

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2044-08-04T15:39:04.600  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 6258727945477949440  
 2Mass ID (if available) : 15243710-1630354

Saturn 2044-08-04T15:39:04 K8.91 G11.25 PgtRgt

ICRS Star Coord at Epoch: 15h 24m 37.08137s -16:30:36.33814s

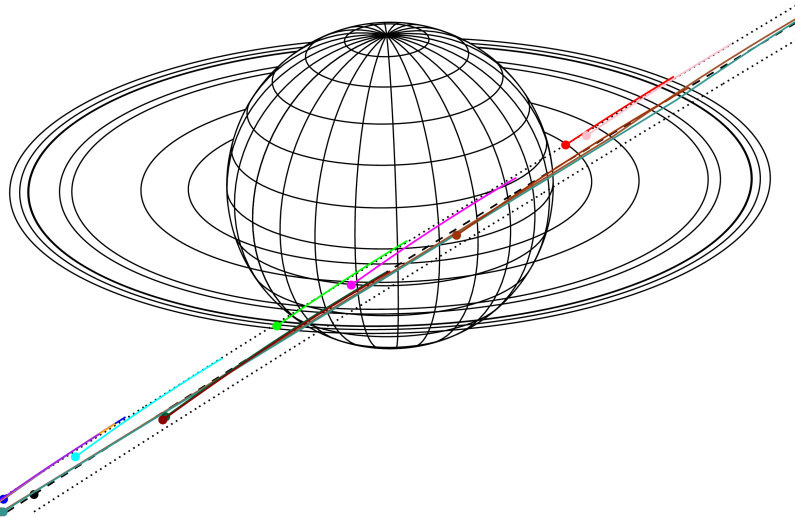
RUWE (>1.4 is poor) : 2.18  
 K magnitude : 8.914  
 G magnitude : 11.253  
 RP magnitude : 10.515  
 BP magnitude : 11.584  
 DUPflag : 0  
 Distance (au) : 9.721  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 4.19  
 Sun-Target sep (deg) : 100.71  
 Sun-Moon sep (deg) : 33.46  
 B (ring opening deg) : 22.90  
 PA of pole (deg) : 1.29

#	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



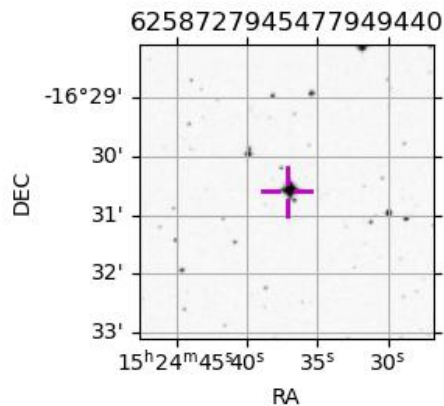
2044-08-04T15:39:04.6000 α: 15 24 37.0814 δ: -16 30 36.338 C/A 3.763° PA 31.71 deg v\_sky + 4.19 km/s D 09.72 AU  
 Credit: Styled after SORA/Lucky Star

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

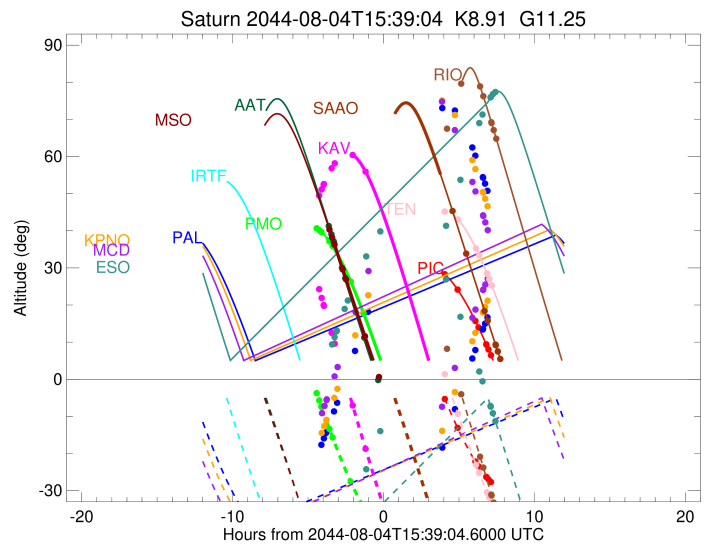
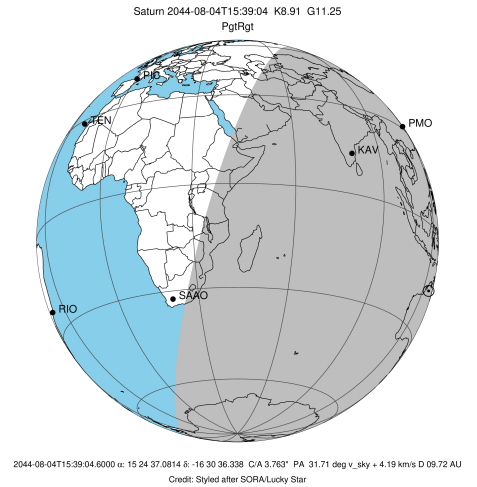


