

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2032-08-30T09:18:38.680  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3376834885915089664  
 2Mass ID (if available) : 06194696+2221561

Saturn 2032-08-30T09:18:38 K9.35 G13.20 PgtRgt

ICRS Star Coord at Epoch: 06h 19m 46.96892s +22:21:56.16988s

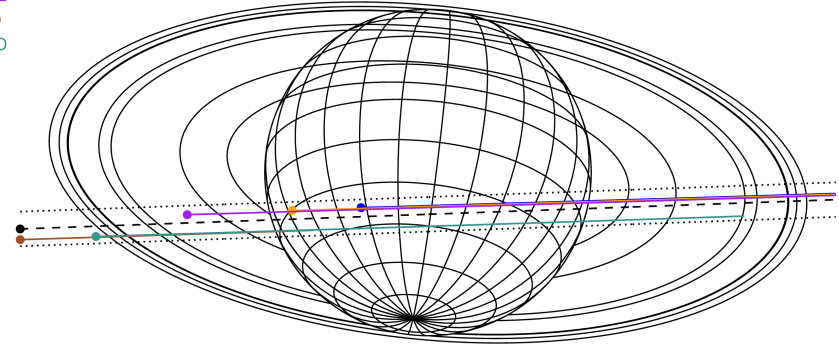
RUWE (>1.4 is poor) : 1.04  
 K magnitude : 9.353  
 G magnitude : 13.200  
 RP magnitude : 12.159  
 BP magnitude : 14.322  
 DUPflag : 0  
 Distance (au) : 9.437  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 23.39  
 Sun-Target sep (deg) : 62.54  
 Sun-Moon sep (deg) : 4.31  
 B (ring opening deg) : -26.05  
 PA of pole (deg) : -5.88

#	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



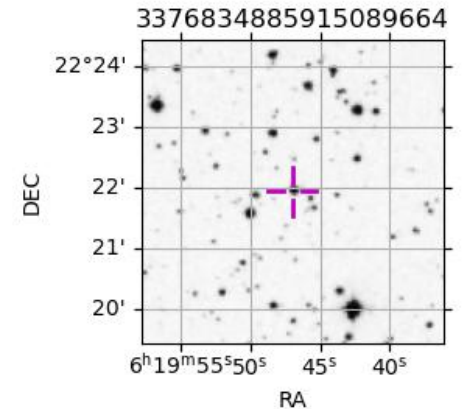
2032-08-30T09:18:38.6800 α: 06 19 46.9689 δ: +22 21 56.170 C/A 2.256° PA 2.06 deg v\_sky +23.39 km/s D 09.44 AU  
 Credit: Styled after SORA/Lucky Star

Earth  
 PAL  
 KPNO  
 MCD  
 RIO  
 ESO

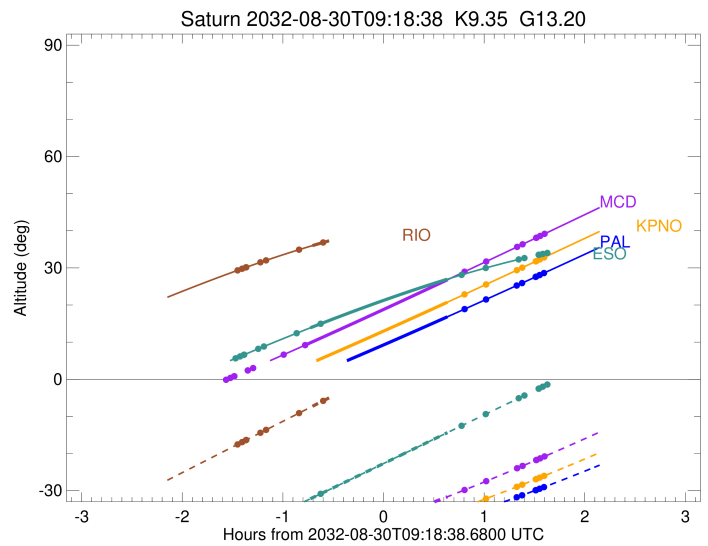
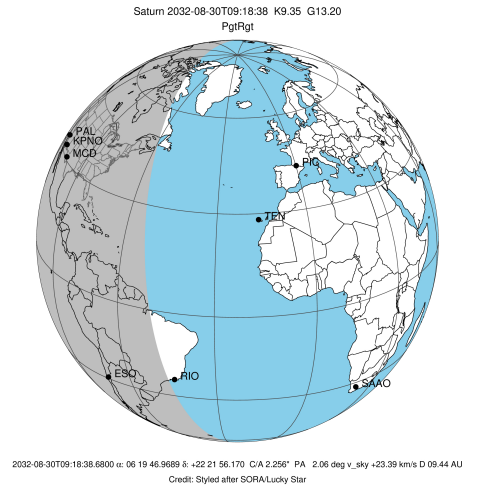


