

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2037-12-12T12:04:58.130  
 Event type : PRgt  
 : Uranus occs: not geocentric or topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 865449550960392576  
 2Mass ID (if available) : 07390343+2159025

ICRS Star Coord at Epoch: 07h 39m 03.43748s +21:59:02.41912s

RUWE (>1.4 is poor) : 2.96  
 K magnitude : 14.103  
 G magnitude : 18.055  
 RP magnitude : 16.617  
 BP magnitude : 19.106  
 DUPflag : 0  
 Distance (au) : 17.871  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -18.61  
 Sun-Target sep (deg) : 147.42  
 Sun-Moon sep (deg) : 145.70  
 B (ring opening deg) : 53.94  
 PA of pole (deg) : 85.70

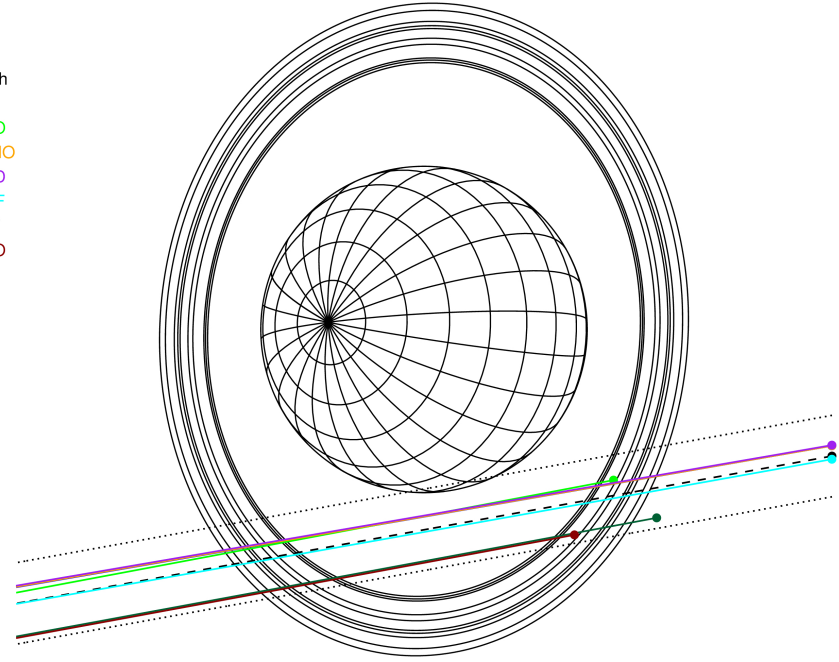
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2037-12-12T12:04:58.1300 α: 07 39 03.4375 δ: +21 59 02.419 C/A 2.371'' PA 10.24 deg v\_sky -18.61 km/s D 17.87 AU  
 Credit: Styled after SORA/Lucky Star

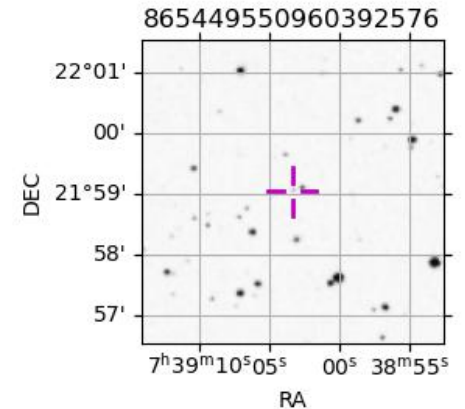
Uranus 2037-12-12T12:04:58 K14.10 G18.05 PRgt

