

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-05-18T13:03:11.390  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 4115052494691697792  
 2Mass ID (if available) : 17205477-2133381

Saturn 2046-05-18T13:03:11 K7.53 G13.80 PgtRgt

ICRS Star Coord at Epoch: 17h 20m 54.76091s -21:33:38.52132s

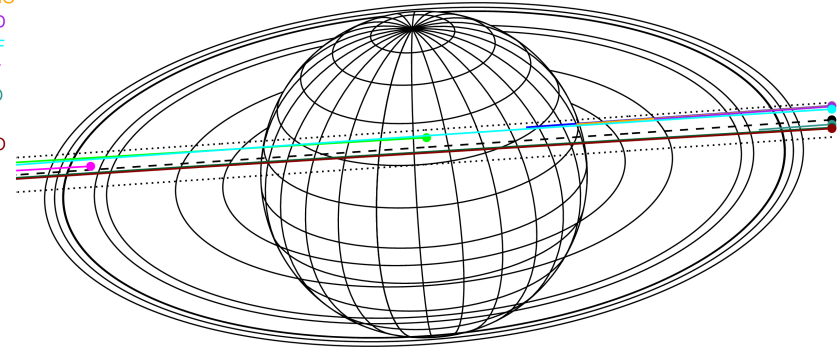
RUWE (>1.4 is poor) : 1.11  
 K magnitude : 7.532  
 G magnitude : 13.797  
 RP magnitude : 12.275  
 BP magnitude : 17.016  
 DUPflag : 0  
 Distance (au) : 9.099  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.65  
 Sun-Target sep (deg) : 156.17  
 Sun-Moon sep (deg) : 45.55  
 B (ring opening deg) : 26.50  
 PA of pole (deg) : 4.63

#	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



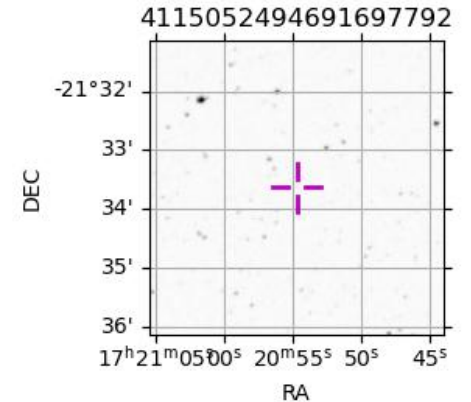
2046-05-18T13:03:11.3900 at: 17 20 54.76091 S: -21 33 38.521 C/A 1.515" PA 183.86 deg v\_sky -17.65 km/s D 09.10 AU  
 Credit: Styled after SORA/Lucky Star

Earth  
 PAL  
 PMO  
 KPNO  
 MCD  
 IRTF  
 KAV  
 ESO  
 AAT  
 MSO

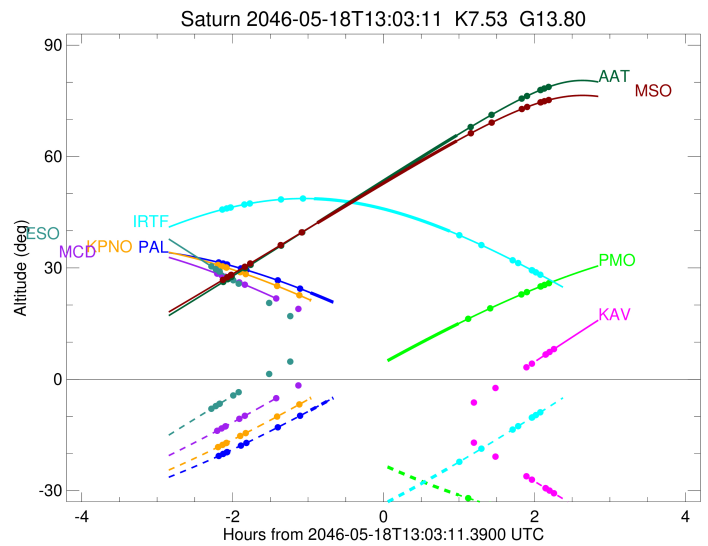
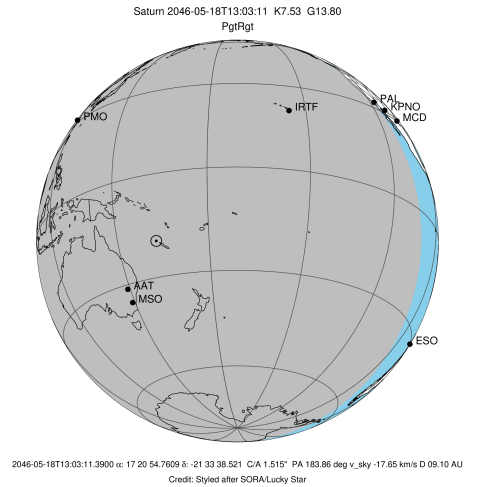


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEncode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (20	33.4	243.1	+	+		MAY 18 10:52 - MAY 18 12:05	PinRin
PMO	Purple Mtn Obs	32.1	118.8		+	+	MAY 18 14:02 - MAY 18 15:14	PneRne
KPNO	Kitt Peak Natl	32.0	248.4	+	+	+	MAY 18 10:51 - MAY 18 12:04	PinRin
MCD	McDonald Obs.	30.7	256.0	+			MAY 18 10:50 - MAY 18 11:37	PnnRin
TEN	Teide Obs./Ten	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+	+	+	MAY 18 10:55 - MAY 18 15:07	PieRie
KAV	Kavalur Observ	12.6	78.8			+	MAY 18 15:11 - MAY 18 15:18	PnnRne
RIO	Rio de Janeiro	-22.9	316.8					PnnRnn
ESO	European South	-29.3	289.3	+			MAY 18 10:46 - MAY 18 10:52	PnnRin
AAT	Siding Spring	-31.3	149.1	+	+	+	MAY 18 10:55 - MAY 18 15:14	PieRie
SAAO	So. Afr. Astro	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Ob	-35.3	149.0	+	+	+	MAY 18 10:55 - MAY 18 15:14	PieRie



