

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-06-04T04:07:35.670
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 4069720725458625536
 2Mass ID (if available) : 18083350-2219456

Saturn 2047-06-04T04:07:35 K9.70 G12.75 PgtRgt

ICRS Star Coord at Epoch: 18h 08m 33.50813s -22:19:45.62503s

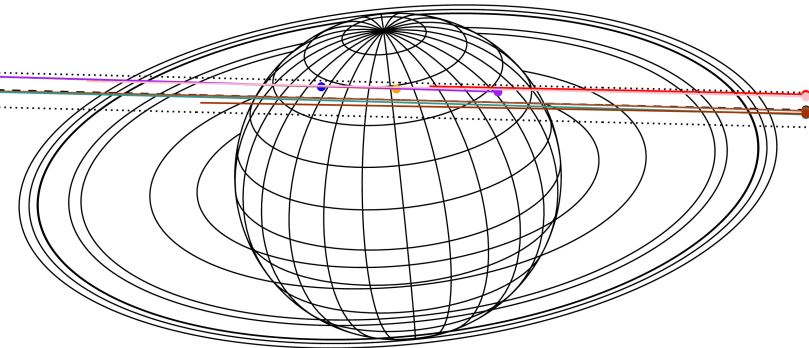
RUWE (>1.4 is poor) : 1.12
 K magnitude : 9.701
 G magnitude : 12.749
 RP magnitude : 11.811
 BP magnitude : 13.614
 DUPflag : 0
 Distance (au) : 9.082
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.53
 Sun-Target sep (deg) : 160.84
 Sun-Moon sep (deg) : 73.78
 B (ring opening deg) : 26.27
 PA of pole (deg) : 5.68

Saturn 2047-06-04T04:07:35 K9.70 G12.75
 PgtRgt



2047-06-04T04:07:35.6700 at: 18 08 33.50813 s: -22 19 45.625 C/A 4.294° PA 178.59 deg v_sky -18.53 km/s D 09.08 AU
 Credit: Styled after SORA/Lucky Star

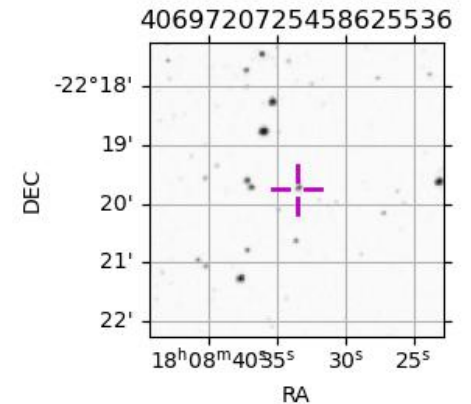
Earth
 PIC
 PAL
 KPNO
 MCD
 TEN
 RIO
 ESO
 SAAO



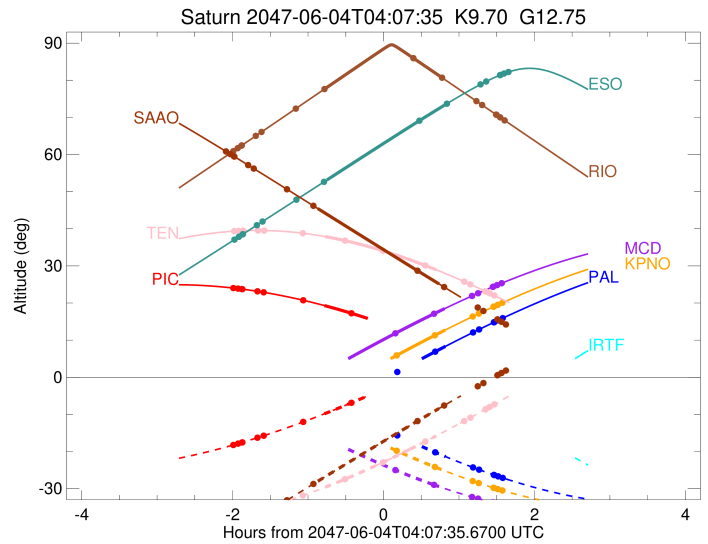
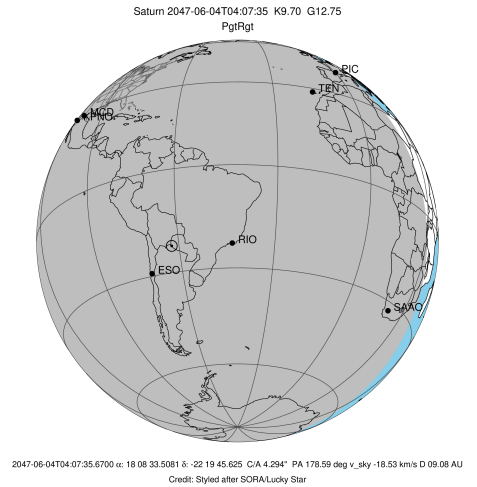
#	a(km)	ring
1	74490.6	C (IER)
2	91984.7	B (IER)
3	117571.2	B (OER)
4	122050.4	A (IER)
5	133423.3	Encke (IEG)
6	133744.9	Encke (OEG)
7	136774.4	A (OER)
8	140461.0	F ring

