

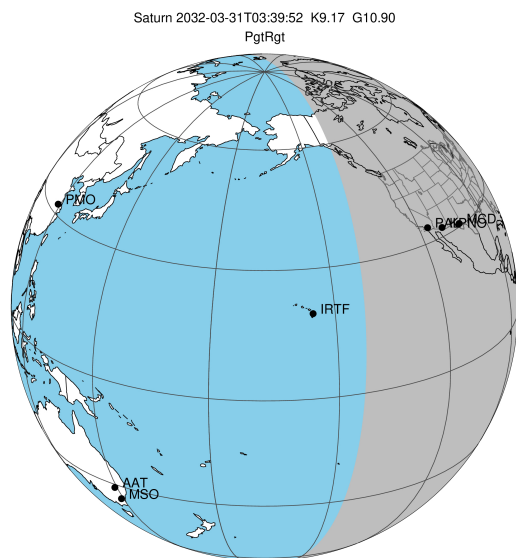
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2032-03-31T03:39:52.660
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 341515788696044416
 2Mass ID (if available) : 05052892+2137479

Saturn 2032-03-31T03:39:52 K9.17 G10.90 PgtRgt

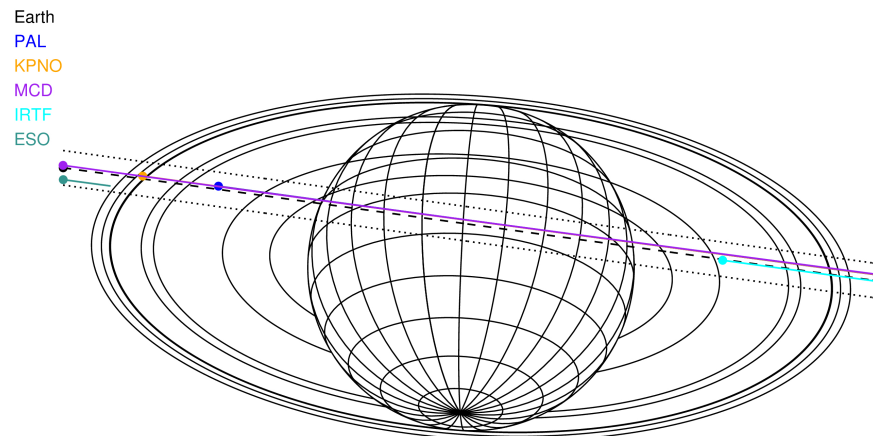
ICRS Star Coord at Epoch: 05h 05m 28.93850s +21:37:47.65960s

RUWE (>1.4 is poor) : 1.00
 K magnitude : 9.169
 G magnitude : 10.901
 RP magnitude : 10.300
 BP magnitude : 11.321
 DUPflag : 0
 Distance (au) : 9.367
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 21.40
 Sun-Target sep (deg) : 66.81
 Sun-Moon sep (deg) : 161.85
 B (ring opening deg) : -26.85
 PA of pole (deg) : -4.26

#	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

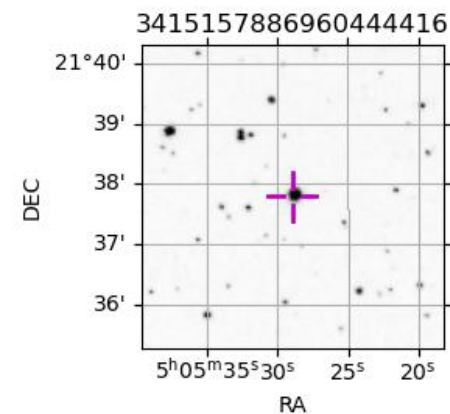


2032-03-31T03:39:52.6600 ex: 05 05 28.9385 s: +21 37 47.6560 C/A 2.316° PA 172.10 deg v_sky +21.40 km/s D 09.37 AU
 Credit: Styled after SORA/Lucky Star

