

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-06-12T05:51:42.730
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 4069684823854270464
 2Mass ID (if available) : 18060730-2220463

Saturn 2047-06-12T05:51:42 K8.17 G13.74 PgtRgt

ICRS Star Coord at Epoch: 18h 06m 07.31161s -22:20:46.44088s

RUWE (>1.4 is poor) : 1.04
 K magnitude : 8.168
 G magnitude : 13.740
 RP magnitude : 12.423
 BP magnitude : 15.761
 DUPflag : 0
 Distance (au) : 9.047
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -19.63
 Sun-Target sep (deg) : 169.11
 Sun-Moon sep (deg) : 43.32
 B (ring opening deg) : 26.34
 PA of pole (deg) : 5.63

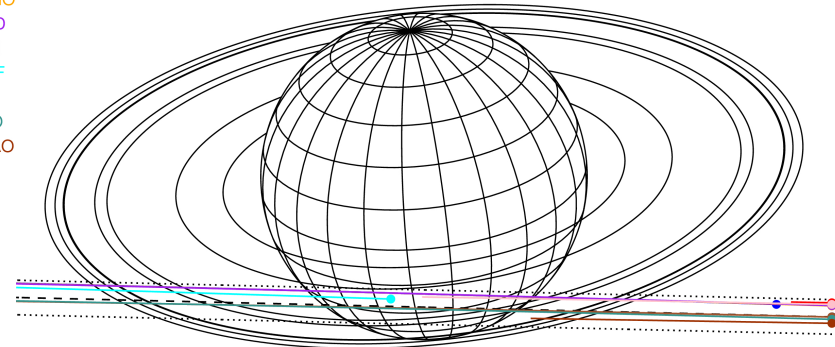
a(km) ring

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



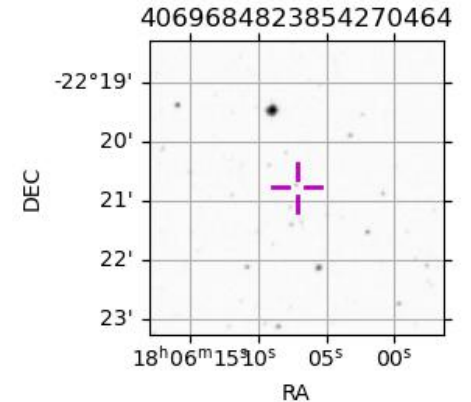
2047-06-12T05:51:42.7300 at: 18 06 07.3116 s: -22 20 46.4411 C/A 7.353° PA 358.64 deg v_sky -19.63 km/s D 09.05 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PIC
 PAL
 KPNO
 MCD
 TEN
 IRTF
 RIO
 ESO
 SAAO

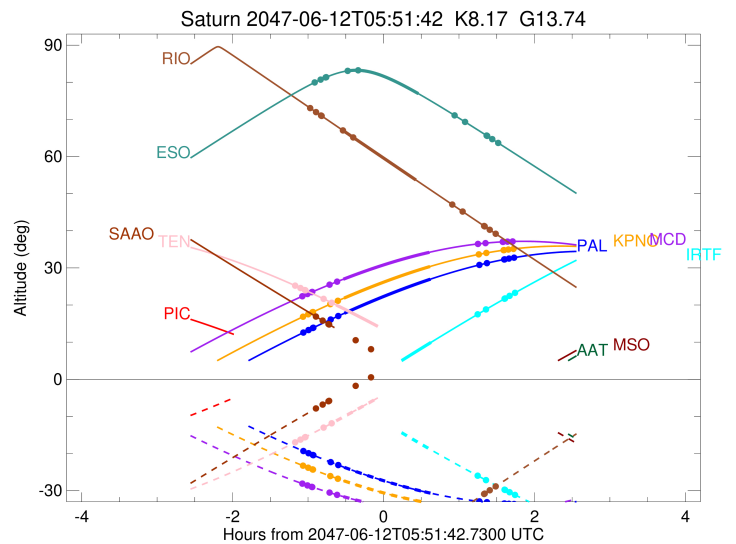
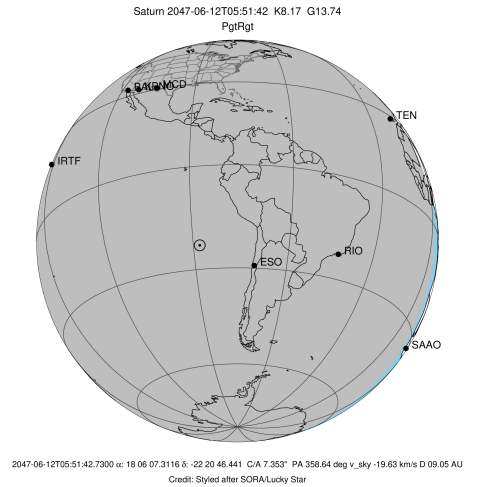


