

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2033-01-24T01:00:41.870
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3423796646740541568
 2Mass ID (if available) : 06040519+2231583

ICRS Star Coord at Epoch: 06h 04m 05.20647s +22:31:58.32073s

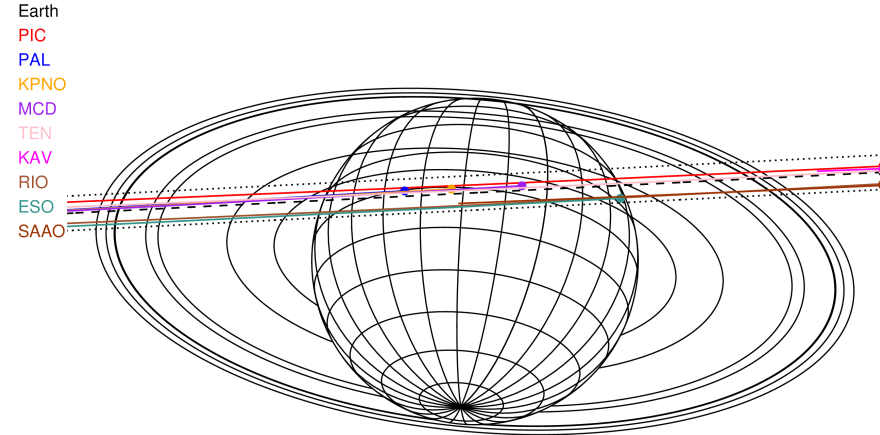
RUWE (>1.4 is poor) : 0.96
 K magnitude : 9.467
 G magnitude : 12.103
 RP magnitude : 11.288
 BP magnitude : 12.801
 DUPflag : 0
 Distance (au) : 8.173
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.35
 Sun-Target sep (deg) : 147.05
 Sun-Moon sep (deg) : 126.32
 B (ring opening deg) : -26.58
 PA of pole (deg) : -5.60

#	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



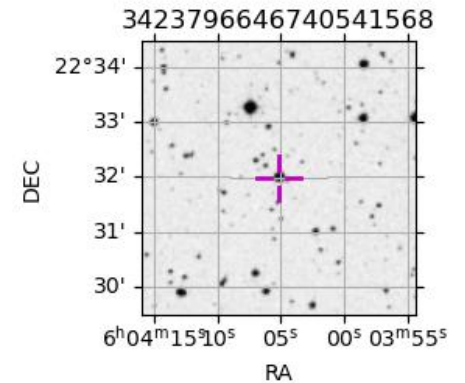
2033-01-24T01:00:41.8700 ex: 06 04 05.2065 s: +22 31 58.321 C/A 4.273° PA 182.89 deg v_sky -15.35 km/s D 08.17 AU
 Credit: Styled after SORA/Lucky Star

Saturn 2033-01-24T01:00:41 K9.47 G12.10 PgtRgt

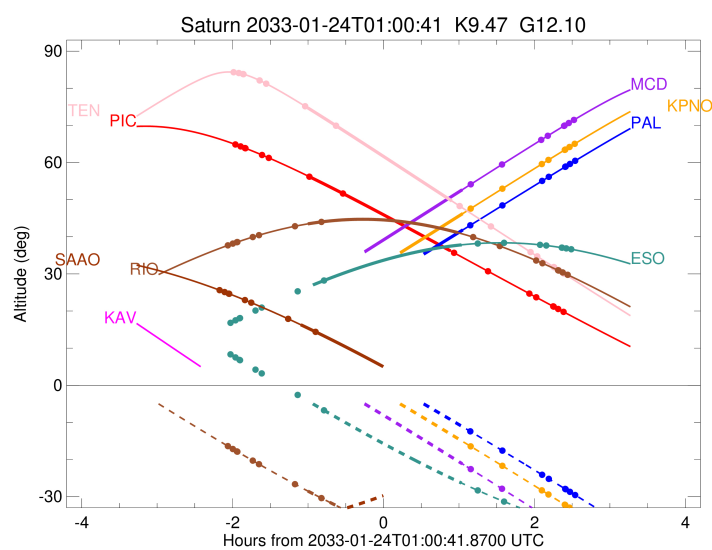
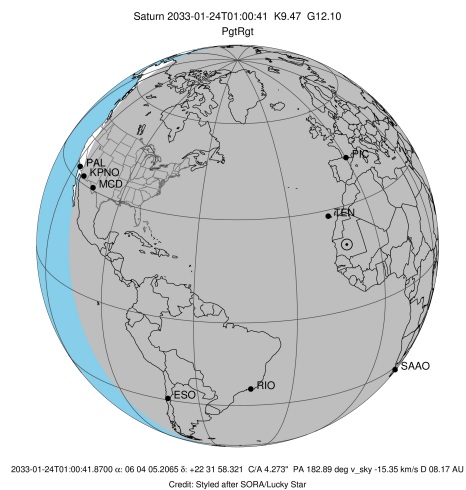


