sun-Moon sep (deg) : 67.67  
 B (ring opening deg) : 25.99  
 PA of pole (deg) : 6.19  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 0.954  
 C/A sky separation (km) : 6783.9  
 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	2048-09-20T20:52:11.423		3.81x	48.17x	140461.00	-3.83		
A (OER)	I	2048-09-20T21:08:17.672		6.81	45.42x	136774.40	-3.80		
Encke (OEG)	I	2048-09-20T21:21:36.281		9.24	43.04x	133744.89	-3.78		
Encke (IEG)	I	2048-09-20T21:23:01.291		9.49	42.78x	133423.31	-3.78		
A (IER)	I	2048-09-20T22:13:36.385		18.16	33.04x	122050.38	-3.71		
B (OER)	I	2048-09-20T22:33:46.157		21.32	28.96x	117571.16	-3.69		
B (IER)	I	2048-09-21T00:30:54.607		34.65	4.15x	91984.69	-3.60		
C (IER)	I	2048-09-21T01:51:56.902		36.63	-13.27	74490.58	-3.60		
Saturn	I	2048-09-21T02:41:37.658		34.39	-23.74	60236.77		8.65	10.59
Saturn	E	2048-09-21T10:43:20.983		-51.54x	-26.45	60265.79		2.29	2.82
C (IER)	E	2048-09-21T11:34:16.994		-62.49x	-15.81	74490.58	4.62		
B (IER)	E	2048-09-21T12:36:43.642		-75.30x	-2.44x	91984.69	4.71		
B (OER)	E	2048-09-21T14:06:31.422		-79.09x	16.81x	117571.16	4.77		
A (IER)	E	2048-09-21T14:22:09.817		-76.41x	20.12x	122050.38	4.77		
Encke (IEG)	E	2048-09-21T15:01:52.222		-68.54x	28.37x	133423.31	4.77		
Encke (OEG)	E	2048-09-21T15:02:59.626		-68.30x	28.60x	133744.89	4.77		
A (OER)	E	2048-09-21T15:13:34.854		-66.09x	30.75x	136774.40	4.77		
F ring	E	2048-09-21T15:26:28.513		-63.36x	33.34x	140461.00	4.76		

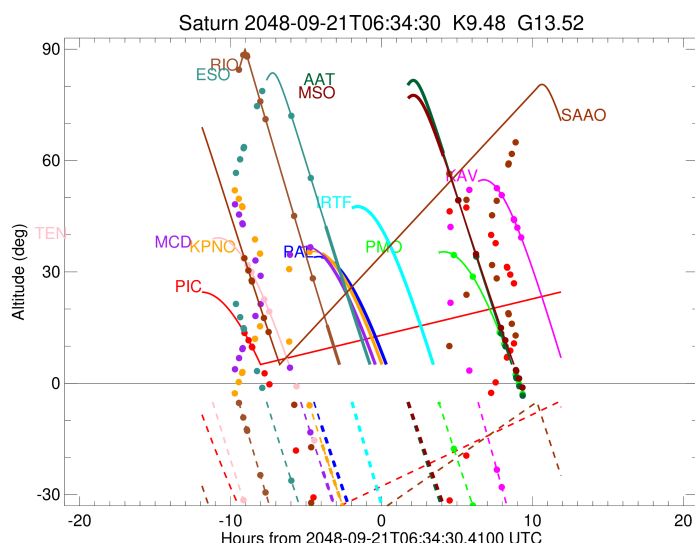
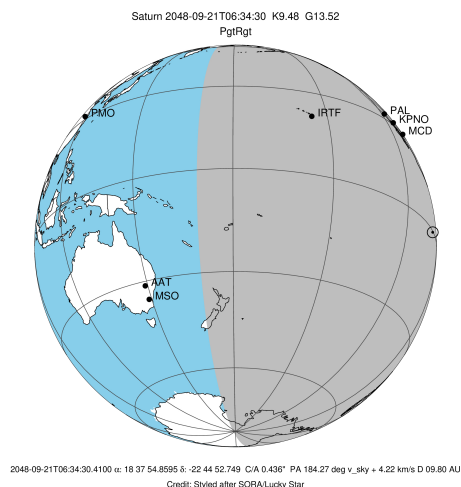
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2048-09-21T06:40:32.980  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : TEN  
 Location : Teide Obs./Tenerife  
 Latitude (deg) : 28.30050  
 E. Longitude (deg) : 343.48909  
 Altitude (km) : 2.395  
 Gaia source ID : 4079213603987017600  
 2Mass ID (if available) : 18375488-2244526  
 ICRS Star Coord at Epoch: 18h 37m 54.85955s -22:44:52.74859s  
 RUWE (>1.4 is poor) : 0.90  
 K magnitude : 9.476  
 G magnitude : 13.518  
 RP magnitude : 12.408  
 BP magnitude : 14.800  
 DUPflag : 0  
