

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-01-22T03:39:10.680
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3415723791851252608
 2Mass ID (if available) : 05114081+2304143

ICRS Star Coord at Epoch: 05h 11m 40.81470s +23:04:14.07508s

RUWE (>1.4 is poor) : 1.05
 K magnitude : 11.753
 G magnitude : 13.700
 RP magnitude : 13.040
 BP magnitude : 14.186
 DUPflag : 0
 Distance (au) : 18.411
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.62
 Sun-Target sep (deg) : 137.43
 Sun-Moon sep (deg) : 151.75
 B (ring opening deg) : 82.08
 PA of pole (deg) : 4.27

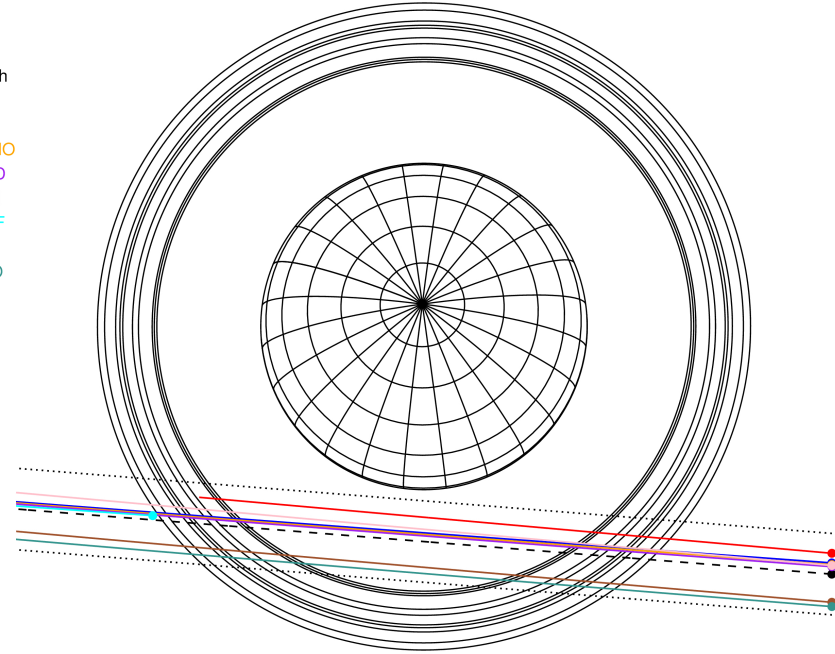
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2031-01-22T03:39:10.6800 ra: 05 11 40.8147 s: +23 04 14.075 C/A 2.508 PA 355.43 deg v_sky -15.62 km/s D 18.41 AU
 Credit: Styled after SORA/Lucky Star

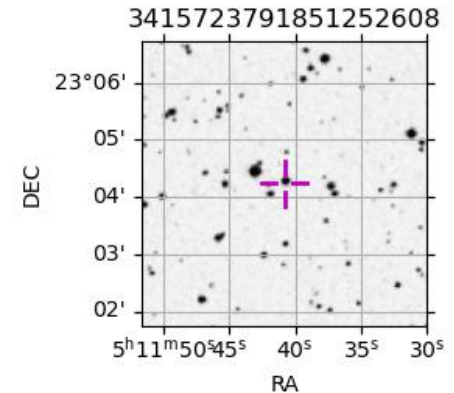
Uranus 2031-01-22T03:39:10 K11.75 G13.70 XRgt

Earth
 PIC
 PAL
 KPNO
 MCD
 TEN
 IRTF
 RIO
 ESO

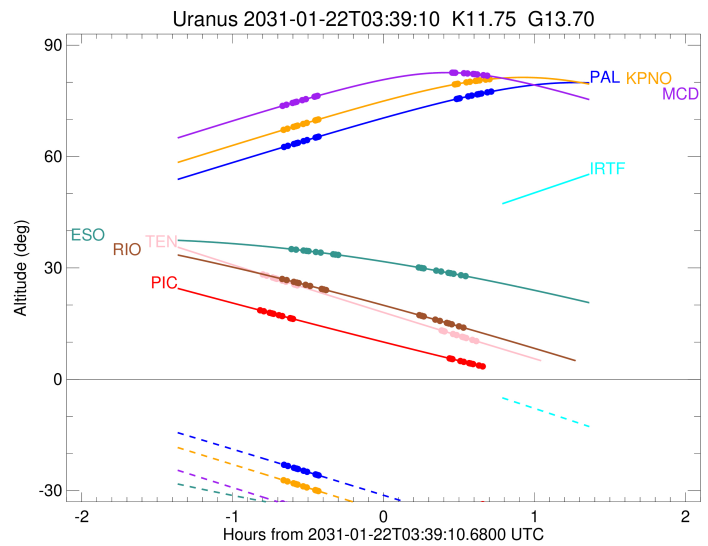
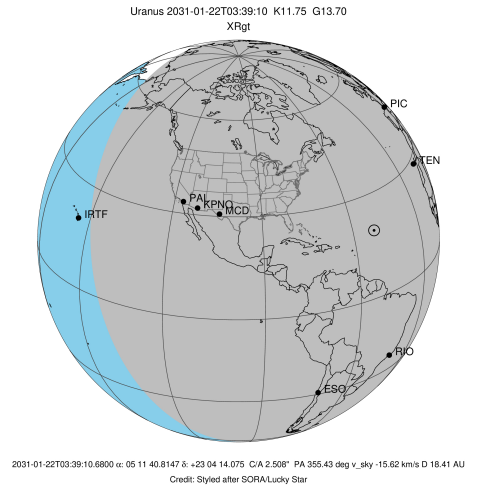


