

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2046-05-16T12:38:43.420
 Event type : PIRgt
 : Saturn occs: topocentric, not geocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 4115064177005187328
 2Mass ID (if available) : 17212759-2134203

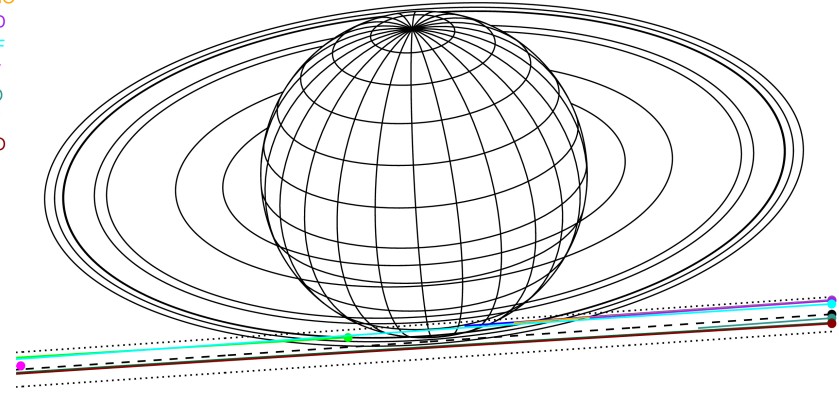
Saturn 2046-05-16T12:38:43 K8.76 G12.95 PIRgt

ICRS Star Coord at Epoch: 17h 21m 27.60146s -21:34:20.42428s

RUWE (>1.4 is poor) : 0.90
 K magnitude : 8.756
 G magnitude : 12.947
 RP magnitude : 11.840
 BP magnitude : 14.230
 DUPflag : 0
 Distance (au) : 9.113
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.20
 Sun-Target sep (deg) : 154.10
 Sun-Moon sep (deg) : 74.78
 B (ring opening deg) : 26.50
 PA of pole (deg) : 4.64



Earth
 PAL
 PMO
 KPNO
 MCD
 IRTF
 KAV
 ESO
 AAT
 MSO

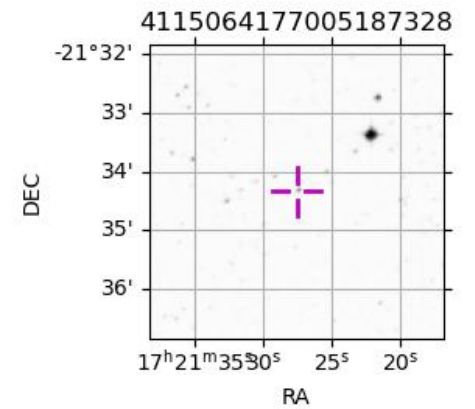


2046-05-16T12:38:43.4200 a: 17 21 27.6015 ð -21 34 20.424 C/A 9.335° PA 3.89 deg v_sky -17.20 km/s D 09.11 AU
 Credit: Styled after SORA/Lucky Star

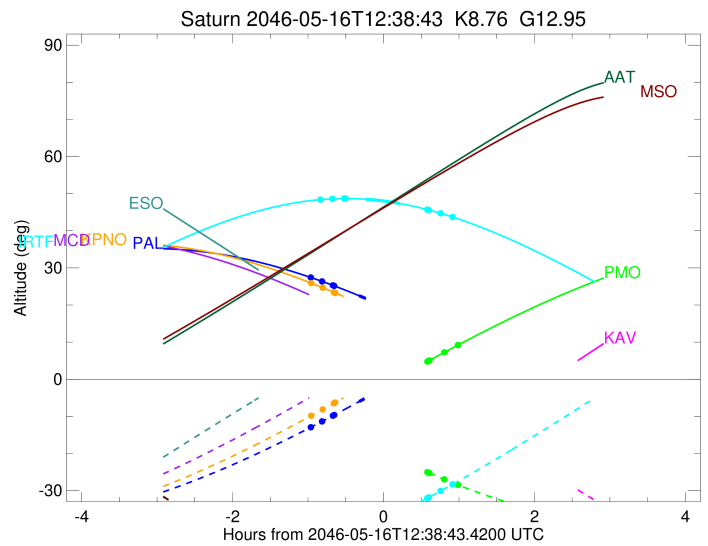
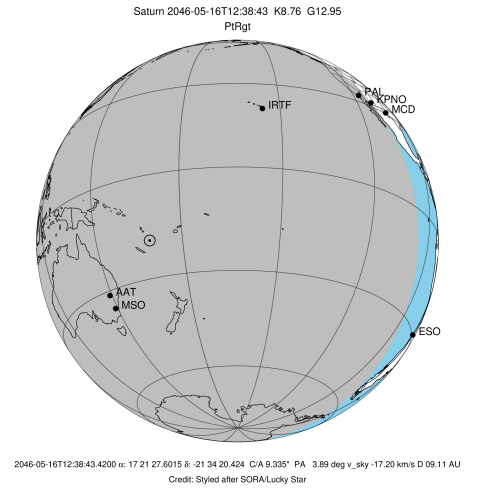
#	a(km)	ring
1	74490.6	C (IER)
2	91984.7	B (IER)
3	117571.2	B (OER)
4	122050.4	A (IER)
5	133423.3	Encke (IEG)
6	133744.9	Encke (OEG)
7	136774.4	A (OER)
8	140461.0	F ring

