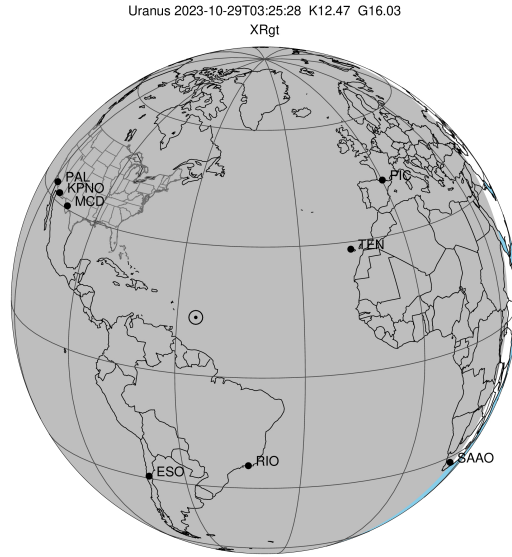


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-10-29T03:25:28.250
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 55714835455470848
 2Mass ID (if available) : 03160579+1747278

ICRS Star Coord at Epoch: 03h 16m 05.84584s +17:47:26.85056s

RUWE (>1.4 is poor) : 1.07
 K magnitude : 12.474
 G magnitude : 16.027
 RP magnitude : 14.899
 BP magnitude : 17.343
 DUPflag : 0
 Distance (au) : 18.668
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.23
 Sun-Target sep (deg) : 163.75
 Sun-Moon sep (deg) : 12.50
 B (ring opening deg) : 62.78
 PA of pole (deg) : -88.69

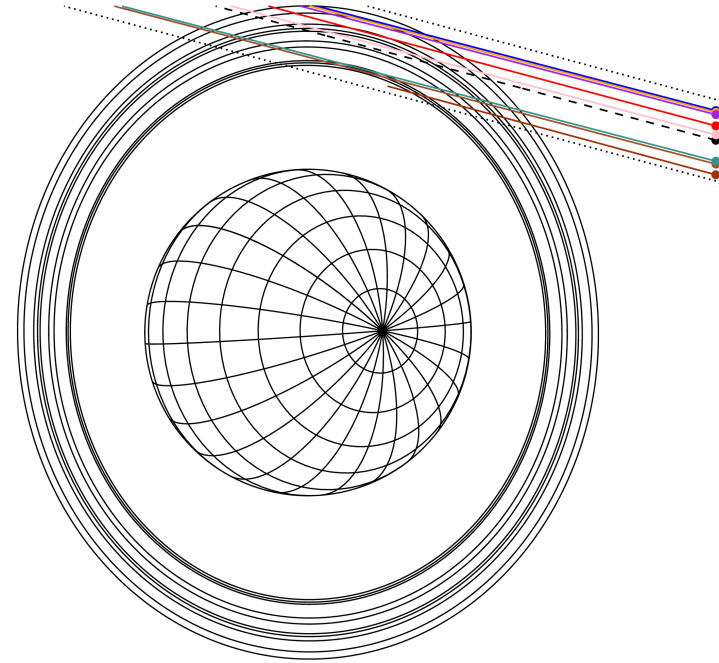
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2023-10-29T03:25:28.2500 ra: 03 16 05.8458 s: +17 47 26.851 C/A 3.372° PA 164.98 deg v_sky -22.23 km/s D 18.67 AU
 Credit: Styled after SORA/Lucky Star

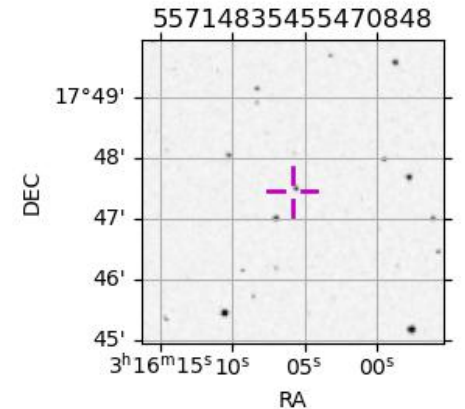
Earth
 PIC
 PAL
 KPNO
 MCD
 TEN
 RIO
 ESO
 SAAO

