

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2033-01-30T11:01:27.460
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3423718336601355904
 2Mass ID (if available) : 06022897+2233043

Saturn 2033-01-30T11:01:27 K6.47 G11.45 PgtRgt

ICRS Star Coord at Epoch: 06h 02m 28.97313s +22:33:04.32242s

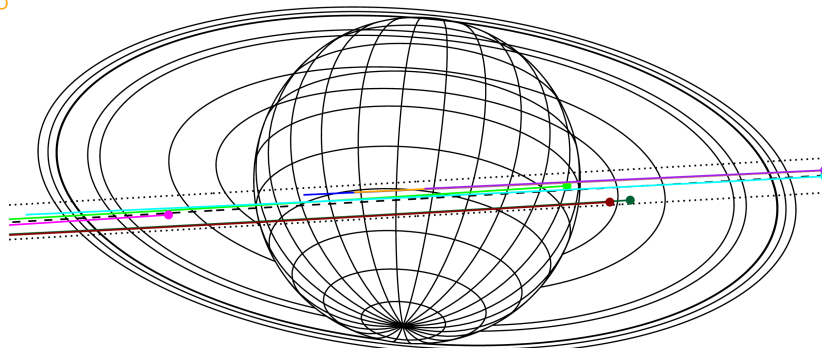
RUWE (>1.4 is poor) : 1.02
 K magnitude : 6.474
 G magnitude : 11.453
 RP magnitude : 10.183
 BP magnitude : 13.286
 DUPflag : 0
 Distance (au) : 8.237
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.24
 Sun-Target sep (deg) : 140.16
 Sun-Moon sep (deg) : 146.32
 B (ring opening deg) : -26.63
 PA of pole (deg) : -5.57

#	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



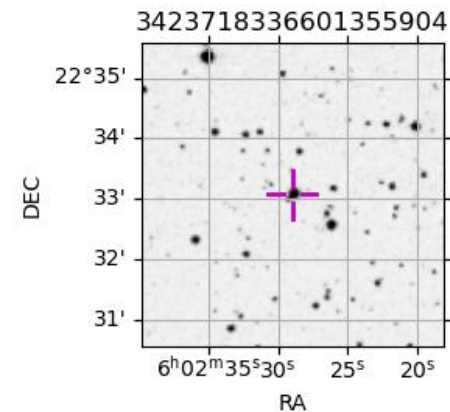
2033-01-30T11:01:27.4600 a: 06 02 28.9731 s: +22 33 04.322 C/A 1.133° PA 3.29 deg v_sky -13.24 km/s D 08.24 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PAL
 PMO
 KPNO
 MCD
 IRTF
 KAV
 AAT
 MSO

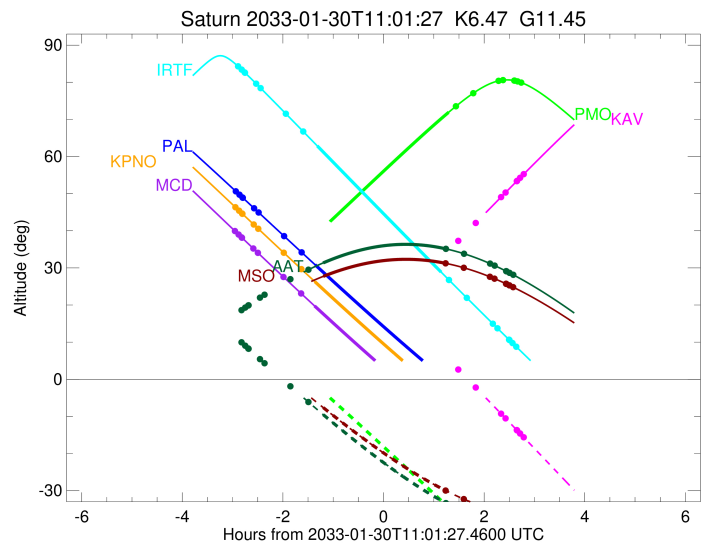
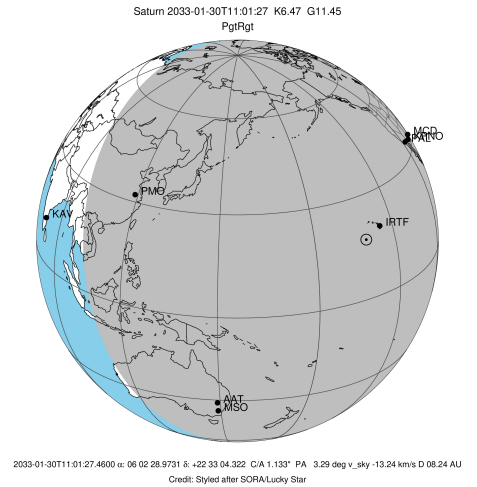


