

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2030-08-03T07:16:30.770
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 48224275053110272
 2Mass ID (if available) : 04195307+1931042

Saturn 2030-08-03T07:16:30 K5.51 G9.22 PgtRgt

ICRS Star Coord at Epoch: 04h 19m 53.06614s +19:31:03.90033s

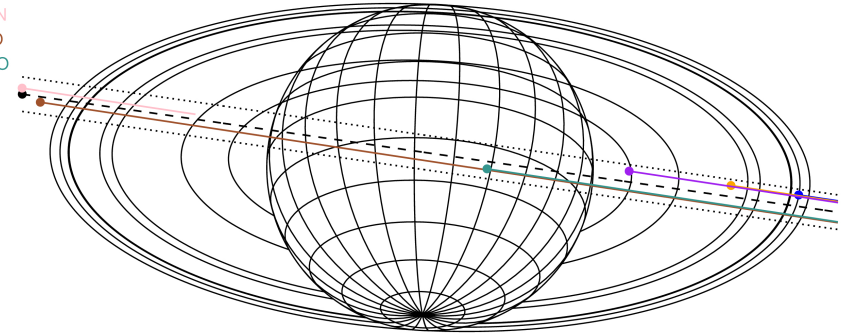
RUWE (>1.4 is poor) : 1.05
 K magnitude : 5.508
 G magnitude : 9.224
 RP magnitude : 8.203
 BP magnitude : 10.312
 DUPflag : 0
 Distance (au) : 9.482
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 22.68
 Sun-Target sep (deg) : 64.13
 Sun-Moon sep (deg) : 110.35
 B (ring opening deg) : -25.41
 PA of pole (deg) : -2.97

#	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



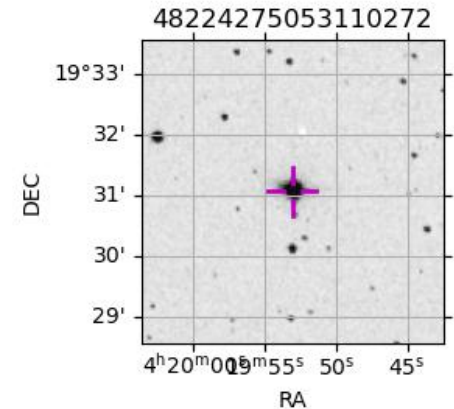
2030-08-03T07:16:30.7700 ex: 04 19 53.0661 8: +19 31 03.9000 C/A 0.759° PA 171.77 deg v_sky +22.68 km/s D 09.48 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PAL
 KPNO
 MCD
 TEN
 RIO
 ESO

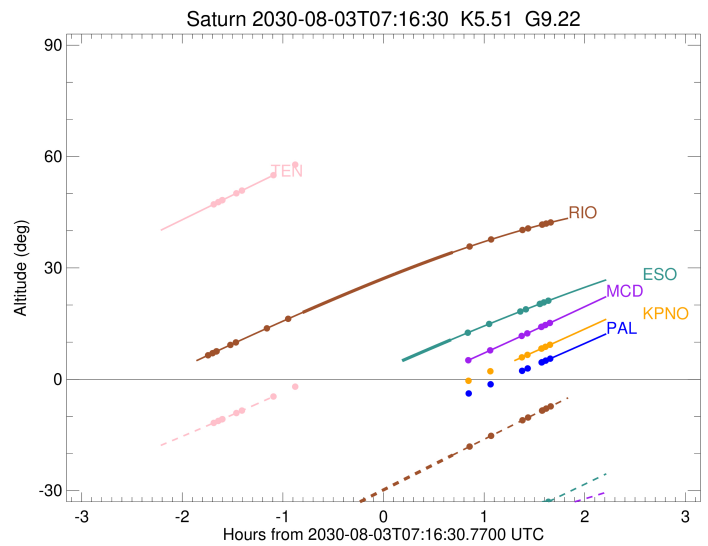
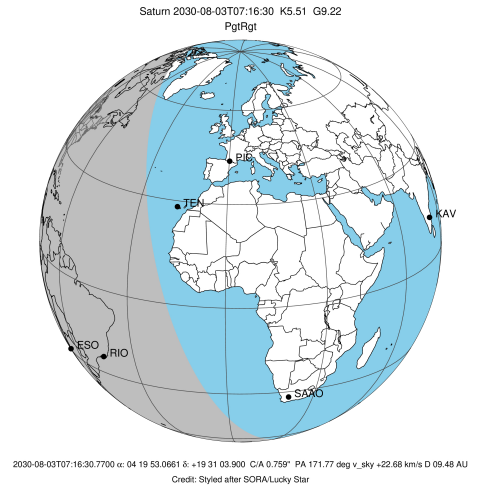


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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			+	AUG 03 08:53 - AUG 03 08:55	PnnRne
PMO	Purple Mtn Obs	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl	32.0	248.4			+	AUG 03 08:39 - AUG 03 08:55	PnnRne
MCD	McDonald Obs.	30.7	256.0			+	AUG 03 08:07 - AUG 03 08:55	PnnRne
TEN	Teide Obs./Ten	28.3	343.5	+		+	AUG 03 05:35 - AUG 03 05:52	PnnRin
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	+	+	+	AUG 03 05:31 - AUG 03 08:56	PieRie
ESO	European South	-29.3	289.3		+	+	AUG 03 07:56 - AUG 03 08:54	PneRne
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



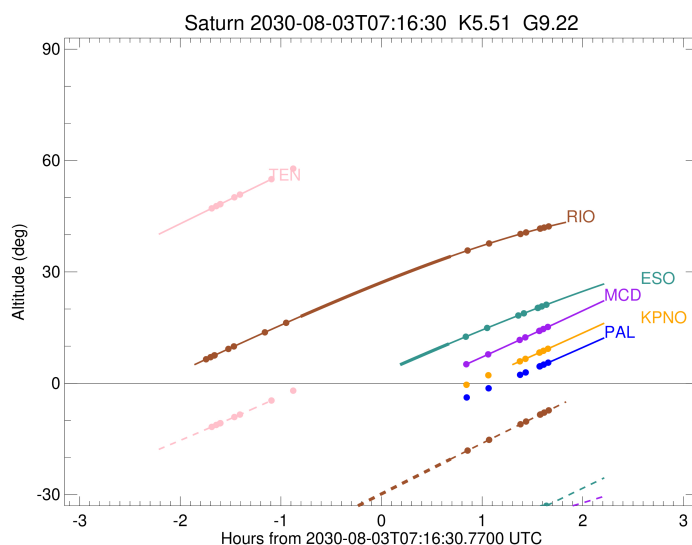
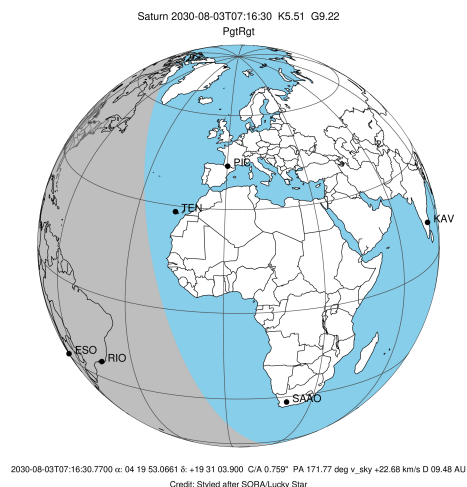
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2030-08-03T07:13:40.910
