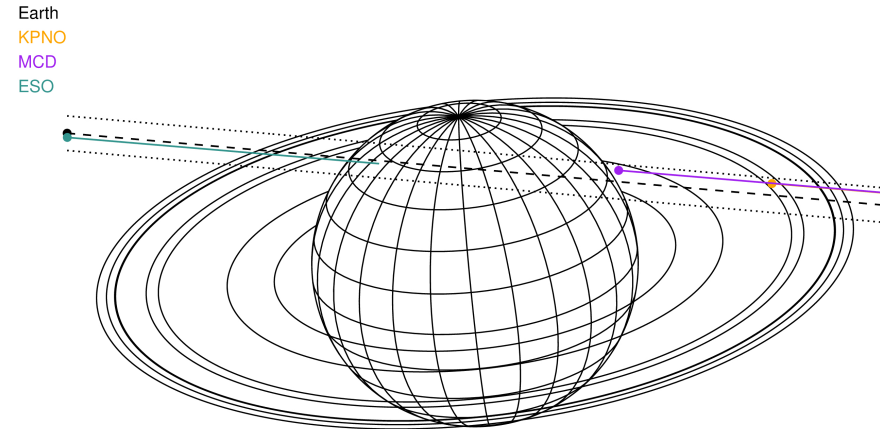
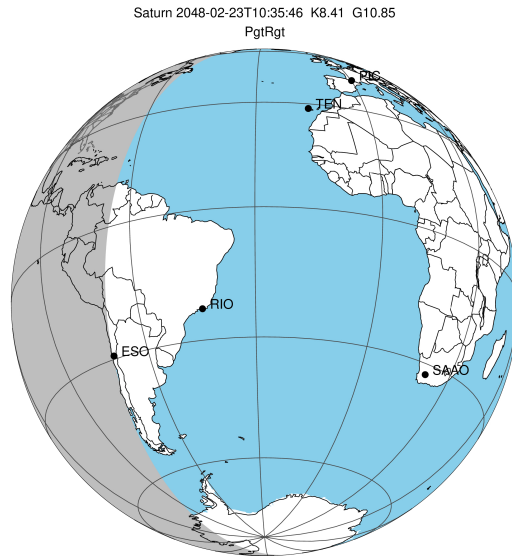


target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2048-02-23T10:35:46.310  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 4078741947806914304  
 2Mass ID (if available) : 18535141-2213482

Saturn 2048-02-23T10:35:46 K8.41 G10.85 PgtRgt

ICRS Star Coord at Epoch: 18h 53m 51.42402s -22:13:49.13129s

RUWE (>1.4 is poor) : 1.40  
 K magnitude : 8.409  
 G magnitude : 10.853  
 RP magnitude : 10.092  
 BP magnitude : 11.482  
 DUPflag : 0  
 Distance (au) : 10.630  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 28.20  
 Sun-Target sep (deg) : 51.37  
 Sun-Moon sep (deg) : 158.99  
 B (ring opening deg) : 25.07  
 PA of pole (deg) : 6.39

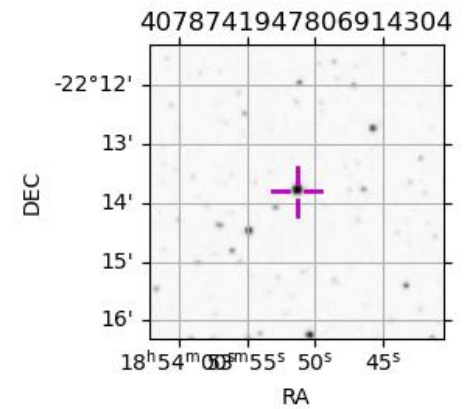


2048-02-23T10:35:46.3100 α: 18 53 51.4240 δ: -22 13 49.131 C/A 4.504° PA 174.97 deg v\_sky +28.20 km/s D 10.63 AU  
 Credit: Styled after SORA/Lucky Star