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEncode
PIC	Pic du Midi	42.9	0.1			+	AUG 04 19:42 - AUG 04 22:46	PnnRne
PAL	Palomar Mt (20	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs	32.1	118.8	+	+		AUG 04 11:23 - AUG 04 11:52	PinRin
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			+	AUG 04 20:34 - AUG 04 22:49	PnnRne
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observ	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8			+	AUG 04 22:03 - AUG 04 23:07	PnnRne
ESO	European South	-29.3	289.3			+	AUG 04 22:44 - AUG 04 23:04	PnnRne
AAT	Siding Spring	-31.3	149.1	+	+		AUG 04 12:01 - AUG 04 12:24	PinRin
SAAO	So. Afr. Astro	-32.4	20.8		+	+	AUG 04 19:26 - AUG 04 23:23	PneRne
MSO	Mt. Stromlo Ob	-35.3	149.0	+	+	+	AUG 04 12:03 - AUG 04 12:25	PinRin

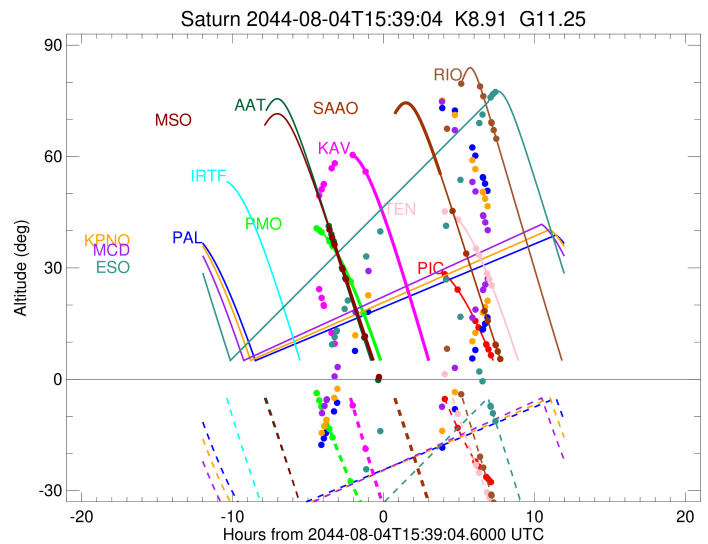
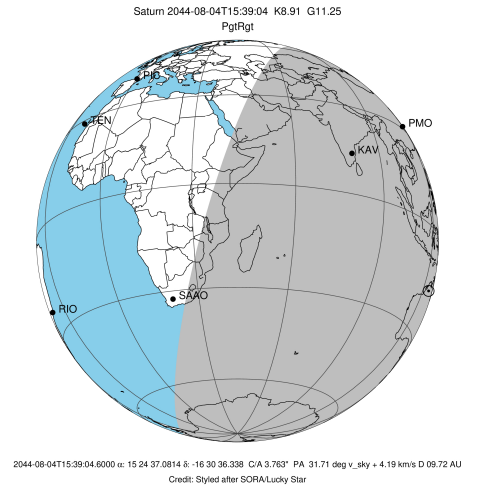


target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2044-08-04T15:21:14.980  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PIC  
 Location : Pic du Midi  
 Latitude (deg) : 42.93656  
 E. Longitude (deg) : 0.14231  
 Altitude (km) : 2.890  
 Gaia source ID : 6258727945477949440  
 2Mass ID (if available) : 15243710-1630354  
 ICRS Star Coord at Epoch: 15h 24m 37.08137s -16:30:36.33814s  
 RUWE (>1.4 is poor) : 2.18  
 K magnitude : 8.914  
 G magnitude : 11.253  
 RP magnitude : 10.515  
 BP magnitude : 11.584  
 DUPflag : 0  
 Distance (au) : 9.720  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 4.19  
 Sun-Target sep (deg) : 100.71  
 Sun-Moon sep (deg) : 34.23  
 B (ring opening deg) : 22.90  
 PA of pole (deg) : 1.29  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 3.414  
 C/A sky separation (km) : 24065.2  
 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	2044-08-04T11:16:28.019	-24.94x	62.21x	140461.00	-6.41			
A (OER)	I	2044-08-04T11:26:03.896	-23.17x	62.91x	136774.40	-6.39			
Encke (OEG)	I	2044-08-04T11:33:58.124	-21.72x	63.38x	133744.89	-6.38			
Encke (IEG)	I	2044-08-04T11:34:48.518	-21.57x	63.42x	133423.31	-6.38			
A (IER)	I	2044-08-04T12:04:38.885	b -16.10x	64.23x	122050.38	-6.32			
B (OER)	I	2044-08-04T12:16:29.100	b -13.95x	64.12x	117571.16	-6.29			
B (IER)	I	2044-08-04T13:25:31.538	b -1.73x	59.09x	91984.69	-6.03			
C (IER)	I	2044-08-04T14:15:11.822	b 6.52	52.25x	74490.58	-5.68			
Saturn	I	2044-08-04T11:39:33.889	-20.69x	63.65x	59676.75			-49.86	-55.21
Saturn	E	2044-08-04T19:12:27.743	29.81	-0.31x	60244.58			8.69	10.63
C (IER)	E	2044-08-04T19:42:46.972	28.30	-5.31	74490.58	5.55			
B (IER)	E	2044-08-04T20:33:43.458	24.16	-13.10	91984.69	5.87			
B (OER)	E	2044-08-04T21:44:46.771	15.66	-22.19	117571.16	6.11			
A (IER)	E	2044-08-04T21:56:57.875	13.95	-23.48	122050.38	6.14			
Encke (IEG)	E	2044-08-04T22:27:39.078	9.39	-26.30	133423.31	6.21			
Encke (OEG)	E	2044-08-04T22:28:30.850	9.26	-26.37	133744.89	6.21			
A (OER)	E	2044-08-04T22:36:37.849	8.00	-27.00	136774.40	6.23			
F ring	E	2044-08-04T22:46:28.739	6.44	-27.70	140461.00	6.25			

