

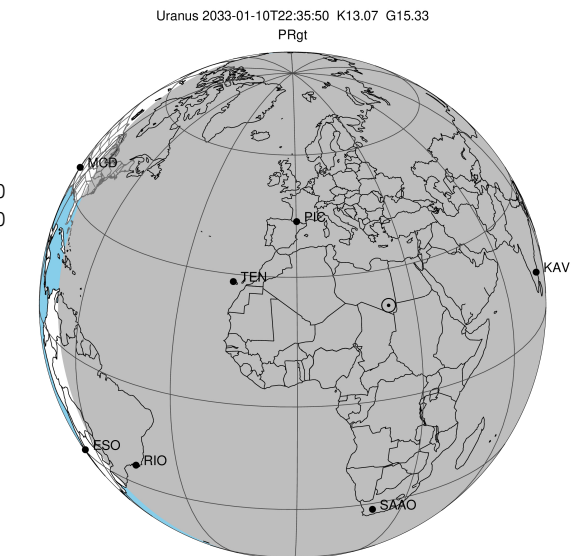
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-10T22:35:50.060
 Event type : PRgt
 : Uranus occs: not geocentric or topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3427497912117708160
 2Mass ID (if available) : 05523153+2338347

ICRS Star Coord at Epoch: 05h 52m 31.54213s +23:38:34.55167s

RUWE (>1.4 is poor) : 5.14
 K magnitude : 13.072
 G magnitude : 15.333
 RP magnitude : 14.573
 BP magnitude : 15.832
 DUPflag : 0
 Distance (au) : 18.102
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.20
 Sun-Target sep (deg) : 157.74
 Sun-Moon sep (deg) : 32.67
 B (ring opening deg) : 76.75
 PA of pole (deg) : 52.23

a(km) ring

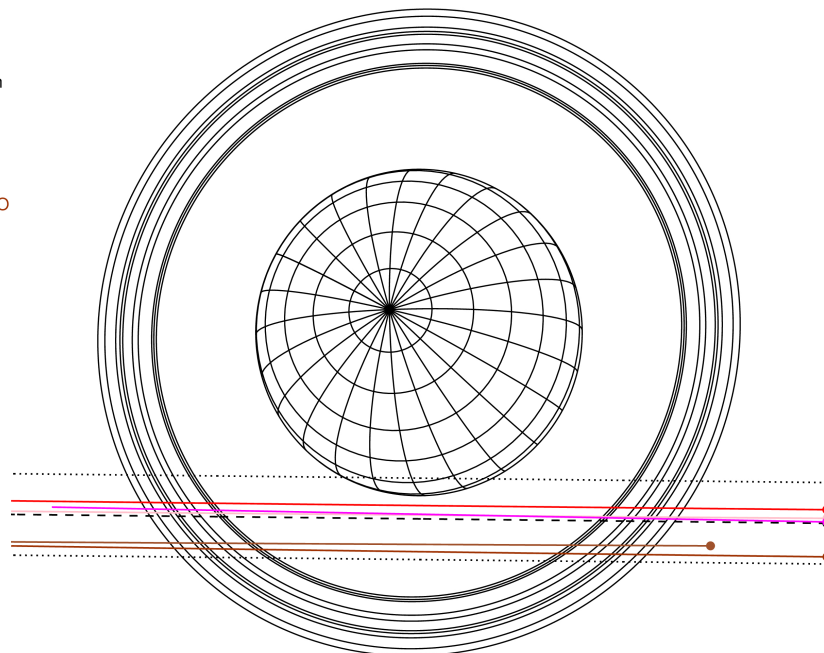
- 1 41837.2 6
- 2 42235.0 5
- 3 42571.2 4
- 4 44718.5 alpha
- 5 45661.1 beta
- 6 47176.1 eta
- 7 47626.3 gamma
- 8 48300.3 delta
- 9 50026.7 lambda
- 10 51149.4 epsilon



