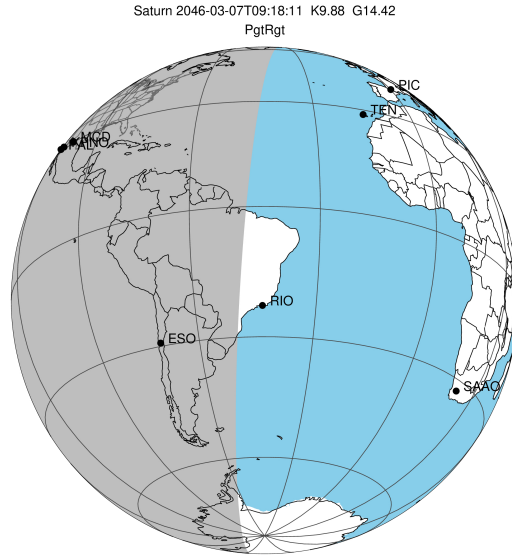


target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-03-07T09:18:11.180  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 4120814691545078784  
 2Mass ID (if available) : 17254740-2142333

Saturn 2046-03-07T09:18:11 K9.88 G14.42 PgtRgt

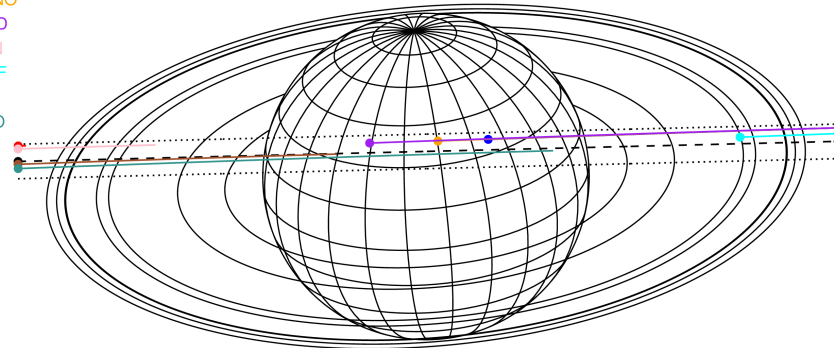
ICRS Star Coord at Epoch: 17h 25m 47.39675s -21:42:33.72317s

RUWE (>1.4 is poor) : 0.96  
 K magnitude : 9.885  
 G magnitude : 14.423  
 RP magnitude : 13.250  
 BP magnitude : 15.910  
 DUPflag : 0  
 Distance (au) : 10.078  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 12.55  
 Sun-Target sep (deg) : 84.27  
 Sun-Moon sep (deg) : 80.18  
 B (ring opening deg) : 26.56  
 PA of pole (deg) : 4.75



2046-03-07T09:18:11.1800 α: 17 25 47.3967 δ: -21 42 33.723 C/A 1.266° PA 181.41 deg v\_sky +12.55 km/s D 10.08 AU  
 Credit: Styled after SORA/Lucky Star

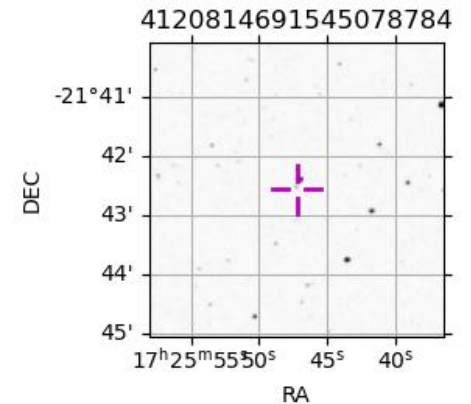
Earth  
 PIC  
 PAL  
 KPNO  
 MCD  
 TEN  
 IRTF  
 RIO  
 ESO



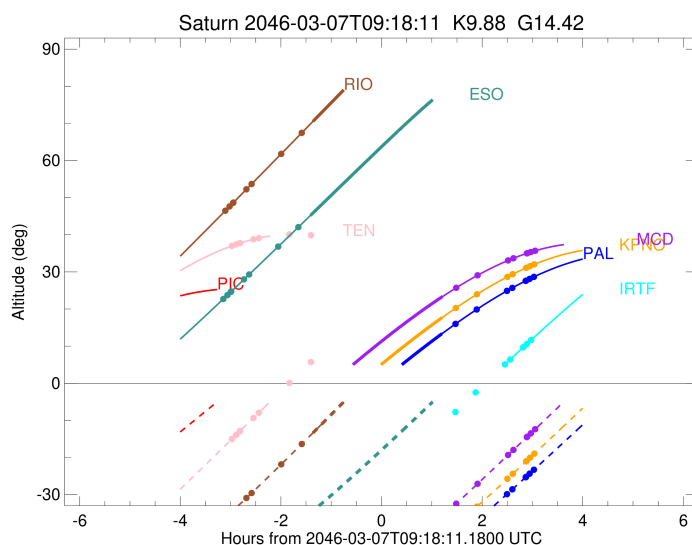
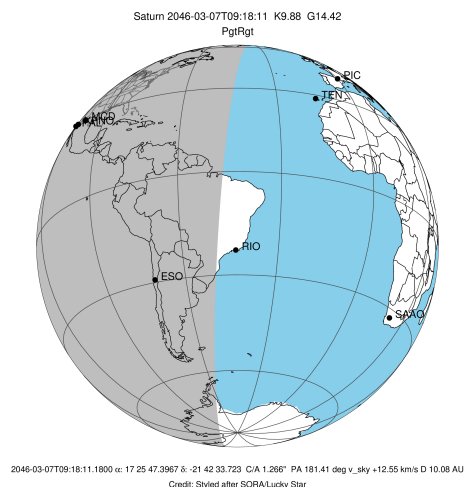
#	a(km)	ring
1	74490.6	C (IER)
2	91984.7	B (IER)
3	117571.2	B (OER)
4	122050.4	A (IER)
5	133423.3	Encke (IEG)
6	133744.9	Encke (OEG)
7	136774.4	A (OER)
8	140461.0	F ring

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		+	+	MAR 07 10:30 - MAR 07 12:19	PneRne
PMO	Purple Mtn Obs	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl	32.0	248.4		+	+	MAR 07 10:30 - MAR 07 12:20	PneRne
MCD	McDonald Obs.	30.7	256.0		+	+	MAR 07 10:31 - MAR 07 12:21	PneRne
TEN	Teide Obs./Ten	28.3	343.5	+			MAR 07 06:19 - MAR 07 06:51	PnnRin
IRTF	Mauna Kea/IRTF	19.8	204.5			+	MAR 07 11:45 - MAR 07 12:16	PnnRne
KAV	Kavalur Observ	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+	+		MAR 07 06:11 - MAR 07 07:56	PinRin
ESO	European South	-29.3	289.3	+	+		MAR 07 06:09 - MAR 07 07:53	PinRin
AAT	Siding Spring	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Ob	-35.3	149.0					PnnRnn



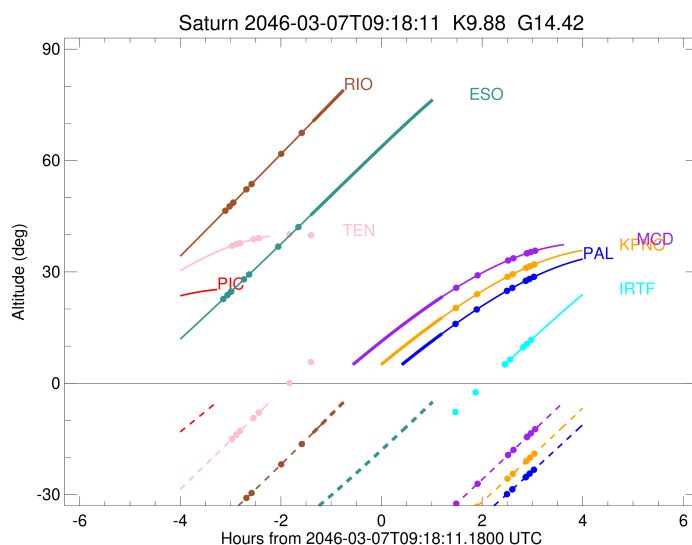
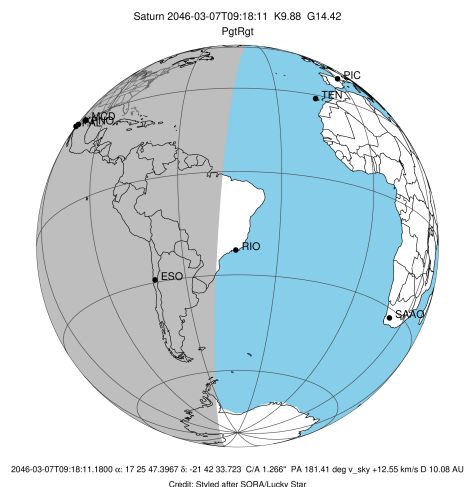
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-03-07T09:11:01.590  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PAL  