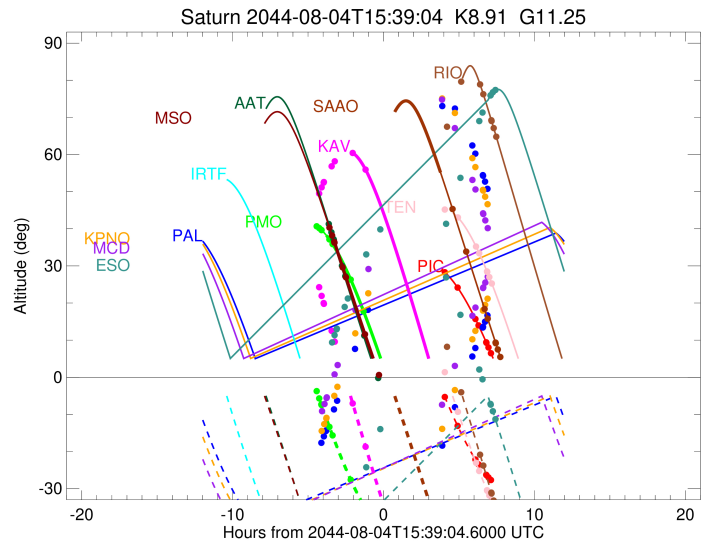
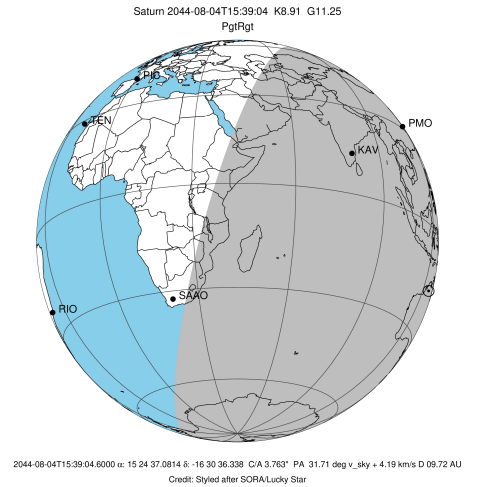
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2044-08-04T15:48:34.750  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PMO  
 Location : Purple Mtn Obs. Nanking  
 Latitude (deg) : 32.06667  
 E. Longitude (deg) : 118.82089  
 Altitude (km) : 0.364  
 Gaia source ID : 6258727945477949440  
 2Mass ID (if available) : 15243710-1630354  
 ICRS Star Coord at Epoch: 15h 24m 37.08137s -16:30:36.33814s  
 RUWE (>1.4 is poor) : 2.18  
 K magnitude : 8.914  
 G magnitude : 11.253  
 RP magnitude : 10.515  
 BP magnitude : 11.584  
 DUPflag : 0  
 Distance (au) : 9.721  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 4.19  
 Sun-Target sep (deg) : 100.71  
 Sun-Moon sep (deg) : 33.13  
 B (ring opening deg) : 22.90  
 PA of pole (deg) : 1.29  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 2.944  
 C/A sky separation (km) : 20755.1  
 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

