

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2028-11-30T07:08:48.950
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 146370153282200576
 2Mass ID (if available) : 04414769+2211283

ICRS Star Coord at Epoch: 04h 41m 47.70274s +22:11:28.45355s

RUWE (>1.4 is poor) : 1.21
 K magnitude : 13.016
 G magnitude : 14.995
 RP magnitude : 14.348
 BP magnitude : 15.460
 DUPflag : 0
 Distance (au) : 18.311
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.38
 Sun-Target sep (deg) : 176.26
 Sun-Moon sep (deg) : 24.81
 B (ring opening deg) : 80.44
 PA of pole (deg) : -43.97

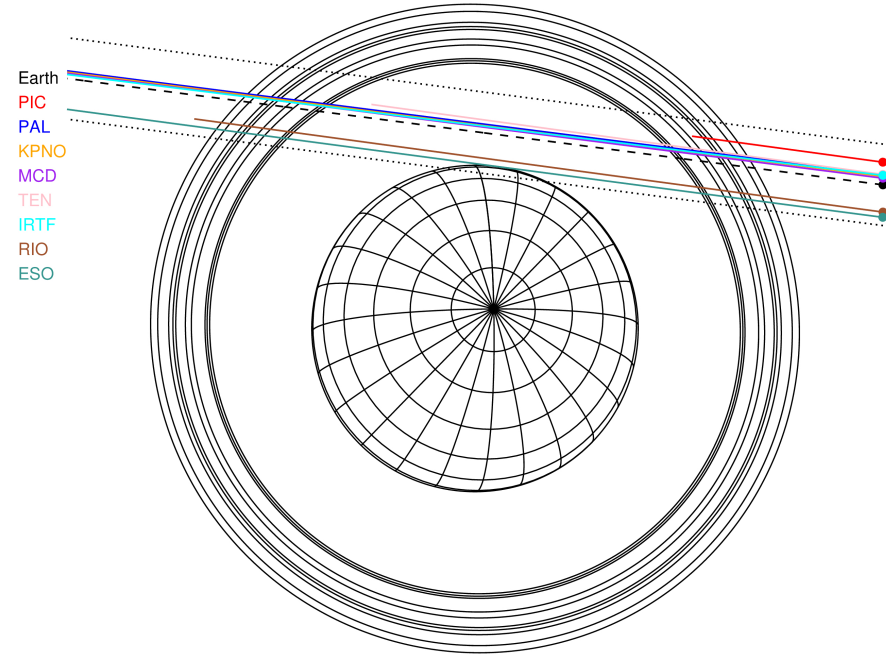
a(km) ring

- 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



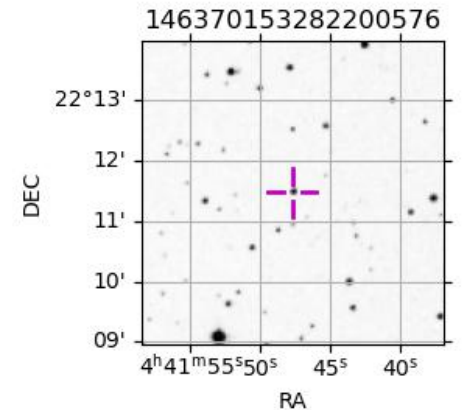
2028-11-30T07:08:48.9500 ra: 04 41 47.7027 s: +22 11 28.454 C/A 2.3077 PA 172.57 deg v_sky -23.38 km/s D 18.31 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2028-11-30T07:08:48 K13.02 G15.00 XRgt

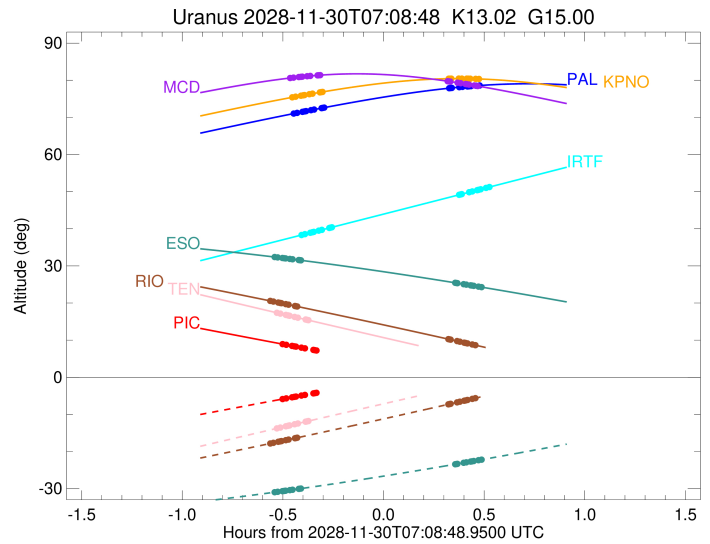
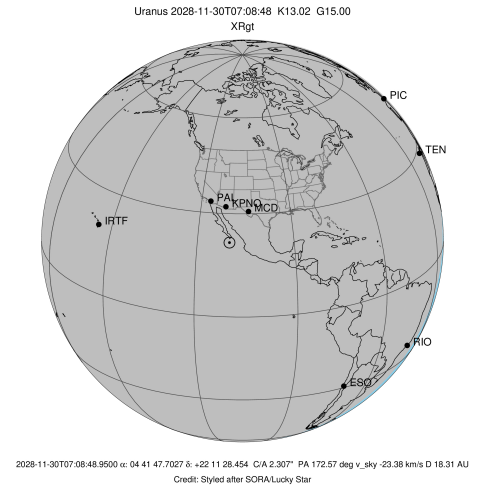