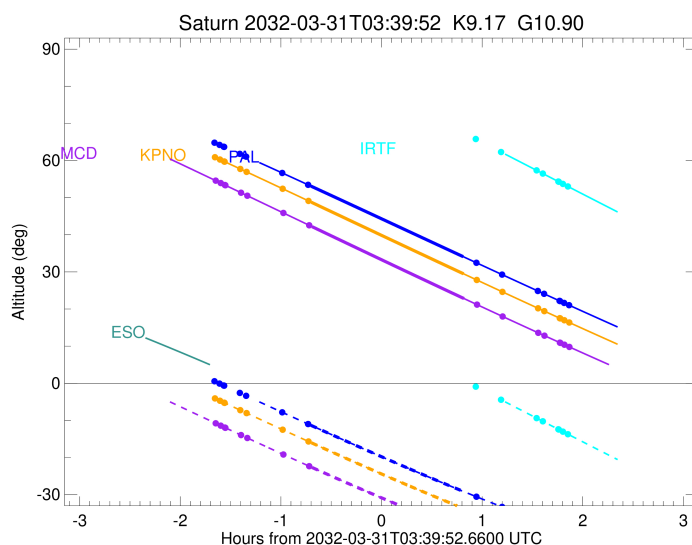
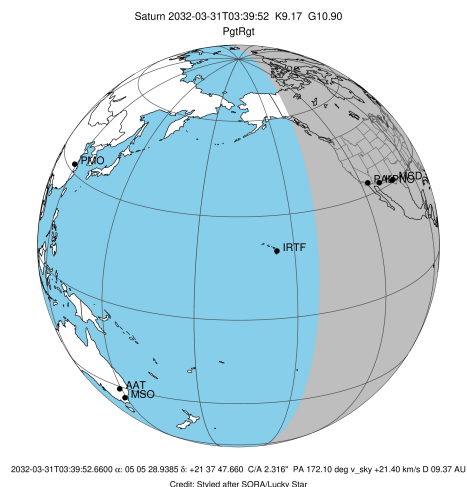


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	++	++	+++++	MAR 31 02:40 - MAR 31 05:31	PieRie
PMO	Purple Mtn Obs	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl	32.0	248.4	+++++	++	+++++	MAR 31 02:06 - MAR 31 05:31	PieRie
MCD	McDonald Obs.	30.7	256.0	+ + + + +	++	+ + + + +	MAR 31 02:00 - MAR 31 05:31	PieRie
TEN	Teide Obs./Ten	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5			+ + + + +	MAR 31 05:12 - MAR 31 05:31	PnnRne
KAV	Kavalur Observ	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8					PnnRnn
ESO	European South	-29.3	289.3					PnnRnn
AAT	Siding Spring	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Ob	-35.3	149.0					PnnRnn



