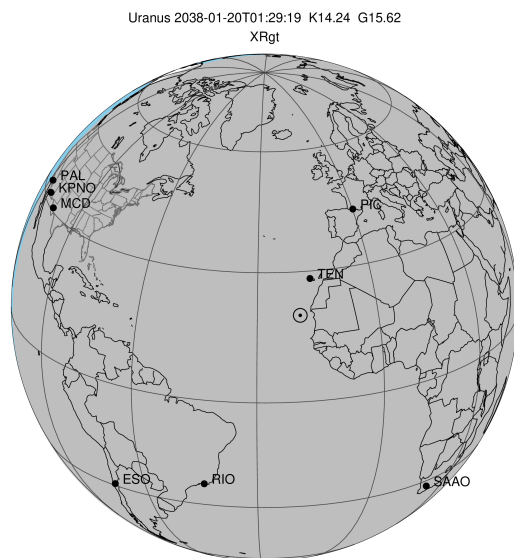


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2038-01-20T01:29:19.070  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 865659287100466432  
 2Mass ID (if available) : 07321964+2214518

ICRS Star Coord at Epoch: 07h 32m 19.64010s +22:14:51.79881s

RUWE (>1.4 is poor) : 1.08  
 K magnitude : 14.244  
 G magnitude : 15.620  
 RP magnitude : 15.193  
 BP magnitude : 15.890  
 DUPflag : 0  
 Distance (au) : 17.728  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.97  
 Sun-Target sep (deg) : 171.71  
 Sun-Moon sep (deg) : 5.97  
 B (ring opening deg) : 55.48  
 PA of pole (deg) : 84.51

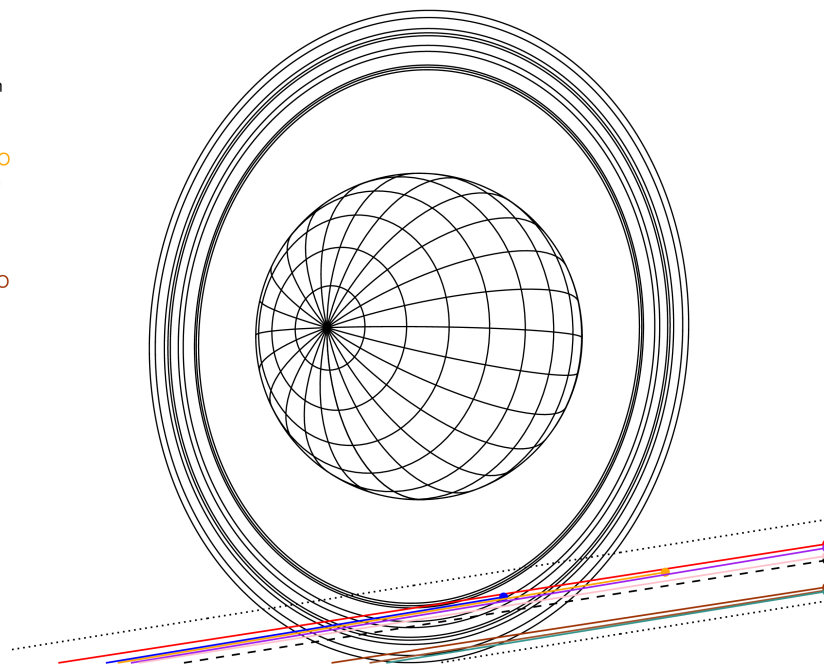
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2038-01-20T01:29:19.0700 a: 07 32 19.6401 s: +22 14 51.799 C/A 3.466° PA 9.07 deg v\_sky -22.97 km/s D 17.73 AU  
 Credit: Styled after SORA/Lucky Star

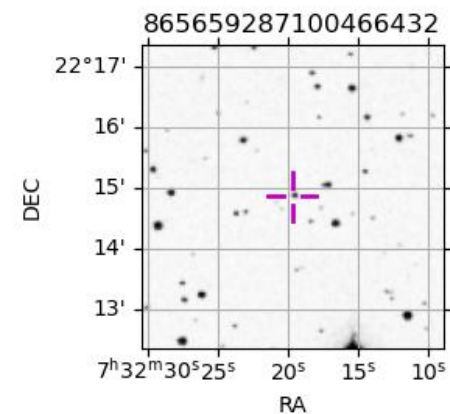
Uranus 2038-01-20T01:29:19 K14.24 G15.62 XRgt

