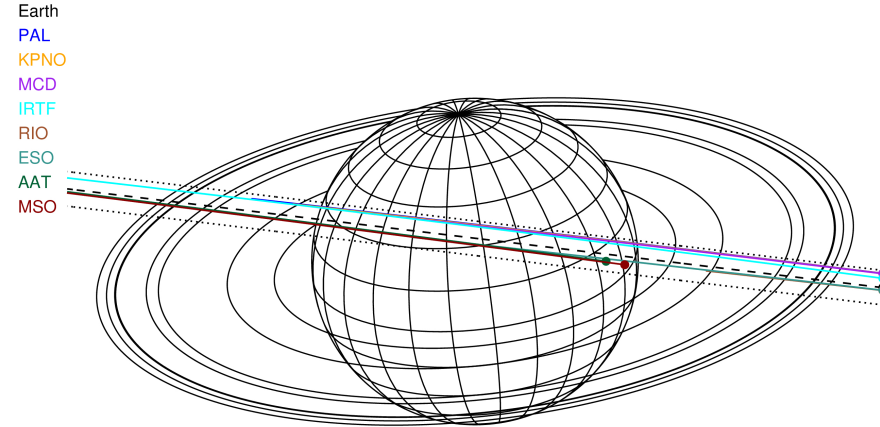


target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2048-05-31T10:46:01.570
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 4081527178238361728
 2Mass ID (if available) : 19013549-2205282

Saturn 2048-05-31T10:46:01 K9.90 G12.29 PgtRgt

ICRS Star Coord at Epoch: 19h 01m 35.50740s -22:05:28.67410s

RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.899
 G magnitude : 12.294
 RP magnitude : 11.553
 BP magnitude : 12.890
 DUPflag : 0
 Distance (au) : 9.184
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -14.99
 Sun-Target sep (deg) : 145.74
 Sun-Moon sep (deg) : 16.97
 B (ring opening deg) : 24.73
 PA of pole (deg) : 6.48

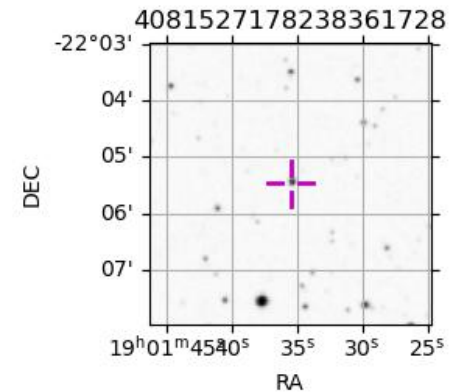


2048-05-31T10:46:01.5700 at: 19 01 35.5074 s -22 05 28.674 C/A 1.279° PA 173.09 deg v_sky -14.99 km/s D 09.18 AU
 Credit: Styled after SORA/Lucky Star

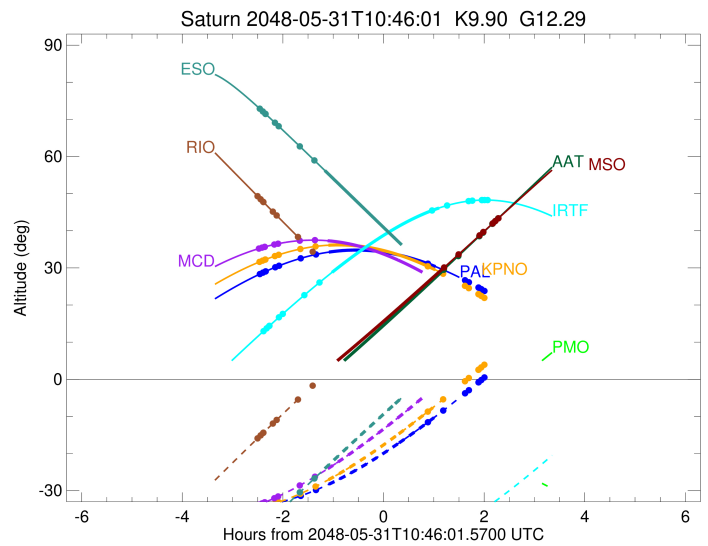
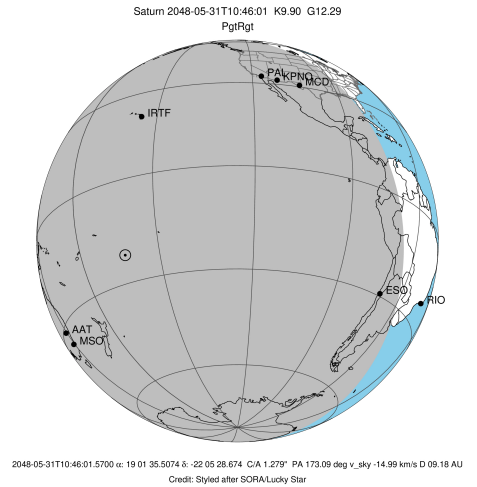
#	a(km)	ring
1	74490.6	C (IER)
2	91984.7	B (IER)
3	117571.2	B (OER)
4	122050.4	A (IER)
5	133423.3	Encke (IEG)
6	133744.9	Encke (OEG)
7	136774.4	A (OER)
8	140461.0	F ring

