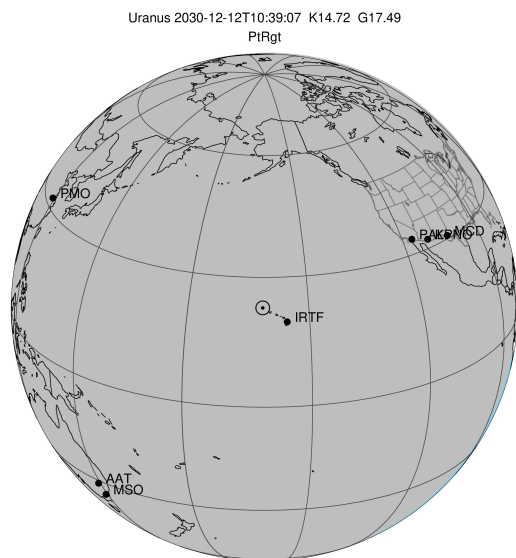


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-12-12T10:39:07.170  
 Event type : PtRgt  
 : Uranus occs: topocentric, not geocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3415587761647395456  
 2Mass ID (if available) : 051820666+2311043

ICRS Star Coord at Epoch: 05h 18m 20.66817s +23:11:04.23681s

RUWE (>1.4 is poor) : 1.08  
 K magnitude : 14.716  
 G magnitude : 17.487  
 RP magnitude : 16.614  
 BP magnitude : 18.275  
 DUPflag : 0  
 Distance (au) : 18.171  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.44  
 Sun-Target sep (deg) : 179.56  
 Sun-Moon sep (deg) : 26.79  
 B (ring opening deg) : 81.71  
 PA of pole (deg) : 15.41

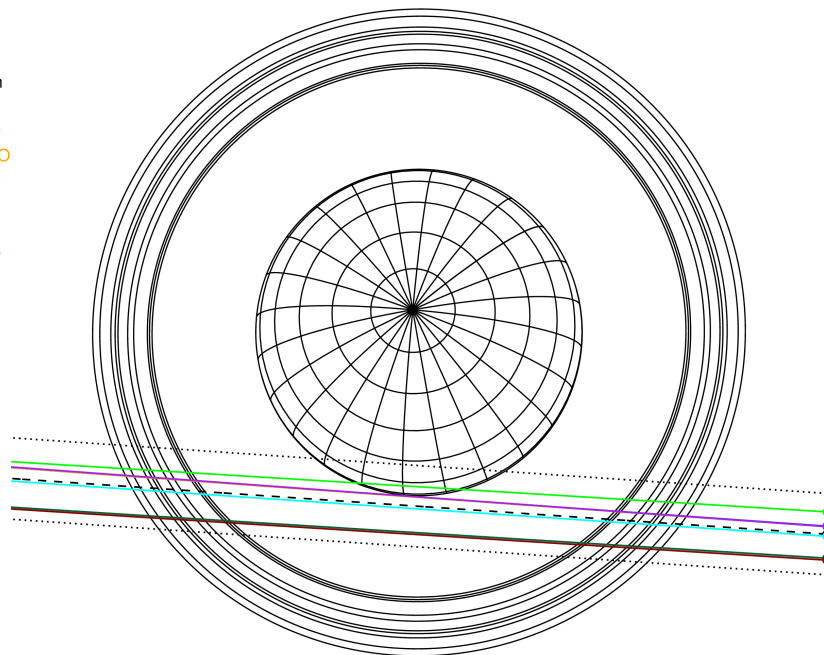
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2030-12-12T10:39:07.1700 ex: 05 18 20.6682 s: +23 11 04.237 C/A 2.055° PA 356.10 deg v\_sky -23.44 km/s D 18.17 AU  
 Credit: Styled after SORA/Lucky Star

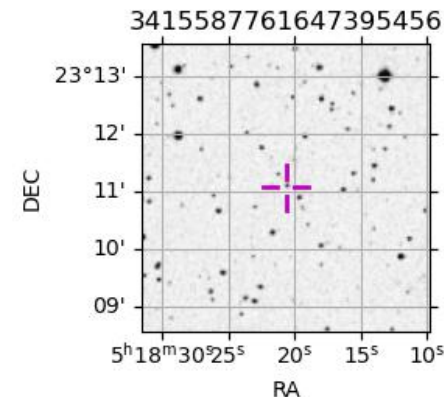
Uranus 2030-12-12T10:39:07 K14.72 G17.49 PtRgt

Earth  
 PAL  
 PMO  
 KPNO  
 MCD  
 IRTF  
 AAT  
 MSO



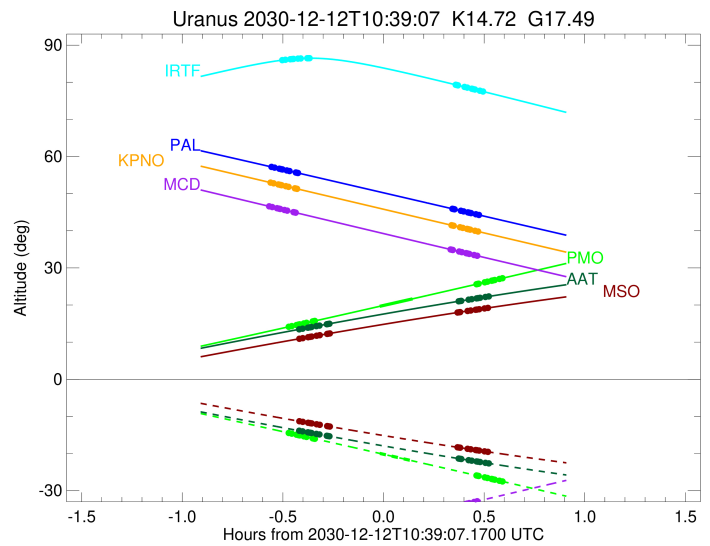
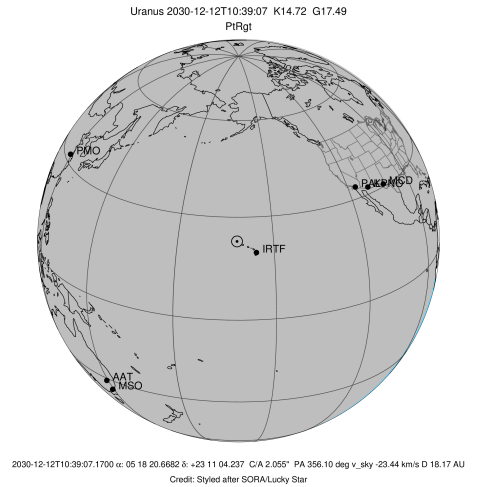
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+++++		+++++	DEC 12 10:06 - DEC 12 11:07	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+ +	+++++	DEC 12 10:11 - DEC 12 11:14	PieRie
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	DEC 12 10:05 - DEC 12 11:07	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	DEC 12 10:05 - DEC 12 11:07	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++		+++++	DEC 12 10:09 - DEC 12 11:09	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	+++++		+++++	DEC 12 10:14 - DEC 12 11:10	PnnRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++		+++++	DEC 12 10:14 - DEC 12 11:10	PnnRie



```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2030-12-12T10:36:30.550
Event type           : PtRgt
: Uranus occs: topocentric, not geocentric
: 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       : 3415587761647395456
2Mass ID (if available) : 05182066+2311043
ICRS Star Coord at Epoch: 05h 18m 20.66817s +23:11:04.23681s
RUWE (>1.4 is poor) : 1.08
K magnitude           : 14.716
G magnitude           : 17.487
