

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2048-08-11T13:45:16.820
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 4079185806956896640
 2Mass ID (if available) : 18410670-2237006

Saturn 2048-08-11T13:45:16 K9.62 G13.57 PgtRgt

ICRS Star Coord at Epoch: 18h 41m 06.69753s -22:37:00.96084s

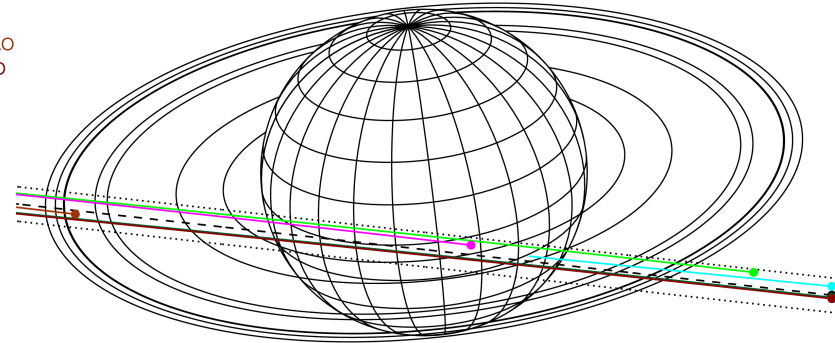
RUWE (>1.4 is poor) : 1.01
 K magnitude : 9.623
 G magnitude : 13.573
 RP magnitude : 12.467
 BP magnitude : 14.837
 DUPflag : 0
 Distance (au) : 9.231
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.42
 Sun-Target sep (deg) : 140.58
 Sun-Moon sep (deg) : 118.98
 B (ring opening deg) : 25.78
 PA of pole (deg) : 6.23

#	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



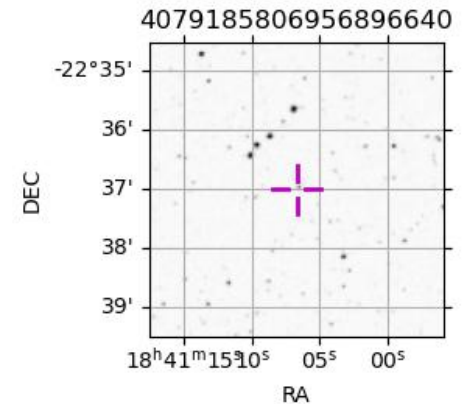
2048-08-11T13:45:16.8200 at: 18 41 06.69753 s: -22 37 00.961 C/A 4.224° PA 353.61 deg v_sky -13.42 km/s D 09.23 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PMO
 IRTF
 KAV
 AAT
 SAAO
 MSO

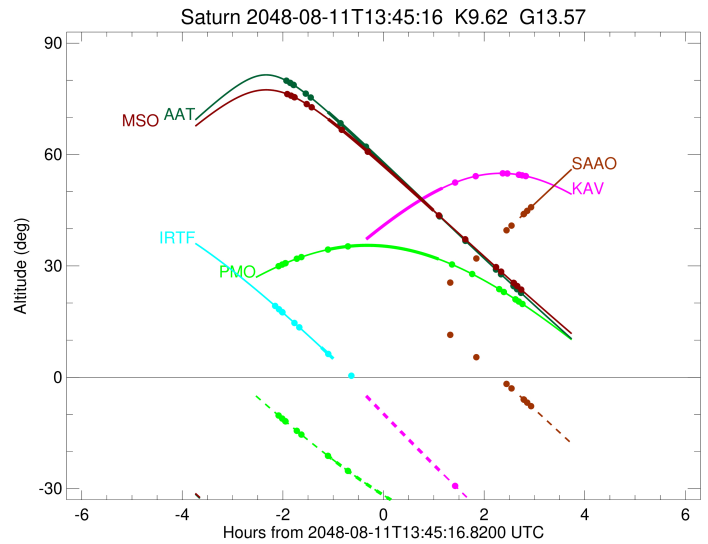
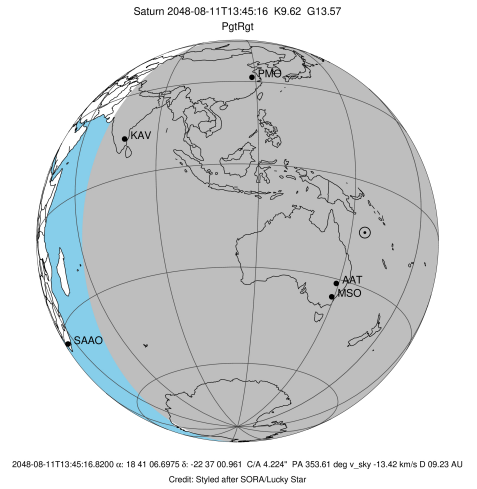