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+ + + + +	+	+ + + + + + + +	JAN 23 23:02 - JAN 24 03:23	PieRie
PAL	Palomar Mt (20	33.4	243.1		+	+ + + + + + + +	JAN 24 02:03 - JAN 24 03:33	PneRne
PMO	Purple Mtn Obs	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl	32.0	248.4		+	+ + + + + + + +	JAN 24 02:03 - JAN 24 03:32	PneRne
MCD	McDonald Obs.	30.7	256.0		+	+ + + + + + + +	JAN 24 02:03 - JAN 24 03:32	PneRne
TEN	Teide Obs./Ten	28.3	343.5	+ + + + +	+	+ + + + + + + +	JAN 23 23:01 - JAN 24 03:24	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	+ + + + +	+	+ + + + + + + +	JAN 23 22:57 - JAN 24 03:27	PieRie
ESO	European South	-29.3	289.3		+	+ + + + + + + +	JAN 24 02:02 - JAN 24 03:29	PneRne
AAT	Siding Spring	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro	-32.4	20.8	+ + + + +	+		JAN 23 22:50 - JAN 23 23:54	PinRin
MSO	Mt. Stromlo Ob	-35.3	149.0					PnnRnn



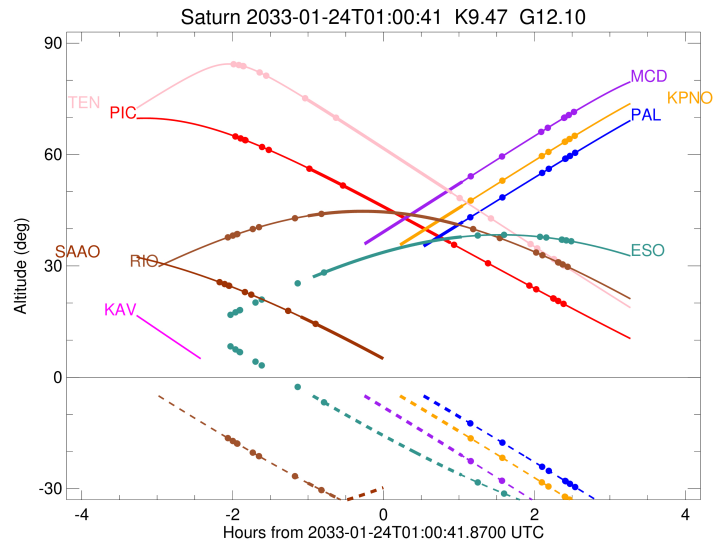
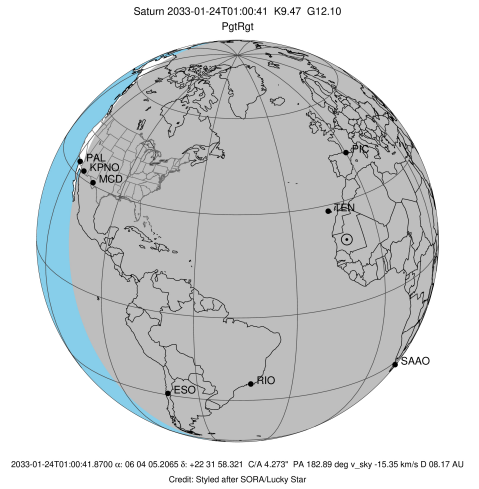
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2033-01-24T00:56:57.940
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3423796646740541568
 2Mass ID (if available) : 06040519+2231583
 ICRS Star Coord at Epoch: 06h 04m 05.20647s +22:31:58.32073s
 RUWE (>1.4 is poor) : 0.96
 K magnitude : 9.467
 G magnitude : 12.103
 RP magnitude : 11.288
 BP magnitude : 12.801
 DUPflag : 0
 Distance (au) : 8.173
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.35
 Sun-Target sep (deg) : 147.05
 Sun-Moon sep (deg) : 127.14
 B (ring opening deg) : -26.58
 PA of pole (deg) : -5.60
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.771
 C/A sky separation (km) : 28279.8
 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

