

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2048-10-21T20:58:42.390
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 4078520671112709760
 2Mass ID (if available) : 18430029-2243335

Saturn 2048-10-21T20:58:42 K9.79 G12.95 PgtRgt

ICRS Star Coord at Epoch: 18h 43m 00.32323s -22:43:33.93097s

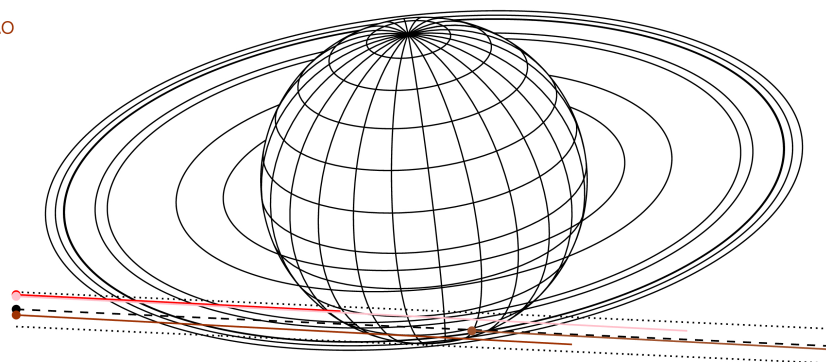
RUWE (>1.4 is poor) : 0.93
 K magnitude : 9.793
 G magnitude : 12.948
 RP magnitude : 12.030
 BP magnitude : 13.816
 DUPflag : 0
 Distance (au) : 10.302
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 19.07
 Sun-Target sep (deg) : 71.45
 Sun-Moon sep (deg) : 109.71
 B (ring opening deg) : 25.84
 PA of pole (deg) : 6.27

#	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



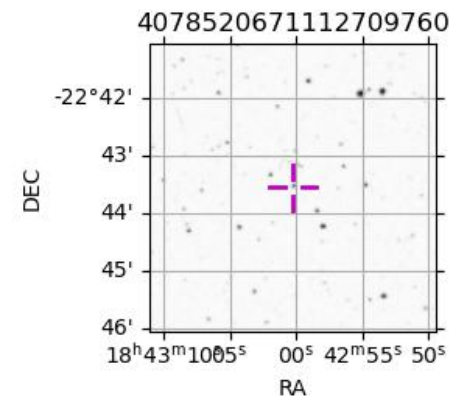
2048-10-21T20:58:42.3900 xi: 18 43 00.32323 s: -22 43 33.931 C/A 7.2677 PA 357.42 deg v_sky +19.07 km/s D 10.30 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PIC
 TEN
 RIO
 SAAO

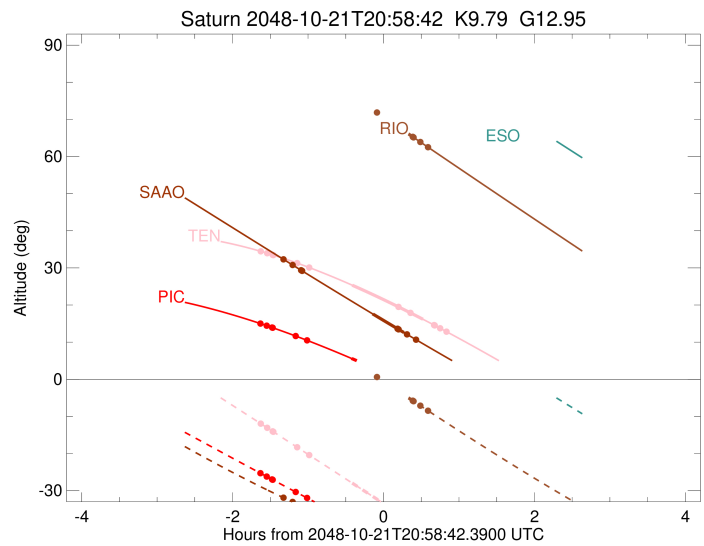
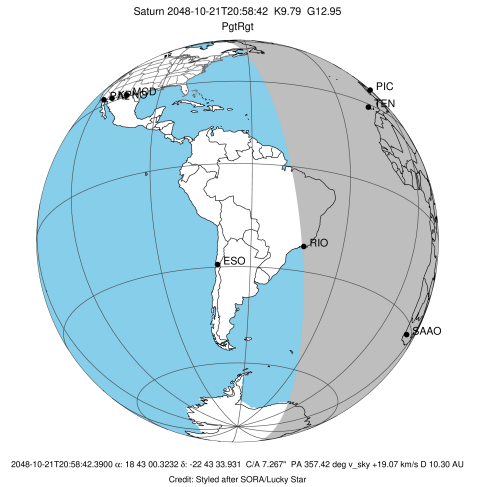


