

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-09-22T21:03:17.600
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 4068924713406728704
 2Mass ID (if available) : 17495721-2233413

Saturn 2047-09-22T21:03:17 K9.95 G14.98 PgtRgt

ICRS Star Coord at Epoch: 17h 49m 57.18756s -22:33:41.36248s

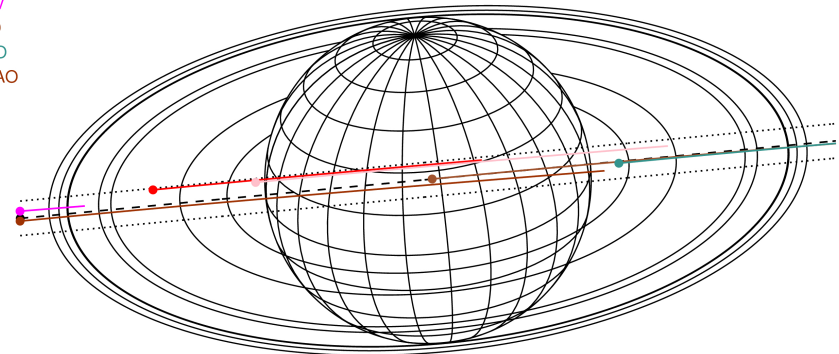
RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.946
 G magnitude : 14.982
 RP magnitude : 13.699
 BP magnitude : 16.684
 DUPflag : 0
 Distance (au) : 10.021
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 10.35
 Sun-Target sep (deg) : 88.55
 Sun-Moon sep (deg) : 45.67
 B (ring opening deg) : 26.91
 PA of pole (deg) : 5.32

#	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



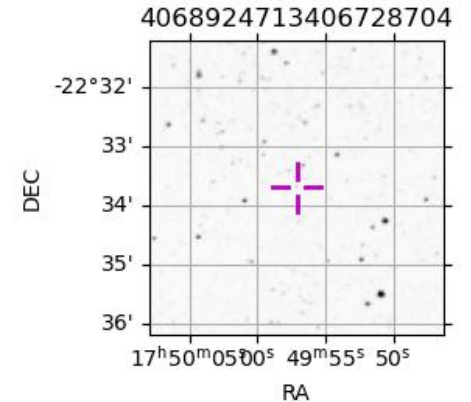
2047-09-22T21:03:17.6000 α: 17 49 57.1876 δ: -22 33 41.362 C/A 0.052° PA 185.41 deg v_sky +10.35 km/s D 10.02 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PIC
 TEN
 KAV
 RIO
 ESO
 SAAO

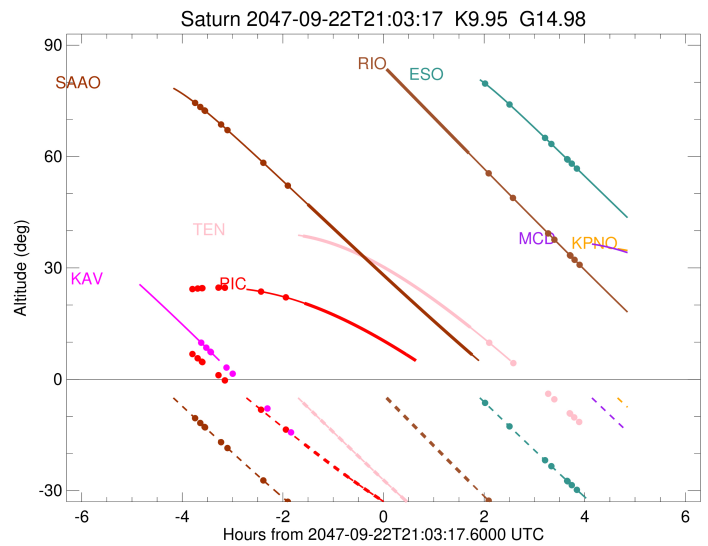
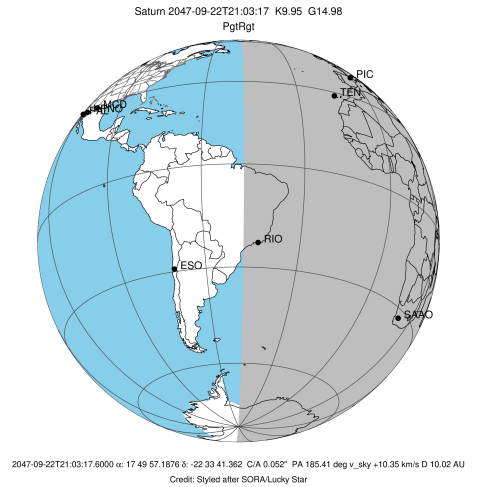