Uranus 2023-10-29T03:25:28 K12.47 G16.03 XRgt

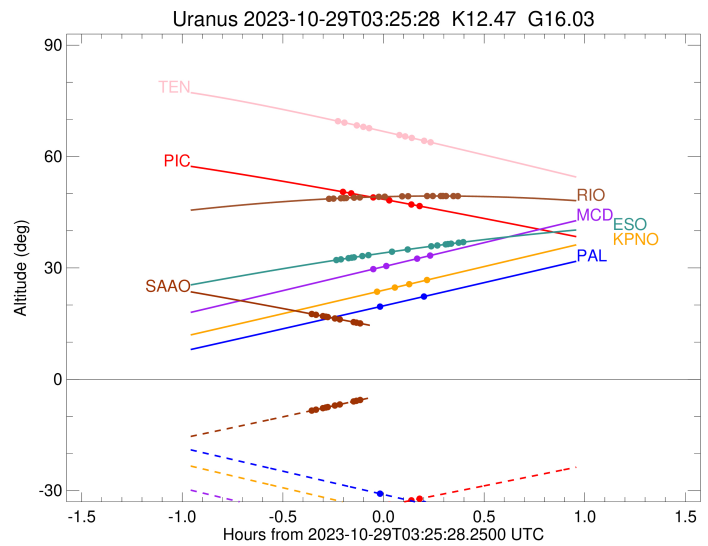
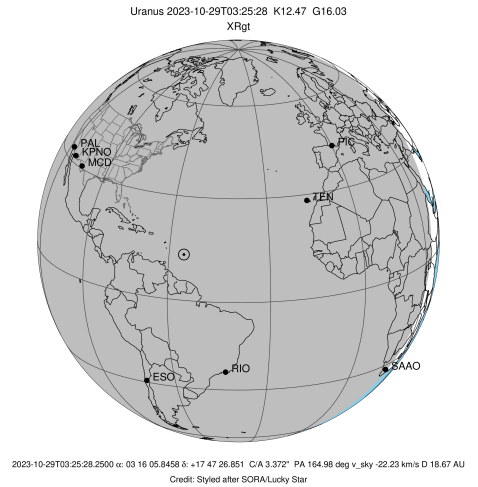


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++		+++	OCT 29 03:14 - OCT 29 03:35	PnnRie
PAL	Palomar Mt (200")	33.4	243.1	+		+	OCT 29 03:25 - OCT 29 03:36	PnnRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	++		++	OCT 29 03:24 - OCT 29 03:37	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	++		++	OCT 29 03:23 - OCT 29 03:38	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++		+++++	OCT 29 03:12 - OCT 29 03:39	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	+++++		+++++	OCT 29 03:09 - OCT 29 03:47	PnnRie
ESO	European Southern Obs	-29.3	289.3	+++++		+++++	OCT 29 03:11 - OCT 29 03:49	PnnRie
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+++++			OCT 29 03:04 - OCT 29 03:18	PnnRin
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-10-29T03:22:46.980
 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 : 55714835455470848
 2Mass ID (if available) : 03160579+1747278
 ICRS Star Coord at Epoch: 03h 16m 05.84584s +17:47:26.85056s
 RUWE (>1.4 is poor) : 1.07
 K magnitude : 12.474
 G magnitude : 16.027
 RP magnitude : 14.899
 BP magnitude : 17.343
 DUPflag : 0
 Distance (au) : 18.668
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.23
 Sun-Target sep (deg) : 163.75
 Sun-Moon sep (deg) : 13.18
 B (ring opening deg) : 62.78
 PA of pole (deg) : -88.69
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.528
 C/A sky separation (km) : 47766.7
 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_itrfr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



