

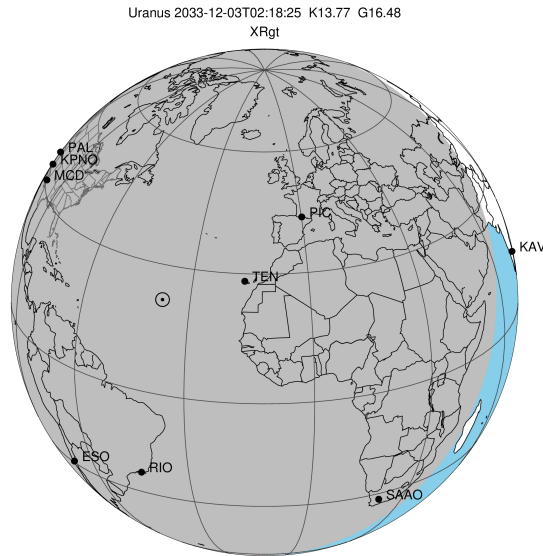
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-03T02:18:25.130
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3377532564699555072
 2Mass ID (if available) : 06194256+2337525

ICRS Star Coord at Epoch: 06h 19m 42.57532s +23:37:52.00427s

RUWE (>1.4 is poor) : 0.97
 K magnitude : 13.774
 G magnitude : 16.480
 RP magnitude : 15.574
 BP magnitude : 17.120
 DUPflag : 0
 Distance (au) : 18.051
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.87
 Sun-Target sep (deg) : 156.24
 Sun-Moon sep (deg) : 67.98
 B (ring opening deg) : 71.38
 PA of pole (deg) : 66.19

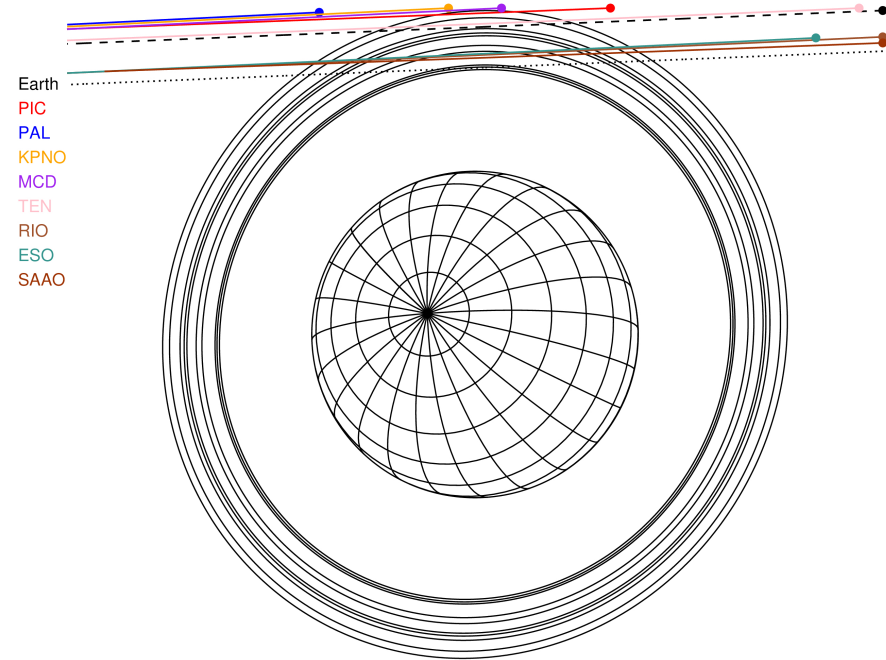
a(km) ring

- 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



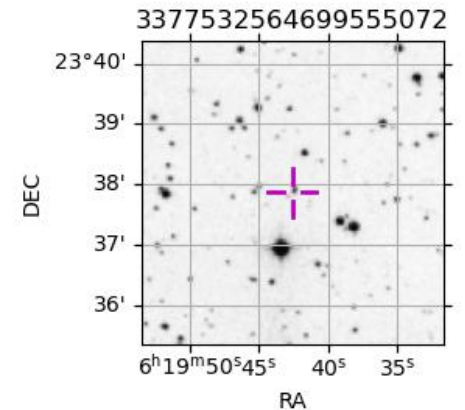
2033-12-03T02:18:25.1300 α: 06 19 42.5753 s: +23 37 52.004 C/A 3.681° PA 182.35 deg v_sky -20.87 km/s D 18.05 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2033-12-03T02:18:25 K13.77 G16.48 XRgt

