

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2046-03-29T19:32:18.810
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 4117825497411079808
 2Mass ID (if available) : 17280113-2142192

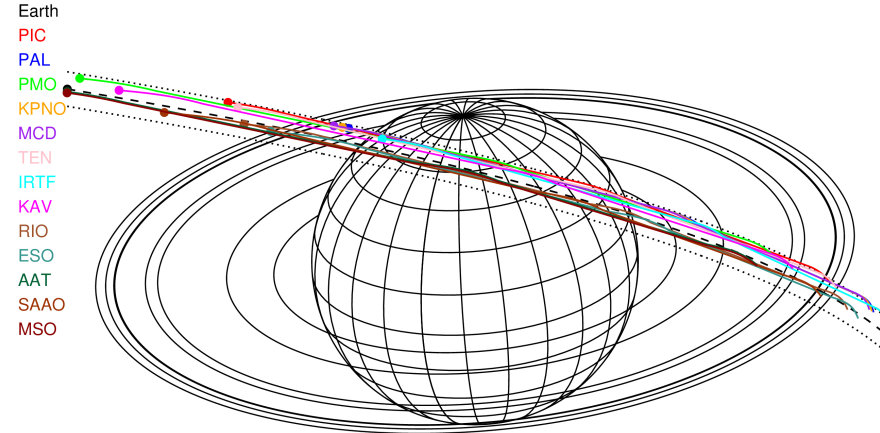
Saturn 2046-03-29T19:32:18 K9.85 G14.54 PgtRgt

ICRS Star Coord at Epoch: 17h 28m 01.12314s -21:42:19.47588s

RUWE (>1.4 is poor) : 0.98
 K magnitude : 9.850
 G magnitude : 14.538
 RP magnitude : 13.336
 BP magnitude : 16.097
 DUPflag : 0
 Distance (au) : 9.707
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 1.40
 Sun-Target sep (deg) : 106.05
 Sun-Moon sep (deg) : 22.38
 B (ring opening deg) : 26.51
 PA of pole (deg) : 4.80



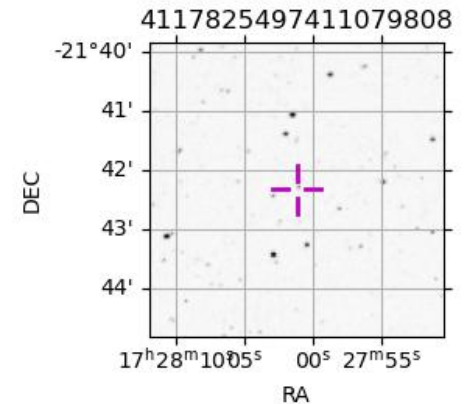
2046-03-29T19:32:18.8100 α: 17 28 01.1231 s: -21 42 19.476 C/A 4.592° PA 165.67 deg v_sky + 1.40 km/s D 09.71 AU
 Credit: Styled after SORA/Lucky Star



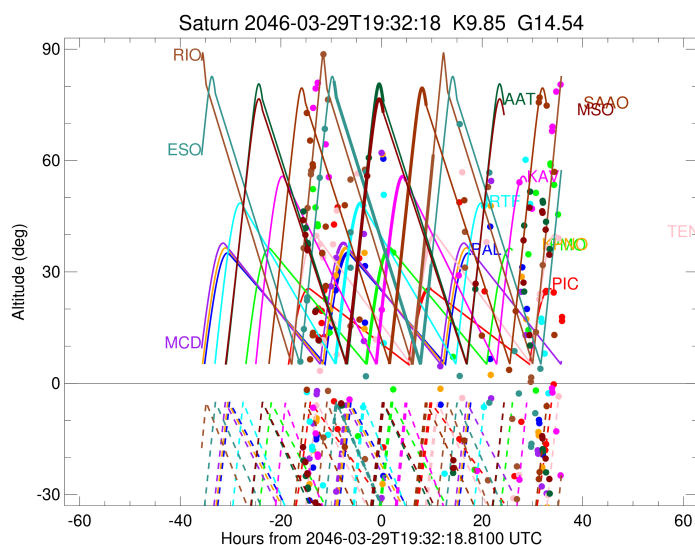
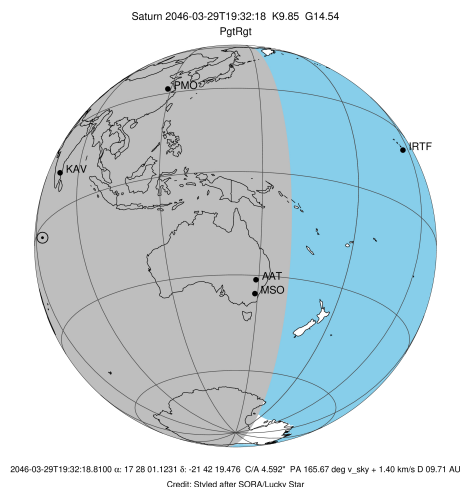
#	a(km)	ring
1	74490.6	C (IER)
2	91984.7	B (IER)
3	117571.2	B (OER)
4	122050.4	A (IER)
5	133423.3	Encke (IEG)
6	133744.9	Encke (OEG)
7	136774.4	A (OER)
8	140461.0	F ring

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			+	MAR 31 04:04 - MAR 31 04:14	PnnRne
PAL	Palomar Mt (20	33.4	243.1	+	+		MAR 29 09:16 - MAR 29 10:33	PinRin
PMO	Purple Mtn Obs	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl	32.0	248.4	+	+		MAR 29 09:19 - MAR 29 10:37	PinRin
MCD	McDonald Obs.	30.7	256.0	+	+		MAR 29 09:25 - MAR 29 10:44	PinRin
TEN	Teide Obs./Ten	28.3	343.5	+	+		MAR 29 06:35 - MAR 31 04:38	PneRie
IRTF	Mauna Kea/IRTF	19.8	204.5			+	MAR 30 15:52 - MAR 30 15:52	PnnRne
KAV	Kavalur Observ	12.6	78.8			+	MAR 30 22:58 - MAR 30 22:58	PnnRne
RIO	Rio de Janeiro	-22.9	316.8	+	+		MAR 29 04:03 - MAR 31 03:34	PneRie
ESO	European South	-29.3	289.3	+	+		MAR 29 03:24 - MAR 30 05:25	PieRin
AAT	Siding Spring	-31.3	149.1			+	MAR 30 14:10 - MAR 30 14:10	PnnRne
SAAO	So. Afr. Astro	-32.4	20.8			+	MAR 30 22:12 - MAR 31 04:21	PnnRne
MSO	Mt. Stromlo Ob	-35.3	149.0			+	MAR 30 14:14 - MAR 30 14:14	PnnRne



