

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-02-09T13:29:09.930
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 4069858095694490240
 2Mass ID (if available) : 18035240-2222393

Saturn 2047-02-09T13:29:09 K7.37 G12.79 PgtRgt

ICRS Star Coord at Epoch: 18h 03m 52.40794s -22:22:39.50017s

RUWE (>1.4 is poor) : 0.96
 K magnitude : 7.366
 G magnitude : 12.795
 RP magnitude : 11.493
 BP magnitude : 14.771
 DUPflag : 0
 Distance (au) : 10.662
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 29.07
 Sun-Target sep (deg) : 49.16
 Sun-Moon sep (deg) : 144.71
 B (ring opening deg) : 26.43
 PA of pole (deg) : 5.59

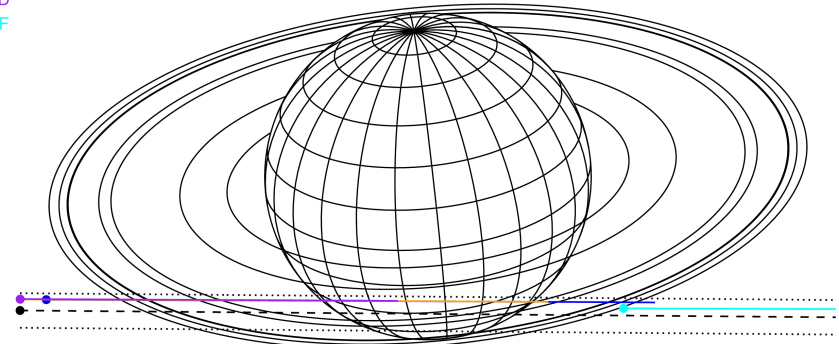
a(km) ring

- 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



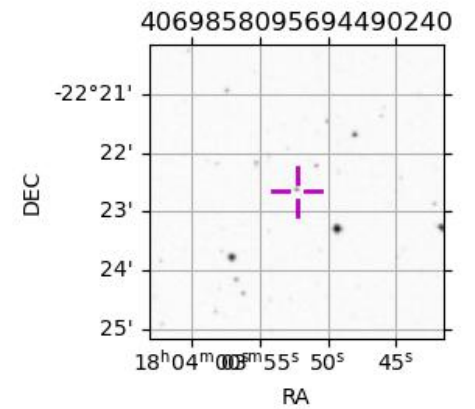
2047-02-09T13:29:09.9300 α: 18 03 52.4079 s: -22 22 39.500 C/A 6.561° PA 359.52 deg v_sky +29.07 km/s D 10.66 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PAL
 KPNO
 MCD
 IRTF

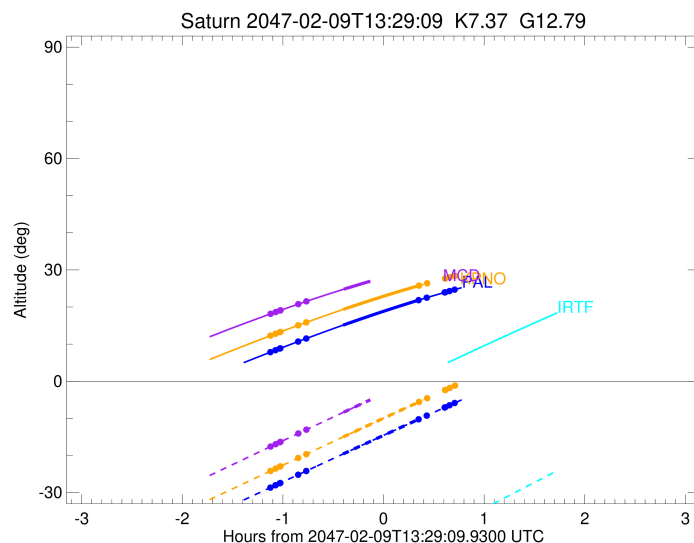
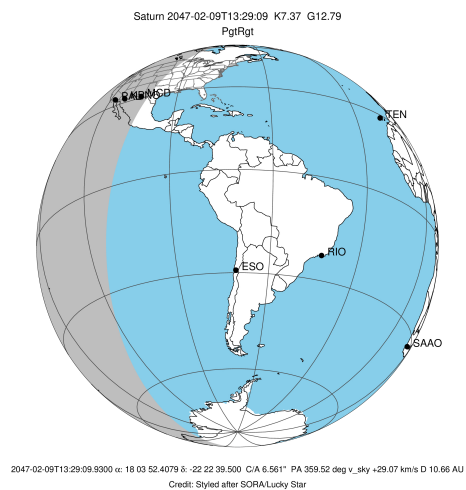