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 48224275053110272
 2Mass ID (if available) : 04195307+1931042
 ICRS Star Coord at Epoch: 04h 19m 53.06614s +19:31:03.90033s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 5.508
 G magnitude : 9.224
 RP magnitude : 8.203
 BP magnitude : 10.312
 DUPflag : 0
 Distance (au) : 9.482
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 22.68
 Sun-Target sep (deg) : 64.13
 Sun-Moon sep (deg) : 109.92
 B (ring opening deg) : -25.41
 PA of pole (deg) : -2.97
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.462
 C/A sky separation (km) : 10055.7
 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_itr93_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	2030-08-03T05:37:59.584	-28.01x	-29.87	140461.00	-23.15			
A (OER)	I	2030-08-03T05:40:38.924	-27.68x	-30.21	136774.40	-23.13			
Encke (OEG)	I	2030-08-03T05:42:49.971	-27.40x	-30.49	133744.89	-23.11			
Encke (IEG)	I	2030-08-03T05:43:03.887	-27.37x	-30.52	133423.31	-23.11			
A (IER)	I	2030-08-03T05:51:16.875	-26.29x	-31.52	122050.38	-23.03			
B (OER)	I	2030-08-03T05:54:31.534	-25.85x	-31.91	117571.17	-22.99			
B (IER)	I	2030-08-03T06:13:11.189	-23.21x	-33.96	91984.69	-22.68			
C (IER)	I	2030-08-03T06:26:09.185	-21.27x	-35.21	74490.58	-22.25			
Saturn	I	2030-08-03T06:30:33.026	-20.60x	-35.60	60195.91			13.59	16.52
Saturn	E	2030-08-03T07:57:00.033	-5.75x	-39.37	60262.55			3.70	4.54
C (IER)	E	2030-08-03T08:07:17.568	-3.83x	-39.27	74490.58	22.11			
B (IER)	E	2030-08-03T08:20:21.188	-1.36x	-38.98	91984.69	22.49			
B (OER)	E	2030-08-03T08:39:11.325	2.27x	-38.23	117571.16	22.75			
A (IER)	E	2030-08-03T08:42:28.084	2.91x	-38.06	122050.38	22.78			
Encke (IEG)	E	2030-08-03T08:50:46.751	4.54x	-37.58	133423.31	22.83			
Encke (OEG)	E	2030-08-03T08:51:00.835	4.58x	-37.56	133744.89	22.83			
