

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2048-02-17T14:04:48.630  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 4078694050337001600  
 2Mass ID (if available) : 18513416-2216435

Saturn 2048-02-17T14:04:48 K9.57 G10.43 PgtRgt

ICRS Star Coord at Epoch: 18h 51m 34.16769s -22:16:43.50483s

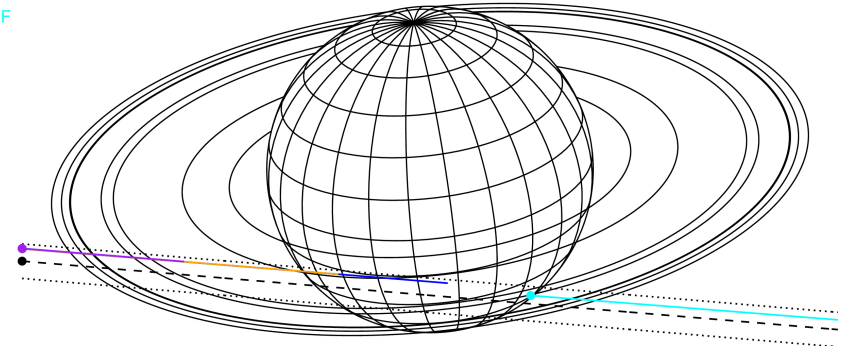
RUWE (>1.4 is poor) : 1.34  
 K magnitude : 9.568  
 G magnitude : 10.428  
 RP magnitude : 10.078  
 BP magnitude : 10.635  
 DUPflag : 0  
 Distance (au) : 10.704  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 30.31  
 Sun-Target sep (deg) : 46.00  
 Sun-Moon sep (deg) : 89.18  
 B (ring opening deg) : 25.17  
 PA of pole (deg) : 6.36

#	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



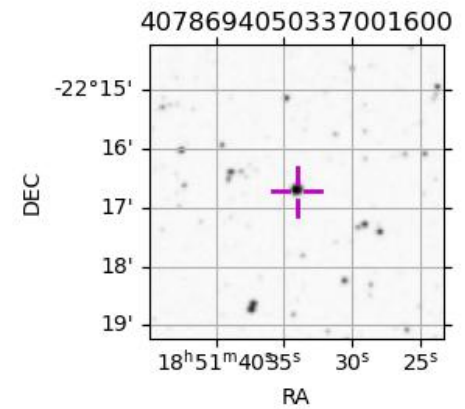
2048-02-17T14:04:48.6300 α: 18 51 34.1677 δ: -22 16 43.505 C/A 5.966° PA 355.20 deg v\_sky +30.31 km/s D 10.70 AU  
 Credit: Styled after SORA/Lucky Star

Earth  
 PAL  
 KPNO  
 MCD  
 IRTF

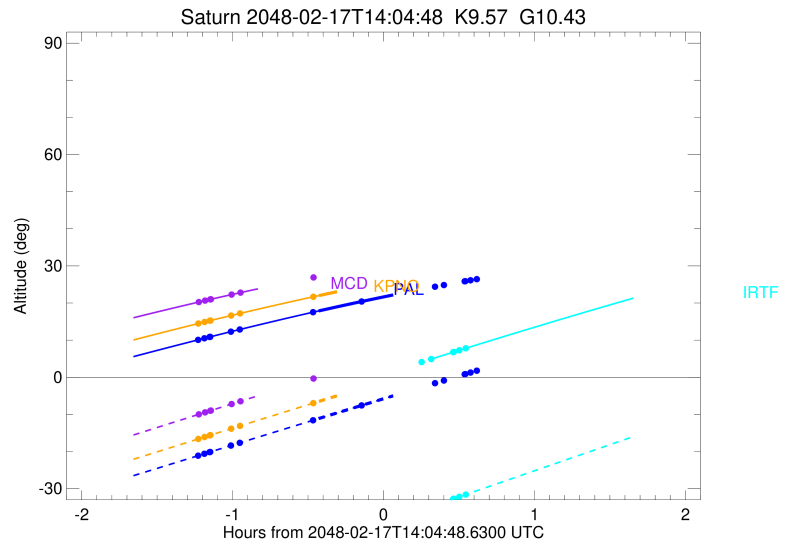
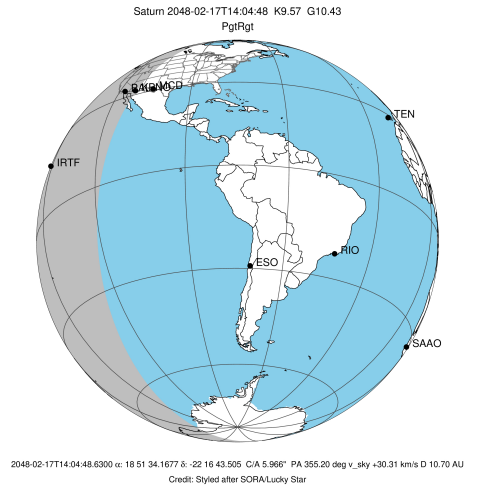