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	+	+	+	MAY 31 08:18 - MAY 31 11:57	PieRie
PMO	Purple Mtn Obs	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl	32.0	248.4	+	+	+	MAY 31 08:18 - MAY 31 11:57	PieRie
MCD	McDonald Obs.	30.7	256.0	+	+		MAY 31 08:17 - MAY 31 09:39	PinRin
TEN	Teide Obs./Ten	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+	+	+	MAY 31 08:23 - MAY 31 12:50	PieRie
KAV	Kavalur Observ	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+			MAY 31 08:15 - MAY 31 09:04	PnnRin
ESO	European South	-29.3	289.3	+	+		MAY 31 08:18 - MAY 31 09:35	PinRin
AAT	Siding Spring	-31.3	149.1		+	+	MAY 31 11:58 - MAY 31 13:02	PneRne
SAAO	So. Afr. Astro	-32.4	20.8			+		PnnRnn
MSO	Mt. Stromlo Ob	-35.3	149.0		+	+	MAY 31 11:58 - MAY 31 13:03	PneRne



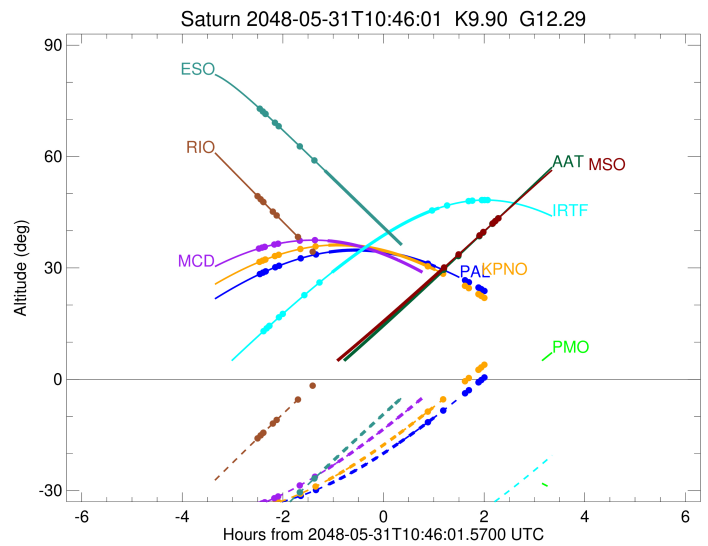
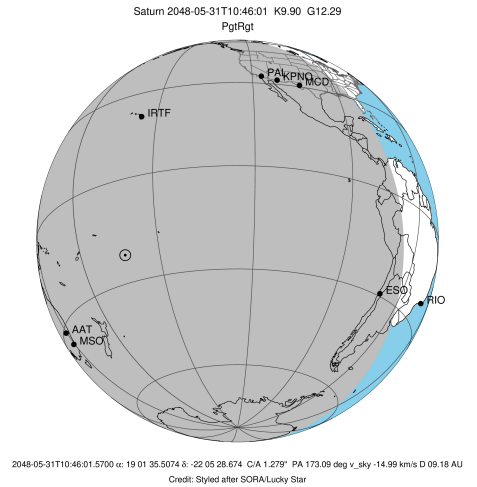
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2048-05-31T10:44:34.150
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 4081527178238361728
 2Mass ID (if available) : 19013549-2205282
 ICRS Star Coord at Epoch: 19h 01m 35.50740s -22:05:28.67410s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.899
 G magnitude : 12.294
 RP magnitude : 11.553
 BP magnitude : 12.890
 DUPflag : 0
 Distance (au) : 9.184
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -14.99
 Sun-Target sep (deg) : 145.74
 Sun-Moon sep (deg) : 16.84
 B (ring opening deg) : 24.73
 PA of pole (deg) : 6.48
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 2.043
 C/A sky separation (km) : 13606.5
 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	2048-05-31T08:18:37.169		28.35	-34.22	140461.00	-16.76		
A (OER)	I	2048-05-31T08:22:17.219		28.73	-34.09	136774.40	-16.74		
Encke (OEG)	I	2048-05-31T08:25:18.244		29.04	-33.97	133744.89	-16.73		
Encke (IEG)	I	2048-05-31T08:25:37.471		29.07	-33.96	133423.31	-16.72		
A (IER)	I	2048-05-31T08:36:59.008		30.17	-33.43	122050.38	-16.65		
B (OER)	I	2048-05-31T08:41:28.398		30.58	-33.18	117571.16	-16.61		
B (IER)	I	2048-05-31T09:07:23.203		32.58	-31.41	91984.69	-16.26		
C (IER)	I	2048-05-31T09:25:33.593		33.63	-29.82	74490.58	-15.77		
Saturn	I	2048-05-31T09:40:52.483		34.25	-28.28	60268.00		-0.11	-0.13
Saturn	E	2048-05-31T11:48:04.343		30.34	-10.02	60072.37		23.57	28.11
C (IER)	E	2048-05-31T11:38:55.288	b	31.14	-11.58	74490.58	15.69		
B (IER)	E	2048-05-31T11:57:12.018		29.48	-8.44	91984.69	16.16		
B (OER)	E	2048-05-31T12:23:17.229		26.67	-3.78x	117571.17	16.49		
A (IER)	E	2048-05-31T12:27:48.627		26.13	-2.96x	122050.38	16.52		
Encke (IEG)	E	2048-05-31T12:39:15.520		24.72	-0.84x	133423.31	16.59		
Encke (OEG)	E	2048-05-31T12:39:34.903		24.67	-0.78x	133744.89	16.59		
A (OER)	E	2048-05-31T12:42:37.422		24.28	-0.21x	136774.40	16.61		
F ring	E	2048-05-31T12:46:19.323		23.80	0.48x	140461.00	16.62		