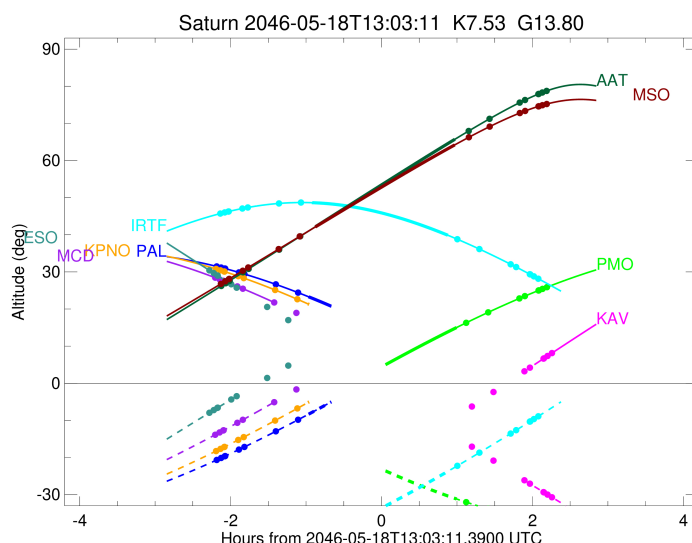
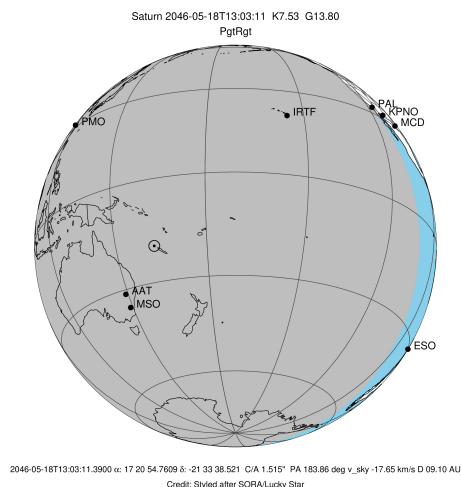
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-05-18T12:59:29.230  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PAL  
 Location : Palomar Mt (200")  
 Latitude (deg) : 33.35622  
 E. Longitude (deg) : 243.13601  
 Altitude (km) : 1.706  
 Gaia source ID : 4115052494691697792  
 2Mass ID (if available) : 17205477-2133381  
 ICRS Star Coord at Epoch: 17h 20m 54.76091s -21:33:38.52132s  
 RUWE (>1.4 is poor) : 1.11  
 K magnitude : 7.532  
 G magnitude : 13.797  
 RP magnitude : 12.275  
 BP magnitude : 17.016  
 DUPflag : 0  
 Distance (au) : 9.099  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.65  
 Sun-Target sep (deg) : 156.17  
 Sun-Moon sep (deg) : 46.24  
 B (ring opening deg) : 26.50  
 PA of pole (deg) : 4.63  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 2.223  
 C/A sky separation (km) : 14667.2  
 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	2046-05-18T10:52:10.190		31.48	-20.66	140461.00	-17.48		
A (OER)	I	2046-05-18T10:55:41.277		31.17	-20.12	136774.40	-17.45		
Encke (OEG)	I	2046-05-18T10:58:35.017		30.92	-19.66	133744.89	-17.42		
Encke (IEG)	I	2046-05-18T10:58:53.474		30.89	-19.62	133423.31	-17.42		
A (IER)	I	2046-05-18T11:09:48.392		29.86	-17.87	122050.38	-17.30		
B (OER)	I	2046-05-18T11:14:07.642		29.43	-17.17	117571.16	-17.25		
B (IER)	I	2046-05-18T11:39:09.709		26.65	-12.95	91984.69	-16.76		
C (IER)	I	2046-05-18T11:56:52.661		24.42	-9.83	74490.58	-16.09		
Saturn	I	2046-05-18T12:05:09.831		23.31	-8.34	60203.71		12.18	14.84
Saturn	E	2046-05-18T13:53:59.940		5.77	12.65x	60195.62		12.94	15.75
C (IER)	E	2046-05-18T14:01:29.331		4.41x	14.17x	74490.58	15.96		
B (IER)	E	2046-05-18T14:19:22.104		1.10x	17.81x	91984.69	16.59		
B (OER)	E	2046-05-18T14:44:42.012		-3.71x	23.02x	117571.16	17.02		
A (IER)	E	2046-05-18T14:49:04.799		-4.56x	23.92x	122050.38	17.07		
Encke (IEG)	E	2046-05-18T15:00:09.239		-6.71x	26.22x	133423.31	17.16		
Encke (OEG)	E	2046-05-18T15:00:27.977		-6.77x	26.28x	133744.89	17.16		
A (OER)	E	2046-05-18T15:03:24.387		-7.34x	26.89x	136774.40	17.18		
F ring	E	2046-05-18T15:06:58.796		-8.04x	27.64x	140461.00	17.21		