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (20	33.4	243.1	+	+		JAN 30 08:05 - JAN 30 09:39	PinRin
PMO	Purple Mtn Obs	32.1	118.8		+	+	JAN 30 12:19 - JAN 30 13:45	PneRne
KPNO	Kitt Peak Natl	32.0	248.4	+	+		JAN 30 08:04 - JAN 30 09:39	PinRin
MCD	McDonald Obs.	30.7	256.0	+	+		JAN 30 08:04 - JAN 30 09:39	PinRin
TEN	Teide Obs./Ten	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+	+	+	JAN 30 08:08 - JAN 30 13:39	PieRie
KAV	Kavalur Observ	12.6	78.8			+	JAN 30 13:21 - JAN 30 13:48	PnnRne
RIO	Rio de Janeiro	-22.9	316.8					PnnRnn
ESO	European South	-29.3	289.3					PnnRnn
AAT	Siding Spring	-31.3	149.1		+	+	JAN 30 09:31 - JAN 30 13:36	PieRie
SAAO	So. Afr. Astro	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Ob	-35.3	149.0		+	+	JAN 30 09:49 - JAN 30 13:36	PieRne



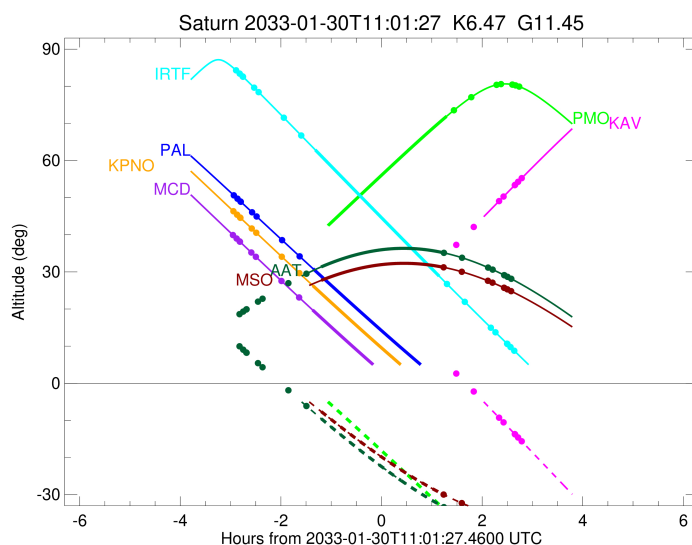
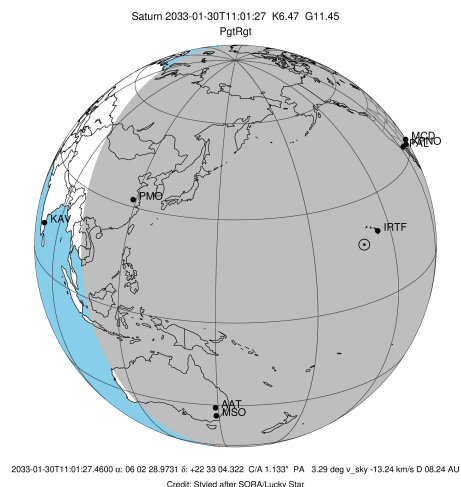
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2033-01-30T10:55:03.460
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 3423718336601355904
 2Mass ID (if available) : 06022897+2233043
 ICRS Star Coord at Epoch: 06h 02m 28.97313s +22:33:04.32242s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 6.474
 G magnitude : 11.453
 RP magnitude : 10.183
 BP magnitude : 13.286
 DUPflag : 0
 Distance (au) : 8.237
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.24
 Sun-Target sep (deg) : 140.16
 Sun-Moon sep (deg) : 145.82
 B (ring opening deg) : -26.63
 PA of pole (deg) : -5.57
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.564
 C/A sky separation (km) : 3370.3
 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	2033-01-30T08:05:23.291		50.62	-74.32	140461.00	-14.09		
A (OER)	I	2033-01-30T08:09:44.958		49.71	-74.22	136774.40	-14.08		
Encke (OEG)	I	2033-01-30T08:13:20.105		48.96	-74.10	133744.89	-14.08		
Encke (IEG)	I	2033-01-30T08:13:42.949		48.88	-74.08	133423.31	-14.08		
A (IER)	I	2033-01-30T08:27:11.660		46.05	-73.26	122050.38	-14.05		
B (OER)	I	2033-01-30T08:32:30.619		44.93	-72.80	117571.16	-14.04		
B (IER)	I	2033-01-30T09:02:57.996		38.55	-69.01	91984.69	-13.96		
C (IER)	I	2033-01-30T09:23:53.622		34.17	-65.63	74490.58	-13.90		
Saturn	I	2033-01-30T09:39:51.432		30.85	-62.79	60259.20		4.45	5.46
Saturn	E	2033-01-30T12:11:02.165		0.69x	-32.15	60222.30		-10.18	-12.44
C (IER)	E	2033-01-30T12:22:57.583		-1.53x	-29.66	74490.58	13.56		
B (IER)	E	2033-01-30T12:44:28.598		-5.44x	-25.16	91984.69	13.54		
B (OER)	E	2033-01-30T13:15:59.896		-10.93x	-18.62	117571.16	13.51		
A (IER)	E	2033-01-30T13:21:31.469		-11.86x	-17.48	122050.38	13.51		
Encke (IEG)	E	2033-01-30T13:35:34.030		-14.17x	-14.59	133423.31	13.49		
Encke (OEG)	E	2033-01-30T13:35:57.868		-14.23x	-14.51	133744.89	13.49		
A (OER)	E	2033-01-30T13:39:42.481		-14.83x	-13.74	136774.40	13.49		
F ring	E	2033-01-30T13:44:15.906		-15.56x	-12.81	140461.00	13.48		

