

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2039-02-21T03:57:48.520  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 674533650447999360  
 2Mass ID (if available) : 07472262+2142153

ICRS Star Coord at Epoch: 07h 47m 22.61797s +21:42:15.37505s

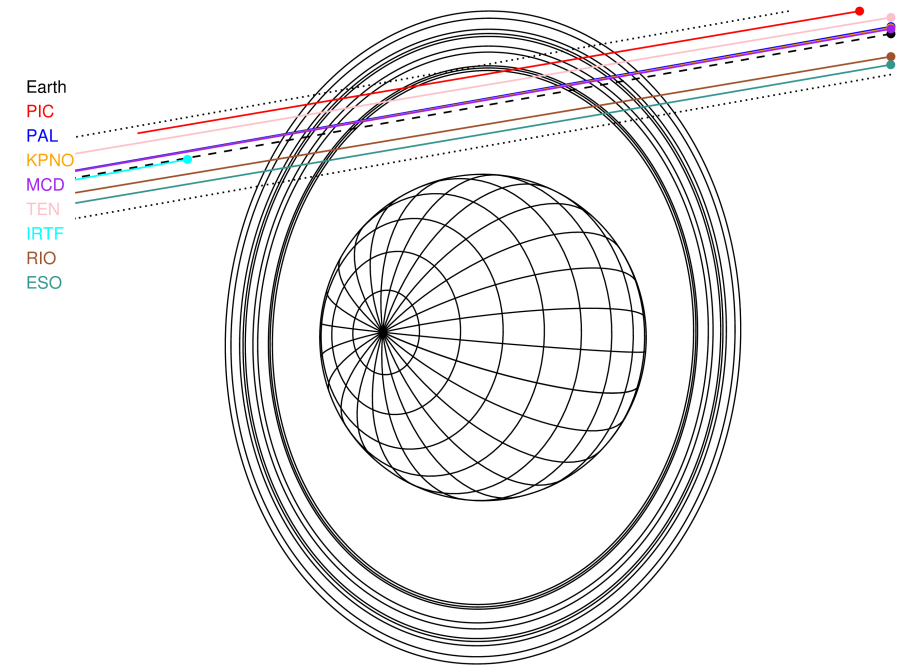
RUWE (>1.4 is poor) : 0.94  
 K magnitude : 10.003  
 G magnitude : 12.151  
 RP magnitude : 11.482  
 BP magnitude : 12.666  
 DUPflag : 0  
 Distance (au) : 17.840  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.29  
 Sun-Target sep (deg) : 142.98  
 Sun-Moon sep (deg) : 167.32  
 B (ring opening deg) : 52.04  
 PA of pole (deg) : 87.01

#	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



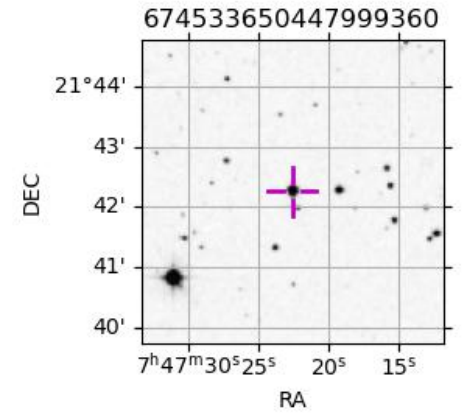
2039-02-21T03:57:48.5200 ra: 07 47 22.6180 s: +21 42 15.375 C/A 2.768° PA 190.01 deg v\_sky -17.29 km/s D 17.84 AU  
 Credit: Styled after SORA/Lucky Star

Uranus 2039-02-21T03:57:48 K10.00 G12.15 XRgt

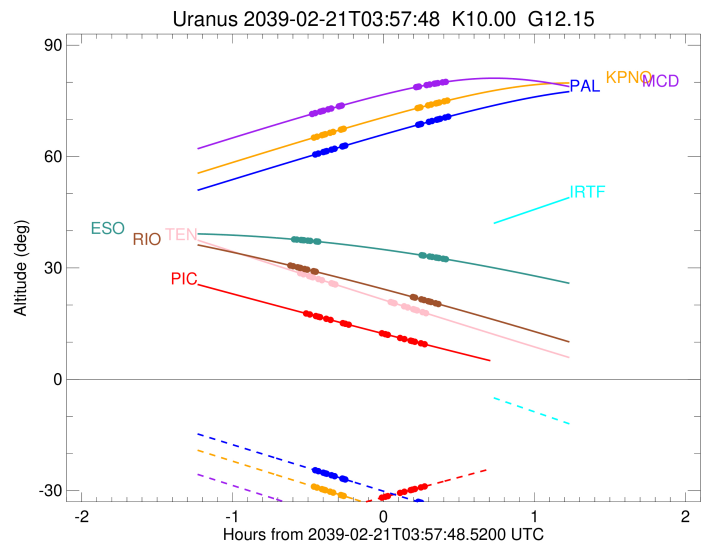
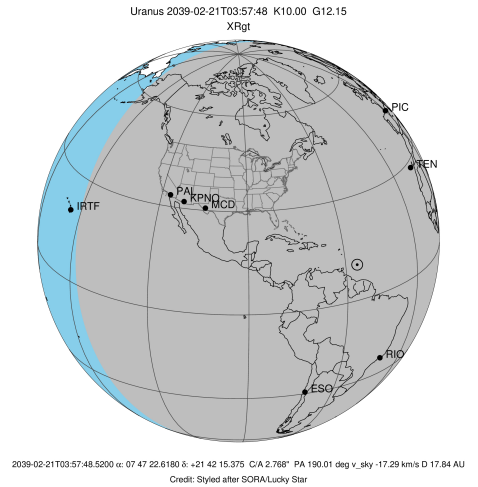


