

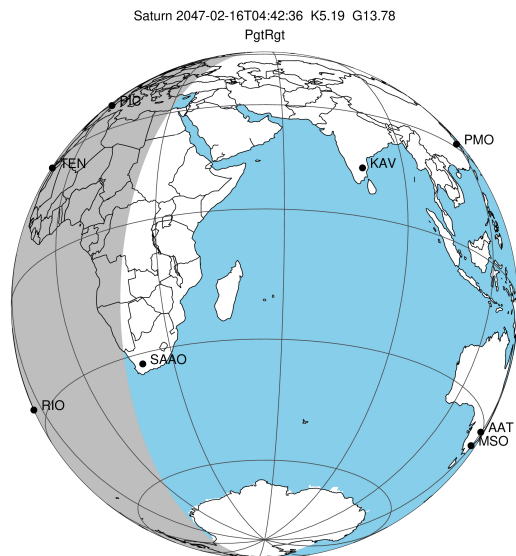
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-02-16T04:42:36.060
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 4069681662758253056
 2Mass ID (if available) : 18062173-2222144

Saturn 2047-02-16T04:42:36 K5.19 G13.78 PgtRgt

ICRS Star Coord at Epoch: 18h 06m 21.73216s -22:22:14.43596s

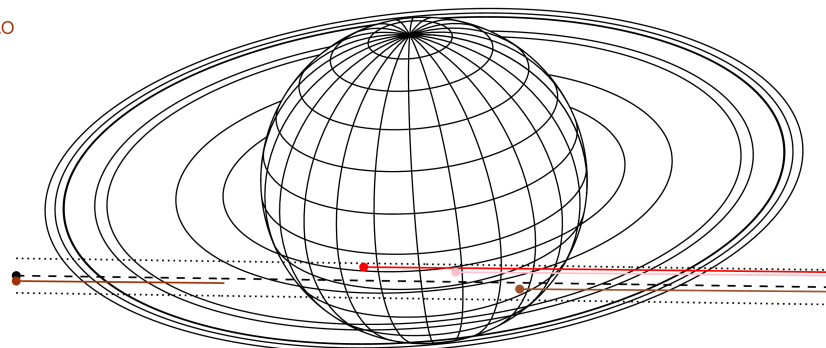
RUWE (>1.4 is poor) : 1.31
 K magnitude : 5.193
 G magnitude : 13.780
 RP magnitude : 12.054
 BP magnitude : 18.971
 DUPflag : 0
 Distance (au) : 10.574
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 26.56
 Sun-Target sep (deg) : 55.29
 Sun-Moon sep (deg) : 49.21
 B (ring opening deg) : 26.36
 PA of pole (deg) : 5.64

- 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



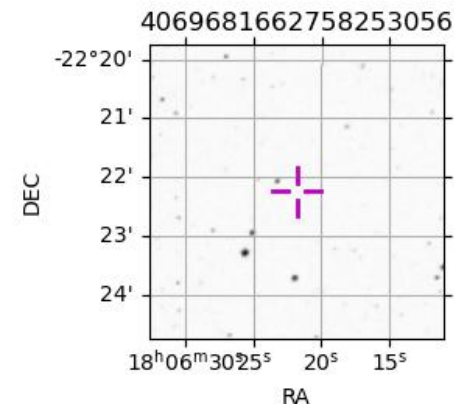
2047-02-16T04:42:36.0600 ra: 18 06 21.7322 s: -22 22 14.436 C/A 4.860° PA 359.18 deg v_sky +26.56 km/s D 10.57 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PIC
 TEN
 RIO
 SAAO

