

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-02-03T03:24:57.460  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3427675547667742080  
 2Mass ID (if available) : 05491238+2337546

ICRS Star Coord at Epoch: 05h 49m 12.39119s +23:37:54.46341s

RUWE (>1.4 is poor) : 0.92  
 K magnitude : 14.483  
 G magnitude : 17.814  
 RP magnitude : 16.869  
 BP magnitude : 18.762  
 DUPflag : 0  
 Distance (au) : 18.321  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -14.10  
 Sun-Target sep (deg) : 133.38  
 Sun-Moon sep (deg) : 88.38  
 B (ring opening deg) : 77.35  
 PA of pole (deg) : 49.86

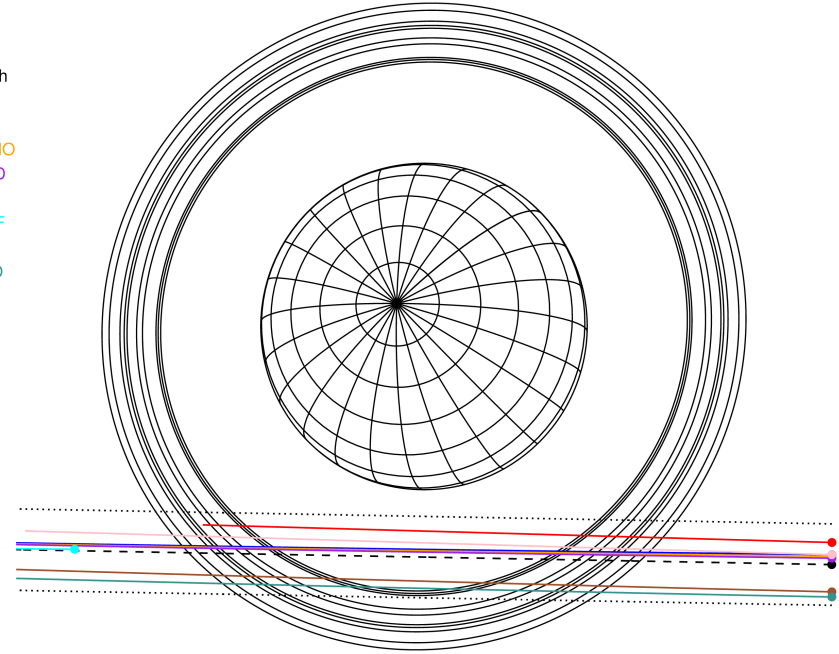
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2033-02-03T03:24:57.4600 ra: 05 49 12.3912 s: +23 37 54.463 C/A 2.7111" PA 358.95 deg v\_sky -14.11 km/s D 18.32 AU  
 Credit: Styled after SORA/Lucky Star

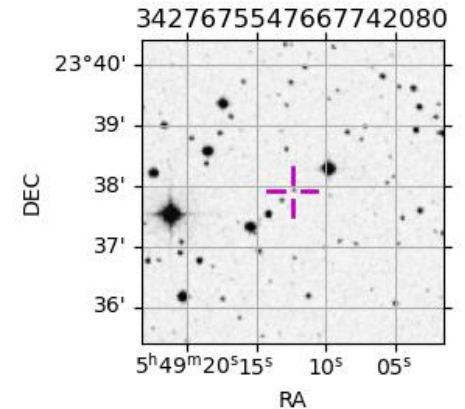
Uranus 2033-02-03T03:24:57 K14.48 G17.81 XRgt

Earth  
 PIC  
 PAL  
 KPNO  
 MCD  
 TEN  
 IRTF  
 RIO  
 ESO



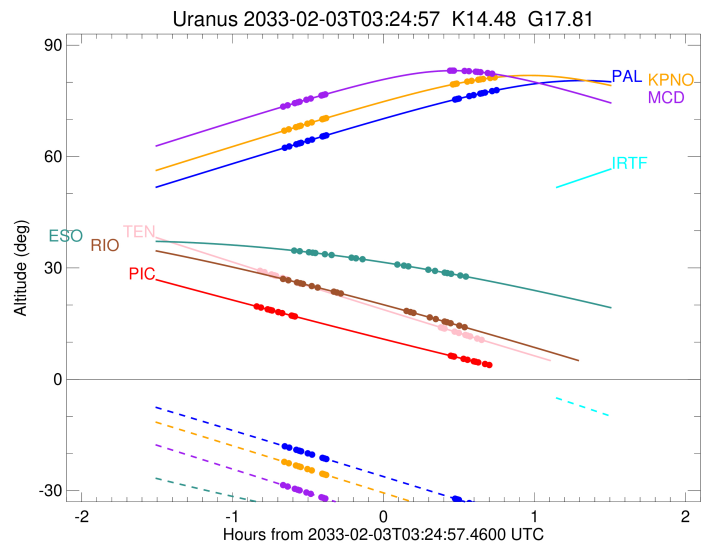
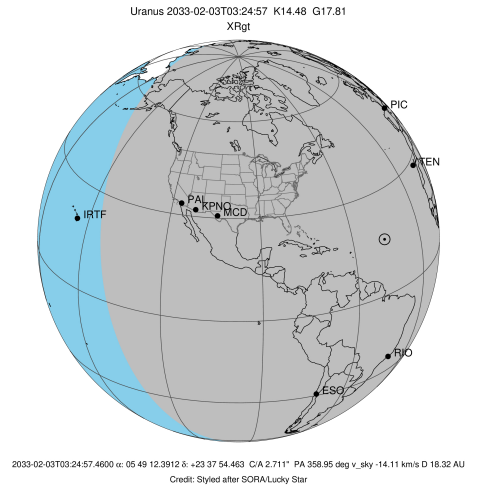
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	FEB 03 02:35 - FEB 03 03:58	PnnRie
PAL	Palomar Mt (200")	33.4	243.1	+++++		+++++	FEB 03 02:46 - FEB 03 04:10	PnnRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	FEB 03 02:46 - FEB 03 04:09	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	FEB 03 02:45 - FEB 03 04:08	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++		+++++	FEB 03 02:36 - FEB 03 04:04	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	+++++		+++++	FEB 03 02:45 - FEB 03 03:57	PnnRie
ESO	European Southern Obs	-29.3	289.3	+++++		+++++	FEB 03 02:50 - FEB 03 03:57	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            : 2033-02-03T03:19:45.210
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      : 3427675547667742080
2Mass ID (if available) : 05491238+2337546
ICRS Star Coord at Epoch: 05h 49m 12.39119s +23:37:54.46341s
RUWE (>1.4 is poor) : 0.92
K magnitude         : 14.483
G magnitude         : 17.814
RP magnitude        : 16.869
BP magnitude        : 18.762