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+ + + + +	+		FEB 17 12:51 - FEB 17 13:39	PinRin
PMO	Purple Mtn Obs	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl	32.0	248.4	+ + + + +	+		FEB 17 12:51 - FEB 17 13:39	PinRin
MCD	McDonald Obs.	30.7	256.0	+ + + + +			FEB 17 12:51 - FEB 17 13:07	PnnRin
TEN	Teide Obs./Ten	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5			+ + + +	FEB 17 14:32 - FEB 17 14:37	PnnRne
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

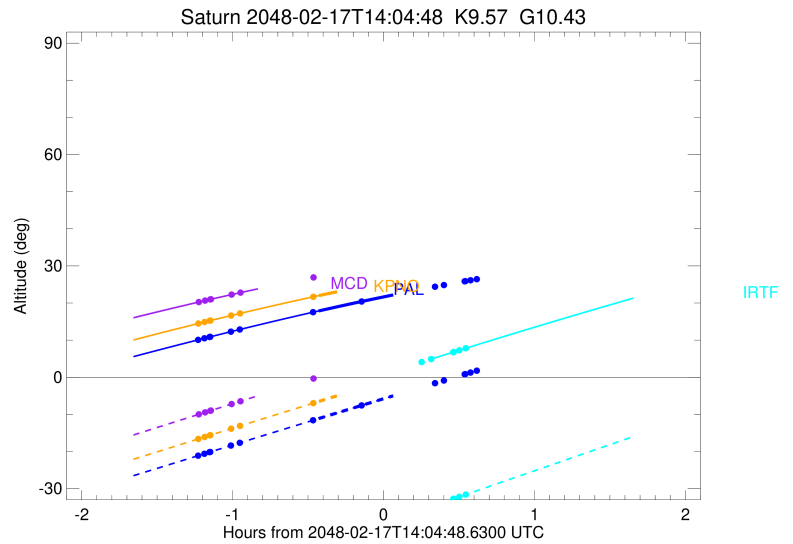
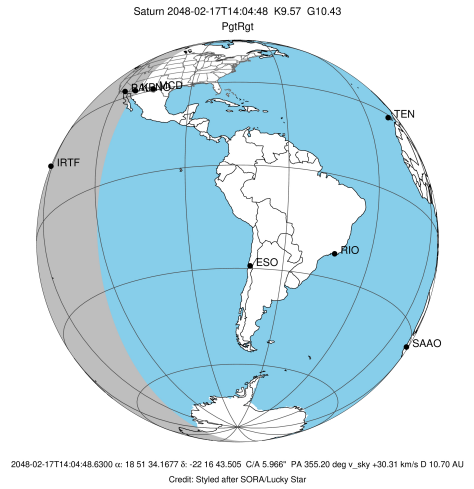