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	+ + + + +	+		JUN 04 02:08 - JUN 04 03:20	PinRin
PAL	Palomar Mt (20	33.4	243.1		+	+ + + + +	JUN 04 04:56 - JUN 04 05:42	PneRne
PMO	Purple Mtn Obs	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl	32.0	248.4		+	+ + + + +	JUN 04 04:56 - JUN 04 05:42	PneRne
MCD	McDonald Obs.	30.7	256.0		+	+ + + + +	JUN 04 04:56 - JUN 04 05:41	PneRne
TEN	Teide Obs./Ten	28.3	343.5	+ + + + +	+	+ + + + +	JUN 04 02:08 - JUN 04 05:35	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	+ + + + +	+	+ + + + +	JUN 04 02:08 - JUN 04 05:43	PieRie
ESO	European South	-29.3	289.3	+ + + + +	+	+ + + + +	JUN 04 02:09 - JUN 04 05:46	PieRie
AAT	Siding Spring	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro	-32.4	20.8	+ + + + +	+	+	JUN 04 02:02 - JUN 04 04:55	PieRie
MSO	Mt. Stromlo Ob	-35.3	149.0					PnnRnn



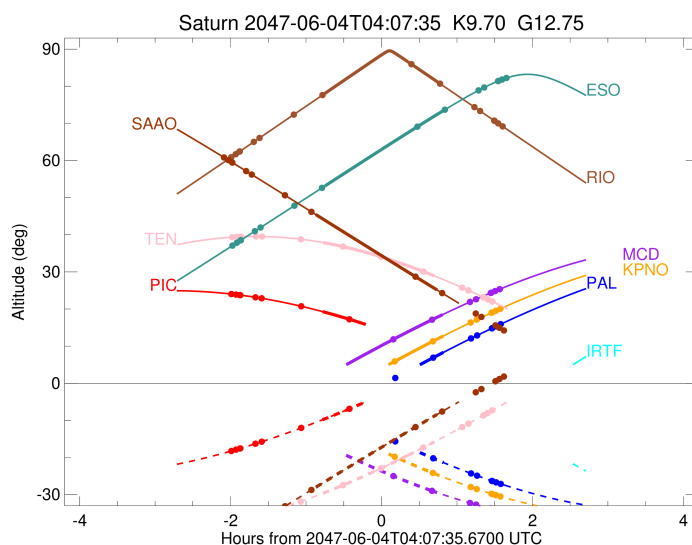
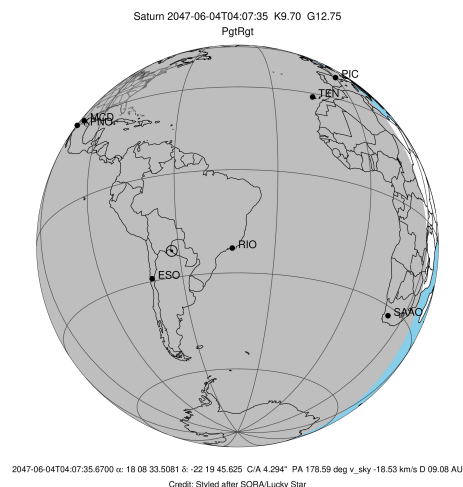
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-06-04T04:04:50.230
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 4069720725458625536
 2Mass ID (if available) : 18083350-2219456
 ICRS Star Coord at Epoch: 18h 08m 33.50813s -22:19:45.62503s
 RUWE (>1.4 is poor) : 1.12
 K magnitude : 9.701
 G magnitude : 12.749
 RP magnitude : 11.811
 BP magnitude : 13.614
 DUPflag : 0
 Distance (au) : 9.082
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.53
 Sun-Target sep (deg) : 160.84
 Sun-Moon sep (deg) : 74.18
 B (ring opening deg) : 26.27
 PA of pole (deg) : 5.68
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 5.091
 C/A sky separation (km) : 33533.1
 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



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	2047-06-04T02:08:09.982		24.03	-18.25	140461.00	-16.49		
A (OER)	I	2047-06-04T02:11:54.660		23.88	-17.88	136774.40	-16.32		
Encke (OEG)	I	2047-06-04T02:15:01.161		23.75	-17.57	133744.89	-16.17		
Encke (IEG)	I	2047-06-04T02:15:21.065		23.74	-17.54	133423.31	-16.15		
A (IER)	I	2047-06-04T02:27:20.491		23.16	-16.29	122050.38	-15.44		
B (OER)	I	2047-06-04T02:32:13.924		22.89	-15.76	117571.16	-15.09		
B (IER)	I	2047-06-04T03:03:43.356		20.74	-12.03	91984.69	-11.57		
C (IER)	I	2047-06-04T03:42:06.462	b	17.23	-6.88	74490.58	-2.69		
Saturn	I	2047-06-04T03:20:40.577		19.31	-9.83	60032.01		24.16	28.77
Saturn	E	2047-06-04T04:48:49.397		9.19	3.32x	59785.85		35.93	41.47
C (IER)	E	2047-06-04T04:00:02.658	b	15.29	-4.28x	74490.58	2.68		
B (IER)	E	2047-06-04T04:38:45.279	b	10.54	1.70x	91984.69	11.48		
B (OER)	E	2047-06-04T05:10:29.197		6.15	6.89x	117571.16	14.96		
A (IER)	E	2047-06-04T05:15:25.127		5.43	7.72x	122050.38	15.30		
Encke (IEG)	E	2047-06-04T05:27:31.125		3.63x	9.78x	133423.31	15.99		
Encke (OEG)	E	2047-06-04T05:27:51.220		3.58x	9.83x	133744.89	16.01		
A (OER)	E	2047-06-04T05:30:59.540		3.11x	10.37x	136774.40	16.16		
F ring	E	2047-06-04T05:34:46.471		2.53x	11.02x	140461.00	16.33		

