

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2045-03-23T02:23:17.240  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 617797613504563584  
 2Mass ID (if available) : 09411626+1439464

Uranus 2045-03-23T02:23:17 K11.44 G12.98 PgtRgt

ICRS Star Coord at Epoch: 09h 41m 16.29019s +14:39:45.71253s

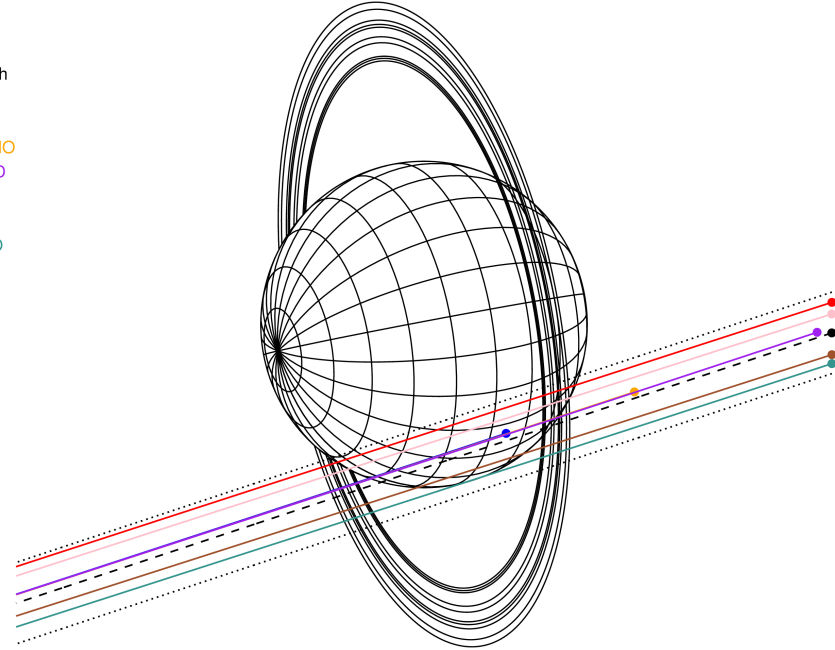
RUWE (>1.4 is poor) : 1.37  
 K magnitude : 11.442  
 G magnitude : 12.982  
 RP magnitude : 12.459  
 BP magnitude : 13.342  
 DUPflag : 0  
 Distance (au) : 17.582  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -16.28  
 Sun-Target sep (deg) : 140.47  
 Sun-Moon sep (deg) : 87.94  
 B (ring opening deg) : 24.58  
 PA of pole (deg) : 100.25

Uranus 2045-03-23T02:23:17 K11.44 G12.98  
 PgtRgt



2045-03-23T02:23:17.2400 α: 09 41 16.2902 δ: +14 39 45.713 C/A 1.672° PA 18.34 deg v\_sky -16.28 km/s D 17.58 AU  
 Credit: Styled after SORA/Lucky Star

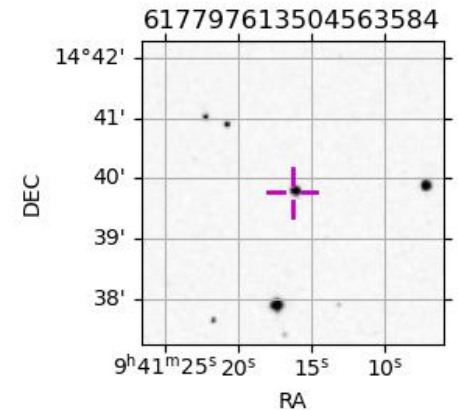
Earth  
 PIC  
 PAL  
 KPNO  
 MCD  
 TEN  
 RIO  
 ESO



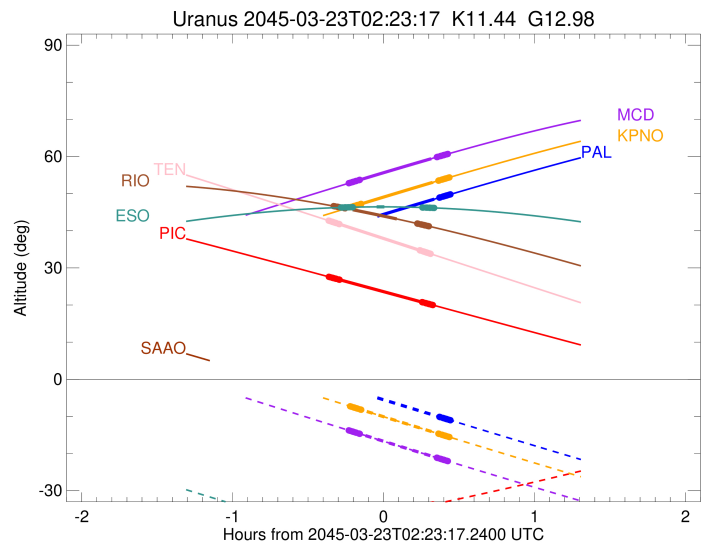
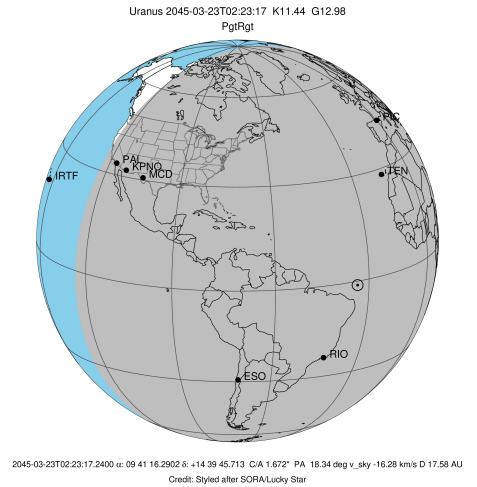
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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		+	+	MAR 23 02:00 - MAR 23 02:42	PieRne
PAL	Palomar Mt (200")	33.4	243.1		+	+++++	MAR 23 02:43 - MAR 23 02:49	PneRne
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++	+	+	MAR 23 02:10 - MAR 23 02:49	PieRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++	+	+	MAR 23 02:09 - MAR 23 02:48	PieRie
TEN	Teide Obs./Tenerife	28.3	343.5		+	+	MAR 23 02:01 - MAR 23 02:41	PieRne
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++	+	+	MAR 23 02:03 - MAR 23 02:41	PieRie
ESO	European Southern Obs	-29.3	289.3	+++++	+	+	MAR 23 02:06 - MAR 23 02:43	PieRie
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn

