

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-09-13T19:55:25.800
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 4068970450597019648
 2Mass ID (if available) : 17485412-2231553

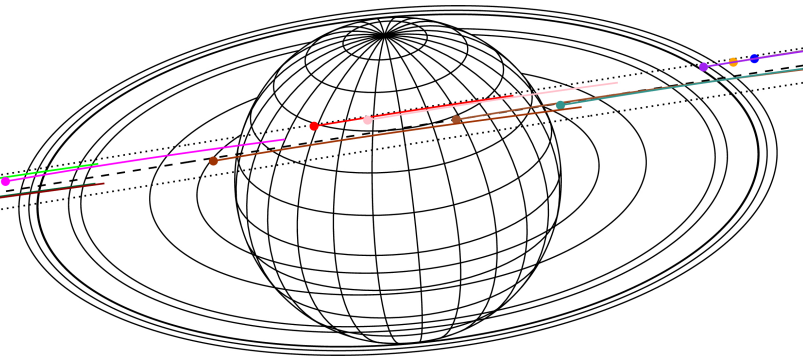
Saturn 2047-09-13T19:55:25 K8.56 G14.69 PgtRgt

ICRS Star Coord at Epoch: 17h 48m 54.12593s -22:31:55.52302s
 RUWE (>1.4 is poor) : 0.79
 K magnitude : 8.557
 G magnitude : 14.694
 RP magnitude : 13.197
 BP magnitude : 17.810
 DUPflag : 0
 Distance (au) : 9.871
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 5.91
 Sun-Target sep (deg) : 97.14
 Sun-Moon sep (deg) : 171.76
 B (ring opening deg) : 26.91
 PA of pole (deg) : 5.30
 # a(km) ring



2047-09-13T19:55:25.8000 α: 17 48 54.1259 s: -22 31 55.523 C/A 2.640° PA 188.97 deg v_sky + 5.91 km/s D 09.87 AU
 Credit: Styled after SORA/Lucky Star

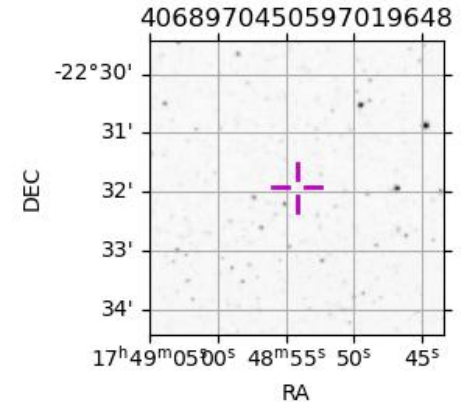
Earth
 PIC
 PAL
 PMO
 KPNO
 MCD
 TEN
 KAV
 RIO
 ESO
 AAT
 SAAO
 MSO



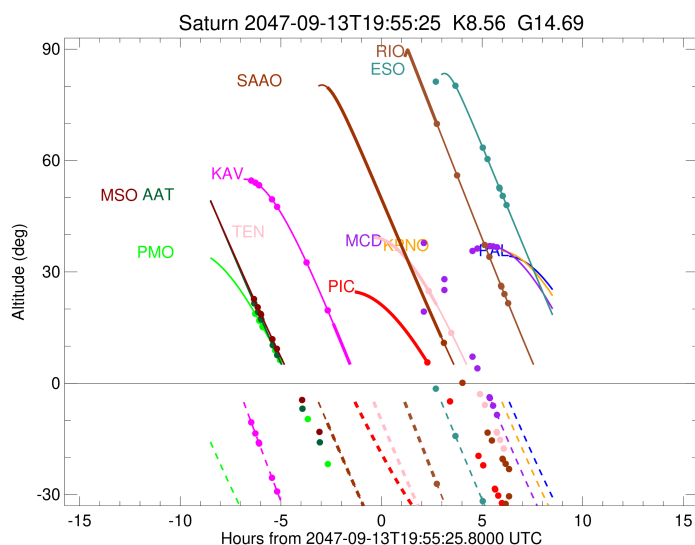
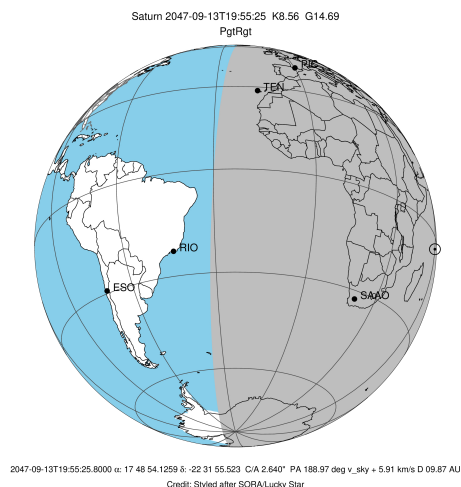
#	a(km)	ring
1	74490.6	C (IER)
2	91984.7	B (IER)
3	117571.2	B (OER)
4	122050.4	A (IER)
5	133423.3	Encke (IEG)
6	133744.9	Encke (OEG)
7	136774.4	A (OER)
8	140461.0	F ring

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	+ + + + +			SEP 13 13:39 - SEP 13 14:52	PnnRin
KPNO	Kitt Peak Natl	32.0	248.4					PnnRnn
MCD	McDonald Obs.	30.7	256.0			+ +	SEP 14 01:28 - SEP 14 01:39	PnnRne
TEN	Teide Obs./Ten	28.3	343.5		+	+	SEP 13 22:40 - SEP 13 23:23	PneRne
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observ	12.6	78.8	+ + + + + + + +	+		SEP 13 13:27 - SEP 13 17:31	PinRin
RIO	Rio de Janeiro	-22.9	316.8		+	+ + + + + + + +	SEP 13 22:41 - SEP 14 02:13	PneRne
ESO	European South	-29.3	289.3			+ + + + + + + +	SEP 13 23:35 - SEP 14 02:08	PnnRne
AAT	Siding Spring	-31.3	149.1	+ + + + + +			SEP 13 13:36 - SEP 13 14:44	PnnRin
SAAO	So. Afr. Astro	-32.4	20.8		+ +	+	SEP 13 17:13 - SEP 13 23:01	PieRne
MSO	Mt. Stromlo Ob	-35.3	149.0	+ + + + + +			SEP 13 13:35 - SEP 13 14:43	PnnRin