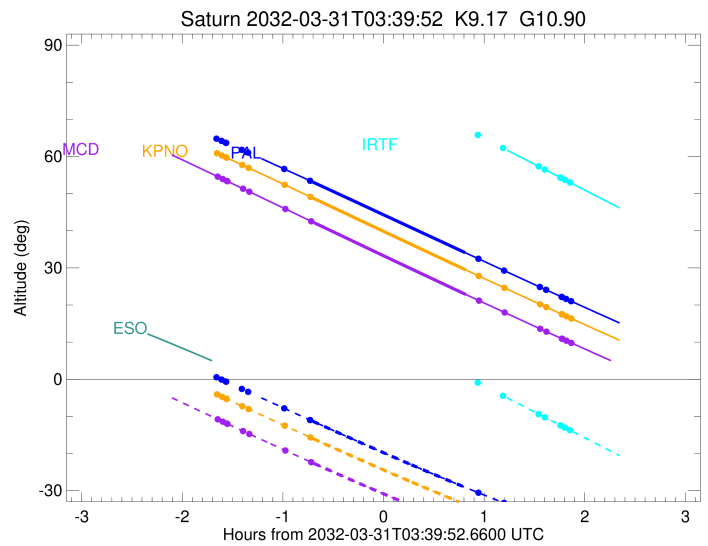
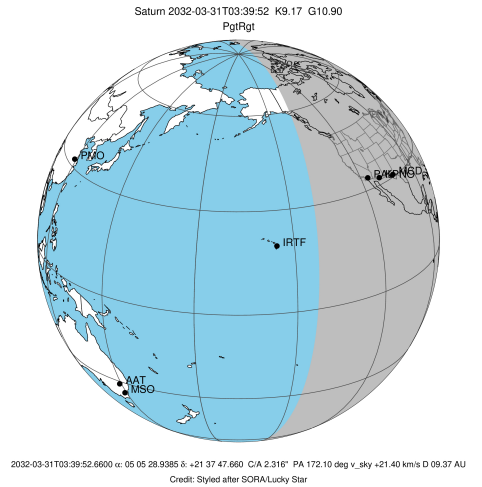
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2032-03-31T03:43:14.720
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 3415157886960444416
 2Mass ID (if available) : 05052892+2137479
 ICRS Star Coord at Epoch: 05h 05m 28.93850s +21:37:47.65960s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 9.169
 G magnitude : 10.901
 RP magnitude : 10.300
 BP magnitude : 11.321
 DUPflag : 0
 Distance (au) : 9.367
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 21.40
 Sun-Target sep (deg) : 66.81
 Sun-Moon sep (deg) : 162.66
 B (ring opening deg) : -26.85
 PA of pole (deg) : -4.26
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 2.527
 C/A sky separation (km) : 17168.1
 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	2032-03-31T02:00:14.710		64.81	0.55x	140461.00	-20.41		
A (OER)	I	2032-03-31T02:03:15.525		64.22	-0.08x	136774.40	-20.37		
Encke (OEG)	I	2032-03-31T02:05:44.398		63.73	-0.59x	133744.89	-20.33		
Encke (IEG)	I	2032-03-31T02:06:00.217		63.68	-0.65x	133423.31	-20.33		
A (IER)	I	2032-03-31T02:15:21.913		61.81	-2.59x	122050.38	-20.16		
B (OER)	I	2032-03-31T02:19:04.528		61.06	-3.36x	117571.17	-20.08		
B (IER)	I	2032-03-31T02:40:39.385		56.66	-7.82	91984.69	-19.35		
C (IER)	I	2032-03-31T02:56:06.115		53.46	-10.99	74490.58	-18.29		
Saturn	I	2032-03-31T02:57:45.288		53.12	-11.32	60128.34		17.85	21.55
Saturn	E	2032-03-31T04:28:38.788		34.10	-29.12	60206.70		11.71	14.27
C (IER)	E	2032-03-31T04:36:26.565		32.47	-30.55	74490.58	18.42		
B (IER)	E	2032-03-31T04:51:45.868		29.28	-33.30	91984.69	19.52		
B (OER)	E	2032-03-31T05:13:07.463		24.86	-36.96	117571.16	20.31		
A (IER)	E	2032-03-31T05:16:47.452		24.10	-37.57	122050.38	20.41		
Encke (IEG)	E	2032-03-31T05:26:02.073		22.20	-39.06	133423.31	20.60		
Encke (OEG)	E	2032-03-31T05:26:17.683		22.15	-39.10	133744.89	20.60		
A (OER)	E	2032-03-31T05:28:44.570		21.65	-39.49	136774.40	20.65		
F ring	E	2032-03-31T05:31:42.913		21.04	-39.96	140461.00	20.70		