Earth  
 PIC  
 PAL  
 KPNO  
 MCD  
 TEN  
 RIO  
 ESO  
 SAAO

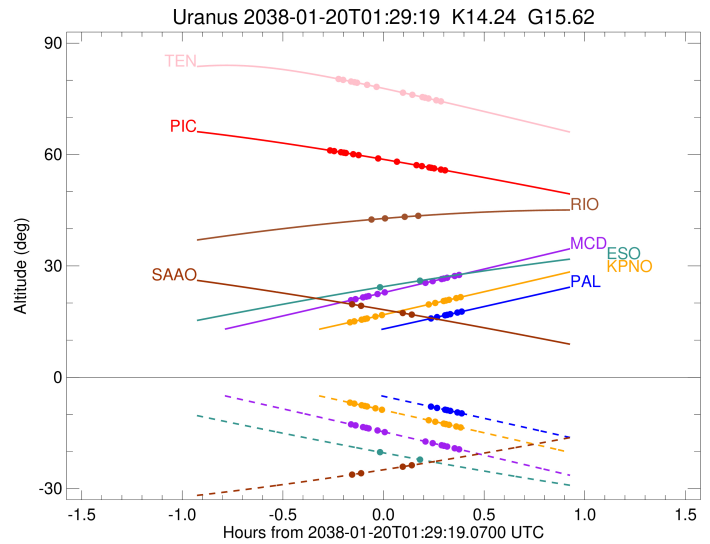
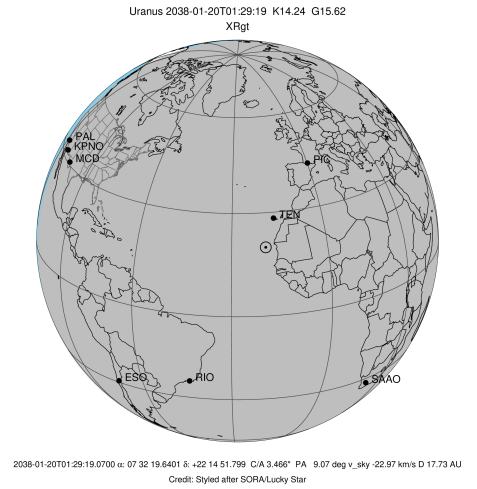


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++++		+++++++	JAN 20 01:13 - JAN 20 01:47	PnnRie
PAL	Palomar Mt (200")	33.4	243.1			+++++++	JAN 20 01:43 - JAN 20 01:52	PnnRne
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++++		+++++++	JAN 20 01:19 - JAN 20 01:52	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++++		+++++++	JAN 20 01:20 - JAN 20 01:51	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++++		+++++++	JAN 20 01:16 - JAN 20 01:46	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	++		++	JAN 20 01:26 - JAN 20 01:38	PnnRie
ESO	European Southern Obs	-29.3	289.3	+		+	JAN 20 01:29 - JAN 20 01:38	PnnRie
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	++		++	JAN 20 01:20 - JAN 20 01:37	PnnRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2038-01-20T01:28:10.090  
 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 : 865659287100466432  
 2Mass ID (if available) : 07321964+2214518  
 ICRS Star Coord at Epoch: 07h 32m 19.64010s +22:14:51.79881s  
 RUWE (>1.4 is poor) : 1.08  
 K magnitude : 14.244  
 G magnitude : 15.620  
 RP magnitude : 15.193  
 BP magnitude : 15.890  
 DUPflag : 0  
 Distance (au) : 17.728  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.97  
 Sun-Target sep (deg) : 171.71  
 Sun-Moon sep (deg) : 6.40  
 B (ring opening deg) : 55.48  
 PA of pole (deg) : 84.51  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.258  
 C/A sky separation (km) : 41895.6  
 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

