

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-10-21T03:21:07.450  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 4115428768187777664  
 2Mass ID (if available) : 17114829-2147123

Saturn 2046-10-21T03:21:07 K9.74 G14.50 PgtRgt

ICRS Star Coord at Epoch: 17h 11m 48.28049s -21:47:12.68040s

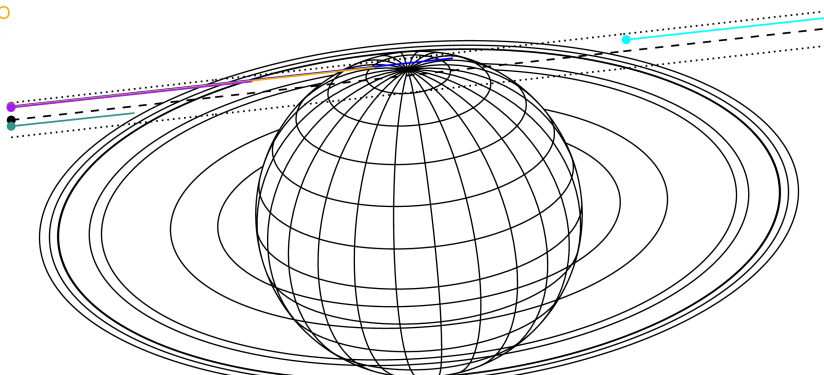
RUWE (>1.4 is poor) : 1.02  
 K magnitude : 9.744  
 G magnitude : 14.501  
 RP magnitude : 13.283  
 BP magnitude : 16.131  
 DUPflag : 0  
 Distance (au) : 10.629  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 28.09  
 Sun-Target sep (deg) : 51.58  
 Sun-Moon sep (deg) : 161.88  
 B (ring opening deg) : 26.89  
 PA of pole (deg) : 4.42

#	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



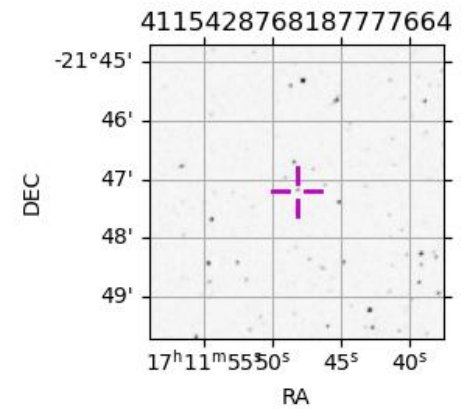
2046-10-21T03:21:07.4500 α: 17 11 48.2805 δ: -21 47 12.6800 C/A 6.6777 PA 186.41 deg v\_sky +28.09 km/s D 10.63 AU  
 Credit: Styled after SORA/Lucky Star

Earth  
 PAL  
 KPNO  
 MCD  
 IRTF  
 ESO

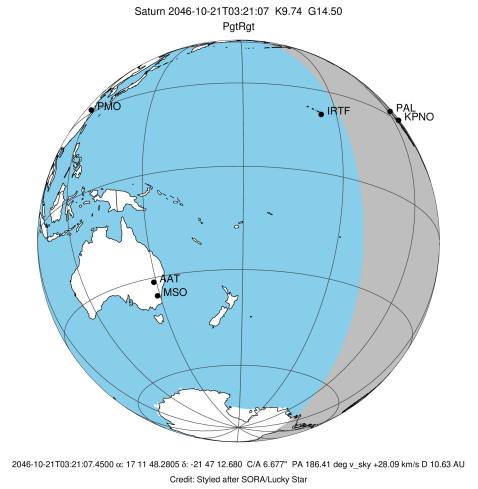


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

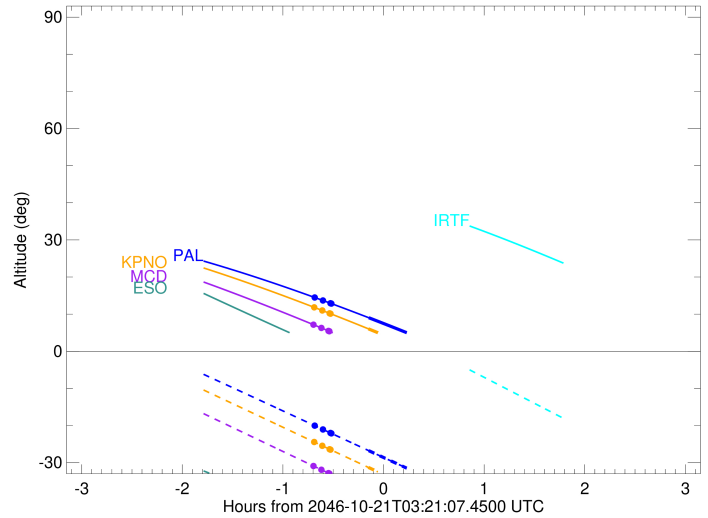
Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEncode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (20	33.4	243.1	+ + + +	+		OCT 21 02:40 - OCT 21 03:12	PinRin
PMO	Purple Mtn Obs	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl	32.0	248.4	+ + + +	+		OCT 21 02:39 - OCT 21 03:12	PinRin
MCD	McDonald Obs.	30.7	256.0	+ + + +			OCT 21 02:39 - OCT 21 02:48	PnnRin
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					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 : 2046-10-21T03:23:51.510  
 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 : 4115428768187777664  
 2Mass ID (if available) : 17114829-2147123  
 ICRS Star Coord at Epoch: 17h 11m 48.28049s -21:47:12.68040s  
 RUWE (>1.4 is poor) : 1.02  
 K magnitude : 9.744  
 G magnitude : 14.501  
 RP magnitude : 13.283  
 BP magnitude : 16.131  
 DUPflag : 0  
 Distance (au) : 10.629  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 28.09  
 Sun-Target sep (deg) : 51.58  
 Sun-Moon sep (deg) : 161.40  
 B (ring opening deg) : 26.89  
 PA of pole (deg) : 4.42  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 7.268  
 C/A sky separation (km) : 56031.9  
 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