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 16 11:40 - MAY 16 12:19	PinRin
PMO	Purple Mtn Obs	32.1	118.8			+	MAY 16 13:15 - MAY 16 13:38	PnnRne
KPNO	Kitt Peak Natl	32.0	248.4	+	+		MAY 16 11:41 - MAY 16 12:00	PnnRin
MCD	McDonald Obs.	30.7	256.0					PnnRnn
TEN	Teide Obs./Ten	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+	+	+	MAY 16 11:48 - MAY 16 13:33	PieRie
KAV	Kavalur Observ	12.6	78.8					PnnRnn
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					PnnRnn
MSO	Mt. Stromlo Ob	-35.3	149.0					PnnRnn



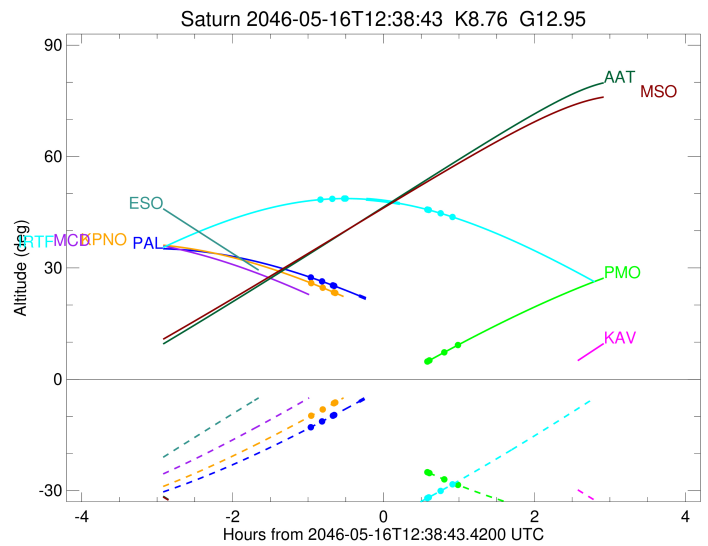
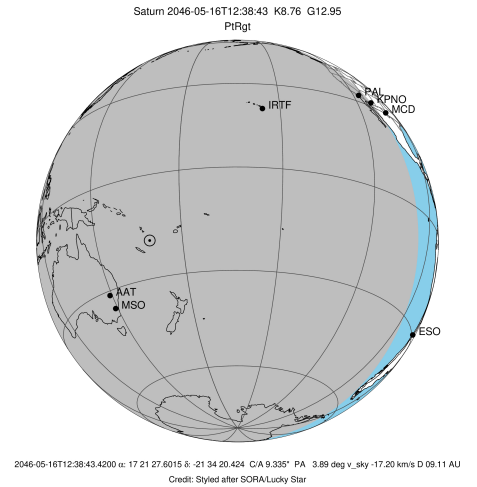
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2046-05-16T12:35:04.590
 Event type : PtRgt
 : Saturn occs: topocentric, not geocentric
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 4115064177005187328
 2Mass ID (if available) : 17212759-2134203
 ICRS Star Coord at Epoch: 17h 21m 27.60146s -21:34:20.42428s
 RUWE (>1.4 is poor) : 0.90
 K magnitude : 8.756
 G magnitude : 12.947
 RP magnitude : 11.840
 BP magnitude : 14.230
 DUPflag : 0
 Distance (au) : 9.113
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.20
 Sun-Target sep (deg) : 154.10
 Sun-Moon sep (deg) : 75.27
 B (ring opening deg) : 26.50
 PA of pole (deg) : 4.64
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 8.600
 C/A sky separation (km) : 56842.5
 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	2046-05-16T11:40:53.719		27.42	-12.93	140461.00	-7.40		
A (OER)	I	2046-05-16T11:49:48.406		26.37	-11.37	136774.40	-6.38		
Encke (OEG)	I	2046-05-16T11:58:25.640		25.30	-9.83	133744.89	-5.32		
Encke (IEG)	I	2046-05-16T11:59:26.795		25.17	-9.65	133423.31	-5.19		
Saturn	I	2046-05-16T12:19:14.917		22.52	-6.03	59223.56		-59.45	-64.01
Saturn	E	2046-05-16T12:50:57.141		17.84	-0.03x	59233.27		-58.99	-63.60
Encke (IEG)	E	2046-05-16T13:14:27.282		14.07	4.54x	133423.31	5.17		
Encke (OEG)	E	2046-05-16T13:15:28.731		13.90	4.74x	133744.89	5.30		
A (OER)	E	2046-05-16T13:24:08.810		12.46	6.46x	136774.40	6.34		
F ring	E	2046-05-16T13:33:07.104		10.93	8.24x	140461.00	7.34		

