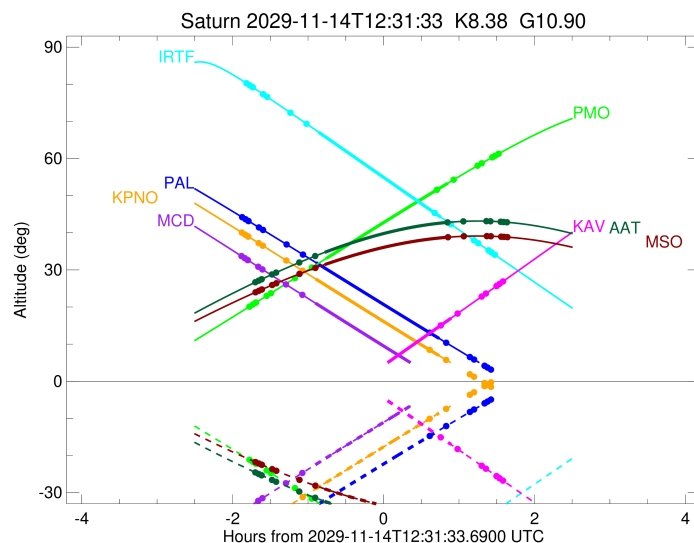
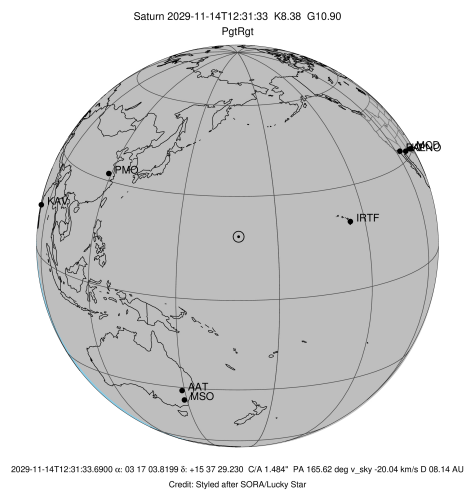


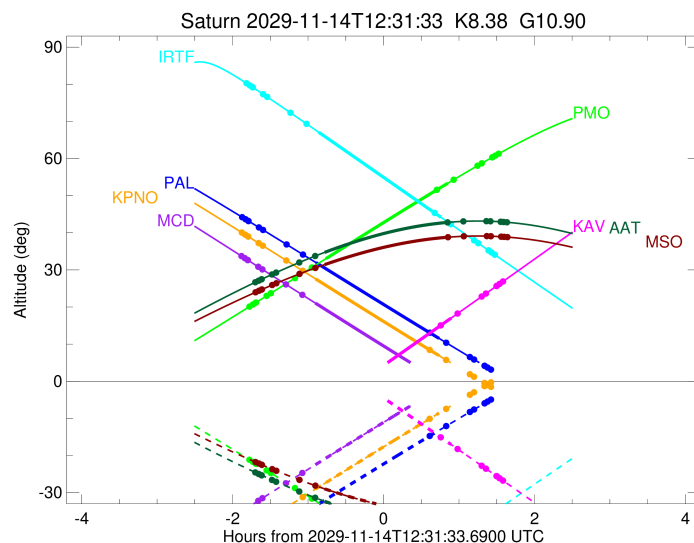
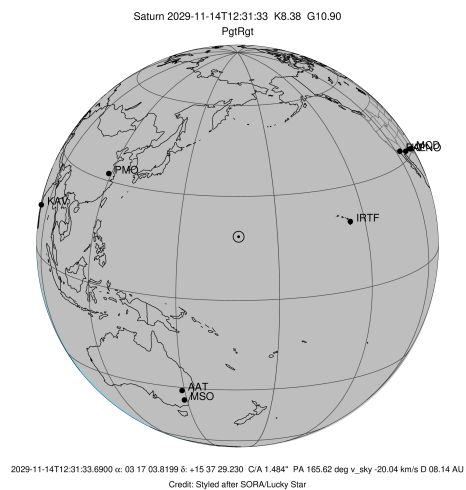
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2029-11-14T12:26:47.510
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 30397755591513728
 2Mass ID (if available) : 03170375+1537297
 ICRS Star Coord at Epoch: 03h 17m 03.81991s +15:37:29.22990s
 RUWE (>1.4 is poor) : 1.07
 K magnitude : 8.377
 G magnitude : 10.903
 RP magnitude : 10.160
 BP magnitude : 11.498
 DUPflag : 0
 Distance (au) : 8.145
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.04
 Sun-Target sep (deg) : 177.34
 Sun-Moon sep (deg) : 72.63
 B (ring opening deg) : -22.05
 PA of pole (deg) : -1.06
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.757
 C/A sky separation (km) : 10378.3
 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	2029-11-14T10:39:09.857		44.20	-45.73	140461.00	-23.06		
A (OER)	I	2029-11-14T10:41:49.823		43.65	-45.18	136774.40	-23.04		
Encke (OEG)	I	2029-11-14T10:44:01.388		43.20	-44.72	133744.89	-23.02		
Encke (IEG)	I	2029-11-14T10:44:15.359		43.15	-44.67	133423.31	-23.02		
A (IER)	I	2029-11-14T10:52:30.330		41.44	-42.96	122050.38	-22.93		
B (OER)	I	2029-11-14T10:55:45.791		40.77	-42.28	117571.16	-22.90		
B (IER)	I	2029-11-14T11:14:30.460		36.86	-38.37	91984.69	-22.56		
C (IER)	I	2029-11-14T11:27:32.724		34.13	-35.64	74490.58	-22.12		
Saturn	I	2029-11-14T11:37:50.390		31.97	-33.49	60264.86		-3.31	-4.07
Saturn	E	2029-11-14T13:15:49.438		11.53	-13.21	60139.64		21.70	25.98
C (IER)	E	2029-11-14T13:08:20.443	b	13.07	-14.73	74490.58	21.98		
B (IER)	E	2029-11-14T13:21:27.668		10.37	-12.06	91984.69	22.41		
B (OER)	E	2029-11-14T13:40:20.751		6.51	-8.25	117571.16	22.71		
A (IER)	E	2029-11-14T13:43:37.855		5.85	-7.60	122050.38	22.74		
Encke (IEG)	E	2029-11-14T13:51:57.239		4.16x	-5.94	133423.31	22.80		
Encke (OEG)	E	2029-11-14T13:52:11.340		4.12x	-5.89	133744.89	22.81		
A (OER)	E	2029-11-14T13:54:24.142		3.67x	-5.45	136774.40	22.82		
F ring	E	2029-11-14T13:57:05.645		3.13x	-4.92x	140461.00	22.83		

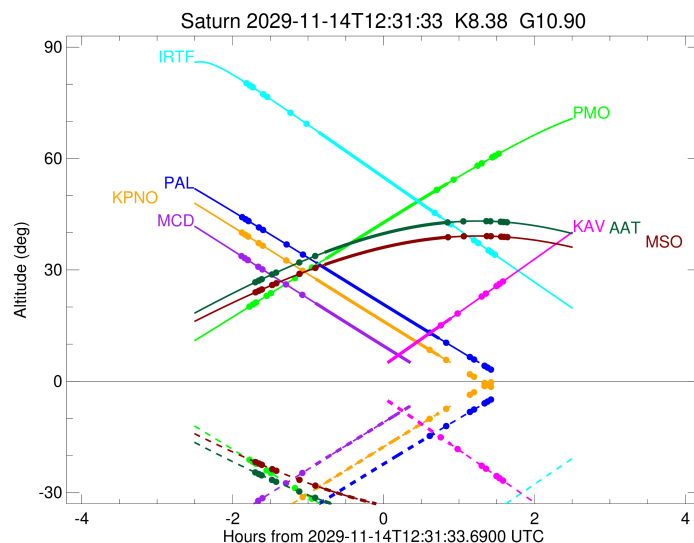