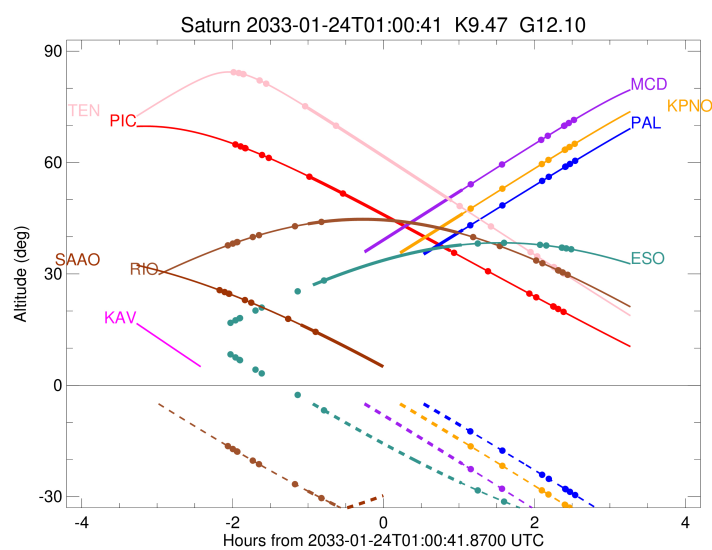
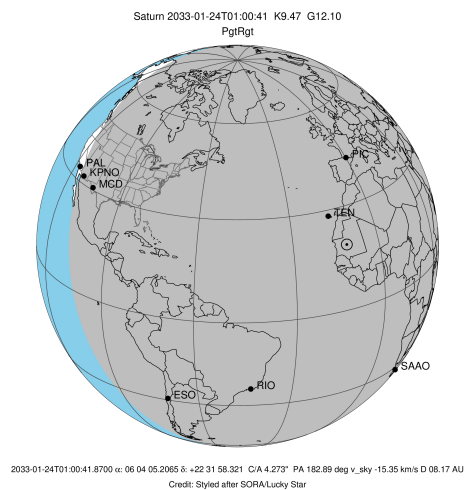
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2033-01-23T23:02:58.585		64.87	-62.37	140461.00	-14.74		
A (OER)	I	2033-01-23T23:07:09.498		64.34	-62.82	136774.40	-14.64		
Encke (OEG)	I	2033-01-23T23:10:36.995		63.89	-63.18	133744.89	-14.56		
Encke (IEG)	I	2033-01-23T23:10:59.094		63.84	-63.21	133423.31	-14.55		
A (IER)	I	2033-01-23T23:24:11.143		62.03	-64.42	122050.38	-14.15		
B (OER)	I	2033-01-23T23:29:29.702		61.25	-64.83	117571.17	-13.96		
B (IER)	I	2033-01-24T00:01:50.537	b	56.18	-66.35	91984.69	-12.19		
C (IER)	I	2033-01-24T00:28:36.187	b	51.63	-66.15	74490.58	-9.30		
Saturn	I	2033-01-24T00:00:39.936		56.37	-66.32	59863.93		31.97	37.31
Saturn	E	2033-01-24T01:53:51.649		36.22	-58.03	60131.87		17.84	21.53
C (IER)	E	2033-01-24T01:56:49.938		35.67	-57.61	74490.58	9.26		
B (IER)	E	2033-01-24T02:23:50.291		30.70	-53.50	91984.69	12.03		
B (OER)	E	2033-01-24T02:56:44.301		24.68	-48.04	117571.16	13.68		
A (IER)	E	2033-01-24T03:02:09.617		23.70	-47.11	122050.38	13.85		
Encke (IEG)	E	2033-01-24T03:15:39.956		21.25	-44.75	133423.31	14.20		
Encke (OEG)	E	2033-01-24T03:16:02.595		21.18	-44.69	133744.89	14.21		
A (OER)	E	2033-01-24T03:19:35.241		20.54	-44.06	136774.40	14.28		
F ring	E	2033-01-24T03:23:52.567		19.77	-43.30	140461.00	14.37		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2033-01-24T01:06:27.540
 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 : 3423796646740541568
 2Mass ID (if available) : 06040519+2231583
 ICRS Star Coord at Epoch: 06h 04m 05.20647s +22:31:58.32073s
 RUWE (>1.4 is poor) : 0.96
 K magnitude : 9.467
 G magnitude : 12.103
 RP magnitude : 11.288
 BP magnitude : 12.801
 DUPflag : 0
 Distance (au) : 8.173
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.35
 Sun-Target sep (deg) : 147.05
 Sun-Moon sep (deg) : 126.24
 B (ring opening deg) : -26.58
 PA of pole (deg) : -5.60
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.644
 C/A sky separation (km) : 27528.7
 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



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2033-01-23T23:11:40.526		6.73	20.39x	140461.00	-14.60		
A (OER)	I	2033-01-23T23:15:53.666		7.55	19.73x	136774.40	-14.52		
Encke (OEG)	I	2033-01-23T23:19:22.764		8.23	19.17x	133744.89	-14.45		
Encke (IEG)	I	2033-01-23T23:19:45.020		8.30	19.11x	133423.31	-14.44		
A (IER)	I	2033-01-23T23:33:00.899		10.91	16.95x	122050.38	-14.12		
B (OER)	I	2033-01-23T23:38:19.918		11.96	16.06x	117571.16	-13.96		
B (IER)	I	2033-01-24T00:10:25.272	b	18.39	10.50x	91984.69	-12.42		
C (IER)	I	2033-01-24T00:36:13.540	b	23.64	5.80x	74490.58	-9.90		
Saturn	I	2033-01-24T00:09:10.290		18.13	10.72x	59862.85		32.02	37.36
Saturn	E	2033-01-24T02:03:48.329		41.86	-11.22	60153.01		16.35	19.78
C (IER)	E	2033-01-24T02:09:44.859		43.10	-12.42	74490.58	10.02		
B (IER)	E	2033-01-24T02:35:15.241		48.45	-17.61	91984.69	12.58		
B (OER)	E	2033-01-24T03:06:53.784		55.06	-24.13	117571.16	14.18		
A (IER)	E	2033-01-24T03:12:07.655		56.15	-25.21	122050.38	14.36		
Encke (IEG)	E	2033-01-24T03:25:09.777		58.84	-27.92	133423.31	14.71		
Encke (OEG)	E	2033-01-24T03:25:31.630		58.92	-28.00	133744.89	14.72		
A (OER)	E	2033-01-24T03:28:56.887		59.62	-28.71	136774.40	14.80		
F ring	E	2033-01-24T03:33:05.260		60.47	-29.57	140461.00	14.89		