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEncode
PIC	Pic du Midi	42.9	0.1	+ + + + +	+		OCT 21 19:20 - OCT 21 20:33	PinRin
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	+ + + + +	+ +	+ + + +	OCT 21 19:21 - OCT 21 21:48	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		+	+ + + +	OCT 21 21:20 - OCT 21 21:34	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	+ + + +	+ +	+ +	OCT 21 19:39 - OCT 21 21:24	PieRie
MSO	Mt. Stromlo Ob	-35.3	149.0					PnnRnn

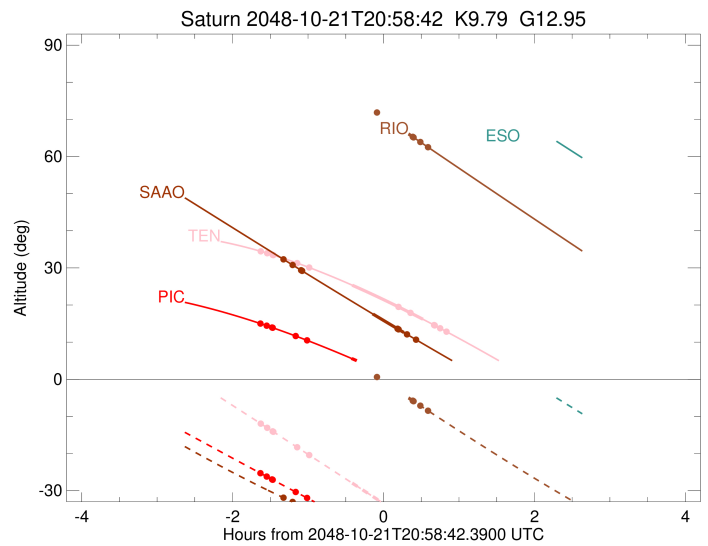
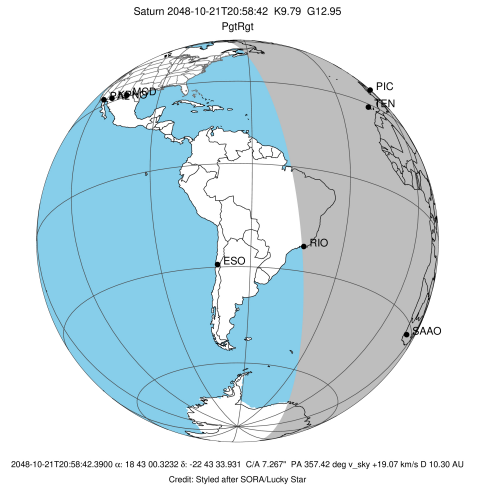


target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2048-10-21T21:02:19.980
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 4078520671112709760
 2Mass ID (if available) : 18430029-2243335
 ICRS Star Coord at Epoch: 18h 43m 00.32323s -22:43:33.93097s
 RUWE (>1.4 is poor) : 0.93
 K magnitude : 9.793
 G magnitude : 12.948
 RP magnitude : 12.030
 BP magnitude : 13.816
 DUPflag : 0
 Distance (au) : 10.302
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 19.07
 Sun-Target sep (deg) : 71.45
 Sun-Moon sep (deg) : 109.98
 B (ring opening deg) : 25.84
 PA of pole (deg) : 6.27
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 6.662
 C/A sky separation (km) : 49772.8
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 Saturn_ring_plane.tf
 sat378.bsp
 sat286.bsp
 vgr1.sat286.bsp
 vgr2.sat286.bsp
 HST1081HSPephemUTC.bsp
 pfb10000r.bsp
 cassini.bsp
 earthstns_itrf93_040916.bsp
 earth_200101_990628_predict.bpc
 earth_720101_070426.bpc
 cpck28Mar2008.tpc
 pck.sat440.tpc
 IAU_SATURN_for_RINGFIT.tpc
 naif0012.tls
 earth_flat_IAU.spk