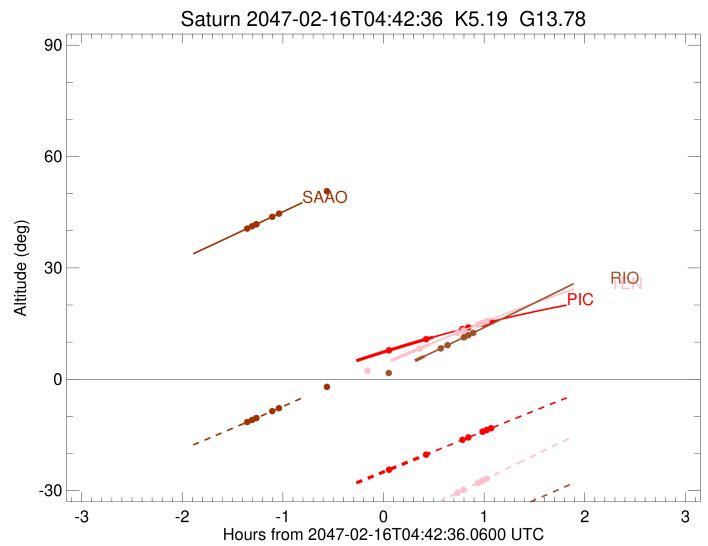
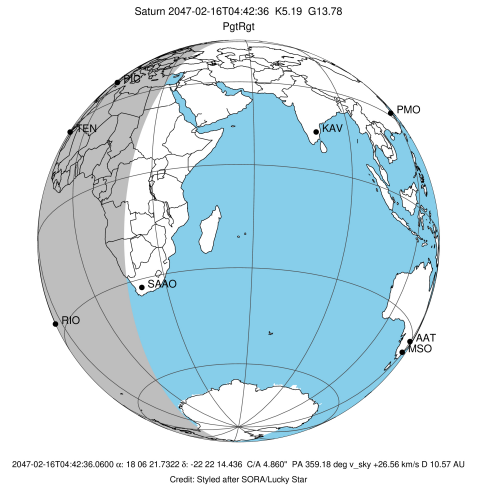


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEncode
PIC	Pic du Midi	42.9	0.1		+	+	FEB 16 05:12 - FEB 16 05:46	PneRne
PAL	Palomar Mt (20	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs	32.1	118.8					PnnRnn
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		+	+	FEB 16 05:10 - FEB 16 05:44	PneRne
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		+	+	FEB 16 05:06 - FEB 16 05:36	PneRne
ESO	European South	-29.3	289.3					PnnRnn
AAT	Siding Spring	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro	-32.4	20.8	+			FEB 16 03:21 - FEB 16 03:40	PnnRin
MSO	Mt. Stromlo Ob	-35.3	149.0	+				PnnRnn



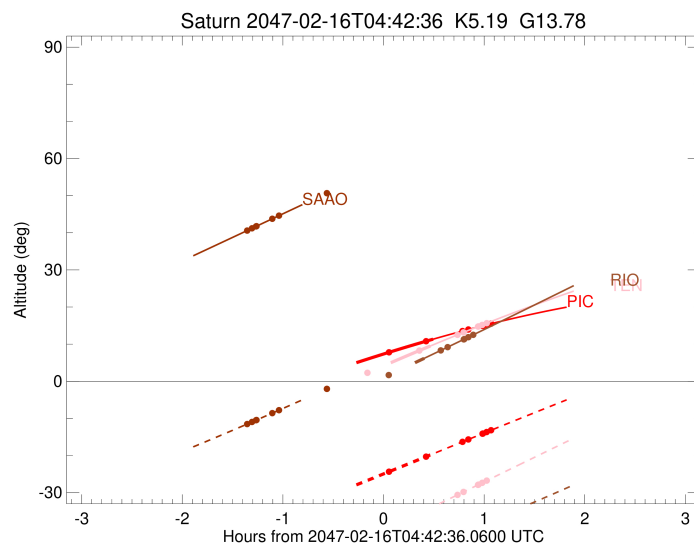
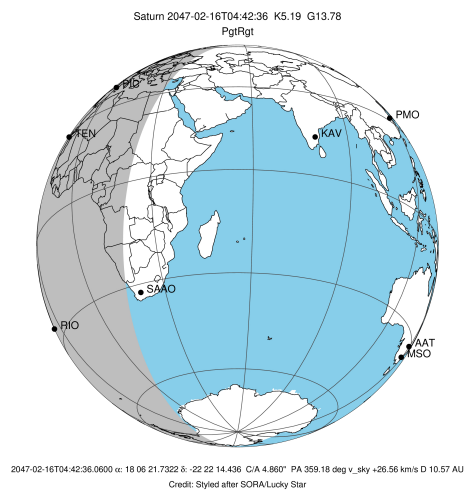
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-02-16T04:40:18.530
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 4069681662758253056
 2Mass ID (if available) : 18062173-2222144
 ICRS Star Coord at Epoch: 18h 06m 21.73216s -22:22:14.43596s
 RUWE (>1.4 is poor) : 1.31
 K magnitude : 5.193
 G magnitude : 13.780
 RP magnitude : 12.054
 BP magnitude : 18.971
 DUPflag : 0
 Distance (au) : 10.574
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 26.56
 Sun-Target sep (deg) : 55.29
 Sun-Moon sep (deg) : 49.00
 B (ring opening deg) : 26.36
 PA of pole (deg) : 5.64
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.199
 C/A sky separation (km) : 32199.6
 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_itr93_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	2047-02-16T03:17:08.764		-5.91x	-40.11	140461.00	-23.42		
A (OER)	I	2047-02-16T03:19:46.888		-5.47x	-39.67	136774.40	-23.20		
Encke (OEG)	I	2047-02-16T03:21:58.020		-5.11x	-39.30	133744.89	-23.00		
Encke (IEG)	I	2047-02-16T03:22:12.007		-5.07x	-39.26	133423.31	-22.98		
A (IER)	I	2047-02-16T03:30:36.472		-3.69x	-37.82	122050.38	-22.07		
B (OER)	I	2047-02-16T03:34:01.467		-3.13x	-37.23	117571.16	-21.62		
B (IER)	I	2047-02-16T03:55:40.479		0.33x	-33.43	91984.69	-17.24		
C (IER)	I	2047-02-16T04:17:46.206	b	3.72x	-29.47	74490.58	-8.20		
Saturn	I	2047-02-16T04:08:18.532		2.28x	-31.17	60044.88		-23.35	-27.86
Saturn	E	2047-02-16T05:12:12.067		11.34	-19.53	59823.10		-34.14	-39.60
C (IER)	E	2047-02-16T04:45:39.048	b	7.77	-24.40	74490.58	8.12		
B (IER)	E	2047-02-16T05:07:55.918	b	10.79	-20.32	91984.69	17.13		
B (OER)	E	2047-02-16T05:29:42.864		13.53	-16.32	117571.16	21.48		
A (IER)	E	2047-02-16T05:33:09.215		13.94	-15.68	122050.38	21.92		
Encke (IEG)	E	2047-02-16T05:41:37.247		14.93	-14.13	133423.31	22.81		
Encke (OEG)	E	2047-02-16T05:41:51.337		14.95	-14.09	133744.89	22.83		
A (OER)	E	2047-02-16T05:44:03.456		15.21	-13.68	136774.40	23.03		
F ring	E	2047-02-16T05:46:42.804		15.50	-13.20	140461.00	23.24		

