

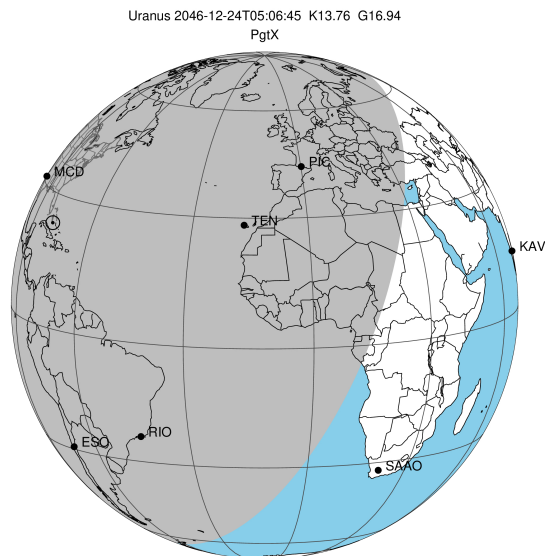
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2046-12-24T05:06:45.740  
 Event type : PgtX  
 : Uranus occs: geocentric, topocentric  
 : No ring occs  
 Gaia source ID : 3882158167908095104  
 2Mass ID (if available) : 10310153+1009204

ICRS Star Coord at Epoch: 10h 31m 01.49838s +10:09:21.13086s

RUWE (>1.4 is poor) : 1.07  
 K magnitude : 13.763  
 G magnitude : 16.936  
 RP magnitude : 15.890  
 BP magnitude : 18.081  
 DUPflag : 0  
 Distance (au) : 17.862  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -6.36  
 Sun-Target sep (deg) : 116.21  
 Sun-Moon sep (deg) : 74.11  
 B (ring opening deg) : 11.76  
 PA of pole (deg) : 103.55

# a(km) ring

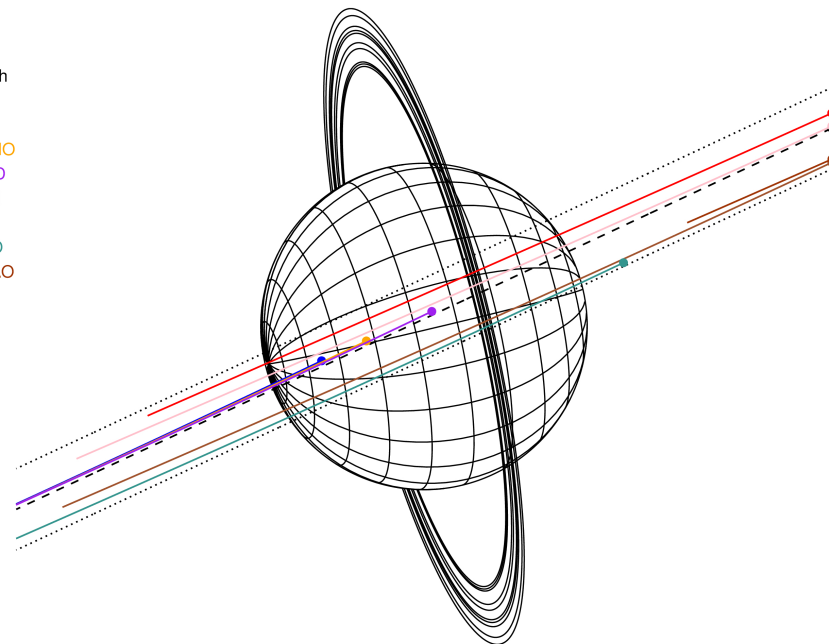
- 1 41837.2 6
- 2 42235.0 5
- 3 42571.2 4
- 4 44718.5 alpha
- 5 45661.1 beta
- 6 47176.1 eta
- 7 47626.3 gamma
- 8 48300.3 delta
- 9 50026.7 lambda
- 10 51149.4 epsilon



2046-12-24T05:06:45.7400 α: 10 31 01.4984 δ: +10 09 21.131 C/A 0.165° PA 252.78 deg v\_sky - 6.36 km/s D 17.86 AU  
 Credit: Styled after SORA/Lucky Star

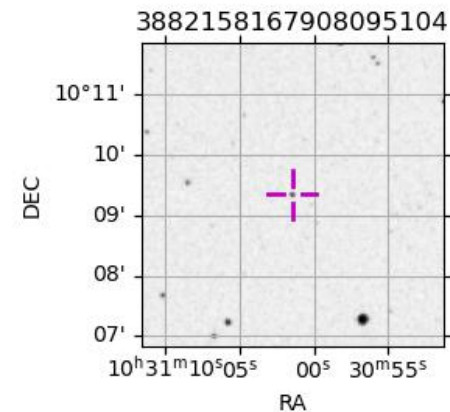
Uranus 2046-12-24T05:06:45 K13.76 G16.94 PgtX