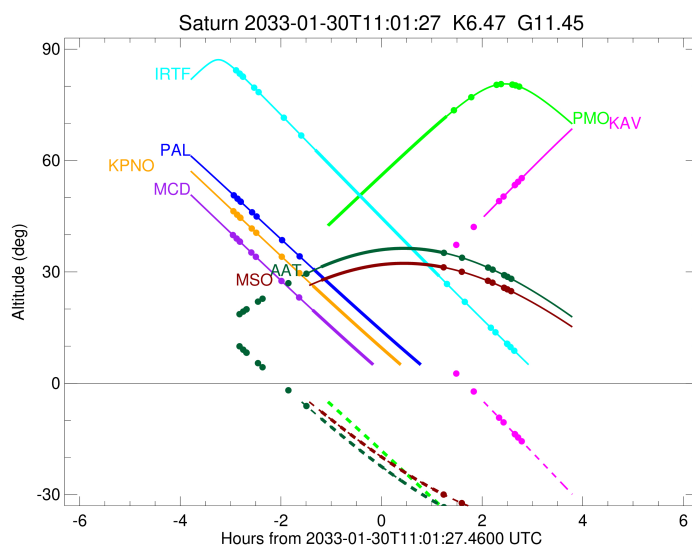
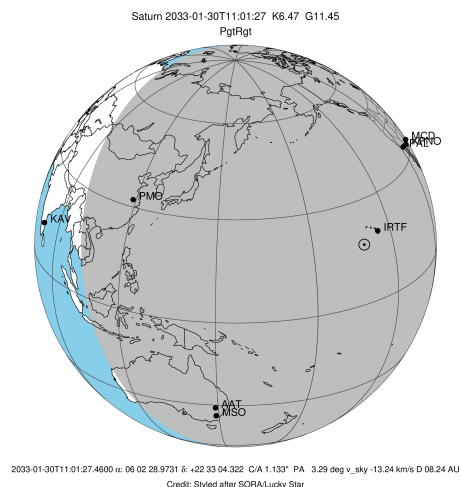
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2033-01-30T11:05:31.160
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 3423718336601355904
 2Mass ID (if available) : 06022897+2233043
 ICRS Star Coord at Epoch: 06h 02m 28.97313s +22:33:04.32242s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 6.474
 G magnitude : 11.453
 RP magnitude : 10.183
 BP magnitude : 13.286
 DUPflag : 0
 Distance (au) : 8.237
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.24
 Sun-Target sep (deg) : 140.16
 Sun-Moon sep (deg) : 147.22
 B (ring opening deg) : -26.63
 PA of pole (deg) : -5.57
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.925
 C/A sky separation (km) : 5525.3
 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	2033-01-30T08:16:52.973		21.29	14.41x	140461.00	-14.01		
A (OER)	I	2033-01-30T08:21:16.015		22.19	13.62x	136774.40	-14.02		
Encke (OEG)	I	2033-01-30T08:24:52.131		22.94	12.96x	133744.89	-14.02		
Encke (IEG)	I	2033-01-30T08:25:15.069		23.02	12.89x	133423.31	-14.02		
A (IER)	I	2033-01-30T08:38:46.098		25.83	10.40x	122050.38	-14.03		
B (OER)	I	2033-01-30T08:44:05.437		26.94	9.40x	117571.16	-14.03		
B (IER)	I	2033-01-30T09:14:29.787		33.33	3.57x	91984.69	-14.02		
C (IER)	I	2033-01-30T09:35:19.433		37.73	-0.53x	74490.58	-13.98		
Saturn	I	2033-01-30T09:51:35.873		41.19	-3.79x	60262.46		3.53	4.33
Saturn	E	2033-01-30T12:19:04.031		71.91	-34.54	60196.83		-12.75	-15.52
C (IER)	E	2033-01-30T12:27:46.804		73.53	-36.39	74490.58	14.05		
B (IER)	E	2033-01-30T12:48:29.391		77.05	-40.77	91984.69	14.10		
B (OER)	E	2033-01-30T13:18:40.884		80.39	-47.14	117571.16	14.14		
A (IER)	E	2033-01-30T13:23:57.689		80.59	-48.24	122050.38	14.14		
Encke (IEG)	E	2033-01-30T13:37:21.930		80.46	-51.04	133423.31	14.14		
Encke (OEG)	E	2033-01-30T13:37:44.669		80.44	-51.12	133744.89	14.14		
A (OER)	E	2033-01-30T13:41:18.892		80.24	-51.86	136774.40	14.14		
F ring	E	2033-01-30T13:45:39.584		79.92	-52.75	140461.00	14.14		