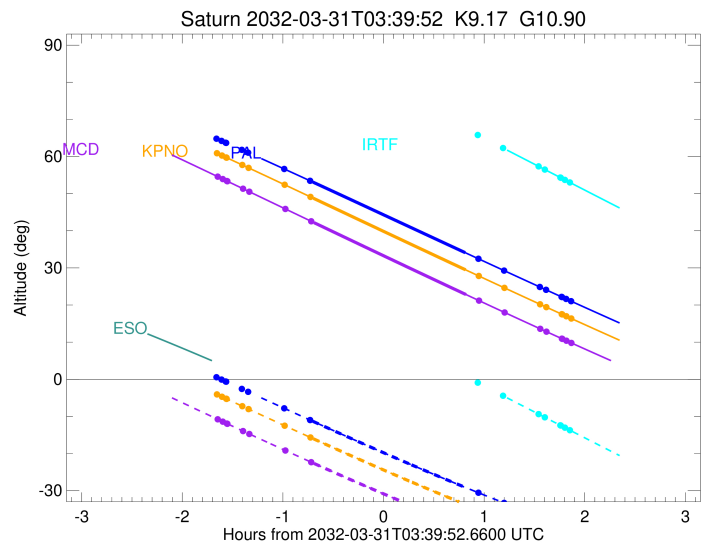
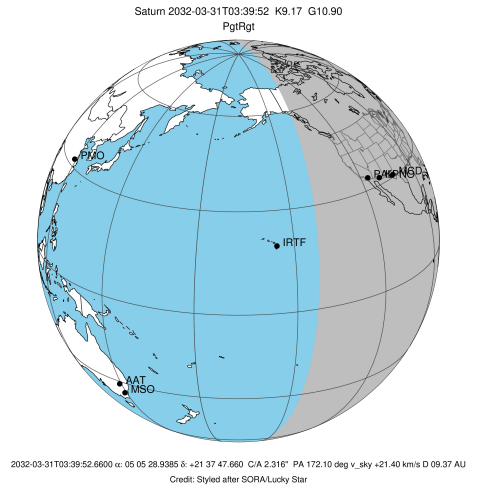
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2032-03-31T03:43:31.090
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KPNO
 Location : Kitt Peak Natl Obs
 Latitude (deg) : 31.96333
 E. Longitude (deg) : 248.40000
 Altitude (km) : 2.120
 Gaia source ID : 3415157886960444416
 2Mass ID (if available) : 05052892+2137479
 ICRS Star Coord at Epoch: 05h 05m 28.93850s +21:37:47.65960s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 9.169
 G magnitude : 10.901
 RP magnitude : 10.300
 BP magnitude : 11.321
 DUPflag : 0
 Distance (au) : 9.367
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 21.40
 Sun-Target sep (deg) : 66.81
 Sun-Moon sep (deg) : 162.70
 B (ring opening deg) : -26.85
 PA of pole (deg) : -4.26
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 2.521
 C/A sky separation (km) : 17129.7
 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	2032-03-31T02:00:31.722		60.90	-4.07x	140461.00	-20.42		
A (OER)	I	2032-03-31T02:03:32.452		60.27	-4.71x	136774.40	-20.38		
Encke (OEG)	I	2032-03-31T02:06:01.250		59.75	-5.23	133744.89	-20.34		
Encke (IEG)	I	2032-03-31T02:06:17.061		59.70	-5.28	133423.31	-20.34		
A (IER)	I	2032-03-31T02:15:38.436		57.74	-7.24	122050.38	-20.17		
B (OER)	I	2032-03-31T02:19:20.907		56.96	-8.02	117571.16	-20.09		
B (IER)	I	2032-03-31T02:40:54.698		52.40	-12.50	91984.69	-19.37		
C (IER)	I	2032-03-31T02:56:20.329		49.13	-15.68	74490.58	-18.32		
Saturn	I	2032-03-31T02:58:03.831		48.76	-16.03	60129.34		17.78	21.47
Saturn	E	2032-03-31T04:28:52.266		29.47	-33.71	60206.75		11.70	14.27
C (IER)	E	2032-03-31T04:36:39.297		27.84	-35.11	74490.58	18.46		
B (IER)	E	2032-03-31T04:51:56.924		24.63	-37.78	91984.69	19.56		
B (OER)	E	2032-03-31T05:13:16.393		20.19	-41.30	117571.17	20.35		
A (IER)	E	2032-03-31T05:16:56.027		19.44	-41.87	122050.38	20.44		
Encke (IEG)	E	2032-03-31T05:26:09.759		17.53	-43.29	133423.31	20.63		
Encke (OEG)	E	2032-03-31T05:26:25.344		17.48	-43.33	133744.89	20.64		
A (OER)	E	2032-03-31T05:28:51.995		16.98	-43.69	136774.40	20.68		
F ring	E	2032-03-31T05:31:50.053		16.37	-44.13	140461.00	20.73		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2032-03-31T03:43:50.800
 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 : 3415157886960444416
 2Mass ID (if available) : 05052892+2137479
 ICRS Star Coord at Epoch: 05h 05m 28.93850s +21:37:47.65960s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 9.169
 G magnitude : 10.901
 RP magnitude : 10.300
 BP magnitude : 11.321
 DUPflag : 0
 Distance (au) : 9.367
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 21.40
 Sun-Target sep (deg) : 66.81
 Sun-Moon sep (deg) : 162.74
 B (ring opening deg) : -26.85
 PA of pole (deg) : -4.26
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 2.528
 C/A sky separation (km) : 17178.2
 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_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