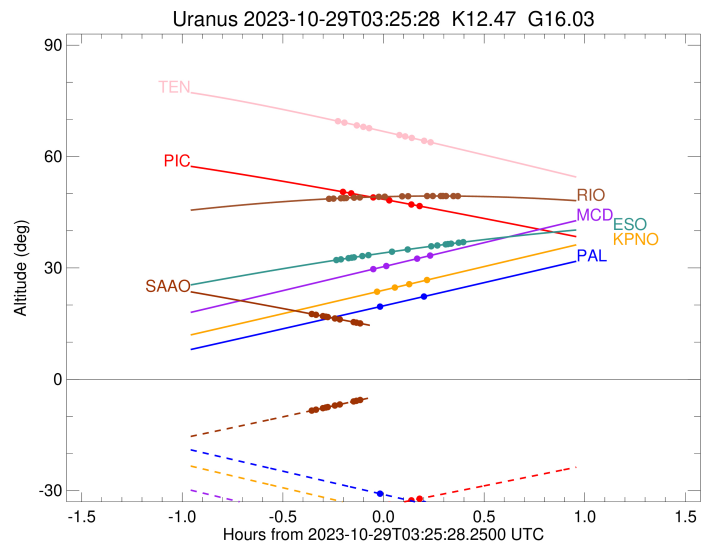
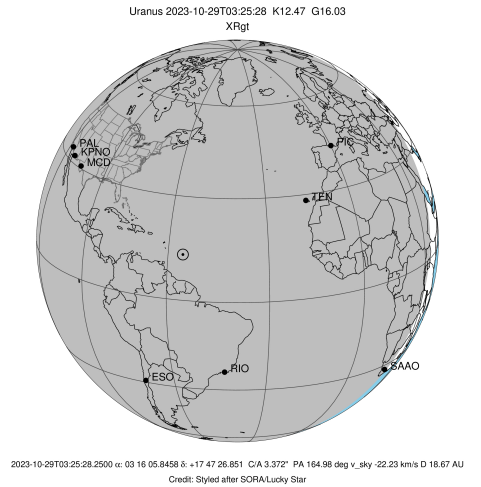
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2023-10-29T03:14:08.372		50.36	-36.11	50793.27	-8.04		
lambda	I	2023-10-29T03:15:52.530		50.07	-35.80	50026.71	-6.76		
delta	I	2023-10-29T03:22:33.534		48.97	-34.62	48300.35	-1.76		

No planet occultations

delta	E	2023-10-29T03:27:03.805		48.21	-33.82	48300.35	1.76		
lambda	E	2023-10-29T03:33:44.954		47.08	-32.62	50026.71	6.76		
epsilon	E	2023-10-29T03:35:52.821		46.72	-32.24	50984.22	8.04		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-10-29T03:28:53.480
 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 : 55714835455470848
 2Mass ID (if available) : 03160579+1747278
 ICRS Star Coord at Epoch: 03h 16m 05.84584s +17:47:26.85056s
 RUWE (>1.4 is poor) : 1.07
 K magnitude : 12.474
 G magnitude : 16.027
 RP magnitude : 14.899
 BP magnitude : 17.343
 DUPflag : 0
 Distance (au) : 18.668
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.23
 Sun-Target sep (deg) : 163.75
 Sun-Moon sep (deg) : 11.86
 B (ring opening deg) : 62.78
 PA of pole (deg) : -88.69
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.679
 C/A sky separation (km) : 49809.3
 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



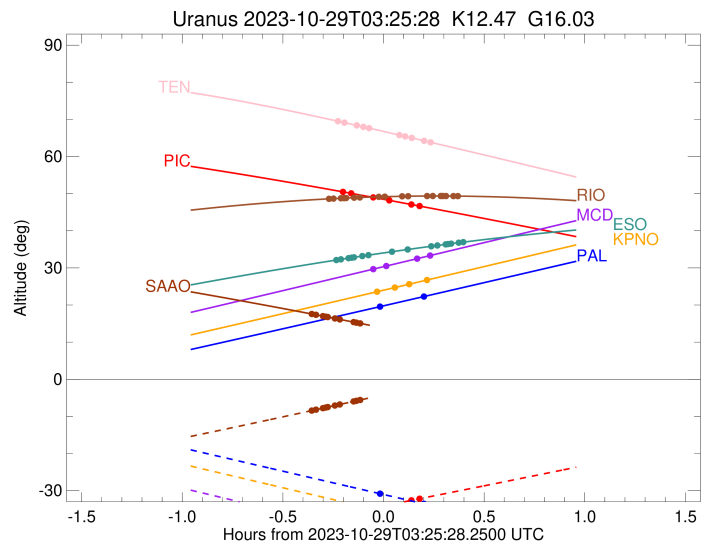
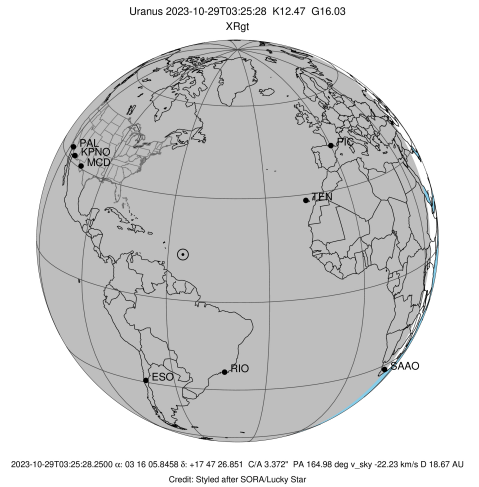
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2023-10-29T03:25:43.927		19.83	-31.09	50831.91	-3.96		

