

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2049-09-13T20:43:01.760
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 6772487436602504704
 2Mass ID (if available) : 19271801-2200010

ICRS Star Coord at Epoch: 19h 27m 18.03438s -22:00:01.26183s

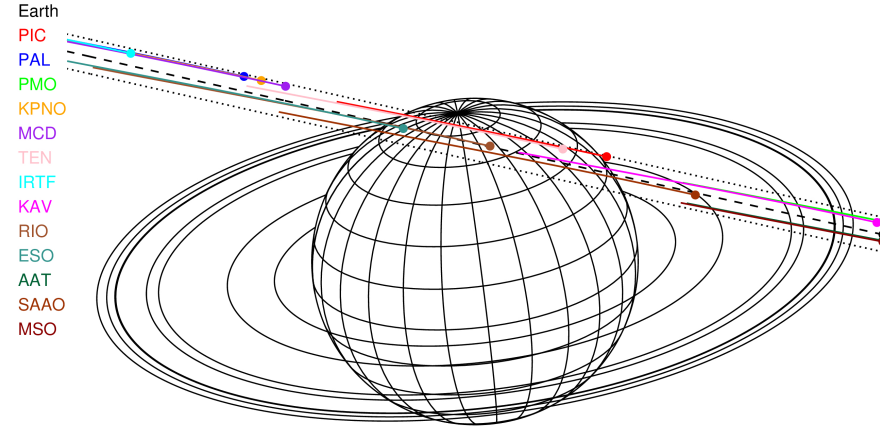
RUWE (>1.4 is poor) : 0.87
 K magnitude : 9.528
 G magnitude : 10.796
 RP magnitude : 10.332
 BP magnitude : 11.091
 DUPflag : 0
 Distance (au) : 9.467
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -5.01
 Sun-Target sep (deg) : 119.35
 Sun-Moon sep (deg) : 89.65
 B (ring opening deg) : 23.95
 PA of pole (deg) : 6.74

#	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



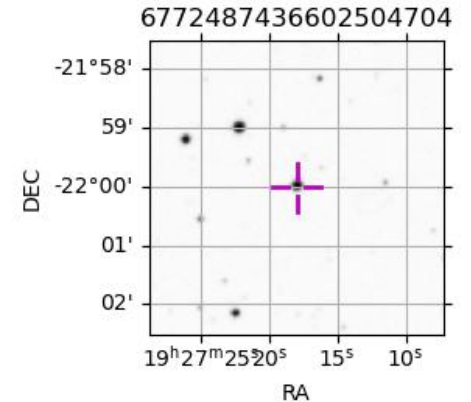
2049-09-13T20:43:01.7600 α: 19 27 18.0344 δ: -22 00 01.262 C/A 6.194° PA 167.35 deg v_sky - 5.01 km/s D 09.47 AU
 Credit: Styled after SORA/Lucky Star

Saturn 2049-09-13T20:43:01 K9.53 G10.80 PgtRgt

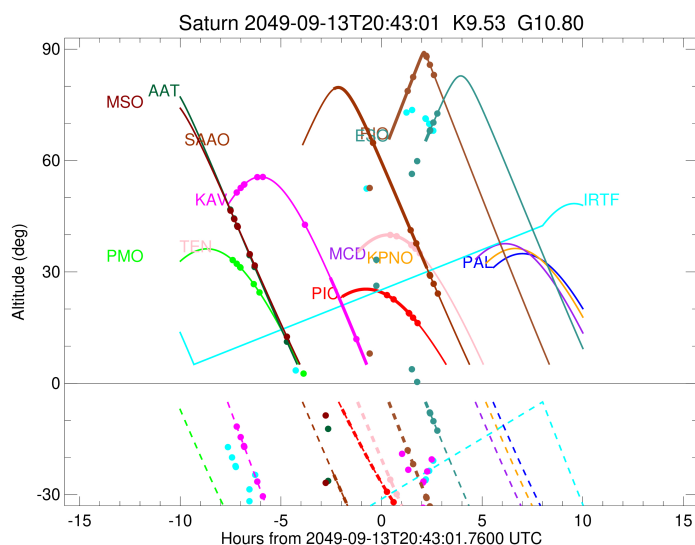
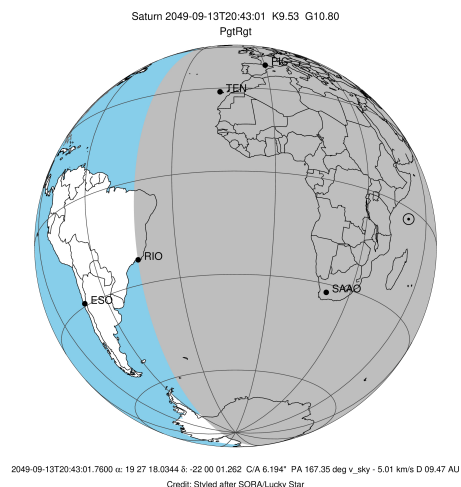


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1		+	+	SEP 13 18:46 - SEP 13 22:30	PieRne
PAL	Palomar Mt (20	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs	32.1	118.8	+	+	+	SEP 13 13:19 - SEP 13 14:38	PnnRin
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 13 22:35 - SEP 13 22:37	PneRne
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observ	12.6	78.8	+	+	+	SEP 13 13:31 - SEP 13 18:10	PinRin
RIO	Rio de Janeiro	-22.9	316.8		+	+	SEP 13 23:01 - SEP 13 23:19	PneRne
ESO	European South	-29.3	289.3		+	+	SEP 13 23:11 - SEP 13 23:29	PneRne
AAT	Siding Spring	-31.3	149.1	+	+	+	SEP 13 13:12 - SEP 13 16:01	PnnRin
SAAO	So. Afr. Astro	-32.4	20.8		+	+	SEP 13 18:20 - SEP 13 23:30	PieRne
MSO	Mt. Stromlo Ob	-35.3	149.0	+	+	+	SEP 13 13:13 - SEP 13 16:00	PnnRin