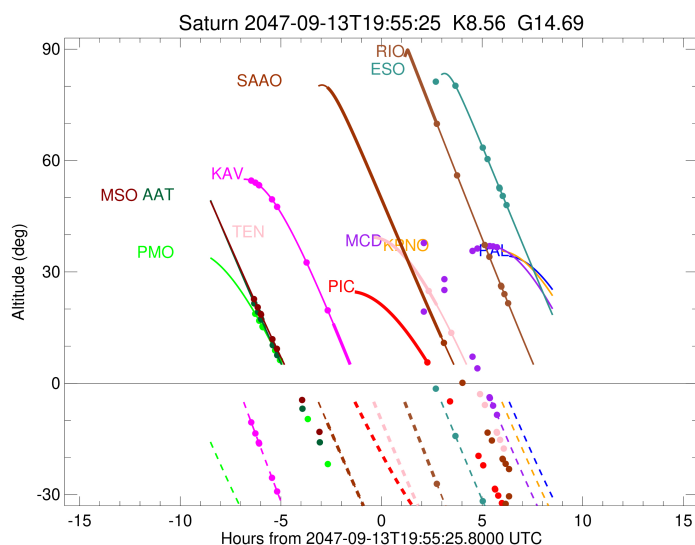
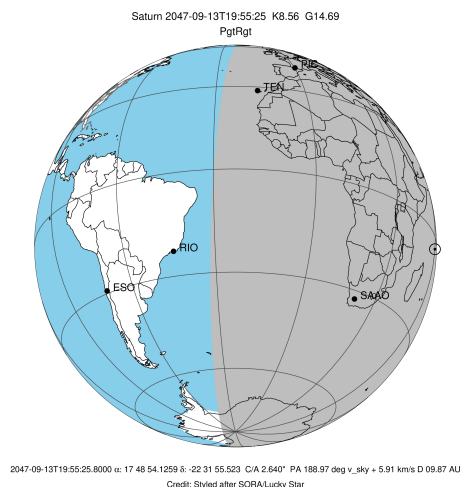
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-09-13T20:04:47.400
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 4068970450597019648
 2Mass ID (if available) : 17485412-2231553
 ICRS Star Coord at Epoch: 17h 48m 54.12593s -22:31:55.52302s
 RUWE (>1.4 is poor) : 0.79
 K magnitude : 8.557
 G magnitude : 14.694
 RP magnitude : 13.197
 BP magnitude : 17.810
 DUPflag : 0
 Distance (au) : 9.871
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 5.91
 Sun-Target sep (deg) : 97.14
 Sun-Moon sep (deg) : 171.22
 B (ring opening deg) : 26.91
 PA of pole (deg) : 5.30
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 2.899
 C/A sky separation (km) : 20756.9
 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	2047-09-13T13:39:02.858		18.70	-41.07	140461.00	-5.18		
A (OER)	I	2047-09-13T13:50:54.522		16.83	-42.96	136774.40	-5.18		
Encke (OEG)	I	2047-09-13T14:00:39.125		15.26	-44.44	133744.89	-5.18		
Encke (IEG)	I	2047-09-13T14:01:41.171		15.09	-44.59	133423.31	-5.18		
A (IER)	I	2047-09-13T14:38:15.548		8.83	-49.42	122050.38	-5.18		
B (OER)	I	2047-09-13T14:52:40.678		6.25	-50.96	117571.16	-5.17		
B (IER)	I	2047-09-13T16:15:55.496		-9.67x	-54.28	91984.69	-5.03		
C (IER)	I	2047-09-13T17:15:37.373		-21.81x	-50.25	74490.58	-4.68		
Saturn	I	2047-09-13T17:30:24.263		-24.87x	-48.56	60155.63		15.91	19.27
Saturn	E	2047-09-13T22:33:43.399		-80.45x	8.93x	60086.85		20.38	24.48
C (IER)	E	2047-09-13T22:29:21.625	b	-80.60x	8.01x	74490.58	5.09		
B (IER)	E	2047-09-13T23:23:31.728		-73.98x	19.46x	91984.69	5.62		
B (OER)	E	2047-09-14T00:36:50.680		-59.31x	34.54x	117571.16	5.96		
A (IER)	E	2047-09-14T00:49:19.494		-56.68x	37.01x	122050.38	6.00		
Encke (IEG)	E	2047-09-14T01:20:44.769		-50.02x	43.02x	133423.31	6.06		
Encke (OEG)	E	2047-09-14T01:21:37.810		-49.83x	43.18x	133744.89	6.06		
A (OER)	E	2047-09-14T01:29:56.923		-48.06x	44.71x	136774.40	6.08		
F ring	E	2047-09-14T01:40:03.029		-45.91x	46.52x	140461.00	6.09		