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1	+++++++	+++	+	JAN 22 02:50 - JAN 22 04:06	PnnRie
PAL	Palomar Mt (200")	33.4	243.1	+++++++	+++++++	+	JAN 22 02:59 - JAN 22 04:22	PnnRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8	+++++++	+++++++	+	JAN 22 02:59 - JAN 22 04:21	PnnRie
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++++	+++++++	+	JAN 22 02:59 - JAN 22 04:21	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++++	+++++++	+	JAN 22 02:59 - JAN 22 04:20	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++++	+++++++	+	JAN 22 02:51 - JAN 22 04:16	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++++	+++++++	+	JAN 22 02:59 - JAN 22 04:21	PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++++	+++++++	+	JAN 22 02:59 - JAN 22 04:21	PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++++	+++++++	+	JAN 22 02:58 - JAN 22 04:11	PnnRie
ESO	European Southern Obs	-29.3	289.3	+++++++	+++++++	+	JAN 22 03:02 - JAN 22 04:12	PnnRie
AAT	Siding Spring (AAT)	-31.3	149.1	+++++++	+++++++	+	JAN 22 03:02 - JAN 22 04:12	PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+++++++	+++++++	+	JAN 22 03:02 - JAN 22 04:12	PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++++	+++++++	+	JAN 22 03:02 - JAN 22 04:12	PnnRnn



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-01-22T03:34:10.080
 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 : 3415723791851252608
 2Mass ID (if available) : 05114081+2304143
 ICRS Star Coord at Epoch: 05h 11m 40.81470s +23:04:14.07508s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 11.753
 G magnitude : 13.700
 RP magnitude : 13.040
 BP magnitude : 14.186
 DUPflag : 0
 Distance (au) : 18.411
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.62
 Sun-Target sep (deg) : 137.43
 Sun-Moon sep (deg) : 151.21
 B (ring opening deg) : 82.08
 PA of pole (deg) : 4.27
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.228
 C/A sky separation (km) : 29757.1
 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

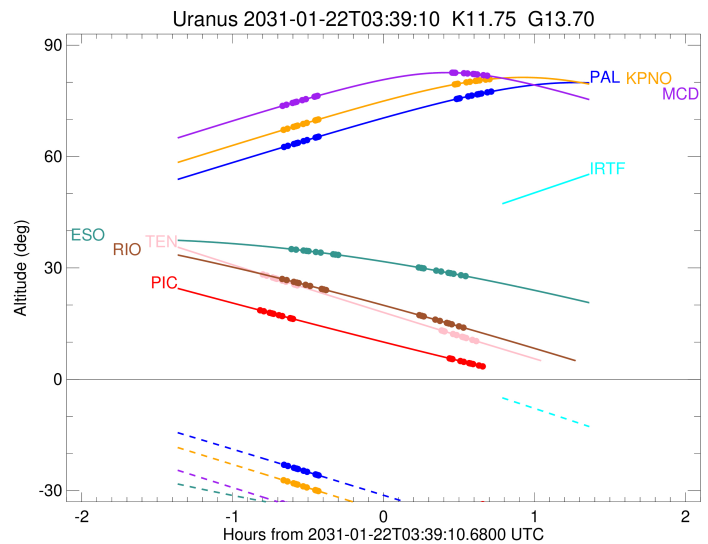
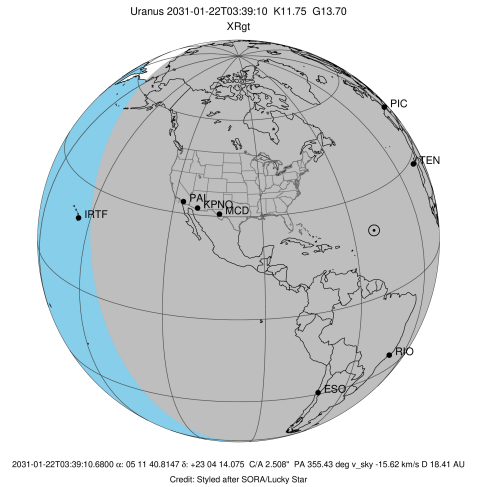


