

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2045-04-13T21:11:33.280
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 4130975995710675712
 2Mass ID (if available) : 16373034-2006171

Saturn 2045-04-13T21:11:33 K9.50 G12.91 PgtRgt

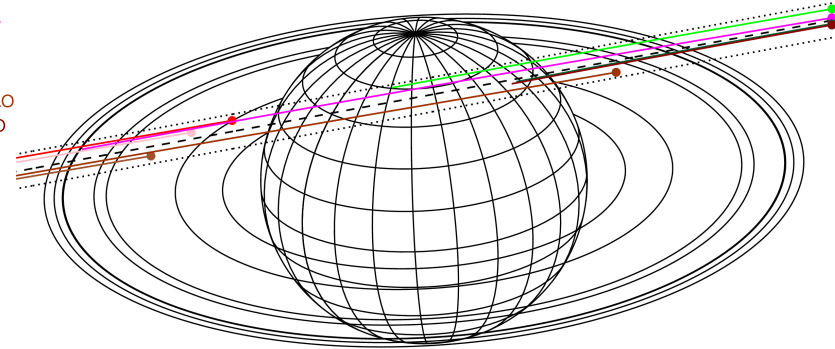
ICRS Star Coord at Epoch: 16h 37m 30.34359s -20:06:17.14762s

RUWE (>1.4 is poor) : 0.86
 K magnitude : 9.500
 G magnitude : 12.905
 RP magnitude : 11.950
 BP magnitude : 13.851
 DUPflag : 0
 Distance (au) : 9.284
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -10.77
 Sun-Target sep (deg) : 133.01
 Sun-Moon sep (deg) : 92.80
 B (ring opening deg) : 25.77
 PA of pole (deg) : 3.47



2045-04-13T21:11:33.2800 at: 16 37 30.3436 s: -20 06 17.148 C/A 4.556° PA 190.49 deg v_sky -10.77 km/s D 09.28 AU
 Credit: Styled after SORA/Lucky Star

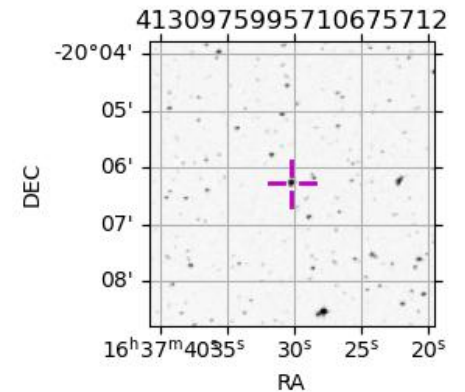
Earth
 PIC
 PMO
 TEN
 KAV
 RIO
 AAT
 SAAO
 MSO



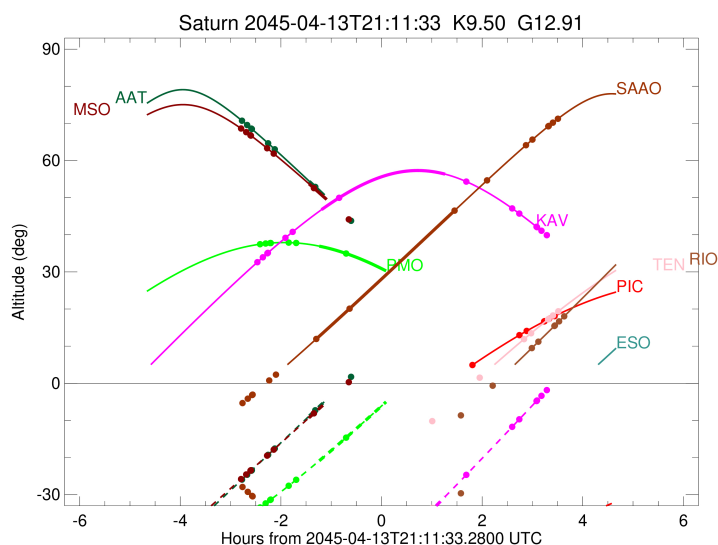
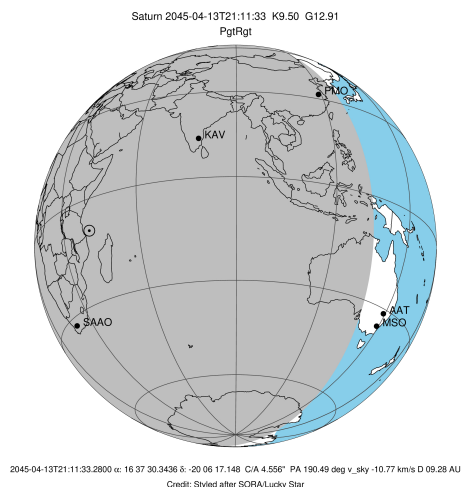
#	a(km)	ring
1	74490.6	C (IER)
2	91984.7	B (IER)
3	117571.2	B (OER)
4	122050.4	A (IER)
5	133423.3	Encke (IEG)
6	133744.9	Encke (OEG)
7	136774.4	A (OER)
8	140461.0	F ring

