

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2035-01-19T06:54:15.750  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3382600729188098560  
 2Mass ID (if available) : 06312543+2334332

ICRS Star Coord at Epoch: 06h 31m 25.43899s +23:34:33.23682s

RUWE (>1.4 is poor) : 1.04  
 K magnitude : 11.257  
 G magnitude : 13.809  
 RP magnitude : 13.040  
 BP magnitude : 14.450  
 DUPflag : 0  
 Distance (au) : 17.966  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.33  
 Sun-Target sep (deg) : 158.67  
 Sun-Moon sep (deg) : 41.48  
 B (ring opening deg) : 68.91  
 PA of pole (deg) : 70.26

# a(km) ring

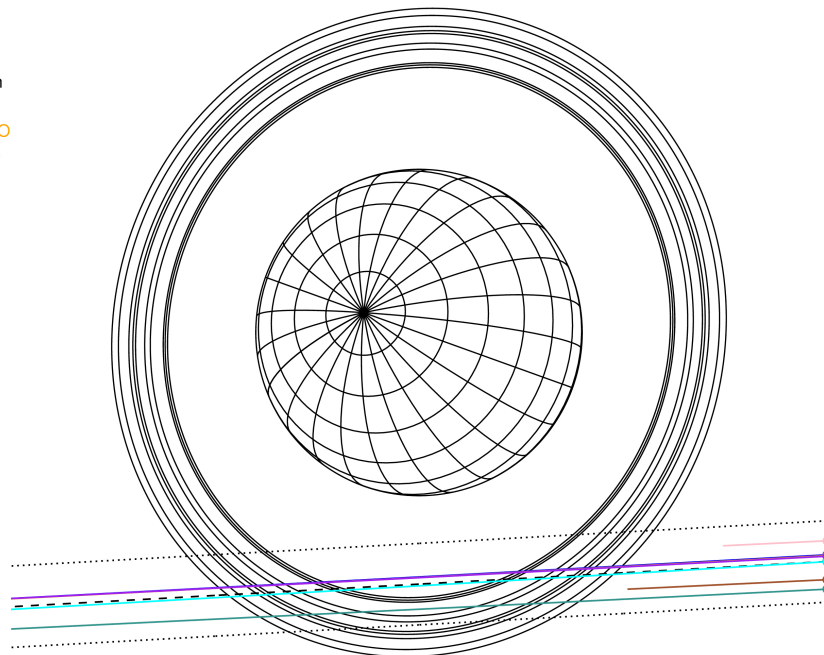
- 1 41837.2 6
- 2 42235.0 5
- 3 42571.2 4
- 4 44718.5 alpha
- 5 45661.1 beta
- 6 47176.1 eta
- 7 47626.3 gamma
- 8 48300.3 delta
- 9 50026.7 lambda
- 10 51149.4 epsilon



2035-01-19T06:54:15.7500 α: 06 31 25.4390 δ: +23 34 33.237 C/A 3.012° PA 3.17 deg v\_sky -21.33 km/s D 17.97 AU  
 Credit: Styled after SORA/Lucky Star

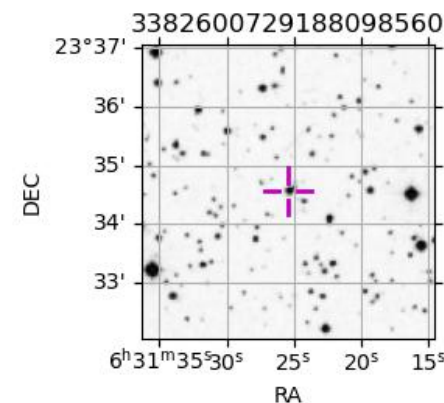
Uranus 2035-01-19T06:54:15 K11.26 G13.81 XRgt

