

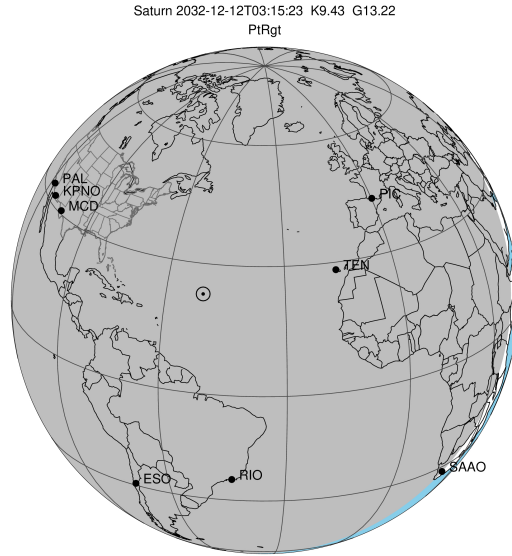
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2032-12-12T03:15:23.130
 Event type : PtRgt
 : Saturn occs: topocentric, not geocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3376843716366371072
 2Mass ID (if available) : 06182775+2223006

Saturn 2032-12-12T03:15:23 K9.43 G13.22 PtRgt

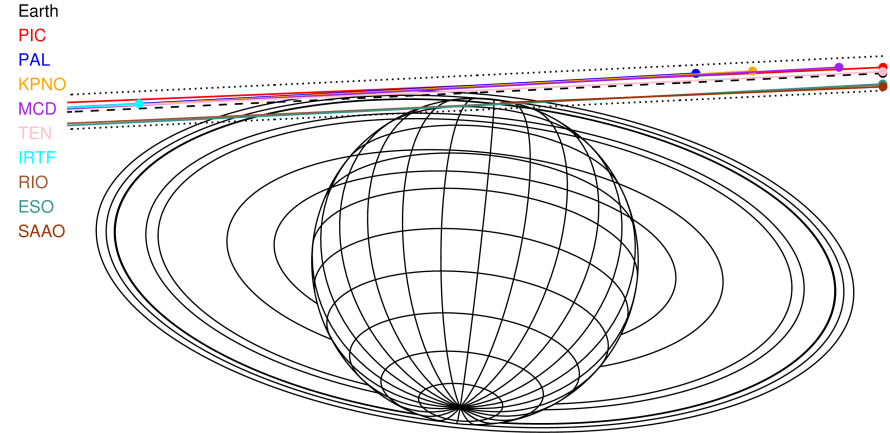
ICRS Star Coord at Epoch: 06h 18m 27.75968s +22:23:00.59034s

RUWE (>1.4 is poor) : 1.11
 K magnitude : 9.427
 G magnitude : 13.219
 RP magnitude : 12.173
 BP magnitude : 14.344
 DUPflag : 0
 Distance (au) : 8.057
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -19.21
 Sun-Target sep (deg) : 165.89
 Sun-Moon sep (deg) : 73.67
 B (ring opening deg) : -26.09
 PA of pole (deg) : -5.86

#	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

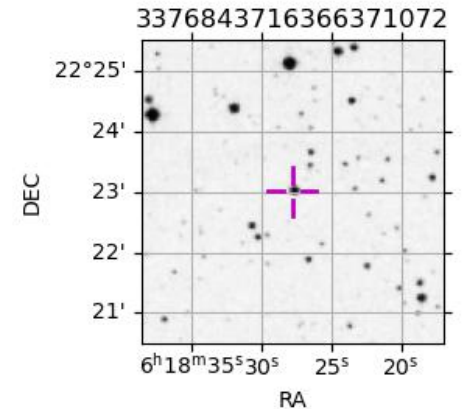


2032-12-12T03:15:23.1300 a: 06 18 27.7597 s: +22 23 00.590 C/A ***** PA 182.71 deg v_sky -19.21 km/s D 08.06 AU
 Credit: Styled after SORA/Lucky Star