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	OEncode
PIC	Pic du Midi	42.9	0.1			+	APR 13 23:56 - APR 14 00:37	PnnRne
PAL	Palomar Mt (20	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs	32.1	118.8	+	+		APR 13 18:46 - APR 13 19:57	PinRin
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			+	APR 14 00:01 - APR 14 00:42	PnnRne
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observ	12.6	78.8	+	+	+	APR 13 18:43 - APR 13 23:55	PieRie
RIO	Rio de Janeiro	-22.9	316.8			+	APR 14 00:10 - APR 14 00:49	PnnRne
ESO	European South	-29.3	289.3					PnnRnn
AAT	Siding Spring	-31.3	149.1	+	+		APR 13 18:25 - APR 13 19:45	PinRin
SAAO	So. Afr. Astro	-32.4	20.8		+	+	APR 13 19:53 - APR 14 00:41	PieRie
MSO	Mt. Stromlo Ob	-35.3	149.0	+	+	+	APR 13 18:23 - APR 13 19:45	PinRin



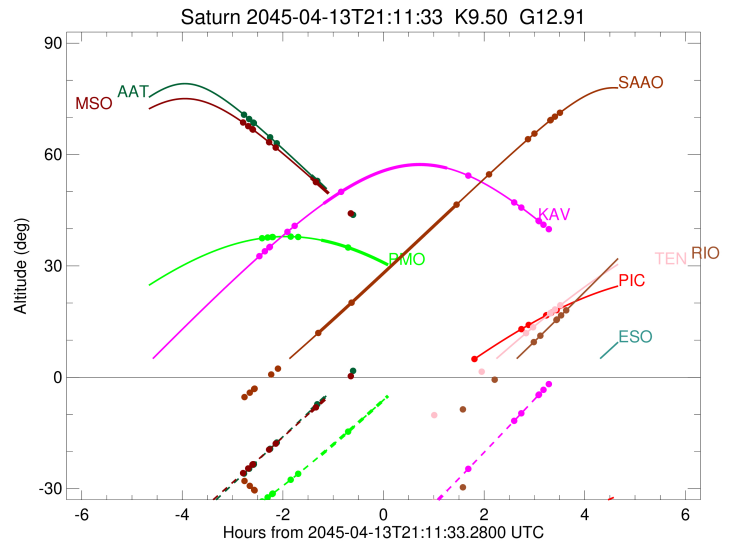
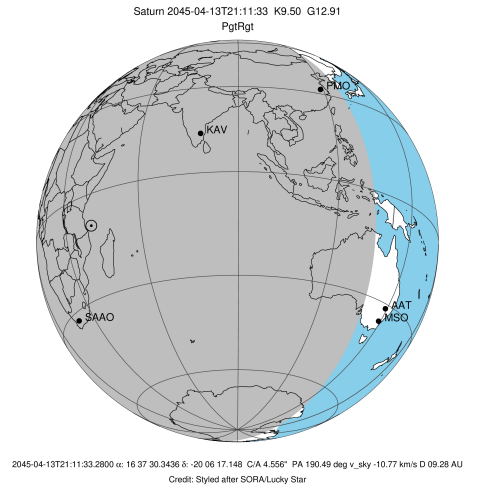
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2045-04-13T21:19:13.940
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 4130975995710675712
 2Mass ID (if available) : 16373034-2006171
 ICRS Star Coord at Epoch: 16h 37m 30.34359s -20:06:17.14762s
 RUWE (>1.4 is poor) : 0.86
 K magnitude : 9.500
 G magnitude : 12.905
 RP magnitude : 11.950
 BP magnitude : 13.851
 DUPflag : 0
 Distance (au) : 9.284
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -10.77
 Sun-Target sep (deg) : 133.01
 Sun-Moon sep (deg) : 92.56
 B (ring opening deg) : 25.77
 PA of pole (deg) : 3.47
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 5.035
 C/A sky separation (km) : 33902.9
 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	2045-04-13T18:43:32.446		-40.21x	-1.54x	140461.00	-9.14		
A (OER)	I	2045-04-13T18:50:17.986		-38.98x	-2.74x	136774.40	-9.04		
Encke (OEG)	I	2045-04-13T18:55:54.715		-37.96x	-3.73x	133744.89	-8.95		
Encke (IEG)	I	2045-04-13T18:56:30.656		-37.85x	-3.84x	133423.31	-8.94		
A (IER)	I	2045-04-13T19:18:11.047		-33.87x	-7.61	122050.38	-8.53		
B (OER)	I	2045-04-13T19:27:02.467		-32.24x	-9.12	117571.16	-8.32		
B (IER)	I	2045-04-13T20:24:48.837	b	-21.64x	-18.52	91984.69	-6.16		
Saturn	I	2045-04-13T20:02:32.162		-25.71x	-15.01	59801.11		36.23	41.78
Saturn	E	2045-04-13T22:35:26.489		1.05x	-34.37	60027.38		25.03	29.74
B (IER)	E	2045-04-13T22:59:59.851		4.91x	-36.04	91984.69	6.31		
B (OER)	E	2045-04-13T23:56:06.980		12.97	-37.77	117571.16	8.62		
A (IER)	E	2045-04-14T00:04:39.772		14.09	-37.76	122050.38	8.85		
Encke (IEG)	E	2045-04-14T00:25:30.699		16.66	-37.44	133423.31	9.32		
Encke (OEG)	E	2045-04-14T00:26:05.197		16.73	-37.42	133744.89	9.33		
A (OER)	E	2045-04-14T00:31:28.203		17.35	-37.27	136774.40	9.43		
F ring	E	2045-04-14T00:37:56.753		18.09	-37.04	140461.00	9.54		

