

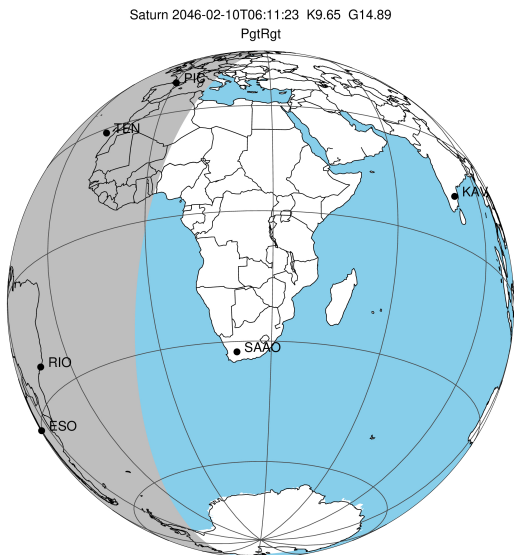
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2046-02-10T06:11:23.510
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 4115094413578461184
 2Mass ID (if available) : 17192079-2138405

Saturn 2046-02-10T06:11:23 K9.65 G14.89 PgtRgt

ICRS Star Coord at Epoch: 17h 19m 20.77609s -21:38:40.78554s

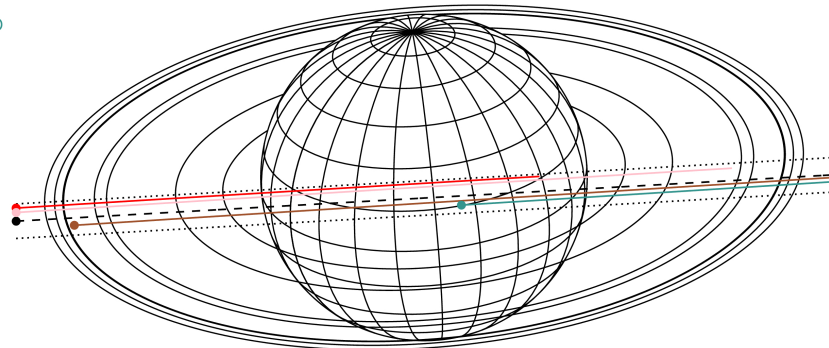
RUWE (>1.4 is poor) : 1.01
 K magnitude : 9.653
 G magnitude : 14.894
 RP magnitude : 13.579
 BP magnitude : 16.922
 DUPflag : 0
 Distance (au) : 10.475
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 24.26
 Sun-Target sep (deg) : 60.47
 Sun-Moon sep (deg) : 106.72
 B (ring opening deg) : 26.61
 PA of pole (deg) : 4.60

#	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



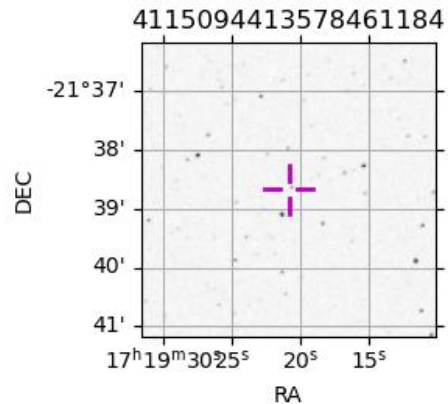
2046-02-10T06:11:23.5100 α: 17 19 20.7761 δ: -21 38 40.786 C/A 0.997 PA 3.24 deg v_sky +24.26 km/s D 10.47 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PIC
 TEN
 RIO
 ESO

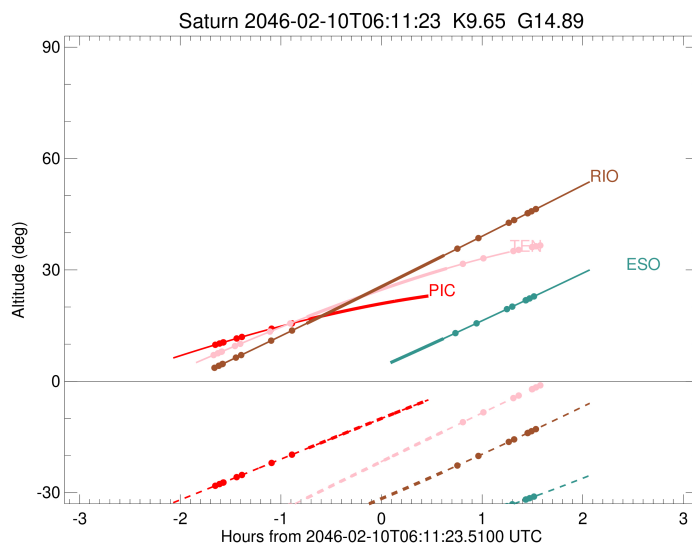
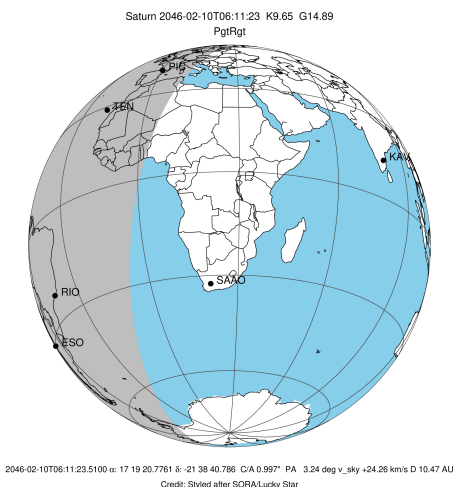