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++			NOV 30 06:39 - NOV 30 06:42	PnnRin
PAL	Palomar Mt (200")	33.4	243.1	+++++		+++++	NOV 30 06:42 - NOV 30 07:37	PnnRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	NOV 30 06:41 - NOV 30 07:37	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	NOV 30 06:41 - NOV 30 07:36	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++			NOV 30 06:37 - NOV 30 06:46	PnnRin
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++		+++++	NOV 30 06:44 - NOV 30 07:40	PnnRie
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++		+++++	NOV 30 06:35 - NOV 30 07:36	PnnRie
ESO	European Southern Obs	-29.3	289.3	+++++		+++++	NOV 30 06:36 - NOV 30 07:38	PnnRie
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 : 2028-11-30T07:05:04.760
 Event type : XRgt
 : No Uranus occs
 : 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 : 146370153282200576
 2Mass ID (if available) : 04414769+2211283
 ICRS Star Coord at Epoch: 04h 41m 47.70274s +22:11:28.45355s
 RUWE (>1.4 is poor) : 1.21
 K magnitude : 13.016
 G magnitude : 14.995
 RP magnitude : 14.348
 BP magnitude : 15.460
 DUPflag : 0
 Distance (au) : 18.311
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.38
 Sun-Target sep (deg) : 176.26
 Sun-Moon sep (deg) : 25.40
 B (ring opening deg) : 80.44
 PA of pole (deg) : -43.97
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.593
 C/A sky separation (km) : 34430.1
 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

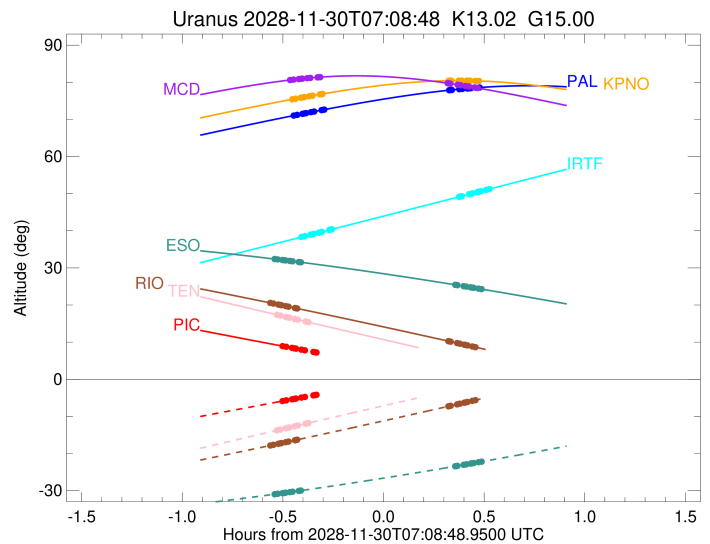
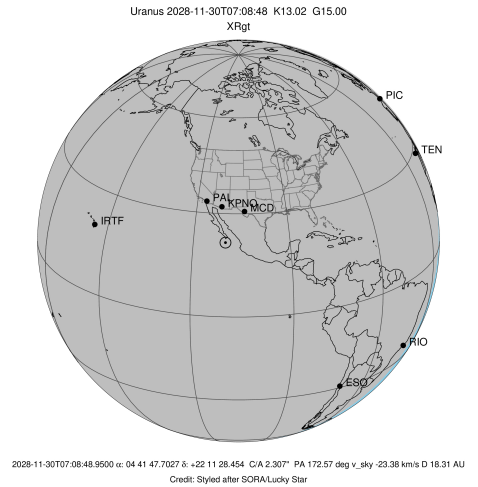


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-11-30T06:39:07.244		8.86	-5.80	50755.95	-17.07		
lambda	I	2028-11-30T06:39:50.176		8.74	-5.68	50026.71	-16.87		
delta	I	2028-11-30T06:41:34.265		8.45	-5.39	48300.35	-16.29		
gamma	I	2028-11-30T06:42:16.105		8.33	-5.28	47624.12	-16.03		
eta	I	2028-11-30T06:42:44.198		8.25	-5.20	47176.12	-15.86		
beta	I	2028-11-30T06:44:22.907		7.97	-4.92x	45643.25	-15.20		
alpha	I	2028-11-30T06:45:22.266		7.80	-4.76x	44752.14	-14.77		
4	I	2028-11-30T06:47:53.177		7.38	-4.34x	42613.49	-13.57		
5	I	2028-11-30T06:48:14.902		7.31	-4.28x	42313.44	-13.38		
6	I	2028-11-30T06:48:48.817		7.22	-4.19x	41879.30	-13.07		