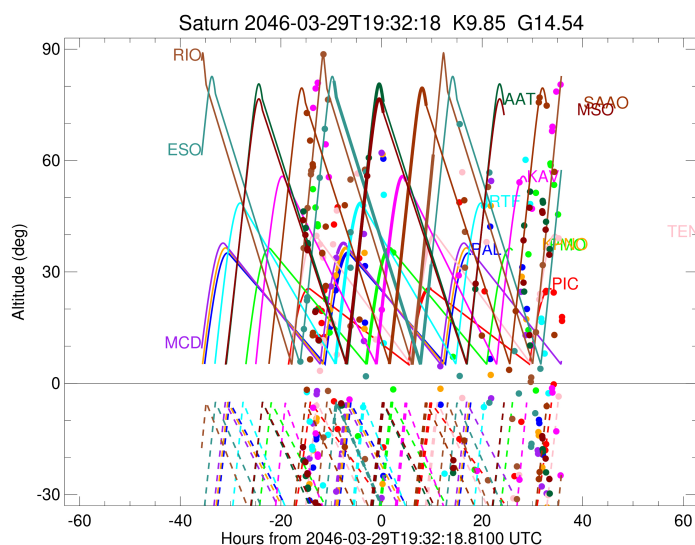
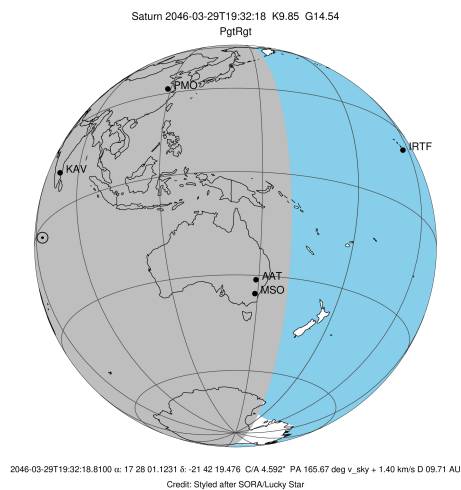
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2046-03-29T18:43:25.650
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 4117825497411079808
 2Mass ID (if available) : 17280113-2142192
 ICRS Star Coord at Epoch: 17h 28m 01.12314s -21:42:19.47588s
 RUWE (>1.4 is poor) : 0.98
 K magnitude : 9.850
 G magnitude : 14.538
 RP magnitude : 13.336
 BP magnitude : 16.097
 DUPflag : 0
 Distance (au) : 9.708
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 1.40
 Sun-Target sep (deg) : 106.05
 Sun-Moon sep (deg) : 22.56
 B (ring opening deg) : 26.51
 PA of pole (deg) : 4.80
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 5.021
 C/A sky separation (km) : 35350.3
 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_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

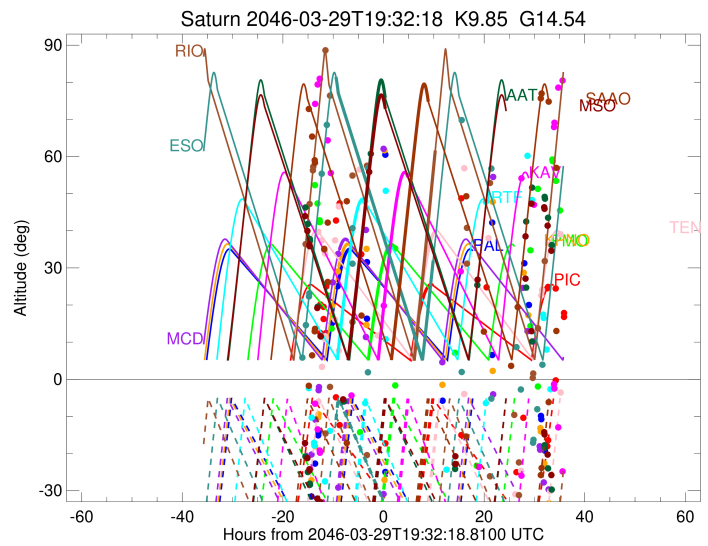
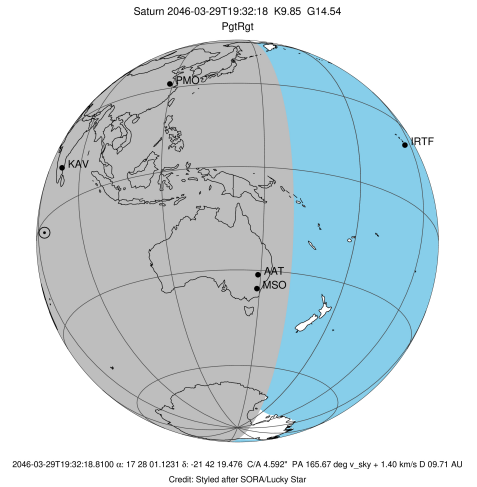
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2046-03-29T06:59:02.860		20.16	12.43x	140461.00	-1.56		
A (OER)	I	2046-03-29T07:37:59.400		16.25	19.47x	136774.40	-1.60		
Encke (OEG)	I	2046-03-29T08:09:17.997		12.50	24.97x	133744.89	-1.63		
Encke (IEG)	I	2046-03-29T08:12:35.360		12.07	25.54x	133423.31	-1.63		
A (IER)	I	2046-03-29T10:05:34.678		-4.86x	42.76x	122050.38	-1.72		
B (OER)	I	2046-03-29T10:48:53.278		-12.25x	47.37x	117571.16	-1.73		
B (IER)	I	2046-03-29T15:07:18.484	b	-58.30x	33.60x	91984.69	-1.46		
C (IER)	I	2046-03-29T19:56:13.991	b	-47.97x	-17.54	74490.58	-0.52		
Saturn	I	2046-03-29T11:26:28.878		-18.92x	49.92x	59520.42		46.51	52.02
Saturn	E	2046-03-30T06:34:26.455		21.85	8.24x	60161.99		15.72	19.05
C (IER)	E	2046-03-30T11:00:24.520		-14.97x	48.71x	74490.58	0.59		
B (IER)	E	2046-03-30T16:01:23.339		-65.98x	24.84x	91984.69	1.24		
B (OER)	E	2046-03-30T21:58:18.897		-24.97x	-35.25	117571.16	0.99		
A (IER)	E	2046-03-30T23:19:16.656		-10.52x	-42.07	122050.38	0.85		
Encke (IEG)	E	2046-03-31T04:04:38.487		24.46	-18.26	133423.31	0.55		
Encke (OEG)	E	2046-03-31T04:14:22.899		24.83	-16.62	133744.89	0.55		
A (OER)	E	2046-03-31T05:44:54.003		24.50	-0.54x	136774.40	0.58		
F ring	E	2046-03-31T07:24:14.444		16.90	17.64x	140461.00	0.67		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2046-03-29T20:51:32.290
 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 : 4117825497411079808
 2Mass ID (if available) : 17280113-2142192
 ICRS Star Coord at Epoch: 17h 28m 01.12314s -21:42:19.47588s
 RUWE (>1.4 is poor) : 0.98
 K magnitude : 9.850
 G magnitude : 14.538
 RP magnitude : 13.336
 BP magnitude : 16.097
 DUPflag : 0
 Distance (au) : 9.706
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 1.40
 Sun-Target sep (deg) : 106.05
 Sun-Moon sep (deg) : 21.67
 B (ring opening deg) : 26.51
 PA of pole (deg) : 4.80
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.742
 C/A sky separation (km) : 33382.1
 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