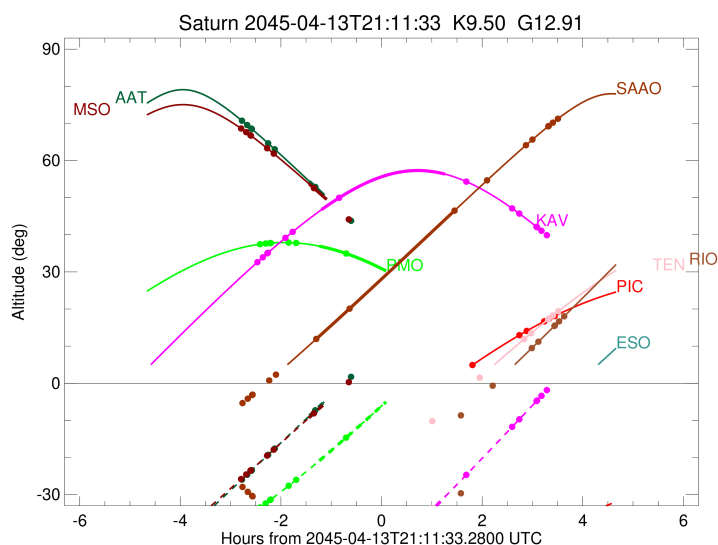
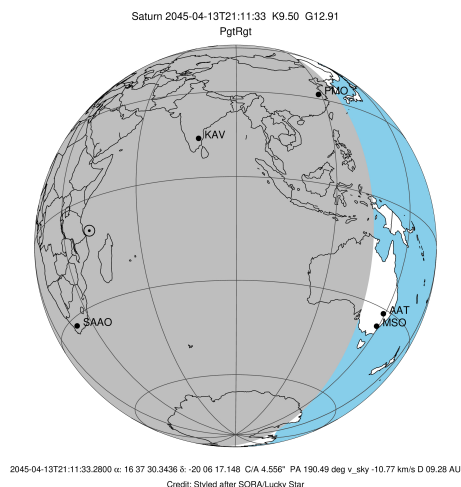
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2045-04-13T21:08:57.310
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 4130975995710675712
 2Mass ID (if available) : 16373034-2006171
 ICRS Star Coord at Epoch: 16h 37m 30.34359s -20:06:17.14762s
 RUWE (>1.4 is poor) : 0.86
 K magnitude : 9.500
 G magnitude : 12.905
 RP magnitude : 11.950
 BP magnitude : 13.851
 DUPflag : 0
 Distance (au) : 9.284
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -10.77
 Sun-Target sep (deg) : 133.01
 Sun-Moon sep (deg) : 93.29
 B (ring opening deg) : 25.77
 PA of pole (deg) : 3.47
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 5.325
 C/A sky separation (km) : 35855.3
 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	2045-04-13T18:46:31.546		37.45	-33.49	140461.00	-9.32		
A (OER)	I	2045-04-13T18:53:09.439		37.64	-32.40	136774.40	-9.20		
Encke (OEG)	I	2045-04-13T18:58:40.475		37.76	-31.47	133744.89	-9.10		
Encke (IEG)	I	2045-04-13T18:59:15.848		37.77	-31.37	133423.31	-9.09		
A (IER)	I	2045-04-13T19:20:41.625		37.89	-27.64	122050.38	-8.58		
B (OER)	I	2045-04-13T19:29:31.232		37.80	-26.05	117571.16	-8.33		
B (IER)	I	2045-04-13T20:29:18.551	b	34.96	-14.66	91984.69	-5.60		
Saturn	I	2045-04-13T19:57:16.363		36.94	-20.88	59748.94		38.58	44.18
Saturn	E	2045-04-13T22:21:19.573		21.38	8.43x	60003.31		26.35	31.21
B (IER)	E	2045-04-13T22:42:21.830		18.00	12.88x	91984.69	5.61		
B (OER)	E	2045-04-13T23:42:17.501		7.45	25.60x	117571.16	8.29		
A (IER)	E	2045-04-13T23:51:09.937		5.79	27.48x	122050.38	8.53		
Encke (IEG)	E	2045-04-14T00:12:43.606		1.69x	32.02x	133423.31	9.03		
Encke (OEG)	E	2045-04-14T00:13:19.213		1.58x	32.14x	133744.89	9.04		
A (OER)	E	2045-04-14T00:18:52.488		0.50x	33.30x	136774.40	9.14		
F ring	E	2045-04-14T00:25:33.164		-0.80x	34.70x	140461.00	9.26		

