

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-22T00:20:26.240
 Event type : PtRgt
 : Uranus occs: topocentric, not geocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3425571838326304000
 2Mass ID (if available) : 06161868+2339328

ICRS Star Coord at Epoch: 06h 16m 18.69084s +23:39:32.88416s

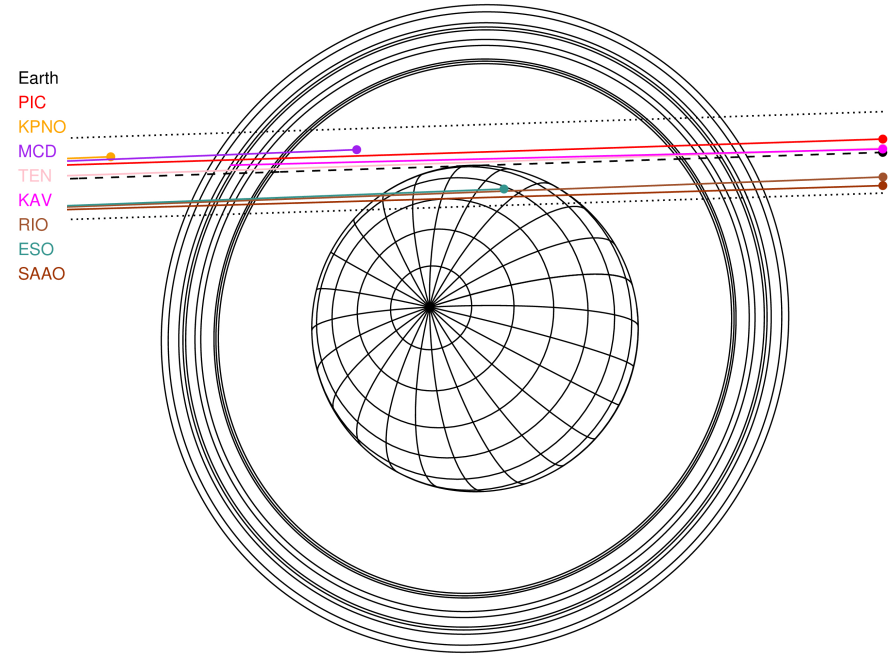
RUWE (>1.4 is poor) : 0.89
 K magnitude : 14.873
 G magnitude : 18.628
 RP magnitude : 17.600
 BP magnitude : 19.770
 DUPflag : 0
 Distance (au) : 17.972
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.35
 Sun-Target sep (deg) : 176.23
 Sun-Moon sep (deg) : 174.64
 B (ring opening deg) : 72.08
 PA of pole (deg) : 64.79

#	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



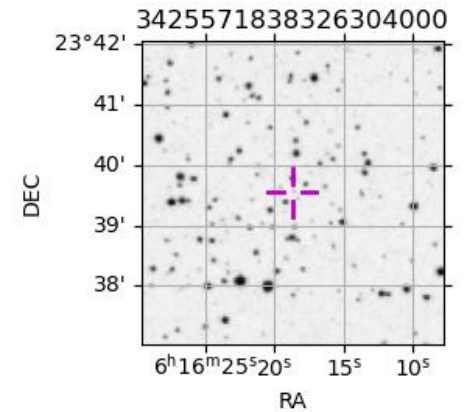
2033-12-22T00:20:26.2400 ra: 06 16 18.69084 ra: +23 39 32.884 C/A 1.964 PA 181.85 deg v_sky -23.35 km/s D 17.97 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2033-12-22T00:20:26 K14.87 G18.63 PtRgt



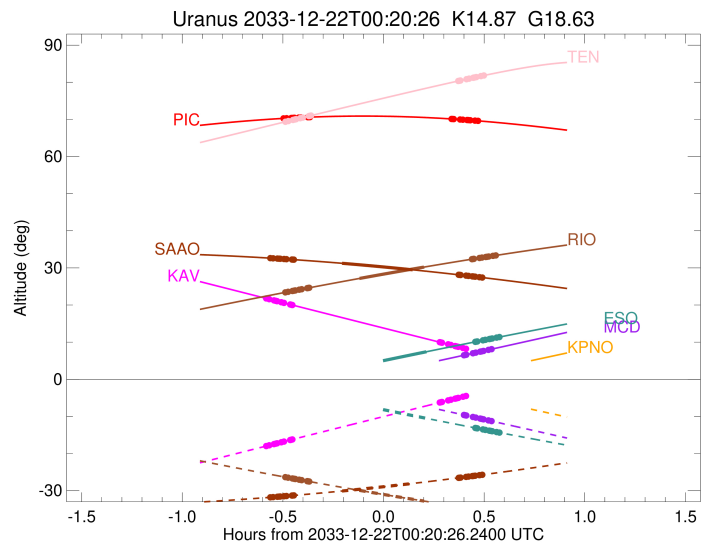
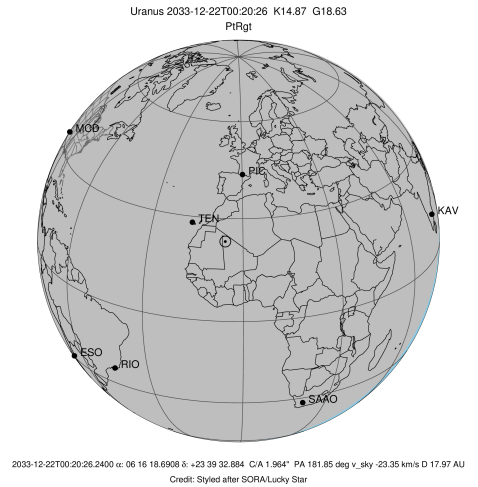
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	DEC 21 23:50 - DEC 22 00:48	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			+++++	DEC 22 00:44 - DEC 22 00:52	PnnRne
TEN	Teide Obs./Tenerife	28.3	343.5	+++++		+++++	DEC 21 23:51 - DEC 22 00:50	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++		+++++	DEC 21 23:45 - DEC 22 00:42	PnnRie
RIO	Rio de Janeiro	-22.9	316.8	+++++	+ +	+++++	DEC 21 23:51 - DEC 22 00:53	PieRie
ESO	European Southern Obs	-29.3	289.3		+	+++++	DEC 22 00:33 - DEC 22 00:55	PneRne
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+++++	+ +	+++++	DEC 21 23:46 - DEC 22 00:49	PieRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch              : 2033-12-22T00:20:23.310
Event type             : PtRgt
: Uranus occs: topocentric, not geocentric
: 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        : 3425571838326304000
2Mass ID (if available) : 06161868+2339328
ICRS Star Coord at Epoch: 06h 16m 18.69084s +23:39:32.88416s
RUWE (>1.4 is poor)  : 0.89
K magnitude           : 14.873
G magnitude           : 18.628
RP magnitude          : 17.600
