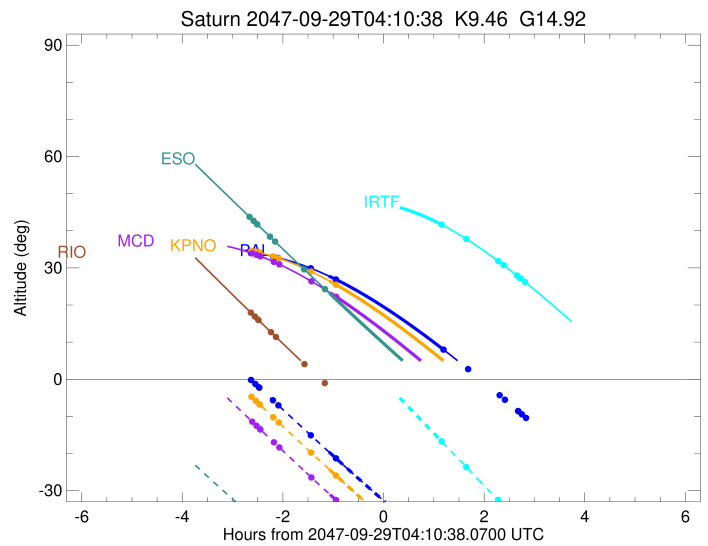
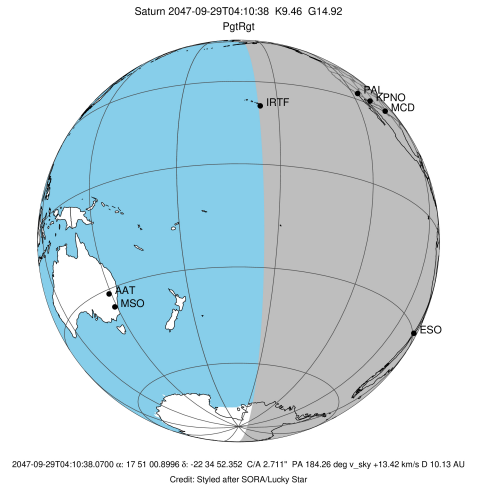
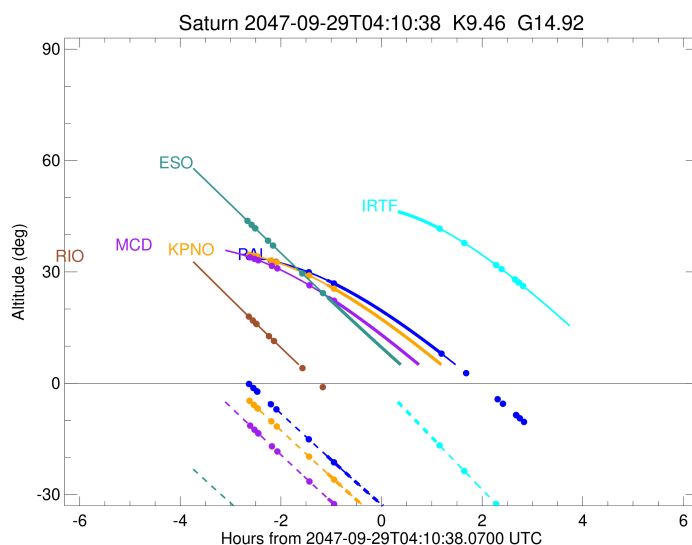
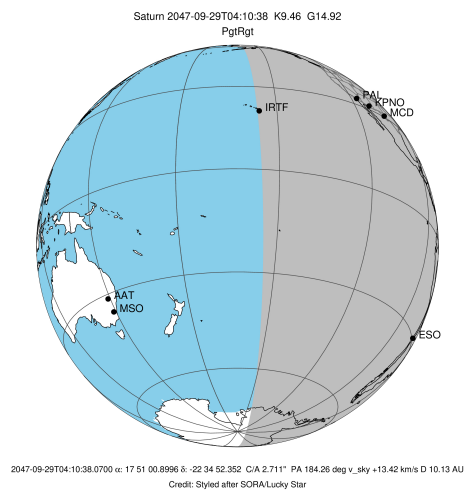


target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-09-29T04:15:13.720
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 4068913069813624960
 2Mass ID (if available) : 17510090-2234520
 ICRS Star Coord at Epoch: 17h 51m 00.89957s -22:34:52.35214s
 RUWE (>1.4 is poor) : 0.92
 K magnitude : 9.461
 G magnitude : 14.919
 RP magnitude : 13.583
 BP magnitude : 17.041
 DUPflag : 0
 Distance (au) : 10.125
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 13.42
 Sun-Target sep (deg) : 82.63
 Sun-Moon sep (deg) : 41.50
 B (ring opening deg) : 26.91
 PA of pole (deg) : 5.34
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 3.376
 C/A sky separation (km) : 24791.2
 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_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	2047-09-29T01:32:42.836		33.97	-0.20x	140461.00	-11.91		
A (OER)	I	2047-09-29T01:37:53.124		33.84	-1.29x	136774.40	-11.85		
Encke (OEG)	I	2047-09-29T01:42:09.247		33.71	-2.18x	133744.89	-11.80		
Encke (IEG)	I	2047-09-29T01:42:36.498		33.70	-2.28x	133423.31	-11.80		
A (IER)	I	2047-09-29T01:58:49.378		33.03	-5.67	122050.38	-11.57		
B (OER)	I	2047-09-29T02:05:18.260		32.70	-7.03	117571.16	-11.46		
B (IER)	I	2047-09-29T02:44:01.608		29.90	-15.11	91984.69	-10.43		
C (IER)	I	2047-09-29T03:14:03.017	b	26.87	-21.31	74490.58	-8.81		
Saturn	I	2047-09-29T03:05:34.811		27.79	-19.57	60044.04		22.79	27.23
Saturn	E	2047-09-29T05:24:22.080		7.60	-46.16	60088.89		20.26	24.33
C (IER)	E	2047-09-29T05:22:12.193	b	7.98	-45.80	74490.58	8.97		
B (IER)	E	2047-09-29T05:51:36.767		2.72x	-50.44	91984.69	10.69		
B (OER)	E	2047-09-29T06:29:14.700		-4.32x	-55.30	117571.16	11.85		