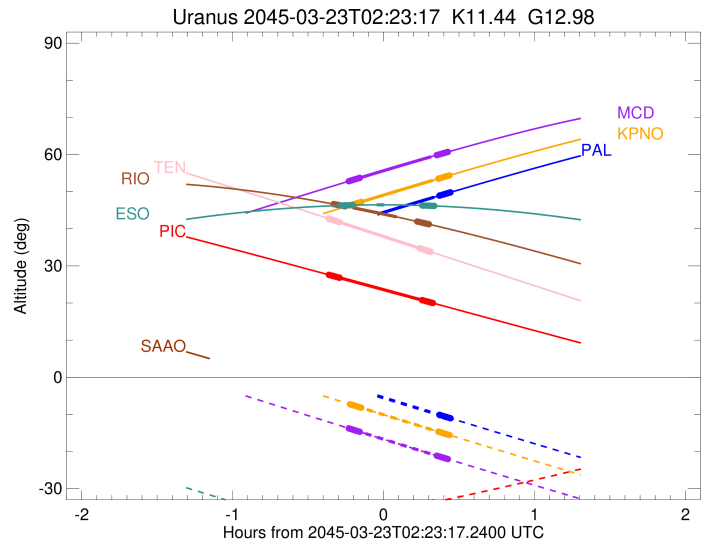
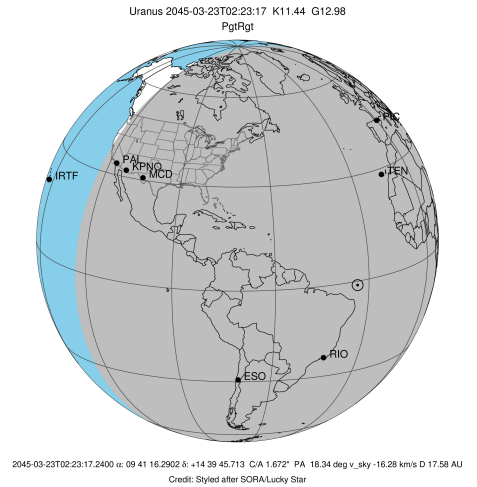


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2045-03-23T02:20:21.430  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PIC  
 Location : Pic du Midi  
 Latitude (deg) : 42.93656  
 E. Longitude (deg) : 0.14231  
 Altitude (km) : 2.890  
 Gaia source ID : 617797613504563584  
 2Mass ID (if available) : 09411626+1439464  
 ICRS Star Coord at Epoch: 09h 41m 16.29019s +14:39:45.71253s  
 RUWE (>1.4 is poor) : 1.37  
 K magnitude : 11.442  
 G magnitude : 12.982  
 RP magnitude : 12.459  
 BP magnitude : 13.342  
 DUPflag : 0  
 Distance (au) : 17.582  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -16.28  
 Sun-Target sep (deg) : 140.47  
 Sun-Moon sep (deg) : 88.33  
 B (ring opening deg) : 24.58  
 PA of pole (deg) : 100.25  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.282  
 C/A sky separation (km) : 16345.8  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 ura111.bsp  
 IAU\_URANUS\_for\_RINGFIT.tpc  
 vgr2.ura111.bsp  
 ura161.bsp  
 vgr2.ura161.bsp  
 peph.ura160.bsp  
 earthstns\_itr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