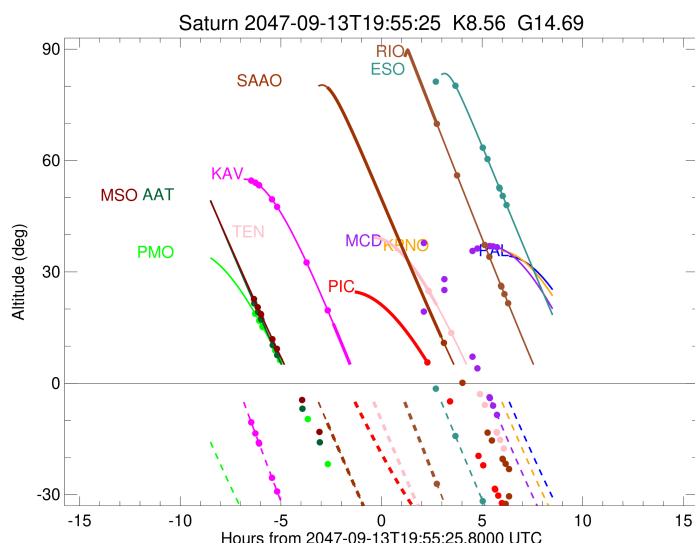
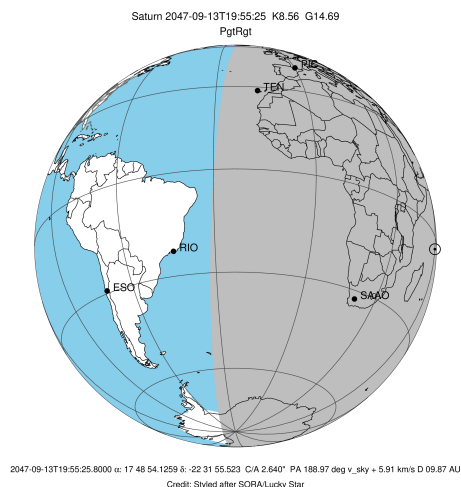
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-09-13T19:37:12.520
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MCD
 Location : McDonald Obs. 2.7m
 Latitude (deg) : 30.67158
 E. Longitude (deg) : 255.97844
 Altitude (km) : 2.075
 Gaia source ID : 4068970450597019648
 2Mass ID (if available) : 17485412-2231553
 ICRS Star Coord at Epoch: 17h 48m 54.12593s -22:31:55.52302s
 RUWE (>1.4 is poor) : 0.79
 K magnitude : 8.557
 G magnitude : 14.694
 RP magnitude : 13.197
 BP magnitude : 17.810
 DUPflag : 0
 Distance (au) : 9.871
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 5.91
 Sun-Target sep (deg) : 97.14
 Sun-Moon sep (deg) : 172.61
 B (ring opening deg) : 26.91
 PA of pole (deg) : 5.30
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 2.962
 C/A sky separation (km) : 21204.7
 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	2047-09-13T13:22:17.799	-81.98x	8.41x	140461.00	-5.94			
A (OER)	I	2047-09-13T13:32:39.572	-81.38x	10.64x	136774.40	-5.92			
Encke (OEG)	I	2047-09-13T13:41:11.745	-80.48x	12.47x	133744.89	-5.91			
Encke (IEG)	I	2047-09-13T13:42:06.183	-80.37x	12.67x	133423.31	-5.91			
A (IER)	I	2047-09-13T14:14:22.406	-75.06x	19.59x	122050.38	-5.84			
B (OER)	I	2047-09-13T14:27:12.245	-72.56x	22.32x	117571.16	-5.80			
B (IER)	I	2047-09-13T15:42:46.250	-56.70x	38.00x	91984.69	-5.44			
C (IER)	I	2047-09-13T16:38:52.312	-44.59x	48.70x	74490.58	-4.90			
Saturn	I	2047-09-13T17:00:51.465	-39.85x	52.47x	60181.35			13.92	16.92
Saturn	E	2047-09-13T22:19:01.797	21.99	34.26x	60041.01			22.96	27.42
C (IER)	E	2047-09-13T22:01:42.895	b	19.31	37.77x	74490.58	4.53		
B (IER)	E	2047-09-13T23:03:01.080		28.05	25.10x	91984.69	4.93		
B (OER)	E	2047-09-14T00:27:07.331		35.66	7.08x	117571.16	5.18		
A (IER)	E	2047-09-14T00:41:30.365		36.31	3.98x	122050.38	5.20		
Encke (IEG)	E	2047-09-14T01:17:43.436		36.95	-3.81x	133423.31	5.26		
Encke (OEG)	E	2047-09-14T01:18:44.536		36.95	-4.03x	133744.89	5.26		
A (OER)	E	2047-09-14T01:28:19.288		36.87	-6.08	136774.40	5.28		
F ring	E	2047-09-14T01:39:56.635		36.64	-8.55	140461.00	5.30		