A (IER)	E	2047-09-29T06:35:30.733		-5.53x	-55.95	122050.38	11.98		
Encke (IEG)	E	2047-09-29T06:51:09.195		-8.56x	-57.36	133423.31	12.25		
Encke (OEG)	E	2047-09-29T06:51:35.436		-8.64x	-57.39	133744.89	12.26		
A (OER)	E	2047-09-29T06:55:41.951		-9.45x	-57.70	136774.40	12.32		
F ring	E	2047-09-29T07:00:40.314		-10.43x	-58.03	140461.00	12.39		

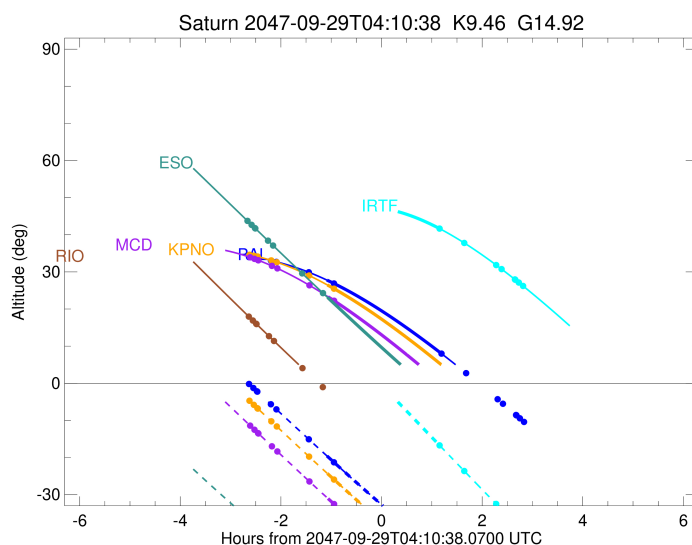
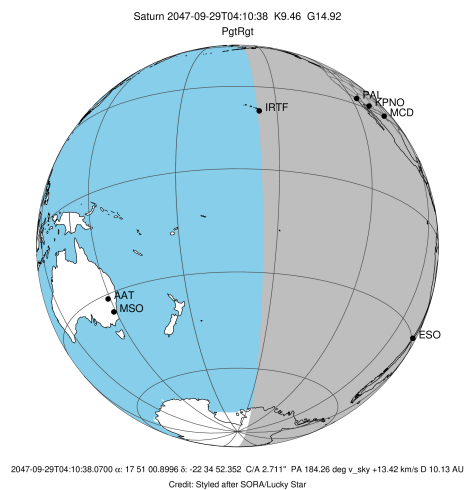
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-09-29T04:15:45.980
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KPNO
 Location : Kitt Peak Natl Obs
 Latitude (deg) : 31.96333
 E. Longitude (deg) : 248.40000
 Altitude (km) : 2.120
 Gaia source ID : 4068913069813624960
 2Mass ID (if available) : 17510090-2234520
 ICRS Star Coord at Epoch: 17h 51m 00.89957s -22:34:52.35214s
 RUWE (>1.4 is poor) : 0.92
 K magnitude : 9.461
 G magnitude : 14.919
 RP magnitude : 13.583
 BP magnitude : 17.041
 DUPflag : 0
 Distance (au) : 10.125
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 13.42
 Sun-Target sep (deg) : 82.63
 Sun-Moon sep (deg) : 41.43
 B (ring opening deg) : 26.91
 PA of pole (deg) : 5.34
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 3.346
 C/A sky separation (km) : 24573.5
 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_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	2047-09-29T01:33:15.611		34.60	-4.73x	140461.00	-11.93		
A (OER)	I	2047-09-29T01:38:25.374		34.35	-5.83	136774.40	-11.87		
Encke (OEG)	I	2047-09-29T01:42:41.022		34.13	-6.73	133744.89	-11.83		
Encke (IEG)	I	2047-09-29T01:43:08.220		34.10	-6.83	133423.31	-11.82		
A (IER)	I	2047-09-29T01:59:18.892		33.08	-10.27	122050.38	-11.60		
B (OER)	I	2047-09-29T02:05:46.701		32.60	-11.64	117571.16	-11.50		
B (IER)	I	2047-09-29T02:44:20.371		29.01	-19.77	91984.69	-10.49		
C (IER)	I	2047-09-29T03:14:06.984	b	25.47	-25.96	74490.58	-8.92		