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-01-22T02:50:13.912		18.57	-49.46	51083.37	-12.74		
lambda	I	2031-01-22T02:51:37.789		18.32	-49.22	50026.71	-12.52		
delta	I	2031-01-22T02:53:57.071		17.90	-48.82	48300.35	-12.26		
gamma	I	2031-01-22T02:54:52.352		17.74	-48.66	47625.65	-12.15		
eta	I	2031-01-22T02:55:29.474		17.63	-48.56	47176.12	-12.07		
beta	I	2031-01-22T02:57:36.357		17.26	-48.19	45661.92	-11.78		
alpha	I	2031-01-22T02:58:54.116		17.03	-47.97	44752.37	-11.60		
4	I	2031-01-22T03:02:02.541		16.47	-47.42	42616.38	-11.09		
5	I	2031-01-22T03:02:31.246		16.39	-47.34	42292.41	-10.99		
6	I	2031-01-22T03:03:13.712		16.26	-47.22	41832.71	-10.87		

No planet occultations

6	E	2031-01-22T04:05:20.820		5.64	-36.09	41794.87	10.80		
5	E	2031-01-22T04:05:56.697		5.54	-35.98	42179.54	10.92		
4	E	2031-01-22T04:06:32.628		5.44	-35.87	42575.01	11.02		
alpha	E	2031-01-22T04:09:43.031	4.92x	-35.29	44717.16	11.51			
beta	E	2031-01-22T04:11:02.656	4.70x	-35.05	45641.15	11.69			
eta	E	2031-01-22T04:13:12.392	4.35x	-34.65	47176.12	11.97			
gamma	E	2031-01-22T04:13:50.322	4.25x	-34.53	47631.56	12.05			
delta	E	2031-01-22T04:14:45.595	4.10x	-34.36	48300.35	12.15			
lambda	E	2031-01-22T04:17:06.142	3.72x	-33.94	50026.71	12.41			
epsilon	E	2031-01-22T04:19:07.883	3.39x	-33.56	51549.63	12.62			

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-01-22T03:40:44.270
 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 : 3415723791851252608
 2Mass ID (if available) : 05114081+2304143
 ICRS Star Coord at Epoch: 05h 11m 40.81470s +23:04:14.07508s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 11.753
 G magnitude : 13.700
 RP magnitude : 13.040
 BP magnitude : 14.186
 DUPflag : 0
 Distance (au) : 18.411
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.62
 Sun-Target sep (deg) : 137.43
 Sun-Moon sep (deg) : 152.45
 B (ring opening deg) : 82.08
 PA of pole (deg) : 4.27
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.413
 C/A sky separation (km) : 32224.0
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

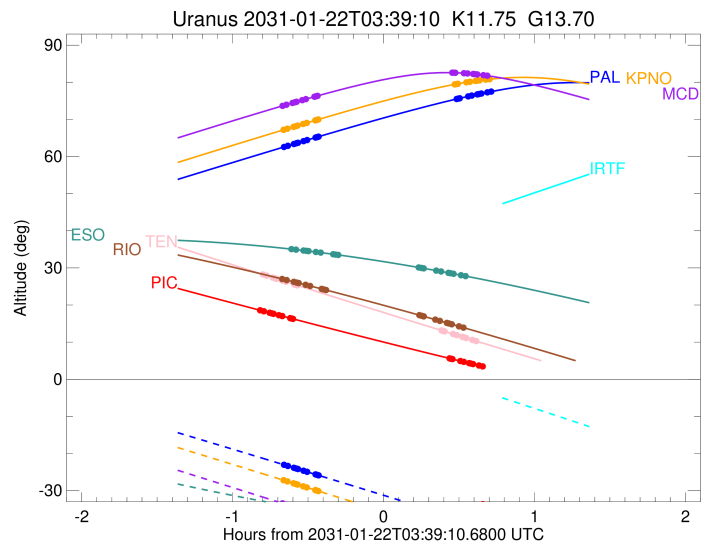
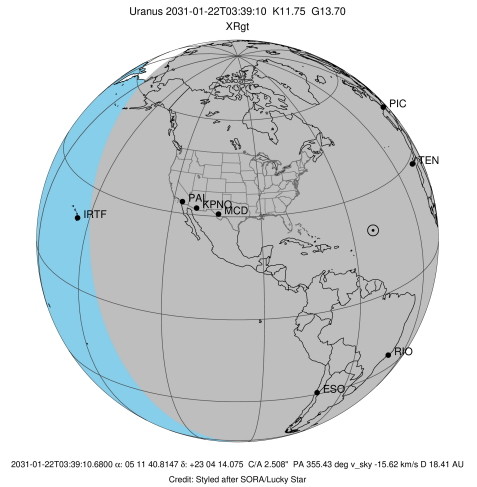