A (OER)	E	2030-08-03T08:53:13.482	5.02	-37.42	136774.40	22.84			
F ring	E	2030-08-03T08:55:54.816	5.55	-37.25	140461.00	22.86			

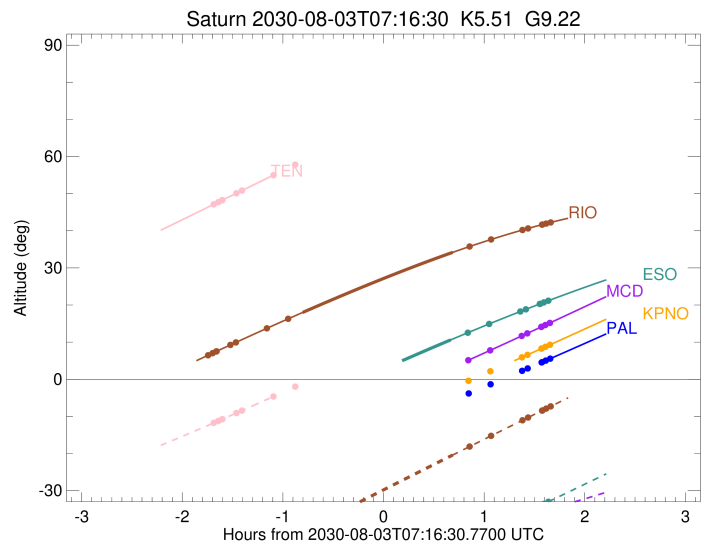
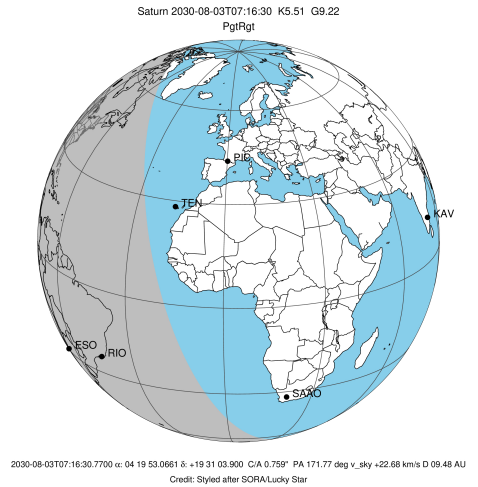
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2030-08-03T07:13:25.930
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KPNO
 Location : Kitt Peak Natl Obs
 Latitude (deg) : 31.96333
 E. Longitude (deg) : 248.40000
 Altitude (km) : 2.120
 Gaia source ID : 48224275053110272
 2Mass ID (if available) : 04195307+1931042
 ICRS Star Coord at Epoch: 04h 19m 53.06614s +19:31:03.90033s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 5.508
 G magnitude : 9.224
 RP magnitude : 8.203
 BP magnitude : 10.312
 DUPflag : 0
 Distance (au) : 9.482
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 22.68
 Sun-Target sep (deg) : 64.13
 Sun-Moon sep (deg) : 109.95
 B (ring opening deg) : -25.41
 PA of pole (deg) : -2.97
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.432
 C/A sky separation (km) : 9850.7
 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_itr93_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	2030-08-03T05:37:34.727	-26.33x	-33.54	140461.00	-23.15			
A (OER)	I	2030-08-03T05:40:14.037	-25.96x	-33.85	136774.40	-23.13			
Encke (OEG)	I	2030-08-03T05:42:25.058	-25.64x	-34.10	133744.89	-23.11			
Encke (IEG)	I	2030-08-03T05:42:38.972	-25.61x	-34.12	133423.31	-23.11			
A (IER)	I	2030-08-03T05:50:51.840	-24.40x	-35.03	122050.38	-23.04			
B (OER)	I	2030-08-03T05:54:06.439	-23.92x	-35.37	117571.16	-23.00			
B (IER)	I	2030-08-03T06:12:45.522	-21.02x	-37.15	91984.69	-22.69			
C (IER)	I	2030-08-03T06:25:42.678	-18.91x	-38.20	74490.58	-22.29			
Saturn	I	2030-08-03T06:30:13.763	-18.16x	-38.52	60197.46			13.44	16.34