DUPflag            : 0
Distance (au)       : 18.321
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -14.10
Sun-Target sep (deg) : 133.38
Sun-Moon sep (deg)  : 88.59
B (ring opening deg) : 77.35
PA of pole (deg)    : 49.86
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.410
C/A sky separation (km) : 32027.5
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall11.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
  
```

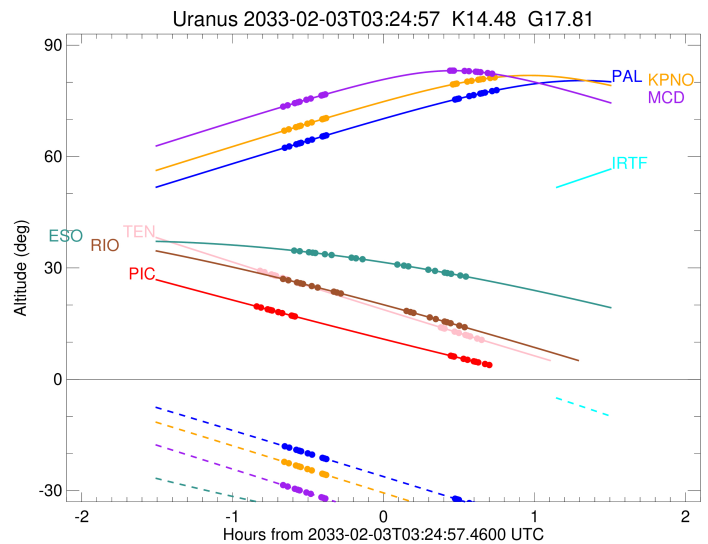
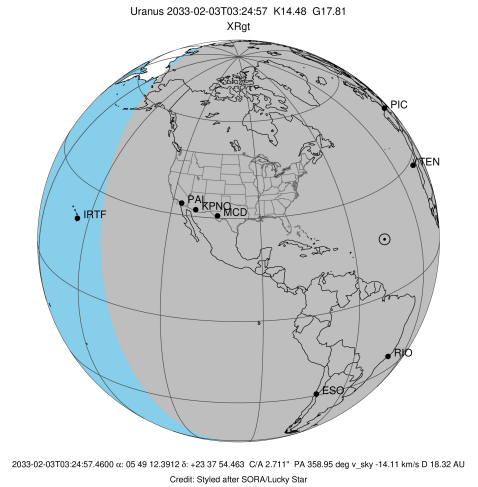


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-02-03T02:35:09.241		19.51	-49.97	50762.92	-11.09		
lambda	I	2033-02-03T02:36:16.079		19.31	-49.79	50026.71	-10.96		
delta	I	2033-02-03T02:38:55.738		18.84	-49.37	48300.35	-10.66		
gamma	I	2033-02-03T02:39:59.640		18.65	-49.20	47622.96	-10.54		
eta	I	2033-02-03T02:40:42.222		18.52	-49.08	47176.12	-10.45		
beta	I	2033-02-03T02:43:11.288		18.08	-48.68	45642.16	-10.12		
alpha	I	2033-02-03T02:44:47.073		17.80	-48.42	44684.73	-9.90		
4	I	2033-02-03T02:48:29.300		17.15	-47.81	42542.04	-9.31		
5	I	2033-02-03T02:49:08.969		17.03	-47.70	42188.14	-9.22		
6	I	2033-02-03T02:49:42.614		16.93	-47.61	41879.44	-9.11		

No planet occultations

6	E	2033-02-03T03:51:41.037		6.34	-36.86	41850.28	9.04		
5	E	2033-02-03T03:52:29.518		6.21	-36.72	42291.15	9.15		
4	E	2033-02-03T03:52:55.735		6.13	-36.64	42532.47	9.23		
alpha	E	2033-02-03T03:56:45.080		5.51	-35.95	44719.72	9.81		
beta	E	2033-02-03T03:58:19.189		5.25	-35.67	45654.51	10.03		
eta	E	2033-02-03T04:00:48.455	4.85x	4.85x	-35.22	47176.12	10.35		
gamma	E	2033-02-03T04:01:31.403	4.73x	4.73x	-35.09	47622.39	10.43		
delta	E	2033-02-03T04:02:36.003	4.55x	4.55x	-34.89	48300.35	10.56		
lambda	E	2033-02-03T04:05:17.344	4.12x	4.12x	-34.41	50026.71	10.84		
epsilon	E	2033-02-03T04:07:17.987	3.80x	3.80x	-34.04	51346.22	10.97		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-02-03T03:26:51.580  
 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 : 3427675547667742080  
 2Mass ID (if available) : 05491238+2337546  
 ICRS Star Coord at Epoch: 05h 49m 12.39119s +23:37:54.46341s  