Earth  
 PAL  
 PMO  
 KPNO  
 MCD  
 IRTF  
 AAT  
 MSO



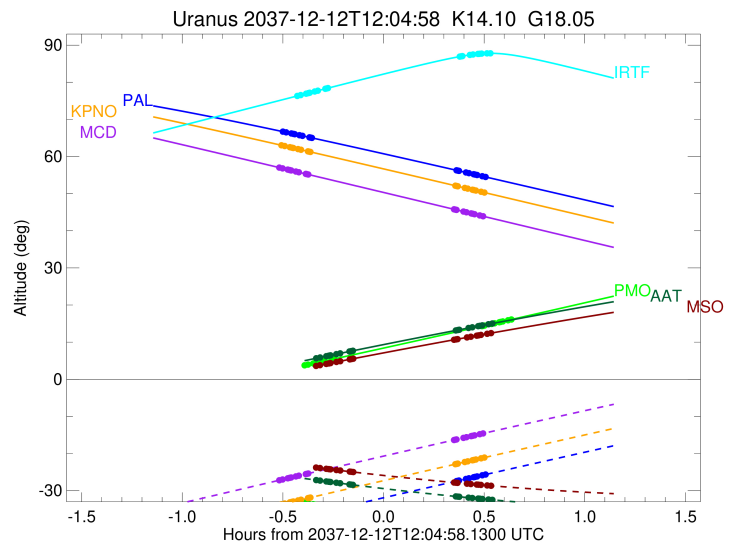
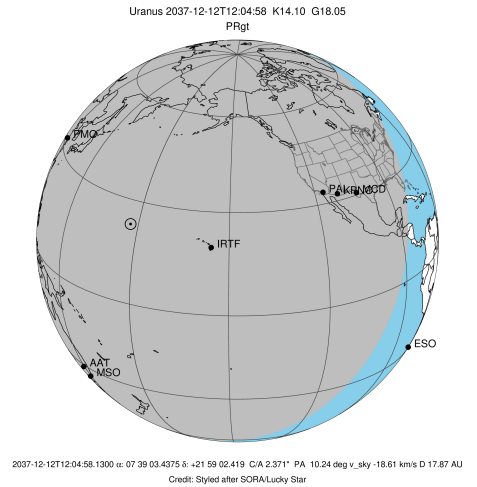
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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 11:34 - DEC 12 12:35	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8		+++	+++++	DEC 12 11:49 - DEC 12 12:42	PnnRie
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	DEC 12 11:34 - DEC 12 12:34	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	DEC 12 11:33 - DEC 12 12:34	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++		+++++	DEC 12 11:39 - DEC 12 12:36	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 11:45 - DEC 12 12:37	PnnRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0		+++	+++++	DEC 12 11:54 - DEC 12 12:36	PnnRie



```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2037-12-12T12:03:02.320
Event type           : PRgt
: Uranus occs: not geocentric or 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       : 865449550960392576
2Mass ID (if available) : 07390343+2159025
ICRS Star Coord at Epoch: 07h 39m 03.43748s +21:59:02.41912s
RUWE (>1.4 is poor) : 2.96
K magnitude           : 14.103
G magnitude           : 18.055
RP magnitude          : 16.617
BP magnitude          : 19.106
DUPflag              : 0
Distance (au)         : 17.871
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -18.61
Sun-Target sep (deg) : 147.42
Sun-Moon sep (deg)   : 145.84
B (ring opening deg) : 53.94
PA of pole (deg)     : 85.70
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.229
C/A sky separation (km) : 28893.3
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
  
```

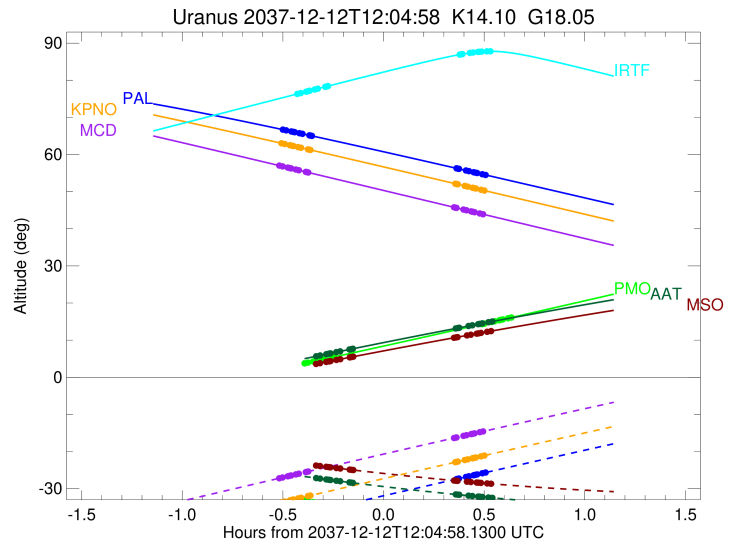
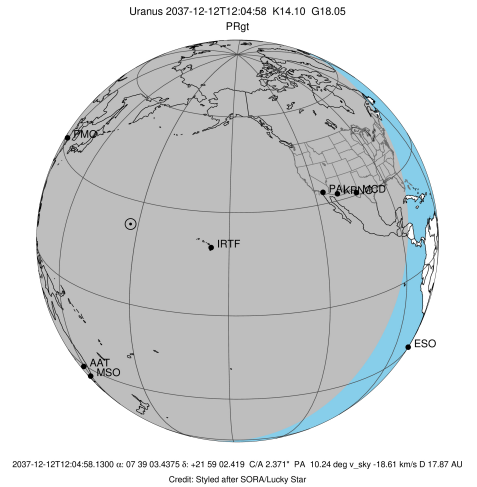