RP magnitude         : 16.614
BP magnitude         : 18.275
DUPflag              : 0
Distance (au)        : 18.171
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -23.44
Sun-Target sep (deg) : 179.56
Sun-Moon sep (deg)   : 26.64
B (ring opening deg) : 81.71
PA of pole (deg)     : 15.41
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.952
C/A sky separation (km) : 25722.5
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
  
```

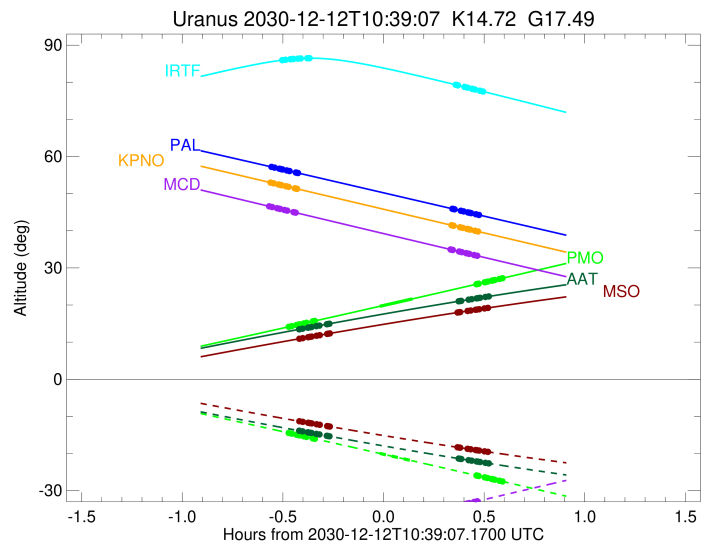
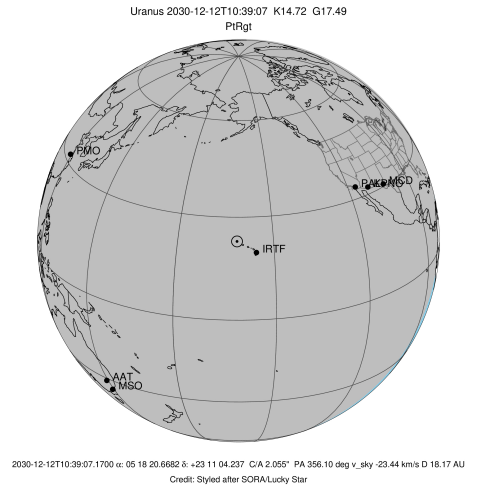


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-12T10:06:02.935		57.14	-56.68	50767.68	-20.46		
lambda	I	2030-12-12T10:06:39.301		57.01	-56.56	50026.71	-20.32		
delta	I	2030-12-12T10:08:04.828		56.71	-56.26	48300.35	-20.04		
gamma	I	2030-12-12T10:08:38.820		56.60	-56.15	47620.98	-19.93		
eta	I	2030-12-12T10:09:01.191		56.52	-56.07	47176.12	-19.85		
beta	I	2030-12-12T10:10:17.050		56.26	-55.81	45681.22	-19.55		
alpha	I	2030-12-12T10:11:06.770		56.08	-55.63	44712.97	-19.36		
4	I	2030-12-12T10:13:00.206		55.69	-55.24	42549.60	-18.84		
5	I	2030-12-12T10:13:15.568		55.64	-55.19	42259.53	-18.77		
6	I	2030-12-12T10:13:36.379		55.56	-55.12	41876.00	-18.65		

No planet occultations

6	E	2030-12-12T10:59:39.386		45.92	-45.51	41845.18	18.61		
5	E	2030-12-12T11:00:03.758		45.84	-45.42	42302.88	18.73		
4	E	2030-12-12T11:00:20.566		45.78	-45.36	42615.31	18.80		
alpha	E	2030-12-12T11:02:12.584		45.39	-44.97	44751.94	19.31		
beta	E	2030-12-12T11:02:59.104		45.23	-44.81	45654.57	19.51		
eta	E	2030-12-12T11:04:16.543		44.95	-44.54	47176.12	19.79		
gamma	E	2030-12-12T11:04:39.371		44.87	-44.46	47628.90	19.87		
delta	E	2030-12-12T11:05:13.055		44.76	-44.34	48300.35	19.99		
lambda	E	2030-12-12T11:06:38.817		44.46	-44.04	50026.71	20.26		
epsilon	E	2030-12-12T11:07:48.925		44.21	-43.80	51454.57	20.40		

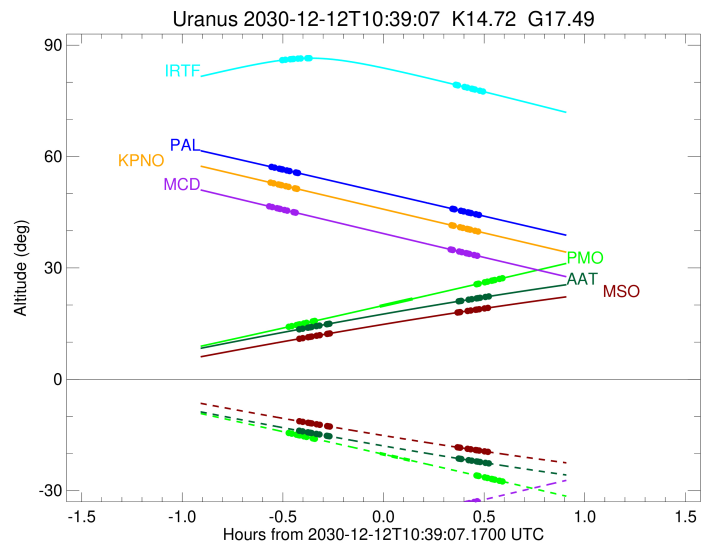
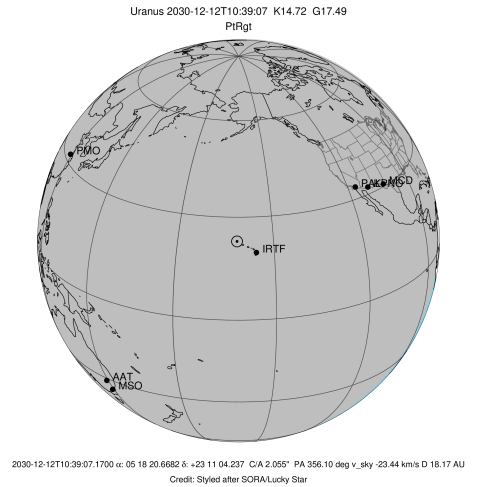
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-12-12T10:42:39.220  
 Event type : PtRgt  
 : Uranus occs: topocentric, not geocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PMO  
 Location : Purple Mtn Obs. Nanking  
 Latitude (deg) : 32.06667  
 E. Longitude (deg) : 118.82089  
 Altitude (km) : 0.364  
 Gaia source ID : 3415587761647395456  