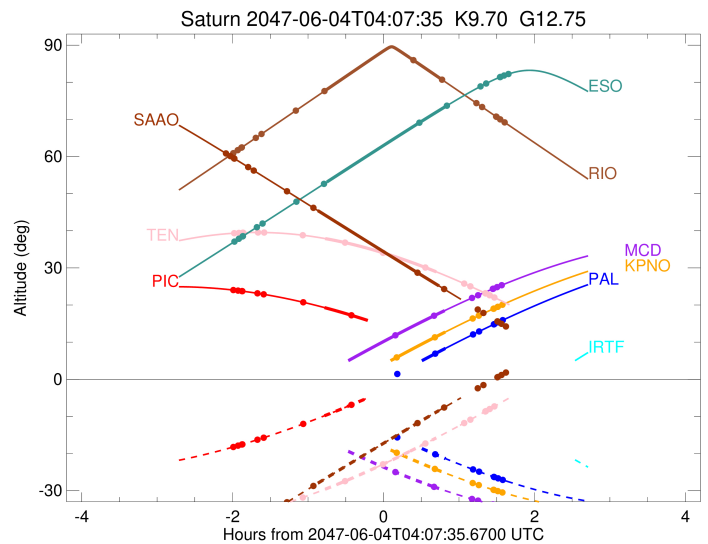
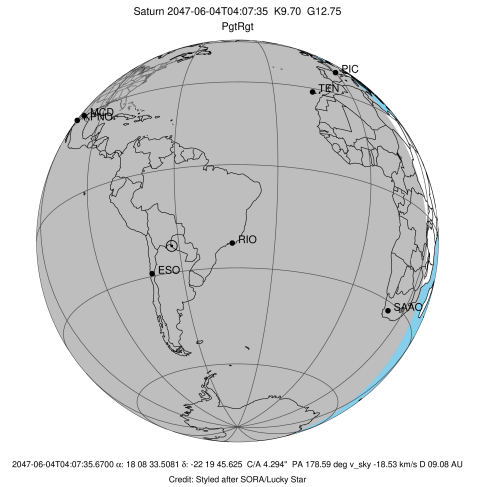
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-06-04T04:11:53.540
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 4069720725458625536
 2Mass ID (if available) : 18083350-2219456
 ICRS Star Coord at Epoch: 18h 08m 33.50813s -22:19:45.62503s
 RUWE (>1.4 is poor) : 1.12
 K magnitude : 9.701
 G magnitude : 12.749
 RP magnitude : 11.811
 BP magnitude : 13.614
 DUPflag : 0
 Distance (au) : 9.082
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.53
 Sun-Target sep (deg) : 160.84
 Sun-Moon sep (deg) : 73.56
 B (ring opening deg) : 26.27
 PA of pole (deg) : 5.68
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.891
 C/A sky separation (km) : 32216.9
 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	2047-06-04T02:11:46.012	-23.52x	6.93x	140461.00	-16.50			
A (OER)	I	2047-06-04T02:15:30.452	-22.75x	6.21x	136774.40	-16.35			
Encke (OEG)	I	2047-06-04T02:18:36.460	-22.12x	5.61x	133744.89	-16.22			
Encke (IEG)	I	2047-06-04T02:18:56.294	-22.05x	5.55x	133423.31	-16.21			
A (IER)	I	2047-06-04T02:30:50.758	-19.62x	3.27x	122050.38	-15.60			
B (OER)	I	2047-06-04T02:35:40.568	-18.64x	2.36x	117571.16	-15.30			
B (IER)	I	2047-06-04T03:06:07.711	-12.52x	-3.29x	91984.69	-12.33			
C (IER)	I	2047-06-04T03:36:26.961	b	-6.57x	-8.68	74490.58	-6.25		
Saturn	I	2047-06-04T03:26:27.182		-8.51x	-6.93	60066.42		22.22	26.57
Saturn	E	2047-06-04T04:56:51.769		8.33	-21.37	59801.27		35.26	40.77
C (IER)	E	2047-06-04T04:18:22.209	b	1.39x	-15.63	74490.58	6.22		
B (IER)	E	2047-06-04T04:48:40.121	b	6.89	-20.21	91984.69	12.40		
B (OER)	E	2047-06-04T05:18:49.688		12.08	-24.30	117571.16	15.50		
A (IER)	E	2047-06-04T05:23:35.688		12.88	-24.89	122050.38	15.82		
Encke (IEG)	E	2047-06-04T05:35:19.743		14.79	-26.30	133423.31	16.46		
Encke (OEG)	E	2047-06-04T05:35:39.268		14.85	-26.34	133744.89	16.48		
A (OER)	E	2047-06-04T05:38:42.328		15.33	-26.69	136774.40	16.62		
F ring	E	2047-06-04T05:42:23.089		15.92	-27.10	140461.00	16.78		