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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					PnnRnn
PMO	Purple Mtn Obs	32.1	118.8	+	+	+	AUG 11 11:40 - AUG 11 16:30	PieRie
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					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+	+		AUG 11 11:36 - AUG 11 12:31	PinRin
KAV	Kavalur Observ	12.6	78.8		+	+	AUG 11 14:55 - AUG 11 16:34	PneRne
RIO	Rio de Janeiro	-22.9	316.8					PnnRnn
ESO	European South	-29.3	289.3					PnnRnn
AAT	Siding Spring	-31.3	149.1	+	+	+	AUG 11 11:49 - AUG 11 16:29	PieRie
SAAO	So. Afr. Astro	-32.4	20.8			+	AUG 11 16:32 - AUG 11 16:41	PnnRne
MSO	Mt. Stromlo Ob	-35.3	149.0	+	+	+	AUG 11 11:50 - AUG 11 16:29	PieRie

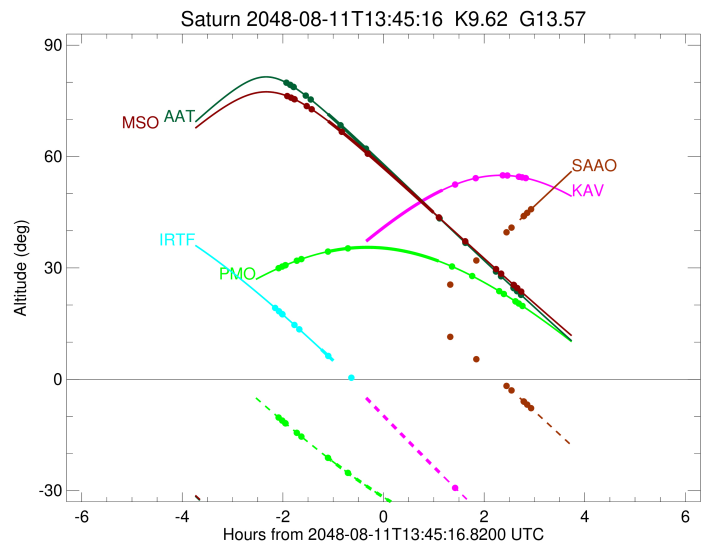
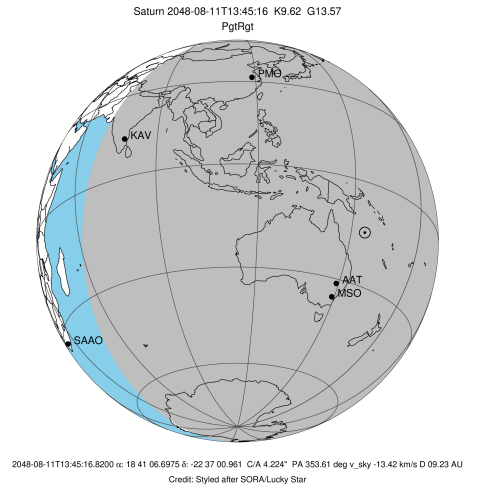