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-12-12T11:34:59.345		66.70	-38.15	51142.28	-18.92		
lambda	I	2037-12-12T11:35:58.297		66.51	-37.95	50026.71	-18.82		
delta	I	2037-12-12T11:37:30.907		66.21	-37.63	48300.35	-18.46		
gamma	I	2037-12-12T11:38:07.292		66.10	-37.50	47631.48	-18.31		
eta	I	2037-12-12T11:38:32.238		66.02	-37.41	47176.12	-18.20		
beta	I	2037-12-12T11:39:57.383		65.74	-37.12	45642.73	-17.81		
alpha	I	2037-12-12T11:40:50.184		65.57	-36.94	44716.18	-17.54		
4	I	2037-12-12T11:42:52.916		65.17	-36.51	42599.88	-16.85		
5	I	2037-12-12T11:43:13.817		65.10	-36.44	42255.92	-16.77		
6	I	2037-12-12T11:43:39.014		65.02	-36.35	41798.55	-16.57		

No planet occultations

6	E	2037-12-12T12:26:44.505		56.29	-27.44	41855.83	16.55		
5	E	2037-12-12T12:27:12.757		56.19	-27.34	42311.36	16.74		
4	E	2037-12-12T12:27:25.708		56.15	-27.30	42534.47	16.82		
alpha	E	2037-12-12T12:29:30.216		55.72	-26.87	44685.41	17.51		
beta	E	2037-12-12T12:30:25.351		55.53	-26.68	45656.60	17.77		
eta	E	2037-12-12T12:31:49.983		55.24	-26.39	47176.12	18.17		
gamma	E	2037-12-12T12:32:14.674		55.15	-26.31	47625.95	18.27		
delta	E	2037-12-12T12:32:51.432		55.03	-26.18	48300.35	18.42		
lambda	E	2037-12-12T12:34:24.231		54.70	-25.87	50026.71	18.78		
epsilon	E	2037-12-12T12:35:03.629		54.57	-25.73	50769.30	18.88		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2037-12-12T12:10:02.830  
 Event type : PRgt  
 : Uranus occs: not geocentric or topocentric  
 : 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 : 865449550960392576  
 2Mass ID (if available) : 07390343+2159025  
 ICRS Star Coord at Epoch: 07h 39m 03.43748s +21:59:02.41912s  
 RUWE (>1.4 is poor) : 2.96  
 K magnitude : 14.103  
 G magnitude : 18.055  
 RP magnitude : 16.617  
 BP magnitude : 19.106  
 DUPflag : 0  
 Distance (au) : 17.871  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -18.61  
 Sun-Target sep (deg) : 147.42  
 Sun-Moon sep (deg) : 146.45  
 B (ring opening deg) : 53.94  
 PA of pole (deg) : 85.70  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.214  
 C/A sky separation (km) : 28692.6  
 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



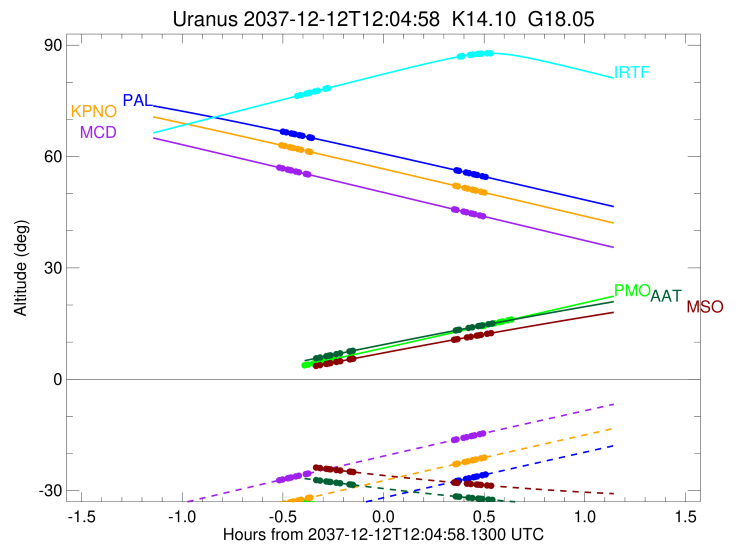
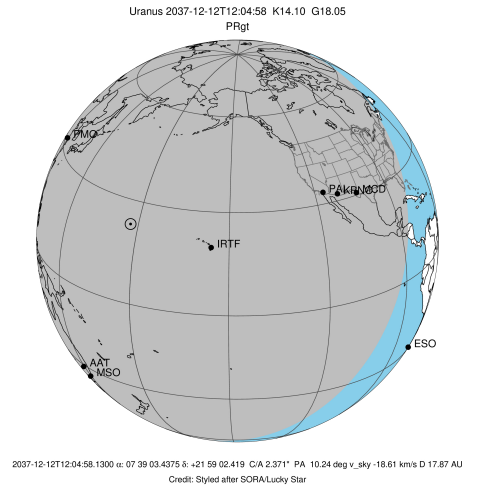
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-12-12T11:41:27.752		3.76x	-33.13	51148.84	-18.57		
lambda	I	2037-12-12T11:42:28.156		3.96x	-33.34	50026.71	-18.48		
delta	I	2037-12-12T11:44:02.455		4.26x	-33.67	48300.35	-18.13		
gamma	I	2037-12-12T11:44:39.490		4.38x	-33.80	47631.46	-17.99		
eta	I	2037-12-12T11:45:04.875		4.47x	-33.89	47176.12	-17.89		
beta	I	2037-12-12T11:46:31.485		4.75x	-34.20	45642.87	-17.51		
alpha	I	2037-12-12T11:47:25.150		4.92x	-34.38	44716.76	-17.25		
4	I	2037-12-12T11:49:29.824		5.33	-34.82	42600.49	-16.59		
5	I	2037-12-12T11:49:51.160		5.40	-34.90	42254.56	-16.51		
6	I	2037-12-12T11:50:16.676		5.49	-34.98	41798.25	-16.33		