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	FEB 21 03:27 - FEB 21 04:13	PnnRie
PAL	Palomar Mt (200")	33.4	243.1	+++++		+++++	FEB 21 03:30 - FEB 21 04:23	PnnRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	FEB 21 03:30 - FEB 21 04:22	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	FEB 21 03:29 - FEB 21 04:22	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++		+++++	FEB 21 03:24 - FEB 21 04:14	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 21 03:20 - FEB 21 04:19	PnnRie
ESO	European Southern Obs	-29.3	289.3	+++++		+++++	FEB 21 03:22 - FEB 21 04:22	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 : 2039-02-21T03:53:47.740  
 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 : 674533650447999360  
 2Mass ID (if available) : 07472262+2142153  
 ICRS Star Coord at Epoch: 07h 47m 22.61797s +21:42:15.37505s  
 RUWE (>1.4 is poor) : 0.94  
 K magnitude : 10.003  
 G magnitude : 12.151  
 RP magnitude : 11.482  
 BP magnitude : 12.666  
 DUPflag : 0  
 Distance (au) : 17.840  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.29  
 Sun-Target sep (deg) : 142.98  
 Sun-Moon sep (deg) : 166.65  
 B (ring opening deg) : 52.04  
 PA of pole (deg) : 87.01  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.136  
 C/A sky separation (km) : 40579.4  
 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

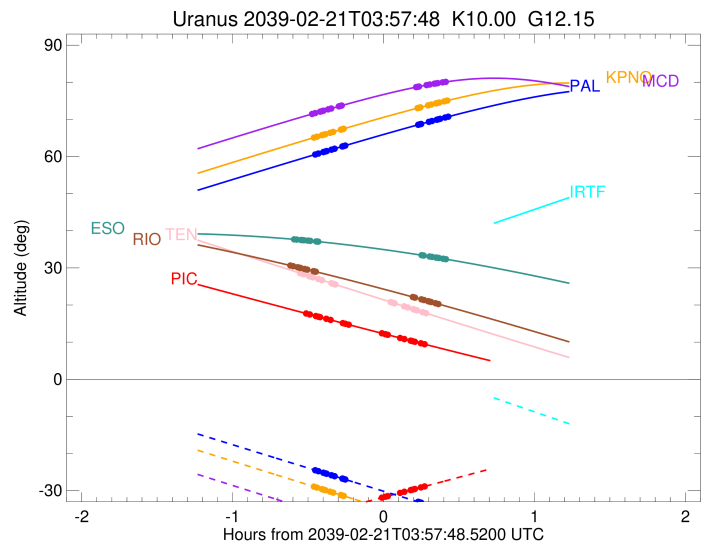
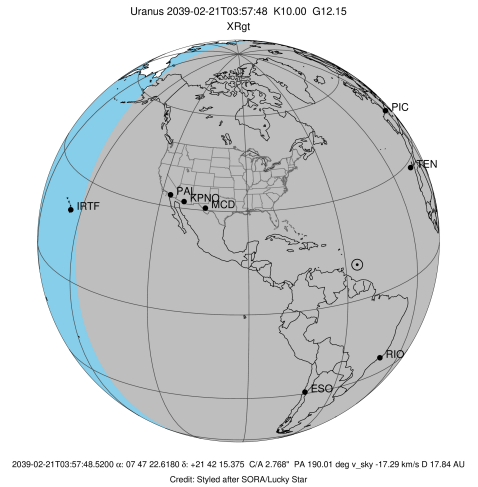


