

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-09-24T13:46:00.750
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3377381789869167872
 2Mass ID (if available) : 06240109+2334040

ICRS Star Coord at Epoch: 06h 24m 01.09578s +23:34:04.13140s

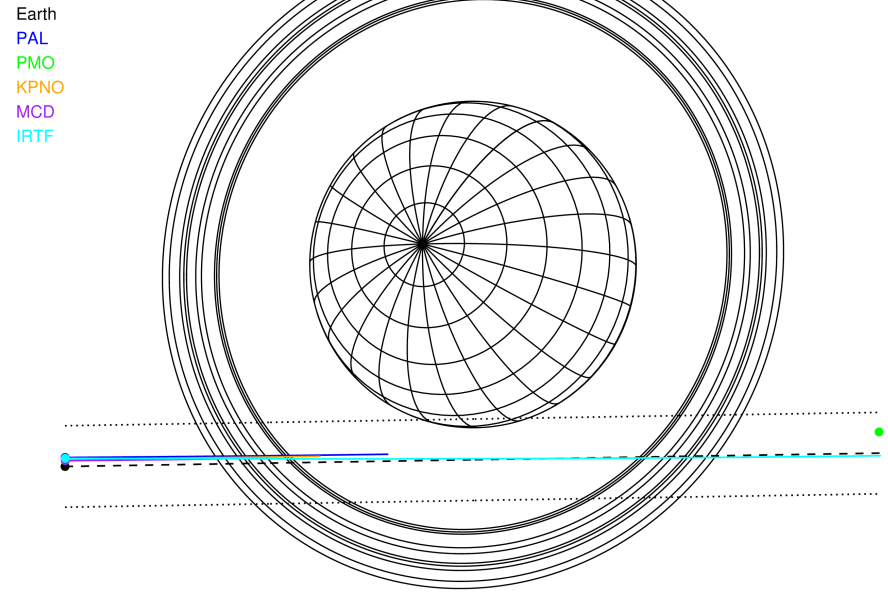
RUWE (>1.4 is poor) : 1.04
 K magnitude : 13.017
 G magnitude : 16.974
 RP magnitude : 15.904
 BP magnitude : 18.180
 DUPflag : 0
 Distance (au) : 19.016
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 8.54
 Sun-Target sep (deg) : 85.86
 Sun-Moon sep (deg) : 96.74
 B (ring opening deg) : 70.50
 PA of pole (deg) : 67.90

#	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



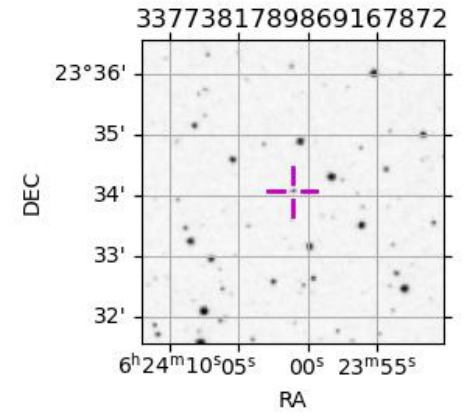
2033-09-24T13:46:00.7500 a: 06 24 01.0958 δ: +23 34 04.131 C/A 2.215° PA 0.94 deg v_sky + 8.54 km/s D 19.02 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2033-09-24T13:46:00 K13.02 G16.97 XRgt

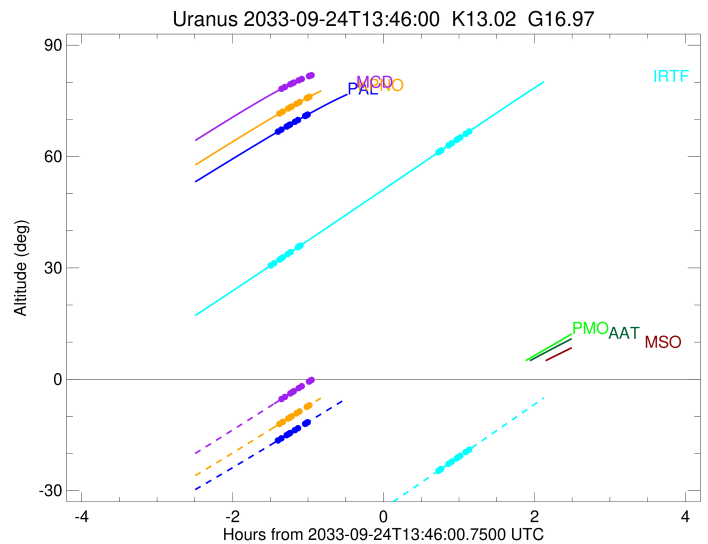
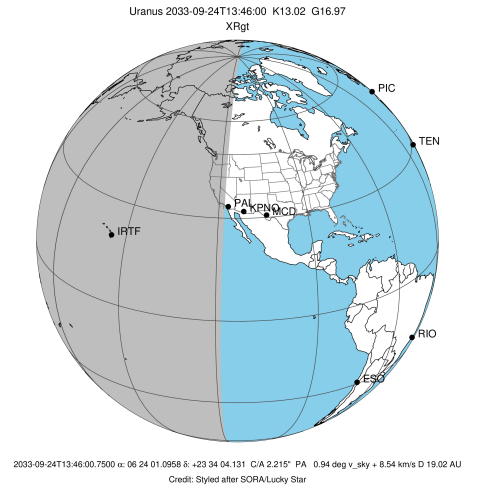