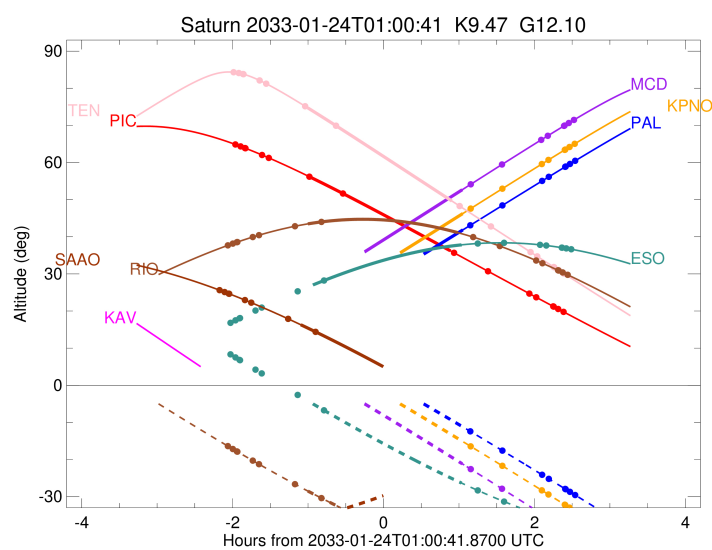
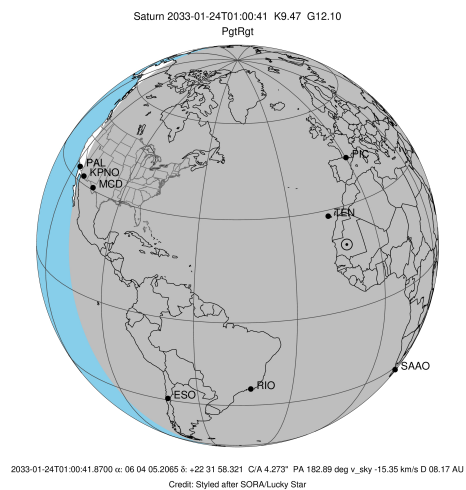
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2033-01-24T01:06:17.380
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KPNO
 Location : Kitt Peak Natl Obs
 Latitude (deg) : 31.96333
 E. Longitude (deg) : 248.40000
 Altitude (km) : 2.120
 Gaia source ID : 3423796646740541568
 2Mass ID (if available) : 06040519+2231583
 ICRS Star Coord at Epoch: 06h 04m 05.20647s +22:31:58.32073s
 RUWE (>1.4 is poor) : 0.96
 K magnitude : 9.467
 G magnitude : 12.103
 RP magnitude : 11.288
 BP magnitude : 12.801
 DUPflag : 0
 Distance (au) : 8.173
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.35
 Sun-Target sep (deg) : 147.05
 Sun-Moon sep (deg) : 126.30
 B (ring opening deg) : -26.58
 PA of pole (deg) : -5.60
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.594
 C/A sky separation (km) : 27231.9
 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	2033-01-23T23:11:16.613		10.28	17.90x	140461.00	-14.67		
A (OER)	I	2033-01-23T23:15:28.530		11.12	17.19x	136774.40	-14.60		
Encke (OEG)	I	2033-01-23T23:18:56.587		11.82	16.60x	133744.89	-14.53		
Encke (IEG)	I	2033-01-23T23:19:18.731		11.89	16.54x	133423.31	-14.52		
A (IER)	I	2033-01-23T23:32:30.356		14.56	14.24x	122050.38	-14.20		
B (OER)	I	2033-01-23T23:37:47.517		15.63	13.30x	117571.16	-14.04		
B (IER)	I	2033-01-24T00:09:38.489	b	22.18	7.47x	91984.69	-12.54		
C (IER)	I	2033-01-24T00:35:05.906	b	27.48	2.63x	74490.58	-10.10		
Saturn	I	2033-01-24T00:08:57.897		22.04	7.60x	59869.27		31.73	37.05
Saturn	E	2033-01-24T02:03:40.678		46.25	-15.15	60156.52		16.09	19.48
C (IER)	E	2033-01-24T02:10:02.251		47.60	-16.46	74490.58	10.21		
B (IER)	E	2033-01-24T02:35:13.123		52.96	-21.71	91984.69	12.69		
B (OER)	E	2033-01-24T03:06:39.381		59.61	-28.32	117571.16	14.25		
A (IER)	E	2033-01-24T03:11:51.802		60.71	-29.42	122050.38	14.42		
Encke (IEG)	E	2033-01-24T03:24:50.760		63.41	-32.17	133423.31	14.77		
Encke (OEG)	E	2033-01-24T03:25:12.533		63.49	-32.25	133744.89	14.77		
A (OER)	E	2033-01-24T03:28:37.056		64.19	-32.97	136774.40	14.85		
F ring	E	2033-01-24T03:32:44.583		65.04	-33.84	140461.00	14.94		