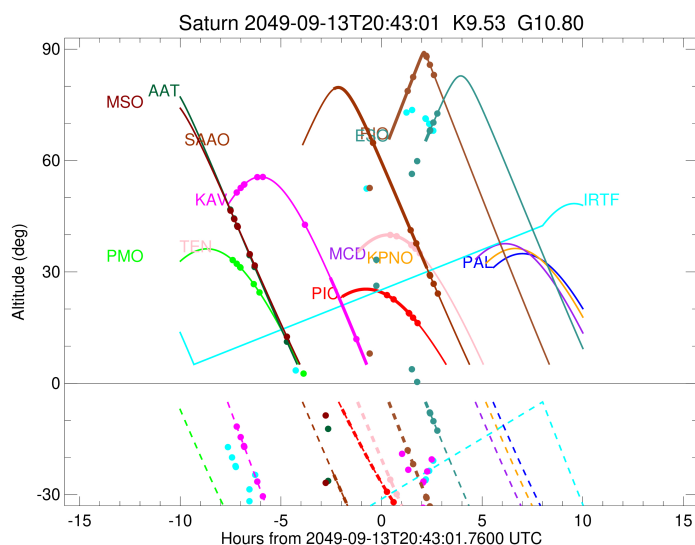
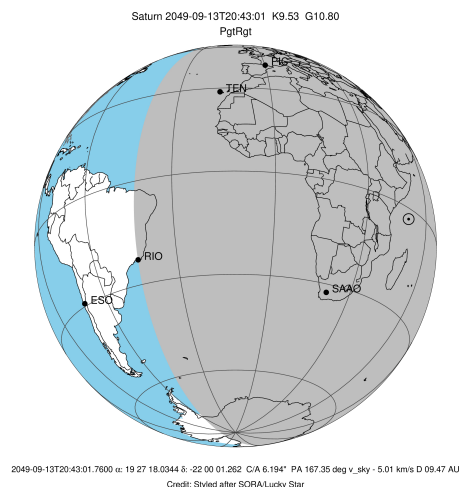
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2049-09-13T20:38:54.200
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 6772487436602504704
 2Mass ID (if available) : 19271801-2200010
 ICRS Star Coord at Epoch: 19h 27m 18.03438s -22:00:01.26183s
 RUWE (>1.4 is poor) : 0.87
 K magnitude : 9.528
 G magnitude : 10.796
 RP magnitude : 10.332
 BP magnitude : 11.091
 DUPflag : 0
 Distance (au) : 9.467
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -5.01
 Sun-Target sep (deg) : 119.35
 Sun-Moon sep (deg) : 90.06
 B (ring opening deg) : 23.95
 PA of pole (deg) : 6.74
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 6.981
 C/A sky separation (km) : 47932.9
 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



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

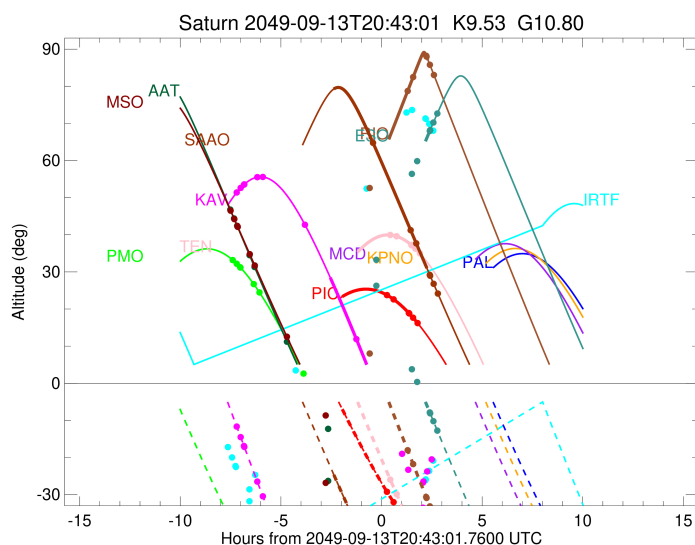
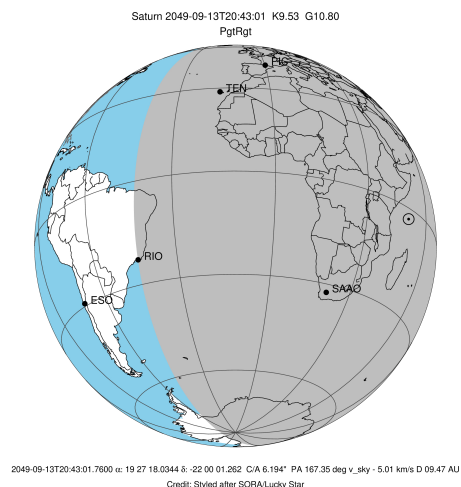
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2049-09-13T13:41:02.834		-17.60x	44.20x	140461.00	-4.74		
A (OER)	I	2049-09-13T13:54:09.595		-15.27x	42.64x	136774.40	-4.63		
Encke (OEG)	I	2049-09-13T14:05:10.464		-13.33x	41.23x	133744.89	-4.54		
Encke (IEG)	I	2049-09-13T14:06:21.458		-13.12x	41.08x	133423.31	-4.52		
A (IER)	I	2049-09-13T14:50:27.315		-5.56x	34.72x	122050.38	-4.05		
B (OER)	I	2049-09-13T15:09:28.467		-2.42x	31.71x	117571.16	-3.80		
Saturn	I	2049-09-13T18:46:02.242		23.33	-6.99	59964.89		31.14	36.42
Saturn	E	2049-09-13T22:30:19.317		16.25	-40.11	59424.94		60.27	64.74
B (OER)	E	2049-09-13T20:59:25.129	b	23.75	-29.25	117571.16	3.71		
A (IER)	E	2049-09-13T21:18:55.376	b	22.62	-32.00	122050.38	3.94		
Encke (IEG)	E	2049-09-13T22:04:20.938	b	18.94	-37.58	133423.31	4.38		
Encke (OEG)	E	2049-09-13T22:05:34.295	b	18.82	-37.71	133744.89	4.39		
A (OER)	E	2049-09-13T22:16:57.696	b	17.68	-38.87	136774.40	4.48		
F ring	E	2049-09-13T22:30:32.538		16.23	-40.13	140461.00	4.57		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2049-09-13T20:29:28.130
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 6772487436602504704
 2Mass ID (if available) : 19271801-2200010
 ICRS Star Coord at Epoch: 19h 27m 18.03438s -22:00:01.26183s
 RUWE (>1.4 is poor) : 0.87
 K magnitude : 9.528
 G magnitude : 10.796
 RP magnitude : 10.332
 BP magnitude : 11.091
 DUPflag : 0
 Distance (au) : 9.467
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -5.01
 Sun-Target sep (deg) : 119.35
 Sun-Moon sep (deg) : 88.95
 B (ring opening deg) : 23.95
 PA of pole (deg) : 6.74
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 6.326
 C/A sky separation (km) : 43435.2
 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_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