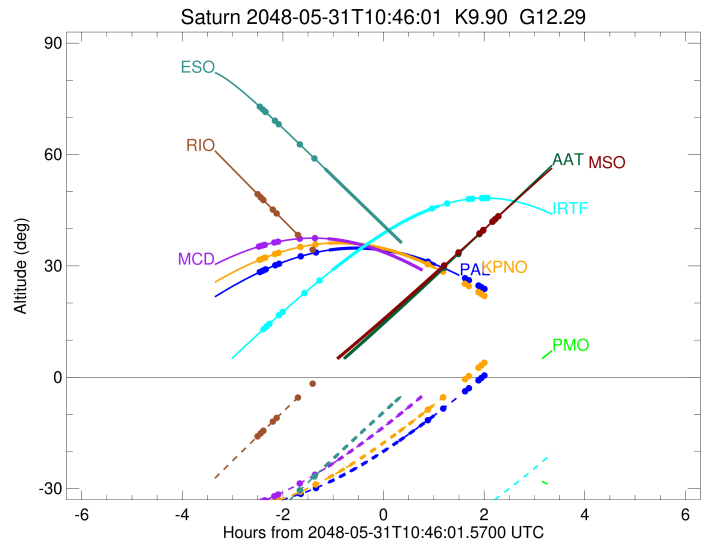
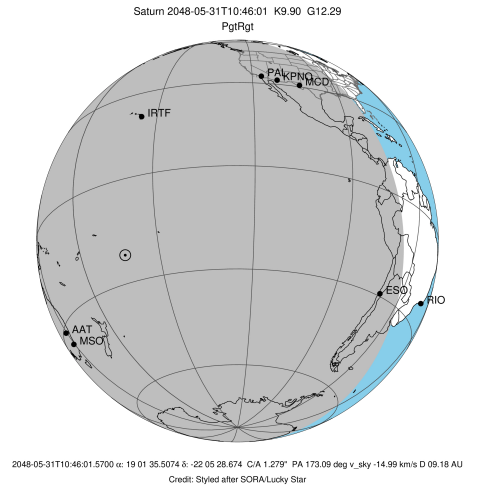
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2048-05-31T10:44:03.520
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KPNO
 Location : Kitt Peak Natl Obs
 Latitude (deg) : 31.96333
 E. Longitude (deg) : 248.40000
 Altitude (km) : 2.120
 Gaia source ID : 4081527178238361728
 2Mass ID (if available) : 19013549-2205282
 ICRS Star Coord at Epoch: 19h 01m 35.50740s -22:05:28.67410s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.899
 G magnitude : 12.294
 RP magnitude : 11.553
 BP magnitude : 12.890
 DUPflag : 0
 Distance (au) : 9.184
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -14.99
 Sun-Target sep (deg) : 145.74
 Sun-Moon sep (deg) : 16.78
 B (ring opening deg) : 24.73
 PA of pole (deg) : 6.48
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 2.015
 C/A sky separation (km) : 13424.4
 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	2048-05-31T08:18:12.726		31.63	-34.65	140461.00	-16.78		
A (OER)	I	2048-05-31T08:21:52.535		31.96	-34.44	136774.40	-16.76		
Encke (OEG)	I	2048-05-31T08:24:53.364		32.23	-34.25	133744.89	-16.74		
Encke (IEG)	I	2048-05-31T08:25:12.569		32.26	-34.23	133423.31	-16.74		
A (IER)	I	2048-05-31T08:36:33.354		33.19	-33.46	122050.38	-16.66		
B (OER)	I	2048-05-31T08:41:02.441		33.53	-33.12	117571.16	-16.63		
B (IER)	I	2048-05-31T09:06:55.269		35.09	-30.82	91984.69	-16.29		
C (IER)	I	2048-05-31T09:25:03.723		35.79	-28.89	74490.58	-15.81		
Saturn	I	2048-05-31T09:40:19.884		36.11	-27.08	60267.98		-0.22	-0.28
Saturn	E	2048-05-31T11:47:38.317		29.51	-7.14	60075.49		23.37	27.88
C (IER)	E	2048-05-31T11:38:49.332	b	30.44	-8.73	74490.58	15.70		
B (IER)	E	2048-05-31T11:57:05.561		28.44	-5.41	91984.69	16.16		
B (OER)	E	2048-05-31T12:23:11.447		25.16	-0.53x	117571.16	16.47		
A (IER)	E	2048-05-31T12:27:43.068		24.55	0.33x	122050.38	16.51		
Encke (IEG)	E	2048-05-31T12:39:10.631		22.95	2.53x	133423.31	16.57		
Encke (OEG)	E	2048-05-31T12:39:30.035		22.90	2.59x	133744.89	16.57		
A (OER)	E	2048-05-31T12:42:32.755		22.47	3.18x	136774.40	16.59		
F ring	E	2048-05-31T12:46:14.913		21.93	3.90x	140461.00	16.60		