 Location : Palomar Mt (200")  
 Latitude (deg) : 33.35622  
 E. Longitude (deg) : 243.13601  
 Altitude (km) : 1.706  
 Gaia source ID : 4120814691545078784  
 2Mass ID (if available) : 17254740-2142333  
 ICRS Star Coord at Epoch: 17h 25m 47.39675s -21:42:33.72317s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 9.885  
 G magnitude : 14.423  
 RP magnitude : 13.250  
 BP magnitude : 15.910  
 DUPflag : 0  
 Distance (au) : 10.078  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 12.55  
 Sun-Target sep (deg) : 84.27  
 Sun-Moon sep (deg) : 80.31  
 B (ring opening deg) : 26.56  
 PA of pole (deg) : 4.75  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.762  
 C/A sky separation (km) : 12876.0  
 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	2046-03-07T06:13:49.591	-36.58x	-52.93	140461.00	-12.62			
A (OER)	I	2046-03-07T06:18:42.080	-35.56x	-53.66	136774.40	-12.59			
Encke (OEG)	I	2046-03-07T06:22:42.874	-34.72x	-54.25	133744.89	-12.57			
Encke (IEG)	I	2046-03-07T06:23:08.458	-34.63x	-54.31	133423.31	-12.57			
A (IER)	I	2046-03-07T06:38:16.484	-31.47x	-56.38	122050.38	-12.48			
B (OER)	I	2046-03-07T06:44:16.009	-30.22x	-57.13	117571.16	-12.44			
B (IER)	I	2046-03-07T07:18:57.589	-23.05x	-60.54	91984.69	-12.11			
C (IER)	I	2046-03-07T07:43:23.620	-18.06x	-61.78	74490.58	-11.71			
Saturn	I	2046-03-07T07:52:54.838	-16.13x	-61.96	60190.10			13.40	16.30
Saturn	E	2046-03-07T10:30:12.029	13.33	-44.91	60235.39			8.62	10.55
C (IER)	E	2046-03-07T10:46:27.394	15.98	-41.91	74490.58	11.37			
B (IER)	E	2046-03-07T11:11:43.087	19.88	-37.07	91984.69	11.67			
B (OER)	E	2046-03-07T11:47:54.407	24.90	-29.86	117571.16	11.87			
A (IER)	E	2046-03-07T11:54:11.612	25.69	-28.58	122050.38	11.88			
Encke (IEG)	E	2046-03-07T12:10:07.018	27.59	-25.32	133423.31	11.92			
Encke (OEG)	E	2046-03-07T12:10:33.992	27.64	-25.23	133744.89	11.92			
A (OER)	E	2046-03-07T12:14:48.019	28.11	-24.36	136774.40	11.93			
F ring	E	2046-03-07T12:19:56.933	28.67	-23.30	140461.00	11.94			

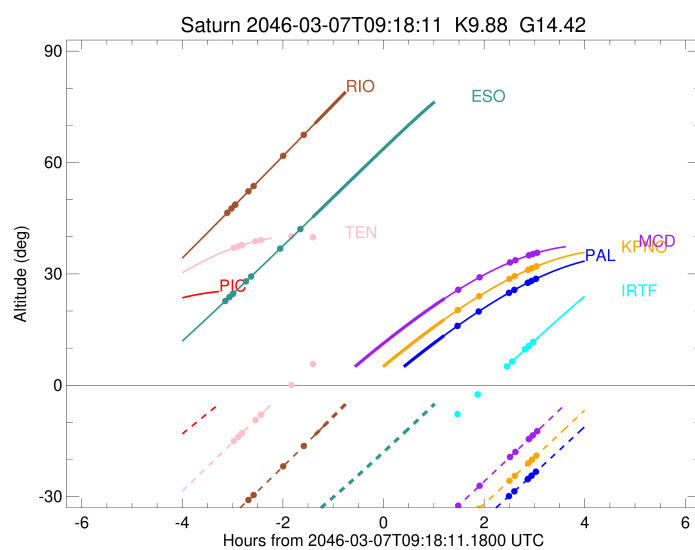
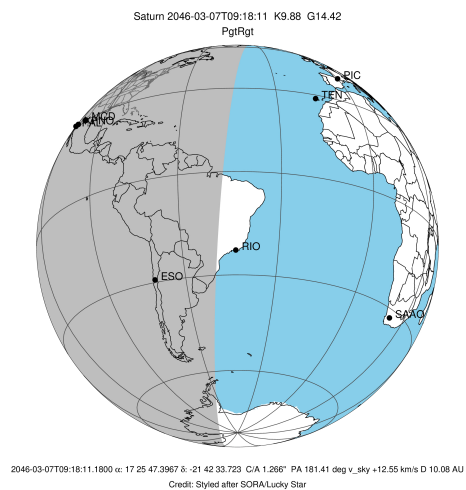