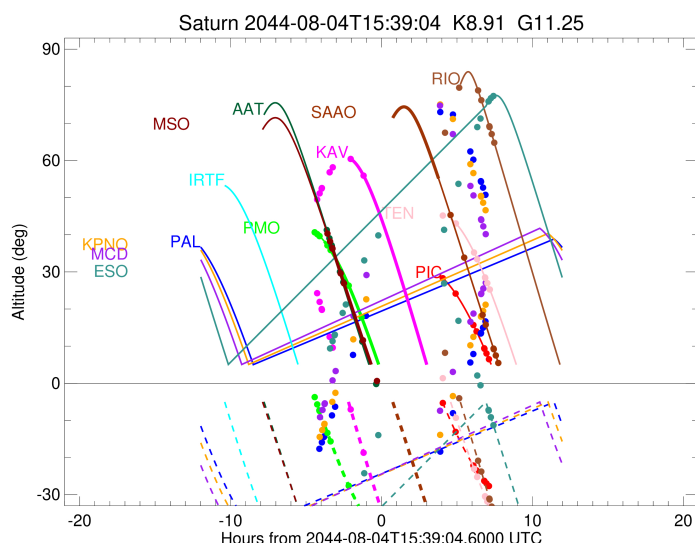
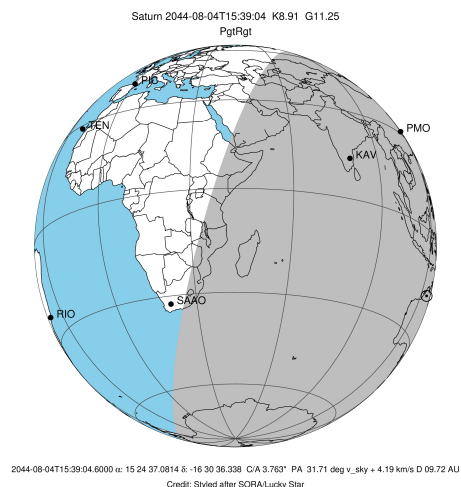
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2044-08-04T11:13:01.318		40.68	-3.65x	140461.00	-6.09		
A (OER)	I	2044-08-04T11:23:07.875		40.20	-5.62	136774.40	-6.07		
Encke (OEG)	I	2044-08-04T11:31:27.537		39.72	-7.23	133744.89	-6.06		
Encke (IEG)	I	2044-08-04T11:32:20.641		39.66	-7.40	133423.31	-6.05		
A (IER)	I	2044-08-04T12:03:47.451	b	37.17	-13.32	122050.38	-6.00		
B (OER)	I	2044-08-04T12:16:15.614	b	35.92	-15.59	117571.16	-5.97		
B (IER)	I	2044-08-04T13:28:42.499	b	26.32	-27.61	91984.69	-5.78		
C (IER)	I	2044-08-04T14:20:11.601	b	17.72	-34.44	74490.58	-5.52		
Saturn	I	2044-08-04T11:52:07.589		38.21	-11.15	59736.57		-46.40	-51.92
Saturn	E	2044-08-04T19:27:41.823		-44.92x	-22.14	60250.26		7.56	9.25
C (IER)	E	2044-08-04T19:59:13.828		-51.51x	-16.71	74490.58	5.90		
B (IER)	E	2044-08-04T20:47:05.872		-61.11x	-7.84	91984.69	6.25		
B (OER)	E	2044-08-04T21:53:36.813		-72.07x	5.32x	117571.16	6.55		
A (IER)	E	2044-08-04T22:04:59.193		-73.29x	7.64x	122050.38	6.58		
Encke (IEG)	E	2044-08-04T22:33:35.850		-74.77x	13.55x	133423.31	6.67		
Encke (OEG)	E	2044-08-04T22:34:24.090		-74.77x	13.72x	133744.89	6.67		
A (OER)	E	2044-08-04T22:41:57.820		-74.70x	15.29x	136774.40	6.69		
F ring	E	2044-08-04T22:51:08.243		-74.35x	17.21x	140461.00	6.71		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2044-08-04T15:19:06.540  
 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 : 6258727945477949440  
 2Mass ID (if available) : 15243710-1630354  
 ICRS Star Coord at Epoch: 15h 24m 37.08137s -16:30:36.33814s  
 RUWE (>1.4 is poor) : 2.18  
 K magnitude : 8.914  
 G magnitude : 11.253  
 RP magnitude : 10.515  
 BP magnitude : 11.584  
 DUPflag : 0  
 Distance (au) : 9.720  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 4.19  
 Sun-Target sep (deg) : 100.71  
 Sun-Moon sep (deg) : 34.31  
 B (ring opening deg) : 22.90  
 PA of pole (deg) : 1.29  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 3.714  
 C/A sky separation (km) : 26181.6  
 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



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2044-08-04T11:27:44.708		-36.22x	63.55x	140461.00	-6.41		
A (OER)	I	2044-08-04T11:37:20.459		-34.10x	65.53x	136774.40	-6.40		
Encke (OEG)	I	2044-08-04T11:45:14.647		-32.35x	67.13x	133744.89	-6.38		
Encke (IEG)	I	2044-08-04T11:46:05.042	b	-32.17x	67.30x	133423.31	-6.38		
A (IER)	I	2044-08-04T12:15:56.145	b	-25.59x	72.94x	122050.38	-6.32		
B (OER)	I	2044-08-04T12:27:47.207	b	-22.99x	74.89x	117571.16	-6.28		
B (IER)	I	2044-08-04T13:37:07.250	b	-7.95x	77.42x	91984.69	-5.98		
C (IER)	I	2044-08-04T14:27:28.411	b	2.66x	69.34x	74490.58	-5.56		
Saturn	I	2044-08-04T11:45:19.662		-32.33x	67.15x	59652.43		-51.28	-56.55
Saturn	E	2044-08-04T19:06:33.814		44.60	9.03x	60252.23		7.12	8.72
C (IER)	E	2044-08-04T19:42:41.171		45.18	1.38x	74490.58	5.38		
B (IER)	E	2044-08-04T20:34:53.323		43.05	-9.32	91984.69	5.75		
B (OER)	E	2044-08-04T21:47:13.029		35.18	-23.09	117571.16	6.01		
A (IER)	E	2044-08-04T21:59:36.093		33.39	-25.28	122050.38	6.04		
Encke (IEG)	E	2044-08-04T22:30:47.020		28.48	-30.47	133423.31	6.11		
Encke (OEG)	E	2044-08-04T22:31:39.624		28.34	-30.61	133744.89	6.11		
A (OER)	E	2044-08-04T22:39:54.448		26.95	-31.89	136774.40	6.13		
F ring	E	2044-08-04T22:49:54.835		25.22	-33.39	140461.00	6.15		