BP magnitude          : 19.770
DUPflag              : 0
Distance (au)         : 17.972
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -23.35
Sun-Target sep (deg)  : 176.23
Sun-Moon sep (deg)    : 175.02
B (ring opening deg)  : 72.08
PA of pole (deg)      : 64.79
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.116
C/A sky separation (km) : 27588.0
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
  
```

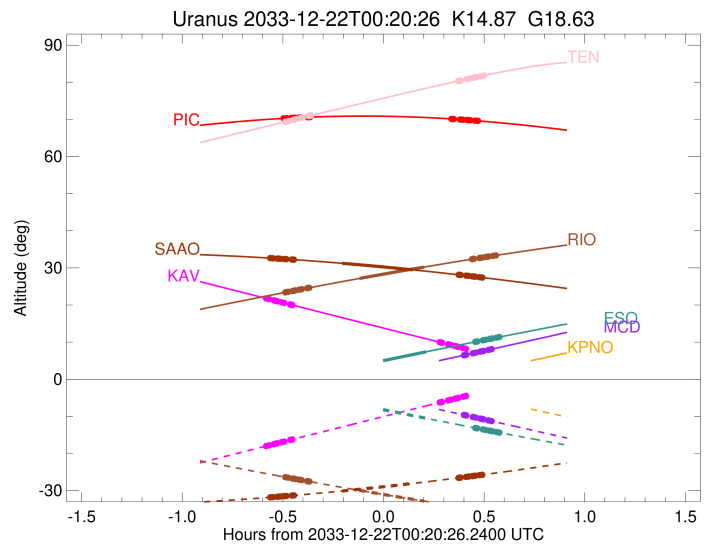
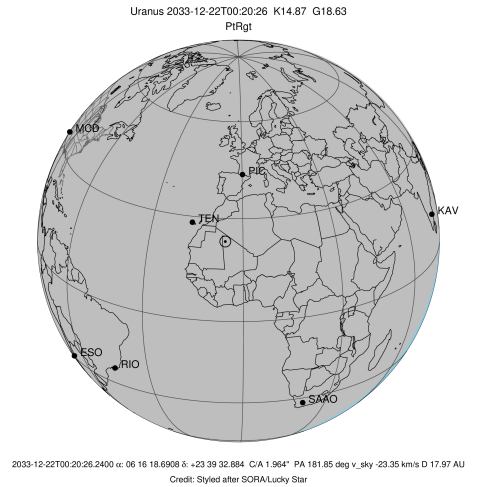


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-21T23:50:56.897		70.29	-70.63	50775.93	-20.56		
lambda	I	2033-12-21T23:51:33.378		70.32	-70.64	50026.71	-20.47		
delta	I	2033-12-21T23:52:58.407		70.39	-70.66	48300.35	-20.13		
gamma	I	2033-12-21T23:53:32.088		70.42	-70.67	47624.71	-19.99		
eta	I	2033-12-21T23:53:54.588		70.43	-70.67	47176.12	-19.89		
beta	I	2033-12-21T23:55:10.453		70.49	-70.68	45680.85	-19.53		
alpha	I	2033-12-21T23:55:59.767		70.52	-70.68	44722.95	-19.29		
4	I	2033-12-21T23:57:55.665		70.60	-70.69	42530.09	-18.63		
5	I	2033-12-21T23:58:10.355		70.61	-70.69	42251.84	-18.49		
6	I	2033-12-21T23:58:31.929		70.62	-70.69	41852.34	-18.40		

No planet occultations

6	E	2033-12-22T00:40:45.229		70.12	-68.74	41875.02	18.39		
5	E	2033-12-22T00:41:00.458		70.11	-68.72	42155.12	18.49		
4	E	2033-12-22T00:41:23.508		70.09	-68.69	42595.79	18.63		
alpha	E	2033-12-22T00:43:17.008		69.97	-68.52	44750.31	19.29		
beta	E	2033-12-22T00:44:04.084		69.92	-68.45	45659.89	19.53		
eta	E	2033-12-22T00:45:20.964		69.84	-68.33	47176.12	19.89		
gamma	E	2033-12-22T00:45:43.326		69.81	-68.29	47621.93	19.98		
delta	E	2033-12-22T00:46:17.149		69.77	-68.24	48300.35	20.13		
lambda	E	2033-12-22T00:47:42.183		69.68	-68.10	50026.71	20.47		
epsilon	E	2033-12-22T00:48:36.735		69.61	-68.01	51148.78	20.56		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-22T00:24:30.240
 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 : 3425571838326304000
 2Mass ID (if available) : 06161868+2339328
 ICRS Star Coord at Epoch: 06h 16m 18.69084s +23:39:32.88416s
 RUWE (>1.4 is poor) : 0.89
 K magnitude : 14.873
 G magnitude : 18.628
 RP magnitude : 17.600