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+++++			SEP 24 12:22 - SEP 24 12:45	PnnRin
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++			SEP 24 12:23 - SEP 24 12:46	PnnRin
MCD	McDonald Obs. 2.7m	30.7	256.0	+			SEP 24 12:25 - SEP 24 12:25	PnnRin
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++	+++++		SEP 24 12:16 - SEP 24 14:53	PnnRie
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 : 2033-09-24T13:45:21.450
 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 : 3377381789869167872
 2Mass ID (if available) : 06240109+2334040
 ICRS Star Coord at Epoch: 06h 24m 01.09578s +23:34:04.13140s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 13.017
 G magnitude : 16.974
 RP magnitude : 15.904
 BP magnitude : 18.180
 DUPflag : 0
 Distance (au) : 19.016
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 8.54
 Sun-Target sep (deg) : 85.86
 Sun-Moon sep (deg) : 97.61
 B (ring opening deg) : 70.50
 PA of pole (deg) : 67.90
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.140
 C/A sky separation (km) : 29513.6
 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



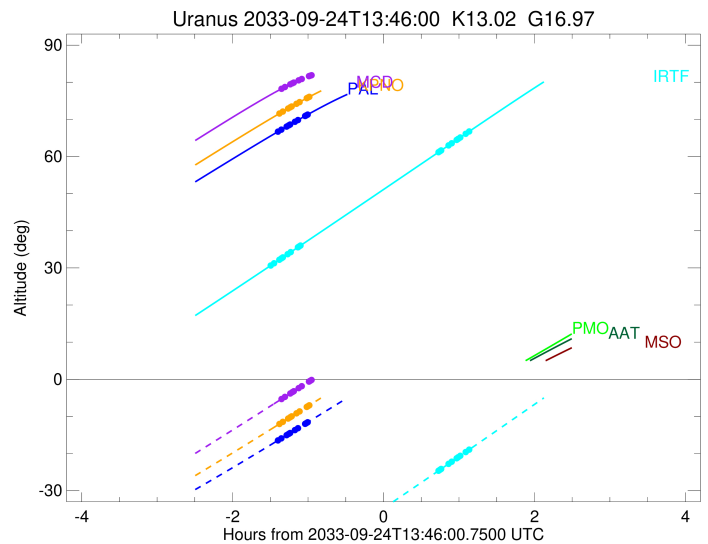
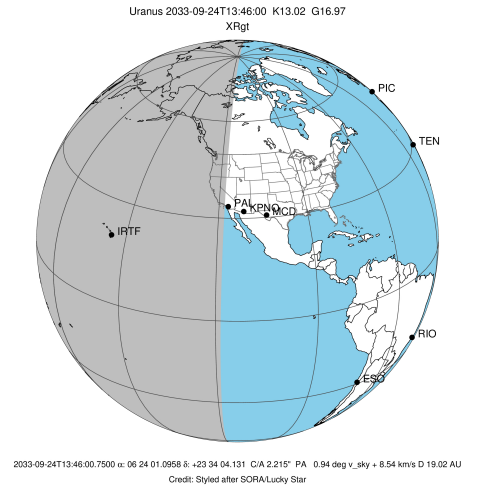
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-09-24T12:22:16.667		66.74	-16.44	51089.96	-6.96		
lambda	I	2033-09-24T12:24:49.378		67.25	-15.91	50026.71	-6.92		
delta	I	2033-09-24T12:29:01.350		68.08	-15.05	48300.35	-6.78		
gamma	I	2033-09-24T12:30:41.146		68.40	-14.70	47626.91	-6.72		
eta	I	2033-09-24T12:31:48.464		68.62	-14.47	47176.12	-6.67		
beta	I	2033-09-24T12:35:34.982		69.36	-13.69	45680.92	-6.52		
alpha	I	2033-09-24T12:38:01.861		69.83	-13.18	44731.38	-6.42		
4	I	2033-09-24T12:43:47.002		70.93	-11.99	42560.51	-6.15		
5	I	2033-09-24T12:44:51.016		71.13	-11.77	42177.22	-6.08		
6	I	2033-09-24T12:45:40.141		71.29	-11.60	41879.69	-6.04		