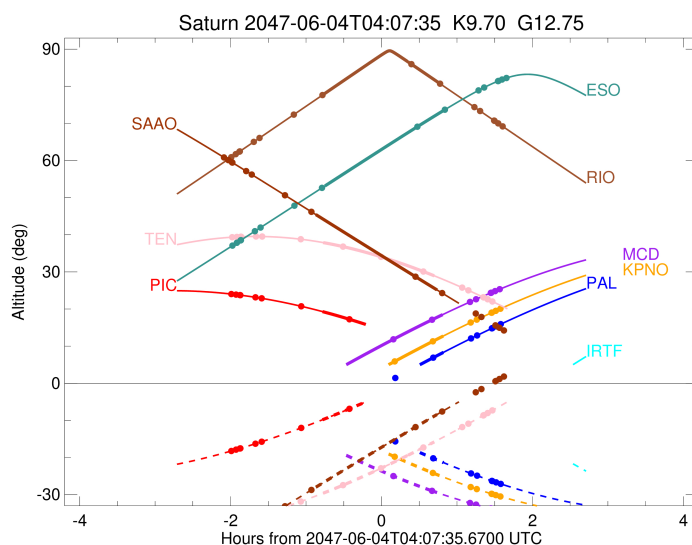
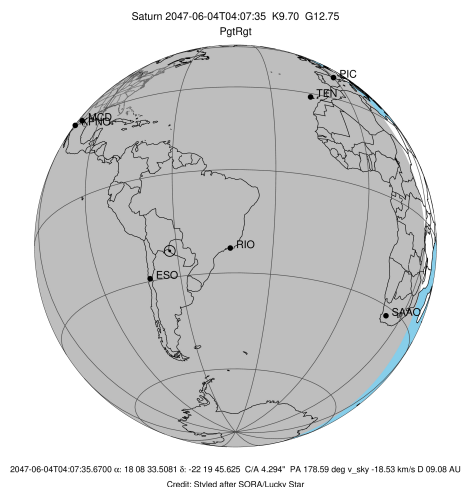
```

target                : Saturn
target radius (km)   : 60268.00
C/A epoch            : 2047-06-04T04:11:49.610
Event type           : PgtRgt
: Saturn occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code        : KPNO
Location             : Kitt Peak Natl Obs
Latitude (deg)       : 31.96333
E. Longitude (deg)  : 248.40000
Altitude (km)        : 2.120
Gaia source ID       : 4069720725458625536
2Mass ID (if available) : 18083350-2219456
ICRS Star Coord at Epoch: 18h 08m 33.50813s -22:19:45.62503s
RUWE (>1.4 is poor) : 1.12
K magnitude          : 9.701
G magnitude          : 12.749
RP magnitude         : 11.811
BP magnitude         : 13.614
DUPflag             : 0
Distance (au)        : 9.082
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -18.53
Sun-Target sep (deg) : 160.84
Sun-Moon sep (deg)  : 73.64
B (ring opening deg) : 26.27
PA of pole (deg)    : 5.68
Pole direction: RA (deg): 40.60000
Dec (deg): 83.50000
C/A sky separation (") : 4.901
C/A sky separation (km) : 32281.8
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
    
```



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-06-04T02:11:58.241	-18.84x	2.27x	140461.00	-16.52			
A (OER)	I	2047-06-04T02:15:42.448	-18.07x	1.55x	136774.40	-16.37			
Encke (OEG)	I	2047-06-04T02:18:48.271	-17.43x	0.96x	133744.89	-16.24			
Encke (IEG)	I	2047-06-04T02:19:08.086	-17.36x	0.90x	133423.31	-16.22			
A (IER)	I	2047-06-04T02:31:01.940	-14.93x	-1.36x	122050.38	-15.61			
B (OER)	I	2047-06-04T02:35:51.555	-13.95x	-2.26x	117571.16	-15.31			
B (IER)	I	2047-06-04T03:06:18.856	-7.84x	-7.84	91984.69	-12.32			
C (IER)	I	2047-06-04T03:36:48.271	b	-1.88x	74490.58	-6.15			
Saturn	I	2047-06-04T03:26:30.736	-3.87x	-11.40	60065.21			22.29	26.65
Saturn	E	2047-06-04T04:56:40.620	12.72	-25.26	59800.12			35.31	40.82
C (IER)	E	2047-06-04T04:17:54.284	b	5.85	-19.76	74490.58	6.12		
B (IER)	E	2047-06-04T04:48:22.836	b	11.29	-24.15	91984.69	12.39		
B (OER)	E	2047-06-04T05:18:33.233	16.37	-27.96	117571.16	15.50			
A (IER)	E	2047-06-04T05:23:19.168	17.14	-28.50	122050.38	15.82			
Encke (IEG)	E	2047-06-04T05:35:02.959	18.99	-29.78	133423.31	16.47			
Encke (OEG)	E	2047-06-04T05:35:22.475	19.04	-29.81	133744.89	16.49			
A (OER)	E	2047-06-04T05:38:25.448	19.51	-30.12	136774.40	16.63			
F ring	E	2047-06-04T05:42:06.097	20.07	-30.49	140461.00	16.79			