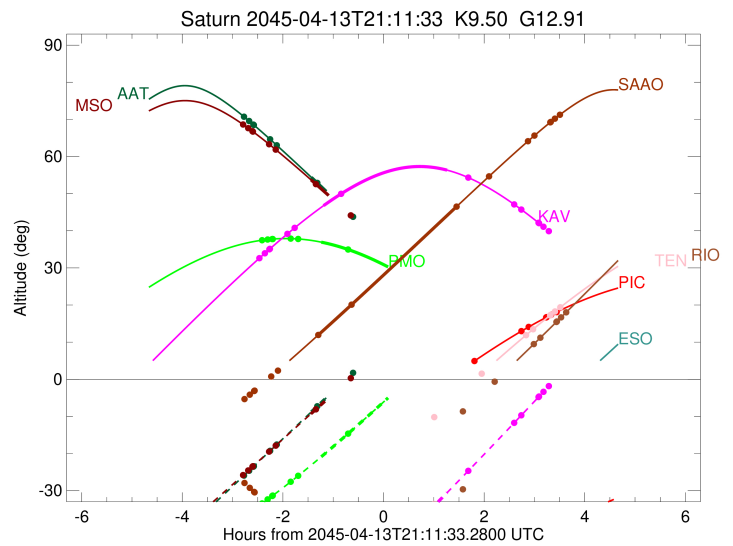
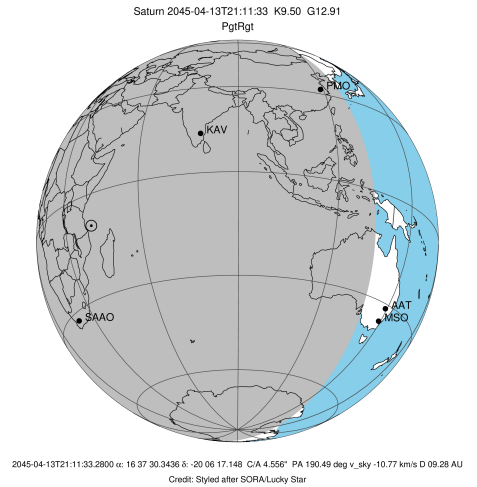
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2045-04-13T21:19:57.670
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 4130975995710675712
 2Mass ID (if available) : 16373034-2006171
 ICRS Star Coord at Epoch: 16h 37m 30.34359s -20:06:17.14762s
 RUWE (>1.4 is poor) : 0.86
 K magnitude : 9.500
 G magnitude : 12.905
 RP magnitude : 11.950
 BP magnitude : 13.851
 DUPflag : 0
 Distance (au) : 9.284
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -10.77
 Sun-Target sep (deg) : 133.01
 Sun-Moon sep (deg) : 92.41
 B (ring opening deg) : 25.77
 PA of pole (deg) : 3.47
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.755
 C/A sky separation (km) : 32016.3
 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	2045-04-13T18:37:26.969		-57.04x	10.72x	140461.00	-9.26		
A (OER)	I	2045-04-13T18:44:06.865		-55.58x	9.26x	136774.40	-9.18		
Encke (OEG)	I	2045-04-13T18:49:38.408		-54.36x	8.05x	133744.89	-9.10		
Encke (IEG)	I	2045-04-13T18:50:13.767		-54.23x	7.92x	133423.31	-9.09		
A (IER)	I	2045-04-13T19:11:28.580		-49.54x	3.28x	122050.38	-8.74		
B (OER)	I	2045-04-13T19:20:06.430		-47.63x	1.40x	117571.16	-8.56		
B (IER)	I	2045-04-13T20:14:53.590	b	-35.54x	-10.34	91984.69	-6.78		
C (IER)	I	2045-04-13T21:12:57.359	b	-22.85x	-22.31	74490.58	-2.85		
Saturn	I	2045-04-13T20:00:21.986		-38.74x	-7.26	59840.62		34.42	39.89
Saturn	E	2045-04-13T22:38:50.770		-4.60x	-38.22	60059.92		23.16	27.64
C (IER)	E	2045-04-13T22:11:55.674	b	-10.23x	-33.56	74490.58	2.90		
B (IER)	E	2045-04-13T23:08:40.068		1.50x	-42.88	91984.69	6.97		
B (OER)	E	2045-04-14T00:01:37.144		11.90	-49.28	117571.16	8.91		
A (IER)	E	2045-04-14T00:09:54.047		13.46	-50.00	122050.38	9.11		
Encke (IEG)	E	2045-04-14T00:30:13.228		17.20	-51.39	133423.31	9.53		
Encke (OEG)	E	2045-04-14T00:30:46.964		17.31	-51.42	133744.89	9.54		
A (OER)	E	2045-04-14T00:36:03.083		18.25	-51.68	136774.40	9.63		
F ring	E	2045-04-14T00:42:23.890		19.38	-51.94	140461.00	9.73		

