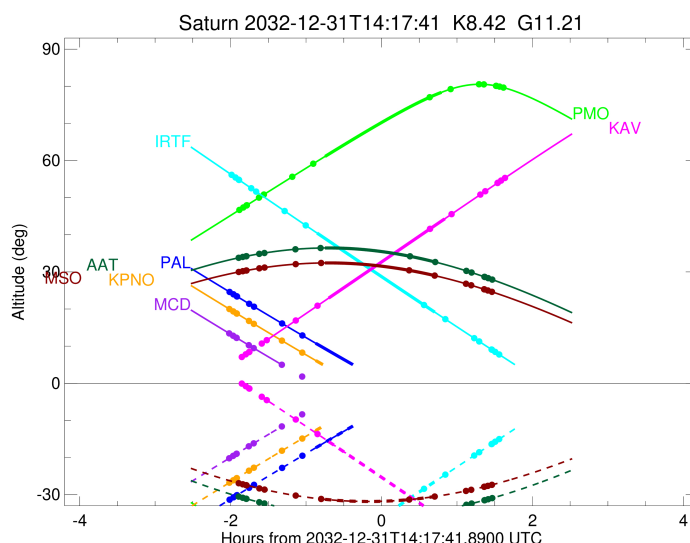
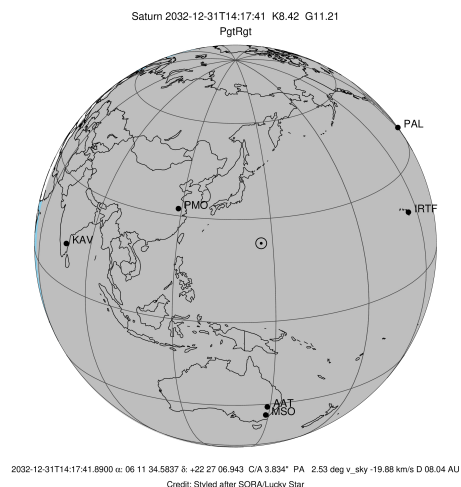




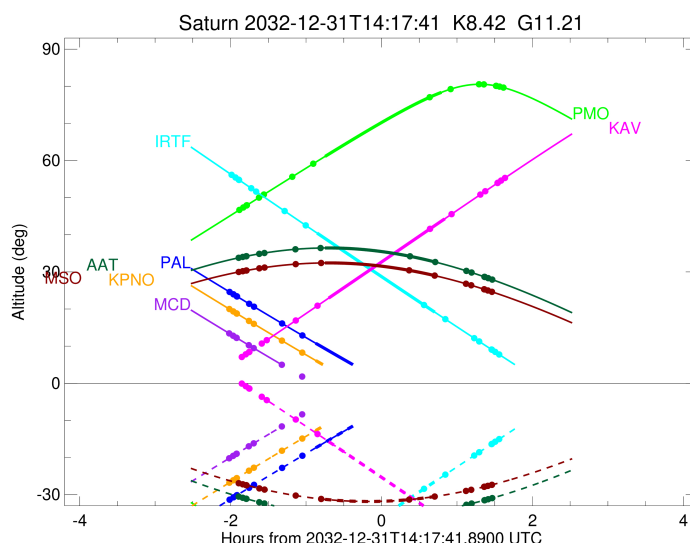
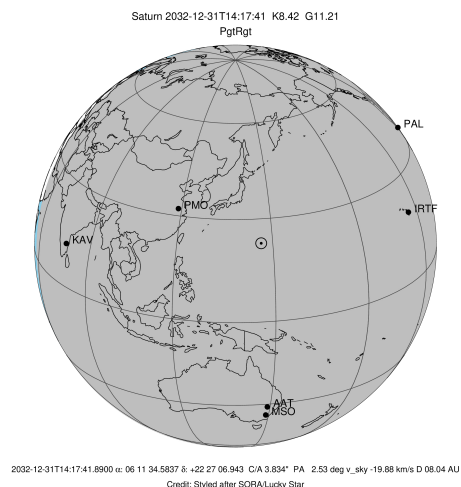
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2032-12-31T14:13:36.950  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PAL  
 Location : Palomar Mt (200")  
 Latitude (deg) : 33.35622  
 E. Longitude (deg) : 243.13601  
 Altitude (km) : 1.706  
 Gaia source ID : 3425016176933235072  
 2Mass ID (if available) : 06113460+2227067  
 ICRS Star Coord at Epoch: 06h 11m 34.58371s +22:27:06.94299s  
 RUWE (>1.4 is poor) : 2.38  
 K magnitude : 8.418  
 G magnitude : 11.212  
 RP magnitude : 9.997  
 BP magnitude : 11.215  
 DUPflag : 0  
 Distance (au) : 8.039  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -19.88  
 Sun-Target sep (deg) : 172.61  
 Sun-Moon sep (deg) : 175.96  
 B (ring opening deg) : -26.32  
 PA of pole (deg) : -5.74  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 3.155  
 C/A sky separation (km) : 18396.4  
 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	2032-12-31T12:16:55.650		24.60	-31.36	140461.00	-19.87		
A (OER)	I	2032-12-31T12:20:01.418		23.96	-30.72	136774.40	-19.82		
Encke (OEG)	I	2032-12-31T12:22:34.462		23.44	-30.19	133744.89	-19.77		
Encke (IEG)	I	2032-12-31T12:22:50.729		23.38	-30.14	133423.31	-19.77		
A (IER)	I	2032-12-31T12:32:29.012		21.41	-28.15	122050.38	-19.56		
B (OER)	I	2032-12-31T12:36:18.592		20.63	-27.36	117571.16	-19.46		
B (IER)	I	2032-12-31T12:58:39.609		16.11	-22.79	91984.69	-18.60		
C (IER)	I	2032-12-31T13:14:48.318		12.88	-19.52	74490.58	-17.40		
Saturn	I	2032-12-31T13:25:24.047		10.78	-17.39	60233.75		-8.93	-10.92
Saturn	E	2032-12-31T15:01:52.116		-7.35x	1.22x	60054.20		-22.86	-27.31
C (IER)	E	2032-12-31T14:56:41.560	b	-6.44x	0.27x	74490.58	17.24		
B (IER)	E	2032-12-31T15:12:59.728		-9.29x	3.25x	91984.69	18.40		
B (OER)	E	2032-12-31T15:35:37.177		-13.11x	7.26x	117571.16	19.20		
A (IER)	E	2032-12-31T15:39:29.987		-13.74x	7.93x	122050.38	19.28		
Encke (IEG)	E	2032-12-31T15:49:16.956		-15.32x	9.61x	133423.31	19.46		
Encke (OEG)	E	2032-12-31T15:49:33.479		-15.36x	9.66x	133744.89	19.47		