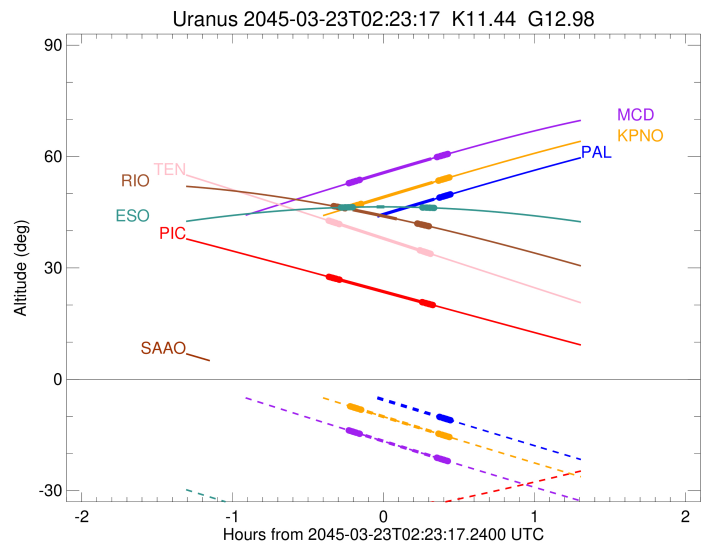
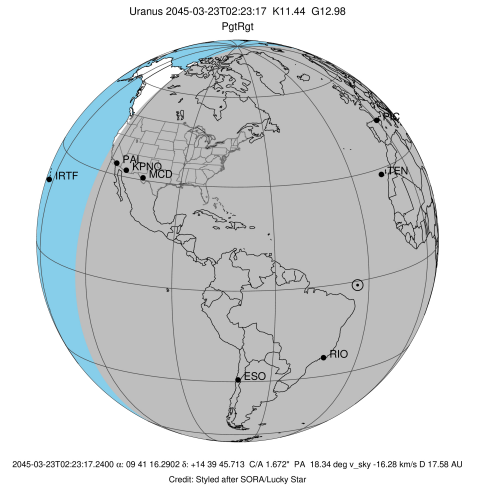
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2045-03-23T02:01:37.657	b	27.58	-38.99	51082.15	-36.93		
lambda	I	2045-03-23T02:02:06.192	b	27.50	-38.93	50026.71	-36.94		
delta	I	2045-03-23T02:02:53.030	b	27.35	-38.85	48300.35	-36.77		
gamma	I	2045-03-23T02:03:11.291	b	27.30	-38.81	47629.46	-36.71		
eta	I	2045-03-23T02:03:23.650	b	27.26	-38.79	47176.12	-36.66		
beta	I	2045-03-23T02:04:05.476	b	27.13	-38.71	45646.70	-36.48		
alpha	I	2045-03-23T02:04:32.095	b	27.05	-38.65	44699.80	-36.37		
4	I	2045-03-23T02:05:29.220	b	26.88	-38.54	42566.43	-36.01		
5	I	2045-03-23T02:05:43.788	b	26.83	-38.51	42157.35	-36.07		
6	I	2045-03-23T02:05:51.794	b	26.81	-38.50	41871.91	-36.05		
Uranus	I	2045-03-23T02:00:28.072		27.80	-39.12	25486.99		-50.31	-51.59
Uranus	E	2045-03-23T02:40:19.184		20.47	-34.07	25513.12		37.86	39.15
6	E	2045-03-23T02:38:35.079	b	20.79	-34.31	41830.98	35.94		
5	E	2045-03-23T02:38:47.699	b	20.75	-34.28	42274.68	35.96		
4	E	2045-03-23T02:38:58.523	b	20.72	-34.26	42542.44	35.89		
alpha	E	2045-03-23T02:39:57.165	b	20.54	-34.12	44712.80	36.24		
beta	E	2045-03-23T02:40:23.421		20.46	-34.06	45662.43	36.35		
eta	E	2045-03-23T02:41:05.109		20.33	-33.96	47176.12	36.52		
gamma	E	2045-03-23T02:41:17.435		20.29	-33.94	47626.59	36.57		
delta	E	2045-03-23T02:41:35.842		20.23	-33.89	48300.35	36.64		
lambda	E	2045-03-23T02:42:22.859		20.09	-33.78	50026.71	36.80		
epsilon	E	2045-03-23T02:42:48.008		20.01	-33.73	50953.12	36.79		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2045-03-23T02:27:45.400  
 Event type : PgtRgt  
 : Uranus 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 : 617797613504563584  
 2Mass ID (if available) : 09411626+1439464  
 ICRS Star Coord at Epoch: 09h 41m 16.29019s +14:39:45.71253s  
 RUWE (>1.4 is poor) : 1.37  
 K magnitude : 11.442  
 G magnitude : 12.982  
 RP magnitude : 12.459  
 BP magnitude : 13.342  
 DUPflag : 0  
 Distance (au) : 17.582  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -16.28  
 Sun-Target sep (deg) : 140.47  
 Sun-Moon sep (deg) : 88.59  
 B (ring opening deg) : 24.58  
 PA of pole (deg) : 100.25  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.586  
 C/A sky separation (km) : 20225.0  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 ura111.bsp  
 IAU\_URANUS\_for\_RINGFIT.tpc  
 vgr2.ura111.bsp  
 ura161.bsp  
 vgr2.ura161.bsp  
 peph.ura160.bsp  
 earthstns\_itr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