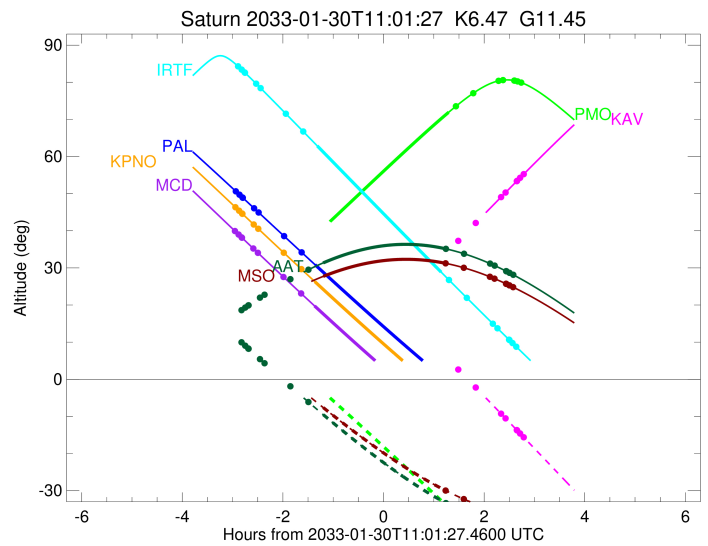
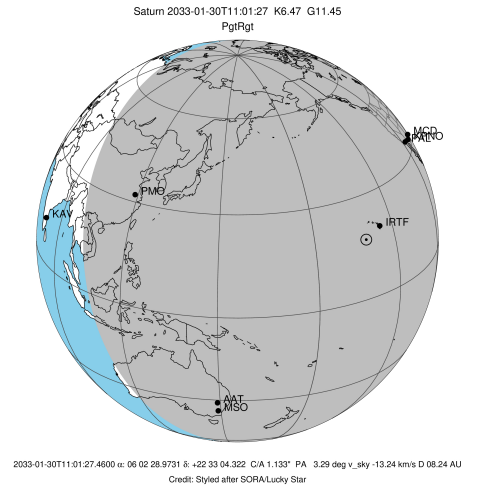
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2033-01-30T10:54:56.390
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KPNO
 Location : Kitt Peak Natl Obs
 Latitude (deg) : 31.96333
 E. Longitude (deg) : 248.40000
 Altitude (km) : 2.120
 Gaia source ID : 3423718336601355904
 2Mass ID (if available) : 06022897+2233043
 ICRS Star Coord at Epoch: 06h 02m 28.97313s +22:33:04.32242s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 6.474
 G magnitude : 11.453
 RP magnitude : 10.183
 BP magnitude : 13.286
 DUPflag : 0
 Distance (au) : 8.237
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.24
 Sun-Target sep (deg) : 140.16
 Sun-Moon sep (deg) : 145.77
 B (ring opening deg) : -26.63
 PA of pole (deg) : -5.57
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.552
 C/A sky separation (km) : 3297.2
 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	2033-01-30T08:04:53.917		46.33	-74.64	140461.00	-14.07		
A (OER)	I	2033-01-30T08:09:16.078		45.40	-74.25	136774.40	-14.06		
Encke (OEG)	I	2033-01-30T08:12:51.638		44.64	-73.88	133744.89	-14.05		
Encke (IEG)	I	2033-01-30T08:13:14.526		44.56	-73.84	133423.31	-14.05		
A (IER)	I	2033-01-30T08:26:44.837		41.68	-72.20	122050.38	-14.02		
B (OER)	I	2033-01-30T08:32:04.446		40.55	-71.46	117571.16	-14.01		
B (IER)	I	2033-01-30T09:02:35.720		34.07	-66.44	91984.69	-13.93		
C (IER)	I	2033-01-30T09:23:34.138		29.65	-62.53	74490.58	-13.87		
Saturn	I	2033-01-30T09:39:32.643		26.30	-59.40	60259.00		4.50	5.52
Saturn	E	2033-01-30T12:11:07.972		-3.90x	-27.63	60222.80		-10.13	-12.37
C (IER)	E	2033-01-30T12:23:08.562		-6.11x	-25.09	74490.58	13.52		
B (IER)	E	2033-01-30T12:44:42.574		-9.96x	-20.54	91984.69	13.51		
B (OER)	E	2033-01-30T13:16:18.098		-15.34x	-13.93	117571.16	13.48		
A (IER)	E	2033-01-30T13:21:50.380		-16.24x	-12.79	122050.38	13.48		
Encke (IEG)	E	2033-01-30T13:35:54.688		-18.47x	-9.88	133423.31	13.46		
Encke (OEG)	E	2033-01-30T13:36:18.574		-18.54x	-9.80	133744.89	13.46		
A (OER)	E	2033-01-30T13:40:03.639		-19.12x	-9.03	136774.40	13.46		
F ring	E	2033-01-30T13:44:37.605		-19.81x	-8.09	140461.00	13.45		