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-03-07T09:11:06.420  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : KPNO  
 Location : Kitt Peak Natl Obs  
 Latitude (deg) : 31.96333  
 E. Longitude (deg) : 248.40000  
 Altitude (km) : 2.120  
 Gaia source ID : 4120814691545078784  
 2Mass ID (if available) : 17254740-2142333  
 ICRS Star Coord at Epoch: 17h 25m 47.39675s -21:42:33.72317s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 9.885  
 G magnitude : 14.423  
 RP magnitude : 13.250  
 BP magnitude : 15.910  
 DUPflag : 0  
 Distance (au) : 10.078  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 12.55  
 Sun-Target sep (deg) : 84.27  
 Sun-Moon sep (deg) : 80.38  
 B (ring opening deg) : 26.56  
 PA of pole (deg) : 4.75  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.771  
 C/A sky separation (km) : 12941.4  
 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	2046-03-07T06:13:26.678		-32.10x	-56.95	140461.00	-12.58		
A (OER)	I	2046-03-07T06:18:19.967		-31.07x	-57.61	136774.40	-12.56		
Encke (OEG)	I	2046-03-07T06:22:21.430		-30.22x	-58.14	133744.89	-12.54		
Encke (IEG)	I	2046-03-07T06:22:47.085		-30.13x	-58.19	133423.31	-12.53		
A (IER)	I	2046-03-07T06:37:57.732		-26.94x	-59.99	122050.38	-12.44		
B (OER)	I	2046-03-07T06:43:58.335		-25.68x	-60.61	117571.16	-12.40		
B (IER)	I	2046-03-07T07:18:46.662		-18.45x	-63.04	91984.69	-12.07		
C (IER)	I	2046-03-07T07:43:18.088		-13.43x	-63.34	74490.58	-11.67		
Saturn	I	2046-03-07T07:52:47.106		-11.51x	-63.13	60189.53		13.45	16.36
Saturn	E	2046-03-07T10:30:29.412		17.70	-41.54	60235.05		8.66	10.60
C (IER)	E	2046-03-07T10:46:45.558		20.26	-38.34	74490.58	11.33		
B (IER)	E	2046-03-07T11:12:06.300		23.98	-33.23	91984.69	11.64		
B (OER)	E	2046-03-07T11:48:23.672		28.67	-25.72	117571.16	11.84		
A (IER)	E	2046-03-07T11:54:41.807		29.39	-24.40	122050.38	11.86		
Encke (IEG)	E	2046-03-07T12:10:39.420		31.09	-21.05	133423.31	11.90		
Encke (OEG)	E	2046-03-07T12:11:06.453		31.13	-20.95	133744.89	11.90		
A (OER)	E	2046-03-07T12:15:21.028		31.55	-20.05	136774.40	11.90		
F ring	E	2046-03-07T12:20:30.588		32.03	-18.96	140461.00	11.91		

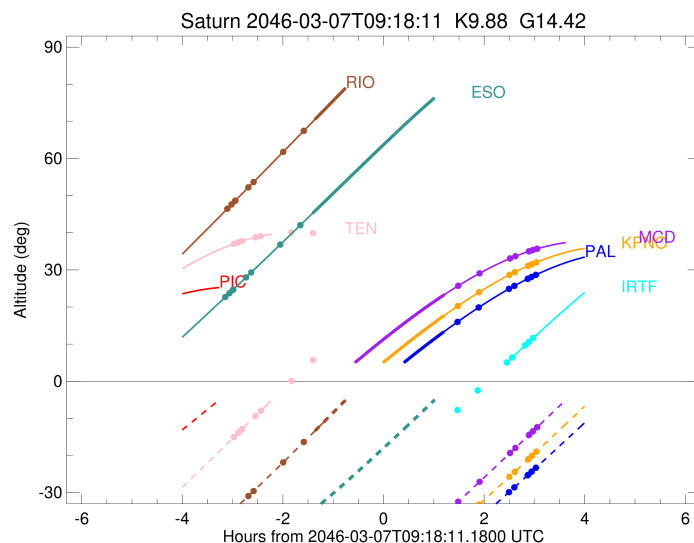