No planet occultations

6	E	2037-12-12T12:34:21.141		14.31	-44.30	41855.57	16.40		
5	E	2037-12-12T12:34:49.672		14.41	-44.40	42311.52	16.59		
4	E	2037-12-12T12:35:02.741		14.45	-44.45	42534.65	16.67		
alpha	E	2037-12-12T12:37:08.404		14.88	-44.89	44685.35	17.34		
beta	E	2037-12-12T12:38:04.062		15.07	-45.09	45656.45	17.60		
eta	E	2037-12-12T12:39:29.533		15.36	-45.39	47176.12	17.99		
gamma	E	2037-12-12T12:39:54.472		15.45	-45.48	47626.00	18.09		
delta	E	2037-12-12T12:40:31.594		15.57	-45.61	48300.35	18.24		
lambda	E	2037-12-12T12:42:05.328		15.89	-45.94	50026.71	18.59		
epsilon	E	2037-12-12T12:42:45.063		16.03	-46.08	50768.15	18.69		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2037-12-12T12:02:38.680
Event type            : PRgt
: Uranus occs: not geocentric or 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        : 865449550960392576
2Mass ID (if available) : 07390343+2159025
ICRS Star Coord at Epoch: 07h 39m 03.43748s +21:59:02.41912s
RUWE (>1.4 is poor) : 2.96
K magnitude           : 14.103
G magnitude           : 18.055
RP magnitude          : 16.617
BP magnitude          : 19.106
DUPflag              : 0
Distance (au)         : 17.871
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -18.61
Sun-Target sep (deg)  : 147.42
Sun-Moon sep (deg)   : 145.77
B (ring opening deg) : 53.94
PA of pole (deg)     : 85.70
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.227
C/A sky separation (km) : 28859.7
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
  
```

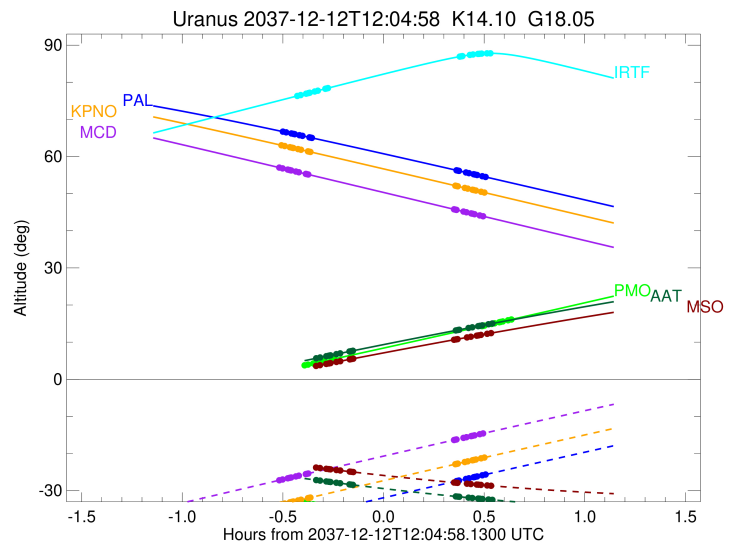
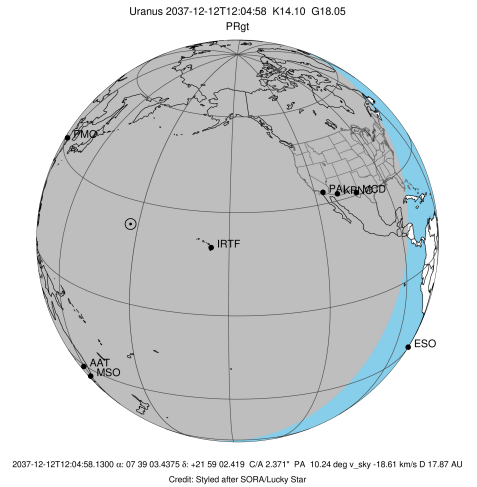


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-12-12T11:34:33.114		63.03	-33.68	51142.44	-18.92		
lambda	I	2037-12-12T11:35:32.073		62.83	-33.47	50026.71	-18.82		
delta	I	2037-12-12T11:37:04.676		62.51	-33.15	48300.35	-18.46		
gamma	I	2037-12-12T11:37:41.056		62.38	-33.02	47631.48	-18.31		
eta	I	2037-12-12T11:38:05.999		62.30	-32.93	47176.12	-18.20		
beta	I	2037-12-12T11:39:31.126		62.00	-32.63	45642.74	-17.81		
alpha	I	2037-12-12T11:40:23.912		61.82	-32.45	44716.20	-17.54		
4	I	2037-12-12T11:42:26.599		61.40	-32.02	42599.90	-16.86		
5	I	2037-12-12T11:42:47.495		61.32	-31.95	42255.86	-16.77		
6	I	2037-12-12T11:43:12.677		61.24	-31.86	41798.54	-16.58		

No planet occultations

6	E	2037-12-12T12:26:23.195		52.14	-22.88	41855.88	16.55		