2033-01-10T22:35:50.0600 ra: 05 52 31.54213 s: +23 38 34.552 C/A 2.216" PA 359.38 deg v_sky -21.20 km/s D 18.10 AU
 Credit: Styled after SORA/Lucky Star

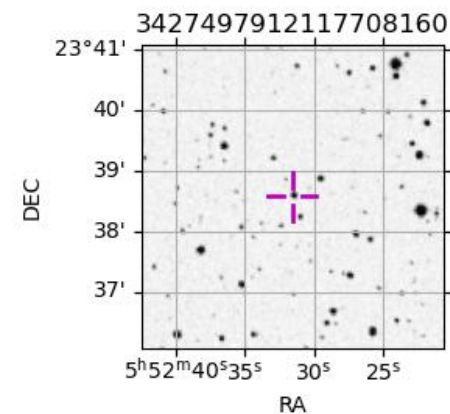
Uranus 2033-01-10T22:35:50 K13.07 G15.33 PRgt

Earth
 PIC
 TEN
 KAV
 RIO
 SAAO



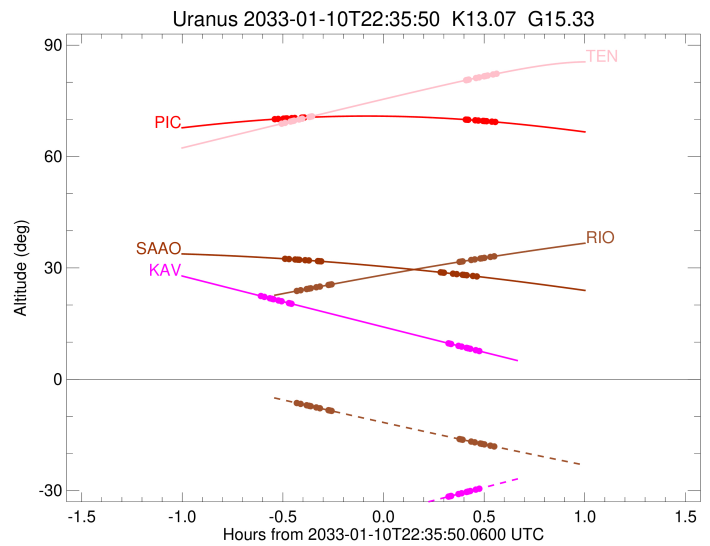
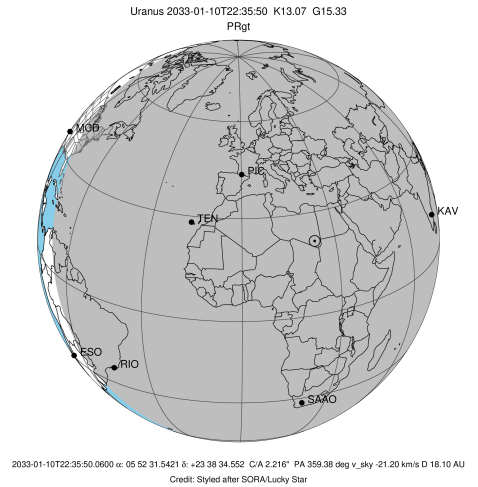
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	JAN 10 22:03 - JAN 10 23:09	PnnRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4					PnnRnn
MCD	McDonald Obs. 2.7m	30.7	256.0					PnnRnn
TEN	Teide Obs./Tenerife	28.3	343.5	+++++		+++++	JAN 10 22:05 - JAN 10 23:09	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++		+++++	JAN 10 21:59 - JAN 10 23:04	PnnRie
RIO	Rio de Janeiro	-22.9	316.8	+++++		+++++	JAN 10 22:10 - JAN 10 23:08	PnnRie
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	+++++		+++++	JAN 10 22:06 - JAN 10 23:03	PnnRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-01-10T22:35:44.700
Event type          : PRgt
: Uranus occs: not geocentric or topocentric
: 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      : 3427497912117708160
2Mass ID (if available) : 05523153+2338347
ICRS Star Coord at Epoch: 05h 52m 31.54213s +23:38:34.55167s
RUWE (>1.4 is poor) : 5.14
K magnitude          : 13.072
G magnitude          : 15.333
RP magnitude         : 14.573
BP magnitude         : 15.832
DUPflag             : 0
Distance (au)       : 18.102
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -21.20
Sun-Target sep (deg) : 157.74
Sun-Moon sep (deg)  : 33.20
B (ring opening deg) : 76.75
PA of pole (deg)    : 52.23
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.064
C/A sky separation (km) : 27100.5
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.bsp
urall1.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall1.bsp
ural61.bsp
vgr2.ural61.bsp
peph.ural60.bsp
earthstns_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```