 Distance (au) : 9.801  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 4.22  
 Sun-Target sep (deg) : 100.45  
 Sun-Moon sep (deg) : 67.04  
 B (ring opening deg) : 25.99  
 PA of pole (deg) : 6.19  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 0.544  
 C/A sky separation (km) : 3870.3  
 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



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	2048-09-20T21:25:47.197		33.65	-31.51	140461.00	-3.65		
A (OER)	I	2048-09-20T21:42:34.767		31.78	-34.96	136774.40	-3.67		
Encke (OEG)	I	2048-09-20T21:56:17.969		30.09	-37.73	133744.89	-3.69		
Encke (IEG)	I	2048-09-20T21:57:45.086		29.91	-38.02	133423.31	-3.69		
A (IER)	I	2048-09-20T22:48:31.564		22.56	-47.61	122050.38	-3.78		
B (OER)	I	2048-09-20T23:08:12.054		19.34	-50.95	117571.16	-3.81		
B (IER)	I	2048-09-21T00:56:56.291		-0.85x	-61.36	91984.69	-4.04		
C (IER)	I	2048-09-21T02:07:52.837		-15.43x	-56.95	74490.58	-4.18		
Saturn	I	2048-09-21T02:56:13.817		-25.72x	-49.89	60250.92		6.39	7.83
Saturn	E	2048-09-21T10:15:54.837		-55.16x	42.17x	60266.94		1.58	1.94
C (IER)	E	2048-09-21T11:07:03.164		-43.87x	51.44x	74490.58	4.57		
B (IER)	E	2048-09-21T12:11:19.704		-29.82x	59.96x	91984.69	4.50		
B (OER)	E	2048-09-21T13:47:24.766		-9.42x	59.81x	117571.16	4.37		
A (IER)	E	2048-09-21T14:04:32.213		-5.91x	58.00x	122050.38	4.35		
Encke (IEG)	E	2048-09-21T14:48:27.188		2.88x	51.71x	133423.31	4.29		
Encke (OEG)	E	2048-09-21T14:49:42.245		3.12x	51.50x	133744.89	4.28		
A (OER)	E	2048-09-21T15:01:30.834		5.42	49.50x	136774.40	4.27		
F ring	E	2048-09-21T15:15:56.721		8.17	46.93x	140461.00	4.25		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2048-09-21T06:10:33.050  
 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 : 4079213603987017600  
 2Mass ID (if available) : 18375488-2244526  
 ICRS Star Coord at Epoch: 18h 37m 54.85955s -22:44:52.74859s  
 RUWE (>1.4 is poor) : 0.90  
 K magnitude : 9.476  
 G magnitude : 13.518  
 RP magnitude : 12.408  
 BP magnitude : 14.800  
 DUPflag : 0  
 Distance (au) : 9.801  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 4.22  
