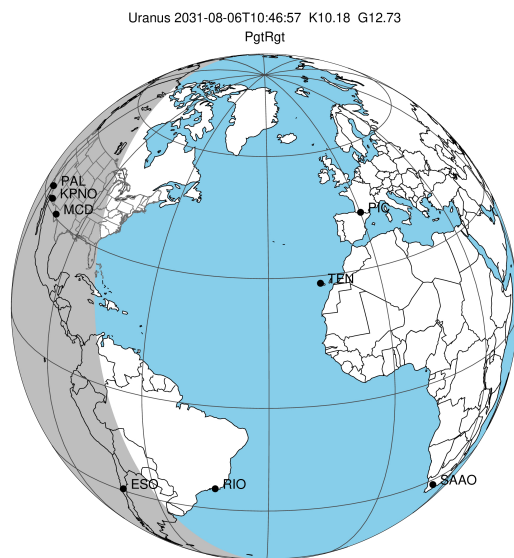


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-08-06T10:46:57.050  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3404409812904057216  
 2Mass ID (if available) : 05401179+2328481

ICRS Star Coord at Epoch: 05h 40m 11.78507s +23:28:48.06650s

RUWE (>1.4 is poor) : 1.05  
 K magnitude : 10.176  
 G magnitude : 12.730  
 RP magnitude : 11.951  
 BP magnitude : 13.377  
 DUPflag : 0  
 Distance (au) : 19.776  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 26.32  
 Sun-Target sep (deg) : 47.91  
 Sun-Moon sep (deg) : 85.66  
 B (ring opening deg) : 78.95  
 PA of pole (deg) : 42.68

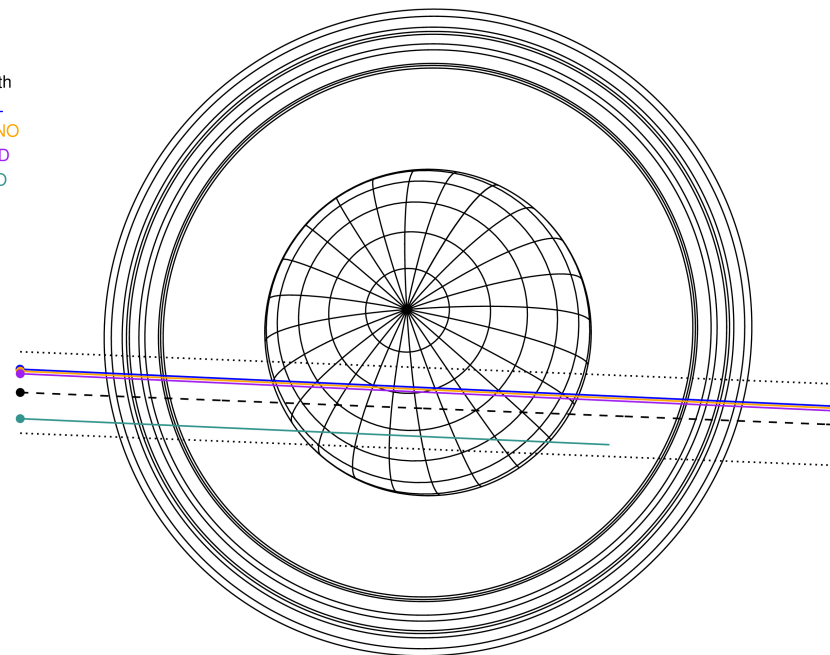
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2031-08-06T10:46:57.0500 ex: 05 40 11.7851 s: +23 28 48.067 C/A 0.826° PA 357.74 deg v\_sky +26.32 km/s D 19.78 AU  
 Credit: Styled after SORA/Lucky Star

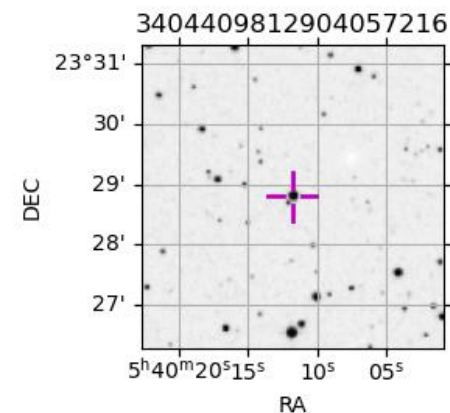
Uranus 2031-08-06T10:46:57 K10.18 G12.73 PgtRgt

Earth  
 PAL  
 KPNO  
 MCD  
 ESO

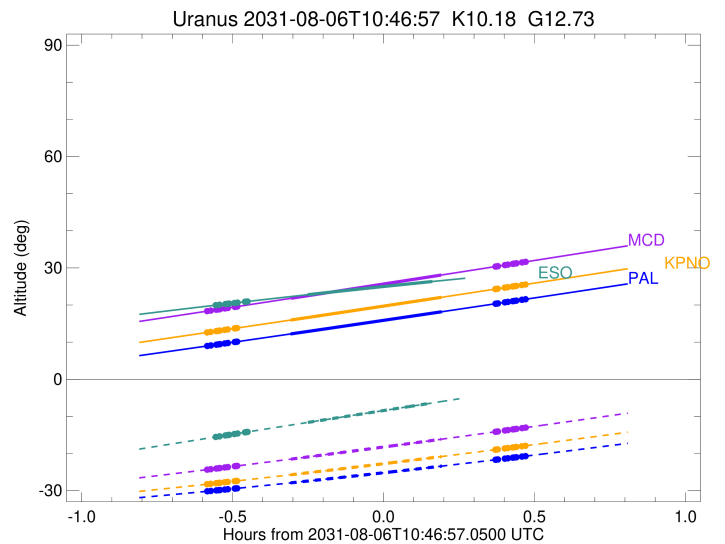
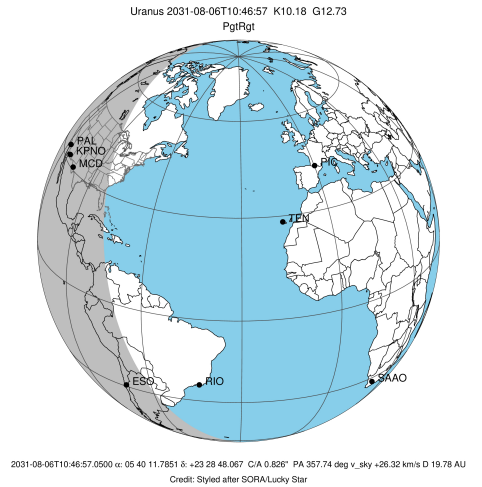


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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 (200")	33.4	243.1	+++++	+ +	+++++	AUG 06 10:11 - AUG 06 11:14	PieRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++	+ +	+++++	AUG 06 10:11 - AUG 06 11:14	PieRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++	+ +	+++++	AUG 06 10:11 - AUG 06 11:15	PieRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
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					PnnRnn
ESO	European Southern Obs	-29.3	289.3	+++++	+ +		AUG 06 10:13 - AUG 06 10:56	PieRin
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



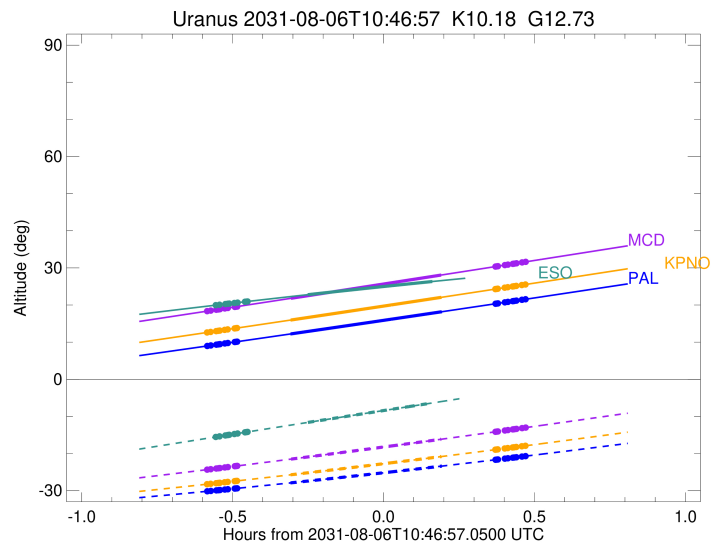
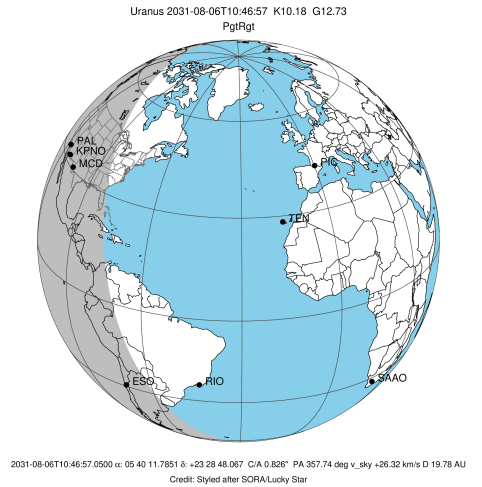