 RUWE (>1.4 is poor) : 0.92  
 K magnitude : 14.483  
 G magnitude : 17.814  
 RP magnitude : 16.869  
 BP magnitude : 18.762  
 DUPflag : 0  
 Distance (au) : 18.321  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -14.10  
 Sun-Target sep (deg) : 133.38  
 Sun-Moon sep (deg) : 89.32  
 B (ring opening deg) : 77.35  
 PA of pole (deg) : 49.86  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.627  
 C/A sky separation (km) : 34908.1  
 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

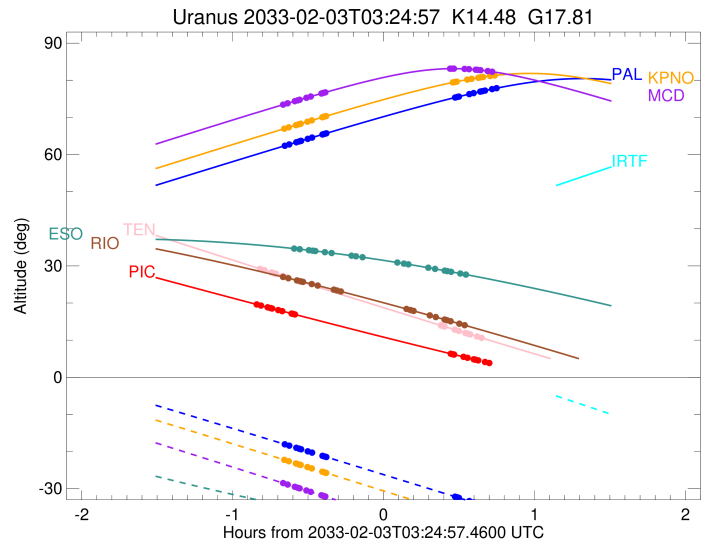
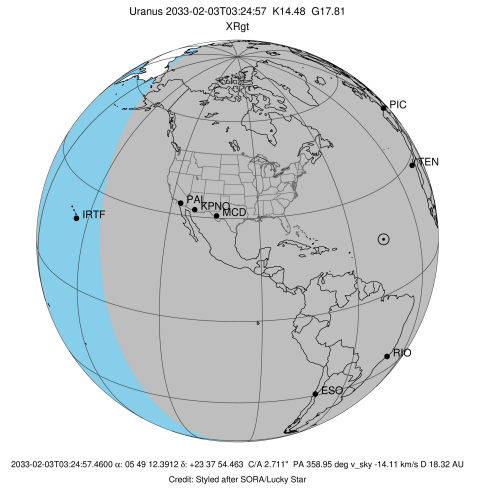


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-02-03T02:46:19.447		62.48	-18.18	50771.40	-10.57		
lambda	I	2033-02-03T02:47:30.580		62.73	-18.43	50026.71	-10.39		
delta	I	2033-02-03T02:50:19.698		63.30	-19.01	48300.35	-10.01		
gamma	I	2033-02-03T02:51:27.924		63.53	-19.25	47622.66	-9.85		
eta	I	2033-02-03T02:52:13.521		63.69	-19.40	47176.12	-9.74		
beta	I	2033-02-03T02:54:54.613		64.24	-19.96	45641.69	-9.30		
alpha	I	2033-02-03T02:56:39.302		64.59	-20.32	44685.09	-9.00		
4	I	2033-02-03T03:00:47.874		65.43	-21.18	42538.74	-8.19		
5	I	2033-02-03T03:01:31.781		65.57	-21.34	42195.02	-8.07		
6	I	2033-02-03T03:02:11.132		65.71	-21.47	41879.74	-7.91		

No planet occultations

6	E	2033-02-03T03:53:25.103		75.36	-32.17	41855.47	7.92		
5	E	2033-02-03T03:54:18.492		75.51	-32.35	42283.34	8.08		
4	E	2033-02-03T03:54:48.773		75.59	-32.46	42529.83	8.20		
alpha	E	2033-02-03T03:59:02.254		76.27	-33.34	44715.90	9.02		
beta	E	2033-02-03T04:00:44.343		76.54	-33.70	45652.51	9.32		
eta	E	2033-02-03T04:03:24.063		76.94	-34.25	47176.12	9.75		
gamma	E	2033-02-03T04:04:09.531		77.06	-34.41	47622.05	9.86		
delta	E	2033-02-03T04:05:17.714		77.22	-34.65	48300.35	10.03		
lambda	E	2033-02-03T04:08:06.561		77.63	-35.24	50026.71	10.41		
epsilon	E	2033-02-03T04:10:08.694		77.91	-35.66	51313.92	10.59		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-02-03T03:26:22.860  
 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 : 3427675547667742080  
 2Mass ID (if available) : 05491238+2337546  