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEncode
PIC	Pic du Midi	42.9	0.1	+	+	+	FEB 10 04:32 - FEB 10 05:27	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	+	+	+	FEB 10 04:31 - FEB 10 07:12	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		+	+	FEB 10 04:44 - FEB 10 07:43	PieRie
ESO	European South	-29.3	289.3		+	+	FEB 10 06:48 - FEB 10 07:42	PneRne
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

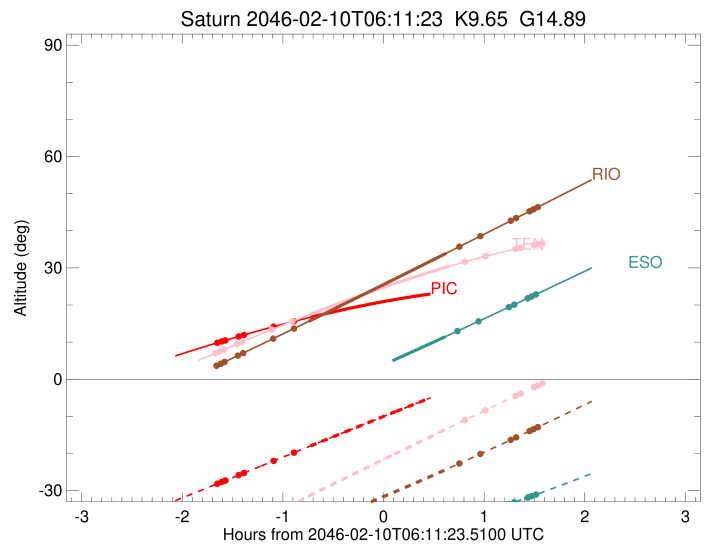
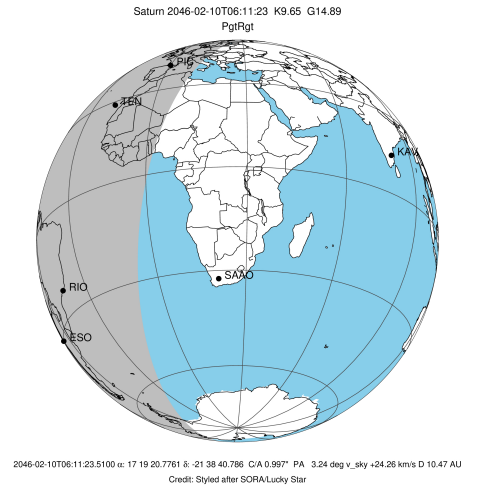


target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2046-02-10T06:09:43.170
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 4115094413578461184
 2Mass ID (if available) : 17192079-2138405
 ICRS Star Coord at Epoch: 17h 19m 20.77609s -21:38:40.78554s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 9.653
 G magnitude : 14.894
 RP magnitude : 13.579
 BP magnitude : 16.922
 DUPflag : 0
 Distance (au) : 10.475
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 24.26
 Sun-Target sep (deg) : 60.47
 Sun-Moon sep (deg) : 106.94
 B (ring opening deg) : 26.61
 PA of pole (deg) : 4.60
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.282
 C/A sky separation (km) : 2140.5
 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