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-08-06T10:43:37.100  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PAL  
 Location : Palomar Mt (200")  
 Latitude (deg) : 33.35622  
 E. Longitude (deg) : 243.13601  
 Altitude (km) : 1.706  
 Gaia source ID : 3404409812904057216  
 2Mass ID (if available) : 05401179+2328481  
 ICRS Star Coord at Epoch: 05h 40m 11.78507s +23:28:48.06650s  
 RUWE (>1.4 is poor) : 1.05  
 K magnitude : 10.176  
 G magnitude : 12.730  
 RP magnitude : 11.951  
 BP magnitude : 13.377  
 DUPflag : 0  
 Distance (au) : 19.776  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 26.32  
 Sun-Target sep (deg) : 47.91  
 Sun-Moon sep (deg) : 85.86  
 B (ring opening deg) : 78.95  
 PA of pole (deg) : 42.68  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.602  
 C/A sky separation (km) : 8640.5  
 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	2031-08-06T10:11:46.924		8.94	-30.19	51369.95	-26.19		
lambda	I	2031-08-06T10:12:38.173		9.11	-30.08	50026.71	-26.20		
delta	I	2031-08-06T10:13:44.109		9.32	-29.93	48300.35	-26.17		
gamma	I	2031-08-06T10:14:09.684		9.41	-29.88	47631.32	-26.15		
eta	I	2031-08-06T10:14:27.093		9.46	-29.84	47176.12	-26.14		
beta	I	2031-08-06T10:15:25.291		9.65	-29.71	45655.80	-26.11		
alpha	I	2031-08-06T10:16:02.520		9.77	-29.62	44685.41	-26.09		
4	I	2031-08-06T10:17:23.595		10.04	-29.44	42570.00	-26.02		
5	I	2031-08-06T10:17:33.901		10.07	-29.42	42305.76	-26.02		
6	I	2031-08-06T10:17:50.719		10.12	-29.38	41869.46	-26.01		
Uranus	I	2031-08-06T10:28:27.335		12.20	-27.91	25452.07		4.72	4.95
Uranus	E	2031-08-06T10:58:33.215		18.19	-23.39	25089.71		-10.04	-10.51
6	E	2031-08-06T11:09:11.689		20.34	-21.69	41819.13	25.92		
5	E	2031-08-06T11:09:24.559		20.38	-21.65	42155.04	25.92		
4	E	2031-08-06T11:09:40.301		20.43	-21.61	42554.07	25.92		