Earth  
 PIC  
 PAL  
 KPNO  
 MCD  
 TEN  
 RIO  
 ESO  
 SAAO

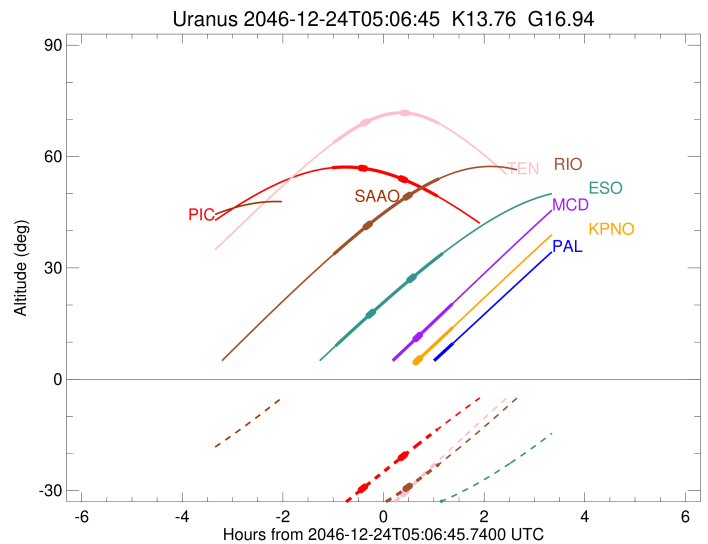
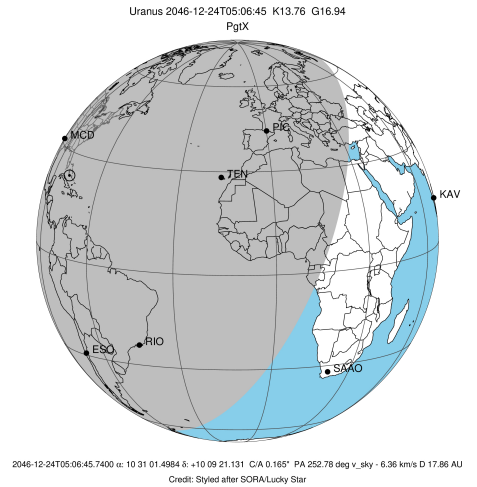


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1		+	+	DEC 24 04:05 - DEC 24 06:10	PieRnn
PAL	Palomar Mt (200")	33.4	243.1		+		DEC 24 06:29 - DEC 24 06:29	PneRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4		+		DEC 24 06:29 - DEC 24 06:29	PneRnn
MCD	McDonald Obs. 2.7m	30.7	256.0		+		DEC 24 06:29 - DEC 24 06:29	PneRnn
TEN	Teide Obs./Tenerife	28.3	343.5		+	+	DEC 24 04:06 - DEC 24 06:12	PieRnn
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		+	+	DEC 24 04:07 - DEC 24 06:13	PieRnn
ESO	European Southern Obs	-29.3	289.3		+	+	DEC 24 04:09 - DEC 24 06:17	PieRnn
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

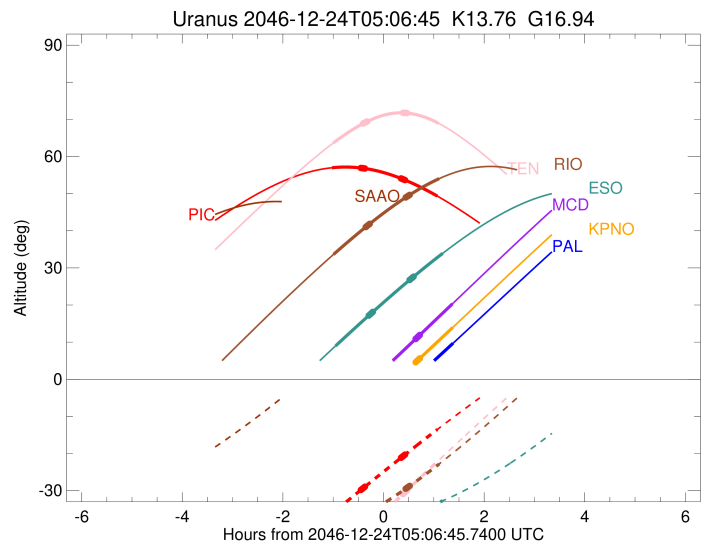
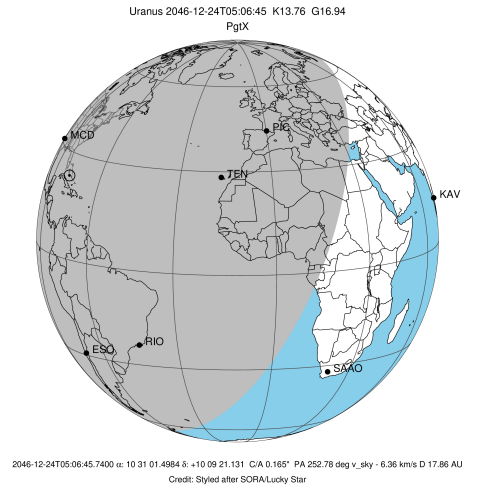


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2046-12-24T05:08:05.700  
 Event type : PgtX  
 : Uranus occs: geocentric, topocentric  
 : No ring occs  
 Observer code : PIC  
 Location : Pic du Midi  
 Latitude (deg) : 42.93656  
 E. Longitude (deg) : 0.14231  
 Altitude (km) : 2.890  
 Gaia source ID : 3882158167908095104  
 2Mass ID (if available) : 10310153+1009204  
 ICRS Star Coord at Epoch: 10h 31m 01.49838s +10:09:21.13086s  
 RUWE (>1.4 is poor) : 1.07  
 K magnitude : 13.763  
 G magnitude : 16.936  
 RP magnitude : 15.890  
 BP magnitude : 18.081  
 DUPflag : 0  
 Distance (au) : 17.862  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -6.36  
 Sun-Target sep (deg) : 116.21  
 Sun-Moon sep (deg) : 74.93  
 B (ring opening deg) : 11.76  
 PA of pole (deg) : 103.55  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.356  
 C/A sky separation (km) : 4616.8  
 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



