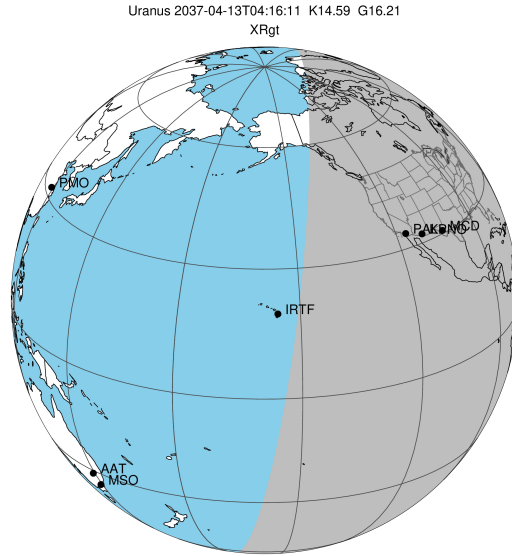


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2037-04-13T04:16:11.970
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3368258592138361984
 2Mass ID (if available) : 07061051+2300052

ICRS Star Coord at Epoch: 07h 06m 10.52908s +23:00:05.01261s

RUWE (>1.4 is poor) : 0.91
 K magnitude : 14.587
 G magnitude : 16.206
 RP magnitude : 15.675
 BP magnitude : 16.585
 DUPflag : 0
 Distance (au) : 18.859
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 10.53
 Sun-Target sep (deg) : 82.13
 Sun-Moon sep (deg) : 109.89
 B (ring opening deg) : 61.35
 PA of pole (deg) : 79.41

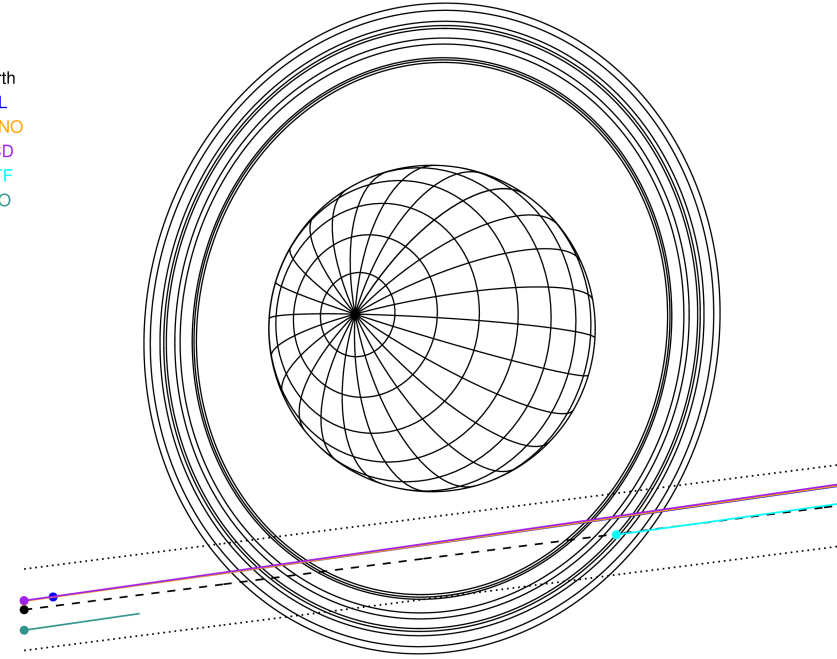
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2037-04-13T04:16:11.9700 α: 07 06 10.5291 δ: +23 00 05.013 C/A 2.592" PA 7.29 deg v_sky +10.53 km/s D 18.86 AU
 Credit: Styled after SORA/Lucky Star