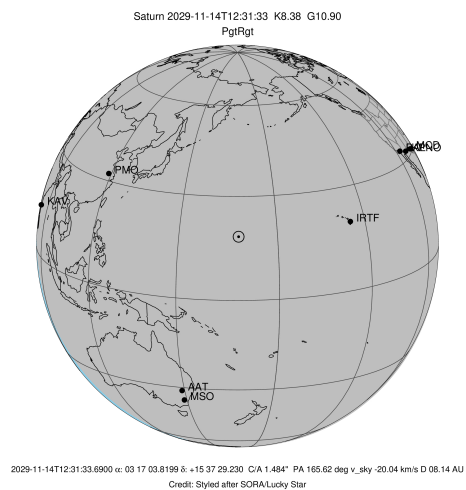
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2029-11-14T12:34:25.590
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 30397755591513728
 2Mass ID (if available) : 03170375+1537297
 ICRS Star Coord at Epoch: 03h 17m 03.81991s +15:37:29.22990s
 RUWE (>1.4 is poor) : 1.07
 K magnitude : 8.377
 G magnitude : 10.903
 RP magnitude : 10.160
 BP magnitude : 11.498
 DUPflag : 0
 Distance (au) : 8.145
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.04
 Sun-Target sep (deg) : 177.34
 Sun-Moon sep (deg) : 72.51
 B (ring opening deg) : -22.05
 PA of pole (deg) : -1.06
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 2.025
 C/A sky separation (km) : 11962.3
 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	2029-11-14T10:44:57.818		20.10	-21.14	140461.00	-22.53		
A (OER)	I	2029-11-14T10:47:41.539		20.68	-21.71	136774.40	-22.51		
Encke (OEG)	I	2029-11-14T10:49:56.199		21.16	-22.18	133744.89	-22.49		
Encke (IEG)	I	2029-11-14T10:50:10.500		21.21	-22.23	133423.31	-22.49		
A (IER)	I	2029-11-14T10:58:37.228		23.00	-24.01	122050.38	-22.40		
B (OER)	I	2029-11-14T11:01:57.403		23.70	-24.71	117571.17	-22.35		
B (IER)	I	2029-11-14T11:21:10.941		27.79	-28.77	91984.69	-21.95		
C (IER)	I	2029-11-14T11:34:37.179		30.65	-31.62	74490.58	-21.38		
Saturn	I	2029-11-14T11:45:47.851		33.03	-33.99	60267.46		-1.37	-1.68
Saturn	E	2029-11-14T13:22:47.208		53.37	-54.43	60130.28		22.52	26.91
C (IER)	E	2029-11-14T13:14:01.311	b	51.58	-52.62	74490.58	21.49		
B (IER)	E	2029-11-14T13:27:22.266		54.29	-55.38	91984.69	22.13		
B (OER)	E	2029-11-14T13:46:25.295		58.08	-59.26	117571.16	22.59		
A (IER)	E	2029-11-14T13:49:43.338		58.73	-59.92	122050.38	22.64		
Encke (IEG)	E	2029-11-14T13:58:04.282		60.33	-61.58	133423.31	22.76		
Encke (OEG)	E	2029-11-14T13:58:18.412		60.38	-61.63	133744.89	22.76		
A (OER)	E	2029-11-14T14:00:31.440		60.80	-62.06	136774.40	22.79		
F ring	E	2029-11-14T14:03:13.127		61.31	-62.59	140461.00	22.82		

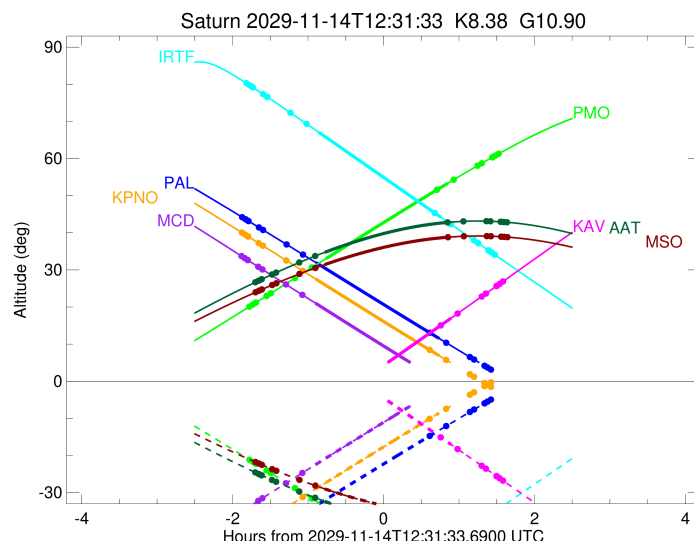
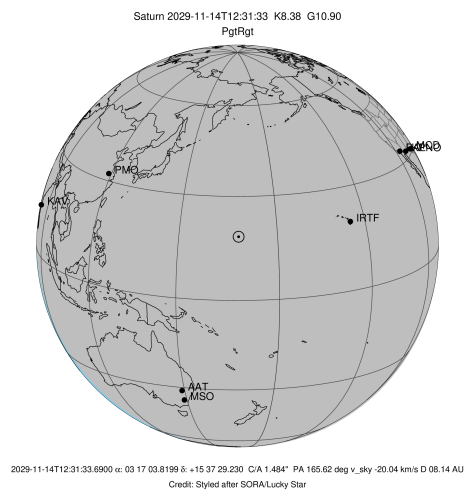