alpha	E	2031-08-06T11:11:04.569		20.72	-21.38	44746.29	25.98		
beta	E	2031-08-06T11:11:39.749		20.84	-21.29	45658.79	26.00		
eta	E	2031-08-06T11:12:38.074		21.03	-21.13	47176.12	26.03		
gamma	E	2031-08-06T11:12:55.207		21.09	-21.08	47622.14	26.04		
delta	E	2031-08-06T11:13:21.248		21.18	-21.01	48300.35	26.05		
lambda	E	2031-08-06T11:14:27.482		21.40	-20.83	50026.71	26.08		
epsilon	E	2031-08-06T11:14:58.051		21.51	-20.74	50824.07	26.07		

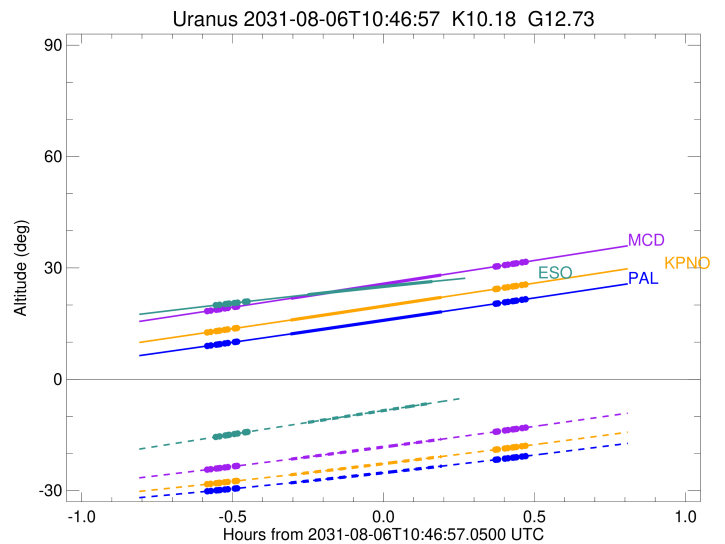
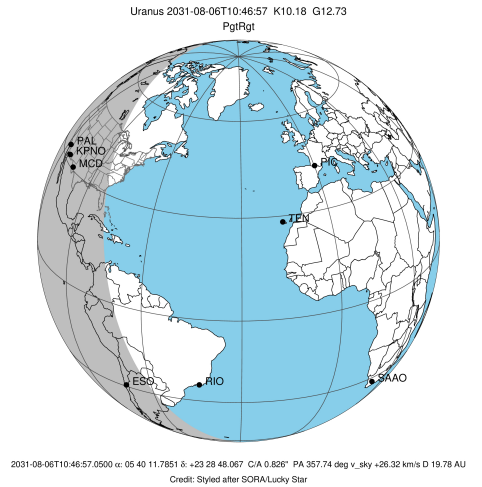
```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2031-08-06T10:43:35.330
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        : 3404409812904057216
2Mass ID (if available) : 05401179+2328481
ICRS Star Coord at Epoch: 05h 40m 11.78507s +23:28:48.06650s
RUWE (>1.4 is poor)  : 1.05
K magnitude           : 10.176
G magnitude           : 12.730
RP magnitude          : 11.951
BP magnitude          : 13.377
DUPflag              : 0
Distance (au)         : 19.776
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : 26.32
Sun-Target sep (deg)  : 47.91
Sun-Moon sep (deg)    : 85.93
B (ring opening deg)  : 78.95
PA of pole (deg)      : 42.68
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.624
C/A sky separation (km) : 8957.2
NAIF SPICE kernels    : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall1.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall1.bsp
ural61.bsp
vgr2.ural61.bsp
peph.ural60.bsp
earthstns_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```



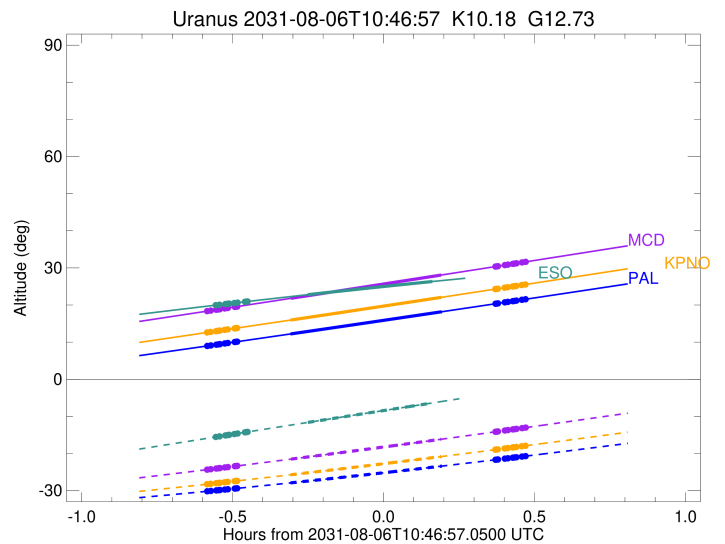
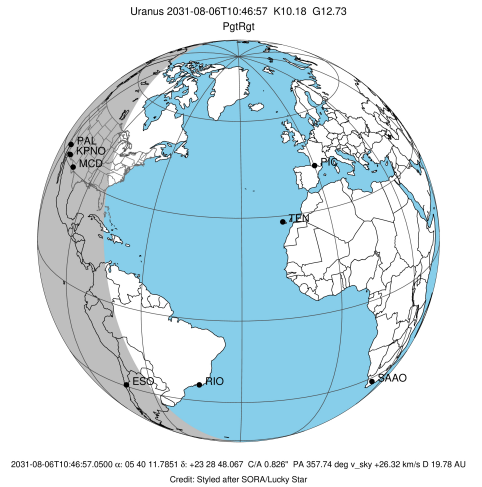
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-08-06T10:11:44.503		12.58	-28.29	51367.82	-26.13		
lambda	I	2031-08-06T10:12:35.799		12.75	-28.16	50026.71	-26.13		
delta	I	2031-08-06T10:13:41.904		12.97	-28.00	48300.35	-26.10		