No planet occultations

6	E	2028-11-30T07:21:59.380		1.75x	1.14x	41847.49	13.05		
5	E	2028-11-30T07:22:32.172		1.66x	1.23x	42278.33	13.35		
4	E	2028-11-30T07:22:56.235		1.60x	1.29x	42600.72	13.54		
alpha	E	2028-11-30T07:25:26.121		1.20x	1.68x	44721.17	14.73		
beta	E	2028-11-30T07:26:28.247		1.03x	1.84x	45649.25	15.16		
eta	E	2028-11-30T07:28:06.797		0.77x	2.10x	47176.12	15.81		
gamma	E	2028-11-30T07:28:34.792		0.70x	2.17x	47621.28	15.99		
delta	E	2028-11-30T07:29:16.931		0.59x	2.28x	48300.35	16.24		
lambda	E	2028-11-30T07:31:01.337		0.31x	2.54x	50026.71	16.82		
epsilon	E	2028-11-30T07:32:02.931		0.15x	2.70x	51072.50	17.01		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2028-11-30T07:09:28.550
 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 : 146370153282200576
 2Mass ID (if available) : 04414769+2211283
 ICRS Star Coord at Epoch: 04h 41m 47.70274s +22:11:28.45355s
 RUWE (>1.4 is poor) : 1.21
 K magnitude : 13.016
 G magnitude : 14.995
 RP magnitude : 14.348
 BP magnitude : 15.460
 DUPflag : 0
 Distance (au) : 18.311
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.38
 Sun-Target sep (deg) : 176.26
 Sun-Moon sep (deg) : 25.04
 B (ring opening deg) : 80.44
 PA of pole (deg) : -43.97
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.404
 C/A sky separation (km) : 31928.2
 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



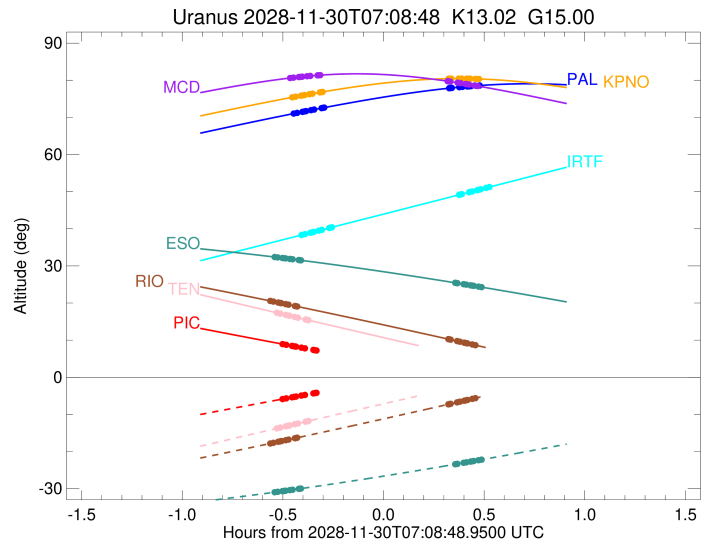
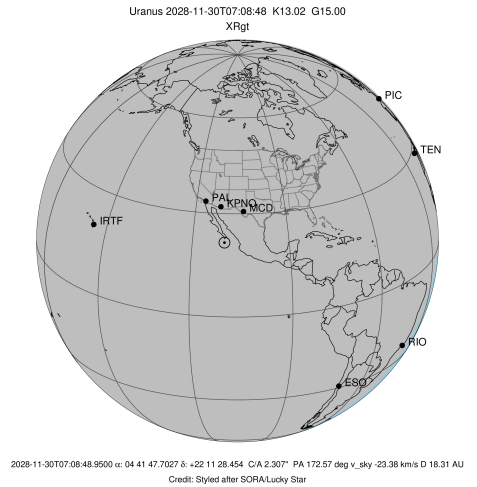
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-11-30T06:42:24.636		71.10	-73.49	50762.24	-18.40		
lambda	I	2028-11-30T06:43:04.722		71.22	-73.60	50026.71	-18.26		
delta	I	2028-11-30T06:44:40.518		71.51	-73.85	48300.35	-17.78		
gamma	I	2028-11-30T06:45:18.755		71.62	-73.95	47624.44	-17.57		
eta	I	2028-11-30T06:45:44.369		71.69	-74.01	47176.12	-17.43		
beta	I	2028-11-30T06:47:13.629		71.96	-74.24	45643.96	-16.90		
alpha	I	2028-11-30T06:48:06.817		72.11	-74.37	44752.38	-16.56		
4	I	2028-11-30T06:50:19.894		72.50	-74.70	42611.90	-15.62		
5	I	2028-11-30T06:50:38.711		72.55	-74.75	42311.62	-15.48		
6	I	2028-11-30T06:51:07.782		72.64	-74.82	41879.68	-15.24		

No planet occultations

6	E	2028-11-30T07:28:23.188		77.87	-78.43	41842.92	15.25		
5	E	2028-11-30T07:28:51.108		77.91	-78.44	42270.90	15.49		
4	E	2028-11-30T07:29:12.132		77.95	-78.45	42596.96	15.64		
alpha	E	2028-11-30T07:31:23.802		78.14	-78.51	44717.98	16.57		
beta	E	2028-11-30T07:32:19.533		78.22	-78.53	45650.76	16.91		
eta	E	2028-11-30T07:33:48.289		78.34	-78.55	47176.12	17.45		
gamma	E	2028-11-30T07:34:13.711		78.37	-78.55	47621.45	17.59		
delta	E	2028-11-30T07:34:52.085		78.42	-78.56	48300.35	17.79		
lambda	E	2028-11-30T07:36:27.793		78.53	-78.56	50026.71	18.27		
epsilon	E	2028-11-30T07:37:26.227		78.59	-78.56	51102.41	18.42		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2028-11-30T07:09:08.910
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      : 146370153282200576
2Mass ID (if available) : 04414769+2211283
ICRS Star Coord at Epoch: 04h 41m 47.70274s +22:11:28.45355s
RUWE (>1.4 is poor) : 1.21
K magnitude         : 13.016
G magnitude         : 14.995
RP magnitude        : 14.348
BP magnitude        : 15.460
DUPflag            : 0
Distance (au)       : 18.311
f0 (km)            : 0.000
g0 (km)            : 0.000
skyplane vel. (km/s) : -23.38
Sun-Target sep (deg) : 176.26
Sun-Moon sep (deg)  : 25.11
B (ring opening deg) : 80.44
PA of pole (deg)    : -43.97
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.386
C/A sky separation (km) : 31692.7
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
    