 2Mass ID (if available) : 05182066+2311043  
 ICRS Star Coord at Epoch: 05h 18m 20.66817s +23:11:04.23681s  
 RUWE (>1.4 is poor) : 1.08  
 K magnitude : 14.716  
 G magnitude : 17.487  
 RP magnitude : 16.614  
 BP magnitude : 18.275  
 DUPflag : 0  
 Distance (au) : 18.171  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.44  
 Sun-Target sep (deg) : 179.56  
 Sun-Moon sep (deg) : 27.62  
 B (ring opening deg) : 81.71  
 PA of pole (deg) : 15.41  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.830  
 C/A sky separation (km) : 24118.9  
 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\_itrff93\_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	2030-12-12T10:11:11.329		14.20	-14.53	50761.72	-20.62		
lambda	I	2030-12-12T10:11:47.102		14.32	-14.65	50026.71	-20.50		
delta	I	2030-12-12T10:13:11.781		14.61	-14.93	48300.35	-20.27		
gamma	I	2030-12-12T10:13:45.381		14.72	-15.05	47620.96	-20.17		
eta	I	2030-12-12T10:14:07.472		14.79	-15.12	47176.12	-20.10		
beta	I	2030-12-12T10:15:22.268		15.05	-15.37	45681.16	-19.86		
alpha	I	2030-12-12T10:16:11.269		15.21	-15.54	44711.18	-19.70		
4	I	2030-12-12T10:18:02.513		15.59	-15.91	42547.37	-19.26		
5	I	2030-12-12T10:18:17.625		15.64	-15.96	42255.09	-19.21		
6	I	2030-12-12T10:18:37.784		15.71	-16.03	41874.91	-19.10		
Uranus	I	2030-12-12T10:38:01.248		19.66	-19.98	24987.74		-8.27	-8.66
Uranus	E	2030-12-12T10:47:46.186		21.66	-21.98	25175.20		-6.74	-7.05
6	E	2030-12-12T11:06:50.195		25.61	-25.92	41843.59	19.17		
5	E	2030-12-12T11:07:13.876		25.69	-26.00	42301.24	19.28		
4	E	2030-12-12T11:07:30.300		25.74	-26.05	42615.66	19.33		
alpha	E	2030-12-12T11:09:19.461		26.12	-26.43	44751.73	19.77		
beta	E	2030-12-12T11:10:04.917		26.28	-26.59	45653.97	19.94		
eta	E	2030-12-12T11:11:20.798		26.54	-26.85	47176.12	20.19		
gamma	E	2030-12-12T11:11:43.197		26.62	-26.93	47629.03	20.25		
delta	E	2030-12-12T11:12:16.257		26.74	-27.04	48300.35	20.36		
lambda	E	2030-12-12T11:13:40.570		27.03	-27.34	50026.71	20.59		
epsilon	E	2030-12-12T11:14:49.936		27.27	-27.58	51461.33	20.71		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2030-12-12T10:36:14.180
Event type          : PtRgt
: Uranus occs: topocentric, not geocentric
: 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      : 3415587761647395456