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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		+	+	AUG 30 09:56 - AUG 30 10:54	PneRne
PMO	Purple Mtn Obs	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl	32.0	248.4		+	+	AUG 30 09:56 - AUG 30 10:54	PneRne
MCD	McDonald Obs.	30.7	256.0	+	+	+	AUG 30 08:19 - AUG 30 10:54	PieRie
TEN	Teide Obs./Ten	28.3	343.5					PnnRnn
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 30 07:51 - AUG 30 08:36	PinRin
ESO	European South	-29.3	289.3	+	+	+	AUG 30 07:50 - AUG 30 10:39	PieRie
AAT	Siding Spring	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Ob	-35.3	149.0					PnnRnn

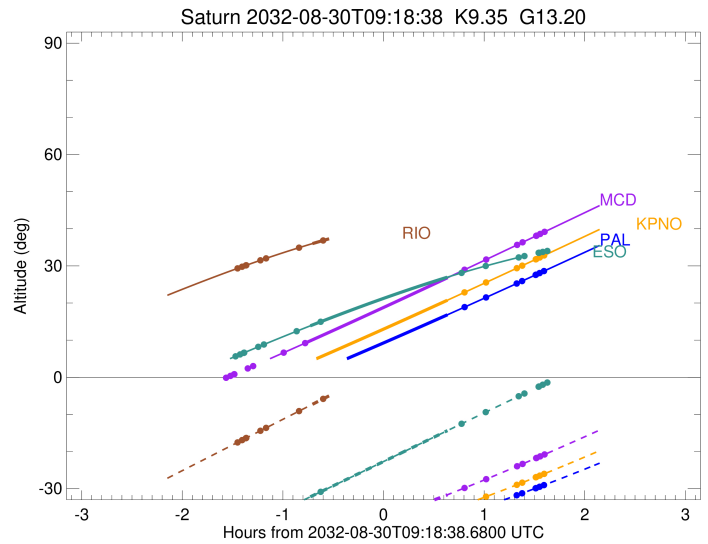
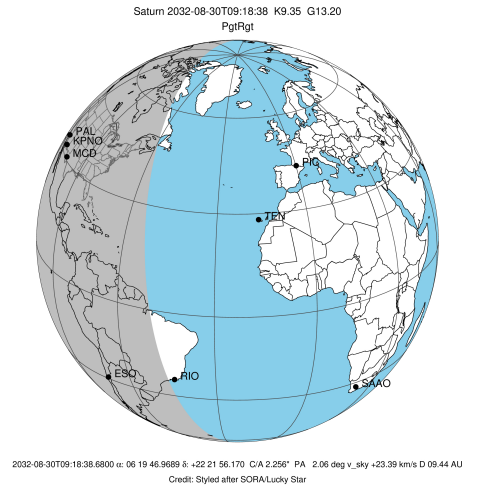