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEncode
PIC	Pic du Midi	42.9	0.1	+	+		SEP 22 18:37 - SEP 22 19:29	PinRin
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		+		SEP 22 19:27 - SEP 22 23:09	PieRne
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observ	12.6	78.8	+	+		SEP 22 17:25 - SEP 22 17:37	PnnRin
RIO	Rio de Janeiro	-22.9	316.8			+	SEP 22 22:45 - SEP 23 00:57	PneRne
ESO	European South	-29.3	289.3			+	SEP 22 23:04 - SEP 23 00:53	PnnRne
AAT	Siding Spring	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro	-32.4	20.8	+	+		SEP 22 17:18 - SEP 22 22:49	PieRin
MSO	Mt. Stromlo Ob	-35.3	149.0					PnnRnn

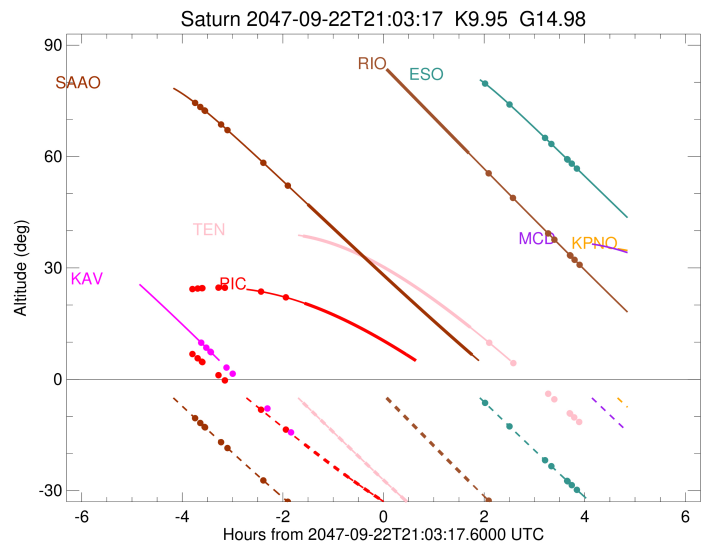
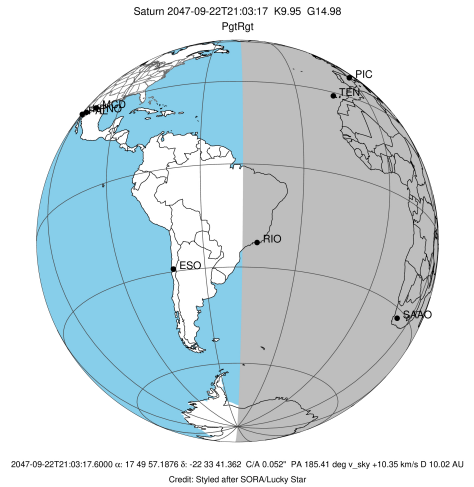


target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-09-22T21:08:26.130
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 4068924713406728704
 2Mass ID (if available) : 17495721-2233413
 ICRS Star Coord at Epoch: 17h 49m 57.18756s -22:33:41.36248s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.946
 G magnitude : 14.982
 RP magnitude : 13.699
 BP magnitude : 16.684
 DUPflag : 0
 Distance (au) : 10.021
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 10.35
 Sun-Target sep (deg) : 88.55
 Sun-Moon sep (deg) : 46.25
 B (ring opening deg) : 26.91
 PA of pole (deg) : 5.32
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.799
 C/A sky separation (km) : 5806.3
 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



