

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-03-23T20:02:21.090  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 4090711162732709376  
 2Mass ID (if available) : 18153392-2218356

ICRS Star Coord at Epoch: 18h 15m 33.92477s -22:18:35.57334s

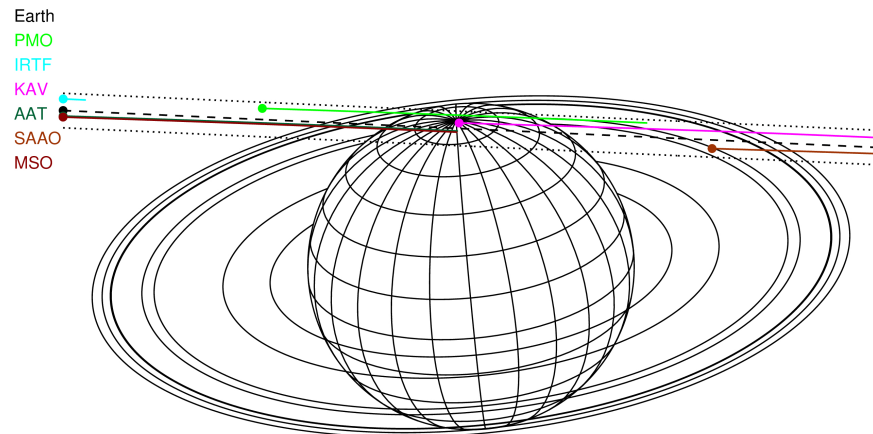
RUWE (>1.4 is poor) : 1.03  
 K magnitude : 9.679  
 G magnitude : 14.365  
 RP magnitude : 13.149  
 BP magnitude : 15.922  
 DUPflag : 0  
 Distance (au) : 10.016  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 10.18  
 Sun-Target sep (deg) : 88.85  
 Sun-Moon sep (deg) : 59.45  
 B (ring opening deg) : 26.09  
 PA of pole (deg) : 5.80

#	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



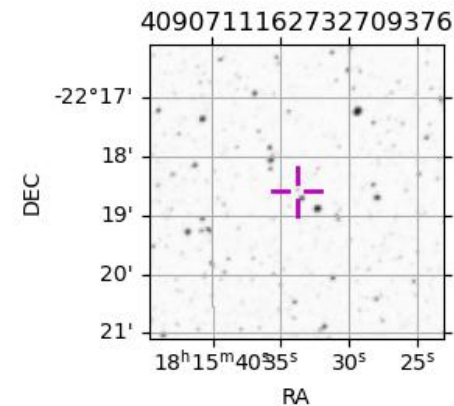
2047-03-23T20:02:21.0900 α: 18 15 33.9248 δ: -22 18 35.573 C/A 6.982° PA 177.40 deg v\_sky +10.18 km/s D 10.02 AU  
 Credit: Styled after SORA/Lucky Star

Saturn 2047-03-23T20:02:21 K9.68 G14.36 PgtRgt

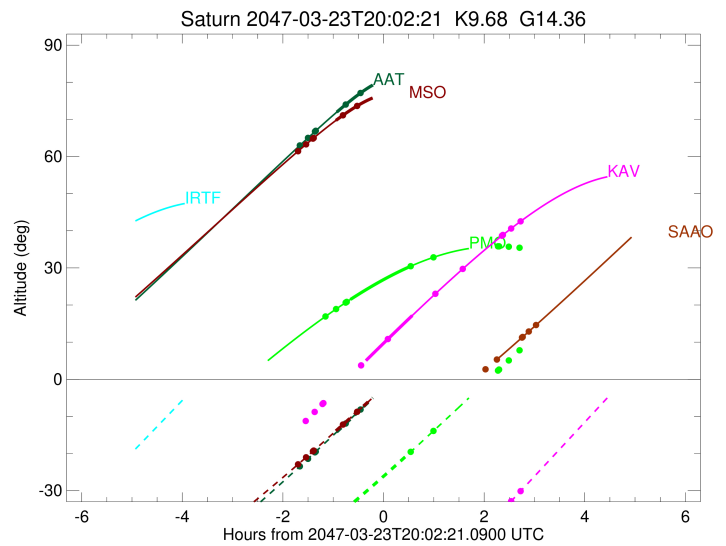
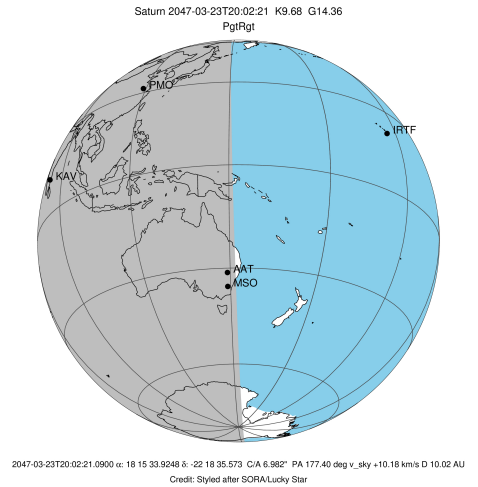