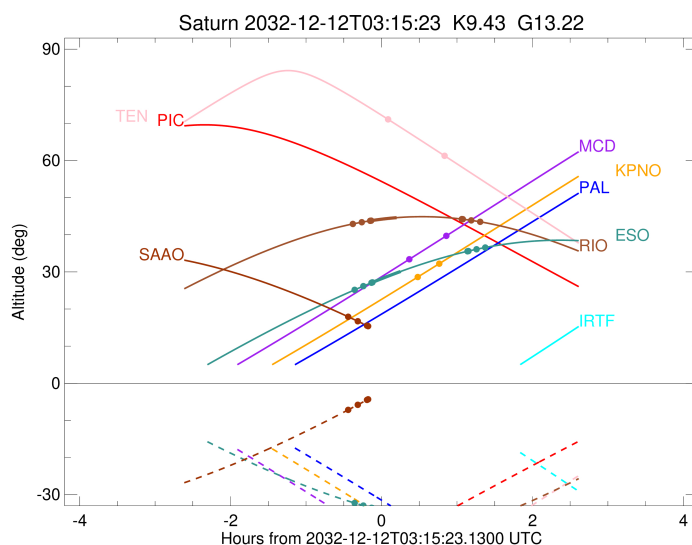
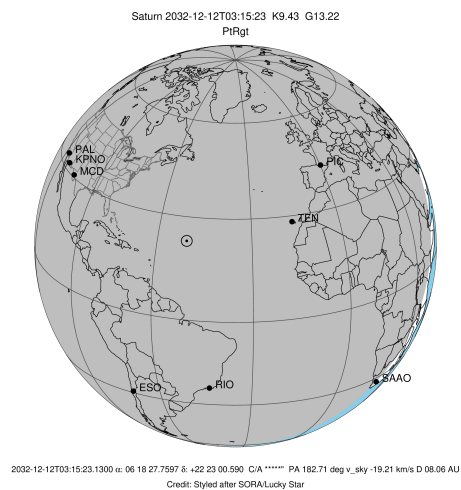


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+		+	DEC 12 03:43 - DEC 12 04:02	PnnRie
MCD	McDonald Obs.	30.7	256.0	+		+	DEC 12 03:36 - DEC 12 04:07	PnnRie
TEN	Teide Obs./Ten	28.3	343.5	+		+	DEC 12 03:20 - DEC 12 04:06	PnnRie
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	+	+	+	DEC 12 02:52 - DEC 12 04:34	PieRie
ESO	European South	-29.3	289.3	+	+	+	DEC 12 02:53 - DEC 12 04:38	PieRie
AAT	Siding Spring	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro	-32.4	20.8	+	+		DEC 12 02:48 - DEC 12 02:56	PnnRin
MSO	Mt. Stromlo Ob	-35.3	149.0					PnnRnn



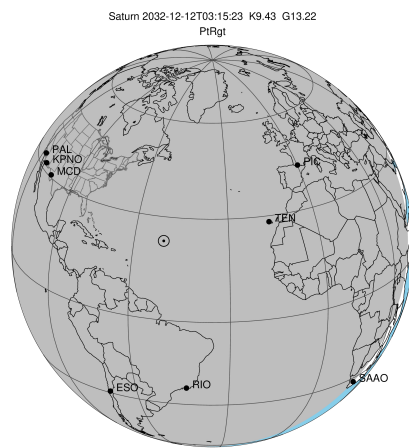
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2032-12-12T03:20:26.580
 Event type : PtRgt
 : Saturn occs: topocentric, not geocentric
 : Ring occs: geocentric, topocentric
 Observer code : KPNO
 Location : Kitt Peak Natl Obs
 Latitude (deg) : 31.96333
 E. Longitude (deg) : 248.40000
 Altitude (km) : 2.120
 Gaia source ID : 3376843716366371072
 2Mass ID (if available) : 06182775+2223006
 ICRS Star Coord at Epoch: 06h 18m 27.75968s +22:23:00.59034s
 RUWE (>1.4 is poor) : 1.11
 K magnitude : 9.427
 G magnitude : 13.219
 RP magnitude : 12.173
 BP magnitude : 14.344
 DUPflag : 0
 Distance (au) : 8.057
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -19.21
 Sun-Target sep (deg) : 165.89
 Sun-Moon sep (deg) : 73.80
 B (ring opening deg) : -26.09
 PA of pole (deg) : -5.86
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 11.052
 C/A sky separation (km) : 64584.0
 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