 ICRS Star Coord at Epoch: 05h 49m 12.39119s +23:37:54.46341s  
 RUWE (>1.4 is poor) : 0.92  
 K magnitude : 14.483  
 G magnitude : 17.814  
 RP magnitude : 16.869  
 BP magnitude : 18.762  
 DUPflag : 0  
 Distance (au) : 18.321  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -14.10  
 Sun-Target sep (deg) : 133.38  
 Sun-Moon sep (deg) : 89.35  
 B (ring opening deg) : 77.35  
 PA of pole (deg) : 49.86  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.643  
 C/A sky separation (km) : 35121.3  
 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

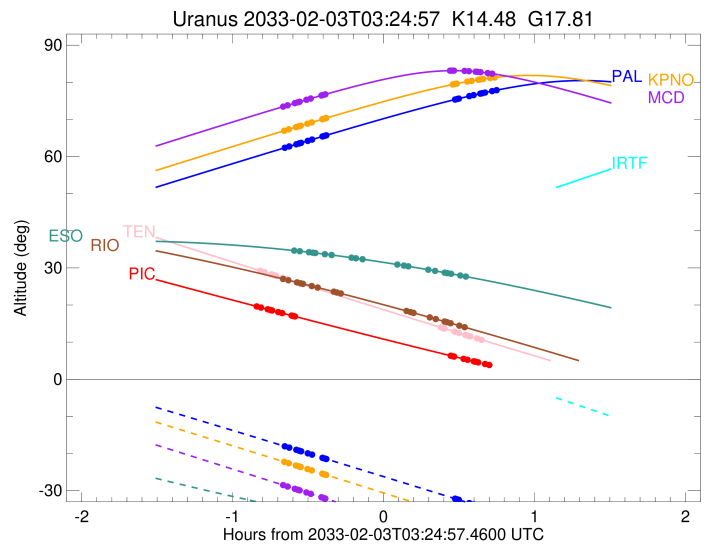
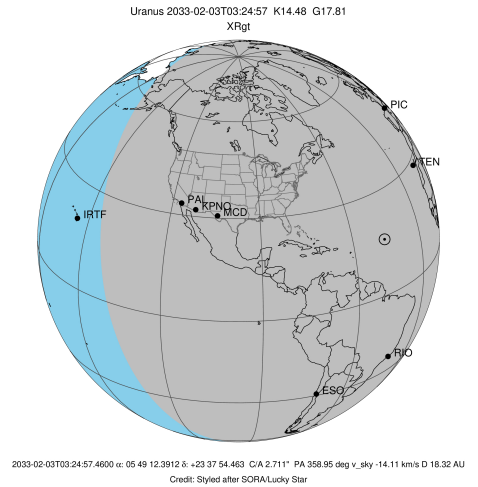


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-02-03T02:46:08.282		67.09	-22.38	50772.39	-10.53		
lambda	I	2033-02-03T02:47:19.824		67.33	-22.63	50026.71	-10.35		
delta	I	2033-02-03T02:50:09.802		67.92	-23.23	48300.35	-9.96		
gamma	I	2033-02-03T02:51:18.428		68.15	-23.47	47622.63	-9.79		
eta	I	2033-02-03T02:52:04.306		68.31	-23.63	47176.12	-9.67		
beta	I	2033-02-03T02:54:46.536		68.86	-24.20	45641.65	-9.23		
alpha	I	2033-02-03T02:56:32.085		69.22	-24.58	44685.14	-8.92		
4	I	2033-02-03T03:00:43.302		70.06	-25.46	42538.43	-8.09		
5	I	2033-02-03T03:01:27.631		70.21	-25.62	42195.72	-7.96		
6	I	2033-02-03T03:02:07.593		70.35	-25.76	41879.75	-7.80		

No planet occultations

6	E	2033-02-03T03:52:32.135		79.43	-36.46	41855.81	7.80		
5	E	2033-02-03T03:53:26.148		79.55	-36.65	42282.79	7.97		
4	E	2033-02-03T03:53:56.881		79.62	-36.76	42529.68	8.09		
alpha	E	2033-02-03T03:58:13.140		80.18	-37.66	44715.67	8.93		
beta	E	2033-02-03T03:59:56.151		80.39	-38.03	45652.39	9.24		
eta	E	2033-02-03T04:02:37.112		80.69	-38.60	47176.12	9.68		
gamma	E	2033-02-03T04:03:22.891		80.77	-38.76	47622.03	9.80		
delta	E	2033-02-03T04:04:31.521		80.88	-39.00	48300.35	9.97		
lambda	E	2033-02-03T04:07:21.351		81.15	-39.60	50026.71	10.36		
epsilon	E	2033-02-03T04:09:23.934		81.31	-40.03	51312.08	10.54		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-02-03T03:25:38.350  
 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 : 3427675547667742080  
 2Mass ID (if available) : 05491238+2337546  