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEncode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (20	33.4	243.1	+ + + + +	+ +	+ + + + +	JUN 12 04:48 - JUN 12 07:35	PieRie
PMO	Purple Mtn Obs	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl	32.0	248.4	+ + + + +	+ +	+ + + + +	JUN 12 04:47 - JUN 12 07:35	PieRie
MCD	McDonald Obs.	30.7	256.0	+ + + + +	+ +	+ + + + +	JUN 12 04:47 - JUN 12 07:34	PieRie
TEN	Teide Obs./Ten	28.3	343.5	+ + + + +	+		JUN 12 04:41 - JUN 12 05:14	PinRin
IRTF	Mauna Kea/IRTF	19.8	204.5		+	+ + + + +	JUN 12 06:29 - JUN 12 07:36	PneRne
KAV	Kavalur Observ	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+ + + + +	+ +	+ + + + +	JUN 12 04:53 - JUN 12 07:21	PieRie
ESO	European South	-29.3	289.3	+ + + + +	+ +	+ + + + +	JUN 12 04:57 - JUN 12 07:23	PieRie
AAT	Siding Spring	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro	-32.4	20.8	+ + + +			JUN 12 04:58 - JUN 12 05:08	PnnRin
MSO	Mt. Stromlo Ob	-35.3	149.0					PnnRnn

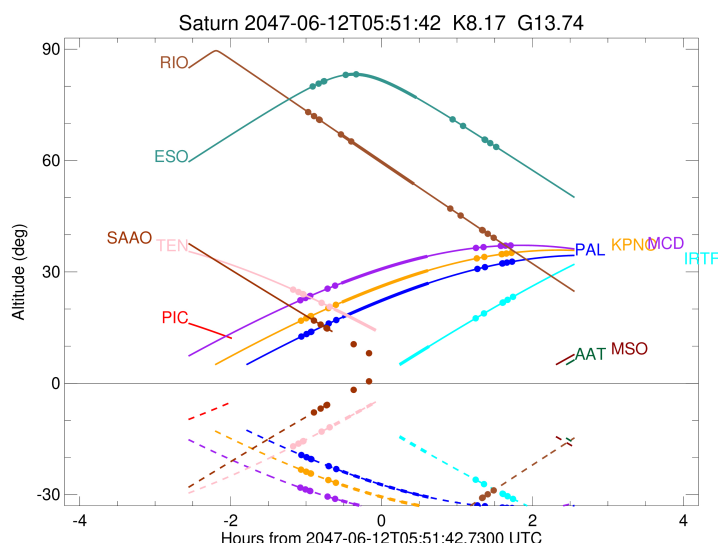
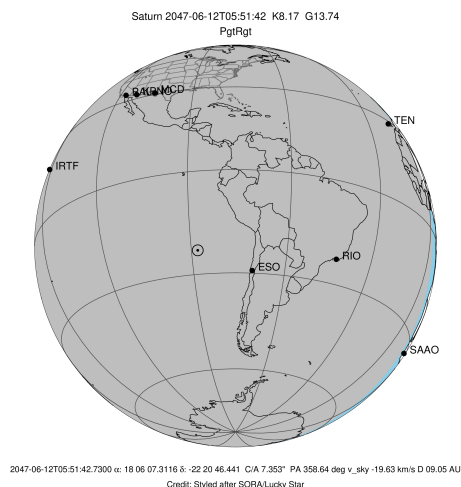


target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-06-12T05:54:39.590
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 4069684823854270464
 2Mass ID (if available) : 18060730-2220463
 ICRS Star Coord at Epoch: 18h 06m 07.31161s -22:20:46.44088s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 8.168
 G magnitude : 13.740
 RP magnitude : 12.423
 BP magnitude : 15.761
 DUPflag : 0
 Distance (au) : 9.047
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -19.63
 Sun-Target sep (deg) : 169.11
 Sun-Moon sep (deg) : 43.92
 B (ring opening deg) : 26.34
 PA of pole (deg) : 5.63
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 6.610
 C/A sky separation (km) : 43370.2
 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	2047-06-12T04:48:01.425		12.58	-19.33	140461.00	-15.14		
A (OER)	I	2047-06-12T04:52:07.632		13.26	-19.92	136774.40	-14.80		
Encke (OEG)	I	2047-06-12T04:55:34.537		13.83	-20.40	133744.89	-14.48		
Encke (IEG)	I	2047-06-12T04:55:56.768		13.89	-20.46	133423.31	-14.45		
A (IER)	I	2047-06-12T05:09:45.334		16.10	-22.33	122050.38	-12.94		
B (OER)	I	2047-06-12T05:15:42.277		17.03	-23.10	117571.16	-12.15		
Saturn	I	2047-06-12T05:20:32.416		17.77	-23.72	59531.95		-46.48	-51.99
Saturn	E	2047-06-12T06:29:03.259		26.97	-30.67	59813.77		-34.59	-40.07
B (OER)	E	2047-06-12T07:08:07.475		30.82	-32.91	117571.16	12.23		
A (IER)	E	2047-06-12T07:14:02.041		31.29	-33.12	122050.38	13.02		
Encke (IEG)	E	2047-06-12T07:27:44.888		32.27	-33.48	133423.31	14.55		
Encke (OEG)	E	2047-06-12T07:28:06.959		32.30	-33.49	133744.89	14.59		
A (OER)	E	2047-06-12T07:31:32.359		32.52	-33.55	136774.40	14.91		
F ring	E	2047-06-12T07:35:36.726		32.76	-33.60	140461.00	15.26		