target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2048-02-17T14:03:07.460  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PAL  
 Location : Palomar Mt (200")  
 Latitude (deg) : 33.35622  
 E. Longitude (deg) : 243.13601  
 Altitude (km) : 1.706  
 Gaia source ID : 4078694050337001600  
 2Mass ID (if available) : 18513416-2216435  
 ICRS Star Coord at Epoch: 18h 51m 34.16769s -22:16:43.50483s  
 RUWE (>1.4 is poor) : 1.34  
 K magnitude : 9.568  
 G magnitude : 10.428  
 RP magnitude : 10.078  
 BP magnitude : 10.635  
 DUPflag : 0  
 Distance (au) : 10.704  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 30.31  
 Sun-Target sep (deg) : 46.00  
 Sun-Moon sep (deg) : 89.53  
 B (ring opening deg) : 25.17  
 PA of pole (deg) : 6.36  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 5.320  
 C/A sky separation (km) : 41300.0  
 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	2048-02-17T12:51:05.738		10.07	-21.13	140461.00	-24.96		
A (OER)	I	2048-02-17T12:53:34.848		10.50	-20.61	136774.40	-24.48		
Encke (OEG)	I	2048-02-17T12:55:39.701		10.85	-20.18	133744.89	-24.04		
Encke (IEG)	I	2048-02-17T12:55:53.088		10.89	-20.13	133423.31	-24.00		
A (IER)	I	2048-02-17T13:04:07.201		12.28	-18.41	122050.38	-21.95		
B (OER)	I	2048-02-17T13:07:36.179		12.86	-17.68	117571.16	-20.90		
B (IER)	I	2048-02-17T13:36:44.924		17.52	-11.60	91984.69	-6.62		
Saturn	I	2048-02-17T13:38:59.949		17.86	-11.13	59966.16		-29.15	-34.28
Saturn	E	2048-02-17T14:26:58.630		24.60	-1.25x	59577.66		-47.76	-53.22
B (IER)	E	2048-02-17T13:55:57.425	b	20.39	-7.62	91984.69	6.60		
B (OER)	E	2048-02-17T14:25:16.037	b	24.39	-1.60x	117571.16	20.79		
A (IER)	E	2048-02-17T14:28:46.126		24.83	-0.89x	122050.38	21.83		
Encke (IEG)	E	2048-02-17T14:37:02.681		25.85	0.79x	133423.31	23.88		
Encke (OEG)	E	2048-02-17T14:37:16.132		25.88	0.84x	133744.89	23.93		
A (OER)	E	2048-02-17T14:39:21.581		26.13	1.26x	136774.40	24.36		
F ring	E	2048-02-17T14:41:51.401		26.42	1.76x	140461.00	24.84		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2048-02-17T14:03:17.830  
 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 : 4078694050337001600  
 2Mass ID (if available) : 18513416-2216435  
 ICRS Star Coord at Epoch: 18h 51m 34.16769s -22:16:43.50483s  
 RUWE (>1.4 is poor) : 1.34  
 K magnitude : 9.568  
 G magnitude : 10.428  
 RP magnitude : 10.078  
 BP magnitude : 10.635  
 DUPflag : 0  
 Distance (au) : 10.704  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 30.31  
 Sun-Target sep (deg) : 46.00  
 Sun-Moon sep (deg) : 89.58  
 B (ring opening deg) : 25.17  
 PA of pole (deg) : 6.36  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 5.321  
 C/A sky separation (km) : 41304.7  
 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

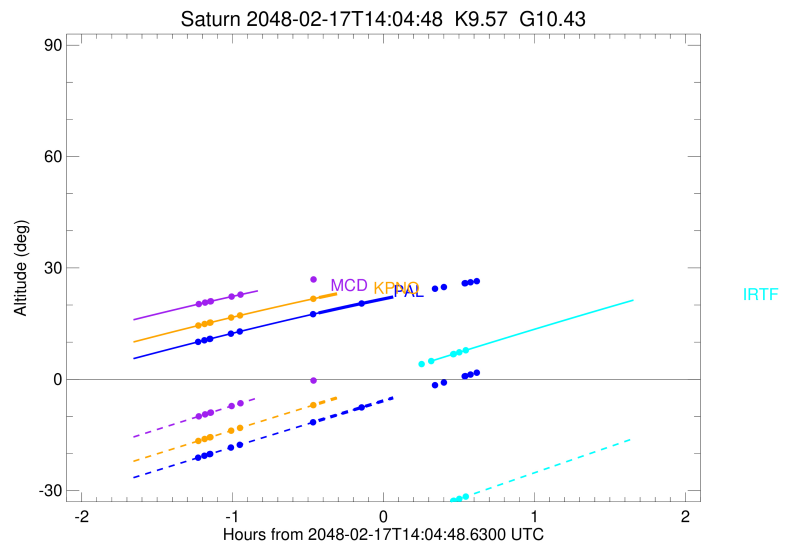
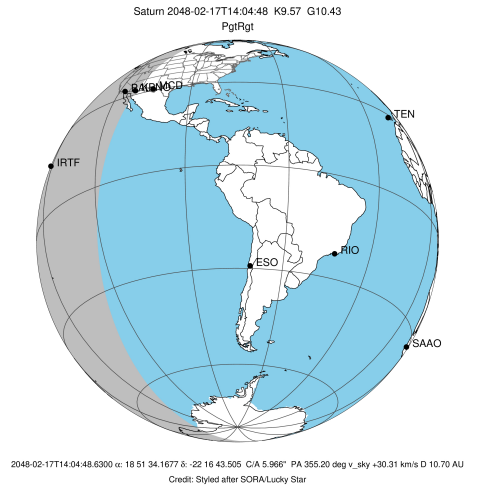