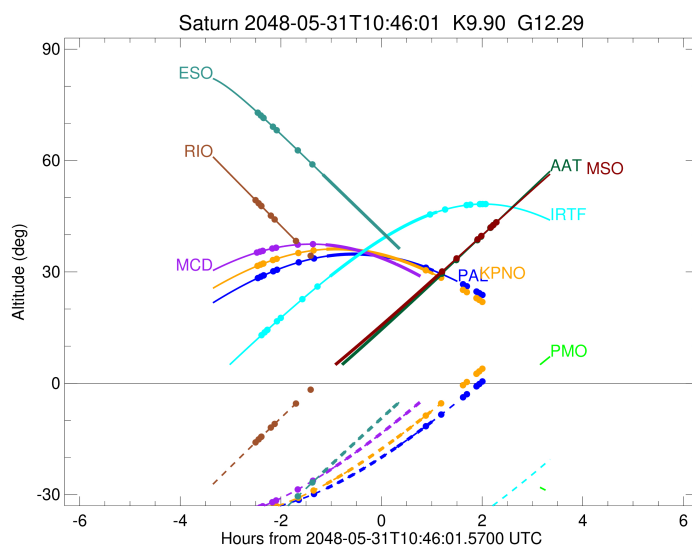
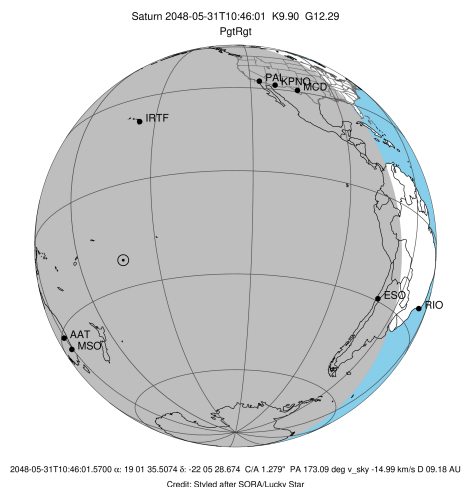
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2048-05-31T10:43:19.760
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : MCD
 Location : McDonald Obs. 2.7m
 Latitude (deg) : 30.67158
 E. Longitude (deg) : 255.97844
 Altitude (km) : 2.075
 Gaia source ID : 4081527178238361728
 2Mass ID (if available) : 19013549-2205282
 ICRS Star Coord at Epoch: 19h 01m 35.50740s -22:05:28.67410s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.899
 G magnitude : 12.294
 RP magnitude : 11.553
 BP magnitude : 12.890
 DUPflag : 0
 Distance (au) : 9.184
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -14.99
 Sun-Target sep (deg) : 145.74
 Sun-Moon sep (deg) : 16.67
 B (ring opening deg) : 24.73
 PA of pole (deg) : 6.48
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.978
 C/A sky separation (km) : 13176.4
 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	2048-05-31T08:17:32.692		35.22	-33.76	140461.00	-16.80		
A (OER)	I	2048-05-31T08:21:12.285		35.46	-33.43	136774.40	-16.78		
Encke (OEG)	I	2048-05-31T08:24:12.936		35.65	-33.16	133744.89	-16.76		
Encke (IEG)	I	2048-05-31T08:24:32.123		35.67	-33.13	133423.31	-16.76		
A (IER)	I	2048-05-31T08:35:52.237		36.31	-32.04	122050.38	-16.68		
B (OER)	I	2048-05-31T08:40:21.051		36.52	-31.57	117571.16	-16.64		
B (IER)	I	2048-05-31T09:06:12.037		37.34	-28.60	91984.69	-16.31		
C (IER)	I	2048-05-31T09:24:18.486		37.48	-26.24	74490.58	-15.85		
Saturn	I	2048-05-31T09:39:31.370		37.31	-24.11	60267.95		-0.38	-0.47
Saturn	E	2048-05-31T11:47:03.046		26.96	-2.23x	60079.66		23.10	27.57
C (IER)	E	2048-05-31T11:38:40.745	b	28.05	-3.82x	74490.58	15.72		
B (IER)	E	2048-05-31T11:56:56.913		25.61	-0.32x	91984.69	16.15		
B (OER)	E	2048-05-31T12:23:04.537		21.79	4.80x	117571.16	16.45		
A (IER)	E	2048-05-31T12:27:36.598		21.09	5.70x	122050.38	16.48		
Encke (IEG)	E	2048-05-31T12:39:05.410		19.27	8.00x	133423.31	16.54		
Encke (OEG)	E	2048-05-31T12:39:24.852		19.22	8.07x	133744.89	16.54		
A (OER)	E	2048-05-31T12:42:27.933		18.72	8.68x	136774.40	16.55		
F ring	E	2048-05-31T12:46:10.545		18.12	9.43x	140461.00	16.57		