 Sun-Target sep (deg) : 100.45  
 Sun-Moon sep (deg) : 68.09  
 B (ring opening deg) : 25.99  
 PA of pole (deg) : 6.19  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 0.451  
 C/A sky separation (km) : 3204.7  
 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

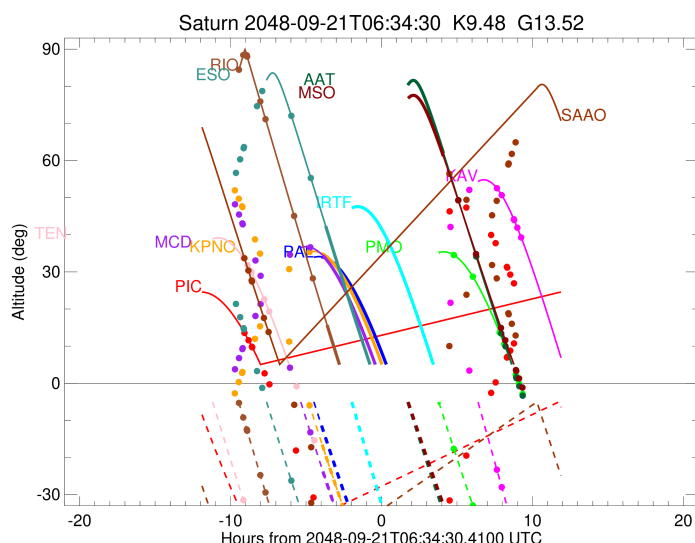
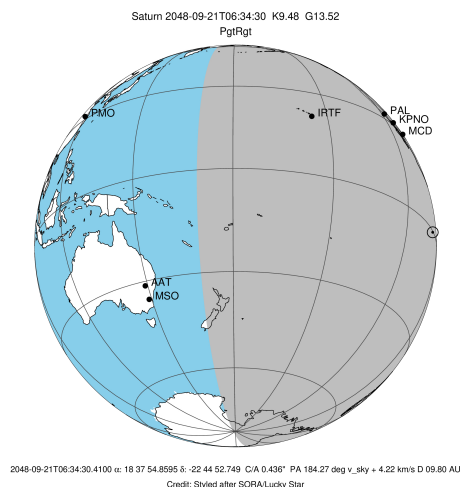


b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2048-09-20T21:32:41.541	-34.36x	-44.66	140461.00	-4.31			
A (OER)	I	2048-09-20T21:46:54.380	-37.65x	-41.27	136774.40	-4.34			
Encke (OEG)	I	2048-09-20T21:58:31.243	-40.33x	-38.50	133744.89	-4.36			
Encke (IEG)	I	2048-09-20T21:59:45.011	-40.62x	-38.20	133423.31	-4.36			
A (IER)	I	2048-09-20T22:42:51.033	-50.54x	-27.81	122050.38	-4.43			
B (OER)	I	2048-09-20T22:59:38.523	-54.37x	-23.74	117571.16	-4.46			
B (IER)	I	2048-09-21T00:34:07.191	-74.51x	-0.73x	91984.69	-4.56			
C (IER)	I	2048-09-21T01:37:54.903	-79.19x	14.83x	74490.58	-4.58			
Saturn	I	2048-09-21T02:27:43.570	-71.49x	26.96x	60263.50			3.27	4.02
Saturn	E	2048-09-21T10:10:31.385	31.47	35.81x	60264.03			3.07	3.78
C (IER)	E	2048-09-21T11:08:40.362	42.09	21.71x	74490.58	3.91			
B (IER)	E	2048-09-21T12:23:34.638	52.08	3.44x	91984.69	3.88			
B (OER)	E	2048-09-21T14:13:22.556	52.53	-23.34	117571.16	3.91			
A (IER)	E	2048-09-21T14:32:26.284	50.68	-27.96	122050.38	3.92			
Encke (IEG)	E	2048-09-21T15:20:24.610	44.20	-39.53	133423.31	3.98			
Encke (OEG)	E	2048-09-21T15:21:45.370	43.98	-39.86	133744.89	3.98			
A (OER)	E	2048-09-21T15:34:24.305	41.93	-42.88	136774.40	4.00			
F ring	E	2048-09-21T15:49:43.029	39.29	-46.52	140461.00	4.02			



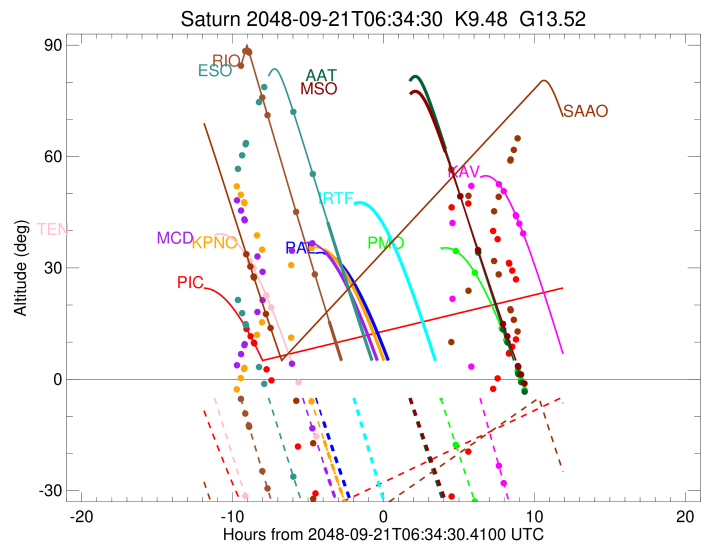
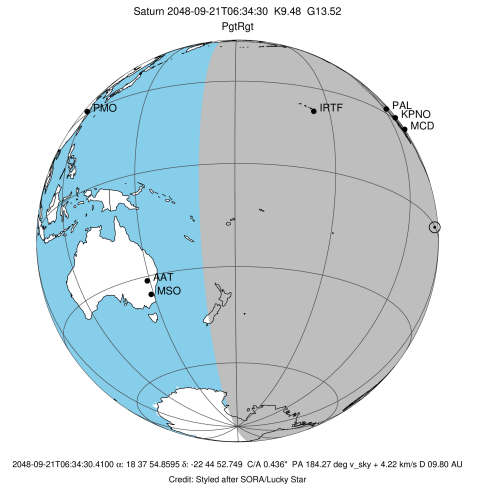
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2048-09-21T06:50:23.570  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : RIO  
 Location : Rio de Janeiro  
 Latitude (deg) : -22.89506  
 E. Longitude (deg) : 316.77708  
 Altitude (km) : 0.033  
 Gaia source ID : 4079213603987017600  
 2Mass ID (if available) : 18375488-2244526  
