

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2028-10-25T12:03:47.180  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3413038818815208192  
 2Mass ID (if available) : 04473095+2221262

ICRS Star Coord at Epoch: 04h 47m 30.95021s +22:21:25.93897s

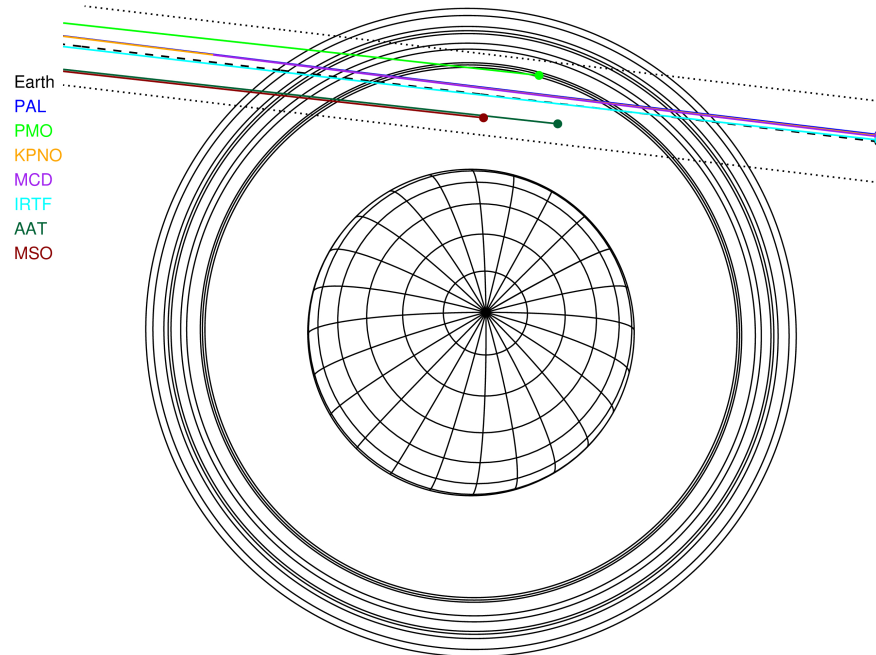
RUWE (>1.4 is poor) : 0.93  
 K magnitude : 14.289  
 G magnitude : 16.440  
 RP magnitude : 15.716  
 BP magnitude : 17.008  
 DUPflag : 0  
 Distance (au) : 18.541  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -16.14  
 Sun-Target sep (deg) : 138.92  
 Sun-Moon sep (deg) : 127.71  
 B (ring opening deg) : 81.17  
 PA of pole (deg) : -36.52

#	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



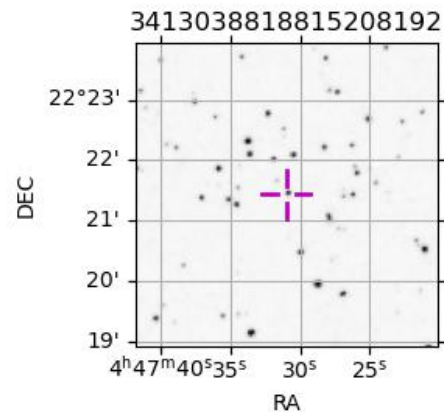
2028-10-25T12:03:47.1800 ra: 04 47 30.95021 s: +22 21 25.939 C/A 2.774" PA 173.18 deg v\_sky -16.13 km/s D 18.54 AU  
 Credit: Styled after SORA/Lucky Star

