

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2031-08-01T13:08:54.060  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3414247177797508736  
 2Mass ID (if available) : 05125642+2130450

Saturn 2031-08-01T13:08:54 K7.96 G12.17 PgtRgt

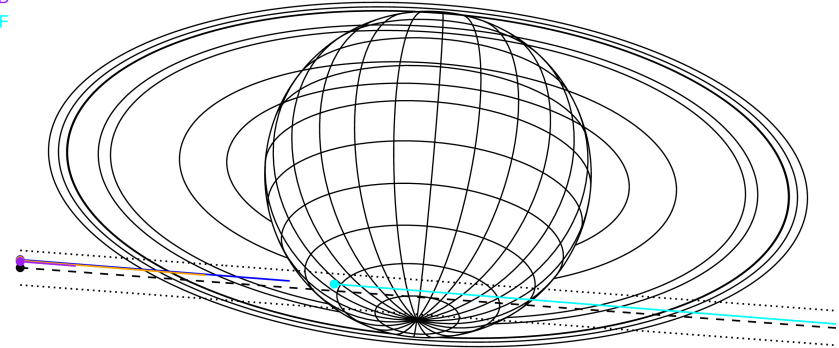
ICRS Star Coord at Epoch: 05h 12m 56.43382s +21:30:44.94491s

RUWE (>1.4 is poor) : 1.03  
 K magnitude : 7.961  
 G magnitude : 12.171  
 RP magnitude : 11.050  
 BP magnitude : 13.488  
 DUPflag : 0  
 Distance (au) : 9.663  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 28.96  
 Sun-Target sep (deg) : 49.63  
 Sun-Moon sep (deg) : 152.07  
 B (ring opening deg) : -26.60  
 PA of pole (deg) : -4.44  
 # a(km) ring



2031-08-01T13:08:54.0600 ex: 05 12 56.4338 8: +21 30 44.945 C/A 6.482° PA 355.77 deg v\_sky +28.96 km/s D 09.66 AU  
 Credit: Styled after SORA/Lucky Star

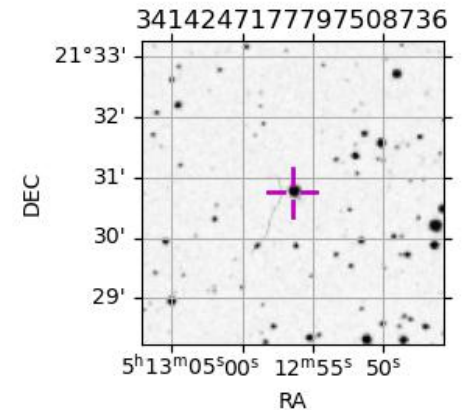
Earth  
 PAL  
 KPNO  
 MCD  
 IRTF



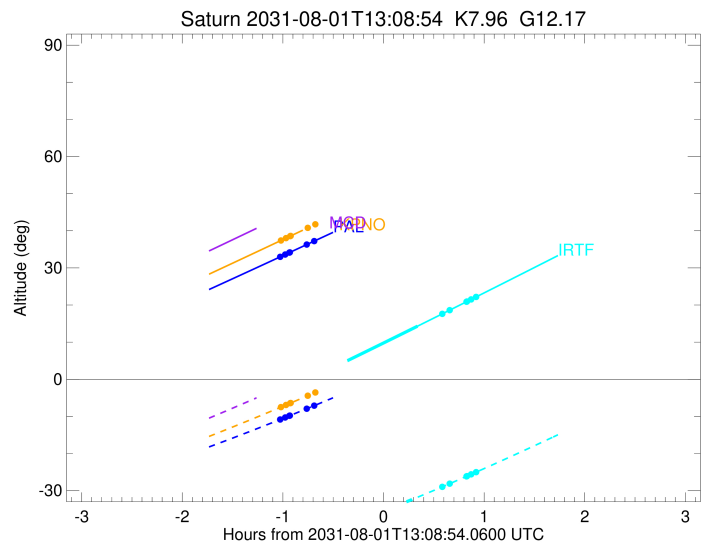
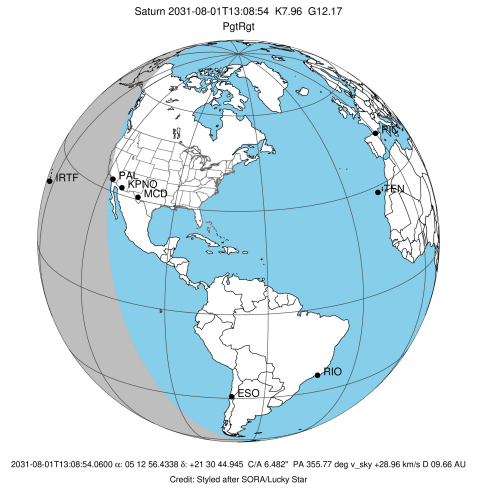
- 1 74490.6 C (IER)
- 2 91984.7 B (IER)
- 3 117571.2 B (OER)
- 4 122050.4 A (IER)
- 5 133423.3 Encke (IEG)
- 6 133744.9 Encke (OEG)
- 7 136774.4 A (OER)
- 8 140461.0 F ring

