

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-07-28T00:06:47.690
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 4070420637736058752
 2Mass ID (if available) : 17523899-2225031

Saturn 2047-07-28T00:06:47 K9.66 G14.84 PgtRgt

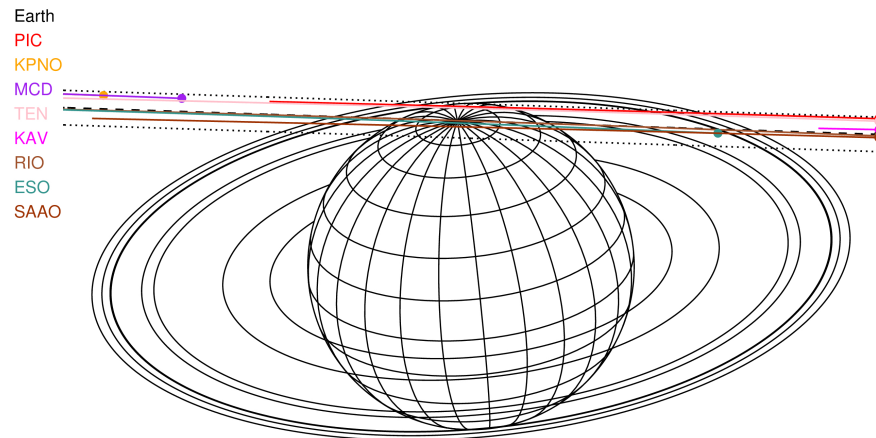
ICRS Star Coord at Epoch: 17h 52m 38.98511s -22:25:03.35890s

RUWE (>1.4 is poor) : 0.95
 K magnitude : 9.662
 G magnitude : 14.835
 RP magnitude : 13.547
 BP magnitude : 16.725
 DUPflag : 0
 Distance (au) : 9.206
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -14.53
 Sun-Target sep (deg) : 144.05
 Sun-Moon sep (deg) : 79.56
 B (ring opening deg) : 26.71
 PA of pole (deg) : 5.37

#	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

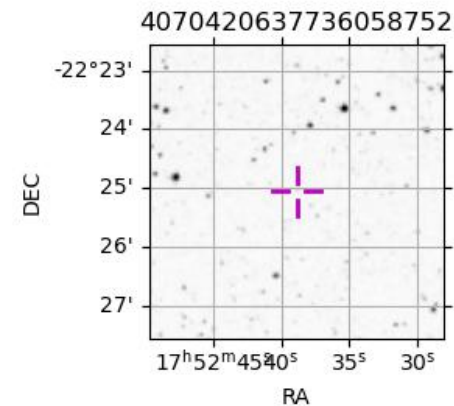


2047-07-28T00:06:47.6900 at: 17 52 38.98511 s: -22 25 03.359 C/A 8.041" PA 178.12 deg v_sky -14.53 km/s D 09.21 AU
 Credit: Styled after SORA/Lucky Star

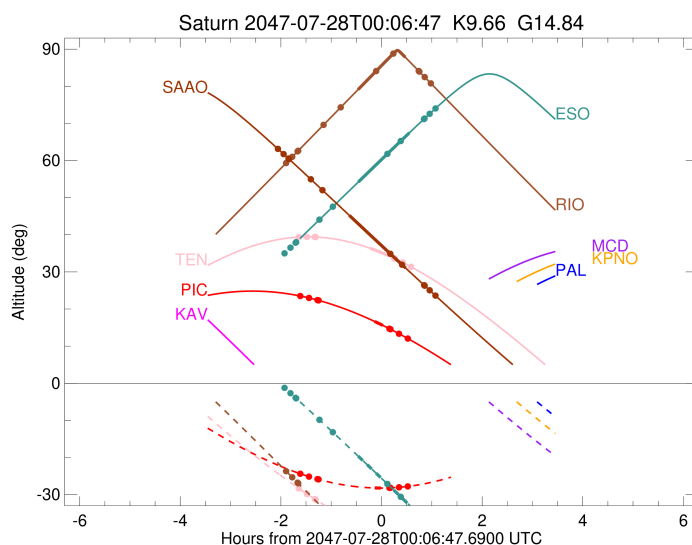
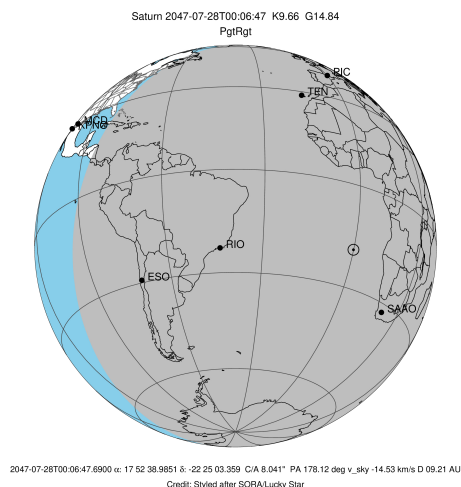