No planet occultations

epsilon	E	2023-10-29T03:36:38.525		22.10	-33.37	50927.12	3.96		
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target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2023-10-29T03:28:55.020
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      : 55714835455470848
2Mass ID (if available) : 03160579+1747278
ICRS Star Coord at Epoch: 03h 16m 05.84584s +17:47:26.85056s
RUWE (>1.4 is poor) : 1.07
K magnitude          : 12.474
G magnitude          : 16.027
RP magnitude         : 14.899
BP magnitude         : 17.343
DUPflag             : 0
Distance (au)       : 18.668
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -22.23
Sun-Target sep (deg) : 163.75
Sun-Moon sep (deg)  : 11.87
B (ring opening deg) : 62.78
PA of pole (deg)    : -88.69
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.658
C/A sky separation (km) : 49528.1
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_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```

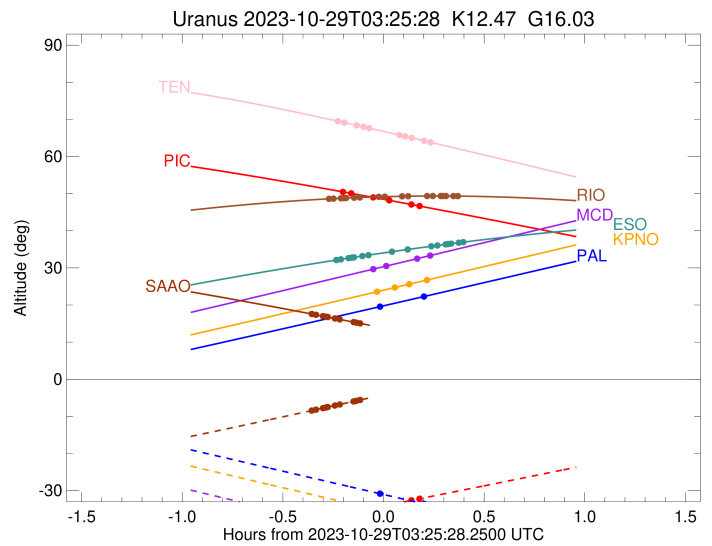
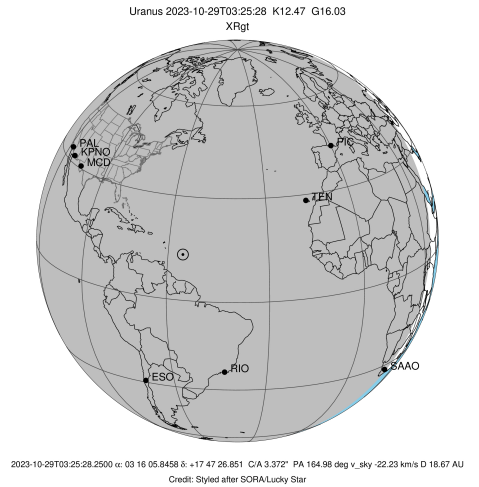


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2023-10-29T03:24:40.570		23.82	-35.42	50823.96	-4.74		
lambda	I	2023-10-29T03:29:00.860		24.74	-36.34	50026.71	-1.47		

No planet occultations

lambda	E	2023-10-29T03:32:58.697		25.58	-37.17	50026.71	1.48		
epsilon	E	2023-10-29T03:37:42.758		26.58	-38.17	50938.09	4.75		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-10-29T03:28:50.690
 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 : 55714835455470848
 2Mass ID (if available) : 03160579+1747278
 ICRS Star Coord at Epoch: 03h 16m 05.84584s +17:47:26.85056s
 RUWE (>1.4 is poor) : 1.07
 K magnitude : 12.474
 G magnitude : 16.027
 RP magnitude : 14.899
 BP magnitude : 17.343
 DUPflag : 0
 Distance (au) : 18.668
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.23
 Sun-Target sep (deg) : 163.75
 Sun-Moon sep (deg) : 11.92
 B (ring opening deg) : 62.78
 PA of pole (deg) : -88.69
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.631
 C/A sky separation (km) : 49157.4
 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