Earth  
 PAL  
 KPNO  
 MCD  
 TEN  
 IRTF  
 RIO  
 ESO

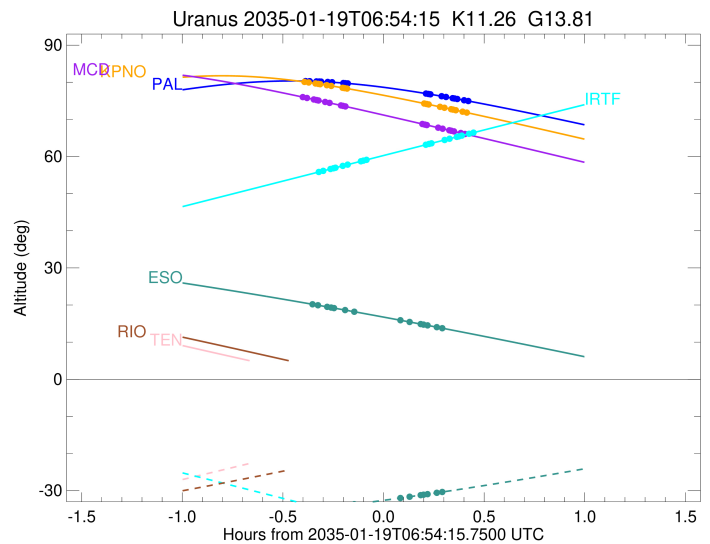
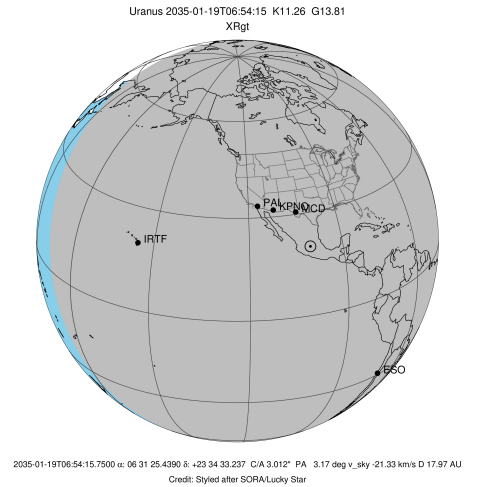


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (200")	33.4	243.1	+++++		+++++	JAN 19 06:31 - JAN 19 07:19	PnnRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	JAN 19 06:30 - JAN 19 07:18	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	JAN 19 06:30 - JAN 19 07:18	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++		+++++	JAN 19 06:35 - JAN 19 07:20	PnnRie
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8					PnnRnn
ESO	European Southern Obs	-29.3	289.3	+++++		+++++	JAN 19 06:33 - JAN 19 07:11	PnnRie
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2035-01-19T06:53:52.850  
 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 : 3382600729188098560  
 2Mass ID (if available) : 06312543+2334332  
 ICRS Star Coord at Epoch: 06h 31m 25.43899s +23:34:33.23682s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 11.257  
 G magnitude : 13.809  
 RP magnitude : 13.040  
 BP magnitude : 14.450  
 DUPflag : 0  
 Distance (au) : 17.966  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.33  
 Sun-Target sep (deg) : 158.67  
 Sun-Moon sep (deg) : 42.22  
 B (ring opening deg) : 68.91  
 PA of pole (deg) : 70.26  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.934  
 C/A sky separation (km) : 38231.9  
 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\_itrff93\_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