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					PnnRnn
PAL	Palomar Mt (20	33.4	243.1	+ + + + +			AUG 01 12:07 - AUG 01 12:27	PnnRin
PMO	Purple Mtn Obs	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl	32.0	248.4	+ + + +			AUG 01 12:07 - AUG 01 12:13	PnnRin
MCD	McDonald Obs.	30.7	256.0					PnnRnn
TEN	Teide Obs./Ten	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5		+	+ + + + +	AUG 01 13:29 - AUG 01 14:04	PneRne
KAV	Kavalur Observ	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8					PnnRnn
ESO	European South	-29.3	289.3					PnnRnn
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



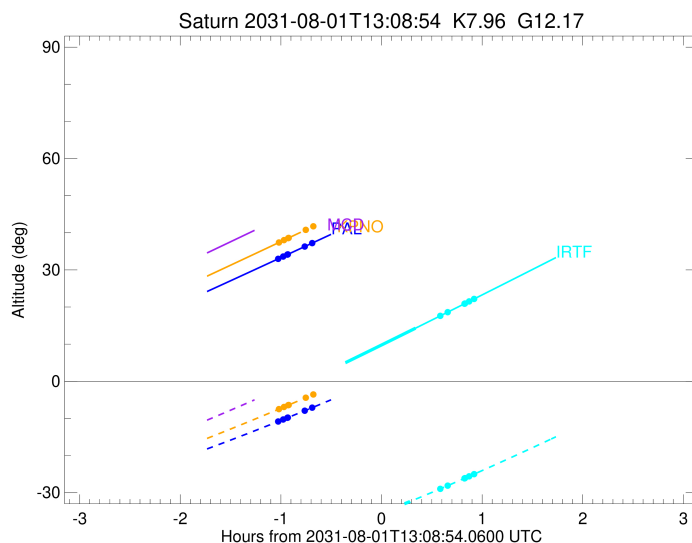
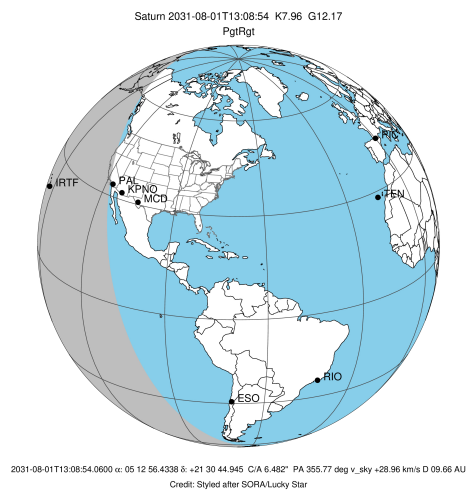
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2031-08-01T13:06:33.680  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PAL  
 Location : Palomar Mt (200")  
 Latitude (deg) : 33.35622  
 E. Longitude (deg) : 243.13601  
 Altitude (km) : 1.706  
 Gaia source ID : 3414247177797508736  
 2Mass ID (if available) : 05125642+2130450  
 ICRS Star Coord at Epoch: 05h 12m 56.43382s +21:30:44.94491s  
 RUWE (>1.4 is poor) : 1.03  
 K magnitude : 7.961  
 G magnitude : 12.171  
 RP magnitude : 11.050  
 BP magnitude : 13.488  
 DUPflag : 0  
 Distance (au) : 9.663  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 28.96  
 Sun-Target sep (deg) : 49.63  
 Sun-Moon sep (deg) : 152.97  
 B (ring opening deg) : -26.60  
 PA of pole (deg) : -4.44  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 6.162  
 C/A sky separation (km) : 43185.4  
 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	2031-08-01T12:07:18.180		32.98	-10.83	140461.00	-20.93		
A (OER)	I	2031-08-01T12:10:16.544		33.60	-10.29	136774.40	-20.40		
Encke (OEG)	I	2031-08-01T12:12:46.740		34.12	-9.84	133744.89	-19.93		
Encke (IEG)	I	2031-08-01T12:13:02.896		34.18	-9.79	133423.31	-19.88		
A (IER)	I	2031-08-01T12:23:08.077		36.29	-7.93	122050.38	-17.61		
B (OER)	I	2031-08-01T12:27:31.205		37.21	-7.12	117571.16	-16.42		
Saturn	I	2031-08-01T12:42:40.576		40.38	-4.27x	59667.30		-40.28	-45.90
Saturn	E	2031-08-01T13:30:28.548		50.40	5.04x	59664.60		-40.39	-46.01
B (OER)	E	2031-08-01T13:45:32.502		53.53	8.05x	117571.16	16.34		
A (IER)	E	2031-08-01T13:49:56.897		54.45	8.93x	122050.38	17.52		
Encke (IEG)	E	2031-08-01T14:00:05.496		56.54	10.98x	133423.31	19.76		
Encke (OEG)	E	2031-08-01T14:00:21.753		56.60	11.04x	133744.89	19.81		
A (OER)	E	2031-08-01T14:02:52.910		57.11	11.55x	136774.40	20.27		
F ring	E	2031-08-01T14:05:52.473		57.73	12.15x	140461.00	20.78		