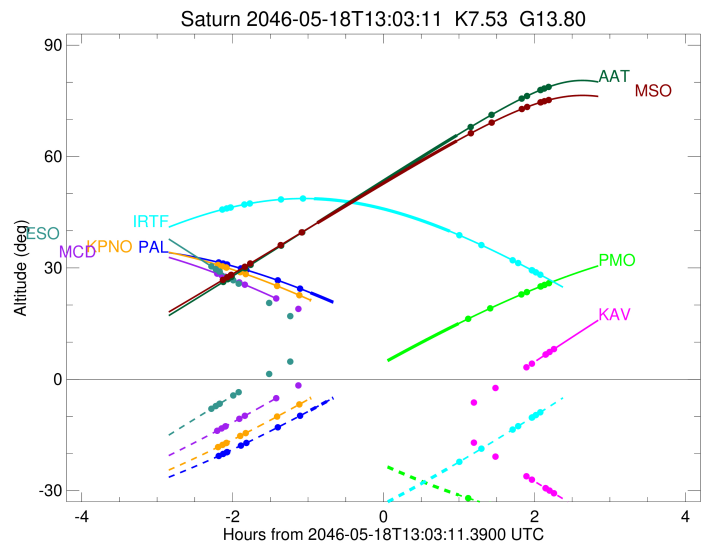
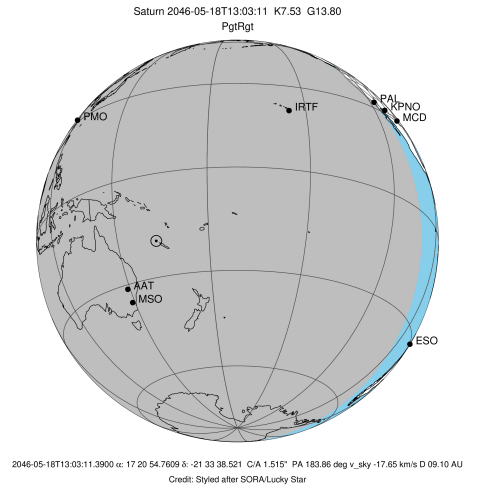
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-05-18T13:08:03.830  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PMO  
 Location : Purple Mtn Obs. Nanking  
 Latitude (deg) : 32.06667  
 E. Longitude (deg) : 118.82089  
 Altitude (km) : 0.364  
 Gaia source ID : 4115052494691697792  
 2Mass ID (if available) : 17205477-2133381  
 ICRS Star Coord at Epoch: 17h 20m 54.76091s -21:33:38.52132s  
 RUWE (>1.4 is poor) : 1.11  
 K magnitude : 7.532  
 G magnitude : 13.797  
 RP magnitude : 12.275  
 BP magnitude : 17.016  
 DUPflag : 0  
 Distance (au) : 9.099  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.65  
 Sun-Target sep (deg) : 156.17  
 Sun-Moon sep (deg) : 45.09  
 B (ring opening deg) : 26.50  
 PA of pole (deg) : 4.63  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 2.050  
 C/A sky separation (km) : 13528.8  
 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	2046-05-18T10:57:42.075	-20.49x	-1.02x	140461.00	-17.15			
A (OER)	I	2046-05-18T11:01:17.139	-19.74x	-1.72x	136774.40	-17.13			
Encke (OEG)	I	2046-05-18T11:04:14.037	-19.13x	-2.28x	133744.89	-17.12			
Encke (IEG)	I	2046-05-18T11:04:32.824	-19.07x	-2.34x	133423.31	-17.12			
A (IER)	I	2046-05-18T11:15:38.595	-16.79x	-4.47x	122050.38	-17.04			
B (OER)	I	2046-05-18T11:20:01.667	-15.89x	-5.30	117571.16	-17.01			
B (IER)	I	2046-05-18T11:45:19.370	-10.75x	-9.99	91984.69	-16.66			
C (IER)	I	2046-05-18T12:03:04.008	-7.20x	-13.18	74490.58	-16.14			
Saturn	I	2046-05-18T12:12:55.162	-5.25x	-14.90	60219.87			10.52	12.84
Saturn	E	2046-05-18T14:02:53.535	15.02	-31.17	60198.61			12.67	15.42
C (IER)	E	2046-05-18T14:10:29.032	16.28	-32.02	74490.58	16.34			
B (IER)	E	2046-05-18T14:27:59.364	19.10	-33.81	91984.69	16.92			
B (OER)	E	2046-05-18T14:52:50.911	22.86	-35.90	117571.16	17.34			
A (IER)	E	2046-05-18T14:57:08.785	23.47	-36.20	122050.38	17.39			
Encke (IEG)	E	2046-05-18T15:08:00.546	24.99	-36.88	133423.31	17.50			
Encke (OEG)	E	2046-05-18T15:08:18.920	25.03	-36.90	133744.89	17.50			
A (OER)	E	2046-05-18T15:11:11.884	25.42	-37.06	136774.40	17.53			
F ring	E	2046-05-18T15:14:42.054	25.89	-37.24	140461.00	17.55			