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2048-10-21T19:20:46.453		15.01	-25.29	140461.00	-12.58		
A (OER)	I	2048-10-21T19:25:45.655		14.44	-26.19	136774.40	-12.06		
Encke (OEG)	I	2048-10-21T19:30:01.830		13.95	-26.97	133744.89	-11.59		
Encke (IEG)	I	2048-10-21T19:30:29.650		13.89	-27.05	133423.31	-11.53		
A (IER)	I	2048-10-21T19:48:46.944		11.66	-30.34	122050.38	-9.09		
B (OER)	I	2048-10-21T19:57:41.561		10.52	-31.93	117571.16	-7.64		
Saturn	I	2048-10-21T20:33:18.923		5.61	-38.11	59680.12		-41.44	-47.05
Saturn	E	2048-10-21T21:30:46.330		-3.24x	-47.23	59364.96		-55.44	-60.39
B (OER)	E	2048-10-21T21:13:21.234	b	-0.45x	-44.62	117571.16	7.66		
A (IER)	E	2048-10-21T21:22:13.960	b	-1.86x	-45.97	122050.38	9.13		
Encke (IEG)	E	2048-10-21T21:40:24.037		-4.81x	-48.61	133423.31	11.63		
Encke (OEG)	E	2048-10-21T21:40:51.613		-4.89x	-48.67	133744.89	11.69		
A (OER)	E	2048-10-21T21:45:05.398		-5.58x	-49.26	136774.40	12.18		
F ring	E	2048-10-21T21:50:01.498		-6.40x	-49.92	140461.00	12.71		