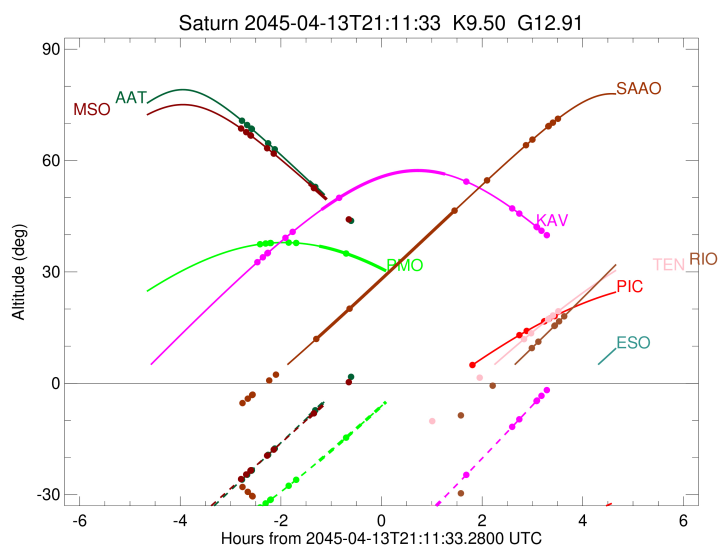
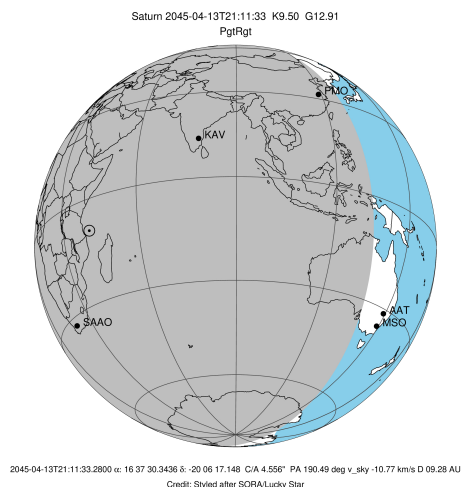
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2045-04-13T21:13:41.330
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KAV
 Location : Kavalur Observatory
 Latitude (deg) : 12.57556
 E. Longitude (deg) : 78.83167
 Altitude (km) : 0.722
 Gaia source ID : 4130975995710675712
 2Mass ID (if available) : 16373034-2006171
 ICRS Star Coord at Epoch: 16h 37m 30.34359s -20:06:17.14762s
 RUWE (>1.4 is poor) : 0.86
 K magnitude : 9.500
 G magnitude : 12.905
 RP magnitude : 11.950
 BP magnitude : 13.851
 DUPflag : 0
 Distance (au) : 9.284
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -10.77
 Sun-Target sep (deg) : 133.01
 Sun-Moon sep (deg) : 93.55
 B (ring opening deg) : 25.77
 PA of pole (deg) : 3.47
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 5.024
 C/A sky separation (km) : 33830.7
 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

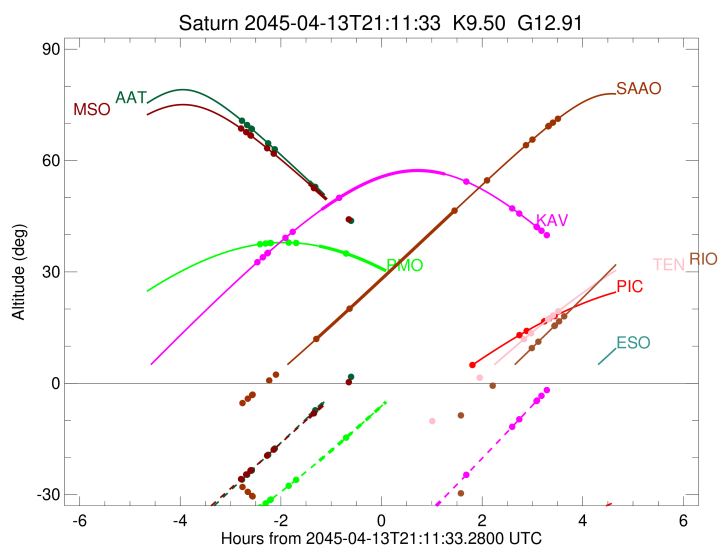
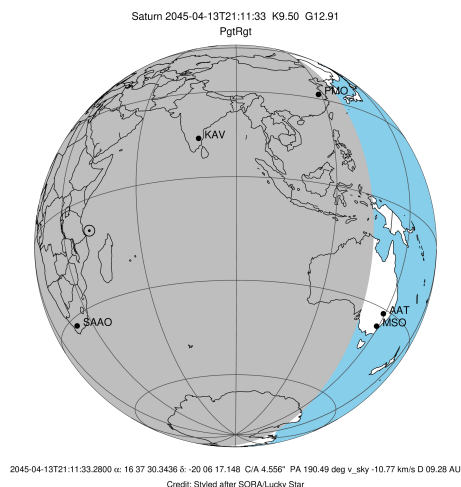
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2045-04-13T18:43:20.384		32.58	-68.10	140461.00	-9.45		
A (OER)	I	2045-04-13T18:49:52.340		33.90	-68.07	136774.40	-9.36		
Encke (OEG)	I	2045-04-13T18:55:17.665		34.98	-67.95	133744.89	-9.27		
Encke (IEG)	I	2045-04-13T18:55:52.383		35.09	-67.93	133423.31	-9.26		
A (IER)	I	2045-04-13T19:16:47.722		39.14	-66.71	122050.38	-8.84		
B (OER)	I	2045-04-13T19:25:20.314		40.74	-65.91	117571.16	-8.63		
B (IER)	I	2045-04-13T20:20:57.133	b	49.95	-57.61	91984.69	-6.42		
Saturn	I	2045-04-13T20:00:00.554		46.76	-61.23	59804.17		36.09	41.63
Saturn	E	2045-04-13T22:27:26.790		56.33	-30.54	60032.48		24.75	29.42
B (IER)	E	2045-04-13T22:52:39.369		54.33	-24.68	91984.69	6.50		
B (OER)	E	2045-04-13T23:47:28.909		47.09	-11.72	117571.16	8.77		
A (IER)	E	2045-04-13T23:55:52.919		45.72	-9.72	122050.38	9.00		
Encke (IEG)	E	2045-04-14T00:16:25.450		42.16	-4.80x	133423.31	9.44		
Encke (OEG)	E	2045-04-14T00:16:59.501		42.05	-4.66x	133744.89	9.45		
A (OER)	E	2045-04-14T00:22:18.476		41.09	-3.39x	136774.40	9.54		
F ring	E	2045-04-14T00:28:42.549		39.90	-1.85x	140461.00	9.65		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2045-04-13T21:17:01.420
 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 : 4130975995710675712
 2Mass ID (if available) : 16373034-2006171
 ICRS Star Coord at Epoch: 16h 37m 30.34359s -20:06:17.14762s
 RUWE (>1.4 is poor) : 0.86
 K magnitude : 9.500
 G magnitude : 12.905
 RP magnitude : 11.950
 BP magnitude : 13.851
 DUPflag : 0
 Distance (au) : 9.284
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -10.77
 Sun-Target sep (deg) : 133.01
 Sun-Moon sep (deg) : 92.36
 B (ring opening deg) : 25.77
 PA of pole (deg) : 3.47
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 3.904
 C/A sky separation (km) : 26288.1
 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