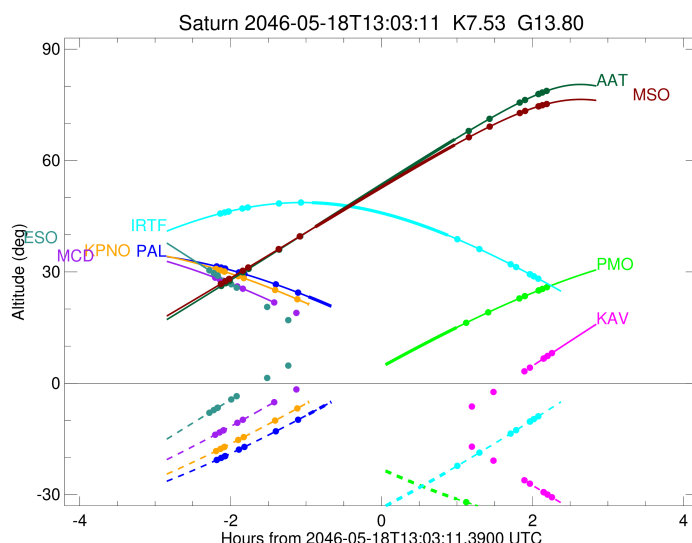
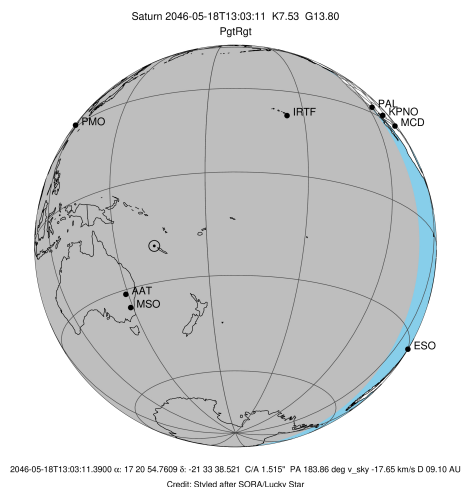
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-05-18T12:59:09.500  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : KPNO  
 Location : Kitt Peak Natl Obs  
 Latitude (deg) : 31.96333  
 E. Longitude (deg) : 248.40000  
 Altitude (km) : 2.120  
 Gaia source ID : 4115052494691697792  
 2Mass ID (if available) : 17205477-2133381  
 ICRS Star Coord at Epoch: 17h 20m 54.76091s -21:33:38.52132s  
 RUWE (>1.4 is poor) : 1.11  
 K magnitude : 7.532  
 G magnitude : 13.797  
 RP magnitude : 12.275  
 BP magnitude : 17.016  
 DUPflag : 0  
 Distance (au) : 9.099  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.65  
 Sun-Target sep (deg) : 156.17  
 Sun-Moon sep (deg) : 46.24  
 B (ring opening deg) : 26.50  
 PA of pole (deg) : 4.63  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 2.188  
 C/A sky separation (km) : 14437.1  
 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	2046-05-18T10:51:38.945		30.80	-18.27	140461.00	-17.49		
A (OER)	I	2046-05-18T10:55:09.931		30.43	-17.68	136774.40	-17.46		
Encke (OEG)	I	2046-05-18T10:58:03.584		30.11	-17.19	133744.89	-17.43		
Encke (IEG)	I	2046-05-18T10:58:22.032		30.08	-17.14	133423.31	-17.43		
A (IER)	I	2046-05-18T11:09:16.576		28.85	-15.27	122050.38	-17.32		
B (OER)	I	2046-05-18T11:13:35.652		28.34	-14.52	117571.16	-17.26		
B (IER)	I	2046-05-18T11:38:36.181		25.13	-10.05	91984.69	-16.79		
C (IER)	I	2046-05-18T11:56:16.949		22.63	-6.77	74490.58	-16.13		
Saturn	I	2046-05-18T12:04:42.824		21.38	-5.18	60205.44		12.01	14.64
Saturn	E	2046-05-18T13:53:48.704		2.59x	16.57x	60198.12		12.71	15.48
C (IER)	E	2046-05-18T14:01:31.864		1.13x	18.17x	74490.58	15.99		
B (IER)	E	2046-05-18T14:19:23.371		-2.31x	21.90x	91984.69	16.60		
B (OER)	E	2046-05-18T14:44:43.415		-7.30x	27.22x	117571.17	17.01		
A (IER)	E	2046-05-18T14:49:06.361		-8.18x	28.14x	122050.38	17.06		
Encke (IEG)	E	2046-05-18T15:00:11.320		-10.40x	30.48x	133423.31	17.15		
Encke (OEG)	E	2046-05-18T15:00:30.075		-10.46x	30.55x	133744.89	17.15		
A (OER)	E	2046-05-18T15:03:26.649		-11.06x	31.17x	136774.40	17.17		
F ring	E	2046-05-18T15:07:01.270		-11.78x	31.93x	140461.00	17.19		

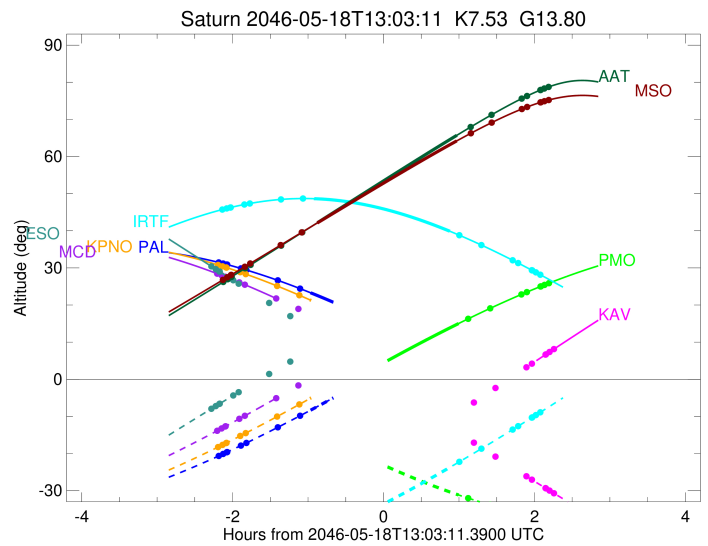
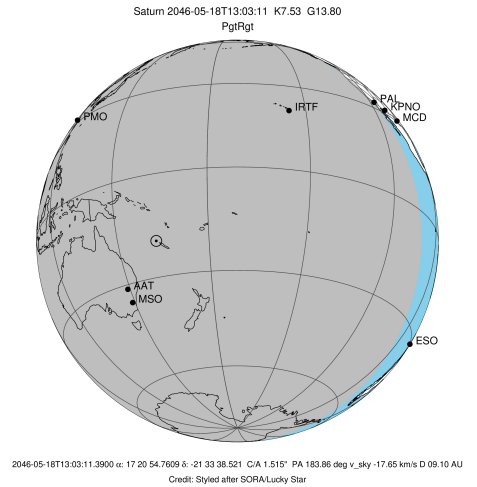
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-05-18T12:58:46.460  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : MCD  
 Location : McDonald Obs. 2.7m  
 Latitude (deg) : 30.67158  
 E. Longitude (deg) : 255.97844  
 Altitude (km) : 2.075  
 Gaia source ID : 4115052494691697792  
 2Mass ID (if available) : 17205477-2133381  
 ICRS Star Coord at Epoch: 17h 20m 54.76091s -21:33:38.52132s  
 RUWE (>1.4 is poor) : 1.11  
 K magnitude : 7.532  
 G magnitude : 13.797  
 RP magnitude : 12.275  
 BP magnitude : 17.016  
 DUPflag : 0  
 Distance (au) : 9.099  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.65  
 Sun-Target sep (deg) : 156.17  
 Sun-Moon sep (deg) : 46.22  
 B (ring opening deg) : 26.50  
 PA of pole (deg) : 4.63  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 2.141  
 C/A sky separation (km) : 14129.1  
 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	2046-05-18T10:50:56.569		28.45	-13.88	140461.00	-17.49		
A (OER)	I	2046-05-18T10:54:27.532		27.99	-13.24	136774.40	-17.46		
Encke (OEG)	I	2046-05-18T10:57:21.161		27.61	-12.72	133744.89	-17.44		
Encke (IEG)	I	2046-05-18T10:57:39.607		27.57	-12.66	133423.31	-17.43		
A (IER)	I	2046-05-18T11:08:34.001		26.09	-10.65	122050.38	-17.32		
B (OER)	I	2046-05-18T11:12:52.984		25.48	-9.85	117571.16	-17.27		
B (IER)	I	2046-05-18T11:37:52.292		21.77	-5.10	91984.69	-16.81		
C (IER)	I	2046-05-18T11:55:30.777		18.96	-1.66x	74490.58	-16.18		
Saturn	I	2046-05-18T12:04:08.439		17.53	0.04x	60207.73		11.79	14.37
Saturn	E	2046-05-18T13:53:38.483		-2.67x	22.63x	60201.36		12.41	15.11
C (IER)	E	2046-05-18T14:01:39.644		-4.27x	24.33x	74490.58	16.02		
B (IER)	E	2046-05-18T14:19:29.975		-7.85x	28.13x	91984.69	16.60		
B (OER)	E	2046-05-18T14:44:50.810		-13.03x	33.56x	117571.16	16.99		
A (IER)	E	2046-05-18T14:49:14.062		-13.93x	34.51x	122050.38	17.04		
Encke (IEG)	E	2046-05-18T15:00:19.944		-16.23x	36.89x	133423.31	17.12		
Encke (OEG)	E	2046-05-18T15:00:38.728		-16.29x	36.96x	133744.89	17.12		
A (OER)	E	2046-05-18T15:03:35.578		-16.91x	37.59x	136774.40	17.14		
F ring	E	2046-05-18T15:07:10.549		-17.65x	38.37x	140461.00	17.16		