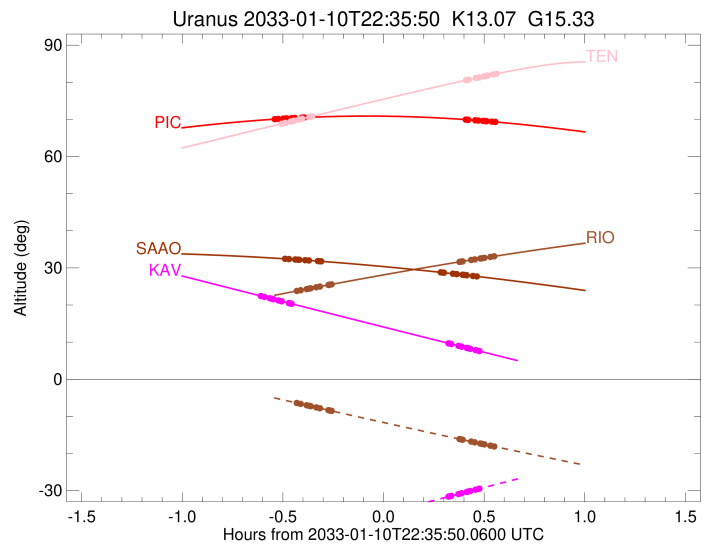
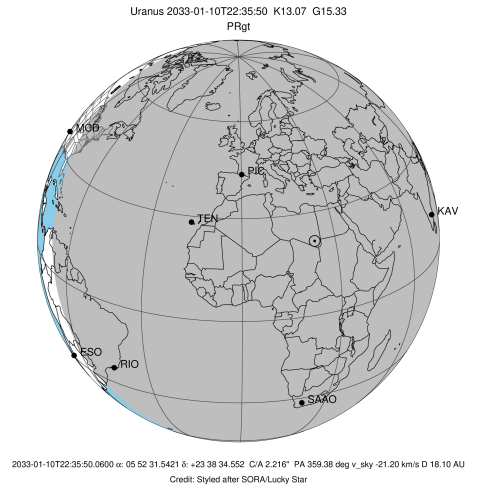
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-01-10T22:03:46.031		70.09	-56.86	50770.83	-18.41		
lambda	I	2033-01-10T22:04:26.491		70.13	-56.97	50026.71	-18.33		
delta	I	2033-01-10T22:06:01.385		70.22	-57.22	48300.35	-18.05		
gamma	I	2033-01-10T22:06:38.811		70.25	-57.32	47627.23	-17.92		
eta	I	2033-01-10T22:07:04.038		70.27	-57.39	47176.12	-17.84		
beta	I	2033-01-10T22:08:29.950		70.34	-57.61	45655.99	-17.52		
alpha	I	2033-01-10T22:09:25.063		70.39	-57.76	44699.20	-17.31		
4	I	2033-01-10T22:11:28.271		70.48	-58.08	42594.10	-16.76		
5	I	2033-01-10T22:11:54.828		70.50	-58.15	42158.68	-16.65		
6	I	2033-01-10T22:12:13.381		70.51	-58.20	41843.64	-16.58		