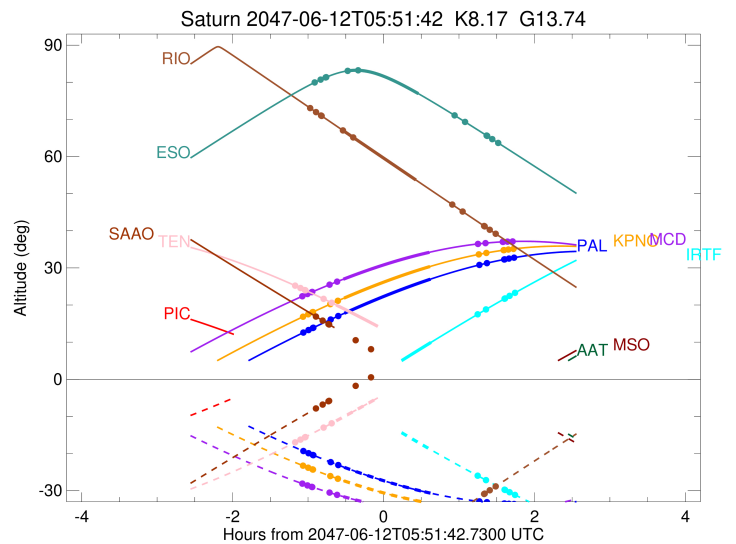
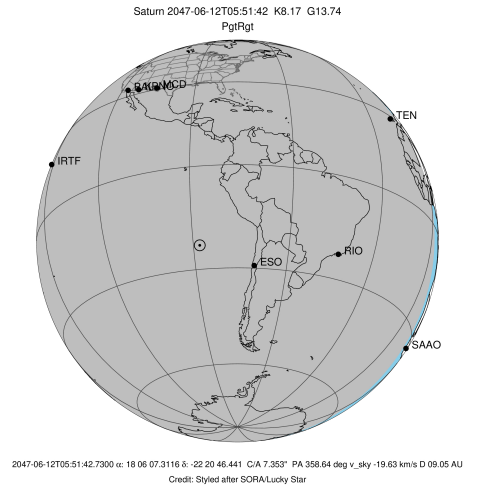
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-06-12T05:54:21.320
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KPNO
 Location : Kitt Peak Natl Obs
 Latitude (deg) : 31.96333
 E. Longitude (deg) : 248.40000
 Altitude (km) : 2.120
 Gaia source ID : 4069684823854270464
 2Mass ID (if available) : 18060730-2220463
 ICRS Star Coord at Epoch: 18h 06m 07.31161s -22:20:46.44088s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 8.168
 G magnitude : 13.740
 RP magnitude : 12.423
 BP magnitude : 15.761
 DUPflag : 0
 Distance (au) : 9.047
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -19.63
 Sun-Target sep (deg) : 169.11
 Sun-Moon sep (deg) : 43.92
 B (ring opening deg) : 26.34
 PA of pole (deg) : 5.63
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 6.608
 C/A sky separation (km) : 43362.5
 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	2047-06-12T04:47:44.967		16.85	-23.28	140461.00	-15.17		
A (OER)	I	2047-06-12T04:51:50.793		17.51	-23.83	136774.40	-14.82		
Encke (OEG)	I	2047-06-12T04:55:17.383		18.05	-24.28	133744.89	-14.50		
Encke (IEG)	I	2047-06-12T04:55:39.580		18.11	-24.33	133423.31	-14.47		
A (IER)	I	2047-06-12T05:09:26.942		20.24	-26.08	122050.38	-12.95		
B (OER)	I	2047-06-12T05:15:23.399		21.13	-26.79	117571.16	-12.16		
Saturn	I	2047-06-12T05:20:16.609		21.85	-27.36	59532.66		-46.45	-51.96
Saturn	E	2047-06-12T06:28:42.810		30.38	-33.37	59813.37		-34.60	-40.08
B (OER)	E	2047-06-12T07:07:40.411		33.65	-34.89	117571.16	12.23		
A (IER)	E	2047-06-12T07:13:34.796		34.03	-34.98	122050.38	13.03		
Encke (IEG)	E	2047-06-12T07:27:17.262		34.78	-35.06	133423.31	14.56		
Encke (OEG)	E	2047-06-12T07:27:39.324		34.79	-35.06	133744.89	14.59		
A (OER)	E	2047-06-12T07:31:04.640		34.95	-35.05	136774.40	14.91		
F ring	E	2047-06-12T07:35:08.912		35.12	-35.02	140461.00	15.27		