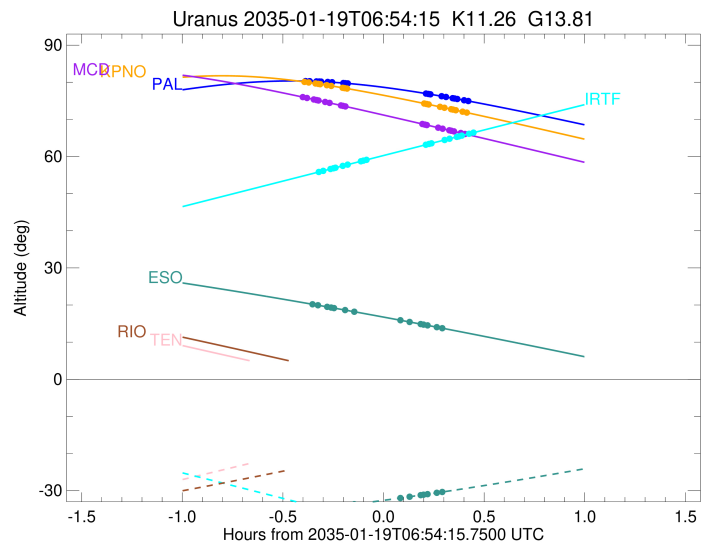
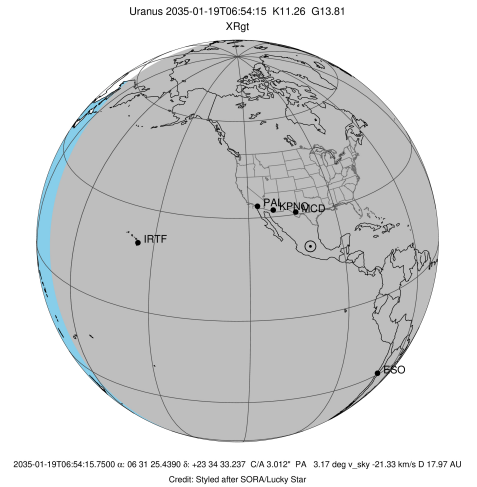
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2035-01-19T06:31:06.660		80.32	-66.83	51060.88	-14.93		
lambda	I	2035-01-19T06:32:16.265		80.30	-67.04	50026.71	-14.64		
delta	I	2035-01-19T06:34:17.462		80.23	-67.41	48300.35	-13.83		
gamma	I	2035-01-19T06:35:06.557		80.20	-67.56	47629.82	-13.48		
eta	I	2035-01-19T06:35:40.531		80.18	-67.66	47176.12	-13.23		
beta	I	2035-01-19T06:37:40.832		80.08	-68.03	45641.15	-12.27		
alpha	I	2035-01-19T06:38:55.544		80.02	-68.25	44744.63	-11.64		
4	I	2035-01-19T06:42:22.969		79.79	-68.86	42529.68	-9.65		
5	I	2035-01-19T06:42:45.888		79.76	-68.93	42315.25	-9.40		
6	I	2035-01-19T06:43:42.611		79.69	-69.10	41794.91	-8.80		

No planet occultations

6	E	2035-01-19T07:06:50.675		76.98	-72.85	41809.91	8.80		
5	E	2035-01-19T07:07:43.284		76.85	-72.98	42288.07	9.40		
4	E	2035-01-19T07:08:11.553		76.77	-73.05	42558.07	9.65		
alpha	E	2035-01-19T07:11:36.992		76.25	-73.54	44750.15	11.63		
beta	E	2035-01-19T07:12:52.611		76.05	-73.71	45654.26	12.27		
eta	E	2035-01-19T07:14:51.945		75.73	-73.98	47176.12	13.22		
gamma	E	2035-01-19T07:15:26.035		75.64	-74.05	47631.13	13.47		
delta	E	2035-01-19T07:16:15.064		75.50	-74.16	48300.35	13.82		
lambda	E	2035-01-19T07:18:16.339		75.17	-74.42	50026.71	14.63		
epsilon	E	2035-01-19T07:19:04.879		75.03	-74.52	50744.27	14.92		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2035-01-19T06:53:30.670
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      : 3382600729188098560
2Mass ID (if available) : 06312543+2334332
ICRS Star Coord at Epoch: 06h 31m 25.43899s +23:34:33.23682s
RUWE (>1.4 is poor) : 1.04
K magnitude          : 11.257
G magnitude          : 13.809
RP magnitude         : 13.040
BP magnitude         : 14.450
DUPflag             : 0
Distance (au)       : 17.966
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -21.33
Sun-Target sep (deg) : 158.67
Sun-Moon sep (deg)  : 42.28
B (ring opening deg) : 68.91
PA of pole (deg)    : 70.26
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.941
C/A sky separation (km) : 38323.4
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
    