 ICRS Star Coord at Epoch: 05h 49m 12.39119s +23:37:54.46341s  
 RUWE (>1.4 is poor) : 0.92  
 K magnitude : 14.483  
 G magnitude : 17.814  
 RP magnitude : 16.869  
 BP magnitude : 18.762  
 DUPflag : 0  
 Distance (au) : 18.321  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -14.10  
 Sun-Target sep (deg) : 133.38  
 Sun-Moon sep (deg) : 89.37  
 B (ring opening deg) : 77.35  
 PA of pole (deg) : 49.86  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.658  
 C/A sky separation (km) : 35324.0  
 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



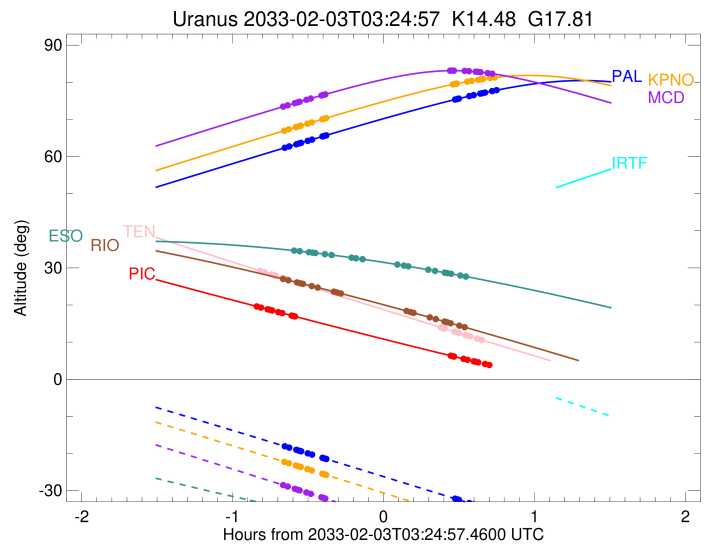
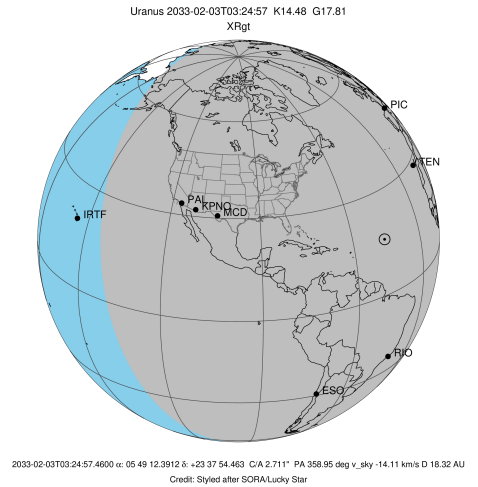
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-02-03T02:45:40.738		73.56	-28.64	50773.43	-10.49		
lambda	I	2033-02-03T02:46:52.673		73.81	-28.90	50026.71	-10.30		
delta	I	2033-02-03T02:49:43.458		74.38	-29.51	48300.35	-9.91		
gamma	I	2033-02-03T02:50:52.463		74.61	-29.76	47622.60	-9.73		
eta	I	2033-02-03T02:51:38.608		74.76	-29.93	47176.12	-9.62		
beta	I	2033-02-03T02:54:21.928		75.30	-30.51	45641.61	-9.16		
alpha	I	2033-02-03T02:56:08.305		75.65	-30.89	44685.19	-8.85		
4	I	2033-02-03T03:00:22.110		76.47	-31.80	42538.12	-7.99		
5	I	2033-02-03T03:01:06.849		76.61	-31.96	42196.44	-7.86		
6	I	2033-02-03T03:01:47.420		76.74	-32.11	41879.74	-7.70		

No planet occultations

6	E	2033-02-03T03:51:24.304		83.13	-42.78	41856.11	7.69		
5	E	2033-02-03T03:52:18.955		83.13	-42.97	42282.30	7.86		
4	E	2033-02-03T03:52:50.140		83.13	-43.08	42529.55	7.99		
alpha	E	2033-02-03T03:57:09.193		83.06	-44.01	44715.46	8.85		
beta	E	2033-02-03T03:58:53.128		83.00	-44.38	45652.29	9.16		
eta	E	2033-02-03T04:01:35.335		82.85	-44.96	47176.12	9.61		
gamma	E	2033-02-03T04:02:21.429		82.80	-45.12	47622.01	9.73		
delta	E	2033-02-03T04:03:30.510		82.72	-45.37	48300.35	9.90		
lambda	E	2033-02-03T04:06:21.336		82.49	-45.97	50026.71	10.30		
epsilon	E	2033-02-03T04:08:24.404		82.29	-46.41	51310.52	10.49		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-02-03T03:18:50.840
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      : 3427675547667742080
