

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2033-01-18T19:16:38.850  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3423752455822302464  
 2Mass ID (if available) : 06053406+2230551

Saturn 2033-01-18T19:16:38 K9.96 G13.92 PgtRgt

ICRS Star Coord at Epoch: 06h 05m 34.06377s +22:30:55.12756s

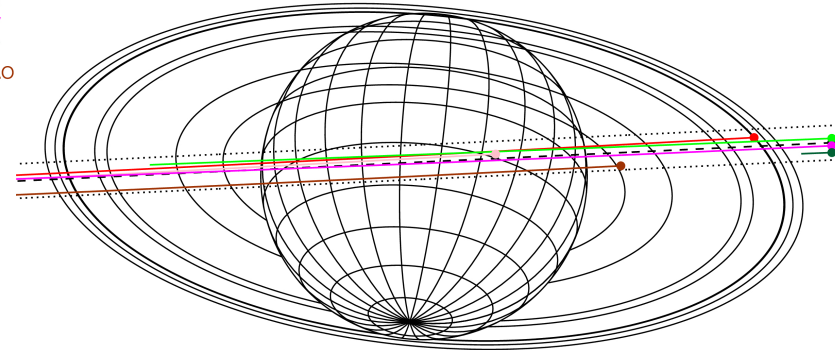
RUWE (>1.4 is poor) : 1.05  
 K magnitude : 9.957  
 G magnitude : 13.921  
 RP magnitude : 12.853  
 BP magnitude : 15.105  
 DUPflag : 0  
 Distance (au) : 8.130  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -16.81  
 Sun-Target sep (deg) : 152.72  
 Sun-Moon sep (deg) : 63.66  
 B (ring opening deg) : -26.52  
 PA of pole (deg) : -5.63

#	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



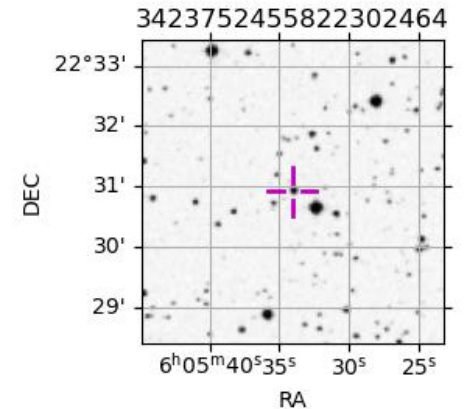
2033-01-18T19:16:38.8500 α: 06 05 34.0638 δ: +22 30 55.128 C/A 0.911" PA 182.69 deg v\_sky -16.81 km/s D 08.13 AU  
 Credit: Styled after SORA/Lucky Star

Earth  
 PIC  
 PMO  
 TEN  
 KAV  
 AAT  
 SAAO

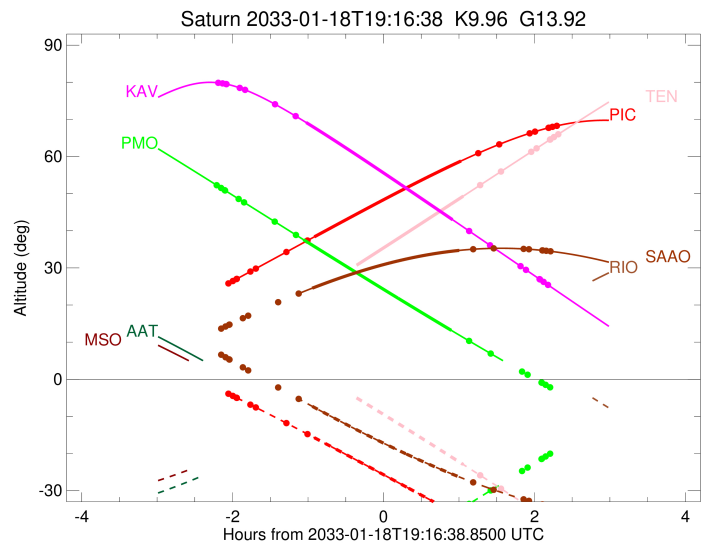
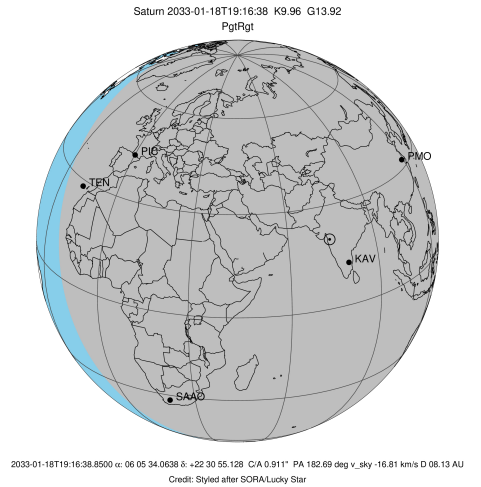