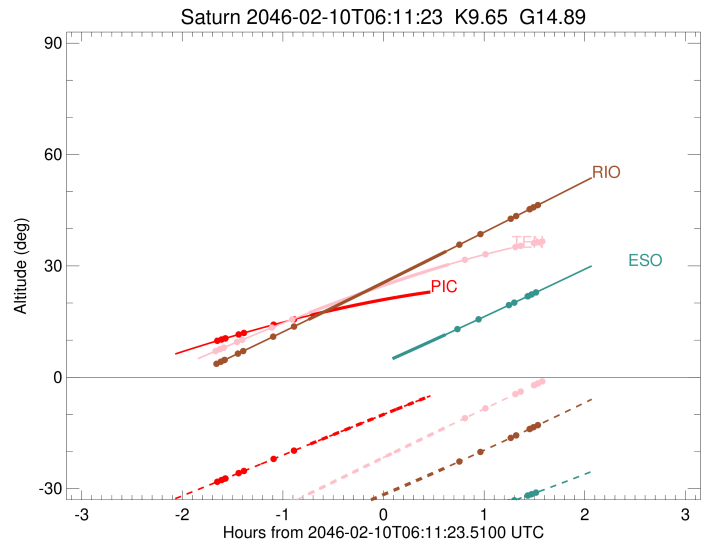
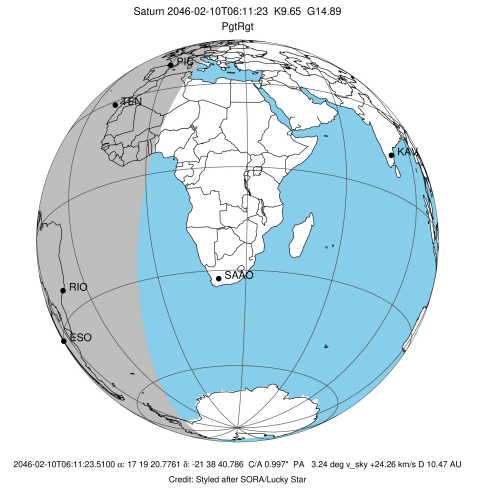
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2046-02-10T04:32:17.211		9.83	-28.15	140461.00	-24.09		
A (OER)	I	2046-02-10T04:34:50.273		10.17	-27.69	136774.40	-24.08		
Encke (OEG)	I	2046-02-10T04:36:56.076		10.46	-27.30	133744.89	-24.08		
Encke (IEG)	I	2046-02-10T04:37:09.431		10.49	-27.26	133423.31	-24.08		
A (IER)	I	2046-02-10T04:45:01.895		11.53	-25.82	122050.38	-24.06		
B (OER)	I	2046-02-10T04:48:08.058		11.94	-25.25	117571.16	-24.06		
B (IER)	I	2046-02-10T05:05:52.453		14.16	-21.99	91984.69	-24.02		
C (IER)	I	2046-02-10T05:18:01.368		15.60	-19.76	74490.58	-23.98		
Saturn	I	2046-02-10T05:27:52.029		16.70	-17.96	60267.71		-0.81	-1.00
Saturn	E	2046-02-10T06:51:38.710		23.70	-2.83x	60264.34		-2.87	-3.52
C (IER)	E	2046-02-10T07:01:16.798		24.19	-1.14x	74490.58	23.88		
B (IER)	E	2046-02-10T07:13:29.184		24.70	0.97x	91984.69	23.89		
B (OER)	E	2046-02-10T07:31:19.931		25.24	4.01x	117571.16	23.90		
A (IER)	E	2046-02-10T07:34:27.359		25.31	4.53x	122050.38	23.90		
Encke (IEG)	E	2046-02-10T07:42:23.242		25.45	5.85x	133423.31	23.90		
Encke (OEG)	E	2046-02-10T07:42:36.698		25.45	5.89x	133744.89	23.90		
A (OER)	E	2046-02-10T07:44:43.463		25.48	6.24x	136774.40	23.90		
F ring	E	2046-02-10T07:47:17.723		25.51	6.67x	140461.00	23.90		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2046-02-10T06:08:33.260
 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 : 4115094413578461184
 2Mass ID (if available) : 17192079-2138405
 ICRS Star Coord at Epoch: 17h 19m 20.77609s -21:38:40.78554s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 9.653
 G magnitude : 14.894
 RP magnitude : 13.579
 BP magnitude : 16.922
 DUPflag : 0
 Distance (au) : 10.475
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 24.26
 Sun-Target sep (deg) : 60.47
 Sun-Moon sep (deg) : 106.92
 B (ring opening deg) : 26.61
 PA of pole (deg) : 4.60
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.461
 C/A sky separation (km) : 3504.7
 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