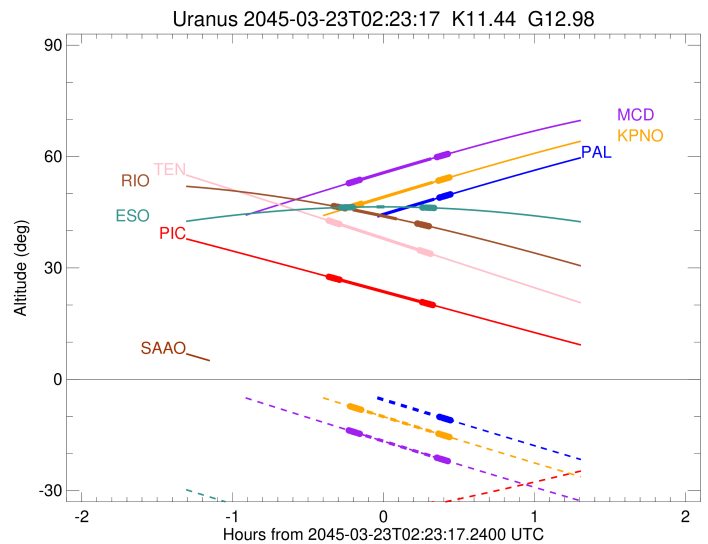
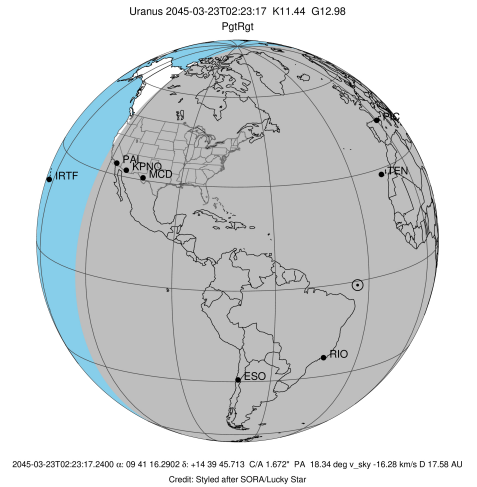
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2045-03-23T02:10:23.399		41.78	-2.82x	51050.33	-36.06		
lambda	I	2045-03-23T02:10:51.746		41.88	-2.92x	50026.71	-36.04		
delta	I	2045-03-23T02:11:39.817		42.04	-3.09x	48300.35	-35.78		
gamma	I	2045-03-23T02:11:58.586		42.10	-3.15x	47629.81	-35.67		
eta	I	2045-03-23T02:12:11.318	b	42.15	-3.20x	47176.12	-35.59		
beta	I	2045-03-23T02:12:54.468	b	42.30	-3.35x	45645.49	-35.32		
alpha	I	2045-03-23T02:13:22.053	b	42.39	-3.44x	44697.23	-35.13		
4	I	2045-03-23T02:14:21.511	b	42.60	-3.65x	42561.95	-34.59		
5	I	2045-03-23T02:14:36.266	b	42.65	-3.70x	42155.73	-34.62		
6	I	2045-03-23T02:14:44.460	b	42.67	-3.73x	41874.24	-34.58		
Uranus	I	2045-03-23T02:12:06.370		42.13	-3.18x	25507.65		-40.50	-41.80
Uranus	E	2045-03-23T02:43:26.338		48.51	-9.70	25534.36		26.72	27.79
6	E	2045-03-23T02:45:28.661		48.92	-10.12	41835.48	34.63		
5	E	2045-03-23T02:45:41.400		48.97	-10.17	42267.14	34.68		
4	E	2045-03-23T02:45:52.409		49.00	-10.20	42538.96	34.65		
alpha	E	2045-03-23T02:46:53.151		49.21	-10.41	44709.55	35.20		
beta	E	2045-03-23T02:47:20.113		49.30	-10.51	45660.51	35.38		
eta	E	2045-03-23T02:48:02.935		49.44	-10.65	47176.12	35.66		
gamma	E	2045-03-23T02:48:15.566		49.48	-10.70	47627.07	35.74		
delta	E	2045-03-23T02:48:34.374		49.54	-10.76	48300.35	35.85		
lambda	E	2045-03-23T02:49:22.347		49.70	-10.93	50026.71	36.12		
epsilon	E	2045-03-23T02:49:47.145		49.78	-11.01	50923.87	36.14		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2045-03-23T02:27:24.480  
 Event type : PgtRgt  
 : Uranus 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 : 617797613504563584  
 2Mass ID (if available) : 09411626+1439464  
 ICRS Star Coord at Epoch: 09h 41m 16.29019s +14:39:45.71253s  
 RUWE (>1.4 is poor) : 1.37  
 K magnitude : 11.442  
 G magnitude : 12.982  
 RP magnitude : 12.459  
 BP magnitude : 13.342  
 DUPflag : 0  
 Distance (au) : 17.582  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -16.28  
 Sun-Target sep (deg) : 140.47  
 Sun-Moon sep (deg) : 88.65  
 B (ring opening deg) : 24.58  
 PA of pole (deg) : 100.25  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.595  
 C/A sky separation (km) : 20340.1  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 ura111.bsp  
 IAU\_URANUS\_for\_RINGFIT.tpc  
 vgr2.ura111.bsp  
 ura161.bsp  
 vgr2.ura161.bsp  
 peph.ura160.bsp  
 earthstns\_itr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2045-03-23T02:10:05.451		46.35	-7.29	51049.22	-36.08		
lambda	I	2045-03-23T02:10:33.749		46.44	-7.39	50026.71	-36.06		
delta	I	2045-03-23T02:11:21.794		46.61	-7.56	48300.35	-35.80		
gamma	I	2045-03-23T02:11:40.553		46.67	-7.63	47629.82	-35.69		
eta	I	2045-03-23T02:11:53.280		46.72	-7.67	47176.12	-35.61		
beta	I	2045-03-23T02:12:36.414	b	46.87	-7.83	45645.45	-35.33		
alpha	I	2045-03-23T02:13:03.993	b	46.96	-7.92	44697.14	-35.14		
4	I	2045-03-23T02:14:03.449	b	47.17	-8.13	42561.80	-34.60		
5	I	2045-03-23T02:14:18.188	b	47.22	-8.18	42155.69	-34.62		
6	I	2045-03-23T02:14:26.378	b	47.25	-8.21	41874.31	-34.57		
Uranus	I	2045-03-23T02:11:55.951		46.73	-7.68	25508.48		-40.10	-41.40
Uranus	E	2045-03-23T02:42:55.021		53.06	-14.19	25534.92		26.38	27.45
6	E	2045-03-23T02:45:04.426		53.49	-14.64	41835.60	34.62		
5	E	2045-03-23T02:45:17.159		53.54	-14.69	42266.94	34.67		
4	E	2045-03-23T02:45:28.165		53.57	-14.73	42538.87	34.65		
alpha	E	2045-03-23T02:46:28.915		53.77	-14.94	44709.46	35.20		
beta	E	2045-03-23T02:46:55.875		53.86	-15.03	45660.46	35.38		
eta	E	2045-03-23T02:47:38.692		54.01	-15.18	47176.12	35.67		
gamma	E	2045-03-23T02:47:51.320		54.05	-15.22	47627.08	35.75		
delta	E	2045-03-23T02:48:10.124		54.11	-15.29	48300.35	35.86		
lambda	E	2045-03-23T02:48:58.081		54.27	-15.46	50026.71	36.13		
epsilon	E	2045-03-23T02:49:22.850		54.35	-15.54	50923.16	36.15		