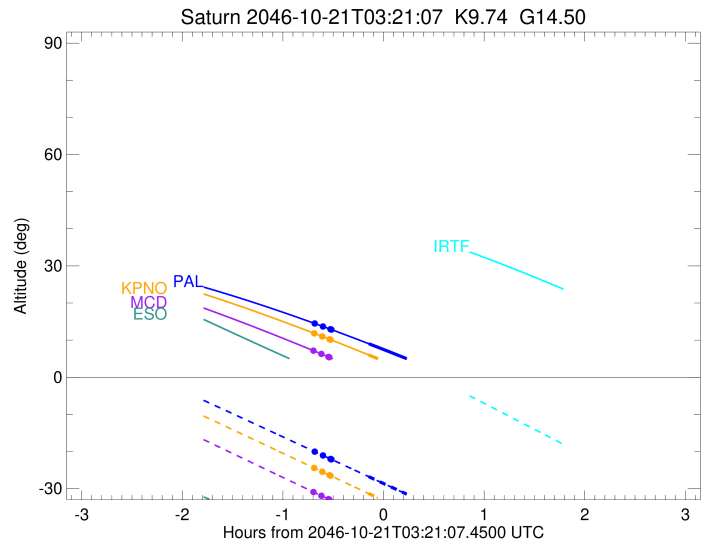
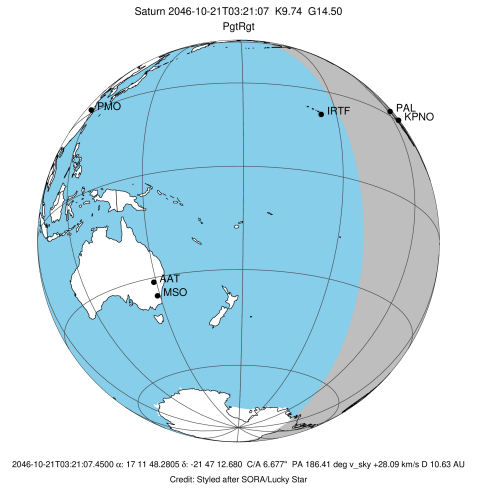


Saturn 2046-10-21T03:21:07 K9.74 G14.50



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2046-10-21T02:40:05.799		14.49	-20.03	140461.00	-13.18		
A (OER)	I	2046-10-21T02:44:59.834		13.68	-21.06	136774.40	-11.87		
Encke (OEG)	I	2046-10-21T02:49:29.538		12.94	-22.00	133744.89	-10.58		
Encke (IEG)	I	2046-10-21T02:50:00.161		12.85	-22.11	133423.31	-10.42		
Saturn	I	2046-10-21T03:12:20.797		9.03	-26.78	59252.09		56.53	61.38
Saturn	E	2046-10-21T03:35:16.776		4.95x	-31.55	59207.43		58.51	63.17
Encke (IEG)	E	2046-10-21T03:49:40.483		2.31x	-34.53	133423.31	10.45		
Encke (OEG)	E	2046-10-21T03:50:11.018		2.22x	-34.63	133744.89	10.61		
A (OER)	E	2046-10-21T03:54:39.831		1.39x	-35.55	136774.40	11.92		
F ring	E	2046-10-21T03:59:32.655		0.48x	-36.55	140461.00	13.25		