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-09-22T17:15:28.072		24.30	6.79x	140461.00	-9.88		
A (OER)	I	2047-09-22T17:21:41.154		24.44	5.65x	136774.40	-9.88		
Encke (OEG)	I	2047-09-22T17:26:47.786		24.53	4.71x	133744.89	-9.88		
Encke (IEG)	I	2047-09-22T17:27:20.336		24.54	4.61x	133423.31	-9.88		
A (IER)	I	2047-09-22T17:46:31.818		24.68	1.09x	122050.38	-9.87		
B (OER)	I	2047-09-22T17:54:05.483		24.66	-0.30x	117571.16	-9.87		
B (IER)	I	2047-09-22T18:37:19.172		23.62	-8.22	91984.69	-9.85		
C (IER)	I	2047-09-22T19:06:56.817		22.06	-13.57	74490.58	-9.82		
Saturn	I	2047-09-22T19:29:07.139		20.48	-17.51	60256.20		5.09	6.24
Saturn	E	2047-09-22T22:46:21.252		-5.06x	-44.74	60258.62		4.54	5.57
C (IER)	E	2047-09-22T23:08:14.942		-8.72x	-46.10	74490.58	10.17		
B (IER)	E	2047-09-22T23:36:45.746		-13.64x	-47.08	91984.69	10.28		
B (OER)	E	2047-09-23T00:18:00.654		-20.96x	-46.83	117571.16	10.39		
A (IER)	E	2047-09-23T00:25:11.185		-22.26x	-46.58	122050.38	10.41		
Encke (IEG)	E	2047-09-23T00:43:21.091		-25.56x	-45.70	133423.31	10.46		
Encke (OEG)	E	2047-09-23T00:43:51.843		-25.65x	-45.67	133744.89	10.46		
A (OER)	E	2047-09-23T00:48:41.391		-26.53x	-45.38	136774.40	10.47		
F ring	E	2047-09-23T00:54:33.333		-27.61x	-44.98	140461.00	10.48		