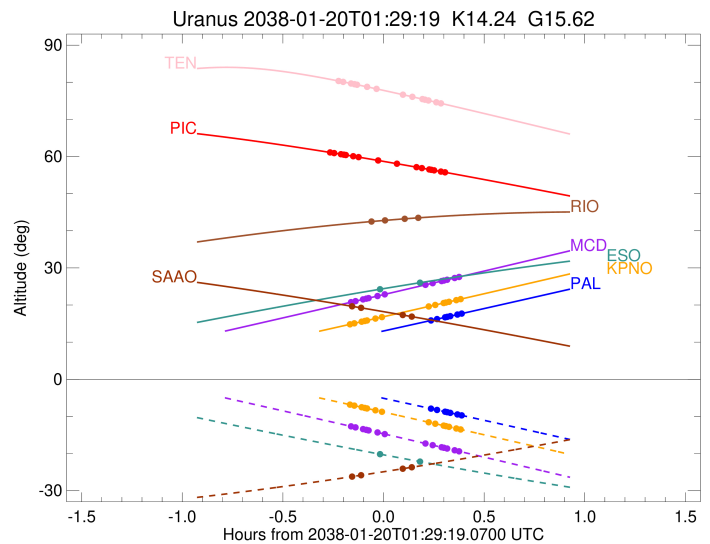
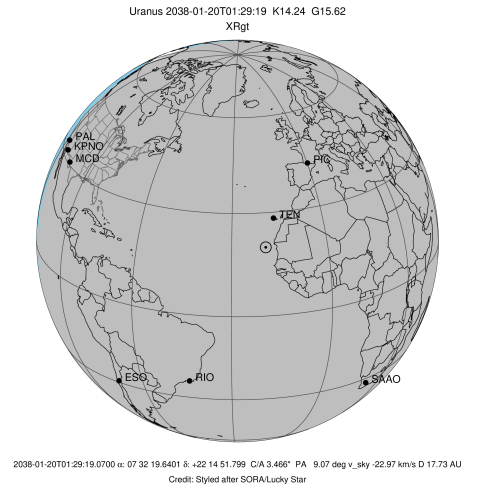


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2038-01-20T01:13:49.393		61.04	-63.74	50756.84	-15.38		
lambda	I	2038-01-20T01:14:37.527		60.92	-63.65	50026.71	-14.90		
delta	I	2038-01-20T01:16:39.120		60.62	-63.43	48300.35	-13.47		
gamma	I	2038-01-20T01:17:30.345		60.50	-63.34	47627.03	-12.81		
eta	I	2038-01-20T01:18:06.183		60.41	-63.27	47176.12	-12.34		
beta	I	2038-01-20T01:20:19.050		60.08	-63.02	45658.78	-10.49		
alpha	I	2038-01-20T01:21:59.041		59.83	-62.83	44688.88	-8.97		
4	I	2038-01-20T01:28:03.041		58.89	-62.10	42527.01	-2.72		

No planet occultations

4	E	2038-01-20T01:32:59.815		58.12	-61.48	42529.75	2.72		
alpha	E	2038-01-20T01:39:06.201		57.15	-60.69	44705.02	8.97		
beta	E	2038-01-20T01:40:45.404		56.88	-60.46	45673.34	10.49		
eta	E	2038-01-20T01:42:56.877		56.52	-60.17	47176.12	12.34		
gamma	E	2038-01-20T01:43:32.385		56.43	-60.09	47622.43	12.80		
delta	E	2038-01-20T01:44:24.016		56.29	-59.97	48300.35	13.46		
lambda	E	2038-01-20T01:46:25.727		55.95	-59.69	50026.71	14.89		
epsilon	E	2038-01-20T01:47:23.173		55.80	-59.55	50900.04	15.37		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2038-01-20T01:33:18.750  
 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 : 865659287100466432  
 2Mass ID (if available) : 07321964+2214518  
 ICRS Star Coord at Epoch: 07h 32m 19.64010s +22:14:51.79881s  
 RUWE (>1.4 is poor) : 1.08  
 K magnitude : 14.244  
 G magnitude : 15.620  
 RP magnitude : 15.193  
 BP magnitude : 15.890  
 DUPflag : 0  
 Distance (au) : 17.728  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.97  
 Sun-Target sep (deg) : 171.71  
 Sun-Moon sep (deg) : 5.19  
 B (ring opening deg) : 55.48  
 PA of pole (deg) : 84.51  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.299  
 C/A sky separation (km) : 42420.1  
 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\_itrf93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

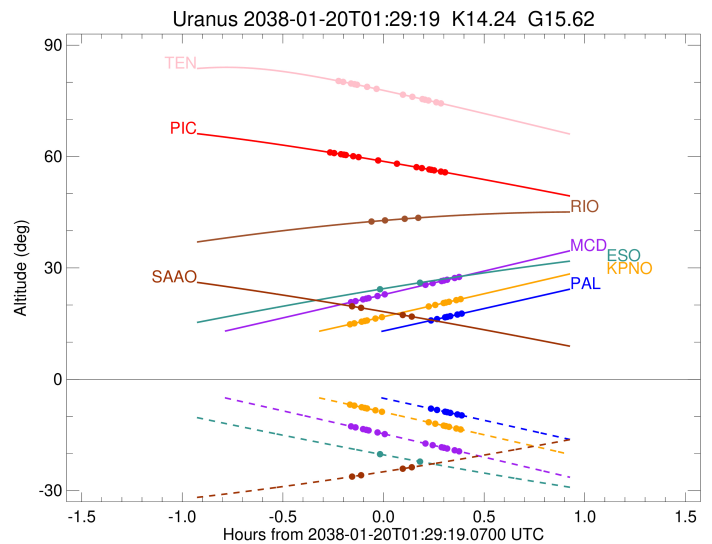
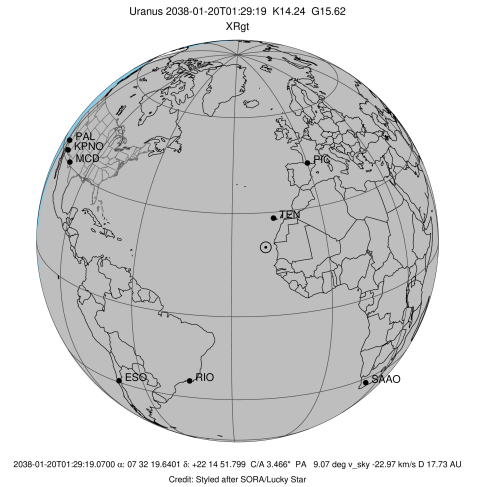