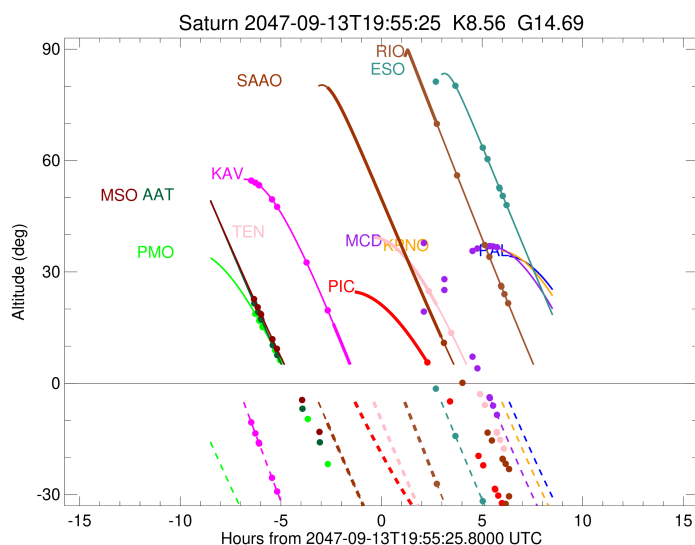
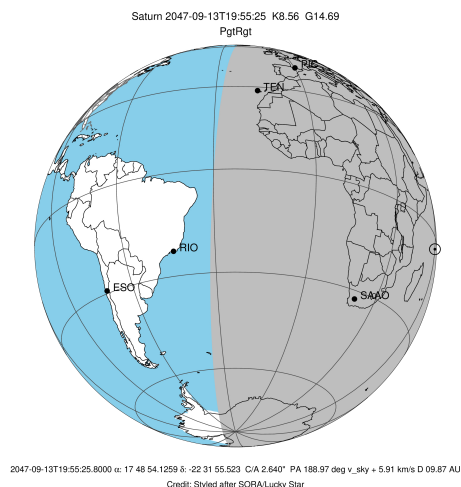
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-09-13T19:54:43.710
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 4068970450597019648
 2Mass ID (if available) : 17485412-2231553
 ICRS Star Coord at Epoch: 17h 48m 54.12593s -22:31:55.52302s
 RUWE (>1.4 is poor) : 0.79
 K magnitude : 8.557
 G magnitude : 14.694
 RP magnitude : 13.197
 BP magnitude : 17.810
 DUPflag : 0
 Distance (au) : 9.871
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 5.91
 Sun-Target sep (deg) : 97.14
 Sun-Moon sep (deg) : 171.86
 B (ring opening deg) : 26.91
 PA of pole (deg) : 5.30
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 3.331
 C/A sky separation (km) : 23848.3
 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	2047-09-13T13:06:59.438		-14.75x	65.52x	140461.00	-5.49		
A (OER)	I	2047-09-13T13:18:13.605		-12.40x	65.24x	136774.40	-5.45		
Encke (OEG)	I	2047-09-13T13:27:31.562		-10.46x	64.79x	133744.89	-5.41		
Encke (IEG)	I	2047-09-13T13:28:31.007		-10.26x	64.74x	133423.31	-5.41		
A (IER)	I	2047-09-13T14:04:03.291		-2.98x	61.40x	122050.38	-5.26		
B (OER)	I	2047-09-13T14:18:21.070		-0.11x	59.49x	117571.16	-5.19		
B (IER)	I	2047-09-13T15:44:42.914		16.18	44.17x	91984.69	-4.64		
C (IER)	I	2047-09-13T16:52:06.977		27.02	30.10x	74490.58	-3.95		
Saturn	I	2047-09-13T17:06:37.846		29.03	26.97x	60146.73		16.54	20.02
Saturn	E	2047-09-13T22:40:17.078		21.03	-43.54	60025.31		23.79	28.36
C (IER)	E	2047-09-13T22:16:06.625	b	24.85	-39.14	74490.58	3.94		
B (IER)	E	2047-09-13T23:23:34.062		13.56	-50.52	91984.69	4.65		
B (OER)	E	2047-09-14T00:49:36.493		-3.00x	-58.24	117571.16	5.22		
A (IER)	E	2047-09-14T01:03:47.628		-5.88x	-58.37	122050.38	5.30		
Encke (IEG)	E	2047-09-14T01:38:58.240		-13.16x	-57.13	133423.31	5.47		
Encke (OEG)	E	2047-09-14T01:39:56.968		-13.36x	-57.07	133744.89	5.48		
A (OER)	E	2047-09-14T01:49:07.890		-15.29x	-56.38	136774.40	5.52		
F ring	E	2047-09-14T02:00:12.785		-17.63x	-55.39	140461.00	5.57		

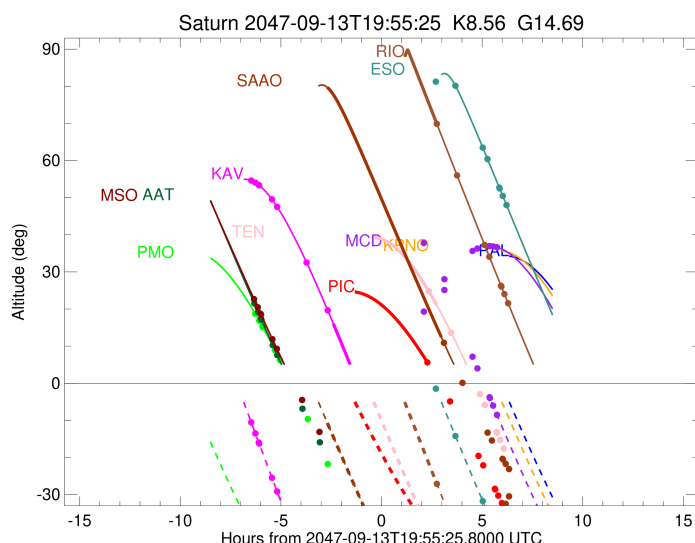
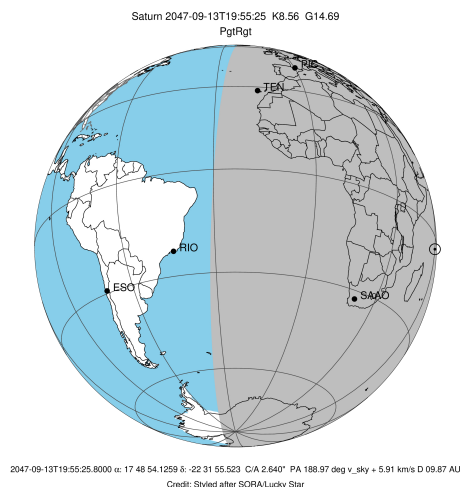
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-09-13T20:13:33.110
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KAV
 Location : Kavalur Observatory
 Latitude (deg) : 12.57556
 E. Longitude (deg) : 78.83167
 Altitude (km) : 0.722
 Gaia source ID : 4068970450597019648
 2Mass ID (if available) : 17485412-2231553
 ICRS Star Coord at Epoch: 17h 48m 54.12593s -22:31:55.52302s
 RUWE (>1.4 is poor) : 0.79
 K magnitude : 8.557
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 DUPflag : 0
 Distance (au) : 9.871
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 5.91
 Sun-Target sep (deg) : 97.14
 Sun-Moon sep (deg) : 170.89
 B (ring opening deg) : 26.91
 PA of pole (deg) : 5.30
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 2.844
 C/A sky separation (km) : 20359.8
 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	2047-09-13T13:27:10.188		54.60	-10.55	140461.00	-4.99		
A (OER)	I	2047-09-13T13:39:30.015		54.04	-13.55	136774.40	-4.98		
Encke (OEG)	I	2047-09-13T13:49:39.238		53.39	-16.01	133744.89	-4.97		
Encke (IEG)	I	2047-09-13T13:50:43.973		53.32	-16.27	133423.31	-4.97		
A (IER)	I	2047-09-13T14:29:01.887		49.52	-25.51	122050.38	-4.93		
B (OER)	I	2047-09-13T14:44:11.794		47.53	-29.14	117571.16	-4.91		
B (IER)	I	2047-09-13T16:12:10.621		32.50	-49.79	91984.69	-4.75		
C (IER)	I	2047-09-13T17:15:16.221		19.59	-63.41	74490.58	-4.45		
Saturn	I	2047-09-13T17:31:43.002		16.07	-66.53	60158.41		15.70	19.03
Saturn	E	2047-09-13T22:45:57.309		-55.47x	-26.95	60103.68		19.37	23.31
C (IER)	E	2047-09-13T22:45:50.622	b	-55.45x	-26.98	74490.58	5.08		
B (IER)	E	2047-09-13T23:39:58.788		-67.46x	-13.92	91984.69	5.64		
B (OER)	E	2047-09-14T00:52:37.792		-79.55x	3.75x	117571.16	6.05		
A (IER)	E	2047-09-14T01:04:54.931		-79.95x	6.75x	122050.38	6.10		
Encke (IEG)	E	2047-09-14T01:35:44.509		-77.50x	14.27x	133423.31	6.19		
Encke (OEG)	E	2047-09-14T01:36:36.417		-77.37x	14.48x	133744.89	6.20		
A (OER)	E	2047-09-14T01:44:44.528		-76.11x	16.47x	136774.40	6.22		
F ring	E	2047-09-14T01:54:36.456		-74.39x	18.87x	140461.00	6.24		