target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2048-08-11T13:43:53.270
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 4079185806956896640
 2Mass ID (if available) : 18410670-2237006
 ICRS Star Coord at Epoch: 18h 41m 06.69753s -22:37:00.96084s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 9.623
 G magnitude : 13.573
 RP magnitude : 12.467
 BP magnitude : 14.837
 DUPflag : 0
 Distance (au) : 9.231
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.42
 Sun-Target sep (deg) : 140.58
 Sun-Moon sep (deg) : 119.35
 B (ring opening deg) : 25.78
 PA of pole (deg) : 6.23
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 3.462
 C/A sky separation (km) : 23179.8
 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	2048-08-11T11:40:14.357		29.93	-10.32	140461.00	-14.27		
A (OER)	I	2048-08-11T11:44:33.271		30.36	-11.14	136774.40	-14.21		
Encke (OEG)	I	2048-08-11T11:48:06.805		30.71	-11.82	133744.89	-14.16		
Encke (IEG)	I	2048-08-11T11:48:29.514		30.74	-11.90	133423.31	-14.16		
A (IER)	I	2048-08-11T12:01:58.766		31.94	-14.44	122050.38	-13.94		
B (OER)	I	2048-08-11T12:07:21.293		32.37	-15.44	117571.16	-13.83		
B (IER)	I	2048-08-11T12:39:09.256	b	34.40	-21.18	91984.69	-12.87		
C (IER)	I	2048-08-11T13:03:00.314	b	35.27	-25.24	74490.58	-11.43		
Saturn	I	2048-08-11T12:37:19.520		34.31	-20.86	59906.20		-31.28	-36.57
Saturn	E	2048-08-11T14:51:01.156		31.84	-39.52	60232.40		-9.33	-11.41
C (IER)	E	2048-08-11T15:06:58.883		30.38	-40.83	74490.58	11.36		
B (IER)	E	2048-08-11T15:31:03.111		27.81	-42.28	91984.69	12.72		
B (OER)	E	2048-08-11T16:03:19.570		23.73	-43.17	117571.16	13.59		
A (IER)	E	2048-08-11T16:08:47.927		22.98	-43.20	122050.38	13.69		
Encke (IEG)	E	2048-08-11T16:22:32.999		21.00	-43.10	133423.31	13.87		
Encke (OEG)	E	2048-08-11T16:22:56.176		20.95	-43.09	133744.89	13.88		
A (OER)	E	2048-08-11T16:26:34.173		20.41	-43.03	136774.40	13.92		
F ring	E	2048-08-11T16:30:58.650		19.75	-42.92	140461.00	13.96		

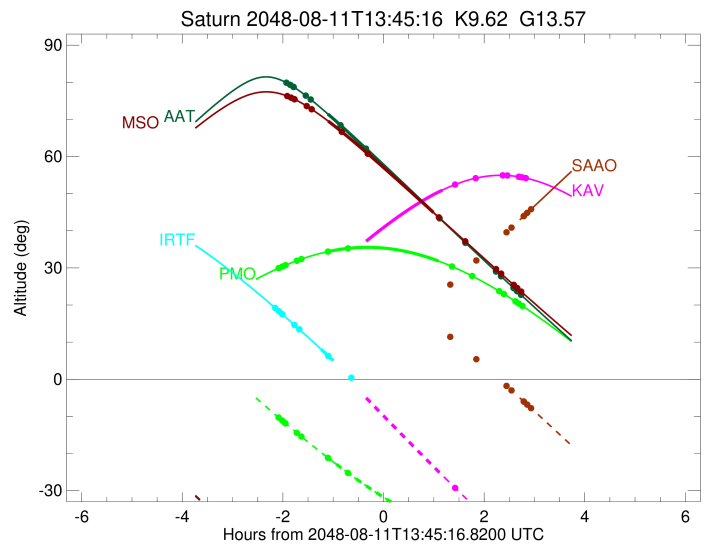
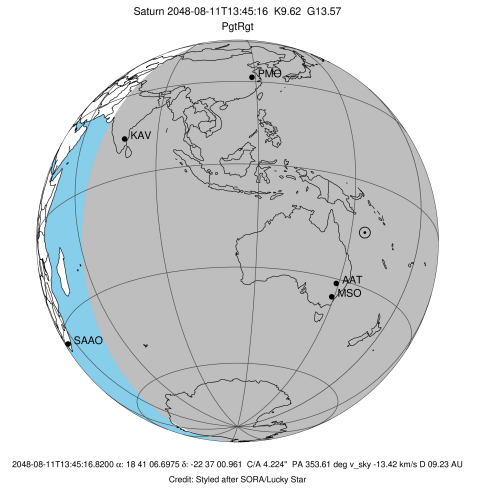
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2048-08-11T13:37:09.710
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : IRTF
 Location : Mauna Kea/IRTF
 Latitude (deg) : 19.82622
 E. Longitude (deg) : 204.52800
 Altitude (km) : 4.168
 Gaia source ID : 4079185806956896640
 2Mass ID (if available) : 18410670-2237006
 ICRS Star Coord at Epoch: 18h 41m 06.69753s -22:37:00.96084s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 9.623
 G magnitude : 13.573
 RP magnitude : 12.467
 BP magnitude : 14.837
 DUPflag : 0
 Distance (au) : 9.231
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.42
 Sun-Target sep (deg) : 140.58
 Sun-Moon sep (deg) : 118.42
 B (ring opening deg) : 25.78
 PA of pole (deg) : 6.23
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.024
 C/A sky separation (km) : 26942.7
 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