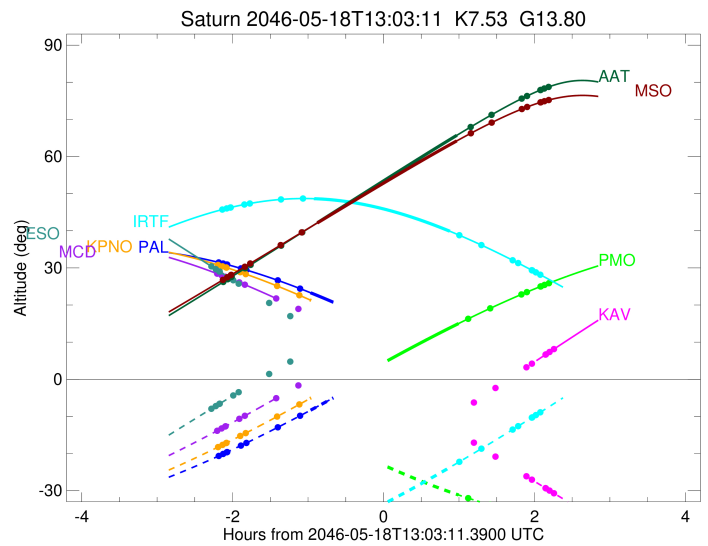
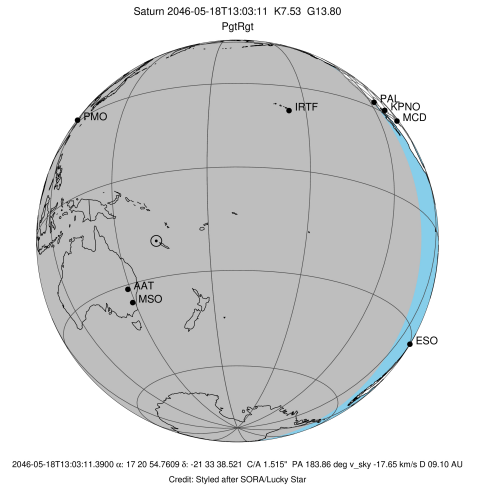
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-05-18T13:01:56.010  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : IRTF  
 Location : Mauna Kea/IRTF  
 Latitude (deg) : 19.82622  
 E. Longitude (deg) : 204.52800  
 Altitude (km) : 4.168  
 Gaia source ID : 4115052494691697792  
 2Mass ID (if available) : 17205477-2133381  
 ICRS Star Coord at Epoch: 17h 20m 54.76091s -21:33:38.52132s  
 RUWE (>1.4 is poor) : 1.11  
 K magnitude : 7.532  
 G magnitude : 13.797  
 RP magnitude : 12.275  
 BP magnitude : 17.016  
 DUPflag : 0  
 Distance (au) : 9.099  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.65  
 Sun-Target sep (deg) : 156.17  
 Sun-Moon sep (deg) : 46.28  
 B (ring opening deg) : 26.50  
 PA of pole (deg) : 4.63  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 2.155  
 C/A sky separation (km) : 14219.5  
 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\_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	2046-05-18T10:55:01.306		45.72	-49.64	140461.00	-17.56		
A (OER)	I	2046-05-18T10:58:31.333		46.02	-49.44	136774.40	-17.54		
Encke (OEG)	I	2046-05-18T11:01:24.150		46.25	-49.26	133744.89	-17.52		
Encke (IEG)	I	2046-05-18T11:01:42.507		46.28	-49.24	133423.31	-17.52		
A (IER)	I	2046-05-18T11:12:33.498		47.08	-48.47	122050.38	-17.42		
B (OER)	I	2046-05-18T11:16:50.995		47.35	-48.12	117571.16	-17.37		
B (IER)	I	2046-05-18T11:41:40.258		48.44	-45.66	91984.69	-16.94		
C (IER)	I	2046-05-18T11:59:10.417		48.69	-43.53	74490.58	-16.32		
Saturn	I	2046-05-18T12:07:58.835		48.65	-42.35	60210.26		11.54	14.07
Saturn	E	2046-05-18T13:55:55.605		39.88	-23.74	60197.50		12.77	15.54
C (IER)	E	2046-05-18T14:03:26.752		38.81	-22.25	74490.58	16.28		
B (IER)	E	2046-05-18T14:20:59.809		36.16	-18.71	91984.69	16.88		
B (OER)	E	2046-05-18T14:45:54.289		32.05	-13.55	117571.16	17.30		
A (IER)	E	2046-05-18T14:50:12.816		31.31	-12.64	122050.38	17.35		
Encke (IEG)	E	2046-05-18T15:01:06.578		29.38	-10.34	133423.31	17.44		
Encke (OEG)	E	2046-05-18T15:01:25.017		29.33	-10.27	133744.89	17.44		
A (OER)	E	2046-05-18T15:04:18.610		28.81	-9.66	136774.40	17.46		
F ring	E	2046-05-18T15:07:49.602		28.17	-8.91	140461.00	17.48		