No planet occultations

6	E	2033-01-10T23:00:23.192		69.95	-64.83	41877.85	16.58		
5	E	2033-01-10T23:00:43.989		69.92	-64.87	42222.81	16.65		
4	E	2033-01-10T23:01:02.473		69.90	-64.91	42528.73	16.76		
alpha	E	2033-01-10T23:03:09.617		69.76	-65.15	44696.40	17.30		
beta	E	2033-01-10T23:04:04.021		69.70	-65.25	45643.97	17.52		
eta	E	2033-01-10T23:05:30.696		69.60	-65.41	47176.12	17.83		
gamma	E	2033-01-10T23:05:55.588		69.57	-65.45	47621.03	17.92		
delta	E	2033-01-10T23:06:33.375		69.52	-65.52	48300.35	18.04		
lambda	E	2033-01-10T23:08:08.308		69.40	-65.69	50026.71	18.33		
epsilon	E	2033-01-10T23:09:10.585		69.32	-65.80	51173.44	18.41		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2033-01-10T22:36:56.230
Event type            : PRgt
: Uranus occs: not geocentric or topocentric
: 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        : 3427497912117708160
2Mass ID (if available) : 05523153+2338347
ICRS Star Coord at Epoch: 05h 52m 31.54213s +23:38:34.55167s
RUWE (>1.4 is poor)  : 5.14
K magnitude           : 13.072
G magnitude           : 15.333
RP magnitude          : 14.573
BP magnitude          : 15.832
DUPflag              : 0
Distance (au)         : 18.102
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -21.20
Sun-Target sep (deg)  : 157.74
Sun-Moon sep (deg)    : 32.99
B (ring opening deg)  : 76.75
PA of pole (deg)      : 52.23
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.178
C/A sky separation (km) : 28597.3
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_itrfr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```



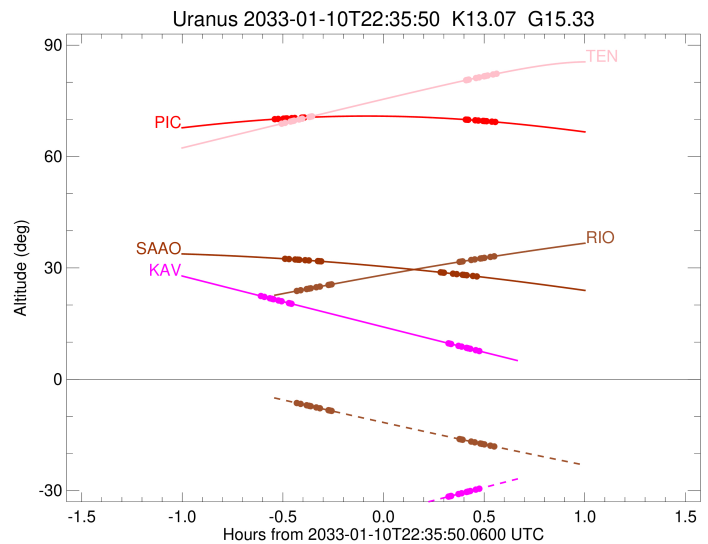
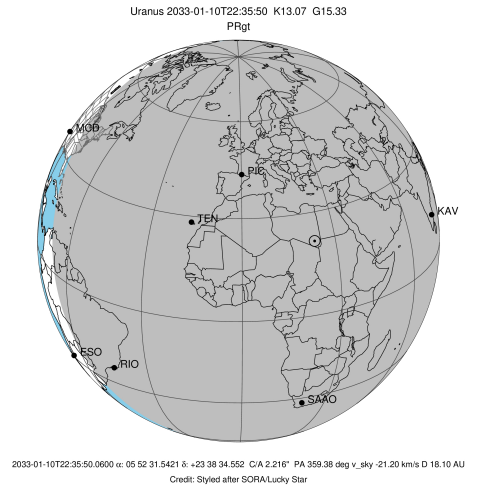
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-01-10T22:05:49.435		68.92	-47.19	50766.15	-18.01		
lambda	I	2033-01-10T22:06:30.563		69.07	-47.35	50026.71	-17.91		
delta	I	2033-01-10T22:08:07.811		69.43	-47.70	48300.35	-17.58		
gamma	I	2033-01-10T22:08:46.252		69.57	-47.84	47627.03	-17.44		
eta	I	2033-01-10T22:09:12.172		69.67	-47.94	47176.12	-17.35		
beta	I	2033-01-10T22:10:40.699		69.99	-48.26	45655.22	-16.99		
alpha	I	2033-01-10T22:11:37.646		70.20	-48.47	44698.06	-16.74		
4	I	2033-01-10T22:13:45.493		70.66	-48.94	42592.31	-16.11		
5	I	2033-01-10T22:14:13.067		70.76	-49.04	42157.63	-15.98		
6	I	2033-01-10T22:14:32.216		70.83	-49.11	41845.60	-15.89		