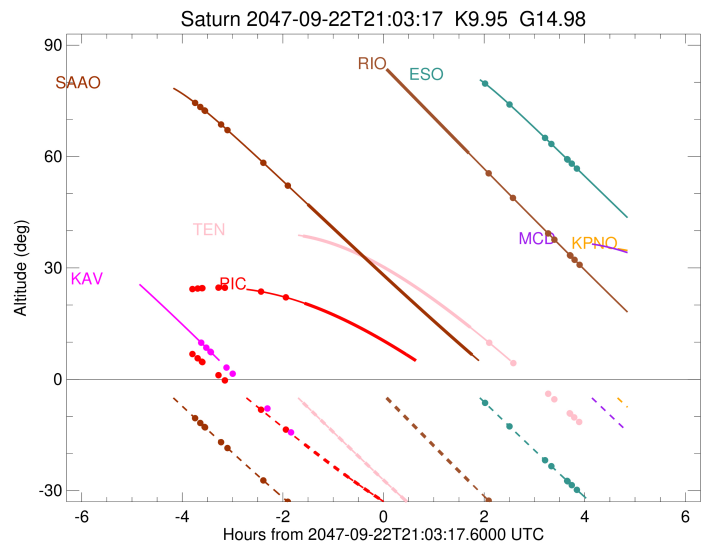
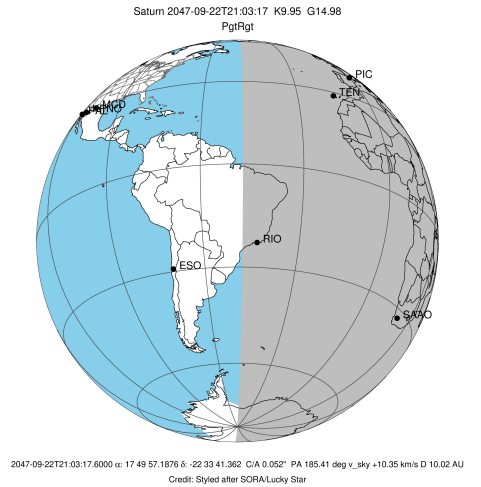
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-09-22T21:07:42.630
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 4068924713406728704
 2Mass ID (if available) : 17495721-2233413
 ICRS Star Coord at Epoch: 17h 49m 57.18756s -22:33:41.36248s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.946
 G magnitude : 14.982
 RP magnitude : 13.699
 BP magnitude : 16.684
 DUPflag : 0
 Distance (au) : 10.021
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 10.35
 Sun-Target sep (deg) : 88.55
 Sun-Moon sep (deg) : 46.42
 B (ring opening deg) : 26.91
 PA of pole (deg) : 5.32
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.716
 C/A sky separation (km) : 5202.1
 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	2047-09-22T17:12:25.396		33.82	23.27x	140461.00	-9.86		
A (OER)	I	2047-09-22T17:18:39.284		34.45	21.93x	136774.40	-9.86		
Encke (OEG)	I	2047-09-22T17:23:46.669		34.95	20.82x	133744.89	-9.85		
Encke (IEG)	I	2047-09-22T17:24:19.304		35.00	20.71x	133423.31	-9.85		
A (IER)	I	2047-09-22T17:43:34.350		36.63	16.53x	122050.38	-9.84		
B (OER)	I	2047-09-22T17:51:09.710		37.17	14.87x	117571.16	-9.83		
B (IER)	I	2047-09-22T18:34:35.773		39.11	5.33x	91984.69	-9.80		
C (IER)	I	2047-09-22T19:04:23.650		39.21	-1.24x	74490.58	-9.77		
Saturn	I	2047-09-22T19:27:10.871		38.60	-6.27	60259.16		4.40	5.41
Saturn	E	2047-09-22T22:46:57.547		13.95	-47.75	60260.38		4.09	5.02
C (IER)	E	2047-09-22T23:09:19.507		9.85	-51.57	74490.58	10.07		
B (IER)	E	2047-09-22T23:38:06.885		4.36x	-55.89	91984.69	10.18		
B (OER)	E	2047-09-23T00:19:45.878		-3.92x	-60.36	117571.16	10.30		
A (IER)	E	2047-09-23T00:27:00.448		-5.39x	-60.85	122050.38	10.32		
Encke (IEG)	E	2047-09-23T00:45:20.251		-9.15x	-61.67	133423.31	10.36		
Encke (OEG)	E	2047-09-23T00:45:51.276		-9.26x	-61.69	133744.89	10.37		
A (OER)	E	2047-09-23T00:50:43.358		-10.27x	-61.79	136774.40	10.38		
F ring	E	2047-09-23T00:56:38.326		-11.50x	-61.85	140461.00	10.39		