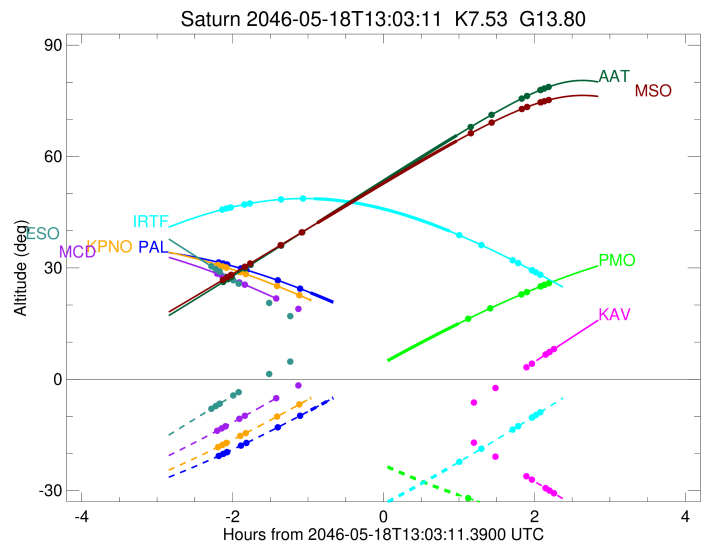
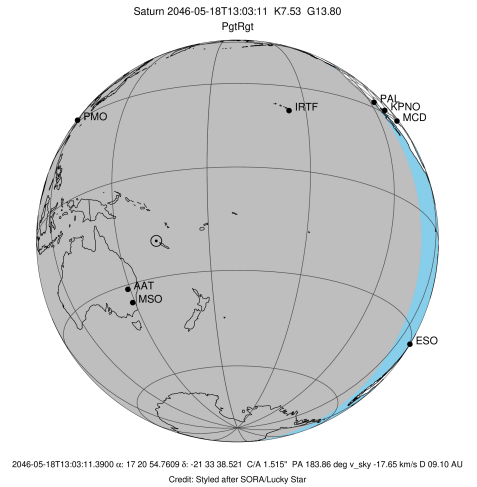
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-05-18T13:08:42.350  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : KAV  
 Location : Kavalur Observatory  
 Latitude (deg) : 12.57556  
 E. Longitude (deg) : 78.83167  
 Altitude (km) : 0.722  
 Gaia source ID : 4115052494691697792  
 2Mass ID (if available) : 17205477-2133381  
 ICRS Star Coord at Epoch: 17h 20m 54.76091s -21:33:38.52132s  
 RUWE (>1.4 is poor) : 1.11  
 K magnitude : 7.532  
 G magnitude : 13.797  
 RP magnitude : 12.275  
 BP magnitude : 17.016  
 DUPflag : 0  
 Distance (au) : 9.099  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.65  
 Sun-Target sep (deg) : 156.17  
 Sun-Moon sep (deg) : 44.64  
 B (ring opening deg) : 26.50  
 PA of pole (deg) : 4.63  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.543  
 C/A sky separation (km) : 10181.5  
 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\_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	2046-05-18T10:55:06.575	-52.65x	28.87x	140461.00	-17.06			
A (OER)	I	2046-05-18T10:58:42.695	-51.81x	28.03x	136774.40	-17.05			
Encke (OEG)	I	2046-05-18T11:01:40.373	-51.13x	27.33x	133744.89	-17.05			
Encke (IEG)	I	2046-05-18T11:01:59.238	-51.06x	27.26x	133423.31	-17.05			
A (IER)	I	2046-05-18T11:13:07.068	-48.48x	24.65x	122050.38	-17.01			
B (OER)	I	2046-05-18T11:17:30.513	-47.46x	23.62x	117571.16	-16.99			
B (IER)	I	2046-05-18T11:42:42.854	-41.59x	17.72x	91984.69	-16.82			
C (IER)	I	2046-05-18T12:00:10.419	-37.53x	13.65x	74490.58	-16.55			
Saturn	I	2046-05-18T12:11:58.542	-34.77x	10.90x	60242.50			7.63	9.35
Saturn	E	2046-05-18T14:05:03.395	-8.56x	-14.87	60225.93			9.83	12.01
C (IER)	E	2046-05-18T14:15:01.071	-6.28x	-17.07	74490.58	16.80			
B (IER)	E	2046-05-18T14:32:11.060	-2.36x	-20.83	91984.69	17.14			
B (OER)	E	2046-05-18T14:56:51.393	3.23x	-26.13	117571.16	17.41			
A (IER)	E	2046-05-18T15:01:08.490	4.20x	-27.04	122050.38	17.44			
Encke (IEG)	E	2046-05-18T15:11:59.235	6.63	-29.32	133423.31	17.51			
Encke (OEG)	E	2046-05-18T15:12:17.596	6.70	-29.38	133744.89	17.51			
A (OER)	E	2046-05-18T15:15:10.483	7.34	-29.98	136774.40	17.53			
F ring	E	2046-05-18T15:18:40.643	8.12	-30.71	140461.00	17.55			