No planet occultations

6	E	2033-01-10T23:00:30.285		80.57	-59.24	41878.43	15.91		
5	E	2033-01-10T23:00:51.655		80.64	-59.31	42218.85	15.99		
4	E	2033-01-10T23:01:11.138		80.71	-59.39	42529.56	16.12		
alpha	E	2033-01-10T23:03:22.771		81.14	-59.87	44695.25	16.75		
beta	E	2033-01-10T23:04:18.934		81.32	-60.07	45643.53	17.00		
eta	E	2033-01-10T23:05:48.117		81.61	-60.40	47176.12	17.36		
gamma	E	2033-01-10T23:06:13.667		81.69	-60.49	47621.00	17.46		
delta	E	2033-01-10T23:06:52.418		81.81	-60.64	48300.35	17.60		
lambda	E	2033-01-10T23:08:29.571		82.11	-60.99	50026.71	17.93		
epsilon	E	2033-01-10T23:09:32.323		82.30	-61.22	51158.17	18.03		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch              : 2033-01-10T22:31:12.900
Event type             : PRgt
: Uranus occs: not geocentric or topocentric
: Ring occs: geocentric, topocentric
Observer code         : KAV
Location              : Kavalur Observatory
Latitude (deg)        : 12.57556
E. Longitude (deg)    : 78.83167
Altitude (km)         : 0.722
Gaia source ID        : 3427497912117708160
2Mass ID (if available) : 05523153+2338347
ICRS Star Coord at Epoch: 05h 52m 31.54213s +23:38:34.55167s
RUWE (>1.4 is poor)  : 5.14
K magnitude            : 13.072
G magnitude           : 15.333
RP magnitude          : 14.573
BP magnitude          : 15.832
DUPflag              : 0
Distance (au)         : 18.102
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -21.20
Sun-Target sep (deg)  : 157.74
Sun-Moon sep (deg)   : 33.57
B (ring opening deg) : 76.75
PA of pole (deg)     : 52.23
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.167
C/A sky separation (km) : 28453.3
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_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```