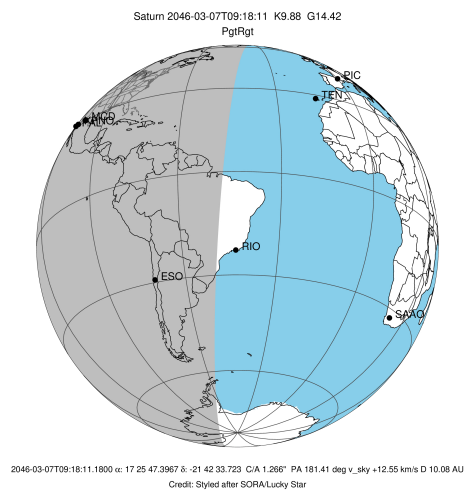
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-03-07T09:11:23.770  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : MCD  
 Location : McDonald Obs. 2.7m  
 Latitude (deg) : 30.67158  
 E. Longitude (deg) : 255.97844  
 Altitude (km) : 2.075  
 Gaia source ID : 4120814691545078784  
 2Mass ID (if available) : 17254740-2142333  
 ICRS Star Coord at Epoch: 17h 25m 47.39675s -21:42:33.72317s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 9.885  
 G magnitude : 14.423  
 RP magnitude : 13.250  
 BP magnitude : 15.910  
 DUPflag : 0  
 Distance (au) : 10.078  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 12.55  
 Sun-Target sep (deg) : 84.27  
 Sun-Moon sep (deg) : 80.46  
 B (ring opening deg) : 26.56  
 PA of pole (deg) : 4.75  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.791  
 C/A sky separation (km) : 13090.7  
 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	2046-03-07T06:13:06.173	-25.57x	-61.70	140461.00	-12.53			
A (OER)	I	2046-03-07T06:18:00.800	-24.53x	-62.19	136774.40	-12.50			
Encke (OEG)	I	2046-03-07T06:22:03.382	-23.68x	-62.57	133744.89	-12.48			
Encke (IEG)	I	2046-03-07T06:22:29.157	-23.58x	-62.61	133423.31	-12.47			
A (IER)	I	2046-03-07T06:37:44.163	-20.38x	-63.77	122050.38	-12.38			
B (OER)	I	2046-03-07T06:43:46.554	-19.11x	-64.10	117571.16	-12.34			
B (IER)	I	2046-03-07T07:18:46.047	-11.87x	-64.52	91984.69	-12.00			
C (IER)	I	2046-03-07T07:43:26.497	-6.85x	-63.25	74490.58	-11.59			
Saturn	I	2046-03-07T07:52:47.135	-4.98x	-62.47	60188.00			13.58	16.52
Saturn	E	2046-03-07T10:31:02.799	23.37	-35.81	60234.31			8.76	10.72
C (IER)	E	2046-03-07T10:47:18.220	25.72	-32.44	74490.58	11.27			
B (IER)	E	2046-03-07T11:12:46.398	29.08	-27.08	91984.69	11.59			
B (OER)	E	2046-03-07T11:49:11.989	33.09	-19.31	117571.16	11.80			
A (IER)	E	2046-03-07T11:55:31.319	33.68	-17.95	122050.38	11.82			
Encke (IEG)	E	2046-03-07T12:11:31.679	35.00	-14.51	133423.31	11.86			
Encke (OEG)	E	2046-03-07T12:11:58.784	35.03	-14.41	133744.89	11.86			
A (OER)	E	2046-03-07T12:16:14.021	35.34	-13.50	136774.40	11.87			
F ring	E	2046-03-07T12:21:24.351	35.69	-12.38	140461.00	11.88			