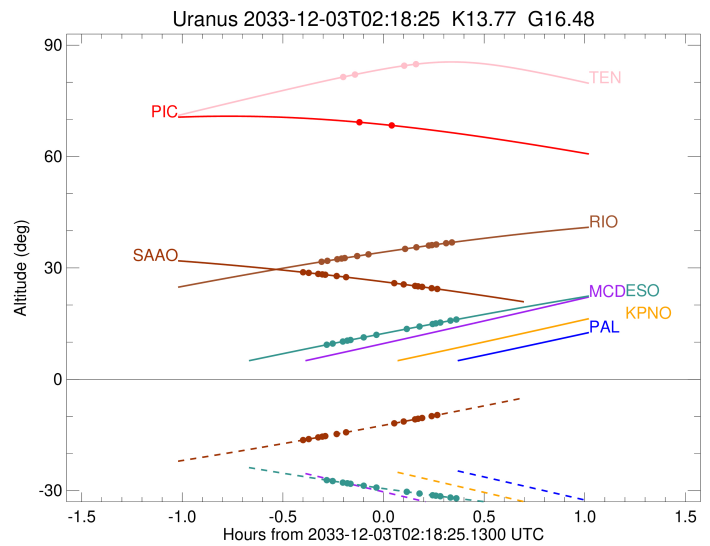
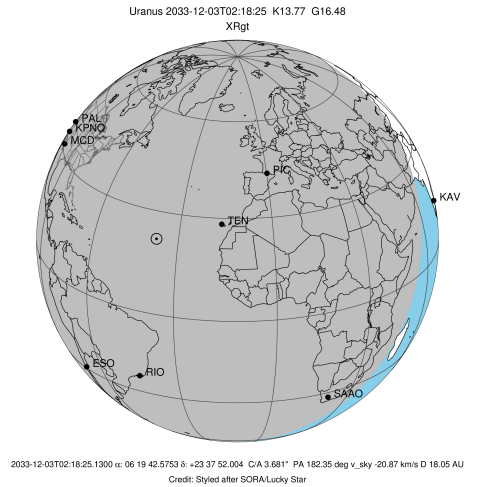


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+		+	DEC 03 02:13 - DEC 03 02:19	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	++		++	DEC 03 02:07 - DEC 03 02:27	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++++		+++++++	DEC 03 02:00 - DEC 03 02:38	PnnRie
ESO	European Southern Obs	-29.3	289.3	+++++++		+++++++	DEC 03 02:02 - DEC 03 02:40	PnnRie
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+++++++		+++++++	DEC 03 01:54 - DEC 03 02:34	PnnRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-03T02:17:40.810
 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 : 3377532564699555072
 2Mass ID (if available) : 06194256+2337525
 ICRS Star Coord at Epoch: 06h 19m 42.57532s +23:37:52.00427s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 13.774
 G magnitude : 16.480
 RP magnitude : 15.574
 BP magnitude : 17.120
 DUPflag : 0
 Distance (au) : 18.051
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.87
 Sun-Target sep (deg) : 156.24
 Sun-Moon sep (deg) : 68.90
 B (ring opening deg) : 71.38
 PA of pole (deg) : 66.19
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.838
 C/A sky separation (km) : 50245.6
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