 BP magnitude : 19.770
 DUPflag : 0
 Distance (au) : 17.972
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.35
 Sun-Target sep (deg) : 176.23
 Sun-Moon sep (deg) : 174.89
 B (ring opening deg) : 72.08
 PA of pole (deg) : 64.79
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.203
 C/A sky separation (km) : 28711.0
 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



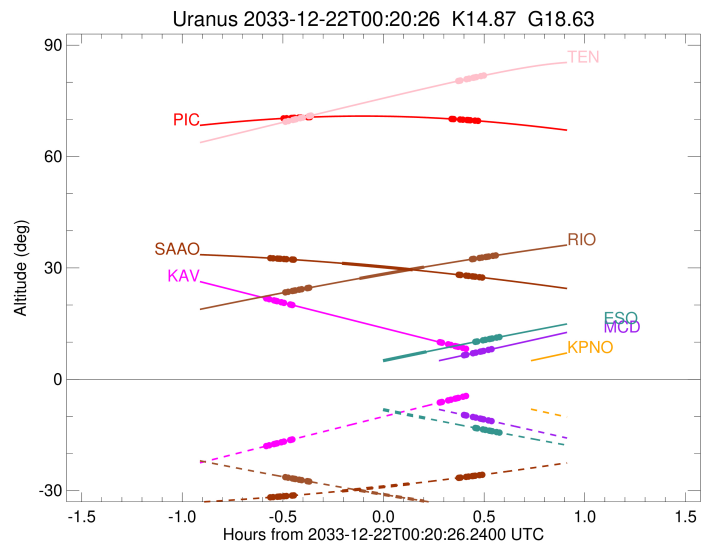
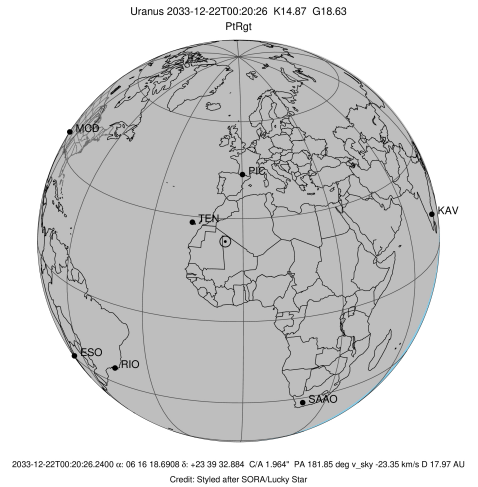
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-21T23:54:59.174	-3.06x	0.06x	50770.77	-19.78			
lambda	I	2033-12-21T23:55:36.849	-2.94x	-0.06x	50026.71	-19.68			
delta	I	2033-12-21T23:57:05.390	-2.67x	-0.34x	48300.35	-19.31			
gamma	I	2033-12-21T23:57:40.525	-2.56x	-0.45x	47624.53	-19.15			
eta	I	2033-12-21T23:58:03.998	-2.48x	-0.53x	47176.12	-19.05			
beta	I	2033-12-21T23:59:23.289	-2.24x	-0.78x	45680.99	-18.66			
alpha	I	2033-12-22T00:00:14.879	-2.07x	-0.94x	44724.29	-18.40			
4	I	2033-12-22T00:02:16.691	-1.69x	-1.33x	42530.94	-17.68			
5	I	2033-12-22T00:02:32.463	-1.64x	-1.39x	42248.41	-17.53			
6	I	2033-12-22T00:02:54.940	-1.57x	-1.46x	41854.07	-17.42			

No planet occultations

6	E	2033-12-22T00:44:27.592	6.48	-9.62	41875.58	17.48			
5	E	2033-12-22T00:44:43.599	6.53	-9.68	42155.36	17.58			
4	E	2033-12-22T00:45:07.771	6.61	-9.76	42594.69	17.73			
alpha	E	2033-12-22T00:47:06.701	7.01	-10.16	44750.60	18.46			
beta	E	2033-12-22T00:47:55.846	7.17	-10.32	45660.39	18.73			
eta	E	2033-12-22T00:49:15.875	7.43	-10.59	47176.12	19.12			
gamma	E	2033-12-22T00:49:39.120	7.51	-10.67	47621.86	19.23			
delta	E	2033-12-22T00:50:14.256	7.63	-10.78	48300.35	19.39			
lambda	E	2033-12-22T00:51:42.436	7.92	-11.08	50026.71	19.76			
epsilon	E	2033-12-22T00:52:38.513	8.11	-11.27	51140.91	19.87			

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-22T00:21:30.030
 Event type : PtRgt
 : Uranus occs: topocentric, not geocentric
 : 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 : 3425571838326304000
 2Mass ID (if available) : 06161868+2339328
 ICRS Star Coord at Epoch: 06h 16m 18.69084s +23:39:32.88416s
 RUWE (>1.4 is poor) : 0.89
 K magnitude : 14.873
 G magnitude : 18.628