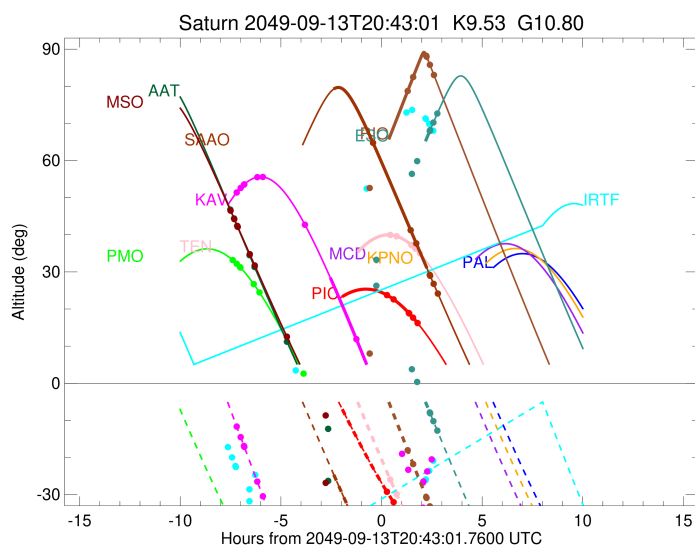
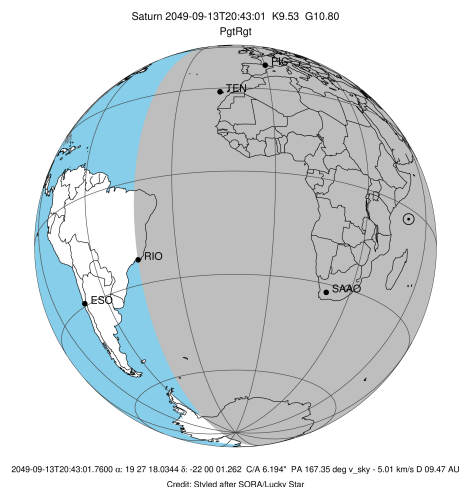
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2049-09-13T13:19:28.605		33.18	-37.95	140461.00	-5.19		
A (OER)	I	2049-09-13T13:31:26.199		32.19	-39.99	136774.40	-5.08		
Encke (OEG)	I	2049-09-13T13:41:27.401		31.27	-41.64	133744.89	-4.99		
Encke (IEG)	I	2049-09-13T13:42:31.881		31.17	-41.82	133423.31	-4.98		
A (IER)	I	2049-09-13T14:22:12.518		26.71	-47.65	122050.38	-4.56		
B (OER)	I	2049-09-13T14:38:58.435		24.50	-49.70	117571.16	-4.35		
B (IER)	I	2049-09-13T16:50:14.900	2.69x	-52.74		91984.69	-1.91		
Saturn	I	2049-09-13T18:09:08.602		-12.77x	-43.29	60055.83		25.61	30.38
Saturn	E	2049-09-13T22:52:58.564		-71.80x	12.95x	59485.73		56.70	61.54
B (IER)	E	2049-09-13T19:20:05.491	b	-27.41x	-30.94	91984.69	1.84		
B (OER)	E	2049-09-13T21:40:16.051	b	-57.11x	-2.46x	117571.16	3.97		
A (IER)	E	2049-09-13T21:58:40.801	b	-60.96x	1.43x	122050.38	4.14		
Encke (IEG)	E	2049-09-13T22:42:34.249	b	-69.83x	10.74x	133423.31	4.48		
Encke (OEG)	E	2049-09-13T22:43:45.889	b	-70.06x	11.00x	133744.89	4.49		
A (OER)	E	2049-09-13T22:54:54.519		-72.16x	13.36x	136774.40	4.57		
F ring	E	2049-09-13T23:08:14.039		-74.53x	16.17x	140461.00	4.65		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2049-09-13T20:43:15.460
 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 : 6772487436602504704
 2Mass ID (if available) : 19271801-2200010
 ICRS Star Coord at Epoch: 19h 27m 18.03438s -22:00:01.26183s
 RUWE (>1.4 is poor) : 0.87
 K magnitude : 9.528
 G magnitude : 10.796
 RP magnitude : 10.332
 BP magnitude : 11.091
 DUPflag : 0
 Distance (au) : 9.467
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -5.01
 Sun-Target sep (deg) : 119.35
 Sun-Moon sep (deg) : 90.28
 B (ring opening deg) : 23.95
 PA of pole (deg) : 6.74
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 6.904
 C/A sky separation (km) : 47403.1
 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