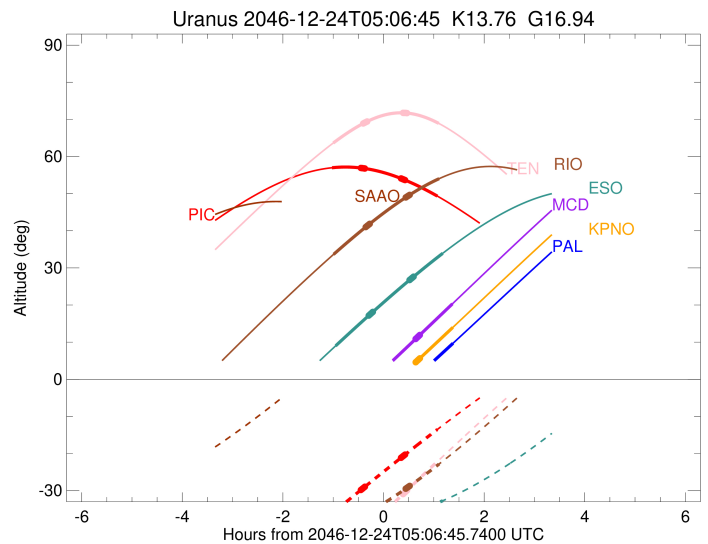
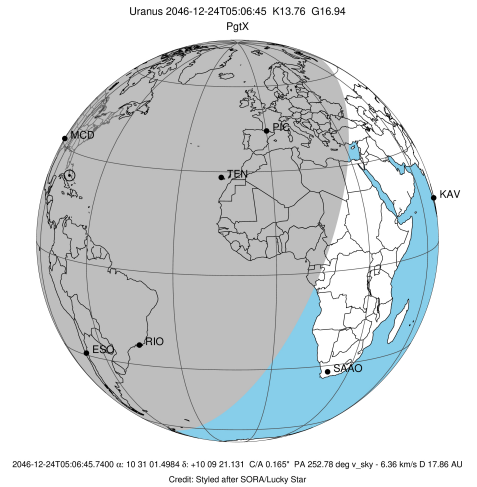
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2046-12-24T04:39:59.970	b	56.91	-29.78	50877.17	-31.93		
lambda	I	2046-12-24T04:40:26.592	b	56.90	-29.70	50026.71	-31.94		
delta	I	2046-12-24T04:41:20.650	b	56.88	-29.54	48300.35	-31.93		
gamma	I	2046-12-24T04:41:41.631	b	56.87	-29.47	47630.51	-31.92		
eta	I	2046-12-24T04:41:55.865	b	56.86	-29.43	47176.12	-31.92		
beta	I	2046-12-24T04:42:42.237	b	56.83	-29.29	45678.53	-31.89		
alpha	I	2046-12-24T04:43:14.052	b	56.82	-29.19	44737.48	-31.94		
4	I	2046-12-24T04:44:22.309	b	56.78	-28.98	42587.98	-31.94		
5	I	2046-12-24T04:44:29.276	b	56.78	-28.96	42288.56	-31.87		
6	I	2046-12-24T04:44:48.782	b	56.77	-28.90	41833.45	-31.99		
Uranus	I	2046-12-24T04:05:14.342		56.98	-36.15	25537.91		-66.37	-67.31
Uranus	E	2046-12-24T06:10:58.603		49.34	-13.52	25534.92		78.24	78.74
6	E	2046-12-24T05:27:22.812	b	54.12	-21.20	41831.31	31.92		
5	E	2046-12-24T05:27:39.913	b	54.10	-21.15	42196.01	31.80		
4	E	2046-12-24T05:27:46.639	b	54.09	-21.13	42545.52	31.87		
alpha	E	2046-12-24T05:28:55.802	b	53.98	-20.93	44705.88	31.87		
beta	E	2046-12-24T05:29:27.532	b	53.94	-20.83	45642.05	31.83		
eta	E	2046-12-24T05:30:15.195	b	53.86	-20.69	47176.12	31.86		
gamma	E	2046-12-24T05:30:29.174	b	53.84	-20.65	47621.48	31.86		
delta	E	2046-12-24T05:30:50.478	b	53.81	-20.58	48300.35	31.87		
lambda	E	2046-12-24T05:31:44.637	b	53.73	-20.42	50026.71	31.88		
epsilon	E	2046-12-24T05:32:26.352	b	53.66	-20.30	51357.00	31.87		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2046-12-24T05:23:15.710  
 Event type : PgtX  
 : Uranus occs: geocentric, topocentric  
 : No ring occs  
 Observer code : PAL  
 Location : Palomar Mt (200")  
 Latitude (deg) : 33.35622  
 E. Longitude (deg) : 243.13601  
 Altitude (km) : 1.706  
 Gaia source ID : 3882158167908095104  
 2Mass ID (if available) : 10310153+1009204  
 ICRS Star Coord at Epoch: 10h 31m 01.49838s +10:09:21.13086s  
 RUWE (>1.4 is poor) : 1.07  
 K magnitude : 13.763  
 G magnitude : 16.936  
 RP magnitude : 15.890  
 BP magnitude : 18.081  
 DUPflag : 0  
 Distance (au) : 17.862  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -6.36  
 Sun-Target sep (deg) : 116.21  
 Sun-Moon sep (deg) : 74.25  
 B (ring opening deg) : 11.76  
 PA of pole (deg) : 103.55  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.164  
 C/A sky separation (km) : 2124.2  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 ural11.bsp  
 IAU\_URANUS\_for\_RINGFIT.tpc  
 vgr2.ural11.bsp  
 ural61.bsp  
 vgr2.ural61.bsp  
 peph.ural60.bsp  
 earthstns\_itr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



