

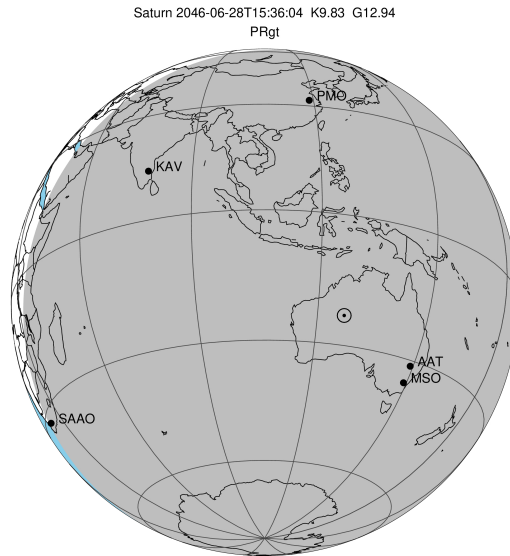
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-06-28T15:36:04.690  
 Event type : PRgt  
 : Saturn occs: not geocentric or topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 4115671588455406336  
 2Mass ID (if available) : 17082038-2122189

Saturn 2046-06-28T15:36:04 K9.83 G12.94 PRgt

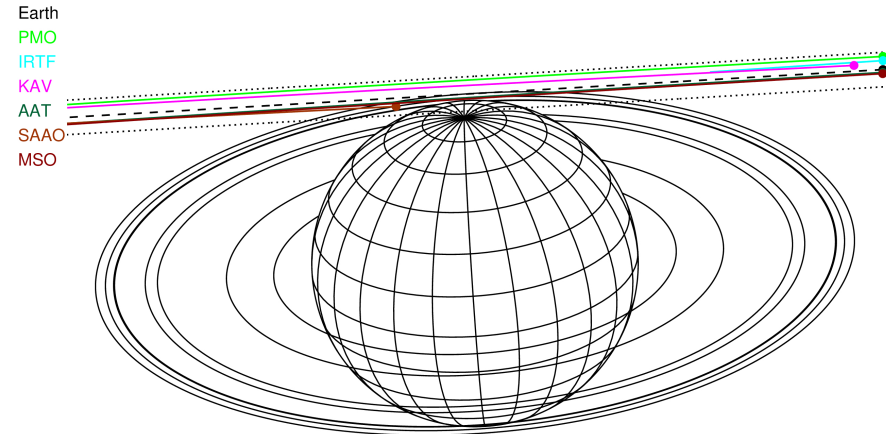
ICRS Star Coord at Epoch: 17h 08m 20.34759s -21:22:19.63513s

RUWE (>1.4 is poor) : 0.85  
 K magnitude : 9.826  
 G magnitude : 12.941  
 RP magnitude : 12.047  
 BP magnitude : 13.769  
 DUPflag : 0  
 Distance (au) : 9.066  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -18.67  
 Sun-Target sep (deg) : 161.44  
 Sun-Moon sep (deg) : 132.50  
 B (ring opening deg) : 26.54  
 PA of pole (deg) : 4.32

#	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

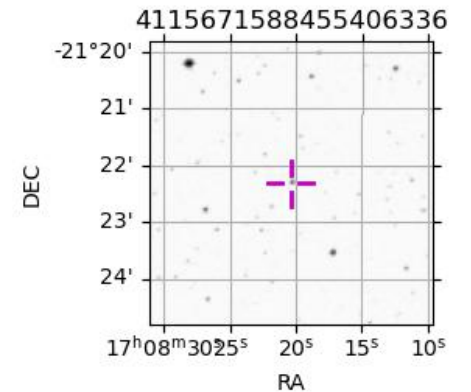


2046-06-28T15:36:04.6900 at: 17 08 20.3476 s: -21 22 19.635 C/A 9.529° PA 183.36 deg v\_sky -18.67 km/s D 09.07 AU  
 Credit: Styled after SORA/Lucky Star