```

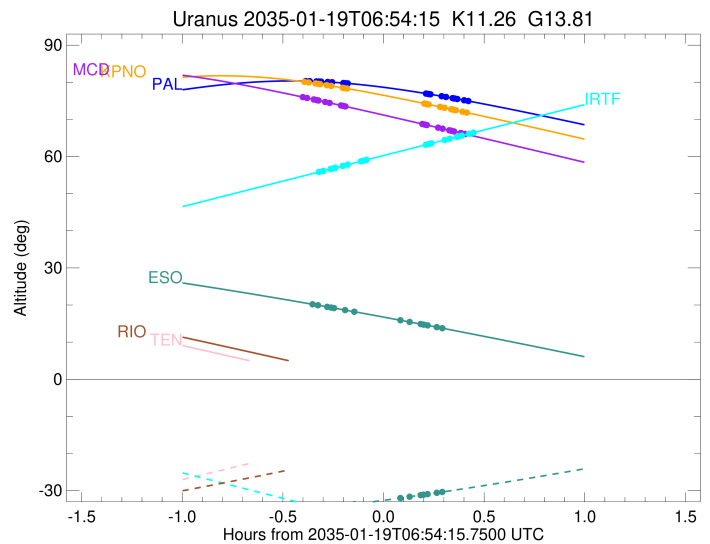
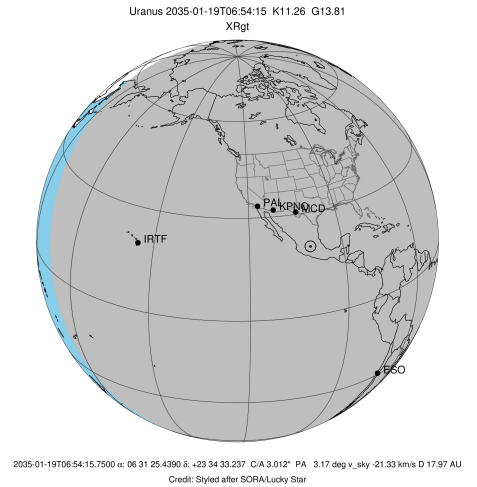


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2035-01-19T06:30:49.374		80.09	-71.30	51059.54	-14.89		
lambda	I	2035-01-19T06:31:59.110		79.94	-71.51	50026.71	-14.59		
delta	I	2035-01-19T06:34:00.753		79.68	-71.86	48300.35	-13.78		
gamma	I	2035-01-19T06:34:50.055		79.57	-72.00	47629.84	-13.42		
eta	I	2035-01-19T06:35:24.186		79.49	-72.10	47176.12	-13.17		
beta	I	2035-01-19T06:37:25.118		79.21	-72.44	45641.16	-12.20		
alpha	I	2035-01-19T06:38:40.299		79.03	-72.65	44744.73	-11.56		
4	I	2035-01-19T06:42:09.542		78.50	-73.23	42529.78	-9.55		
5	I	2035-01-19T06:42:32.743		78.44	-73.29	42315.25	-9.29		
6	I	2035-01-19T06:43:30.198		78.30	-73.45	41794.93	-8.68		

No planet occultations

6	E	2035-01-19T07:06:18.962		74.30	-76.66	41809.74	8.67		
5	E	2035-01-19T07:07:12.309		74.13	-76.76	42288.36	9.29		
4	E	2035-01-19T07:07:40.868		74.04	-76.81	42557.87	9.54		
alpha	E	2035-01-19T07:11:08.165		73.38	-77.18	44750.19	11.55		
beta	E	2035-01-19T07:12:24.274		73.14	-77.31	45654.20	12.19		
eta	E	2035-01-19T07:14:24.270		72.75	-77.49	47176.12	13.15		
gamma	E	2035-01-19T07:14:58.526		72.64	-77.54	47631.13	13.41		
delta	E	2035-01-19T07:15:47.776		72.48	-77.61	48300.35	13.76		
lambda	E	2035-01-19T07:17:49.536		72.09	-77.78	50026.71	14.58		
epsilon	E	2035-01-19T07:18:38.245		71.93	-77.84	50744.22	14.87		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2035-01-19T06:52:59.280  
 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 : 3382600729188098560  
 2Mass ID (if available) : 06312543+2334332  
 ICRS Star Coord at Epoch: 06h 31m 25.43899s +23:34:33.23682s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 11.257  
 G magnitude : 13.809  
 RP magnitude : 13.040  
 BP magnitude : 14.450  
 DUPflag : 0  
 Distance (au) : 17.966  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.33  
 Sun-Target sep (deg) : 158.67  