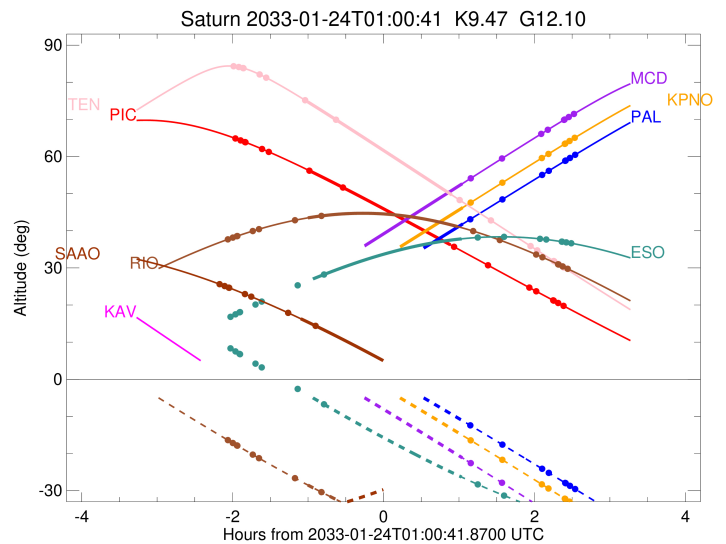
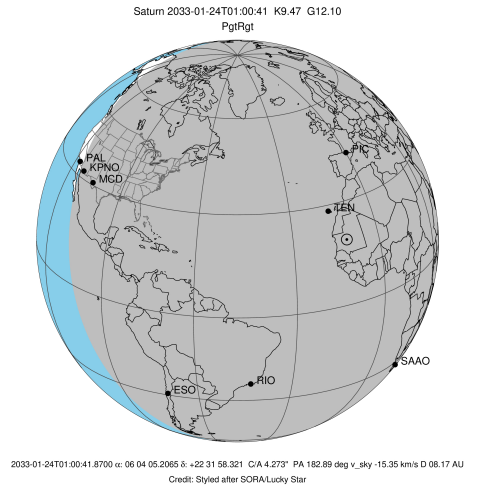
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2033-01-24T01:05:55.030
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MCD
 Location : McDonald Obs. 2.7m
 Latitude (deg) : 30.67158
 E. Longitude (deg) : 255.97844
 Altitude (km) : 2.075
 Gaia source ID : 3423796646740541568
 2Mass ID (if available) : 06040519+2231583
 ICRS Star Coord at Epoch: 06h 04m 05.20647s +22:31:58.32073s
 RUWE (>1.4 is poor) : 0.96
 K magnitude : 9.467
 G magnitude : 12.103
 RP magnitude : 11.288
 BP magnitude : 12.801
 DUPflag : 0
 Distance (au) : 8.173
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.35
 Sun-Target sep (deg) : 147.05
 Sun-Moon sep (deg) : 126.39
 B (ring opening deg) : -26.58
 PA of pole (deg) : -5.60
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.536
 C/A sky separation (km) : 26886.7
 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	2033-01-23T23:10:40.475		15.89	13.41x	140461.00	-14.76		
A (OER)	I	2033-01-23T23:14:50.836		16.76	12.65x	136774.40	-14.69		
Encke (OEG)	I	2033-01-23T23:18:17.580		17.47	12.02x	133744.89	-14.62		
Encke (IEG)	I	2033-01-23T23:18:39.582		17.54	11.95x	133423.31	-14.61		
A (IER)	I	2033-01-23T23:31:45.897		20.27	9.51x	122050.38	-14.30		
B (OER)	I	2033-01-23T23:37:00.769		21.37	8.51x	117571.17	-14.15		
B (IER)	I	2033-01-24T00:08:34.564		28.02	2.41x	91984.69	-12.69		
C (IER)	I	2033-01-24T00:33:38.396	b	33.36	-2.57x	74490.58	-10.32		
Saturn	I	2033-01-24T00:08:34.844		28.02	2.41x	59876.98		31.38	36.68
Saturn	E	2033-01-24T02:03:19.949		52.68	-21.15	60160.31		15.80	19.14
C (IER)	E	2033-01-24T02:10:07.371		54.14	-22.59	74490.58	10.43		
B (IER)	E	2033-01-24T02:34:56.851		59.48	-27.88	91984.69	12.81		
B (OER)	E	2033-01-24T03:06:09.550		66.12	-34.58	117571.16	14.33		
A (IER)	E	2033-01-24T03:11:20.390		67.20	-35.69	122050.38	14.49		
Encke (IEG)	E	2033-01-24T03:24:15.938		69.88	-38.47	133423.31	14.82		
Encke (OEG)	E	2033-01-24T03:24:37.625		69.96	-38.55	133744.89	14.83		
A (OER)	E	2033-01-24T03:28:01.365		70.65	-39.28	136774.40	14.91		
F ring	E	2033-01-24T03:32:07.998		71.48	-40.16	140461.00	14.99		

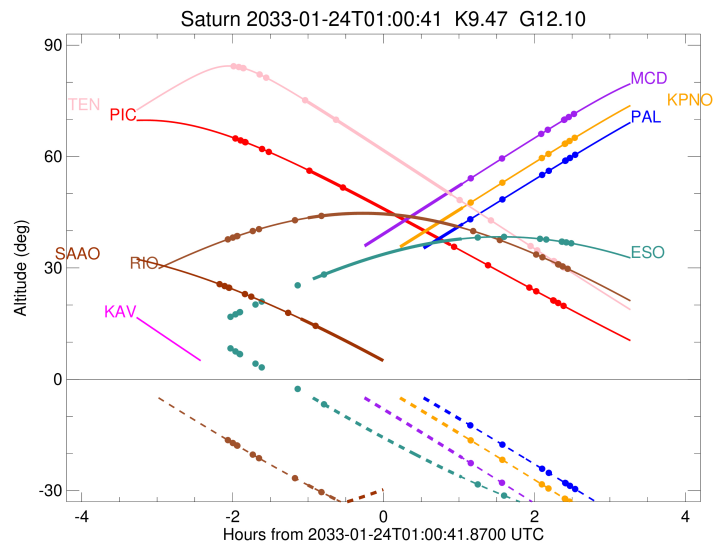
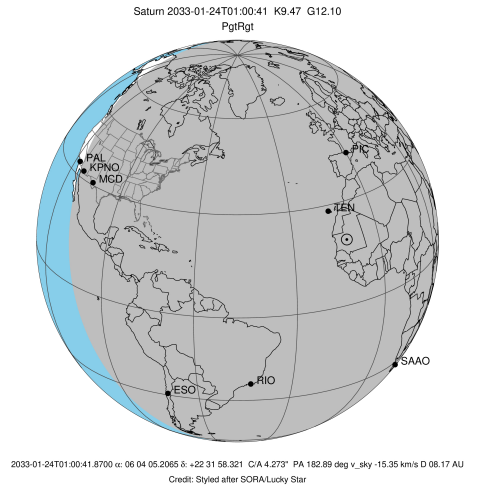
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2033-01-24T00:57:31.280
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 3423796646740541568
 2Mass ID (if available) : 06040519+2231583
 ICRS Star Coord at Epoch: 06h 04m 05.20647s +22:31:58.32073s
 RUWE (>1.4 is poor) : 0.96
 K magnitude : 9.467
 G magnitude : 12.103
 RP magnitude : 11.288
 BP magnitude : 12.801
 DUPflag : 0
 Distance (au) : 8.173
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.35
 Sun-Target sep (deg) : 147.05
 Sun-Moon sep (deg) : 127.21
 B (ring opening deg) : -26.58
 PA of pole (deg) : -5.60
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.454
 C/A sky separation (km) : 26401.6
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 Saturn_ring_plane.tf
 sat378.bsp
 sat286.bsp
 vgr1.sat286.bsp
 vgr2.sat286.bsp
 HST1081HSPephemUTC.bsp
 pfb10000r.bsp
 cassini.bsp
 earthstns_itrf93_040916.bsp
 earth_200101_990628_predict.bpc
 earth_720101_070426.bpc
 cpck28Mar2008.tpc
 pck.sat440.tpc
 IAU_SATURN_for_RINGFIT.tpc
 naif0012.tls
 earth_flat_IAU.spk