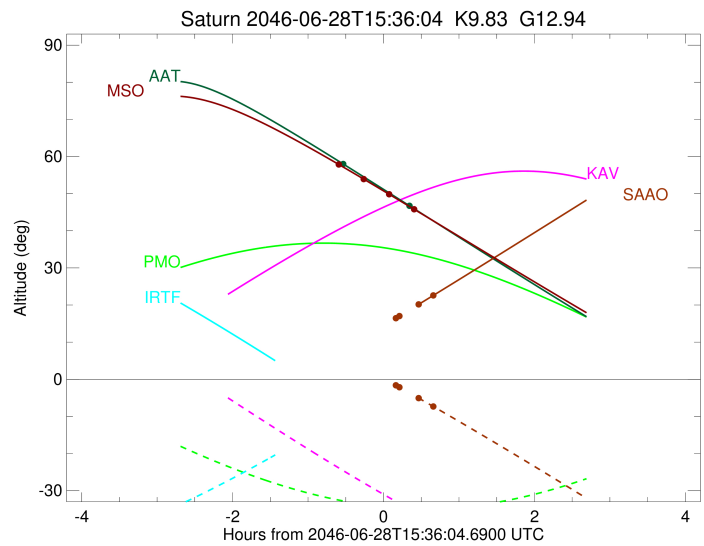
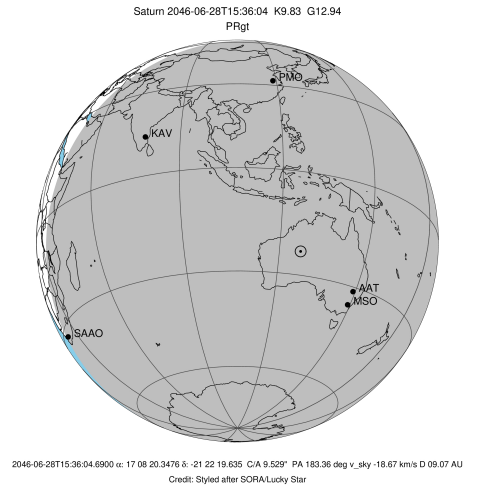


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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					PnnRnn
PMO	Purple Mtn Obs	32.1	118.8					PnnRnn
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					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					PnnRnn
AAT	Siding Spring	-31.3	149.1	+			JUN 28 15:03 - JUN 28 15:56	PnnRie
SAAO	So. Afr. Astro	-32.4	20.8			++	JUN 28 16:04 - JUN 28 16:15	PnnRne
MSO	Mt. Stromlo Ob	-35.3	149.0	++		++	JUN 28 15:00 - JUN 28 16:00	PnnRie



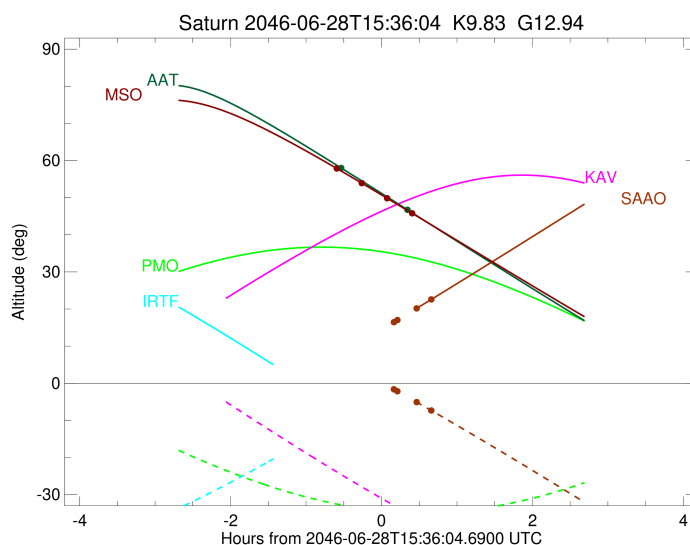
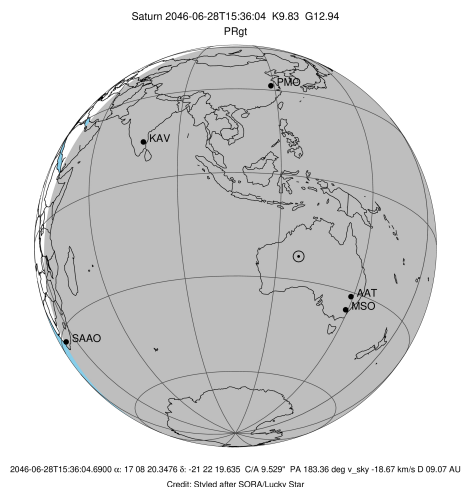
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-06-28T15:33:00.730  
 Event type : PRgt  
 : Saturn occs: not geocentric or topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : AAT  
 Location : Siding Spring (AAT)  
 Latitude (deg) : -31.27703  
 E. Longitude (deg) : 149.06608  
 Altitude (km) : 1.164  
 Gaia source ID : 4115671588455406336  
 2Mass ID (if available) : 17082038-2122189  
 ICRS Star Coord at Epoch: 17h 08m 20.34759s -21:22:19.63513s  
 RUWE (>1.4 is poor) : 0.85  
 K magnitude : 9.826  
 G magnitude : 12.941  
 RP magnitude : 12.047  
 BP magnitude : 13.769  
 DUPflag : 0  
 Distance (au) : 9.066  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -18.67  
 Sun-Target sep (deg) : 161.44  
 Sun-Moon sep (deg) : 133.37  
 B (ring opening deg) : 26.54  
 PA of pole (deg) : 4.32  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 9.321  
 C/A sky separation (km) : 61286.3  
 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	2046-06-28T15:03:36.754		58.08	-75.19	140461.00	-4.07		
No planet occultations									
F ring	E	2046-06-28T15:56:58.570		46.68	-64.40	140461.00	4.05		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-06-28T15:40:18.820  
 Event type : PRgt  
 : Saturn occs: not geocentric or 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 : 4115671588455406336  
 2Mass ID (if available) : 17082038-2122189  
 ICRS Star Coord at Epoch: 17h 08m 20.34759s -21:22:19.63513s  
 RUWE (>1.4 is poor) : 0.85  
 K magnitude : 9.826  
 G magnitude : 12.941  
 RP magnitude : 12.047  
 BP magnitude : 13.769  
 DUPflag : 0  
 Distance (au) : 9.066  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -18.67  
 Sun-Target sep (deg) : 161.44  
 Sun-Moon sep (deg) : 132.13  
 B (ring opening deg) : 26.54  
 PA of pole (deg) : 4.32  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 9.032  
 C/A sky separation (km) : 59388.4  
 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