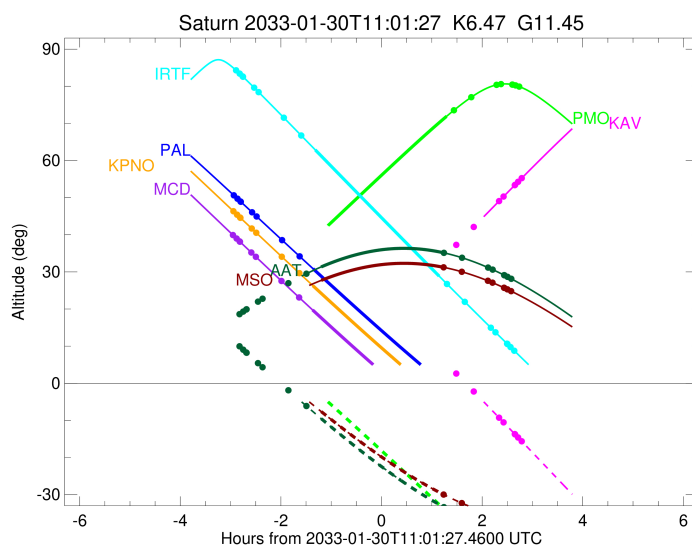
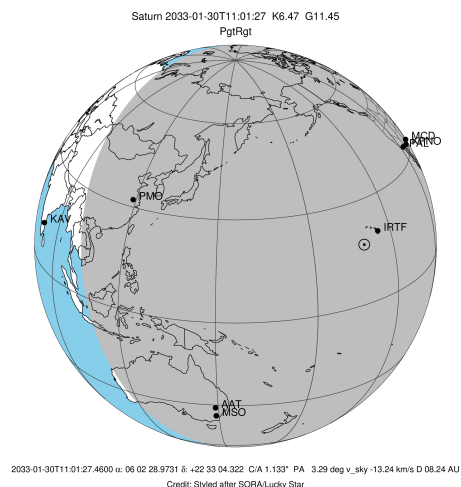
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2033-01-30T10:54:55.930
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MCD
 Location : McDonald Obs. 2.7m
 Latitude (deg) : 30.67158
 E. Longitude (deg) : 255.97844
 Altitude (km) : 2.075
 Gaia source ID : 3423718336601355904
 2Mass ID (if available) : 06022897+2233043
 ICRS Star Coord at Epoch: 06h 02m 28.97313s +22:33:04.32242s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 6.474
 G magnitude : 11.453
 RP magnitude : 10.183
 BP magnitude : 13.286
 DUPflag : 0
 Distance (au) : 8.237
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.24
 Sun-Target sep (deg) : 140.16
 Sun-Moon sep (deg) : 145.71
 B (ring opening deg) : -26.63
 PA of pole (deg) : -5.57
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.524
 C/A sky separation (km) : 3131.9
 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	2033-01-30T08:04:20.690		39.92	-71.98	140461.00	-14.02		
A (OER)	I	2033-01-30T08:08:43.665		38.97	-71.27	136774.40	-14.01		
Encke (OEG)	I	2033-01-30T08:12:19.901		38.20	-70.67	133744.89	-14.01		
Encke (IEG)	I	2033-01-30T08:12:42.861		38.12	-70.61	133423.31	-14.01		
A (IER)	I	2033-01-30T08:26:15.764		35.21	-68.22	122050.38	-13.98		
B (OER)	I	2033-01-30T08:31:36.415		34.07	-67.24	117571.17	-13.96		
B (IER)	I	2033-01-30T09:02:13.791		27.54	-61.26	91984.69	-13.89		
C (IER)	I	2033-01-30T09:23:16.434		23.10	-56.94	74490.58	-13.82		
Saturn	I	2033-01-30T09:39:14.025		19.76	-53.60	60258.45		4.63	5.69
Saturn	E	2033-01-30T12:11:26.394		-10.15x	-20.98	60223.84		-10.01	-12.23
C (IER)	E	2033-01-30T12:23:36.380		-12.31x	-18.39	74490.58	13.48		
B (IER)	E	2033-01-30T12:45:14.145		-16.01x	-13.82	91984.69	13.47		
B (OER)	E	2033-01-30T13:16:54.866		-21.10x	-7.21	117571.16	13.45		
A (IER)	E	2033-01-30T13:22:28.001		-21.95x	-6.06	122050.38	13.44		
Encke (IEG)	E	2033-01-30T13:36:34.386		-24.02x	-3.16x	133423.31	13.43		
Encke (OEG)	E	2033-01-30T13:36:58.329		-24.07x	-3.08x	133744.89	13.43		
A (OER)	E	2033-01-30T13:40:43.921		-24.61x	-2.31x	136774.40	13.43		
F ring	E	2033-01-30T13:45:18.515		-25.24x	-1.38x	140461.00	13.42		