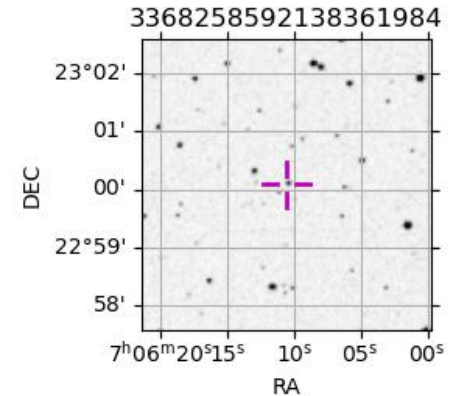
Uranus 2037-04-13T04:16:11 K14.59 G16.21 XRgt

Earth
 PAL
 KPNO
 MCD
 IRTF
 ESO

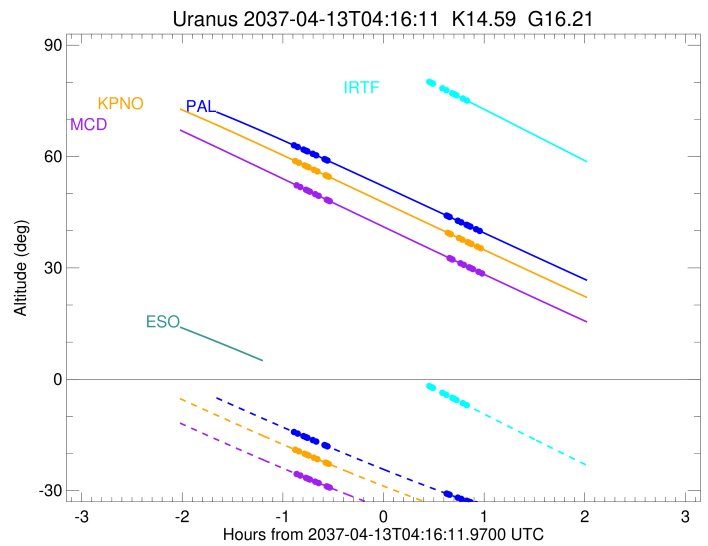
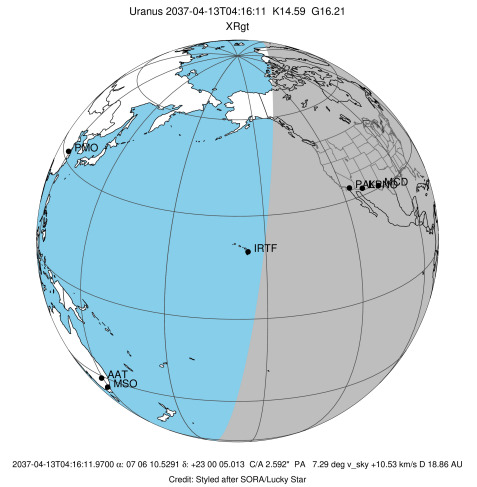


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+++++		+++++	APR 13 03:23 - APR 13 05:13	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	APR 13 03:24 - APR 13 05:13	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	APR 13 03:25 - APR 13 05:14	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5			++++	APR 13 04:58 - APR 13 05:05	PnnRne
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					PnnRnn
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 : 2037-04-13T04:22:18.830
 Event type : XRgt
 : No Uranus occs
 : 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 : 3368258592138361984
 2Mass ID (if available) : 07061051+2300052
 ICRS Star Coord at Epoch: 07h 06m 10.52908s +23:00:05.01261s
 RUWE (>1.4 is poor) : 0.91
 K magnitude : 14.587
 G magnitude : 16.206
 RP magnitude : 15.675
 BP magnitude : 16.585
 DUPflag : 0
 Distance (au) : 18.859
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 10.53
 Sun-Target sep (deg) : 82.13
 Sun-Moon sep (deg) : 110.38
 B (ring opening deg) : 61.35
 PA of pole (deg) : 79.41
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.444
 C/A sky separation (km) : 33429.7
 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