Uranus 2028-10-25T12:03:47 K14.29 G16.44 XRgt

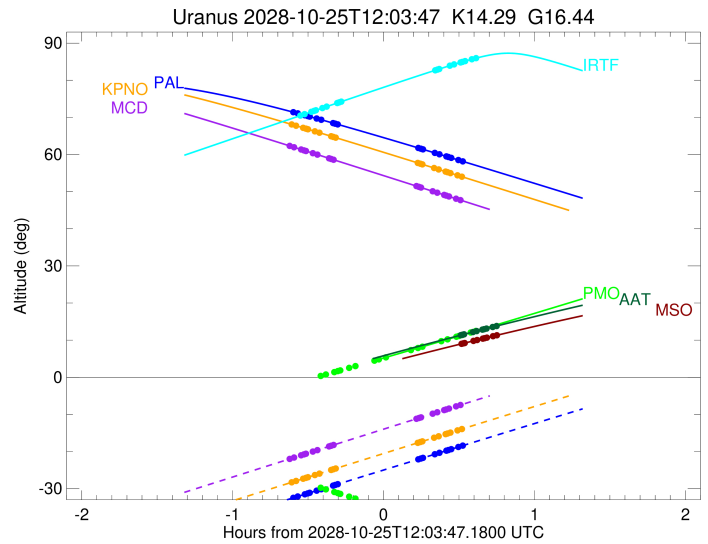
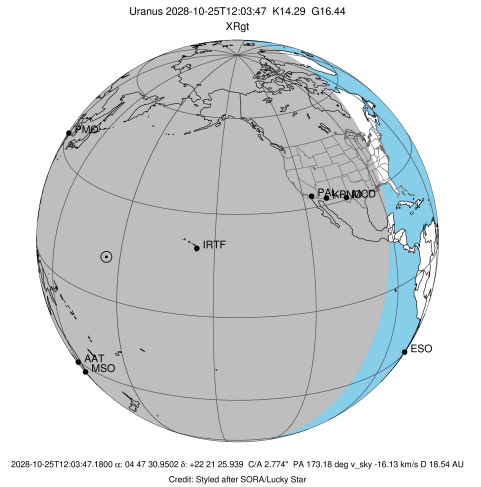


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (200")	33.4	243.1	+++++		+++++	OCT 25 11:28 - OCT 25 12:35	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8		+	+++++	OCT 25 12:05 - OCT 25 12:40	PnnRie
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	OCT 25 11:27 - OCT 25 12:35	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	OCT 25 11:26 - OCT 25 12:34	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++		+++++	OCT 25 11:31 - OCT 25 12:40	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					PnnRnn
AAT	Siding Spring (AAT)	-31.3	149.1			+++++	OCT 25 12:34 - OCT 25 12:49	PnnRne
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0			+++++	OCT 25 12:34 - OCT 25 12:49	PnnRne



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2028-10-25T12:01:12.400  
 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 : 3413038818815208192  
 2Mass ID (if available) : 04473095+2221262  
 ICRS Star Coord at Epoch: 04h 47m 30.95021s +22:21:25.93897s  
 RUWE (>1.4 is poor) : 0.93  
 K magnitude : 14.289  
 G magnitude : 16.440  
 RP magnitude : 15.716  
 BP magnitude : 17.008  
 DUPflag : 0  
 Distance (au) : 18.541  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -16.14  
 Sun-Target sep (deg) : 138.92  
 Sun-Moon sep (deg) : 128.14  
 B (ring opening deg) : 81.17  
 PA of pole (deg) : -36.52  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.852  
 C/A sky separation (km) : 38350.0  
 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

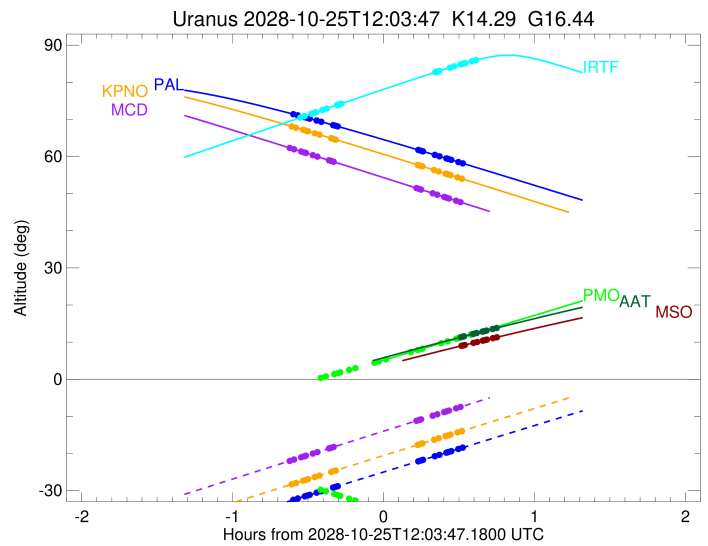
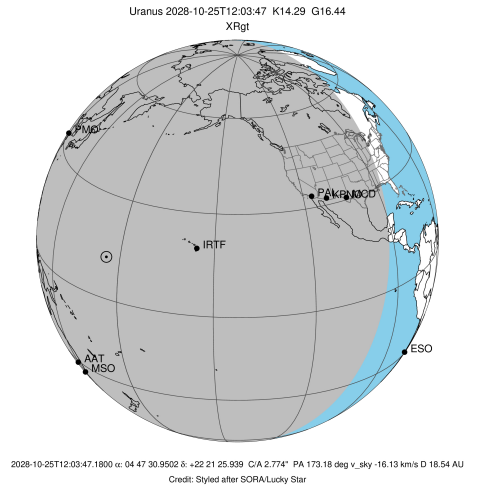


