

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2044-05-15T13:25:51.470  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 6261454876055344896  
 2Mass ID (if available) : 15384516-1705337

Saturn 2044-05-15T13:25:51 K9.45 G11.87 PgtRgt

ICRS Star Coord at Epoch: 15h 38m 45.15104s -17:05:33.93737s

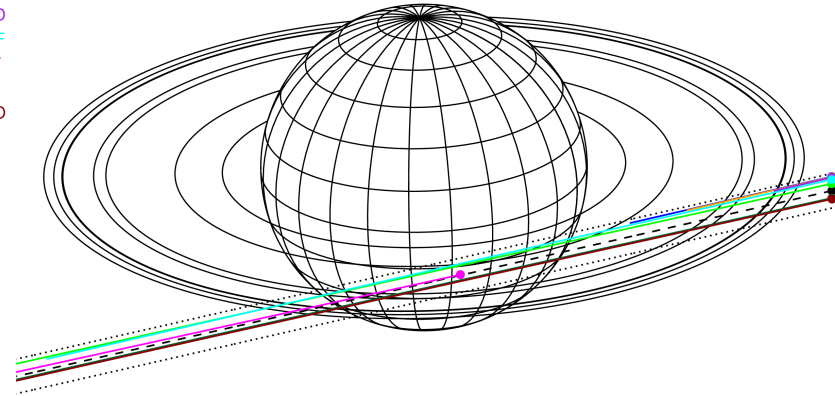
RUWE (>1.4 is poor) : 0.97  
 K magnitude : 9.449  
 G magnitude : 11.867  
 RP magnitude : 11.131  
 BP magnitude : 12.468  
 DUPflag : 0  
 Distance (au) : 8.936  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -20.18  
 Sun-Target sep (deg) : 177.13  
 Sun-Moon sep (deg) : 38.06  
 B (ring opening deg) : 23.39  
 PA of pole (deg) : 1.72

#	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



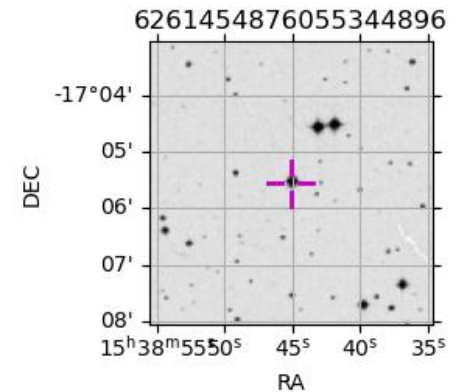
2044-05-15T13:25:51.4700 α: 15 38 45.1510 δ: -17 05 33.937 C/A 6.450° PA 12.82 deg v\_sky -20.18 km/s D 08.94 AU  
 Credit: Styled after SORA/Lucky Star

Earth  
 PAL  
 PMO  
 KPNO  
 MCD  
 IRTF  
 KAV  
 AAT  
 MSO

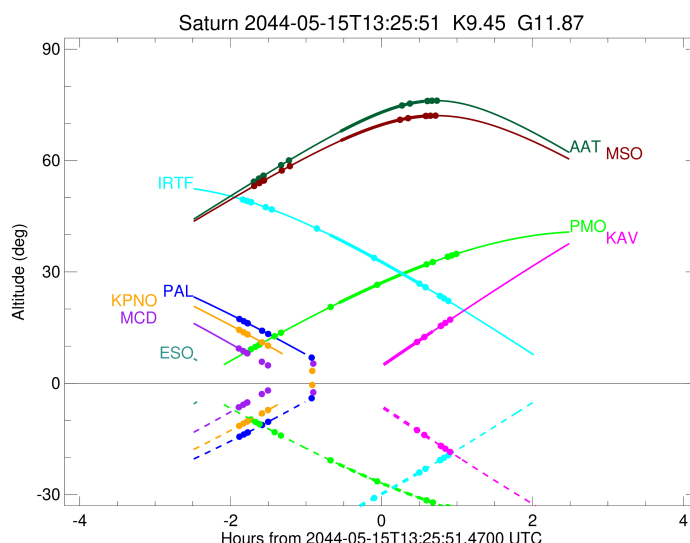
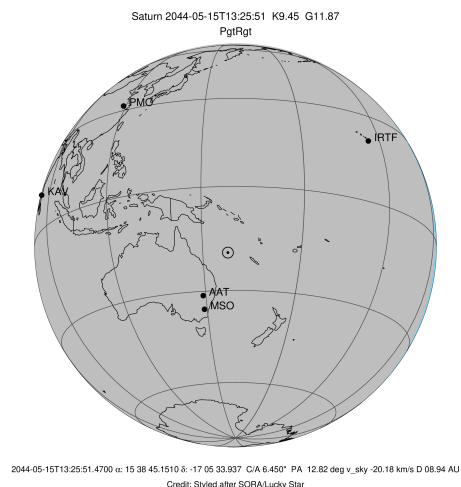