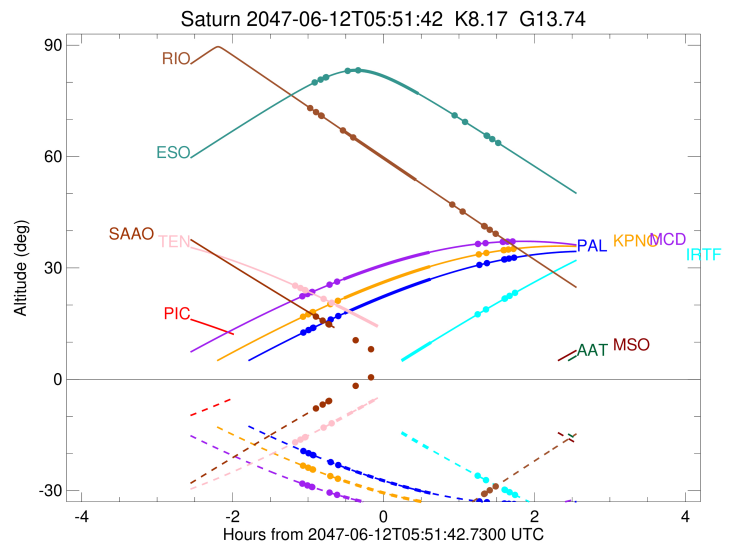
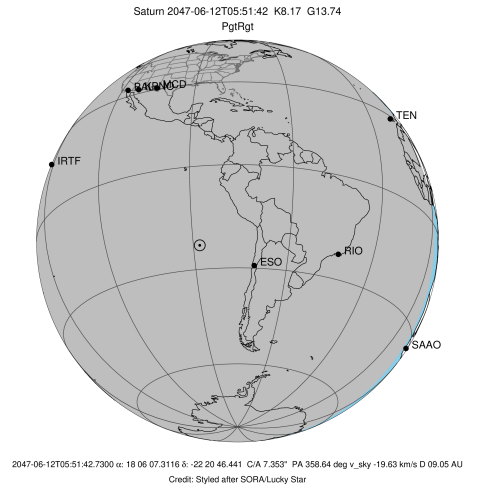
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-06-12T05:53:50.400
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MCD
 Location : McDonald Obs. 2.7m
 Latitude (deg) : 30.67158
 E. Longitude (deg) : 255.97844
 Altitude (km) : 2.075
 Gaia source ID : 4069684823854270464
 2Mass ID (if available) : 18060730-2220463
 ICRS Star Coord at Epoch: 18h 06m 07.31161s -22:20:46.44088s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 8.168
 G magnitude : 13.740
 RP magnitude : 12.423
 BP magnitude : 15.761
 DUPflag : 0
 Distance (au) : 9.047
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -19.63
 Sun-Target sep (deg) : 169.11
 Sun-Moon sep (deg) : 43.91
 B (ring opening deg) : 26.34
 PA of pole (deg) : 5.63
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 6.603
 C/A sky separation (km) : 43329.1
 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	2047-06-12T04:47:11.828		22.36	-28.11	140461.00	-15.20		
A (OER)	I	2047-06-12T04:51:17.091		22.97	-28.60	136774.40	-14.85		
Encke (OEG)	I	2047-06-12T04:54:43.209		23.47	-28.99	133744.89	-14.54		
Encke (IEG)	I	2047-06-12T04:55:05.356		23.53	-29.04	133423.31	-14.50		
A (IER)	I	2047-06-12T05:08:50.815		25.48	-30.53	122050.38	-12.98		
B (OER)	I	2047-06-12T05:14:46.429		26.29	-31.13	117571.16	-12.19		
Saturn	I	2047-06-12T05:19:47.326		26.95	-31.62	59534.39		-46.38	-51.90
Saturn	E	2047-06-12T06:28:10.743		34.20	-35.94	59813.28		-34.61	-40.09
B (OER)	E	2047-06-12T07:07:00.577		36.47	-36.28	117571.16	12.25		
A (IER)	E	2047-06-12T07:12:54.598		36.68	-36.20	122050.38	13.04		
Encke (IEG)	E	2047-06-12T07:26:36.445		37.02	-35.85	133423.31	14.57		
Encke (OEG)	E	2047-06-12T07:26:58.494		37.03	-35.83	133744.89	14.60		
A (OER)	E	2047-06-12T07:30:23.698		37.08	-35.71	136774.40	14.92		
F ring	E	2047-06-12T07:34:27.855		37.12	-35.56	140461.00	15.27		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-06-12T05:47:16.760
 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 : 4069684823854270464
 2Mass ID (if available) : 18060730-2220463
 ICRS Star Coord at Epoch: 18h 06m 07.31161s -22:20:46.44088s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 8.168
 G magnitude : 13.740
 RP magnitude : 12.423
 BP magnitude : 15.761
 DUPflag : 0
 Distance (au) : 9.047
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -19.63
 Sun-Target sep (deg) : 169.11
 Sun-Moon sep (deg) : 42.92
 B (ring opening deg) : 26.34
 PA of pole (deg) : 5.63
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 6.781
 C/A sky separation (km) : 44494.5
 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