2Mass ID (if available) : 05182066+2311043
ICRS Star Coord at Epoch: 05h 18m 20.66817s +23:11:04.23681s
RUWE (>1.4 is poor) : 1.08
K magnitude          : 14.716
G magnitude          : 17.487
RP magnitude         : 16.614
BP magnitude         : 18.275
DUPflag             : 0
Distance (au)       : 18.171
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -23.44
Sun-Target sep (deg) : 179.56
Sun-Moon sep (deg)  : 26.57
B (ring opening deg) : 81.71
PA of pole (deg)    : 15.41
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.954
C/A sky separation (km) : 25752.4
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
    
```



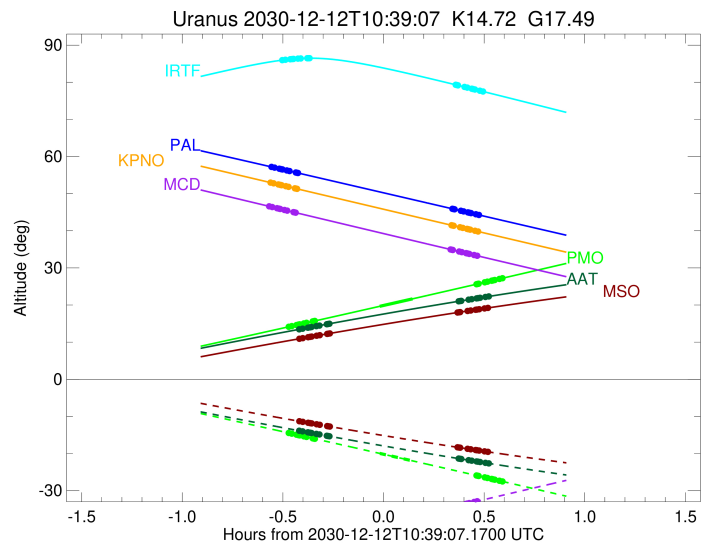
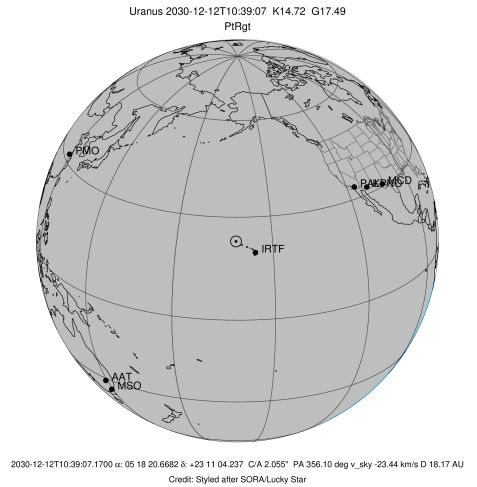
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-12T10:05:45.940		52.91	-52.45	50767.86	-20.44		
lambda	I	2030-12-12T10:06:22.354		52.78	-52.33	50026.71	-20.30		
delta	I	2030-12-12T10:07:47.978		52.48	-52.02	48300.35	-20.02		
gamma	I	2030-12-12T10:08:22.011		52.36	-51.90	47620.99	-19.90		
eta	I	2030-12-12T10:08:44.408		52.28	-51.82	47176.12	-19.82		
beta	I	2030-12-12T10:10:00.360		52.01	-51.56	45681.23	-19.53		
alpha	I	2030-12-12T10:10:50.142		51.83	-51.38	44713.02	-19.33		
4	I	2030-12-12T10:12:43.730		51.43	-50.98	42549.66	-18.81		
5	I	2030-12-12T10:12:59.112		51.37	-50.92	42259.64	-18.75		
6	I	2030-12-12T10:13:19.956		51.30	-50.85	41876.02	-18.62		

No planet occultations

6	E	2030-12-12T10:59:23.299		41.49	-41.07	41845.19	18.58		
5	E	2030-12-12T10:59:47.712		41.41	-40.99	42302.90	18.70		
4	E	2030-12-12T11:00:04.547		41.35	-40.93	42615.30	18.77		
alpha	E	2030-12-12T11:01:56.747		40.95	-40.53	44751.94	19.28		
beta	E	2030-12-12T11:02:43.340		40.78	-40.37	45654.57	19.48		
eta	E	2030-12-12T11:04:00.897		40.51	-40.09	47176.12	19.76		
gamma	E	2030-12-12T11:04:23.758		40.43	-40.01	47628.90	19.84		
delta	E	2030-12-12T11:04:57.493		40.31	-39.89	48300.35	19.96		
lambda	E	2030-12-12T11:06:23.379		40.00	-39.59	50026.71	20.23		
epsilon	E	2030-12-12T11:07:33.585		39.76	-39.34	51454.53	20.37		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2030-12-12T10:35:53.650
Event type           : PtRgt
: Uranus occs: topocentric, not geocentric
: 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       : 3415587761647395456