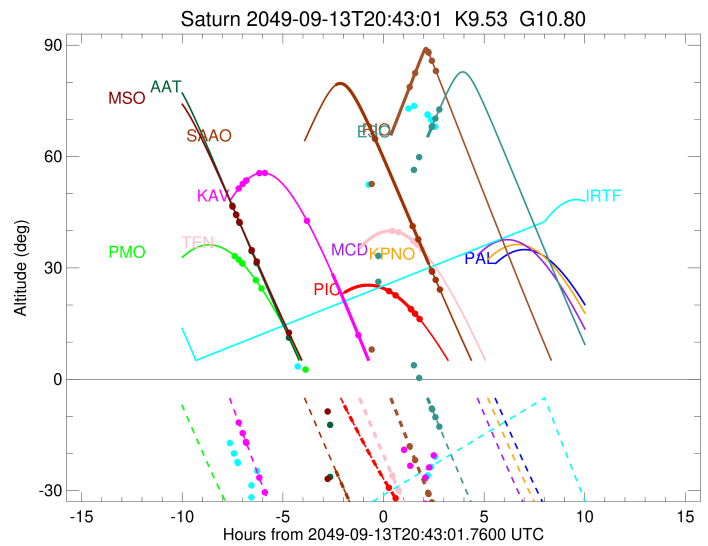
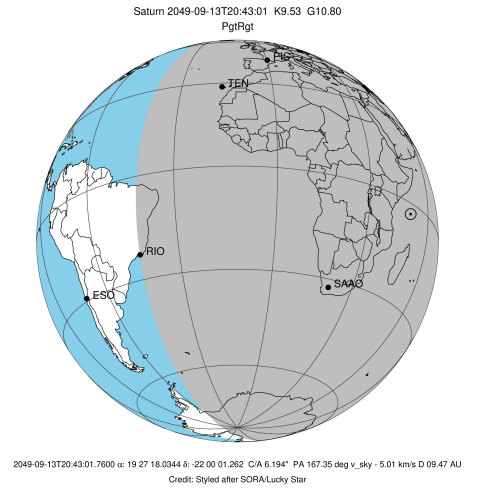
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2049-09-13T13:42:22.871		-27.50x	63.50x	140461.00	-4.76		
A (OER)	I	2049-09-13T13:55:25.842		-24.68x	62.21x	136774.40	-4.66		
Encke (OEG)	I	2049-09-13T14:06:22.088		-22.32x	60.92x	133744.89	-4.57		
Encke (IEG)	I	2049-09-13T14:07:32.502		-22.07x	60.77x	133423.31	-4.56		
A (IER)	I	2049-09-13T14:51:02.660		-12.83x	54.12x	122050.38	-4.13		
B (OER)	I	2049-09-13T15:09:37.702		-8.95x	50.79x	117571.16	-3.90		
Saturn	I	2049-09-13T18:48:58.860		30.39	4.37x	59983.00		30.09	35.29
Saturn	E	2049-09-13T22:35:14.674		35.21	-42.82	59432.35		59.82	64.34
B (OER)	E	2049-09-13T21:09:11.650	b	39.95	-25.97	117571.16	3.88		
A (IER)	E	2049-09-13T21:27:54.150	b	39.61	-29.82	122050.38	4.10		
Encke (IEG)	E	2049-09-13T22:11:47.207	b	37.27	-38.49	133423.31	4.52		
Encke (OEG)	E	2049-09-13T22:12:58.346	b	37.18	-38.71	133744.89	4.53		
A (OER)	E	2049-09-13T22:24:01.634	b	36.26	-40.78	136774.40	4.61		
F ring	E	2049-09-13T22:37:13.700		35.01	-43.17	140461.00	4.70		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2049-09-13T20:26:40.780
 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 : 6772487436602504704
 2Mass ID (if available) : 19271801-2200010
 ICRS Star Coord at Epoch: 19h 27m 18.03438s -22:00:01.26183s
 RUWE (>1.4 is poor) : 0.87
 K magnitude : 9.528
 G magnitude : 10.796
 RP magnitude : 10.332
 BP magnitude : 11.091
 DUPflag : 0
 Distance (au) : 9.467
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -5.01
 Sun-Target sep (deg) : 119.35
 Sun-Moon sep (deg) : 89.56
 B (ring opening deg) : 23.95
 PA of pole (deg) : 6.74
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 6.200
 C/A sky separation (km) : 42567.1
 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	2049-09-13T13:31:25.449		51.40	-11.68	140461.00	-5.29		
A (OER)	I	2049-09-13T13:43:09.092		52.62	-14.52	136774.40	-5.19		
Encke (OEG)	I	2049-09-13T13:52:57.690		53.50	-16.90	133744.89	-5.10		
Encke (IEG)	I	2049-09-13T13:54:00.768		53.59	-17.15	133423.31	-5.09		
A (IER)	I	2049-09-13T14:32:42.982		55.52	-26.49	122050.38	-4.68		
B (OER)	I	2049-09-13T14:49:00.238		55.58	-30.39	117571.16	-4.48		
B (IER)	I	2049-09-13T16:54:21.444		42.77	-59.25	91984.69	-2.07		
Saturn	I	2049-09-13T18:10:09.387		28.49	-72.43	60060.37		25.31	30.05
Saturn	E	2049-09-13T22:48:29.550		-33.91x	-26.35	59518.98		54.84	59.84
B (IER)	E	2049-09-13T19:28:02.769	b	11.90	-70.17	91984.69	1.97		
B (OER)	E	2049-09-13T21:44:16.728	b	-19.00x	-41.62	117571.16	3.99		
A (IER)	E	2049-09-13T22:02:37.326	b	-23.25x	-37.30	122050.38	4.15		
Encke (IEG)	E	2049-09-13T22:46:38.973	b	-33.48x	-26.79	133423.31	4.45		
Encke (OEG)	E	2049-09-13T22:47:51.181	b	-33.76x	-26.50	133744.89	4.46		
A (OER)	E	2049-09-13T22:59:05.972		-36.37x	-23.80	136774.40	4.52		
F ring	E	2049-09-13T23:12:34.866		-39.51x	-20.55	140461.00	4.59		