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (20	33.4	243.1	+ + + + +			MAY 15 11:32 - MAY 15 11:55	PnnRin
PMO	Purple Mtn Obs	32.1	118.8	+ + + + + + +	+ +	+ + + +	MAY 15 11:42 - MAY 15 14:25	PieRie
KPNO	Kitt Peak Natl	32.0	248.4	+ + + + + + +			MAY 15 11:32 - MAY 15 11:55	PnnRin
MCD	McDonald Obs.	30.7	256.0	+ + + +			MAY 15 11:32 - MAY 15 11:39	PnnRin
TEN	Teide Obs./Ten	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+ + + + + + +	+ +	+ + + + +	MAY 15 11:35 - MAY 15 14:19	PieRie
KAV	Kavalur Observ	12.6	78.8		+	+ + + +	MAY 15 14:06 - MAY 15 14:20	PneRne
RIO	Rio de Janeiro	-22.9	316.8					PnnRnn
ESO	European South	-29.3	289.3					PnnRnn
AAT	Siding Spring	-31.3	149.1	+ + + + + + +	+ +	+ + + +	MAY 15 11:44 - MAY 15 14:10	PieRie
SAAO	So. Afr. Astro	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Ob	-35.3	149.0	+ + + + + + +	+ +	+ + + +	MAY 15 11:44 - MAY 15 14:09	PieRie

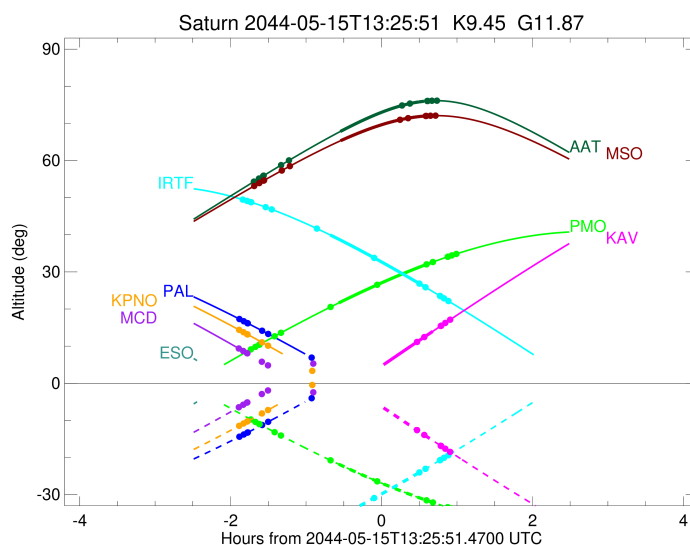
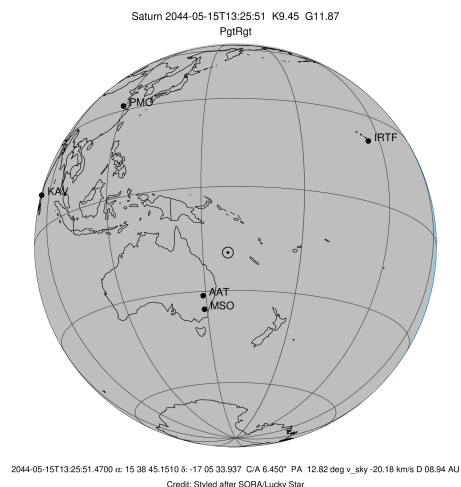


target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2044-05-15T13:22:05.050  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PAL  
 Location : Palomar Mt (200")  
 Latitude (deg) : 33.35622  
 E. Longitude (deg) : 243.13601  
 Altitude (km) : 1.706  
 Gaia source ID : 6261454876055344896  
 2Mass ID (if available) : 15384516-1705337  
 ICRS Star Coord at Epoch: 15h 38m 45.15104s -17:05:33.93737s  
 RUWE (>1.4 is poor) : 0.97  
 K magnitude : 9.449  
 G magnitude : 11.867  
 RP magnitude : 11.131  
 BP magnitude : 12.468  
 DUPflag : 0  
 Distance (au) : 8.936  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -20.18  
 Sun-Target sep (deg) : 177.13  
 Sun-Moon sep (deg) : 37.65  
 B (ring opening deg) : 23.39  
 PA of pole (deg) : 1.72  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 5.738  
 C/A sky separation (km) : 37191.1  
 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



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2044-05-15T11:32:53.269		17.31	-14.40	140461.00	-17.82		
A (OER)	I	2044-05-15T11:36:21.808		16.71	-13.80	136774.40	-17.53		
Encke (OEG)	I	2044-05-15T11:39:15.884		16.20	-13.30	133744.89	-17.27		
Encke (IEG)	I	2044-05-15T11:39:34.518		16.15	-13.24	133423.31	-17.24		
A (IER)	I	2044-05-15T11:50:57.000		14.15	-11.24	122050.38	-16.03		
B (OER)	I	2044-05-15T11:55:41.712		13.30	-10.39	117571.16	-15.42		
B (IER)	I	2044-05-15T12:30:18.230		6.92	-4.03x	91984.69	-8.37		
Saturn	I	2044-05-15T12:43:19.592		4.44x	-1.56x	60083.11		-24.52	-29.18
Saturn	E	2044-05-15T14:00:36.310		-10.91x	13.72x	59742.98		-44.62	-50.19
B (IER)	E	2044-05-15T13:21:31.348	b	-3.03x	5.88x	91984.69	8.31		
B (OER)	E	2044-05-15T13:56:27.272	b	-10.06x	12.87x	117571.16	15.27		
A (IER)	E	2044-05-15T14:01:14.798		-11.04x	13.85x	122050.38	15.87		
Encke (IEG)	E	2044-05-15T14:12:44.218		-13.39x	16.19x	133423.31	17.06		
Encke (OEG)	E	2044-05-15T14:13:03.047		-13.45x	16.25x	133744.89	17.09		
A (OER)	E	2044-05-15T14:15:58.963		-14.06x	16.85x	136774.40	17.35		
F ring	E	2044-05-15T14:19:29.755		-14.78x	17.57x	140461.00	17.63		