 Sun-Moon sep (deg) : 42.34  
 B (ring opening deg) : 68.91  
 PA of pole (deg) : 70.26  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.943  
 C/A sky separation (km) : 38346.4  
 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\_itr93\_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

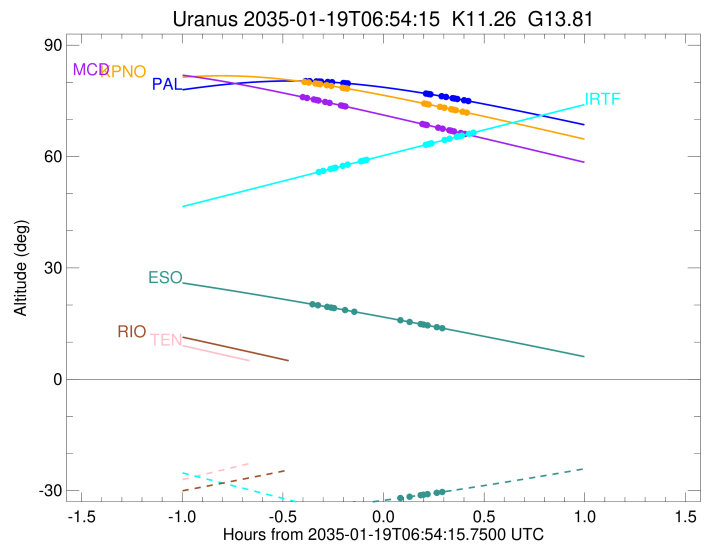
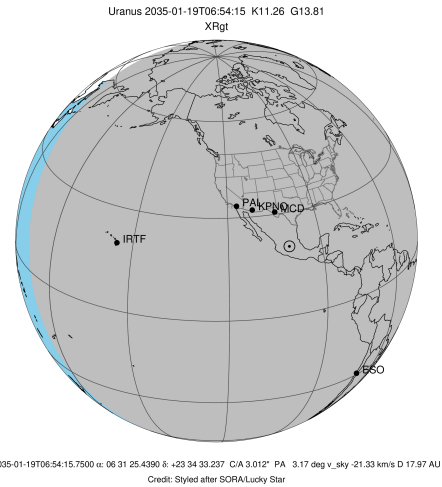
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2035-01-19T06:30:18.631		75.99	-76.97	51058.93	-14.87		
lambda	I	2035-01-19T06:31:28.393		75.77	-77.13	50026.71	-14.58		
delta	I	2035-01-19T06:33:30.170		75.37	-77.40	48300.35	-13.76		
gamma	I	2035-01-19T06:34:19.533		75.21	-77.51	47629.85	-13.40		
eta	I	2035-01-19T06:34:53.709		75.10	-77.59	47176.12	-13.15		
beta	I	2035-01-19T06:36:54.822		74.70	-77.84	45641.16	-12.18		
alpha	I	2035-01-19T06:38:10.135		74.45	-77.99	44744.77	-11.54		
4	I	2035-01-19T06:41:39.877		73.75	-78.40	42529.82	-9.52		
5	I	2035-01-19T06:42:03.156		73.67	-78.44	42315.24	-9.26		
6	I	2035-01-19T06:43:00.807		73.48	-78.54	41794.94	-8.64		

No planet occultations

6	E	2035-01-19T07:05:45.497		68.78	-79.84	41809.72	8.64		
5	E	2035-01-19T07:06:39.044		68.60	-79.85	42288.38	9.26		
4	E	2035-01-19T07:07:07.693		68.50	-79.84	42557.85	9.51		
alpha	E	2035-01-19T07:10:35.546		67.77	-79.81	44750.19	11.53		
beta	E	2035-01-19T07:11:51.816		67.50	-79.78	45654.20	12.17		
eta	E	2035-01-19T07:13:52.038		67.07	-79.71	47176.12	13.13		
gamma	E	2035-01-19T07:14:26.353		66.95	-79.69	47631.13	13.39		
delta	E	2035-01-19T07:15:15.685		66.78	-79.66	48300.35	13.74		
lambda	E	2035-01-19T07:17:17.632		66.35	-79.56	50026.71	14.56		
epsilon	E	2035-01-19T07:18:06.412		66.18	-79.52	50744.23	14.85		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2035-01-19T06:56:35.280
Event type          : XRgt
: No Uranus occs
: Ring occs: geocentric, topocentric
Observer code       : IRTF
Location            : Mauna Kea/IRTF
Latitude (deg)      : 19.82622