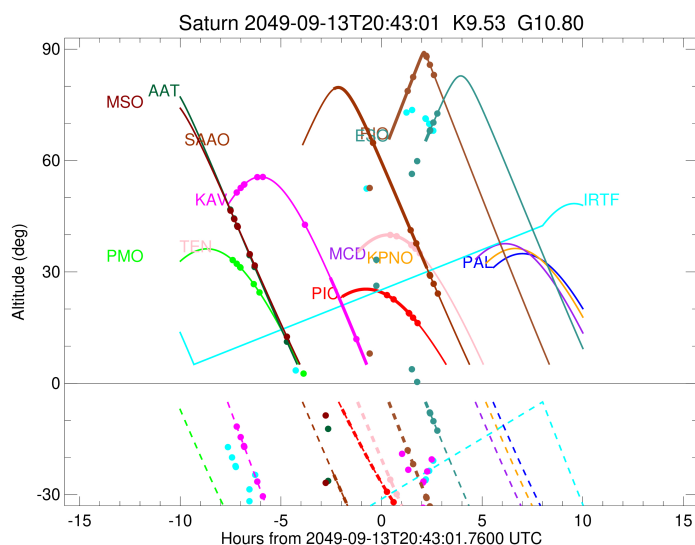
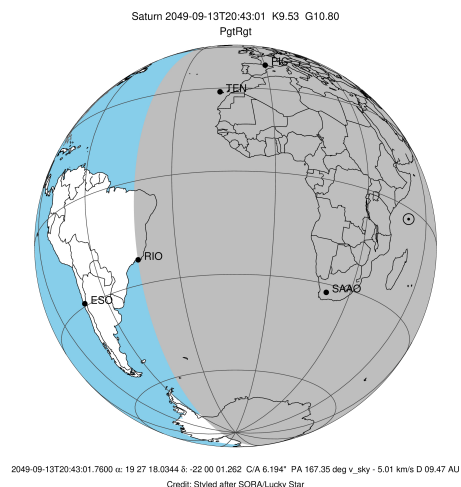
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2049-09-13T20:52:49.330
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : RIO
 Location : Rio de Janeiro
 Latitude (deg) : -22.89506
 E. Longitude (deg) : 316.77708
 Altitude (km) : 0.033
 Gaia source ID : 6772487436602504704
 2Mass ID (if available) : 19271801-2200010
 ICRS Star Coord at Epoch: 19h 27m 18.03438s -22:00:01.26183s
 RUWE (>1.4 is poor) : 0.87
 K magnitude : 9.528
 G magnitude : 10.796
 RP magnitude : 10.332
 BP magnitude : 11.091
 DUPflag : 0
 Distance (au) : 9.467
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -5.01
 Sun-Target sep (deg) : 119.35
 Sun-Moon sep (deg) : 90.51
 B (ring opening deg) : 23.95
 PA of pole (deg) : 6.74
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 6.235
 C/A sky separation (km) : 42811.9
 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



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	2049-09-13T13:39:04.357		-29.45x	58.76x	140461.00	-5.02		
A (OER)	I	2049-09-13T13:51:23.608		-27.38x	60.29x	136774.40	-4.95		
Encke (OEG)	I	2049-09-13T14:01:38.752		-25.60x	61.38x	133744.89	-4.89		
Encke (IEG)	I	2049-09-13T14:02:44.492		-25.41x	61.49x	133423.31	-4.89		
A (IER)	I	2049-09-13T14:42:36.994		-18.07x	63.74x	122050.38	-4.60		
B (OER)	I	2049-09-13T14:59:05.509		-14.88x	63.66x	117571.16	-4.46		
B (IER)	I	2049-09-13T16:54:36.824		9.17	49.59x	91984.69	-2.68		
Saturn	I	2049-09-13T18:39:56.038		32.57	27.82x	60090.44		23.28	27.78
Saturn	E	2049-09-13T23:01:36.713		87.08	-31.87	59502.31		55.77	60.69
B (IER)	E	2049-09-13T20:07:45.777	b	52.59	8.03x	91984.69	2.72		
B (OER)	E	2049-09-13T22:01:04.616	b	78.73	-18.04	117571.16	4.56		
A (IER)	E	2049-09-13T22:17:10.291	b	82.44	-21.73	122050.38	4.71		
Encke (IEG)	E	2049-09-13T22:56:05.325	b	88.26	-30.62	133423.31	5.01		
Encke (OEG)	E	2049-09-13T22:57:09.464	b	88.04	-30.86	133744.89	5.02		
A (OER)	E	2049-09-13T23:07:09.636		85.83	-33.12	136774.40	5.08		
F ring	E	2049-09-13T23:19:10.982		83.08	-35.83	140461.00	5.14		