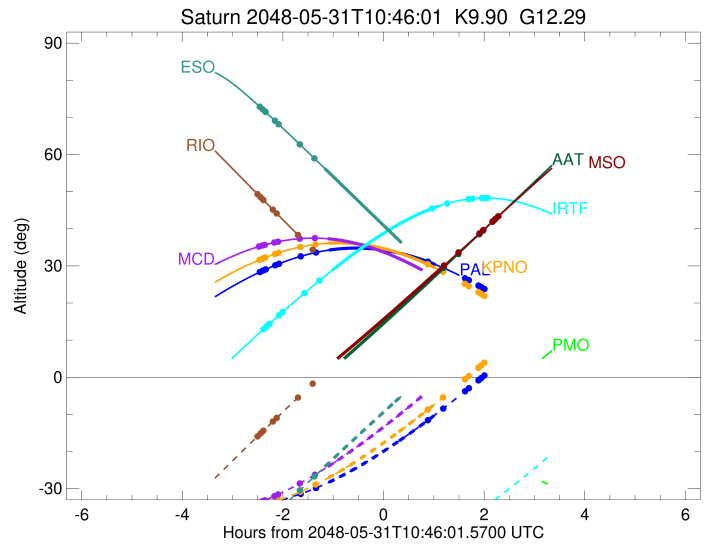
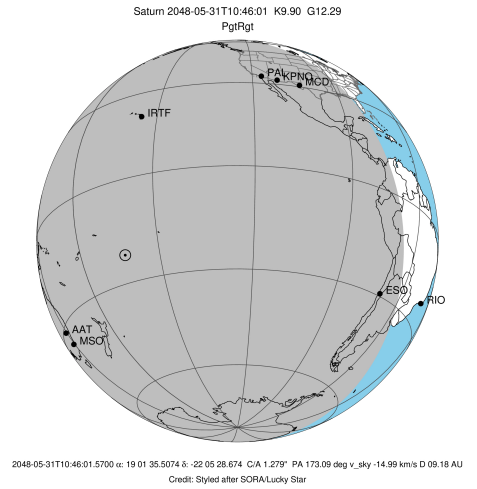
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2048-05-31T10:48:44.130
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : IRTF
 Location : Mauna Kea/IRTF
 Latitude (deg) : 19.82622
 E. Longitude (deg) : 204.52800
 Altitude (km) : 4.168
 Gaia source ID : 4081527178238361728
 2Mass ID (if available) : 19013549-2205282
 ICRS Star Coord at Epoch: 19h 01m 35.50740s -22:05:28.67410s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.899
 G magnitude : 12.294
 RP magnitude : 11.553
 BP magnitude : 12.890
 DUPflag : 0
 Distance (au) : 9.184
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -14.99
 Sun-Target sep (deg) : 145.74
 Sun-Moon sep (deg) : 17.46
 B (ring opening deg) : 24.73
 PA of pole (deg) : 6.48
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 1.924
 C/A sky separation (km) : 12814.0
 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

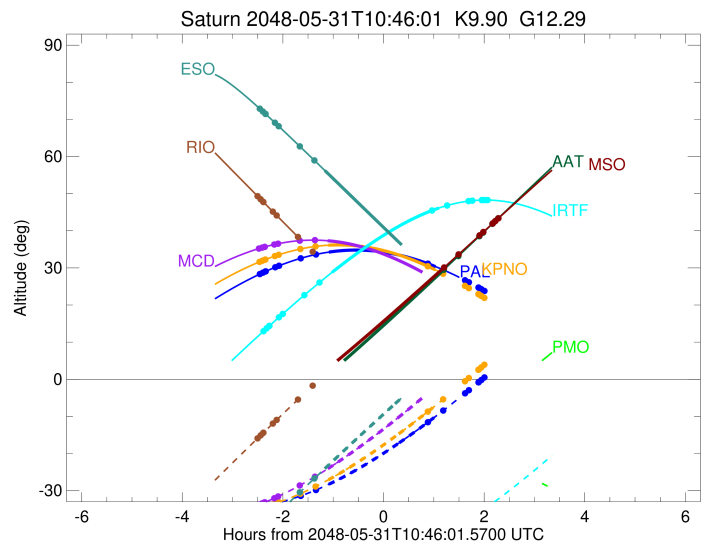
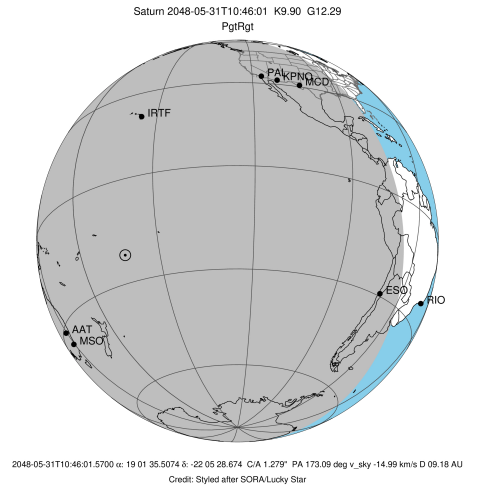
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2048-05-31T08:23:01.904		12.97	-39.48	140461.00	-16.74		
A (OER)	I	2048-05-31T08:26:42.213		13.72	-39.98	136774.40	-16.73		
Encke (OEG)	I	2048-05-31T08:29:43.384		14.34	-40.38	133744.89	-16.72		
Encke (IEG)	I	2048-05-31T08:30:02.623		14.41	-40.43	133423.31	-16.71		
A (IER)	I	2048-05-31T08:41:24.086		16.71	-41.87	122050.38	-16.66		
B (OER)	I	2048-05-31T08:45:53.170		17.61	-42.40	117571.16	-16.63		
B (IER)	I	2048-05-31T09:11:42.421		22.67	-45.09	91984.69	-16.36		
C (IER)	I	2048-05-31T09:29:43.518		26.08	-46.52	74490.58	-15.96		
Saturn	I	2048-05-31T09:44:43.528		28.81	-47.40	60267.49		-1.16	-1.43
Saturn	E	2048-05-31T11:52:15.413		46.14	-42.51	60078.16		23.20	27.68
C (IER)	E	2048-05-31T11:43:52.872	b	45.47	-43.45	74490.58	16.01		
B (IER)	E	2048-05-31T12:01:49.397		46.81	-41.36	91984.69	16.44		
B (OER)	E	2048-05-31T12:27:29.268		47.99	-37.86	117571.16	16.75		
A (IER)	E	2048-05-31T12:31:56.431		48.10	-37.20	122050.38	16.78		
Encke (IEG)	E	2048-05-31T12:43:12.672		48.26	-35.47	133423.31	16.85		
Encke (OEG)	E	2048-05-31T12:43:31.756		48.27	-35.42	133744.89	16.85		
A (OER)	E	2048-05-31T12:46:31.450		48.28	-34.95	136774.40	16.87		
F ring	E	2048-05-31T12:50:09.916		48.27	-34.36	140461.00	16.88		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2048-05-31T10:39:58.350
 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 : 4081527178238361728
 2Mass ID (if available) : 19013549-2205282
 ICRS Star Coord at Epoch: 19h 01m 35.50740s -22:05:28.67410s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.899
 G magnitude : 12.294
 RP magnitude : 11.553
 BP magnitude : 12.890
 DUPflag : 0
 Distance (au) : 9.184
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -14.99
 Sun-Target sep (deg) : 145.74
 Sun-Moon sep (deg) : 16.29
 B (ring opening deg) : 24.73
 PA of pole (deg) : 6.48
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.886
 C/A sky separation (km) : 5899.2
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 Saturn_ring_plane.tf
 sat378.bsp
 sat286.bsp
 vgr1.sat286.bsp
 vgr2.sat286.bsp
 HST1081HSPephemUTC.bsp
 pfb10000r.bsp
 cassini.bsp
 earthstns_itr93_040916.bsp
 earth_200101_990628_predict.bpc
 earth_720101_070426.bpc
 cpck28Mar2008.tpc
 pck.sat440.tpc
 IAU_SATURN_for_RINGFIT.tpc
 naif0012.tls
 earth_flat_IAU.spk