5	E	2037-12-12T12:26:51.436		52.04	-22.78	42311.32	16.74		
4	E	2037-12-12T12:27:04.384		52.00	-22.73	42534.43	16.83		
alpha	E	2037-12-12T12:29:08.892		51.56	-22.31	44685.42	17.51		
beta	E	2037-12-12T12:30:04.035		51.36	-22.12	45656.63	17.77		
eta	E	2037-12-12T12:31:28.681		51.06	-21.83	47176.12	18.16		
gamma	E	2037-12-12T12:31:53.379		50.97	-21.74	47625.95	18.27		
delta	E	2037-12-12T12:32:30.148		50.84	-21.62	48300.35	18.42		
lambda	E	2037-12-12T12:34:02.978		50.51	-21.30	50026.71	18.77		
epsilon	E	2037-12-12T12:34:42.401		50.37	-21.16	50769.47	18.87		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2037-12-12T12:02:08.250  
 Event type : PRgt  
 : Uranus occs: not geocentric or 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 : 865449550960392576  
 2Mass ID (if available) : 07390343+2159025  
 ICRS Star Coord at Epoch: 07h 39m 03.43748s +21:59:02.41912s  
 RUWE (>1.4 is poor) : 2.96  
 K magnitude : 14.103  
 G magnitude : 18.055  
 RP magnitude : 16.617  
 BP magnitude : 19.106  
 DUPflag : 0  
 Distance (au) : 17.871  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -18.61  
 Sun-Target sep (deg) : 147.42  
 Sun-Moon sep (deg) : 145.67  
 B (ring opening deg) : 53.94  
 PA of pole (deg) : 85.70  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.216  
 C/A sky separation (km) : 28720.7  
 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



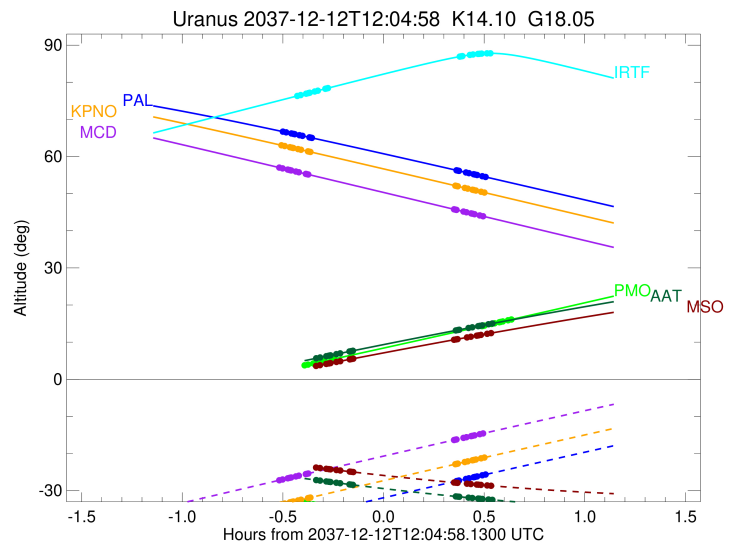
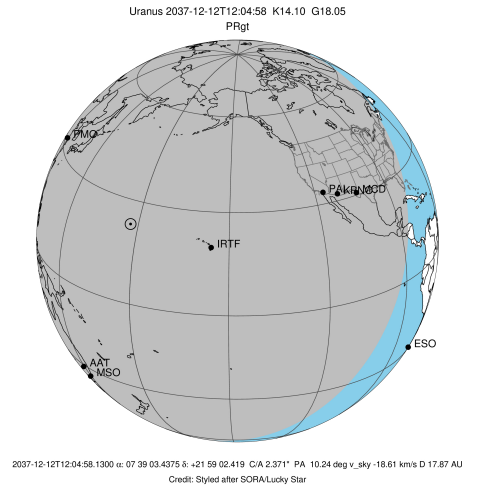
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-12-12T11:33:55.112		57.02	-27.20	51143.61	-18.94		
lambda	I	2037-12-12T11:34:54.064		56.81	-26.99	50026.71	-18.84		
delta	I	2037-12-12T11:36:26.541		56.47	-26.67	48300.35	-18.49		
gamma	I	2037-12-12T11:37:02.865		56.34	-26.54	47631.48	-18.34		
eta	I	2037-12-12T11:37:27.766		56.26	-26.46	47176.12	-18.23		
beta	I	2037-12-12T11:38:52.734		55.95	-26.16	45642.77	-17.85		
alpha	I	2037-12-12T11:39:45.403		55.76	-25.97	44716.33	-17.58		
4	I	2037-12-12T11:41:47.766		55.32	-25.55	42600.04	-16.91		
5	I	2037-12-12T11:42:08.626		55.25	-25.47	42255.54	-16.83		
6	I	2037-12-12T11:42:33.715		55.16	-25.38	41798.46	-16.64		

No planet occultations

6	E	2037-12-12T12:26:00.189		45.79	-16.36	41856.08	16.60		
5	E	2037-12-12T12:26:28.334		45.68	-16.27	42311.20	16.79		
4	E	2037-12-12T12:26:41.248		45.64	-16.22	42534.30	16.87		