b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2048-02-17T12:51:11.034		14.48	-16.62	140461.00	-24.94		
A (OER)	I	2048-02-17T12:53:40.251		14.89	-16.09	136774.40	-24.46		
Encke (OEG)	I	2048-02-17T12:55:45.191		15.24	-15.65	133744.89	-24.03		
Encke (IEG)	I	2048-02-17T12:55:58.587		15.27	-15.60	133423.31	-23.98		
A (IER)	I	2048-02-17T13:04:13.020		16.62	-13.86	122050.38	-21.93		
B (OER)	I	2048-02-17T13:07:42.120		17.18	-13.12	117571.16	-20.89		
B (IER)	I	2048-02-17T13:36:50.562		21.67	-6.98	91984.69	-6.64		
Saturn	I	2048-02-17T13:39:09.110		22.01	-6.50	59966.41		-29.14	-34.27
Saturn	E	2048-02-17T14:27:10.033		28.32	3.43x	59577.17		-47.79	-53.24
B (IER)	E	2048-02-17T13:56:07.986	b	24.40	-2.96x	91984.69	6.62		
B (OER)	E	2048-02-17T14:25:25.939	b	28.11	3.08x	117571.16	20.78		
A (IER)	E	2048-02-17T14:28:56.081		28.52	3.80x	122050.38	21.83		
Encke (IEG)	E	2048-02-17T14:37:12.773		29.44	5.48x	133423.31	23.88		
Encke (OEG)	E	2048-02-17T14:37:26.228		29.47	5.52x	133744.89	23.92		
A (OER)	E	2048-02-17T14:39:31.713		29.69	5.95x	136774.40	24.36		
F ring	E	2048-02-17T14:42:01.575		29.96	6.45x	140461.00	24.84		



target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2048-02-17T14:01:47.730  
 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 : 4078694050337001600  
 2Mass ID (if available) : 18513416-2216435  
 ICRS Star Coord at Epoch: 18h 51m 34.16769s -22:16:43.50483s  
 RUWE (>1.4 is poor) : 1.34  
 K magnitude : 9.568  
 G magnitude : 10.428  
 RP magnitude : 10.078  
 BP magnitude : 10.635  
 DUPflag : 0  
 Distance (au) : 10.704  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 30.31  
 Sun-Target sep (deg) : 46.00  
 Sun-Moon sep (deg) : 89.20  
 B (ring opening deg) : 25.17  
 PA of pole (deg) : 6.36  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 5.599  
 C/A sky separation (km) : 43469.6  
 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	2048-02-17T12:51:41.310	-15.24x	-56.47	140461.00	-24.12			
A (OER)	I	2048-02-17T12:54:15.912	-14.67x	-55.87	136774.40	-23.56			
Encke (OEG)	I	2048-02-17T12:56:25.893	-14.18x	-55.36	133744.89	-23.05			
Encke (IEG)	I	2048-02-17T12:56:39.862	-14.13x	-55.31	133423.31	-22.99			
A (IER)	I	2048-02-17T13:05:20.919	-12.20x	-53.28	122050.38	-20.55			
B (OER)	I	2048-02-17T13:09:05.643	-11.36x	-52.40	117571.16	-19.29			
Saturn	I	2048-02-17T13:39:04.933	-4.75x	-45.36	59913.71	-31.88		-37.21	
Saturn	E	2048-02-17T14:24:14.220	5.00x	-34.73	59531.12	-49.94		-55.29	
B (OER)	E	2048-02-17T14:19:56.862	b	4.09x	-35.74	117571.16	19.14		
A (IER)	E	2048-02-17T14:23:43.334	b	4.89x	-34.86	122050.38	20.40		
Encke (IEG)	E	2048-02-17T14:32:28.394		6.74	-32.80	133423.31	22.82		
Encke (OEG)	E	2048-02-17T14:32:42.471		6.79	-32.74	133744.89	22.87		
A (OER)	E	2048-02-17T14:34:53.459		7.25	-32.23	136774.40	23.38		
F ring	E	2048-02-17T14:37:29.274		7.80	-31.62	140461.00	23.94		