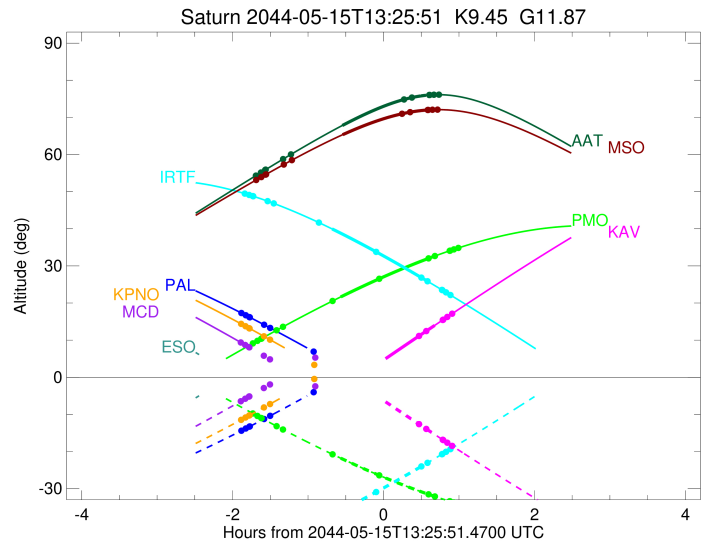
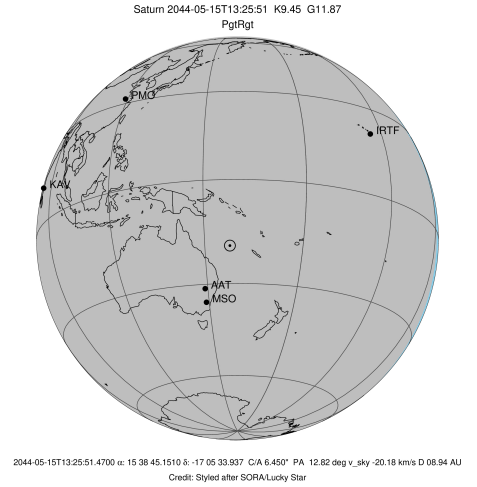
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2044-05-15T13:29:41.080  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PMO  
 Location : Purple Mtn Obs. Nanking  
 Latitude (deg) : 32.06667  
 E. Longitude (deg) : 118.82089  
 Altitude (km) : 0.364  
 Gaia source ID : 6261454876055344896  
 2Mass ID (if available) : 15384516-1705337  
 ICRS Star Coord at Epoch: 15h 38m 45.15104s -17:05:33.93737s  
 RUWE (>1.4 is poor) : 0.97  
 K magnitude : 9.449  
 G magnitude : 11.867  
 RP magnitude : 11.131  
 BP magnitude : 12.468  
 DUPflag : 0  
 Distance (au) : 8.936  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -20.18  
 Sun-Target sep (deg) : 177.13  
 Sun-Moon sep (deg) : 38.88  
 B (ring opening deg) : 23.39  
 PA of pole (deg) : 1.72  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 5.899  
 C/A sky separation (km) : 38230.6  
 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	2044-05-15T11:42:00.714		9.13	-9.76	140461.00	-17.15		
A (OER)	I	2044-05-15T11:45:37.543		9.81	-10.42	136774.40	-16.85		
Encke (OEG)	I	2044-05-15T11:48:38.841		10.38	-10.97	133744.89	-16.57		
Encke (IEG)	I	2044-05-15T11:48:58.266		10.44	-11.03	133423.31	-16.54		
A (IER)	I	2044-05-15T12:00:52.842		12.66	-13.18	122050.38	-15.23		
B (OER)	I	2044-05-15T12:05:53.345		13.58	-14.07	117571.17	-14.57		
B (IER)	I	2044-05-15T12:45:17.971		20.54	-20.75	91984.69	-6.01		
Saturn	I	2044-05-15T12:51:54.459		21.65	-21.81	60057.84		-26.27	-31.12
Saturn	E	2044-05-15T14:07:02.122		32.70	-32.15	59733.77		-45.12	-50.68
B (IER)	E	2044-05-15T13:22:30.142	b	26.54	-26.42	91984.69	6.01		
B (OER)	E	2044-05-15T14:01:51.333	b	32.05	-31.55	117571.16	14.65		
A (IER)	E	2044-05-15T14:06:49.971	b	32.68	-32.12	122050.38	15.34		
Encke (IEG)	E	2044-05-15T14:18:38.736		34.09	-33.41	133423.31	16.70		
Encke (OEG)	E	2044-05-15T14:18:57.978		34.12	-33.44	133744.89	16.73		
A (OER)	E	2044-05-15T14:21:57.515		34.46	-33.74	136774.40	17.02		
F ring	E	2044-05-15T14:25:32.106		34.86	-34.10	140461.00	17.34		