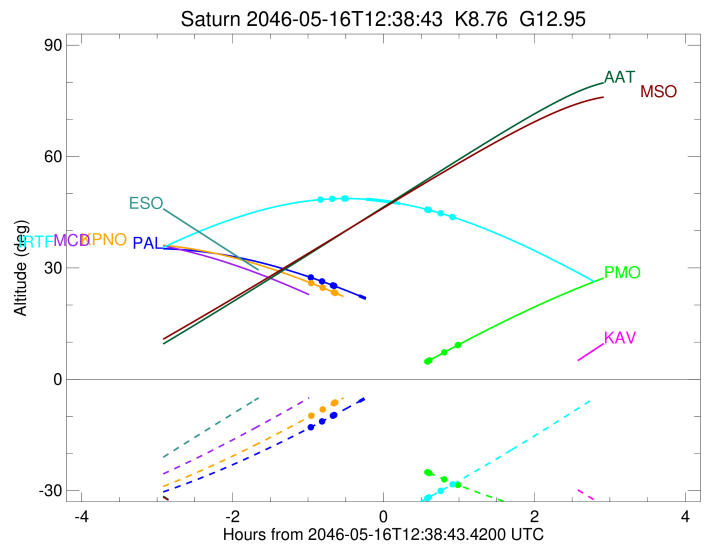
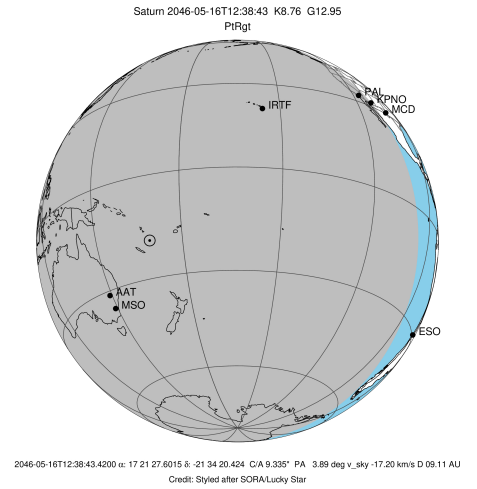
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2046-05-16T12:44:30.870
 Event type : PtRgt
 : Saturn occs: topocentric, not geocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 4115064177005187328
 2Mass ID (if available) : 17212759-2134203
 ICRS Star Coord at Epoch: 17h 21m 27.60146s -21:34:20.42428s
 RUWE (>1.4 is poor) : 0.90
 K magnitude : 8.756
 G magnitude : 12.947
 RP magnitude : 11.840
 BP magnitude : 14.230
 DUPflag : 0
 Distance (au) : 9.113
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.20
 Sun-Target sep (deg) : 154.10
 Sun-Moon sep (deg) : 74.54
 B (ring opening deg) : 26.50
 PA of pole (deg) : 4.64
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 8.843
 C/A sky separation (km) : 58448.9
 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	2046-05-16T12:00:20.971		-9.42x	-13.00	140461.00	-6.22		
A (OER)	I	2046-05-16T12:11:18.843		-7.23x	-14.94	136774.40	-4.97		
Encke (OEG)	I	2046-05-16T12:23:12.804		-4.88x	-16.99	133744.89	-3.50		
Encke (IEG)	I	2046-05-16T12:24:47.388		-4.57x	-17.26	133423.31	-3.30		
Saturn	I	2046-05-16T12:35:41.111		-2.44x	-19.09	59161.46		-62.51	-66.73
Saturn	E	2046-05-16T12:53:25.635		0.98x	-21.95	59176.27		-61.76	-66.07
Encke (IEG)	E	2046-05-16T13:14:02.161		4.86x	-25.10	133423.31	3.32		
Encke (OEG)	E	2046-05-16T13:15:36.081		5.15	-25.33	133744.89	3.53		
A (OER)	E	2046-05-16T13:27:23.897		7.32	-27.02	136774.40	5.02		
F ring	E	2046-05-16T13:38:14.437		9.27	-28.50	140461.00	6.30		