A (OER)	E	2032-12-31T15:52:08.957		-15.77x	10.10x	136774.40	19.50		
F ring	E	2032-12-31T15:55:17.754		-16.27x	10.62x	140461.00	19.55		

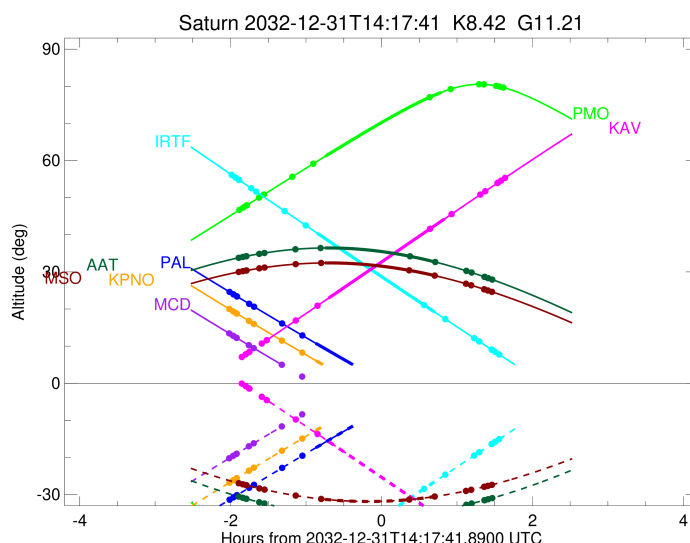
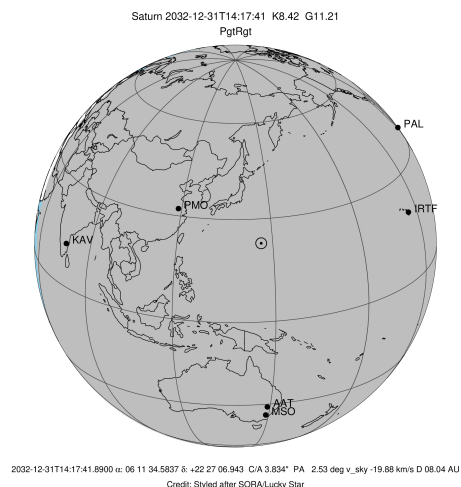
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2032-12-31T14:19:12.400  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PMO  
 Location : Purple Mtn Obs. Nanking  
 Latitude (deg) : 32.06667  
 E. Longitude (deg) : 118.82089  
 Altitude (km) : 0.364  
 Gaia source ID : 3425016176933235072  
 2Mass ID (if available) : 06113460+2227067  
 ICRS Star Coord at Epoch: 06h 11m 34.58371s +22:27:06.94299s  
 RUWE (>1.4 is poor) : 2.38  
 K magnitude : 8.418  
 G magnitude : 11.212  
 RP magnitude : 9.997  
 BP magnitude : 11.215  
 DUPflag : 0  
 Distance (au) : 8.039  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -19.88  
 Sun-Target sep (deg) : 172.61  
 Sun-Moon sep (deg) : 174.98  
 B (ring opening deg) : -26.32  
 PA of pole (deg) : -5.74  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 3.648  
 C/A sky separation (km) : 21269.4  
 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	2032-12-31T12:24:43.062		46.70	-40.23	140461.00	-19.86		
A (OER)	I	2032-12-31T12:27:48.960		47.35	-40.89	136774.40	-19.80		
Encke (OEG)	I	2032-12-31T12:30:22.183		47.90	-41.43	133744.89	-19.74		
Encke (IEG)	I	2032-12-31T12:30:38.473		47.96	-41.48	133423.31	-19.74		
A (IER)	I	2032-12-31T12:40:18.246		50.01	-43.53	122050.38	-19.48		
B (OER)	I	2032-12-31T12:44:08.864		50.83	-44.35	117571.16	-19.36		
B (IER)	I	2032-12-31T13:06:45.200		55.63	-49.14	91984.69	-18.23		
C (IER)	I	2032-12-31T13:23:25.991		59.14	-52.68	74490.58	-16.56		
Saturn	I	2032-12-31T13:32:48.646		61.11	-54.66	60215.97		-11.03	-13.46
Saturn	E	2032-12-31T15:05:21.674		78.37	-73.55	60000.16		-25.80	-30.60
C (IER)	E	2032-12-31T14:55:57.897	b	77.04	-71.76	74490.58	16.54		
B (IER)	E	2032-12-31T15:12:38.663		79.24	-74.87	91984.69	18.24		
B (OER)	E	2032-12-31T15:35:13.580		80.55	-78.54	117571.16	19.39		
A (IER)	E	2032-12-31T15:39:03.865		80.52	-79.05	122050.38	19.51		
Encke (IEG)	E	2032-12-31T15:48:42.708		80.12	-80.15	133423.31	19.77		
Encke (OEG)	E	2032-12-31T15:48:58.970		80.10	-80.17	133744.89	19.78		