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-10-25T11:28:26.002		71.32	-32.37	50842.65	-10.80		
lambda	I	2028-10-25T11:29:42.878		71.09	-32.11	50026.71	-10.49		
delta	I	2028-10-25T11:32:32.107		70.57	-31.52	48300.35	-9.90		
gamma	I	2028-10-25T11:33:41.614		70.36	-31.28	47620.97	-9.64		
eta	I	2028-10-25T11:34:28.176		70.22	-31.12	47176.12	-9.46		
beta	I	2028-10-25T11:37:15.475		69.70	-30.54	45649.44	-8.78		
alpha	I	2028-10-25T11:39:04.710		69.36	-30.16	44715.49	-8.28		
4	I	2028-10-25T11:43:46.657		68.47	-29.18	42576.83	-6.87		
5	I	2028-10-25T11:44:37.576		68.31	-29.00	42227.86	-6.59		
6	I	2028-10-25T11:45:41.926		68.10	-28.78	41816.46	-6.24		

No planet occultations

6	E	2028-10-25T12:17:27.627		61.81	-22.14	41796.50	6.24		
5	E	2028-10-25T12:18:27.364		61.61	-21.93	42171.89	6.58		
4	E	2028-10-25T12:19:21.669		61.42	-21.74	42540.99	6.87		
alpha	E	2028-10-25T12:24:05.297		60.46	-20.75	44687.79	8.27		
beta	E	2028-10-25T12:26:00.562		60.07	-20.35	45670.67	8.77		
eta	E	2028-10-25T12:28:45.704		59.50	-19.78	47176.12	9.45		
gamma	E	2028-10-25T12:29:32.745		59.34	-19.61	47624.94	9.63		
delta	E	2028-10-25T12:30:41.945		59.11	-19.37	48300.35	9.89		
lambda	E	2028-10-25T12:33:31.446		58.52	-18.78	50026.71	10.47		
epsilon	E	2028-10-25T12:35:36.921		58.09	-18.35	51365.71	10.78		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2028-10-25T12:09:16.530  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Observer code : PMO  
 Location : Purple Mtn Obs. Nanking  
 Latitude (deg) : 32.06667  
 E. Longitude (deg) : 118.82089  
 Altitude (km) : 0.364  
 Gaia source ID : 3413038818815208192  
 2Mass ID (if available) : 04473095+2221262  
 ICRS Star Coord at Epoch: 04h 47m 30.95021s +22:21:25.93897s  
 RUWE (>1.4 is poor) : 0.93  
 K magnitude : 14.289  
 G magnitude : 16.440  
 RP magnitude : 15.716  
 BP magnitude : 17.008  
 DUPflag : 0  
 Distance (au) : 18.541  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -16.14  
 Sun-Target sep (deg) : 138.92  
 Sun-Moon sep (deg) : 128.22  
 B (ring opening deg) : 81.17  
 PA of pole (deg) : -36.52  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.063  
 C/A sky separation (km) : 41192.7  
 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