alpha	E	2037-12-12T12:28:45.495		45.19	-15.80	44685.45	17.54		
beta	E	2037-12-12T12:29:40.552		44.99	-15.61	45656.71	17.80		
eta	E	2037-12-12T12:31:05.080		44.69	-15.32	47176.12	18.18		
gamma	E	2037-12-12T12:31:29.749		44.60	-15.24	47625.92	18.29		
delta	E	2037-12-12T12:32:06.482		44.47	-15.11	48300.35	18.43		
lambda	E	2037-12-12T12:33:39.239		44.13	-14.80	50026.71	18.78		
epsilon	E	2037-12-12T12:34:18.668		43.99	-14.66	50770.02	18.88		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2037-12-12T12:05:44.120
Event type            : PRgt
: Uranus occs: not geocentric or topocentric
: 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        : 865449550960392576
2Mass ID (if available) : 07390343+2159025
ICRS Star Coord at Epoch: 07h 39m 03.43748s +21:59:02.41912s
RUWE (>1.4 is poor)  : 2.96
K magnitude           : 14.103
G magnitude           : 18.055
RP magnitude          : 16.617
BP magnitude          : 19.106
DUPflag               : 0
Distance (au)         : 17.871
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -18.61
Sun-Target sep (deg)  : 147.42
Sun-Moon sep (deg)    : 146.30
B (ring opening deg)  : 53.94
PA of pole (deg)      : 85.70
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.410
C/A sky separation (km) : 31236.1
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
    
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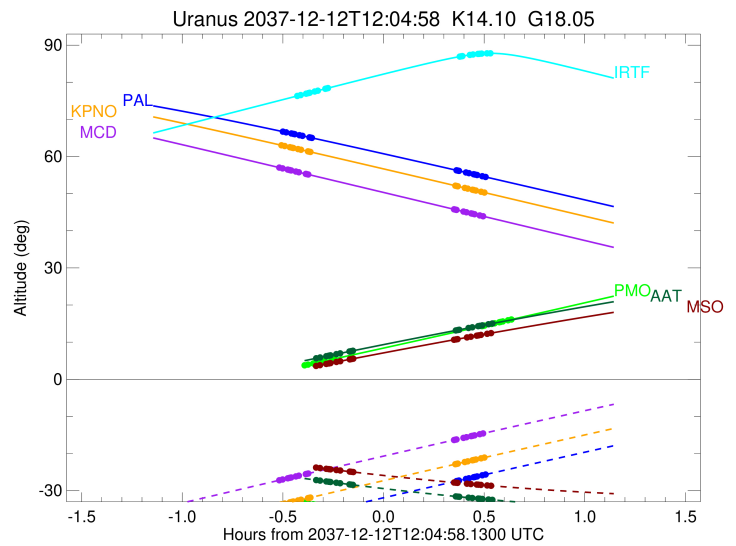
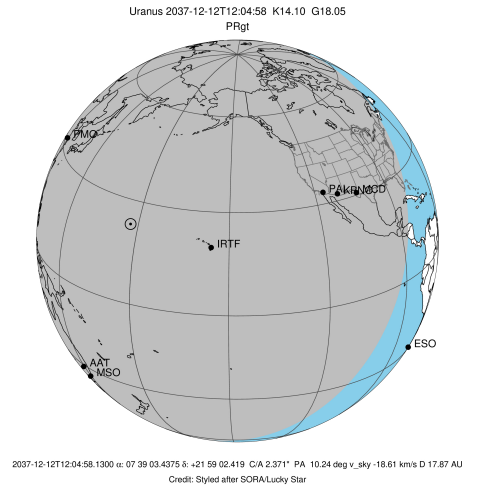


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-12-12T11:39:18.114		76.33	-70.26	51120.07	-18.18		
lambda	I	2037-12-12T11:40:18.284		76.56	-70.03	50026.71	-18.04		
delta	I	2037-12-12T11:41:55.118		76.93	-69.66	48300.35	-17.60		
gamma	I	2037-12-12T11:42:33.311		77.08	-69.51	47631.53	-17.42		
eta	I	2037-12-12T11:42:59.557		77.18	-69.41	47176.12	-17.28		
beta	I	2037-12-12T11:44:29.524		77.53	-69.07	45642.24	-16.80		
alpha	I	2037-12-12T11:45:25.720		77.74	-68.86	44713.84	-16.46		
4	I	2037-12-12T11:47:37.458		78.25	-68.35	42597.10	-15.59		
5	I	2037-12-12T11:47:59.522		78.33	-68.27	42261.87	-15.49		
6	I	2037-12-12T11:48:27.179		78.44	-68.16	41800.07	-15.24		

No planet occultations

6	E	2037-12-12T12:27:41.783		86.93	-59.15	41852.47	15.26		
5	E	2037-12-12T12:28:12.692		87.01	-59.03	42313.16	15.50		
4	E	2037-12-12T12:28:26.723		87.05	-58.98	42536.80	15.61		
alpha	E	2037-12-12T12:30:39.860		87.37	-58.47	44684.95	16.48		