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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 09 12:21 - FEB 09 14:11	PieRie
PMO	Purple Mtn Obs	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl	32.0	248.4	+ + + + +	+ +	+	FEB 09 12:21 - FEB 09 13:50	PieRie
MCD	McDonald Obs.	30.7	256.0	+ + + + +	+		FEB 09 12:21 - FEB 09 13:05	PinRin
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

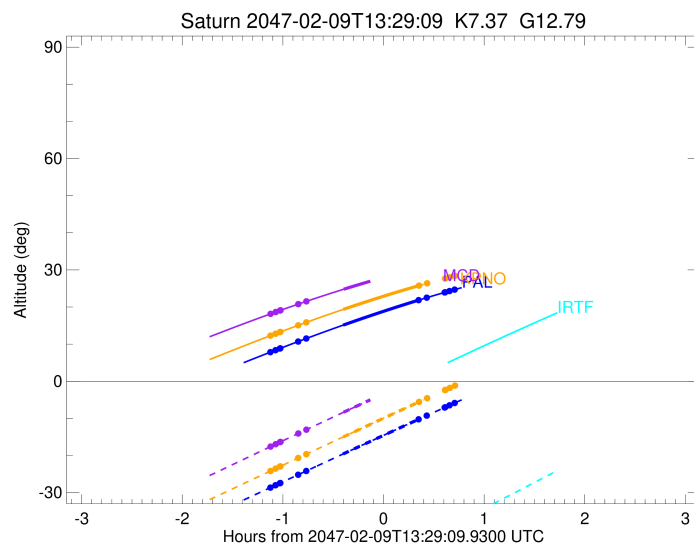
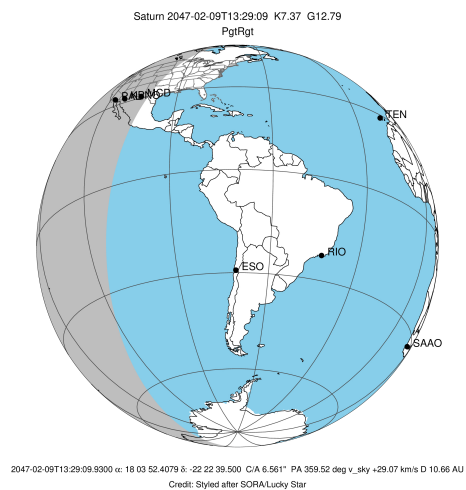


target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-02-09T13:27:03.220
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 4069858095694490240
 2Mass ID (if available) : 18035240-2222393
 ICRS Star Coord at Epoch: 18h 03m 52.40794s -22:22:39.50017s
 RUWE (>1.4 is poor) : 0.96
 K magnitude : 7.366
 G magnitude : 12.795
 RP magnitude : 11.493
 BP magnitude : 14.771
 DUPflag : 0
 Distance (au) : 10.662
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 29.07
 Sun-Target sep (deg) : 49.16
 Sun-Moon sep (deg) : 145.37
 B (ring opening deg) : 26.43
 PA of pole (deg) : 5.59
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 5.959
 C/A sky separation (km) : 46077.9
 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