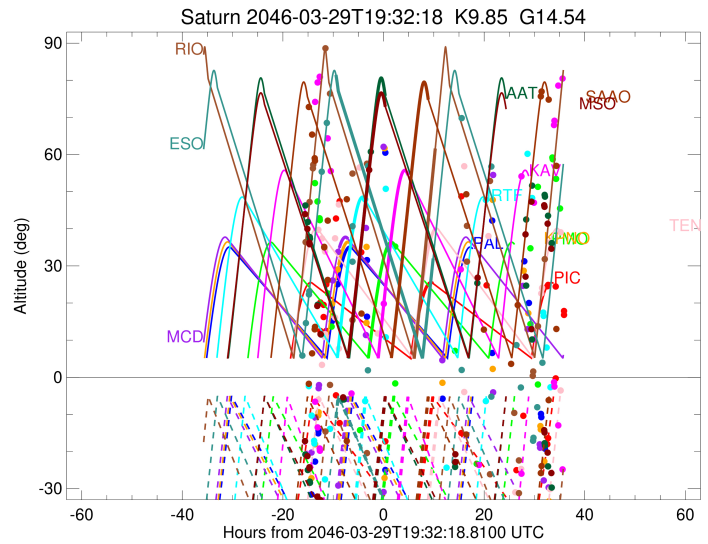
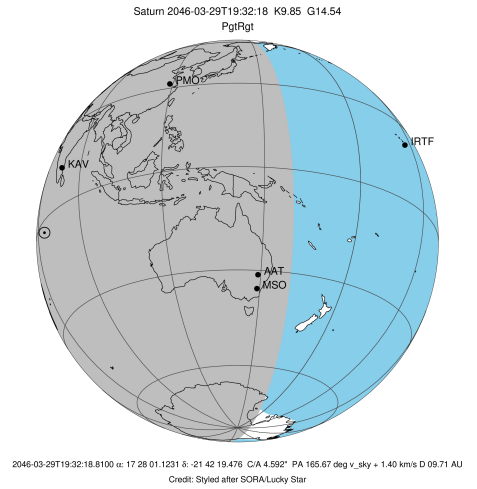
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2046-03-29T05:13:17.021	-31.62x	-37.58	140461.00	-1.48			
A (OER)	I	2046-03-29T05:56:07.173	-22.75x	-44.24	136774.40	-1.39			
Encke (OEG)	I	2046-03-29T06:33:31.020	-15.15x	-48.91	133744.89	-1.31			
Encke (IEG)	I	2046-03-29T06:37:36.488	-14.32x	-49.34	133423.31	-1.31			
A (IER)	I	2046-03-29T09:16:22.195	15.06	-48.25	122050.38	-1.12			
B (OER)	I	2046-03-29T10:23:51.677	24.93	-38.69	117571.16	-1.10			
B (IER)	I	2046-03-29T16:15:47.199	b	16.24	31.66x	91984.69	-1.35		
C (IER)	I	2046-03-29T19:55:09.366	b	-25.17x	60.49x	74490.58	-1.21		
Saturn	I	2046-03-29T10:33:35.904		26.15	-37.06	59459.37		49.03	54.43
Saturn	E	2046-03-30T05:04:27.086		-32.64x	-35.84	60176.50		14.58	17.70
C (IER)	E	2046-03-30T07:16:56.589	-5.77x	-52.05	74490.58	0.65			
B (IER)	E	2046-03-30T17:08:22.060	6.65	42.08x	91984.69	0.72			
B (OER)	E	2046-03-30T23:31:37.131	-70.32x	31.21x	117571.16	1.37			
A (IER)	E	2046-03-31T00:25:59.514	-77.89x	20.13x	122050.38	1.37			
Encke (IEG)	E	2046-03-31T02:49:36.835	-59.94x	-9.75	133423.31	1.24			
Encke (OEG)	E	2046-03-31T02:53:56.584	-59.05x	-10.63	133744.89	1.23			
A (OER)	E	2046-03-31T03:35:56.429	-50.36x	-19.10	136774.40	1.17			
F ring	E	2046-03-31T04:30:50.476	-38.85x	-29.63	140461.00	1.07			

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2046-03-29T20:46:14.970
 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 : 4117825497411079808
 2Mass ID (if available) : 17280113-2142192
 ICRS Star Coord at Epoch: 17h 28m 01.12314s -21:42:19.47588s
 RUWE (>1.4 is poor) : 0.98
 K magnitude : 9.850
 G magnitude : 14.538
 RP magnitude : 13.336
 BP magnitude : 16.097
 DUPflag : 0
 Distance (au) : 9.706
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 1.40
 Sun-Target sep (deg) : 106.05
 Sun-Moon sep (deg) : 21.64
 B (ring opening deg) : 26.51
 PA of pole (deg) : 4.80
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.711
 C/A sky separation (km) : 33161.9
 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_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



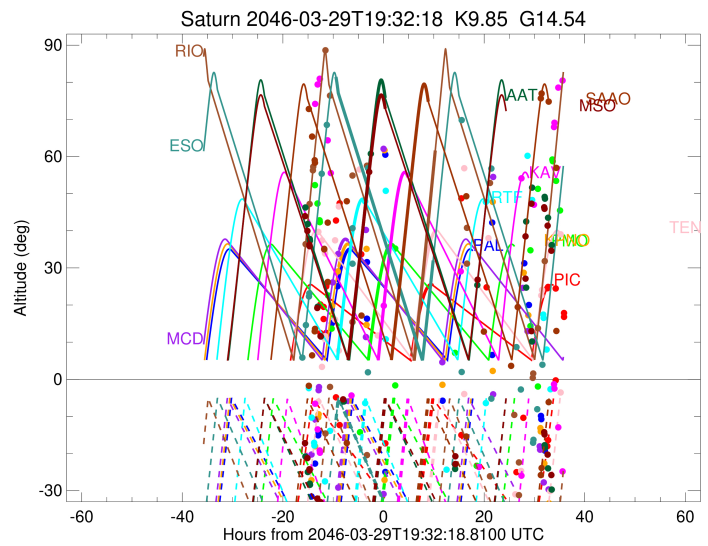
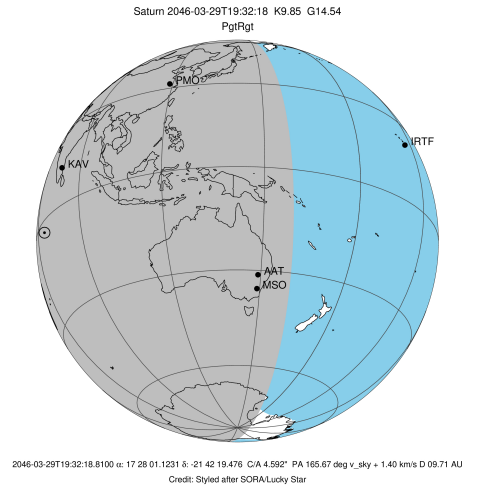
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2046-03-29T05:12:22.911		-27.21x	-41.77	140461.00	-1.45		
A (OER)	I	2046-03-29T05:56:11.538		-18.10x	-48.16	136774.40	-1.36		
Encke (OEG)	I	2046-03-29T06:34:25.576		-10.31x	-52.26	133744.89	-1.29		
Encke (IEG)	I	2046-03-29T06:38:36.346		-9.47x	-52.60	133423.31	-1.28		
A (IER)	I	2046-03-29T09:19:24.004		19.79	-46.31	122050.38	-1.12		
B (OER)	I	2046-03-29T10:26:30.863		28.95	-35.39	117571.16	-1.11		
B (IER)	I	2046-03-29T16:10:17.628	b	14.57	35.22x	91984.69	-1.38		
C (IER)	I	2046-03-29T19:45:47.371	b	-27.35x	61.67x	74490.58	-1.22		
Saturn	I	2046-03-29T10:37:36.566		30.19	-33.36	59461.27		48.96	54.36
Saturn	E	2046-03-30T05:00:33.281		-28.88x	-39.58	60175.51		14.66	17.79
C (IER)	E	2046-03-30T07:15:13.602		-1.48x	-54.15	74490.58	0.62		
B (IER)	E	2046-03-30T17:14:23.381		2.36x	47.68x	91984.69	0.77		
B (OER)	E	2046-03-30T23:24:55.371		-73.62x	28.66x	117571.16	1.38		
A (IER)	E	2046-03-31T00:18:58.162		-79.91x	17.37x	122050.38	1.38		
Encke (IEG)	E	2046-03-31T02:43:01.551		-57.23x	-13.03	133423.31	1.23		
Encke (OEG)	E	2046-03-31T02:47:23.994		-56.31x	-13.93	133744.89	1.22		
A (OER)	E	2046-03-31T03:29:56.694		-47.28x	-22.56	136774.40	1.15		
F ring	E	2046-03-31T04:25:54.172		-35.37x	-33.27	140461.00	1.04		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2046-03-29T20:38:02.770
 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 : 4117825497411079808
 2Mass ID (if available) : 17280113-2142192
 ICRS Star Coord at Epoch: 17h 28m 01.12314s -21:42:19.47588s
 RUWE (>1.4 is poor) : 0.98
 K magnitude : 9.850
 G magnitude : 14.538
 RP magnitude : 13.336
 BP magnitude : 16.097
 DUPflag : 0
 Distance (au) : 9.706
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 1.40
 Sun-Target sep (deg) : 106.05
 Sun-Moon sep (deg) : 21.62
 B (ring opening deg) : 26.51
 PA of pole (deg) : 4.80
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.680
 C/A sky separation (km) : 32942.6
 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_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