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2029-11-14T12:26:37.810
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KPNO
 Location : Kitt Peak Natl Obs
 Latitude (deg) : 31.96333
 E. Longitude (deg) : 248.40000
 Altitude (km) : 2.120
 Gaia source ID : 30397755591513728
 2Mass ID (if available) : 03170375+1537297
 ICRS Star Coord at Epoch: 03h 17m 03.81991s +15:37:29.22990s
 RUWE (>1.4 is poor) : 1.07
 K magnitude : 8.377
 G magnitude : 10.903
 RP magnitude : 10.160
 BP magnitude : 11.498
 DUPflag : 0
 Distance (au) : 8.145
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.04
 Sun-Target sep (deg) : 177.34
 Sun-Moon sep (deg) : 72.57
 B (ring opening deg) : -22.05
 PA of pole (deg) : -1.06
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.749
 C/A sky separation (km) : 10329.6
 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_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	2029-11-14T10:38:56.500		40.06	-41.48	140461.00	-23.05		
A (OER)	I	2029-11-14T10:41:36.498		39.49	-40.92	136774.40	-23.03		
Encke (OEG)	I	2029-11-14T10:43:48.090		39.03	-40.45	133744.89	-23.01		
Encke (IEG)	I	2029-11-14T10:44:02.065		38.98	-40.40	133423.31	-23.01		
A (IER)	I	2029-11-14T10:52:17.145		37.22	-38.65	122050.38	-22.93		
B (OER)	I	2029-11-14T10:55:32.650		36.53	-37.96	117571.16	-22.89		
B (IER)	I	2029-11-14T11:14:17.561		32.54	-33.98	91984.69	-22.56		
C (IER)	I	2029-11-14T11:27:19.919		29.76	-31.21	74490.58	-22.12		
Saturn	I	2029-11-14T11:37:36.001		27.57	-29.04	60264.71		-3.39	-4.16
Saturn	E	2029-11-14T13:15:45.005		6.90	-8.57	60139.79		21.68	25.96
C (IER)	E	2029-11-14T13:08:16.814	b	8.45	-10.10	74490.58	21.97		
B (IER)	E	2029-11-14T13:21:24.573		5.74	-7.42	91984.69	22.40		
B (OER)	E	2029-11-14T13:40:18.708		1.87x	-3.61x	117571.16	22.69		
A (IER)	E	2029-11-14T13:43:36.018		1.20x	-2.95x	122050.38	22.72		
Encke (IEG)	E	2029-11-14T13:51:55.947		-0.48x	-1.29x	133423.31	22.78		
Encke (OEG)	E	2029-11-14T13:52:10.064		-0.53x	-1.25x	133744.89	22.78		
A (OER)	E	2029-11-14T13:54:23.015		-0.98x	-0.81x	136774.40	22.79		
F ring	E	2029-11-14T13:57:04.704		-1.52x	-0.27x	140461.00	22.81		

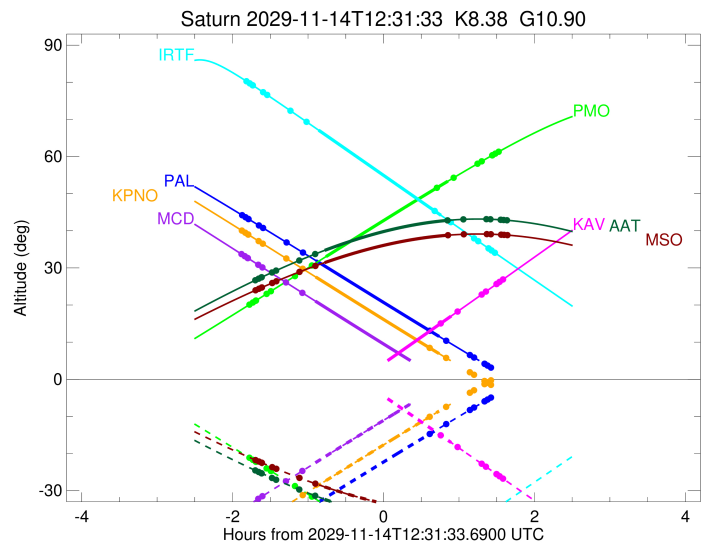