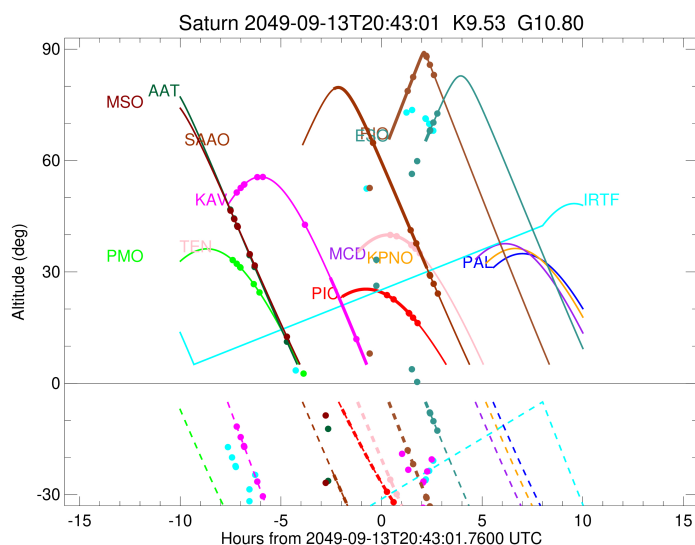
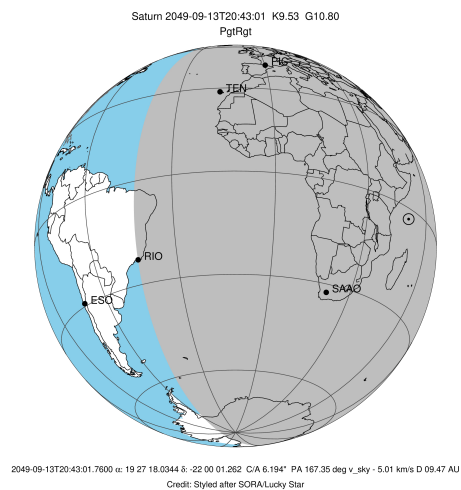
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2049-09-13T20:57:20.050
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : ESO
 Location : European Southern Obs. (3.6m)
 Latitude (deg) : -29.26097
 E. Longitude (deg) : 289.26831
 Altitude (km) : 2.400
 Gaia source ID : 6772487436602504704
 2Mass ID (if available) : 19271801-2200010
 ICRS Star Coord at Epoch: 19h 27m 18.03438s -22:00:01.26183s
 RUWE (>1.4 is poor) : 0.87
 K magnitude : 9.528
 G magnitude : 10.796
 RP magnitude : 10.332
 BP magnitude : 11.091
 DUPflag : 0
 Distance (au) : 9.467
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -5.01
 Sun-Target sep (deg) : 119.35
 Sun-Moon sep (deg) : 90.24
 B (ring opening deg) : 23.95
 PA of pole (deg) : 6.74
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 6.103
 C/A sky separation (km) : 41906.6
 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	2049-09-13T13:31:05.532		-37.61x	34.52x	140461.00	-5.02		
A (OER)	I	2049-09-13T13:43:24.376		-36.85x	36.87x	136774.40	-4.96		
Encke (OEG)	I	2049-09-13T13:53:38.794		-36.10x	38.79x	133744.89	-4.90		
Encke (IEG)	I	2049-09-13T13:54:44.430		-36.01x	38.99x	133423.31	-4.90		
A (IER)	I	2049-09-13T14:34:27.694		-32.14x	45.89x	122050.38	-4.64		
B (OER)	I	2049-09-13T14:50:47.751		-30.18x	48.43x	117571.16	-4.50		
B (IER)	I	2049-09-13T16:41:18.409		-12.82x	57.46x	91984.69	-3.01		
Saturn	I	2049-09-13T18:37:21.712		9.84	46.78x	60115.62		21.47	25.72
Saturn	E	2049-09-13T23:11:07.802		68.83	-8.76	59507.32		55.49	60.43
B (IER)	E	2049-09-13T20:27:31.337	b	33.23	26.30x	91984.69	3.11		
B (OER)	E	2049-09-13T22:13:37.901	b	56.40	3.78x	117571.16	4.73		
A (IER)	E	2049-09-13T22:29:10.655	b	59.79	0.39x	122050.38	4.87		
Encke (IEG)	E	2049-09-13T23:06:53.818	b	67.93	-7.84	133423.31	5.16		
Encke (OEG)	E	2049-09-13T23:07:56.081	b	68.16	-8.06	133744.89	5.17		
A (OER)	E	2049-09-13T23:17:38.847		70.21	-10.18	136774.40	5.23		
F ring	E	2049-09-13T23:29:19.553		72.63	-12.73	140461.00	5.29		