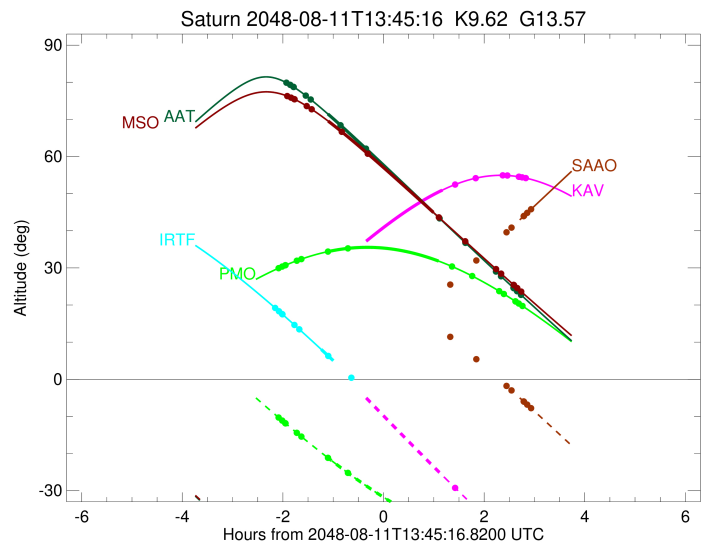
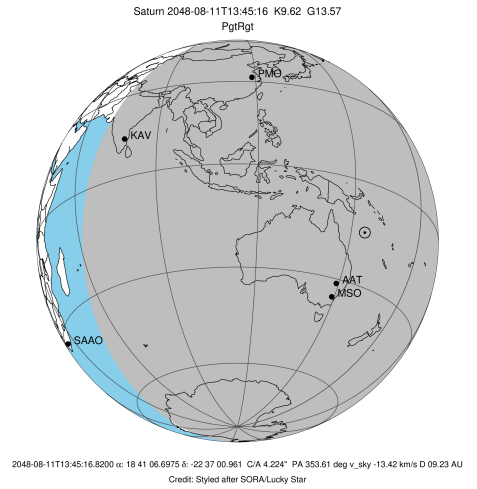
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2048-08-11T11:36:08.612		19.20	-51.38	140461.00	-13.58		
A (OER)	I	2048-08-11T11:40:40.888		18.30	-50.87	136774.40	-13.50		
Encke (OEG)	I	2048-08-11T11:44:25.943		17.56	-50.44	133744.89	-13.42		
Encke (IEG)	I	2048-08-11T11:44:49.906		17.48	-50.39	133423.31	-13.42		
A (IER)	I	2048-08-11T11:59:07.694		14.62	-48.58	122050.38	-13.09		
B (OER)	I	2048-08-11T12:04:51.949		13.45	-47.79	117571.16	-12.93		
B (IER)	I	2048-08-11T12:39:30.890	b	6.26	-42.42	91984.69	-11.52		
C (IER)	I	2048-08-11T13:07:08.815	b	0.37x	-37.53	74490.58	-9.37		
Saturn	I	2048-08-11T12:31:07.470		8.02	-43.81	59844.69		-34.19	-39.65
Saturn	E	2048-08-11T14:44:24.125		-21.11x	-17.85	60197.49		-13.20	-16.06
C (IER)	E	2048-08-11T14:56:59.864		-23.95x	-15.13	74490.58	9.26		
B (IER)	E	2048-08-11T15:25:06.774		-30.33x	-8.95	91984.69	11.26		
B (OER)	E	2048-08-11T16:00:46.426		-38.49x	-0.96x	117571.16	12.50		
A (IER)	E	2048-08-11T16:06:42.941		-39.85x	0.39x	122050.38	12.63		
Encke (IEG)	E	2048-08-11T16:21:33.789		-43.26x	3.76x	133423.31	12.89		
Encke (OEG)	E	2048-08-11T16:21:58.726		-43.36x	3.85x	133744.89	12.90		
A (OER)	E	2048-08-11T16:25:53.057		-44.26x	4.74x	136774.40	12.96		
F ring	E	2048-08-11T16:30:36.867		-45.35x	5.82x	140461.00	13.02		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2048-08-11T13:49:14.300
 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 : 4079185806956896640
 2Mass ID (if available) : 18410670-2237006
 ICRS Star Coord at Epoch: 18h 41m 06.69753s -22:37:00.96084s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 9.623