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

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2033-01-23T23:01:35.431		84.33	-57.64	140461.00	-15.07		
A (OER)	I	2033-01-23T23:05:40.772		84.11	-58.53	136774.40	-14.98		
Encke (OEG)	I	2033-01-23T23:09:03.451		83.83	-59.27	133744.89	-14.91		
Encke (IEG)	I	2033-01-23T23:09:25.025		83.80	-59.34	133423.31	-14.90		
A (IER)	I	2033-01-23T23:22:16.551		82.10	-62.12	122050.38	-14.57		
B (OER)	I	2033-01-23T23:27:25.765		81.24	-63.23	117571.16	-14.40		
B (IER)	I	2033-01-23T23:58:27.621		75.15	-69.75	91984.69	-12.90		
C (IER)	I	2033-01-24T00:23:04.065	b	69.89	-74.58	74490.58	-10.55		
Saturn	I	2033-01-24T00:00:34.556		74.71	-70.18	59901.13		30.28	35.50
Saturn	E	2033-01-24T01:55:00.376		49.65	-77.67	60157.22		16.03	19.42
C (IER)	E	2033-01-24T02:01:16.111		48.27	-76.64	74490.58	10.49		
B (IER)	E	2033-01-24T02:26:07.490		42.79	-72.03	91984.69	12.73		
B (OER)	E	2033-01-24T02:57:40.936		35.86	-65.53	117571.16	14.12		
A (IER)	E	2033-01-24T03:02:56.558		34.71	-64.41	122050.38	14.26		
Encke (IEG)	E	2033-01-24T03:16:05.425		31.85	-61.59	133423.31	14.56		
Encke (OEG)	E	2033-01-24T03:16:27.511		31.77	-61.51	133744.89	14.56		
A (OER)	E	2033-01-24T03:19:55.073		31.02	-60.76	136774.40	14.63		
F ring	E	2033-01-24T03:24:06.496		30.11	-59.86	140461.00	14.70		