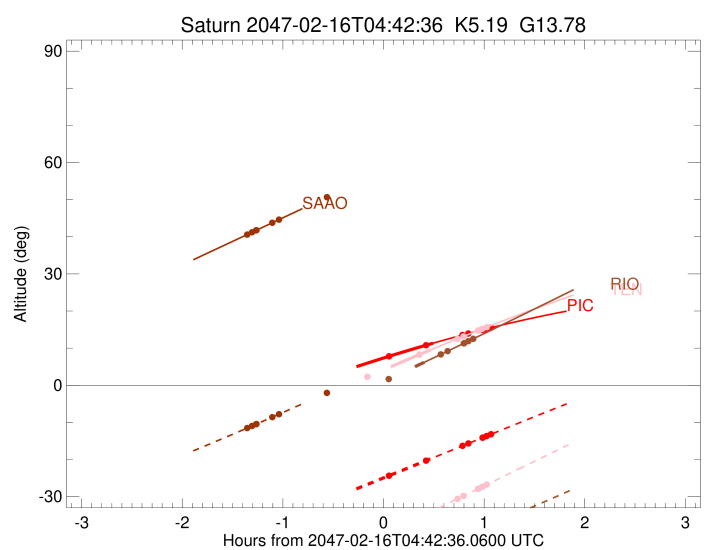
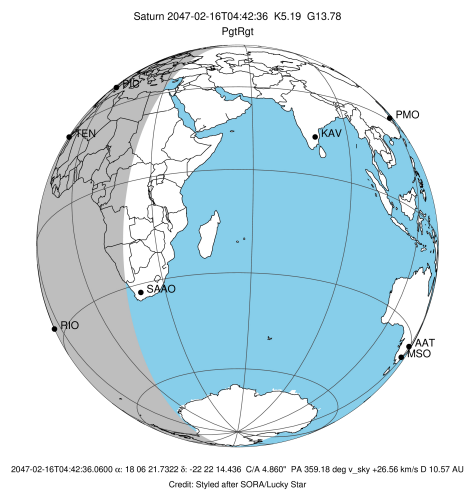
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-02-16T04:39:23.380
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 4069681662758253056
 2Mass ID (if available) : 18062173-2222144
 ICRS Star Coord at Epoch: 18h 06m 21.73216s -22:22:14.43596s
 RUWE (>1.4 is poor) : 1.31
 K magnitude : 5.193
 G magnitude : 13.780
 RP magnitude : 12.054
 BP magnitude : 18.971
 DUPflag : 0
 Distance (au) : 10.574
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 26.56
 Sun-Target sep (deg) : 55.29
 Sun-Moon sep (deg) : 48.78
 B (ring opening deg) : 26.36
 PA of pole (deg) : 5.64
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.401
 C/A sky separation (km) : 33754.7
 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_itr93_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	2047-02-16T03:17:25.866		-13.13x	-58.39	140461.00	-23.09		
A (OER)	I	2047-02-16T03:20:06.384		-12.57x	-57.85	136774.40	-22.84		
Encke (OEG)	I	2047-02-16T03:22:19.677		-12.10x	-57.40	133744.89	-22.61		
Encke (IEG)	I	2047-02-16T03:22:33.904		-12.05x	-57.35	133423.31	-22.59		
A (IER)	I	2047-02-16T03:31:08.579		-10.27x	-55.59	122050.38	-21.56		
B (OER)	I	2047-02-16T03:34:38.759		-9.54x	-54.86	117571.16	-21.05		
B (IER)	I	2047-02-16T03:57:18.729		-4.88x	-50.09	91984.69	-15.96		
C (IER)	I	2047-02-16T04:29:09.934	b	1.52x	-43.23	74491.15	-0.78		
Saturn	I	2047-02-16T04:08:08.830		-2.68x	-47.77	60014.59		-24.99	-29.70
Saturn	E	2047-02-16T05:10:32.042		9.51	-34.17	59790.21		-35.58	-41.10
C (IER)	E	2047-02-16T04:31:47.588	b	2.04x	-42.66	74491.84	0.79		
B (IER)	E	2047-02-16T05:03:54.758	b	8.26	-35.63	91984.69	15.83		
B (OER)	E	2047-02-16T05:26:45.342		12.52	-30.60	117571.16	20.88		
A (IER)	E	2047-02-16T05:30:17.338		13.16	-29.82	122050.38	21.37		
Encke (IEG)	E	2047-02-16T05:38:56.797		14.72	-27.91	133423.31	22.37		
Encke (OEG)	E	2047-02-16T05:39:11.164		14.77	-27.86	133744.89	22.39		
A (OER)	E	2047-02-16T05:41:25.784		15.17	-27.36	136774.40	22.61		
F ring	E	2047-02-16T05:44:07.947		15.65	-26.77	140461.00	22.85		