 G magnitude : 13.573
 RP magnitude : 12.467
 BP magnitude : 14.837
 DUPflag : 0
 Distance (au) : 9.231
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.42
 Sun-Target sep (deg) : 140.58
 Sun-Moon sep (deg) : 119.73
 B (ring opening deg) : 25.78
 PA of pole (deg) : 6.23
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 3.680
 C/A sky separation (km) : 24637.9
 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	2048-08-11T11:48:46.394		17.91	17.68x	140461.00	-14.09		
A (OER)	I	2048-08-11T11:53:08.618		18.84	16.63x	136774.40	-14.03		
Encke (OEG)	I	2048-08-11T11:56:44.912		19.61	15.77x	133744.89	-13.98		
Encke (IEG)	I	2048-08-11T11:57:07.917		19.69	15.68x	133423.31	-13.98		
A (IER)	I	2048-08-11T12:10:48.042		22.57	12.42x	122050.38	-13.75		
B (OER)	I	2048-08-11T12:16:15.168		23.71	11.13x	117571.16	-13.64		
B (IER)	I	2048-08-11T12:48:37.294	b	30.30	3.45x	91984.69	-12.58		
C (IER)	I	2048-08-11T13:13:13.879	b	35.07	-2.35x	74490.58	-10.94		
Saturn	I	2048-08-11T12:43:16.496		29.23	4.72x	59870.21		-33.00	-38.40
Saturn	E	2048-08-11T14:55:24.866		50.95	-25.87	60224.75		-10.30	-12.58
C (IER)	E	2048-08-11T15:10:41.933		52.45	-29.26	74490.58	11.00		
B (IER)	E	2048-08-11T15:35:13.347		54.17	-34.61	91984.69	12.61		
B (OER)	E	2048-08-11T16:07:31.745		54.94	-41.40	117571.16	13.66		
A (IER)	E	2048-08-11T16:12:58.345		54.89	-42.51	122050.38	13.77		
Encke (IEG)	E	2048-08-11T16:26:37.199		54.55	-45.23	133423.31	14.00		
Encke (OEG)	E	2048-08-11T16:27:00.169		54.54	-45.30	133744.89	14.00		
A (OER)	E	2048-08-11T16:30:36.135		54.40	-46.00	136774.40	14.05		
F ring	E	2048-08-11T16:34:57.964		54.19	-46.84	140461.00	14.11		