 RP magnitude : 17.600
 BP magnitude : 19.770
 DUPflag : 0
 Distance (au) : 17.972
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.35
 Sun-Target sep (deg) : 176.23
 Sun-Moon sep (deg) : 174.76
 B (ring opening deg) : 72.08
 PA of pole (deg) : 64.79
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.996
 C/A sky separation (km) : 26021.2
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



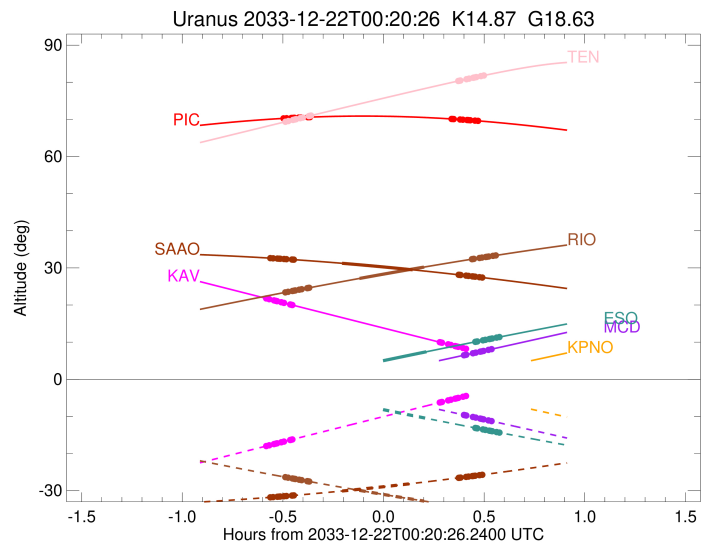
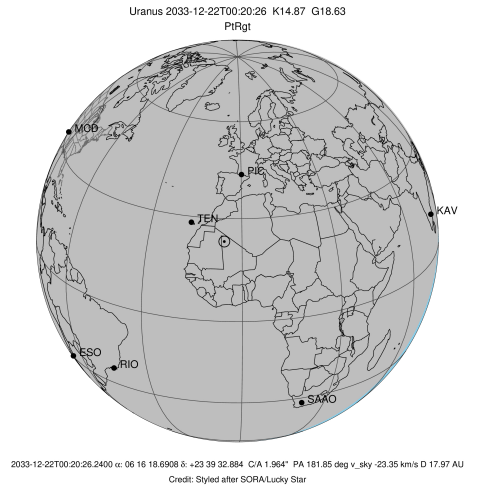
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-21T23:51:29.125		69.43	-72.95	50781.68	-21.08		
lambda	I	2033-12-21T23:52:04.963		69.56	-73.08	50026.71	-21.01		
delta	I	2033-12-21T23:53:27.713		69.86	-73.37	48300.35	-20.71		
gamma	I	2033-12-21T23:54:00.419		69.98	-73.49	47624.91	-20.59		
eta	I	2033-12-21T23:54:22.263		70.06	-73.57	47176.12	-20.50		
beta	I	2033-12-21T23:55:35.754		70.33	-73.83	45680.68	-20.19		
alpha	I	2033-12-21T23:56:23.460		70.50	-74.00	44721.52	-19.99		
4	I	2033-12-21T23:58:14.966		70.91	-74.40	42529.26	-19.42		
5	I	2033-12-21T23:58:28.774		70.96	-74.45	42255.51	-19.30		
6	I	2033-12-21T23:58:49.717		71.03	-74.52	41850.43	-19.22		

No planet occultations

6	E	2033-12-22T00:42:45.477		80.35	-83.23	41873.97	19.24		
5	E	2033-12-22T00:43:00.078		80.40	-83.27	42154.88	19.31		
4	E	2033-12-22T00:43:22.226		80.47	-83.33	42597.66	19.44		
alpha	E	2033-12-22T00:45:11.242		80.83	-83.61	44749.73	20.00		
beta	E	2033-12-22T00:45:56.652		80.98	-83.73	45659.00	20.21		
eta	E	2033-12-22T00:47:11.080		81.22	-83.91	47176.12	20.52		
gamma	E	2033-12-22T00:47:32.763		81.29	-83.96	47622.06	20.61		
delta	E	2033-12-22T00:48:05.573		81.40	-84.03	48300.35	20.74		
lambda	E	2033-12-22T00:49:28.230		81.66	-84.22	50026.71	21.03		
epsilon	E	2033-12-22T00:50:22.094		81.83	-84.34	51164.31	21.11		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-12-22T00:15:56.930
Event type          : PtRgt
: Uranus occs: topocentric, not geocentric
: 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      : 3425571838326304000
2Mass ID (if available) : 06161868+2339328
ICRS Star Coord at Epoch: 06h 16m 18.69084s +23:39:32.88416s
RUWE (>1.4 is poor) : 0.89