target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2032-08-30T09:14:42.440  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PAL  
 Location : Palomar Mt (200")  
 Latitude (deg) : 33.35622  
 E. Longitude (deg) : 243.13601  
 Altitude (km) : 1.706  
 Gaia source ID : 3376834885915089664  
 2Mass ID (if available) : 06194696+2221561  
 ICRS Star Coord at Epoch: 06h 19m 46.96892s +22:21:56.16988s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 9.353  
 G magnitude : 13.200  
 RP magnitude : 12.159  
 BP magnitude : 14.322  
 DUPflag : 0  
 Distance (au) : 9.437  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 23.39  
 Sun-Target sep (deg) : 62.54  
 Sun-Moon sep (deg) : 5.14  
 B (ring opening deg) : -26.05  
 PA of pole (deg) : -5.88  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.791  
 C/A sky separation (km) : 12258.2  
 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\_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



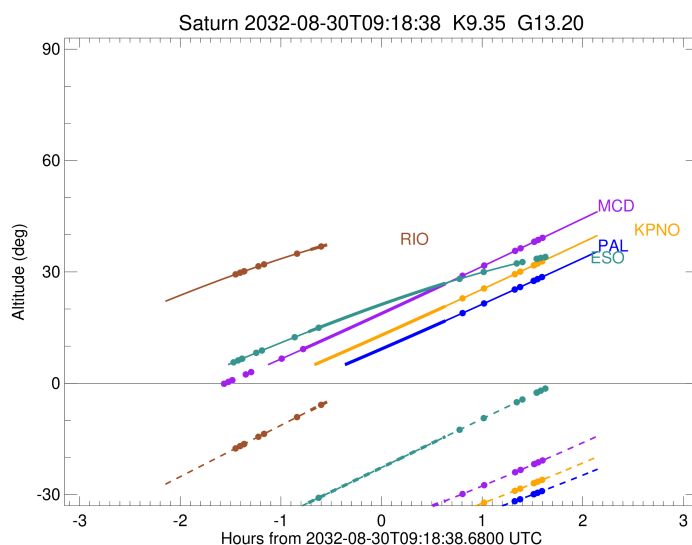
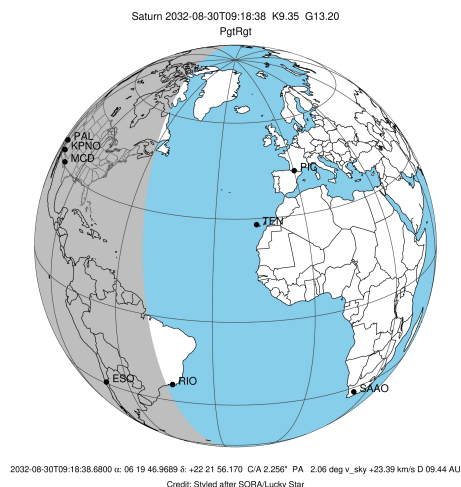
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2032-08-30T07:44:46.210	-8.27x	-48.06	140461.00	-23.98			
A (OER)	I	2032-08-30T07:47:20.049	-7.82x	-48.07	136774.40	-23.95			
Encke (OEG)	I	2032-08-30T07:49:26.619	-7.45x	-48.07	133744.89	-23.92			
Encke (IEG)	I	2032-08-30T07:49:40.062	-7.41x	-48.07	133423.31	-23.92			
A (IER)	I	2032-08-30T07:57:36.658	-6.00x	-48.01	122050.38	-23.80			
B (OER)	I	2032-08-30T08:00:45.054	-5.44x	-47.96	117571.17	-23.75			
B (IER)	I	2032-08-30T08:18:51.894	-2.15x	-47.44	91984.69	-23.28			
C (IER)	I	2032-08-30T08:31:32.282	0.21x	-46.82	74490.58	-22.67			
Saturn	I	2032-08-30T08:32:51.769	0.45x	-46.74	60145.91			-17.28	-20.88
Saturn	E	2032-08-30T09:56:47.246		16.84	-38.10	60262.00		-3.77	-4.63
C (IER)	E	2032-08-30T10:06:58.879		18.90	-36.63	74490.58	22.49		
B (IER)	E	2032-08-30T10:19:46.137		21.50	-34.71	91984.69	23.05		
B (OER)	E	2032-08-30T10:38:05.868		25.26	-31.78	117571.16	23.43		
A (IER)	E	2032-08-30T10:41:16.849		25.91	-31.25	122050.38	23.47		
Encke (IEG)	E	2032-08-30T10:49:20.435		27.57	-29.90	133423.31	23.56		