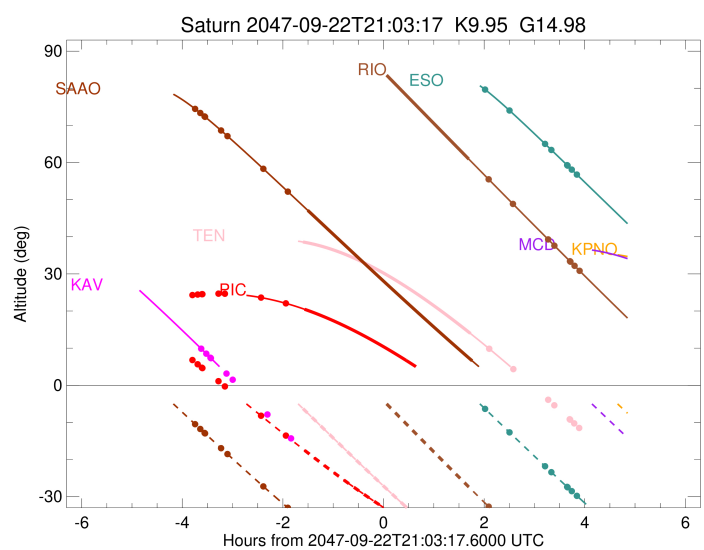
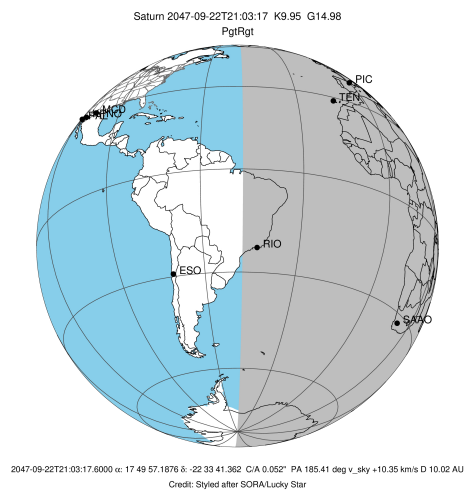
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-09-22T21:10:59.050
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KAV
 Location : Kavalur Observatory
 Latitude (deg) : 12.57556
 E. Longitude (deg) : 78.83167
 Altitude (km) : 0.722
 Gaia source ID : 4068924713406728704
 2Mass ID (if available) : 17495721-2233413
 ICRS Star Coord at Epoch: 17h 49m 57.18756s -22:33:41.36248s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.946
 G magnitude : 14.982
 RP magnitude : 13.699
 BP magnitude : 16.684
 DUPflag : 0
 Distance (au) : 10.021
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 10.35
 Sun-Target sep (deg) : 88.55
 Sun-Moon sep (deg) : 45.74
 B (ring opening deg) : 26.91
 PA of pole (deg) : 5.32
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.074
 C/A sky separation (km) : 538.0
 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	2047-09-22T17:25:55.123		9.84	-68.26	140461.00	-10.14		
A (OER)	I	2047-09-22T17:31:58.521		8.50	-69.47	136774.40	-10.15		
Encke (OEG)	I	2047-09-22T17:36:56.782		7.40	-70.43	133744.89	-10.16		
Encke (IEG)	I	2047-09-22T17:37:28.422		7.29	-70.53	133423.31	-10.16		
A (IER)	I	2047-09-22T17:56:05.018		3.14x	-73.77	122050.38	-10.21		
B (OER)	I	2047-09-22T18:03:23.507		1.51x	-74.84	117571.16	-10.22		
B (IER)	I	2047-09-22T18:44:54.525		-7.88x	-77.25	91984.69	-10.32		
C (IER)	I	2047-09-22T19:13:04.563		-14.32x	-74.57	74490.58	-10.38		
Saturn	I	2047-09-22T19:35:41.296		-19.52x	-70.79	60267.39		1.16	1.42
Saturn	E	2047-09-22T22:44:41.688		-62.89x	-27.38	60268.00		-0.09	-0.11
C (IER)	E	2047-09-22T23:06:34.761		-67.65x	-22.07	74490.58	10.81		
B (IER)	E	2047-09-22T23:33:30.667		-73.13x	-15.52	91984.69	10.84		
B (OER)	E	2047-09-23T00:12:47.553		-79.10x	-5.94	117571.16	10.87		
A (IER)	E	2047-09-23T00:19:39.561		-79.61x	-4.26x	122050.38	10.87		
Encke (IEG)	E	2047-09-23T00:37:05.104		-79.79x	-0.01x	133423.31	10.88		
Encke (OEG)	E	2047-09-23T00:37:34.658		-79.77x	0.11x	133744.89	10.88		
A (OER)	E	2047-09-23T00:42:13.051		-79.52x	1.24x	136774.40	10.88		
F ring	E	2047-09-23T00:47:51.777		-79.08x	2.62x	140461.00	10.88		