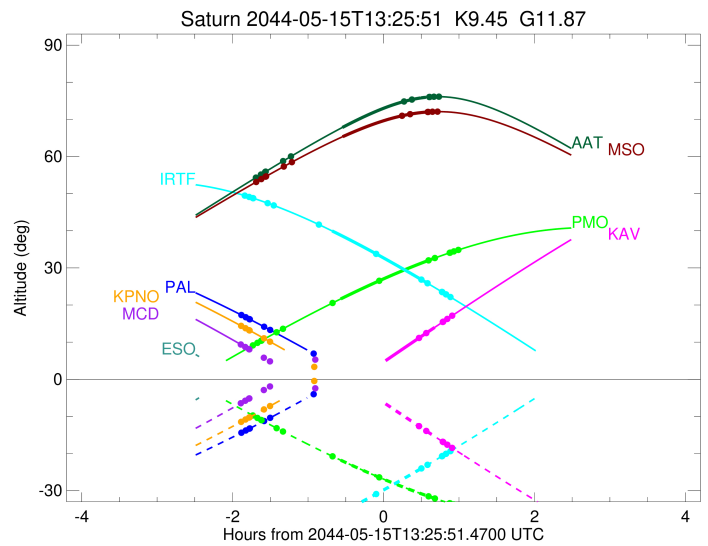
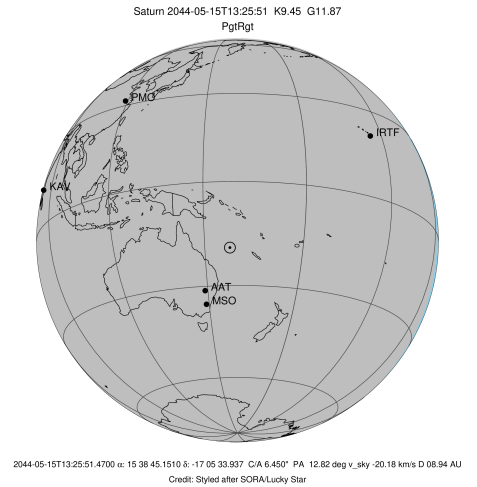
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2044-05-15T13:21:55.010  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : KPNO  
 Location : Kitt Peak Natl Obs  
 Latitude (deg) : 31.96333  
 E. Longitude (deg) : 248.40000  
 Altitude (km) : 2.120  
 Gaia source ID : 6261454876055344896  
 2Mass ID (if available) : 15384516-1705337  
 ICRS Star Coord at Epoch: 15h 38m 45.15104s -17:05:33.93737s  
 RUWE (>1.4 is poor) : 0.97  
 K magnitude : 9.449  
 G magnitude : 11.867  
 RP magnitude : 11.131  
 BP magnitude : 12.468  
 DUPflag : 0  
 Distance (au) : 8.936  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -20.18  
 Sun-Target sep (deg) : 177.13  
 Sun-Moon sep (deg) : 37.59  
 B (ring opening deg) : 23.39  
 PA of pole (deg) : 1.72  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 5.774  
 C/A sky separation (km) : 37423.4  
 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	2044-05-15T11:32:40.351		14.38	-11.47	140461.00	-17.75		
A (OER)	I	2044-05-15T11:36:09.781		13.75	-10.83	136774.40	-17.45		
Encke (OEG)	I	2044-05-15T11:39:04.655		13.21	-10.30	133744.89	-17.19		
Encke (IEG)	I	2044-05-15T11:39:23.378		13.15	-10.24	133423.31	-17.16		
A (IER)	I	2044-05-15T11:50:49.635		11.03	-8.12	122050.38	-15.93		
B (OER)	I	2044-05-15T11:55:36.302		10.13	-7.23	117571.16	-15.31		
B (IER)	I	2044-05-15T12:30:47.282		3.34x	-0.47x	91984.69	-8.05		
Saturn	I	2044-05-15T12:43:15.060		0.88x	1.99x	60079.88		-24.75	-29.43
Saturn	E	2044-05-15T14:00:20.744		-14.89x	17.68x	59738.17		-44.88	-50.44
B (IER)	E	2044-05-15T13:20:11.884	b	-6.58x	9.41x	91984.69	8.00		
B (OER)	E	2044-05-15T13:55:43.261	b	-13.93x	16.72x	117571.16	15.15		
A (IER)	E	2044-05-15T14:00:32.944		-14.93x	17.72x	122050.38	15.76		
Encke (IEG)	E	2044-05-15T14:12:06.663		-17.36x	20.13x	133423.31	16.97		
Encke (OEG)	E	2044-05-15T14:12:25.595		-17.42x	20.20x	133744.89	17.00		
A (OER)	E	2044-05-15T14:15:22.455		-18.04x	20.81x	136774.40	17.26		
F ring	E	2044-05-15T14:18:54.315		-18.78x	21.55x	140461.00	17.54		