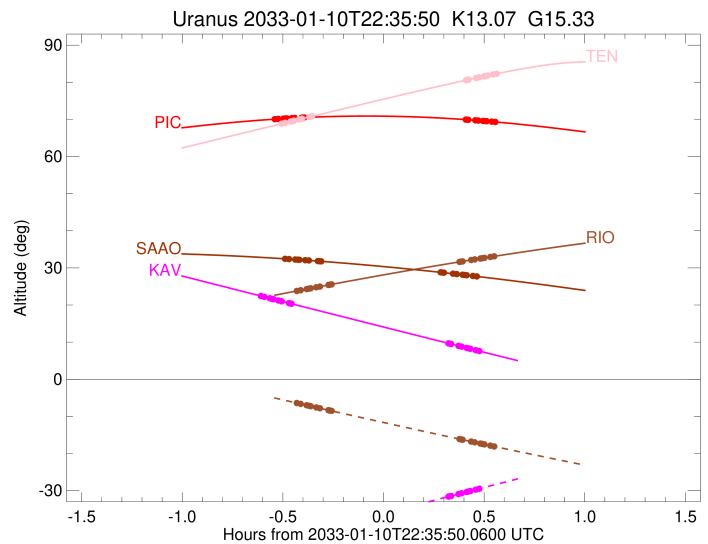
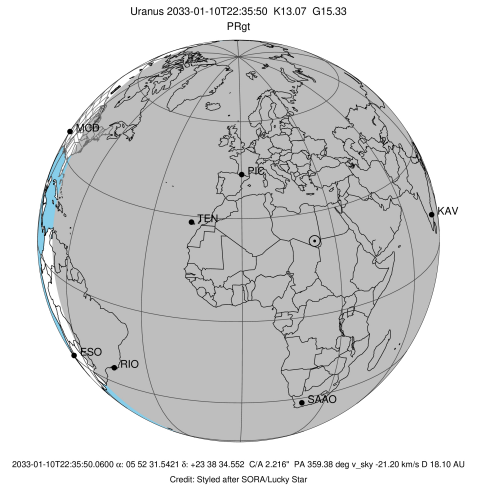
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-01-10T21:59:38.616		22.34	-44.50	50765.23	-17.88		
lambda	I	2033-01-10T22:00:20.002		22.19	-44.34	50026.71	-17.78		
delta	I	2033-01-10T22:01:57.974		21.81	-43.96	48300.35	-17.46		
gamma	I	2033-01-10T22:02:36.700		21.66	-43.81	47627.00	-17.32		
eta	I	2033-01-10T22:03:02.808		21.56	-43.71	47176.12	-17.22		
beta	I	2033-01-10T22:04:31.981		21.22	-43.37	45655.10	-16.87		
alpha	I	2033-01-10T22:05:29.333		21.01	-43.15	44697.90	-16.62		
4	I	2033-01-10T22:07:38.050		20.52	-42.65	42592.08	-16.00		
5	I	2033-01-10T22:08:05.791		20.41	-42.54	42157.52	-15.87		
6	I	2033-01-10T22:08:25.039		20.34	-42.47	41845.82	-15.79		

No planet occultations

6	E	2033-01-10T22:55:14.486		9.67	-31.61	41878.27	15.72		
5	E	2033-01-10T22:55:36.192		9.59	-31.52	42220.02	15.80		
4	E	2033-01-10T22:55:55.829		9.52	-31.45	42529.30	15.93		
alpha	E	2033-01-10T22:58:09.133		9.01	-30.93	44695.60	16.54		
beta	E	2033-01-10T22:59:06.020		8.80	-30.71	45643.67	16.78		
eta	E	2033-01-10T23:00:36.403		8.46	-30.36	47176.12	17.13		
gamma	E	2033-01-10T23:01:02.309		8.36	-30.26	47621.01	17.22		
delta	E	2033-01-10T23:01:41.603		8.21	-30.11	48300.35	17.36		
lambda	E	2033-01-10T23:03:20.154		7.84	-29.73	50026.71	17.67		
epsilon	E	2033-01-10T23:04:24.141		7.60	-29.48	51163.68	17.77		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2033-01-10T22:38:46.400
Event type            : PRgt
: Uranus occs: not geocentric or topocentric
: 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        : 3427497912117708160
2Mass ID (if available) : 05523153+2338347
ICRS Star Coord at Epoch: 05h 52m 31.54213s +23:38:34.55167s
RUWE (>1.4 is poor)  : 5.14
K magnitude           : 13.072
G magnitude           : 15.333
RP magnitude          : 14.573
BP magnitude          : 15.832
DUPflag              : 0
Distance (au)         : 18.102
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -21.20
Sun-Target sep (deg)  : 157.74
Sun-Moon sep (deg)    : 32.37
B (ring opening deg)  : 76.75
PA of pole (deg)      : 52.23
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.528
C/A sky separation (km) : 33184.4
NAIF SPICE kernels    : RAJobs_U111+rgf15.spk
URKALLvl1.bsp
urall1.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall1.bsp
ural61.bsp
vgr2.ural61.bsp
peph.ural60.bsp
earthstns_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```