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2048-05-31T08:15:55.558		49.31	-15.90	140461.00	-16.86		
A (OER)	I	2048-05-31T08:19:34.333		48.47	-15.10	136774.40	-16.85		
Encke (OEG)	I	2048-05-31T08:22:34.209		47.79	-14.44	133744.89	-16.84		
Encke (IEG)	I	2048-05-31T08:22:53.308		47.71	-14.37	133423.31	-16.84		
A (IER)	I	2048-05-31T08:34:09.434		45.14	-11.91	122050.38	-16.80		
B (OER)	I	2048-05-31T08:38:36.112		44.12	-10.95	117571.16	-16.79		
B (IER)	I	2048-05-31T09:04:04.635		38.32	-5.45	91984.69	-16.68		
C (IER)	I	2048-05-31T09:21:36.750		34.34	-1.71x	74490.58	-16.56		
Saturn	I	2048-05-31T09:33:45.871		31.60	0.85x	60252.54		-6.44	-7.90
Saturn	E	2048-05-31T11:46:33.924		2.35x	26.64x	60167.59		16.63	20.12
C (IER)	E	2048-05-31T11:48:07.301		2.02x	26.90x	74490.58	16.31		
B (IER)	E	2048-05-31T12:05:57.260		-1.74x	29.88x	91984.69	16.38		
B (OER)	E	2048-05-31T12:31:57.824		-7.14x	33.90x	117571.16	16.41		
A (IER)	E	2048-05-31T12:36:30.822		-8.07x	34.56x	122050.38	16.41		
Encke (IEG)	E	2048-05-31T12:48:03.912		-10.42x	36.16x	133423.31	16.41		
Encke (OEG)	E	2048-05-31T12:48:23.509		-10.48x	36.21x	133744.89	16.41		
A (OER)	E	2048-05-31T12:51:28.132		-11.10x	36.62x	136774.40	16.41		
F ring	E	2048-05-31T12:55:12.804		-11.85x	37.11x	140461.00	16.41		