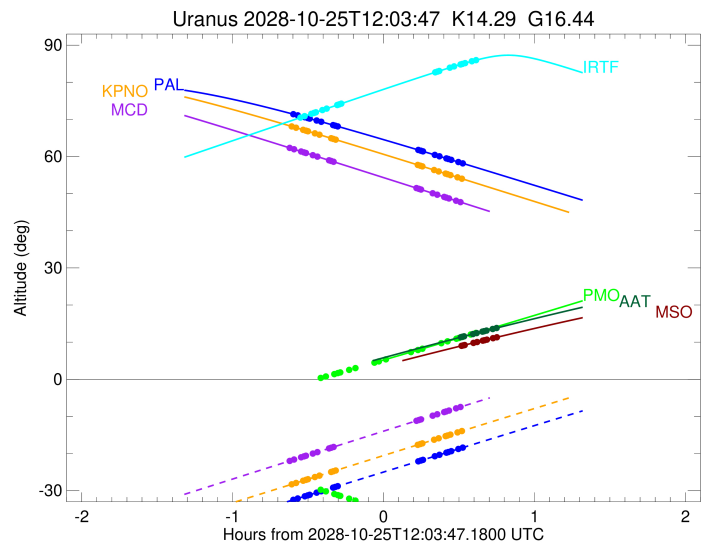
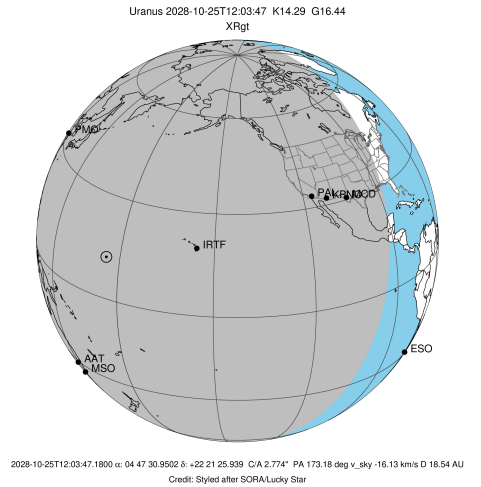


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-10-25T11:39:21.396		0.46x	-29.88	50870.68	-9.33		
lambda	I	2028-10-25T11:40:54.205		0.75x	-30.20	50026.71	-8.93		
delta	I	2028-10-25T11:44:15.850		1.40x	-30.91	48300.35	-8.18		
gamma	I	2028-10-25T11:45:40.681		1.67x	-31.21	47621.06	-7.84		
eta	I	2028-10-25T11:46:38.350		1.85x	-31.42	47176.12	-7.59		
beta	I	2028-10-25T11:50:12.273		2.54x	-32.17	45651.88	-6.65		
alpha	I	2028-10-25T11:52:41.872		3.02x	-32.70	44710.25	-5.90		
4	I	2028-10-25T12:00:17.931		4.50x	-34.30	42566.75	-3.43		
5	I	2028-10-25T12:02:10.962		4.87x	-34.70	42208.57	-2.75		
6	I	2028-10-25T12:05:13.780		5.46	-35.34	41806.66	-1.66		

No planet occultations

6	E	2028-10-25T12:14:09.046		7.22	-37.22	41801.26	1.66		
5	E	2028-10-25T12:17:06.828		7.80	-37.84	42184.62	2.76		
4	E	2028-10-25T12:19:03.044		8.18	-38.24	42548.40	3.44		
alpha	E	2028-10-25T12:26:39.007		9.70	-39.83	44690.03	5.93		
beta	E	2028-10-25T12:29:13.967		10.21	-40.37	45668.45	6.68		
eta	E	2028-10-25T12:32:44.331		10.91	-41.10	47176.12	7.64		
gamma	E	2028-10-25T12:33:42.094		11.11	-41.30	47624.43	7.88		
delta	E	2028-10-25T12:35:05.985		11.39	-41.59	48300.35	8.23		
lambda	E	2028-10-25T12:38:26.292		12.06	-42.28	50026.71	9.00		
epsilon	E	2028-10-25T12:40:48.085		12.53	-42.77	51337.78	9.40		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2028-10-25T12:00:42.220  
 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 : 3413038818815208192  
 2Mass ID (if available) : 04473095+2221262  
 ICRS Star Coord at Epoch: 04h 47m 30.95021s +22:21:25.93897s  
 RUWE (>1.4 is poor) : 0.93  
 K magnitude : 14.289  
 G magnitude : 16.440  
 RP magnitude : 15.716  
 BP magnitude : 17.008  
 DUPflag : 0  
 Distance (au) : 18.541  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -16.14  
 Sun-Target sep (deg) : 138.92  
 Sun-Moon sep (deg) : 128.08  
 B (ring opening deg) : 81.17  
 PA of pole (deg) : -36.52  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.843  
 C/A sky separation (km) : 38235.0  
 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  
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 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