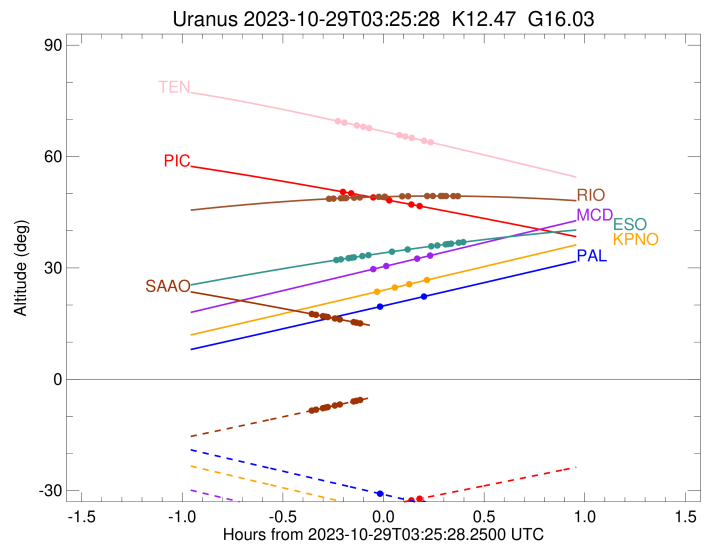
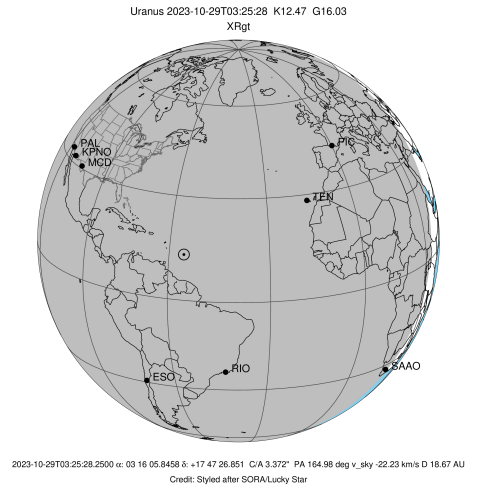
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2023-10-29T03:23:25.025		29.88	-41.75	50815.63	-5.61		
lambda	I	2023-10-29T03:26:22.209		30.52	-42.38	50026.71	-3.38		

No planet occultations

lambda	E	2023-10-29T03:35:25.858		32.47	-44.30	50026.71	3.39		
epsilon	E	2023-10-29T03:38:46.771		33.20	-45.00	50950.53	5.62		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2023-10-29T03:23:45.660
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       : 55714835455470848
2Mass ID (if available) : 03160579+1747278
ICRS Star Coord at Epoch: 03h 16m 05.84584s +17:47:26.85056s
RUWE (>1.4 is poor) : 1.07
K magnitude           : 12.474
G magnitude           : 16.027
RP magnitude          : 14.899
BP magnitude          : 17.343
DUPflag              : 0
Distance (au)         : 18.668
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -22.23
Sun-Target sep (deg) : 163.75
Sun-Moon sep (deg)   : 13.06
B (ring opening deg) : 62.78
PA of pole (deg)     : -88.69
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.420
C/A sky separation (km) : 46298.5
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_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```

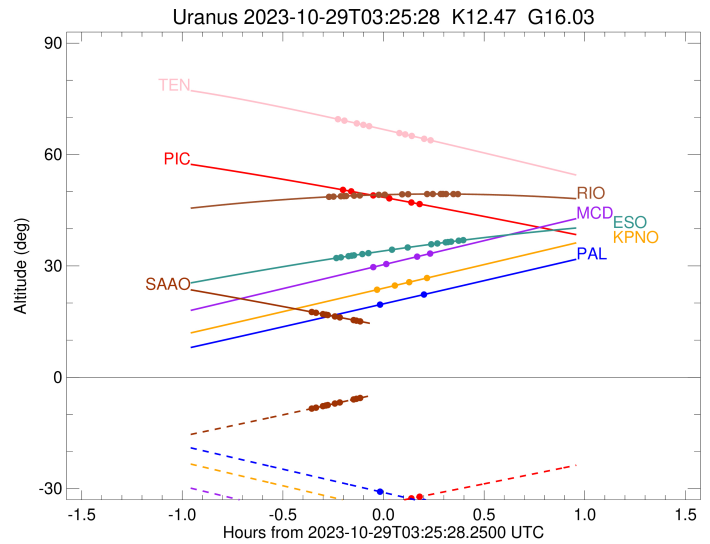
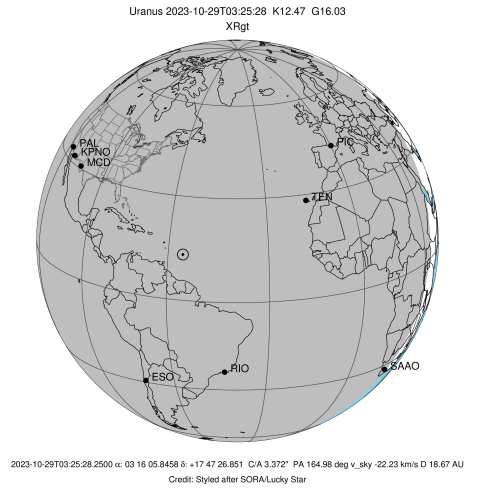