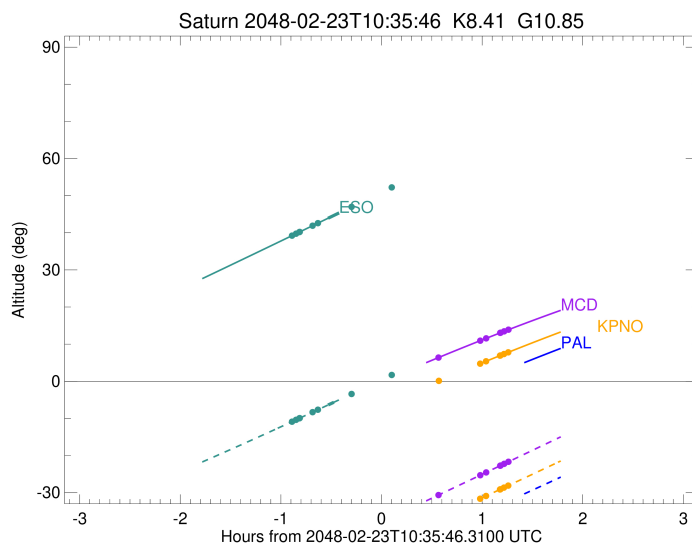
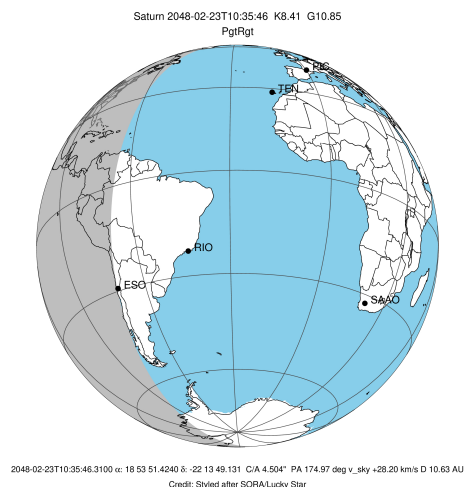
#	a(km)	ring
1	74490.6	C (IER)
2	91984.7	B (IER)
3	117571.2	B (OER)
4	122050.4	A (IER)
5	133423.3	Encke (IEG)
6	133744.9	Encke (OEG)
7	136774.4	A (OER)
8	140461.0	F ring

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

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEncode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (20	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl	32.0	248.4			+	FEB 23 11:38 - FEB 23 11:51	PnnRne
MCD	McDonald Obs.	30.7	256.0			+	FEB 23 11:09 - FEB 23 11:51	PnnRne
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					PnnRnn
ESO	European South	-29.3	289.3	+	+		FEB 23 09:42 - FEB 23 10:03	PinRin
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



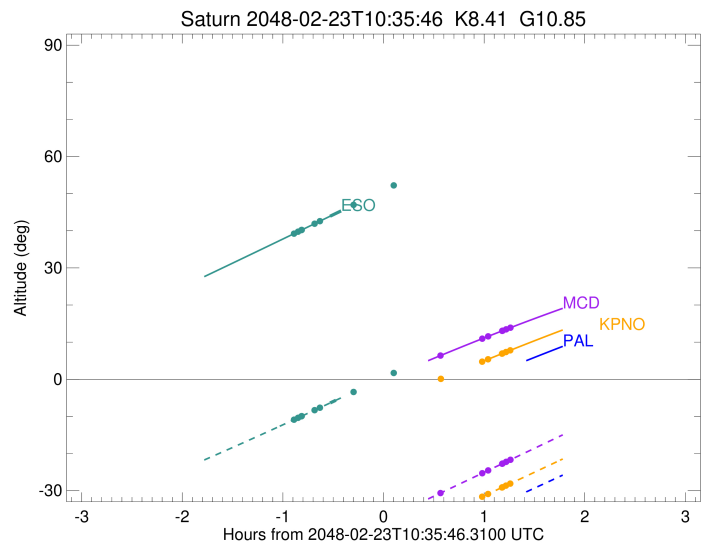
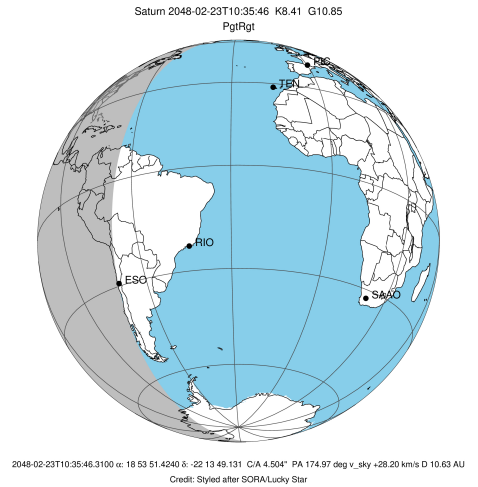
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2048-02-23T10:32:39.700  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : KPNO  
 Location : Kitt Peak Natl Obs  
 Latitude (deg) : 31.96333  
 E. Longitude (deg) : 248.40000  
 Altitude (km) : 2.120  
 Gaia source ID : 4078741947806914304  
 2Mass ID (if available) : 18535141-2213482  
 ICRS Star Coord at Epoch: 18h 53m 51.42402s -22:13:49.13129s  
 RUWE (>1.4 is poor) : 1.40  
 K magnitude : 8.409  
 G magnitude : 10.853  
 RP magnitude : 10.092  
 BP magnitude : 11.482  
 DUPflag : 0  