Encke (OEG)	E	2032-08-30T10:49:34.085		27.62	-29.86	133744.89	23.56		
A (OER)	E	2032-08-30T10:51:42.624		28.06	-29.50	136774.40	23.58		
F ring	E	2032-08-30T10:54:18.916		28.60	-29.05	140461.00	23.60		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2032-08-30T09:14:38.570  
 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 : 3376834885915089664  
 2Mass ID (if available) : 06194696+2221561  
 ICRS Star Coord at Epoch: 06h 19m 46.96892s +22:21:56.16988s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 9.353  
 G magnitude : 13.200  
 RP magnitude : 12.159  
 BP magnitude : 14.322  
 DUPflag : 0  
 Distance (au) : 9.437  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 23.39  
 Sun-Target sep (deg) : 62.54  
 Sun-Moon sep (deg) : 5.12  
 B (ring opening deg) : -26.05  
 PA of pole (deg) : -5.88  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.836  
 C/A sky separation (km) : 12568.0  
 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	2032-08-30T07:44:46.052	-5.24x	-49.23	140461.00	-23.92			
A (OER)	I	2032-08-30T07:47:20.276	-4.77x	-49.17	136774.40	-23.89			
Encke (OEG)	I	2032-08-30T07:49:27.170	-4.38x	-49.10	133744.89	-23.86			
Encke (IEG)	I	2032-08-30T07:49:40.649	-4.33x	-49.09	133423.31	-23.86			
A (IER)	I	2032-08-30T07:57:38.538	-2.85x	-48.80	122050.38	-23.73			
B (OER)	I	2032-08-30T08:00:47.481	-2.26x	-48.66	117571.16	-23.68			
B (IER)	I	2032-08-30T08:18:58.035	1.19x	-47.60	91984.69	-23.19			
C (IER)	I	2032-08-30T08:31:41.977	3.65x	-46.61	74490.58	-22.54			
Saturn	I	2032-08-30T08:32:47.082	3.86x	-46.52	60142.30			-17.54	-21.18
Saturn	E	2032-08-30T09:56:44.490	20.75	-35.94	60261.11			-4.04	-4.96
C (IER)	E	2032-08-30T10:06:55.584	22.86	-34.31	74490.58	22.37			
B (IER)	E	2032-08-30T10:19:46.408	25.54	-32.17	91984.69	22.96			
B (OER)	E	2032-08-30T10:38:09.889	29.39	-28.97	117571.16	23.36			
A (IER)	E	2032-08-30T10:41:21.424	30.06	-28.40	122050.38	23.41			
Encke (IEG)	E	2032-08-30T10:49:26.325	31.76	-26.94	133423.31	23.50			
Encke (OEG)	E	2032-08-30T10:49:40.010	31.81	-26.90	133744.89	23.50			
A (OER)	E	2032-08-30T10:51:48.879	32.26	-26.51	136774.40	23.52			
F ring	E	2032-08-30T10:54:25.564	32.82	-26.03	140461.00	23.54			