gamma	I	2031-08-06T10:14:07.547		13.05	-27.93	47631.33	-26.08		
eta	I	2031-08-06T10:14:25.003		13.11	-27.89	47176.12	-26.07		
beta	I	2031-08-06T10:15:23.365		13.31	-27.74	45655.66	-26.03		
alpha	I	2031-08-06T10:16:00.694		13.43	-27.65	44685.36	-26.01		
4	I	2031-08-06T10:17:22.019		13.71	-27.44	42569.66	-25.94		
5	I	2031-08-06T10:17:32.351		13.74	-27.42	42305.47	-25.94		
6	I	2031-08-06T10:17:49.202		13.80	-27.38	41869.68	-25.94		
Uranus	I	2031-08-06T10:28:28.512		15.95	-25.73	25457.85		4.59	4.81
Uranus	E	2031-08-06T10:58:27.947		22.07	-20.82	25084.09		-10.10	-10.57
6	E	2031-08-06T11:09:09.224		24.28	-18.97	41819.43	25.84		
5	E	2031-08-06T11:09:22.117		24.33	-18.94	42154.99	25.84		
4	E	2031-08-06T11:09:37.900		24.38	-18.89	42553.74	25.84		
alpha	E	2031-08-06T11:11:02.422		24.67	-18.64	44746.14	25.90		
beta	E	2031-08-06T11:11:37.703		24.79	-18.54	45658.65	25.92		
eta	E	2031-08-06T11:12:36.194		25.00	-18.37	47176.12	25.96		
gamma	E	2031-08-06T11:12:53.374		25.06	-18.32	47622.17	25.97		
delta	E	2031-08-06T11:13:19.484		25.15	-18.24	48300.35	25.98		
lambda	E	2031-08-06T11:14:25.891		25.38	-18.05	50026.71	26.01		
epsilon	E	2031-08-06T11:14:56.479		25.48	-17.96	50822.53	26.00		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-08-06T10:43:37.800  
 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 : 3404409812904057216  
 2Mass ID (if available) : 05401179+2328481  
 ICRS Star Coord at Epoch: 05h 40m 11.78507s +23:28:48.06650s  
 RUWE (>1.4 is poor) : 1.05  
 K magnitude : 10.176  
 G magnitude : 12.730  
 RP magnitude : 11.951  
 BP magnitude : 13.377  
 DUPflag : 0  
 Distance (au) : 19.776  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 26.32  
 Sun-Target sep (deg) : 47.91  
 Sun-Moon sep (deg) : 86.02  
 B (ring opening deg) : 78.95  
 PA of pole (deg) : 42.68  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.653  