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-02-21T03:27:22.879		17.66	-37.06	50926.17	-12.79		
lambda	I	2039-02-21T03:28:33.767		17.45	-36.86	50026.71	-12.47		
delta	I	2039-02-21T03:30:57.718		17.02	-36.45	48300.35	-11.50		
gamma	I	2039-02-21T03:31:57.226		16.84	-36.28	47628.56	-11.07		
eta	I	2039-02-21T03:32:38.663		16.72	-36.16	47176.12	-10.76		
beta	I	2039-02-21T03:35:09.016		16.27	-35.73	45645.39	-9.56		
alpha	I	2039-02-21T03:36:53.746		15.96	-35.43	44692.37	-8.66		
4	I	2039-02-21T03:41:36.375		15.13	-34.62	42615.25	-5.94		
5	I	2039-02-21T03:42:49.598		14.91	-34.40	42207.58	-5.15		
6	I	2039-02-21T03:44:16.002		14.66	-34.15	41798.94	-4.27		

No planet occultations

6	E	2039-02-21T03:56:53.697		12.43	-31.94	41794.81	4.27		
5	E	2039-02-21T03:58:15.788		12.19	-31.70	42175.90	5.15		
4	E	2039-02-21T03:59:32.209		11.97	-31.47	42602.94	5.94		
alpha	E	2039-02-21T04:04:17.435		11.14	-30.63	44684.90	8.63		
beta	E	2039-02-21T04:06:01.966		10.84	-30.32	45641.64	9.53		
eta	E	2039-02-21T04:08:33.450		10.40	-29.87	47176.12	10.73		
gamma	E	2039-02-21T04:09:14.552		10.28	-29.75	47623.18	11.03		
delta	E	2039-02-21T04:10:14.779		10.11	-29.57	48300.35	11.46		
lambda	E	2039-02-21T04:12:39.337		9.69	-29.14	50026.71	12.41		
epsilon	E	2039-02-21T04:13:37.429		9.53	-28.97	50758.14	12.73		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2039-02-21T04:00:02.570  
 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 : 674533650447999360  
 2Mass ID (if available) : 07472262+2142153  
 ICRS Star Coord at Epoch: 07h 47m 22.61797s +21:42:15.37505s  
 RUWE (>1.4 is poor) : 0.94  
 K magnitude : 10.003  
 G magnitude : 12.151  
 RP magnitude : 11.482  
 BP magnitude : 12.666  
 DUPflag : 0  
 Distance (au) : 17.840  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.29  
 Sun-Target sep (deg) : 142.98  
 Sun-Moon sep (deg) : 167.82  
 B (ring opening deg) : 52.04  
 PA of pole (deg) : 87.01  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.842  
 C/A sky separation (km) : 36771.1  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 ural11.bsp  
 IAU\_URANUS\_for\_RINGFIT.tpc  
 vgr2.ural11.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



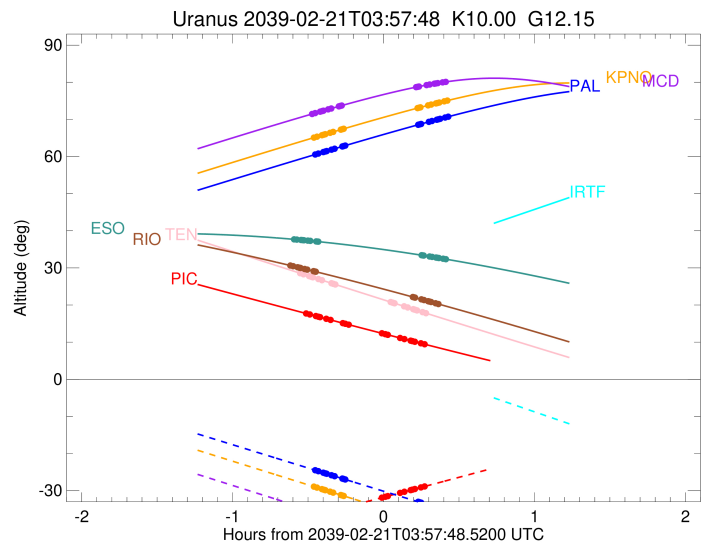
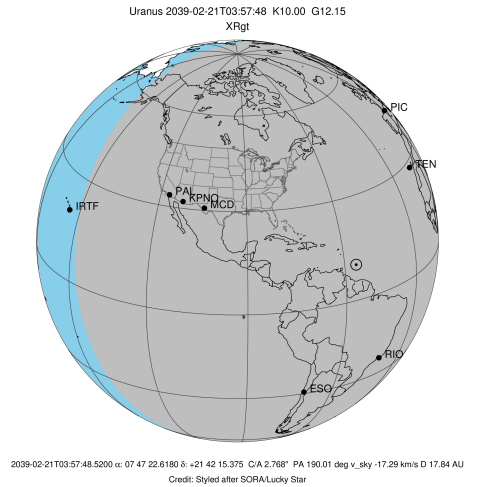
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-02-21T03:30:54.012		60.60	-24.55	50965.40	-15.05		
lambda	I	2039-02-21T03:31:56.575		60.81	-24.77	50026.71	-14.84		
delta	I	2039-02-21T03:33:55.601		61.21	-25.18	48300.35	-14.16		
gamma	I	2039-02-21T03:34:43.498		61.37	-25.35	47629.19	-13.86		
eta	I	2039-02-21T03:35:16.423		61.48	-25.46	47176.12	-13.65		
beta	I	2039-02-21T03:37:11.508		61.86	-25.86	45647.55	-12.87		
alpha	I	2039-02-21T03:38:27.230		62.12	-26.13	44696.48	-12.31		
4	I	2039-02-21T03:41:26.003		62.71	-26.75	42616.56	-10.85		
5	I	2039-02-21T03:42:02.511		62.83	-26.87	42226.87	-10.49		
6	I	2039-02-21T03:42:44.216		62.97	-27.02	41805.28	-10.15		