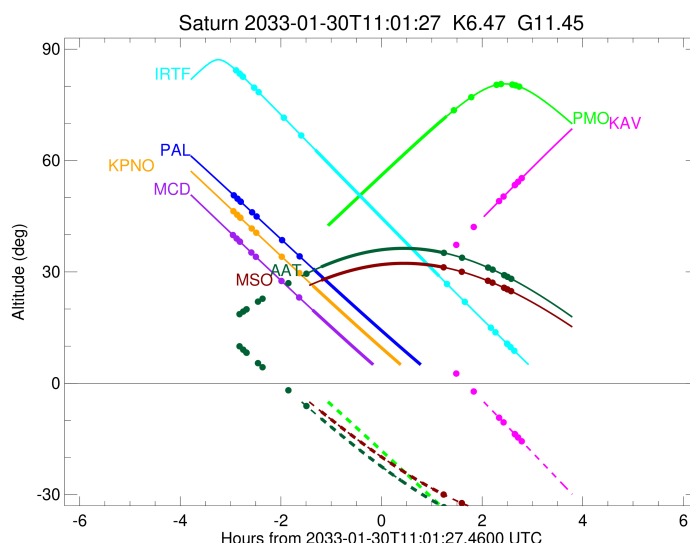
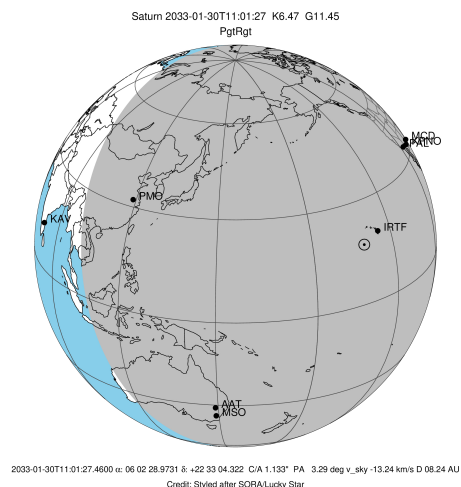
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2033-01-30T10:56:00.890
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : IRTF
 Location : Mauna Kea/IRTF
 Latitude (deg) : 19.82622
 E. Longitude (deg) : 204.52800
 Altitude (km) : 4.168
 Gaia source ID : 3423718336601355904
 2Mass ID (if available) : 06022897+2233043
 ICRS Star Coord at Epoch: 06h 02m 28.97313s +22:33:04.32242s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 6.474
 G magnitude : 11.453
 RP magnitude : 10.183
 BP magnitude : 13.286
 DUPflag : 0
 Distance (au) : 8.237
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.24
 Sun-Target sep (deg) : 140.16
 Sun-Moon sep (deg) : 146.13
 B (ring opening deg) : -26.63
 PA of pole (deg) : -5.57
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.015
 C/A sky separation (km) : 6062.6
 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	2033-01-30T08:08:05.077		84.29	-55.16	140461.00	-14.25		
A (OER)	I	2033-01-30T08:12:23.866		83.40	-56.17	136774.40	-14.24		
Encke (OEG)	I	2033-01-30T08:15:56.630		82.64	-57.01	133744.89	-14.24		
Encke (IEG)	I	2033-01-30T08:16:19.220		82.56	-57.10	133423.31	-14.24		
A (IER)	I	2033-01-30T08:29:38.881		79.61	-60.23	122050.38	-14.21		
B (OER)	I	2033-01-30T08:34:54.260		78.43	-61.47	117571.16	-14.20		
B (IER)	I	2033-01-30T09:05:01.924		71.52	-68.55	91984.69	-14.10		
C (IER)	I	2033-01-30T09:25:46.529		66.73	-73.43	74490.58	-14.00		
Saturn	I	2033-01-30T09:42:27.312		62.87	-77.33	60265.72		2.26	2.78
Saturn	E	2033-01-30T12:10:09.562		28.88	-67.40	60200.09		-12.45	-15.17
C (IER)	E	2033-01-30T12:19:28.089		26.76	-65.21	74490.58	13.68		
B (IER)	E	2033-01-30T12:40:45.477		21.94	-60.20	91984.69	13.71		
B (OER)	E	2033-01-30T13:11:52.538		14.96	-52.88	117571.16	13.69		
A (IER)	E	2033-01-30T13:17:19.676		13.75	-51.60	122050.38	13.69		
Encke (IEG)	E	2033-01-30T13:31:10.957		10.67	-48.35	133423.31	13.67		
Encke (OEG)	E	2033-01-30T13:31:34.477		10.58	-48.26	133744.89	13.67		
A (OER)	E	2033-01-30T13:35:16.102		9.77	-47.39	136774.40	13.67		
F ring	E	2033-01-30T13:39:45.908		8.77	-46.34	140461.00	13.66		