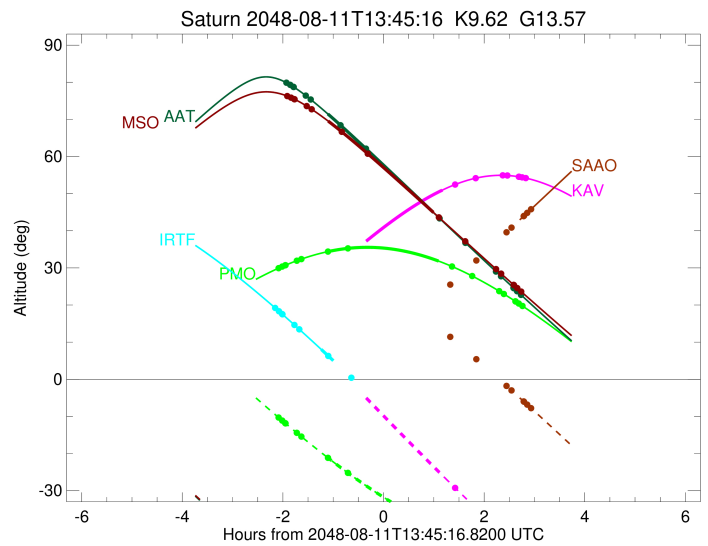
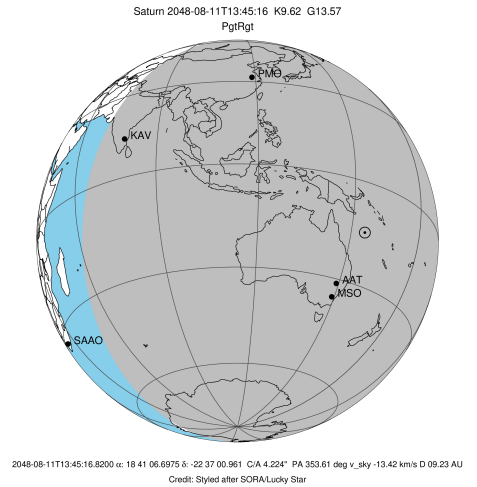
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2048-08-11T13:41:21.610
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : AAT
 Location : Siding Spring (AAT)
 Latitude (deg) : -31.27703
 E. Longitude (deg) : 149.06608
 Altitude (km) : 1.164
 Gaia source ID : 4079185806956896640
 2Mass ID (if available) : 18410670-2237006
 ICRS Star Coord at Epoch: 18h 41m 06.69753s -22:37:00.96084s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 9.623
 G magnitude : 13.573
 RP magnitude : 12.467
 BP magnitude : 14.837
 DUPflag : 0
 Distance (au) : 9.231
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.42
 Sun-Target sep (deg) : 140.58
 Sun-Moon sep (deg) : 119.46
 B (ring opening deg) : 25.78
 PA of pole (deg) : 6.23
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.471
 C/A sky separation (km) : 29929.3
 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