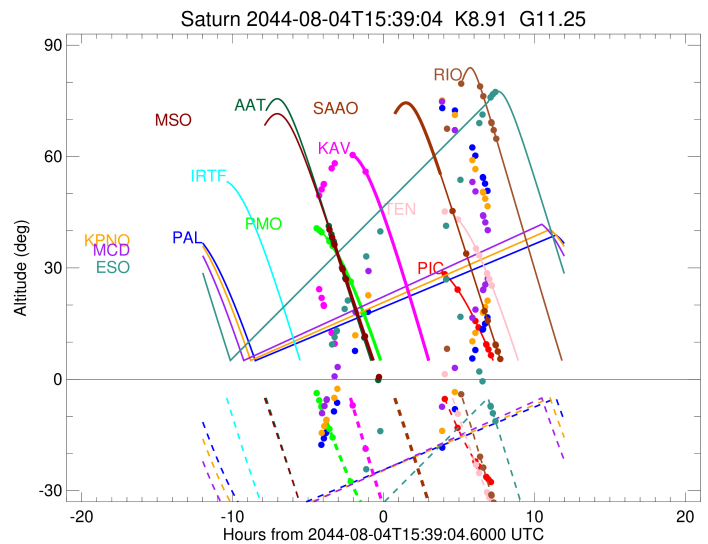
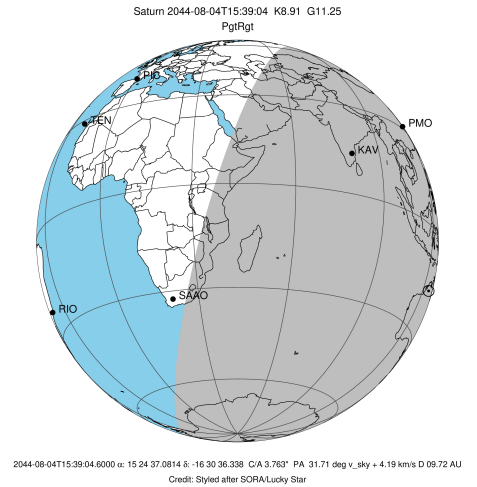
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2044-08-04T15:27:13.630  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : RIO  
 Location : Rio de Janeiro  
 Latitude (deg) : -22.89506  
 E. Longitude (deg) : 316.77708  
 Altitude (km) : 0.033  
 Gaia source ID : 6258727945477949440  
 2Mass ID (if available) : 15243710-1630354  
 ICRS Star Coord at Epoch: 15h 24m 37.08137s -16:30:36.33814s  
 RUWE (>1.4 is poor) : 2.18  
 K magnitude : 8.914  
 G magnitude : 11.253  
 RP magnitude : 10.515  
 BP magnitude : 11.584  
 DUPflag : 0  
 Distance (au) : 9.720  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 4.19  
 Sun-Target sep (deg) : 100.71  
 Sun-Moon sep (deg) : 34.05  
 B (ring opening deg) : 22.90  
 PA of pole (deg) : 1.29  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 4.486  
 C/A sky separation (km) : 31623.0  
 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	2044-08-04T12:07:07.064		-34.11x	32.18x	140461.00	-6.26		
A (OER)	I	2044-08-04T12:16:56.849	b	-32.38x	33.91x	136774.40	-6.24		
Encke (OEG)	I	2044-08-04T12:25:03.057	b	-30.91x	35.29x	133744.89	-6.22		
Encke (IEG)	I	2044-08-04T12:25:54.755	b	-30.76x	35.43x	133423.31	-6.22		
A (IER)	I	2044-08-04T12:56:36.227	b	-24.95x	40.28x	122050.38	-6.13		
B (OER)	I	2044-08-04T13:08:49.934	b	-22.54x	42.02x	117571.16	-6.08		
B (IER)	I	2044-08-04T14:21:15.329	b	-7.51x	49.24x	91984.69	-5.64		
C (IER)	I	2044-08-04T15:15:52.764	b	4.44x	50.08x	74490.58	-4.97		
Saturn	I	2044-08-04T12:11:22.570		-33.37x	32.94x	59591.45		-54.95	-59.94
Saturn	E	2044-08-04T18:56:58.282		54.96	19.57x	60267.57		1.17	1.44
C (IER)	E	2044-08-04T19:51:32.353		67.47	8.23x	74490.58	4.83		
B (IER)	E	2044-08-04T20:47:57.754		79.62	-4.04x	91984.69	5.44		
B (OER)	E	2044-08-04T22:03:15.684		78.84	-20.92	117571.16	5.84		
A (IER)	E	2044-08-04T22:16:00.366		76.22	-23.81	122050.38	5.88		
Encke (IEG)	E	2044-08-04T22:47:59.687		69.20	-31.11	133423.31	5.97		
Encke (OEG)	E	2044-08-04T22:48:53.553		69.00	-31.32	133744.89	5.97		
A (OER)	E	2044-08-04T22:57:20.048		67.09	-33.25	136774.40	5.99		
F ring	E	2044-08-04T23:07:34.144		64.76	-35.60	140461.00	6.01		