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+	+	+	MAR 23 18:53 - MAR 23 21:03	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					PnnRnn
KAV	Kavalur Observ	12.6	78.8		+	+	MAR 23 20:36 - MAR 23 22:46	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	+	+		MAR 23 18:22 - MAR 23 19:06	PinRin
SAAO	So. Afr. Astro	-32.4	20.8			+	MAR 23 22:17 - MAR 23 23:04	PnnRne
MSO	Mt. Stromlo Ob	-35.3	149.0	+	+		MAR 23 18:20 - MAR 23 19:05	PinRin



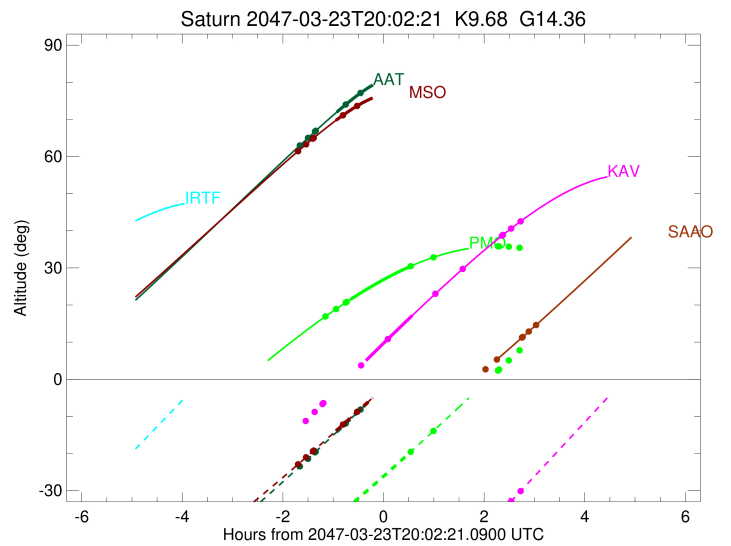
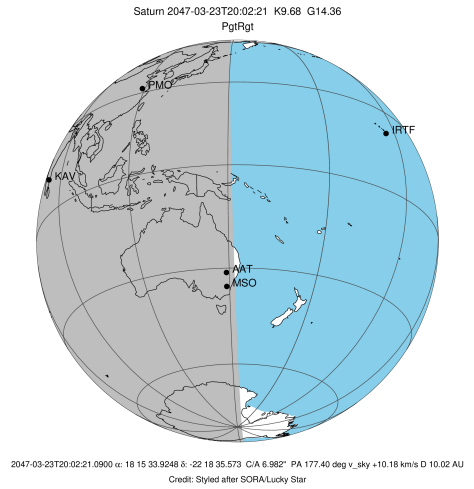
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-03-23T19:56:59.410  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PMO  
 Location : Purple Mtn Obs. Nanking  
 Latitude (deg) : 32.06667  
 E. Longitude (deg) : 118.82089  
 Altitude (km) : 0.364  
 Gaia source ID : 4090711162732709376  
 2Mass ID (if available) : 18153392-2218356  
 ICRS Star Coord at Epoch: 18h 15m 33.92477s -22:18:35.57334s  
 RUWE (>1.4 is poor) : 1.03  
 K magnitude : 9.679  
 G magnitude : 14.365  
 RP magnitude : 13.149  
 BP magnitude : 15.922  
 DUPflag : 0  
 Distance (au) : 10.016  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 10.18  
 Sun-Target sep (deg) : 88.85  
 Sun-Moon sep (deg) : 60.00  
 B (ring opening deg) : 26.09  
 PA of pole (deg) : 5.80  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 7.663  
 C/A sky separation (km) : 55664.4  
 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\_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	2047-03-23T18:53:10.787		16.92	-39.35	140461.00	-5.09		
A (OER)	I	2047-03-23T19:05:48.574		18.92	-37.06	136774.40	-4.64		
Encke (OEG)	I	2047-03-23T19:17:13.471		20.65	-34.93	133744.89	-4.20		
Encke (IEG)	I	2047-03-23T19:18:30.407		20.84	-34.69	133423.31	-4.15		
A (IER)	I	2047-03-23T20:34:01.231		30.38	-19.71	122050.38	-0.73		
Saturn	I	2047-03-23T19:22:48.685		21.48	-33.88	59220.22		61.46	65.80
Saturn	E	2047-03-23T20:32:18.363		30.20	-20.07	59417.55		52.13	57.34
A (IER)	E	2047-03-23T21:03:20.419		32.95	-13.63	122050.39	0.73		
Encke (IEG)	E	2047-03-23T22:19:16.420		35.81	2.42x	133423.31	4.11		
Encke (OEG)	E	2047-03-23T22:20:34.199		35.81	2.69x	133744.89	4.16		
A (OER)	E	2047-03-23T22:32:07.351		35.70	5.15x	136774.40	4.58		
F ring	E	2047-03-23T22:44:55.872		35.42	7.87x	140461.00	5.01		