Saturn	I	2047-09-29T03:06:05.431		26.48	-24.31	60046.77		22.64	27.06
Saturn	E	2047-09-29T05:24:53.288		4.46x	-50.54	60092.98		20.01	24.05
C (IER)	E	2047-09-29T05:23:19.260	b	4.75x	-50.30	74490.58	9.09		
B (IER)	E	2047-09-29T05:52:26.400		-0.71x	-54.54	91984.69	10.77		
B (OER)	E	2047-09-29T06:29:49.869		-7.99x	-58.61	117571.17	11.91		
A (IER)	E	2047-09-29T06:36:03.883		-9.22x	-59.10	122050.38	12.04		
Encke (IEG)	E	2047-09-29T06:51:37.603		-12.34x	-60.04	133423.31	12.31		
Encke (OEG)	E	2047-09-29T06:52:03.717		-12.43x	-60.06	133744.89	12.32		
A (OER)	E	2047-09-29T06:56:09.047		-13.25x	-60.23	136774.40	12.38		
F ring	E	2047-09-29T07:01:06.005		-14.25x	-60.40	140461.00	12.45		

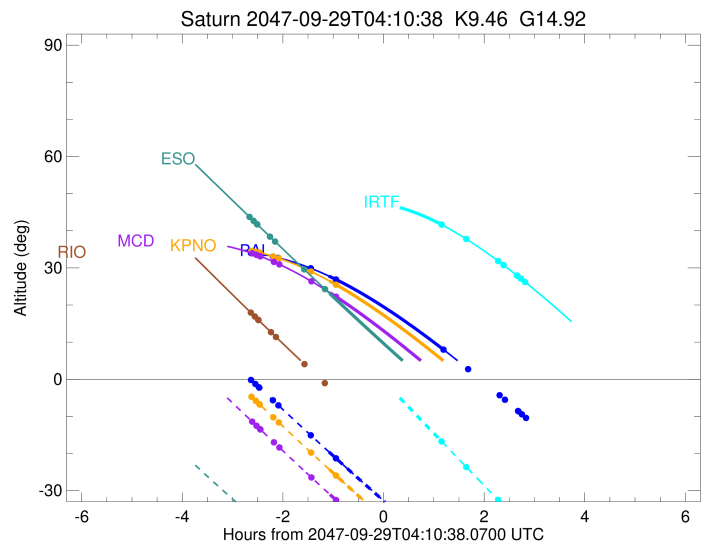
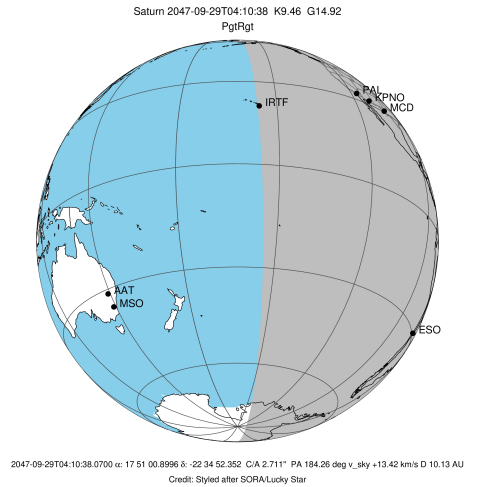
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-09-29T04:16:25.160
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MCD
 Location : McDonald Obs. 2.7m
 Latitude (deg) : 30.67158
 E. Longitude (deg) : 255.97844
 Altitude (km) : 2.075
 Gaia source ID : 4068913069813624960
 2Mass ID (if available) : 17510090-2234520
 ICRS Star Coord at Epoch: 17h 51m 00.89957s -22:34:52.35214s
 RUWE (>1.4 is poor) : 0.92
 K magnitude : 9.461
 G magnitude : 14.919
 RP magnitude : 13.583
 BP magnitude : 17.041
 DUPflag : 0
 Distance (au) : 10.125
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 13.42
 Sun-Target sep (deg) : 82.63
 Sun-Moon sep (deg) : 41.33
 B (ring opening deg) : 26.91
 PA of pole (deg) : 5.34
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 3.306
 C/A sky separation (km) : 24277.1
 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



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

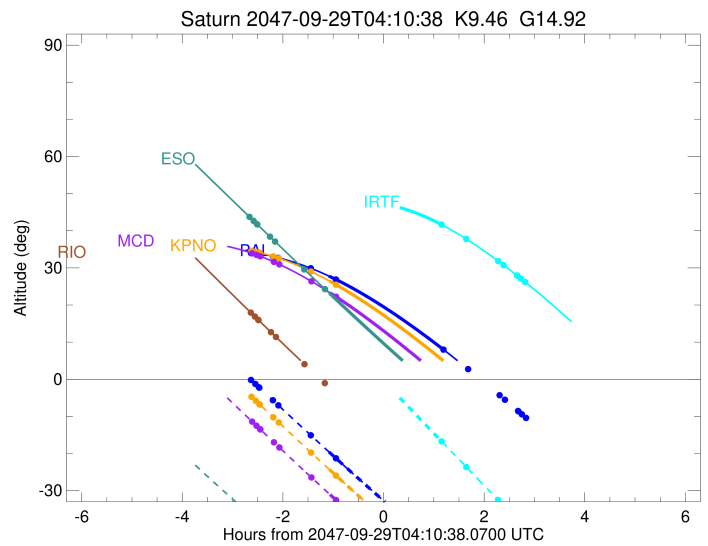
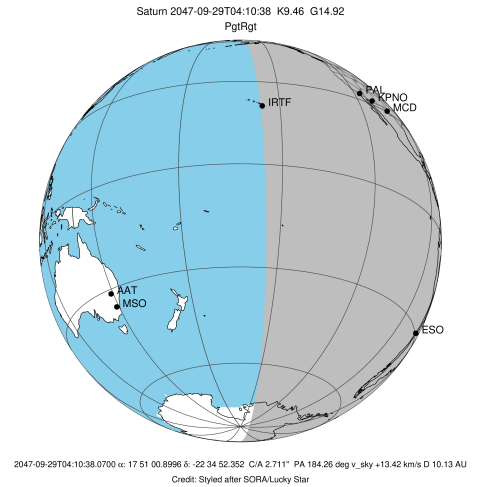
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-09-29T01:34:03.056		33.92	-11.43	140461.00	-11.96		