A (OER)	E	2032-12-31T15:51:31.925		79.92	-80.40	136774.40	19.83		
F ring	E	2032-12-31T15:54:37.487		79.66	-80.64	140461.00	19.90		

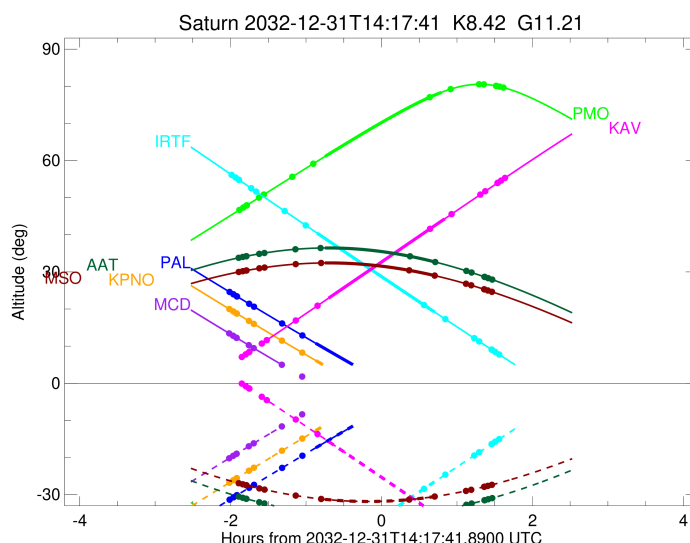
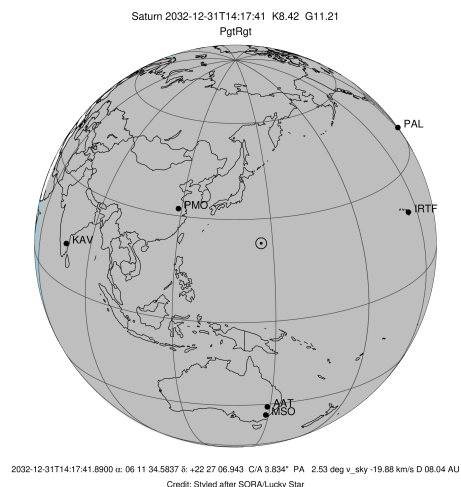
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2032-12-31T14:13:39.910  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : KPNO  
 Location : Kitt Peak Natl Obs  
 Latitude (deg) : 31.96333  
 E. Longitude (deg) : 248.40000  
 Altitude (km) : 2.120  
 Gaia source ID : 3425016176933235072  
 2Mass ID (if available) : 06113460+2227067  
 ICRS Star Coord at Epoch: 06h 11m 34.58371s +22:27:06.94299s  
 RUWE (>1.4 is poor) : 2.38  
 K magnitude : 8.418  
 G magnitude : 11.212  
 RP magnitude : 9.997  
 BP magnitude : 11.215  
 DUPflag : 0  
 Distance (au) : 8.039  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -19.88  
 Sun-Target sep (deg) : 172.61  
 Sun-Moon sep (deg) : 175.95  
 B (ring opening deg) : -26.32  
 PA of pole (deg) : -5.74  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 3.144  
 C/A sky separation (km) : 18329.1  
 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\_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	2032-12-31T12:16:45.809		19.99	-26.78	140461.00	-19.84		
A (OER)	I	2032-12-31T12:19:51.828		19.35	-26.14	136774.40	-19.79		
Encke (OEG)	I	2032-12-31T12:22:25.077		18.83	-25.60	133744.89	-19.75		
Encke (IEG)	I	2032-12-31T12:22:41.365		18.77	-25.55	133423.31	-19.74		
A (IER)	I	2032-12-31T12:32:20.398		16.79	-23.55	122050.38	-19.53		
B (OER)	I	2032-12-31T12:36:10.262		16.01	-22.76	117571.16	-19.44		
B (IER)	I	2032-12-31T12:58:32.711		11.48	-18.17	91984.69	-18.58		
C (IER)	I	2032-12-31T13:14:41.981		8.25	-14.89	74490.58	-17.39		
Saturn	I	2032-12-31T13:25:20.645		6.15	-12.75	60234.23		-8.86	-10.84
Saturn	E	2032-12-31T15:02:01.380		-11.82x	5.78x	60055.04		-22.82	-27.25
C (IER)	E	2032-12-31T14:56:54.597	b	-10.94x	4.86x	74490.58	17.24		
B (IER)	E	2032-12-31T15:13:13.098		-13.73x	7.79x	91984.69	18.39		
B (OER)	E	2032-12-31T15:35:51.569		-17.44x	11.73x	117571.16	19.18		
A (IER)	E	2032-12-31T15:39:44.583		-18.05x	12.39x	122050.38	19.27		
Encke (IEG)	E	2032-12-31T15:49:32.080		-19.57x	14.02x	133423.31	19.44		