K magnitude          : 14.873
G magnitude          : 18.628
RP magnitude         : 17.600
BP magnitude         : 19.770
DUPflag             : 0
Distance (au)       : 17.972
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -23.35
Sun-Target sep (deg) : 176.23
Sun-Moon sep (deg)  : 174.91
B (ring opening deg) : 72.08
PA of pole (deg)    : 64.79
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.034
C/A sky separation (km) : 26511.6
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
  
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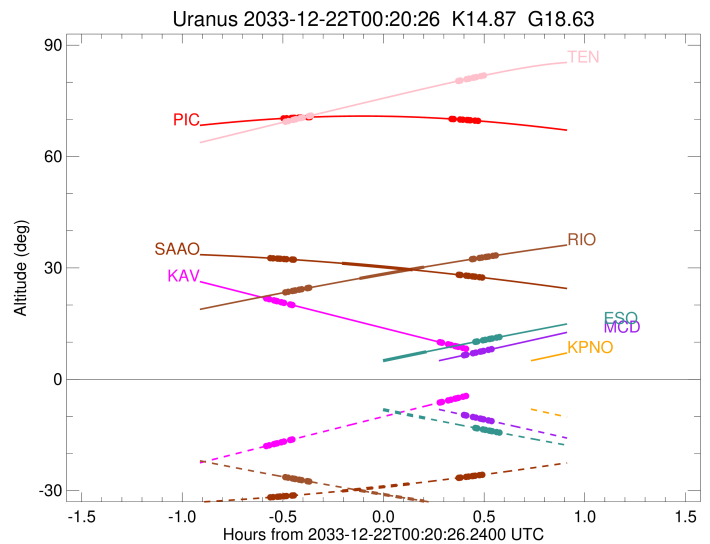
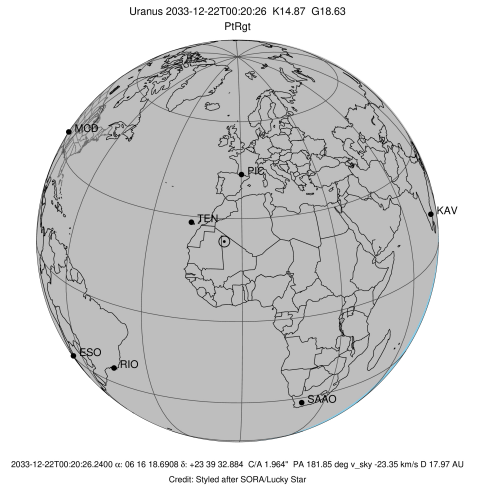


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-21T23:45:46.644		21.71	-17.92	50781.29	-20.73		
lambda	I	2033-12-21T23:46:23.084		21.57	-17.78	50026.71	-20.65		
delta	I	2033-12-21T23:47:47.318		21.25	-17.46	48300.35	-20.34		
gamma	I	2033-12-21T23:48:20.634		21.12	-17.34	47624.89	-20.21		
eta	I	2033-12-21T23:48:42.891		21.04	-17.25	47176.12	-20.12		
beta	I	2033-12-21T23:49:57.819		20.75	-16.97	45680.70	-19.80		
alpha	I	2033-12-21T23:50:46.493		20.56	-16.78	44721.68	-19.58		
4	I	2033-12-21T23:52:40.425		20.13	-16.35	42529.36	-18.99		
5	I	2033-12-21T23:52:54.586		20.08	-16.30	42255.04	-18.86		
6	I	2033-12-21T23:53:15.979		19.99	-16.22	41850.68	-18.78		

No planet occultations

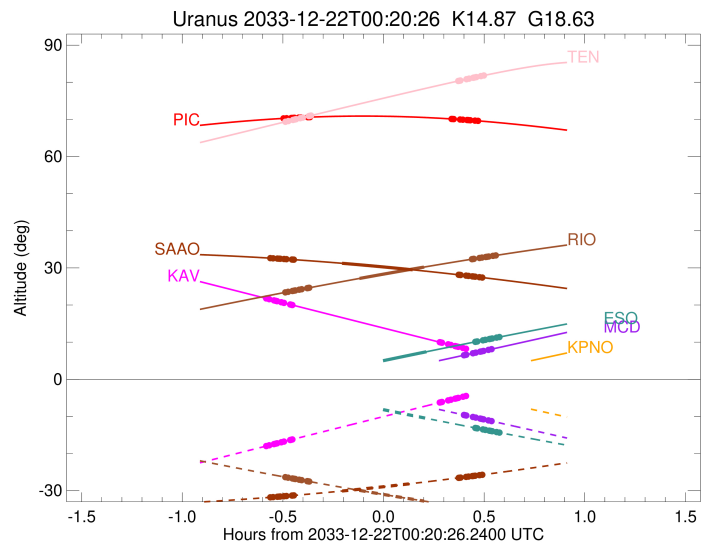
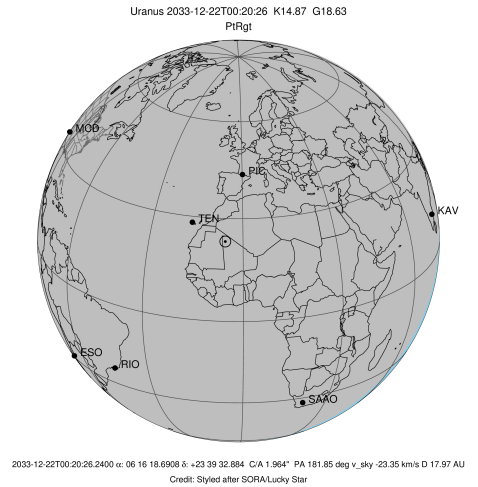
6	E	2033-12-22T00:37:14.336		9.98	-6.26	41874.46	18.71		
5	E	2033-12-22T00:37:29.330		9.92	-6.20	42154.96	18.79		
4	E	2033-12-22T00:37:52.059		9.84	-6.12	42596.81	18.91		
alpha	E	2033-12-22T00:39:44.035		9.41	-5.70	44750.01	19.50		
beta	E	2033-12-22T00:40:30.623		9.24	-5.52	45659.43	19.71		
eta	E	2033-12-22T00:41:46.894		8.95	-5.23	47176.12	20.03		
gamma	E	2033-12-22T00:42:09.107		8.87	-5.15	47622.00	20.12		
delta	E	2033-12-22T00:42:42.719		8.74	-5.03	48300.35	20.25		
lambda	E	2033-12-22T00:44:07.351		8.42	-4.71x	50026.71	20.55		
epsilon	E	2033-12-22T00:45:02.096		8.22	-4.50x	51156.45	20.62		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-22T00:23:09.480
 Event type : PtRgt
 : Uranus occs: topocentric, not geocentric