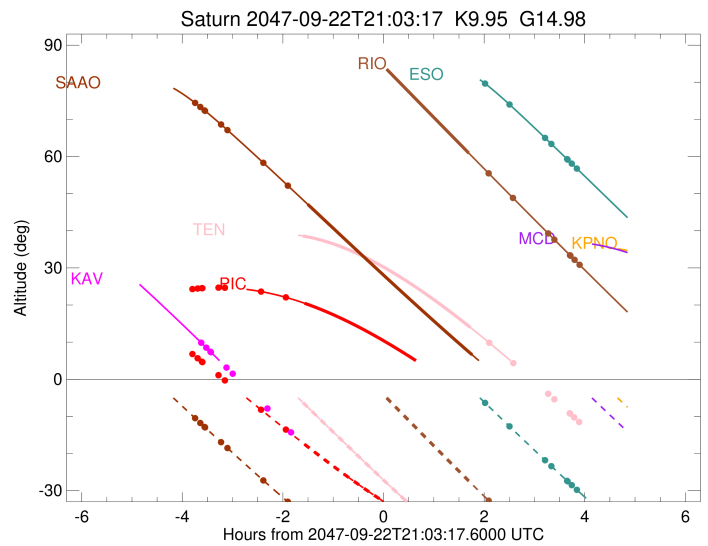
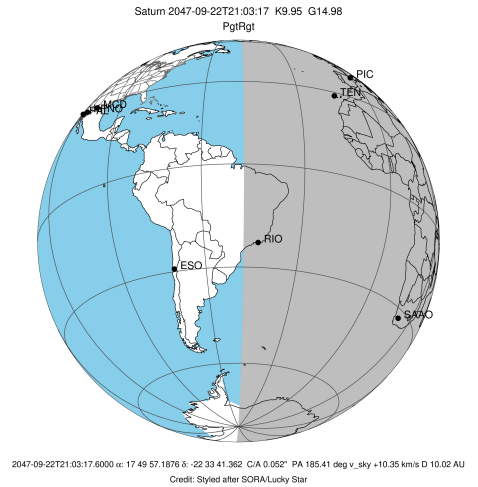
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-09-22T21:04:20.180
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : RIO
 Location : Rio de Janeiro
 Latitude (deg) : -22.89506
 E. Longitude (deg) : 316.77708
 Altitude (km) : 0.033
 Gaia source ID : 4068924713406728704
 2Mass ID (if available) : 17495721-2233413
 ICRS Star Coord at Epoch: 17h 49m 57.18756s -22:33:41.36248s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.946
 G magnitude : 14.982
 RP magnitude : 13.699
 BP magnitude : 16.684
 DUPflag : 0
 Distance (au) : 10.021
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 10.35
 Sun-Target sep (deg) : 88.55
 Sun-Moon sep (deg) : 46.46
 B (ring opening deg) : 26.91
 PA of pole (deg) : 5.32
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.055
 C/A sky separation (km) : 398.6
 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	2047-09-22T17:08:58.784		41.68	48.26x	140461.00	-10.03		
A (OER)	I	2047-09-22T17:15:06.511		43.07	47.01x	136774.40	-10.02		
Encke (OEG)	I	2047-09-22T17:20:08.896		44.22	45.97x	133744.89	-10.02		
Encke (IEG)	I	2047-09-22T17:20:41.004		44.34	45.86x	133423.31	-10.02		
A (IER)	I	2047-09-22T17:39:37.786		48.66	41.87x	122050.38	-9.99		
B (OER)	I	2047-09-22T17:47:06.148		50.37	40.27x	117571.16	-9.99		
B (IER)	I	2047-09-22T18:29:53.507		60.18	30.88x	91984.69	-9.95		
C (IER)	I	2047-09-22T18:59:14.018		66.94	24.29x	74490.58	-9.93		
Saturn	I	2047-09-22T19:23:03.627		72.43	18.88x	60267.99		-0.08	-0.10
Saturn	E	2047-09-22T22:45:06.583		60.90	-27.42	60267.94		0.36	0.45
C (IER)	E	2047-09-22T23:08:40.023		55.49	-32.69	74490.58	10.05		
B (IER)	E	2047-09-22T23:37:37.615		48.86	-39.05	91984.69	10.09		
B (OER)	E	2047-09-23T00:19:43.736		39.28	-47.93	117571.16	10.17		
A (IER)	E	2047-09-23T00:27:03.985		37.62	-49.42	122050.38	10.18		
Encke (IEG)	E	2047-09-23T00:45:39.032		33.42	-53.07	133423.31	10.22		
Encke (OEG)	E	2047-09-23T00:46:10.502		33.30	-53.17	133744.89	10.22		
A (OER)	E	2047-09-23T00:51:06.816		32.19	-54.10	136774.40	10.23		
F ring	E	2047-09-23T00:57:07.009		30.84	-55.22	140461.00	10.24		