Encke (OEG)	E	2032-12-31T15:49:48.617		-19.61x	14.07x	133744.89	19.45		
A (OER)	E	2032-12-31T15:52:24.238		-20.01x	14.50x	136774.40	19.49		
F ring	E	2032-12-31T15:55:33.208		-20.48x	15.01x	140461.00	19.53		

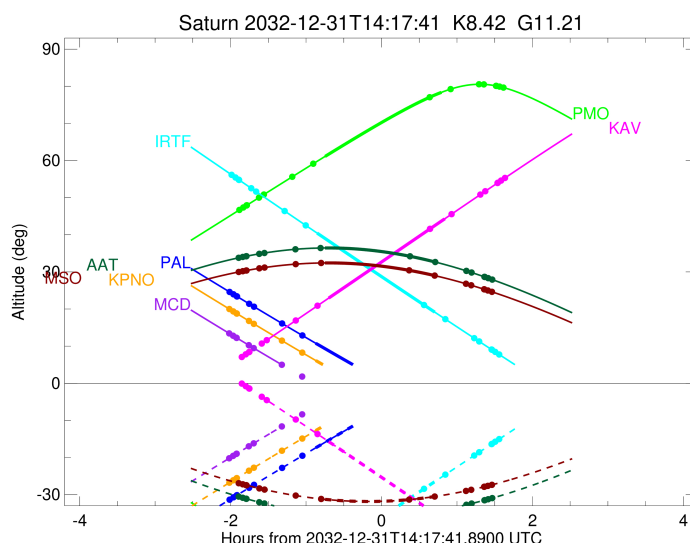
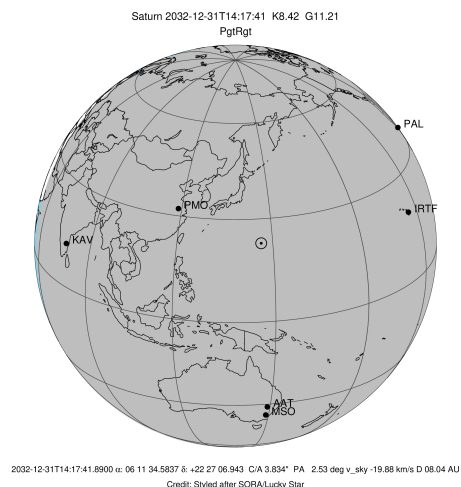
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2032-12-31T14:13:50.540  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : MCD  
 Location : McDonald Obs. 2.7m  
 Latitude (deg) : 30.67158  
 E. Longitude (deg) : 255.97844  
 Altitude (km) : 2.075  
 Gaia source ID : 3425016176933235072  
 2Mass ID (if available) : 06113460+2227067  
 ICRS Star Coord at Epoch: 06h 11m 34.58371s +22:27:06.94299s  
 RUWE (>1.4 is poor) : 2.38  
 K magnitude : 8.418  
 G magnitude : 11.212  
 RP magnitude : 9.997  
 BP magnitude : 11.215  
 DUPflag : 0  
 Distance (au) : 8.039  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -19.88  
 Sun-Target sep (deg) : 172.61  
 Sun-Moon sep (deg) : 175.94  
 B (ring opening deg) : -26.32  
 PA of pole (deg) : -5.74  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 3.119  
 C/A sky separation (km) : 18186.3  
 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	2032-12-31T12:16:37.454		13.44	-20.20	140461.00	-19.81		
A (OER)	I	2032-12-31T12:19:43.805		12.80	-19.56	136774.40	-19.76		
Encke (OEG)	I	2032-12-31T12:22:17.320		12.28	-19.03	133744.89	-19.71		
Encke (IEG)	I	2032-12-31T12:22:33.637		12.22	-18.97	133423.31	-19.71		
A (IER)	I	2032-12-31T12:32:13.618		10.25	-16.98	122050.38	-19.50		
B (OER)	I	2032-12-31T12:36:03.829		9.48	-16.19	117571.16	-19.41		
B (IER)	I	2032-12-31T12:58:27.765		4.98x	-11.62	91984.69	-18.57		
C (IER)	I	2032-12-31T13:14:37.068		1.80x	-8.37	74490.58	-17.41		
Saturn	I	2032-12-31T13:25:21.402		-0.29x	-6.24	60235.30		-8.72	-10.67
Saturn	E	2032-12-31T15:02:21.499		-17.76x	11.95x	60056.81		-22.72	-27.14
C (IER)	E	2032-12-31T14:57:23.023	b	-16.94x	11.08x	74490.58	17.26		
B (IER)	E	2032-12-31T15:13:41.001		-19.58x	13.90x	91984.69	18.39		
B (OER)	E	2032-12-31T15:36:19.956		-23.05x	17.65x	117571.16	19.17		
A (IER)	E	2032-12-31T15:40:13.116		-23.61x	18.27x	122050.38	19.25		