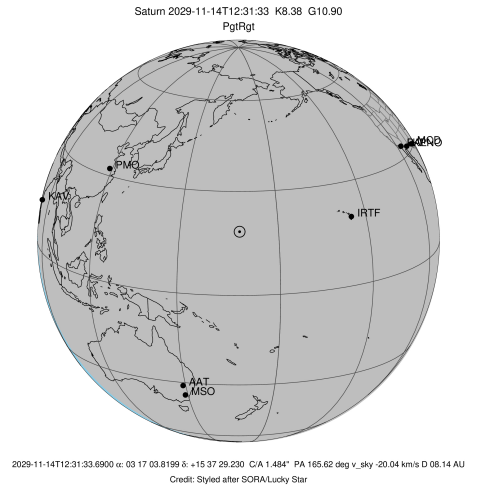
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2029-11-14T12:26:28.730
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MCD
 Location : McDonald Obs. 2.7m
 Latitude (deg) : 30.67158
 E. Longitude (deg) : 255.97844
 Altitude (km) : 2.075
 Gaia source ID : 30397755591513728
 2Mass ID (if available) : 03170375+1537297
 ICRS Star Coord at Epoch: 03h 17m 03.81991s +15:37:29.22990s
 RUWE (>1.4 is poor) : 1.07
 K magnitude : 8.377
 G magnitude : 10.903
 RP magnitude : 10.160
 BP magnitude : 11.498
 DUPflag : 0
 Distance (au) : 8.145
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.04
 Sun-Target sep (deg) : 177.34
 Sun-Moon sep (deg) : 72.48
 B (ring opening deg) : -22.05
 PA of pole (deg) : -1.06
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.754
 C/A sky separation (km) : 10360.7
 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	2029-11-14T10:38:36.751		33.73	-35.08	140461.00	-23.03		
A (OER)	I	2029-11-14T10:41:16.900		33.15	-34.51	136774.40	-23.01		
Encke (OEG)	I	2029-11-14T10:43:28.619		32.68	-34.03	133744.89	-22.99		
Encke (IEG)	I	2029-11-14T10:43:42.607		32.63	-33.98	133423.31	-22.99		
A (IER)	I	2029-11-14T10:51:58.190		30.84	-32.21	122050.38	-22.91		
B (OER)	I	2029-11-14T10:55:13.906		30.14	-31.51	117571.16	-22.87		
B (IER)	I	2029-11-14T11:14:00.158		26.09	-27.48	91984.69	-22.53		
C (IER)	I	2029-11-14T11:27:03.603		23.28	-24.69	74490.58	-22.08		
Saturn	I	2029-11-14T11:37:20.331		21.07	-22.50	60264.67		-3.41	-4.18
Saturn	E	2029-11-14T13:15:43.016		0.33x	-2.02x	60139.05		21.75	26.04
C (IER)	E	2029-11-14T13:08:08.504	b	1.88x	-3.55x	74490.58	21.93		
B (IER)	E	2029-11-14T13:21:17.910		-0.82x	-0.89x	91984.69	22.35		
B (OER)	E	2029-11-14T13:40:14.399		-4.66x	2.88x	117571.16	22.64		
A (IER)	E	2029-11-14T13:43:32.120		-5.32x	3.53x	122050.38	22.67		
Encke (IEG)	E	2029-11-14T13:51:53.095		-6.99x	5.17x	133423.31	22.73		
Encke (OEG)	E	2029-11-14T13:52:07.242		-7.04x	5.22x	133744.89	22.73		
A (OER)	E	2029-11-14T13:54:20.473		-7.48x	5.65x	136774.40	22.75		
F ring	E	2029-11-14T13:57:02.502		-8.02x	6.18x	140461.00	22.76		