No planet occultations

6	E	2033-09-24T14:40:12.245		76.71	12.27x	41839.90	6.00		
5	E	2033-09-24T14:41:07.699		76.57	12.46x	42179.51	6.04		
4	E	2033-09-24T14:42:18.869		76.39	12.71x	42615.52	6.10		
alpha	E	2033-09-24T14:48:02.169		75.47	13.89x	44748.18	6.37		
beta	E	2033-09-24T14:50:23.717		75.08	14.37x	45661.63	6.47		
eta	E	2033-09-24T14:54:15.319		74.43	15.17x	47176.12	6.62		
gamma	E	2033-09-24T14:55:22.328		74.23	15.40x	47620.98	6.66		
delta	E	2033-09-24T14:57:03.890		73.94	15.74x	48300.35	6.72		
lambda	E	2033-09-24T15:01:18.162		73.18	16.61x	50026.71	6.86		
epsilon	E	2033-09-24T15:03:08.421		72.85	16.98x	50785.93	6.90		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2033-09-24T13:46:29.150
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        : 3377381789869167872
2Mass ID (if available) : 06240109+2334040
ICRS Star Coord at Epoch: 06h 24m 01.09578s +23:34:04.13140s
RUWE (>1.4 is poor)  : 1.04
K magnitude           : 13.017
G magnitude           : 16.974
RP magnitude          : 15.904
BP magnitude          : 18.180
DUPflag              : 0
Distance (au)         : 19.016
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : 8.54
Sun-Target sep (deg)  : 85.86
Sun-Moon sep (deg)    : 97.62
B (ring opening deg)  : 70.50
PA of pole (deg)      : 67.90
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.150
C/A sky separation (km) : 29657.7
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
    