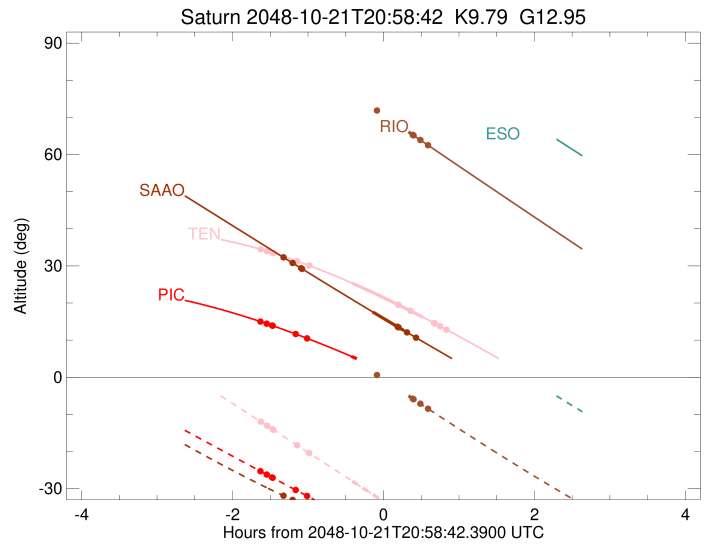
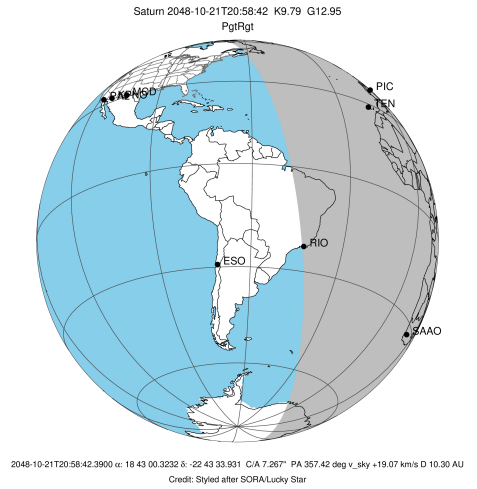
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2048-10-21T21:02:15.810
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 4078520671112709760
 2Mass ID (if available) : 18430029-2243335
 ICRS Star Coord at Epoch: 18h 43m 00.32323s -22:43:33.93097s
 RUWE (>1.4 is poor) : 0.93
 K magnitude : 9.793
 G magnitude : 12.948
 RP magnitude : 12.030
 BP magnitude : 13.816
 DUPflag : 0
 Distance (au) : 10.302
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 19.07
 Sun-Target sep (deg) : 71.45
 Sun-Moon sep (deg) : 110.27
 B (ring opening deg) : 25.84
 PA of pole (deg) : 6.27
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 6.733
 C/A sky separation (km) : 50308.6
 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	2048-10-21T19:21:01.329		34.48	-11.93	140461.00	-12.31		
A (OER)	I	2048-10-21T19:26:07.422		33.97	-13.05	136774.40	-11.77		
Encke (OEG)	I	2048-10-21T19:30:30.149		33.51	-14.01	133744.89	-11.28		
Encke (IEG)	I	2048-10-21T19:30:58.723		33.46	-14.12	133423.31	-11.23		
A (IER)	I	2048-10-21T19:49:55.653		31.31	-18.28	122050.38	-8.66		
B (OER)	I	2048-10-21T19:59:22.213		30.13	-20.37	117571.16	-7.12		
Saturn	I	2048-10-21T20:33:49.040		25.34	-27.96	59662.25		-42.22	-47.83
Saturn	E	2048-10-21T21:30:07.427		16.16	-40.31	59351.44		-56.08	-60.97
B (OER)	E	2048-10-21T21:10:37.409	b	19.50	-36.06	117571.16	7.14		
A (IER)	E	2048-10-21T21:20:01.963	b	17.90	-38.11	122050.38	8.70		
Encke (IEG)	E	2048-10-21T21:38:51.308		14.61	-42.21	133423.31	11.33		
Encke (OEG)	E	2048-10-21T21:39:19.624		14.53	-42.31	133744.89	11.39		
A (OER)	E	2048-10-21T21:43:39.836		13.75	-43.25	136774.40	11.89		
F ring	E	2048-10-21T21:48:42.664		12.84	-44.34	140461.00	12.45		

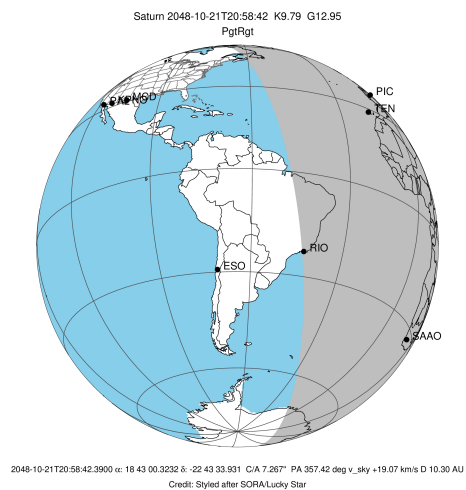
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2048-10-21T21:00:21.960
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : RIO
 Location : Rio de Janeiro
 Latitude (deg) : -22.89506
 E. Longitude (deg) : 316.77708
 Altitude (km) : 0.033
 Gaia source ID : 4078520671112709760
 2Mass ID (if available) : 18430029-2243335
 ICRS Star Coord at Epoch: 18h 43m 00.32323s -22:43:33.93097s
 RUWE (>1.4 is poor) : 0.93
 K magnitude : 9.793
 G magnitude : 12.948
 RP magnitude : 12.030
 BP magnitude : 13.816
 DUPflag : 0
 Distance (au) : 10.302
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 19.07
 Sun-Target sep (deg) : 71.45
 Sun-Moon sep (deg) : 110.63
 B (ring opening deg) : 25.84
 PA of pole (deg) : 6.27
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 7.304
 C/A sky separation (km) : 54571.1
 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