 C/A sky separation (km) : 9359.6  
 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	2031-08-06T10:11:45.730		18.32	-24.37	51365.07	-26.03		
lambda	I	2031-08-06T10:12:37.101		18.50	-24.23	50026.71	-26.04		
delta	I	2031-08-06T10:13:43.446		18.73	-24.04	48300.35	-26.00		
gamma	I	2031-08-06T10:14:09.184		18.82	-23.97	47631.35	-25.99		
eta	I	2031-08-06T10:14:26.706		18.88	-23.92	47176.12	-25.97		
beta	I	2031-08-06T10:15:25.299		19.08	-23.76	45655.49	-25.93		
alpha	I	2031-08-06T10:16:02.771		19.21	-23.65	44685.29	-25.91		
4	I	2031-08-06T10:17:24.445		19.49	-23.42	42569.22	-25.84		
5	I	2031-08-06T10:17:34.814		19.53	-23.39	42305.09	-25.83		
6	I	2031-08-06T10:17:51.713		19.59	-23.34	41869.95	-25.83		
Uranus	I	2031-08-06T10:28:34.763		21.81	-21.50	25465.10		4.42	4.63
Uranus	E	2031-08-06T10:58:25.898		28.08	-16.15	25077.15		-10.18	-10.65
6	E	2031-08-06T11:09:11.017		30.35	-14.16	41819.82	25.73		
5	E	2031-08-06T11:09:23.944		30.40	-14.12	42154.95	25.73		
4	E	2031-08-06T11:09:39.783		30.45	-14.07	42553.34	25.73		
alpha	E	2031-08-06T11:11:04.656		30.75	-13.80	44745.96	25.80		
beta	E	2031-08-06T11:11:40.075		30.88	-13.69	45658.47	25.82		
eta	E	2031-08-06T11:12:38.796		31.09	-13.51	47176.12	25.86		
gamma	E	2031-08-06T11:12:56.041		31.15	-13.45	47622.19	25.87		
delta	E	2031-08-06T11:13:22.245		31.24	-13.37	48300.35	25.89		
lambda	E	2031-08-06T11:14:28.892		31.48	-13.16	50026.71	25.92		
epsilon	E	2031-08-06T11:14:59.513		31.58	-13.06	50820.60	25.91		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-08-06T10:44:31.090  
 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 : 3404409812904057216  
 2Mass ID (if available) : 05401179+2328481  
 ICRS Star Coord at Epoch: 05h 40m 11.78507s +23:28:48.06650s  
 RUWE (>1.4 is poor) : 1.05  
 K magnitude : 10.176  
 G magnitude : 12.730  
 RP magnitude : 11.951  