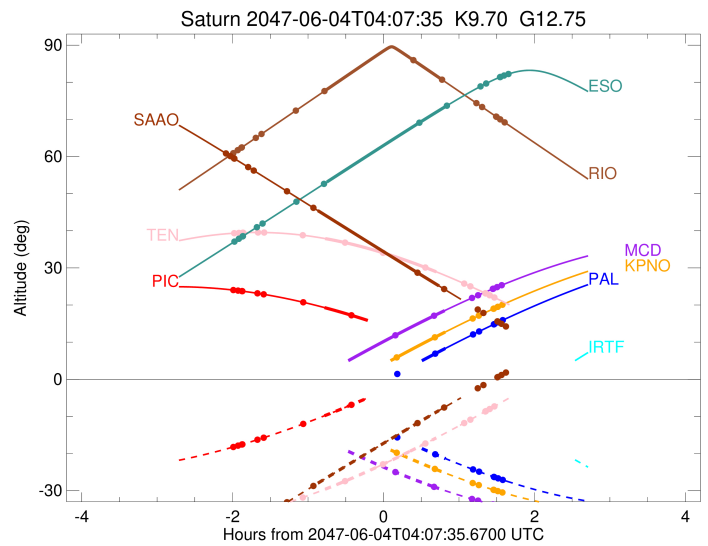
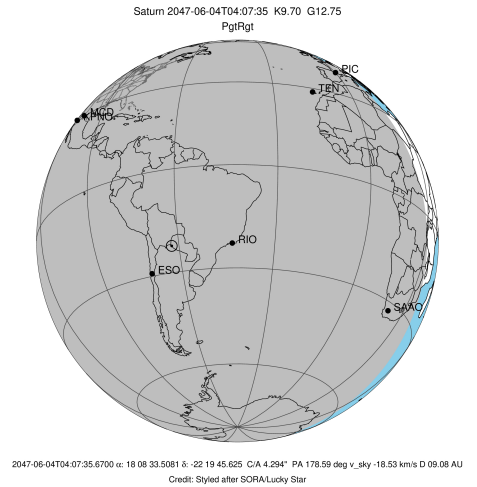
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-06-04T04:11:37.510
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MCD
 Location : McDonald Obs. 2.7m
 Latitude (deg) : 30.67158
 E. Longitude (deg) : 255.97844
 Altitude (km) : 2.075
 Gaia source ID : 4069720725458625536
 2Mass ID (if available) : 18083350-2219456
 ICRS Star Coord at Epoch: 18h 08m 33.50813s -22:19:45.62503s
 RUWE (>1.4 is poor) : 1.12
 K magnitude : 9.701
 G magnitude : 12.749
 RP magnitude : 11.811
 BP magnitude : 13.614
 DUPflag : 0
 Distance (au) : 9.082
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.53
 Sun-Target sep (deg) : 160.84
 Sun-Moon sep (deg) : 73.76
 B (ring opening deg) : 26.27
 PA of pole (deg) : 5.68
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.922
 C/A sky separation (km) : 32420.2
 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

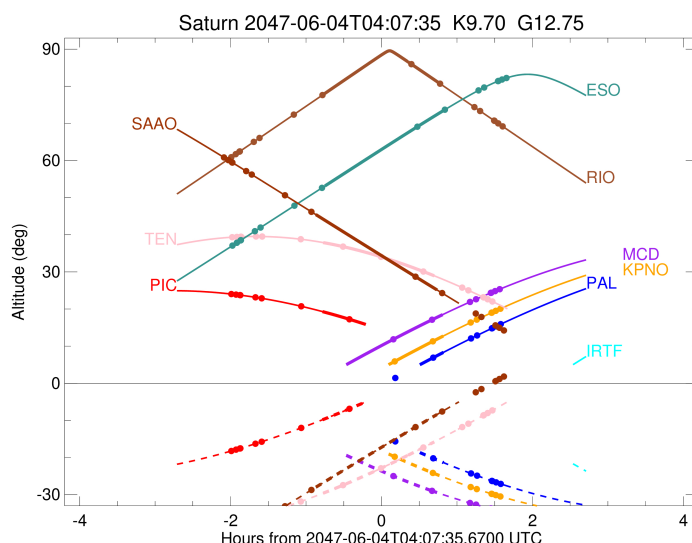
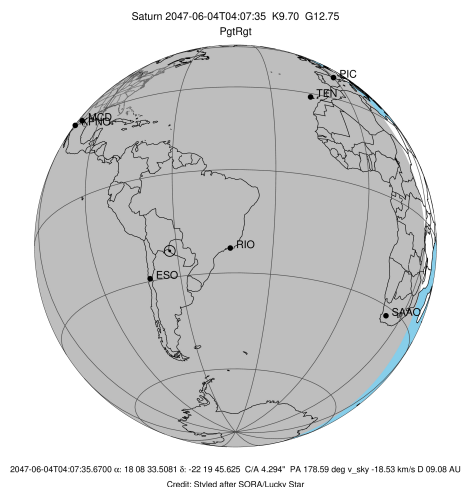
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-06-04T02:12:11.823		-12.21x	-4.13x	140461.00	-16.53		
A (OER)	I	2047-06-04T02:15:55.805		-11.45x	-4.83x	136774.40	-16.38		
Encke (OEG)	I	2047-06-04T02:19:01.462		-10.82x	-5.41	133744.89	-16.25		
Encke (IEG)	I	2047-06-04T02:19:21.261		-10.75x	-5.47	133423.31	-16.24		
A (IER)	I	2047-06-04T02:31:14.699		-8.34x	-7.67	122050.38	-15.62		
B (OER)	I	2047-06-04T02:36:04.266		-7.37x	-8.55	117571.16	-15.31		
B (IER)	I	2047-06-04T03:06:34.360		-1.33x	-13.95	91984.69	-12.27		
C (IER)	I	2047-06-04T03:37:29.412	b	4.61x	-19.08	74490.58	-5.91		
Saturn	I	2047-06-04T03:26:30.787		2.53x	-17.30	60062.51		22.44	26.83
Saturn	E	2047-06-04T04:56:17.001		18.50	-29.97	59797.65		35.42	40.93
C (IER)	E	2047-06-04T04:16:50.167	b	11.81	-24.97	74490.58	5.88		
B (IER)	E	2047-06-04T04:47:45.371	b	17.11	-28.98	91984.69	12.33		
B (OER)	E	2047-06-04T05:17:59.962		21.91	-32.24	117571.16	15.49		
A (IER)	E	2047-06-04T05:22:46.120		22.63	-32.69	122050.38	15.81		
Encke (IEG)	E	2047-06-04T05:34:30.224		24.34	-33.71	133423.31	16.47		
Encke (OEG)	E	2047-06-04T05:34:49.745		24.39	-33.74	133744.89	16.48		
A (OER)	E	2047-06-04T05:37:52.756		24.82	-33.98	136774.40	16.62		
F ring	E	2047-06-04T05:41:33.433		25.34	-34.26	140461.00	16.79		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-06-04T04:05:29.040
 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 : 4069720725458625536
 2Mass ID (if available) : 18083350-2219456
 ICRS Star Coord at Epoch: 18h 08m 33.50813s -22:19:45.62503s
 RUWE (>1.4 is poor) : 1.12
 K magnitude : 9.701
 G magnitude : 12.749
 RP magnitude : 11.811
 BP magnitude : 13.614
 DUPflag : 0
 Distance (au) : 9.082
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.53
 Sun-Target sep (deg) : 160.84
 Sun-Moon sep (deg) : 74.44
 B (ring opening deg) : 26.27
 PA of pole (deg) : 5.68
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 5.000
 C/A sky separation (km) : 32937.5
 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