No planet occultations

6	E	2039-02-21T04:11:29.045		68.54	-32.98	41795.87	10.16		
5	E	2039-02-21T04:12:06.382		68.65	-33.11	42164.03	10.49		
4	E	2039-02-21T04:12:45.909		68.77	-33.25	42594.37	10.86		
alpha	E	2039-02-21T04:15:46.399		69.33	-33.87	44686.26	12.32		
beta	E	2039-02-21T04:17:01.642		69.56	-34.13	45642.72	12.88		
eta	E	2039-02-21T04:18:57.195		69.91	-34.52	47176.12	13.67		
gamma	E	2039-02-21T04:19:29.611		70.01	-34.63	47622.58	13.88		
delta	E	2039-02-21T04:20:17.935		70.15	-34.80	48300.35	14.17		
lambda	E	2039-02-21T04:22:16.831		70.51	-35.21	50026.71	14.85		
epsilon	E	2039-02-21T04:23:06.708		70.65	-35.38	50774.26	15.07		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2039-02-21T03:59:34.650
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       : 674533650447999360
2Mass ID (if available) : 07472262+2142153
ICRS Star Coord at Epoch: 07h 47m 22.61797s +21:42:15.37505s
RUWE (>1.4 is poor) : 0.94
K magnitude           : 10.003
G magnitude           : 12.151
RP magnitude          : 11.482
BP magnitude          : 12.666
DUPflag              : 0
Distance (au)        : 17.840
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -17.29
Sun-Target sep (deg) : 142.98
Sun-Moon sep (deg)   : 167.76
B (ring opening deg) : 52.04
PA of pole (deg)     : 87.01
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.831
C/A sky separation (km) : 36636.8
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLvl1.spk
ural11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ural11.bsp
ural161.bsp
vgr2.ural161.bsp
peph.ural160.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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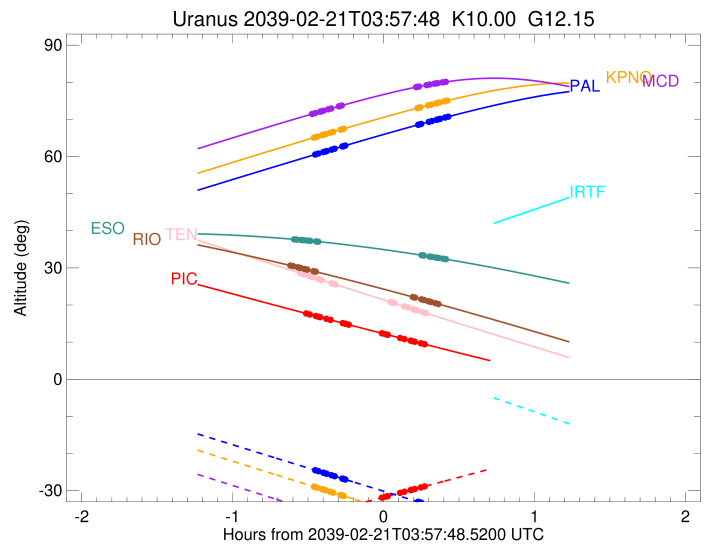
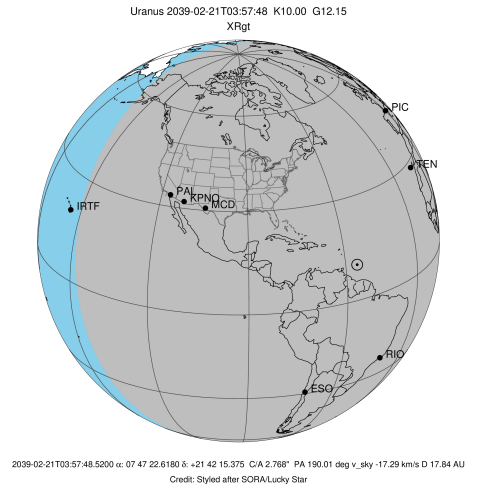