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2038-01-20T01:19:26.849		11.04	-3.20x	50755.68	-14.71		
lambda	I	2038-01-20T01:20:17.188		11.21	-3.37x	50026.71	-14.20		
delta	I	2038-01-20T01:22:25.443		11.63	-3.78x	48300.35	-12.69		
gamma	I	2038-01-20T01:23:19.985		11.81	-3.96x	47626.94	-11.99		
eta	I	2038-01-20T01:23:58.364		11.94	-4.08x	47176.12	-11.49		
beta	I	2038-01-20T01:26:23.002		12.42	-4.55x	45659.30	-9.47		
alpha	I	2038-01-20T01:28:15.950		12.80	-4.92x	44689.44	-7.75		

No planet occultations

alpha	E	2038-01-20T01:43:24.754		15.83	-7.90	44703.44	7.76		
beta	E	2038-01-20T01:45:16.725		16.21	-8.27	45672.64	9.49		
eta	E	2038-01-20T01:47:39.625		16.69	-8.74	47176.12	11.51		
gamma	E	2038-01-20T01:48:17.573		16.81	-8.86	47622.56	12.02		
delta	E	2038-01-20T01:49:12.378		17.00	-9.05	48300.35	12.72		
lambda	E	2038-01-20T01:51:20.366		17.43	-9.47	50026.71	14.24		
epsilon	E	2038-01-20T01:52:19.689		17.63	-9.67	50890.68	14.74		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2038-01-20T01:33:18.630  
 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 : 865659287100466432  
 2Mass ID (if available) : 07321964+2214518  
 ICRS Star Coord at Epoch: 07h 32m 19.64010s +22:14:51.79881s  
 RUWE (>1.4 is poor) : 1.08  
 K magnitude : 14.244  
 G magnitude : 15.620  
 RP magnitude : 15.193  
 BP magnitude : 15.890  
 DUPflag : 0  
 Distance (au) : 17.728  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.97  
 Sun-Target sep (deg) : 171.71  
 Sun-Moon sep (deg) : 5.19  
 B (ring opening deg) : 55.48  
 PA of pole (deg) : 84.51  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.323  
 C/A sky separation (km) : 42731.1  
 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\_itrf93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

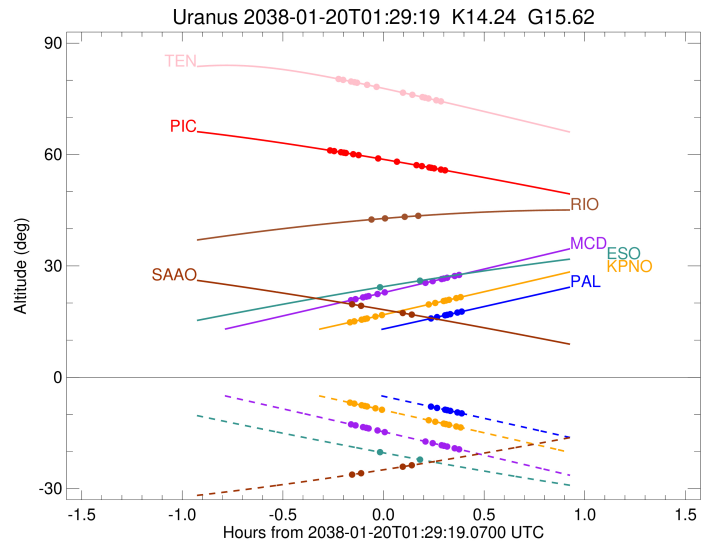
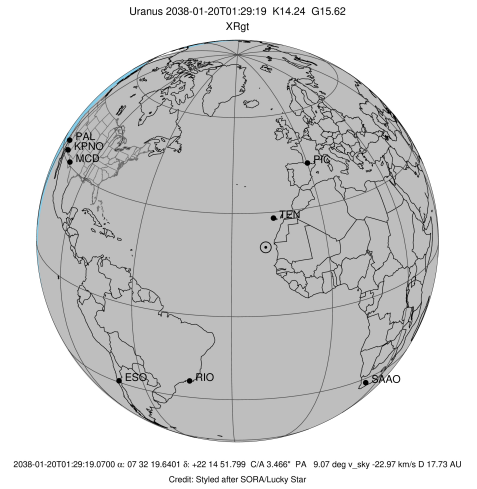