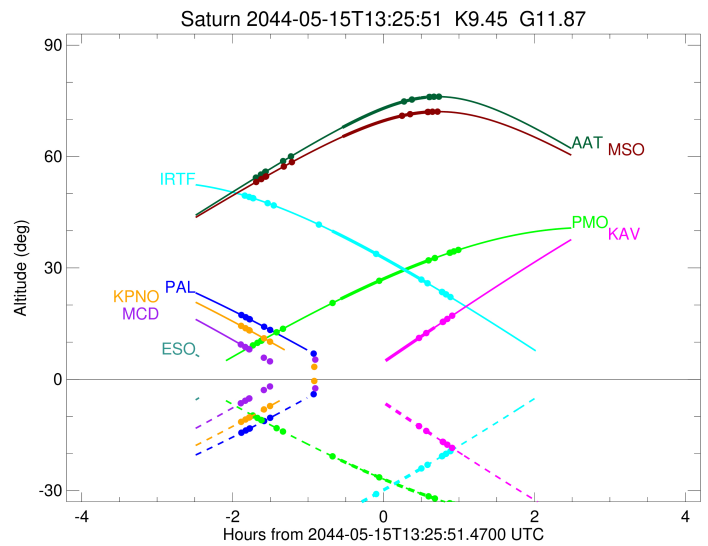
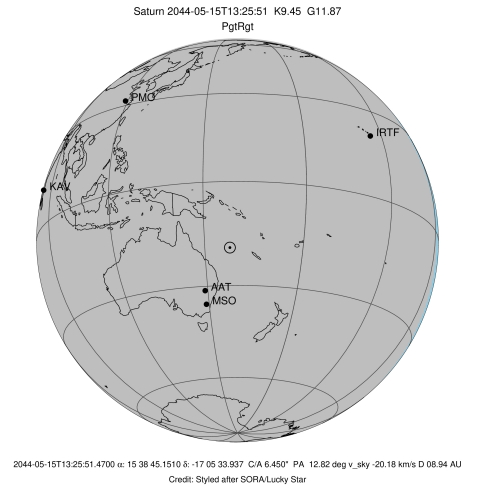
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2044-05-15T13:21:47.340  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : MCD  
 Location : McDonald Obs. 2.7m  
 Latitude (deg) : 30.67158  
 E. Longitude (deg) : 255.97844  
 Altitude (km) : 2.075  
 Gaia source ID : 6261454876055344896  
 2Mass ID (if available) : 15384516-1705337  
 ICRS Star Coord at Epoch: 15h 38m 45.15104s -17:05:33.93737s  
 RUWE (>1.4 is poor) : 0.97  
 K magnitude : 9.449  
 G magnitude : 11.867  
 RP magnitude : 11.131  
 BP magnitude : 12.468  
 DUPflag : 0  
 Distance (au) : 8.936  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -20.18  
 Sun-Target sep (deg) : 177.13  
 Sun-Moon sep (deg) : 37.51  
 B (ring opening deg) : 23.39  
 PA of pole (deg) : 1.72  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 5.822  
 C/A sky separation (km) : 37733.0  
 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	2044-05-15T11:32:26.446		9.37	-6.46	140461.00	-17.64		
A (OER)	I	2044-05-15T11:35:57.182		8.69	-5.78	136774.40	-17.34		
Encke (OEG)	I	2044-05-15T11:38:53.225		8.12	-5.21	133744.89	-17.07		
Encke (IEG)	I	2044-05-15T11:39:12.076		8.05	-5.15	133423.31	-17.04		
A (IER)	I	2044-05-15T11:50:43.803		5.79	-2.90x	122050.38	-15.78		
B (OER)	I	2044-05-15T11:55:33.285		4.84x	-1.95x	117571.16	-15.15		
B (IER)	I	2044-05-15T12:31:34.957		-2.43x	5.29x	91984.69	-7.61		
Saturn	I	2044-05-15T12:43:14.101		-4.83x	7.67x	60075.51		-25.06	-29.77
Saturn	E	2044-05-15T14:00:06.186		-21.01x	23.77x	59731.79		-45.23	-50.78
B (IER)	E	2044-05-15T13:18:27.288	b	-12.17x	14.97x	91984.69	7.56		
B (OER)	E	2044-05-15T13:54:50.545	b	-19.89x	22.65x	117571.16	14.98		
A (IER)	E	2044-05-15T13:59:43.290	b	-20.93x	23.69x	122050.38	15.61		
Encke (IEG)	E	2044-05-15T14:11:23.118		-23.43x	26.18x	133423.31	16.84		
Encke (OEG)	E	2044-05-15T14:11:42.198		-23.50x	26.25x	133744.89	16.87		
A (OER)	E	2044-05-15T14:14:40.401		-24.14x	26.88x	136774.40	17.13		
F ring	E	2044-05-15T14:18:13.784		-24.90x	27.64x	140461.00	17.42		