Encke (IEG)	E	2032-12-31T15:50:01.024		-25.01x	19.81x	133423.31	19.43		
Encke (OEG)	E	2032-12-31T15:50:17.574		-25.05x	19.85x	133744.89	19.43		
A (OER)	E	2032-12-31T15:52:53.310		-25.41x	20.26x	136774.40	19.47		
F ring	E	2032-12-31T15:56:02.423		-25.84x	20.74x	140461.00	19.52		

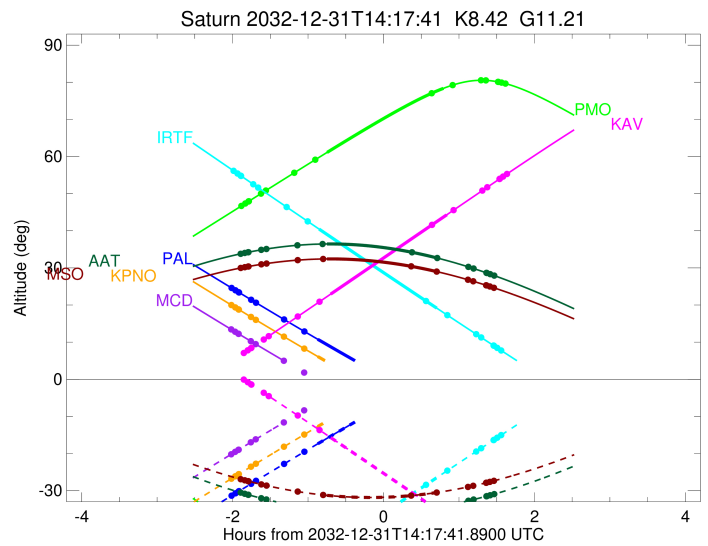
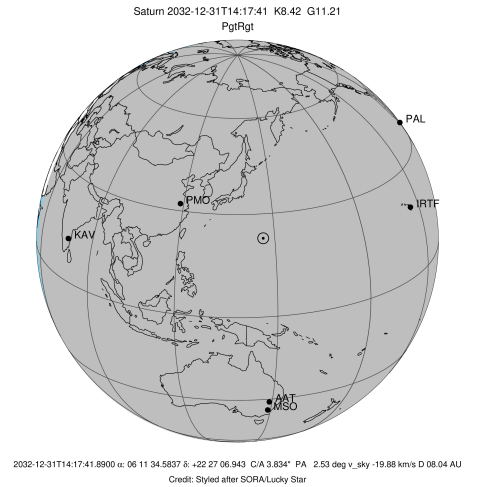
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2032-12-31T14:13:19.250  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : IRTF  
 Location : Mauna Kea/IRTF  
 Latitude (deg) : 19.82622  
 E. Longitude (deg) : 204.52800  
 Altitude (km) : 4.168  
 Gaia source ID : 3425016176933235072  
 2Mass ID (if available) : 06113460+2227067  
 ICRS Star Coord at Epoch: 06h 11m 34.58371s +22:27:06.94299s  
 RUWE (>1.4 is poor) : 2.38  
 K magnitude : 8.418  
 G magnitude : 11.212  
 RP magnitude : 9.997  
 BP magnitude : 11.215  
 DUPflag : 0  
 Distance (au) : 8.039  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -19.88  
 Sun-Target sep (deg) : 172.61  
 Sun-Moon sep (deg) : 175.73  
 B (ring opening deg) : -26.32  
 PA of pole (deg) : -5.74  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 3.613  
 C/A sky separation (km) : 21067.3  
 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

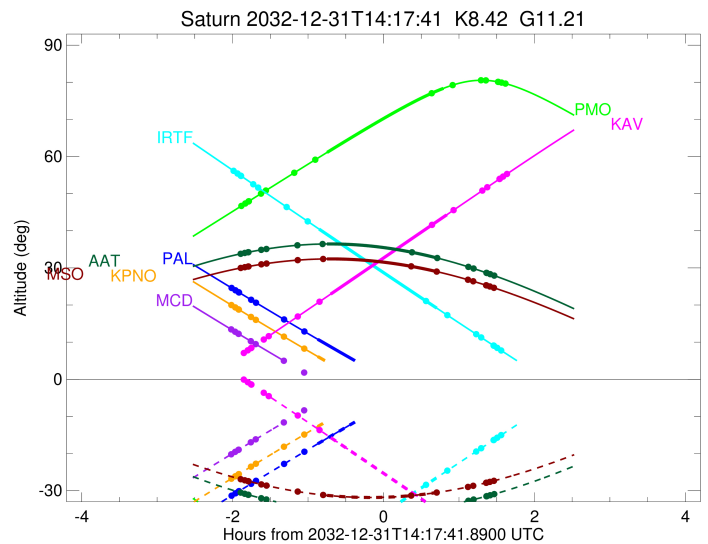
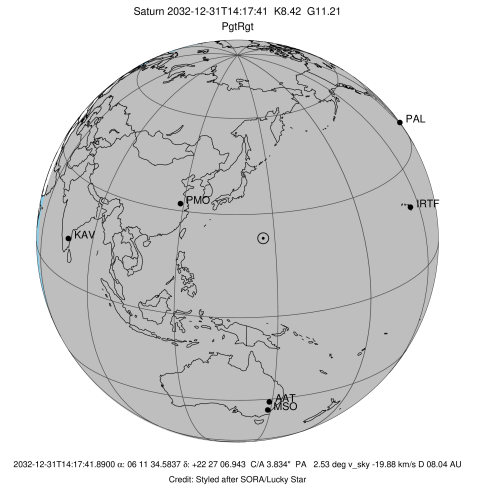
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2032-12-31T12:18:31.064		56.15	-63.43	140461.00	-19.84		
A (OER)	I	2032-12-31T12:21:37.187		55.43	-62.71	136774.40	-19.77		
Encke (OEG)	I	2032-12-31T12:24:10.641		54.84	-62.13	133744.89	-19.71		
Encke (IEG)	I	2032-12-31T12:24:26.958		54.77	-62.06	133423.31	-19.70		
A (IER)	I	2032-12-31T12:34:07.980		52.53	-59.84	122050.38	-19.43		
B (OER)	I	2032-12-31T12:37:59.249		51.64	-58.95	117571.16	-19.30		
B (IER)	I	2032-12-31T13:00:41.020		46.40	-53.73	91984.69	-18.14		
C (IER)	I	2032-12-31T13:17:27.114		42.53	-49.88	74490.58	-16.46		
Saturn	I	2032-12-31T13:26:32.687		40.44	-47.79	60212.89		-11.35	-13.85
Saturn	E	2032-12-31T15:00:06.726		19.14	-26.49	60012.23		-25.16	-29.89
C (IER)	E	2032-12-31T14:51:27.556	b	21.09	-28.44	74490.58	16.30		
B (IER)	E	2032-12-31T15:08:24.665		17.28	-24.62	91984.69	17.92		