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2038-01-20T01:19:47.248		14.90	-6.93	50754.55	-14.46		
lambda	I	2038-01-20T01:20:38.429		15.07	-7.10	50026.71	-13.93		
delta	I	2038-01-20T01:22:49.617		15.52	-7.54	48300.35	-12.36		
gamma	I	2038-01-20T01:23:45.753		15.71	-7.73	47626.86	-11.63		
eta	I	2038-01-20T01:24:25.403		15.84	-7.86	47176.12	-11.10		
beta	I	2038-01-20T01:26:56.561		16.36	-8.37	45659.71	-8.95		
alpha	I	2038-01-20T01:28:57.987		16.77	-8.78	44689.91	-7.07		

No planet occultations

alpha	E	2038-01-20T01:42:44.036		19.60	-11.56	44702.66	7.08		
beta	E	2038-01-20T01:44:44.481		20.01	-11.97	45672.30	8.97		
eta	E	2038-01-20T01:47:13.904		20.53	-12.48	47176.12	11.12		
gamma	E	2038-01-20T01:47:53.123		20.66	-12.61	47622.62	11.65		
delta	E	2038-01-20T01:48:49.522		20.86	-12.81	48300.35	12.38		
lambda	E	2038-01-20T01:51:00.444		21.31	-13.25	50026.71	13.96		
epsilon	E	2038-01-20T01:52:00.600		21.52	-13.46	50887.13	14.49		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2038-01-20T01:33:13.720  
 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 : 865659287100466432  
 2Mass ID (if available) : 07321964+2214518  
 ICRS Star Coord at Epoch: 07h 32m 19.64010s +22:14:51.79881s  
 RUWE (>1.4 is poor) : 1.08  
 K magnitude : 14.244  
 G magnitude : 15.620  
 RP magnitude : 15.193  
 BP magnitude : 15.890  
 DUPflag : 0  
 Distance (au) : 17.728  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.97  
 Sun-Target sep (deg) : 171.71  
 Sun-Moon sep (deg) : 5.20  
 B (ring opening deg) : 55.48  
 PA of pole (deg) : 84.51  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.352  
 C/A sky separation (km) : 43099.6  
 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

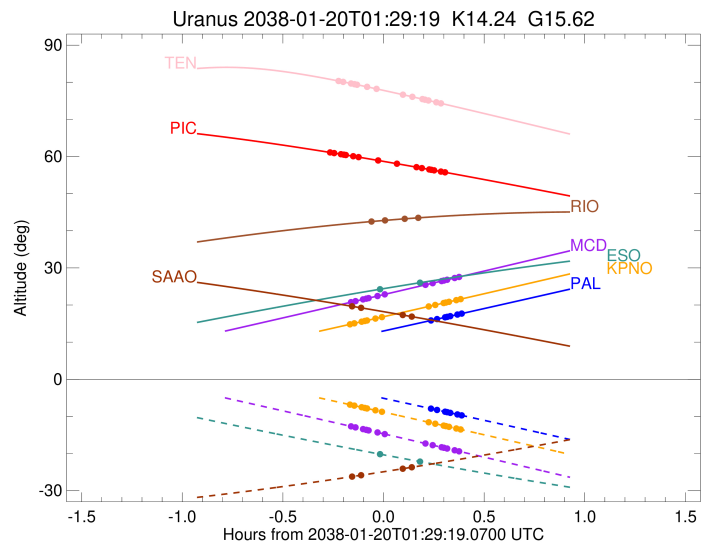
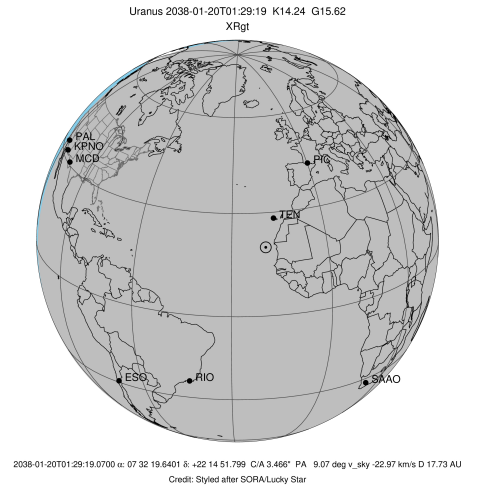