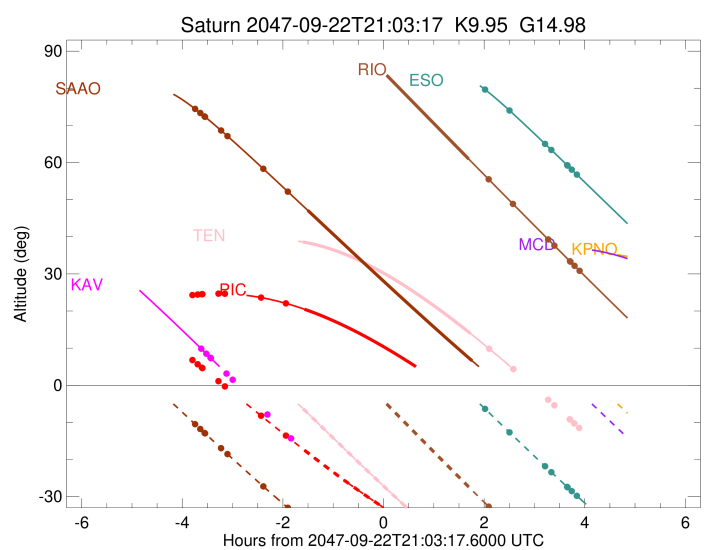
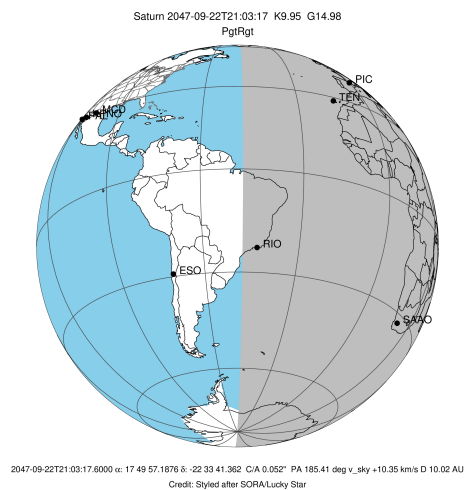
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-09-22T21:00:02.940
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : ESO
 Location : European Southern Obs. (3.6m)
 Latitude (deg) : -29.26097
 E. Longitude (deg) : 289.26831
 Altitude (km) : 2.400
 Gaia source ID : 4068924713406728704
 2Mass ID (if available) : 17495721-2233413
 ICRS Star Coord at Epoch: 17h 49m 57.18756s -22:33:41.36248s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.946
 G magnitude : 14.982
 RP magnitude : 13.699
 BP magnitude : 16.684
 DUPflag : 0
 Distance (au) : 10.021
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 10.35
 Sun-Target sep (deg) : 88.55
 Sun-Moon sep (deg) : 46.12
 B (ring opening deg) : 26.91
 PA of pole (deg) : 5.32
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.096
 C/A sky separation (km) : 696.7
 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	2047-09-22T17:08:04.812		18.74	59.74x	140461.00	-10.22		
A (OER)	I	2047-09-22T17:14:05.534		20.01	59.34x	136774.40	-10.22		
Encke (OEG)	I	2047-09-22T17:19:02.186		21.05	58.97x	133744.89	-10.21		
Encke (IEG)	I	2047-09-22T17:19:33.687		21.17	58.92x	133423.31	-10.21		
A (IER)	I	2047-09-22T17:38:09.212		25.12	57.16x	122050.38	-10.18		
B (OER)	I	2047-09-22T17:45:29.337		26.69	56.33x	117571.16	-10.17		
B (IER)	I	2047-09-22T18:27:31.718		35.75	50.39x	91984.69	-10.12		
C (IER)	I	2047-09-22T18:56:24.199		42.03	45.46x	74490.58	-10.08		
Saturn	I	2047-09-22T19:19:45.846		47.13	41.13x	60267.20		-1.32	-1.62
Saturn	E	2047-09-22T22:40:42.310		82.95	-1.18x	60267.99		-0.16	-0.20
C (IER)	E	2047-09-22T23:04:22.348		79.67	-6.35	74490.58	9.99		
B (IER)	E	2047-09-22T23:33:31.607		74.03	-12.69	91984.69	10.01		
B (OER)	E	2047-09-23T00:16:02.092		65.01	-21.83	117571.16	10.05		
A (IER)	E	2047-09-23T00:23:27.427		63.40	-23.40	122050.38	10.06		
Encke (IEG)	E	2047-09-23T00:42:16.386		59.30	-27.36	133423.31	10.09		
Encke (OEG)	E	2047-09-23T00:42:48.269		59.18	-27.48	133744.89	10.09		
A (OER)	E	2047-09-23T00:47:48.529		58.09	-28.52	136774.40	10.09		