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-02-21T03:30:22.518		65.14	-28.97	50967.07	-15.13		
lambda	I	2039-02-21T03:31:24.844		65.35	-29.19	50026.71	-14.92		
delta	I	2039-02-21T03:33:23.145		65.75	-29.61	48300.35	-14.25		
gamma	I	2039-02-21T03:34:10.720		65.91	-29.78	47629.21	-13.96		
eta	I	2039-02-21T03:34:43.416		66.02	-29.89	47176.12	-13.75		
beta	I	2039-02-21T03:36:37.605		66.40	-30.29	45647.63	-12.98		
alpha	I	2039-02-21T03:37:52.654		66.65	-30.56	44696.64	-12.42		
4	I	2039-02-21T03:40:49.490		67.24	-31.18	42616.57	-10.99		
5	I	2039-02-21T03:41:25.461		67.36	-31.30	42227.47	-10.63		
6	I	2039-02-21T03:42:06.646		67.50	-31.45	41805.50	-10.31		

No planet occultations

6	E	2039-02-21T04:11:13.684		73.03	-37.55	41795.93	10.31		
5	E	2039-02-21T04:11:50.504		73.13	-37.68	42163.80	10.64		
4	E	2039-02-21T04:12:29.510		73.25	-37.81	42594.14	10.99		
alpha	E	2039-02-21T04:15:28.104		73.77	-38.43	44686.31	12.43		
beta	E	2039-02-21T04:16:42.702		73.99	-38.69	45642.76	12.98		
eta	E	2039-02-21T04:18:37.396		74.31	-39.08	47176.12	13.76		
gamma	E	2039-02-21T04:19:09.595		74.41	-39.19	47622.57	13.97		
delta	E	2039-02-21T04:19:57.614		74.54	-39.36	48300.35	14.26		
lambda	E	2039-02-21T04:21:55.830		74.87	-39.77	50026.71	14.93		
epsilon	E	2039-02-21T04:22:45.483		75.00	-39.94	50774.78	15.15		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2039-02-21T03:58:52.310  
 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 : 674533650447999360  
 2Mass ID (if available) : 07472262+2142153  
 ICRS Star Coord at Epoch: 07h 47m 22.61797s +21:42:15.37505s  
 RUWE (>1.4 is poor) : 0.94  
 K magnitude : 10.003  
 G magnitude : 12.151  
 RP magnitude : 11.482  
 BP magnitude : 12.666  
 DUPflag : 0  
 Distance (au) : 17.840  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.29  
 Sun-Target sep (deg) : 142.98  
 Sun-Moon sep (deg) : 167.67  
 B (ring opening deg) : 52.04  
 PA of pole (deg) : 87.01  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.825  
 C/A sky separation (km) : 36552.8  
 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



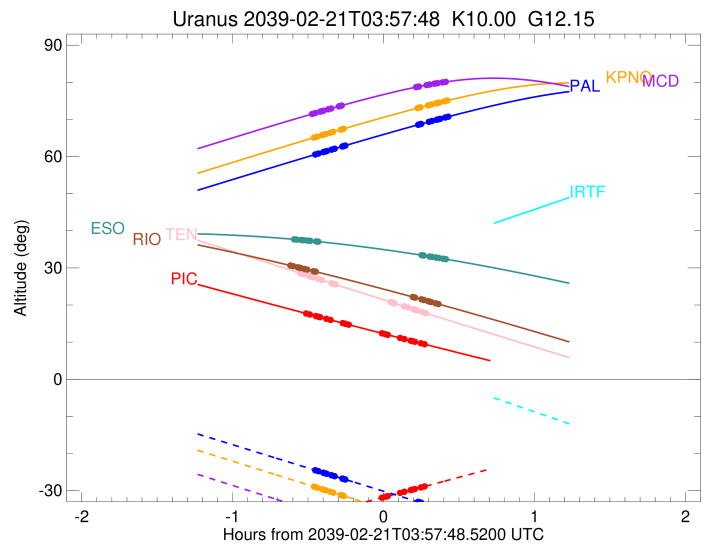
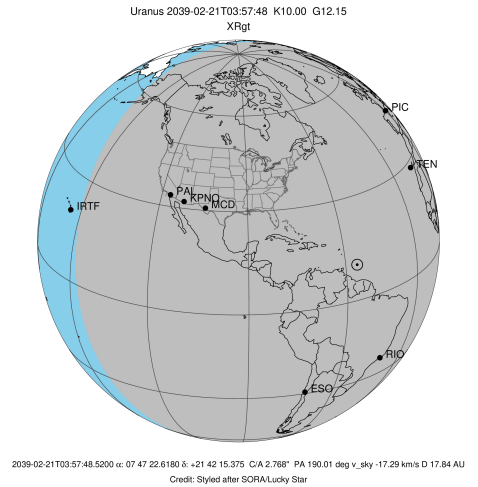
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-02-21T03:29:39.088		71.51	-35.41	50968.33	-15.20		
lambda	I	2039-02-21T03:30:41.245		71.71	-35.63	50026.71	-14.98		
delta	I	2039-02-21T03:32:39.029		72.10	-36.05	48300.35	-14.32		
gamma	I	2039-02-21T03:33:26.378		72.25	-36.22	47629.23	-14.03		
eta	I	2039-02-21T03:33:58.914		72.35	-36.33	47176.12	-13.82		
beta	I	2039-02-21T03:35:52.483		72.72	-36.74	45647.69	-13.05		
alpha	I	2039-02-21T03:37:07.075		72.96	-37.00	44696.75	-12.50		
4	I	2039-02-21T03:40:02.623		73.51	-37.62	42616.57	-11.08		
5	I	2039-02-21T03:40:38.241		73.63	-37.74	42227.89	-10.73		
6	I	2039-02-21T03:41:19.091		73.75	-37.89	41805.65	-10.41		