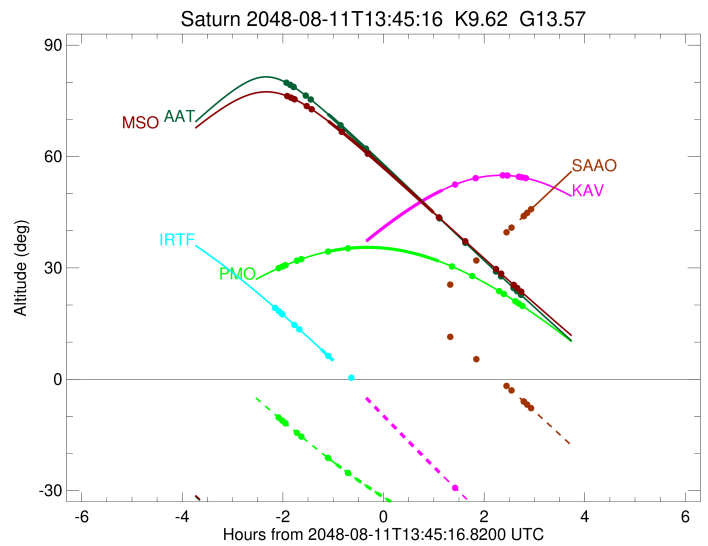
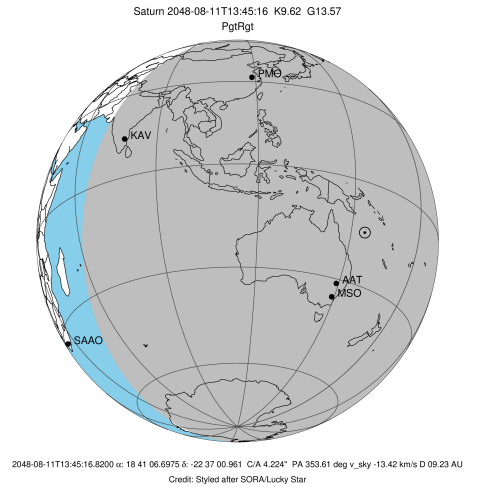
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2048-08-11T11:49:32.645		79.88	-54.35	140461.00	-13.55		
A (OER)	I	2048-08-11T11:54:05.658		79.30	-55.27	136774.40	-13.45		
Encke (OEG)	I	2048-08-11T11:57:51.584		78.78	-56.03	133744.89	-13.36		
Encke (IEG)	I	2048-08-11T11:58:15.654		78.72	-56.11	133423.31	-13.35		
A (IER)	I	2048-08-11T12:12:39.631		76.40	-58.95	122050.38	-12.95		
B (OER)	I	2048-08-11T12:18:27.945		75.37	-60.07	117571.16	-12.76		
B (IER)	I	2048-08-11T12:54:07.784	b	68.41	-66.50	91984.69	-10.94		
C (IER)	I	2048-08-11T13:24:35.599	b	62.07	-70.94	74490.58	-7.90		
Saturn	I	2048-08-11T12:38:48.150		71.50	-63.85	59778.69		-37.21	-42.78
Saturn	E	2048-08-11T14:44:49.642		44.92	-71.84	60165.42		-15.99	-19.37
C (IER)	E	2048-08-11T14:52:11.923		43.33	-71.01	74490.58	7.87		
B (IER)	E	2048-08-11T15:22:59.328		36.75	-66.54	91984.69	10.76		
B (OER)	E	2048-08-11T15:59:26.965		29.00	-59.96	117571.17	12.42		
A (IER)	E	2048-08-11T16:05:25.168		27.74	-58.80	122050.38	12.59		
Encke (IEG)	E	2048-08-11T16:20:15.982		24.62	-55.87	133423.31	12.93		
Encke (OEG)	E	2048-08-11T16:20:40.846		24.53	-55.79	133744.89	12.94		
A (OER)	E	2048-08-11T16:24:34.339		23.72	-55.00	136774.40	13.01		
F ring	E	2048-08-11T16:29:16.780		22.74	-54.05	140461.00	13.09		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2048-08-11T13:52:49.140
 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 : 4079185806956896640
 2Mass ID (if available) : 18410670-2237006
 ICRS Star Coord at Epoch: 18h 41m 06.69753s -22:37:00.96084s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 9.623
 G magnitude : 13.573
 RP magnitude : 12.467
 BP magnitude : 14.837
 DUPflag : 0
 Distance (au) : 9.231
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.42
 Sun-Target sep (deg) : 140.58
 Sun-Moon sep (deg) : 119.54
 B (ring opening deg) : 25.78
 PA of pole (deg) : 6.23
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.602
 C/A sky separation (km) : 30809.7
 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