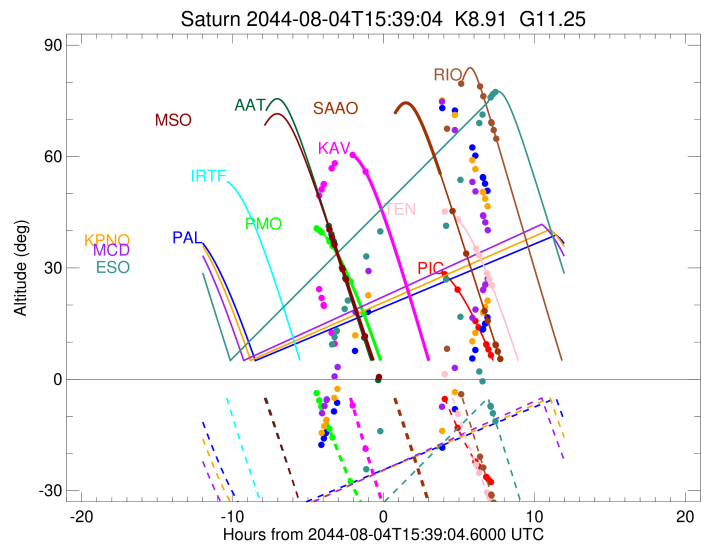
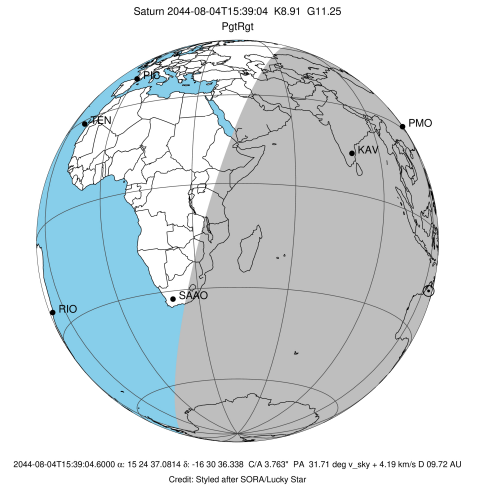
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2044-08-04T15:29:39.890  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : ESO  
 Location : European Southern Obs. (3.6m)  
 Latitude (deg) : -29.26097  
 E. Longitude (deg) : 289.26831  
 Altitude (km) : 2.400  
 Gaia source ID : 6258727945477949440  
 2Mass ID (if available) : 15243710-1630354  
 ICRS Star Coord at Epoch: 15h 24m 37.08137s -16:30:36.33814s  
 RUWE (>1.4 is poor) : 2.18  
 K magnitude : 8.914  
 G magnitude : 11.253  
 RP magnitude : 10.515  
 BP magnitude : 11.584  
 DUPflag : 0  
 Distance (au) : 9.720  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 4.19  
 Sun-Target sep (deg) : 100.71  
 Sun-Moon sep (deg) : 33.71  
 B (ring opening deg) : 22.90  
 PA of pole (deg) : 1.29  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 4.580  
 C/A sky separation (km) : 32289.0  
 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	2044-08-04T12:14:13.387		-42.06x	9.32x	140461.00	-6.16		
A (OER)	I	2044-08-04T12:24:12.314	b	-41.29x	11.27x	136774.40	-6.15		
Encke (OEG)	I	2044-08-04T12:32:25.966	b	-40.57x	12.87x	133744.89	-6.13		
Encke (IEG)	I	2044-08-04T12:33:18.452	b	-40.49x	13.04x	133423.31	-6.13		
A (IER)	I	2044-08-04T13:04:27.622	b	-37.15x	18.90x	122050.38	-6.04		
B (OER)	I	2044-08-04T13:16:52.318	b	-35.59x	21.16x	117571.16	-5.99		
B (IER)	I	2044-08-04T14:30:29.745	b	-24.23x	33.10x	91984.69	-5.53		
C (IER)	I	2044-08-04T15:26:33.790	b	-13.93x	39.85x	74490.58	-4.79		
Saturn	I	2044-08-04T12:20:02.969		-41.62x	10.46x	59598.14		-54.54	-59.56
Saturn	E	2044-08-04T18:50:00.123		28.67	35.50x	60267.81		-0.79	-0.97
C (IER)	E	2044-08-04T19:47:46.616		41.32	26.92x	74490.58	4.71		
B (IER)	E	2044-08-04T20:44:52.785		53.72	16.83x	91984.69	5.42		
B (OER)	E	2044-08-04T22:00:06.396		69.06	2.04x	117571.16	5.86		
A (IER)	E	2044-08-04T22:12:48.141		71.33	-0.57x	122050.38	5.90		
Encke (IEG)	E	2044-08-04T22:44:39.640		75.93	-7.22	133423.31	5.99		
Encke (OEG)	E	2044-08-04T22:45:33.290		76.02	-7.40	133744.89	5.99		
A (OER)	E	2044-08-04T22:53:57.794		76.80	-9.18	136774.40	6.01		
F ring	E	2044-08-04T23:04:09.596		77.39	-11.34	140461.00	6.04		