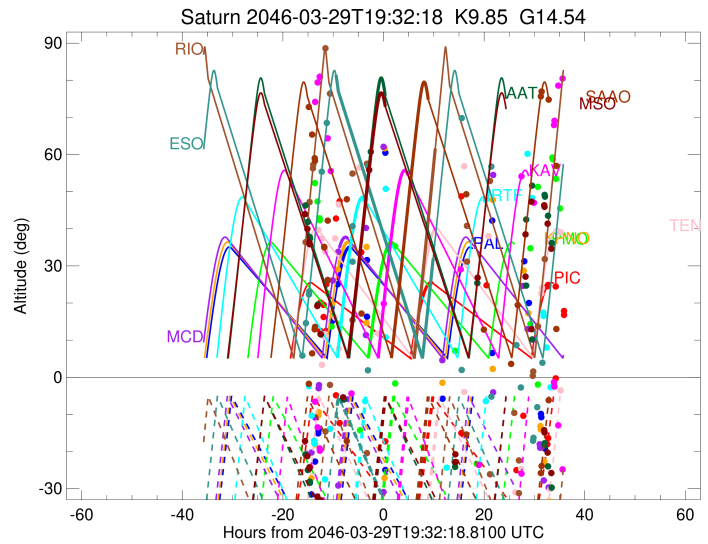
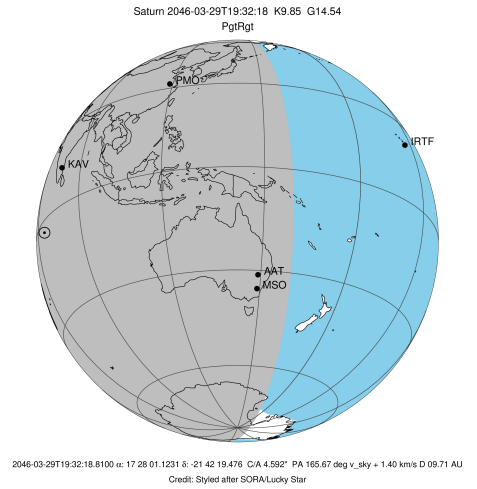
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2046-03-29T05:13:44.820		-20.32x	-47.52	140461.00	-1.40		
A (OER)	I	2046-03-29T05:59:04.164		-10.93x	-52.98	136774.40	-1.31		
Encke (OEG)	I	2046-03-29T06:38:31.153		-2.99x	-55.62	133744.89	-1.25		
Encke (IEG)	I	2046-03-29T06:42:49.293		-2.14x	-55.76	133423.31	-1.24		
A (IER)	I	2046-03-29T09:25:31.734		26.07	-41.52	122050.38	-1.13		
B (OER)	I	2046-03-29T10:31:29.009		33.71	-29.34	117571.16	-1.14		
B (IER)	I	2046-03-29T16:03:14.022	b	11.29	40.31x	91984.69	-1.42		
C (IER)	I	2046-03-29T19:34:19.647	b	-31.12x	62.01x	74490.58	-1.24		
Saturn	I	2046-03-29T10:44:34.507		34.80	-26.74	59464.25		48.83	54.24
Saturn	E	2046-03-30T04:55:43.545		-23.28x	-44.55	60173.30		14.84	18.01
C (IER)	E	2046-03-30T07:13:41.938		4.60x	-55.49	74490.58	0.57		
B (IER)	E	2046-03-30T17:19:27.360		-3.94x	54.41x	91984.69	0.84		
B (OER)	E	2046-03-30T23:15:24.313		-77.88x	24.58x	117571.16	1.39		
A (IER)	E	2046-03-31T00:09:16.763		-80.48x	13.07x	122050.38	1.37		
Encke (IEG)	E	2046-03-31T02:34:49.363		-52.67x	-17.93	133423.31	1.20		
Encke (OEG)	E	2046-03-31T02:39:17.498		-51.71x	-18.85	133744.89	1.20		
A (OER)	E	2046-03-31T03:22:56.468		-42.29x	-27.66	136774.40	1.12		
F ring	E	2046-03-31T04:20:54.982		-29.84x	-38.52	140461.00	1.00		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2046-03-29T18:52:32.710
 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 : 4117825497411079808
 2Mass ID (if available) : 17280113-2142192
 ICRS Star Coord at Epoch: 17h 28m 01.12314s -21:42:19.47588s
 RUWE (>1.4 is poor) : 0.98
 K magnitude : 9.850
 G magnitude : 14.538
 RP magnitude : 13.336
 BP magnitude : 16.097
 DUPflag : 0
 Distance (au) : 9.707
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 1.40
 Sun-Target sep (deg) : 106.05
 Sun-Moon sep (deg) : 22.35
 B (ring opening deg) : 26.51
 PA of pole (deg) : 4.80
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.751
 C/A sky separation (km) : 33452.1
 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