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2038-01-20T01:20:07.343		20.87	-12.79	50753.23	-14.16		
lambda	I	2038-01-20T01:20:59.585		21.05	-12.97	50026.71	-13.61		
delta	I	2038-01-20T01:23:14.524		21.52	-13.43	48300.35	-11.95		
gamma	I	2038-01-20T01:24:12.749		21.72	-13.63	47626.75	-11.18		
eta	I	2038-01-20T01:24:54.092		21.87	-13.78	47176.12	-10.62		
beta	I	2038-01-20T01:27:34.362		22.43	-14.33	45660.24	-8.29		
alpha	I	2038-01-20T01:29:49.067		22.90	-14.80	44690.57	-6.15		

No planet occultations

alpha	E	2038-01-20T01:41:44.612		25.42	-17.29	44701.64	6.16		
beta	E	2038-01-20T01:43:58.337		25.89	-17.75	45671.86	8.30		
eta	E	2038-01-20T01:46:36.880		26.45	-18.31	47176.12	10.63		
gamma	E	2038-01-20T01:47:17.794		26.59	-18.45	47622.69	11.20		
delta	E	2038-01-20T01:48:16.284		26.80	-18.66	48300.35	11.97		
lambda	E	2038-01-20T01:50:30.963		27.27	-19.13	50026.71	13.64		
epsilon	E	2038-01-20T01:51:32.174		27.49	-19.34	50882.94	14.19		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2038-01-20T01:28:43.280  
 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 : 865659287100466432  
 2Mass ID (if available) : 07321964+2214518  
 ICRS Star Coord at Epoch: 07h 32m 19.64010s +22:14:51.79881s  
 RUWE (>1.4 is poor) : 1.08  
 K magnitude : 14.244  
 G magnitude : 15.620  
 RP magnitude : 15.193  
 BP magnitude : 15.890  
 DUPflag : 0  
 Distance (au) : 17.728  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -22.97  
 Sun-Target sep (deg) : 171.71  
 Sun-Moon sep (deg) : 6.24  
 B (ring opening deg) : 55.48  
 PA of pole (deg) : 84.51  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.406  
 C/A sky separation (km) : 43787.3  
 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\_itr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



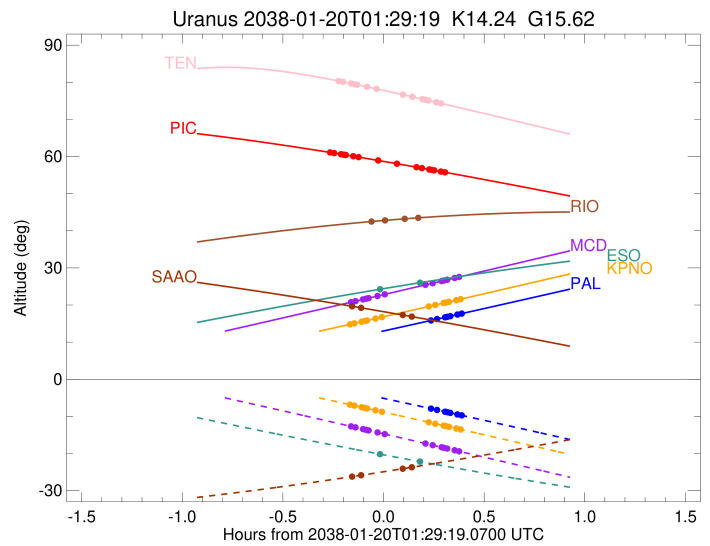
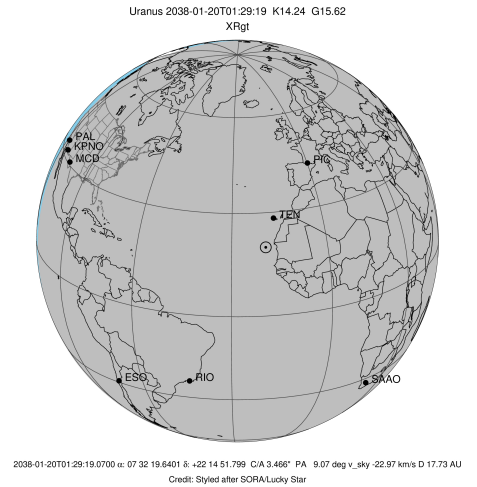
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2038-01-20T01:16:24.791		80.26	-82.00	50750.48	-13.72		
lambda	I	2038-01-20T01:17:18.660		80.10	-82.00	50026.71	-13.11		
delta	I	2038-01-20T01:19:40.113		79.67	-81.97	48300.35	-11.27		
gamma	I	2038-01-20T01:20:42.294		79.48	-81.95	47626.52	-10.39		
eta	I	2038-01-20T01:21:26.993		79.34	-81.93	47176.12	-9.75		
beta	I	2038-01-20T01:24:27.962		78.77	-81.81	45661.47	-6.96		
alpha	I	2038-01-20T01:27:25.192		78.19	-81.64	44692.38	-3.99		