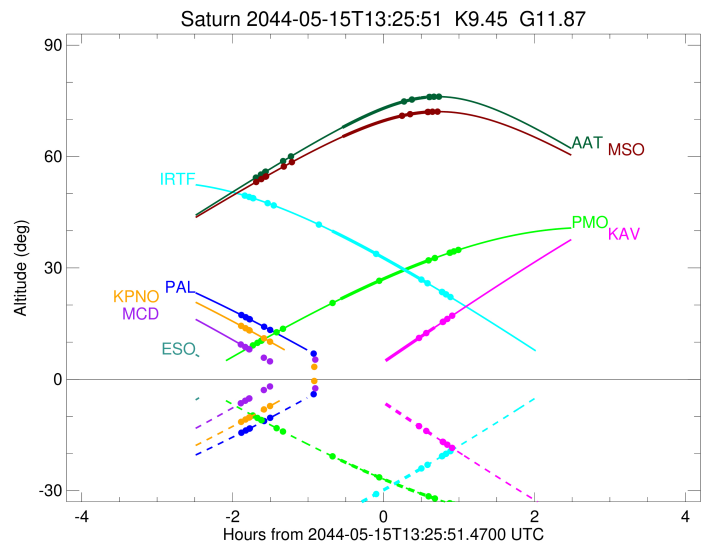
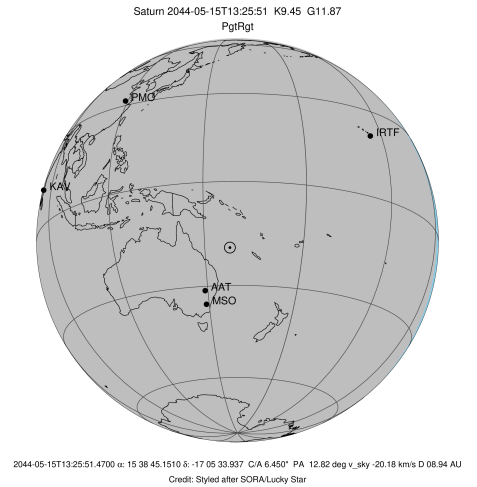
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2044-05-15T13:23:04.340  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : IRTF  
 Location : Mauna Kea/IRTF  
 Latitude (deg) : 19.82622  
 E. Longitude (deg) : 204.52800  
 Altitude (km) : 4.168  
 Gaia source ID : 6261454876055344896  
 2Mass ID (if available) : 15384516-1705337  
 ICRS Star Coord at Epoch: 15h 38m 45.15104s -17:05:33.93737s  
 RUWE (>1.4 is poor) : 0.97  
 K magnitude : 9.449  
 G magnitude : 11.867  
 RP magnitude : 11.131  
 BP magnitude : 12.468  
 DUPflag : 0  
 Distance (au) : 8.936  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -20.18  
 Sun-Target sep (deg) : 177.13  
 Sun-Moon sep (deg) : 38.09  
 B (ring opening deg) : 23.39  
 PA of pole (deg) : 1.72  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 5.807  
 C/A sky separation (km) : 37637.3  
 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	2044-05-15T11:35:34.422		49.48	-46.83	140461.00	-17.75		
A (OER)	I	2044-05-15T11:39:03.904		49.11	-46.44	136774.40	-17.45		
Encke (OEG)	I	2044-05-15T11:41:58.882		48.80	-46.11	133744.89	-17.18		
Encke (IEG)	I	2044-05-15T11:42:17.620		48.77	-46.08	133423.31	-17.15		
A (IER)	I	2044-05-15T11:53:45.075		47.44	-44.69	122050.38	-15.88		
B (OER)	I	2044-05-15T11:58:32.764		46.84	-44.07	117571.16	-15.24		
B (IER)	I	2044-05-15T12:34:26.971		41.67	-38.81	91984.69	-7.57		
Saturn	I	2044-05-15T12:45:04.559		39.95	-37.08	60072.96		-25.24	-29.97
Saturn	E	2044-05-15T14:00:48.131		25.88	-23.06	59737.87		-44.90	-50.46
B (IER)	E	2044-05-15T13:20:02.567	b	33.78	-30.91	91984.69	7.54		
B (OER)	E	2044-05-15T13:56:09.530	b	26.81	-23.98	117571.16	15.17		
A (IER)	E	2044-05-15T14:00:58.675		25.84	-23.02	122050.38	15.81		
Encke (IEG)	E	2044-05-15T14:12:29.365		23.51	-20.70	133423.31	17.07		
Encke (OEG)	E	2044-05-15T14:12:48.187		23.44	-20.64	133744.89	17.10		
A (OER)	E	2044-05-15T14:15:43.960		22.84	-20.04	136774.40	17.37		
F ring	E	2044-05-15T14:19:14.390		22.12	-19.33	140461.00	17.67		