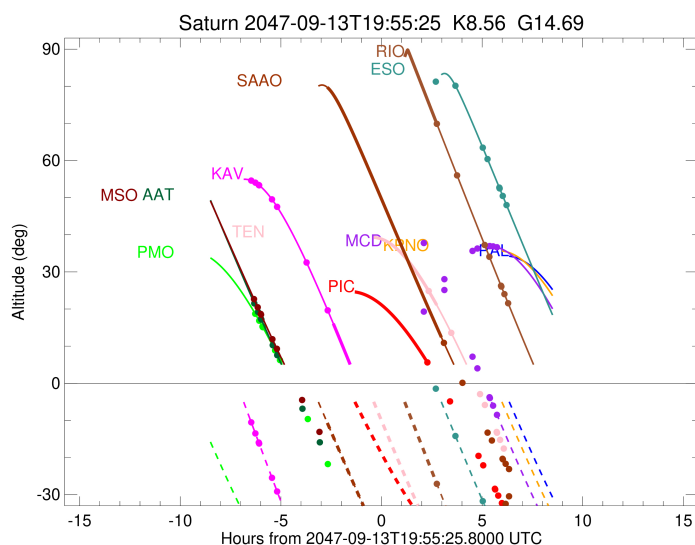
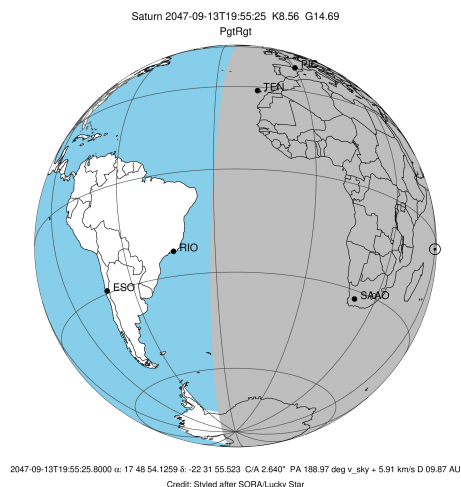
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-09-13T19:48:25.260
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : RIO
 Location : Rio de Janeiro
 Latitude (deg) : -22.89506
 E. Longitude (deg) : 316.77708
 Altitude (km) : 0.033
 Gaia source ID : 4068970450597019648
 2Mass ID (if available) : 17485412-2231553
 ICRS Star Coord at Epoch: 17h 48m 54.12593s -22:31:55.52302s
 RUWE (>1.4 is poor) : 0.79
 K magnitude : 8.557
 G magnitude : 14.694
 RP magnitude : 13.197
 BP magnitude : 17.810
 DUPflag : 0
 Distance (au) : 9.871
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 5.91
 Sun-Target sep (deg) : 97.14
 Sun-Moon sep (deg) : 172.16
 B (ring opening deg) : 26.91
 PA of pole (deg) : 5.30
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 2.569
 C/A sky separation (km) : 18390.6
 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	2047-09-13T13:05:07.745		-17.94x	53.41x	140461.00	-5.87		
A (OER)	I	2047-09-13T13:15:36.935		-15.94x	55.13x	136774.40	-5.85		
Encke (OEG)	I	2047-09-13T13:24:16.169		-14.26x	56.47x	133744.89	-5.82		
Encke (IEG)	I	2047-09-13T13:25:11.407		-14.08x	56.61x	133423.31	-5.82		
A (IER)	I	2047-09-13T13:58:01.629		-7.52x	60.81x	122050.38	-5.72		
B (OER)	I	2047-09-13T14:11:07.610		-4.84x	62.02x	117571.16	-5.68		
B (IER)	I	2047-09-13T15:28:29.115		11.59	61.86x	91984.69	-5.32		
C (IER)	I	2047-09-13T16:25:23.067		24.12	54.59x	74490.58	-4.90		
Saturn	I	2047-09-13T16:57:05.113		31.22	49.03x	60212.56		11.09	13.53
Saturn	E	2047-09-13T22:41:46.995		69.57	-27.40	60099.45		19.63	23.61
C (IER)	E	2047-09-13T22:40:28.394	b	69.88	-27.10	74490.58	4.63		
B (IER)	E	2047-09-13T23:40:53.025		55.97	-40.72	91984.69	5.00		
B (OER)	E	2047-09-14T01:03:15.559		37.19	-58.06	117571.16	5.34		
A (IER)	E	2047-09-14T01:17:10.533		34.05	-60.67	122050.38	5.39		
Encke (IEG)	E	2047-09-14T01:51:57.318		26.24	-66.36	133423.31	5.51		
Encke (OEG)	E	2047-09-14T01:52:55.668		26.02	-66.49	133744.89	5.51		
A (OER)	E	2047-09-14T02:02:03.682		23.98	-67.68	136774.40	5.54		
F ring	E	2047-09-14T02:13:06.524		21.53	-68.90	140461.00	5.58		