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEncode
PIC	Pic du Midi	42.9	0.1	+	+	+	JUL 27 22:29 - JUL 28 00:38	PieRie
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	+	+	+	JUL 27 22:27 - JUL 28 00:42	PieRie
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	+	+	+	JUL 27 22:12 - JUL 28 01:05	PieRie
ESO	European South	-29.3	289.3		+	+	JUL 27 22:52 - JUL 28 01:11	PieRie
AAT	Siding Spring	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro	-32.4	20.8	+	+	+	JUL 27 22:03 - JUL 28 01:11	PieRie
MSO	Mt. Stromlo Ob	-35.3	149.0					PnnRnn



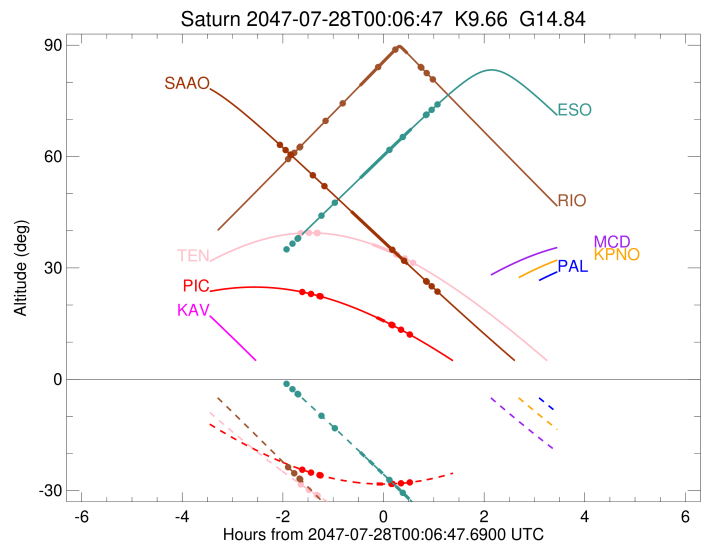
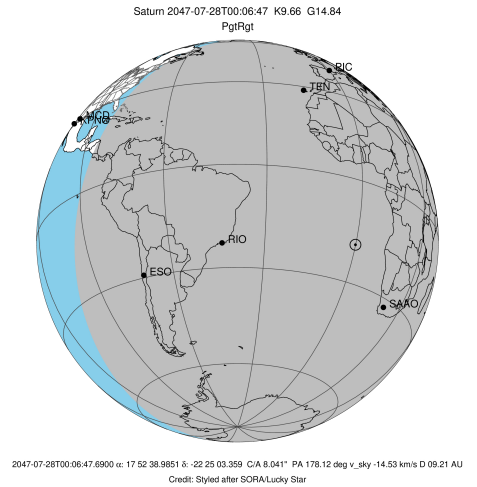
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-07-28T00:03:41.090
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 4070420637736058752
 2Mass ID (if available) : 17523899-2225031
 ICRS Star Coord at Epoch: 17h 52m 38.98511s -22:25:03.35890s
 RUWE (>1.4 is poor) : 0.95
 K magnitude : 9.662
 G magnitude : 14.835
 RP magnitude : 13.547
 BP magnitude : 16.725
 DUPflag : 0
 Distance (au) : 9.206
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -14.53
 Sun-Target sep (deg) : 144.05
 Sun-Moon sep (deg) : 79.92
 B (ring opening deg) : 26.71
 PA of pole (deg) : 5.37
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 8.835
 C/A sky separation (km) : 58991.8
 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	2047-07-27T22:29:39.989		23.52	-24.35	140461.00	-6.36		
A (OER)	I	2047-07-27T22:40:02.873		23.00	-25.12	136774.40	-5.47		
Encke (OEG)	I	2047-07-27T22:50:07.909		22.43	-25.79	133744.89	-4.54		
Encke (IEG)	I	2047-07-27T22:51:19.692		22.35	-25.87	133423.31	-4.42		
Saturn	I	2047-07-27T23:58:33.445		16.65	-28.20	59167.03		61.18	65.56
Saturn	E	2047-07-28T00:08:11.808		15.61	-28.22	59127.42		63.16	67.30
Encke (IEG)	E	2047-07-28T00:16:20.984		14.69	-28.18	133423.31	4.38		
Encke (OEG)	E	2047-07-28T00:17:33.394		14.55	-28.17	133744.89	4.50		
A (OER)	E	2047-07-28T00:27:44.181		13.34	-28.02	136774.40	5.41		
F ring	E	2047-07-28T00:38:13.751		12.04	-27.78	140461.00	6.29		