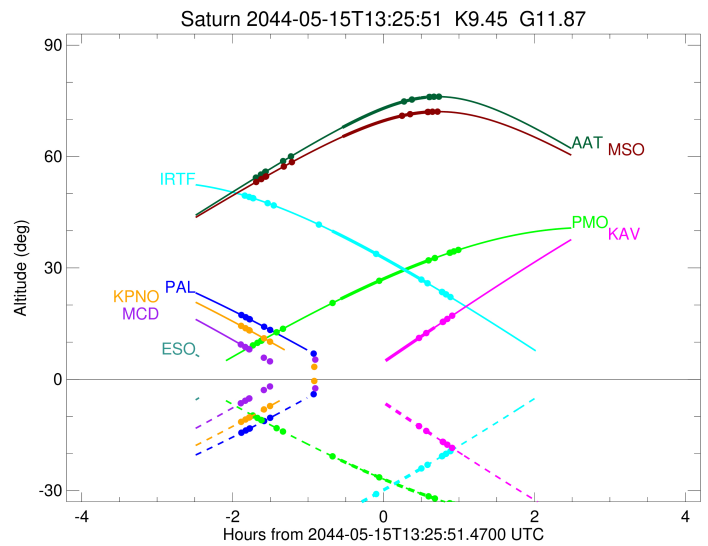
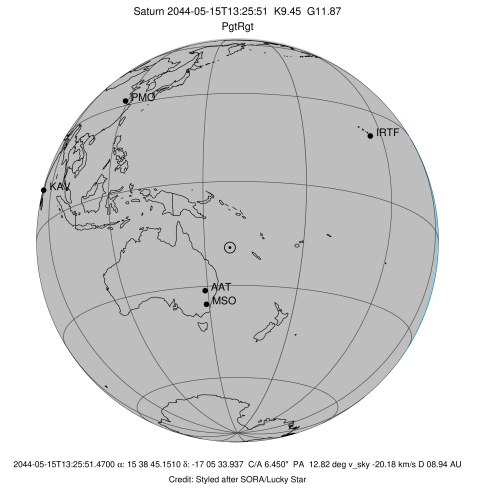
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2044-05-15T13:31:20.540  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : KAV  
 Location : Kavalur Observatory  
 Latitude (deg) : 12.57556  
 E. Longitude (deg) : 78.83167  
 Altitude (km) : 0.722  
 Gaia source ID : 6261454876055344896  
 2Mass ID (if available) : 15384516-1705337  
 ICRS Star Coord at Epoch: 15h 38m 45.15104s -17:05:33.93737s  
 RUWE (>1.4 is poor) : 0.97  
 K magnitude : 9.449  
 G magnitude : 11.867  
 RP magnitude : 11.131  
 BP magnitude : 12.468  
 DUPflag : 0  
 Distance (au) : 8.936  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -20.18  
 Sun-Target sep (deg) : 177.13  
 Sun-Moon sep (deg) : 38.80  
 B (ring opening deg) : 23.39  
 PA of pole (deg) : 1.72  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 6.408  
 C/A sky separation (km) : 41533.5  
 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	2044-05-15T11:45:00.420		-19.08x	17.09x	140461.00	-15.88		
A (OER)	I	2044-05-15T11:48:55.403		-18.15x	16.17x	136774.40	-15.49		
Encke (OEG)	I	2044-05-15T11:52:13.115		-17.37x	15.40x	133744.89	-15.15		
Encke (IEG)	I	2044-05-15T11:52:34.373		-17.28x	15.32x	133423.31	-15.11		
A (IER)	I	2044-05-15T12:05:49.193		-14.14x	12.22x	122050.38	-13.43		
B (OER)	I	2044-05-15T12:11:33.684		-12.79x	10.89x	117571.16	-12.55		
Saturn	I	2044-05-15T12:55:35.774		-2.43x	0.69x	59998.78		-30.09	-35.29
Saturn	E	2044-05-15T14:06:35.366		13.98	-15.42	59670.35		-48.60	-54.02
B (OER)	E	2044-05-15T13:54:17.575	b	11.17	-12.67	117571.16	12.62		
A (IER)	E	2044-05-15T13:59:59.973	b	12.48	-13.94	122050.38	13.53		
Encke (IEG)	E	2044-05-15T14:13:07.978		15.47	-16.87	133423.31	15.26		
Encke (OEG)	E	2044-05-15T14:13:29.017		15.55	-16.95	133744.89	15.31		
A (OER)	E	2044-05-15T14:16:44.614		16.28	-17.67	136774.40	15.67		
F ring	E	2044-05-15T14:20:36.894		17.16	-18.52	140461.00	16.07		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2044-05-15T13:26:34.670  
 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 : 6261454876055344896  
 2Mass ID (if available) : 15384516-1705337  
 ICRS Star Coord at Epoch: 15h 38m 45.15104s -17:05:33.93737s  
 RUWE (>1.4 is poor) : 0.97  
 K magnitude : 9.449  
 G magnitude : 11.867  
 RP magnitude : 11.131  
 BP magnitude : 12.468  
 DUPflag : 0  
 Distance (au) : 8.936  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -20.18  
 Sun-Target sep (deg) : 177.13  
 Sun-Moon sep (deg) : 38.63  
 B (ring opening deg) : 23.39  
 PA of pole (deg) : 1.72  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 6.718  
 C/A sky separation (km) : 43542.1  
 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

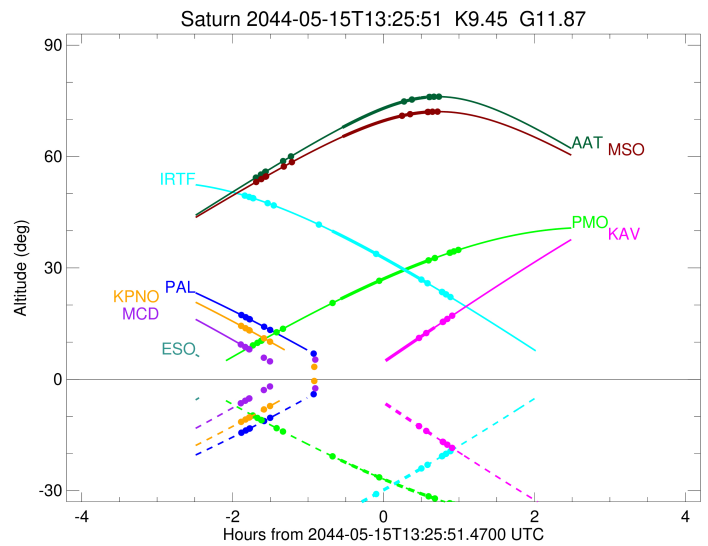
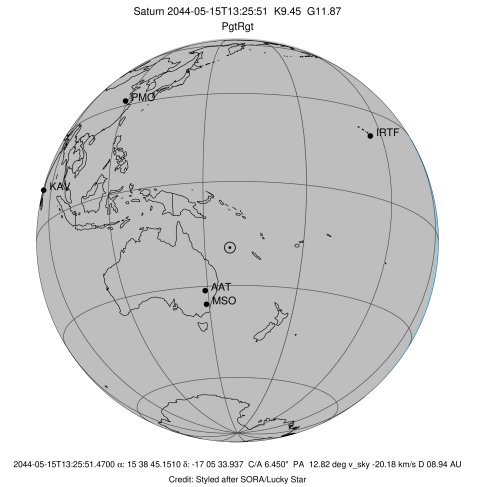