Saturn	E	2030-08-03T07:56:49.831	-2.42x	-40.42	60263.13			3.50	4.30
C (IER)	E	2030-08-03T08:07:09.744	-0.41x	-40.07	74490.58	22.14			
B (IER)	E	2030-08-03T08:20:12.968	2.15x	-39.46	91984.69	22.50			
B (OER)	E	2030-08-03T08:39:03.344	5.91	-38.26	117571.16	22.74			
A (IER)	E	2030-08-03T08:42:20.204	6.57	-38.01	122050.38	22.77			
Encke (IEG)	E	2030-08-03T08:50:39.185	8.25	-37.34	133423.31	22.82			
Encke (OEG)	E	2030-08-03T08:50:53.279	8.30	-37.32	133744.89	22.82			
A (OER)	E	2030-08-03T08:53:06.022	8.75	-37.13	136774.40	22.83			
F ring	E	2030-08-03T08:55:47.478	9.29	-36.89	140461.00	22.84			

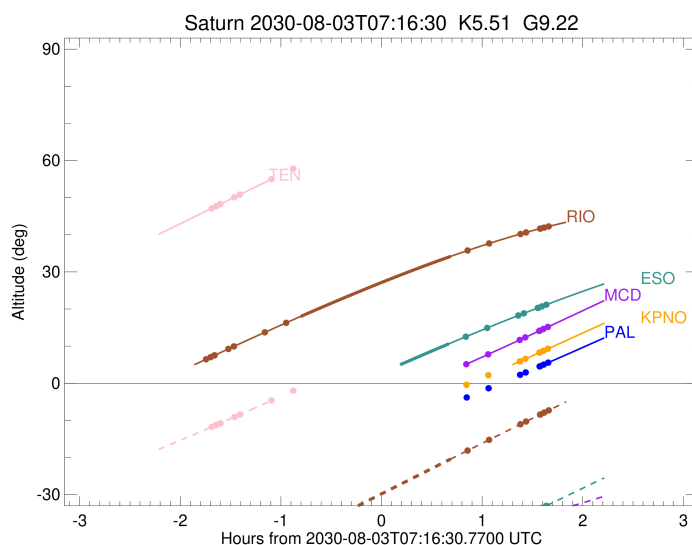
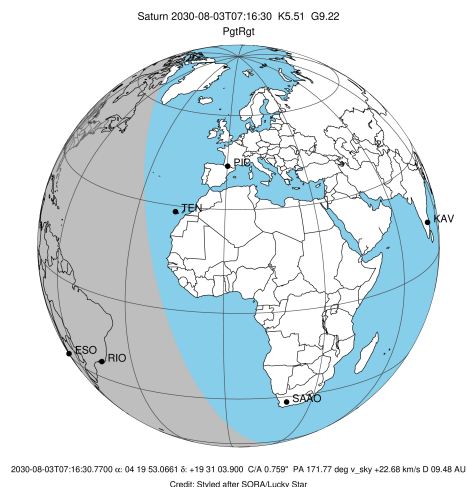
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2030-08-03T07:13:08.980
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MCD
 Location : McDonald Obs. 2.7m
 Latitude (deg) : 30.67158
 E. Longitude (deg) : 255.97844
 Altitude (km) : 2.075
 Gaia source ID : 48224275053110272
 2Mass ID (if available) : 04195307+1931042
 ICRS Star Coord at Epoch: 04h 19m 53.06614s +19:31:03.90033s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 5.508
 G magnitude : 9.224
 RP magnitude : 8.203
 BP magnitude : 10.312
 DUPflag : 0
 Distance (au) : 9.482
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 22.68
 Sun-Target sep (deg) : 64.13
 Sun-Moon sep (deg) : 110.01
 B (ring opening deg) : -25.41
 PA of pole (deg) : -2.97
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.393
 C/A sky separation (km) : 9576.6
 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_itr93_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	2030-08-03T05:37:02.363	-22.75x	-37.82	140461.00	-23.15			
A (OER)	I	2030-08-03T05:39:41.699	-22.32x	-38.07	136774.40	-23.13			
Encke (OEG)	I	2030-08-03T05:41:52.738	-21.97x	-38.27	133744.89	-23.11			