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-02-09T12:21:39.141		7.83	-28.66	140461.00	-20.41		
A (OER)	I	2047-02-09T12:24:42.521		8.36	-28.02	136774.40	-19.79		
Encke (OEG)	I	2047-02-09T12:27:17.817		8.81	-27.48	133744.89	-19.22		
Encke (IEG)	I	2047-02-09T12:27:34.575		8.86	-27.42	133423.31	-19.16		
A (IER)	I	2047-02-09T12:38:12.454		10.69	-25.20	122050.38	-16.38		
B (OER)	I	2047-02-09T12:42:58.833		11.49	-24.20	117571.16	-14.88		
Saturn	I	2047-02-09T13:05:06.013		15.12	-19.58	59705.89		-39.05	-44.65
Saturn	E	2047-02-09T13:48:49.576		21.68	-10.51	59480.23		-48.41	-53.84
B (OER)	E	2047-02-09T13:50:06.722		21.85	-10.25	117571.16	14.79		
A (IER)	E	2047-02-09T13:54:54.718		22.51	-9.26	122050.38	16.29		
Encke (IEG)	E	2047-02-09T14:05:36.085		23.93	-7.07	133423.31	19.05		
Encke (OEG)	E	2047-02-09T14:05:52.936		23.96	-7.02	133744.89	19.12		
A (OER)	E	2047-02-09T14:08:29.094		24.30	-6.49	136774.40	19.68		
F ring	E	2047-02-09T14:11:33.512		24.69	-5.86	140461.00	20.29		