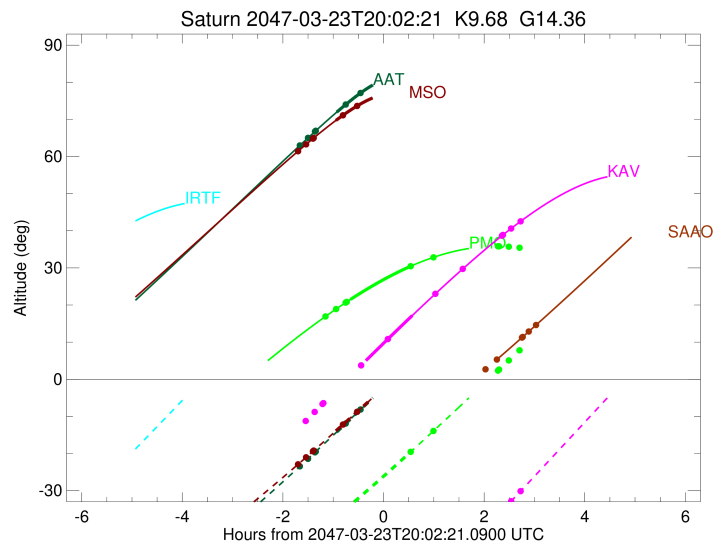
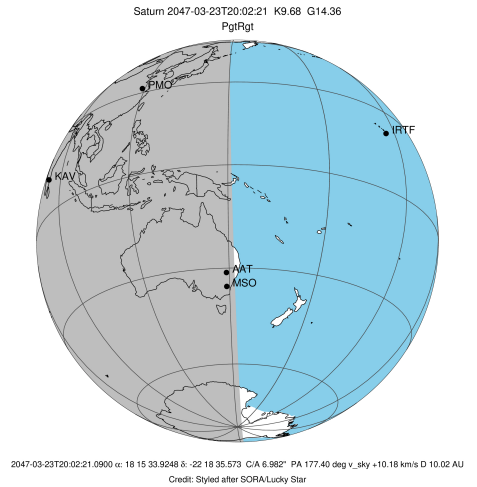
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-03-23T19:51:12.200  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : KAV  
 Location : Kavalur Observatory  
 Latitude (deg) : 12.57556  
 E. Longitude (deg) : 78.83167  
 Altitude (km) : 0.722  
 Gaia source ID : 4090711162732709376  
 2Mass ID (if available) : 18153392-2218356  
 ICRS Star Coord at Epoch: 18h 15m 33.92477s -22:18:35.57334s  
 RUWE (>1.4 is poor) : 1.03  
 K magnitude : 9.679  
 G magnitude : 14.365  
 RP magnitude : 13.149  
 BP magnitude : 15.922  
 DUPflag : 0  
 Distance (au) : 10.016  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 10.18  
 Sun-Target sep (deg) : 88.85  
 Sun-Moon sep (deg) : 60.00  
 B (ring opening deg) : 26.09  
 PA of pole (deg) : 5.80  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 7.276  
 C/A sky separation (km) : 52850.0  
 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	2047-03-23T18:29:36.924		-11.23x	-75.30	140461.00	-5.95		
A (OER)	I	2047-03-23T18:40:17.132		-8.79x	-76.03	136774.40	-5.57		
Encke (OEG)	I	2047-03-23T18:49:39.223		-6.65x	-76.28	133744.89	-5.21		
Encke (IEG)	I	2047-03-23T18:50:41.183		-6.42x	-76.29	133423.31	-5.17		
A (IER)	I	2047-03-23T19:35:42.054	b	3.75x	-72.36	122050.38	-3.18		
B (OER)	I	2047-03-23T20:06:55.074	b	10.69	-66.69	117571.16	-1.58		
Saturn	I	2047-03-23T19:06:55.409		-2.73x	-75.73	59293.18		57.84	62.57
Saturn	E	2047-03-23T20:36:47.983		17.20	-60.37	59524.94		47.47	52.94
B (OER)	E	2047-03-23T21:05:30.149		23.29	-53.91	117571.17	1.56		
A (IER)	E	2047-03-23T21:37:17.517		29.81	-46.51	122050.38	3.10		
Encke (IEG)	E	2047-03-23T22:23:56.609		38.73	-35.41	133423.31	4.93		
Encke (OEG)	E	2047-03-23T22:25:01.534		38.92	-35.15	133744.89	4.97		
A (OER)	E	2047-03-23T22:34:51.966		40.66	-32.78	136774.40	5.29		
F ring	E	2047-03-23T22:46:07.582		42.58	-30.07	140461.00	5.62		