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+	+	+	JAN 18 17:20 - JAN 18 21:34	PieRie
PAL	Palomar Mt (20	33.4	243.1	+	+	+		PnnRnn
PMO	Purple Mtn Obs	32.1	118.8	+	+	+	JAN 18 17:04 - JAN 18 20:41	PieRie
KPNO	Kitt Peak Natl	32.0	248.4	+	+	+		PnnRnn
MCD	McDonald Obs.	30.7	256.0	+	+	+		PnnRnn
TEN	Teide Obs./Ten	28.3	343.5	+	+	+	JAN 18 20:20 - JAN 18 21:35	PneRne
IRTF	Mauna Kea/IRTF	19.8	204.5	+	+	+		PnnRnn
KAV	Kavalur Observ	12.6	78.8	+	+	+	JAN 18 17:05 - JAN 18 21:27	PieRie
RIO	Rio de Janeiro	-22.9	316.8	+	+	+		PnnRnn
ESO	European South	-29.3	289.3	+	+	+		PnnRnn
AAT	Siding Spring	-31.3	149.1	+	+	+		PnnRnn
SAAO	So. Afr. Astro	-32.4	20.8	+	+	+	JAN 18 18:09 - JAN 18 21:29	PieRie
MSO	Mt. Stromlo Ob	-35.3	149.0	+	+	+		PnnRnn



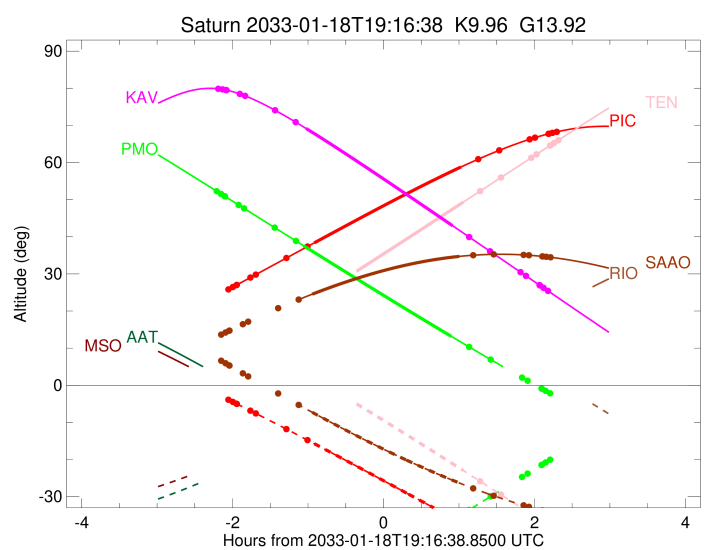
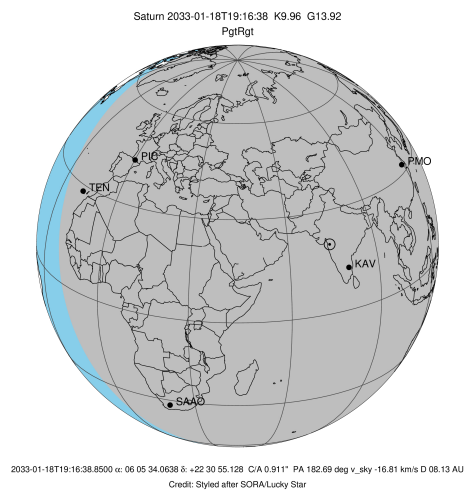
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2033-01-18T19:19:59.460  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PIC  
 Location : Pic du Midi  
 Latitude (deg) : 42.93656  
 E. Longitude (deg) : 0.14231  
 Altitude (km) : 2.890  
 Gaia source ID : 3423752455822302464  
 2Mass ID (if available) : 06053406+2230551  
 ICRS Star Coord at Epoch: 06h 05m 34.06377s +22:30:55.12756s  
 RUWE (>1.4 is poor) : 1.05  
 K magnitude : 9.957  
 G magnitude : 13.921  
 RP magnitude : 12.853  
 BP magnitude : 15.105  
 DUPflag : 0  
 Distance (au) : 8.130  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -16.81  
 Sun-Target sep (deg) : 152.72  
 Sun-Moon sep (deg) : 64.48  
 B (ring opening deg) : -26.52  
 PA of pole (deg) : -5.63  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.341  
 C/A sky separation (km) : 7905.9  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 Saturn\_ring\_plane.tf  
 sat378.bsp  
 sat286.bsp  
 vgr1.sat286.bsp  
 vgr2.sat286.bsp  
 HST1081HSPephemUTC.bsp  
 pfb10000r.bsp  
 cassini.bsp  
 earthstns\_itrf93\_040916.bsp  
 earth\_200101\_990628\_predict.bpc  
 earth\_720101\_070426.bpc  
 cpck28Mar2008.tpc  
 pck.sat440.tpc  
 IAU\_SATURN\_for\_RINGFIT.tpc  
 naif0012.tls  
 earth\_flat\_IAU.spk