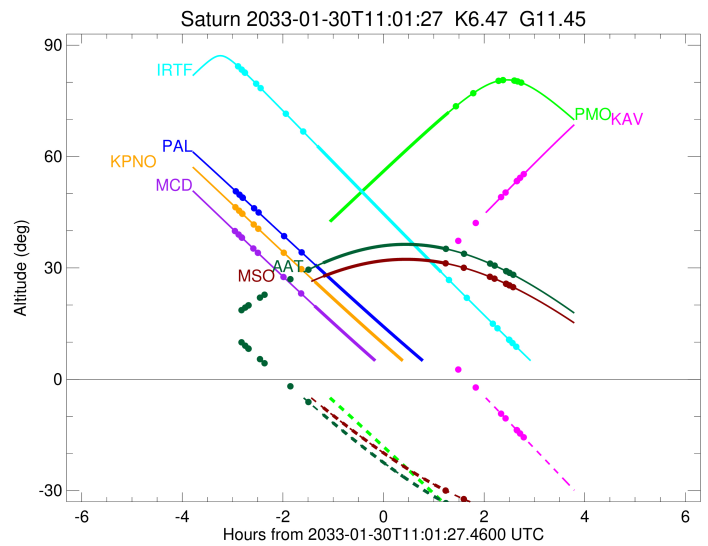
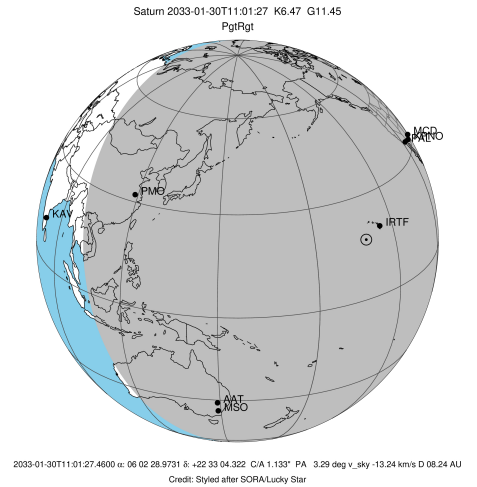
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2033-01-30T11:08:58.130
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KAV
 Location : Kavalur Observatory
 Latitude (deg) : 12.57556
 E. Longitude (deg) : 78.83167
 Altitude (km) : 0.722
 Gaia source ID : 3423718336601355904
 2Mass ID (if available) : 06022897+2233043
 ICRS Star Coord at Epoch: 06h 02m 28.97313s +22:33:04.32242s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 6.474
 G magnitude : 11.453
 RP magnitude : 10.183
 BP magnitude : 13.286
 DUPflag : 0
 Distance (au) : 8.237
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.24
 Sun-Target sep (deg) : 140.16
 Sun-Moon sep (deg) : 147.29
 B (ring opening deg) : -26.63
 PA of pole (deg) : -5.57
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.083
 C/A sky separation (km) : 6468.8
 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	2033-01-30T08:16:57.087	-20.04x	54.19x	140461.00	-13.71			
A (OER)	I	2033-01-30T08:21:25.926	-19.09x	53.58x	136774.40	-13.72			
Encke (OEG)	I	2033-01-30T08:25:06.789	-18.30x	53.06x	133744.89	-13.72			
Encke (IEG)	I	2033-01-30T08:25:30.230	-18.22x	53.00x	133423.31	-13.72			
A (IER)	I	2033-01-30T08:39:18.937	-15.25x	50.91x	122050.38	-13.73			
B (OER)	I	2033-01-30T08:44:45.182	-14.07x	50.04x	117571.16	-13.73			
B (IER)	I	2033-01-30T09:15:48.527	-7.25x	44.62x	91984.69	-13.72			
C (IER)	I	2033-01-30T09:37:04.928	-2.51x	40.57x	74490.58	-13.68			
Saturn	I	2033-01-30T09:53:53.897	1.28x	37.21x	60263.90			3.04	3.73
Saturn	E	2033-01-30T12:23:15.213	35.58	4.33x	60183.30			-13.94	-16.94
C (IER)	E	2033-01-30T12:30:34.568	37.27	2.63x	74490.58	13.93			
B (IER)	E	2033-01-30T12:51:25.034	42.09	-2.20x	91984.69	14.04			
B (OER)	E	2033-01-30T13:21:41.311	49.07	-9.28	117571.17	14.13			
A (IER)	E	2033-01-30T13:26:58.261	50.29	-10.52	122050.38	14.14			
Encke (IEG)	E	2033-01-30T13:40:22.031	53.35	-13.67	133423.31	14.16			
Encke (OEG)	E	2033-01-30T13:40:44.740	53.44	-13.76	133744.89	14.16			
A (OER)	E	2033-01-30T13:44:18.632	54.25	-14.60	136774.40	14.17			
F ring	E	2033-01-30T13:48:38.813	55.24	-15.62	140461.00	14.17			