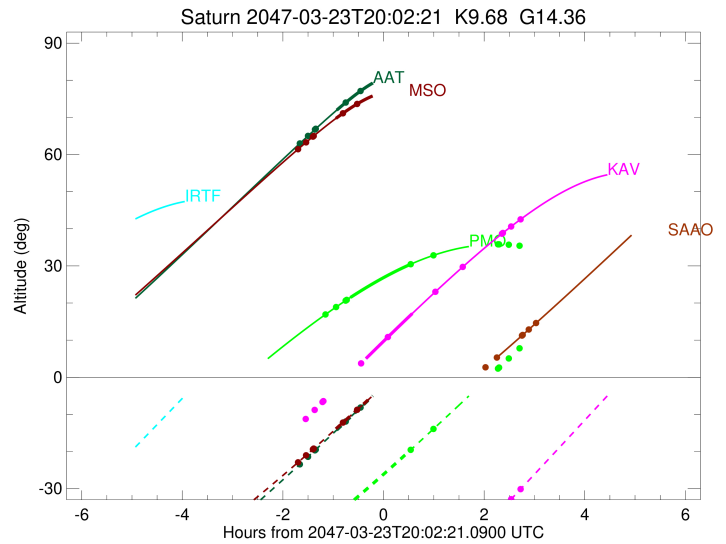
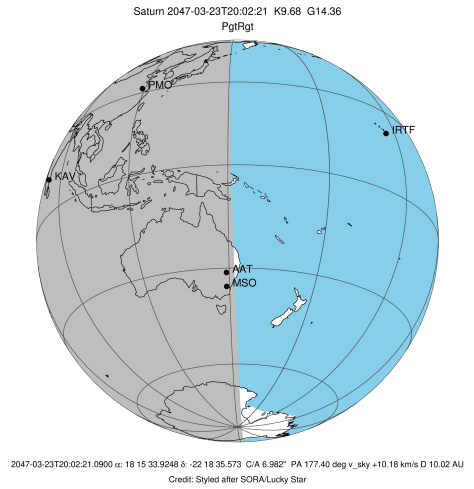
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-03-23T20:01:45.370  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : AAT  
 Location : Siding Spring (AAT)  
 Latitude (deg) : -31.27703  
 E. Longitude (deg) : 149.06608  
 Altitude (km) : 1.164  
 Gaia source ID : 4090711162732709376  
 2Mass ID (if available) : 18153392-2218356  
 ICRS Star Coord at Epoch: 18h 15m 33.92477s -22:18:35.57334s  
 RUWE (>1.4 is poor) : 1.03  
 K magnitude : 9.679  
 G magnitude : 14.365  
 RP magnitude : 13.149  
 BP magnitude : 15.922  
 DUPflag : 0  
 Distance (au) : 10.016  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 10.18  
 Sun-Target sep (deg) : 88.85  
 Sun-Moon sep (deg) : 60.27  
 B (ring opening deg) : 26.09  
 PA of pole (deg) : 5.80  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 6.850  
 C/A sky separation (km) : 49759.4  
 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\_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	2047-03-23T18:22:36.348		62.99	-23.45	140461.00	-6.45		
A (OER)	I	2047-03-23T18:32:20.417		65.03	-21.42	136774.40	-6.17		
Encke (OEG)	I	2047-03-23T18:40:40.999		66.76	-19.67	133744.89	-5.93		
Encke (IEG)	I	2047-03-23T18:41:35.388		66.94	-19.48	133423.31	-5.90		
A (IER)	I	2047-03-23T19:17:23.414	b	74.02	-11.90	122050.38	-4.64		
B (OER)	I	2047-03-23T19:34:49.979	b	77.09	-8.18	117571.16	-3.91		
Saturn	I	2047-03-23T19:06:33.337		71.96	-14.21	59360.90		54.68	59.69
Saturn	E	2047-03-23T20:58:00.920		77.29	9.58x	59656.50		41.87	47.48
B (OER)	E	2047-03-23T22:05:27.982		64.26	23.67x	117571.16	3.95		
A (IER)	E	2047-03-23T22:22:43.846		60.62	27.18x	122050.38	4.69		
Encke (IEG)	E	2047-03-23T22:58:08.168		53.08	34.15x	133423.31	5.97		
Encke (OEG)	E	2047-03-23T22:59:01.935		52.89	34.32x	133744.89	6.00		
A (OER)	E	2047-03-23T23:07:16.746		51.12	35.89x	136774.40	6.25		
F ring	E	2047-03-23T23:16:53.970		49.06	37.69x	140461.00	6.52		