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2046-03-29T06:35:30.792		39.73	-6.08	140461.00	-1.42		
A (OER)	I	2046-03-29T07:18:11.893		37.42	3.30x	136774.40	-1.46		
Encke (OEG)	I	2046-03-29T07:52:10.691		34.26	10.80x	133744.89	-1.51		
Encke (IEG)	I	2046-03-29T07:55:43.685		33.87	11.58x	133423.31	-1.51		
A (IER)	I	2046-03-29T09:55:03.880		16.05	37.42x	122050.38	-1.66		
B (OER)	I	2046-03-29T10:39:24.159		7.83	46.43x	117571.16	-1.70		
B (IER)	I	2046-03-29T14:46:46.583	b	-44.26x	56.44x	91984.69	-1.63		
C (IER)	I	2046-03-29T18:26:08.939	b	-82.33x	11.50x	74490.58	-0.94		
Saturn	I	2046-03-29T11:27:10.699		-1.59x	55.21x	59539.45		45.73	51.26
Saturn	E	2046-03-30T06:08:54.599		40.12	-11.62	60164.00		15.57	18.87
C (IER)	E	2046-03-30T11:34:31.114		-3.87x	56.77x	74490.58	0.59		
B (IER)	E	2046-03-30T16:23:48.990		-66.50x	38.10x	91984.69	1.33		
B (OER)	E	2046-03-30T21:44:45.756		-39.72x	-31.04	117571.16	1.16		
A (IER)	E	2046-03-30T22:52:56.064		-24.85x	-43.85	122050.38	1.03		
Encke (IEG)	E	2046-03-31T02:52:46.587		22.37	-49.32	133423.31	0.58		
Encke (OEG)	E	2046-03-31T03:02:02.844		23.86	-47.92	133744.89	0.57		
A (OER)	E	2046-03-31T04:38:03.927		36.19	-30.46	136774.40	0.49		
F ring	E	2046-03-31T06:43:14.184		39.12	-3.89x	140461.00	0.51		

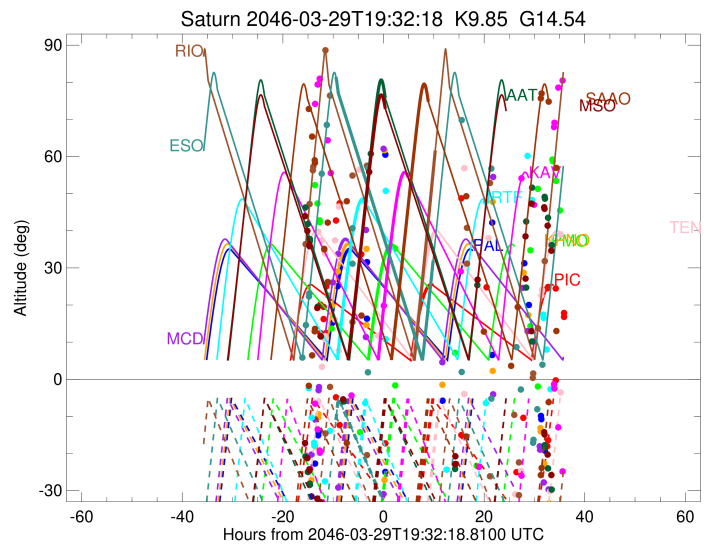
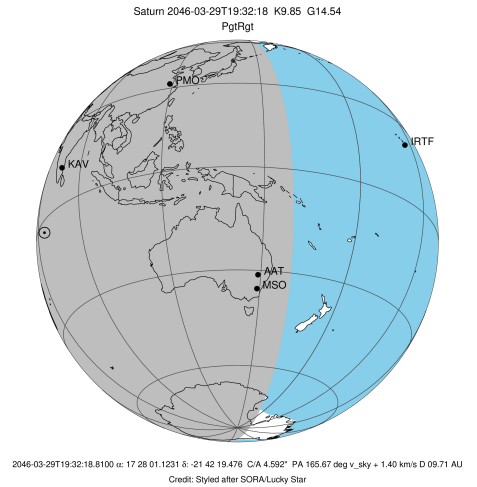
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2046-03-29T21:33:12.370
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : IRTF
 Location : Mauna Kea/IRTF
 Latitude (deg) : 19.82622
 E. Longitude (deg) : 204.52800
 Altitude (km) : 4.168
 Gaia source ID : 4117825497411079808
 2Mass ID (if available) : 17280113-2142192
 ICRS Star Coord at Epoch: 17h 28m 01.12314s -21:42:19.47588s
 RUWE (>1.4 is poor) : 0.98
 K magnitude : 9.850
 G magnitude : 14.538
 RP magnitude : 13.336
 BP magnitude : 16.097
 DUPflag : 0
 Distance (au) : 9.706
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 1.40
 Sun-Target sep (deg) : 106.05
 Sun-Moon sep (deg) : 21.88
 B (ring opening deg) : 26.51
 PA of pole (deg) : 4.80
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.667
 C/A sky separation (km) : 32854.5
 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



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

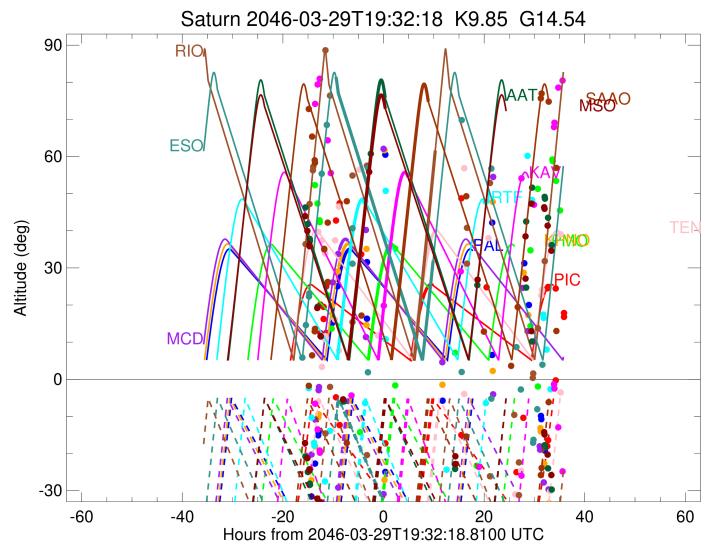
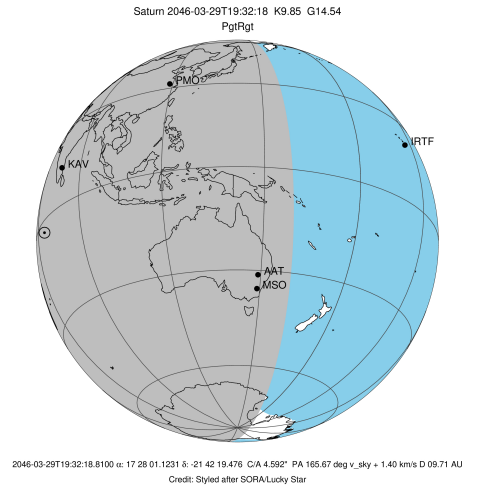
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2046-03-29T04:41:36.292	-72.11x	-2.37x	140461.00	-1.86			
A (OER)	I	2046-03-29T05:15:28.235	-64.22x	-10.30	136774.40	-1.77			
Encke (OEG)	I	2046-03-29T05:44:41.975	-57.42x	-17.10	133744.89	-1.69			
Encke (IEG)	I	2046-03-29T05:47:53.177	-56.68x	-17.83	133423.31	-1.68			
A (IER)	I	2046-03-29T07:54:17.383	-27.52x	-46.00	122050.38	-1.33			
B (OER)	I	2046-03-29T08:53:44.780	-14.07x	-57.47	117571.16	-1.19			
B (IER)	I	2046-03-29T15:54:25.756	b	47.88	-6.29	91984.69	-1.08		
C (IER)	I	2046-03-29T20:00:24.275	b	10.58	50.98x	74490.58	-1.22		
Saturn	I	2046-03-29T09:38:45.864	-4.09x	-63.99	59505.23			47.13	52.62
Saturn	E	2046-03-30T05:40:05.314	-57.58x	-15.95	60206.68			11.89	14.49
C (IER)	E	2046-03-30T08:04:08.775	-24.38x	-47.88	74490.58	0.93			
B (IER)	E	2046-03-30T15:52:05.038	47.81	-6.63	91984.69	0.43			
B (OER)	E	2046-03-31T00:10:29.398	-46.18x	60.17x	117571.16	1.35			
A (IER)	E	2046-03-31T01:04:25.030	-58.70x	48.41x	122050.38	1.41			
Encke (IEG)	E	2046-03-31T03:17:23.131	-87.95x	17.55x	133423.31	1.41			
Encke (OEG)	E	2046-03-31T03:21:11.201	-87.82x	16.65x	133744.89	1.41			
A (OER)	E	2046-03-31T03:57:24.737	-80.52x	8.13x	136774.40	1.38			
F ring	E	2046-03-31T04:42:55.211	-69.98x	-2.56x	140461.00	1.32			