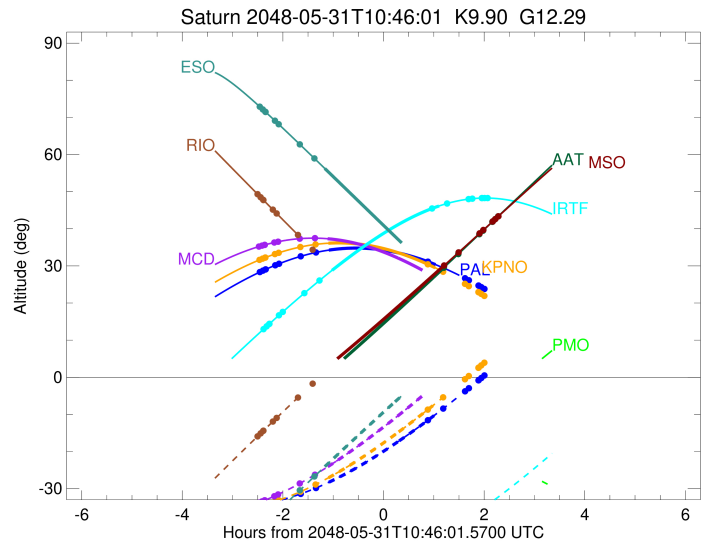
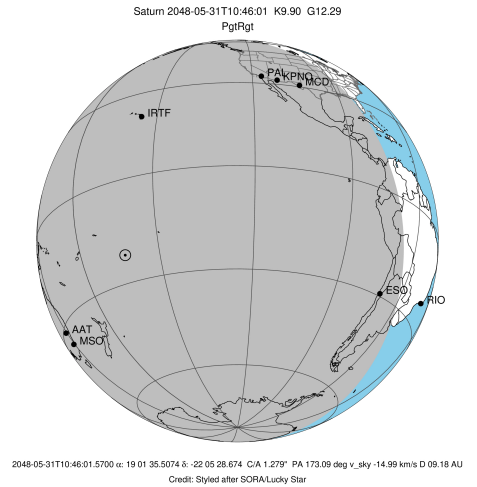
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2048-05-31T10:41:24.300
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : ESO
 Location : European Southern Obs. (3.6m)
 Latitude (deg) : -29.26097
 E. Longitude (deg) : 289.26831
 Altitude (km) : 2.400
 Gaia source ID : 4081527178238361728
 2Mass ID (if available) : 19013549-2205282
 ICRS Star Coord at Epoch: 19h 01m 35.50740s -22:05:28.67410s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.899
 G magnitude : 12.294
 RP magnitude : 11.553
 BP magnitude : 12.890
 DUPflag : 0
 Distance (au) : 9.184
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -14.99
 Sun-Target sep (deg) : 145.74
 Sun-Moon sep (deg) : 16.57
 B (ring opening deg) : 24.73
 PA of pole (deg) : 6.48
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.954
 C/A sky separation (km) : 6357.3
 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_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	2048-05-31T08:18:33.127		72.87	-40.77	140461.00	-16.99		
A (OER)	I	2048-05-31T08:22:10.157		72.13	-39.98	136774.40	-16.98		
Encke (OEG)	I	2048-05-31T08:25:08.583		71.51	-39.34	133744.89	-16.98		
Encke (IEG)	I	2048-05-31T08:25:27.527		71.44	-39.27	133423.31	-16.97		
A (IER)	I	2048-05-31T08:36:38.079		69.09	-36.84	122050.38	-16.95		
B (OER)	I	2048-05-31T08:41:02.514		68.16	-35.89	117571.16	-16.93		
B (IER)	I	2048-05-31T09:06:17.886		62.72	-30.43	91984.69	-16.83		
C (IER)	I	2048-05-31T09:23:41.016		58.94	-26.70	74490.58	-16.70		
Saturn	I	2048-05-31T09:35:55.935		56.27	-24.09	60253.96		-6.14	-7.52
Saturn	E	2048-05-31T11:47:07.817		27.68	2.81x	60162.69		17.04	20.60
C (IER)	E	2048-05-31T11:48:06.213		27.47	3.00x	74490.58	16.48		
B (IER)	E	2048-05-31T12:05:45.126		23.69	6.39x	91984.69	16.55		
B (OER)	E	2048-05-31T12:31:28.832		18.22	11.18x	117571.16	16.59		
A (IER)	E	2048-05-31T12:35:58.860		17.27	12.00x	122050.38	16.59		
Encke (IEG)	E	2048-05-31T12:47:24.438		14.88	14.05x	133423.31	16.59		
Encke (OEG)	E	2048-05-31T12:47:43.823		14.81	14.11x	133744.89	16.59		
A (OER)	E	2048-05-31T12:50:46.457		14.17	14.65x	136774.40	16.59		
F ring	E	2048-05-31T12:54:28.716		13.40	15.30x	140461.00	16.59		