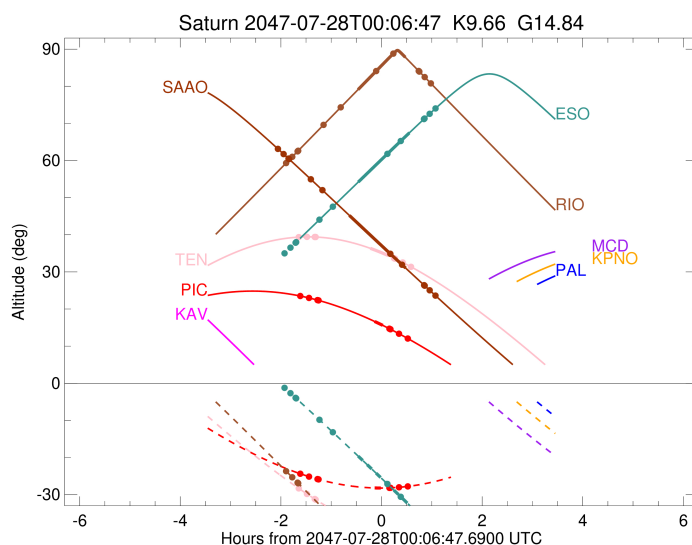
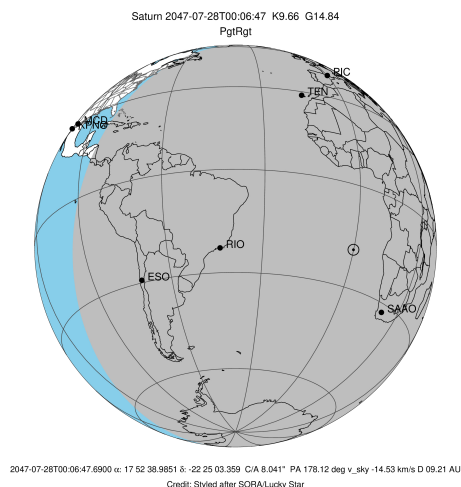
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-07-28T00:04:33.550
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 4070420637736058752
 2Mass ID (if available) : 17523899-2225031
 ICRS Star Coord at Epoch: 17h 52m 38.98511s -22:25:03.35890s
 RUWE (>1.4 is poor) : 0.95
 K magnitude : 9.662
 G magnitude : 14.835
 RP magnitude : 13.547
 BP magnitude : 16.725
 DUPflag : 0
 Distance (au) : 9.206
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -14.53
 Sun-Target sep (deg) : 144.05
 Sun-Moon sep (deg) : 80.19
 B (ring opening deg) : 26.71
 PA of pole (deg) : 5.37
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 8.745
 C/A sky separation (km) : 58391.3
 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