A (OER)	I	2047-09-29T01:39:11.850		33.51	-12.53	136774.40	-11.91		
Encke (OEG)	I	2047-09-29T01:43:26.640		33.15	-13.45	133744.89	-11.87		
Encke (IEG)	I	2047-09-29T01:43:53.744		33.11	-13.54	133423.31	-11.86		
A (IER)	I	2047-09-29T02:00:00.623		31.61	-16.99	122050.38	-11.65		
B (OER)	I	2047-09-29T02:06:26.659		30.95	-18.37	117571.16	-11.55		
B (IER)	I	2047-09-29T02:44:45.436		26.38	-26.47	91984.69	-10.59		
C (IER)	I	2047-09-29T03:14:11.095	b	22.22	-32.56	74490.58	-9.06		
Saturn	I	2047-09-29T03:06:45.560		23.32	-31.04	60050.51		22.44	26.83
Saturn	E	2047-09-29T05:25:28.324		-0.77x	-55.99	60098.36		19.69	23.68
C (IER)	E	2047-09-29T05:24:40.651	b	-0.62x	-55.88	74490.58	9.25		
B (IER)	E	2047-09-29T05:53:23.878		-6.27x	-59.22	91984.69	10.89		
B (OER)	E	2047-09-29T06:30:27.046		-13.77x	-61.65	117571.16	12.00		
A (IER)	E	2047-09-29T06:36:38.214		-15.04x	-61.81	122050.38	12.13		
Encke (IEG)	E	2047-09-29T06:52:05.256		-18.23x	-61.88	133423.31	12.40		
Encke (OEG)	E	2047-09-29T06:52:31.191		-18.32x	-61.87	133744.89	12.40		
A (OER)	E	2047-09-29T06:56:34.855		-19.16x	-61.81	136774.40	12.46		
F ring	E	2047-09-29T07:01:29.838		-20.19x	-61.69	140461.00	12.53		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-09-29T04:11:06.810
 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 : 4068913069813624960
 2Mass ID (if available) : 17510090-2234520
 ICRS Star Coord at Epoch: 17h 51m 00.89957s -22:34:52.35214s
 RUWE (>1.4 is poor) : 0.92
 K magnitude : 9.461
 G magnitude : 14.919
 RP magnitude : 13.583
 BP magnitude : 17.041
 DUPflag : 0
 Distance (au) : 10.125
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 13.42
 Sun-Target sep (deg) : 82.63
 Sun-Moon sep (deg) : 42.10
 B (ring opening deg) : 26.91
 PA of pole (deg) : 5.34
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 3.298