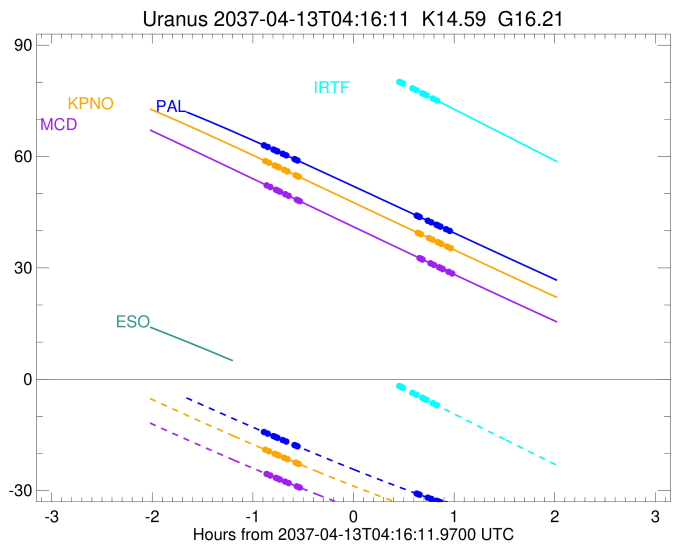
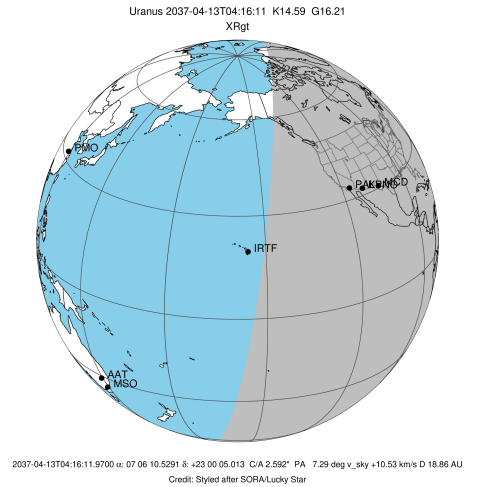
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-04-13T03:23:27.435		62.90	-14.34	50841.68	-8.51		
lambda	I	2037-04-13T03:25:03.384		62.57	-14.65	50026.71	-8.44		
delta	I	2037-04-13T03:28:31.122		61.87	-15.32	48300.35	-8.18		
gamma	I	2037-04-13T03:29:53.486		61.59	-15.58	47631.30	-8.07		
eta	I	2037-04-13T03:30:50.189		61.39	-15.77	47176.12	-7.99		
beta	I	2037-04-13T03:34:04.218		60.73	-16.39	45653.17	-7.70		
alpha	I	2037-04-13T03:36:02.736		60.33	-16.77	44751.81	-7.51		
4	I	2037-04-13T03:41:08.798		59.28	-17.75	42537.19	-6.95		
5	I	2037-04-13T03:41:49.312		59.14	-17.88	42253.10	-6.89		
6	I	2037-04-13T03:42:46.449		58.94	-18.06	41875.06	-6.76		

No planet occultations

6	E	2037-04-13T04:53:50.135		44.10	-30.80	41830.46	6.83		
5	E	2037-04-13T04:54:59.945		43.86	-30.99	42315.12	6.96		
4	E	2037-04-13T04:55:30.851		43.75	-31.07	42533.30	7.03		
alpha	E	2037-04-13T05:00:30.098		42.70	-31.89	44729.73	7.60		
beta	E	2037-04-13T05:02:32.769		42.28	-32.22	45678.70	7.81		
eta	E	2037-04-13T05:05:40.799		41.62	-32.72	47176.12	8.10		
gamma	E	2037-04-13T05:06:36.279		41.42	-32.87	47628.00	8.19		
delta	E	2037-04-13T05:07:57.830		41.14	-33.09	48300.35	8.30		
lambda	E	2037-04-13T05:11:22.350		40.43	-33.62	50026.71	8.58		
epsilon	E	2037-04-13T05:13:05.507		40.07	-33.89	50917.92	8.65		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2037-04-13T04:23:00.320
Event type          : XRgt
: No Uranus occs
: 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      : 3368258592138361984
2Mass ID (if available) : 07061051+2300052
ICRS Star Coord at Epoch: 07h 06m 10.52908s +23:00:05.01261s
RUWE (>1.4 is poor) : 0.91
K magnitude          : 14.587
G magnitude          : 16.206
RP magnitude         : 15.675
BP magnitude         : 16.585
DUPflag             : 0
Distance (au)       : 18.859
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : 10.53
Sun-Target sep (deg) : 82.13
Sun-Moon sep (deg)  : 110.32
B (ring opening deg) : 61.35
PA of pole (deg)    : 79.41
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.440
C/A sky separation (km) : 33375.1
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_itr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```