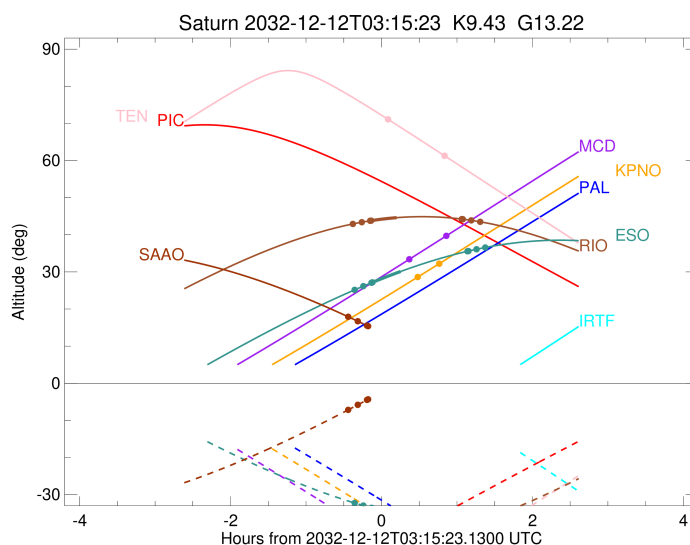
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2032-12-12T03:43:13.337		28.41	-41.58	140461.02	-1.71		
No planet occultations									
F ring	E	2032-12-12T04:02:30.534		32.47	-45.68	140461.04	1.71		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2032-12-12T03:20:15.970
 Event type : PtRgt
 : Saturn occs: topocentric, not geocentric
 : 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 : 3376843716366371072
 2Mass ID (if available) : 06182775+2223006
 ICRS Star Coord at Epoch: 06h 18m 27.75968s +22:23:00.59034s
 RUWE (>1.4 is poor) : 1.11
 K magnitude : 9.427
 G magnitude : 13.219
 RP magnitude : 12.173
 BP magnitude : 14.344
 DUPflag : 0
 Distance (au) : 8.057
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -19.21
 Sun-Target sep (deg) : 165.89
 Sun-Moon sep (deg) : 73.90
 B (ring opening deg) : -26.09
 PA of pole (deg) : -5.86
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 10.989
 C/A sky separation (km) : 64211.6
 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



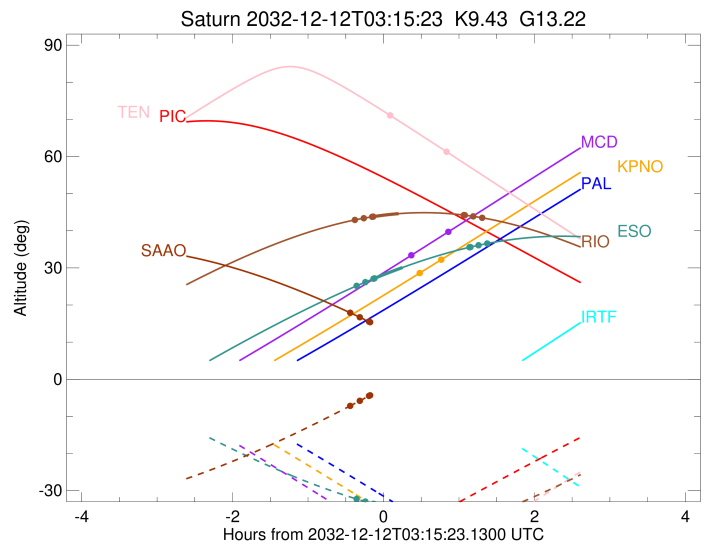
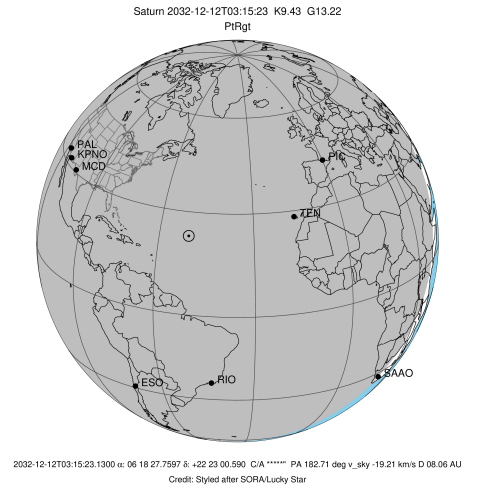
2032-12-12T03:15:23.1300 u: 06 18 27.7597 r: +22 23 00.590 CIA ***** PA 182.71 deg v_sky -19.21 km/s D 08.06 AU
 Credit: Styled after SORA/Lucky Star