No planet occultations

alpha	E	2038-01-20T01:34:58.582		76.69	-80.99	44699.54	3.99		
beta	E	2038-01-20T01:37:54.983		76.09	-80.66	45671.09	6.96		
eta	E	2038-01-20T01:40:54.517		75.48	-80.30	47176.12	9.75		
gamma	E	2038-01-20T01:41:38.875		75.32	-80.20	47622.80	10.39		
delta	E	2038-01-20T01:42:41.440		75.11	-80.06	48300.35	11.26		
lambda	E	2038-01-20T01:45:02.961		74.62	-79.73	50026.71	13.10		
epsilon	E	2038-01-20T01:46:06.063		74.40	-79.58	50877.54	13.72		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2038-01-20T01:29:55.050
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      : 865659287100466432
2Mass ID (if available) : 07321964+2214518
ICRS Star Coord at Epoch: 07h 32m 19.64010s +22:14:51.79881s
RUWE (>1.4 is poor) : 1.08
K magnitude          : 14.244
G magnitude          : 15.620
RP magnitude         : 15.193
BP magnitude         : 15.890
DUPflag             : 0
Distance (au)        : 17.728
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -22.97
Sun-Target sep (deg) : 171.71
Sun-Moon sep (deg)  : 5.86
B (ring opening deg) : 55.48
PA of pole (deg)    : 84.51
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.833
C/A sky separation (km) : 49278.3
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
  
```



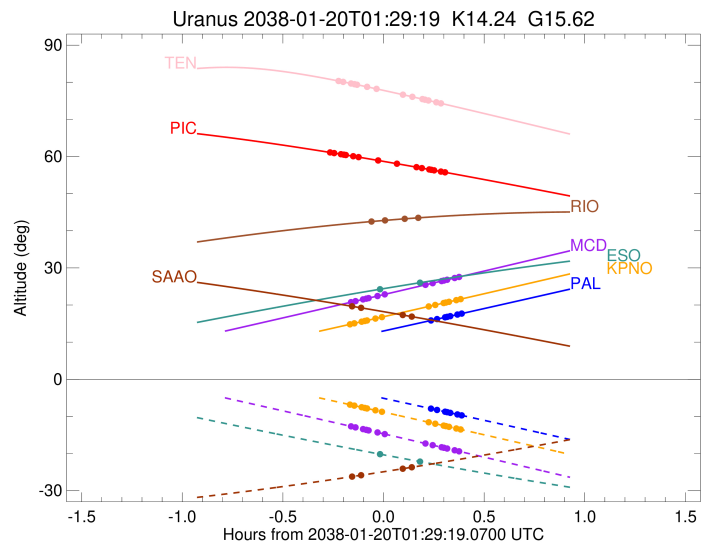
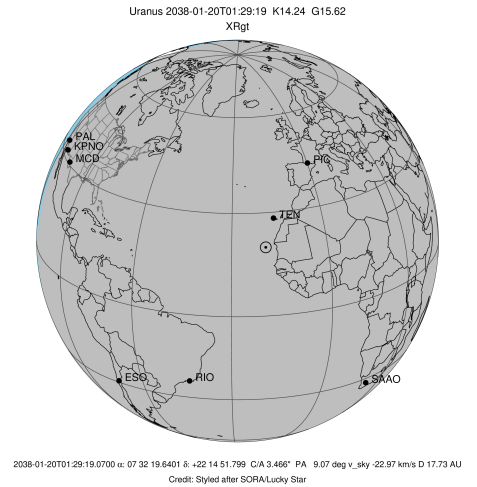
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2038-01-20T01:26:54.406		42.58	-41.04	50747.05	-5.44		
lambda	I	2038-01-20T01:29:51.518		42.81	-41.39	50026.71	-2.70		

No planet occultations

lambda	E	2038-01-20T01:35:33.710		43.22	-42.03	50026.71	2.70		
epsilon	E	2038-01-20T01:38:39.918		43.42	-42.36	50796.98	5.44		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2038-01-20T01:31:23.180
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      : 865659287100466432
2Mass ID (if available) : 07321964+2214518
ICRS Star Coord at Epoch: 07h 32m 19.64010s +22:14:51.79881s
RUWE (>1.4 is poor) : 1.08
K magnitude          : 14.244