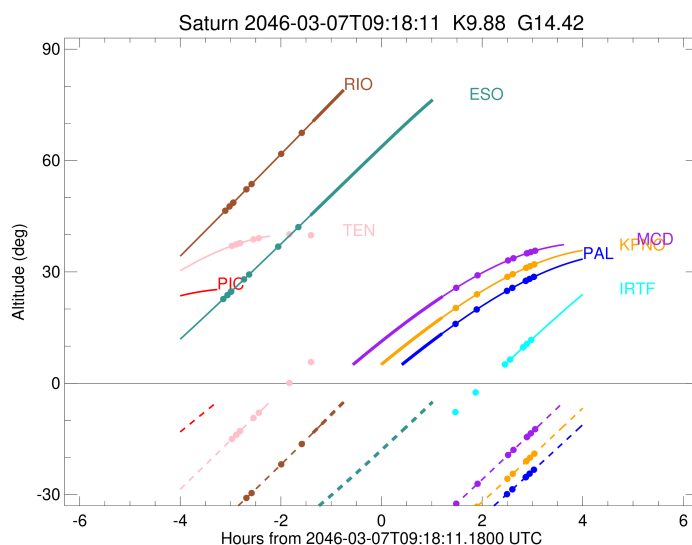
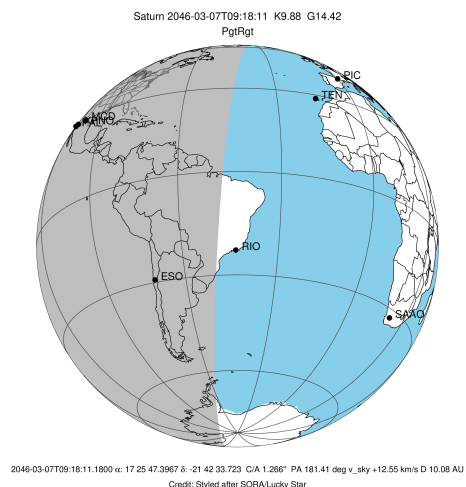
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-03-07T09:21:33.130  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : TEN  
 Location : Teide Obs./Tenerife  
 Latitude (deg) : 28.30050  
 E. Longitude (deg) : 343.48909  
 Altitude (km) : 2.395  
 Gaia source ID : 4120814691545078784  
 2Mass ID (if available) : 17254740-2142333  
 ICRS Star Coord at Epoch: 17h 25m 47.39675s -21:42:33.72317s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 9.885  
 G magnitude : 14.423  
 RP magnitude : 13.250  
 BP magnitude : 15.910  
 DUPflag : 0  
 Distance (au) : 10.078  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 12.55  
 Sun-Target sep (deg) : 84.27  
 Sun-Moon sep (deg) : 80.62  
 B (ring opening deg) : 26.56  
 PA of pole (deg) : 4.75  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.909  
 C/A sky separation (km) : 13956.1  
 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	2046-03-07T06:19:48.361		37.01	-15.02	140461.00	-11.97		
A (OER)	I	2046-03-07T06:24:56.734		37.42	-13.89	136774.40	-11.94		
Encke (OEG)	I	2046-03-07T06:29:10.558		37.74	-12.95	133744.89	-11.93		
Encke (IEG)	I	2046-03-07T06:29:37.523		37.77	-12.85	133423.31	-11.92		
A (IER)	I	2046-03-07T06:45:34.275		38.78	-9.34	122050.38	-11.85		
B (OER)	I	2046-03-07T06:51:52.924		39.11	-7.94	117571.16	-11.81		
B (IER)	I	2046-03-07T07:28:23.865		40.10	0.09x	91984.69	-11.51		
C (IER)	I	2046-03-07T07:54:07.653		39.87	5.72x	74490.58	-11.11		
Saturn	I	2046-03-07T08:01:23.938		39.67	7.30x	60169.93		15.08	18.29
Saturn	E	2046-03-07T10:41:33.764		22.51	39.96x	60235.15		8.65	10.58
C (IER)	E	2046-03-07T10:58:05.108		19.76	42.86x	74490.58	11.22		
B (IER)	E	2046-03-07T11:23:31.848		15.30	46.99x	91984.69	11.65		
B (OER)	E	2046-03-07T11:59:33.193		8.62	51.90x	117571.16	11.99		
A (IER)	E	2046-03-07T12:05:46.147		7.43	52.62x	122050.38	12.03		
Encke (IEG)	E	2046-03-07T12:21:27.848		4.39x	54.19x	133423.31	12.12		
Encke (OEG)	E	2046-03-07T12:21:54.376		4.30x	54.23x	133744.89	12.12		
A (OER)	E	2046-03-07T12:26:04.052		3.48x	54.59x	136774.40	12.14		