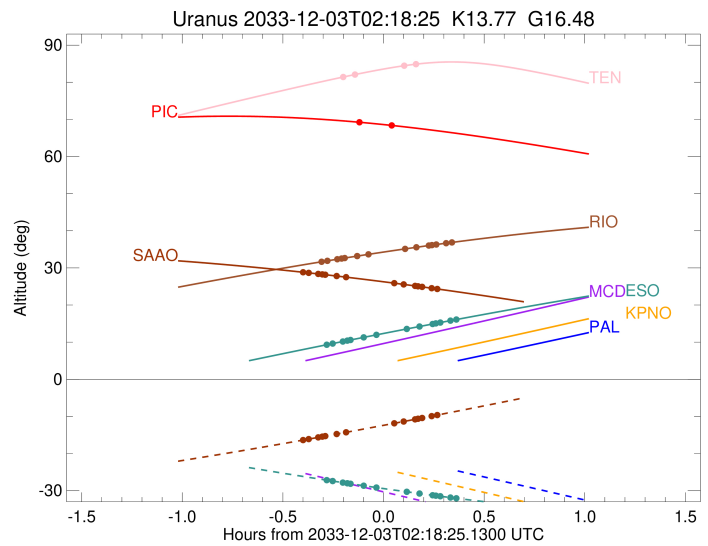
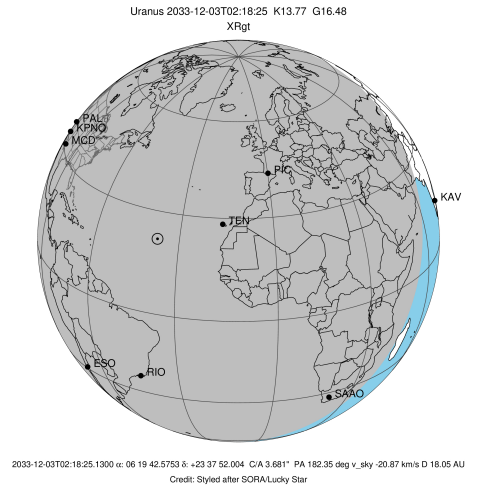
Ring	I/E	UTC	b? alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-03T02:13:05.767	69.08	-53.71	50915.25	-1.87		

No planet occultations

epsilon	E	2033-12-03T02:19:32.825	68.51	-52.62	50972.79	1.86		
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target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-12-03T02:18:49.230
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      : 3377532564699555072
2Mass ID (if available) : 06194256+2337525
ICRS Star Coord at Epoch: 06h 19m 42.57532s +23:37:52.00427s
RUWE (>1.4 is poor) : 0.97
K magnitude          : 13.774
G magnitude          : 16.480
RP magnitude         : 15.574
BP magnitude         : 17.120
DUPflag             : 0
Distance (au)        : 18.051
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -20.87
Sun-Target sep (deg) : 156.24
Sun-Moon sep (deg)  : 68.88
B (ring opening deg) : 71.38
PA of pole (deg)    : 66.19
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.710
C/A sky separation (km) : 48570.3
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_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```