2Mass ID (if available) : 05182066+2311043
ICRS Star Coord at Epoch: 05h 18m 20.66817s +23:11:04.23681s
RUWE (>1.4 is poor) : 1.08
K magnitude          : 14.716
G magnitude          : 17.487
RP magnitude         : 16.614
BP magnitude         : 18.275
DUPflag             : 0
Distance (au)        : 18.171
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -23.44
Sun-Target sep (deg) : 179.56
Sun-Moon sep (deg)   : 26.48
B (ring opening deg) : 81.71
PA of pole (deg)     : 15.41
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.950
C/A sky separation (km) : 25692.8
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_itrff93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```

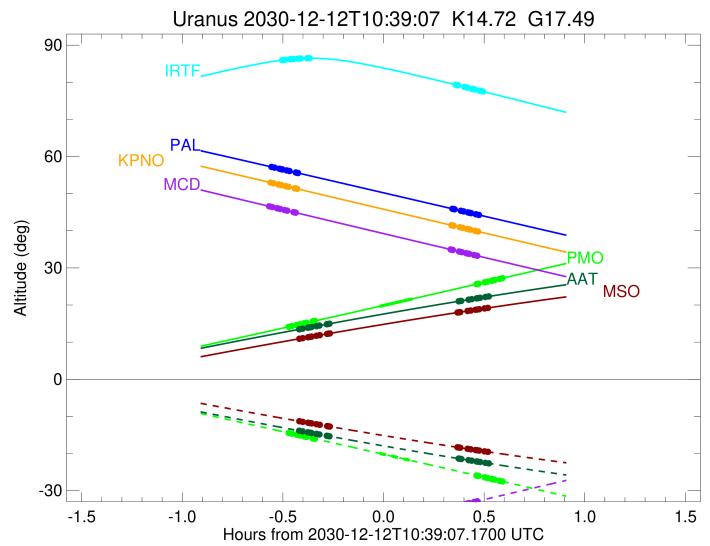
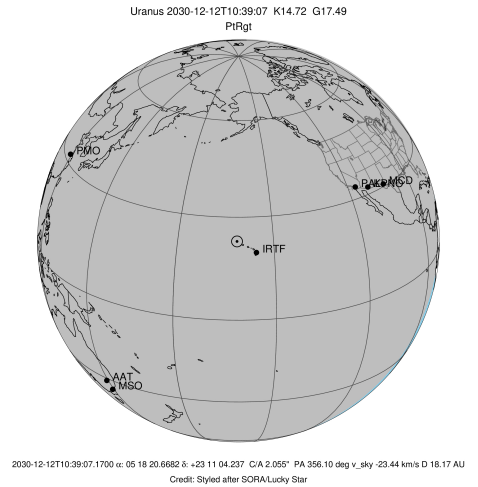


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-12T10:05:21.295		46.52	-46.06	50767.77	-20.43		
lambda	I	2030-12-12T10:05:57.721		46.39	-45.93	50026.71	-20.29		
delta	I	2030-12-12T10:07:23.381		46.08	-45.62	48300.35	-20.01		
gamma	I	2030-12-12T10:07:57.425		45.96	-45.50	47620.98	-19.90		
eta	I	2030-12-12T10:08:19.830		45.88	-45.42	47176.12	-19.82		
beta	I	2030-12-12T10:09:35.803		45.60	-45.15	45681.22	-19.53		
alpha	I	2030-12-12T10:10:25.595		45.42	-44.97	44712.98	-19.33		
4	I	2030-12-12T10:12:19.192		45.02	-44.56	42549.62	-18.81		
5	I	2030-12-12T10:12:34.575		44.96	-44.51	42259.56	-18.75		
6	I	2030-12-12T10:12:55.415		44.89	-44.43	41876.00	-18.62		

No planet occultations

6	E	2030-12-12T10:59:07.002		34.96	-34.54	41845.09	18.57		
5	E	2030-12-12T10:59:31.421		34.88	-34.46	42302.79	18.69		
4	E	2030-12-12T10:59:48.267		34.82	-34.40	42615.33	18.76		
alpha	E	2030-12-12T11:01:40.512		34.42	-34.00	44751.93	19.27		
beta	E	2030-12-12T11:02:27.129		34.25	-33.83	45654.53	19.47		
eta	E	2030-12-12T11:03:44.739		33.98	-33.56	47176.12	19.75		
gamma	E	2030-12-12T11:04:07.617		33.89	-33.48	47628.91	19.83		
delta	E	2030-12-12T11:04:41.376		33.77	-33.36	48300.35	19.95		
lambda	E	2030-12-12T11:06:07.333		33.47	-33.05	50026.71	20.22		
epsilon	E	2030-12-12T11:07:17.630		33.22	-32.81	51455.08	20.36		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-12-12T10:38:43.840  
 Event type : PtRgt  
 : Uranus occs: topocentric, not geocentric  