 Distance (au) : 10.630  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 28.20  
 Sun-Target sep (deg) : 51.37  
 Sun-Moon sep (deg) : 158.32  
 B (ring opening deg) : 25.07  
 PA of pole (deg) : 6.39  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 4.995  
 C/A sky separation (km) : 38511.0  
 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	2048-02-23T09:47:59.855		-16.14x	-53.11	140461.00	-24.44		
A (OER)	I	2048-02-23T09:50:31.843		-15.62x	-52.64	136774.40	-24.06		
Encke (OEG)	I	2048-02-23T09:52:38.644		-15.19x	-52.24	133744.89	-23.72		
Encke (IEG)	I	2048-02-23T09:52:52.213		-15.15x	-52.20	133423.31	-23.68		
A (IER)	I	2048-02-23T10:01:08.519		-13.46x	-50.63	122050.38	-22.08		
B (OER)	I	2048-02-23T10:04:35.068		-12.77x	-49.97	117571.16	-21.28		
B (IER)	I	2048-02-23T10:29:13.256	b	-7.83x	-45.13	91984.69	-12.29		
Saturn	I	2048-02-23T10:05:43.046		-12.54x	-49.75	59643.44		44.99	50.55
Saturn	E	2048-02-23T10:59:57.334		-1.81x	-38.87	60027.58		25.89	30.69
B (IER)	E	2048-02-23T11:10:02.688		0.12x	-36.78	91984.69	12.32		
B (OER)	E	2048-02-23T11:34:41.009		4.75x	-31.63	117571.17	21.20		
A (IER)	E	2048-02-23T11:38:08.411		5.39	-30.90	122050.38	21.98		
Encke (IEG)	E	2048-02-23T11:46:27.444		6.91	-29.14	133423.31	23.53		
Encke (OEG)	E	2048-02-23T11:46:41.099		6.95	-29.10	133744.88	23.57		
A (OER)	E	2048-02-23T11:48:48.737		7.34	-28.65	136774.40	23.90		
F ring	E	2048-02-23T11:51:21.796		7.80	-28.11	140461.00	24.27		