beta	E	2037-12-12T12:31:38.202		87.49	-58.25	45655.18	16.81		
eta	E	2037-12-12T12:33:07.423		87.64	-57.90	47176.12	17.30		
gamma	E	2037-12-12T12:33:33.342		87.67	-57.81	47626.31	17.44		
delta	E	2037-12-12T12:34:11.792		87.72	-57.66	48300.35	17.62		
lambda	E	2037-12-12T12:35:48.514		87.79	-57.29	50026.71	18.07		
epsilon	E	2037-12-12T12:36:28.982		87.81	-57.13	50761.30	18.20		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2037-12-12T12:08:25.470  
 Event type : PRgt  
 : Uranus occs: not geocentric or topocentric  
 : 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 : 865449550960392576  
 2Mass ID (if available) : 07390343+2159025  
 ICRS Star Coord at Epoch: 07h 39m 03.43748s +21:59:02.41912s  
 RUWE (>1.4 is poor) : 2.96  
 K magnitude : 14.103  
 G magnitude : 18.055  
 RP magnitude : 16.617  
 BP magnitude : 19.106  
 DUPflag : 0  
 Distance (au) : 17.871  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -18.61  
 Sun-Target sep (deg) : 147.42  
 Sun-Moon sep (deg) : 146.32  
 B (ring opening deg) : 53.94  
 PA of pole (deg) : 85.70  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.752  
 C/A sky separation (km) : 35672.9  
 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

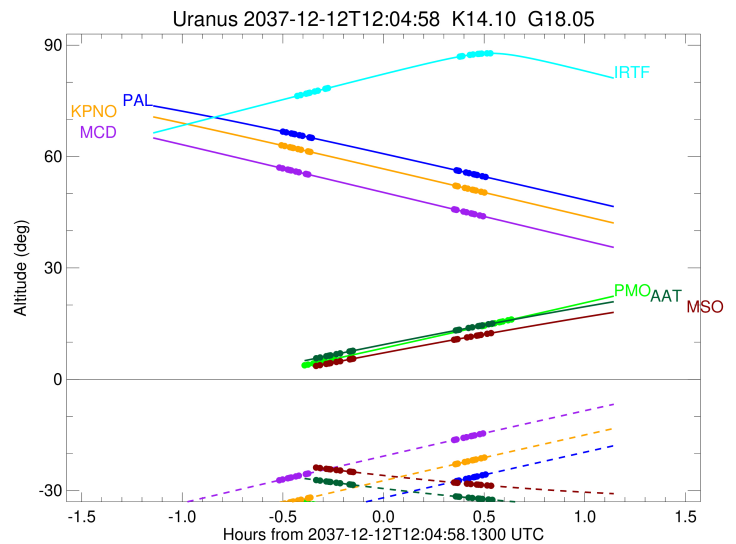
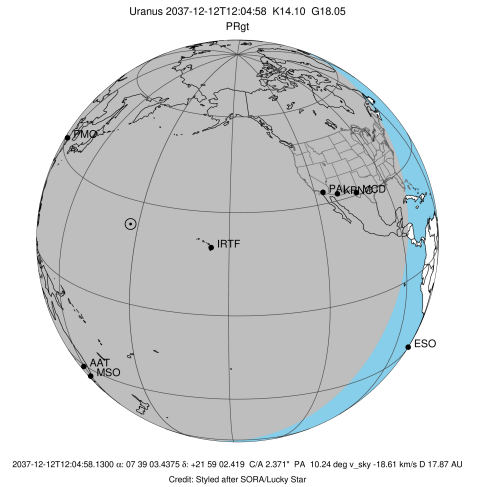


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-12-12T11:44:59.761		5.67	-27.17	51074.90	-16.11		
lambda	I	2037-12-12T11:46:05.022		5.87	-27.30	50026.71	-15.89		
delta	I	2037-12-12T11:47:55.876		6.22	-27.52	48300.35	-15.25		
gamma	I	2037-12-12T11:48:40.129		6.35	-27.61	47631.58	-14.97		
eta	I	2037-12-12T11:49:10.745		6.45	-27.67	47176.12	-14.78		
beta	I	2037-12-12T11:50:57.136		6.78	-27.88	45641.47	-14.05		
alpha	I	2037-12-12T11:52:05.117		6.99	-28.01	44708.91	-13.53		
4	I	2037-12-12T11:54:49.638		7.49	-28.33	42590.44	-12.16		
5	I	2037-12-12T11:55:16.453		7.57	-28.38	42274.50	-11.98		
6	I	2037-12-12T11:55:53.514		7.68	-28.45	41804.33	-11.59		

No planet occultations

6	E	2037-12-12T12:26:30.507		13.15	-31.56	41844.62	11.62		
5	E	2037-12-12T12:27:11.316		13.27	-31.62	42315.18	12.01		
4	E	2037-12-12T12:27:29.787		13.32	-31.65	42542.73	12.20		
alpha	E	2037-12-12T12:30:15.238		13.80	-31.89	44684.62	13.58		
beta	E	2037-12-12T12:31:25.157		14.00	-31.99	45652.30	14.10		
eta	E	2037-12-12T12:33:10.504		14.30	-32.14	47176.12	14.84		