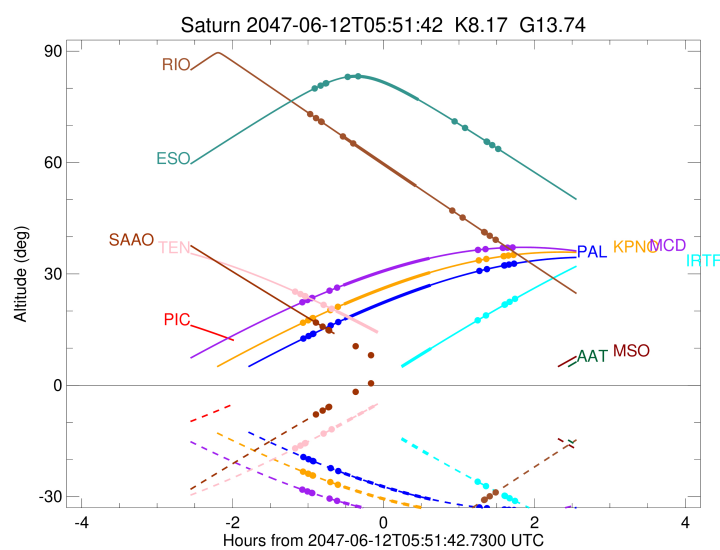
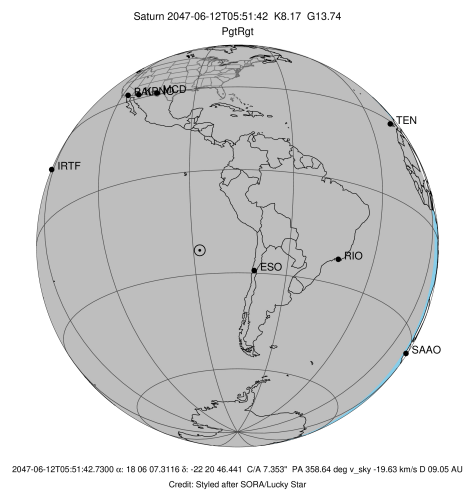


b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-06-12T04:41:29.036		25.22	-16.99	140461.00	-14.72		
A (OER)	I	2047-06-12T04:45:42.814		24.57	-16.26	136774.40	-14.33		
Encke (OEG)	I	2047-06-12T04:49:16.825		24.02	-15.64	133744.89	-13.98		
Encke (IEG)	I	2047-06-12T04:49:39.864		23.96	-15.57	133423.31	-13.94		
A (IER)	I	2047-06-12T05:04:06.285		21.66	-13.02	122050.38	-12.24		
B (OER)	I	2047-06-12T05:10:25.839		20.62	-11.87	117571.16	-11.35		
Saturn	I	2047-06-12T05:14:07.653		20.00	-11.20	59514.37		-47.22	-52.70
Saturn	E	2047-06-12T06:20:50.273		8.01	1.57x	59770.01		-36.49	-42.04
B (OER)	E	2047-06-12T06:57:23.732		0.90x	8.96x	117571.16	11.26		
A (IER)	E	2047-06-12T07:03:46.490		-0.37x	10.27x	122050.38	12.13		
Encke (IEG)	E	2047-06-12T07:18:22.389		-3.31x	13.29x	133423.31	13.77		
Encke (OEG)	E	2047-06-12T07:18:45.717		-3.39x	13.37x	133744.89	13.80		
A (OER)	E	2047-06-12T07:22:22.511		-4.12x	14.12x	136774.40	14.14		
F ring	E	2047-06-12T07:26:39.791		-4.99x	15.02x	140461.00	14.51		