2Mass ID (if available) : 05491238+2337546
ICRS Star Coord at Epoch: 05h 49m 12.39119s +23:37:54.46341s
RUWE (>1.4 is poor) : 0.92
K magnitude         : 14.483
G magnitude         : 17.814
RP magnitude        : 16.869
BP magnitude        : 18.762
DUPflag            : 0
Distance (au)       : 18.321
f0 (km)            : 0.000
g0 (km)            : 0.000
skyplane vel. (km/s) : -14.10
Sun-Target sep (deg) : 133.38
Sun-Moon sep (deg)  : 88.72
B (ring opening deg) : 77.35
PA of pole (deg)    : 49.86
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.549
C/A sky separation (km) : 33870.0
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_itr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```



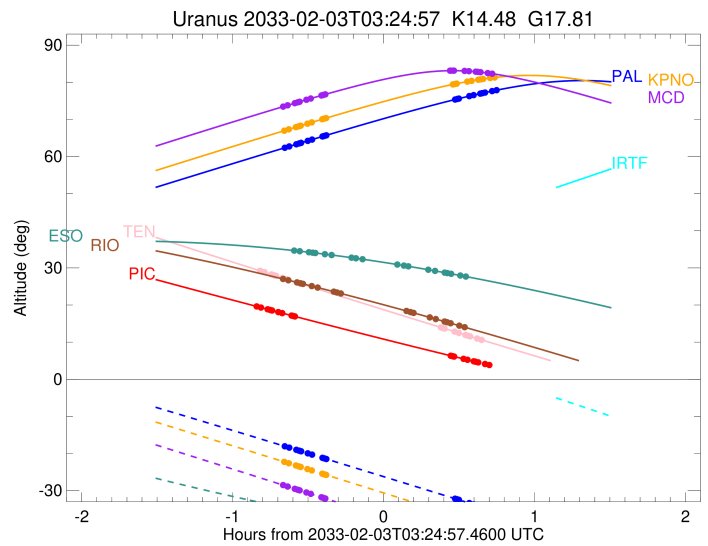
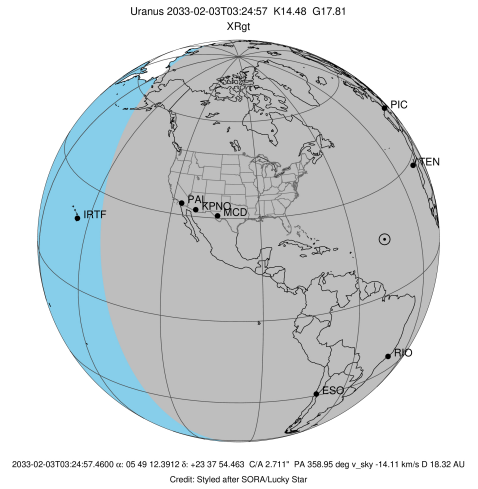
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-02-03T02:36:30.368		29.09	-68.80	50769.50	-10.73		
lambda	I	2033-02-03T02:37:40.210		28.84	-68.57	50026.71	-10.57		
delta	I	2033-02-03T02:40:26.259		28.24	-68.04	48300.35	-10.22		
gamma	I	2033-02-03T02:41:33.048		28.00	-67.82	47622.73	-10.07		
eta	I	2033-02-03T02:42:17.626		27.84	-67.67	47176.12	-9.97		
beta	I	2033-02-03T02:44:54.568		27.28	-67.16	45641.80	-9.58		
alpha	I	2033-02-03T02:46:36.082		26.91	-66.82	44684.97	-9.31		
4	I	2033-02-03T02:50:34.872		26.06	-66.03	42539.64	-8.58		
5	I	2033-02-03T02:51:17.059		25.91	-65.88	42193.01	-8.48		
6	I	2033-02-03T02:51:54.222		25.78	-65.76	41879.70	-8.34		

No planet occultations

6	E	2033-02-03T03:47:45.619		13.97	-53.99	41853.14	8.28		
5	E	2033-02-03T03:48:37.565		13.79	-53.80	42287.01	8.41		
4	E	2033-02-03T03:49:06.357		13.69	-53.70	42530.96	8.51		
alpha	E	2033-02-03T03:53:12.497		12.83	-52.81	44717.67	9.22		
beta	E	2033-02-03T03:54:52.448		12.49	-52.45	45653.43	9.48		
eta	E	2033-02-03T03:57:29.775		11.94	-51.88	47176.12	9.86		
gamma	E	2033-02-03T03:58:14.773		11.79	-51.71	47622.20	9.96		
delta	E	2033-02-03T03:59:22.340		11.56	-51.47	48300.35	10.11		
lambda	E	2033-02-03T04:02:10.285		10.98	-50.86	50026.71	10.44		
epsilon	E	2033-02-03T04:04:13.697		10.55	-50.41	51329.64	10.60		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-02-03T03:19:56.450