b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2044-05-15T11:44:24.105		54.32	-57.19	140461.00	-15.55		
A (OER)	I	2044-05-15T11:48:24.584		55.15	-58.02	136774.40	-15.10		
Encke (OEG)	I	2044-05-15T11:51:47.940		55.85	-58.72	133744.89	-14.69		
Encke (IEG)	I	2044-05-15T11:52:09.866		55.93	-58.80	133423.31	-14.64		
A (IER)	I	2044-05-15T12:06:01.298		58.77	-61.64	122050.38	-12.62		
B (OER)	I	2044-05-15T12:12:11.826		60.01	-62.89	117571.16	-11.53		
Saturn	I	2044-05-15T12:53:09.103		67.83	-70.71	59959.76		-32.46	-37.83
Saturn	E	2044-05-15T13:59:35.246		75.96	-78.00	59628.50		-50.92	-56.21
B (OER)	E	2044-05-15T13:42:23.678	b	74.85	-77.35	117571.16	11.54		
A (IER)	E	2044-05-15T13:48:33.733	b	75.36	-77.72	122050.38	12.65		
Encke (IEG)	E	2044-05-15T14:02:22.607		76.04	-77.99	133423.31	14.71		
Encke (OEG)	E	2044-05-15T14:02:44.437		76.05	-77.99	133744.89	14.75		
A (OER)	E	2044-05-15T14:06:06.834		76.11	-77.92	136774.40	15.18		
F ring	E	2044-05-15T14:10:06.028		76.13	-77.79	140461.00	15.64		



target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2044-05-15T13:26:27.800  
 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 : 6261454876055344896  
 2Mass ID (if available) : 15384516-1705337  
 ICRS Star Coord at Epoch: 15h 38m 45.15104s -17:05:33.93737s  
 RUWE (>1.4 is poor) : 0.97  
 K magnitude : 9.449  
 G magnitude : 11.867  
 RP magnitude : 11.131  
 BP magnitude : 12.468  
 DUPflag : 0  
 Distance (au) : 8.936  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -20.18  
 Sun-Target sep (deg) : 177.13  
 Sun-Moon sep (deg) : 38.60  
 B (ring opening deg) : 23.39  
 PA of pole (deg) : 1.72  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 6.782  
 C/A sky separation (km) : 43953.3  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 Saturn\_ring\_plane.tf  
 sat378.bsp  
 sat286.bsp  
 vgr1.sat286.bsp  
 vgr2.sat286.bsp  
 HST1081HSPephemUTC.bsp  
 pfb10000r.bsp  
 cassini.bsp  
 earthstns\_itrf93\_040916.bsp  
 earth\_200101\_990628\_predict.bpc  
 earth\_720101\_070426.bpc  
 cpck28Mar2008.tpc  
 pck.sat440.tpc  
 IAU\_SATURN\_for\_RINGFIT.tpc  
 naif0012.tls  
 earth\_flat\_IAU.spk



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2044-05-15T11:44:38.468		53.15	-56.05	140461.00	-15.39		
A (OER)	I	2044-05-15T11:48:41.595		53.93	-56.83	136774.40	-14.93		
Encke (OEG)	I	2044-05-15T11:52:07.438		54.58	-57.49	133744.89	-14.50		
Encke (IEG)	I	2044-05-15T11:52:29.648		54.65	-57.56	133423.31	-14.46		
A (IER)	I	2044-05-15T12:06:34.776		57.31	-60.21	122050.38	-12.36		
B (OER)	I	2044-05-15T12:12:54.129		58.47	-61.37	117571.16	-11.23		
Saturn	I	2044-05-15T12:53:22.548		65.34	-68.18	59951.29		-32.96	-38.36
Saturn	E	2044-05-15T13:59:07.886		71.95	-73.97	59620.19		-51.39	-56.65
B (OER)	E	2044-05-15T13:40:48.831	b	71.00	-73.40	117571.16	11.24		
A (IER)	E	2044-05-15T13:47:07.821	b	71.42	-73.71	122050.38	12.38		
Encke (IEG)	E	2044-05-15T14:01:10.679		72.00	-73.97	133423.31	14.51		
Encke (OEG)	E	2044-05-15T14:01:32.801		72.01	-73.97	133744.89	14.56		
A (OER)	E	2044-05-15T14:04:57.757		72.07	-73.94	136774.40	15.00		
F ring	E	2044-05-15T14:08:59.685		72.10	-73.86	140461.00	15.47		