gamma	E	2037-12-12T12:33:40.696		14.39	-32.18	47627.06	15.04		
delta	E	2037-12-12T12:34:25.066		14.51	-32.24	48300.35	15.31		
lambda	E	2037-12-12T12:36:15.432		14.83	-32.39	50026.71	15.96		
epsilon	E	2037-12-12T12:37:00.373		14.95	-32.45	50749.48	16.18		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2037-12-12T12:08:11.560  
 Event type : PRgt  
 : Uranus occs: not geocentric or topocentric  
 : 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 : 865449550960392576  
 2Mass ID (if available) : 07390343+2159025  
 ICRS Star Coord at Epoch: 07h 39m 03.43748s +21:59:02.41912s  
 RUWE (>1.4 is poor) : 2.96  
 K magnitude : 14.103  
 G magnitude : 18.055  
 RP magnitude : 16.617  
 BP magnitude : 19.106  
 DUPflag : 0  
 Distance (au) : 17.871  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -18.61  
 Sun-Target sep (deg) : 147.42  
 Sun-Moon sep (deg) : 146.27  
 B (ring opening deg) : 53.94  
 PA of pole (deg) : 85.70  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.772  
 C/A sky separation (km) : 35930.8  
 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	2037-12-12T11:44:57.887		3.61x	-23.80	51071.92	-15.98		
lambda	I	2037-12-12T11:46:03.487		3.80x	-23.92	50026.71	-15.76		
delta	I	2037-12-12T11:47:55.337		4.13x	-24.12	48300.35	-15.10		
gamma	I	2037-12-12T11:48:40.032		4.26x	-24.21	47631.58	-14.82		
eta	I	2037-12-12T11:49:10.972		4.36x	-24.26	47176.12	-14.62		
beta	I	2037-12-12T11:50:58.610		4.67x	-24.46	45641.43	-13.87		
alpha	I	2037-12-12T11:52:07.523		4.87x	-24.58	44708.58	-13.34		
4	I	2037-12-12T11:54:54.809		5.36	-24.88	42589.95	-11.93		
5	I	2037-12-12T11:55:22.044		5.44	-24.93	42275.34	-11.74		
6	I	2037-12-12T11:55:59.969		5.55	-25.00	41804.67	-11.34		

No planet occultations

6	E	2037-12-12T12:25:58.637		10.64	-27.82	41844.10	11.37		
5	E	2037-12-12T12:26:40.343		10.75	-27.88	42315.21	11.77		
4	E	2037-12-12T12:26:59.227		10.80	-27.90	42543.13	11.96		
alpha	E	2037-12-12T12:29:47.459		11.26	-28.13	44684.63	13.39		
beta	E	2037-12-12T12:30:58.317		11.45	-28.22	45652.13	13.92		
eta	E	2037-12-12T12:32:44.927		11.74	-28.36	47176.12	14.68		
gamma	E	2037-12-12T12:33:15.447		11.82	-28.40	47627.11	14.88		
delta	E	2037-12-12T12:34:00.266		11.94	-28.46	48300.35	15.16		
lambda	E	2037-12-12T12:35:51.647		12.24	-28.60	50026.71	15.82		
epsilon	E	2037-12-12T12:36:36.932		12.37	-28.65	50748.99	16.05		