 C/A sky separation (km) : 24216.0
 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



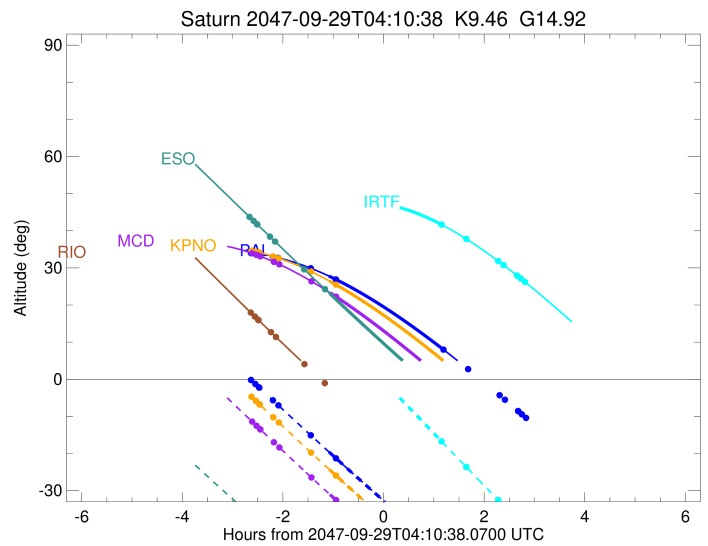
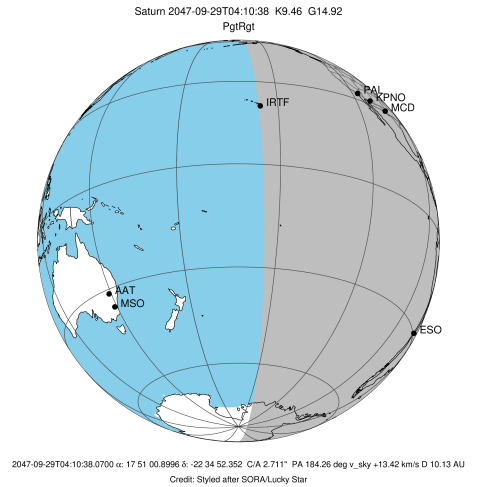
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2047-09-29T01:25:53.906		35.81	37.64x	140461.00	-11.98		
A (OER)	I	2047-09-29T01:31:02.318		36.59	36.50x	136774.40	-11.92		
Encke (OEG)	I	2047-09-29T01:35:16.958		37.22	35.55x	133744.89	-11.87		
Encke (IEG)	I	2047-09-29T01:35:44.055		37.29	35.45x	133423.31	-11.86		
A (IER)	I	2047-09-29T01:51:51.787		39.54	31.81x	122050.38	-11.63		
B (OER)	I	2047-09-29T01:58:18.762		40.38	30.35x	117571.16	-11.52		
B (IER)	I	2047-09-29T02:36:49.952		44.60	21.51x	91984.69	-10.50		
C (IER)	I	2047-09-29T03:06:32.248	b	46.71	14.60x	74490.58	-8.97		
Saturn	I	2047-09-29T03:00:25.880		46.36	16.03x	60061.09		21.86	26.16
Saturn	E	2047-09-29T05:21:38.384		41.46	-17.14	60091.98		20.07	24.12
C (IER)	E	2047-09-29T05:19:55.238	b	41.66	-16.73	74490.58	9.02		
B (IER)	E	2047-09-29T05:49:24.108		37.79	-23.65	91984.69	10.60		
B (OER)	E	2047-09-29T06:27:31.589		31.83	-32.54	117571.16	11.66		
A (IER)	E	2047-09-29T06:33:53.896		30.75	-34.02	122050.38	11.77		
Encke (IEG)	E	2047-09-29T06:49:49.099		27.96	-37.69	133423.31	12.03		
Encke (OEG)	E	2047-09-29T06:50:15.828		27.88	-37.79	133744.89	12.03		
A (OER)	E	2047-09-29T06:54:26.963		27.12	-38.75	136774.40	12.09		
F ring	E	2047-09-29T06:59:31.019		26.20	-39.91	140461.00	12.16		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-09-29T04:17:26.480
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : RIO
 Location : Rio de Janeiro
 Latitude (deg) : -22.89506
 E. Longitude (deg) : 316.77708
 Altitude (km) : 0.033
 Gaia source ID : 4068913069813624960
 2Mass ID (if available) : 17510090-2234520
 ICRS Star Coord at Epoch: 17h 51m 00.89957s -22:34:52.35214s
 RUWE (>1.4 is poor) : 0.92