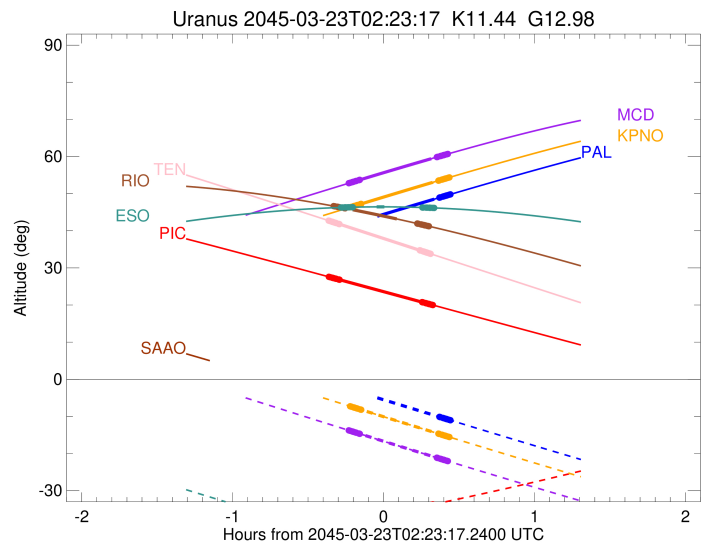
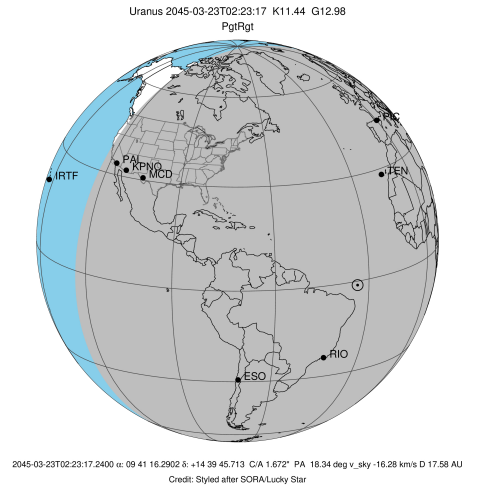
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2045-03-23T02:26:50.550  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : MCD  
 Location : McDonald Obs. 2.7m  
 Latitude (deg) : 30.67158  
 E. Longitude (deg) : 255.97844  
 Altitude (km) : 2.075  
 Gaia source ID : 617797613504563584  
 2Mass ID (if available) : 09411626+1439464  
 ICRS Star Coord at Epoch: 09h 41m 16.29019s +14:39:45.71253s  
 RUWE (>1.4 is poor) : 1.37  
 K magnitude : 11.442  
 G magnitude : 12.982  
 RP magnitude : 12.459  
 BP magnitude : 13.342  
 DUPflag : 0  
 Distance (au) : 17.582  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -16.28  
 Sun-Target sep (deg) : 140.47  
 Sun-Moon sep (deg) : 88.72  
 B (ring opening deg) : 24.58  
 PA of pole (deg) : 100.25  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.600  
 C/A sky separation (km) : 20397.4  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 ura111.bsp  
 IAU\_URANUS\_for\_RINGFIT.tpc  
 vgr2.ura111.bsp  
 ura161.bsp  
 vgr2.ura161.bsp  
 peph.ura160.bsp  
 earthstns\_itr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2045-03-23T02:09:33.444		52.83	-13.78	51048.56	-36.14		
lambda	I	2045-03-23T02:10:01.679		52.93	-13.88	50026.71	-36.12		
delta	I	2045-03-23T02:10:49.648		53.09	-14.05	48300.35	-35.85		
gamma	I	2045-03-23T02:11:08.379		53.16	-14.12	47629.83	-35.74		
eta	I	2045-03-23T02:11:21.087		53.20	-14.16	47176.12	-35.66		
beta	I	2045-03-23T02:12:04.158	b	53.35	-14.31	45645.42	-35.38		
alpha	I	2045-03-23T02:12:31.700	b	53.44	-14.41	44697.09	-35.19		
4	I	2045-03-23T02:13:31.080	b	53.65	-14.62	42561.71	-34.64		
5	I	2045-03-23T02:13:45.792	b	53.70	-14.67	42155.67	-34.67		
6	I	2045-03-23T02:13:53.969	b	53.72	-14.70	41874.35	-34.62		
Uranus	I	2045-03-23T02:11:28.313		53.23	-14.19	25508.97		-39.87	-41.17
Uranus	E	2045-03-23T02:42:14.945		59.41	-20.66	25535.13		26.26	27.32
6	E	2045-03-23T02:44:26.945		59.84	-21.12	41835.64	34.66		
5	E	2045-03-23T02:44:39.662		59.88	-21.17	42266.86	34.71		
4	E	2045-03-23T02:44:50.656		59.92	-21.21	42538.84	34.68		
alpha	E	2045-03-23T02:45:51.349		60.12	-21.42	44709.43	35.23		
beta	E	2045-03-23T02:46:18.280		60.20	-21.51	45660.45	35.42		
eta	E	2045-03-23T02:47:01.051		60.34	-21.66	47176.12	35.71		
gamma	E	2045-03-23T02:47:13.666		60.38	-21.70	47627.09	35.79		
delta	E	2045-03-23T02:47:32.447		60.44	-21.77	48300.35	35.90		
lambda	E	2045-03-23T02:48:20.350		60.59	-21.93	50026.71	36.17		
epsilon	E	2045-03-23T02:48:45.083		60.67	-22.02	50922.94	36.19		