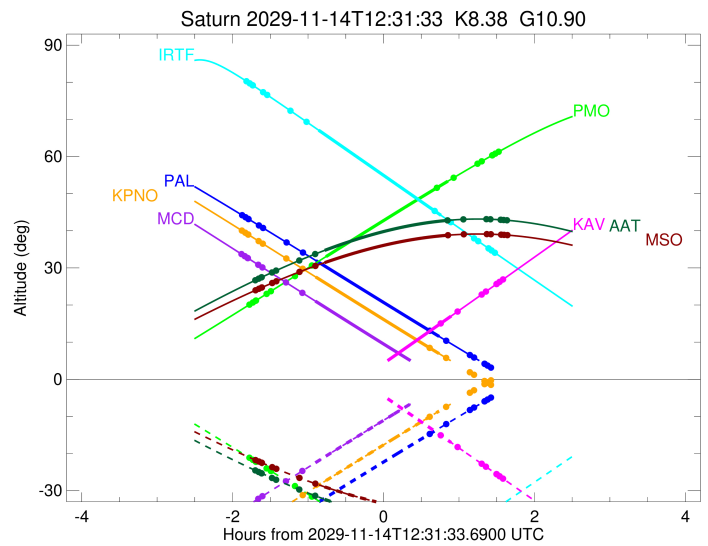
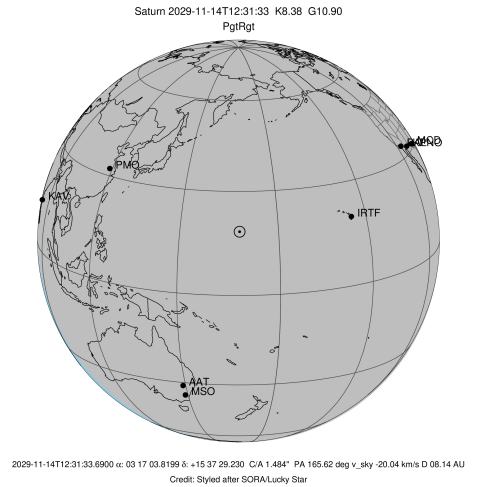
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2029-11-14T12:28:34.650
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : IRTF
 Location : Mauna Kea/IRTF
 Latitude (deg) : 19.82622
 E. Longitude (deg) : 204.52800
 Altitude (km) : 4.168
 Gaia source ID : 30397755591513728
 2Mass ID (if available) : 03170375+1537297
 ICRS Star Coord at Epoch: 03h 17m 03.81991s +15:37:29.22990s
 RUWE (>1.4 is poor) : 1.07
 K magnitude : 8.377
 G magnitude : 10.903
 RP magnitude : 10.160
 BP magnitude : 11.498
 DUPflag : 0
 Distance (au) : 8.145
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.04
 Sun-Target sep (deg) : 177.34
 Sun-Moon sep (deg) : 72.95
 B (ring opening deg) : -22.05
 PA of pole (deg) : -1.06
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.461
 C/A sky separation (km) : 8632.9
 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



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	2029-11-14T10:42:35.198		80.29	-81.33	140461.00	-23.21		
A (OER)	I	2029-11-14T10:45:14.054		79.71	-80.72	136774.40	-23.20		
Encke (OEG)	I	2029-11-14T10:47:24.660		79.23	-80.21	133744.89	-23.19		
Encke (IEG)	I	2029-11-14T10:47:38.527		79.18	-80.15	133423.31	-23.19		
A (IER)	I	2029-11-14T10:55:49.469		77.34	-78.24	122050.38	-23.14		
B (OER)	I	2029-11-14T10:59:03.141		76.61	-77.48	117571.16	-23.12		
B (IER)	I	2029-11-14T11:17:34.588		72.34	-73.12	91984.69	-22.90		
C (IER)	I	2029-11-14T11:30:23.093		69.35	-70.11	74490.58	-22.60		
Saturn	I	2029-11-14T11:39:55.187		67.11	-67.87	60261.89		-4.62	-5.67
Saturn	E	2029-11-14T13:17:15.899		44.16	-45.02	60158.89		19.92	23.95
C (IER)	E	2029-11-14T13:12:16.279	b	45.34	-46.19	74490.58	22.55		
B (IER)	E	2029-11-14T13:25:06.277		42.31	-43.19	91984.69	22.85		
B (OER)	E	2029-11-14T13:43:39.983		37.94	-38.86	117571.16	23.07		
A (IER)	E	2029-11-14T13:46:54.082		37.18	-38.11	122050.38	23.09		
Encke (IEG)	E	2029-11-14T13:55:06.156		35.26	-36.20	133423.31	23.13		
Encke (OEG)	E	2029-11-14T13:55:20.056		35.20	-36.15	133744.89	23.13		
A (OER)	E	2029-11-14T13:57:30.978		34.69	-35.64	136774.40	23.14		