 : 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 : 3425571838326304000
 2Mass ID (if available) : 06161868+2339328
 ICRS Star Coord at Epoch: 06h 16m 18.69084s +23:39:32.88416s
 RUWE (>1.4 is poor) : 0.89
 K magnitude : 14.873
 G magnitude : 18.628
 RP magnitude : 17.600
 BP magnitude : 19.770
 DUPflag : 0
 Distance (au) : 17.972
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.35
 Sun-Target sep (deg) : 176.23
 Sun-Moon sep (deg) : 173.98
 B (ring opening deg) : 72.08
 PA of pole (deg) : 64.79
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.636
 C/A sky separation (km) : 21328.3
 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



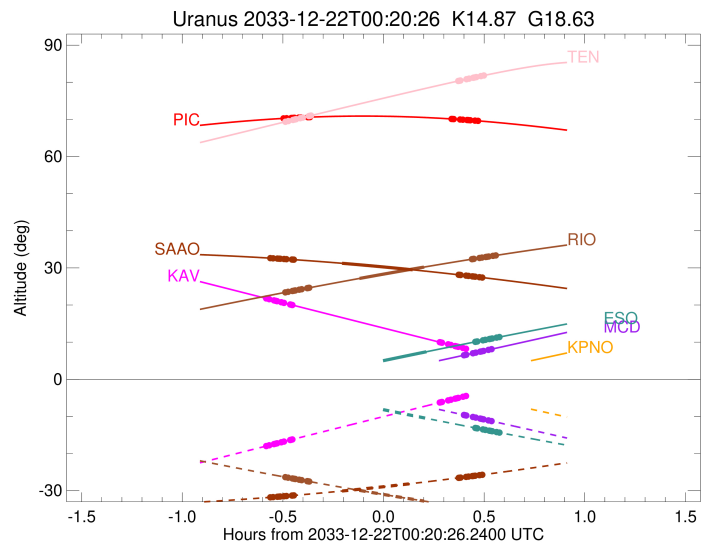
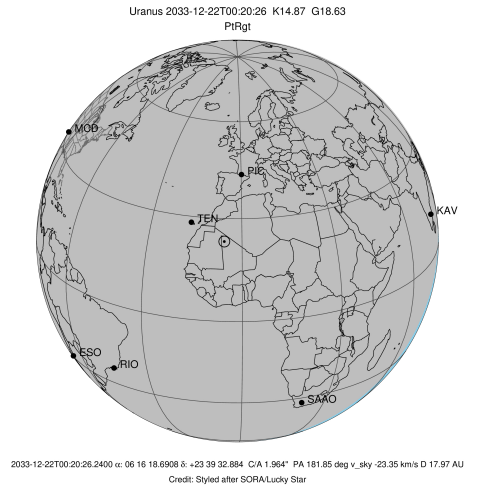
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-12-21T23:51:25.603		23.46	-26.41	50801.16	-22.22		
lambda	I	2033-12-21T23:52:00.446		23.56	-26.51	50026.71	-22.19		
delta	I	2033-12-21T23:53:18.568		23.78	-26.72	48300.35	-22.00		
gamma	I	2033-12-21T23:53:49.290		23.87	-26.81	47625.49	-21.93		
eta	I	2033-12-21T23:54:09.809		23.93	-26.87	47176.12	-21.87		
beta	I	2033-12-21T23:55:18.506		24.13	-27.06	45679.98	-21.68		
alpha	I	2033-12-21T23:56:02.999		24.26	-27.18	44717.37	-21.56		
4	I	2033-12-21T23:57:45.674		24.55	-27.46	42527.38	-21.21		
5	I	2033-12-21T23:57:57.623		24.59	-27.49	42265.65	-21.13		
6	I	2033-12-21T23:58:17.463		24.64	-27.55	41844.86	-21.09		
Uranus	I	2033-12-22T00:13:15.004		27.15	-29.93	25552.83		-1.87	-1.96
Uranus	E	2033-12-22T00:32:33.263		30.22	-32.81	25163.61		15.35	16.04
6	E	2033-12-22T00:46:50.115		32.35	-34.79	41870.60	21.14		
5	E	2033-12-22T00:47:03.565		32.39	-34.82	42155.25	21.18		
4	E	2033-12-22T00:47:23.911		32.44	-34.86	42602.47	21.26		
alpha	E	2033-12-22T00:49:03.959		32.67	-35.08	44747.77	21.62		
beta	E	2033-12-22T00:49:46.033		32.77	-35.17	45656.53	21.75		
eta	E	2033-12-22T00:50:55.558		32.94	-35.33	47176.12	21.94		
gamma	E	2033-12-22T00:51:15.878		32.99	-35.37	47622.48	21.99		
delta	E	2033-12-22T00:51:46.643		33.06	-35.44	48300.35	22.07		
lambda	E	2033-12-22T00:53:04.518		33.24	-35.60	50026.71	22.26		
epsilon	E	2033-12-22T00:53:57.448		33.37	-35.72	51208.08	22.30		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-22T00:24:08.070