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-06-04T02:08:52.159		39.35	-37.11	140461.00	-16.68		
A (OER)	I	2047-06-04T02:12:34.264		39.42	-36.84	136774.40	-16.51		
Encke (OEG)	I	2047-06-04T02:15:38.525		39.47	-36.60	133744.89	-16.37		
Encke (IEG)	I	2047-06-04T02:15:58.184		39.47	-36.58	133423.31	-16.35		
A (IER)	I	2047-06-04T02:27:47.870		39.55	-35.59	122050.38	-15.67		
B (OER)	I	2047-06-04T02:32:36.739		39.53	-35.15	117571.16	-15.34		
B (IER)	I	2047-06-04T03:03:21.149		38.81	-31.86	91984.69	-12.00		
C (IER)	I	2047-06-04T03:36:59.495	b	36.82	-27.45	74490.58	-4.55		
Saturn	I	2047-06-04T03:21:12.784		37.90	-29.61	60043.97		23.50	28.03
Saturn	E	2047-06-04T04:49:33.663		28.95	-15.79	59798.42		35.38	40.90
C (IER)	E	2047-06-04T04:06:55.671	b	34.10	-22.95	74490.58	4.51		
B (IER)	E	2047-06-04T04:40:50.654	b	30.11	-17.31	91984.69	11.92		
B (OER)	E	2047-06-04T05:11:47.250		25.77	-11.79	117571.16	15.23		
A (IER)	E	2047-06-04T05:16:38.200		25.03	-10.89	122050.38	15.56		
Encke (IEG)	E	2047-06-04T05:28:33.354		23.18	-8.67	133423.31	16.22		
Encke (OEG)	E	2047-06-04T05:28:53.172		23.13	-8.61	133744.89	16.24		
A (OER)	E	2047-06-04T05:31:58.944		22.63	-8.02	136774.40	16.38		
F ring	E	2047-06-04T05:35:42.921		22.03	-7.31	140461.00	16.54		

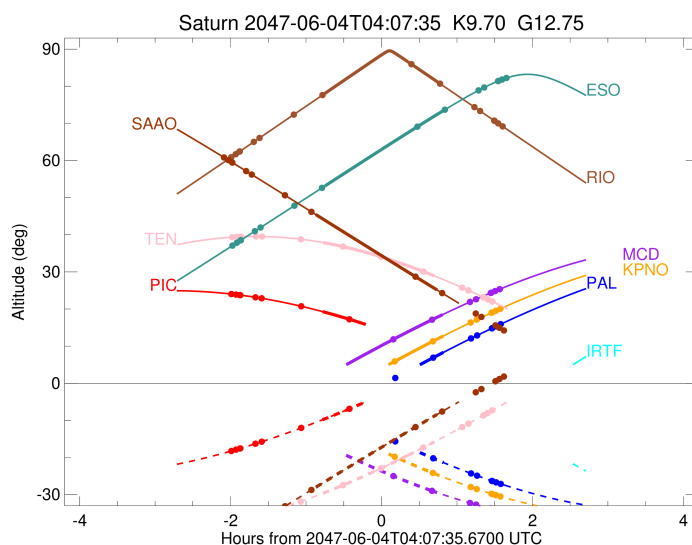
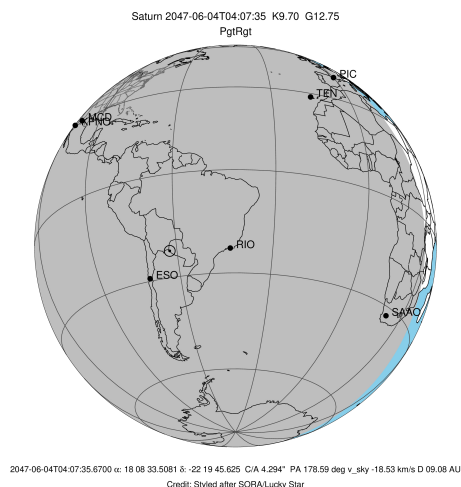
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-06-04T04:07:45.140
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : RIO
 Location : Rio de Janeiro
 Latitude (deg) : -22.89506
 E. Longitude (deg) : 316.77708
 Altitude (km) : 0.033
 Gaia source ID : 4069720725458625536
 2Mass ID (if available) : 18083350-2219456
 ICRS Star Coord at Epoch: 18h 08m 33.50813s -22:19:45.62503s
 RUWE (>1.4 is poor) : 1.12
 K magnitude : 9.701
 G magnitude : 12.749
 RP magnitude : 11.811
 BP magnitude : 13.614
 DUPflag : 0
 Distance (au) : 9.082
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.53
 Sun-Target sep (deg) : 160.84
 Sun-Moon sep (deg) : 74.74
 B (ring opening deg) : 26.27
 PA of pole (deg) : 5.68
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.287
 C/A sky separation (km) : 28241.4
 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