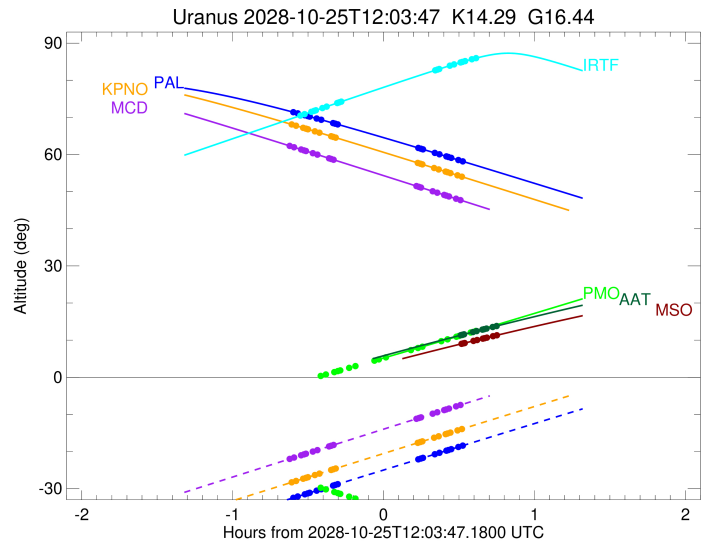
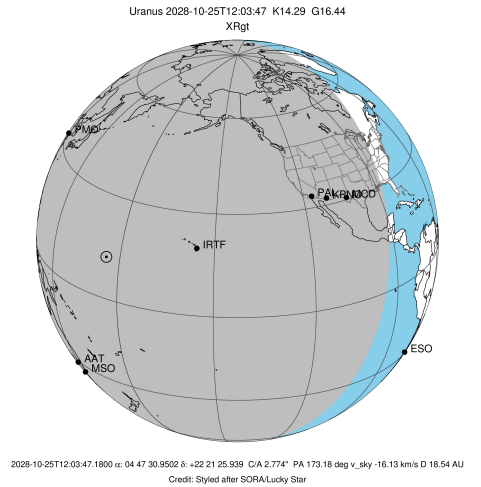


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-10-25T11:27:46.784		68.01	-28.19	50841.51	-10.84		
lambda	I	2028-10-25T11:29:03.249		67.76	-27.92	50026.71	-10.53		
delta	I	2028-10-25T11:31:51.711		67.19	-27.33	48300.35	-9.95		
gamma	I	2028-10-25T11:33:00.856		66.96	-27.08	47620.97	-9.70		
eta	I	2028-10-25T11:33:47.157		66.80	-26.92	47176.12	-9.52		
beta	I	2028-10-25T11:36:33.391		66.24	-26.33	45649.35	-8.84		
alpha	I	2028-10-25T11:38:21.743		65.87	-25.95	44715.69	-8.35		
4	I	2028-10-25T11:43:00.654		64.92	-24.96	42577.16	-6.97		
5	I	2028-10-25T11:43:50.812		64.75	-24.78	42228.48	-6.69		
6	I	2028-10-25T11:44:54.166		64.53	-24.56	41816.77	-6.35		

No planet occultations

6	E	2028-10-25T12:17:15.023		57.77	-17.69	41796.42	6.34		
5	E	2028-10-25T12:18:13.781		57.57	-17.49	42171.60	6.68		
4	E	2028-10-25T12:19:07.344		57.38	-17.30	42540.80	6.96		
alpha	E	2028-10-25T12:23:48.045		56.39	-16.31	44687.73	8.33		
beta	E	2028-10-25T12:25:42.479		55.99	-15.90	45670.74	8.83		
eta	E	2028-10-25T12:28:26.634		55.41	-15.32	47176.12	9.50		
gamma	E	2028-10-25T12:29:13.438		55.24	-15.16	47624.96	9.68		
delta	E	2028-10-25T12:30:22.313		55.00	-14.92	48300.35	9.93		
lambda	E	2028-10-25T12:33:11.142		54.40	-14.32	50026.71	10.51		
epsilon	E	2028-10-25T12:35:16.291		53.96	-13.88	51366.60	10.82		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2028-10-25T12:00:00.850  
 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 : 3413038818815208192  
 2Mass ID (if available) : 04473095+2221262  
 ICRS Star Coord at Epoch: 04h 47m 30.95021s +22:21:25.93897s  
 RUWE (>1.4 is poor) : 0.93  
 K magnitude : 14.289  
 G magnitude : 16.440  
 RP magnitude : 15.716  
 BP magnitude : 17.008  
 DUPflag : 0  
 Distance (au) : 18.541  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -16.14  
 Sun-Target sep (deg) : 138.92  
 Sun-Moon sep (deg) : 127.98  
 B (ring opening deg) : 81.17  
 PA of pole (deg) : -36.52  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.839  
 C/A sky separation (km) : 38177.9  
 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