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-01-22T02:59:42.772		62.59	-23.05	51102.38	-12.38		
lambda	I	2031-01-22T03:01:10.864		62.89	-23.36	50026.71	-12.12		
delta	I	2031-01-22T03:03:35.238		63.38	-23.85	48300.35	-11.79		
gamma	I	2031-01-22T03:04:32.774		63.57	-24.05	47625.95	-11.65		
eta	I	2031-01-22T03:05:11.546		63.70	-24.19	47176.12	-11.55		
beta	I	2031-01-22T03:07:24.717		64.15	-24.65	45660.69	-11.19		
alpha	I	2031-01-22T03:08:46.688		64.43	-24.93	44752.43	-10.96		
4	I	2031-01-22T03:12:07.787		65.10	-25.62	42616.56	-10.30		
5	I	2031-01-22T03:12:39.128		65.21	-25.73	42288.09	-10.18		
6	I	2031-01-22T03:13:25.068		65.36	-25.89	41829.50	-10.01		

No planet occultations

6	E	2031-01-22T04:08:10.280		75.48	-37.30	41794.76	10.02		
5	E	2031-01-22T04:08:49.552		75.59	-37.44	42185.66	10.19		
4	E	2031-01-22T04:09:27.765		75.69	-37.57	42579.47	10.32		
alpha	E	2031-01-22T04:12:49.169		76.20	-38.28	44720.24	10.97		
beta	E	2031-01-22T04:14:12.178		76.41	-38.56	45641.06	11.20		
eta	E	2031-01-22T04:16:26.942		76.74	-39.03	47176.12	11.57		
gamma	E	2031-01-22T04:17:06.140		76.83	-39.17	47631.58	11.67		
delta	E	2031-01-22T04:18:03.107		76.96	-39.37	48300.35	11.81		
lambda	E	2031-01-22T04:20:27.256		77.29	-39.87	50026.71	12.14		
epsilon	E	2031-01-22T04:22:31.709		77.57	-40.31	51553.54	12.40		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-01-22T03:40:18.520
 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 : 3415723791851252608
 2Mass ID (if available) : 05114081+2304143
 ICRS Star Coord at Epoch: 05h 11m 40.81470s +23:04:14.07508s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 11.753
 G magnitude : 13.700
 RP magnitude : 13.040
 BP magnitude : 14.186
 DUPflag : 0
 Distance (au) : 18.411
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.62
 Sun-Target sep (deg) : 137.43
 Sun-Moon sep (deg) : 152.39
 B (ring opening deg) : 82.08
 PA of pole (deg) : 4.27
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.431
 C/A sky separation (km) : 32460.8
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



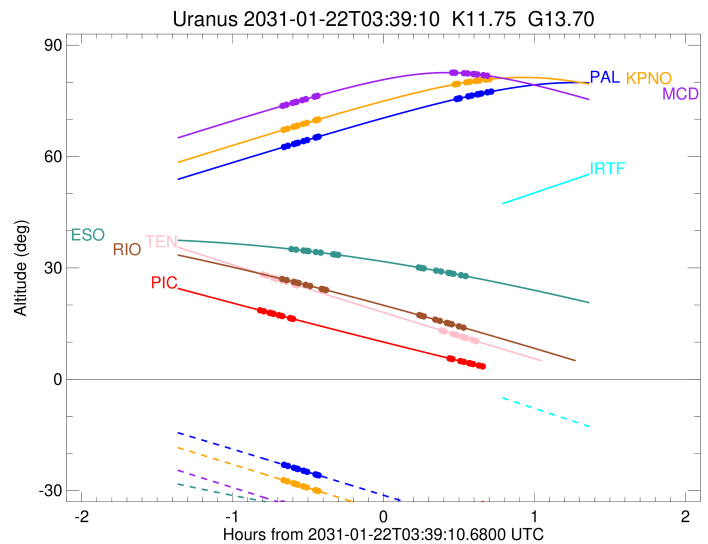
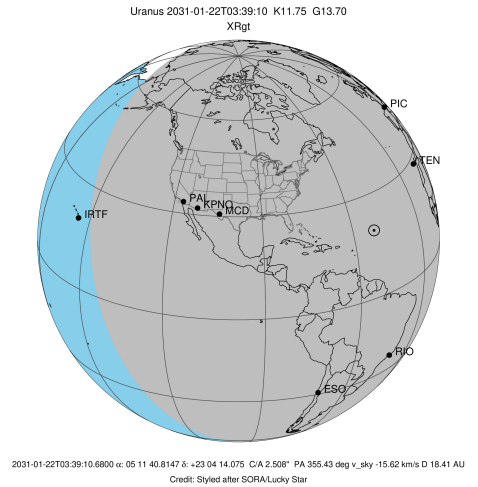
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-01-22T02:59:32.177		67.20	-27.21	51105.09	-12.34		
lambda	I	2031-01-22T03:01:00.835		67.51	-27.52	50026.71	-12.07		
delta	I	2031-01-22T03:03:25.856		68.00	-28.03	48300.35	-11.73		
gamma	I	2031-01-22T03:04:23.678		68.19	-28.24	47625.99	-11.59		
eta	I	2031-01-22T03:05:02.660		68.33	-28.37	47176.12	-11.49		
beta	I	2031-01-22T03:07:16.633		68.78	-28.84	45660.53	-11.12		
alpha	I	2031-01-22T03:08:39.142		69.05	-29.13	44752.43	-10.88		
4	I	2031-01-22T03:12:01.873		69.73	-29.85	42616.56	-10.21		
5	I	2031-01-22T03:12:33.561		69.84	-29.96	42287.51	-10.08		
6	I	2031-01-22T03:13:19.951		69.99	-30.12	41829.09	-9.91		