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2023-10-29T03:12:31.774		69.39	-53.68	50778.98	-9.99		
lambda	I	2023-10-29T03:13:51.075		69.13	-53.40	50026.71	-9.05		
delta	I	2023-10-29T03:17:33.161		68.38	-52.61	48300.35	-6.45		
gamma	I	2023-10-29T03:19:32.236		67.98	-52.19	47621.22	-4.95		
eta	I	2023-10-29T03:21:16.446		67.63	-51.82	47176.12	-3.59		

No planet occultations

eta	E	2023-10-29T03:30:08.252		65.80	-49.93	47176.12	3.59		
gamma	E	2023-10-29T03:31:52.433		65.44	-49.55	47620.97	4.95		
delta	E	2023-10-29T03:33:51.591		65.02	-49.13	48300.35	6.45		
lambda	E	2023-10-29T03:37:33.765		64.25	-48.33	50026.71	9.05		
epsilon	E	2023-10-29T03:39:16.675		63.88	-47.96	51015.45	9.98		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-10-29T03:26:42.540
 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 : 55714835455470848
 2Mass ID (if available) : 03160579+1747278
 ICRS Star Coord at Epoch: 03h 16m 05.84584s +17:47:26.85056s
 RUWE (>1.4 is poor) : 1.07
 K magnitude : 12.474
 G magnitude : 16.027
 RP magnitude : 14.899
 BP magnitude : 17.343
 DUPflag : 0
 Distance (au) : 18.668
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.23
 Sun-Target sep (deg) : 163.75
 Sun-Moon sep (deg) : 12.54
 B (ring opening deg) : 62.78
 PA of pole (deg) : -88.69
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.081
 C/A sky separation (km) : 41715.8
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

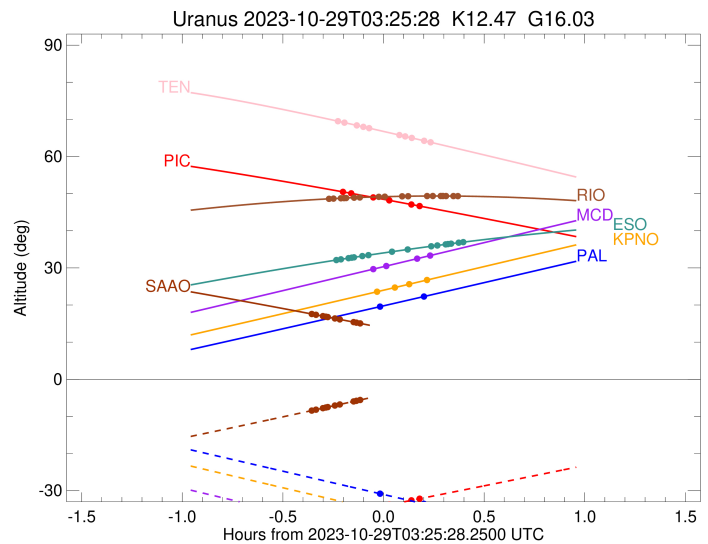
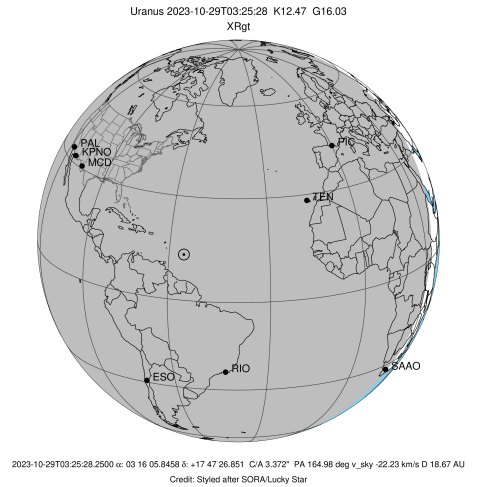