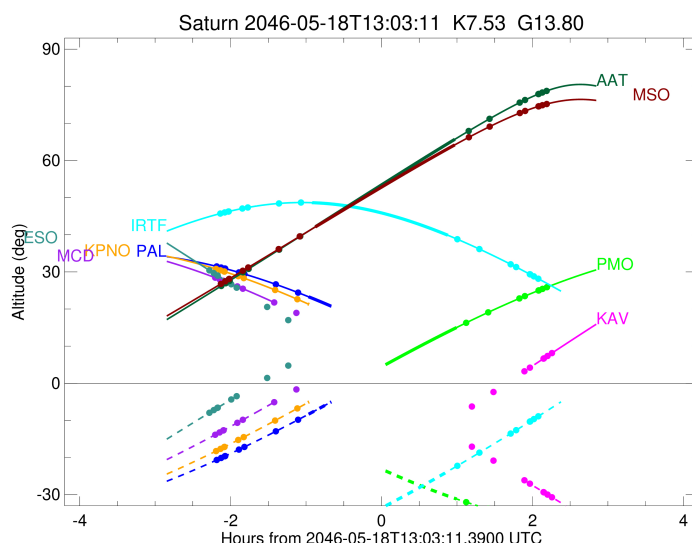
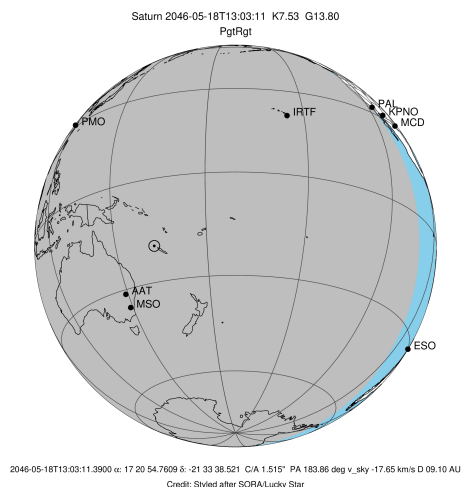
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-05-18T12:57:52.540  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : ESO  
 Location : European Southern Obs. (3.6m)  
 Latitude (deg) : -29.26097  
 E. Longitude (deg) : 289.26831  
 Altitude (km) : 2.400  
 Gaia source ID : 4115052494691697792  
 2Mass ID (if available) : 17205477-2133381  
 ICRS Star Coord at Epoch: 17h 20m 54.76091s -21:33:38.52132s  
 RUWE (>1.4 is poor) : 1.11  
 K magnitude : 7.532  
 G magnitude : 13.797  
 RP magnitude : 12.275  
 BP magnitude : 17.016  
 DUPflag : 0  
 Distance (au) : 9.099  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.65  
 Sun-Target sep (deg) : 156.17  
 Sun-Moon sep (deg) : 46.13  
 B (ring opening deg) : 26.50  
 PA of pole (deg) : 4.63  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.081  
 C/A sky separation (km) : 7135.3  
 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	2046-05-18T10:46:21.039		30.42	-7.95	140461.00	-17.68		
A (OER)	I	2046-05-18T10:49:49.599		29.67	-7.23	136774.40	-17.67		
Encke (OEG)	I	2046-05-18T10:52:41.090		29.05	-6.64	133744.89	-17.66		
Encke (IEG)	I	2046-05-18T10:52:59.299		28.98	-6.57	133423.31	-17.66		
A (IER)	I	2046-05-18T11:03:44.037		26.67	-4.36x	122050.38	-17.62		
B (OER)	I	2046-05-18T11:07:58.405		25.76	-3.49x	117571.16	-17.60		
B (IER)	I	2046-05-18T11:32:17.626		20.56	1.43x	91984.69	-17.46		
C (IER)	I	2046-05-18T11:49:04.357		17.01	4.76x	74490.58	-17.28		
Saturn	I	2046-05-18T12:01:20.775		14.43	7.16x	60252.95		5.86	7.18
Saturn	E	2046-05-18T13:54:41.716		-8.31x	27.11x	60250.53		6.31	7.74
C (IER)	E	2046-05-18T14:06:50.566		-10.58x	28.92x	74490.58	17.07		
B (IER)	E	2046-05-18T14:23:51.135		-13.69x	31.29x	91984.69	17.19		
B (OER)	E	2046-05-18T14:48:35.488		-18.04x	34.39x	117571.16	17.27		
A (IER)	E	2046-05-18T14:52:54.834		-18.78x	34.88x	122050.38	17.27		
Encke (IEG)	E	2046-05-18T15:03:52.959		-20.61x	36.06x	133423.31	17.29		
Encke (OEG)	E	2046-05-18T15:04:11.562		-20.66x	36.09x	133744.89	17.29		
A (OER)	E	2046-05-18T15:07:06.805		-21.14x	36.39x	136774.40	17.29		
F ring	E	2046-05-18T15:10:40.030		-21.72x	36.74x	140461.00	17.29		