E. Longitude (deg)  : 204.52800
Altitude (km)       : 4.168
Gaia source ID      : 3382600729188098560
2Mass ID (if available) : 06312543+2334332
ICRS Star Coord at Epoch: 06h 31m 25.43899s +23:34:33.23682s
RUWE (>1.4 is poor) : 1.04
K magnitude          : 11.257
G magnitude          : 13.809
RP magnitude         : 13.040
BP magnitude         : 14.450
DUPflag             : 0
Distance (au)       : 17.966
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -21.33
Sun-Target sep (deg) : 158.67
Sun-Moon sep (deg)  : 41.69
B (ring opening deg) : 68.91
PA of pole (deg)    : 70.26
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.040
C/A sky separation (km) : 39612.4
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
    
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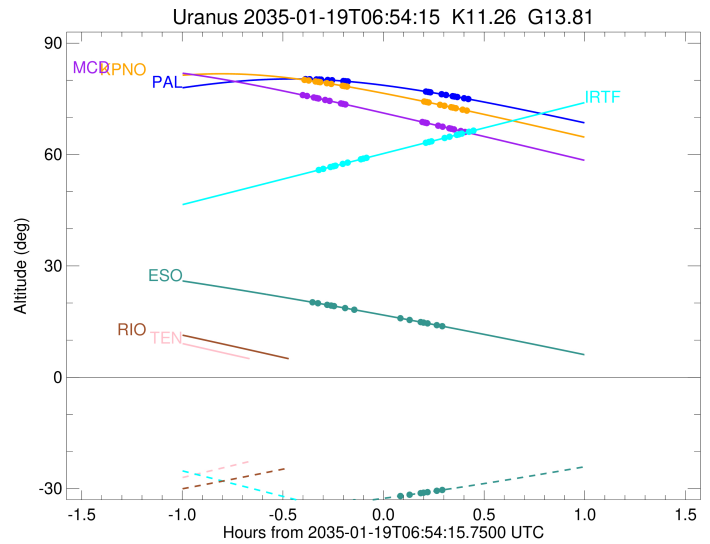
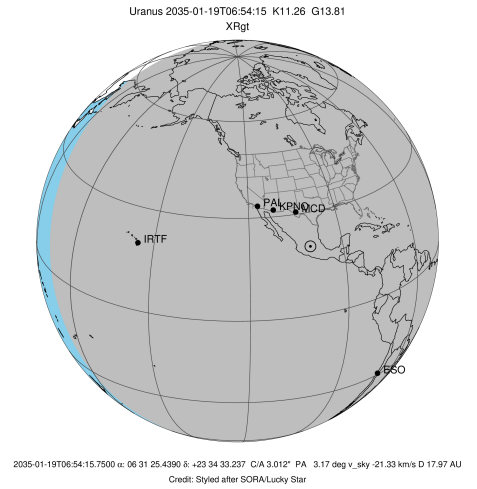


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2035-01-19T06:35:06.171		55.87	-34.58	51045.62	-14.13		
lambda	I	2035-01-19T06:36:18.758		56.15	-34.86	50026.71	-13.80		
delta	I	2035-01-19T06:38:28.140		56.64	-35.35	48300.35	-12.87		
gamma	I	2035-01-19T06:39:21.041		56.84	-35.56	47630.01	-12.47		
eta	I	2035-01-19T06:39:57.878		56.99	-35.70	47176.12	-12.17		
beta	I	2035-01-19T06:42:09.909		57.49	-36.21	45641.29	-11.05		
alpha	I	2035-01-19T06:43:33.518		57.81	-36.53	44745.91	-10.29		
4	I	2035-01-19T06:47:37.486		58.75	-37.47	42531.30	-7.79		
5	I	2035-01-19T06:48:06.474		58.86	-37.58	42314.91	-7.45		
6	I	2035-01-19T06:49:19.739		59.14	-37.86	41795.45	-6.62		

No planet occultations

6	E	2035-01-19T07:06:45.902		63.14	-41.89	41806.65	6.63		
5	E	2035-01-19T07:07:55.042		63.41	-42.16	42293.57	7.46		
4	E	2035-01-19T07:08:29.302		63.54	-42.29	42554.15	7.80		
alpha	E	2035-01-19T07:12:30.993		64.46	-43.23	44750.93	10.30		
beta	E	2035-01-19T07:13:55.365		64.79	-43.55	45653.04	11.07		
eta	E	2035-01-19T07:16:06.194		65.29	-44.06	47176.12	12.19		
gamma	E	2035-01-19T07:16:43.077		65.43	-44.20	47631.24	12.49		