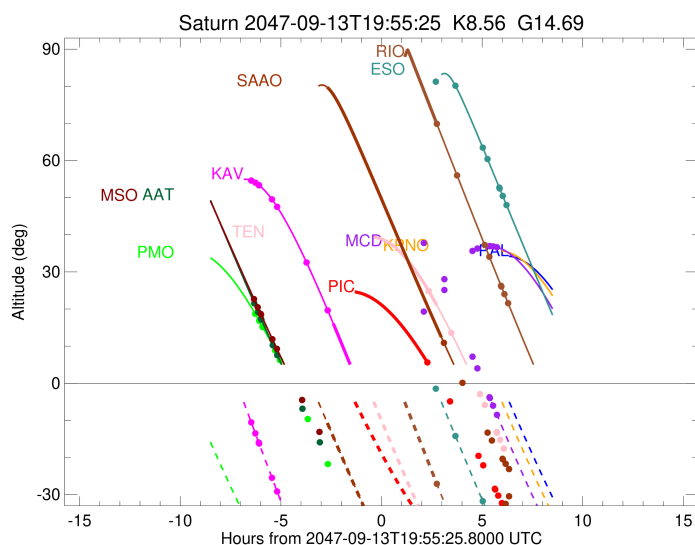
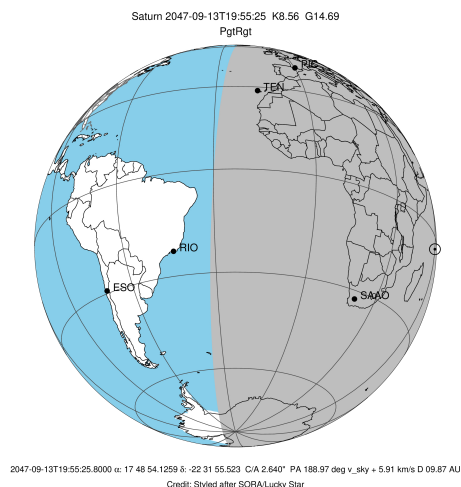
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-09-13T19:42:47.930
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : ESO
 Location : European Southern Obs. (3.6m)
 Latitude (deg) : -29.26097
 E. Longitude (deg) : 289.26831
 Altitude (km) : 2.400
 Gaia source ID : 4068970450597019648
 2Mass ID (if available) : 17485412-2231553
 ICRS Star Coord at Epoch: 17h 48m 54.12593s -22:31:55.52302s
 RUWE (>1.4 is poor) : 0.79
 K magnitude : 8.557
 G magnitude : 14.694
 RP magnitude : 13.197
 BP magnitude : 17.810
 DUPflag : 0
 Distance (au) : 9.871
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 5.91
 Sun-Target sep (deg) : 97.14
 Sun-Moon sep (deg) : 172.38
 B (ring opening deg) : 26.91
 PA of pole (deg) : 5.30
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 2.342
 C/A sky separation (km) : 16764.9
 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	2047-09-13T13:10:53.864		-30.09x	30.40x	140461.00	-6.02		
A (OER)	I	2047-09-13T13:21:07.256		-28.80x	32.42x	136774.40	-6.00		
Encke (OEG)	I	2047-09-13T13:29:32.603		-27.69x	34.06x	133744.89	-5.99		
Encke (IEG)	I	2047-09-13T13:30:26.317		-27.57x	34.23x	133423.31	-5.99		
A (IER)	I	2047-09-13T14:02:16.370		-22.95x	40.19x	122050.38	-5.92		
B (OER)	I	2047-09-13T14:14:55.092		-20.97x	42.43x	117571.16	-5.89		
B (IER)	I	2047-09-13T15:28:53.633		-8.05x	53.21x	91984.69	-5.61		
C (IER)	I	2047-09-13T16:22:20.465		2.28x	57.03x	74490.58	-5.27		
Saturn	I	2047-09-13T16:55:40.989		9.01	57.02x	60226.08		9.63	11.77
Saturn	E	2047-09-13T22:34:55.509		80.87	-0.92x	60113.44		18.76	22.60
C (IER)	E	2047-09-13T22:37:27.308		81.25	-1.47x	74490.58	4.85		
B (IER)	E	2047-09-13T23:35:57.044		80.12	-14.23	91984.69	5.10		
B (OER)	E	2047-09-14T00:57:42.308		63.41	-31.82	117571.16	5.32		
A (IER)	E	2047-09-14T01:11:41.696		60.36	-34.75	122050.38	5.35		
Encke (IEG)	E	2047-09-14T01:46:50.703		52.67	-41.93	133423.31	5.43		
Encke (OEG)	E	2047-09-14T01:47:49.886		52.46	-42.12	133744.89	5.43		
A (OER)	E	2047-09-14T01:57:06.251		50.43	-43.96	136774.40	5.46		
F ring	E	2047-09-14T02:08:20.404		47.97	-46.13	140461.00	5.48		