No planet occultations

6	E	2039-02-21T04:10:39.548		78.68	-44.04	41795.97	10.41		
5	E	2039-02-21T04:11:16.040		78.76	-44.16	42163.68	10.73		
4	E	2039-02-21T04:11:54.715		78.85	-44.29	42594.01	11.08		
alpha	E	2039-02-21T04:14:52.089		79.24	-44.91	44686.34	12.50		
beta	E	2039-02-21T04:16:06.270		79.39	-45.16	45642.78	13.05		
eta	E	2039-02-21T04:18:00.404		79.62	-45.55	47176.12	13.82		
gamma	E	2039-02-21T04:18:32.461		79.68	-45.66	47622.56	14.03		
delta	E	2039-02-21T04:19:20.279		79.77	-45.83	48300.35	14.32		
lambda	E	2039-02-21T04:21:18.049		79.98	-46.23	50026.71	14.99		
epsilon	E	2039-02-21T04:22:07.547		80.06	-46.40	50775.03	15.20		



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2039-02-21T03:52:41.240  
 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 : 674533650447999360  
 2Mass ID (if available) : 07472262+2142153  
 ICRS Star Coord at Epoch: 07h 47m 22.61797s +21:42:15.37505s  
 RUWE (>1.4 is poor) : 0.94  
 K magnitude : 10.003  
 G magnitude : 12.151  
 RP magnitude : 11.482  
 BP magnitude : 12.666  
 DUPflag : 0  
 Distance (au) : 17.840  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.29  
 Sun-Target sep (deg) : 142.98  
 Sun-Moon sep (deg) : 166.58  
 B (ring opening deg) : 52.04  
 PA of pole (deg) : 87.01  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.008  
 C/A sky separation (km) : 38925.9  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 ural11.bsp  
 IAU\_URANUS\_for\_RINGFIT.tpc  
 vgr2.ural11.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

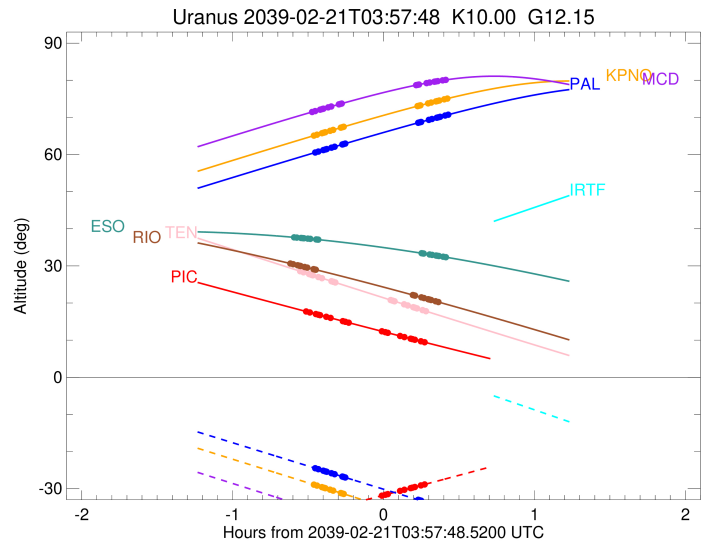
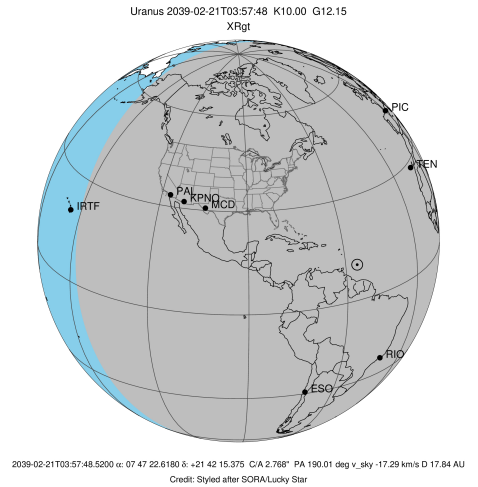