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2023-10-29T03:09:42.663		48.63	-53.01	50754.70	-14.17		
lambda	I	2023-10-29T03:10:35.031		48.67	-52.97	50026.71	-13.67		
delta	I	2023-10-29T03:12:47.314		48.76	-52.84	48300.35	-12.41		
gamma	I	2023-10-29T03:13:43.264		48.80	-52.79	47621.90	-11.84		
eta	I	2023-10-29T03:14:21.576		48.83	-52.75	47176.12	-11.43		
beta	I	2023-10-29T03:16:41.858		48.91	-52.60	45680.66	-9.85		
alpha	I	2023-10-29T03:18:28.573		48.98	-52.48	44696.75	-8.52		
4	I	2023-10-29T03:24:20.665		49.15	-52.07	42529.76	-3.68		
5	I	2023-10-29T03:25:41.312		49.18	-51.96	42279.91	-2.54		

No planet occultations

5	E	2023-10-29T03:31:17.141		49.29	-51.51	42292.29	2.54		
4	E	2023-10-29T03:32:32.076		49.31	-51.40	42526.27	3.69		
alpha	E	2023-10-29T03:38:22.480		49.36	-50.87	44685.20	8.53		
beta	E	2023-10-29T03:40:10.568		49.36	-50.70	45678.15	9.85		
eta	E	2023-10-29T03:42:31.195		49.36	-50.46	47176.12	11.44		
gamma	E	2023-10-29T03:43:09.440		49.36	-50.40	47621.32	11.84		
delta	E	2023-10-29T03:44:05.411		49.36	-50.31	48300.35	12.42		
lambda	E	2023-10-29T03:46:17.623		49.35	-50.08	50026.71	13.68		
epsilon	E	2023-10-29T03:47:33.554		49.34	-49.94	51090.69	14.18		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2023-10-29T03:28:35.870
 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 : 55714835455470848
 2Mass ID (if available) : 03160579+1747278
 ICRS Star Coord at Epoch: 03h 16m 05.84584s +17:47:26.85056s
 RUWE (>1.4 is poor) : 1.07
 K magnitude : 12.474
 G magnitude : 16.027
 RP magnitude : 14.899
 BP magnitude : 17.343
 DUPflag : 0
 Distance (au) : 18.668
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.23
 Sun-Target sep (deg) : 163.75
 Sun-Moon sep (deg) : 12.11
 B (ring opening deg) : 62.78
 PA of pole (deg) : -88.69
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.109
 C/A sky separation (km) : 42087.6
 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



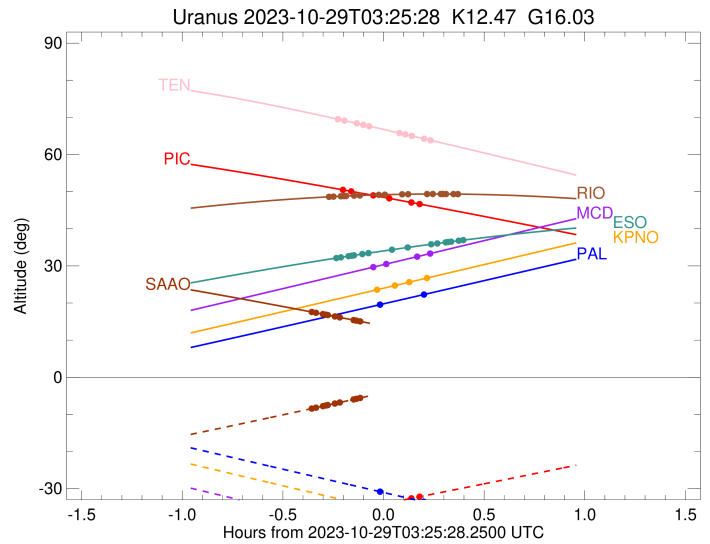
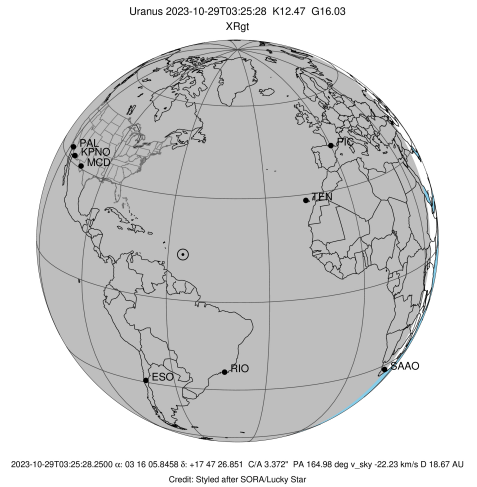
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2023-10-29T03:11:54.084		32.18	-43.89	50756.09	-13.83		
lambda	I	2023-10-29T03:12:47.901		32.31	-43.97	50026.71	-13.31		
delta	I	2023-10-29T03:15:04.153		32.63	-44.18	48300.35	-12.01		
gamma	I	2023-10-29T03:16:02.101		32.76	-44.27	47621.84	-11.41		
eta	I	2023-10-29T03:16:41.912		32.85	-44.33	47176.12	-10.98		
beta	I	2023-10-29T03:19:09.010		33.19	-44.54	45680.76	-9.31		
alpha	I	2023-10-29T03:21:03.158		33.44	-44.70	44696.07	-7.88		
4	I	2023-10-29T03:28:34.383		34.44	-45.30	42528.48	-1.58		