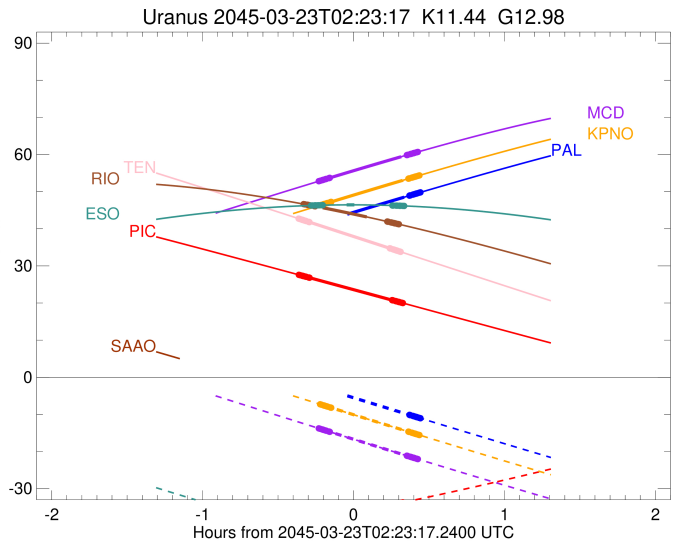
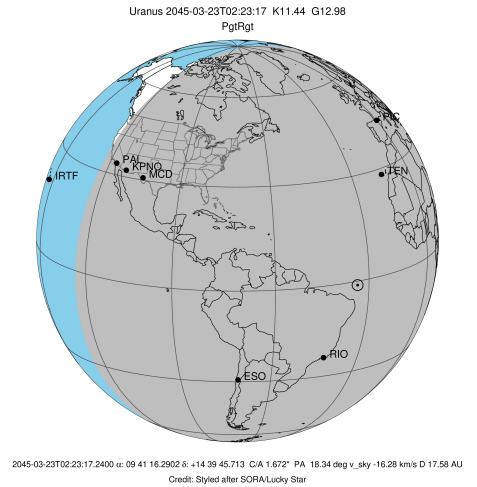


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2045-03-23T02:19:44.750  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : TEN  
 Location : Teide Obs./Tenerife  
 Latitude (deg) : 28.30050  
 E. Longitude (deg) : 343.48909  
 Altitude (km) : 2.395  
 Gaia source ID : 617797613504563584  
 2Mass ID (if available) : 09411626+1439464  
 ICRS Star Coord at Epoch: 09h 41m 16.29019s +14:39:45.71253s  
 RUWE (>1.4 is poor) : 1.37  
 K magnitude : 11.442  
 G magnitude : 12.982  
 RP magnitude : 12.459  
 BP magnitude : 13.342  
 DUPflag : 0  
 Distance (au) : 17.582  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -16.28  
 Sun-Target sep (deg) : 140.47  
 Sun-Moon sep (deg) : 88.54  
 B (ring opening deg) : 24.58  
 PA of pole (deg) : 100.25  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.407  
 C/A sky separation (km) : 17938.4  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 ura111.bsp  
 IAU\_URANUS\_for\_RINGFIT.tpc  
 vgr2.ura111.bsp  
 ura161.bsp  
 vgr2.ura161.bsp  
 peph.ura160.bsp  
 earthstns\_itrf93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