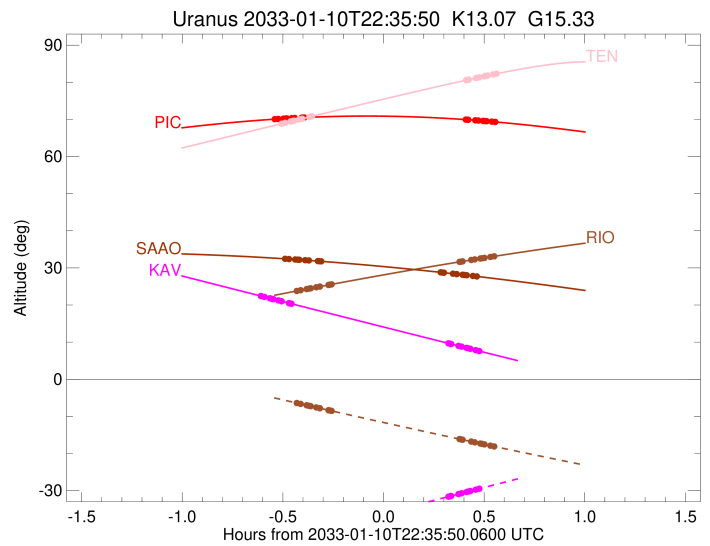
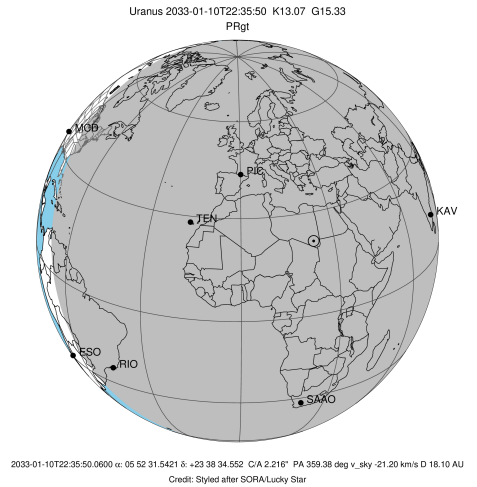


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-01-10T22:10:24.077		23.86	-6.48	50753.59	-16.38		
lambda	I	2033-01-10T22:11:08.647		23.99	-6.64	50026.71	-16.21		
delta	I	2033-01-10T22:12:56.710		24.30	-7.01	48300.35	-15.73		
gamma	I	2033-01-10T22:13:39.848		24.42	-7.15	47626.37	-15.52		
eta	I	2033-01-10T22:14:08.999		24.51	-7.25	47176.12	-15.37		
beta	I	2033-01-10T22:15:49.800		24.79	-7.60	45652.66	-14.82		
alpha	I	2033-01-10T22:16:55.483		24.98	-7.82	44694.43	-14.44		
4	I	2033-01-10T22:19:26.175		25.41	-8.33	42585.72	-13.46		
5	I	2033-01-10T22:19:58.824		25.50	-8.44	42155.26	-13.25		
6	I	2033-01-10T22:20:21.279		25.56	-8.52	41852.30	-13.10		