 ICRS Star Coord at Epoch: 18h 37m 54.85955s -22:44:52.74859s  
 RUWE (>1.4 is poor) : 0.90  
 K magnitude : 9.476  
 G magnitude : 13.518  
 RP magnitude : 12.408  
 BP magnitude : 14.800  
 DUPflag : 0  
 Distance (au) : 9.801  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 4.22  
 Sun-Target sep (deg) : 100.45  
 Sun-Moon sep (deg) : 67.39  
 B (ring opening deg) : 25.99  
 PA of pole (deg) : 6.19  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 0.093  
 C/A sky separation (km) : 661.4  
 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	2048-09-20T21:08:00.696		84.50	-5.33	140461.00	-3.59		
A (OER)	I	2048-09-20T21:25:06.105		88.45	-9.27	136774.40	-3.60		
Encke (OEG)	I	2048-09-20T21:39:07.397		88.31	-12.49	133744.89	-3.60		
Encke (IEG)	I	2048-09-20T21:40:36.609		87.96	-12.83	133423.31	-3.61		
A (IER)	I	2048-09-20T22:32:56.124		75.87	-24.78	122050.38	-3.64		
B (OER)	I	2048-09-20T22:53:21.846		71.16	-29.39	117571.16	-3.67		
B (IER)	I	2048-09-21T00:47:12.835		45.04	-53.60	91984.69	-3.84		
C (IER)	I	2048-09-21T02:01:41.792		28.21	-65.29	74490.58	-3.99		
Saturn	I	2048-09-21T02:58:16.183		15.67	-67.50	60264.33		2.96	3.63
Saturn	E	2048-09-21T10:25:45.092		-42.54x	22.82x	60264.14		-3.03	-3.72
C (IER)	E	2048-09-21T11:14:19.761		-37.89x	33.71x	74490.58	4.70		
B (IER)	E	2048-09-21T12:16:35.969		-29.01x	47.04x	91984.69	4.66		
B (OER)	E	2048-09-21T13:49:08.983		-12.14x	63.17x	117571.16	4.55		
A (IER)	E	2048-09-21T14:05:35.586		-8.86x	64.98x	122050.38	4.53		
Encke (IEG)	E	2048-09-21T14:47:43.589		-0.18x	66.96x	133423.31	4.47		
Encke (OEG)	E	2048-09-21T14:48:55.573		0.07x	66.95x	133744.89	4.47		
A (OER)	E	2048-09-21T15:00:15.130		2.46x	66.69x	136774.40	4.45		
F ring	E	2048-09-21T15:14:05.569		5.40	65.95x	140461.00	4.43		

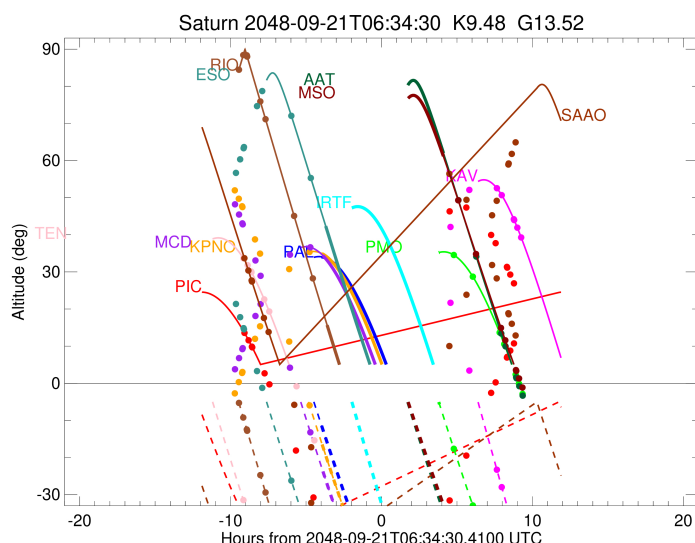
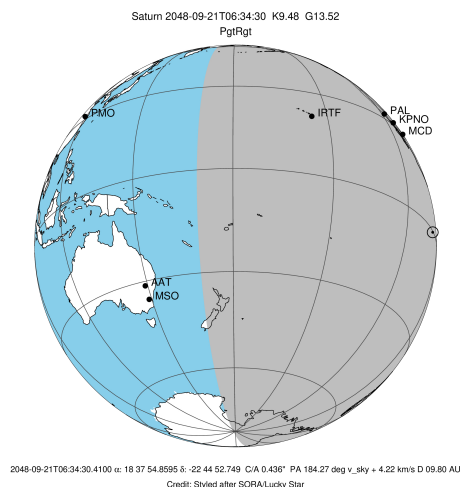
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2048-09-21T06:55:32.310  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : ESO  
 Location : European Southern Obs. (3.6m)  
 Latitude (deg) : -29.26097  
 E. Longitude (deg) : 289.26831  