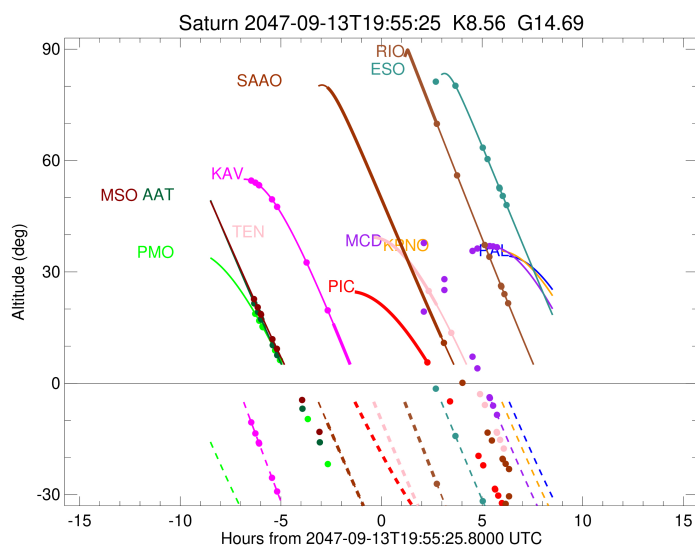
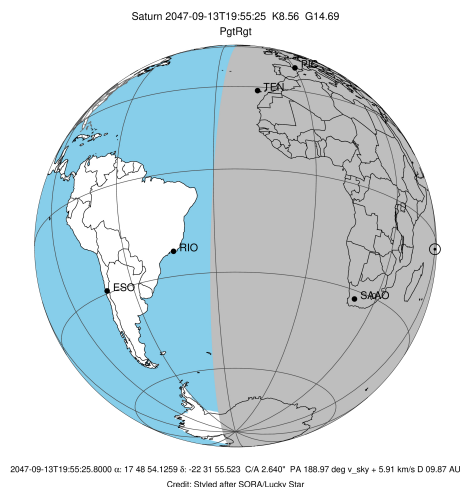
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-09-13T19:59:43.490
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : AAT
 Location : Siding Spring (AAT)
 Latitude (deg) : -31.27703
 E. Longitude (deg) : 149.06608
 Altitude (km) : 1.164
 Gaia source ID : 4068970450597019648
 2Mass ID (if available) : 17485412-2231553
 ICRS Star Coord at Epoch: 17h 48m 54.12593s -22:31:55.52302s
 RUWE (>1.4 is poor) : 0.79
 K magnitude : 8.557
 G magnitude : 14.694
 RP magnitude : 13.197
 BP magnitude : 17.810
 DUPflag : 0
 Distance (au) : 9.871
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 5.91
 Sun-Target sep (deg) : 97.14
 Sun-Moon sep (deg) : 171.41
 B (ring opening deg) : 26.91
 PA of pole (deg) : 5.30
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.943
 C/A sky separation (km) : 13911.5
 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	2047-09-13T13:36:18.845		21.49	-62.03	140461.00	-5.55		
A (OER)	I	2047-09-13T13:47:22.129		19.20	-62.42	136774.40	-5.57		
Encke (OEG)	I	2047-09-13T13:56:25.826		17.33	-62.56	133744.89	-5.58		
Encke (IEG)	I	2047-09-13T13:57:23.468		17.13	-62.56	133423.31	-5.58		
A (IER)	I	2047-09-13T14:31:13.972		10.24	-61.56	122050.38	-5.62		
B (OER)	I	2047-09-13T14:44:29.821		7.58	-60.58	117571.16	-5.63		
B (IER)	I	2047-09-13T15:59:53.134		-6.88x	-50.55	91984.69	-5.66		
C (IER)	I	2047-09-13T16:51:43.532		-15.93x	-41.08	74490.58	-5.57		
Saturn	I	2047-09-13T17:22:55.160		-20.87x	-34.90	60226.89		9.53	11.66
Saturn	E	2047-09-13T22:33:55.303		-27.97x	30.10x	60168.33		14.96	18.15
C (IER)	E	2047-09-13T22:48:54.295		-26.09x	32.96x	74490.58	5.84		
B (IER)	E	2047-09-13T23:37:59.283		-19.00x	41.70x	91984.69	6.02		
B (OER)	E	2047-09-14T00:48:16.801		-6.99x	51.47x	117571.16	6.10		
A (IER)	E	2047-09-14T01:00:31.495		-4.73x	52.66x	122050.38	6.10		
Encke (IEG)	E	2047-09-14T01:31:36.917		1.17x	54.77x	133423.31	6.09		
Encke (OEG)	E	2047-09-14T01:32:29.691		1.34x	54.81x	133744.89	6.09		
A (OER)	E	2047-09-14T01:40:47.004		2.95x	55.12x	136774.40	6.09		
F ring	E	2047-09-14T01:50:52.577		4.93x	55.35x	140461.00	6.09		

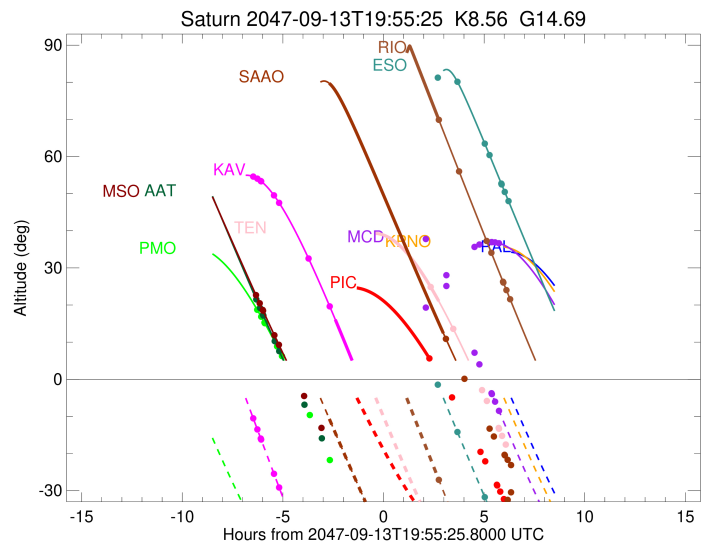
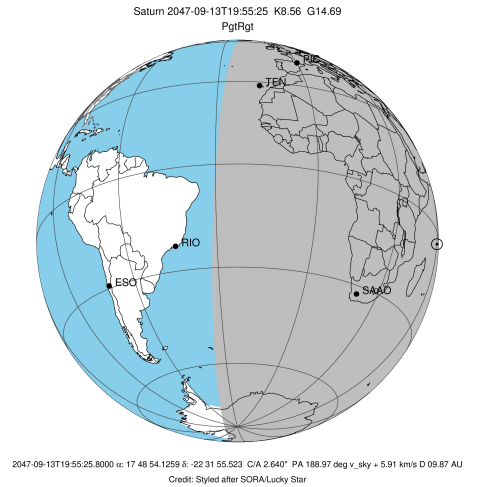
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-09-13T20:07:54.500
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : SAAO
 Location : So. Afr. Astro. Obs. (Sutherland)
 Latitude (deg) : -32.37953
 E. Longitude (deg) : 20.81070
 Altitude (km) : 1.768
 Gaia source ID : 4068970450597019648
 2Mass ID (if available) : 17485412-2231553
 ICRS Star Coord at Epoch: 17h 48m 54.12593s -22:31:55.52302s
 RUWE (>1.4 is poor) : 0.79
 K magnitude : 8.557
 G magnitude : 14.694
 RP magnitude : 13.197
 BP magnitude : 17.810
 DUPflag : 0
 Distance (au) : 9.871
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 5.91
 Sun-Target sep (deg) : 97.14
 Sun-Moon sep (deg) : 171.29
 B (ring opening deg) : 26.91
 PA of pole (deg) : 5.30
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 2.481
 C/A sky separation (km) : 17763.2
 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