No planet occultations

6	E	2031-01-22T04:07:24.424		79.42	-41.59	41794.77	9.92		
5	E	2031-01-22T04:08:04.168		79.51	-41.73	42186.18	10.08		
4	E	2031-01-22T04:08:42.739		79.59	-41.87	42579.83	10.22		
alpha	E	2031-01-22T04:12:05.878		79.98	-42.59	44720.48	10.89		
beta	E	2031-01-22T04:13:29.473		80.13	-42.88	45641.05	11.13		
eta	E	2031-01-22T04:15:45.115		80.36	-43.36	47176.12	11.50		
gamma	E	2031-01-22T04:16:24.545		80.42	-43.50	47631.58	11.60		
delta	E	2031-01-22T04:17:21.835		80.51	-43.70	48300.35	11.74		
lambda	E	2031-01-22T04:19:46.725		80.71	-44.22	50026.71	12.08		
epsilon	E	2031-01-22T04:21:51.758		80.87	-44.66	51553.73	12.35		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2031-01-22T03:39:38.270
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       : 3415723791851252608
2Mass ID (if available) : 05114081+2304143
ICRS Star Coord at Epoch: 05h 11m 40.81470s +23:04:14.07508s
RUWE (>1.4 is poor) : 1.05
K magnitude          : 11.753
G magnitude          : 13.700
RP magnitude         : 13.040
BP magnitude         : 14.186
DUPflag              : 0
Distance (au)        : 18.411
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -15.62
Sun-Target sep (deg) : 137.43
Sun-Moon sep (deg)   : 152.31
B (ring opening deg) : 82.08
PA of pole (deg)     : 4.27
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.449
C/A sky separation (km) : 32701.1
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_itr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```

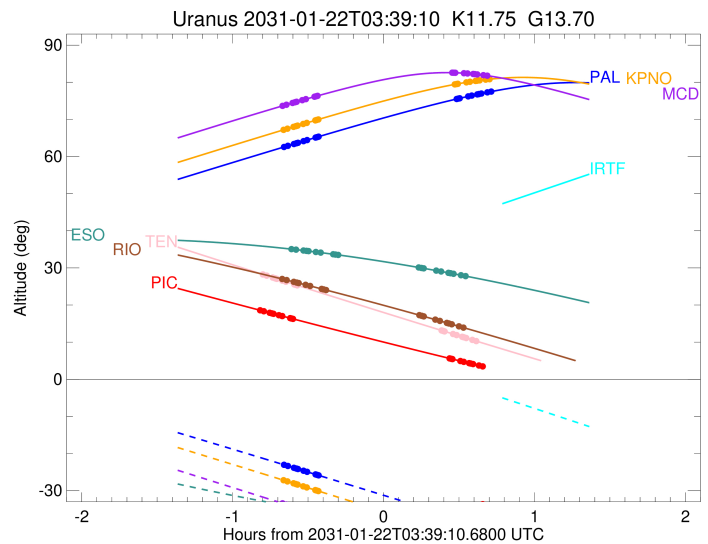
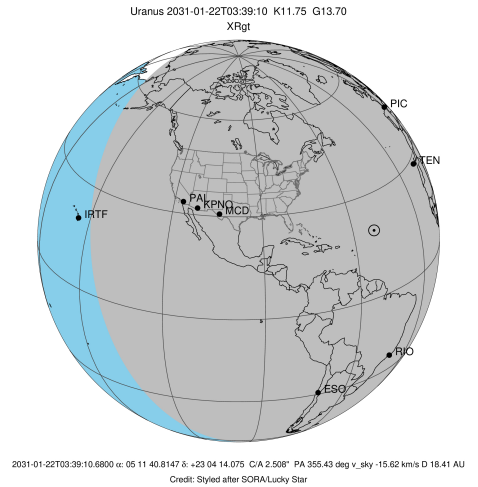