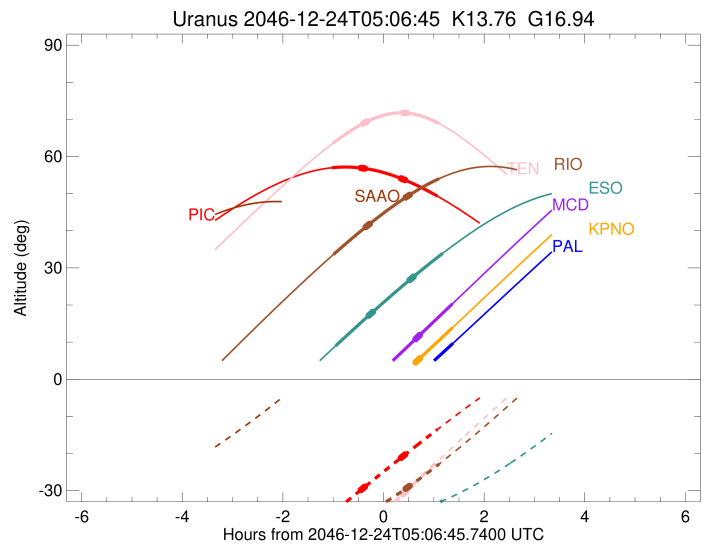
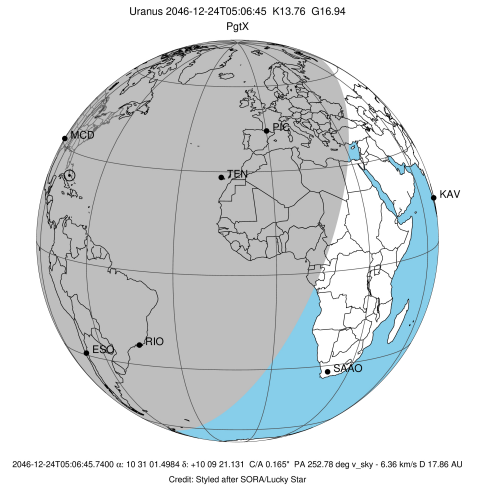
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2046-12-24T04:54:11.368	b	-9.85x	-51.06	50889.92	-29.90		
lambda	I	2046-12-24T04:54:40.233	b	-9.76x	-51.16	50026.71	-29.90		
delta	I	2046-12-24T04:55:37.963	b	-9.56x	-51.37	48300.35	-29.90		
gamma	I	2046-12-24T04:56:00.359	b	-9.49x	-51.44	47630.65	-29.90		
eta	I	2046-12-24T04:56:15.560	b	-9.44x	-51.50	47176.12	-29.90		
beta	I	2046-12-24T04:57:05.047	b	-9.28x	-51.67	45678.99	-29.89		
alpha	I	2046-12-24T04:57:39.079	b	-9.16x	-51.79	44736.09	-29.94		
4	I	2046-12-24T04:58:51.884	b	-8.92x	-52.04	42590.15	-29.95		
5	I	2046-12-24T04:58:59.017	b	-8.90x	-52.06	42285.36	-29.88		
6	I	2046-12-24T04:59:19.784	b	-8.83x	-52.14	41835.70	-30.00		
Uranus	I	2046-12-24T04:15:34.162		-17.37x	-42.99	25537.04		-69.18	-70.03
Uranus	E	2046-12-24T06:29:38.270		9.69	-70.45	25535.31		76.17	76.76
6	E	2046-12-24T05:44:39.860	b	0.36x	-61.52	41834.17	30.36		
5	E	2046-12-24T05:44:57.521	b	0.42x	-61.58	42191.39	30.25		
4	E	2046-12-24T05:45:05.383	b	0.45x	-61.61	42548.07	30.33		
alpha	E	2046-12-24T05:46:17.785	b	0.70x	-61.86	44703.89	30.34		
beta	E	2046-12-24T05:46:51.217	b	0.81x	-61.97	45642.48	30.30		
eta	E	2046-12-24T05:47:41.236	b	0.99x	-62.14	47176.12	30.34		
gamma	E	2046-12-24T05:47:55.919	b	1.04x	-62.19	47621.63	30.35		
delta	E	2046-12-24T05:48:18.282	b	1.11x	-62.27	48300.35	30.35		
lambda	E	2046-12-24T05:49:15.132	b	1.31x	-62.46	50026.71	30.38		
epsilon	E	2046-12-24T05:49:59.552	b	1.46x	-62.61	51376.52	30.39		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2046-12-24T05:23:23.070  
 Event type : PgtX  
 : Uranus occs: geocentric, topocentric  
 : No ring occs  
 Observer code : KPNO  
 Location : Kitt Peak Natl Obs  
 Latitude (deg) : 31.96333  
 E. Longitude (deg) : 248.40000  
 Altitude (km) : 2.120  
 Gaia source ID : 3882158167908095104  
 2Mass ID (if available) : 10310153+1009204  
 ICRS Star Coord at Epoch: 10h 31m 01.49838s +10:09:21.13086s  
 RUWE (>1.4 is poor) : 1.07  
 K magnitude : 13.763  
 G magnitude : 16.936  
 RP magnitude : 15.890  
 BP magnitude : 18.081  
 DUPflag : 0  
 Distance (au) : 17.862  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -6.36  
 Sun-Target sep (deg) : 116.21  
 Sun-Moon sep (deg) : 74.32  
 B (ring opening deg) : 11.76  
 PA of pole (deg) : 103.55  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.144  
 C/A sky separation (km) : 1866.3  
 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\_itrf93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