 : 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 : 3415587761647395456  
 2Mass ID (if available) : 05182066+2311043  
 ICRS Star Coord at Epoch: 05h 18m 20.66817s +23:11:04.23681s  
 RUWE (>1.4 is poor) : 1.08  
 K magnitude : 14.716  
 G magnitude : 17.487  
 RP magnitude : 16.614  
 BP magnitude : 18.275  
 DUPflag : 0  
 Distance (au) : 18.171  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.44  
 Sun-Target sep (deg) : 179.56  
 Sun-Moon sep (deg) : 27.12  
 B (ring opening deg) : 81.71  
 PA of pole (deg) : 15.41  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.092  
 C/A sky separation (km) : 27574.6  
 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

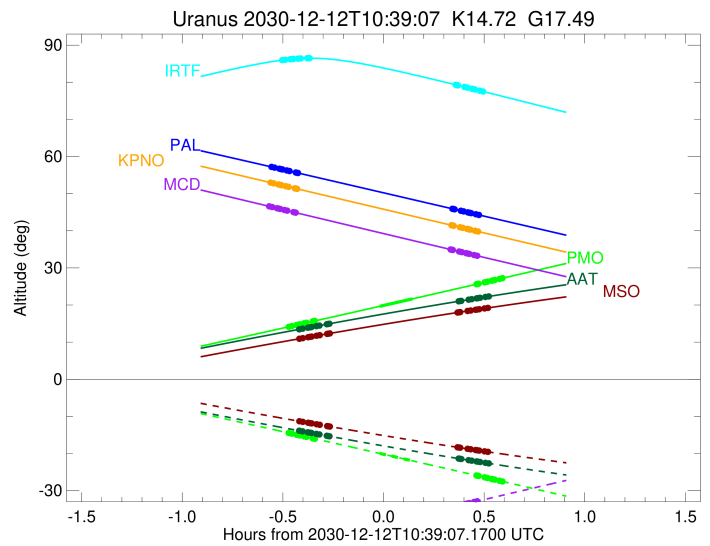
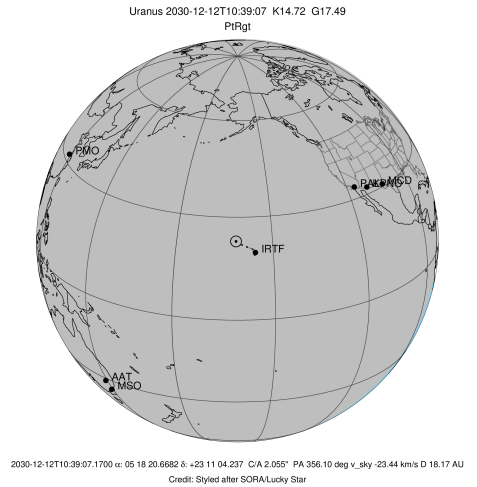


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-12T10:09:15.171		86.00	-86.31	50773.33	-20.02		
lambda	I	2030-12-12T10:09:52.665		86.07	-86.37	50026.71	-19.85		
delta	I	2030-12-12T10:11:20.355		86.21	-86.48	48300.35	-19.52		
gamma	I	2030-12-12T10:11:55.281		86.26	-86.51	47621.01	-19.38		
eta	I	2030-12-12T10:12:18.294		86.29	-86.53	47176.12	-19.28		
beta	I	2030-12-12T10:13:36.489		86.38	-86.59	45681.23	-18.94		
alpha	I	2030-12-12T10:14:27.804		86.42	-86.61	44714.59	-18.70		
4	I	2030-12-12T10:16:25.577		86.48	-86.61	42551.73	-18.08		
5	I	2030-12-12T10:16:41.510		86.48	-86.60	42263.56	-18.00		
6	I	2030-12-12T10:17:03.401		86.49	-86.60	41876.88	-17.85		

No planet occultations

6	E	2030-12-12T11:00:38.438		79.33	-78.98	41847.77	17.84		
5	E	2030-12-12T11:01:03.802		79.24	-78.89	42305.38	17.99		
4	E	2030-12-12T11:01:21.142		79.17	-78.82	42614.58	18.08		
alpha	E	2030-12-12T11:03:17.261		78.75	-78.39	44752.21	18.70		
beta	E	2030-12-12T11:04:05.292		78.57	-78.21	45655.62	18.93		
eta	E	2030-12-12T11:05:24.883		78.27	-77.92	47176.12	19.28		
gamma	E	2030-12-12T11:05:48.296		78.19	-77.83	47628.66	19.38		
delta	E	2030-12-12T11:06:22.837		78.06	-77.70	48300.35	19.52		
lambda	E	2030-12-12T11:07:50.553		77.73	-77.38	50026.71	19.84		
epsilon	E	2030-12-12T11:09:01.427		77.47	-77.11	51441.62	20.01		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-12-12T10:42:07.840  
 Event type : PtRgt  
 : Uranus occs: topocentric, not geocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : AAT  