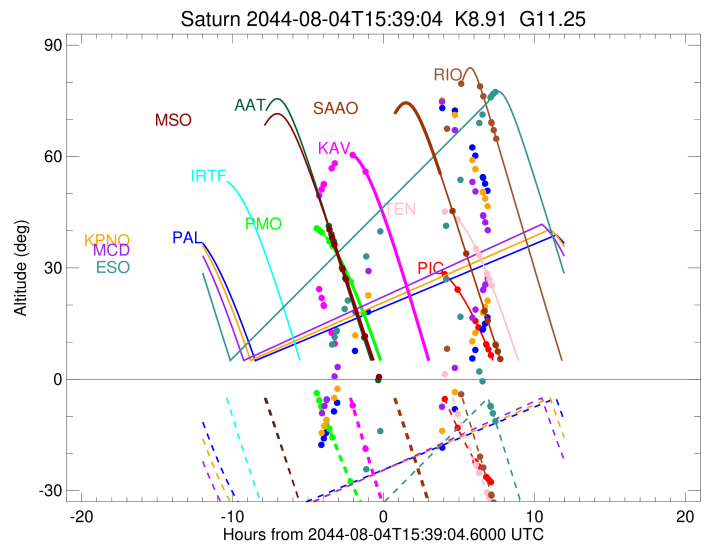
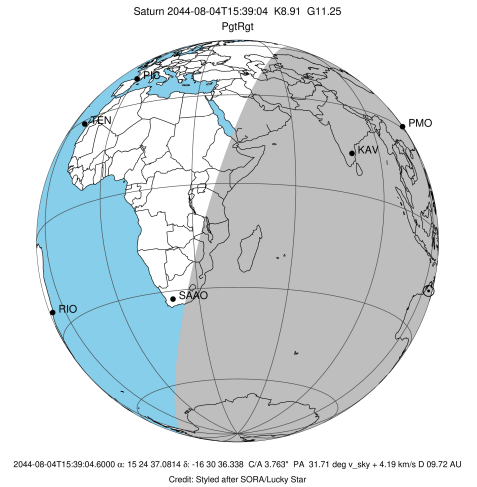
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2044-08-04T15:59:48.580  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : AAT  
 Location : Siding Spring (AAT)  
 Latitude (deg) : -31.27703  
 E. Longitude (deg) : 149.06608  
 Altitude (km) : 1.164  
 Gaia source ID : 6258727945477949440  
 2Mass ID (if available) : 15243710-1630354  
 ICRS Star Coord at Epoch: 15h 24m 37.08137s -16:30:36.33814s  
 RUWE (>1.4 is poor) : 2.18  
 K magnitude : 8.914  
 G magnitude : 11.253  
 RP magnitude : 10.515  
 BP magnitude : 11.584  
 DUPflag : 0  
 Distance (au) : 9.721  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 4.19  
 Sun-Target sep (deg) : 100.71  
 Sun-Moon sep (deg) : 32.67  
 B (ring opening deg) : 22.90  
 PA of pole (deg) : 1.29  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 3.840  
 C/A sky separation (km) : 27075.4  
 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	2044-08-04T12:01:10.966		41.37	-57.59	140461.00	-5.88		
A (OER)	I	2044-08-04T12:11:38.671		39.13	-59.70	136774.40	-5.86		
Encke (OEG)	I	2044-08-04T12:20:15.911		37.28	-61.41	133744.89	-5.85		
Encke (IEG)	I	2044-08-04T12:21:10.894		37.09	-61.59	133423.31	-5.85		
A (IER)	I	2044-08-04T12:53:46.388	b	30.09	-67.69	122050.38	-5.78		
B (OER)	I	2044-08-04T13:06:43.317	b	27.32	-69.87	117571.16	-5.75		
B (IER)	I	2044-08-04T14:22:38.041	b	11.21	-75.54	91984.69	-5.45		
C (IER)	I	2044-08-04T15:18:19.512	b	-0.26x	-68.94	74490.58	-4.97		
Saturn	I	2044-08-04T12:24:54.054		36.29	-62.32	59670.84		-50.20	-55.54
Saturn	E	2044-08-04T19:21:01.979		-39.05x	-18.84	60267.81		0.78	0.96
C (IER)	E	2044-08-04T20:09:46.106		-41.85x	-8.62	74490.58	5.31		
B (IER)	E	2044-08-04T21:01:26.516		-41.79x	1.91x	91984.69	5.92		
B (OER)	E	2044-08-04T22:10:35.221		-36.92x	15.22x	117571.16	6.36		
A (IER)	E	2044-08-04T22:22:16.203		-35.64x	17.34x	122050.38	6.41		
Encke (IEG)	E	2044-08-04T22:51:34.153		-31.94x	22.46x	133423.31	6.52		
Encke (OEG)	E	2044-08-04T22:52:23.467		-31.83x	22.60x	133744.89	6.52		
A (OER)	E	2044-08-04T23:00:07.120		-30.75x	23.88x	136774.40	6.55		
F ring	E	2044-08-04T23:09:29.207		-29.39x	25.41x	140461.00	6.57		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2044-08-04T15:42:53.100  
 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 : 6258727945477949440  
 2Mass ID (if available) : 15243710-1630354  
 ICRS Star Coord at Epoch: 15h 24m 37.08137s -16:30:36.33814s  
 RUWE (>1.4 is poor) : 2.18  
 K magnitude : 8.914  
 G magnitude : 11.253  
 RP magnitude : 10.515  
 BP magnitude : 11.584  
 DUPflag : 0  
 Distance (au) : 9.721  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 4.19  
 Sun-Target sep (deg) : 100.71  
 Sun-Moon sep (deg) : 34.04  
 B (ring opening deg) : 22.90  
 PA of pole (deg) : 1.29  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 4.137  
 C/A sky separation (km) : 29165.5  
 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

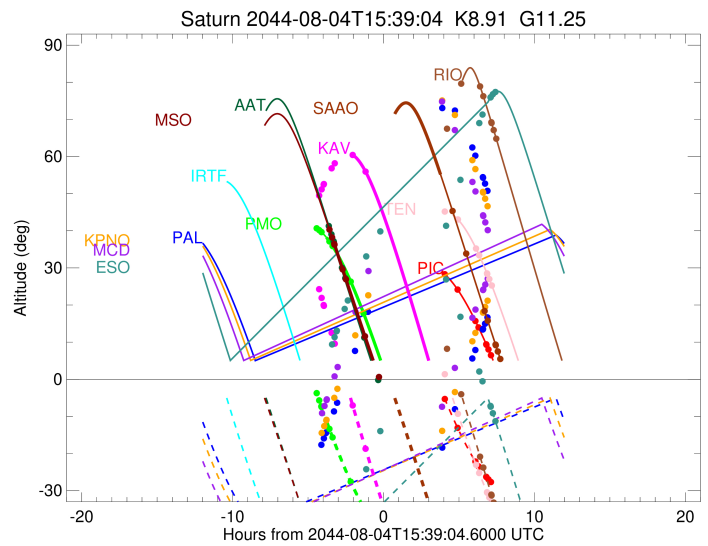
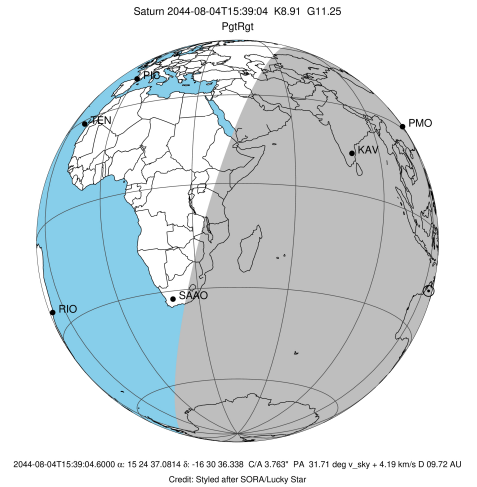