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	2032-12-12T03:36:58.446		33.29	-46.66	140461.00	-2.73		
No planet occultations									
F ring	E	2032-12-12T04:07:40.455		39.88	-53.27	140461.00	2.74		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2032-12-12T03:13:42.340
 Event type : PtRgt
 : Saturn occs: topocentric, not geocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 3376843716366371072
 2Mass ID (if available) : 06182775+2223006
 ICRS Star Coord at Epoch: 06h 18m 27.75968s +22:23:00.59034s
 RUWE (>1.4 is poor) : 1.11
 K magnitude : 9.427
 G magnitude : 13.219
 RP magnitude : 12.173
 BP magnitude : 14.344
 DUPflag : 0
 Distance (au) : 8.057
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -19.21
 Sun-Target sep (deg) : 165.89
 Sun-Moon sep (deg) : 74.64
 B (ring opening deg) : -26.09
 PA of pole (deg) : -5.86
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 10.800
 C/A sky separation (km) : 63108.7
 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

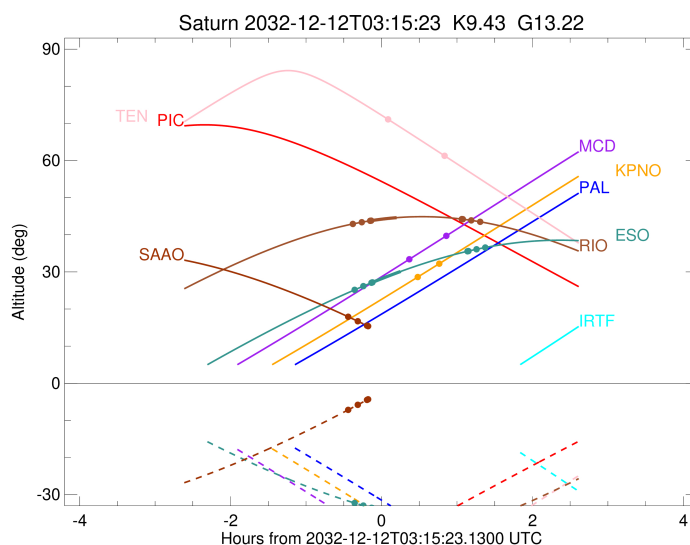
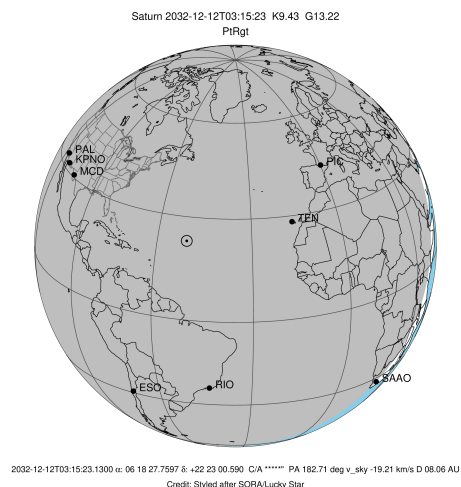


b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2032-12-12T03:20:21.505		71.15	-58.02	140461.00	-4.10		
No planet occultations									
F ring	E	2032-12-12T04:06:02.669		61.17	-47.96	140461.00	4.09		