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2046-03-29T17:33:16.500
 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 : 4117825497411079808
 2Mass ID (if available) : 17280113-2142192
 ICRS Star Coord at Epoch: 17h 28m 01.12314s -21:42:19.47588s
 RUWE (>1.4 is poor) : 0.98
 K magnitude : 9.850
 G magnitude : 14.538
 RP magnitude : 13.336
 BP magnitude : 16.097
 DUPflag : 0
 Distance (au) : 9.708
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 1.40
 Sun-Target sep (deg) : 106.05
 Sun-Moon sep (deg) : 23.29
 B (ring opening deg) : 26.51
 PA of pole (deg) : 4.80
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 5.011
 C/A sky separation (km) : 35279.9
 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_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



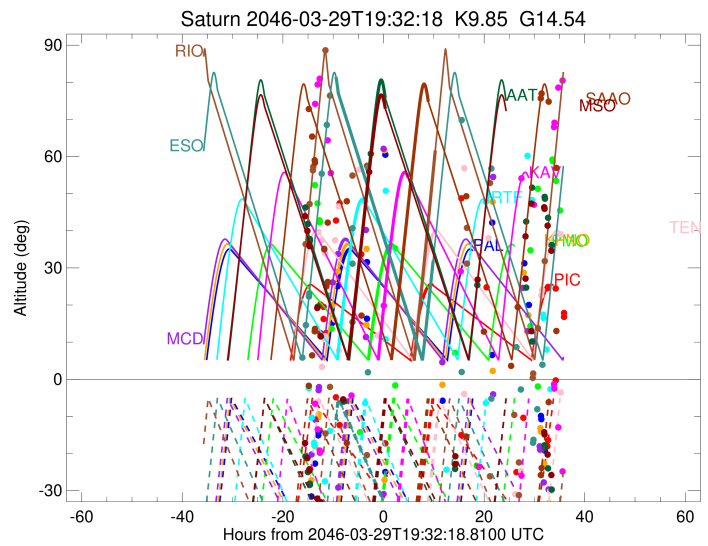
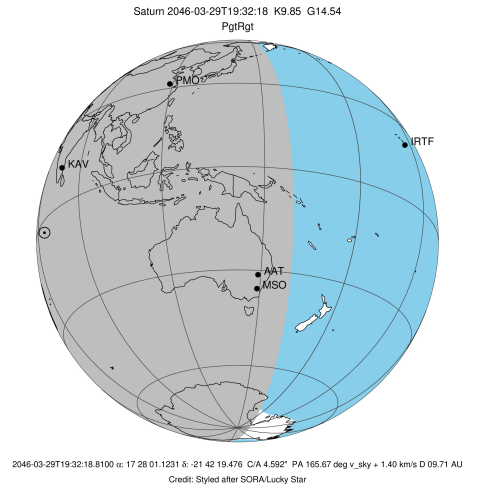
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2046-03-29T05:56:45.748	-6.57x	74.16x	140461.00	-2.03			
A (OER)	I	2046-03-29T06:26:54.848	-13.49x	79.40x	136774.40	-2.05			
Encke (OEG)	I	2046-03-29T06:51:30.897	-19.17x	80.96x	133744.89	-2.06			
Encke (IEG)	I	2046-03-29T06:54:07.209	-19.78x	80.90x	133423.31	-2.06			
A (IER)	I	2046-03-29T08:26:23.797	-41.23x	64.36x	122050.38	-2.03			
B (OER)	I	2046-03-29T09:03:24.206	-49.82x	55.65x	117571.16	-2.00			
B (IER)	I	2046-03-29T13:10:50.365	b	-67.95x	-4.49x	91984.69	-1.35		
C (IER)	I	2046-03-29T19:38:02.686	b	20.26	-69.78	74490.58	-0.39		
Saturn	I	2046-03-29T10:20:34.331	-67.33x	37.02x	59611.61			42.77	48.37
Saturn	E	2046-03-30T08:01:10.594	-36.27x	70.19x	60232.69			8.99	11.00
C (IER)	E	2046-03-30T10:53:01.414	-74.84x	29.13x	74490.58	1.27			
B (IER)	E	2046-03-30T14:29:40.346	-49.20x	-23.54	91984.69	1.30			
B (OER)	E	2046-03-30T22:58:21.198	54.17	-25.85	117571.16	0.48			
A (IER)	E	2046-03-31T01:25:36.401	47.21	9.87x	122050.38	0.57			
Encke (IEG)	E	2046-03-31T05:25:15.144	-1.17x	67.77x	133423.31	1.05			
Encke (OEG)	E	2046-03-31T05:30:21.233	-2.33x	68.94x	133744.89	1.06			
A (OER)	E	2046-03-31T06:16:06.219	-12.80x	78.46x	136774.40	1.15			
F ring	E	2046-03-31T07:07:25.829	-24.68x	80.55x	140461.00	1.24			

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2046-03-29T19:46:41.950
 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 : 4117825497411079808
 2Mass ID (if available) : 17280113-2142192
 ICRS Star Coord at Epoch: 17h 28m 01.12314s -21:42:19.47588s
 RUWE (>1.4 is poor) : 0.98
 K magnitude : 9.850
 G magnitude : 14.538
 RP magnitude : 13.336
 BP magnitude : 16.097
 DUPflag : 0
 Distance (au) : 9.707
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 1.40
 Sun-Target sep (deg) : 106.05
 Sun-Moon sep (deg) : 21.68
 B (ring opening deg) : 26.51
 PA of pole (deg) : 4.80
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 3.856
 C/A sky separation (km) : 27145.3
 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_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