Encke (IEG)	I	2030-08-03T05:42:06.654	-21.93x	-38.29	133423.31	-23.11			
A (IER)	I	2030-08-03T05:50:19.564	-20.58x	-38.99	122050.38	-23.03			
B (OER)	I	2030-08-03T05:53:34.164	-20.04x	-39.25	117571.16	-23.00			
B (IER)	I	2030-08-03T06:12:12.959	-16.84x	-40.54	91984.69	-22.71			
C (IER)	I	2030-08-03T06:25:09.344	-14.54x	-41.21	74490.58	-22.32			
Saturn	I	2030-08-03T06:29:50.125	-13.70x	-41.40	60199.52			13.24	16.10
Saturn	E	2030-08-03T07:56:40.163	3.02x	-40.30	60263.85			3.23	3.96
C (IER)	E	2030-08-03T08:07:03.204	5.12	-39.59	74490.58	22.15			
B (IER)	E	2030-08-03T08:20:06.210	7.79	-38.53	91984.69	22.49			
B (OER)	E	2030-08-03T08:38:57.299	11.68	-36.72	117571.16	22.72			
A (IER)	E	2030-08-03T08:42:14.360	12.36	-36.37	122050.38	22.74			
Encke (IEG)	E	2030-08-03T08:50:33.921	14.09	-35.44	133423.31	22.79			
Encke (OEG)	E	2030-08-03T08:50:48.033	14.14	-35.42	133744.89	22.79			
A (OER)	E	2030-08-03T08:53:00.945	14.61	-35.16	136774.40	22.80			
F ring	E	2030-08-03T08:55:42.615	15.17	-34.84	140461.00	22.81			

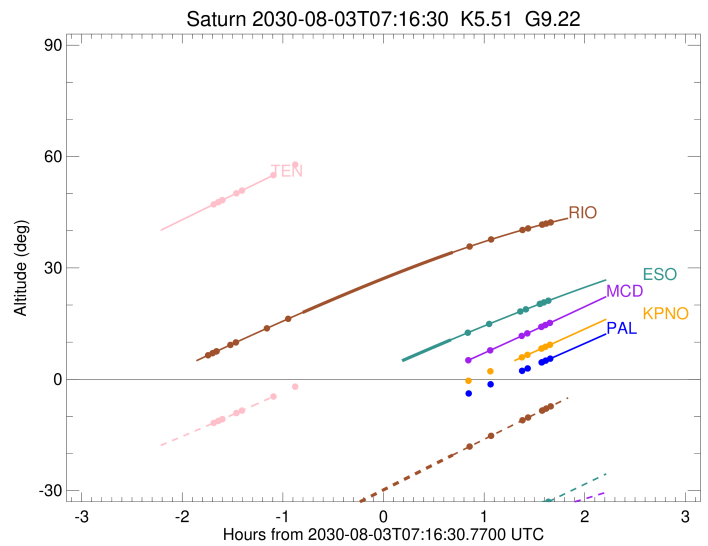
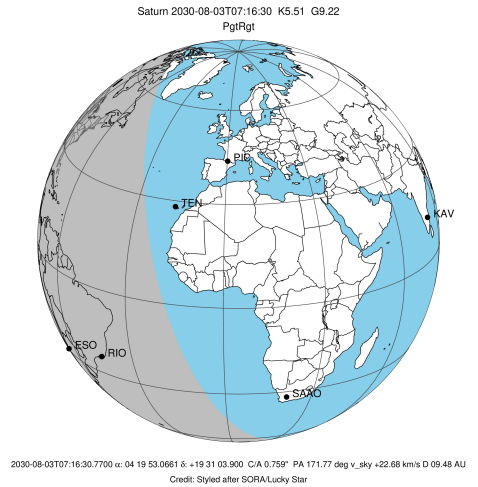
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2030-08-03T07:15:09.990
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 48224275053110272
 2Mass ID (if available) : 04195307+1931042
 ICRS Star Coord at Epoch: 04h 19m 53.06614s +19:31:03.90033s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 5.508
 G magnitude : 9.224
 RP magnitude : 8.203
 BP magnitude : 10.312
 DUPflag : 0
 Distance (au) : 9.482
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 22.68
 Sun-Target sep (deg) : 64.13
 Sun-Moon sep (deg) : 111.08
 B (ring opening deg) : -25.41
 PA of pole (deg) : -2.97
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.957
 C/A sky separation (km) : 6579.4
 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