b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2044-08-04T12:01:20.165		19.66	37.34x	140461.00	-6.27		
A (OER)	I	2044-08-04T12:11:09.503	b	21.72	36.46x	136774.40	-6.24		
Encke (OEG)	I	2044-08-04T12:19:15.644	b	23.43	35.66x	133744.89	-6.22		
Encke (IEG)	I	2044-08-04T12:20:07.350	b	23.62	35.57x	133423.31	-6.22		
A (IER)	I	2044-08-04T12:50:50.409	b	30.12	32.05x	122050.38	-6.12		
B (OER)	I	2044-08-04T13:03:05.121	b	32.72	30.45x	117571.16	-6.07		
B (IER)	I	2044-08-04T14:15:25.455	b	47.97	19.26x	91984.69	-5.68		
C (IER)	I	2044-08-04T15:09:05.759	b	58.86	9.57x	74490.58	-5.14		
Saturn	I	2044-08-04T12:05:23.425		20.51	36.99x	59590.54		-55.00	-59.99
Saturn	E	2044-08-04T19:26:10.899		55.09	-43.20	60263.69		3.72	4.56
C (IER)	E	2044-08-04T20:13:27.788		45.34	-53.01	74490.58	5.07		
B (IER)	E	2044-08-04T21:07:52.348		33.85	-63.64	91984.69	5.60		
B (OER)	E	2044-08-04T22:21:12.850		18.35	-73.90	117571.16	6.00		
A (IER)	E	2044-08-04T22:33:36.665		15.75	-74.51	122050.38	6.05		
Encke (IEG)	E	2044-08-04T23:04:39.629		9.31	-73.86	133423.31	6.16		
Encke (OEG)	E	2044-08-04T23:05:31.820		9.13	-73.80	133744.89	6.16		
A (OER)	E	2044-08-04T23:13:42.297		7.45	-73.12	136774.40	6.19		
F ring	E	2044-08-04T23:23:36.306		5.43	-72.07	140461.00	6.22		



target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2044-08-04T15:59:51.240  
 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 : 6258727945477949440  
 2Mass ID (if available) : 15243710-1630354  
 ICRS Star Coord at Epoch: 15h 24m 37.08137s -16:30:36.33814s  
 RUWE (>1.4 is poor) : 2.18  
 K magnitude : 8.914  
 G magnitude : 11.253  
 RP magnitude : 10.515  
 BP magnitude : 11.584  
 DUPflag : 0  
 Distance (au) : 9.721  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 4.19  
 Sun-Target sep (deg) : 100.71  
 Sun-Moon sep (deg) : 32.70  
 B (ring opening deg) : 22.90  
 PA of pole (deg) : 1.29  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 3.897  
 C/A sky separation (km) : 27476.4  
 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	2044-08-04T12:03:53.079		40.40	-56.59	140461.00	-5.88		
A (OER)	I	2044-08-04T12:14:20.556		38.28	-58.51	136774.40	-5.87		
Encke (OEG)	I	2044-08-04T12:22:57.651		36.52	-60.05	133744.89	-5.85		
Encke (IEG)	I	2044-08-04T12:23:52.621		36.33	-60.21	133423.31	-5.85		
A (IER)	I	2044-08-04T12:56:28.030	b	29.66	-65.54	122050.38	-5.78		
B (OER)	I	2044-08-04T13:09:25.176	b	27.00	-67.36	117571.16	-5.75		
B (IER)	I	2044-08-04T14:25:25.965	b	11.57	-71.49	91984.69	-5.43		
C (IER)	I	2044-08-04T15:21:21.952	b	0.56x	-65.83	74490.58	-4.94		
Saturn	I	2044-08-04T12:25:59.190		35.90	-60.58	59664.36		-50.58	-55.89
Saturn	E	2044-08-04T19:20:46.322		-35.28x	-19.51	60267.93		0.50	0.61
C (IER)	E	2044-08-04T20:10:16.941		-37.87x	-9.56	74490.58	5.25		
B (IER)	E	2044-08-04T21:02:20.499		-37.78x	0.59x	91984.69	5.89		
B (OER)	E	2044-08-04T22:11:49.156		-33.28x	13.29x	117571.16	6.34		
A (IER)	E	2044-08-04T22:23:32.897		-32.09x	15.30x	122050.38	6.39		
Encke (IEG)	E	2044-08-04T22:52:57.279		-28.65x	20.12x	133423.31	6.50		
Encke (OEG)	E	2044-08-04T22:53:46.765		-28.55x	20.25x	133744.89	6.50		
A (OER)	E	2044-08-04T23:01:32.011		-27.54x	21.46x	136774.40	6.52		
F ring	E	2044-08-04T23:10:55.982		-26.27x	22.89x	140461.00	6.55		