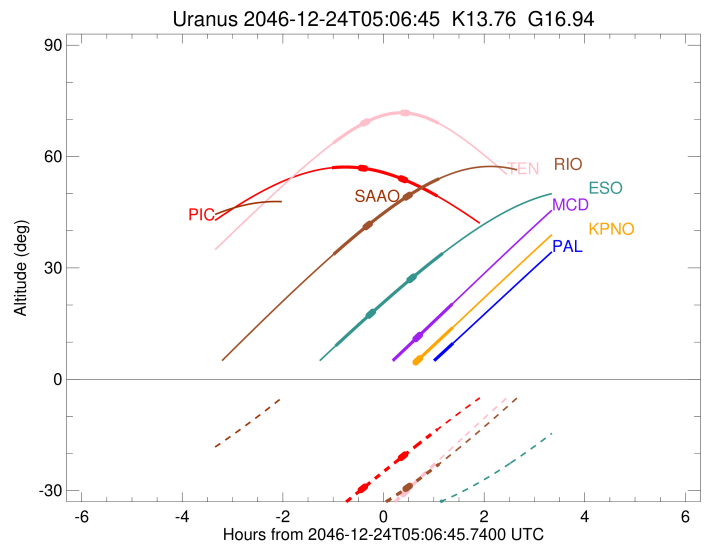
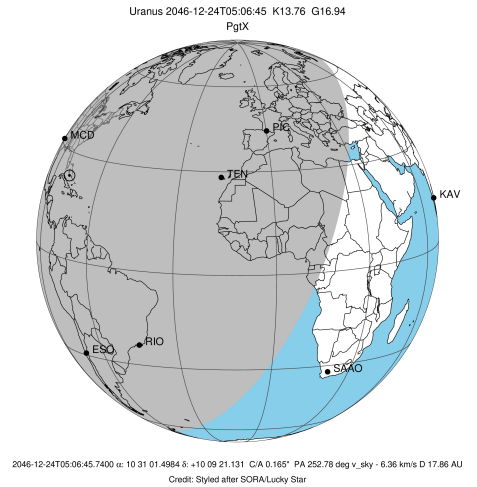
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2046-12-24T04:54:37.132	b	-5.93x	-55.68	50891.68	-30.06		
lambda	I	2046-12-24T04:55:05.899	b	-5.83x	-55.78	50026.71	-30.07		
delta	I	2046-12-24T04:56:03.315	b	-5.64x	-55.98	48300.35	-30.07		
gamma	I	2046-12-24T04:56:25.589	b	-5.56x	-56.06	47630.66	-30.07		
eta	I	2046-12-24T04:56:40.708	b	-5.51x	-56.11	47176.12	-30.06		
beta	I	2046-12-24T04:57:29.926	b	-5.34x	-56.29	45679.05	-30.05		
alpha	I	2046-12-24T04:58:03.783	b	-5.22x	-56.41	44735.90	-30.10		
4	I	2046-12-24T04:59:16.193	b	-4.98x	-56.66	42590.43	-30.12		
5	I	2046-12-24T04:59:23.248	b	-4.95x	-56.69	42284.93	-30.04		
6	I	2046-12-24T04:59:43.896	b	-4.88x	-56.76	41835.99	-30.16		
Uranus	I	2046-12-24T04:15:58.163		-13.75x	-47.47	25536.88		-69.74	-70.57
Uranus	E	2046-12-24T06:29:28.598		13.98	-75.00	25535.36		75.93	76.53
6	E	2046-12-24T05:44:49.502	b	4.52x	-66.20	41834.42	30.54		
5	E	2046-12-24T05:45:07.031	b	4.58x	-66.26	42190.99	30.43		
4	E	2046-12-24T05:45:14.917	b	4.61x	-66.28	42548.29	30.50		
alpha	E	2046-12-24T05:46:26.875	b	4.86x	-66.53	44703.72	30.52		
beta	E	2046-12-24T05:47:00.122	b	4.98x	-66.64	45642.52	30.48		
eta	E	2046-12-24T05:47:49.848	b	5.15	-66.81	47176.12	30.52		
gamma	E	2046-12-24T05:48:04.447	b	5.20	-66.86	47621.64	30.52		
delta	E	2046-12-24T05:48:26.680	b	5.28	-66.94	48300.35	30.53		
lambda	E	2046-12-24T05:49:23.201	b	5.48	-67.13	50026.71	30.56		
epsilon	E	2046-12-24T05:50:07.416	b	5.64	-67.28	51378.11	30.57		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2046-12-24T05:23:20.270  
 Event type : PgtX  
 : Uranus occs: geocentric, topocentric  
 : No ring occs  
 Observer code : MCD  
 Location : McDonald Obs. 2.7m  
 Latitude (deg) : 30.67158  
 E. Longitude (deg) : 255.97844  
 Altitude (km) : 2.075  
 Gaia source ID : 3882158167908095104  
 2Mass ID (if available) : 10310153+1009204  
 ICRS Star Coord at Epoch: 10h 31m 01.49838s +10:09:21.13086s  
 RUWE (>1.4 is poor) : 1.07  
 K magnitude : 13.763  
 G magnitude : 16.936  
 RP magnitude : 15.890  
 BP magnitude : 18.081  
 DUPflag : 0  
 Distance (au) : 17.862  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -6.36  
 Sun-Target sep (deg) : 116.21  
 Sun-Moon sep (deg) : 74.42  
 B (ring opening deg) : 11.76  
 PA of pole (deg) : 103.55  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.124  
 C/A sky separation (km) : 1601.2  
 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