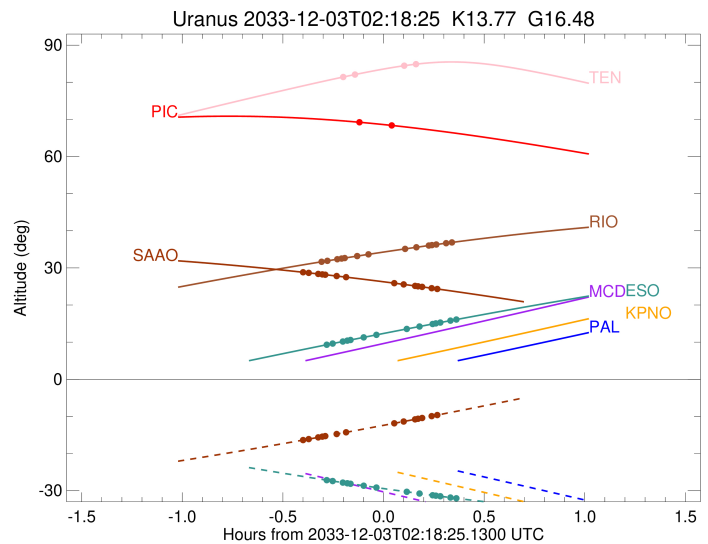
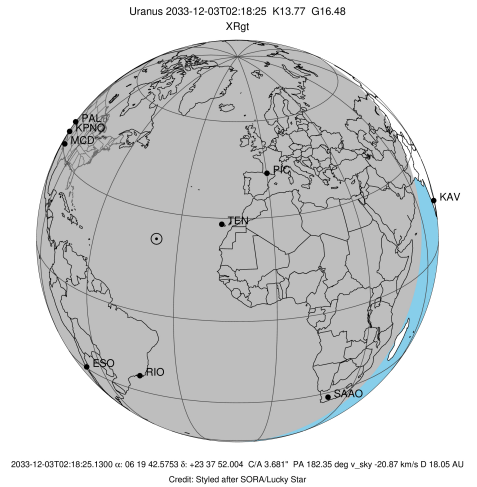
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b: ring blocked by planet  x: target alt < 5.0 deg or sun > -5.0 deg
Ring      I/E      UTC      b? alt  alt-sun  radius  r-dot  lat-geo lat-geodetic
-----
epsilon   I  2033-12-03T02:07:15.229  81.58 -72.75  50856.86  -5.95
lambda    I  2033-12-03T02:09:58.501  82.10 -72.17  50026.71  -4.32