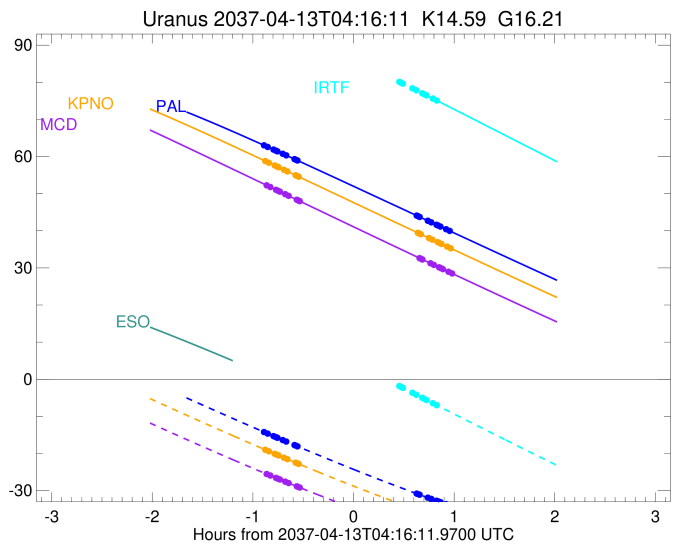
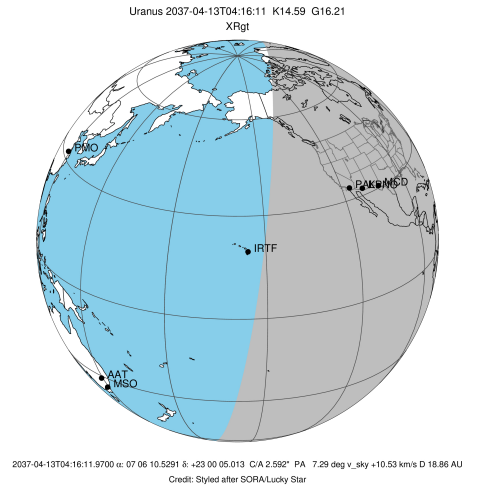


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-04-13T03:24:11.897		58.66	-19.11	50841.82	-8.53		
lambda	I	2037-04-13T03:25:47.582		58.32	-19.42	50026.71	-8.46		
delta	I	2037-04-13T03:29:14.679		57.59	-20.08	48300.35	-8.20		
gamma	I	2037-04-13T03:30:36.776		57.30	-20.35	47631.30	-8.09		
eta	I	2037-04-13T03:31:33.288		57.10	-20.53	47176.12	-8.01		
beta	I	2037-04-13T03:34:46.634		56.42	-21.14	45653.15	-7.73		
alpha	I	2037-04-13T03:36:44.701		56.00	-21.52	44751.80	-7.54		
4	I	2037-04-13T03:41:49.467		54.92	-22.48	42537.22	-6.98		
5	I	2037-04-13T03:42:29.812		54.78	-22.61	42253.00	-6.92		
6	I	2037-04-13T03:43:26.664		54.58	-22.78	41875.09	-6.79		