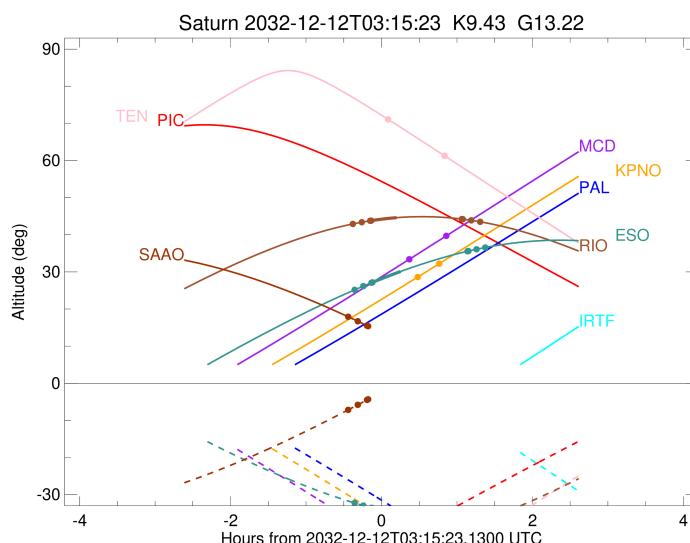
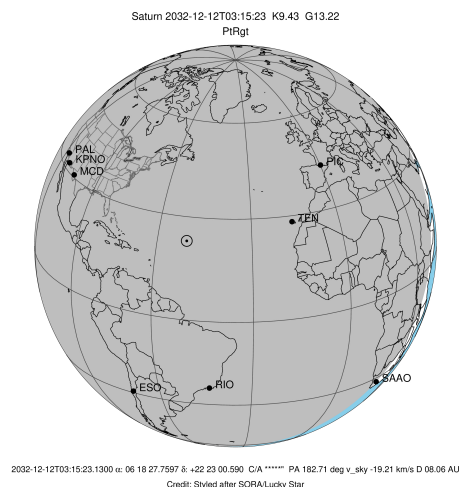
```

target                : Saturn
target radius (km)   : 60268.00
C/A epoch            : 2032-12-12T03:15:53.790
Event type           : PtRgt
: Saturn occs: topocentric, not geocentric
: Ring occs: geocentric, topocentric
Observer code        : RIO
Location             : Rio de Janeiro
Latitude (deg)       : -22.89506
E. Longitude (deg)  : 316.77708
Altitude (km)        : 0.033
Gaia source ID       : 3376843716366371072
2Mass ID (if available) : 06182775+2223006
ICRS Star Coord at Epoch: 06h 18m 27.75968s +22:23:00.59034s
RUWE (>1.4 is poor) : 1.11
K magnitude           : 9.427
G magnitude           : 13.219
RP magnitude          : 12.173
BP magnitude          : 14.344
DUPflag              : 0
Distance (au)         : 8.057
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -19.21
Sun-Target sep (deg) : 165.89
Sun-Moon sep (deg)   : 74.30
B (ring opening deg) : -26.09
PA of pole (deg)     : -5.86
Pole direction: RA (deg): 40.60000
Dec (deg): 83.50000
C/A sky separation (") : 9.881
C/A sky separation (km) : 57741.0
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	2032-12-12T02:52:33.287		42.92	-44.12	140461.00	-9.19		
A (OER)	I	2032-12-12T02:59:39.048		43.38	-44.03	136774.40	-8.12		
Encke (OEG)	I	2032-12-12T03:06:18.620	b	43.76	-43.89	133744.89	-7.04		
Encke (IEG)	I	2032-12-12T03:07:04.750	b	43.80	-43.87	133423.31	-6.91		
Saturn	I	2032-12-12T03:04:54.090		43.69	-43.93	59179.12		63.63	67.72
Saturn	E	2032-12-12T03:27:25.515		44.61	-43.08	59320.76		56.53	61.38
Encke (IEG)	E	2032-12-12T04:19:32.998		44.21	-38.88	133423.31	6.91		
Encke (OEG)	E	2032-12-12T04:20:19.079		44.18	-38.80	133744.89	7.04		
A (OER)	E	2032-12-12T04:26:58.277		43.87	-38.06	136774.40	8.12		
F ring	E	2032-12-12T04:34:03.784		43.48	-37.23	140461.00	9.19		

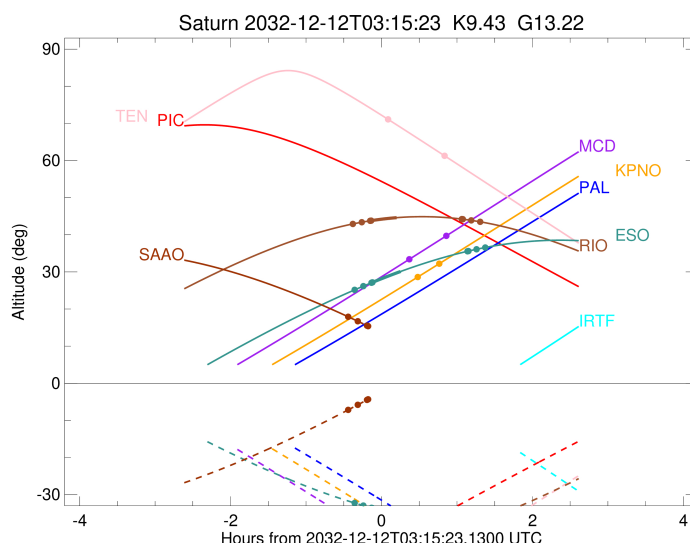
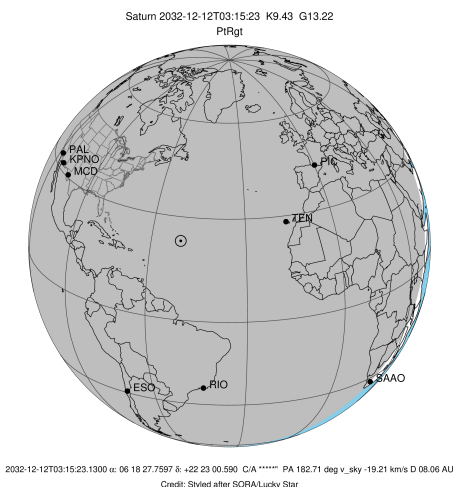
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2032-12-12T03:18:07.660
 Event type : PtRgt
 : Saturn occs: topocentric, not geocentric
 : Ring occs: geocentric, topocentric
 Observer code : ESO
 Location : European Southern Obs. (3.6m)
 Latitude (deg) : -29.26097
 E. Longitude (deg) : 289.26831
 Altitude (km) : 2.400
 Gaia source ID : 3376843716366371072
 2Mass ID (if available) : 06182775+2223006
 ICRS Star Coord at Epoch: 06h 18m 27.75968s +22:23:00.59034s
 RUWE (>1.4 is poor) : 1.11
 K magnitude : 9.427
 G magnitude : 13.219
 RP magnitude : 12.173
 BP magnitude : 14.344
 DUPflag : 0
 Distance (au) : 8.057