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       : 3427675547667742080
2Mass ID (if available) : 05491238+2337546
ICRS Star Coord at Epoch: 05h 49m 12.39119s +23:37:54.46341s
RUWE (>1.4 is poor) : 0.92
K magnitude           : 14.483
G magnitude           : 17.814
RP magnitude          : 16.869
BP magnitude          : 18.762
DUPflag              : 0
Distance (au)        : 18.321
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -14.10
Sun-Target sep (deg) : 133.38
Sun-Moon sep (deg)   : 88.74
B (ring opening deg) : 77.35
PA of pole (deg)     : 49.86
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.001
C/A sky separation (km) : 39872.7
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall11.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
  
```



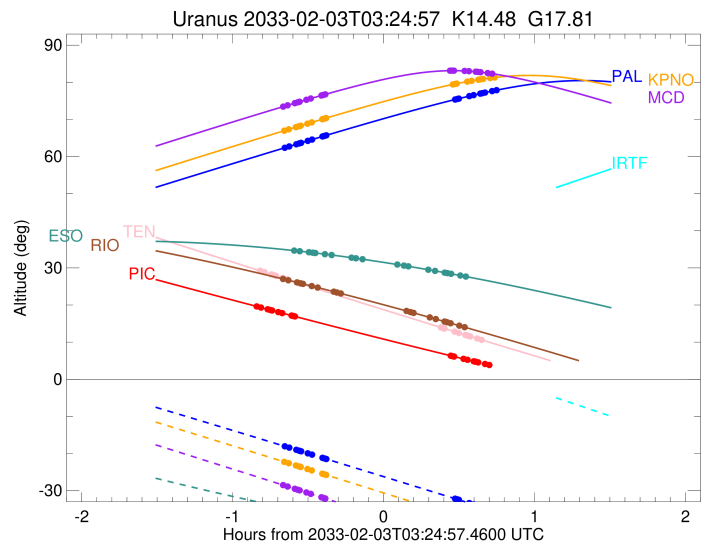
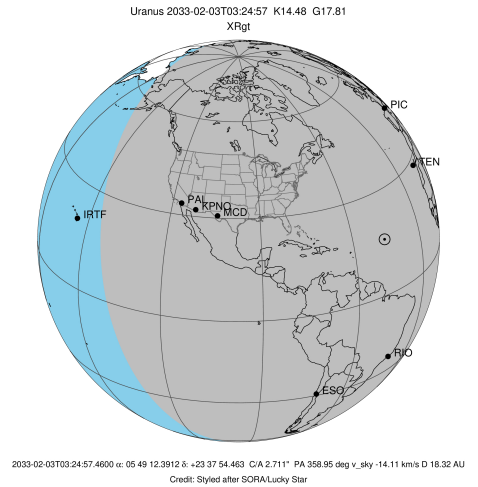
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-02-03T02:45:42.201		26.91	-50.46	50799.68	-8.97		
lambda	I	2033-02-03T02:47:10.015		26.66	-50.50	50026.71	-8.68		
delta	I	2033-02-03T02:50:35.916		26.09	-50.60	48300.35	-8.08		
gamma	I	2033-02-03T02:52:01.320		25.85	-50.63	47622.00	-7.81		
eta	I	2033-02-03T02:52:59.130		25.69	-50.65	47176.12	-7.62		
beta	I	2033-02-03T02:56:30.660		25.09	-50.72	45641.07	-6.88		
alpha	I	2033-02-03T02:58:55.292		24.68	-50.75	44687.21	-6.34		
4	I	2033-02-03T03:05:23.646		23.56	-50.79	42531.30	-4.69		
5	I	2033-02-03T03:06:35.237		23.36	-50.80	42216.55	-4.41		
6	I	2033-02-03T03:07:55.278		23.12	-50.79	41877.96	-4.00		

No planet occultations

6	E	2033-02-03T03:34:09.341	18.39	-50.23	41865.36	3.99
5	E	2033-02-03T03:35:43.943	18.09	-50.16	42264.95	4.39
4	E	2033-02-03T03:36:41.958	17.91	-50.12	42526.54	4.68
alpha	E	2033-02-03T03:43:17.372	16.68	-49.79	44709.23	6.31
beta	E	2033-02-03T03:45:40.272	16.23	-49.66	45649.32	6.84
eta	E	2033-02-03T03:49:11.940	15.56	-49.45	47176.12	7.57
gamma	E	2033-02-03T03:50:10.088	15.38	-49.39	47621.59	7.75
delta	E	2033-02-03T03:51:36.148	15.10	-49.29	48300.35	8.02
lambda	E	2033-02-03T03:55:03.621	14.44	-49.06	50026.71	8.61