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2048-08-11T12:02:00.405		-10.07x	39.07x	140461.00	-13.08		
A (OER)	I	2048-08-11T12:06:43.280		-9.24x	38.63x	136774.40	-12.99		
Encke (OEG)	I	2048-08-11T12:10:37.231		-8.56x	38.26x	133744.89	-12.91		
Encke (IEG)	I	2048-08-11T12:11:02.149		-8.48x	38.22x	133423.31	-12.90		
A (IER)	I	2048-08-11T12:25:55.699		-5.82x	36.65x	122050.38	-12.54		
B (OER)	I	2048-08-11T12:31:55.499		-4.72x	35.96x	117571.16	-12.36		
B (IER)	I	2048-08-11T13:08:43.005	b	2.17x	31.17x	91984.69	-10.60		
C (IER)	I	2048-08-11T13:40:18.776	b	8.32	26.38x	74490.58	-7.54		
Saturn	I	2048-08-11T12:49:06.059		-1.55x	33.85x	59739.21		-38.97	-44.58
Saturn	E	2048-08-11T14:56:41.911		23.80	12.97x	60167.69		-15.81	-19.16
C (IER)	E	2048-08-11T15:04:55.222		25.51	11.42x	74490.58	7.65		
B (IER)	E	2048-08-11T15:36:00.233		32.00	5.40x	91984.69	10.79		
B (OER)	E	2048-08-11T16:12:04.153		39.61	-1.81x	117571.16	12.64		
A (IER)	E	2048-08-11T16:17:55.804		40.85	-3.00x	122050.38	12.83		
Encke (IEG)	E	2048-08-11T16:32:27.714		43.93	-5.97	133423.31	13.24		
Encke (OEG)	E	2048-08-11T16:32:52.000		44.02	-6.05	133744.89	13.25		
A (OER)	E	2048-08-11T16:36:39.939		44.82	-6.83	136774.40	13.33		
F ring	E	2048-08-11T16:41:15.362		45.80	-7.78	140461.00	13.43		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2048-08-11T13:41:36.130
 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 : 4079185806956896640
 2Mass ID (if available) : 18410670-2237006
 ICRS Star Coord at Epoch: 18h 41m 06.69753s -22:37:00.96084s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 9.623
 G magnitude : 13.573
 RP magnitude : 12.467
 BP magnitude : 14.837
 DUPflag : 0
 Distance (au) : 9.231
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.42
 Sun-Target sep (deg) : 140.58
 Sun-Moon sep (deg) : 119.47
 B (ring opening deg) : 25.78
 PA of pole (deg) : 6.23
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 4.531
 C/A sky separation (km) : 30334.5
 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	2048-08-11T11:50:32.179		76.28	-53.02	140461.00	-13.49		
A (OER)	I	2048-08-11T11:55:06.502		75.85	-53.87	136774.40	-13.39		
Encke (OEG)	I	2048-08-11T11:58:53.562		75.46	-54.56	133744.89	-13.30		
Encke (IEG)	I	2048-08-11T11:59:17.756		75.41	-54.64	133423.31	-13.29		
A (IER)	I	2048-08-11T12:13:46.598		73.58	-57.23	122050.38	-12.88		
B (OER)	I	2048-08-11T12:19:37.153		72.73	-58.25	117571.16	-12.68		
B (IER)	I	2048-08-11T12:55:37.085	b	66.64	-63.95	91984.69	-10.79		
C (IER)	I	2048-08-11T13:26:45.448	b	60.71	-67.69	74490.58	-7.62		
Saturn	I	2048-08-11T12:39:16.194		69.55	-61.50	59769.84		-37.61	-43.19
Saturn	E	2048-08-11T14:44:50.209		44.95	-68.25	60160.67		-16.37	-19.82
C (IER)	E	2048-08-11T14:51:21.366		43.61	-67.66	74490.58	7.59		
B (IER)	E	2048-08-11T15:22:47.920		37.17	-63.86	91984.69	10.63		
B (OER)	E	2048-08-11T15:59:33.669		29.67	-58.01	117571.16	12.35		
A (IER)	E	2048-08-11T16:05:33.744		28.45	-56.96	122050.38	12.53		
Encke (IEG)	E	2048-08-11T16:20:28.438		25.44	-54.27	133423.31	12.88		
Encke (OEG)	E	2048-08-11T16:20:53.397		25.35	-54.19	133744.89	12.89		
A (OER)	E	2048-08-11T16:24:47.749		24.57	-53.47	136774.40	12.96		
F ring	E	2048-08-11T16:29:31.159		23.62	-52.59	140461.00	13.05		