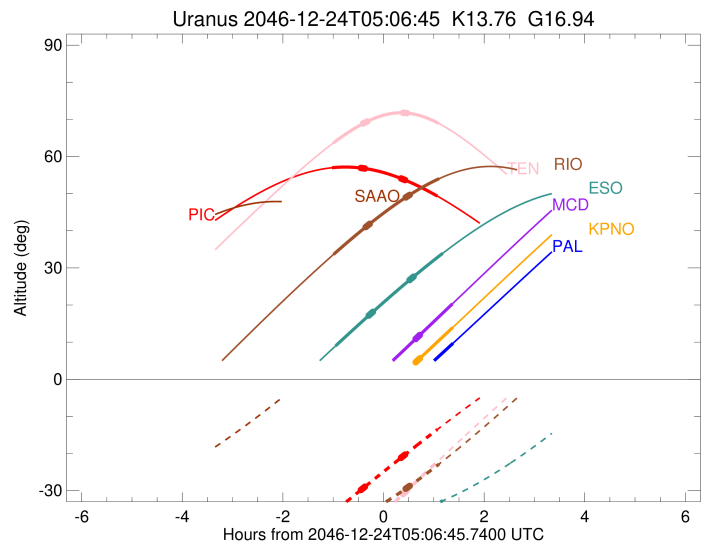
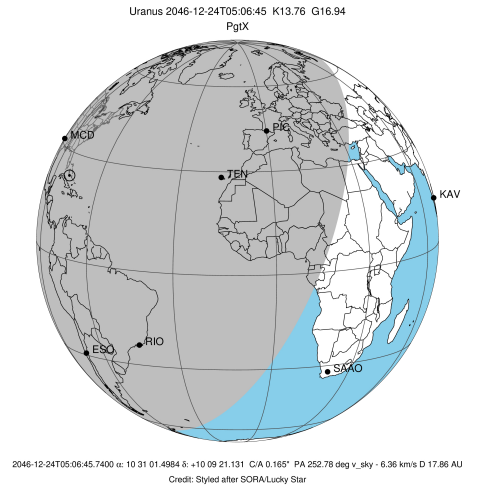
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2046-12-24T04:54:57.588	b	0.15x	-62.33	50893.59	-30.31		
lambda	I	2046-12-24T04:55:26.183	b	0.25x	-62.43	50026.71	-30.31		
delta	I	2046-12-24T04:56:23.133	b	0.45x	-62.64	48300.35	-30.31		
gamma	I	2046-12-24T04:56:45.225	b	0.53x	-62.72	47630.68	-30.31		
eta	I	2046-12-24T04:57:00.221	b	0.58x	-62.77	47176.12	-30.31		
beta	I	2046-12-24T04:57:49.039	b	0.75x	-62.94	45679.11	-30.30		
alpha	I	2046-12-24T04:58:22.631	b	0.87x	-63.06	44735.70	-30.35		
4	I	2046-12-24T04:59:34.453	b	1.12x	-63.32	42590.72	-30.36		
5	I	2046-12-24T04:59:41.412	b	1.15x	-63.34	42284.48	-30.29		
6	I	2046-12-24T05:00:01.885	b	1.22x	-63.41	41834.30	-30.41		
Uranus	I	2046-12-24T04:16:22.311		-7.94x	-54.05	25536.71		-70.36	-71.17
Uranus	E	2046-12-24T06:28:59.889		20.33	-80.78	25535.40		75.71	76.32
6	E	2046-12-24T05:44:45.963	b	10.79	-72.76	41834.67	30.80		
5	E	2046-12-24T05:45:03.319	b	10.85	-72.82	42190.60	30.68		
4	E	2046-12-24T05:45:11.208	b	10.88	-72.85	42548.52	30.76		
alpha	E	2046-12-24T05:46:22.547	b	11.13	-73.09	44703.56	30.77		
beta	E	2046-12-24T05:46:55.525	b	11.25	-73.20	45642.56	30.73		
eta	E	2046-12-24T05:47:44.838	b	11.43	-73.36	47176.12	30.77		
gamma	E	2046-12-24T05:47:59.316	b	11.48	-73.41	47621.65	30.78		
delta	E	2046-12-24T05:48:21.366	b	11.56	-73.48	48300.35	30.79		
lambda	E	2046-12-24T05:49:17.421	b	11.76	-73.67	50026.71	30.81		
epsilon	E	2046-12-24T05:50:01.322	b	11.92	-73.82	51379.66	30.82		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2046-12-24T05:09:50.950  
 Event type : PgtX  
 : Uranus occs: geocentric, topocentric  
 : No ring occs  
 Observer code : TEN  
 Location : Teide Obs./Tenerife  
 Latitude (deg) : 28.30050  
 E. Longitude (deg) : 343.48909  
 Altitude (km) : 2.395  
 Gaia source ID : 3882158167908095104  
 2Mass ID (if available) : 10310153+1009204  
 ICRS Star Coord at Epoch: 10h 31m 01.49838s +10:09:21.13086s  
 RUWE (>1.4 is poor) : 1.07  
 K magnitude : 13.763  
 G magnitude : 16.936  
 RP magnitude : 15.890  
 BP magnitude : 18.081  
 DUPflag : 0  
 Distance (au) : 17.862  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -6.36  
 Sun-Target sep (deg) : 116.21  
 Sun-Moon sep (deg) : 75.07  
 B (ring opening deg) : 11.76  
 PA of pole (deg) : 103.55  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.208  
 C/A sky separation (km) : 2691.0  
 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