```

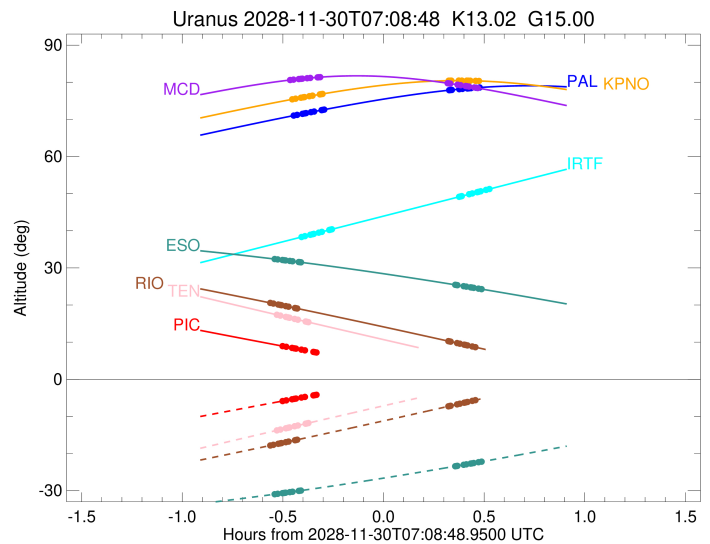
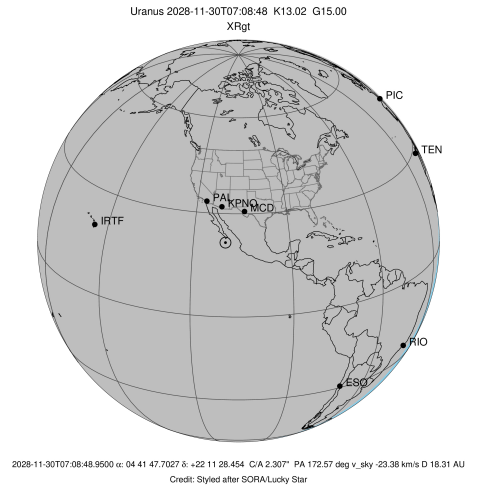


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-11-30T06:41:57.707		75.47	-77.52	50763.03	-18.51		
lambda	I	2028-11-30T06:42:37.605		75.58	-77.60	50026.71	-18.36		
delta	I	2028-11-30T06:44:12.809		75.85	-77.81	48300.35	-17.89		
gamma	I	2028-11-30T06:44:50.789		75.95	-77.89	47624.48	-17.69		
eta	I	2028-11-30T06:45:16.229		76.02	-77.94	47176.12	-17.55		
beta	I	2028-11-30T06:46:44.819		76.26	-78.12	45644.04	-17.03		
alpha	I	2028-11-30T06:47:37.576		76.40	-78.22	44752.39	-16.70		
4	I	2028-11-30T06:49:49.424		76.74	-78.47	42611.72	-15.79		
5	I	2028-11-30T06:50:08.045		76.79	-78.50	42311.40	-15.64		
6	I	2028-11-30T06:50:36.784		76.86	-78.55	41879.70	-15.41		

No planet occultations

6	E	2028-11-30T07:28:14.731		80.43	-79.54	41842.56	15.42		
5	E	2028-11-30T07:28:42.335		80.44	-79.51	42270.31	15.65		
4	E	2028-11-30T07:29:03.161		80.44	-79.49	42596.66	15.80		
alpha	E	2028-11-30T07:31:13.638		80.45	-79.33	44717.74	16.71		
beta	E	2028-11-30T07:32:08.948		80.45	-79.26	45650.87	17.04		
eta	E	2028-11-30T07:33:37.062		80.44	-79.14	47176.12	17.56		
gamma	E	2028-11-30T07:34:02.316		80.43	-79.11	47621.46	17.70		
delta	E	2028-11-30T07:34:40.445		80.42	-79.05	48300.35	17.91		
lambda	E	2028-11-30T07:36:15.592		80.39	-78.91	50026.71	18.37		
epsilon	E	2028-11-30T07:37:13.833		80.36	-78.82	51104.62	18.52		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2028-11-30T07:08:38.680
 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 : 146370153282200576
 2Mass ID (if available) : 04414769+2211283
 ICRS Star Coord at Epoch: 04h 41m 47.70274s +22:11:28.45355s
 RUWE (>1.4 is poor) : 1.21
 K magnitude : 13.016
 G magnitude : 14.995
 RP magnitude : 14.348
 BP magnitude : 15.460
 DUPflag : 0
 Distance (au) : 18.311
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.38
 Sun-Target sep (deg) : 176.26
 Sun-Moon sep (deg) : 25.21
 B (ring opening deg) : 80.44
 PA of pole (deg) : -43.97
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.369
 C/A sky separation (km) : 31454.8
 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

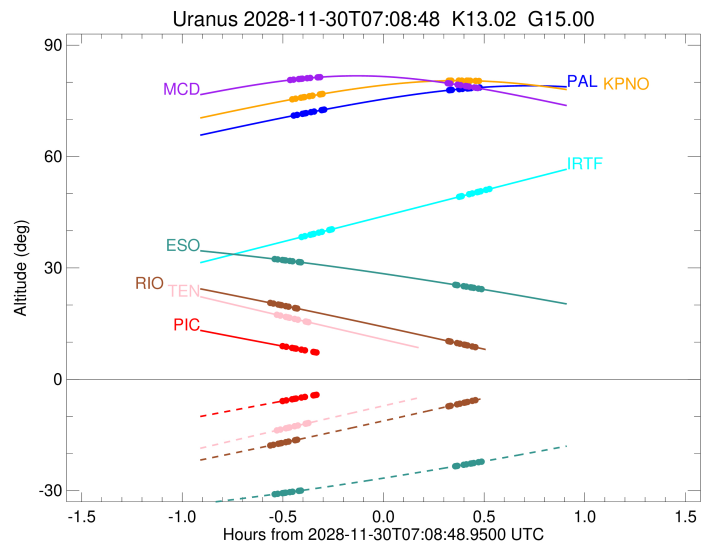
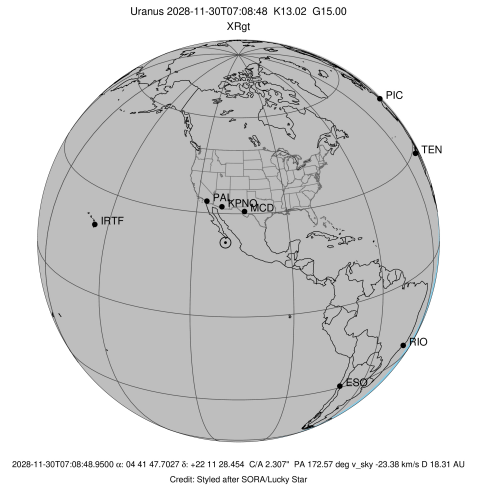


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-11-30T06:41:20.063		80.65	-81.20	50763.88	-18.61		
lambda	I	2028-11-30T06:41:59.782		80.72	-81.21	50026.71	-18.47		
delta	I	2028-11-30T06:43:34.407		80.87	-81.23	48300.35	-18.01		
gamma	I	2028-11-30T06:44:12.136		80.93	-81.23	47624.52	-17.81		
eta	I	2028-11-30T06:44:37.404		80.97	-81.23	47176.12	-17.68		
beta	I	2028-11-30T06:46:05.341		81.10	-81.23	45644.13	-17.17		
alpha	I	2028-11-30T06:46:57.679		81.17	-81.22	44752.41	-16.84		
4	I	2028-11-30T06:49:08.337		81.33	-81.18	42611.53	-15.95		
5	I	2028-11-30T06:49:26.768		81.35	-81.17	42311.17	-15.81		
6	I	2028-11-30T06:49:55.186		81.38	-81.16	41879.72	-15.58		

No planet occultations

6	E	2028-11-30T07:27:55.772		79.75	-76.97	41842.22	15.58		
5	E	2028-11-30T07:28:23.075		79.69	-76.89	42269.74	15.81		
4	E	2028-11-30T07:28:43.712		79.65	-76.84	42596.37	15.95		
alpha	E	2028-11-30T07:30:53.050		79.35	-76.47	44717.51	16.84		
beta	E	2028-11-30T07:31:47.960		79.22	-76.32	45650.99	17.17		