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

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2033-01-18T17:13:23.529		25.83	-3.90x	140461.00	-17.56		
A (OER)	I	2033-01-18T17:16:53.433		26.47	-4.49x	136774.40	-17.56		
Encke (OEG)	I	2033-01-18T17:19:45.955		26.99	-4.97x	133744.89	-17.56		
Encke (IEG)	I	2033-01-18T17:20:04.269		27.05	-5.02	133423.31	-17.56		
A (IER)	I	2033-01-18T17:30:52.264		29.03	-6.86	122050.38	-17.54		
B (OER)	I	2033-01-18T17:35:07.667		29.81	-7.58	117571.16	-17.53		
B (IER)	I	2033-01-18T17:59:30.300		34.29	-11.82	91984.69	-17.44		
C (IER)	I	2033-01-18T18:16:17.325		37.38	-14.78	74490.58	-17.29		
Saturn	I	2033-01-18T18:21:37.989		38.37	-15.73	60178.49		14.41	17.49
Saturn	E	2033-01-18T20:18:16.288		58.80	-36.98	60267.67		-0.86	-1.06
C (IER)	E	2033-01-18T20:31:56.591		60.90	-39.47	74490.58	17.37		
B (IER)	E	2033-01-18T20:48:38.415		63.28	-42.48	91984.69	17.54		
B (OER)	E	2033-01-18T21:12:51.787		66.26	-46.79	117571.16	17.66		
A (IER)	E	2033-01-18T21:17:05.364		66.70	-47.53	122050.38	17.67		
Encke (IEG)	E	2033-01-18T21:27:48.456		67.73	-49.38	133423.31	17.70		
Encke (OEG)	E	2033-01-18T21:28:06.627		67.75	-49.43	133744.89	17.70		
A (OER)	E	2033-01-18T21:30:57.775		67.99	-49.92	136774.40	17.70		
F ring	E	2033-01-18T21:34:25.972		68.27	-50.51	140461.00	17.71		