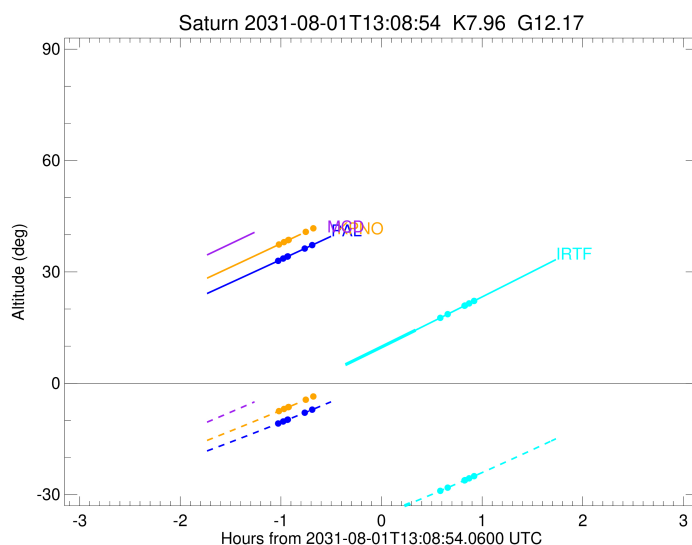
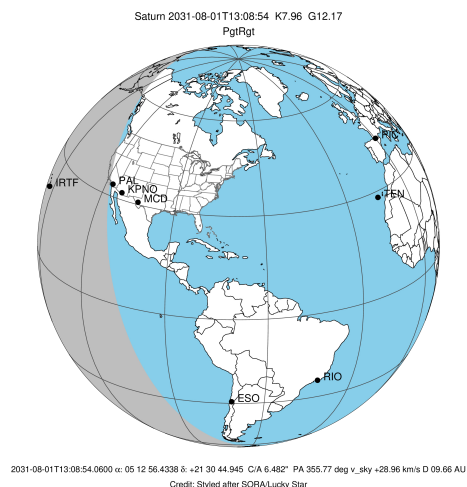
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2031-08-01T13:06:42.990  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : KPNO  
 Location : Kitt Peak Natl Obs  
 Latitude (deg) : 31.96333  
 E. Longitude (deg) : 248.40000  
 Altitude (km) : 2.120  
 Gaia source ID : 3414247177797508736  
 2Mass ID (if available) : 05125642+2130450  
 ICRS Star Coord at Epoch: 05h 12m 56.43382s +21:30:44.94491s  
 RUWE (>1.4 is poor) : 1.03  
 K magnitude : 7.961  
 G magnitude : 12.171  
 RP magnitude : 11.050  
 BP magnitude : 13.488  
 DUPflag : 0  
 Distance (au) : 9.663  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 28.96  
 Sun-Target sep (deg) : 49.63  
 Sun-Moon sep (deg) : 152.96  
 B (ring opening deg) : -26.60  
 PA of pole (deg) : -4.44  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 6.204  
 C/A sky separation (km) : 43478.8  
 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\_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	2031-08-01T12:07:45.678		37.38	-7.50	140461.00	-20.77		
A (OER)	I	2031-08-01T12:10:45.444		38.02	-6.93	136774.40	-20.24		
Encke (OEG)	I	2031-08-01T12:13:16.920		38.56	-6.45	133744.89	-19.76		
Encke (IEG)	I	2031-08-01T12:13:33.220		38.62	-6.39	133423.31	-19.70		
A (IER)	I	2031-08-01T12:23:44.896		40.78	-4.43x	122050.38	-17.38		
B (OER)	I	2031-08-01T12:28:11.785		41.73	-3.57x	117571.17	-16.16		
Saturn	I	2031-08-01T12:42:59.478		44.88	-0.67x	59658.84		-40.63	-46.24
Saturn	E	2031-08-01T13:30:28.165		54.97	8.88x	59656.59		-40.72	-46.34
B (OER)	E	2031-08-01T13:45:12.298		58.07	11.90x	117571.16	16.09		
A (IER)	E	2031-08-01T13:49:40.390		59.00	12.83x	122050.38	17.30		
Encke (IEG)	E	2031-08-01T13:59:55.312		61.14	14.95x	133423.31	19.59		
Encke (OEG)	E	2031-08-01T14:00:11.707		61.19	15.01x	133744.89	19.64		
A (OER)	E	2031-08-01T14:02:44.097		61.72	15.53x	136774.40	20.11		