 Location : Siding Spring (AAT)  
 Latitude (deg) : -31.27703  
 E. Longitude (deg) : 149.06608  
 Altitude (km) : 1.164  
 Gaia source ID : 3415587761647395456  
 2Mass ID (if available) : 05182066+2311043  
 ICRS Star Coord at Epoch: 05h 18m 20.66817s +23:11:04.23681s  
 RUWE (>1.4 is poor) : 1.08  
 K magnitude : 14.716  
 G magnitude : 17.487  
 RP magnitude : 16.614  
 BP magnitude : 18.275  
 DUPflag : 0  
 Distance (au) : 18.171  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.44  
 Sun-Target sep (deg) : 179.56  
 Sun-Moon sep (deg) : 27.41  
 B (ring opening deg) : 81.71  
 PA of pole (deg) : 15.41  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.376  
 C/A sky separation (km) : 31311.7  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl1.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



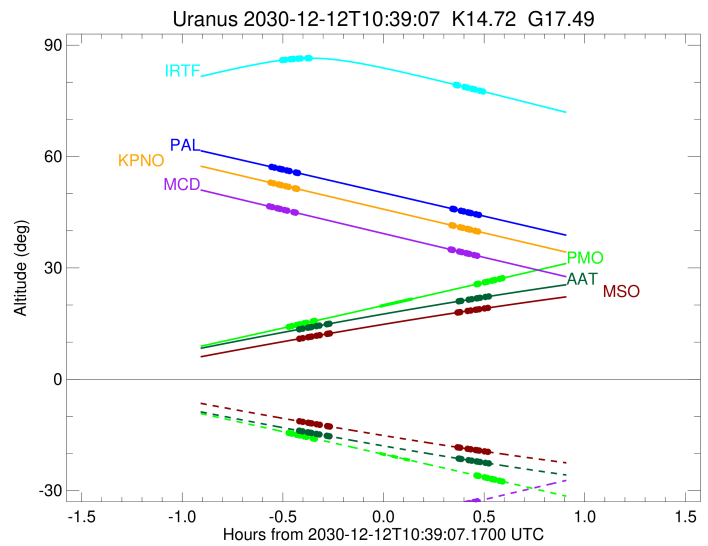
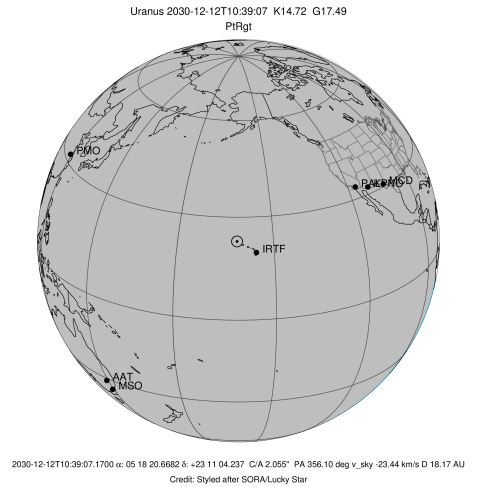
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-12T10:14:19.456		13.51	-13.92	50787.85	-18.58		
lambda	I	2030-12-12T10:15:00.746		13.62	-14.03	50026.71	-18.34		
delta	I	2030-12-12T10:16:36.004		13.89	-14.30	48300.35	-17.89		
gamma	I	2030-12-12T10:17:14.165		14.00	-14.40	47621.11	-17.70		
eta	I	2030-12-12T10:17:39.398		14.07	-14.47	47176.12	-17.57		
beta	I	2030-12-12T10:19:05.643		14.31	-14.71	45681.09	-17.09		
alpha	I	2030-12-12T10:20:02.495		14.47	-14.87	44718.25	-16.75		
4	I	2030-12-12T10:22:15.185		14.83	-15.23	42556.73	-15.87		
5	I	2030-12-12T10:22:33.193		14.88	-15.28	42272.40	-15.74		
6	I	2030-12-12T10:22:58.708		14.95	-15.35	41878.47	-15.53		

No planet occultations

6	E	2030-12-12T11:01:31.771		21.01	-21.36	41853.17	15.56		
5	E	2030-12-12T11:02:00.666		21.08	-21.43	42309.82	15.78		
4	E	2030-12-12T11:02:20.060		21.13	-21.48	42612.50	15.90		
alpha	E	2030-12-12T11:04:30.715		21.45	-21.80	44752.43	16.80		
beta	E	2030-12-12T11:05:24.108		21.58	-21.93	45657.86	17.13		
eta	E	2030-12-12T11:06:51.504		21.79	-22.14	47176.12	17.62		
gamma	E	2030-12-12T11:07:17.062		21.85	-22.20	47628.14	17.75		
delta	E	2030-12-12T11:07:54.720		21.94	-22.29	48300.35	17.95		
lambda	E	2030-12-12T11:09:29.695		22.17	-22.51	50026.71	18.40		
epsilon	E	2030-12-12T11:10:44.380		22.35	-22.69	51413.14	18.64		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2030-12-12T10:42:01.140