 K magnitude : 9.461
 G magnitude : 14.919
 RP magnitude : 13.583
 BP magnitude : 17.041
 DUPflag : 0
 Distance (au) : 10.125
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 13.42
 Sun-Target sep (deg) : 82.63
 Sun-Moon sep (deg) : 41.00
 B (ring opening deg) : 26.91
 PA of pole (deg) : 5.34
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 2.293
 C/A sky separation (km) : 16834.9
 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	2047-09-29T01:32:28.269		17.94	-59.55	140461.00	-12.82		
A (OER)	I	2047-09-29T01:37:16.063		16.89	-60.20	136774.40	-12.80		
Encke (OEG)	I	2047-09-29T01:41:12.843		16.02	-60.70	133744.89	-12.79		
Encke (IEG)	I	2047-09-29T01:41:37.993		15.93	-60.76	133423.31	-12.79		
A (IER)	I	2047-09-29T01:56:29.874		12.68	-62.44	122050.38	-12.71		
B (OER)	I	2047-09-29T02:02:22.719		11.40	-63.00	117571.16	-12.68		
B (IER)	I	2047-09-29T02:36:27.626		4.06x	-64.84	91984.69	-12.29		
C (IER)	I	2047-09-29T03:00:42.371		-1.06x	-64.53	74490.58	-11.69		
Saturn	I	2047-09-29T03:06:26.938		-2.26x	-64.26	60154.39		15.99	19.37
Saturn	E	2047-09-29T05:27:45.179		-29.07x	-42.67	60192.58		12.97	15.78
C (IER)	E	2047-09-29T05:38:06.231		-30.73x	-40.52	74490.58	11.97		
B (IER)	E	2047-09-29T06:01:42.607		-34.26x	-35.50	91984.69	12.67		
B (OER)	E	2047-09-29T06:34:37.982		-38.51x	-28.29	117571.16	13.18		
A (IER)	E	2047-09-29T06:40:17.051		-39.15x	-27.04	122050.38	13.24		
Encke (IEG)	E	2047-09-29T06:54:31.870		-40.62x	-23.85	133423.31	13.36		
Encke (OEG)	E	2047-09-29T06:54:55.929		-40.66x	-23.76	133744.89	13.37		
A (OER)	E	2047-09-29T06:58:42.318		-41.02x	-22.92	136774.40	13.40		
F ring	E	2047-09-29T07:03:17.190		-41.43x	-21.89	140461.00	13.43		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2047-09-29T04:18:02.010
 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 : 4068913069813624960