eta	E	2028-11-30T07:33:15.461		79.01	-76.06	47176.12	17.68		
gamma	E	2028-11-30T07:33:40.556		78.94	-75.99	47621.48	17.81		
delta	E	2028-11-30T07:34:18.452		78.85	-75.88	48300.35	18.01		
lambda	E	2028-11-30T07:35:53.067		78.61	-75.60	50026.71	18.47		
epsilon	E	2028-11-30T07:36:51.125		78.46	-75.43	51106.74	18.61		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2028-11-30T07:04:26.740
 Event type : XRgt
 : No Uranus occs
 : 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 : 146370153282200576
 2Mass ID (if available) : 04414769+2211283
 ICRS Star Coord at Epoch: 04h 41m 47.70274s +22:11:28.45355s
 RUWE (>1.4 is poor) : 1.21
 K magnitude : 13.016
 G magnitude : 14.995
 RP magnitude : 14.348
 BP magnitude : 15.460
 DUPflag : 0
 Distance (au) : 18.311
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.38
 Sun-Target sep (deg) : 176.26
 Sun-Moon sep (deg) : 25.60
 B (ring opening deg) : 80.44
 PA of pole (deg) : -43.97
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.452
 C/A sky separation (km) : 32560.7
 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



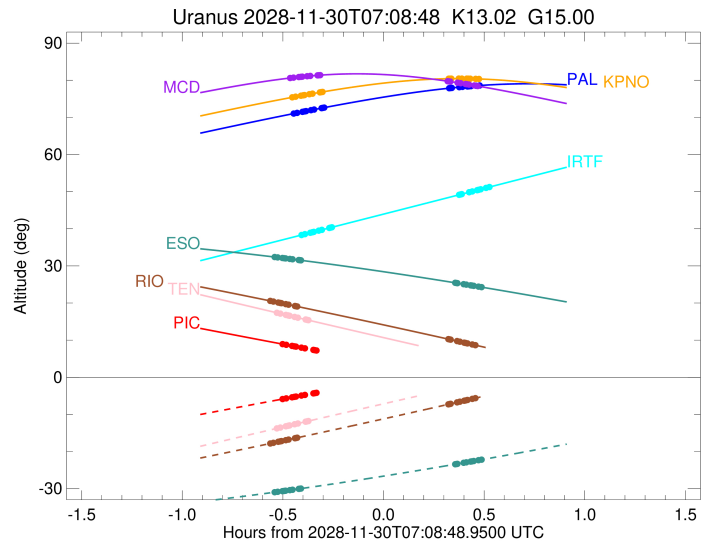
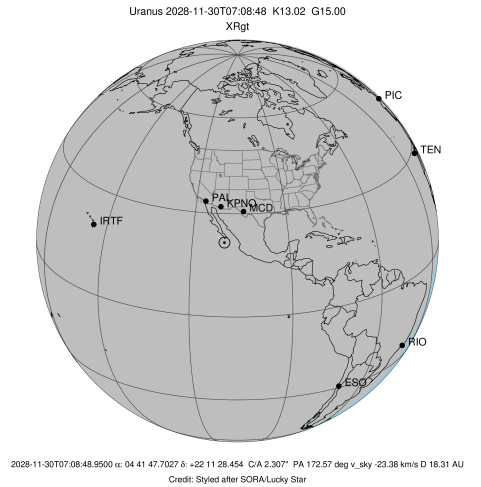
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-11-30T06:37:23.736		17.29	-13.69	50761.43	-17.93		
lambda	I	2028-11-30T06:38:04.851		17.15	-13.55	50026.71	-17.77		
delta	I	2028-11-30T06:39:43.352		16.80	-13.20	48300.35	-17.27		
gamma	I	2028-11-30T06:40:22.732		16.66	-13.06	47624.40	-17.05		
eta	I	2028-11-30T06:40:49.130		16.57	-12.97	47176.12	-16.91		
beta	I	2028-11-30T06:42:21.284		16.24	-12.65	45643.85	-16.35		
alpha	I	2028-11-30T06:43:16.313		16.05	-12.46	44752.36	-15.99		
4	I	2028-11-30T06:45:34.485		15.56	-11.98	42612.17	-15.00		
5	I	2028-11-30T06:45:54.093		15.49	-11.91	42311.95	-14.84		
6	I	2028-11-30T06:46:24.452		15.39	-11.80	41879.65	-14.59		

No planet occultations

6	E	2028-11-30T07:23:05.915		7.73	-4.23x	41844.34	14.55		
5	E	2028-11-30T07:23:35.228		7.63	-4.13x	42273.26	14.80		
4	E	2028-11-30T07:23:57.140		7.55	-4.05x	42598.17	14.96		
alpha	E	2028-11-30T07:26:14.378		7.08	-3.59x	44719.01	15.94		
beta	E	2028-11-30T07:27:12.186		6.88	-3.39x	45650.25	16.29		
eta	E	2028-11-30T07:28:44.242		6.57	-3.08x	47176.12	16.85		
gamma	E	2028-11-30T07:29:10.559		6.48	-2.99x	47621.39	16.99		
delta	E	2028-11-30T07:29:50.264		6.34	-2.86x	48300.35	17.21		
lambda	E	2028-11-30T07:31:29.150		6.00	-2.52x	50026.71	17.70		
epsilon	E	2028-11-30T07:32:28.865		5.80	-2.32x	51091.99	17.86		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2028-11-30T07:12:06.700
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      : 146370153282200576
2Mass ID (if available) : 04414769+2211283
ICRS Star Coord at Epoch: 04h 41m 47.70274s +22:11:28.45355s
RUWE (>1.4 is poor) : 1.21
K magnitude          : 13.016
G magnitude          : 14.995
RP magnitude         : 14.348
BP magnitude         : 15.460
DUPflag             : 0
Distance (au)       : 18.311
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -23.38
Sun-Target sep (deg) : 176.26
Sun-Moon sep (deg)  : 24.47
B (ring opening deg) : 80.44
PA of pole (deg)    : -43.97
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.381
C/A sky separation (km) : 31624.0
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
    
```