F ring	E	2047-09-23T00:53:53.645		56.76	-29.78	140461.00	10.10		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-09-22T21:11:51.150
 Event type : PgtRgt
 : Saturn occs: geocentric, 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 : 4068924713406728704
 2Mass ID (if available) : 17495721-2233413
 ICRS Star Coord at Epoch: 17h 49m 57.18756s -22:33:41.36248s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.946
 G magnitude : 14.982
 RP magnitude : 13.699
 BP magnitude : 16.684
 DUPflag : 0
 Distance (au) : 10.021
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 10.35
 Sun-Target sep (deg) : 88.55
 Sun-Moon sep (deg) : 46.53
 B (ring opening deg) : 26.91
 PA of pole (deg) : 5.32
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.229
 C/A sky separation (km) : 1663.5
 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	2047-09-22T17:18:37.260		74.45	-10.48	140461.00	-9.89		
A (OER)	I	2047-09-22T17:24:49.934		73.34	-11.79	136774.40	-9.89		
Encke (OEG)	I	2047-09-22T17:29:56.060		72.41	-12.86	133744.89	-9.90		
Encke (IEG)	I	2047-09-22T17:30:28.548		72.31	-12.97	133423.31	-9.90		
A (IER)	I	2047-09-22T17:49:36.617		68.63	-16.96	122050.38	-9.91		
B (OER)	I	2047-09-22T17:57:08.267		67.13	-18.52	117571.16	-9.92		
B (IER)	I	2047-09-22T18:40:01.767		58.30	-27.26	91984.69	-9.97		
C (IER)	I	2047-09-22T19:09:14.299		52.15	-33.01	74490.58	-10.00		
Saturn	I	2047-09-22T19:32:46.685		47.16	-37.47	60267.57		-0.98	-1.20
Saturn	E	2047-09-22T22:49:05.696		6.57	-57.51	60266.14		-2.02	-2.48
C (IER)	E	2047-09-22T23:11:27.181		2.24x	-56.33	74490.58	10.46		
B (IER)	E	2047-09-22T23:39:15.052		-3.00x	-53.84	91984.69	10.52		
B (OER)	E	2047-09-23T00:19:37.792		-10.25x	-48.60	117571.16	10.60		
A (IER)	E	2047-09-23T00:26:40.041		-11.47x	-47.54	122050.38	10.61		
Encke (IEG)	E	2047-09-23T00:44:29.798		-14.46x	-44.68	133423.31	10.65		
Encke (OEG)	E	2047-09-23T00:44:59.998		-14.54x	-44.60	133744.89	10.65		
A (OER)	E	2047-09-23T00:49:44.383		-15.32x	-43.80	136774.40	10.66		
F ring	E	2047-09-23T00:55:30.146		-16.25x	-42.82	140461.00	10.67		