 BP magnitude : 13.377  
 DUPflag : 0  
 Distance (au) : 19.776  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 26.32  
 Sun-Target sep (deg) : 47.91  
 Sun-Moon sep (deg) : 86.03  
 B (ring opening deg) : 78.95  
 PA of pole (deg) : 42.68  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.137  
 C/A sky separation (km) : 16310.1  
 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\_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	2031-08-06T10:13:30.300		19.94	-15.56	51313.68	-24.85		
lambda	I	2031-08-06T10:14:22.048		20.08	-15.38	50026.71	-24.83		
delta	I	2031-08-06T10:15:31.727		20.27	-15.13	48300.35	-24.72		
gamma	I	2031-08-06T10:15:58.810		20.34	-15.03	47631.53	-24.67		
eta	I	2031-08-06T10:16:17.281		20.38	-14.97	47176.12	-24.64		
beta	I	2031-08-06T10:17:19.274		20.55	-14.74	45652.46	-24.52		
alpha	I	2031-08-06T10:17:58.842		20.65	-14.60	44684.63	-24.44		
4	I	2031-08-06T10:19:26.004		20.88	-14.29	42561.38	-24.23		
5	I	2031-08-06T10:19:36.992		20.91	-14.25	42297.15	-24.20		
6	I	2031-08-06T10:19:54.548		20.95	-14.19	41874.23	-24.17		
Uranus	I	2031-08-06T10:31:55.008		22.79	-11.62	25553.57		1.06	1.11
Uranus	E	2031-08-06T10:56:39.699		26.33	-6.38	24997.55		-11.02	-11.53
6	E	2031-08-06T11:08:43.679		27.92	-3.85x	41826.83	24.11		
5	E	2031-08-06T11:08:57.109		27.95	-3.80x	42155.38	24.13		
4	E	2031-08-06T11:09:13.757		27.99	-3.74x	42546.49	24.16		
alpha	E	2031-08-06T11:10:43.984		28.18	-3.43x	44742.38	24.37		
beta	E	2031-08-06T11:11:21.467		28.26	-3.30x	45655.36	24.44		
eta	E	2031-08-06T11:12:23.520		28.39	-3.08x	47176.12	24.56		
gamma	E	2031-08-06T11:12:41.693		28.43	-3.02x	47622.75	24.59		
delta	E	2031-08-06T11:13:09.218		28.48	-2.92x	48300.35	24.64		
lambda	E	2031-08-06T11:14:19.126		28.63	-2.68x	50026.71	24.75		
epsilon	E	2031-08-06T11:14:49.961		28.69	-2.57x	50790.53	24.76		