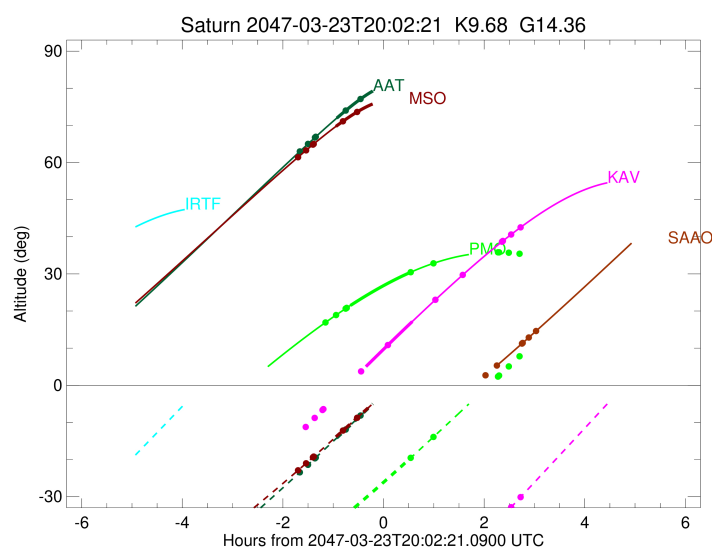
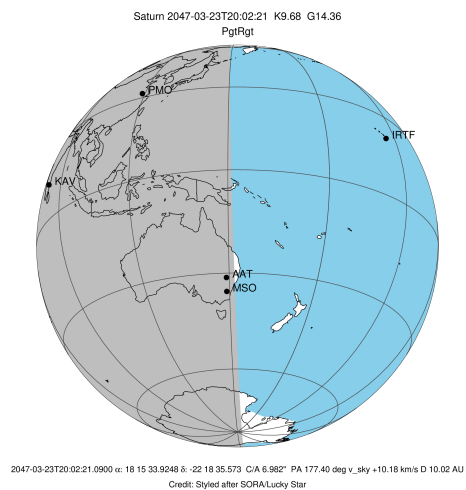
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-03-23T19:54:44.330  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : SAAO  
 Location : So. Afr. Astro. Obs. (Sutherland)  
 Latitude (deg) : -32.37953  
 E. Longitude (deg) : 20.81070  
 Altitude (km) : 1.768  
 Gaia source ID : 4090711162732709376  
 2Mass ID (if available) : 18153392-2218356  
 ICRS Star Coord at Epoch: 18h 15m 33.92477s -22:18:35.57334s  
 RUWE (>1.4 is poor) : 1.03  
 K magnitude : 9.679  
 G magnitude : 14.365  
 RP magnitude : 13.149  
 BP magnitude : 15.922  
 DUPflag : 0  
 Distance (au) : 10.016  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 10.18  
 Sun-Target sep (deg) : 88.85  
 Sun-Moon sep (deg) : 59.52  
 B (ring opening deg) : 26.09  
 PA of pole (deg) : 5.80  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 6.383  
 C/A sky separation (km) : 46365.4  
 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	2047-03-23T18:05:36.055		-32.61x	-18.01	140461.00	-7.65		
A (OER)	I	2047-03-23T18:13:45.745		-31.97x	-19.70	136774.40	-7.40		
Encke (OEG)	I	2047-03-23T18:20:41.010		-31.38x	-21.14	133744.89	-7.18		
Encke (IEG)	I	2047-03-23T18:21:25.854		-31.31x	-21.29	133423.31	-7.16		
A (IER)	I	2047-03-23T18:49:58.454		-28.45x	-27.13	122050.38	-6.08		
B (OER)	I	2047-03-23T19:02:51.678	b	-26.96x	-29.72	117571.16	-5.50		
Saturn	I	2047-03-23T18:55:43.792		-27.80x	-28.29	59457.92		50.36	55.69
Saturn	E	2047-03-23T20:55:02.765		-10.03x	-49.94	59746.69		37.99	43.58
B (OER)	E	2047-03-23T22:04:23.879		2.76x	-57.75	117571.16	5.31		
A (IER)	E	2047-03-23T22:17:46.877		5.35	-58.50	122050.38	5.84		
Encke (IEG)	E	2047-03-23T22:47:42.013		11.27	-59.06	133423.31	6.79		
Encke (OEG)	E	2047-03-23T22:48:29.315		11.43	-59.05	133744.89	6.81		