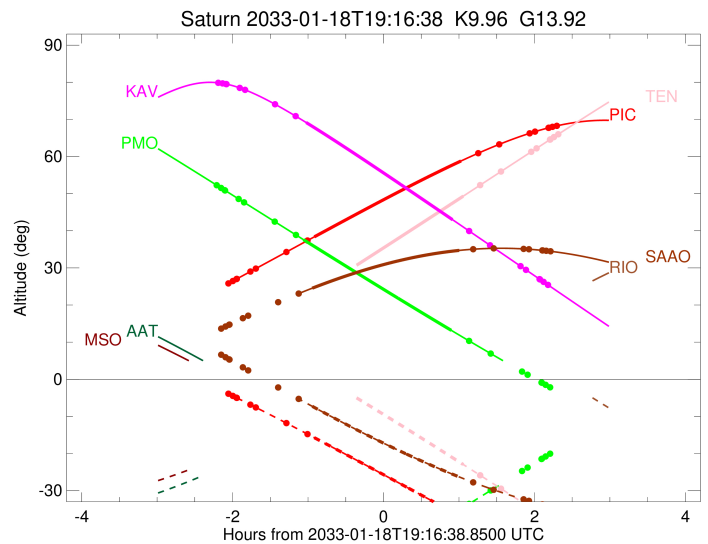
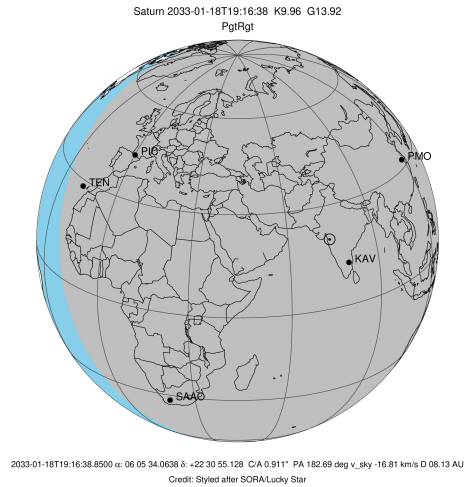
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2033-01-18T19:11:34.170  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PMO  
 Location : Purple Mtn Obs. Nanking  
 Latitude (deg) : 32.06667  
 E. Longitude (deg) : 118.82089  
 Altitude (km) : 0.364  
 Gaia source ID : 3423752455822302464  
 2Mass ID (if available) : 06053406+2230551  
 ICRS Star Coord at Epoch: 06h 05m 34.06377s +22:30:55.12756s  
 RUWE (>1.4 is poor) : 1.05  
 K magnitude : 9.957  
 G magnitude : 13.921  
 RP magnitude : 12.853  
 BP magnitude : 15.105  
 DUPflag : 0  
 Distance (au) : 8.129  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -16.81  
 Sun-Target sep (deg) : 152.72  
 Sun-Moon sep (deg) : 63.68  
 B (ring opening deg) : -26.52  
 PA of pole (deg) : -5.63  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.383  
 C/A sky separation (km) : 8156.3  
 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	2033-01-18T17:04:04.628		52.27	-74.12	140461.00	-17.63		
A (OER)	I	2033-01-18T17:07:33.823		51.53	-73.57	136774.40	-17.62		
Encke (OEG)	I	2033-01-18T17:10:25.854		50.92	-73.11	133744.89	-17.60		
Encke (IEG)	I	2033-01-18T17:10:44.122		50.85	-73.06	133423.31	-17.60		
A (IER)	I	2033-01-18T17:21:31.075		48.56	-71.22	122050.38	-17.55		
B (OER)	I	2033-01-18T17:25:46.402		47.66	-70.47	117571.16	-17.53		
B (IER)	I	2033-01-18T17:50:12.406		42.46	-65.85	91984.69	-17.36		
C (IER)	I	2033-01-18T18:07:05.787		38.87	-62.49	74490.58	-17.15		
Saturn	I	2033-01-18T18:13:00.457		37.61	-61.29	60184.35		13.91	16.91
Saturn	E	2033-01-18T20:10:35.258		13.17	-36.57	60268.00		0.00	0.00
C (IER)	E	2033-01-18T20:24:40.729		10.34	-33.58	74490.58	16.89		
B (IER)	E	2033-01-18T20:41:51.560		6.93	-29.95	91984.69	17.03		
B (OER)	E	2033-01-18T21:06:49.539		2.07x	-24.71	117571.16	17.11		
A (IER)	E	2033-01-18T21:11:11.224		1.23x	-23.79	122050.38	17.12		
Encke (IEG)	E	2033-01-18T21:22:15.307		-0.88x	-21.48	133423.31	17.13		
Encke (OEG)	E	2033-01-18T21:22:34.079		-0.94x	-21.42	133744.89	17.13		
A (OER)	E	2033-01-18T21:25:30.920		-1.49x	-20.80	136774.40	17.13		
F ring	E	2033-01-18T21:29:06.098		-2.16x	-20.06	140461.00	17.13		