F ring	E	2046-03-07T12:31:07.308		2.48x	55.00x	140461.00	12.17		

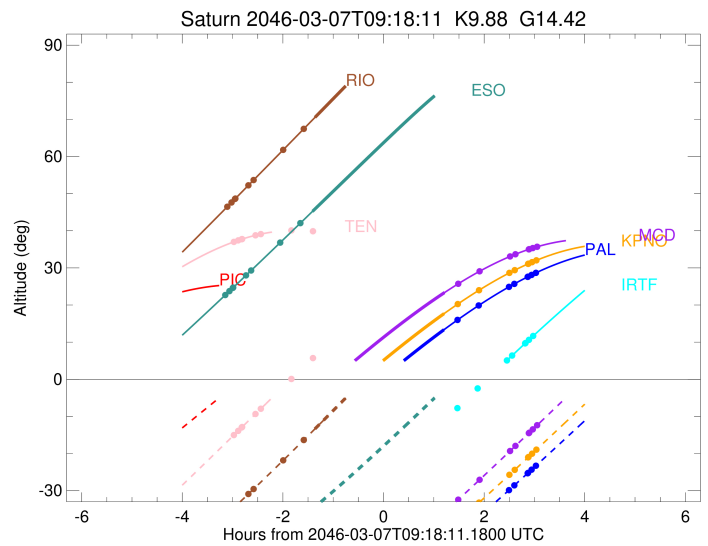
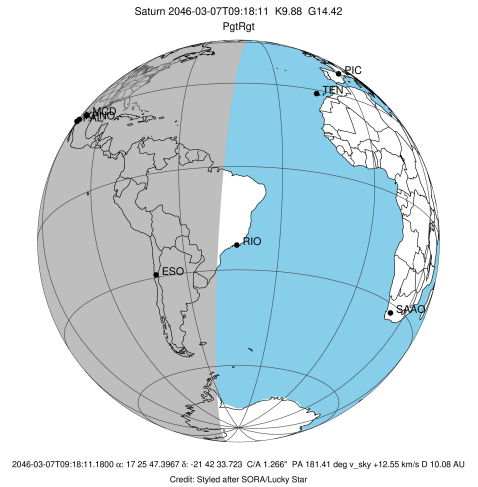
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-03-07T09:10:45.550  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : IRTF  
 Location : Mauna Kea/IRTF  
 Latitude (deg) : 19.82622  
 E. Longitude (deg) : 204.52800  
 Altitude (km) : 4.168  
 Gaia source ID : 4120814691545078784  
 2Mass ID (if available) : 17254740-2142333  
 ICRS Star Coord at Epoch: 17h 25m 47.39675s -21:42:33.72317s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 9.885  
 G magnitude : 14.423  
 RP magnitude : 13.250  
 BP magnitude : 15.910  
 DUPflag : 0  
 Distance (au) : 10.078  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 12.55  
 Sun-Target sep (deg) : 84.27  
 Sun-Moon sep (deg) : 79.90  
 B (ring opening deg) : 26.56  
 PA of pole (deg) : 4.75  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.398  
 C/A sky separation (km) : 10221.7  
 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	2046-03-07T06:15:17.790	-69.91x	-25.86	140461.00	-12.95			
A (OER)	I	2046-03-07T06:20:02.665	-68.81x	-26.97	136774.40	-12.93			
Encke (OEG)	I	2046-03-07T06:23:57.027	-67.90x	-27.89	133744.89	-12.92			
Encke (IEG)	I	2046-03-07T06:24:21.918	-67.80x	-27.98	133423.31	-12.92			
A (IER)	I	2046-03-07T06:39:04.186	-64.38x	-31.43	122050.38	-12.86			
B (OER)	I	2046-03-07T06:44:52.823	-63.03x	-32.79	117571.17	-12.83			
B (IER)	I	2046-03-07T07:18:21.370	-55.24x	-40.58	91984.69	-12.62			
C (IER)	I	2046-03-07T07:41:40.443	-49.83x	-45.95	74490.58	-12.36			
Saturn	I	2046-03-07T07:53:37.682	-47.06x	-48.67	60213.45			11.18	13.64
Saturn	E	2046-03-07T10:28:55.654	-11.64x	-75.39	60250.02			6.39	7.83
C (IER)	E	2046-03-07T10:46:17.770	-7.78x	-75.05	74490.58	11.98			
B (IER)	E	2046-03-07T11:10:27.108	-2.47x	-72.76	91984.69	12.14			
B (OER)	E	2046-03-07T11:45:26.941	5.09	-67.06	117571.16	12.21			
A (IER)	E	2046-03-07T11:51:33.640	6.39	-65.89	122050.38	12.22			
Encke (IEG)	E	2046-03-07T12:07:04.443	9.66	-62.79	133423.31	12.22			
Encke (OEG)	E	2046-03-07T12:07:30.761	9.75	-62.70	133744.89	12.22			