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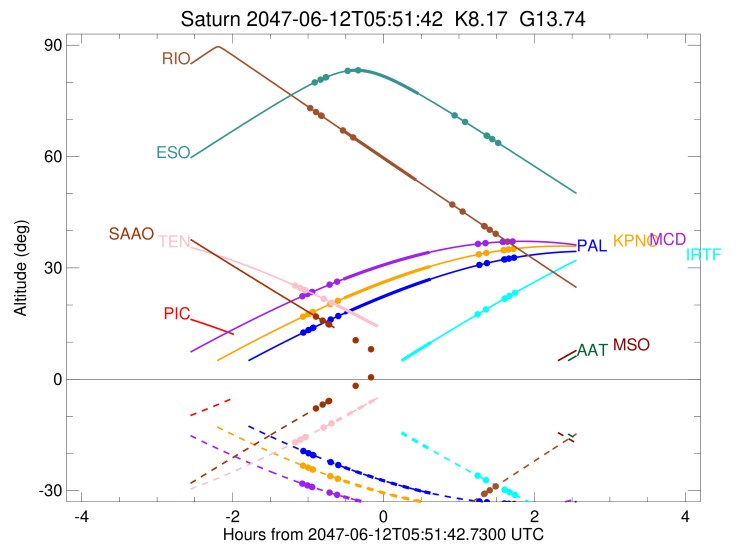
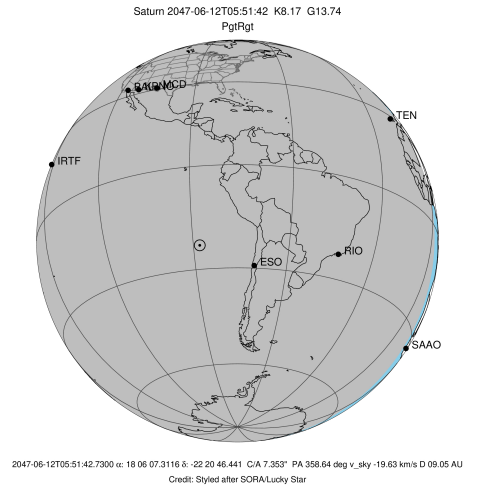
target                : Saturn
target radius (km)   : 60268.00
C/A epoch            : 2047-06-12T05:56:57.080
Event type          : PgtRgt
: Saturn occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code       : IRTF
Location            : Mauna Kea/IRTF
Latitude (deg)      : 19.82622
E. Longitude (deg)  : 204.52800
Altitude (km)       : 4.168
Gaia source ID      : 4069684823854270464
2Mass ID (if available) : 18060730-2220463
ICRS Star Coord at Epoch: 18h 06m 07.31161s -22:20:46.44088s
RUWE (>1.4 is poor) : 1.04
K magnitude         : 8.168
G magnitude         : 13.740
RP magnitude        : 12.423
BP magnitude        : 15.761
DUPflag            : 0
Distance (au)       : 9.047
f0 (km)            : 0.000
g0 (km)            : 0.000
skyplane vel. (km/s) : -19.63
Sun-Target sep (deg) : 169.11
Sun-Moon sep (deg)  : 43.96
B (ring opening deg) : 26.34
PA of pole (deg)    : 5.63
Pole direction: RA (deg): 40.60000
Dec (deg): 83.50000
C/A sky separation (") : 6.952
C/A sky separation (km) : 45614.9
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	2047-06-12T04:54:42.773		-10.50x	0.46x	140461.00	-14.31		
A (OER)	I	2047-06-12T04:59:04.004		-9.54x	-0.47x	136774.40	-13.91		
Encke (OEG)	I	2047-06-12T05:02:44.576		-8.72x	-1.26x	133744.89	-13.55		
Encke (IEG)	I	2047-06-12T05:03:08.339		-8.64x	-1.34x	133423.31	-13.51		
A (IER)	I	2047-06-12T05:18:05.690		-5.35x	-4.51x	122050.38	-11.75		
B (OER)	I	2047-06-12T05:24:42.334	b	-3.90x	-5.89	117571.16	-10.81		
Saturn	I	2047-06-12T05:24:40.231		-3.91x	-5.89	59468.84		-49.13	-54.52
Saturn	E	2047-06-12T06:29:30.160		9.94	-19.01	59754.84		-37.14	-42.71
B (OER)	E	2047-06-12T07:06:46.643		17.54	-26.01	117571.16	10.95		
A (IER)	E	2047-06-12T07:13:18.291		18.83	-27.18	122050.38	11.91		
Encke (IEG)	E	2047-06-12T07:28:03.210		21.71	-29.76	133423.31	13.72		
Encke (OEG)	E	2047-06-12T07:28:26.619		21.79	-29.83	133744.89	13.76		
A (OER)	E	2047-06-12T07:32:03.848		22.48	-30.44	136774.40	14.13		
F ring	E	2047-06-12T07:36:20.965		23.30	-31.17	140461.00	14.54		