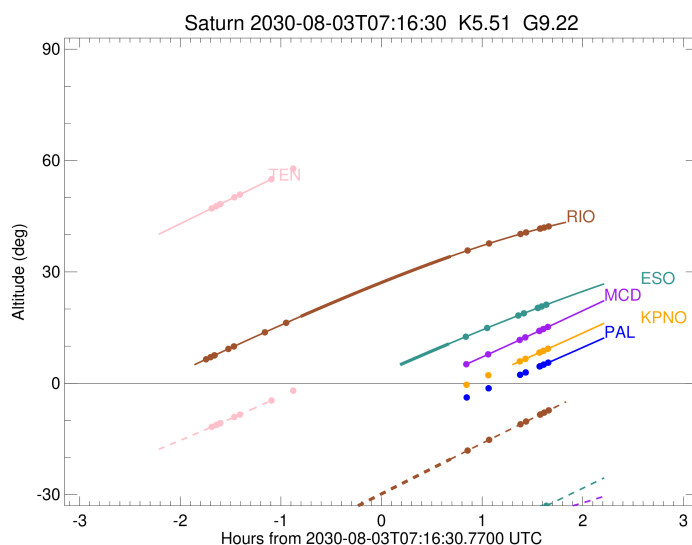
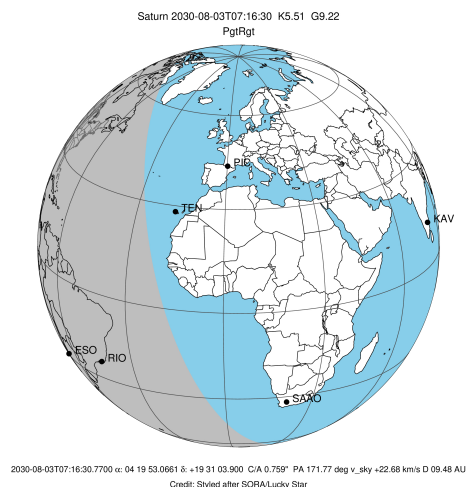
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2030-08-03T05:35:16.244		47.12	-11.76	140461.00	-22.79		
A (OER)	I	2030-08-03T05:37:58.077		47.71	-11.23	136774.40	-22.77		
Encke (OEG)	I	2030-08-03T05:40:11.131		48.20	-10.79	133744.89	-22.76		
Encke (IEG)	I	2030-08-03T05:40:25.258		48.25	-10.75	133423.31	-22.76		
A (IER)	I	2030-08-03T05:48:45.355		50.10	-9.10	122050.38	-22.72		
B (OER)	I	2030-08-03T05:52:02.596		50.82	-8.44	117571.16	-22.70		
B (IER)	I	2030-08-03T06:10:53.252		54.97	-4.65x	91984.69	-22.55		
C (IER)	I	2030-08-03T06:23:52.157		57.82	-1.99x	74490.58	-22.36		
Saturn	I	2030-08-03T06:30:29.870		59.27	-0.62x	60223.06		10.69	13.05
Saturn	E	2030-08-03T07:59:57.666		77.51	18.38x	60267.82		0.68	0.83
C (IER)	E	2030-08-03T08:10:37.308		79.16	20.69x	74490.58	22.23		
B (IER)	E	2030-08-03T08:23:41.106		80.70	23.54x	91984.69	22.39		
B (OER)	E	2030-08-03T08:42:40.812		81.43	27.70x	117571.16	22.50		
A (IER)	E	2030-08-03T08:45:59.861		81.34	28.42x	122050.38	22.51		
Encke (IEG)	E	2030-08-03T08:54:24.843		80.82	30.27x	133423.31	22.53		
Encke (OEG)	E	2030-08-03T08:54:39.114		80.80	30.32x	133744.89	22.53		
A (OER)	E	2030-08-03T08:56:53.542		80.60	30.82x	136774.40	22.54		
F ring	E	2030-08-03T08:59:37.087		80.32	31.42x	140461.00	22.54		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2030-08-03T07:12:56.810
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : 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 : 48224275053110272
 2Mass ID (if available) : 04195307+1931042
 ICRS Star Coord at Epoch: 04h 19m 53.06614s +19:31:03.90033s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 5.508
 G magnitude : 9.224
 RP magnitude : 8.203
 BP magnitude : 10.312
 DUPflag : 0
 Distance (au) : 9.482