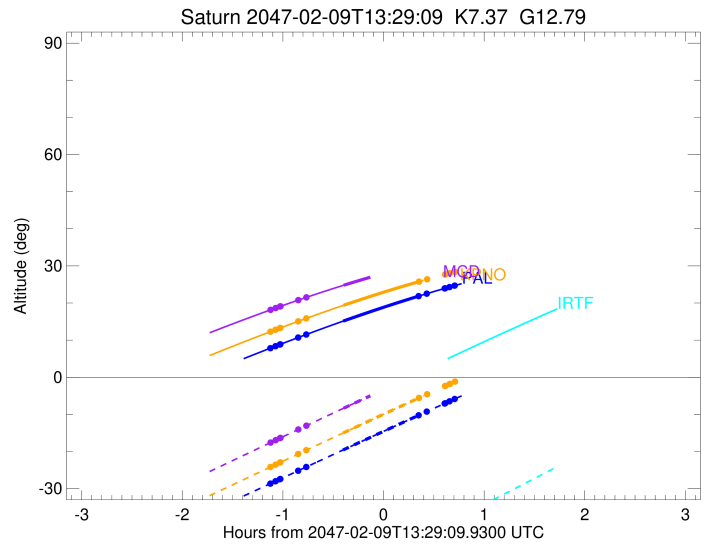
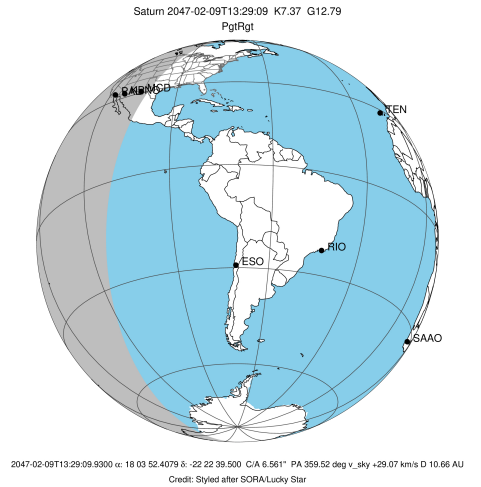
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-02-09T13:27:12.950
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KPNO
 Location : Kitt Peak Natl Obs
 Latitude (deg) : 31.96333
 E. Longitude (deg) : 248.40000
 Altitude (km) : 2.120
 Gaia source ID : 4069858095694490240
 2Mass ID (if available) : 18035240-2222393
 ICRS Star Coord at Epoch: 18h 03m 52.40794s -22:22:39.50017s
 RUWE (>1.4 is poor) : 0.96
 K magnitude : 7.366
 G magnitude : 12.795
 RP magnitude : 11.493
 BP magnitude : 14.771
 DUPflag : 0
 Distance (au) : 10.662
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 29.07
 Sun-Target sep (deg) : 49.16
 Sun-Moon sep (deg) : 145.37
 B (ring opening deg) : 26.43
 PA of pole (deg) : 5.59
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 5.955
 C/A sky separation (km) : 46046.4
 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	2047-02-09T12:21:41.190		12.27	-24.19	140461.00	-20.41		
A (OER)	I	2047-02-09T12:24:44.584		12.79	-23.55	136774.40	-19.79		
Encke (OEG)	I	2047-02-09T12:27:19.875		13.23	-23.00	133744.89	-19.22		
Encke (IEG)	I	2047-02-09T12:27:36.631		13.28	-22.94	133423.31	-19.16		
A (IER)	I	2047-02-09T12:38:14.242		15.06	-20.68	122050.38	-16.39		
B (OER)	I	2047-02-09T12:43:00.310		15.84	-19.67	117571.16	-14.90		
Saturn	I	2047-02-09T13:05:12.969		19.37	-14.99	59707.16		-38.99	-44.60
Saturn	E	2047-02-09T13:49:01.950		25.60	-5.84	59480.78		-48.39	-53.82
B (OER)	E	2047-02-09T13:50:20.994		25.77	-5.57	117571.16	14.81		
A (IER)	E	2047-02-09T13:55:08.606		26.38	-4.58x	122050.38	16.31		
Encke (IEG)	E	2047-02-09T14:05:49.510		27.68	-2.38x	133423.31	19.06		
Encke (OEG)	E	2047-02-09T14:06:06.353		27.72	-2.33x	133744.88	19.12		
A (OER)	E	2047-02-09T14:08:42.453		28.02	-1.79x	136774.40	19.68		
F ring	E	2047-02-09T14:11:46.817		28.38	-1.17x	140461.00	20.30		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-02-09T13:27:30.300
 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 : 4069858095694490240
 2Mass ID (if available) : 18035240-2222393
 ICRS Star Coord at Epoch: 18h 03m 52.40794s -22:22:39.50017s
 RUWE (>1.4 is poor) : 0.96
 K magnitude : 7.366
 G magnitude : 12.795
 RP magnitude : 11.493
 BP magnitude : 14.771
 DUPflag : 0
 Distance (au) : 10.662
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 29.07
 Sun-Target sep (deg) : 49.16
 Sun-Moon sep (deg) : 145.34
 B (ring opening deg) : 26.43
 PA of pole (deg) : 5.59
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 5.945
 C/A sky separation (km) : 45973.5
 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	2047-02-09T12:21:45.736		18.15	-17.61	140461.00	-20.42		
A (OER)	I	2047-02-09T12:24:48.991		18.64	-16.96	136774.40	-19.81		
Encke (OEG)	I	2047-02-09T12:27:24.125		19.06	-16.40	133744.89	-19.24		
Encke (IEG)	I	2047-02-09T12:27:40.862		19.10	-16.34	133423.31	-19.18		
A (IER)	I	2047-02-09T12:38:17.283		20.77	-14.08	122050.38	-16.44		
B (OER)	I	2047-02-09T12:43:02.401		21.50	-13.07	117571.16	-14.96		
Saturn	I	2047-02-09T13:05:25.363		24.79	-8.33	59709.92		-38.88	-44.48
Saturn	E	2047-02-09T13:49:24.031		30.36	0.83x	59482.21		-48.33	-53.76
B (OER)	E	2047-02-09T13:50:48.085		30.51	1.12x	117571.16	14.88		
A (IER)	E	2047-02-09T13:55:34.616		31.03	2.10x	122050.38	16.36		
Encke (IEG)	E	2047-02-09T14:06:13.992		32.12	4.27x	133423.31	19.09		
Encke (OEG)	E	2047-02-09T14:06:30.806		32.15	4.32x	133744.89	19.16		
A (OER)	E	2047-02-09T14:09:06.654		32.40	4.85x	136774.40	19.71		
F ring	E	2047-02-09T14:12:10.761		32.69	5.47x	140461.00	20.33		