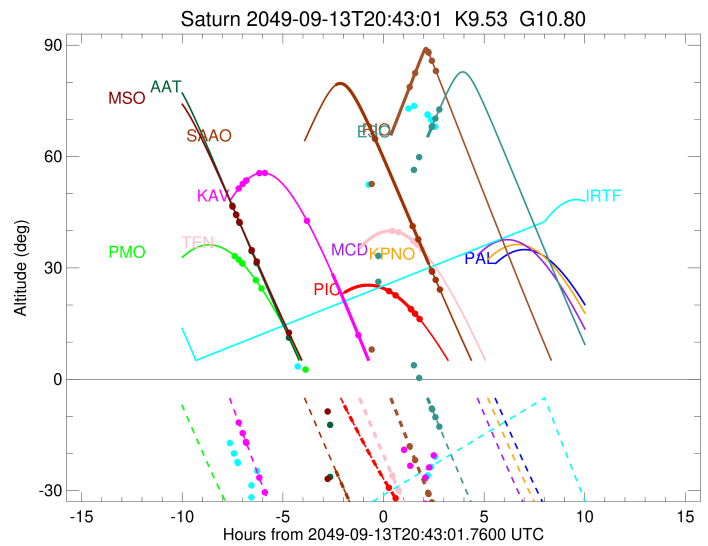
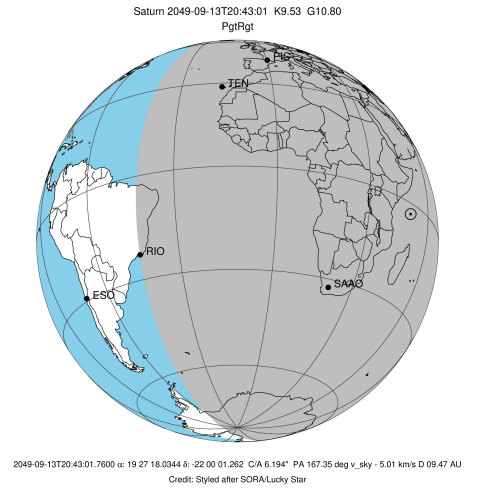
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2049-09-13T20:39:42.180
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : AAT
 Location : Siding Spring (AAT)
 Latitude (deg) : -31.27703
 E. Longitude (deg) : 149.06608
 Altitude (km) : 1.164
 Gaia source ID : 6772487436602504704
 2Mass ID (if available) : 19271801-2200010
 ICRS Star Coord at Epoch: 19h 27m 18.03438s -22:00:01.26183s
 RUWE (>1.4 is poor) : 0.87
 K magnitude : 9.528
 G magnitude : 10.796
 RP magnitude : 10.332
 BP magnitude : 11.091
 DUPflag : 0
 Distance (au) : 9.467
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -5.01
 Sun-Target sep (deg) : 119.35
 Sun-Moon sep (deg) : 89.11
 B (ring opening deg) : 23.95
 PA of pole (deg) : 6.74
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 5.429
 C/A sky separation (km) : 37274.9
 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