No planet occultations

6	E	2037-04-13T04:54:32.858		39.45	-35.21	41830.34	6.87		
5	E	2037-04-13T04:55:42.301		39.20	-35.40	42315.13	7.00		
4	E	2037-04-13T04:56:13.039		39.09	-35.48	42533.37	7.06		
alpha	E	2037-04-13T05:01:10.706		38.04	-36.25	44729.66	7.64		
beta	E	2037-04-13T05:03:12.793		37.61	-36.56	45678.72	7.84		
eta	E	2037-04-13T05:06:19.941		36.95	-37.04	47176.12	8.14		
gamma	E	2037-04-13T05:07:15.169		36.75	-37.18	47627.99	8.22		
delta	E	2037-04-13T05:08:36.357		36.47	-37.38	48300.35	8.34		
lambda	E	2037-04-13T05:11:59.986		35.75	-37.88	50026.71	8.61		
epsilon	E	2037-04-13T05:13:42.782		35.39	-38.13	50918.59	8.69		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2037-04-13T04:23:49.310
 Event type : XRgt
 : No Uranus occs
 : 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 : 3368258592138361984
 2Mass ID (if available) : 07061051+2300052
 ICRS Star Coord at Epoch: 07h 06m 10.52908s +23:00:05.01261s
 RUWE (>1.4 is poor) : 0.91
 K magnitude : 14.587
 G magnitude : 16.206
 RP magnitude : 15.675
 BP magnitude : 16.585
 DUPflag : 0
 Distance (au) : 18.859
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 10.53
 Sun-Target sep (deg) : 82.13
 Sun-Moon sep (deg) : 110.23
 B (ring opening deg) : 61.35
 PA of pole (deg) : 79.41
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.428
 C/A sky separation (km) : 33210.9
 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



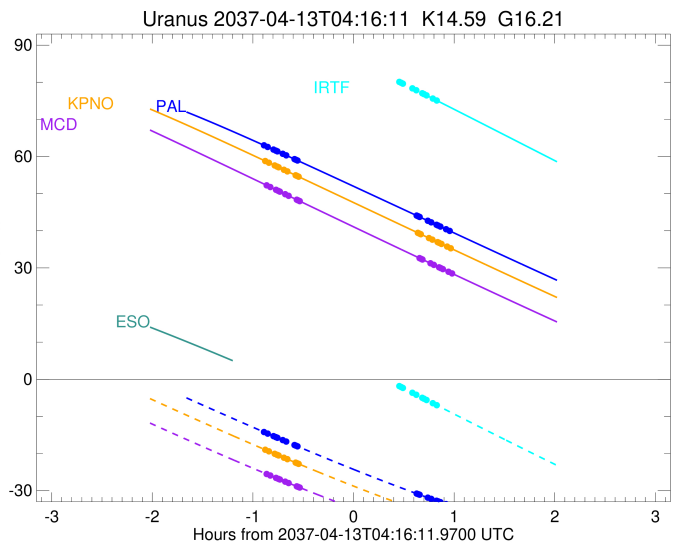
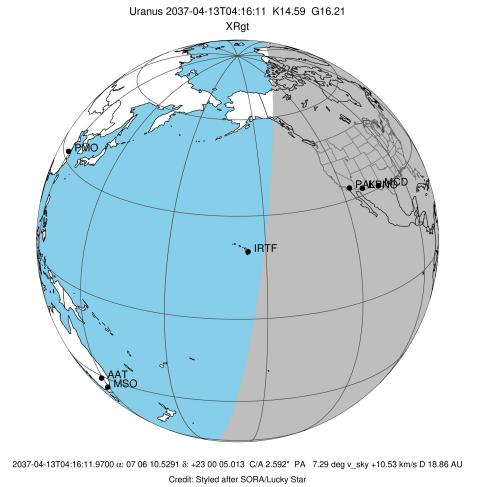
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-04-13T03:25:01.923		52.11	-25.64	50842.70	-8.59		
lambda	I	2037-04-13T03:26:37.031		51.77	-25.94	50026.71	-8.52		
delta	I	2037-04-13T03:30:02.567		51.03	-26.58	48300.35	-8.27		
gamma	I	2037-04-13T03:31:24.008		50.74	-26.83	47631.30	-8.16		
eta	I	2037-04-13T03:32:20.053		50.54	-27.00	47176.12	-8.08		
beta	I	2037-04-13T03:35:31.717		49.85	-27.59	45653.07	-7.80		
alpha	I	2037-04-13T03:37:28.661		49.42	-27.95	44751.77	-7.61		
4	I	2037-04-13T03:42:30.159		48.34	-28.87	42537.39	-7.06		
5	I	2037-04-13T03:43:10.103		48.20	-28.99	42252.57	-7.00		
6	I	2037-04-13T03:44:06.213		47.99	-29.16	41875.20	-6.88		