No planet occultations

4	E	2023-10-29T03:32:06.754		34.89	-45.56	42527.00	1.58		
alpha	E	2023-10-29T03:39:36.103		35.82	-46.07	44685.36	7.89		
beta	E	2023-10-29T03:41:31.547		36.05	-46.18	45678.36	9.32		
eta	E	2023-10-29T03:43:58.871		36.34	-46.33	47176.12	11.00		
gamma	E	2023-10-29T03:44:38.578		36.41	-46.36	47621.29	11.42		
delta	E	2023-10-29T03:45:36.489		36.52	-46.42	48300.35	12.02		
lambda	E	2023-10-29T03:47:52.518		36.78	-46.54	50026.71	13.34		
epsilon	E	2023-10-29T03:49:09.944		36.93	-46.60	51086.03	13.86		


```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2023-10-29T03:22:49.770
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       : 55714835455470848
2Mass ID (if available) : 03160579+1747278
ICRS Star Coord at Epoch: 03h 16m 05.84584s +17:47:26.85056s
RUWE (>1.4 is poor) : 1.07
K magnitude          : 12.474
G magnitude          : 16.027
RP magnitude         : 14.899
BP magnitude         : 17.343
DUPflag             : 0
Distance (au)        : 18.668
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -22.23
Sun-Target sep (deg) : 163.75
Sun-Moon sep (deg)   : 13.19
B (ring opening deg) : 62.78
PA of pole (deg)     : -88.69
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.991
C/A sky separation (km) : 40492.5
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_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	2023-10-29T03:04:32.413		17.51	-8.35	50750.64	-14.90		
lambda	I	2023-10-29T03:05:21.753		17.36	-8.18	50026.71	-14.47		
delta	I	2023-10-29T03:07:25.691		17.00	-7.78	48300.35	-13.37		
gamma	I	2023-10-29T03:08:17.360		16.85	-7.61	47622.08	-12.88		
eta	I	2023-10-29T03:08:52.455		16.75	-7.49	47176.12	-12.53		
beta	I	2023-10-29T03:10:58.214		16.39	-7.08	45680.28	-11.21		
alpha	I	2023-10-29T03:12:29.727		16.12	-6.77	44698.89	-10.15		
4	I	2023-10-29T03:16:42.418		15.37	-5.94	42532.73	-6.95		
5	I	2023-10-29T03:17:21.805		15.26	-5.81	42268.26	-6.46		
6	I	2023-10-29T03:18:39.721		15.03	-5.55	41812.92	-5.30		

No planet occultations

6	E	2023-10-29T03:30:27.040		12.91	-3.19x	41800.69	5.30		
5	E	2023-10-29T03:31:51.930		12.65	-2.90x	42300.20	6.45		
4	E	2023-10-29T03:32:25.553		12.55	-2.79x	42525.93	6.94		
alpha	E	2023-10-29T03:36:36.959		11.78	-1.94x	44684.86	10.14		
beta	E	2023-10-29T03:38:10.045		11.50	-1.63x	45677.52	11.20		
eta	E	2023-10-29T03:40:16.408		11.11	-1.20x	47176.12	12.51		
gamma	E	2023-10-29T03:40:51.515		11.00	-1.08x	47621.41	12.85		
delta	E	2023-10-29T03:41:43.334		10.84	-0.91x	48300.35	13.35		
lambda	E	2023-10-29T03:43:47.529		10.46	-0.49x	50026.71	14.44		
epsilon	E	2023-10-29T03:45:00.677		10.23	-0.24x	51104.52	14.87		