F ring	E	2029-11-14T14:00:10.224		34.07	-35.02	140461.00	23.16		

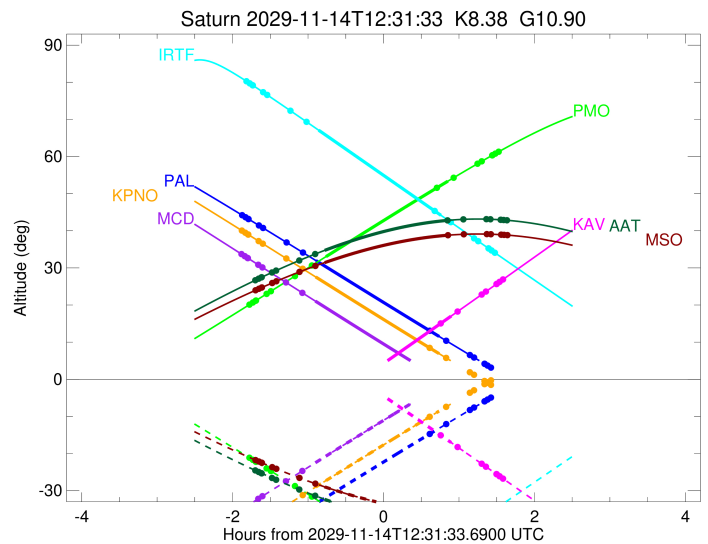
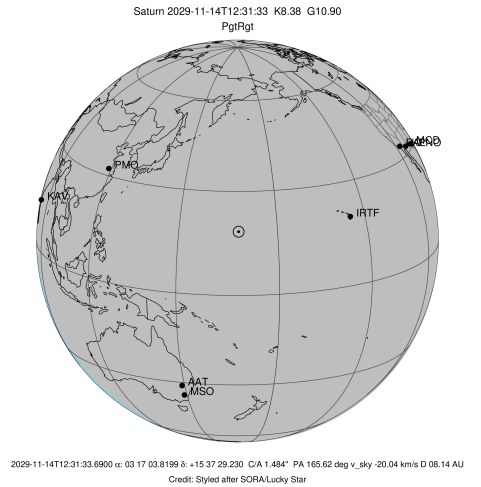
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2029-11-14T12:36:22.620
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KAV
 Location : Kavalur Observatory
 Latitude (deg) : 12.57556
 E. Longitude (deg) : 78.83167
 Altitude (km) : 0.722
 Gaia source ID : 30397755591513728
 2Mass ID (if available) : 03170375+1537297
 ICRS Star Coord at Epoch: 03h 17m 03.81991s +15:37:29.22990s
 RUWE (>1.4 is poor) : 1.07
 K magnitude : 8.377
 G magnitude : 10.903
 RP magnitude : 10.160
 BP magnitude : 11.498
 DUPflag : 0
 Distance (au) : 8.145
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.04
 Sun-Target sep (deg) : 177.34
 Sun-Moon sep (deg) : 71.88
 B (ring opening deg) : -22.05
 PA of pole (deg) : -1.06
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.952
 C/A sky separation (km) : 11528.2
 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	2029-11-14T10:45:47.352		-20.31x	19.61x	140461.00	-22.30		
A (OER)	I	2029-11-14T10:48:32.709		-19.69x	19.00x	136774.40	-22.28		
Encke (OEG)	I	2029-11-14T10:50:48.711		-19.17x	18.50x	133744.89	-22.27		
Encke (IEG)	I	2029-11-14T10:51:03.153		-19.12x	18.45x	133423.31	-22.26		
A (IER)	I	2029-11-14T10:59:34.863		-17.18x	16.55x	122050.38	-22.18		
B (OER)	I	2029-11-14T11:02:56.971		-16.41x	15.79x	117571.16	-22.14		
B (IER)	I	2029-11-14T11:22:20.936		-11.94x	11.42x	91984.69	-21.77		
C (IER)	I	2029-11-14T11:35:53.083		-8.81x	8.35x	74490.58	-21.25		
Saturn	I	2029-11-14T11:47:02.039		-6.21x	5.80x	60267.04		-1.83	-2.25
Saturn	E	2029-11-14T13:25:22.515		17.03	-17.05	60134.54		22.15	26.49
C (IER)	E	2029-11-14T13:17:04.446	b	15.05	-15.10	74490.58	21.38		
B (IER)	E	2029-11-14T13:30:30.621		18.25	-18.26	91984.69	21.96		
B (OER)	E	2029-11-14T13:49:42.882		22.85	-22.78	117571.16	22.40		
A (IER)	E	2029-11-14T13:53:02.623		23.64	-23.57	122050.38	22.45		
Encke (IEG)	E	2029-11-14T14:01:27.922		25.66	-25.56	133423.31	22.56		
Encke (OEG)	E	2029-11-14T14:01:42.175		25.72	-25.61	133744.89	22.56		