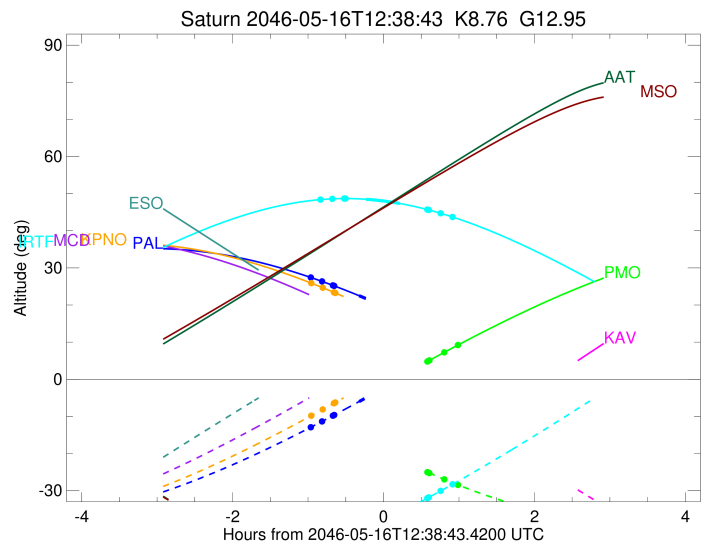
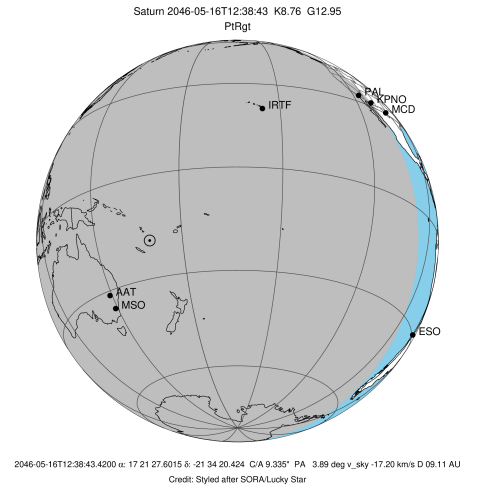
target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2046-05-16T12:34:39.000
 Event type : PtRgt
 : Saturn occs: topocentric, not geocentric
 : Ring occs: geocentric, topocentric
 Observer code : KPNO
 Location : Kitt Peak Natl Obs
 Latitude (deg) : 31.96333
 E. Longitude (deg) : 248.40000
 Altitude (km) : 2.120
 Gaia source ID : 4115064177005187328
 2Mass ID (if available) : 17212759-2134203
 ICRS Star Coord at Epoch: 17h 21m 27.60146s -21:34:20.42428s
 RUWE (>1.4 is poor) : 0.90
 K magnitude : 8.756
 G magnitude : 12.947
 RP magnitude : 11.840
 BP magnitude : 14.230
 DUPflag : 0
 Distance (au) : 9.113
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.20
 Sun-Target sep (deg) : 154.10
 Sun-Moon sep (deg) : 75.25
 B (ring opening deg) : 26.50
 PA of pole (deg) : 4.64
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 8.632
 C/A sky separation (km) : 57050.1
 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	2046-05-16T11:41:13.865		25.90	-9.83	140461.00	-7.26		
A (OER)	I	2046-05-16T11:50:20.392		24.67	-8.14	136774.40	-6.22		
Encke (OEG)	I	2046-05-16T11:59:14.366		23.41	-6.47	133744.89	-5.12		
Encke (IEG)	I	2046-05-16T12:00:18.025		23.26	-6.27	133423.31	-4.98		
Saturn	I	2046-05-16T12:19:31.239		20.40	-2.60x	59216.50		-59.79	-64.32
Saturn	E	2046-05-16T12:49:49.497		15.54	3.35x	59225.00		-59.38	-63.95
Encke (IEG)	E	2046-05-16T13:12:28.487		11.66	7.90x	133423.31	4.96		
Encke (OEG)	E	2046-05-16T13:13:32.479		11.48	8.12x	133744.89	5.09		
A (OER)	E	2046-05-16T13:22:29.676		9.89	9.93x	136774.40	6.17		
F ring	E	2046-05-16T13:31:40.278		8.24	11.81x	140461.00	7.20		