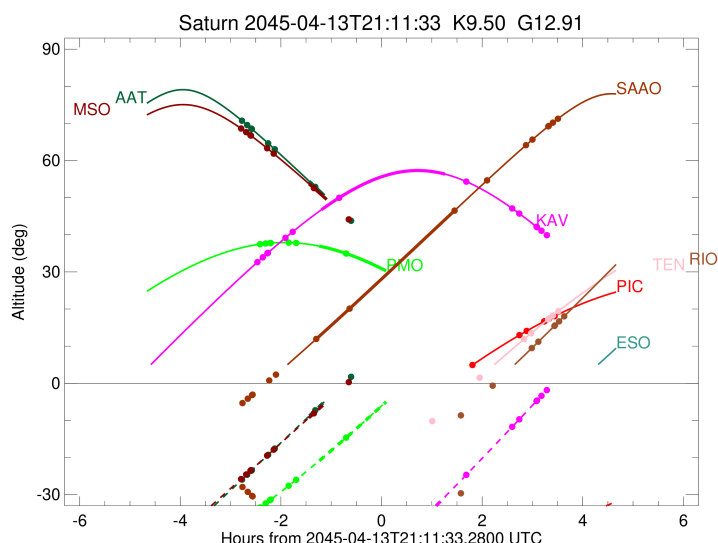
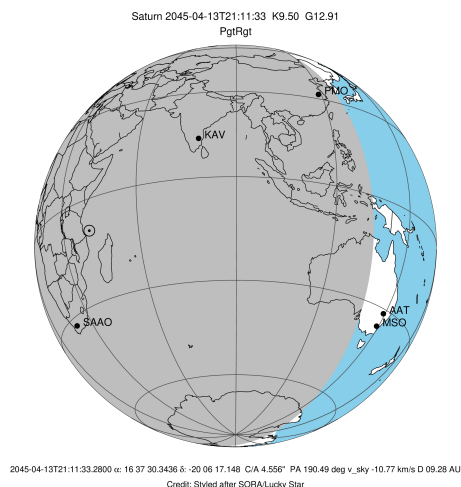
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2045-04-13T18:19:09.214		-46.88x	30.21x	140461.00	-9.74		
A (OER)	I	2045-04-13T18:25:28.638		-46.72x	28.90x	136774.40	-9.69		
Encke (OEG)	I	2045-04-13T18:30:42.175		-46.54x	27.81x	133744.89	-9.64		
Encke (IEG)	I	2045-04-13T18:31:15.554		-46.52x	27.70x	133423.31	-9.63		
A (IER)	I	2045-04-13T18:51:09.926		-45.50x	23.48x	122050.38	-9.40		
B (OER)	I	2045-04-13T18:59:09.040		-44.95x	21.77x	117571.16	-9.29		
B (IER)	I	2045-04-13T19:47:23.572		-40.11x	11.19x	91984.69	-8.26		
C (IER)	I	2045-04-13T20:26:13.233	b	-34.67x	2.48x	74490.58	-6.58		
Saturn	I	2045-04-13T19:50:53.261		-39.67x	10.41x	59946.94		29.29	34.43
Saturn	E	2045-04-13T22:42:26.319		-9.44x	-28.77	60147.96		17.36	20.98
C (IER)	E	2045-04-13T22:46:10.878		-8.66x	-29.63	74490.58	6.72		
B (IER)	E	2045-04-13T23:24:06.923		-0.67x	-38.36	91984.69	8.48		
B (OER)	E	2045-04-14T00:10:54.125		9.49	-49.01	117571.16	9.62		
A (IER)	E	2045-04-14T00:18:36.432		11.19	-50.75	122050.38	9.75		
Encke (IEG)	E	2045-04-14T00:37:46.160		15.43	-55.02	133423.31	10.02		
Encke (OEG)	E	2045-04-14T00:38:18.237		15.55	-55.13	133744.89	10.03		
A (OER)	E	2045-04-14T00:43:19.401		16.67	-56.24	136774.40	10.09		
F ring	E	2045-04-14T00:49:23.519		18.02	-57.57	140461.00	10.16		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2045-04-13T21:04:16.890
 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 : 4130975995710675712
 2Mass ID (if available) : 16373034-2006171
 ICRS Star Coord at Epoch: 16h 37m 30.34359s -20:06:17.14762s
 RUWE (>1.4 is poor) : 0.86
 K magnitude : 9.500
 G magnitude : 12.905
 RP magnitude : 11.950
 BP magnitude : 13.851
 DUPflag : 0
 Distance (au) : 9.284
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -10.77
 Sun-Target sep (deg) : 133.01
 Sun-Moon sep (deg) : 93.38
 B (ring opening deg) : 25.77
 PA of pole (deg) : 3.47
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.373
 C/A sky separation (km) : 29444.1
 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	2045-04-13T18:25:01.357		70.75	-25.98	140461.00	-10.06		
A (OER)	I	2045-04-13T18:31:09.091		69.60	-24.67	136774.40	-9.99		
Encke (OEG)	I	2045-04-13T18:36:13.471		68.63	-23.58	133744.89	-9.92		
Encke (IEG)	I	2045-04-13T18:36:45.905		68.53	-23.47	133423.31	-9.91		
A (IER)	I	2045-04-13T18:56:10.901		64.67	-19.32	122050.38	-9.60		
B (OER)	I	2045-04-13T19:04:01.212		63.08	-17.64	117571.16	-9.45		
B (IER)	I	2045-04-13T19:52:29.437	b	52.91	-7.29	91984.69	-7.97		
C (IER)	I	2045-04-13T20:35:22.372	b	43.74	1.76x	74490.58	-5.36		
Saturn	I	2045-04-13T19:45:26.486		54.41	-8.79	59878.67		32.63	38.01
Saturn	E	2045-04-13T22:24:09.871		20.54	23.58x	60117.53		19.53	23.49
C (IER)	E	2045-04-13T22:19:57.330	b	21.43	22.79x	74490.58	5.36		
B (IER)	E	2045-04-13T23:03:07.567		12.43	30.66x	91984.69	7.87		
B (OER)	E	2045-04-13T23:52:23.354		2.44x	38.61x	117571.16	9.26		
A (IER)	E	2045-04-14T00:00:23.309		0.86x	39.76x	122050.38	9.40		
Encke (IEG)	E	2045-04-14T00:20:14.152		-3.02x	42.40x	133423.31	9.69		
Encke (OEG)	E	2045-04-14T00:20:47.343		-3.12x	42.47x	133744.89	9.69		
A (OER)	E	2045-04-14T00:25:58.922		-4.12x	43.11x	136774.40	9.75		
F ring	E	2045-04-14T00:32:15.575		-5.32x	43.84x	140461.00	9.82		