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	2047-06-04T02:08:09.661		60.90	-80.08	140461.00	-17.47		
A (OER)	I	2047-06-04T02:11:41.402		61.71	-80.89	136774.40	-17.35		
Encke (OEG)	I	2047-06-04T02:14:36.483		62.39	-81.57	133744.89	-17.25		
Encke (IEG)	I	2047-06-04T02:14:55.129		62.46	-81.64	133423.31	-17.24		
A (IER)	I	2047-06-04T02:26:03.307		65.02	-84.20	122050.38	-16.78		
B (OER)	I	2047-06-04T02:30:32.027		66.06	-85.24	117571.16	-16.55		
B (IER)	I	2047-06-04T02:57:50.851		72.36	-88.41	91984.69	-14.41		
C (IER)	I	2047-06-04T03:20:37.489		77.63	-83.18	74490.58	-10.82		
Saturn	I	2047-06-04T03:21:02.711		77.72	-83.09	60123.05		18.69	22.52
Saturn	E	2047-06-04T04:54:12.903		80.69	-61.64	59894.32		31.06	36.34
C (IER)	E	2047-06-04T04:31:16.340	b	85.98	-66.91	74490.58	10.75		
B (IER)	E	2047-06-04T04:54:07.674	b	80.71	-61.66	91984.69	14.38		
B (OER)	E	2047-06-04T05:21:28.909		74.38	-55.39	117571.16	16.53		
A (IER)	E	2047-06-04T05:25:57.954		73.35	-54.37	122050.38	16.76		
Encke (IEG)	E	2047-06-04T05:37:06.930		70.77	-51.82	133423.31	17.22		
Encke (OEG)	E	2047-06-04T05:37:25.597		70.70	-51.75	133744.89	17.23		
A (OER)	E	2047-06-04T05:40:20.887		70.02	-51.08	136774.40	17.33		
F ring	E	2047-06-04T05:43:52.883		69.21	-50.28	140461.00	17.45		