 Altitude (km) : 2.400  
 Gaia source ID : 4079213603987017600  
 2Mass ID (if available) : 18375488-2244526  
 ICRS Star Coord at Epoch: 18h 37m 54.85955s -22:44:52.74859s  
 RUWE (>1.4 is poor) : 0.90  
 K magnitude : 9.476  
 G magnitude : 13.518  
 RP magnitude : 12.408  
 BP magnitude : 14.800  
 DUPflag : 0  
 Distance (au) : 9.801  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 4.22  
 Sun-Target sep (deg) : 100.45  
 Sun-Moon sep (deg) : 67.67  
 B (ring opening deg) : 25.99  
 PA of pole (deg) : 6.19  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 0.040  
 C/A sky separation (km) : 285.1  
 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	2048-09-20T20:56:01.860		56.70	21.34x	140461.00	-3.69		
A (OER)	I	2048-09-20T21:12:43.387		60.35	17.77x	136774.40	-3.68		
Encke (OEG)	I	2048-09-20T21:26:28.502		63.35	14.82x	133744.89	-3.67		
Encke (IEG)	I	2048-09-20T21:27:56.184		63.67	14.50x	133423.31	-3.67		
A (IER)	I	2048-09-20T22:19:45.457		74.69	3.25x	122050.38	-3.65		
B (OER)	I	2048-09-20T22:40:12.132		78.70	-1.22x	117571.16	-3.65		
B (IER)	I	2048-09-21T00:36:14.265		72.01	-26.27	91984.69	-3.72		
C (IER)	I	2048-09-21T01:53:41.749		55.25	-41.94	74490.58	-3.82		
Saturn	I	2048-09-21T02:52:41.125		42.35	-52.27	60263.69		3.20	3.93
Saturn	E	2048-09-21T10:35:28.417		-37.12x	-0.21x	60263.40		-3.31	-4.07
C (IER)	E	2048-09-21T11:23:35.098		-38.19x	10.29x	74490.58	4.74		
B (IER)	E	2048-09-21T12:25:06.036		-35.84x	23.51x	91984.69	4.74		
B (OER)	E	2048-09-21T13:55:29.814		-25.98x	41.80x	117571.16	4.69		
A (IER)	E	2048-09-21T14:11:26.481		-23.65x	44.75x	122050.38	4.68		
Encke (IEG)	E	2048-09-21T14:52:09.454		-17.12x	51.62x	133423.31	4.63		
Encke (OEG)	E	2048-09-21T14:53:18.855		-16.92x	51.80x	133744.89	4.63		
A (OER)	E	2048-09-21T15:04:13.614		-15.04x	53.41x	136774.40	4.62		
F ring	E	2048-09-21T15:17:32.793		-12.69x	55.22x	140461.00	4.61		

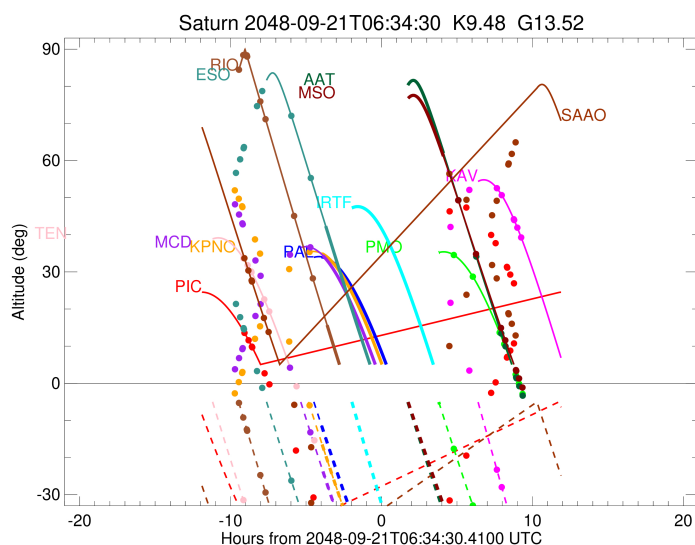
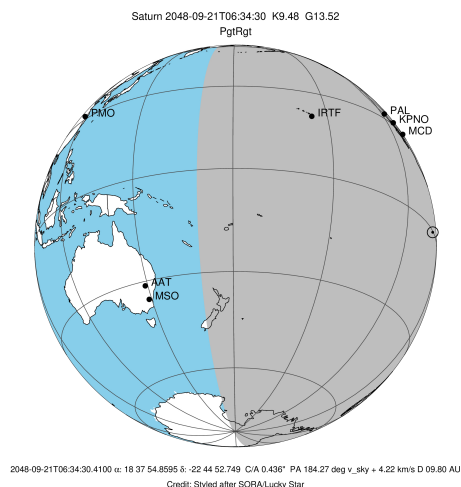
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2048-09-21T06:22:27.140  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : AAT  