No planet occultations

lambda    E  2033-12-03T02:24:32.317  84.46 -69.05  50026.71  4.32
epsilon   E  2033-12-03T02:27:46.811  84.85 -68.35  51043.76  5.96
  
```

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-03T02:20:49.040
 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 : 3377532564699555072
 2Mass ID (if available) : 06194256+2337525
 ICRS Star Coord at Epoch: 06h 19m 42.57532s +23:37:52.00427s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 13.774
 G magnitude : 16.480
 RP magnitude : 15.574
 BP magnitude : 17.120
 DUPflag : 0
 Distance (au) : 18.051
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.87
 Sun-Target sep (deg) : 156.24
 Sun-Moon sep (deg) : 68.33
 B (ring opening deg) : 71.38
 PA of pole (deg) : 66.19
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.336
 C/A sky separation (km) : 43677.2
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

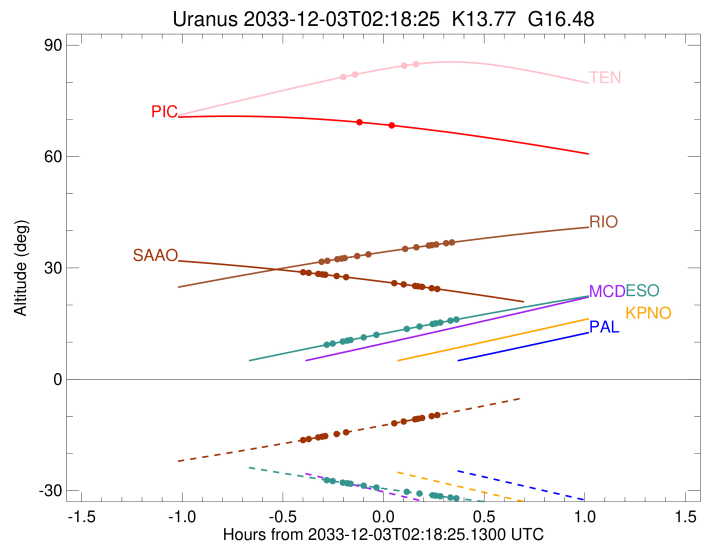
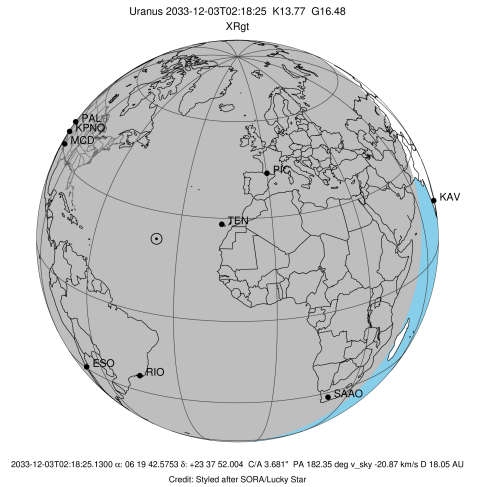


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-03T02:00:30.608		31.73	-43.97	50796.94	-11.05		
lambda	I	2033-12-03T02:01:42.544		31.91	-44.04	50026.71	-10.44		
delta	I	2033-12-03T02:04:39.907		32.34	-44.19	48300.35	-9.01		
gamma	I	2033-12-03T02:05:58.284		32.53	-44.25	47621.00	-8.32		
eta	I	2033-12-03T02:06:53.353		32.66	-44.29	47176.12	-7.83		
beta	I	2033-12-03T02:10:35.544		33.19	-44.46	45669.58	-5.69		
alpha	I	2033-12-03T02:13:51.310		33.64	-44.58	44752.42	-3.66		

No planet occultations

alpha	E	2033-12-03T02:24:55.601		35.13	-44.92	44750.36	3.66		
beta	E	2033-12-03T02:28:10.432		35.55	-44.99	45659.45	5.69		
eta	E	2033-12-03T02:31:54.066		36.02	-45.05	47176.12	7.84		
gamma	E	2033-12-03T02:32:49.182		36.13	-45.06	47622.01	8.34		
delta	E	2033-12-03T02:34:07.322		36.29	-45.08	48300.35	9.02		
lambda	E	2033-12-03T02:37:04.383		36.65	-45.10	50026.71	10.46		
epsilon	E	2033-12-03T02:38:47.562		36.86	-45.12	51145.57	11.07		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-03T02:22:16.480
 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 : 3377532564699555072
 2Mass ID (if available) : 06194256+2337525
 ICRS Star Coord at Epoch: 06h 19m 42.57532s +23:37:52.00427s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 13.774
 G magnitude : 16.480
 RP magnitude : 15.574
 BP magnitude : 17.120
 DUPflag : 0
 Distance (au) : 18.051
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.87
 Sun-Target sep (deg) : 156.24
 Sun-Moon sep (deg) : 67.90
 B (ring opening deg) : 71.38
 PA of pole (deg) : 66.19
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.350
 C/A sky separation (km) : 43863.9
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