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -19.21
 Sun-Target sep (deg) : 165.89
 Sun-Moon sep (deg) : 73.99
 B (ring opening deg) : -26.09
 PA of pole (deg) : -5.86
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 9.842
 C/A sky separation (km) : 57511.6
 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



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	2032-12-12T02:53:58.473		25.15	-32.25	140461.00	-9.37		
A (OER)	I	2032-12-12T03:00:54.377		26.16	-32.94	136774.40	-8.35		
Encke (OEG)	I	2032-12-12T03:07:20.789	b	27.07	-33.55	133744.89	-7.32		
Encke (IEG)	I	2032-12-12T03:08:05.070	b	27.17	-33.62	133423.31	-7.20		
Saturn	I	2032-12-12T03:06:14.046		26.91	-33.45	59181.41		63.51	67.61
Saturn	E	2032-12-12T03:30:33.693		30.11	-35.43	59336.62		55.79	60.71
Encke (IEG)	E	2032-12-12T04:24:02.261		35.58	-37.71	133423.31	7.23		
Encke (OEG)	E	2032-12-12T04:24:46.339		35.63	-37.72	133744.89	7.36		
A (OER)	E	2032-12-12T04:31:10.904		36.11	-37.78	136774.40	8.39		
F ring	E	2032-12-12T04:38:04.707		36.58	-37.80	140461.00	9.42		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2032-12-12T03:11:01.700
 Event type : PtRgt
 : Saturn occs: topocentric, not geocentric
 : 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 : 3376843716366371072
 2Mass ID (if available) : 06182775+2223006
 ICRS Star Coord at Epoch: 06h 18m 27.75968s +22:23:00.59034s
 RUWE (>1.4 is poor) : 1.11
 K magnitude : 9.427
 G magnitude : 13.219
 RP magnitude : 12.173
 BP magnitude : 14.344
 DUPflag : 0
 Distance (au) : 8.057
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -19.21
 Sun-Target sep (deg) : 165.89
 Sun-Moon sep (deg) : 74.09
 B (ring opening deg) : -26.09
 PA of pole (deg) : -5.86
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 9.956
 C/A sky separation (km) : 58180.0
 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



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	2032-12-12T02:48:50.276		17.92	-7.18	140461.00	-8.63		
A (OER)	I	2032-12-12T02:56:27.415		16.72	-5.82	136774.40	-7.48		
Encke (OEG)	I	2032-12-12T03:03:46.499	b	15.54	-4.50x	133744.89	-6.30		
Encke (IEG)	I	2032-12-12T03:04:38.110	b	15.40	-4.34x	133423.31	-6.16		
Saturn	I	2032-12-12T03:01:45.981		15.87	-4.86x	59175.48		63.83	67.89
Saturn	E	2032-12-12T03:20:49.095		12.71	-1.37x	59289.61		58.01	62.72
Encke (IEG)	E	2032-12-12T04:11:32.331		3.71x	8.32x	133423.31	6.14		
Encke (OEG)	E	2032-12-12T04:12:24.140		3.55x	8.49x	133744.89	6.28		
A (OER)	E	2032-12-12T04:19:45.222		2.18x	9.94x	136774.40	7.45		
F ring	E	2032-12-12T04:27:25.091		0.74x	11.45x	140461.00	8.57		