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-01-22T02:59:07.454		73.66	-33.44	51108.02	-12.29		
lambda	I	2031-01-22T03:00:36.703		73.96	-33.76	50026.71	-12.02		
delta	I	2031-01-22T03:03:02.386		74.44	-34.28	48300.35	-11.68		
gamma	I	2031-01-22T03:04:00.503		74.63	-34.49	47626.03	-11.53		
eta	I	2031-01-22T03:04:39.701		74.75	-34.63	47176.12	-11.43		
beta	I	2031-01-22T03:06:54.505		75.19	-35.11	45660.35	-11.04		
alpha	I	2031-01-22T03:08:17.573		75.46	-35.41	44752.42	-10.80		
4	I	2031-01-22T03:11:42.013		76.11	-36.14	42616.57	-10.11		
5	I	2031-01-22T03:12:14.070		76.21	-36.26	42286.89	-9.98		
6	I	2031-01-22T03:13:00.934		76.35	-36.42	41828.65	-9.80		

No planet occultations

6	E	2031-01-22T04:06:23.683		82.59	-47.91	41794.79	9.80		
5	E	2031-01-22T04:07:03.929		82.58	-48.05	42186.69	9.98		
4	E	2031-01-22T04:07:42.889		82.56	-48.19	42580.17	10.11		
alpha	E	2031-01-22T04:11:07.896		82.45	-48.93	44720.71	10.80		
beta	E	2031-01-22T04:12:32.125		82.38	-49.23	45641.06	11.04		
eta	E	2031-01-22T04:14:48.717		82.24	-49.72	47176.12	11.43		
gamma	E	2031-01-22T04:15:28.400		82.20	-49.86	47631.58	11.53		
delta	E	2031-01-22T04:16:26.040		82.13	-50.06	48300.35	11.67		
lambda	E	2031-01-22T04:18:51.737		81.92	-50.58	50026.71	12.02		
epsilon	E	2031-01-22T04:20:57.402		81.72	-51.03	51553.90	12.29		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-01-22T03:33:25.510
 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 : 3415723791851252608
 2Mass ID (if available) : 05114081+2304143
 ICRS Star Coord at Epoch: 05h 11m 40.81470s +23:04:14.07508s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 11.753
 G magnitude : 13.700
 RP magnitude : 13.040
 BP magnitude : 14.186
 DUPflag : 0
 Distance (au) : 18.411
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.62
 Sun-Target sep (deg) : 137.43
 Sun-Moon sep (deg) : 151.14
 B (ring opening deg) : 82.08
 PA of pole (deg) : 4.27
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.369
 C/A sky separation (km) : 31634.9
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

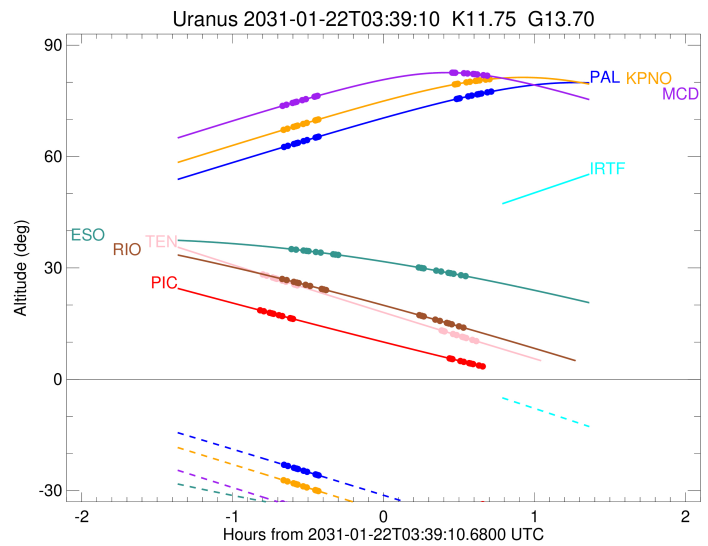
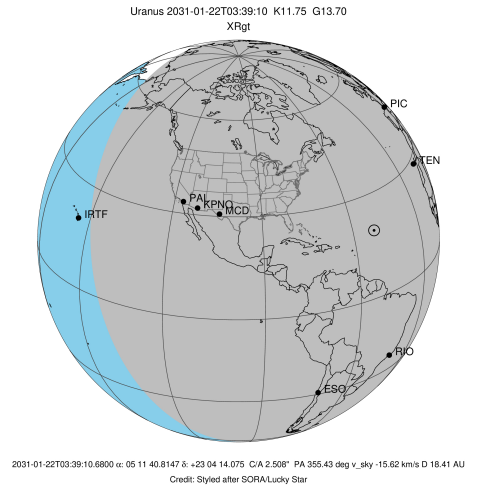