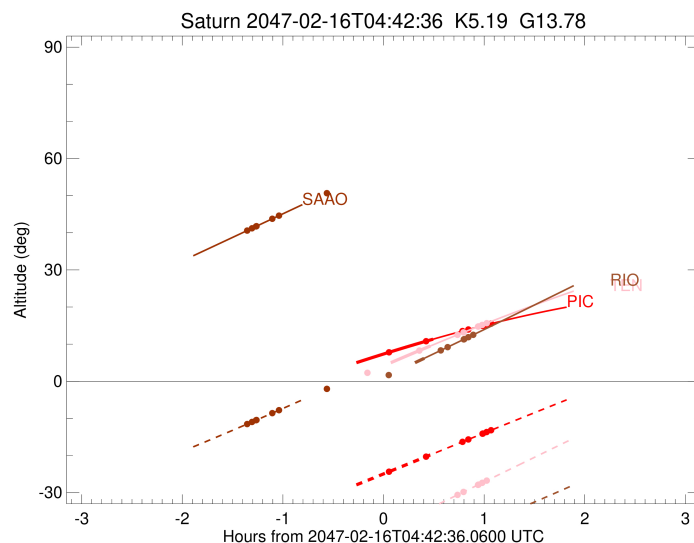
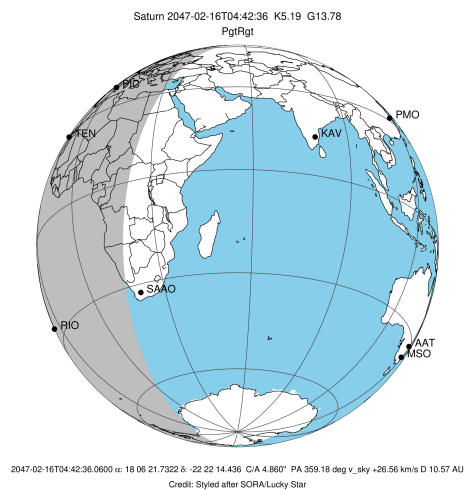
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-02-16T04:39:05.090
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : RIO
 Location : Rio de Janeiro
 Latitude (deg) : -22.89506
 E. Longitude (deg) : 316.77708
 Altitude (km) : 0.033
 Gaia source ID : 4069681662758253056
 2Mass ID (if available) : 18062173-2222144
 ICRS Star Coord at Epoch: 18h 06m 21.73216s -22:22:14.43596s
 RUWE (>1.4 is poor) : 1.31
 K magnitude : 5.193
 G magnitude : 13.780
 RP magnitude : 12.054
 BP magnitude : 18.971
 DUPflag : 0
 Distance (au) : 10.574
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 26.56
 Sun-Target sep (deg) : 55.29
 Sun-Moon sep (deg) : 48.59
 B (ring opening deg) : 26.36
 PA of pole (deg) : 5.64
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 5.191
 C/A sky separation (km) : 39812.0
 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	2047-02-16T03:21:53.958		-15.41x	-54.66	140461.00	-21.39		
A (OER)	I	2047-02-16T03:24:47.810		-14.85x	-54.58	136774.40	-21.01		
Encke (OEG)	I	2047-02-16T03:27:13.163		-14.38x	-54.51	133744.89	-20.67		
Encke (IEG)	I	2047-02-16T03:27:28.735		-14.33x	-54.50	133423.31	-20.63		
A (IER)	I	2047-02-16T03:37:01.330		-12.45x	-54.09	122050.38	-19.02		
B (OER)	I	2047-02-16T03:41:01.841		-11.65x	-53.88	117571.17	-18.21		
B (IER)	I	2047-02-16T04:11:56.870	b	-5.39x	-51.42	91984.69	-8.16		
Saturn	I	2047-02-16T04:11:07.131		-5.56x	-51.50	59883.04		-31.44	-36.74
Saturn	E	2047-02-16T05:06:54.801		6.19	-44.19	59645.36		-41.71	-47.33
B (IER)	E	2047-02-16T04:45:35.205	b	1.64x	-47.35	91984.69	8.09		
B (OER)	E	2047-02-16T05:16:46.390		8.31	-42.61	117571.17	18.05		
A (IER)	E	2047-02-16T05:20:49.036		9.19	-41.94	122050.38	18.85		
Encke (IEG)	E	2047-02-16T05:30:27.091		11.28	-40.30	133423.31	20.43		
Encke (OEG)	E	2047-02-16T05:30:42.820		11.34	-40.25	133744.89	20.46		
A (OER)	E	2047-02-16T05:33:09.663		11.87	-39.83	136774.40	20.80		
F ring	E	2047-02-16T05:36:05.356		12.51	-39.31	140461.00	21.17		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-02-16T04:40:42.480
 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 : 4069681662758253056
 2Mass ID (if available) : 18062173-2222144
 ICRS Star Coord at Epoch: 18h 06m 21.73216s -22:22:14.43596s
 RUWE (>1.4 is poor) : 1.31
 K magnitude : 5.193
 G magnitude : 13.780
 RP magnitude : 12.054
 BP magnitude : 18.971
 DUPflag : 0
 Distance (au) : 10.574
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 26.56
 Sun-Target sep (deg) : 55.29
 Sun-Moon sep (deg) : 49.52
 B (ring opening deg) : 26.36
 PA of pole (deg) : 5.64
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 5.043
 C/A sky separation (km) : 38673.4
 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