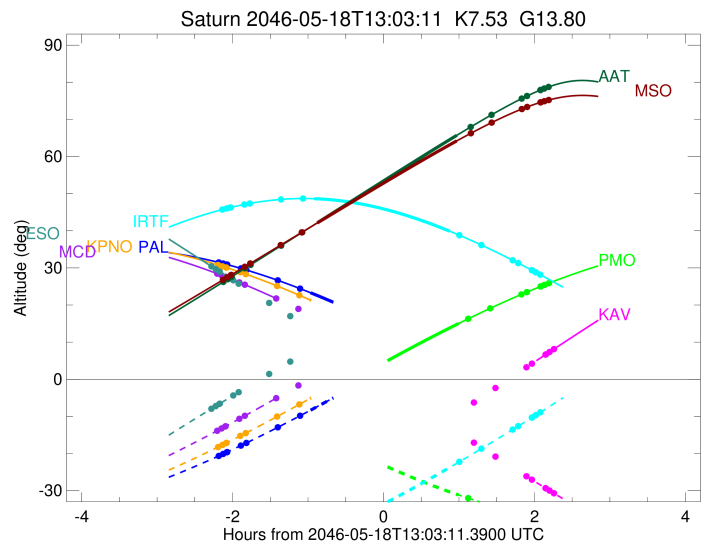
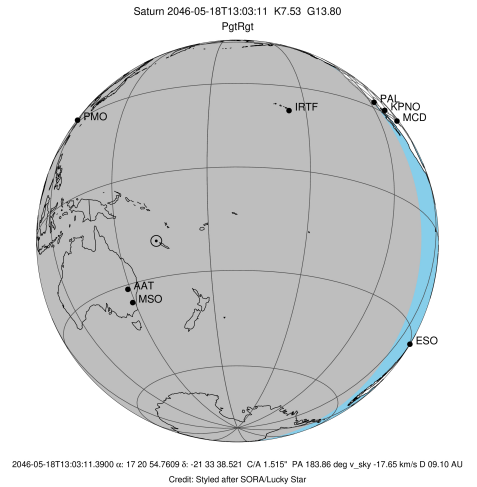
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-05-18T13:06:16.850  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : AAT  
 Location : Siding Spring (AAT)  
 Latitude (deg) : -31.27703  
 E. Longitude (deg) : 149.06608  
 Altitude (km) : 1.164  
 Gaia source ID : 4115052494691697792  
 2Mass ID (if available) : 17205477-2133381  
 ICRS Star Coord at Epoch: 17h 20m 54.76091s -21:33:38.52132s  
 RUWE (>1.4 is poor) : 1.11  
 K magnitude : 7.532  
 G magnitude : 13.797  
 RP magnitude : 12.275  
 BP magnitude : 17.016  
 DUPflag : 0  
 Distance (au) : 9.099  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.65  
 Sun-Target sep (deg) : 156.17  
 Sun-Moon sep (deg) : 45.73  
 B (ring opening deg) : 26.50  
 PA of pole (deg) : 4.63  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.256  
 C/A sky separation (km) : 8288.0  
 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	2046-05-18T10:55:48.513		26.21	-47.14	140461.00	-17.60		
A (OER)	I	2046-05-18T10:59:17.948		26.95	-47.88	136774.40	-17.60		
Encke (OEG)	I	2046-05-18T11:02:10.080		27.56	-48.50	133744.89	-17.60		
Encke (IEG)	I	2046-05-18T11:02:28.353		27.62	-48.56	133423.31	-17.60		
A (IER)	I	2046-05-18T11:13:14.871		29.90	-50.86	122050.38	-17.58		
B (OER)	I	2046-05-18T11:17:29.694		30.81	-51.76	117571.17	-17.57		
B (IER)	I	2046-05-18T11:41:49.332		35.99	-56.89	91984.69	-17.47		
C (IER)	I	2046-05-18T11:58:35.238		39.58	-60.38	74490.58	-17.29		
Saturn	I	2046-05-18T12:10:45.508		42.19	-62.87	60251.89		6.06	7.43
Saturn	E	2046-05-18T14:01:34.701		65.74	-78.56	60239.89		8.02	9.82
C (IER)	E	2046-05-18T14:12:27.824		67.95	-78.23	74490.58	17.45		
B (IER)	E	2046-05-18T14:29:03.810		71.23	-76.84	91984.69	17.66		
B (OER)	E	2046-05-18T14:53:05.303		75.61	-73.49	117571.16	17.82		
A (IER)	E	2046-05-18T14:57:16.515		76.30	-72.80	122050.38	17.84		
Encke (IEG)	E	2046-05-18T15:07:53.296		77.90	-70.95	133423.31	17.88		
Encke (OEG)	E	2046-05-18T15:08:11.282		77.94	-70.89	133744.89	17.88		
A (OER)	E	2046-05-18T15:11:00.677		78.32	-70.38	136774.40	17.89		
F ring	E	2046-05-18T15:14:26.706		78.75	-69.75	140461.00	17.90		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2046-05-18T13:06:07.260  
 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 : 4115052494691697792  
 2Mass ID (if available) : 17205477-2133381  
 ICRS Star Coord at Epoch: 17h 20m 54.76091s -21:33:38.52132s  
 RUWE (>1.4 is poor) : 1.11  
 K magnitude : 7.532  
 G magnitude : 13.797  
 RP magnitude : 12.275  
 BP magnitude : 17.016  
 DUPflag : 0  
 Distance (au) : 9.099  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.65  
 Sun-Target sep (deg) : 156.17  
 Sun-Moon sep (deg) : 45.74  
 B (ring opening deg) : 26.50  
 PA of pole (deg) : 4.63  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.194  
 C/A sky separation (km) : 7877.0  
 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	2046-05-18T10:55:29.988		26.77	-46.58	140461.00	-17.61		
A (OER)	I	2046-05-18T10:58:59.315		27.48	-47.29	136774.40	-17.61		
Encke (OEG)	I	2046-05-18T11:01:51.352		28.06	-47.87	133744.89	-17.61		
Encke (IEG)	I	2046-05-18T11:02:09.615		28.12	-47.93	133423.31	-17.61		
A (IER)	I	2046-05-18T11:12:55.721		30.31	-50.10	122050.38	-17.59		
B (OER)	I	2046-05-18T11:17:10.351		31.18	-50.94	117571.16	-17.59		
B (IER)	I	2046-05-18T11:41:28.381		36.15	-55.74	91984.69	-17.49		
C (IER)	I	2046-05-18T11:58:12.279		39.58	-58.97	74490.58	-17.34		
Saturn	I	2046-05-18T12:10:30.368		42.10	-61.27	60253.63		5.72	7.02
Saturn	E	2046-05-18T14:01:31.149		64.23	-74.53	60242.37		7.65	9.37
C (IER)	E	2046-05-18T14:12:36.629		66.26	-74.30	74490.58	17.49		
B (IER)	E	2046-05-18T14:29:10.952		69.14	-73.28	91984.69	17.68		
B (OER)	E	2046-05-18T14:53:11.468		72.80	-70.64	117571.16	17.83		
A (IER)	E	2046-05-18T14:57:22.613		73.35	-70.07	122050.38	17.84		
Encke (IEG)	E	2046-05-18T15:07:59.321		74.59	-68.52	133423.31	17.88		
Encke (OEG)	E	2046-05-18T15:08:17.307		74.62	-68.48	133744.89	17.88		
A (OER)	E	2046-05-18T15:11:06.703		74.91	-68.04	136774.40	17.89		
F ring	E	2046-05-18T15:14:32.743		75.22	-67.50	140461.00	17.90		