 Event type : PtRgt
 : Uranus occs: topocentric, not geocentric
 : 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 : 3425571838326304000
 2Mass ID (if available) : 06161868+2339328
 ICRS Star Coord at Epoch: 06h 16m 18.69084s +23:39:32.88416s
 RUWE (>1.4 is poor) : 0.89
 K magnitude : 14.873
 G magnitude : 18.628
 RP magnitude : 17.600
 BP magnitude : 19.770
 DUPflag : 0
 Distance (au) : 17.972
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.35
 Sun-Target sep (deg) : 176.23
 Sun-Moon sep (deg) : 173.94
 B (ring opening deg) : 72.08
 PA of pole (deg) : 64.79
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.661
 C/A sky separation (km) : 21653.1
 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	2033-12-21T23:52:15.281	-0.39x	-2.91x	50799.34	-21.97			
lambda	I	2033-12-21T23:52:50.441	-0.27x	-3.02x	50026.71	-21.94			
delta	I	2033-12-21T23:54:09.476	-0.01x	-3.28x	48300.35	-21.75			
gamma	I	2033-12-21T23:54:40.566	0.09x	-3.37x	47625.45	-21.67			
eta	I	2033-12-21T23:55:01.330	0.15x	-3.44x	47176.12	-21.61			
beta	I	2033-12-21T23:56:10.864	0.38x	-3.66x	45680.05	-21.42			
alpha	I	2033-12-21T23:56:55.901	0.52x	-3.80x	44717.71	-21.29			
4	I	2033-12-21T23:58:39.916	0.86x	-4.13x	42527.50	-20.93			
5	I	2033-12-21T23:58:52.078	0.90x	-4.17x	42264.85	-20.85			
6	I	2033-12-21T23:59:12.126	0.96x	-4.23x	41845.31	-20.80			
Uranus	I	2033-12-22T00:14:30.443	3.90x	-7.10	25555.40			-1.43	-1.50
Uranus	E	2033-12-22T00:33:14.139	7.41	-10.53	25173.88			15.14	15.82
6	E	2033-12-22T00:47:50.155	10.08	-13.12	41870.79	20.88			
5	E	2033-12-22T00:48:03.763	10.13	-13.16	42155.19	20.92			
4	E	2033-12-22T00:48:24.358	10.19	-13.22	42602.24	21.00			
alpha	E	2033-12-22T00:50:05.618	10.49	-13.51	44747.88	21.37			
beta	E	2033-12-22T00:50:48.179	10.62	-13.64	45656.65	21.50			
eta	E	2033-12-22T00:51:58.476	10.83	-13.84	47176.12	21.70			
gamma	E	2033-12-22T00:52:19.018	10.89	-13.90	47622.45	21.76			
delta	E	2033-12-22T00:52:50.117	10.98	-13.99	48300.35	21.84			
lambda	E	2033-12-22T00:54:08.815	11.22	-14.22	50026.71	22.03			
epsilon	E	2033-12-22T00:55:02.197	11.38	-14.37	51206.03	22.07			