target : Saturn
 target radius (km) : 60268.00
 C/A epoch : 2046-05-16T12:38:14.810
 Event type : PtRgt
 : Saturn occs: topocentric, not geocentric
 : 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 : 4115064177005187328
 2Mass ID (if available) : 17212759-2134203
 ICRS Star Coord at Epoch: 17h 21m 27.60146s -21:34:20.42428s
 RUWE (>1.4 is poor) : 0.90
 K magnitude : 8.756
 G magnitude : 12.947
 RP magnitude : 11.840
 BP magnitude : 14.230
 DUPflag : 0
 Distance (au) : 9.113
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -17.20
 Sun-Target sep (deg) : 154.10
 Sun-Moon sep (deg) : 75.54
 B (ring opening deg) : 26.50
 PA of pole (deg) : 4.64
 Pole direction: RA (deg): 40.60000
 Dec (deg): 83.50000
 C/A sky separation (") : 8.694
 C/A sky separation (km) : 57462.7
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 Saturn_ring_plane.tf
 sat378.bsp
 sat286.bsp
 vgr1.sat286.bsp
 vgr2.sat286.bsp
 HST1081HSPephemUTC.bsp
 pfb10000r.bsp
 cassini.bsp
 earthstns_itrf93_040916.bsp
 earth_200101_990628_predict.bpc
 earth_720101_070426.bpc
 cpck28Mar2008.tpc
 pck.sat440.tpc
 IAU_SATURN_for_RINGFIT.tpc
 naif0012.tls
 earth_flat_IAU.spk



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

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
F ring	I	2046-05-16T11:48:31.651		48.39	-45.24	140461.00	-7.06		
A (OER)	I	2046-05-16T11:57:57.332		48.60	-44.05	136774.40	-5.95		
Encke (OEG)	I	2046-05-16T12:07:22.073		48.68	-42.78	133744.89	-4.76		
Encke (IEG)	I	2046-05-16T12:08:30.696		48.68	-42.62	133423.31	-4.61		
Saturn	I	2046-05-16T12:24:48.908		48.49	-40.23	59198.54		-60.66	-65.09
Saturn	E	2046-05-16T12:51:44.031		47.35	-35.87	59212.48		-59.98	-64.49
Encke (IEG)	E	2046-05-16T13:13:53.284		45.68	-31.97	133423.31	4.61		
Encke (OEG)	E	2046-05-16T13:15:01.894		45.58	-31.76	133744.89	4.76		
A (OER)	E	2046-05-16T13:24:26.593		44.68	-30.02	136774.40	5.95		
F ring	E	2046-05-16T13:33:52.354		43.69	-28.25	140461.00	7.06		