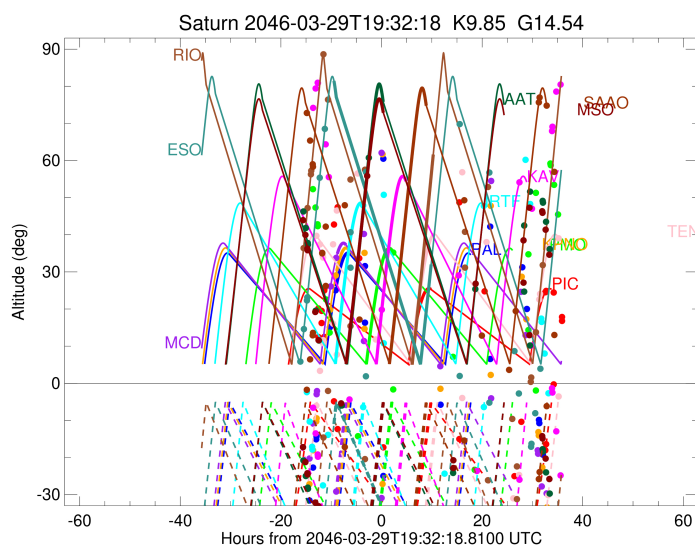
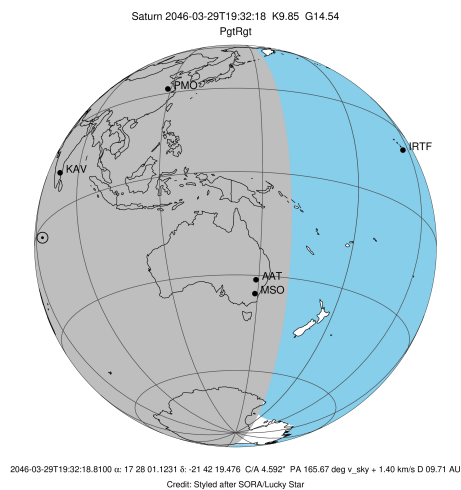
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2046-03-29T03:24:31.444		5.82	-57.62	140461.00	-1.49		
A (OER)	I	2046-03-29T04:06:51.754		14.57	-62.57	136774.40	-1.41		
Encke (OEG)	I	2046-03-29T04:43:21.986		22.29	-64.32	133744.89	-1.36		
Encke (IEG)	I	2046-03-29T04:47:19.744		23.13	-64.34	133423.31	-1.35		
A (IER)	I	2046-03-29T07:15:35.543		55.37	-46.56	122050.38	-1.24		
B (OER)	I	2046-03-29T08:15:41.016		68.37	-34.49	117571.16	-1.25		
B (IER)	I	2046-03-29T13:23:22.791	b	40.60	31.20x	91984.69	-1.55		
C (IER)	I	2046-03-29T16:27:22.126	b	1.70x	56.92x	74490.58	-1.56		
Saturn	I	2046-03-29T10:04:53.812		81.46	-11.03	59601.89		43.16	48.76
Saturn	E	2046-03-30T05:25:08.308		32.11	-63.19	60222.08		10.26	12.54
C (IER)	E	2046-03-30T11:04:09.442		70.00	1.77x	74490.58	0.48		
B (IER)	E	2046-03-30T16:58:08.602		-5.12x	56.77x	91984.69	1.23		
B (OER)	E	2046-03-30T21:58:04.665		-38.97x	8.64x	117571.16	1.46		
A (IER)	E	2046-03-30T22:49:59.311		-36.41x	-2.64x	122050.38	1.41		
Encke (IEG)	E	2046-03-31T01:15:36.254		-17.22x	-34.15	133423.31	1.17		
Encke (OEG)	E	2046-03-31T01:20:11.664		-16.42x	-35.12	133744.89	1.16		
A (OER)	E	2046-03-31T02:05:24.128		-8.20x	-44.34	136774.40	1.07		
F ring	E	2046-03-31T03:06:29.923		3.76x	-55.53	140461.00	0.94		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2046-03-29T20:54:05.780
 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 : 4117825497411079808
 2Mass ID (if available) : 17280113-2142192
 ICRS Star Coord at Epoch: 17h 28m 01.12314s -21:42:19.47588s
 RUWE (>1.4 is poor) : 0.98
 K magnitude : 9.850
 G magnitude : 14.538
 RP magnitude : 13.336
 BP magnitude : 16.097
 DUPflag : 0
 Distance (au) : 9.706
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 1.40
 Sun-Target sep (deg) : 106.05
 Sun-Moon sep (deg) : 22.62
 B (ring opening deg) : 26.51
 PA of pole (deg) : 4.80
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.382
 C/A sky separation (km) : 30848.9
 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_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	2046-03-29T04:01:00.841		-20.79x	46.28x	140461.00	-2.17		
A (OER)	I	2046-03-29T04:29:26.743		-24.98x	41.83x	136774.40	-2.15		
Encke (OEG)	I	2046-03-29T04:53:00.982		-28.11x	37.77x	133744.89	-2.13		
Encke (IEG)	I	2046-03-29T04:55:31.934		-28.42x	37.32x	133423.31	-2.13		
A (IER)	I	2046-03-29T06:27:07.330		-36.29x	19.53x	122050.38	-2.00		
B (OER)	I	2046-03-29T07:05:14.041		-37.15x	11.61x	117571.16	-1.92		
B (IER)	I	2046-03-29T11:39:22.216	b	-5.90x	-45.42	91984.69	-1.17		
C (IER)	I	2046-03-29T17:02:41.362	b	61.10	-40.66	74490.58	-0.79		
Saturn	I	2046-03-29T09:03:04.869		-30.23x	-13.52	59673.40		40.22	45.84
Saturn	E	2046-03-30T06:58:35.525		-37.14x	12.72x	60253.35		5.77	7.08
C (IER)	E	2046-03-30T09:46:06.089		-24.21x	-22.93	74490.58	1.28		
B (IER)	E	2046-03-30T14:10:39.220		25.24	-62.87	91984.69	0.88		
B (OER)	E	2046-03-30T23:54:20.140		24.65	42.51x	117571.16	1.01		
A (IER)	E	2046-03-31T01:03:38.513		10.32	51.55x	122050.38	1.14		
Encke (IEG)	E	2046-03-31T03:33:38.004		-17.67x	49.20x	133423.31	1.36		
Encke (OEG)	E	2046-03-31T03:37:33.938		-18.31x	48.72x	133744.89	1.36		
A (OER)	E	2046-03-31T04:14:10.101		-23.93x	43.59x	136774.40	1.39		
F ring	E	2046-03-31T04:57:58.974		-29.66x	36.24x	140461.00	1.41		