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-12-22T00:18:49.940
 Event type : PtRgt
 : Uranus occs: topocentric, not geocentric
 : 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 : 3425571838326304000
 2Mass ID (if available) : 06161868+2339328
 ICRS Star Coord at Epoch: 06h 16m 18.69084s +23:39:32.88416s
 RUWE (>1.4 is poor) : 0.89
 K magnitude : 14.873
 G magnitude : 18.628
 RP magnitude : 17.600
 BP magnitude : 19.770
 DUPflag : 0
 Distance (au) : 17.972
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.35
 Sun-Target sep (deg) : 176.23
 Sun-Moon sep (deg) : 174.01
 B (ring opening deg) : 72.08
 PA of pole (deg) : 64.79
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.569
 C/A sky separation (km) : 20454.8
 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	2033-12-21T23:46:56.997		32.61	-31.78	50806.72	-22.52		
lambda	I	2033-12-21T23:47:31.630		32.58	-31.74	50026.71	-22.49		
delta	I	2033-12-21T23:48:48.687		32.51	-31.65	48300.35	-22.32		
gamma	I	2033-12-21T23:49:18.968		32.48	-31.61	47625.64	-22.24		
eta	I	2033-12-21T23:49:39.198		32.46	-31.59	47176.12	-22.20		
beta	I	2033-12-21T23:50:46.880		32.40	-31.51	45679.77	-22.02		
alpha	I	2033-12-21T23:51:30.718		32.35	-31.45	44716.37	-21.90		
4	I	2033-12-21T23:53:11.662		32.25	-31.33	42527.05	-21.58		
5	I	2033-12-21T23:53:23.254		32.24	-31.31	42267.95	-21.51		
6	I	2033-12-21T23:53:42.907		32.22	-31.29	41843.54	-21.47		
Uranus	I	2033-12-22T00:08:04.940		31.24	-30.10	25542.87		-3.03	-3.17
Uranus	E	2033-12-22T00:29:06.319		29.49	-28.07	25139.82		15.83	16.54
6	E	2033-12-22T00:42:52.186		28.14	-26.56	41870.13	21.44		
5	E	2033-12-22T00:43:05.473		28.12	-26.53	42155.41	21.48		
4	E	2033-12-22T00:43:25.551		28.09	-26.49	42603.02	21.55		
alpha	E	2033-12-22T00:45:04.313		27.92	-26.30	44747.50	21.87		
beta	E	2033-12-22T00:45:45.906		27.84	-26.22	45656.24	21.99		
eta	E	2033-12-22T00:46:54.712		27.72	-26.09	47176.12	22.16		
gamma	E	2033-12-22T00:47:14.833		27.69	-26.05	47622.53	22.21		
delta	E	2033-12-22T00:47:45.301		27.63	-25.99	48300.35	22.28		
lambda	E	2033-12-22T00:49:02.481		27.50	-25.84	50026.71	22.45		
epsilon	E	2033-12-22T00:49:55.193		27.40	-25.73	51212.93	22.48		