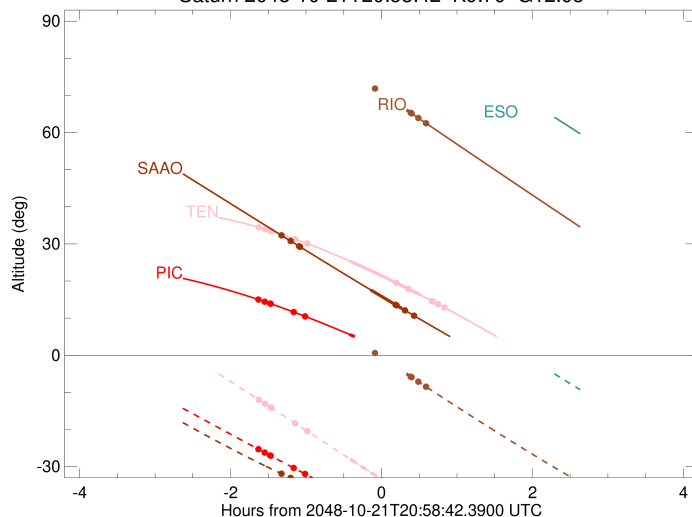
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2048-10-21T19:28:05.590		88.40	20.09x	140461.00	-10.39		
A (OER)	I	2048-10-21T19:34:13.612		89.80	18.68x	136774.40	-9.64		
Encke (OEG)	I	2048-10-21T19:39:40.099		88.92	17.43x	133744.89	-8.91		
Encke (IEG)	I	2048-10-21T19:40:16.339		88.78	17.29x	133423.31	-8.83		
A (IER)	I	2048-10-21T20:08:48.316		82.19	10.76x	122050.38	-4.25		
Saturn	I	2048-10-21T20:39:12.782		75.16	3.84x	59498.24		-49.38	-54.76
Saturn	E	2048-10-21T21:20:56.476		65.54	-5.55	59253.63		-60.93	-65.33
A (IER)	E	2048-10-21T20:53:24.560	b	71.89	0.63x	122050.38	4.25		
Encke (IEG)	E	2048-10-21T21:21:53.923		65.32	-5.76	133423.31	8.86		
Encke (OEG)	E	2048-10-21T21:22:30.045		65.18	-5.89	133744.89	8.94		
A (OER)	E	2048-10-21T21:27:55.298		63.94	-7.10	136774.40	9.68		
F ring	E	2048-10-21T21:34:01.566		62.53	-8.46	140461.00	10.44		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2048-10-21T21:02:52.150
 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 : 4078520671112709760
 2Mass ID (if available) : 18430029-2243335
 ICRS Star Coord at Epoch: 18h 43m 00.32323s -22:43:33.93097s
 RUWE (>1.4 is poor) : 0.93
 K magnitude : 9.793
 G magnitude : 12.948
 RP magnitude : 12.030
 BP magnitude : 13.816
 DUPflag : 0
 Distance (au) : 10.302
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 19.07
 Sun-Target sep (deg) : 71.45
 Sun-Moon sep (deg) : 110.19
 B (ring opening deg) : 25.84
 PA of pole (deg) : 6.27
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 7.703
 C/A sky separation (km) : 57557.1
 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



Saturn 2048-10-21T20:58:42 K9.79 G12.95



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	2048-10-21T19:39:01.690		32.34	-31.88	140461.00	-8.99		
A (OER)	I	2048-10-21T19:46:15.810		30.82	-33.01	136774.40	-7.98		
Encke (OEG)	I	2048-10-21T19:53:01.158		29.40	-34.04	133744.89	-6.96		
Encke (IEG)	I	2048-10-21T19:53:47.787		29.24	-34.16	133423.31	-6.84		
Saturn	I	2048-10-21T20:50:09.603		17.60	-41.49	59359.68		-55.69	-60.62
Saturn	E	2048-10-21T21:14:58.557		12.58	-43.83	59199.38		-63.86	-67.92
Encke (IEG)	E	2048-10-21T21:09:49.190	b	13.62	-43.40	133423.31	6.87		
Encke (OEG)	E	2048-10-21T21:10:35.603	b	13.46	-43.47	133744.89	6.99		
A (OER)	E	2048-10-21T21:17:18.805		12.11	-44.02	136774.40	8.03		
F ring	E	2048-10-21T21:24:30.029		10.68	-44.56	140461.00	9.06		