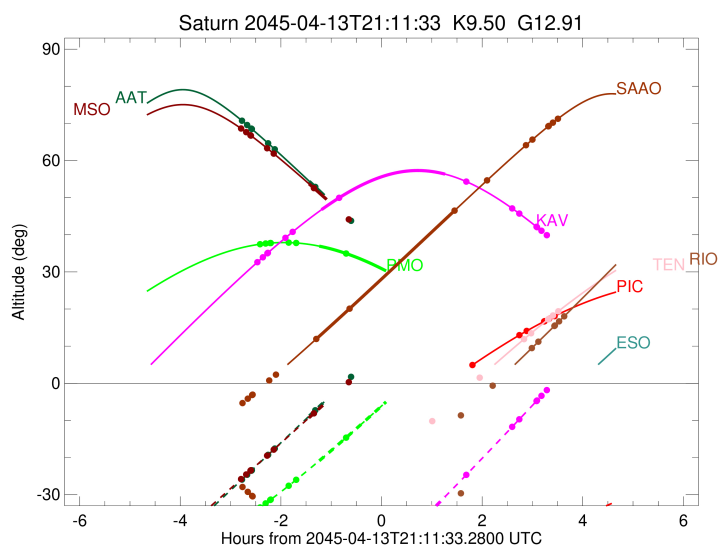
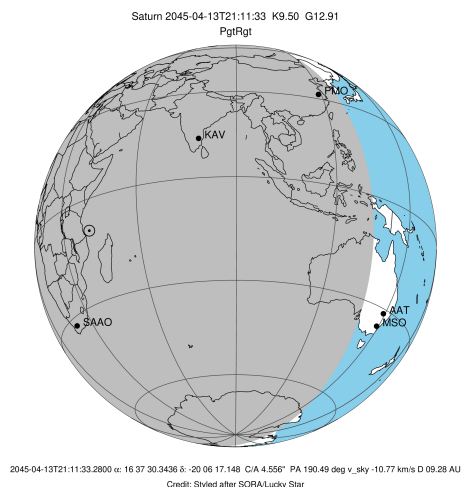
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2045-04-13T21:17:52.060
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : SAAO
 Location : So. Afr. Astro. Obs. (Sutherland)
 Latitude (deg) : -32.37953
 E. Longitude (deg) : 20.81070
 Altitude (km) : 1.768
 Gaia source ID : 4130975995710675712
 2Mass ID (if available) : 16373034-2006171
 ICRS Star Coord at Epoch: 16h 37m 30.34359s -20:06:17.14762s
 RUWE (>1.4 is poor) : 0.86
 K magnitude : 9.500
 G magnitude : 12.905
 RP magnitude : 11.950
 BP magnitude : 13.851
 DUPflag : 0
 Distance (au) : 9.284
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -10.77
 Sun-Target sep (deg) : 133.01
 Sun-Moon sep (deg) : 93.20
 B (ring opening deg) : 25.77
 PA of pole (deg) : 3.47
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.064
 C/A sky separation (km) : 27360.2
 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	2045-04-13T18:25:38.325		-5.37x	-27.91	140461.00	-9.79		
A (OER)	I	2045-04-13T18:31:55.966		-4.18x	-29.23	136774.40	-9.73		
Encke (OEG)	I	2045-04-13T18:37:07.982		-3.20x	-30.32	133744.89	-9.68		
Encke (IEG)	I	2045-04-13T18:37:41.197		-3.09x	-30.43	133423.31	-9.68		
A (IER)	I	2045-04-13T18:57:29.766		0.72x	-34.56	122050.38	-9.45		
B (OER)	I	2045-04-13T19:05:26.769		2.27x	-36.21	117571.16	-9.33		
B (IER)	I	2045-04-13T19:53:41.535		11.92	-45.96	91984.69	-8.20		
C (IER)	I	2045-04-13T20:33:30.741	b	20.11	-53.49	74490.58	-6.23		
Saturn	I	2045-04-13T19:55:43.922		12.33	-46.36	59937.61		29.76	34.94
Saturn	E	2045-04-13T22:39:13.528		46.62	-67.25	60129.99		18.67	22.49
C (IER)	E	2045-04-13T22:38:37.451	b	46.49	-67.25	74490.58	6.38		
B (IER)	E	2045-04-13T23:17:23.683		54.65	-65.42	91984.69	8.45		
B (OER)	E	2045-04-14T00:03:55.036		64.14	-59.66	117571.16	9.73		
A (IER)	E	2045-04-14T00:11:31.960		65.64	-58.47	122050.38	9.87		
Encke (IEG)	E	2045-04-14T00:30:26.925		69.21	-55.31	133423.31	10.16		
Encke (OEG)	E	2045-04-14T00:30:58.572		69.30	-55.21	133744.89	10.17		