A (OER)	E	2046-03-07T12:11:38.713	10.62	-61.85	136774.40	12.22			
F ring	E	2046-03-07T12:16:40.478	11.66	-60.79	140461.00	12.22			

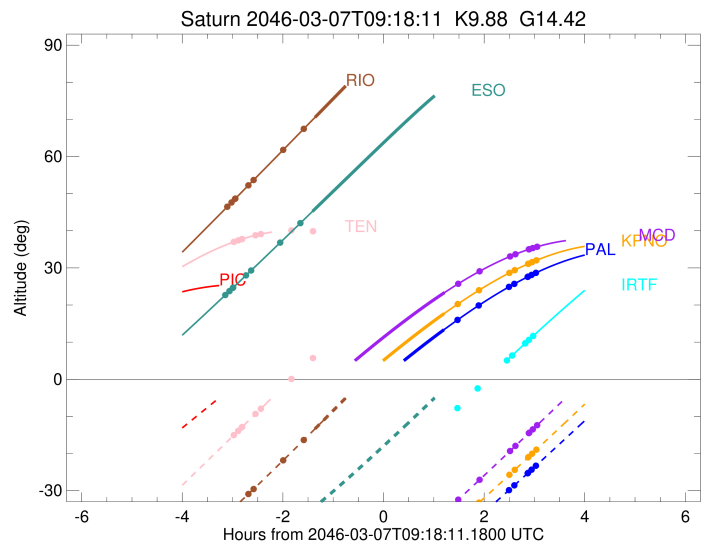
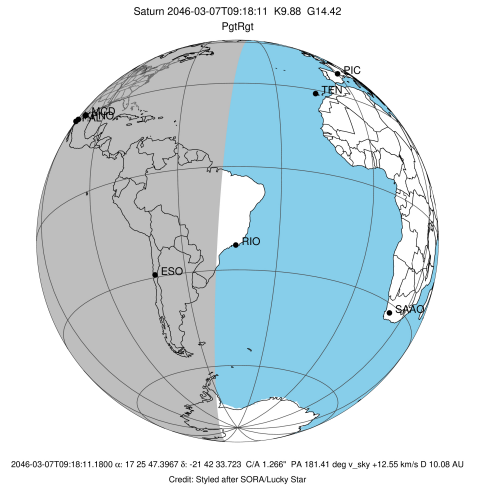
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-03-07T09:18:06.290  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : RIO  
 Location : Rio de Janeiro  
 Latitude (deg) : -22.89506  
 E. Longitude (deg) : 316.77708  
 Altitude (km) : 0.033  
 Gaia source ID : 4120814691545078784  
 2Mass ID (if available) : 17254740-2142333  
 ICRS Star Coord at Epoch: 17h 25m 47.39675s -21:42:33.72317s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 9.885  
 G magnitude : 14.423  
 RP magnitude : 13.250  
 BP magnitude : 15.910  
 DUPflag : 0  
 Distance (au) : 10.078  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 12.55  
 Sun-Target sep (deg) : 84.27  
 Sun-Moon sep (deg) : 81.07  
 B (ring opening deg) : 26.56  
 PA of pole (deg) : 4.75  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.251  
 C/A sky separation (km) : 9145.4  
 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	2046-03-07T06:11:57.404		46.49	-36.21	140461.00	-12.24		
A (OER)	I	2046-03-07T06:16:58.779		47.64	-35.16	136774.40	-12.22		
Encke (OEG)	I	2046-03-07T06:21:06.731		48.58	-34.30	133744.89	-12.21		
Encke (IEG)	I	2046-03-07T06:21:33.066		48.69	-34.20	133423.31	-12.21		
A (IER)	I	2046-03-07T06:37:06.502		52.25	-30.89	122050.38	-12.16		
B (OER)	I	2046-03-07T06:43:15.299		53.67	-29.57	117571.16	-12.13		
B (IER)	I	2046-03-07T07:18:37.562		61.81	-21.83	91984.69	-11.97		
C (IER)	I	2046-03-07T07:43:10.444		67.48	-16.35	74490.58	-11.77		
Saturn	I	2046-03-07T07:56:25.983		70.54	-13.36	60218.82		10.61	12.95
Saturn	E	2046-03-07T10:40:02.864		71.48	24.16x	60258.00		4.76	5.84
C (IER)	E	2046-03-07T10:58:55.807		67.12	28.49x	74490.58	11.73		
B (IER)	E	2046-03-07T11:23:34.336		61.43	34.11x	91984.69	11.91		
B (OER)	E	2046-03-07T11:59:07.236		53.25	42.12x	117571.16	12.07		
A (IER)	E	2046-03-07T12:05:18.183		51.83	43.50x	122050.38	12.08		
Encke (IEG)	E	2046-03-07T12:20:57.464		48.24	46.95x	133423.31	12.13		