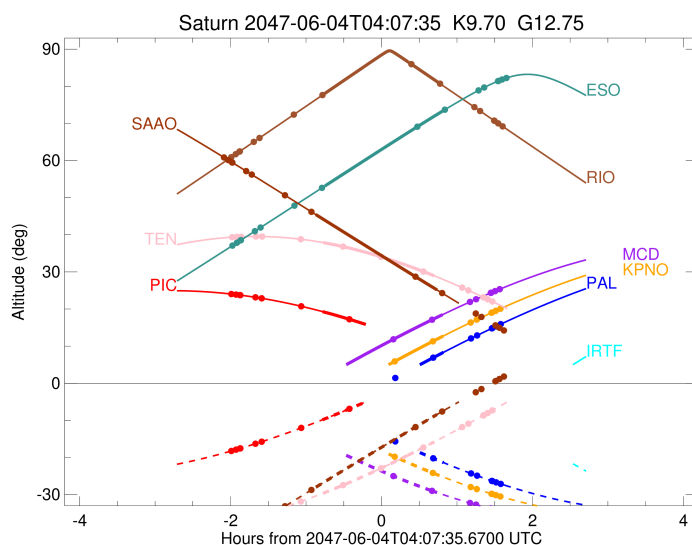
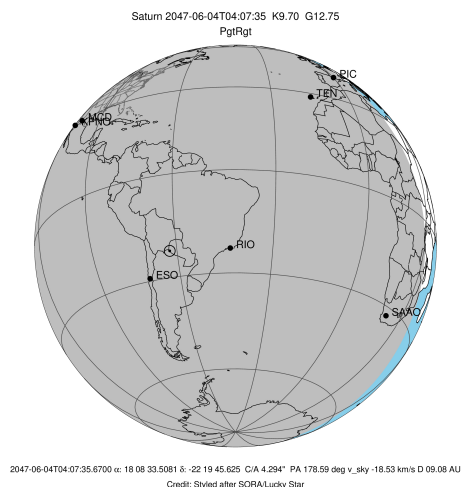
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-06-04T04:09:55.960
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : ESO
 Location : European Southern Obs. (3.6m)
 Latitude (deg) : -29.26097
 E. Longitude (deg) : 289.26831
 Altitude (km) : 2.400
 Gaia source ID : 4069720725458625536
 2Mass ID (if available) : 18083350-2219456
 ICRS Star Coord at Epoch: 18h 08m 33.50813s -22:19:45.62503s
 RUWE (>1.4 is poor) : 1.12
 K magnitude : 9.701
 G magnitude : 12.749
 RP magnitude : 11.811
 BP magnitude : 13.614
 DUPflag : 0
 Distance (au) : 9.082
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.53
 Sun-Target sep (deg) : 160.84
 Sun-Moon sep (deg) : 74.52
 B (ring opening deg) : 26.27
 PA of pole (deg) : 5.68
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.153
 C/A sky separation (km) : 27356.3
 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	2047-06-04T02:09:04.772		37.08	-55.27	140461.00	-17.49		
A (OER)	I	2047-06-04T02:12:36.104		37.85	-56.03	136774.40	-17.39		
Encke (OEG)	I	2047-06-04T02:15:30.739		38.48	-56.67	133744.89	-17.30		
Encke (IEG)	I	2047-06-04T02:15:49.331		38.55	-56.74	133423.31	-17.29		
A (IER)	I	2047-06-04T02:26:54.722		40.96	-59.15	122050.38	-16.87		
B (OER)	I	2047-06-04T02:31:21.769		41.94	-60.12	117571.16	-16.67		
B (IER)	I	2047-06-04T02:58:19.272		47.83	-65.96	91984.69	-14.72		
C (IER)	I	2047-06-04T03:20:14.442		52.63	-70.63	74490.58	-11.54		
Saturn	I	2047-06-04T03:22:35.355		53.15	-71.12	60138.09		17.65	21.32
Saturn	E	2047-06-04T04:56:56.284		73.48	-82.44	59907.89		30.42	35.65
C (IER)	E	2047-06-04T04:36:02.134	b	69.10	-83.22	74490.58	11.50		
B (IER)	E	2047-06-04T04:57:56.116		73.68	-82.33	91984.69	14.77		
B (OER)	E	2047-06-04T05:24:46.306		78.90	-78.14	117571.16	16.77		
A (IER)	E	2047-06-04T05:29:11.760		79.67	-77.31	122050.38	16.98		
Encke (IEG)	E	2047-06-04T05:40:12.781		81.39	-75.15	133423.31	17.41		
Encke (OEG)	E	2047-06-04T05:40:31.243		81.43	-75.08	133744.89	17.42		
A (OER)	E	2047-06-04T05:43:24.637		81.81	-74.50	136774.40	17.52		
F ring	E	2047-06-04T05:46:54.418		82.23	-73.79	140461.00	17.63		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-06-04T04:03:33.890
 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 : 4069720725458625536
 2Mass ID (if available) : 18083350-2219456
 ICRS Star Coord at Epoch: 18h 08m 33.50813s -22:19:45.62503s
 RUWE (>1.4 is poor) : 1.12
 K magnitude : 9.701
 G magnitude : 12.749
 RP magnitude : 11.811
 BP magnitude : 13.614
 DUPflag : 0
 Distance (au) : 9.082
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.53
 Sun-Target sep (deg) : 160.84
 Sun-Moon sep (deg) : 74.51
 B (ring opening deg) : 26.27
 PA of pole (deg) : 5.68
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 3.945
 C/A sky separation (km) : 25984.7
 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	2047-06-04T02:02:21.100		60.84	-43.35	140461.00	-17.68		
A (OER)	I	2047-06-04T02:05:50.143		60.11	-42.62	136774.40	-17.59		
Encke (OEG)	I	2047-06-04T02:08:42.846		59.51	-42.01	133744.89	-17.50		
Encke (IEG)	I	2047-06-04T02:09:01.230		59.45	-41.94	133423.31	-17.49		
A (IER)	I	2047-06-04T02:19:58.743		57.16	-39.63	122050.38	-17.09		
B (OER)	I	2047-06-04T02:24:22.305		56.23	-38.70	117571.16	-16.90		
B (IER)	I	2047-06-04T02:50:49.926		50.65	-33.13	91984.69	-15.12		
C (IER)	I	2047-06-04T03:11:50.361		46.19	-28.74	74490.58	-12.35		
Saturn	I	2047-06-04T03:15:19.147		45.46	-28.02	60148.39		16.92	20.45
Saturn	E	2047-06-04T04:51:46.884		25.13	-8.40	59944.95		28.65	33.73
C (IER)	E	2047-06-04T04:34:33.990	b	28.72	-11.82	74490.58	12.23		
B (IER)	E	2047-06-04T04:55:46.747		24.30	-7.61	91984.69	14.97		
B (OER)	E	2047-06-04T05:22:33.177		18.78	-2.42x	117571.16	16.67		
A (IER)	E	2047-06-04T05:27:00.370		17.87	-1.57x	122050.38	16.85		
Encke (IEG)	E	2047-06-04T05:38:07.610		15.61	0.54x	133423.31	17.22		
Encke (OEG)	E	2047-06-04T05:38:26.279		15.54	0.59x	133744.89	17.23		
A (OER)	E	2047-06-04T05:41:21.703		14.95	1.14x	136774.40	17.31		
F ring	E	2047-06-04T05:44:54.125		14.23	1.80x	140461.00	17.40		