```

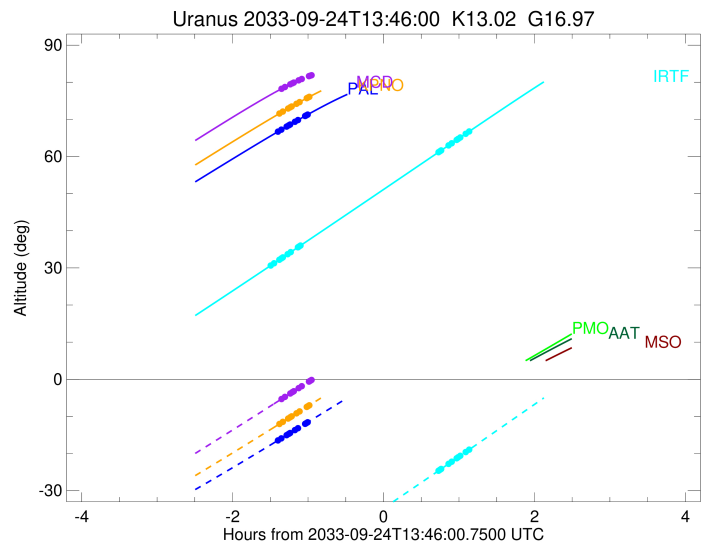
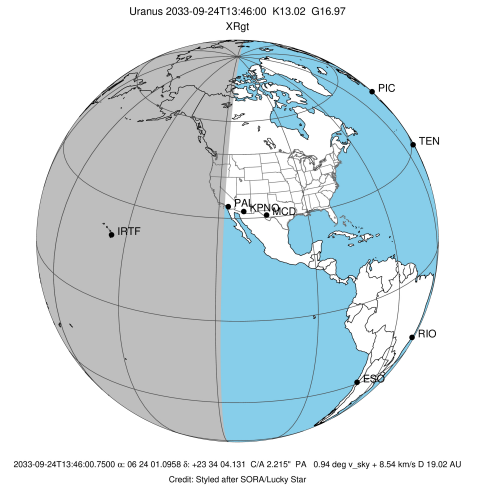


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-09-24T12:23:26.926		71.62	-12.01	51087.84	-6.93		
lambda	I	2033-09-24T12:26:00.132		72.12	-11.47	50026.71	-6.89		
delta	I	2033-09-24T12:30:13.467		72.95	-10.57	48300.35	-6.74		
gamma	I	2033-09-24T12:31:53.825		73.27	-10.22	47626.88	-6.68		
eta	I	2033-09-24T12:33:01.522		73.49	-9.98	47176.12	-6.64		
beta	I	2033-09-24T12:36:49.370		74.21	-9.18	45680.94	-6.48		
alpha	I	2033-09-24T12:39:17.129		74.67	-8.66	44731.57	-6.38		
4	I	2033-09-24T12:45:04.545		75.73	-7.43	42560.80	-6.10		
5	I	2033-09-24T12:46:09.103		75.93	-7.20	42176.85	-6.04		
6	I	2033-09-24T12:46:58.521		76.07	-7.03	41879.70	-6.00		

No planet occultations

6	E	2033-09-24T14:41:02.193		73.71	17.06x	41840.04	5.97		
5	E	2033-09-24T14:41:57.861		73.54	17.26x	42179.32	6.01		
4	E	2033-09-24T14:43:09.375		73.31	17.50x	42615.49	6.07		
alpha	E	2033-09-24T14:48:54.063		72.19	18.70x	44748.23	6.35		
beta	E	2033-09-24T14:51:16.092		71.73	19.18x	45661.68	6.45		
eta	E	2033-09-24T14:55:08.377		70.96	19.98x	47176.12	6.60		
gamma	E	2033-09-24T14:56:15.567		70.74	20.21x	47620.98	6.64		
delta	E	2033-09-24T14:57:57.387		70.40	20.56x	48300.35	6.70		
lambda	E	2033-09-24T15:02:12.229		69.54	21.44x	50026.71	6.84		
epsilon	E	2033-09-24T15:04:02.657		69.17	21.81x	50785.61	6.88		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-09-24T13:48:08.410
 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 : 3377381789869167872
 2Mass ID (if available) : 06240109+2334040
 ICRS Star Coord at Epoch: 06h 24m 01.09578s +23:34:04.13140s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 13.017
 G magnitude : 16.974
 RP magnitude : 15.904
 BP magnitude : 18.180
 DUPflag : 0
 Distance (au) : 19.016
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 8.54
 Sun-Target sep (deg) : 85.86
 Sun-Moon sep (deg) : 97.63
 B (ring opening deg) : 70.50
 PA of pole (deg) : 67.90
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.157
 C/A sky separation (km) : 29751.5
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



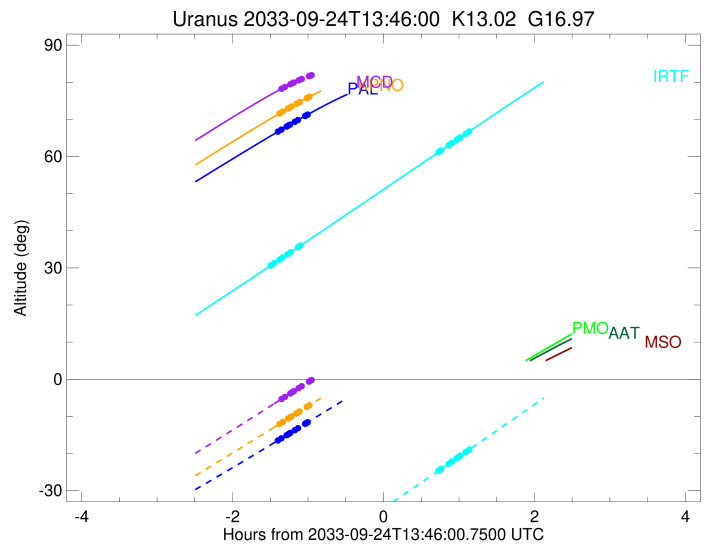
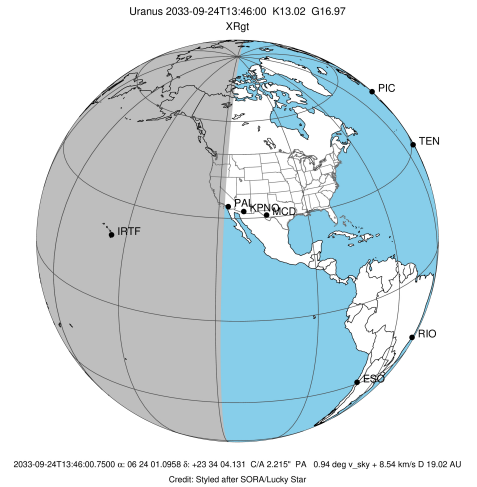
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-09-24T12:25:06.931		78.28	-5.29	51085.86	-6.90		
lambda	I	2033-09-24T12:27:40.511		78.74	-4.74x	50026.71	-6.86		
delta	I	2033-09-24T12:31:54.956		79.46	-3.82x	48300.35	-6.71		
gamma	I	2033-09-24T12:33:35.765		79.74	-3.46x	47626.85	-6.65		
eta	I	2033-09-24T12:34:43.763		79.93	-3.22x	47176.12	-6.61		
beta	I	2033-09-24T12:38:32.653		80.52	-2.40x	45680.96	-6.45		
alpha	I	2033-09-24T12:41:01.086		80.89	-1.86x	44731.75	-6.35		
4	I	2033-09-24T12:46:50.213		81.67	-0.61x	42561.05	-6.07		
5	I	2033-09-24T12:47:55.187		81.80	-0.38x	42176.52	-6.00		