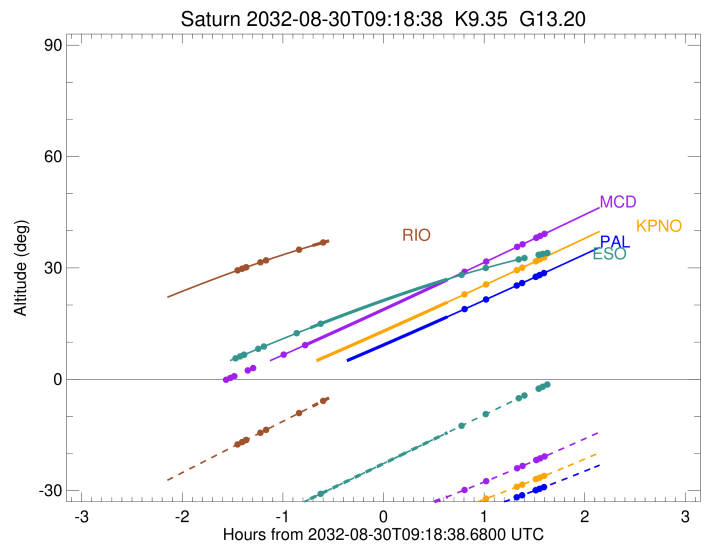
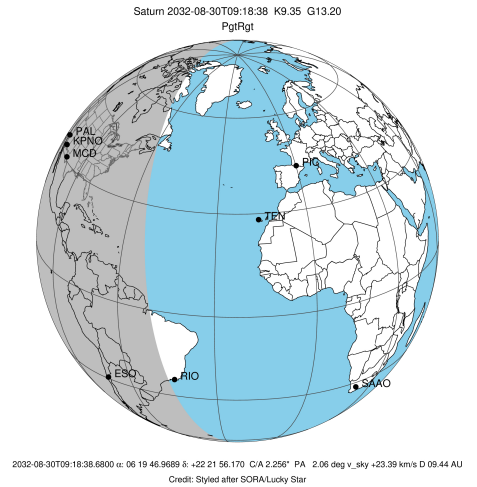
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2032-08-30T09:14:38.430  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : MCD  
 Location : McDonald Obs. 2.7m  
 Latitude (deg) : 30.67158  
 E. Longitude (deg) : 255.97844  
 Altitude (km) : 2.075  
 Gaia source ID : 3376834885915089664  
 2Mass ID (if available) : 06194696+2221561  
 ICRS Star Coord at Epoch: 06h 19m 46.96892s +22:21:56.16988s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 9.353  
 G magnitude : 13.200  
 RP magnitude : 12.159  
 BP magnitude : 14.322  
 DUPflag : 0  
 Distance (au) : 9.437  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 23.39  
 Sun-Target sep (deg) : 62.54  
 Sun-Moon sep (deg) : 5.08  
 B (ring opening deg) : -26.05  
 PA of pole (deg) : -5.88  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.893  
 C/A sky separation (km) : 12957.1  
 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	2032-08-30T07:44:49.119	-0.13x	-49.07	140461.00	-23.84			
A (OER)	I	2032-08-30T07:47:23.898	0.37x	-48.89	136774.40	-23.80			
Encke (OEG)	I	2032-08-30T07:49:31.258	0.78x	-48.74	133744.89	-23.77			
Encke (IEG)	I	2032-08-30T07:49:44.786	0.83x	-48.72	133423.31	-23.77			
A (IER)	I	2032-08-30T07:57:44.523	2.39x	-48.09	122050.38	-23.64			
B (OER)	I	2032-08-30T08:00:54.240	3.01x	-47.82	117571.16	-23.58			
B (IER)	I	2032-08-30T08:19:09.982	6.64	-46.03	91984.69	-23.06			
C (IER)	I	2032-08-30T08:31:58.792	9.21	-44.57	74490.58	-22.38			
Saturn	I	2032-08-30T08:32:45.073		9.37	-44.47	60137.61		-17.88	-21.58
Saturn	E	2032-08-30T09:56:46.421		26.80	-31.65	60259.93		-4.37	-5.37
C (IER)	E	2032-08-30T10:06:56.739		28.96	-29.83	74490.58	22.21		
B (IER)	E	2032-08-30T10:19:52.300		31.71	-27.45	91984.69	22.84		
B (OER)	E	2032-08-30T10:38:20.746		35.67	-23.96	117571.16	23.27		
A (IER)	E	2032-08-30T10:41:33.012		36.35	-23.35	122050.38	23.32		
Encke (IEG)	E	2032-08-30T10:49:39.641		38.09	-21.78	133423.31	23.42		
Encke (OEG)	E	2032-08-30T10:49:53.374		38.14	-21.73	133744.88	23.42		
A (OER)	E	2032-08-30T10:52:02.676		38.61	-21.31	136774.40	23.44		
F ring	E	2032-08-30T10:54:39.873		39.17	-20.80	140461.00	23.46		