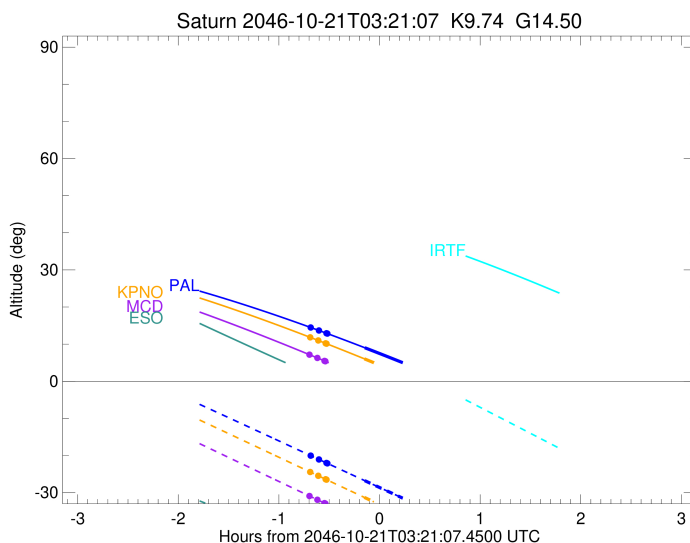
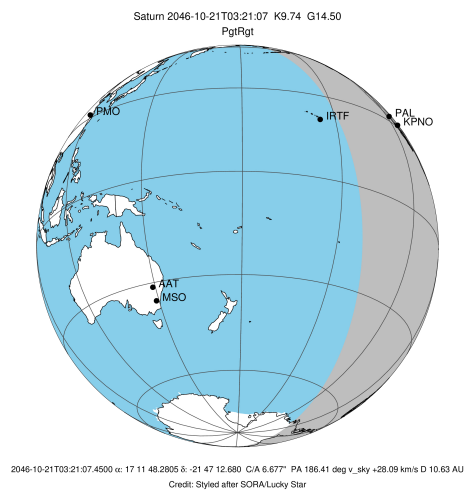
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-10-21T03:24:02.660  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : KPNO  
 Location : Kitt Peak Natl Obs  
 Latitude (deg) : 31.96333  
 E. Longitude (deg) : 248.40000  
 Altitude (km) : 2.120  
 Gaia source ID : 4115428768187777664  
 2Mass ID (if available) : 17114829-2147123  
 ICRS Star Coord at Epoch: 17h 11m 48.28049s -21:47:12.68040s  
 RUWE (>1.4 is poor) : 1.02  
 K magnitude : 9.744  
 G magnitude : 14.501  
 RP magnitude : 13.283  
 BP magnitude : 16.131  
 DUPflag : 0  
 Distance (au) : 10.629  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 28.09  
 Sun-Target sep (deg) : 51.58  
 Sun-Moon sep (deg) : 161.34  
 B (ring opening deg) : 26.89  
 PA of pole (deg) : 4.42  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 7.236  
 C/A sky separation (km) : 55781.4  
 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	2046-10-21T02:39:47.637		11.83	-24.44	140461.00	-13.40		
A (OER)	I	2046-10-21T02:44:36.392		10.99	-25.46	136774.40	-12.12		
Encke (OEG)	I	2046-10-21T02:48:59.876		10.22	-26.39	133744.89	-10.86		
Encke (IEG)	I	2046-10-21T02:49:29.683		10.13	-26.50	133423.31	-10.71		
Saturn	I	2046-10-21T03:12:06.103		6.05	-31.29	59261.88		56.10	60.99
Saturn	E	2046-10-21T03:35:53.791		1.60x	-36.29	59216.26		58.11	62.81
Encke (IEG)	E	2046-10-21T03:50:41.420		-1.23x	-39.37	133423.31	10.75		
Encke (OEG)	E	2046-10-21T03:51:11.130		-1.32x	-39.47	133744.89	10.90		
A (OER)	E	2046-10-21T03:55:33.642		-2.17x	-40.37	136774.40	12.17		
F ring	E	2046-10-21T04:00:21.093		-3.10x	-41.36	140461.00	13.46		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-10-21T03:24:14.330  
 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 : 4115428768187777664  
 2Mass ID (if available) : 17114829-2147123  
 ICRS Star Coord at Epoch: 17h 11m 48.28049s -21:47:12.68040s  
 RUWE (>1.4 is poor) : 1.02  
 K magnitude : 9.744  
 G magnitude : 14.501  
 RP magnitude : 13.283  
 BP magnitude : 16.131  
 DUPflag : 0  
 Distance (au) : 10.629  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 28.09  
 Sun-Target sep (deg) : 51.58  
 Sun-Moon sep (deg) : 161.26  
 B (ring opening deg) : 26.89  
 PA of pole (deg) : 4.42  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 7.192  
 C/A sky separation (km) : 55446.0  
 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	2046-10-21T02:39:21.609		7.16	-30.91	140461.00	-13.68		
A (OER)	I	2046-10-21T02:44:03.617		6.29	-31.91	136774.40	-12.45		
Encke (OEG)	I	2046-10-21T02:48:19.316		5.49	-32.83	133744.89	-11.24		
Encke (IEG)	I	2046-10-21T02:48:48.115		5.40	-32.93	133423.31	-11.09		
Saturn	I	2046-10-21T03:11:45.123		1.01x	-37.82	59274.87		55.54	60.48
Saturn	E	2046-10-21T03:36:38.128		-3.87x	-43.05	59228.07		57.59	62.34
Encke (IEG)	E	2046-10-21T03:51:56.431		-6.93x	-46.22	133423.31	11.14		
Encke (OEG)	E	2046-10-21T03:52:25.124		-7.03x	-46.32	133744.89	11.28		
A (OER)	E	2046-10-21T03:56:39.764		-7.88x	-47.19	136774.40	12.50		
F ring	E	2046-10-21T04:01:20.368		-8.83x	-48.14	140461.00	13.76		