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-02-21T03:24:57.633		28.51	-55.81	50945.30	-13.82		
lambda	I	2039-02-21T03:26:04.489		28.27	-55.59	50026.71	-13.54		
delta	I	2039-02-21T03:28:15.864		27.79	-55.14	48300.35	-12.72		
gamma	I	2039-02-21T03:29:09.396		27.60	-54.96	47628.88	-12.36		
eta	I	2039-02-21T03:29:46.406		27.46	-54.84	47176.12	-12.10		
beta	I	2039-02-21T03:31:57.923		26.99	-54.39	45646.42	-11.12		
alpha	I	2039-02-21T03:33:26.538		26.67	-54.09	44694.36	-10.40		
4	I	2039-02-21T03:37:05.904		25.88	-53.34	42616.23	-8.44		
5	I	2039-02-21T03:37:54.497		25.70	-53.18	42217.86	-7.94		
6	I	2039-02-21T03:38:49.015		25.50	-52.99	41802.13	-7.44		

No planet occultations

6	E	2039-02-21T04:00:30.322		20.83	-48.47	41794.94	7.42		
5	E	2039-02-21T04:01:20.522		20.65	-48.29	42169.38	7.92		
4	E	2039-02-21T04:02:12.365		20.47	-48.11	42598.93	8.42		
alpha	E	2039-02-21T04:05:54.359		19.68	-47.32	44685.38	10.37		
beta	E	2039-02-21T04:07:22.861		19.36	-47.01	45642.06	11.07		
eta	E	2039-02-21T04:09:35.561		18.89	-46.54	47176.12	12.05		
gamma	E	2039-02-21T04:10:12.259		18.76	-46.41	47622.91	12.30		
delta	E	2039-02-21T04:11:06.536		18.56	-46.22	48300.35	12.66		
lambda	E	2039-02-21T04:13:18.595		18.10	-45.75	50026.71	13.47		
epsilon	E	2039-02-21T04:14:12.719		17.90	-45.55	50764.26	13.74		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2039-02-21T03:52:41.610  
 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 : 674533650447999360  
 2Mass ID (if available) : 07472262+2142153  
 ICRS Star Coord at Epoch: 07h 47m 22.61797s +21:42:15.37505s  
 RUWE (>1.4 is poor) : 0.94  
 K magnitude : 10.003  
 G magnitude : 12.151  
 RP magnitude : 11.482  
 BP magnitude : 12.666  
 DUPflag : 0  
 Distance (au) : 17.840  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.29  
 Sun-Target sep (deg) : 142.98  
 Sun-Moon sep (deg) : 166.75  
 B (ring opening deg) : 52.04  
 PA of pole (deg) : 87.01  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.538  
 C/A sky separation (km) : 32843.3  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl1.spk  
 ural11.bsp  
 IAU\_URANUS\_for\_RINGFIT.tpc  
 vgr2.ural11.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

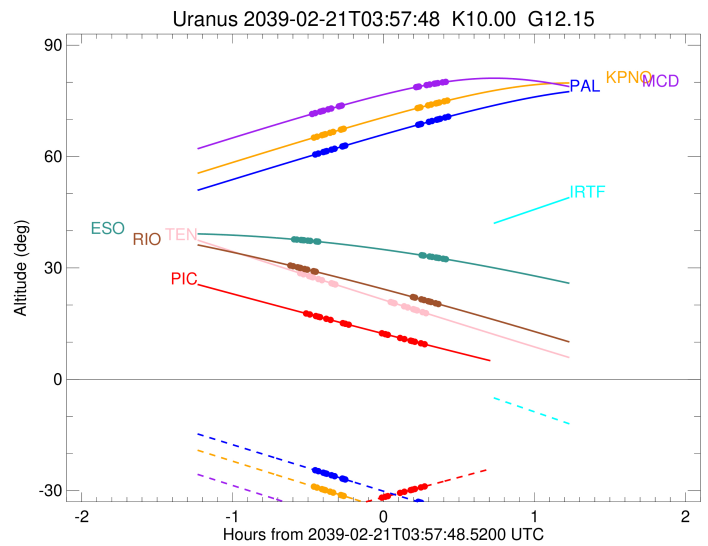
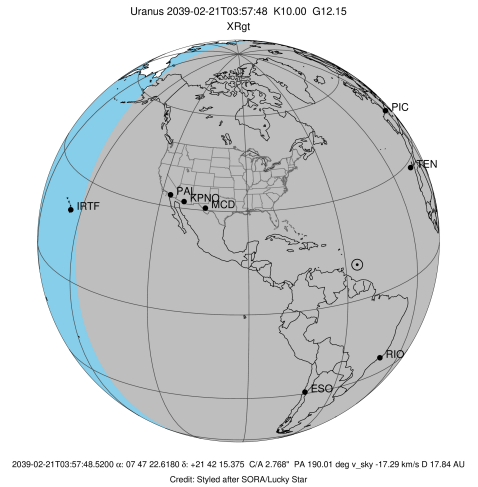