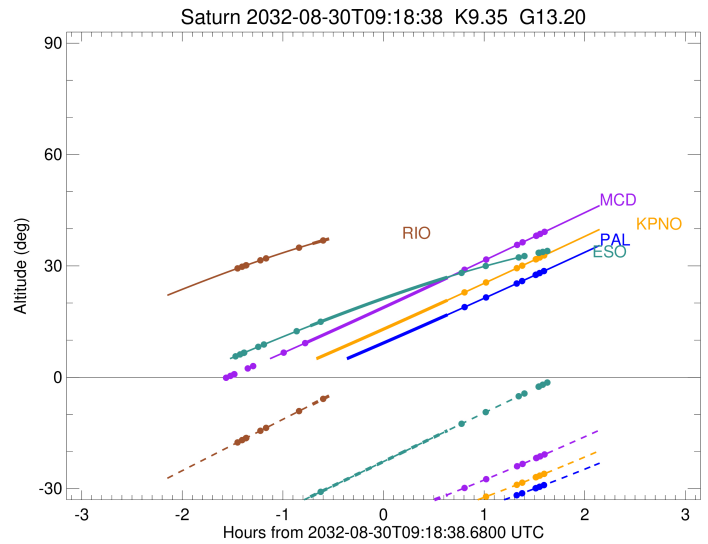
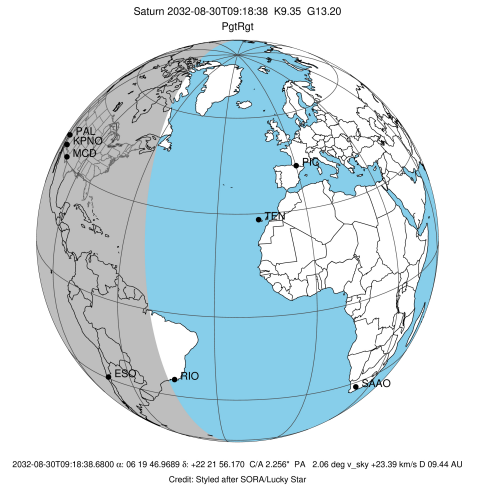
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2032-08-30T09:17:17.780  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : RIO  
 Location : Rio de Janeiro  
 Latitude (deg) : -22.89506  
 E. Longitude (deg) : 316.77708  
 Altitude (km) : 0.033  
 Gaia source ID : 3376834885915089664  
 2Mass ID (if available) : 06194696+2221561  
 ICRS Star Coord at Epoch: 06h 19m 46.96892s +22:21:56.16988s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 9.353  
 G magnitude : 13.200  
 RP magnitude : 12.159  
 BP magnitude : 14.322  
 DUPflag : 0  
 Distance (au) : 9.437  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 23.39  
 Sun-Target sep (deg) : 62.54  
 Sun-Moon sep (deg) : 4.00  
 B (ring opening deg) : -26.05  
 PA of pole (deg) : -5.88  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 2.906  
 C/A sky separation (km) : 19886.2  
 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