B (OER)	E	2032-12-31T15:31:25.281		12.14	-19.46	117571.16	19.00		
A (IER)	E	2032-12-31T15:35:20.252		11.27	-18.59	122050.38	19.12		
Encke (IEG)	E	2032-12-31T15:45:11.227		9.09	-16.39	133423.31	19.36		
Encke (OEG)	E	2032-12-31T15:45:27.837		9.03	-16.33	133744.89	19.36		
A (OER)	E	2032-12-31T15:48:04.081		8.46	-15.75	136774.40	19.42		
F ring	E	2032-12-31T15:51:13.676		7.76	-15.05	140461.00	19.47		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2032-12-31T14:22:00.980  
 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 : 3425016176933235072  
 2Mass ID (if available) : 06113460+2227067  
 ICRS Star Coord at Epoch: 06h 11m 34.58371s +22:27:06.94299s  
 RUWE (>1.4 is poor) : 2.38  
 K magnitude : 8.418  
 G magnitude : 11.212  
 RP magnitude : 9.997  
 BP magnitude : 11.215  
 DUPflag : 0  
 Distance (au) : 8.039  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -19.88  
 Sun-Target sep (deg) : 172.61  
 Sun-Moon sep (deg) : 174.42  
 B (ring opening deg) : -26.32  
 PA of pole (deg) : -5.74  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 3.870  
 C/A sky separation (km) : 22565.3  
 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



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2032-12-31T12:26:38.562		7.08	-0.09x	140461.00	-19.54		
A (OER)	I	2032-12-31T12:29:47.599		7.80	-0.79x	136774.40	-19.47		
Encke (OEG)	I	2032-12-31T12:32:23.456		8.39	-1.37x	133744.89	-19.41		
Encke (IEG)	I	2032-12-31T12:32:40.029		8.46	-1.44x	133423.31	-19.40		
A (IER)	I	2032-12-31T12:42:30.258		10.70	-3.64x	122050.38	-19.12		
B (OER)	I	2032-12-31T12:46:25.294		11.60	-4.53x	117571.16	-18.99		
B (IER)	I	2032-12-31T13:09:32.862		16.91	-9.75	91984.69	-17.73		
C (IER)	I	2032-12-31T13:26:49.031		20.89	-13.68	74490.58	-15.83		
Saturn	I	2032-12-31T13:35:41.594		22.94	-15.70	60206.98		-11.96	-14.57
Saturn	E	2032-12-31T15:07:57.610		44.30	-36.88	59972.14		-27.23	-32.18
C (IER)	E	2032-12-31T14:56:12.982	b	41.58	-34.18	74490.58	15.89		
B (IER)	E	2032-12-31T15:13:23.125		45.55	-38.13	91984.69	17.86		
B (OER)	E	2032-12-31T15:36:17.897		50.83	-43.39	117571.16	19.20		
A (IER)	E	2032-12-31T15:40:10.323		51.72	-44.27	122050.38	19.34		