epsilon	E	2033-02-03T03:57:24.139	13.99	-48.89	51263.01	8.89

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-02-03T03:22:24.420
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      : 3427675547667742080
2Mass ID (if available) : 05491238+2337546
ICRS Star Coord at Epoch: 05h 49m 12.39119s +23:37:54.46341s
RUWE (>1.4 is poor) : 0.92
K magnitude         : 14.483
G magnitude         : 17.814
RP magnitude        : 16.869
BP magnitude        : 18.762
DUPflag            : 0
Distance (au)       : 18.321
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -14.10
Sun-Target sep (deg) : 133.38
Sun-Moon sep (deg)  : 88.91
B (ring opening deg) : 77.35
PA of pole (deg)    : 49.86
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.086
C/A sky separation (km) : 40999.6
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall11.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	2033-02-03T02:50:08.493		34.61	-35.16	50806.59	-8.57		
lambda	I	2033-02-03T02:51:41.485		34.49	-35.36	50026.71	-8.25		
delta	I	2033-02-03T02:55:19.594		34.22	-35.84	48300.35	-7.57		
gamma	I	2033-02-03T02:56:51.096		34.09	-36.04	47621.87	-7.26		
eta	I	2033-02-03T02:57:53.426		34.01	-36.18	47176.12	-7.04		
beta	I	2033-02-03T03:01:45.312		33.69	-36.67	45641.06	-6.18		
alpha	I	2033-02-03T03:04:28.477		33.46	-37.01	44688.02	-5.53		
4	I	2033-02-03T03:12:31.025		32.73	-37.97	42529.49	-3.34		
5	I	2033-02-03T03:14:12.015		32.57	-38.17	42224.75	-2.89		
6	I	2033-02-03T03:16:28.858		32.35	-38.43	41876.13	-2.18		

No planet occultations

6	E	2033-02-03T03:30:33.939		30.90	-39.94	41869.37	2.18		
5	E	2033-02-03T03:33:05.101		30.62	-40.19	42256.35	2.89		
4	E	2033-02-03T03:34:32.423		30.46	-40.33	42526.02	3.34		
alpha	E	2033-02-03T03:42:41.287		29.52	-41.08	44707.05	5.51		
beta	E	2033-02-03T03:45:22.399		29.20	-41.32	45648.35	6.16		
eta	E	2033-02-03T03:49:13.882		28.73	-41.64	47176.12	7.02		
gamma	E	2033-02-03T03:50:16.379		28.60	-41.72	47621.46	7.23		
delta	E	2033-02-03T03:51:48.284		28.41	-41.85	48300.35	7.54		
lambda	E	2033-02-03T03:55:27.295		27.96	-42.13	50026.71	8.21		
epsilon	E	2033-02-03T03:57:52.152		27.65	-42.30	51246.59	8.53		