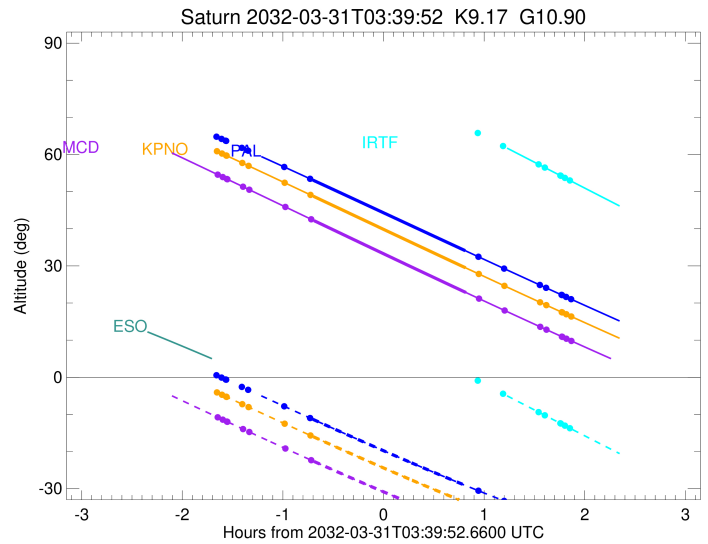
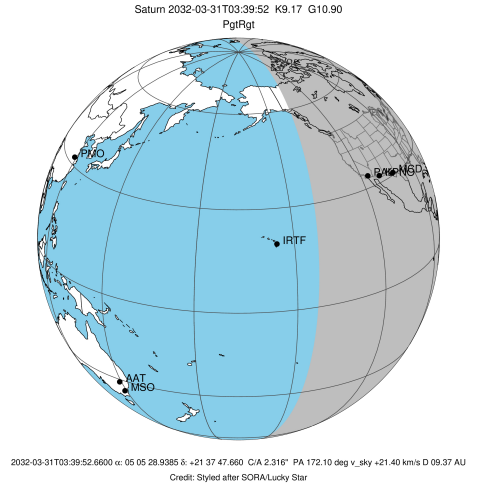