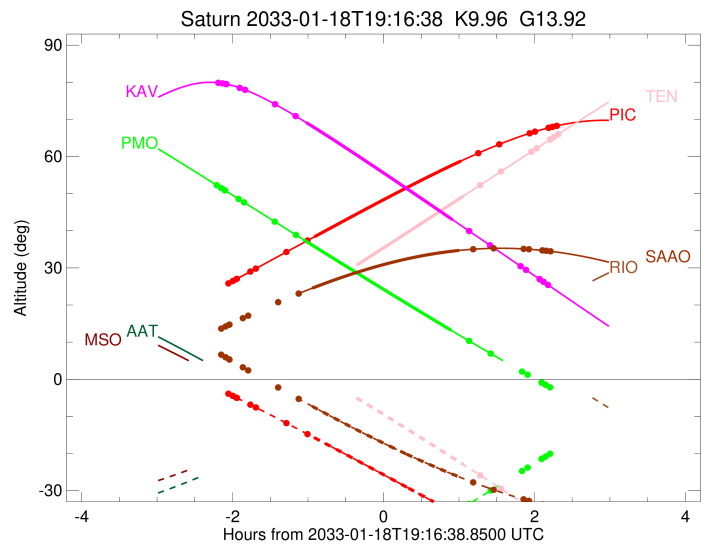
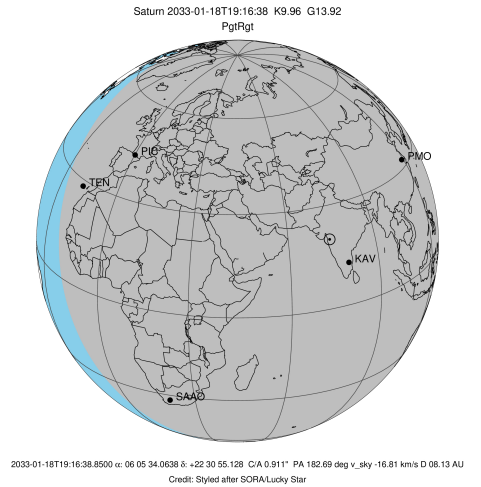
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2033-01-18T19:21:34.630  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : TEN  
 Location : Teide Obs./Tenerife  
 Latitude (deg) : 28.30050  
 E. Longitude (deg) : 343.48909  
 Altitude (km) : 2.395  
 Gaia source ID : 3423752455822302464  
 2Mass ID (if available) : 06053406+2230551  
 ICRS Star Coord at Epoch: 06h 05m 34.06377s +22:30:55.12756s  
 RUWE (>1.4 is poor) : 1.05  
 K magnitude : 9.957  
 G magnitude : 13.921  
 RP magnitude : 12.853  
 BP magnitude : 15.105  
 DUPflag : 0  
 Distance (au) : 8.130  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -16.81  
 Sun-Target sep (deg) : 152.72  
 Sun-Moon sep (deg) : 64.44  
 B (ring opening deg) : -26.52  
 PA of pole (deg) : -5.63  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 1.156  
 C/A sky separation (km) : 6818.4  
 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	2033-01-18T17:13:51.329		9.16	14.92x	140461.00	-17.52		
A (OER)	I	2033-01-18T17:17:21.798		9.89	14.28x	136774.40	-17.52		
Encke (OEG)	I	2033-01-18T17:20:14.751		10.48	13.74x	133744.89	-17.52		
Encke (IEG)	I	2033-01-18T17:20:33.110		10.55	13.68x	133423.31	-17.52		
A (IER)	I	2033-01-18T17:31:22.431		12.80	11.65x	122050.38	-17.51		
B (OER)	I	2033-01-18T17:35:38.221		13.70	10.85x	117571.16	-17.51		
B (IER)	I	2033-01-18T18:00:01.167		18.85	6.13x	91984.69	-17.46		
C (IER)	I	2033-01-18T18:16:45.652		22.42	2.81x	74490.58	-17.36		
Saturn	I	2033-01-18T18:22:53.703		23.73	1.59x	60187.82		13.62	16.56
Saturn	E	2033-01-18T20:20:03.844		49.33	-22.96	60266.34		-1.94	-2.38
C (IER)	E	2033-01-18T20:33:27.876		52.29	-25.86	74490.58	17.52		
B (IER)	E	2033-01-18T20:50:02.304		55.96	-29.46	91984.69	17.65		
B (OER)	E	2033-01-18T21:14:07.102		61.28	-34.73	117571.16	17.75		
A (IER)	E	2033-01-18T21:18:19.299		62.20	-35.65	122050.38	17.77		
Encke (IEG)	E	2033-01-18T21:28:58.955		64.55	-37.99	133423.31	17.79		
Encke (OEG)	E	2033-01-18T21:29:17.029		64.61	-38.05	133744.89	17.79		
A (OER)	E	2033-01-18T21:32:07.271		65.24	-38.68	136774.40	17.80		
F ring	E	2033-01-18T21:35:34.369		65.99	-39.43	140461.00	17.80		