Event type            : PtRgt
: Uranus occs: topocentric, not geocentric
: Ring occs: geocentric, topocentric
Observer code         : MSO
Location              : Mt. Stromlo Observatory
Latitude (deg)        : -35.32000
E. Longitude (deg)    : 149.00833
Altitude (km)         : 0.770
Gaia source ID        : 3415587761647395456
2Mass ID (if available) : 05182066+2311043
ICRS Star Coord at Epoch: 05h 18m 20.66817s +23:11:04.23681s
RUWE (>1.4 is poor) : 1.08
K magnitude           : 14.716
G magnitude           : 17.487
RP magnitude          : 16.614
BP magnitude          : 18.275
DUPflag              : 0
Distance (au)         : 18.171
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -23.44
Sun-Target sep (deg) : 179.56
Sun-Moon sep (deg)   : 27.36
B (ring opening deg) : 81.71
PA of pole (deg)     : 15.41
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation ("): 2.398
C/A sky separation (km): 31601.3
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	2030-12-12T10:14:21.905		10.97	-11.36	50789.25	-18.46		
lambda	I	2030-12-12T10:15:03.539		11.08	-11.47	50026.71	-18.22		
delta	I	2030-12-12T10:16:39.468		11.33	-11.72	48300.35	-17.76		
gamma	I	2030-12-12T10:17:17.921		11.43	-11.82	47621.12	-17.56		
eta	I	2030-12-12T10:17:43.354		11.50	-11.89	47176.12	-17.43		
beta	I	2030-12-12T10:19:10.340		11.73	-12.12	45681.06	-16.93		
alpha	I	2030-12-12T10:20:07.709		11.88	-12.27	44718.57	-16.59		
4	I	2030-12-12T10:22:21.835		12.23	-12.62	42557.19	-15.68		
5	I	2030-12-12T10:22:40.049		12.28	-12.66	42273.16	-15.55		
6	I	2030-12-12T10:23:05.925		12.34	-12.73	41878.58	-15.33		

No planet occultations

6	E	2030-12-12T11:01:11.419		17.98	-18.32	41853.58	15.36		
5	E	2030-12-12T11:01:40.674		18.05	-18.39	42310.12	15.58		
4	E	2030-12-12T11:02:00.281		18.09	-18.44	42612.31	15.71		
alpha	E	2030-12-12T11:04:12.381		18.40	-18.74	44752.43	16.63		
beta	E	2030-12-12T11:05:06.296		18.52	-18.86	45658.03	16.97		
eta	E	2030-12-12T11:06:34.445		18.72	-19.06	47176.12	17.47		
gamma	E	2030-12-12T11:07:00.207		18.78	-19.12	47628.10	17.61		
delta	E	2030-12-12T11:07:38.160		18.87	-19.20	48300.35	17.81		
lambda	E	2030-12-12T11:09:13.818		19.08	-19.42	50026.71	18.28		
epsilon	E	2030-12-12T11:10:28.872		19.25	-19.58	51410.96	18.52		