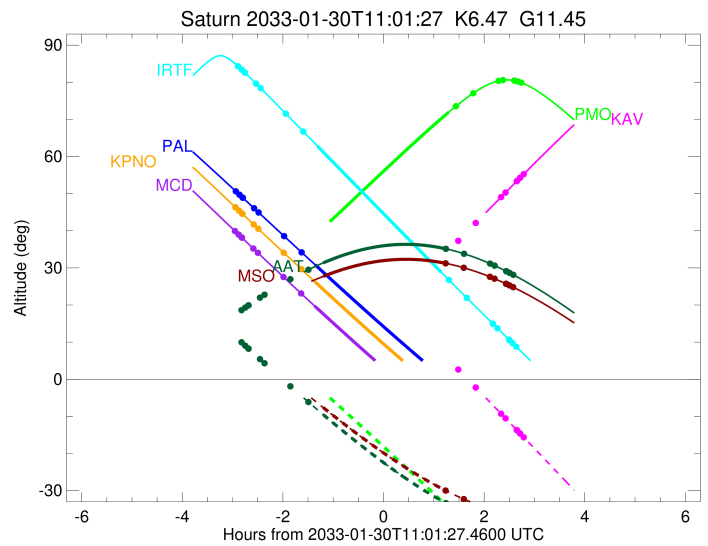
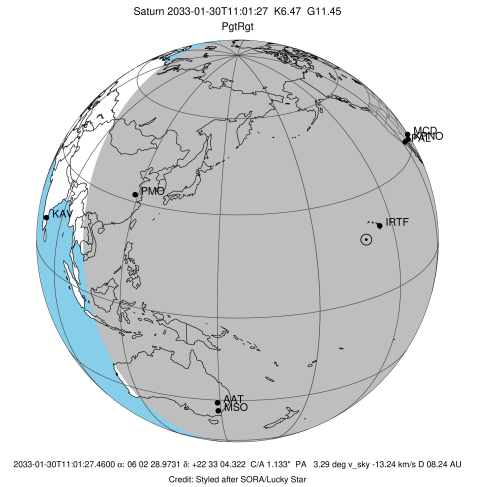
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2033-01-30T11:01:51.540
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : AAT
 Location : Siding Spring (AAT)
 Latitude (deg) : -31.27703
 E. Longitude (deg) : 149.06608
 Altitude (km) : 1.164
 Gaia source ID : 3423718336601355904
 2Mass ID (if available) : 06022897+2233043
 ICRS Star Coord at Epoch: 06h 02m 28.97313s +22:33:04.32242s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 6.474
 G magnitude : 11.453
 RP magnitude : 10.183
 BP magnitude : 13.286
 DUPflag : 0
 Distance (au) : 8.237
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.24
 Sun-Target sep (deg) : 140.16
 Sun-Moon sep (deg) : 146.62
 B (ring opening deg) : -26.63
 PA of pole (deg) : -5.57
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.993
 C/A sky separation (km) : 11907.1
 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	2033-01-30T08:12:10.934		18.63	9.95x	140461.00	-13.98		
A (OER)	I	2033-01-30T08:16:34.816		19.32	9.04x	136774.40	-13.97		
Encke (OEG)	I	2033-01-30T08:20:11.808		19.88	8.29x	133744.89	-13.96		
Encke (IEG)	I	2033-01-30T08:20:34.850		19.94	8.21x	133423.31	-13.96		
A (IER)	I	2033-01-30T08:34:10.946		21.99	5.42x	122050.38	-13.91		
B (OER)	I	2033-01-30T08:39:33.128		22.77	4.32x	117571.16	-13.89		
B (IER)	I	2033-01-30T09:10:26.723		26.97	-1.90x	91984.69	-13.69		
C (IER)	I	2033-01-30T09:31:57.231		29.52	-6.13	74490.58	-13.39		
Saturn	I	2033-01-30T09:49:36.448		31.35	-9.53	60265.79		-2.23	-2.74
Saturn	E	2033-01-30T12:13:58.226		35.23	-33.13	60130.01		-17.92	-21.62
C (IER)	E	2033-01-30T12:15:50.643		35.13	-33.36	74490.58	13.33		
B (IER)	E	2033-01-30T12:37:28.187		33.82	-35.85	91984.69	13.61		
B (OER)	E	2033-01-30T13:08:34.231		31.16	-38.71	117571.16	13.79		
A (IER)	E	2033-01-30T13:13:58.877		30.62	-39.12	122050.38	13.81		
Encke (IEG)	E	2033-01-30T13:27:41.615		29.13	-40.00	133423.31	13.84		
Encke (OEG)	E	2033-01-30T13:28:04.852		29.09	-40.02	133744.89	13.84		
A (OER)	E	2033-01-30T13:31:43.713		28.67	-40.22	136774.40	13.85		
F ring	E	2033-01-30T13:36:09.921		28.15	-40.44	140461.00	13.85		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2033-01-30T11:01:48.710
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MSO
 Location : Mt. Stromlo Observatory
 Latitude (deg) : -35.32000
 E. Longitude (deg) : 149.00833
 Altitude (km) : 0.770
 Gaia source ID : 3423718336601355904
 2Mass ID (if available) : 06022897+2233043
 ICRS Star Coord at Epoch: 06h 02m 28.97313s +22:33:04.32242s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 6.474
 G magnitude : 11.453
 RP magnitude : 10.183
 BP magnitude : 13.286
 DUPflag : 0
 Distance (au) : 8.237
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.24
 Sun-Target sep (deg) : 140.16
 Sun-Moon sep (deg) : 146.58
 B (ring opening deg) : -26.63
 PA of pole (deg) : -5.57
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 2.035
 C/A sky separation (km) : 12157.1
 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_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	2033-01-30T08:11:52.397		15.79	11.04x	140461.00	-13.95		
A (OER)	I	2033-01-30T08:16:16.759		16.45	10.17x	136774.40	-13.94		
Encke (OEG)	I	2033-01-30T08:19:54.158		16.98	9.45x	133744.89	-13.93		
Encke (IEG)	I	2033-01-30T08:20:17.243		17.03	9.38x	133423.31	-13.93		
A (IER)	I	2033-01-30T08:33:54.966		18.97	6.69x	122050.38	-13.88		
B (OER)	I	2033-01-30T08:39:17.838		19.70	5.64x	117571.16	-13.86		
B (IER)	I	2033-01-30T09:10:16.124		23.63	-0.32x	91984.69	-13.65		
C (IER)	I	2033-01-30T09:31:51.077		26.01	-4.37x	74490.58	-13.34		
Saturn	I	2033-01-30T09:49:31.875		27.71	-7.61	60265.33		-2.45	-3.01
Saturn	E	2033-01-30T12:13:57.013		31.30	-29.79	60126.72		-18.14	-21.88
C (IER)	E	2033-01-30T12:15:29.084		31.24	-29.97	74490.58	13.27		
B (IER)	E	2033-01-30T12:37:10.938		30.04	-32.27	91984.69	13.57		
B (OER)	E	2033-01-30T13:08:21.405		27.61	-34.91	117571.16	13.76		
A (IER)	E	2033-01-30T13:13:46.686		27.10	-35.27	122050.38	13.78		
Encke (IEG)	E	2033-01-30T13:27:30.904		25.73	-36.08	133423.31	13.81		
Encke (OEG)	E	2033-01-30T13:27:54.181		25.69	-36.10	133744.89	13.82		
A (OER)	E	2033-01-30T13:31:33.406		25.30	-36.29	136774.40	13.82		
F ring	E	2033-01-30T13:36:00.043		24.82	-36.49	140461.00	13.83		