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-02-21T03:20:56.748		30.61	-56.42	51008.57	-16.70		
lambda	I	2039-02-21T03:21:55.591		30.45	-56.39	50026.71	-16.56		
delta	I	2039-02-21T03:23:41.344		30.17	-56.34	48300.35	-16.08		
gamma	I	2039-02-21T03:24:23.317		30.05	-56.32	47629.75	-15.87		
eta	I	2039-02-21T03:24:52.026		29.97	-56.30	47176.12	-15.73		
beta	I	2039-02-21T03:26:30.617		29.70	-56.25	45649.83	-15.19		
alpha	I	2039-02-21T03:27:34.056		29.53	-56.21	44700.65	-14.81		
4	I	2039-02-21T03:29:58.615		29.13	-56.11	42615.98	-13.88		
5	I	2039-02-21T03:30:25.763		29.05	-56.10	42241.28	-13.65		
6	I	2039-02-21T03:30:58.932		28.96	-56.07	41811.00	-13.46		

No planet occultations

6	E	2039-02-21T04:09:22.656		22.18	-53.23	41798.12	13.41		
5	E	2039-02-21T04:09:51.427		22.09	-53.18	42158.85	13.59		
4	E	2039-02-21T04:10:21.911		22.00	-53.13	42587.86	13.82		
alpha	E	2039-02-21T04:12:48.839		21.54	-52.87	44688.01	14.75		
beta	E	2039-02-21T04:13:52.249		21.34	-52.76	45643.92	15.12		
eta	E	2039-02-21T04:15:31.880		21.03	-52.58	47176.12	15.65		
gamma	E	2039-02-21T04:16:00.250		20.95	-52.52	47622.16	15.79		
delta	E	2039-02-21T04:16:42.915		20.81	-52.44	48300.35	16.00		
lambda	E	2039-02-21T04:18:29.228		20.48	-52.24	50026.71	16.47		
epsilon	E	2039-02-21T04:19:15.417		20.34	-52.16	50791.94	16.61		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2039-02-21T03:54:50.590  
 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 : 674533650447999360  
 2Mass ID (if available) : 07472262+2142153  
 ICRS Star Coord at Epoch: 07h 47m 22.61797s +21:42:15.37505s  
 RUWE (>1.4 is poor) : 0.94  
 K magnitude : 10.003  
 G magnitude : 12.151  
 RP magnitude : 11.482  
 BP magnitude : 12.666  
 DUPflag : 0  
 Distance (au) : 17.840  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.29  
 Sun-Target sep (deg) : 142.98  
 Sun-Moon sep (deg) : 167.13  
 B (ring opening deg) : 52.04  
 PA of pole (deg) : 87.01  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.425  
 C/A sky separation (km) : 31377.7  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 ural11.bsp  
 IAU\_URANUS\_for\_RINGFIT.tpc  
 vgr2.ural11.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	2039-02-21T03:22:25.104		37.68	-44.24	51022.05	-17.31		
lambda	I	2039-02-21T03:23:22.627		37.62	-44.36	50026.71	-17.19		
delta	I	2039-02-21T03:25:04.286		37.52	-44.56	48300.35	-16.77		
gamma	I	2039-02-21T03:25:44.491		37.48	-44.64	47629.90	-16.58		
eta	I	2039-02-21T03:26:11.960		37.45	-44.69	47176.12	-16.46		
beta	I	2039-02-21T03:27:45.879		37.35	-44.87	45650.56	-15.98		
alpha	I	2039-02-21T03:28:45.999		37.28	-44.99	44701.98	-15.65		
4	I	2039-02-21T03:31:02.071		37.13	-45.24	42615.55	-14.84		
5	I	2039-02-21T03:31:27.068		37.10	-45.29	42245.45	-14.64		
6	I	2039-02-21T03:31:58.321		37.07	-45.34	41812.82	-14.48		

No planet occultations

6	E	2039-02-21T04:12:52.315		33.43	-48.91	41799.15	14.45		
5	E	2039-02-21T04:13:19.137		33.38	-48.94	42157.56	14.61		
4	E	2039-02-21T04:13:47.419		33.33	-48.97	42585.51	14.81		
alpha	E	2039-02-21T04:16:05.562		33.08	-49.10	44688.78	15.61		
beta	E	2039-02-21T04:17:05.558		32.97	-49.16	45644.44	15.94		
eta	E	2039-02-21T04:18:40.292		32.79	-49.25	47176.12	16.41		
gamma	E	2039-02-21T04:19:07.361		32.74	-49.27	47622.01	16.54		
delta	E	2039-02-21T04:19:48.160		32.67	-49.31	48300.35	16.72		
lambda	E	2039-02-21T04:21:30.126		32.47	-49.39	50026.71	17.14		
epsilon	E	2039-02-21T04:22:15.008		32.39	-49.43	50799.79	17.25		