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

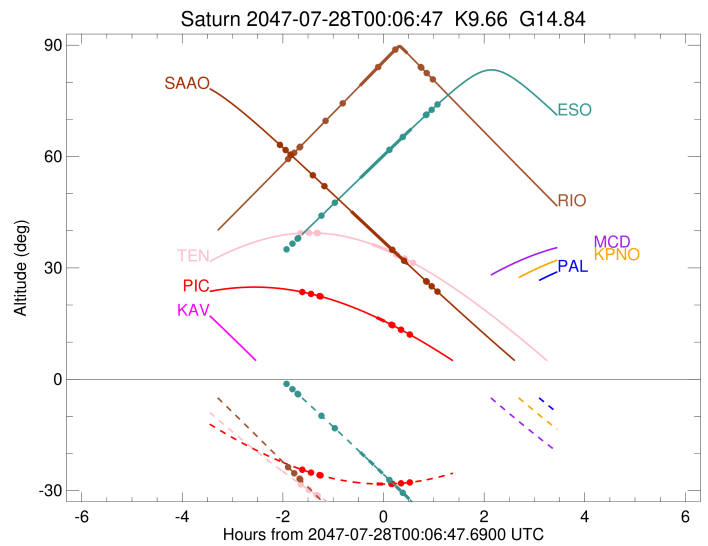
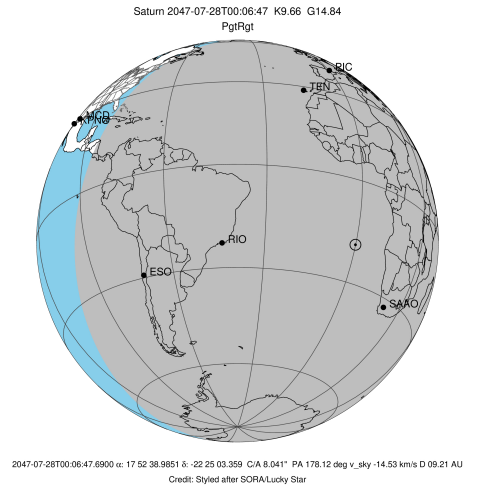
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-07-27T22:27:52.210		39.37	-28.28	140461.00	-6.71		
A (OER)	I	2047-07-27T22:37:37.183		39.44	-29.77	136774.40	-5.88		
Encke (OEG)	I	2047-07-27T22:46:51.295		39.41	-31.13	133744.89	-5.04		
Encke (IEG)	I	2047-07-27T22:47:55.726		39.40	-31.29	133423.31	-4.94		
Saturn	I	2047-07-27T23:53:33.162		36.34	-39.12	59214.48		58.93	63.55
Saturn	E	2047-07-28T00:14:57.545		34.39	-40.83	59125.88		63.23	67.37
Encke (IEG)	E	2047-07-28T00:21:48.212		33.68	-41.27	133423.31	4.90		
Encke (OEG)	E	2047-07-28T00:22:53.170		33.57	-41.34	133744.89	5.00		
A (OER)	E	2047-07-28T00:32:12.104		32.53	-41.84	136774.40	5.83		
F ring	E	2047-07-28T00:42:02.652		31.36	-42.27	140461.00	6.64		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-07-28T00:07:21.240
 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 : 4070420637736058752
 2Mass ID (if available) : 17523899-2225031
 ICRS Star Coord at Epoch: 17h 52m 38.98511s -22:25:03.35890s
 RUWE (>1.4 is poor) : 0.95
 K magnitude : 9.662
 G magnitude : 14.835
 RP magnitude : 13.547
 BP magnitude : 16.725
 DUPflag : 0
 Distance (au) : 9.206
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -14.53
 Sun-Target sep (deg) : 144.05
 Sun-Moon sep (deg) : 80.52
 B (ring opening deg) : 26.71
 PA of pole (deg) : 5.37
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 8.038
 C/A sky separation (km) : 53669.4
 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