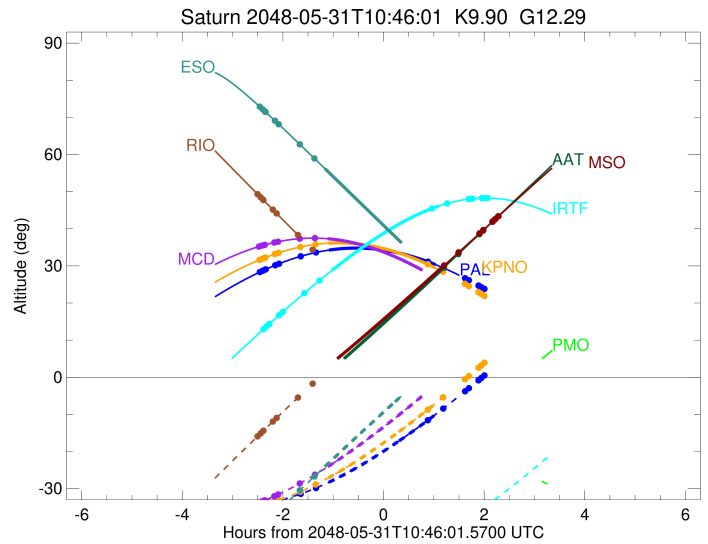
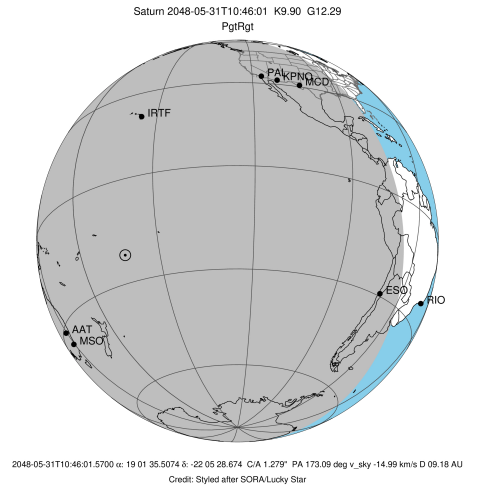
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2048-05-31T10:52:20.760
 Event type : PgtRgt
 : Saturn occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : AAT
 Location : Siding Spring (AAT)
 Latitude (deg) : -31.27703
 E. Longitude (deg) : 149.06608
 Altitude (km) : 1.164
 Gaia source ID : 4081527178238361728
 2Mass ID (if available) : 19013549-2205282
 ICRS Star Coord at Epoch: 19h 01m 35.50740s -22:05:28.67410s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.899
 G magnitude : 12.294
 RP magnitude : 11.553
 BP magnitude : 12.890
 DUPflag : 0
 Distance (au) : 9.184
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -14.99
 Sun-Target sep (deg) : 145.74
 Sun-Moon sep (deg) : 17.94
 B (ring opening deg) : 24.73
 PA of pole (deg) : 6.48
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.957
 C/A sky separation (km) : 6375.1
 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	2048-05-31T08:27:48.069	-12.12x	-16.55	140461.00	-16.61			
A (OER)	I	2048-05-31T08:31:30.024	-11.47x	-17.31	136774.40	-16.61			
Encke (OEG)	I	2048-05-31T08:34:32.388	-10.93x	-17.94	133744.89	-16.61			
Encke (IEG)	I	2048-05-31T08:34:51.744	-10.87x	-18.01	133423.31	-16.61			
A (IER)	I	2048-05-31T08:46:16.148	-8.83x	-20.37	122050.38	-16.62			
B (OER)	I	2048-05-31T08:50:45.647	-8.01x	-21.30	117571.16	-16.62			
B (IER)	I	2048-05-31T09:16:25.569	-3.24x	-26.67	91984.69	-16.60			
C (IER)	I	2048-05-31T09:34:01.039	0.12x	-30.38	74490.58	-16.54			
Saturn	I	2048-05-31T09:45:42.458	2.40x	-32.86	60249.11	-7.12		-7.12	-8.73
Saturn	E	2048-05-31T11:58:19.420	29.59	-61.13	60150.50	18.04		18.04	21.76
C (IER)	E	2048-05-31T11:57:54.674	b	29.51	-61.04	74490.58	16.79		
B (IER)	E	2048-05-31T12:15:12.317		33.18	-64.65	91984.69	16.92		
B (OER)	E	2048-05-31T12:40:19.382		38.54	-69.77	117571.16	17.03		
A (IER)	E	2048-05-31T12:44:42.335		39.48	-70.64	122050.38	17.04		
Encke (IEG)	E	2048-05-31T12:55:49.087		41.86	-72.78	133423.31	17.07		
Encke (OEG)	E	2048-05-31T12:56:07.923		41.93	-72.84	133744.89	17.07		
A (OER)	E	2048-05-31T12:59:05.328		42.56	-73.40	136774.40	17.08		
F ring	E	2048-05-31T13:02:41.110		43.33	-74.07	140461.00	17.09		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2048-05-31T10:52:08.010
 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 : 4081527178238361728
 2Mass ID (if available) : 19013549-2205282
 ICRS Star Coord at Epoch: 19h 01m 35.50740s -22:05:28.67410s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 9.899
 G magnitude : 12.294
 RP magnitude : 11.553
 BP magnitude : 12.890
 DUPflag : 0
 Distance (au) : 9.184
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -14.99
 Sun-Target sep (deg) : 145.74
 Sun-Moon sep (deg) : 17.92
 B (ring opening deg) : 24.73
 PA of pole (deg) : 6.48
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 0.899
 C/A sky separation (km) : 5987.2
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 Saturn_ring_plane.tf
 sat378.bsp
 sat286.bsp
 vgr1.sat286.bsp
 vgr2.sat286.bsp
 HST1081HSPephemUTC.bsp
 pfb10000r.bsp
 cassini.bsp
 earthstns_itr93_040916.bsp
 earth_200101_990628_predict.bpc
 earth_720101_070426.bpc
 cpck28Mar2008.tpc
 pck.sat440.tpc
 IAU_SATURN_for_RINGFIT.tpc
 naif0012.tls
 earth_flat_IAU.spk



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2048-05-31T08:27:51.763	-9.80x	-17.60	140461.00	-16.62			
A (OER)	I	2048-05-31T08:31:33.565	-9.18x	-18.33	136774.40	-16.62			
Encke (OEG)	I	2048-05-31T08:34:35.802	-8.67x	-18.93	133744.89	-16.63			
Encke (IEG)	I	2048-05-31T08:34:55.144	-8.62x	-18.99	133423.31	-16.63			
A (IER)	I	2048-05-31T08:46:19.046	-6.68x	-21.26	122050.38	-16.63			
B (OER)	I	2048-05-31T08:50:48.334	-5.90x	-22.16	117571.16	-16.63			
B (IER)	I	2048-05-31T09:16:26.778	-1.37x	-27.31	91984.69	-16.62			
C (IER)	I	2048-05-31T09:34:00.722	1.84x	-30.87	74490.58	-16.57			
Saturn	I	2048-05-31T09:45:26.938	3.96x	-33.20	60247.42			-7.44	-9.11
Saturn	E	2048-05-31T11:58:11.106	30.09	-60.06	60154.91			17.68	21.35
C (IER)	E	2048-05-31T11:58:15.806	30.10	-60.08	74490.58	16.81			
B (IER)	E	2048-05-31T12:15:32.577	33.63	-63.40	91984.69	16.93			
B (OER)	E	2048-05-31T12:40:39.385	38.77	-67.99	117571.16	17.03			
A (IER)	E	2048-05-31T12:45:02.370	39.67	-68.75	122050.38	17.04			
Encke (IEG)	E	2048-05-31T12:56:09.278	41.95	-70.60	133423.31	17.07			
Encke (OEG)	E	2048-05-31T12:56:28.120	42.01	-70.65	133744.89	17.07			
A (OER)	E	2048-05-31T12:59:25.583	42.62	-71.12	136774.40	17.07			
F ring	E	2048-05-31T13:03:01.444	43.36	-71.68	140461.00	17.08			