 Location : Siding Spring (AAT)  
 Latitude (deg) : -31.27703  
 E. Longitude (deg) : 149.06608  
 Altitude (km) : 1.164  
 Gaia source ID : 4079213603987017600  
 2Mass ID (if available) : 18375488-2244526  
 ICRS Star Coord at Epoch: 18h 37m 54.85955s -22:44:52.74859s  
 RUWE (>1.4 is poor) : 0.90  
 K magnitude : 9.476  
 G magnitude : 13.518  
 RP magnitude : 12.408  
 BP magnitude : 14.800  
 DUPflag : 0  
 Distance (au) : 9.801  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 4.22  
 Sun-Target sep (deg) : 100.45  
 Sun-Moon sep (deg) : 68.94  
 B (ring opening deg) : 25.99  
 PA of pole (deg) : 6.19  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 0.220  
 C/A sky separation (km) : 1563.8  
 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	2048-09-20T21:06:40.563	-35.89x	14.62x	140461.00	-4.43			
A (OER)	I	2048-09-20T21:20:32.528	-35.43x	17.54x	136774.40	-4.43			
Encke (OEG)	I	2048-09-20T21:31:56.072	-34.91x	19.92x	133744.89	-4.43			
Encke (IEG)	I	2048-09-20T21:33:08.628	-34.85x	20.17x	133423.31	-4.43			
A (IER)	I	2048-09-20T22:15:56.315	-31.72x	28.94x	122050.38	-4.42			
B (OER)	I	2048-09-20T22:32:49.461	-30.05x	32.30x	117571.16	-4.42			
B (IER)	I	2048-09-21T00:10:03.587	-16.70x	49.52x	91984.69	-4.34			
C (IER)	I	2048-09-21T01:17:46.538	-4.85x	57.08x	74490.58	-4.26			
Saturn	I	2048-09-21T02:13:28.268	5.83	58.16x	60267.47		1.12	1.37	
Saturn	E	2048-09-21T10:40:54.736	61.98	-34.48	60268.00		-0.01	-0.02	
C (IER)	E	2048-09-21T11:40:03.206	49.35	-45.39	74490.58	4.04			
B (IER)	E	2048-09-21T12:51:01.199	34.16	-55.52	91984.69	4.18			
B (OER)	E	2048-09-21T14:30:35.194	13.39	-58.13	117571.16	4.39			
A (IER)	E	2048-09-21T14:47:30.954	9.96	-56.88	122050.38	4.43			
Encke (IEG)	E	2048-09-21T15:29:52.808	1.60x	-52.03	133423.31	4.52			
Encke (OEG)	E	2048-09-21T15:31:03.936	1.37x	-51.87	133744.89	4.52			
A (OER)	E	2048-09-21T15:42:12.105	-0.76x	-50.26	136774.40	4.55			
F ring	E	2048-09-21T15:55:40.615	-3.31x	-48.17	140461.00	4.57			

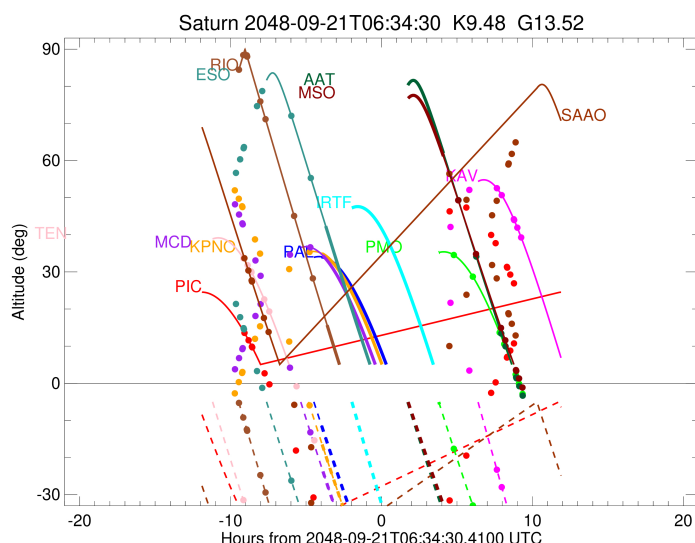
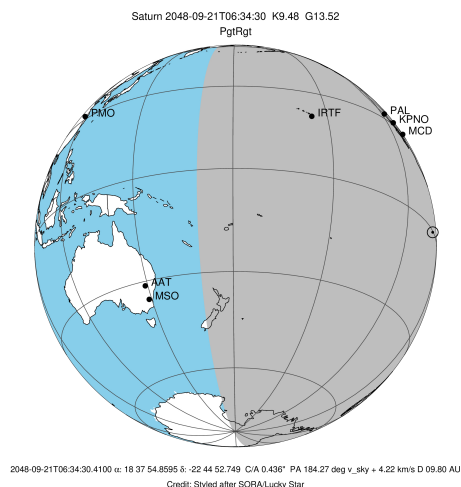