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-02-16T03:21:15.781		40.59	-11.53	140461.00	-21.48		
A (OER)	I	2047-02-16T03:24:08.782		41.20	-10.97	136774.40	-21.13		
Encke (OEG)	I	2047-02-16T03:26:33.180		41.71	-10.50	133744.89	-20.82		
Encke (IEG)	I	2047-02-16T03:26:48.636		41.76	-10.45	133423.31	-20.79		
A (IER)	I	2047-02-16T03:36:14.607		43.76	-8.59	122050.38	-19.34		
B (OER)	I	2047-02-16T03:40:10.615		44.60	-7.81	117571.16	-18.61		
B (IER)	I	2047-02-16T04:08:46.968		50.66	-2.06x	91984.69	-10.18		
Saturn	I	2047-02-16T04:11:40.197		51.27	-1.47x	59912.90		-30.05	-35.26
Saturn	E	2047-02-16T05:09:35.058		63.39	10.50x	59670.11		-40.68	-46.30
B (IER)	E	2047-02-16T04:51:50.771	b	59.72	6.80x	91984.69	10.10		
B (OER)	E	2047-02-16T05:20:37.574		65.64	12.82x	117571.16	18.51		
A (IER)	E	2047-02-16T05:24:34.809		66.44	13.65x	122050.38	19.24		
Encke (IEG)	E	2047-02-16T05:34:03.834		68.32	15.64x	133423.31	20.67		
Encke (OEG)	E	2047-02-16T05:34:19.377		68.38	15.70x	133744.89	20.71		
A (OER)	E	2047-02-16T05:36:44.594		68.85	16.21x	136774.40	21.01		
F ring	E	2047-02-16T05:39:38.601		69.42	16.82x	140461.00	21.35		