 2Mass ID (if available) : 17510090-2234520
 ICRS Star Coord at Epoch: 17h 51m 00.89957s -22:34:52.35214s
 RUWE (>1.4 is poor) : 0.92
 K magnitude : 9.461
 G magnitude : 14.919
 RP magnitude : 13.583
 BP magnitude : 17.041
 DUPflag : 0
 Distance (au) : 10.125
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 13.42
 Sun-Target sep (deg) : 82.63
 Sun-Moon sep (deg) : 41.22
 B (ring opening deg) : 26.91
 PA of pole (deg) : 5.34
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 2.357
 C/A sky separation (km) : 17311.5
 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_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	2047-09-29T01:30:52.824		43.73	-36.23	140461.00	-12.60		
A (OER)	I	2047-09-29T01:35:45.552		42.66	-37.17	136774.40	-12.58		
Encke (OEG)	I	2047-09-29T01:39:46.452		41.79	-37.94	133744.89	-12.57		
Encke (IEG)	I	2047-09-29T01:40:12.043		41.70	-38.02	133423.31	-12.57		
A (IER)	I	2047-09-29T01:55:19.968		38.40	-40.84	122050.38	-12.48		
B (OER)	I	2047-09-29T02:01:19.393		37.10	-41.93	117571.16	-12.44		
B (IER)	I	2047-09-29T02:36:05.637		29.58	-47.86	91984.69	-12.03		
C (IER)	I	2047-09-29T03:00:54.912		24.27	-51.55	74490.58	-11.39		
Saturn	I	2047-09-29T03:06:09.081		23.15	-52.26	60149.03		16.38	19.82
Saturn	E	2047-09-29T05:29:09.334		-5.89x	-55.78	60188.34		13.33	16.22
C (IER)	E	2047-09-29T05:39:13.175		-7.78x	-54.77	74490.58	11.69		
B (IER)	E	2047-09-29T06:03:18.566		-12.21x	-51.83	91984.69	12.44		
B (OER)	E	2047-09-29T06:36:45.584		-18.03x	-46.79	117571.16	13.00		
A (IER)	E	2047-09-29T06:42:29.359		-18.98x	-45.84	122050.38	13.06		
Encke (IEG)	E	2047-09-29T06:56:55.258		-21.32x	-43.36	133423.31	13.20		
Encke (OEG)	E	2047-09-29T06:57:19.614		-21.39x	-43.28	133744.89	13.21		
A (OER)	E	2047-09-29T07:01:08.752		-21.99x	-42.61	136774.40	13.24		
F ring	E	2047-09-29T07:05:46.866		-22.71x	-41.77	140461.00	13.27		