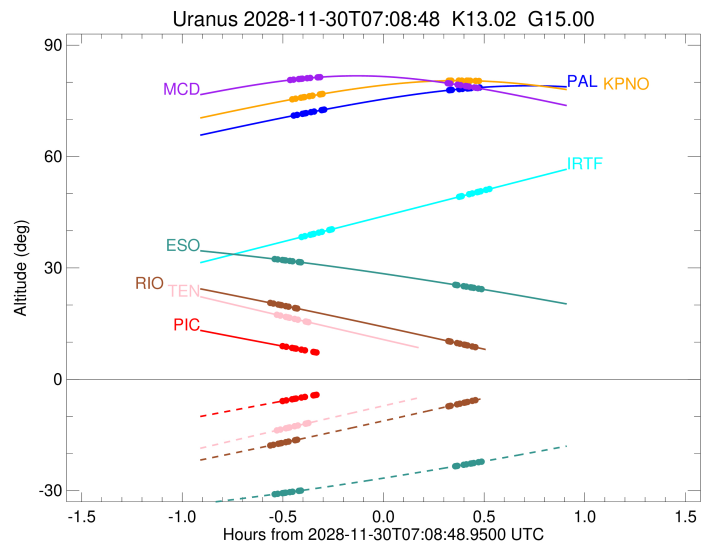
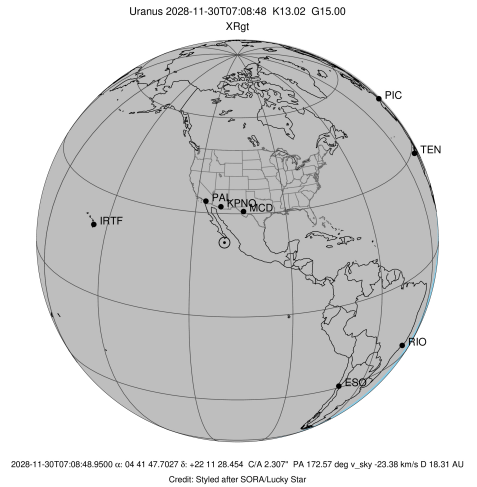