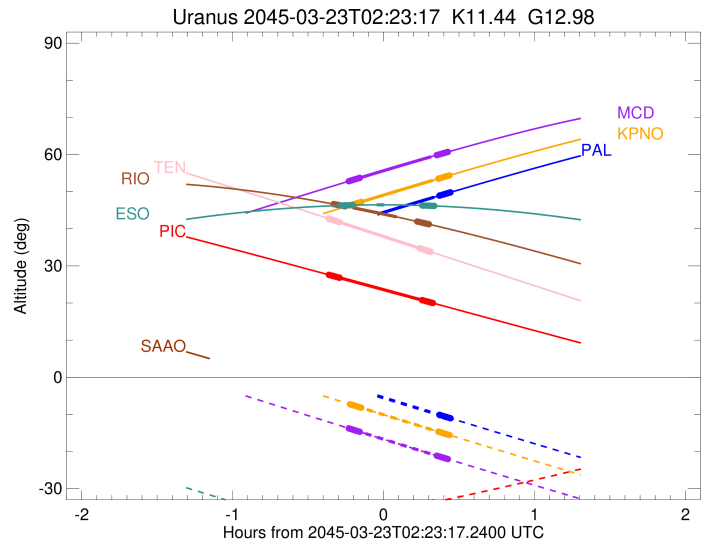
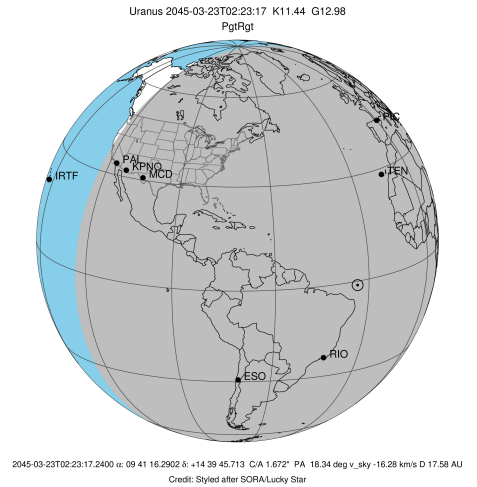
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2045-03-23T02:01:32.986	b	42.72	-58.45	51068.43	-36.77		
lambda	I	2045-03-23T02:02:01.276	b	42.62	-58.41	50026.71	-36.77		
delta	I	2045-03-23T02:02:48.359	b	42.45	-58.34	48300.35	-36.56		
gamma	I	2045-03-23T02:03:06.725	b	42.38	-58.31	47629.61	-36.48		
eta	I	2045-03-23T02:03:19.167	b	42.33	-58.29	47176.12	-36.42		
beta	I	2045-03-23T02:04:01.295	b	42.18	-58.23	45646.17	-36.20		
alpha	I	2045-03-23T02:04:28.156	b	42.08	-58.18	44698.69	-36.06		
4	I	2045-03-23T02:05:25.888	b	41.87	-58.09	42564.54	-35.63		
5	I	2045-03-23T02:05:40.450	b	41.81	-58.07	42156.57	-35.68		
6	I	2045-03-23T02:05:48.479	b	41.78	-58.06	41872.93	-35.65		
Uranus	I	2045-03-23T02:01:27.228		42.74	-58.46	25495.11		-46.44	-47.75
Uranus	E	2045-03-23T02:38:06.521		34.66	-54.23	25521.17		33.86	35.09
6	E	2045-03-23T02:37:40.350	b	34.75	-54.29	41832.71	35.54		
5	E	2045-03-23T02:37:52.982	b	34.71	-54.27	42271.82	35.57		
4	E	2045-03-23T02:38:03.850	b	34.67	-54.24	42541.06	35.51		
alpha	E	2045-03-23T02:39:03.120		34.45	-54.10	44711.54	35.94		
beta	E	2045-03-23T02:39:29.574		34.35	-54.04	45661.70	36.07		
eta	E	2045-03-23T02:40:11.585		34.20	-53.94	47176.12	36.28		
gamma	E	2045-03-23T02:40:23.996		34.15	-53.92	47626.78	36.34		
delta	E	2045-03-23T02:40:42.510		34.08	-53.87	48300.35	36.42		
lambda	E	2045-03-23T02:41:29.777		33.91	-53.76	50026.71	36.62		
epsilon	E	2045-03-23T02:41:54.732		33.82	-53.70	50941.77	36.62		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2045-03-23T02:19:45.700  
 Event type : PgtRgt  
 : Uranus 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 : 617797613504563584  
 2Mass ID (if available) : 09411626+1439464  
 ICRS Star Coord at Epoch: 09h 41m 16.29019s +14:39:45.71253s  
 RUWE (>1.4 is poor) : 1.37  
 K magnitude : 11.442  
 G magnitude : 12.982  
 RP magnitude : 12.459  
 BP magnitude : 13.342  
 DUPflag : 0  
 Distance (au) : 17.582  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -16.28  
 Sun-Target sep (deg) : 140.47  
 Sun-Moon sep (deg) : 88.62  
 B (ring opening deg) : 24.58  
 PA of pole (deg) : 100.25  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.883  
 C/A sky separation (km) : 24008.3  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 ura111.bsp  
 IAU\_URANUS\_for\_RINGFIT.tpc  
 vgr2.ura111.bsp  
 ura161.bsp  
 vgr2.ura161.bsp  
 peph.ura160.bsp  
 earthstns\_itr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2045-03-23T02:03:33.146		46.64	-64.48	51016.74	-34.86		
lambda	I	2045-03-23T02:04:01.510		46.58	-64.54	50026.71	-34.80		
delta	I	2045-03-23T02:04:51.389		46.47	-64.65	48300.35	-34.41		
gamma	I	2045-03-23T02:05:10.909		46.43	-64.69	47630.17	-34.25		
eta	I	2045-03-23T02:05:24.189		46.40	-64.72	47176.12	-34.13		
beta	I	2045-03-23T02:06:09.297		46.31	-64.81	45644.32	-33.71		
alpha	I	2045-03-23T02:06:38.287		46.24	-64.87	44694.66	-33.43		
4	I	2045-03-23T02:07:41.248		46.11	-65.00	42557.22	-32.65		
5	I	2045-03-23T02:07:56.343		46.08	-65.03	42154.89	-32.63		
6	I	2045-03-23T02:08:04.915		46.06	-65.05	41876.32	-32.54		