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2048-09-21T06:29:07.660  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : SAAO  
 Location : So. Afr. Astro. Obs. (Sutherland)  
 Latitude (deg) : -32.37953  
 E. Longitude (deg) : 20.81070  
 Altitude (km) : 1.768  
 Gaia source ID : 4079213603987017600  
 2Mass ID (if available) : 18375488-2244526  
 ICRS Star Coord at Epoch: 18h 37m 54.85955s -22:44:52.74859s  
 RUWE (>1.4 is poor) : 0.90  
 K magnitude : 9.476  
 G magnitude : 13.518  
 RP magnitude : 12.408  
 BP magnitude : 14.800  
 DUPflag : 0  
 Distance (au) : 9.801  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 4.22  
 Sun-Target sep (deg) : 100.45  
 Sun-Moon sep (deg) : 67.68  
 B (ring opening deg) : 25.99  
 PA of pole (deg) : 6.19  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 0.300  
 C/A sky separation (km) : 2132.1  
 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\_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	2048-09-20T21:29:34.193		33.66	-55.32	140461.00	-3.88		
A (OER)	I	2048-09-20T21:45:21.359		30.35	-56.67	136774.40	-3.91		
Encke (OEG)	I	2048-09-20T21:58:14.126		27.66	-57.49	133744.89	-3.93		
Encke (IEG)	I	2048-09-20T21:59:35.859		27.38	-57.56	133423.31	-3.94		
A (IER)	I	2048-09-20T22:47:10.656		17.57	-58.06	122050.38	-4.03		
B (OER)	I	2048-09-20T23:05:36.358		13.83	-57.21	117571.16	-4.07		
B (IER)	I	2048-09-21T00:47:49.070		-5.82x	-44.56	91984.69	-4.27		
C (IER)	I	2048-09-21T01:55:10.056		-17.25x	-32.18	74490.58	-4.38		
Saturn	I	2048-09-21T02:48:36.523		-24.92x	-21.43	60267.94		0.36	0.45
Saturn	E	2048-09-21T10:11:00.512		-0.28x	57.15x	60265.20		-2.58	-3.17
C (IER)	E	2048-09-21T11:04:01.304		9.99	56.45x	74490.58	4.32		
B (IER)	E	2048-09-21T12:12:08.200		23.82	49.43x	91984.69	4.24		
B (OER)	E	2048-09-21T13:54:12.531		45.28	31.84x	117571.16	4.12		
A (IER)	E	2048-09-21T14:12:20.973		49.12	28.28x	122050.38	4.11		
Encke (IEG)	E	2048-09-21T14:58:41.922		58.90	18.89x	133423.31	4.07		
Encke (OEG)	E	2048-09-21T15:00:00.865		59.18	18.62x	133744.89	4.07		