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-11-30T06:44:43.737		38.40	-42.02	50762.78	-18.42		
lambda	I	2028-11-30T06:45:23.818		38.55	-42.18	50026.71	-18.27		
delta	I	2028-11-30T06:46:59.473		38.92	-42.55	48300.35	-17.81		
gamma	I	2028-11-30T06:47:37.626		39.07	-42.69	47624.47	-17.61		
eta	I	2028-11-30T06:48:03.177		39.16	-42.79	47176.12	-17.48		
beta	I	2028-11-30T06:49:32.142		39.51	-43.13	45644.02	-16.96		
alpha	I	2028-11-30T06:50:25.107		39.71	-43.34	44752.39	-16.64		
4	I	2028-11-30T06:52:37.416		40.22	-43.84	42611.74	-15.74		
5	I	2028-11-30T06:52:56.095		40.29	-43.92	42311.43	-15.59		
6	I	2028-11-30T06:53:24.922		40.40	-44.03	41879.70	-15.37		

No planet occultations

6	E	2028-11-30T07:31:21.202		49.15	-52.79	41842.28	15.41		
5	E	2028-11-30T07:31:48.816		49.26	-52.90	42269.83	15.63		
4	E	2028-11-30T07:32:09.678		49.34	-52.98	42596.41	15.78		
alpha	E	2028-11-30T07:34:20.327		49.84	-53.48	44717.52	16.69		
beta	E	2028-11-30T07:35:15.742		50.05	-53.70	45650.98	17.01		
eta	E	2028-11-30T07:36:43.999		50.39	-54.04	47176.12	17.53		
gamma	E	2028-11-30T07:37:09.300		50.49	-54.13	47621.48	17.67		
delta	E	2028-11-30T07:37:47.499		50.64	-54.28	48300.35	17.87		
lambda	E	2028-11-30T07:39:22.830		51.01	-54.65	50026.71	18.34		
epsilon	E	2028-11-30T07:40:21.320		51.23	-54.88	51107.06	18.48		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2028-11-30T07:05:21.330
 Event type : XRgt
 : No Uranus occs
 : 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 : 146370153282200576
 2Mass ID (if available) : 04414769+2211283
 ICRS Star Coord at Epoch: 04h 41m 47.70274s +22:11:28.45355s
 RUWE (>1.4 is poor) : 1.21
 K magnitude : 13.016
 G magnitude : 14.995
 RP magnitude : 14.348
 BP magnitude : 15.460
 DUPflag : 0
 Distance (au) : 18.311
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.38
 Sun-Target sep (deg) : 176.26
 Sun-Moon sep (deg) : 25.61
 B (ring opening deg) : 80.44
 PA of pole (deg) : -43.97
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.004
 C/A sky separation (km) : 26610.1
 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

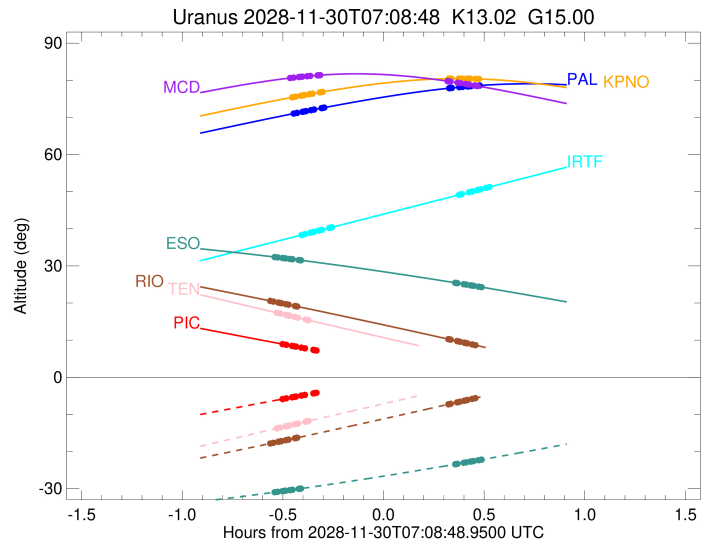
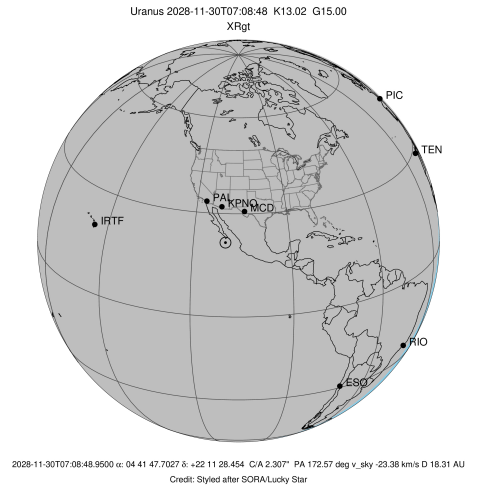