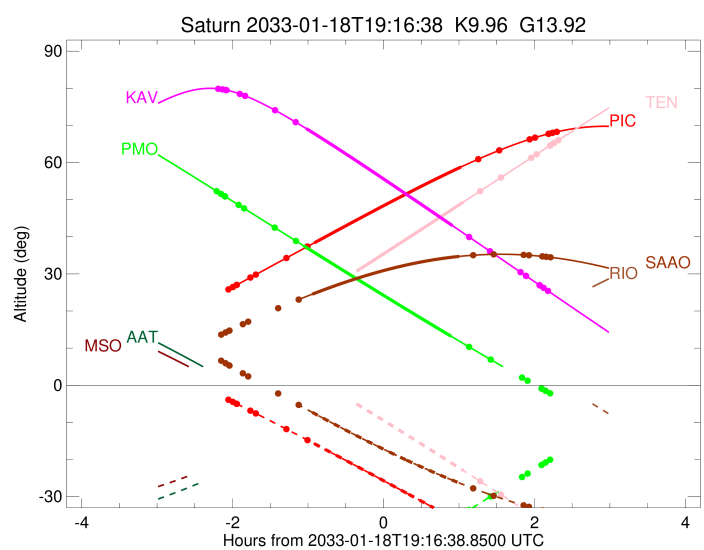
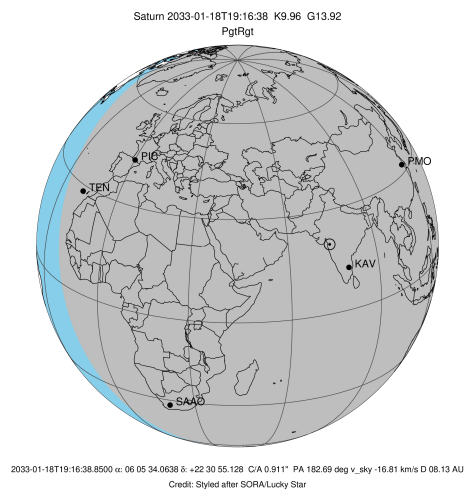
target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2033-01-18T19:13:09.310  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : KAV  
 Location : Kavalur Observatory  
 Latitude (deg) : 12.57556  
 E. Longitude (deg) : 78.83167  
 Altitude (km) : 0.722  
 Gaia source ID : 3423752455822302464  
 2Mass ID (if available) : 06053406+2230551  
 ICRS Star Coord at Epoch: 06h 05m 34.06377s +22:30:55.12756s  
 RUWE (>1.4 is poor) : 1.05  
 K magnitude : 9.957  
 G magnitude : 13.921  
 RP magnitude : 12.853  
 BP magnitude : 15.105  
 DUPflag : 0  
 Distance (au) : 8.129  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -16.81  
 Sun-Target sep (deg) : 152.72  
 Sun-Moon sep (deg) : 64.11  
 B (ring opening deg) : -26.52  
 PA of pole (deg) : -5.63  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 0.822  
 C/A sky separation (km) : 4849.2  
 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	2033-01-18T17:05:18.220		79.86	-62.54	140461.00	-17.94		
A (OER)	I	2033-01-18T17:08:43.788		79.70	-63.33	136774.40	-17.93		
Encke (OEG)	I	2033-01-18T17:11:32.762		79.52	-63.97	133744.89	-17.93		
Encke (IEG)	I	2033-01-18T17:11:50.701		79.50	-64.04	133423.31	-17.93		
A (IER)	I	2033-01-18T17:22:25.472		78.48	-66.43	122050.38	-17.91		
B (OER)	I	2033-01-18T17:26:35.680		77.96	-67.37	117571.16	-17.90		
B (IER)	I	2033-01-18T17:50:27.849		74.07	-72.61	91984.69	-17.83		
C (IER)	I	2033-01-18T18:06:51.276		70.88	-76.00	74490.58	-17.74		
Saturn	I	2033-01-18T18:15:03.689		69.18	-77.58	60212.97		11.24	13.72
Saturn	E	2033-01-18T20:11:33.268		42.99	-70.11	60264.30		-2.90	-3.56
C (IER)	E	2033-01-18T20:24:42.322		39.94	-67.19	74490.58	17.52		
B (IER)	E	2033-01-18T20:41:19.841		36.09	-63.42	91984.69	17.55		
B (OER)	E	2033-01-18T21:05:37.843		30.47	-57.83	117571.16	17.54		
A (IER)	E	2033-01-18T21:09:53.194		29.48	-56.84	122050.38	17.54		
Encke (IEG)	E	2033-01-18T21:20:41.839		26.98	-54.33	133423.31	17.53		
Encke (OEG)	E	2033-01-18T21:21:00.187		26.91	-54.26	133744.89	17.53		
A (OER)	E	2033-01-18T21:23:53.061		26.24	-53.59	136774.40	17.52		
F ring	E	2033-01-18T21:27:23.482		25.43	-52.78	140461.00	17.52		