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

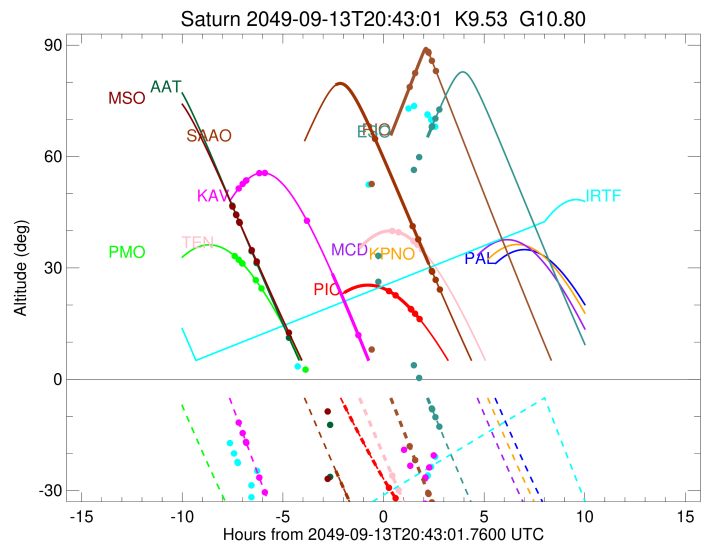
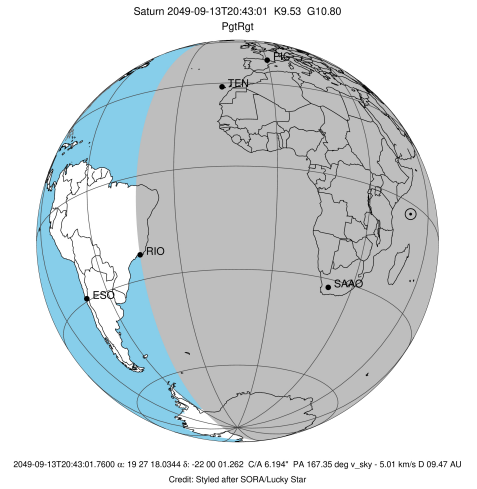
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2049-09-13T13:12:22.238		46.76	-60.24	140461.00	-5.56		
A (OER)	I	2049-09-13T13:23:29.530		44.37	-61.11	136774.40	-5.49		
Encke (OEG)	I	2049-09-13T13:32:44.982		42.38	-61.67	133744.89	-5.42		
Encke (IEG)	I	2049-09-13T13:33:44.343		42.17	-61.72	133423.31	-5.41		
A (IER)	I	2049-09-13T14:09:41.129		34.48	-62.26	122050.38	-5.12		
B (OER)	I	2049-09-13T14:24:27.153		31.34	-61.74	117571.16	-4.99		
B (IER)	I	2049-09-13T16:01:03.851		11.21	-50.17	91984.69	-3.72		
C (IER)	I	2049-09-13T18:03:20.631	b	-12.18x	-26.43	74490.58	-0.79		
Saturn	I	2049-09-13T17:54:58.244		-10.70x	-28.17	60164.27		17.56	21.21
Saturn	E	2049-09-13T23:26:08.250		-33.14x	39.87x	59576.35		51.72	56.96
C (IER)	E	2049-09-13T18:56:43.321	b	-21.00x	-15.14	74490.58	0.79		
B (IER)	E	2049-09-13T21:02:07.270	b	-35.17x	11.60x	91984.69	3.56		
B (OER)	E	2049-09-13T22:44:03.316	b	-35.97x	32.21x	117571.16	4.69		
A (IER)	E	2049-09-13T22:59:47.028	b	-35.12x	35.16x	122050.38	4.81		
Encke (IEG)	E	2049-09-13T23:38:11.178		-32.03x	41.91x	133423.31	5.06		
Encke (OEG)	E	2049-09-13T23:39:14.717		-31.93x	42.09x	133744.89	5.06		
A (OER)	E	2049-09-13T23:49:09.545		-30.91x	43.70x	136774.40	5.12		
F ring	E	2049-09-14T00:01:04.767		-29.59x	45.55x	140461.00	5.19		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2049-09-13T20:38:48.520
 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 : 6772487436602504704
 2Mass ID (if available) : 19271801-2200010
 ICRS Star Coord at Epoch: 19h 27m 18.03438s -22:00:01.26183s
 RUWE (>1.4 is poor) : 0.87
 K magnitude : 9.528
 G magnitude : 10.796
 RP magnitude : 10.332
 BP magnitude : 11.091
 DUPflag : 0
 Distance (au) : 9.467
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -5.01
 Sun-Target sep (deg) : 119.35
 Sun-Moon sep (deg) : 90.50
 B (ring opening deg) : 23.95
 PA of pole (deg) : 6.74
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 5.903
 C/A sky separation (km) : 40528.9
 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	2049-09-13T13:42:21.956		25.24	32.57x	140461.00	-5.36		
A (OER)	I	2049-09-13T13:53:54.542		27.65	30.42x	136774.40	-5.29		
Encke (OEG)	I	2049-09-13T14:03:30.877		29.66	28.59x	133744.89	-5.22		
Encke (IEG)	I	2049-09-13T14:04:32.470		29.87	28.40x	133423.31	-5.22		
A (IER)	I	2049-09-13T14:41:53.946		37.75	21.06x	122050.38	-4.91		
B (OER)	I	2049-09-13T14:57:19.600		41.02	17.95x	117571.16	-4.76		
B (IER)	I	2049-09-13T16:43:55.075		63.42	-4.27x	91984.69	-3.02		
Saturn	I	2049-09-13T18:20:52.684		79.27	-24.64	60106.85		22.11	26.45
Saturn	E	2049-09-13T22:58:35.966		30.95	-60.47	59558.78		52.67	57.84
B (IER)	E	2049-09-13T20:17:29.697	b	64.81	-47.23	91984.69	2.92		
B (OER)	E	2049-09-13T22:09:53.053	b	41.24	-60.66	117571.16	4.44		
A (IER)	E	2049-09-13T22:26:26.491	b	37.74	-61.10	122050.38	4.57		
Encke (IEG)	E	2049-09-13T23:06:47.168		29.23	-60.01	133423.31	4.81		
Encke (OEG)	E	2049-09-13T23:07:53.968		29.00	-59.94	133744.89	4.82		
A (OER)	E	2049-09-13T23:18:19.719		26.82	-59.16	136774.40	4.87		
F ring	E	2049-09-13T23:30:53.296		24.20	-58.01	140461.00	4.92		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2049-09-13T20:40:14.300
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MSO
 Location : Mt. Stromlo Observatory
 Latitude (deg) : -35.32000
 E. Longitude (deg) : 149.00833
 Altitude (km) : 0.770
 Gaia source ID : 6772487436602504704
 2Mass ID (if available) : 19271801-2200010
 ICRS Star Coord at Epoch: 19h 27m 18.03438s -22:00:01.26183s
 RUWE (>1.4 is poor) : 0.87
 K magnitude : 9.528
 G magnitude : 10.796
 RP magnitude : 10.332
 BP magnitude : 11.091
 DUPflag : 0
 Distance (au) : 9.467
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -5.01
 Sun-Target sep (deg) : 119.35
 Sun-Moon sep (deg) : 89.16
 B (ring opening deg) : 23.95
 PA of pole (deg) : 6.74
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 5.395
 C/A sky separation (km) : 37039.9
 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	2049-09-13T13:13:09.282		46.47	-56.57	140461.00	-5.57		
A (OER)	I	2049-09-13T13:24:15.479		44.20	-57.30	136774.40	-5.50		
Encke (OEG)	I	2049-09-13T13:33:29.865		42.31	-57.77	133744.89	-5.43		
Encke (IEG)	I	2049-09-13T13:34:29.103		42.10	-57.81	133423.31	-5.42		
A (IER)	I	2049-09-13T14:10:20.109		34.76	-58.24	122050.38	-5.14		
B (OER)	I	2049-09-13T14:25:02.903		31.75	-57.79	117571.16	-5.01		
B (IER)	I	2049-09-13T16:00:57.099		12.55	-47.65	91984.69	-3.77		
C (IER)	I	2049-09-13T17:56:10.402	b	-8.60x	-26.92	74490.58	-1.05		
Saturn	I	2049-09-13T17:55:13.785		-8.44x	-27.11	60167.39		17.29	20.89
Saturn	E	2049-09-13T23:26:50.989		-29.40x	37.49x	59581.22		51.46	56.72
C (IER)	E	2049-09-13T19:06:52.410	b	-19.57x	-12.71	74490.58	1.04		
B (IER)	E	2049-09-13T21:05:06.421	b	-31.45x	11.35x	91984.69	3.61		
B (OER)	E	2049-09-13T22:46:09.540	b	-31.95x	30.61x	117571.16	4.71		
A (IER)	E	2049-09-13T23:01:48.250	b	-31.15x	33.34x	122050.38	4.83		
Encke (IEG)	E	2049-09-13T23:40:02.323		-28.27x	39.54x	133423.31	5.08		
Encke (OEG)	E	2049-09-13T23:41:05.622		-28.18x	39.70x	133744.89	5.08		
A (OER)	E	2049-09-13T23:50:58.296		-27.23x	41.15x	136774.40	5.14		
F ring	E	2049-09-14T00:02:51.136		-26.00x	42.82x	140461.00	5.20		