No planet occultations

6	E	2037-04-13T04:55:33.287		32.64	-40.84	41830.04	6.97		
5	E	2037-04-13T04:56:41.880		32.40	-41.00	42315.16	7.10		
4	E	2037-04-13T04:57:12.230		32.29	-41.07	42533.54	7.16		
alpha	E	2037-04-13T05:02:06.313		31.25	-41.75	44729.46	7.73		
beta	E	2037-04-13T05:04:07.118		30.82	-42.02	45678.78	7.93		
eta	E	2037-04-13T05:07:12.364		30.16	-42.44	47176.12	8.22		
gamma	E	2037-04-13T05:08:07.054		29.97	-42.56	47627.96	8.30		
delta	E	2037-04-13T05:09:27.477		29.68	-42.73	48300.35	8.42		
lambda	E	2037-04-13T05:12:49.261		28.97	-43.16	50026.71	8.69		
epsilon	E	2037-04-13T05:14:31.348		28.61	-43.38	50920.21	8.76		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2037-04-13T04:17:13.060
Event type            : XRgt
: No Uranus occs
: 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        : 3368258592138361984
2Mass ID (if available) : 07061051+2300052
ICRS Star Coord at Epoch: 07h 06m 10.52908s +23:00:05.01261s
RUWE (>1.4 is poor)  : 0.91
K magnitude           : 14.587
G magnitude           : 16.206
RP magnitude          : 15.675
BP magnitude          : 16.585
DUPflag              : 0
Distance (au)         : 18.859
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : 10.53
Sun-Target sep (deg)  : 82.13
Sun-Moon sep (deg)    : 110.71
B (ring opening deg)  : 61.35
PA of pole (deg)      : 79.41
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.624
C/A sky separation (km) : 35896.2
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_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	2037-04-13T03:20:49.920		79.53	17.46x	50826.34	-7.89		
lambda	I	2037-04-13T03:22:31.613		79.91	17.07x	50026.71	-7.80		
delta	I	2037-04-13T03:26:17.670		80.74	16.18x	48300.35	-7.47		
gamma	I	2037-04-13T03:27:48.022		81.07	15.83x	47631.41	-7.33		
eta	I	2037-04-13T03:28:50.525		81.29	15.58x	47176.12	-7.23		
beta	I	2037-04-13T03:32:26.127		82.06	14.74x	45654.63	-6.87		
alpha	I	2037-04-13T03:34:39.871		82.54	14.22x	44752.23	-6.62		
4	I	2037-04-13T03:40:33.659		83.75	12.84x	42534.47	-5.89		
5	I	2037-04-13T03:41:20.008		83.90	12.65x	42260.70	-5.81		
6	I	2037-04-13T03:42:29.239		84.13	12.38x	41872.89	-5.64		

No planet occultations

6	E	2037-04-13T04:43:31.065	80.11	-1.84x	41835.30	5.66
5	E	2037-04-13T04:44:53.495	79.80	-2.16x	42314.11	5.83
4	E	2037-04-13T04:45:30.274	79.67	-2.30x	42530.84	5.91
alpha	E	2037-04-13T04:51:19.654	78.37	-3.64x	44732.72	6.65
beta	E	2037-04-13T04:53:38.654	77.85	-4.18x	45677.75	6.90
eta	E	2037-04-13T04:57:09.963	77.06	-4.99x	47176.12	7.27
gamma	E	2037-04-13T04:58:11.785	76.82	-5.23	47628.41	7.37
delta	E	2037-04-13T04:59:42.138	76.48	-5.57	48300.35	7.51
lambda	E	2037-04-13T05:03:27.118	75.63	-6.44	50026.71	7.83
epsilon	E	2037-04-13T05:05:16.823	75.22	-6.86	50894.33	7.93