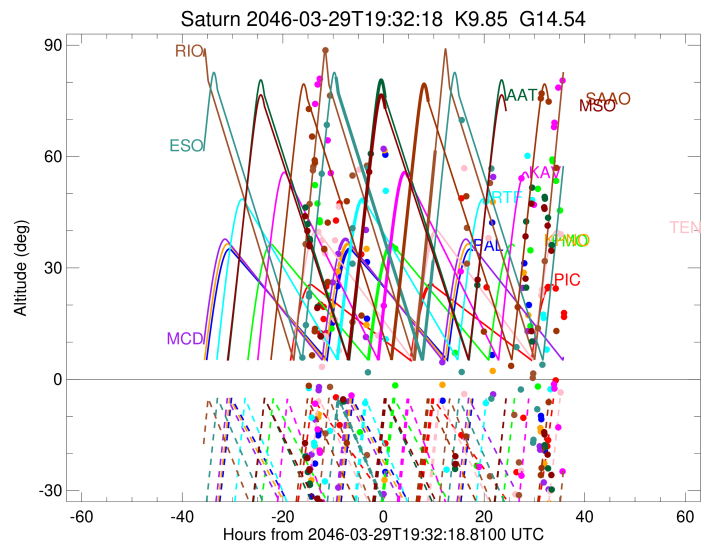
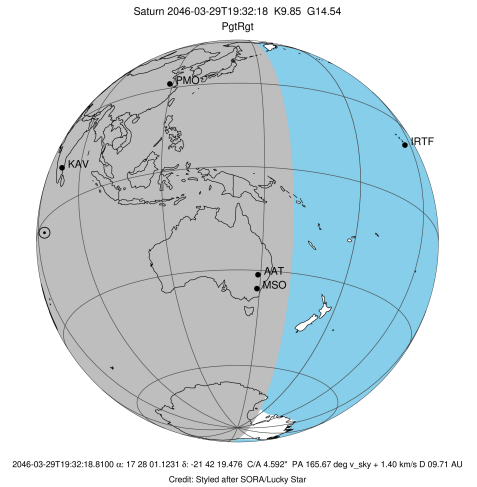
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2046-03-29T18:07:14.470
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : SAAO
 Location : So. Afr. Astro. Obs. (Sutherland)
 Latitude (deg) : -32.37953
 E. Longitude (deg) : 20.81070
 Altitude (km) : 1.768
 Gaia source ID : 4117825497411079808
 2Mass ID (if available) : 17280113-2142192
 ICRS Star Coord at Epoch: 17h 28m 01.12314s -21:42:19.47588s
 RUWE (>1.4 is poor) : 0.98
 K magnitude : 9.850
 G magnitude : 14.538
 RP magnitude : 13.336
 BP magnitude : 16.097
 DUPflag : 0
 Distance (au) : 9.708
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 1.40
 Sun-Target sep (deg) : 106.05
 Sun-Moon sep (deg) : 22.80
 B (ring opening deg) : 26.51
 PA of pole (deg) : 4.80
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.078
 C/A sky separation (km) : 28714.7
 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	2046-03-29T04:41:42.596		72.83	-1.78x	140461.00	-1.55		
A (OER)	I	2046-03-29T05:20:40.016		65.39	6.42x	136774.40	-1.60		
Encke (OEG)	I	2046-03-29T05:51:49.449		59.01	12.90x	133744.89	-1.64		
Encke (IEG)	I	2046-03-29T05:55:05.220		58.33	13.57x	133423.31	-1.64		
A (IER)	I	2046-03-29T07:45:33.739		34.99	35.14x	122050.38	-1.78		
B (OER)	I	2046-03-29T08:26:53.401		26.31	42.12x	117571.16	-1.83		
B (IER)	I	2046-03-29T12:14:47.272	b	-17.23x	47.92x	91984.69	-1.83		
C (IER)	I	2046-03-29T15:10:39.887	b	-35.64x	16.97x	74490.58	-1.42		
Saturn	I	2046-03-29T10:24:03.218		2.61x	54.03x	59683.50		39.80	45.42
Saturn	E	2046-03-30T08:08:29.628		29.34	38.89x	60247.96		6.76	8.29
C (IER)	E	2046-03-30T11:59:19.874		-15.35x	49.35x	74490.58	1.22		
B (IER)	E	2046-03-30T15:28:59.129		-36.04x	12.93x	91984.69	1.47		
B (OER)	E	2046-03-30T20:54:36.798		3.65x	-52.45	117571.16	1.04		
A (IER)	E	2046-03-30T22:12:26.932		19.27	-61.12	122050.38	0.88		
Encke (IEG)	E	2046-03-31T02:47:27.482		75.47	-26.08	133423.31	0.58		
Encke (OEG)	E	2046-03-31T02:56:37.935		76.80	-24.18	133744.89	0.58		
A (OER)	E	2046-03-31T04:21:02.702		74.99	-6.43	136774.40	0.62		
F ring	E	2046-03-31T05:52:50.551		57.17	12.79x	140461.00	0.73		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2046-03-29T20:44:07.690
 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 : 4117825497411079808
 2Mass ID (if available) : 17280113-2142192
 ICRS Star Coord at Epoch: 17h 28m 01.12314s -21:42:19.47588s
 RUWE (>1.4 is poor) : 0.98
 K magnitude : 9.850
 G magnitude : 14.538
 RP magnitude : 13.336
 BP magnitude : 16.097
 DUPflag : 0
 Distance (au) : 9.706
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 1.40
 Sun-Target sep (deg) : 106.05
 Sun-Moon sep (deg) : 22.60
 B (ring opening deg) : 26.51
 PA of pole (deg) : 4.80
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.332
 C/A sky separation (km) : 30498.4
 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	2046-03-29T03:56:03.829		-17.21x	43.94x	140461.00	-2.16		
A (OER)	I	2046-03-29T04:24:40.107		-21.24x	39.96x	136774.40	-2.14		
Encke (OEG)	I	2046-03-29T04:48:22.040		-24.24x	36.26x	133744.89	-2.12		
Encke (IEG)	I	2046-03-29T04:50:53.758		-24.53x	35.84x	133423.31	-2.12		
A (IER)	I	2046-03-29T06:22:48.025		-32.15x	19.20x	122050.38	-1.99		
B (OER)	I	2046-03-29T07:00:55.971		-33.10x	11.69x	117571.16	-1.92		
B (IER)	I	2046-03-29T11:31:26.209	b	-5.33x	-41.87	91984.69	-1.21		
C (IER)	I	2046-03-29T16:43:15.125	b	56.19	-42.34	74490.58	-0.80		
Saturn	I	2046-03-29T09:02:08.014		-26.89x	-12.95	59679.94		39.95	45.57
Saturn	E	2046-03-30T06:59:10.873		-33.11x	11.75x	60254.51		5.54	6.80
C (IER)	E	2046-03-30T09:49:05.331		-20.80x	-22.75	74490.58	1.27		
B (IER)	E	2046-03-30T14:14:31.168		26.69	-58.81	91984.69	0.88		
B (OER)	E	2046-03-30T23:46:16.312		27.07	38.52x	117571.16	1.00		
A (IER)	E	2046-03-31T00:56:17.415		13.10	47.24x	122050.38	1.13		
Encke (IEG)	E	2046-03-31T03:28:12.336		-14.16x	46.40x	133423.31	1.34		
Encke (OEG)	E	2046-03-31T03:32:11.329		-14.78x	45.98x	133744.89	1.35		
A (OER)	E	2046-03-31T04:09:15.592		-20.21x	41.45x	136774.40	1.37		
F ring	E	2046-03-31T04:53:36.924		-25.74x	34.71x	140461.00	1.39		