delta	E	2035-01-19T07:17:35.799		65.63	-44.40	48300.35	12.89		
lambda	E	2035-01-19T07:19:44.972		66.12	-44.90	50026.71	13.82		
epsilon	E	2035-01-19T07:20:36.205		66.32	-45.10	50743.55	14.16		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2035-01-19T06:50:51.750  
 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 : 3382600729188098560  
 2Mass ID (if available) : 06312543+2334332  
 ICRS Star Coord at Epoch: 06h 31m 25.43899s +23:34:33.23682s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 11.257  
 G magnitude : 13.809  
 RP magnitude : 13.040  
 BP magnitude : 14.450  
 DUPflag : 0  
 Distance (au) : 17.966  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.33  
 Sun-Target sep (deg) : 158.67  
 Sun-Moon sep (deg) : 42.16  
 B (ring opening deg) : 68.91  
 PA of pole (deg) : 70.26  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.322  
 C/A sky separation (km) : 43291.3  
 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



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	2035-01-19T06:33:20.273		20.16	-35.00	50992.60	-11.65		
lambda	I	2035-01-19T06:34:44.502		19.94	-34.85	50026.71	-11.14		
delta	I	2035-01-19T06:37:29.746		19.50	-34.55	48300.35	-9.73		
gamma	I	2035-01-19T06:38:40.898		19.31	-34.42	47630.60	-9.09		
eta	I	2035-01-19T06:39:32.279		19.17	-34.33	47176.12	-8.60		
beta	I	2035-01-19T06:42:53.959		18.63	-33.95	45642.43	-6.57		
alpha	I	2035-01-19T06:45:29.320		18.20	-33.66	44750.11	-4.88		

No planet occultations

alpha	E	2035-01-19T06:59:22.292		15.89	-31.98	44752.37	4.88		
beta	E	2035-01-19T07:01:58.759		15.45	-31.65	45649.53	6.57		
eta	E	2035-01-19T07:05:19.713		14.87	-31.22	47176.12	8.59		
gamma	E	2035-01-19T07:06:11.285		14.73	-31.11	47631.47	9.07		
delta	E	2035-01-19T07:07:22.482		14.52	-30.95	48300.35	9.72		
lambda	E	2035-01-19T07:10:08.102		14.04	-30.59	50026.71	11.11		
epsilon	E	2035-01-19T07:11:11.422		13.86	-30.44	50745.82	11.62		