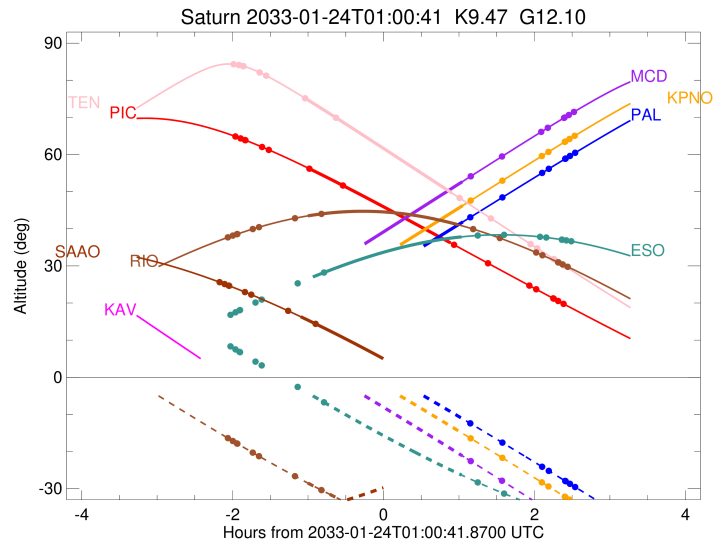
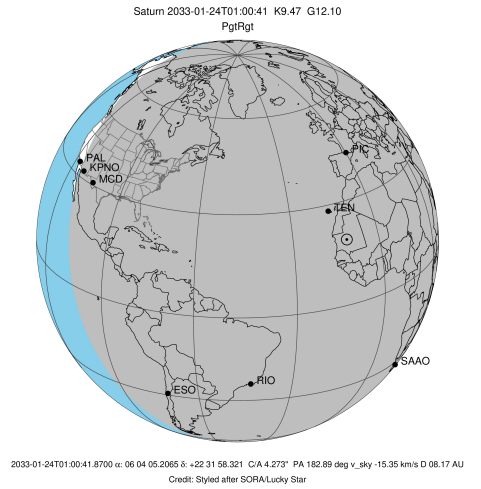
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2033-01-24T00:59:56.890
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : RIO
 Location : Rio de Janeiro
 Latitude (deg) : -22.89506
 E. Longitude (deg) : 316.77708
 Altitude (km) : 0.033
 Gaia source ID : 3423796646740541568
 2Mass ID (if available) : 06040519+2231583
 ICRS Star Coord at Epoch: 06h 04m 05.20647s +22:31:58.32073s
 RUWE (>1.4 is poor) : 0.96
 K magnitude : 9.467
 G magnitude : 12.103
 RP magnitude : 11.288
 BP magnitude : 12.801
 DUPflag : 0
 Distance (au) : 8.173
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.35
 Sun-Target sep (deg) : 147.05
 Sun-Moon sep (deg) : 126.86
 B (ring opening deg) : -26.58
 PA of pole (deg) : -5.60
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 3.516
 C/A sky separation (km) : 20842.2
 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	2033-01-23T22:57:01.361		37.69	-16.40	140461.00	-15.63		
A (OER)	I	2033-01-23T23:00:57.554		38.17	-17.18	136774.40	-15.58		
Encke (OEG)	I	2033-01-23T23:04:12.211		38.55	-17.83	133744.89	-15.54		
Encke (IEG)	I	2033-01-23T23:04:32.905		38.59	-17.90	133423.31	-15.54		
A (IER)	I	2033-01-23T23:16:49.241		39.94	-20.31	122050.38	-15.34		
B (OER)	I	2033-01-23T23:21:42.022		40.43	-21.26	117571.16	-15.25		
B (IER)	I	2033-01-23T23:50:21.717		42.84	-26.66	91984.69	-14.40		
C (IER)	I	2033-01-24T00:11:25.486	b	44.01	-30.41	74490.58	-13.15		
Saturn	I	2033-01-24T00:00:33.615		43.48	-28.50	60000.49		25.47	30.23
Saturn	E	2033-01-24T01:59:39.811		41.13	-45.16	60217.76		10.71	13.08
C (IER)	E	2033-01-24T02:11:59.232		39.92	-46.14	74490.58	13.09		
B (IER)	E	2033-01-24T02:33:11.323		37.50	-47.38	91984.69	14.28		
B (OER)	E	2033-01-24T03:02:07.819		33.59	-48.09	117571.16	15.08		
A (IER)	E	2033-01-24T03:07:04.006		32.87	-48.10	122050.38	15.16		
Encke (IEG)	E	2033-01-24T03:19:29.571		30.97	-47.95	133423.31	15.34		
Encke (OEG)	E	2033-01-24T03:19:50.538		30.92	-47.94	133744.89	15.34		
A (OER)	E	2033-01-24T03:23:07.798		30.40	-47.87	136774.40	15.38		
F ring	E	2033-01-24T03:27:07.234		29.76	-47.75	140461.00	15.42		