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-01-22T02:51:19.157		28.22	-67.00	51102.29	-12.40		
lambda	I	2031-01-22T02:52:47.081		27.90	-66.69	50026.71	-12.14		
delta	I	2031-01-22T02:55:11.048		27.39	-66.18	48300.35	-11.83		
gamma	I	2031-01-22T02:56:08.364		27.18	-65.98	47625.93	-11.70		
eta	I	2031-01-22T02:56:46.965		27.04	-65.84	47176.12	-11.61		
beta	I	2031-01-22T02:58:59.397		26.57	-65.37	45660.77	-11.26		
alpha	I	2031-01-22T03:00:20.792		26.28	-65.08	44752.43	-11.04		
4	I	2031-01-22T03:03:39.918		25.56	-64.37	42616.55	-10.43		
5	I	2031-01-22T03:04:10.831		25.45	-64.26	42288.53	-10.31		
6	I	2031-01-22T03:04:56.153		25.29	-64.10	41829.83	-10.16		

No planet occultations

6	E	2031-01-22T04:02:09.897		13.17	-51.61	41794.75	10.09		
5	E	2031-01-22T04:02:48.702		13.03	-51.47	42183.42	10.23		
4	E	2031-01-22T04:03:26.849		12.90	-51.33	42577.88	10.35		
alpha	E	2031-01-22T04:06:48.122		12.20	-50.59	44719.11	10.95		
beta	E	2031-01-22T04:08:11.457		11.91	-50.29	45641.07	11.17		
eta	E	2031-01-22T04:10:26.866		11.45	-49.79	47176.12	11.50		
gamma	E	2031-01-22T04:11:06.312		11.31	-49.64	47631.57	11.59		
delta	E	2031-01-22T04:12:03.687		11.11	-49.43	48300.35	11.72		
lambda	E	2031-01-22T04:14:29.082		10.61	-48.90	50026.71	12.02		
epsilon	E	2031-01-22T04:16:34.731		10.18	-48.44	51552.27	12.27		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-01-22T03:34:44.750
 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 : 3415723791851252608
 2Mass ID (if available) : 05114081+2304143
 ICRS Star Coord at Epoch: 05h 11m 40.81470s +23:04:14.07508s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 11.753
 G magnitude : 13.700
 RP magnitude : 13.040
 BP magnitude : 14.186
 DUPflag : 0
 Distance (au) : 18.411
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.62
 Sun-Target sep (deg) : 137.43
 Sun-Moon sep (deg) : 151.22
 B (ring opening deg) : 82.08
 PA of pole (deg) : 4.27
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.814
 C/A sky separation (km) : 37572.2
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

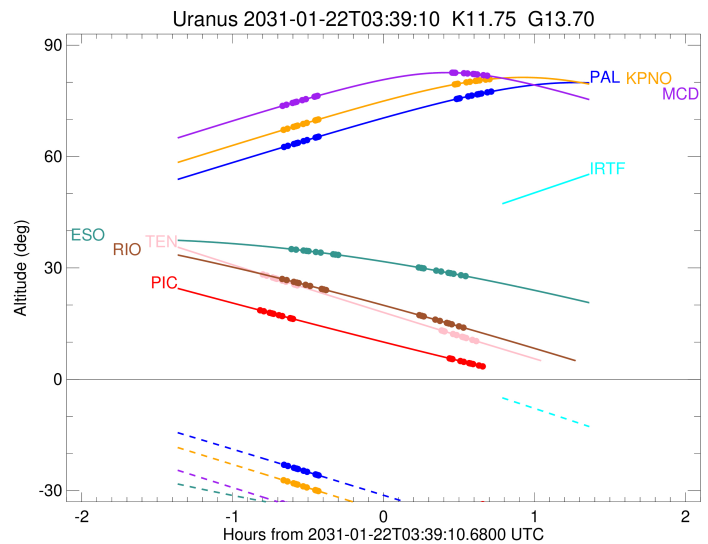
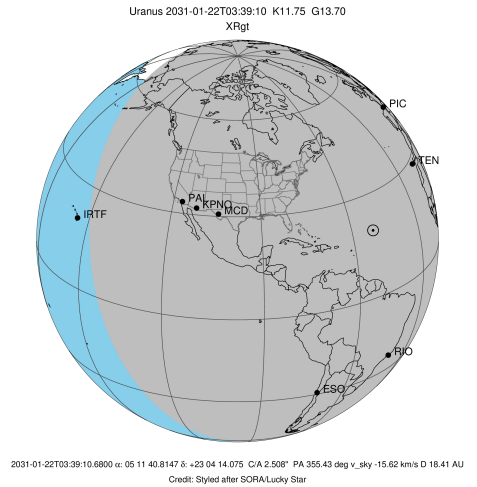