target : Saturn  
 target radius (km) : 60268.00  
 C/A epoch : 2033-01-18T19:18:28.660  
 Event type : PgtRgt  
 : Saturn occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : SAAO  
 Location : So. Afr. Astro. Obs. (Sutherland)  
 Latitude (deg) : -32.37953  
 E. Longitude (deg) : 20.81070  
 Altitude (km) : 1.768  
 Gaia source ID : 3423752455822302464  
 2Mass ID (if available) : 06053406+2230551  
 ICRS Star Coord at Epoch: 06h 05m 34.06377s +22:30:55.12756s  
 RUWE (>1.4 is poor) : 1.05  
 K magnitude : 9.957  
 G magnitude : 13.921  
 RP magnitude : 12.853  
 BP magnitude : 15.105  
 DUPflag : 0  
 Distance (au) : 8.130  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -16.81  
 Sun-Target sep (deg) : 152.72  
 Sun-Moon sep (deg) : 64.19  
 B (ring opening deg) : -26.52  
 PA of pole (deg) : -5.63  
 Pole direction: RA (deg): 40.60000  
 Dec (deg): 83.50000  
 C/A sky separation (") : 0.041  
 C/A sky separation (km) : 243.8  
 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	2033-01-18T17:07:39.603		13.65	6.61x	140461.00	-17.82		
A (OER)	I	2033-01-18T17:11:06.422		14.22	5.92x	136774.40	-17.83		
Encke (OEG)	I	2033-01-18T17:13:56.348		14.69	5.36x	133744.89	-17.83		
Encke (IEG)	I	2033-01-18T17:14:14.384		14.74	5.30x	133423.31	-17.83		
A (IER)	I	2033-01-18T17:24:52.059		16.46	3.21x	122050.38	-17.84		
B (OER)	I	2033-01-18T17:29:03.112		17.12	2.39x	117571.16	-17.84		
B (IER)	I	2033-01-18T17:52:56.298		20.77	-2.22x	91984.69	-17.86		
C (IER)	I	2033-01-18T18:09:15.481		23.09	-5.30	74490.58	-17.87		
Saturn	I	2033-01-18T18:19:57.557		24.53	-7.28	60241.36		7.79	9.54
Saturn	E	2033-01-18T20:16:54.373		34.71	-26.32	60244.79		-7.27	-8.91
C (IER)	E	2033-01-18T20:27:55.156		35.03	-27.77	74490.58	17.89		
B (IER)	E	2033-01-18T20:44:13.211		35.27	-29.77	91984.69	17.88		
B (OER)	E	2033-01-18T21:08:04.370		35.11	-32.34	117571.17	17.87		
A (IER)	E	2033-01-18T21:12:15.025		35.03	-32.75	122050.38	17.87		
Encke (IEG)	E	2033-01-18T21:22:51.634		34.72	-33.71	133423.31	17.86		
Encke (OEG)	E	2033-01-18T21:23:09.639		34.71	-33.74	133744.89	17.86		
A (OER)	E	2033-01-18T21:25:59.268		34.61	-33.97	136774.40	17.86		
F ring	E	2033-01-18T21:29:25.718		34.47	-34.26	140461.00	17.86		