No planet occultations

6	E	2033-01-10T22:58:32.250		31.63	-16.12	41879.61	13.13		
5	E	2033-01-10T22:58:56.948		31.69	-16.20	42205.96	13.27		
4	E	2033-01-10T22:59:21.390		31.75	-16.28	42533.03	13.48		
alpha	E	2033-01-10T23:01:55.676		32.13	-16.77	44691.85	14.48		
beta	E	2033-01-10T23:03:00.437		32.28	-16.98	45642.33	14.86		
eta	E	2033-01-10T23:04:41.735		32.53	-17.31	47176.12	15.41		
gamma	E	2033-01-10T23:05:10.462		32.59	-17.40	47620.96	15.56		
delta	E	2033-01-10T23:05:53.832		32.70	-17.54	48300.35	15.77		
lambda	E	2033-01-10T23:07:41.592		32.95	-17.88	50026.71	16.26		
epsilon	E	2033-01-10T23:08:47.644		33.11	-18.09	51110.05	16.42		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-10T22:34:22.590
 Event type : PRgt
 : Uranus occs: not geocentric or topocentric
 : Ring occs: geocentric, topocentric
 Observer code : SAAO
 Location : So. Afr. Astro. Obs. (Sutherland)
 Latitude (deg) : -32.37953
 E. Longitude (deg) : 20.81070
 Altitude (km) : 1.768
 Gaia source ID : 3427497912117708160
 2Mass ID (if available) : 05523153+2338347
 ICRS Star Coord at Epoch: 05h 52m 31.54213s +23:38:34.55167s
 RUWE (>1.4 is poor) : 5.14
 K magnitude : 13.072
 G magnitude : 15.333
 RP magnitude : 14.573
 BP magnitude : 15.832
 DUPflag : 0
 Distance (au) : 18.102
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.20
 Sun-Target sep (deg) : 157.74
 Sun-Moon sep (deg) : 33.13
 B (ring opening deg) : 76.75
 PA of pole (deg) : 52.23
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.614
 C/A sky separation (km) : 34323.2
 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_itrfr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-01-10T22:06:54.768		32.42	-35.26	50750.46	-16.01		
lambda	I	2033-01-10T22:07:40.212		32.38	-35.29	50026.71	-15.82		
delta	I	2033-01-10T22:09:31.191		32.27	-35.36	48300.35	-15.28		
gamma	I	2033-01-10T22:10:15.652		32.22	-35.38	47626.14	-15.04		
eta	I	2033-01-10T22:10:45.725		32.19	-35.40	47176.12	-14.88		
beta	I	2033-01-10T22:12:30.188		32.08	-35.46	45651.85	-14.27		
alpha	I	2033-01-10T22:13:38.596		32.01	-35.50	44693.32	-13.84		
4	I	2033-01-10T22:16:16.974		31.83	-35.58	42583.44	-12.72		
5	I	2033-01-10T22:16:51.356		31.80	-35.60	42154.92	-12.48		
6	I	2033-01-10T22:17:15.023		31.77	-35.61	41854.45	-12.31		

No planet occultations

6	E	2033-01-10T22:52:54.794		28.80	-35.97	41879.71	12.30		
5	E	2033-01-10T22:53:20.871		28.76	-35.97	42203.12	12.47		
4	E	2033-01-10T22:53:47.123		28.72	-35.96	42533.96	12.70		
alpha	E	2033-01-10T22:56:29.651		28.45	-35.93	44691.20	13.82		
beta	E	2033-01-10T22:57:37.375		28.33	-35.92	45642.13	14.25		
eta	E	2033-01-10T22:59:22.742		28.15	-35.89	47176.12	14.86		
gamma	E	2033-01-10T22:59:52.520		28.10	-35.88	47620.96	15.02		
delta	E	2033-01-10T23:00:37.402		28.03	-35.87	48300.35	15.25		
lambda	E	2033-01-10T23:02:28.581		27.83	-35.84	50026.71	15.79		
epsilon	E	2033-01-10T23:03:35.960		27.71	-35.82	51101.04	15.98		