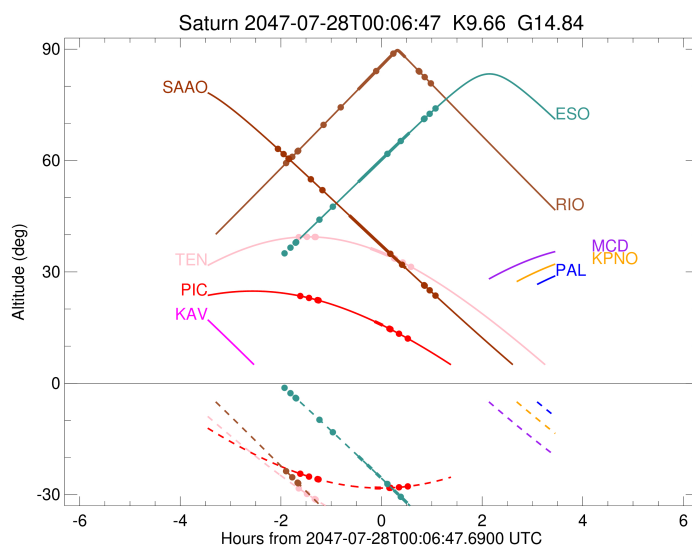
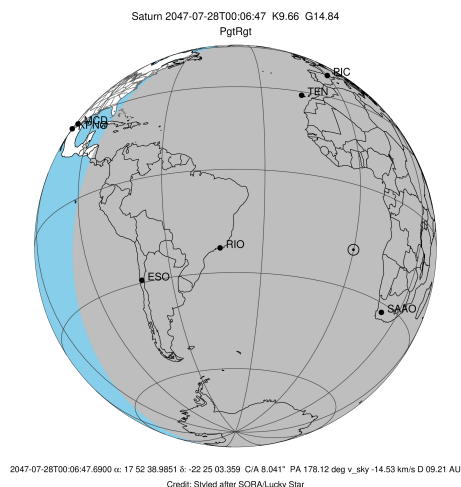
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-07-27T22:12:51.911		59.28	-23.64	140461.00	-8.67		
A (OER)	I	2047-07-27T22:20:09.886		60.96	-25.29	136774.40	-8.15		
Encke (OEG)	I	2047-07-27T22:26:32.690		62.43	-26.73	133744.89	-7.67		
Encke (IEG)	I	2047-07-27T22:27:14.783		62.59	-26.89	133423.31	-7.61		
A (IER)	I	2047-07-27T22:57:24.514		69.54	-33.75	122050.38	-4.83		
B (OER)	I	2047-07-27T23:17:20.463		74.14	-38.30	117571.16	-2.62		
Saturn	I	2047-07-27T23:38:49.433		79.11	-43.23	59451.92		48.73	54.14
Saturn	E	2047-07-28T00:35:18.338		87.79	-56.22	59229.10		58.26	62.94
B (OER)	E	2047-07-28T00:00:55.253	b	84.22	-48.30	117571.16	2.61		
A (IER)	E	2047-07-28T00:20:55.717	b	88.81	-52.91	122050.38	4.81		
Encke (IEG)	E	2047-07-28T00:51:13.321		84.12	-59.89	133423.31	7.58		
Encke (OEG)	E	2047-07-28T00:51:55.588		83.96	-60.05	133744.89	7.64		
A (OER)	E	2047-07-28T00:58:19.949		82.48	-61.53	136774.40	8.12		
F ring	E	2047-07-28T01:05:39.662		80.78	-63.22	140461.00	8.64		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-07-28T00:09:54.090
 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 : 4070420637736058752
 2Mass ID (if available) : 17523899-2225031
 ICRS Star Coord at Epoch: 17h 52m 38.98511s -22:25:03.35890s
 RUWE (>1.4 is poor) : 0.95
 K magnitude : 9.662
 G magnitude : 14.835
 RP magnitude : 13.547
 BP magnitude : 16.725
 DUPflag : 0
 Distance (au) : 9.206
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -14.53
 Sun-Target sep (deg) : 144.05
 Sun-Moon sep (deg) : 80.32
 B (ring opening deg) : 26.71
 PA of pole (deg) : 5.37
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 7.901
 C/A sky separation (km) : 52753.1
 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_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	2047-07-27T22:10:59.750		34.97	-1.20x	140461.00	-8.95		
A (OER)	I	2047-07-27T22:18:02.523		36.50	-2.64x	136774.40	-8.48		
Encke (OEG)	I	2047-07-27T22:24:09.149		37.83	-3.89x	133744.89	-8.04		
Encke (IEG)	I	2047-07-27T22:24:49.269		37.97	-4.03x	133423.31	-7.99		
A (IER)	I	2047-07-27T22:52:32.426		44.02	-9.78	122050.38	-5.58		
B (OER)	I	2047-07-27T23:08:11.990		47.44	-13.08	117571.16	-3.93		