6	I	2033-09-24T12:48:44.813		81.89	-0.20x	41879.71	-5.97		

No planet occultations

6	E	2033-09-24T14:42:25.757		67.72	23.96x	41840.07	5.96		
5	E	2033-09-24T14:43:21.508		67.52	24.15x	42179.28	6.00		
4	E	2033-09-24T14:44:33.139		67.27	24.39x	42615.48	6.07		
alpha	E	2033-09-24T14:50:18.217		66.05	25.58x	44748.23	6.34		
beta	E	2033-09-24T14:52:40.338		65.55	26.07x	45661.69	6.45		
eta	E	2033-09-24T14:56:32.700		64.73	26.86x	47176.12	6.60		
gamma	E	2033-09-24T14:57:39.896		64.49	27.09x	47620.98	6.64		
delta	E	2033-09-24T14:59:21.713		64.12	27.43x	48300.35	6.70		
lambda	E	2033-09-24T15:03:36.484		63.22	28.30x	50026.71	6.85		
epsilon	E	2033-09-24T15:05:26.857		62.82	28.67x	50785.63	6.89		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-09-24T13:37:01.500
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      : 3377381789869167872
2Mass ID (if available) : 06240109+2334040
ICRS Star Coord at Epoch: 06h 24m 01.09578s +23:34:04.13140s
RUWE (>1.4 is poor) : 1.04
K magnitude          : 13.017
G magnitude          : 16.974
RP magnitude         : 15.904
BP magnitude         : 18.180
DUPflag             : 0
Distance (au)       : 19.016
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : 8.54
Sun-Target sep (deg) : 85.86
Sun-Moon sep (deg)  : 97.36
B (ring opening deg) : 70.50
PA of pole (deg)    : 67.90
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.205
C/A sky separation (km) : 30417.2
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.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	2033-09-24T12:16:31.133		30.68	-54.46	51086.09	-7.00		
lambda	I	2033-09-24T12:19:02.587		31.25	-53.94	50026.71	-6.95		
delta	I	2033-09-24T12:23:13.882		32.20	-53.07	48300.35	-6.79		
gamma	I	2033-09-24T12:24:53.604		32.58	-52.72	47626.84	-6.72		
eta	I	2033-09-24T12:26:00.923		32.84	-52.48	47176.12	-6.67		
beta	I	2033-09-24T12:29:47.879		33.69	-51.68	45680.97	-6.50		
alpha	I	2033-09-24T12:32:15.361		34.25	-51.16	44731.85	-6.38		
4	I	2033-09-24T12:38:03.403		35.57	-49.92	42561.28	-6.07		
5	I	2033-09-24T12:39:08.452		35.82	-49.68	42176.22	-6.00		
6	I	2033-09-24T12:39:58.075		36.01	-49.51	41879.72	-5.96		

No planet occultations

6	E	2033-09-24T14:29:44.118		61.16	-24.65	41841.77	5.82		
5	E	2033-09-24T14:30:40.542		61.37	-24.43	42177.03	5.86		
4	E	2033-09-24T14:31:54.041		61.66	-24.15	42615.06	5.93		
alpha	E	2033-09-24T14:37:46.747		63.00	-22.78	44748.82	6.22		
beta	E	2033-09-24T14:40:11.722		63.56	-22.22	45662.42	6.32		
eta	E	2033-09-24T14:44:08.394		64.46	-21.30	47176.12	6.48		
gamma	E	2033-09-24T14:45:16.828		64.73	-21.03	47620.97	6.52		
delta	E	2033-09-24T14:47:00.500		65.12	-20.63	48300.35	6.58		
lambda	E	2033-09-24T14:51:19.787		66.11	-19.62	50026.71	6.73		
epsilon	E	2033-09-24T14:53:11.218		66.54	-19.18	50779.79	6.77		