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-01-22T02:58:54.210		27.02	-47.49	51166.06	-10.78		
lambda	I	2031-01-22T03:00:42.318		26.72	-47.50	50026.71	-10.38		
delta	I	2031-01-22T03:03:32.828		26.24	-47.51	48300.35	-9.86		
gamma	I	2031-01-22T03:04:41.955		26.04	-47.51	47626.91	-9.63		
eta	I	2031-01-22T03:05:29.181		25.91	-47.51	47176.12	-9.46		
beta	I	2031-01-22T03:08:14.918		25.44	-47.50	45656.72	-8.85		
alpha	I	2031-01-22T03:09:59.471		25.14	-47.49	44751.66	-8.44		
4	I	2031-01-22T03:14:31.928		24.35	-47.44	42615.44	-7.24		
5	I	2031-01-22T03:15:18.960		24.21	-47.42	42271.65	-6.99		
6	I	2031-01-22T03:16:26.183		24.02	-47.41	41819.10	-6.67		

No planet occultations

6	E	2031-01-22T03:53:16.240		17.30	-45.87	41796.20	6.65		
5	E	2031-01-22T03:54:16.975		17.11	-45.80	42200.99	6.96		
4	E	2031-01-22T03:55:11.220		16.94	-45.74	42588.91	7.21		
alpha	E	2031-01-22T03:59:45.529		16.07	-45.41	44726.48	8.39		
beta	E	2031-01-22T04:01:31.869		15.73	-45.28	45641.34	8.80		
eta	E	2031-01-22T04:04:20.374		15.19	-45.06	47176.12	9.41		
gamma	E	2031-01-22T04:05:08.380		15.04	-45.00	47631.52	9.57		
delta	E	2031-01-22T04:06:17.477		14.82	-44.90	48300.35	9.79		
lambda	E	2031-01-22T04:09:09.175		14.26	-44.67	50026.71	10.31		
epsilon	E	2031-01-22T04:11:34.577		13.79	-44.46	51554.97	10.70		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-01-22T03:37:02.480
 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 : 3415723791851252608
 2Mass ID (if available) : 05114081+2304143
 ICRS Star Coord at Epoch: 05h 11m 40.81470s +23:04:14.07508s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 11.753
 G magnitude : 13.700
 RP magnitude : 13.040
 BP magnitude : 14.186
 DUPflag : 0
 Distance (au) : 18.411
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.62
 Sun-Target sep (deg) : 137.43
 Sun-Moon sep (deg) : 151.61
 B (ring opening deg) : 82.08
 PA of pole (deg) : 4.27
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.888
 C/A sky separation (km) : 38561.8
 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_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	2031-01-22T03:02:33.559		35.06	-34.22	51176.10	-10.48		
lambda	I	2031-01-22T03:04:26.040		34.91	-34.44	50026.71	-10.05		
delta	I	2031-01-22T03:07:22.876		34.68	-34.78	48300.35	-9.47		
gamma	I	2031-01-22T03:08:34.953		34.59	-34.91	47627.07	-9.21		
eta	I	2031-01-22T03:09:24.383		34.52	-35.00	47176.12	-9.03		
beta	I	2031-01-22T03:12:19.093		34.28	-35.32	45656.01	-8.35		
alpha	I	2031-01-22T03:14:10.419		34.12	-35.52	44751.35	-7.88		
4	I	2031-01-22T03:19:07.537		33.68	-36.04	42614.88	-6.49		
5	I	2031-01-22T03:20:00.765		33.60	-36.13	42267.84	-6.20		
6	I	2031-01-22T03:21:17.015		33.49	-36.26	41816.96	-5.81		

No planet occultations

6	E	2031-01-22T03:52:59.499		30.14	-38.98	41797.01	5.80		
5	E	2031-01-22T03:54:09.220		30.00	-39.06	42205.54	6.18		
4	E	2031-01-22T03:55:09.552		29.88	-39.13	42591.34	6.48		
alpha	E	2031-01-22T04:00:07.950		29.28	-39.46	44728.06	7.86		
beta	E	2031-01-22T04:02:00.785		29.04	-39.57	45641.51	8.32		
eta	E	2031-01-22T04:04:57.835		28.67	-39.75	47176.12	9.00		
gamma	E	2031-01-22T04:05:47.915		28.57	-39.79	47631.48	9.18		
delta	E	2031-01-22T04:06:59.769		28.41	-39.86	48300.35	9.43		
lambda	E	2031-01-22T04:09:57.282		28.03	-40.02	50026.71	10.01		
epsilon	E	2031-01-22T04:12:26.603		27.71	-40.14	51554.19	10.44		