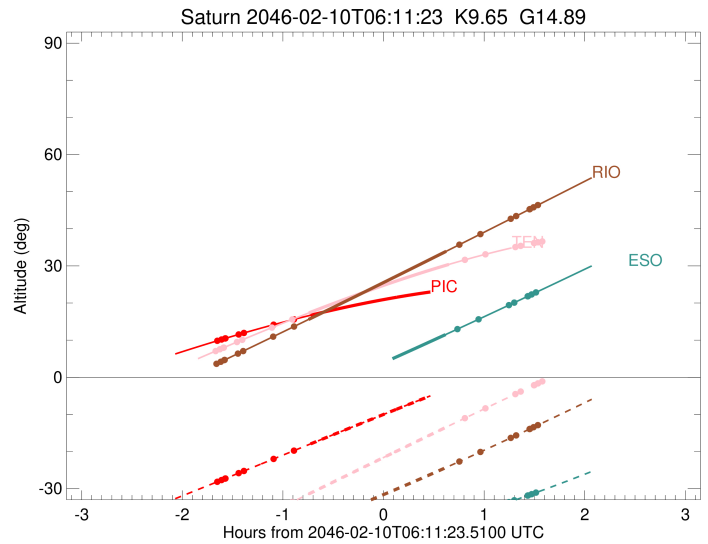
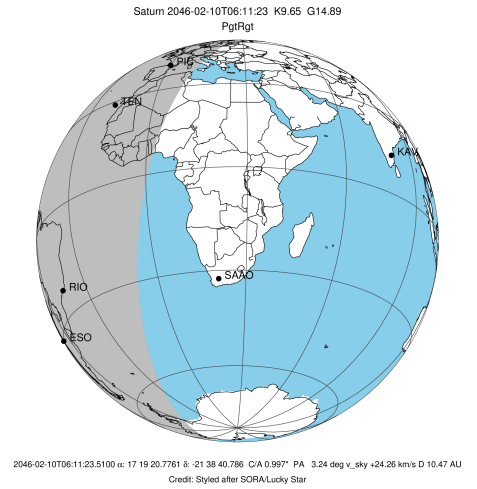
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2046-02-10T04:31:18.369		7.06	-43.65	140461.00	-24.13		
A (OER)	I	2046-02-10T04:33:51.194		7.55	-43.10	136774.40	-24.12		
Encke (OEG)	I	2046-02-10T04:35:56.814		7.95	-42.64	133744.89	-24.11		
Encke (IEG)	I	2046-02-10T04:36:10.150		7.99	-42.59	133423.31	-24.11		
A (IER)	I	2046-02-10T04:44:02.040		9.49	-40.86	122050.38	-24.09		
B (OER)	I	2046-02-10T04:47:08.027		10.08	-40.18	117571.16	-24.08		
B (IER)	I	2046-02-10T05:04:52.126		13.38	-36.28	91984.69	-24.01		
C (IER)	I	2046-02-10T05:17:01.835		15.59	-33.60	74490.58	-23.94		
Saturn	I	2046-02-10T05:26:47.411		17.32	-31.45	60266.09		-2.07	-2.55
Saturn	E	2046-02-10T06:50:25.876		30.41	-13.08	60261.15		-3.93	-4.82
C (IER)	E	2046-02-10T06:59:53.136		31.63	-11.03	74490.58	23.78		
B (IER)	E	2046-02-10T07:12:08.286		33.12	-8.38	91984.69	23.81		
B (OER)	E	2046-02-10T07:30:02.333		35.08	-4.53x	117571.16	23.83		
A (IER)	E	2046-02-10T07:33:10.302		35.39	-3.86x	122050.38	23.83		
Encke (IEG)	E	2046-02-10T07:41:07.541		36.15	-2.16x	133423.31	23.83		
Encke (OEG)	E	2046-02-10T07:41:21.035		36.17	-2.11x	133744.89	23.83		
A (OER)	E	2046-02-10T07:43:28.160		36.36	-1.66x	136774.40	23.83		
F ring	E	2046-02-10T07:46:02.858		36.59	-1.11x	140461.00	23.83		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2046-02-10T06:07:40.230
 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 : 4115094413578461184
 2Mass ID (if available) : 17192079-2138405
 ICRS Star Coord at Epoch: 17h 19m 20.77609s -21:38:40.78554s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 9.653
 G magnitude : 14.894
 RP magnitude : 13.579
 BP magnitude : 16.922
 DUPflag : 0
 Distance (au) : 10.475
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 24.26
 Sun-Target sep (deg) : 60.47
 Sun-Moon sep (deg) : 106.86
 B (ring opening deg) : 26.61
 PA of pole (deg) : 4.60
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.245
 C/A sky separation (km) : 9455.9
 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