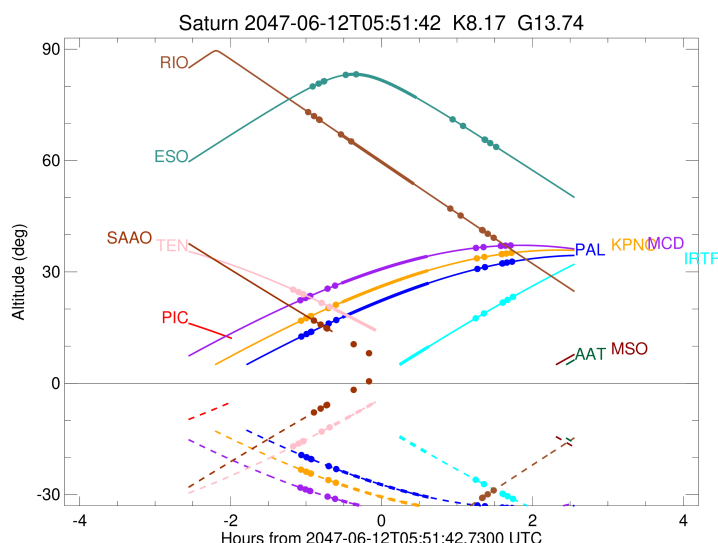
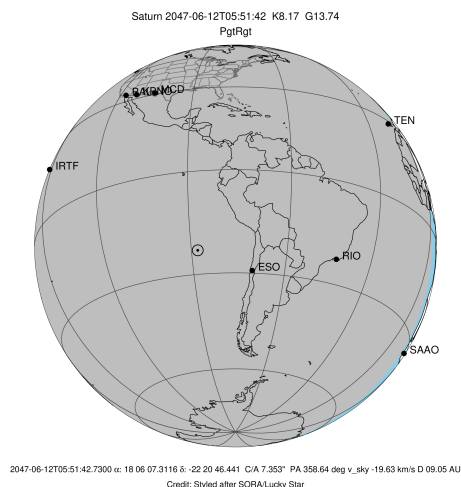
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-06-12T05:48:51.430
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : RIO
 Location : Rio de Janeiro
 Latitude (deg) : -22.89506
 E. Longitude (deg) : 316.77708
 Altitude (km) : 0.033
 Gaia source ID : 4069684823854270464
 2Mass ID (if available) : 18060730-2220463
 ICRS Star Coord at Epoch: 18h 06m 07.31161s -22:20:46.44088s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 8.168
 G magnitude : 13.740
 RP magnitude : 12.423
 BP magnitude : 15.761
 DUPflag : 0
 Distance (au) : 9.047
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -19.63
 Sun-Target sep (deg) : 169.11
 Sun-Moon sep (deg) : 43.55
 B (ring opening deg) : 26.34
 PA of pole (deg) : 5.63
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 7.426
 C/A sky separation (km) : 48730.1
 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	2047-06-12T04:53:23.871		73.05	-62.25	140461.00	-13.38		
A (OER)	I	2047-06-12T04:58:04.740		71.97	-61.18	136774.40	-12.86		
Encke (OEG)	I	2047-06-12T05:02:04.672		71.05	-60.27	133744.89	-12.39		
Encke (IEG)	I	2047-06-12T05:02:30.693		70.94	-60.17	133423.31	-12.33		
A (IER)	I	2047-06-12T05:19:28.299		67.03	-56.29	122050.38	-9.92		
B (OER)	I	2047-06-12T05:27:33.172	b	65.17	-54.45	117571.16	-8.54		
Saturn	I	2047-06-12T05:20:34.621		66.77	-56.04	59396.92		-52.21	-57.41
Saturn	E	2047-06-12T06:17:31.996		53.67	-43.09	59642.66		-41.87	-47.49
B (OER)	E	2047-06-12T06:46:40.295		47.00	-36.52	117571.16	8.52		
A (IER)	E	2047-06-12T06:54:46.779		45.15	-34.70	122050.38	9.87		
Encke (IEG)	E	2047-06-12T07:11:50.567		41.26	-30.88	133423.31	12.24		
Encke (OEG)	E	2047-06-12T07:12:16.792		41.16	-30.78	133744.89	12.29		
A (OER)	E	2047-06-12T07:16:18.712		40.24	-29.88	136774.40	12.75		
F ring	E	2047-06-12T07:21:02.133		39.17	-28.83	140461.00	13.26		