Encke (IEG)	E	2032-12-31T15:49:53.474		53.94	-46.50	133423.31	19.65		
Encke (OEG)	E	2032-12-31T15:50:09.837		54.01	-46.56	133744.89	19.66		
A (OER)	E	2032-12-31T15:52:43.697		54.59	-47.15	136774.40	19.72		
F ring	E	2032-12-31T15:55:50.246		55.30	-47.86	140461.00	19.80		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2032-12-31T14:16:43.240  
 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 : 3425016176933235072  
 2Mass ID (if available) : 06113460+2227067  
 ICRS Star Coord at Epoch: 06h 11m 34.58371s +22:27:06.94299s  
 RUWE (>1.4 is poor) : 2.38  
 K magnitude : 8.418  
 G magnitude : 11.212  
 RP magnitude : 9.997  
 BP magnitude : 11.215  
 DUPflag : 0  
 Distance (au) : 8.039  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -19.88  
 Sun-Target sep (deg) : 172.61  
 Sun-Moon sep (deg) : 174.59  
 B (ring opening deg) : -26.32  
 PA of pole (deg) : -5.74  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 4.697  
 C/A sky separation (km) : 27384.4  
 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

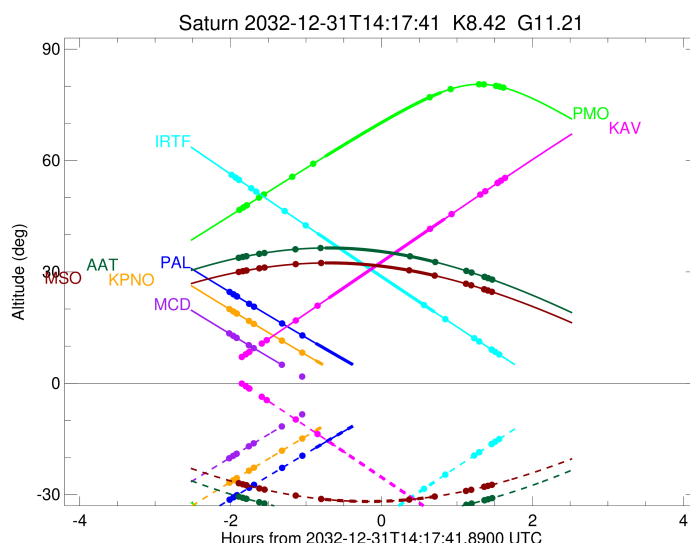
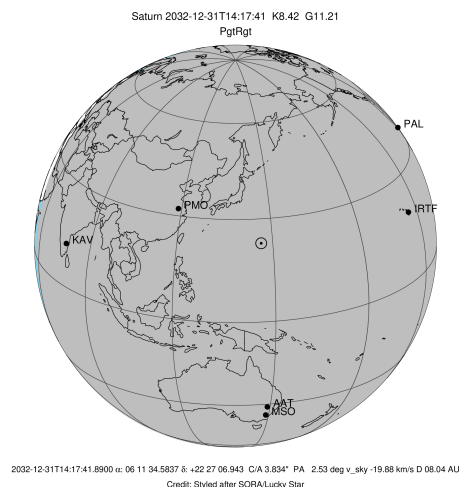


b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2032-12-31T12:24:08.765		33.80	-30.53	140461.00	-19.11		
A (OER)	I	2032-12-31T12:27:22.248		34.03	-30.85	136774.40	-19.00		
Encke (OEG)	I	2032-12-31T12:30:02.149		34.21	-31.10	133744.89	-18.89		
Encke (IEG)	I	2032-12-31T12:30:19.173		34.23	-31.13	133423.31	-18.88		
A (IER)	I	2032-12-31T12:40:28.537		34.86	-32.04	122050.38	-18.42		
B (OER)	I	2032-12-31T12:44:33.126		35.09	-32.38	117571.17	-18.20		
B (IER)	I	2032-12-31T13:09:14.094		36.09	-34.13	91984.69	-16.10		
C (IER)	I	2032-12-31T13:29:13.869		36.43	-35.12	74490.58	-12.71		
Saturn	I	2032-12-31T13:32:41.357		36.45	-35.25	60147.81		-16.92	-20.46
Saturn	E	2032-12-31T15:00:33.023		32.65	-34.38	59890.01		-31.18	-36.46
C (IER)	E	2032-12-31T14:40:17.357	b	34.21	-35.29	74490.58	12.63		
B (IER)	E	2032-12-31T15:00:23.410	b	32.67	-34.39	91984.69	16.02		
B (OER)	E	2032-12-31T15:25:11.474		30.28	-32.73	117571.16	18.11		
A (IER)	E	2032-12-31T15:29:17.356		29.83	-32.40	122050.38	18.32		
Encke (IEG)	E	2032-12-31T15:39:30.144		28.67	-31.52	133423.31	18.77		