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 22.68
 Sun-Target sep (deg) : 64.13
 Sun-Moon sep (deg) : 110.52
 B (ring opening deg) : -25.41
 PA of pole (deg) : -2.97
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.328
 C/A sky separation (km) : 2254.2
 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_itr93_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	2030-08-03T05:31:53.769		6.46	-53.85	140461.00	-23.08		
A (OER)	I	2030-08-03T05:34:33.541		7.02	-53.24	136774.40	-23.07		
Encke (OEG)	I	2030-08-03T05:36:44.872		7.48	-52.74	133744.89	-23.07		
Encke (IEG)	I	2030-08-03T05:36:58.814		7.53	-52.68	133423.31	-23.06		
A (IER)	I	2030-08-03T05:45:12.132		9.25	-50.79	122050.38	-23.04		
B (OER)	I	2030-08-03T05:48:26.553		9.92	-50.04	117571.16	-23.03		
B (IER)	I	2030-08-03T06:06:58.643		13.72	-45.77	91984.69	-22.98		
C (IER)	I	2030-08-03T06:19:40.737		16.28	-42.84	74490.58	-22.93		
Saturn	I	2030-08-03T06:28:15.812		17.99	-40.86	60248.29		7.05	8.64
Saturn	E	2030-08-03T07:57:47.938		34.19	-20.41	60264.03		-3.16	-3.88
C (IER)	E	2030-08-03T08:07:50.457		35.76	-18.14	74490.58	22.73		
B (IER)	E	2030-08-03T08:20:40.056		37.66	-15.25	91984.69	22.73		
B (OER)	E	2030-08-03T08:39:25.904		40.22	-11.04	117571.16	22.72		
A (IER)	E	2030-08-03T08:42:43.066		40.64	-10.31	122050.38	22.72		
Encke (IEG)	E	2030-08-03T08:51:03.785		41.65	-8.45	133423.31	22.71		
Encke (OEG)	E	2030-08-03T08:51:17.945		41.68	-8.40	133744.89	22.71		
A (OER)	E	2030-08-03T08:53:31.357		41.94	-7.90	136774.40	22.71		
F ring	E	2030-08-03T08:56:13.722		42.25	-7.30	140461.00	22.70		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2030-08-03T07:12:14.550
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : 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 : 48224275053110272
 2Mass ID (if available) : 04195307+1931042