Uranus	I	2045-03-23T02:11:02.466		45.67	-65.40	25537.57		-24.78	-25.80
Uranus	E	2045-03-23T02:28:32.188		43.19	-67.13	25554.26		11.37	11.89
6	E	2045-03-23T02:36:41.007		41.95	-67.70	41839.89	32.47		
5	E	2045-03-23T02:36:54.200		41.92	-67.71	42259.44	32.56		
4	E	2045-03-23T02:37:05.675		41.89	-67.72	42535.90	32.58		
alpha	E	2045-03-23T02:38:10.208		41.72	-67.79	44706.49	33.36		
beta	E	2045-03-23T02:38:38.574		41.65	-67.81	45658.67	33.64		
eta	E	2045-03-23T02:39:23.573		41.53	-67.85	47176.12	34.05		
gamma	E	2045-03-23T02:39:36.807		41.50	-67.86	47627.52	34.17		
delta	E	2045-03-23T02:39:56.453		41.44	-67.88	48300.35	34.33		
lambda	E	2045-03-23T02:40:46.458		41.31	-67.92	50026.71	34.71		
epsilon	E	2045-03-23T02:41:11.488		41.25	-67.94	50897.82	34.77		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2045-03-23T02:22:04.550  
 Event type : PgtRgt  
 : Uranus 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 : 617797613504563584  
 2Mass ID (if available) : 09411626+1439464  
 ICRS Star Coord at Epoch: 09h 41m 16.29019s +14:39:45.71253s  
 RUWE (>1.4 is poor) : 1.37  
 K magnitude : 11.442  
 G magnitude : 12.982  
 RP magnitude : 12.459  
 BP magnitude : 13.342  
 DUPflag : 0  
 Distance (au) : 17.582  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -16.28  
 Sun-Target sep (deg) : 140.47  
 Sun-Moon sep (deg) : 88.64  
 B (ring opening deg) : 24.58  
 PA of pole (deg) : 100.25  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.001  
 C/A sky separation (km) : 25511.3  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 ura111.bsp  
 IAU\_URANUS\_for\_RINGFIT.tpc  
 vgr2.ura111.bsp  
 ura161.bsp  
 vgr2.ura161.bsp  
 peph.ura160.bsp  
 earthstns\_itrff93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2045-03-23T02:06:27.906		46.27	-42.20	51004.07	-34.23		
lambda	I	2045-03-23T02:06:56.430		46.28	-42.29	50026.71	-34.15		
delta	I	2045-03-23T02:07:47.313		46.30	-42.45	48300.35	-33.70		
gamma	I	2045-03-23T02:08:07.251		46.31	-42.51	47630.30	-33.51		
eta	I	2045-03-23T02:08:20.831		46.31	-42.56	47176.12	-33.38		
beta	I	2045-03-23T02:09:07.017		46.32	-42.71	45643.91	-32.89		
alpha	I	2045-03-23T02:09:36.770		46.33	-42.80	44693.72	-32.57		
4	I	2045-03-23T02:10:41.646		46.35	-43.01	42555.37	-31.66		
5	I	2045-03-23T02:10:56.974		46.36	-43.06	42154.82	-31.62		
6	I	2045-03-23T02:11:05.784		46.36	-43.08	41877.02	-31.51		
Uranus	I	2045-03-23T02:20:34.558		46.44	-44.87	25555.31		-10.00	-10.47
Uranus	E	2045-03-23T02:23:37.719		46.45	-45.44	25558.48		-3.79	-3.97
6	E	2045-03-23T02:38:42.052		46.27	-48.17	41841.84	31.49		
5	E	2045-03-23T02:38:55.470		46.27	-48.21	42255.94	31.60		
4	E	2045-03-23T02:39:07.171		46.26	-48.24	42534.67	31.65		
alpha	E	2045-03-23T02:40:13.551		46.24	-48.44	44705.18	32.55		
beta	E	2045-03-23T02:40:42.587		46.23	-48.52	45657.86	32.87		
eta	E	2045-03-23T02:41:28.605		46.21	-48.66	47176.12	33.35		
gamma	E	2045-03-23T02:41:42.117		46.20	-48.70	47627.72	33.49		
delta	E	2045-03-23T02:42:02.147		46.19	-48.76	48300.35	33.68		
lambda	E	2045-03-23T02:42:53.068		46.17	-48.91	50026.71	34.12		
epsilon	E	2045-03-23T02:43:18.199		46.16	-48.98	50886.81	34.20		