A (OER)	E	2029-11-14T14:03:56.370		26.26	-26.14	136774.40	22.59		
F ring	E	2029-11-14T14:06:39.476		26.91	-26.78	140461.00	22.62		

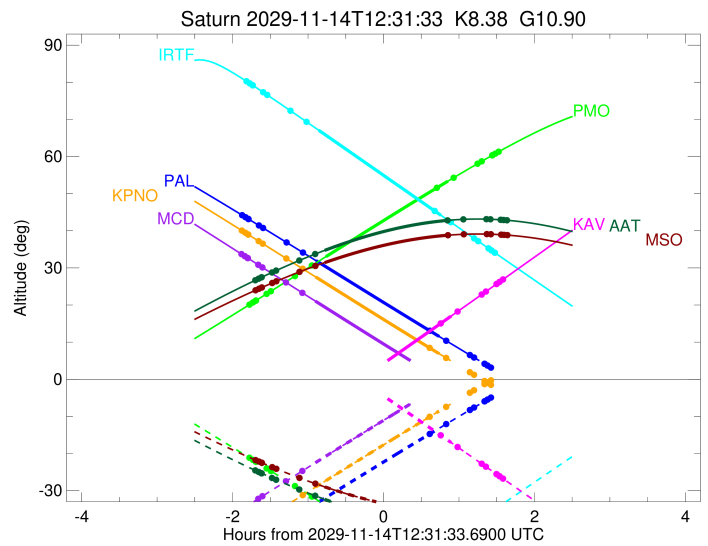
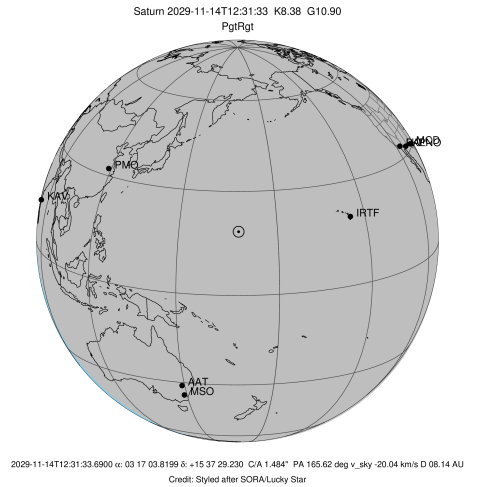
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2029-11-14T12:33:53.920
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : AAT
 Location : Siding Spring (AAT)
 Latitude (deg) : -31.27703
 E. Longitude (deg) : 149.06608
 Altitude (km) : 1.164
 Gaia source ID : 30397755591513728
 2Mass ID (if available) : 03170375+1537297
 ICRS Star Coord at Epoch: 03h 17m 03.81991s +15:37:29.22990s
 RUWE (>1.4 is poor) : 1.07
 K magnitude : 8.377
 G magnitude : 10.903
 RP magnitude : 10.160
 BP magnitude : 11.498
 DUPflag : 0
 Distance (au) : 8.145
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.04
 Sun-Target sep (deg) : 177.34
 Sun-Moon sep (deg) : 72.53
 B (ring opening deg) : -22.05
 PA of pole (deg) : -1.06
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.805
 C/A sky separation (km) : 4757.3
 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	2029-11-14T10:49:36.838		26.67	-24.55	140461.00	-23.11		
A (OER)	I	2029-11-14T10:52:16.328		27.09	-24.96	136774.40	-23.11		
Encke (OEG)	I	2029-11-14T10:54:27.394		27.44	-25.30	133744.89	-23.11		
Encke (IEG)	I	2029-11-14T10:54:41.306		27.48	-25.34	133423.31	-23.11		
A (IER)	I	2029-11-14T11:02:53.377		28.77	-26.59	122050.38	-23.11		
B (OER)	I	2029-11-14T11:06:07.212		29.27	-27.07	117571.16	-23.11		
B (IER)	I	2029-11-14T11:24:35.344		31.99	-29.70	91984.69	-23.06		
C (IER)	I	2029-11-14T11:37:14.923		33.74	-31.38	74490.58	-22.99		
Saturn	I	2029-11-14T11:44:47.429		34.72	-32.33	60250.63		-7.80	-9.56
Saturn	E	2029-11-14T13:22:53.198		42.81	-40.14	60194.69		16.21	19.63
C (IER)	E	2029-11-14T13:22:29.440	b	42.80	-40.13	74490.58	23.09		
B (IER)	E	2029-11-14T13:35:05.072		43.08	-40.41	91984.69	23.20		
B (OER)	E	2029-11-14T13:53:25.775		43.13	-40.49	117571.17	23.28		
A (IER)	E	2029-11-14T13:56:38.119		43.10	-40.46	122050.38	23.29		
Encke (IEG)	E	2029-11-14T14:04:46.155		42.96	-40.34	133423.31	23.31		