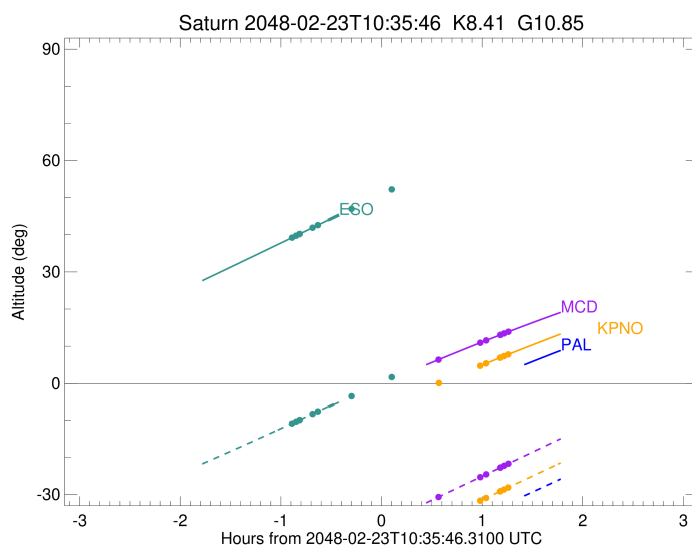
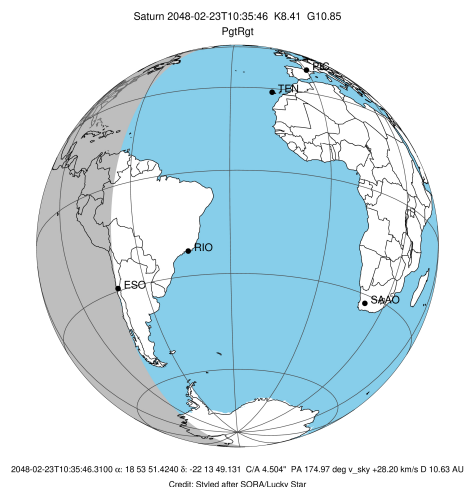
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2048-02-23T10:32:41.970  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : MCD  
 Location : McDonald Obs. 2.7m  
 Latitude (deg) : 30.67158  
 E. Longitude (deg) : 255.97844  
 Altitude (km) : 2.075  
 Gaia source ID : 4078741947806914304  
 2Mass ID (if available) : 18535141-2213482  
 ICRS Star Coord at Epoch: 18h 53m 51.42402s -22:13:49.13129s  
 RUWE (>1.4 is poor) : 1.40  
 K magnitude : 8.409  
 G magnitude : 10.853  
 RP magnitude : 10.092  
 BP magnitude : 11.482  
 DUPflag : 0  
 Distance (au) : 10.630  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 28.20  
 Sun-Target sep (deg) : 51.37  
 Sun-Moon sep (deg) : 158.36  
 B (ring opening deg) : 25.07  
 PA of pole (deg) : 6.39  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 5.015  
 C/A sky separation (km) : 38666.3  
 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	2048-02-23T09:48:10.075		-9.54x	-47.73	140461.00	-24.34		
A (OER)	I	2048-02-23T09:50:42.708		-9.03x	-47.22	136774.40	-23.96		
Encke (OEG)	I	2048-02-23T09:52:50.069		-8.60x	-46.79	133744.89	-23.61		
Encke (IEG)	I	2048-02-23T09:53:03.700		-8.55x	-46.74	133423.31	-23.57		
A (IER)	I	2048-02-23T10:01:22.477		-6.88x	-45.05	122050.38	-21.96		
B (OER)	I	2048-02-23T10:04:50.216		-6.19x	-44.34	117571.17	-21.15		
B (IER)	I	2048-02-23T10:29:44.694	b	-1.26x	-39.15	91984.69	-12.02		
Saturn	I	2048-02-23T10:05:47.083		-6.00x	-44.14	59639.87		45.16	50.72
Saturn	E	2048-02-23T10:59:57.930		4.55x	-32.75	60024.82		26.05	30.87
B (IER)	E	2048-02-23T11:09:49.738		6.40	-30.64	91984.69	12.05		
B (OER)	E	2048-02-23T11:34:43.930		10.95	-25.30	117571.17	21.08		
A (IER)	E	2048-02-23T11:38:12.448		11.56	-24.55	122050.38	21.87		
Encke (IEG)	E	2048-02-23T11:46:33.762		13.04	-22.75	133423.31	23.43		
Encke (OEG)	E	2048-02-23T11:46:47.473		13.08	-22.70	133744.89	23.47		
A (OER)	E	2048-02-23T11:48:55.621		13.45	-22.24	136774.40	23.81		
F ring	E	2048-02-23T11:51:29.260		13.90	-21.69	140461.00	24.18		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2048-02-23T10:33:23.050  
 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 : 4078741947806914304  
 2Mass ID (if available) : 18535141-2213482  
 ICRS Star Coord at Epoch: 18h 53m 51.42402s -22:13:49.13129s  
 RUWE (>1.4 is poor) : 1.40  
 K magnitude : 8.409  
 G magnitude : 10.853  
 RP magnitude : 10.092  
 BP magnitude : 11.482  
 DUPflag : 0  
 Distance (au) : 10.630  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 28.20  
 Sun-Target sep (deg) : 51.37  
 Sun-Moon sep (deg) : 158.71  
 B (ring opening deg) : 25.07  
 PA of pole (deg) : 6.39  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 4.376  
 C/A sky separation (km) : 33736.0  
 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	2048-02-23T09:42:26.677		39.23	-10.88	140461.00	-25.78		
A (OER)	I	2048-02-23T09:44:50.421		39.76	-10.38	136774.40	-25.51		
Encke (OEG)	I	2048-02-23T09:46:49.744		40.19	-9.97	133744.89	-25.27		
Encke (IEG)	I	2048-02-23T09:47:02.478		40.24	-9.92	133423.31	-25.24		
A (IER)	I	2048-02-23T09:54:42.804		41.91	-8.32	122050.38	-24.12		
B (OER)	I	2048-02-23T09:57:50.576		42.59	-7.66	117571.16	-23.57		
B (IER)	I	2048-02-23T10:18:00.123	b	47.00	-3.40x	91984.69	-18.07		
C (IER)	I	2048-02-23T10:42:05.696	b	52.28	1.74x	74490.58	-4.75		
Saturn	I	2048-02-23T10:03:56.463		43.92	-6.38	59743.50		40.32	45.94
Saturn	E	2048-02-23T11:03:08.342		56.88	6.28x	60110.96		20.64	24.77
C (IER)	E	2048-02-23T10:55:00.197	b	55.10	4.52x	74490.58	4.76		
B (IER)	E	2048-02-23T11:18:59.430		60.34	9.72x	91984.69	18.13		
B (OER)	E	2048-02-23T11:39:08.657		64.71	14.10x	117571.16	23.53		
A (IER)	E	2048-02-23T11:42:16.846		65.39	14.79x	122050.38	24.06		
Encke (IEG)	E	2048-02-23T11:49:58.524		67.04	16.47x	133423.31	25.15		
Encke (OEG)	E	2048-02-23T11:50:11.302		67.09	16.51x	133744.89	25.18		
A (OER)	E	2048-02-23T11:52:11.045		67.51	16.95x	136774.40	25.42		
F ring	E	2048-02-23T11:54:35.327		68.03	17.47x	140461.00	25.68		