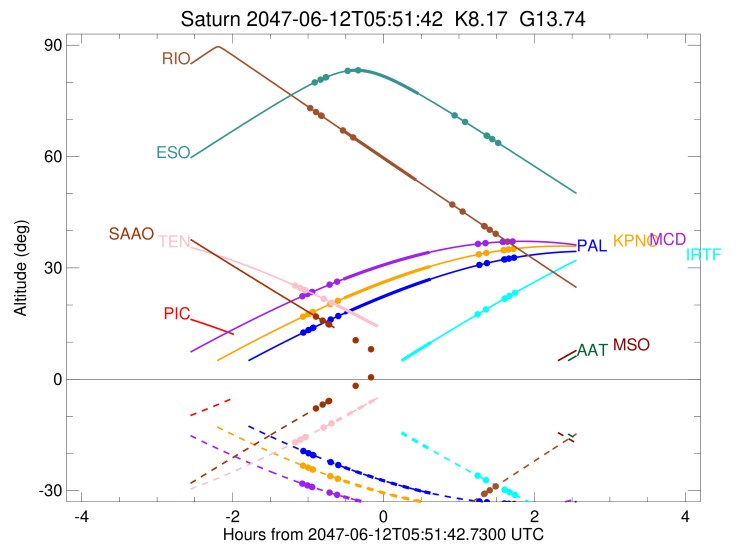
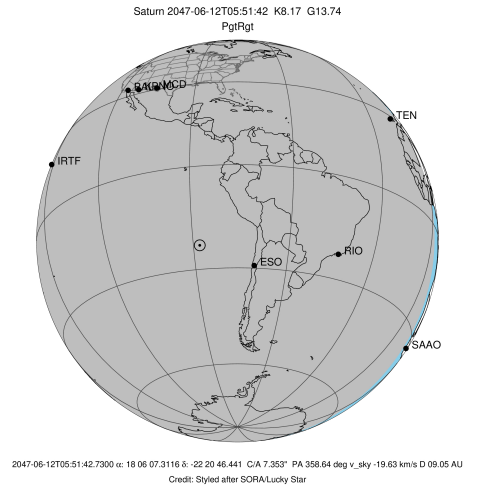
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-06-12T05:51:14.160
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : ESO
 Location : European Southern Obs. (3.6m)
 Latitude (deg) : -29.26097
 E. Longitude (deg) : 289.26831
 Altitude (km) : 2.400
 Gaia source ID : 4069684823854270464
 2Mass ID (if available) : 18060730-2220463
 ICRS Star Coord at Epoch: 18h 06m 07.31161s -22:20:46.44088s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 8.168
 G magnitude : 13.740
 RP magnitude : 12.423
 BP magnitude : 15.761
 DUPflag : 0
 Distance (au) : 9.047
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -19.63
 Sun-Target sep (deg) : 169.11
 Sun-Moon sep (deg) : 43.93
 B (ring opening deg) : 26.34
 PA of pole (deg) : 5.63
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 7.471
 C/A sky separation (km) : 49021.8
 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	2047-06-12T04:57:00.179		79.96	-83.23	140461.00	-13.32		
A (OER)	I	2047-06-12T05:01:42.364		80.72	-82.68	136774.40	-12.80		
Encke (OEG)	I	2047-06-12T05:05:43.585		81.31	-82.12	133744.89	-12.31		
Encke (IEG)	I	2047-06-12T05:06:09.757		81.38	-82.05	133423.31	-12.26		
A (IER)	I	2047-06-12T05:23:15.873		83.08	-79.13	122050.38	-9.80		
B (OER)	I	2047-06-12T05:31:27.953	b	83.23	-77.55	117571.16	-8.38		
Saturn	I	2047-06-12T05:23:22.285		83.08	-79.11	59385.58		-52.70	-57.87
Saturn	E	2047-06-12T06:19:28.437		76.93	-67.52	59636.97		-42.11	-47.72
B (OER)	E	2047-06-12T06:48:30.671		71.03	-61.23	117571.16	8.39		
A (IER)	E	2047-06-12T06:56:42.537		69.29	-59.45	122050.38	9.80		
Encke (IEG)	E	2047-06-12T07:13:49.982		65.62	-55.71	133423.31	12.23		
Encke (OEG)	E	2047-06-12T07:14:16.216		65.53	-55.61	133744.89	12.28		
A (OER)	E	2047-06-12T07:18:18.073		64.66	-54.73	136774.40	12.76		
F ring	E	2047-06-12T07:23:01.130		63.64	-53.70	140461.00	13.28		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-06-12T05:46:54.590
 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 : 4069684823854270464
 2Mass ID (if available) : 18060730-2220463
 ICRS Star Coord at Epoch: 18h 06m 07.31161s -22:20:46.44088s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 8.168
 G magnitude : 13.740
 RP magnitude : 12.423
 BP magnitude : 15.761
 DUPflag : 0
 Distance (au) : 9.047
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -19.63
 Sun-Target sep (deg) : 169.11
 Sun-Moon sep (deg) : 42.83
 B (ring opening deg) : 26.34
 PA of pole (deg) : 5.63
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 7.887
 C/A sky separation (km) : 51751.8
 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	2047-06-12T04:57:59.600		16.89	-7.86	140461.00	-11.84		
A (OER)	I	2047-06-12T05:03:19.571		15.81	-6.82	136774.40	-11.20		
Encke (OEG)	I	2047-06-12T05:07:57.451		14.87	-5.92	133744.89	-10.60		
Encke (IEG)	I	2047-06-12T05:08:27.883		14.76	-5.82	133423.31	-10.53		
A (IER)	I	2047-06-12T05:29:34.300	b	10.52	-1.78x	122050.38	-7.29		
B (OER)	I	2047-06-12T05:41:35.532	b	8.13	0.48x	117571.16	-5.09		
Saturn	I	2047-06-12T05:22:16.105		11.98	-3.17x	59316.40		-55.77	-60.69
Saturn	E	2047-06-12T06:11:58.955		2.21x	6.04x	59534.90		-46.36	-51.87
B (OER)	E	2047-06-12T06:31:15.428		-1.45x	9.43x	117571.16	5.09		
A (IER)	E	2047-06-12T06:43:18.184		-3.70x	11.49x	122050.38	7.27		
Encke (IEG)	E	2047-06-12T07:04:31.985		-7.56x	14.99x	133423.31	10.45		
Encke (OEG)	E	2047-06-12T07:05:02.675		-7.65x	15.07x	133744.89	10.51		
A (OER)	E	2047-06-12T07:09:43.074		-8.49x	15.82x	136774.40	11.09		
F ring	E	2047-06-12T07:15:06.311		-9.44x	16.67x	140461.00	11.71		