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	2047-09-13T13:06:51.431		38.26	38.75x	140461.00	-5.39		
A (OER)	I	2047-09-13T13:18:17.132		40.68	36.79x	136774.40	-5.36		
Encke (OEG)	I	2047-09-13T13:27:43.335		42.68	35.12x	133744.89	-5.34		
Encke (IEG)	I	2047-09-13T13:28:43.583		42.89	34.94x	133423.31	-5.34		
A (IER)	I	2047-09-13T14:04:33.402		50.49	28.30x	122050.38	-5.24		
B (OER)	I	2047-09-13T14:18:50.914		53.51	25.54x	117571.16	-5.20		
B (IER)	I	2047-09-13T15:42:53.782		70.74	8.49x	91984.69	-4.93		
C (IER)	I	2047-09-13T16:43:51.164		79.84	-4.33x	74490.58	-4.61		
Saturn	I	2047-09-13T17:13:55.485		79.71	-10.69	60202.72		12.05	14.69
Saturn	E	2047-09-13T22:53:58.244		12.40	-60.89	60132.77		17.50	21.14
C (IER)	E	2047-09-13T23:01:34.241		10.88	-60.52	74490.58	5.04		
B (IER)	E	2047-09-13T23:56:53.561		0.11x	-55.14	91984.69	5.47		
B (OER)	E	2047-09-14T01:11:58.941		-13.34x	-42.88	117571.16	5.86		
A (IER)	E	2047-09-14T01:24:40.231		-15.43x	-40.50	122050.38	5.91		
Encke (IEG)	E	2047-09-14T01:56:25.943		-20.37x	-34.32	133423.31	6.02		
Encke (OEG)	E	2047-09-14T01:57:19.314		-20.50x	-34.14	133744.89	6.03		
A (OER)	E	2047-09-14T02:05:40.849		-21.71x	-32.47	136774.40	6.05		
F ring	E	2047-09-14T02:15:48.194		-23.13x	-30.43	140461.00	6.09		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-09-13T19:59:44.620
 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 : 4068970450597019648
 2Mass ID (if available) : 17485412-2231553
 ICRS Star Coord at Epoch: 17h 48m 54.12593s -22:31:55.52302s
 RUWE (>1.4 is poor) : 0.79
 K magnitude : 8.557
 G magnitude : 14.694
 RP magnitude : 13.197
 BP magnitude : 17.810
 DUPflag : 0
 Distance (au) : 9.871
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 5.91
 Sun-Target sep (deg) : 97.14
 Sun-Moon sep (deg) : 171.41
 B (ring opening deg) : 26.91
 PA of pole (deg) : 5.30
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.908
 C/A sky separation (km) : 13659.3
 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	2047-09-13T13:35:22.695		22.66	-58.04	140461.00	-5.56		
A (OER)	I	2047-09-13T13:46:25.042		20.45	-58.39	136774.40	-5.57		
Encke (OEG)	I	2047-09-13T13:55:28.032		18.65	-58.52	133744.89	-5.59		
Encke (IEG)	I	2047-09-13T13:56:25.602		18.46	-58.53	133423.31	-5.59		
A (IER)	I	2047-09-13T14:30:13.938		11.85	-57.75	122050.38	-5.63		
B (OER)	I	2047-09-13T14:43:29.104		9.30	-56.94	117571.16	-5.64		
B (IER)	I	2047-09-13T15:58:49.436		-4.53x	-48.16	91984.69	-5.66		
C (IER)	I	2047-09-13T16:50:36.821		-13.12x	-39.50	74490.58	-5.57		
Saturn	I	2047-09-13T17:22:21.436		-17.88x	-33.63	60229.07		9.28	11.34
Saturn	E	2047-09-13T22:34:32.564		-24.57x	28.36x	60171.04		14.75	17.90
C (IER)	E	2047-09-13T22:50:10.485		-22.74x	31.15x	74490.58	5.84		
B (IER)	E	2047-09-13T23:39:15.577		-16.08x	39.23x	91984.69	6.01		
B (OER)	E	2047-09-14T00:49:36.428		-4.67x	48.01x	117571.16	6.09		
A (IER)	E	2047-09-14T01:01:51.782		-2.51x	49.05x	122050.38	6.09		
Encke (IEG)	E	2047-09-14T01:32:58.778		3.13x	50.87x	133423.31	6.09		
Encke (OEG)	E	2047-09-14T01:33:51.593		3.29x	50.90x	133744.89	6.09		
A (OER)	E	2047-09-14T01:42:09.282		4.84x	51.16x	136774.40	6.09		
F ring	E	2047-09-14T01:52:15.281		6.73	51.34x	140461.00	6.08		