b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2032-03-31T02:00:59.010		54.59	-10.78	140461.00	-20.43		
A (OER)	I	2032-03-31T02:03:59.629		53.94	-11.41	136774.40	-20.39		
Encke (OEG)	I	2032-03-31T02:06:28.335		53.41	-11.93	133744.89	-20.35		
Encke (IEG)	I	2032-03-31T02:06:44.135		53.35	-11.99	133423.31	-20.35		
A (IER)	I	2032-03-31T02:16:05.146		51.34	-13.95	122050.38	-20.19		
B (OER)	I	2032-03-31T02:19:47.468		50.54	-14.72	117571.16	-20.11		
B (IER)	I	2032-03-31T02:41:20.408		45.89	-19.19	91984.69	-19.38		
C (IER)	I	2032-03-31T02:56:45.590		42.56	-22.33	74490.58	-18.32		
Saturn	I	2032-03-31T02:58:29.112		42.19	-22.68	60129.36		17.78	21.47
Saturn	E	2032-03-31T04:29:05.587		22.82	-39.83	60205.91		11.78	14.36
C (IER)	E	2032-03-31T04:36:48.026		21.20	-41.13	74490.58	18.48		
B (IER)	E	2032-03-31T04:52:04.513		18.00	-43.61	91984.69	19.58		
B (OER)	E	2032-03-31T05:13:21.864		13.58	-46.79	117571.16	20.38		
A (IER)	E	2032-03-31T05:17:01.097		12.83	-47.29	122050.38	20.48		
Encke (IEG)	E	2032-03-31T05:26:13.783		10.94	-48.52	133423.31	20.67		
Encke (OEG)	E	2032-03-31T05:26:29.338		10.89	-48.56	133744.89	20.68		
A (OER)	E	2032-03-31T05:28:55.706		10.39	-48.87	136774.40	20.72		
F ring	E	2032-03-31T05:31:53.415		9.79	-49.24	140461.00	20.77		

```

target                : Saturn
target radius (km)   : 60268.00
C/A epoch             : 2032-03-31T03:40:50.070
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       : 3415157886960444416
2Mass ID (if available) : 05052892+2137479
ICRS Star Coord at Epoch: 05h 05m 28.93850s +21:37:47.65960s
RUWE (>1.4 is poor) : 1.00
K magnitude           : 9.169
G magnitude           : 10.901
RP magnitude          : 10.300
BP magnitude          : 11.321
DUPflag              : 0
Distance (au)        : 9.367
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : 21.40
Sun-Target sep (deg) : 66.81
Sun-Moon sep (deg)   : 162.30
B (ring opening deg) : -26.85
PA of pole (deg)     : -4.26
Pole direction: RA (deg): 40.60000
Dec (deg): 83.50000
C/A sky separation (") : 2.267
C/A sky separation (km) : 15401.2
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_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	2032-03-31T01:56:28.313		76.58	36.54x	140461.00	-20.53		
A (OER)	I	2032-03-31T01:59:28.015		77.28	35.84x	136774.40	-20.50		
Encke (OEG)	I	2032-03-31T02:01:55.932		77.85	35.27x	133744.89	-20.47		
Encke (IEG)	I	2032-03-31T02:02:11.646		77.91	35.21x	133423.31	-20.46		
A (IER)	I	2032-03-31T02:11:29.301		80.05	33.04x	122050.38	-20.32		
B (OER)	I	2032-03-31T02:15:10.087		80.89	32.19x	117571.16	-20.25		
B (IER)	I	2032-03-31T02:36:29.961		85.64	27.20x	91984.69	-19.66		
C (IER)	I	2032-03-31T02:51:37.145		88.00	23.65x	74490.58	-18.82		
Saturn	I	2032-03-31T02:54:36.456		88.00	22.95x	60147.22		16.56	20.04
Saturn	E	2032-03-31T04:27:03.639		67.90	1.21x	60223.82		9.92	12.12
C (IER)	E	2032-03-31T04:36:03.336		65.81	-0.90x	74490.58	18.87		
B (IER)	E	2032-03-31T04:51:07.901		62.30	-4.43x	91984.69	19.72		
B (OER)	E	2032-03-31T05:12:23.229		57.35	-9.39	117571.16	20.33		
A (IER)	E	2032-03-31T05:16:03.120		56.50	-10.24	122050.38	20.40		
Encke (IEG)	E	2032-03-31T05:25:18.363		54.35	-12.40	133423.31	20.55		
Encke (OEG)	E	2032-03-31T05:25:34.006		54.29	-12.46	133744.89	20.56		
A (OER)	E	2032-03-31T05:28:01.245		53.72	-13.03	136774.40	20.59		
F ring	E	2032-03-31T05:31:00.104		53.02	-13.72	140461.00	20.63		