Encke (OEG)	E	2046-03-07T12:21:23.973		48.14	47.05x	133744.89	12.13		
A (OER)	E	2046-03-07T12:25:33.580		47.19	47.96x	136774.40	12.14		
F ring	E	2046-03-07T12:30:37.023		46.03	49.06x	140461.00	12.16		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-03-07T09:14:33.930  
 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 : 4120814691545078784  
 2Mass ID (if available) : 17254740-2142333  
 ICRS Star Coord at Epoch: 17h 25m 47.39675s -21:42:33.72317s  
 RUWE (>1.4 is poor) : 0.96  
 K magnitude : 9.885  
 G magnitude : 14.423  
 RP magnitude : 13.250  
 BP magnitude : 15.910  
 DUPflag : 0  
 Distance (au) : 10.078  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 12.55  
 Sun-Target sep (deg) : 84.27  
 Sun-Moon sep (deg) : 81.03  
 B (ring opening deg) : 26.56  
 PA of pole (deg) : 4.75  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.113  
 C/A sky separation (km) : 8132.7  
 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	2046-03-07T06:09:33.064		22.70	-51.18	140461.00	-12.46		
A (OER)	I	2046-03-07T06:14:29.076		23.75	-50.61	136774.40	-12.45		
Encke (OEG)	I	2046-03-07T06:18:32.619		24.62	-50.12	133744.89	-12.43		
Encke (IEG)	I	2046-03-07T06:18:58.487		24.71	-50.07	133423.31	-12.43		
A (IER)	I	2046-03-07T06:34:15.347		28.00	-48.07	122050.38	-12.38		
B (OER)	I	2046-03-07T06:40:17.595		29.30	-47.22	117571.16	-12.35		
B (IER)	I	2046-03-07T07:15:01.732		36.82	-41.78	91984.69	-12.19		
C (IER)	I	2046-03-07T07:39:06.522		42.08	-37.57	74490.58	-12.01		
Saturn	I	2046-03-07T07:53:24.676		45.20	-34.93	60228.63		9.48	11.59
Saturn	E	2046-03-07T10:36:25.996		79.43	-1.28x	60260.20		4.20	5.16
C (IER)	E	2046-03-07T10:55:28.249		81.95	2.86x	74490.58	11.80		
B (IER)	E	2046-03-07T11:20:01.843		82.31	8.21x	91984.69	11.93		
B (OER)	E	2046-03-07T11:55:37.856		77.34	15.98x	117571.16	12.02		
A (IER)	E	2046-03-07T12:01:50.302		76.17	17.33x	122050.38	12.03		
Encke (IEG)	E	2046-03-07T12:17:34.455		73.06	20.76x	133423.31	12.06		
Encke (OEG)	E	2046-03-07T12:18:01.123		72.97	20.85x	133744.89	12.06		
A (OER)	E	2046-03-07T12:22:12.279		72.11	21.76x	136774.40	12.07		
F ring	E	2046-03-07T12:27:17.736		71.06	22.87x	140461.00	12.07		