Encke (OEG)	E	2029-11-14T14:04:59.948		42.95	-40.34	133744.89	23.31		
A (OER)	E	2029-11-14T14:07:09.877		42.90	-40.29	136774.40	23.32		
F ring	E	2029-11-14T14:09:47.951		42.83	-40.23	140461.00	23.32		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2029-11-14T12:33:53.920
 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 : 30397755591513728
 2Mass ID (if available) : 03170375+1537297
 ICRS Star Coord at Epoch: 03h 17m 03.81991s +15:37:29.22990s
 RUWE (>1.4 is poor) : 1.07
 K magnitude : 8.377
 G magnitude : 10.903
 RP magnitude : 10.160
 BP magnitude : 11.498
 DUPflag : 0
 Distance (au) : 8.145
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.04
 Sun-Target sep (deg) : 177.34
 Sun-Moon sep (deg) : 72.49
 B (ring opening deg) : -22.05
 PA of pole (deg) : -1.06
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.754
 C/A sky separation (km) : 4452.0
 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	2029-11-14T10:49:47.040		23.97	-21.77	140461.00	-23.12		
A (OER)	I	2029-11-14T10:52:26.509		24.37	-22.15	136774.40	-23.12		
Encke (OEG)	I	2029-11-14T10:54:37.555		24.69	-22.47	133744.89	-23.12		
Encke (IEG)	I	2029-11-14T10:54:51.465		24.73	-22.50	133423.31	-23.12		
A (IER)	I	2029-11-14T11:03:03.446		25.93	-23.67	122050.38	-23.11		
B (OER)	I	2029-11-14T11:06:17.237		26.39	-24.12	117571.16	-23.11		
B (IER)	I	2029-11-14T11:24:44.950		28.92	-26.57	91984.69	-23.08		
C (IER)	I	2029-11-14T11:37:23.956		30.53	-28.12	74490.58	-23.01		
Saturn	I	2029-11-14T11:44:44.077		31.41	-28.98	60249.35		-8.09	-9.90
Saturn	E	2029-11-14T13:22:56.892		38.81	-36.14	60196.92		15.96	19.33
C (IER)	E	2029-11-14T13:22:50.660	b	38.81	-36.14	74490.58	23.11		
B (IER)	E	2029-11-14T13:35:25.894		39.06	-36.39	91984.69	23.21		
B (OER)	E	2029-11-14T13:53:46.513		39.10	-36.46	117571.16	23.28		
A (IER)	E	2029-11-14T13:56:58.880		39.07	-36.43	122050.38	23.29		
Encke (IEG)	E	2029-11-14T14:05:07.009		38.94	-36.33	133423.31	23.31		
Encke (OEG)	E	2029-11-14T14:05:20.806		38.94	-36.32	133744.89	23.31		
A (OER)	E	2029-11-14T14:07:30.767		38.89	-36.28	136774.40	23.31		
F ring	E	2029-11-14T14:10:08.885		38.83	-36.22	140461.00	23.32		