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-11-30T06:35:22.135		20.51	-17.78	50782.58	-20.13		
lambda	I	2028-11-30T06:35:59.725		20.40	-17.66	50026.71	-20.05		
delta	I	2028-11-30T06:37:26.476		20.13	-17.38	48300.35	-19.75		
gamma	I	2028-11-30T06:38:00.774		20.02	-17.27	47625.22	-19.62		
eta	I	2028-11-30T06:38:23.716		19.95	-17.20	47176.12	-19.53		
beta	I	2028-11-30T06:39:42.731		19.70	-16.94	45645.87	-19.20		
alpha	I	2028-11-30T06:40:29.420		19.56	-16.79	44752.21	-19.00		
4	I	2028-11-30T06:42:24.109		19.20	-16.42	42607.56	-18.45		
5	I	2028-11-30T06:42:40.064		19.15	-16.37	42305.88	-18.36		
6	I	2028-11-30T06:43:04.151		19.07	-16.29	41879.35	-18.22		

No planet occultations

6	E	2028-11-30T07:28:08.766		10.27	-7.29	41835.54	18.17		
5	E	2028-11-30T07:28:31.970		10.20	-7.21	42258.23	18.31		
4	E	2028-11-30T07:28:50.104		10.14	-7.15	42590.38	18.39		
alpha	E	2028-11-30T07:30:43.859		9.75	-6.76	44712.85	18.94		
beta	E	2028-11-30T07:31:33.269		9.59	-6.59	45653.38	19.14		
eta	E	2028-11-30T07:32:52.152		9.32	-6.32	47176.12	19.46		
gamma	E	2028-11-30T07:33:15.003		9.25	-6.24	47621.79	19.55		
delta	E	2028-11-30T07:33:49.605		9.13	-6.12	48300.35	19.67		
lambda	E	2028-11-30T07:35:16.694		8.83	-5.83	50026.71	19.97		
epsilon	E	2028-11-30T07:36:12.778		8.65	-5.63	51151.54	20.04		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2028-11-30T07:06:56.870
 Event type : XRgt
 : No Uranus occs
 : 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 : 146370153282200576
 2Mass ID (if available) : 04414769+2211283
 ICRS Star Coord at Epoch: 04h 41m 47.70274s +22:11:28.45355s
 RUWE (>1.4 is poor) : 1.21
 K magnitude : 13.016
 G magnitude : 14.995
 RP magnitude : 14.348
 BP magnitude : 15.460
 DUPflag : 0
 Distance (au) : 18.311
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.38
 Sun-Target sep (deg) : 176.26
 Sun-Moon sep (deg) : 25.45
 B (ring opening deg) : 80.44
 PA of pole (deg) : -43.97
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.928
 C/A sky separation (km) : 25602.6
 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	2028-11-30T06:36:39.793		32.35	-30.93	50786.17	-20.51		
lambda	I	2028-11-30T06:37:16.852		32.28	-30.85	50026.71	-20.44		
delta	I	2028-11-30T06:38:41.882		32.13	-30.68	48300.35	-20.16		
gamma	I	2028-11-30T06:39:15.455		32.07	-30.61	47625.34	-20.05		
eta	I	2028-11-30T06:39:37.908		32.02	-30.56	47176.12	-19.97		
beta	I	2028-11-30T06:40:55.115		31.88	-30.40	45646.19	-19.67		
alpha	I	2028-11-30T06:41:40.696		31.79	-30.30	44752.10	-19.48		
4	I	2028-11-30T06:43:32.397		31.58	-30.07	42606.80	-18.98		
5	I	2028-11-30T06:43:47.914		31.55	-30.03	42304.82	-18.90		
6	I	2028-11-30T06:44:11.244		31.50	-29.98	41879.17	-18.78		

No planet occultations

6	E	2028-11-30T07:30:10.675		25.45	-23.43	41834.09	18.74		
5	E	2028-11-30T07:30:33.112		25.39	-23.38	42255.63	18.87		
4	E	2028-11-30T07:30:50.764		25.35	-23.33	42589.00	18.95		
alpha	E	2028-11-30T07:32:41.391		25.08	-23.04	44711.81	19.44		
beta	E	2028-11-30T07:33:29.617		24.96	-22.92	45653.94	19.63		
eta	E	2028-11-30T07:34:46.568		24.77	-22.71	47176.12	19.92		
gamma	E	2028-11-30T07:35:08.897		24.71	-22.66	47621.88	20.00		
delta	E	2028-11-30T07:35:42.716		24.63	-22.57	48300.35	20.12		
lambda	E	2028-11-30T07:37:07.939		24.42	-22.34	50026.71	20.39		
epsilon	E	2028-11-30T07:38:03.405		24.28	-22.19	51162.20	20.46		