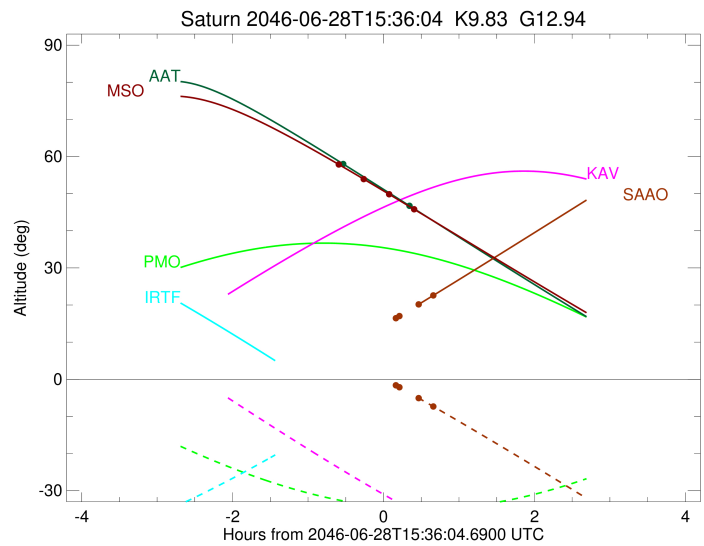
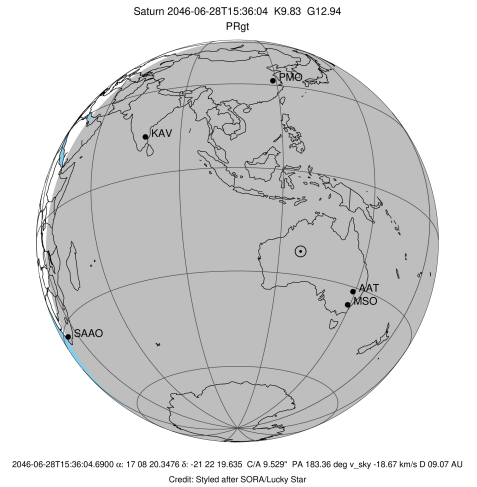
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2046-06-28T14:54:16.282		6.06	7.81x	140461.00	-6.07		
A (OER)	I	2046-06-28T15:05:54.841		8.37	5.75x	136774.40	-4.46		
Encke (OEG)	I	2046-06-28T15:21:00.942		11.39	3.01x	133744.89	-2.20		
Encke (IEG)	I	2046-06-28T15:23:42.250		11.94	2.52x	133423.31	-1.79		

No planet occultations

Encke (IEG)	E	2046-06-28T15:46:28.856		16.57	-1.73x	133423.31	1.79		
Encke (OEG)	E	2046-06-28T15:49:09.982		17.12	-2.24x	133744.89	2.20		
A (OER)	E	2046-06-28T16:04:14.092		20.22	-5.12	136774.40	4.47		
F ring	E	2046-06-28T16:15:49.758		22.62	-7.36	140461.00	6.10		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-06-28T15:33:07.660  
 Event type : PRgt  
 : Saturn occs: not geocentric or 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 : 4115671588455406336  
 2Mass ID (if available) : 17082038-2122189  
 ICRS Star Coord at Epoch: 17h 08m 20.34759s -21:22:19.63513s  
 RUWE (>1.4 is poor) : 0.85  
 K magnitude : 9.826  
 G magnitude : 12.941  
 RP magnitude : 12.047  
 BP magnitude : 13.769  
 DUPflag : 0  
 Distance (au) : 9.066  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -18.67  
 Sun-Target sep (deg) : 161.44  
 Sun-Moon sep (deg) : 133.35  
 B (ring opening deg) : 26.54  
 PA of pole (deg) : 4.32  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 9.256  
 C/A sky separation (km) : 60862.5  
 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	2046-06-28T15:00:08.502		57.94	-73.46	140461.00	-4.61		
A (OER)	I	2046-06-28T15:19:32.036		54.09	-70.31	136774.41	-1.69		

No planet occultations

A (OER)	E	2046-06-28T15:41:11.768		49.71	-66.40	136774.40	1.69		
F ring	E	2046-06-28T16:00:38.564		45.75	-62.69	140461.00	4.59		