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	2032-08-30T07:51:39.778		29.34	-17.54	140461.00	-22.73		
A (OER)	I	2032-08-30T07:54:22.213		29.78	-16.92	136774.40	-22.66		
Encke (OEG)	I	2032-08-30T07:56:36.087		30.14	-16.40	133744.89	-22.60		
Encke (IEG)	I	2032-08-30T07:56:50.319		30.18	-16.35	133423.31	-22.59		
A (IER)	I	2032-08-30T08:05:16.706		31.51	-14.40	122050.38	-22.31		
B (OER)	I	2032-08-30T08:08:38.022		32.03	-13.63	117571.16	-22.18		
B (IER)	I	2032-08-30T08:28:19.195		34.92	-9.11	91984.69	-21.00		
C (IER)	I	2032-08-30T08:42:43.672	b	36.86	-5.80	74490.58	-19.29		
Saturn	I	2032-08-30T08:36:14.587		36.00	-7.29	60036.54		-24.17	-28.78
Saturn	E	2032-08-30T09:58:33.729		43.88	11.37x	60223.92		-10.27	-12.54
C (IER)	E	2032-08-30T10:07:05.534		44.27	13.27x	74490.58	19.29		
B (IER)	E	2032-08-30T10:21:31.091		44.72	16.47x	91984.69	20.96		
B (OER)	E	2032-08-30T10:41:15.373		44.89	20.79x	117571.16	22.11		
A (IER)	E	2032-08-30T10:44:37.352		44.87	21.52x	122050.38	22.24		
Encke (IEG)	E	2032-08-30T10:53:05.563		44.74	23.35x	133423.31	22.51		
Encke (OEG)	E	2032-08-30T10:53:19.850		44.74	23.40x	133744.89	22.51		
A (OER)	E	2032-08-30T10:55:34.242		44.69	23.88x	136774.40	22.57		
F ring	E	2032-08-30T10:58:17.325		44.62	24.46x	140461.00	22.64		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2032-08-30T09:15:44.860  
 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 : 3376834885915089664  
 2Mass ID (if available) : 06194696+2221561  
 ICRS Star Coord at Epoch: 06h 19m 46.96892s +22:21:56.16988s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 9.353  
 G magnitude : 13.200  
 RP magnitude : 12.159  
 BP magnitude : 14.322  
 DUPflag : 0  
 Distance (au) : 9.437  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 23.39  
 Sun-Target sep (deg) : 62.54  
 Sun-Moon sep (deg) : 4.18  
 B (ring opening deg) : -26.05  
 PA of pole (deg) : -5.88  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 2.904  
 C/A sky separation (km) : 19873.2  
 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	2032-08-30T07:50:28.559		5.65	-41.73	140461.00	-22.89		
A (OER)	I	2032-08-30T07:53:09.871		6.16	-41.16	136774.40	-22.82		
Encke (OEG)	I	2032-08-30T07:55:22.827		6.58	-40.69	133744.89	-22.75		
Encke (IEG)	I	2032-08-30T07:55:36.963		6.63	-40.64	133423.31	-22.75		
A (IER)	I	2032-08-30T08:03:59.962		8.20	-38.86	122050.38	-22.46		
B (OER)	I	2032-08-30T08:07:19.964		8.83	-38.15	117571.16	-22.33		
B (IER)	I	2032-08-30T08:26:53.867		12.41	-33.95	91984.69	-21.12		
C (IER)	I	2032-08-30T08:41:13.565	b	14.96	-30.85	74490.58	-19.40		
Saturn	I	2032-08-30T08:34:56.684		13.85	-32.21	60039.05		-24.03	-28.62
Saturn	E	2032-08-30T09:56:48.515		26.97	-14.37	60222.74		-10.41	-12.71
C (IER)	E	2032-08-30T10:05:12.298		28.12	-12.53	74490.58	19.33		
B (IER)	E	2032-08-30T10:19:36.107		29.98	-9.39	91984.69	21.00		
B (OER)	E	2032-08-30T10:39:18.632		32.29	-5.11	117571.16	22.14		
A (IER)	E	2032-08-30T10:42:40.395		32.65	-4.38x	122050.38	22.26		
Encke (IEG)	E	2032-08-30T10:51:08.174		33.52	-2.55x	133423.31	22.52		
Encke (OEG)	E	2032-08-30T10:51:22.451		33.55	-2.49x	133744.89	22.53		
A (OER)	E	2032-08-30T10:53:36.757		33.77	-2.01x	136774.40	22.59		
F ring	E	2032-08-30T10:56:19.752		34.03	-1.42x	140461.00	22.65		