 ICRS Star Coord at Epoch: 04h 19m 53.06614s +19:31:03.90033s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 5.508
 G magnitude : 9.224
 RP magnitude : 8.203
 BP magnitude : 10.312
 DUPflag : 0
 Distance (au) : 9.482
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 22.68
 Sun-Target sep (deg) : 64.13
 Sun-Moon sep (deg) : 110.10
 B (ring opening deg) : -25.41
 PA of pole (deg) : -2.97
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.386
 C/A sky separation (km) : 2655.0
 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_itr93_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	2030-08-03T05:32:10.148	-18.88x	-74.77	140461.00	-23.26			
A (OER)	I	2030-08-03T05:34:48.696	-18.32x	-74.37	136774.40	-23.25			
Encke (OEG)	I	2030-08-03T05:36:59.018	-17.85x	-74.04	133744.89	-23.24			
Encke (IEG)	I	2030-08-03T05:37:12.853	-17.81x	-74.00	133423.31	-23.24			
A (IER)	I	2030-08-03T05:45:22.374	-16.07x	-72.66	122050.38	-23.22			
B (OER)	I	2030-08-03T05:48:35.296	-15.38x	-72.11	117571.16	-23.21			
B (IER)	I	2030-08-03T06:06:58.857	-11.50x	-68.73	91984.69	-23.15			
C (IER)	I	2030-08-03T06:19:35.250	-8.85x	-66.27	74490.58	-23.10			
Saturn	I	2030-08-03T06:27:57.219	-7.11x	-64.59	60246.46			7.37	9.03
Saturn	E	2030-08-03T07:56:43.338	10.64	-45.69	60264.82			-2.82	-3.47
C (IER)	E	2030-08-03T08:06:46.122	12.53	-43.50	74490.58	22.88			
B (IER)	E	2030-08-03T08:19:30.425	14.90	-40.71	91984.69	22.89			
B (OER)	E	2030-08-03T08:38:08.500	18.26	-36.64	117571.16	22.88			
A (IER)	E	2030-08-03T08:41:24.317	18.84	-35.93	122050.38	22.87			
Encke (IEG)	E	2030-08-03T08:49:41.653	20.28	-34.12	133423.31	22.86			
Encke (OEG)	E	2030-08-03T08:49:55.718	20.32	-34.07	133744.89	22.86			
A (OER)	E	2030-08-03T08:52:08.239	20.70	-33.59	136774.40	22.86			
F ring	E	2030-08-03T08:54:49.525	21.16	-33.00	140461.00	22.86			