A (OER)	E	2048-09-21T15:12:25.273		61.77	16.05x	136774.40	4.07		
F ring	E	2048-09-21T15:27:32.657		64.88	12.90x	140461.00	4.06		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2048-09-21T06:23:12.730  
 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 : 4079213603987017600  
 2Mass ID (if available) : 18375488-2244526  
 ICRS Star Coord at Epoch: 18h 37m 54.85955s -22:44:52.74859s  
 RUWE (>1.4 is poor) : 0.90  
 K magnitude : 9.476  
 G magnitude : 13.518  
 RP magnitude : 12.408  
 BP magnitude : 14.800  
 DUPflag : 0  
 Distance (au) : 9.801  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 4.22  
 Sun-Target sep (deg) : 100.45  
 Sun-Moon sep (deg) : 68.93  
 B (ring opening deg) : 25.99  
 PA of pole (deg) : 6.19  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 0.162  
 C/A sky separation (km) : 1154.4  
 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	2048-09-20T21:06:49.106		-31.88x	13.88x	140461.00	-4.41		
A (OER)	I	2048-09-20T21:20:44.539		-31.47x	16.67x	136774.40	-4.41		
Encke (OEG)	I	2048-09-20T21:32:10.901		-30.99x	18.94x	133744.89	-4.41		
Encke (IEG)	I	2048-09-20T21:33:23.754		-30.93x	19.18x	133423.31	-4.41		
A (IER)	I	2048-09-20T22:16:21.654		-28.05x	27.52x	122050.38	-4.41		
B (OER)	I	2048-09-20T22:33:18.631		-26.50x	30.69x	117571.16	-4.40		
B (IER)	I	2048-09-21T00:10:51.501		-13.96x	46.61x	91984.69	-4.33		
C (IER)	I	2048-09-21T01:18:42.741		-2.69x	53.27x	74490.58	-4.26		
Saturn	I	2048-09-21T02:14:33.177		7.56	54.14x	60267.69		0.85	1.05
Saturn	E	2048-09-21T10:40:33.166		61.14	-32.65	60267.94		-0.38	-0.47
C (IER)	E	2048-09-21T11:39:22.404		49.33	-42.74	74490.58	4.06		
B (IER)	E	2048-09-21T12:50:06.347		34.85	-51.87	91984.69	4.19		
B (OER)	E	2048-09-21T14:29:32.924		14.89	-54.31	117571.16	4.39		
A (IER)	E	2048-09-21T14:46:28.770		11.60	-53.25	122050.38	4.43		
Encke (IEG)	E	2048-09-21T15:28:52.377		3.58x	-49.03	133423.31	4.51		
Encke (OEG)	E	2048-09-21T15:30:03.584		3.36x	-48.89	133744.89	4.52		
A (OER)	E	2048-09-21T15:41:12.569		1.31x	-47.45	136774.40	4.54		
F ring	E	2048-09-21T15:54:42.242		-1.13x	-45.58	140461.00	4.57		