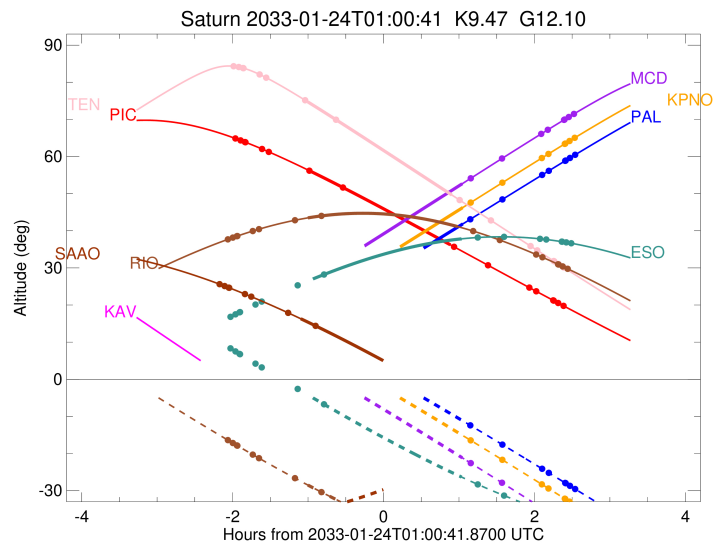
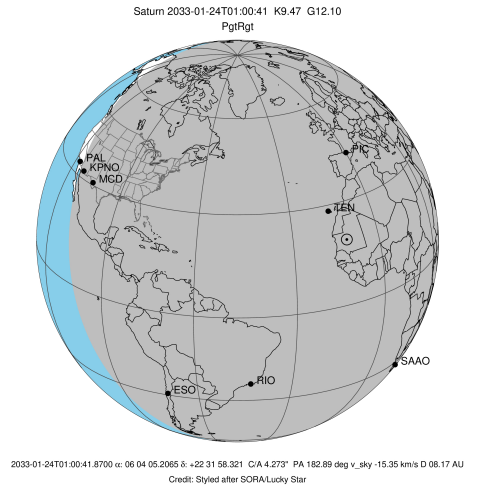
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2033-01-24T01:02:49.160
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : ESO
 Location : European Southern Obs. (3.6m)
 Latitude (deg) : -29.26097
 E. Longitude (deg) : 289.26831
 Altitude (km) : 2.400
 Gaia source ID : 3423796646740541568
 2Mass ID (if available) : 06040519+2231583
 ICRS Star Coord at Epoch: 06h 04m 05.20647s +22:31:58.32073s
 RUWE (>1.4 is poor) : 0.96
 K magnitude : 9.467
 G magnitude : 12.103
 RP magnitude : 11.288
 BP magnitude : 12.801
 DUPflag : 0
 Distance (au) : 8.173
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.35
 Sun-Target sep (deg) : 147.05
 Sun-Moon sep (deg) : 126.53
 B (ring opening deg) : -26.58
 PA of pole (deg) : -5.60
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 3.441
 C/A sky separation (km) : 20398.9
 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	2033-01-23T22:59:06.731		16.82	8.31x	140461.00	-15.56		
A (OER)	I	2033-01-23T23:03:03.977		17.50	7.49x	136774.40	-15.52		
Encke (OEG)	I	2033-01-23T23:06:19.438		18.05	6.81x	133744.89	-15.48		
Encke (IEG)	I	2033-01-23T23:06:40.214		18.10	6.74x	133423.31	-15.48		
A (IER)	I	2033-01-23T23:18:59.001		20.14	4.20x	122050.38	-15.30		
B (OER)	I	2033-01-23T23:23:52.481		20.93	3.19x	117571.16	-15.22		
B (IER)	I	2033-01-23T23:52:32.130		25.31	-2.62x	91984.69	-14.44		
C (IER)	I	2033-01-24T00:13:28.665	b	28.23	-6.76	74490.58	-13.28		
Saturn	I	2033-01-24T00:02:58.400		26.80	-4.69x	60003.66		25.31	30.05
Saturn	E	2033-01-24T02:02:48.514		37.83	-26.35	60223.56		10.07	12.30
C (IER)	E	2033-01-24T02:15:39.067		38.19	-28.32	74490.58	13.30		
B (IER)	E	2033-01-24T02:36:34.141		38.37	-31.33	91984.69	14.45		
B (OER)	E	2033-01-24T03:05:12.677		37.83	-34.97	117571.16	15.23		
A (IER)	E	2033-01-24T03:10:06.003		37.65	-35.53	122050.38	15.31		
Encke (IEG)	E	2033-01-24T03:22:24.425		37.07	-36.85	133423.31	15.48		
Encke (OEG)	E	2033-01-24T03:22:45.191		37.05	-36.88	133744.89	15.49		
A (OER)	E	2033-01-24T03:26:00.561		36.87	-37.21	136774.40	15.53		
F ring	E	2033-01-24T03:29:57.698		36.64	-37.59	140461.00	15.57		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2033-01-24T00:54:52.470
 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 : 3423796646740541568
 2Mass ID (if available) : 06040519+2231583
 ICRS Star Coord at Epoch: 06h 04m 05.20647s +22:31:58.32073s
 RUWE (>1.4 is poor) : 0.96
 K magnitude : 9.467
 G magnitude : 12.103
 RP magnitude : 11.288
 BP magnitude : 12.801
 DUPflag : 0
 Distance (au) : 8.173
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.35
 Sun-Target sep (deg) : 147.05
 Sun-Moon sep (deg) : 126.81
 B (ring opening deg) : -26.58
 PA of pole (deg) : -5.60
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 3.653
 C/A sky separation (km) : 21656.6
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 Saturn_ring_plane.tf
 sat378.bsp
 sat286.bsp
 vgr1.sat286.bsp
 vgr2.sat286.bsp
 HST1081HSPephemUTC.bsp
 pfb10000r.bsp
 cassini.bsp
 earthstns_itrf93_040916.bsp
 earth_200101_990628_predict.bpc
 earth_720101_070426.bpc
 cpck28Mar2008.tpc
 pck.sat440.tpc
 IAU_SATURN_for_RINGFIT.tpc
 naif0012.tls
 earth_flat_IAU.spk



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

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2033-01-23T22:50:25.769		25.61	-38.61	140461.00	-15.39		
A (OER)	I	2033-01-23T22:54:25.761		25.10	-38.59	136774.40	-15.33		
Encke (OEG)	I	2033-01-23T22:57:43.688		24.67	-38.56	133744.89	-15.28		
Encke (IEG)	I	2033-01-23T22:58:04.738		24.63	-38.56	133423.31	-15.27		
A (IER)	I	2033-01-23T23:10:34.719		22.95	-38.35	122050.38	-15.04		
B (OER)	I	2033-01-23T23:15:33.508		22.25	-38.21	117571.16	-14.94		
B (IER)	I	2033-01-23T23:44:57.049		17.88	-36.88	91984.69	-13.97		
C (IER)	I	2033-01-24T00:06:47.765	b	14.37	-35.33	74490.58	-12.58		
Saturn	I	2033-01-23T23:54:55.328		16.31	-36.23	59994.27		25.79	30.59
Saturn	E	2033-01-24T01:55:29.685		-5.38x	-21.93	60207.51		11.77	14.35
C (IER)	E	2033-01-24T02:07:08.750		-7.67x	-20.07	74490.58	12.41		
B (IER)	E	2033-01-24T02:29:21.966		-12.08x	-16.38	91984.69	13.69		
B (OER)	E	2033-01-24T02:59:28.207		-18.17x	-11.08	117571.16	14.53		
A (IER)	E	2033-01-24T03:04:35.529		-19.22x	-10.15	122050.38	14.62		
Encke (IEG)	E	2033-01-24T03:17:28.520		-21.87x	-7.78	133423.31	14.80		
Encke (OEG)	E	2033-01-24T03:17:50.247		-21.95x	-7.71	133744.89	14.80		
A (OER)	E	2033-01-24T03:21:14.635		-22.65x	-7.08	136774.40	14.84		
F ring	E	2033-01-24T03:25:22.666		-23.50x	-6.30	140461.00	14.88		