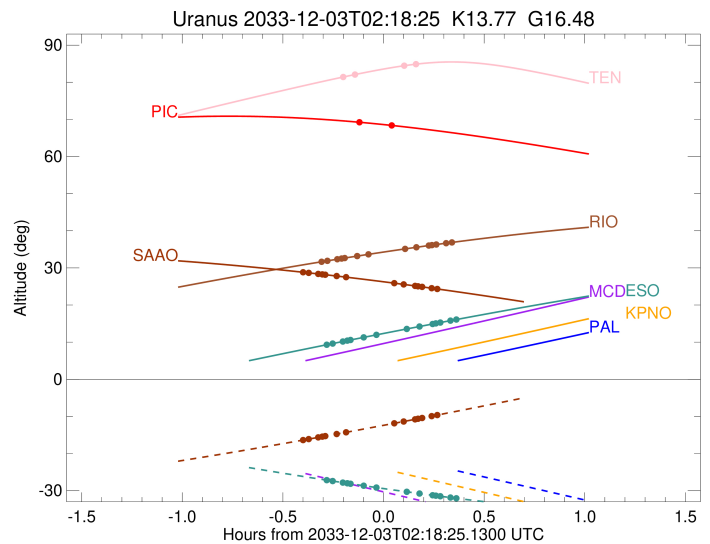
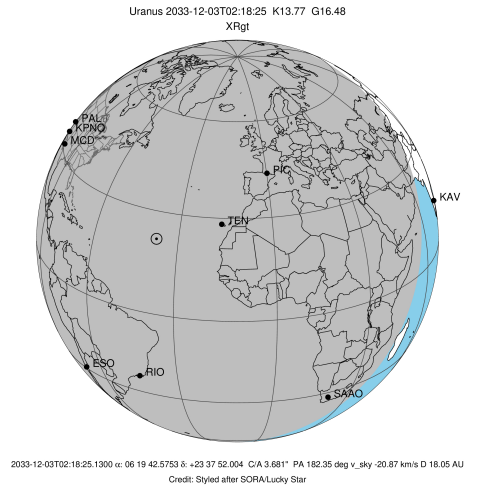


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-03T02:02:03.319		9.40	-27.25	50798.98	-10.82		
lambda	I	2033-12-03T02:03:17.089		9.62	-27.42	50026.71	-10.19		
delta	I	2033-12-03T02:06:19.257		10.17	-27.84	48300.35	-8.73		
gamma	I	2033-12-03T02:07:40.251		10.42	-28.02	47620.99	-8.04		
eta	I	2033-12-03T02:08:37.416		10.59	-28.15	47176.12	-7.53		
beta	I	2033-12-03T02:12:31.935		11.29	-28.67	45669.22	-5.28		
alpha	I	2033-12-03T02:16:12.529		11.94	-29.16	44752.38	-3.00		

No planet occultations

alpha	E	2033-12-03T02:25:26.496		13.57	-30.33	44750.65	3.01		
beta	E	2033-12-03T02:29:06.082		14.20	-30.77	45659.74	5.29		
eta	E	2033-12-03T02:33:01.926		14.88	-31.24	47176.12	7.54		
gamma	E	2033-12-03T02:33:59.100		15.04	-31.35	47621.98	8.05		
delta	E	2033-12-03T02:35:19.793		15.27	-31.51	48300.35	8.75		
lambda	E	2033-12-03T02:38:21.502		15.79	-31.86	50026.71	10.22		
epsilon	E	2033-12-03T02:40:06.711		16.09	-32.06	51143.56	10.85		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-03T02:15:49.890
 Event type : XRgt
 : No Uranus occs
 : 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 : 3377532564699555072
 2Mass ID (if available) : 06194256+2337525
 ICRS Star Coord at Epoch: 06h 19m 42.57532s +23:37:52.00427s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 13.774
 G magnitude : 16.480
 RP magnitude : 15.574
 BP magnitude : 17.120
 DUPflag : 0
 Distance (au) : 18.051
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.87
 Sun-Target sep (deg) : 156.24
 Sun-Moon sep (deg) : 68.56
 B (ring opening deg) : 71.38
 PA of pole (deg) : 66.19
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.304
 C/A sky separation (km) : 43259.6
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-03T01:54:59.010		28.77	-16.30	50792.12	-11.37		
lambda	I	2033-12-03T01:56:08.291		28.66	-16.11	50026.71	-10.79		
delta	I	2033-12-03T01:58:58.738		28.38	-15.65	48300.35	-9.44		
gamma	I	2033-12-03T02:00:13.170		28.25	-15.45	47621.03	-8.81		
eta	I	2033-12-03T02:01:05.026		28.16	-15.31	47176.12	-8.35		
beta	I	2033-12-03T02:04:28.259		27.81	-14.75	45670.35	-6.43		
alpha	I	2033-12-03T02:07:11.881		27.52	-14.30	44752.41	-4.77		

No planet occultations

alpha	E	2033-12-03T02:21:40.449		25.88	-11.86	44749.82	4.77		
beta	E	2033-12-03T02:24:23.358		25.56	-11.39	45658.90	6.42		
eta	E	2033-12-03T02:27:48.462		25.15	-10.80	47176.12	8.34		
gamma	E	2033-12-03T02:28:40.489		25.04	-10.65	47622.06	8.80		
delta	E	2033-12-03T02:29:54.886		24.89	-10.43	48300.35	9.43		
lambda	E	2033-12-03T02:32:45.547		24.54	-9.94	50026.71	10.78		
epsilon	E	2033-12-03T02:34:26.268		24.33	-9.64	51149.28	11.36		