F ring	E	2031-08-01T14:05:45.000		62.34	16.16x	140461.00	20.64		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2031-08-01T13:05:23.690  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : IRTF  
 Location : Mauna Kea/IRTF  
 Latitude (deg) : 19.82622  
 E. Longitude (deg) : 204.52800  
 Altitude (km) : 4.168  
 Gaia source ID : 3414247177797508736  
 2Mass ID (if available) : 05125642+2130450  
 ICRS Star Coord at Epoch: 05h 12m 56.43382s +21:30:44.94491s  
 RUWE (>1.4 is poor) : 1.03  
 K magnitude : 7.961  
 G magnitude : 12.171  
 RP magnitude : 11.050  
 BP magnitude : 13.488  
 DUPflag : 0  
 Distance (au) : 9.663  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 28.96  
 Sun-Target sep (deg) : 49.63  
 Sun-Moon sep (deg) : 153.01  
 B (ring opening deg) : -26.60  
 PA of pole (deg) : -4.44  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 6.148  
 C/A sky separation (km) : 43085.6  
 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\_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	2031-08-01T12:06:28.705	-3.89x	-45.27	140461.00	-21.19			
A (OER)	I	2031-08-01T12:09:24.867	-3.26x	-44.88	136774.40	-20.66			
Encke (OEG)	I	2031-08-01T12:11:53.179	-2.73x	-44.54	133744.89	-20.19			
Encke (IEG)	I	2031-08-01T12:12:09.130	-2.67x	-44.51	133423.31	-20.13			
A (IER)	I	2031-08-01T12:22:06.327	-0.52x	-43.10	122050.38	-17.85			
B (OER)	I	2031-08-01T12:26:25.703	0.42x	-42.46	117571.16	-16.66			
Saturn	I	2031-08-01T12:41:39.380	3.75x	-40.09	59671.27			-40.12	-45.73
Saturn	E	2031-08-01T13:29:10.296	14.30	-31.79	59665.81			-40.34	-45.96
B (OER)	E	2031-08-01T13:44:05.649	17.65	-28.95	117571.16	16.56			
A (IER)	E	2031-08-01T13:48:26.719	18.63	-28.11	122050.38	17.73			
Encke (IEG)	E	2031-08-01T13:58:28.482	20.90	-26.14	133423.31	19.97			
Encke (OEG)	E	2031-08-01T13:58:44.568	20.96	-26.09	133744.89	20.02			
A (OER)	E	2031-08-01T14:01:14.164	21.52	-25.59	136774.40	20.48			
F ring	E	2031-08-01T14:04:11.926	22.20	-25.00	140461.00	20.99			