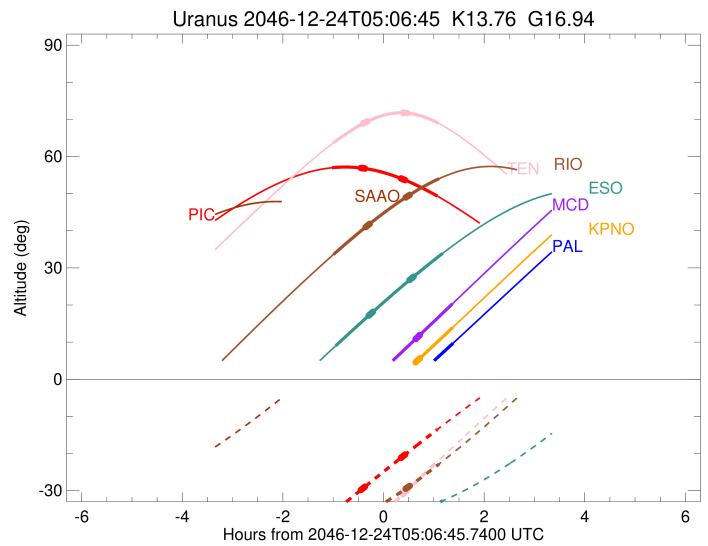
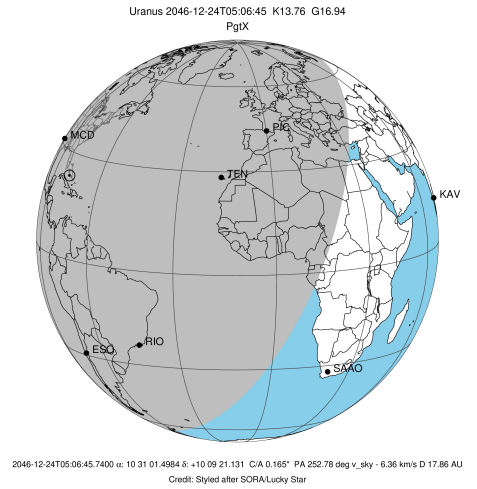
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2046-12-24T04:42:49.925	b	68.94	-41.20	50889.08	-32.30		
lambda	I	2046-12-24T04:43:16.616	b	68.99	-41.10	50026.71	-32.31		
delta	I	2046-12-24T04:44:10.060	b	69.09	-40.90	48300.35	-32.30		
gamma	I	2046-12-24T04:44:30.796	b	69.13	-40.83	47630.63	-32.29		
eta	I	2046-12-24T04:44:44.871	b	69.16	-40.78	47176.12	-32.29		
beta	I	2046-12-24T04:45:30.701	b	69.24	-40.61	45678.95	-32.27		
alpha	I	2046-12-24T04:46:02.216	b	69.30	-40.50	44736.21	-32.32		
4	I	2046-12-24T04:47:09.667	b	69.43	-40.25	42589.94	-32.33		
5	I	2046-12-24T04:47:16.297	b	69.44	-40.23	42285.68	-32.25		
6	I	2046-12-24T04:47:35.546	b	69.47	-40.16	41835.47	-32.37		
Uranus	I	2046-12-24T04:06:53.848		63.65	-49.07	25536.79		-70.06	-70.88
Uranus	E	2046-12-24T06:12:36.186		68.93	-21.83	25535.03		77.61	78.14
6	E	2046-12-24T05:29:48.204	b	71.77	-30.99	41833.28	32.39		
5	E	2046-12-24T05:30:04.860	b	71.77	-30.93	42192.81	32.26		
4	E	2046-12-24T05:30:11.990	b	71.77	-30.91	42547.26	32.34		
alpha	E	2046-12-24T05:31:19.973	b	71.76	-30.66	44704.52	32.35		
beta	E	2046-12-24T05:31:51.306	b	71.75	-30.55	45642.33	32.30		
eta	E	2046-12-24T05:32:38.249	b	71.74	-30.38	47176.12	32.33		
gamma	E	2046-12-24T05:32:52.026	b	71.74	-30.33	47621.58	32.34		
delta	E	2046-12-24T05:33:13.015	b	71.73	-30.26	48300.35	32.34		
lambda	E	2046-12-24T05:34:06.380	b	71.72	-30.07	50026.71	32.36		
epsilon	E	2046-12-24T05:34:47.889	b	71.70	-29.92	51370.10	32.36		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2046-12-24T05:10:26.220  
 Event type : PgtX  
 : Uranus occs: geocentric, topocentric  
 : No ring occs  
 Observer code : RIO  
 Location : Rio de Janeiro  
 Latitude (deg) : -22.89506  
 E. Longitude (deg) : 316.77708  
 Altitude (km) : 0.033  
 Gaia source ID : 3882158167908095104  
 2Mass ID (if available) : 10310153+1009204  
 ICRS Star Coord at Epoch: 10h 31m 01.49838s +10:09:21.13086s  
 RUWE (>1.4 is poor) : 1.07  
 K magnitude : 13.763  
 G magnitude : 16.936  
 RP magnitude : 15.890  
 BP magnitude : 18.081  
 DUPflag : 0  
 Distance (au) : 17.862  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -6.36  
 Sun-Target sep (deg) : 116.21  
 Sun-Moon sep (deg) : 74.84  
 B (ring opening deg) : 11.76  
 PA of pole (deg) : 103.55  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.247  
 C/A sky separation (km) : 3203.5  
 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	2046-12-24T04:45:48.612	b	41.05	-36.21	50926.98	-32.02		
lambda	I	2046-12-24T04:46:16.741	b	41.13	-36.15	50026.71	-32.00		
delta	I	2046-12-24T04:47:10.694	b	41.30	-36.04	48300.35	-31.99		
gamma	I	2046-12-24T04:47:31.618	b	41.36	-35.99	47630.98	-31.99		
eta	I	2046-12-24T04:47:45.838	b	41.40	-35.96	47176.12	-31.99		
beta	I	2046-12-24T04:48:32.106	b	41.54	-35.87	45680.01	-31.96		
alpha	I	2046-12-24T04:49:04.080	b	41.64	-35.80	44732.21	-32.01		
4	I	2046-12-24T04:50:12.143	b	41.84	-35.65	42595.53	-32.02		
5	I	2046-12-24T04:50:18.142	b	41.86	-35.64	42276.40	-31.93		