G magnitude          : 15.620
RP magnitude         : 15.193
BP magnitude         : 15.890
DUPflag             : 0
Distance (au)        : 17.728
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -22.97
Sun-Target sep (deg) : 171.71
Sun-Moon sep (deg)  : 5.49
B (ring opening deg) : 55.48
PA of pole (deg)    : 84.51
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.861
C/A sky separation (km) : 49642.3
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	2038-01-20T01:29:42.911		24.47	-20.42	50749.94	-4.23		

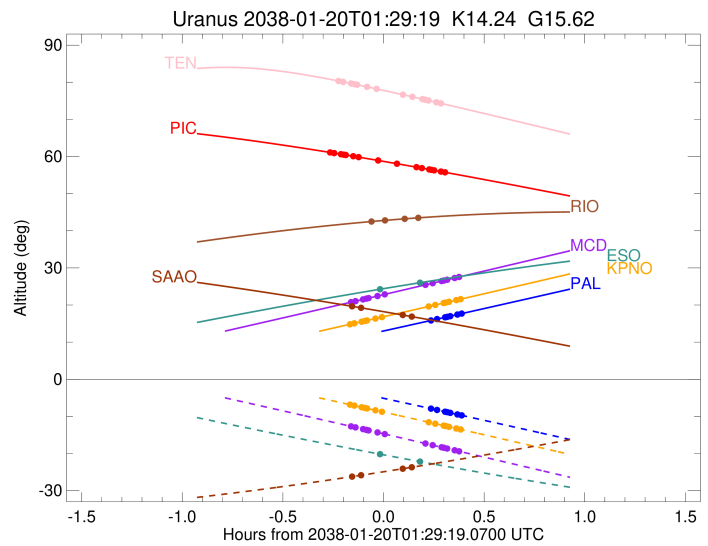
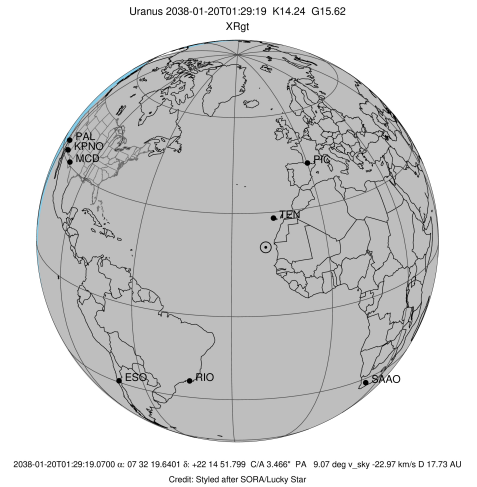
No planet occultations

epsilon	E	2038-01-20T01:38:55.791		25.83	-21.97	50788.44	4.23		
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```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch              : 2038-01-20T01:26:08.380
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        : 865659287100466432
2Mass ID (if available) : 07321964+2214518
ICRS Star Coord at Epoch: 07h 32m 19.64010s +22:14:51.79881s
RUWE (>1.4 is poor)  : 1.08
K magnitude           : 14.244
G magnitude           : 15.620
RP magnitude          : 15.193
BP magnitude          : 15.890
DUPflag              : 0
Distance (au)         : 17.728
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -22.97
Sun-Target sep (deg)  : 171.71
Sun-Moon sep (deg)    : 6.66
B (ring opening deg)  : 55.48
PA of pole (deg)      : 84.51
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.769
C/A sky separation (km) : 48460.3
NAIF SPICE kernels    : RAJobs_U111+rgf15.spk
URKALLvl.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
    
```



```

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  2038-01-20T01:20:51.385  19.52 -26.10  50744.29  -7.37
lambda    I  2038-01-20T01:22:40.661  19.24 -25.85  50026.71  -5.76

No planet occultations

lambda    E  2038-01-20T01:35:01.332  17.31 -24.10  50026.71  5.76
epsilon   E  2038-01-20T01:37:00.007  17.00 -23.81  50813.33  7.37
    
```