A (OER)	E	2045-04-14T00:35:55.662		70.20	-54.34	136774.40	10.23		
F ring	E	2045-04-14T00:41:54.801		71.24	-53.27	140461.00	10.30		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2045-04-13T21:04:28.290
 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 : 4130975995710675712
 2Mass ID (if available) : 16373034-2006171
 ICRS Star Coord at Epoch: 16h 37m 30.34359s -20:06:17.14762s
 RUWE (>1.4 is poor) : 0.86
 K magnitude : 9.500
 G magnitude : 12.905
 RP magnitude : 11.950
 BP magnitude : 13.851
 DUPflag : 0
 Distance (au) : 9.284
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -10.77
 Sun-Target sep (deg) : 133.01
 Sun-Moon sep (deg) : 93.38
 B (ring opening deg) : 25.77
 PA of pole (deg) : 3.47
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.309
 C/A sky separation (km) : 29016.3
 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	2045-04-13T18:23:56.500		68.65	-25.84	140461.00	-10.09		
A (OER)	I	2045-04-13T18:30:03.163		67.67	-24.60	136774.40	-10.02		
Encke (OEG)	I	2045-04-13T18:35:06.575		66.83	-23.57	133744.89	-9.95		
Encke (IEG)	I	2045-04-13T18:35:38.900		66.74	-23.46	133423.31	-9.94		
A (IER)	I	2045-04-13T18:54:59.311		63.34	-19.52	122050.38	-9.64		
B (OER)	I	2045-04-13T19:02:47.307		61.91	-17.93	117571.16	-9.50		
B (IER)	I	2045-04-13T19:50:50.672	b	52.58	-8.12	91984.69	-8.08		
C (IER)	I	2045-04-13T20:32:39.438	b	44.13	0.32x	74490.58	-5.62		
Saturn	I	2045-04-13T19:45:10.271		53.72	-9.28	59887.41		32.21	37.57
Saturn	E	2045-04-13T22:24:46.815		21.24	21.70x	60123.34		19.13	23.03
C (IER)	E	2045-04-13T22:22:17.126	b	21.74	21.26x	74490.58	5.61		
B (IER)	E	2045-04-13T23:04:22.536		13.33	28.43x	91984.69	7.98		
B (OER)	E	2045-04-13T23:53:10.692		3.86x	35.70x	117571.16	9.32		
A (IER)	E	2045-04-14T00:01:07.758		2.35x	36.75x	122050.38	9.46		
Encke (IEG)	E	2045-04-14T00:20:52.467		-1.33x	39.13x	133423.31	9.73		
Encke (OEG)	E	2045-04-14T00:21:25.504		-1.43x	39.20x	133744.89	9.74		
A (OER)	E	2045-04-14T00:26:35.680		-2.38x	39.77x	136774.40	9.80		
F ring	E	2045-04-14T00:32:50.722		-3.52x	40.43x	140461.00	9.86		