6	I	2046-12-24T04:50:37.339	b	41.92	-35.60	41841.54	-32.07		
Uranus	I	2046-12-24T04:07:08.526		33.63	-40.37	25535.00		-77.75	-78.28
Uranus	E	2046-12-24T06:13:05.038		54.04	-22.82	25537.09		69.02	69.88
6	E	2046-12-24T05:33:00.246	b	48.94	-29.52	41839.45	32.39		
5	E	2046-12-24T05:33:16.159	b	48.98	-29.48	42183.46	32.25		
4	E	2046-12-24T05:33:24.940	b	49.00	-29.46	42552.98	32.35		
alpha	E	2046-12-24T05:34:32.358	b	49.17	-29.28	44700.46	32.34		
beta	E	2046-12-24T05:35:03.850	b	49.24	-29.20	45643.44	32.30		
eta	E	2046-12-24T05:35:50.734	b	49.36	-29.07	47176.12	32.32		
gamma	E	2046-12-24T05:36:04.524	b	49.39	-29.04	47621.93	32.33		
delta	E	2046-12-24T05:36:25.507	b	49.44	-28.98	48300.35	32.34		
lambda	E	2046-12-24T05:37:18.882	b	49.57	-28.84	50026.71	32.35		
epsilon	E	2046-12-24T05:38:01.600	b	49.67	-28.73	51408.97	32.38		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2046-12-24T05:14:01.070  
 Event type : PgtX  
 : Uranus occs: geocentric, topocentric  
 : No ring occs  
 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 : 3882158167908095104  
 2Mass ID (if available) : 10310153+1009204  
 ICRS Star Coord at Epoch: 10h 31m 01.49838s +10:09:21.13086s  
 RUWE (>1.4 is poor) : 1.07  
 K magnitude : 13.763  
 G magnitude : 16.936  
 RP magnitude : 15.890  
 BP magnitude : 18.081  
 DUPflag : 0  
 Distance (au) : 17.862  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -6.36  
 Sun-Target sep (deg) : 116.21  
 Sun-Moon sep (deg) : 74.56  
 B (ring opening deg) : 11.76  
 PA of pole (deg) : 103.55  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.321  
 C/A sky separation (km) : 4159.7  
 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	2046-12-24T04:49:25.166	b	17.21	-37.47	50932.70	-31.26		
lambda	I	2046-12-24T04:49:54.168	b	17.31	-37.46	50026.71	-31.24		
delta	I	2046-12-24T04:50:49.439	b	17.49	-37.45	48300.35	-31.23		
gamma	I	2046-12-24T04:51:10.872	b	17.57	-37.45	47631.02	-31.23		
eta	I	2046-12-24T04:51:25.441	b	17.62	-37.45	47176.12	-31.22		
beta	I	2046-12-24T04:52:12.838	b	17.78	-37.44	45680.14	-31.21		
alpha	I	2046-12-24T04:52:45.606	b	17.89	-37.43	44731.59	-31.25		
4	I	2046-12-24T04:53:55.309	b	18.12	-37.42	42596.32	-31.27		
5	I	2046-12-24T04:54:01.364	b	18.14	-37.42	42274.95	-31.18		
6	I	2046-12-24T04:54:20.966	b	18.21	-37.41	41842.43	-31.31		
Uranus	I	2046-12-24T04:09:41.031		9.00	-36.91	25534.95		-78.07	-78.59
Uranus	E	2046-12-24T06:17:21.246		33.92	-32.73	25537.82		66.65	67.58
6	E	2046-12-24T05:37:33.712	b	26.68	-35.84	41840.56	31.76		
5	E	2046-12-24T05:37:49.786	b	26.73	-35.82	42181.89	31.62		
4	E	2046-12-24T05:37:59.054	b	26.76	-35.81	42554.05	31.72		
alpha	E	2046-12-24T05:39:07.699	b	26.98	-35.74	44699.76	31.71		
beta	E	2046-12-24T05:39:39.831	b	27.08	-35.71	45643.67	31.67		
eta	E	2046-12-24T05:40:27.624	b	27.23	-35.66	47176.12	31.70		
gamma	E	2046-12-24T05:40:41.686	b	27.27	-35.65	47622.00	31.71		
delta	E	2046-12-24T05:41:03.076	b	27.34	-35.62	48300.35	31.72		
lambda	E	2046-12-24T05:41:57.489	b	27.51	-35.57	50026.71	31.74		
epsilon	E	2046-12-24T05:42:41.244	b	27.65	-35.52	51415.68	31.77		