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2046-02-10T04:31:48.007	3.62x	-47.51	140461.00	-24.07			
A (OER)	I	2046-02-10T04:34:21.210	4.17x	-47.21	136774.40	-24.05			
Encke (OEG)	I	2046-02-10T04:36:27.209	4.62x	-46.95	133744.89	-24.03			
Encke (IEG)	I	2046-02-10T04:36:40.589	4.67x	-46.92	133423.31	-24.03			
A (IER)	I	2046-02-10T04:44:34.553	6.37	-45.90	122050.38	-23.96			
B (OER)	I	2046-02-10T04:47:41.675	7.05	-45.49	117571.16	-23.92			
B (IER)	I	2046-02-10T05:05:37.306	10.94	-42.92	91984.69	-23.62			
C (IER)	I	2046-02-10T05:18:03.214	13.67	-40.98	74490.58	-23.25			
Saturn	I	2046-02-10T05:26:39.236	15.56	-39.58	60244.92			-7.22	-8.85
Saturn	E	2046-02-10T06:48:49.506	33.95	-24.28	60232.86			-8.93	-10.92
C (IER)	E	2046-02-10T06:56:36.177	35.71	-22.70	74490.58	23.05			
B (IER)	E	2046-02-10T07:09:09.168	38.56	-20.12	91984.69	23.38			
B (OER)	E	2046-02-10T07:27:17.741	42.69	-16.33	117571.16	23.60			
A (IER)	E	2046-02-10T07:30:27.440	43.41	-15.66	122050.38	23.62			
Encke (IEG)	E	2046-02-10T07:38:28.362	45.24	-13.96	133423.31	23.67			
Encke (OEG)	E	2046-02-10T07:38:41.947	45.30	-13.91	133744.89	23.67			
A (OER)	E	2046-02-10T07:40:49.902	45.78	-13.46	136774.40	23.68			
F ring	E	2046-02-10T07:43:25.543	46.38	-12.90	140461.00	23.69			

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2046-02-10T06:07:46.440
 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 : 4115094413578461184
 2Mass ID (if available) : 17192079-2138405
 ICRS Star Coord at Epoch: 17h 19m 20.77609s -21:38:40.78554s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 9.653
 G magnitude : 14.894
 RP magnitude : 13.579
 BP magnitude : 16.922
 DUPflag : 0
 Distance (au) : 10.475
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 24.26
 Sun-Target sep (deg) : 60.47
 Sun-Moon sep (deg) : 106.55
 B (ring opening deg) : 26.61
 PA of pole (deg) : 4.60
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.455
 C/A sky separation (km) : 11050.7
 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	2046-02-10T04:32:56.796	-14.91x	-46.21	140461.00	-24.14			
A (OER)	I	2046-02-10T04:35:29.575	-14.45x	-46.29	136774.40	-24.12			
Encke (OEG)	I	2046-02-10T04:37:35.249	-14.08x	-46.35	133744.89	-24.09			
Encke (IEG)	I	2046-02-10T04:37:48.596	-14.04x	-46.36	133423.31	-24.09			
A (IER)	I	2046-02-10T04:45:41.580	-12.62x	-46.52	122050.38	-23.99			
B (OER)	I	2046-02-10T04:48:48.436	-12.05x	-46.56	117571.17	-23.95			
B (IER)	I	2046-02-10T05:06:44.591	-8.73x	-46.54	91984.69	-23.56			
C (IER)	I	2046-02-10T05:19:14.476	-6.36x	-46.28	74490.58	-23.05			
Saturn	I	2046-02-10T05:27:16.875	-4.81x	-46.00	60235.69	-8.56		-8.56	-10.47
Saturn	E	2046-02-10T06:48:23.742	11.50	-38.96	60221.23	-10.31		-10.31	-12.60
C (IER)	E	2046-02-10T06:55:26.061	12.96	-38.05	74490.58	22.86			
B (IER)	E	2046-02-10T07:08:02.810	15.60	-36.32	91984.69	23.32			
B (OER)	E	2046-02-10T07:26:11.505	19.43	-33.63	117571.16	23.64			
A (IER)	E	2046-02-10T07:29:20.858	20.10	-33.14	122050.38	23.67			
Encke (IEG)	E	2046-02-10T07:37:20.587	21.80	-31.88	133423.31	23.74			
Encke (OEG)	E	2046-02-10T07:37:34.133	21.85	-31.84	133744.89	23.74			
A (OER)	E	2046-02-10T07:39:41.705	22.30	-31.50	136774.40	23.75			
F ring	E	2046-02-10T07:42:16.848	22.85	-31.08	140461.00	23.77			