A (OER)	E	2047-03-23T22:55:48.041		12.90	-58.94	136774.40	7.00		
F ring	E	2047-03-23T23:04:26.991		14.64	-58.68	140461.00	7.21		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2047-03-23T20:01:43.890  
 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 : 4090711162732709376  
 2Mass ID (if available) : 18153392-2218356  
 ICRS Star Coord at Epoch: 18h 15m 33.92477s -22:18:35.57334s  
 RUWE (>1.4 is poor) : 1.03  
 K magnitude : 9.679  
 G magnitude : 14.365  
 RP magnitude : 13.149  
 BP magnitude : 15.922  
 DUPflag : 0  
 Distance (au) : 10.016  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 10.18  
 Sun-Target sep (deg) : 88.85  
 Sun-Moon sep (deg) : 60.26  
 B (ring opening deg) : 26.09  
 PA of pole (deg) : 5.80  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 6.790  
 C/A sky separation (km) : 49319.4  
 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	2047-03-23T18:20:29.367		61.44	-22.91	140461.00	-6.55		
A (OER)	I	2047-03-23T18:30:04.025		63.29	-21.02	136774.40	-6.28		
Encke (OEG)	I	2047-03-23T18:38:15.613		64.83	-19.39	133744.89	-6.04		
Encke (IEG)	I	2047-03-23T18:39:08.966		65.00	-19.21	133423.31	-6.01		
A (IER)	I	2047-03-23T19:14:02.728	b	71.12	-12.19	122050.38	-4.80		
B (OER)	I	2047-03-23T19:30:47.247	b	73.61	-8.79	117571.16	-4.11		
Saturn	I	2047-03-23T19:05:28.363		69.71	-13.92	59372.28		54.16	59.22
Saturn	E	2047-03-23T20:59:02.576		74.23	9.20x	59671.15		41.24	46.86
B (OER)	E	2047-03-23T22:08:15.568		62.56	22.93x	117571.16	4.15		
A (IER)	E	2047-03-23T22:24:50.424		59.34	26.10x	122050.38	4.85		
Encke (IEG)	E	2047-03-23T22:59:23.004		52.42	32.48x	133423.31	6.08		
Encke (OEG)	E	2047-03-23T23:00:15.804		52.25	32.64x	133744.89	6.10		
A (OER)	E	2047-03-23T23:08:22.271		50.60	34.07x	136774.40	6.35		
F ring	E	2047-03-23T23:17:50.868		48.67	35.72x	140461.00	6.62		