Encke (OEG)	E	2032-12-31T15:39:47.268		28.64	-31.49	133744.89	18.78		
A (OER)	E	2032-12-31T15:42:28.120		28.32	-31.25	136774.40	18.88		
F ring	E	2032-12-31T15:45:42.783		27.93	-30.94	140461.00	18.99		



target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2032-12-31T14:16:44.980  
 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 : 3425016176933235072  
 2Mass ID (if available) : 06113460+2227067  
 ICRS Star Coord at Epoch: 06h 11m 34.58371s +22:27:06.94299s  
 RUWE (>1.4 is poor) : 2.38  
 K magnitude : 8.418  
 G magnitude : 11.212  
 RP magnitude : 9.997  
 BP magnitude : 11.215  
 DUPflag : 0  
 Distance (au) : 8.039  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -19.88  
 Sun-Target sep (deg) : 172.61  
 Sun-Moon sep (deg) : 174.55  
 B (ring opening deg) : -26.32  
 PA of pole (deg) : -5.74  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 4.741  
 C/A sky separation (km) : 27640.4  
 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	2032-12-31T12:24:10.185		29.98	-26.92	140461.00	-19.06		
A (OER)	I	2032-12-31T12:27:24.236		30.19	-27.21	136774.40	-18.94		
Encke (OEG)	I	2032-12-31T12:30:04.628		30.36	-27.45	133744.89	-18.84		
Encke (IEG)	I	2032-12-31T12:30:21.706		30.38	-27.47	133423.31	-18.82		
A (IER)	I	2032-12-31T12:40:33.157		30.96	-28.32	122050.38	-18.35		
B (OER)	I	2032-12-31T12:44:38.698		31.17	-28.64	117571.16	-18.13		
B (IER)	I	2032-12-31T13:09:27.792		32.09	-30.25	91984.69	-15.98		
C (IER)	I	2032-12-31T13:29:41.315		32.40	-31.16	74490.58	-12.49		
Saturn	I	2032-12-31T13:32:47.494		32.42	-31.27	60144.47		-17.16	-20.74
Saturn	E	2032-12-31T15:00:30.107		28.97	-30.49	59884.72		-31.42	-36.72
C (IER)	E	2032-12-31T14:39:37.608	b	30.43	-31.34	74490.58	12.41		
B (IER)	E	2032-12-31T14:59:57.419	b	29.01	-30.52	91984.69	15.91		
B (OER)	E	2032-12-31T15:24:53.381		26.81	-29.00	117571.16	18.04		
A (IER)	E	2032-12-31T15:29:00.164		26.40	-28.70	122050.38	18.26		
Encke (IEG)	E	2032-12-31T15:39:14.902		25.33	-27.89	133423.31	18.72		
Encke (OEG)	E	2032-12-31T15:39:32.075		25.30	-27.87	133744.89	18.73		
A (OER)	E	2032-12-31T15:42:13.379		25.00	-27.64	136774.40	18.83		
F ring	E	2032-12-31T15:45:28.561		24.64	-27.36	140461.00	18.94		