Saturn	I	2047-07-27T23:39:02.178		54.20	-19.64	59494.48		47.00	52.49
Saturn	E	2047-07-28T00:40:07.638		67.49	-32.84	59250.30		57.30	62.08
B (OER)	E	2047-07-28T00:14:06.502	b	61.86	-27.19	117571.16	3.92		
A (IER)	E	2047-07-28T00:29:46.577	b	65.26	-30.59	122050.38	5.58		
Encke (IEG)	E	2047-07-28T00:57:27.459		71.17	-36.61	133423.31	8.01		
Encke (OEG)	E	2047-07-28T00:58:07.464		71.31	-36.76	133744.89	8.06		
A (OER)	E	2047-07-28T01:04:12.902		72.59	-38.09	136774.40	8.51		
F ring	E	2047-07-28T01:11:14.027		74.03	-39.62	140461.00	8.99		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-07-28T00:02:10.770
 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 : 4070420637736058752
 2Mass ID (if available) : 17523899-2225031
 ICRS Star Coord at Epoch: 17h 52m 38.98511s -22:25:03.35890s
 RUWE (>1.4 is poor) : 0.95
 K magnitude : 9.662
 G magnitude : 14.835
 RP magnitude : 13.547
 BP magnitude : 16.725
 DUPflag : 0
 Distance (au) : 9.206
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -14.53
 Sun-Target sep (deg) : 144.05
 Sun-Moon sep (deg) : 80.26
 B (ring opening deg) : 26.71
 PA of pole (deg) : 5.37
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 7.709
 C/A sky separation (km) : 51473.1
 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_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	2047-07-27T22:03:05.848		63.17	-74.05	140461.00	-9.27		
A (OER)	I	2047-07-27T22:09:53.089		61.77	-74.86	136774.40	-8.83		
Encke (OEG)	I	2047-07-27T22:15:44.541		60.56	-75.47	133744.89	-8.41		
Encke (IEG)	I	2047-07-27T22:16:22.885		60.43	-75.53	133423.31	-8.36		
A (IER)	I	2047-07-27T22:42:18.120		54.99	-76.84	122050.38	-6.17		
B (OER)	I	2047-07-27T22:55:53.905		52.12	-76.54	117571.16	-4.79		
Saturn	I	2047-07-27T23:28:24.446		45.23	-73.39	59528.57		45.62	51.16
Saturn	E	2047-07-28T00:35:32.924		31.04	-61.59	59296.00		55.28	60.24
B (OER)	E	2047-07-28T00:17:31.523	b	34.83	-65.09	117571.16	4.73		
A (IER)	E	2047-07-28T00:31:17.989	b	31.93	-62.43	122050.38	6.08		
Encke (IEG)	E	2047-07-28T00:57:38.420		26.42	-57.15	133423.31	8.21		
Encke (OEG)	E	2047-07-28T00:58:17.463		26.29	-57.01	133744.89	8.26		
A (OER)	E	2047-07-28T01:04:15.495		25.05	-55.79	136774.40	8.66		
F ring	E	2047-07-28T01:11:10.774		23.61	-54.37	140461.00	9.09		