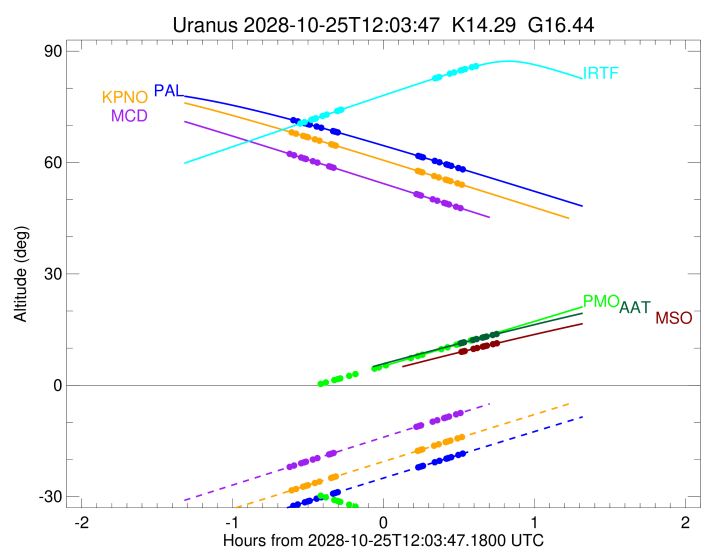
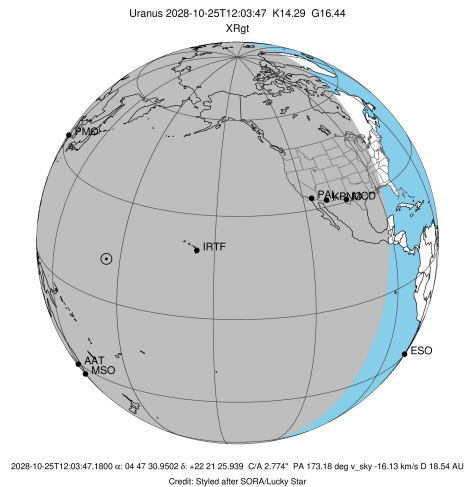
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-10-25T11:26:59.050		62.22	-21.89	50840.74	-10.85		
lambda	I	2028-10-25T11:28:15.359		61.95	-21.62	50026.71	-10.55		
delta	I	2028-10-25T11:31:03.589		61.35	-21.01	48300.35	-9.97		
gamma	I	2028-10-25T11:32:12.618		61.11	-20.76	47620.97	-9.71		
eta	I	2028-10-25T11:32:58.833		60.94	-20.60	47176.12	-9.54		
beta	I	2028-10-25T11:35:44.698		60.35	-20.00	45649.30	-8.87		
alpha	I	2028-10-25T11:37:32.715		59.97	-19.62	44715.82	-8.37		
4	I	2028-10-25T11:42:10.426		58.98	-18.62	42577.35	-7.01		
5	I	2028-10-25T11:43:00.265		58.80	-18.44	42228.84	-6.73		
6	I	2028-10-25T11:44:03.210		58.57	-18.22	41816.94	-6.40		

No planet occultations

6	E	2028-10-25T12:16:43.354		51.54	-11.22	41796.40	6.39		
5	E	2028-10-25T12:17:41.722		51.33	-11.02	42171.49	6.72		
4	E	2028-10-25T12:18:34.996		51.13	-10.83	42540.73	7.00		
alpha	E	2028-10-25T12:23:14.644		50.13	-9.83	44687.71	8.36		
beta	E	2028-10-25T12:25:08.821		49.72	-9.43	45670.76	8.85		
eta	E	2028-10-25T12:27:52.712		49.13	-8.85	47176.12	9.51		
gamma	E	2028-10-25T12:28:39.463		48.96	-8.68	47624.96	9.69		
delta	E	2028-10-25T12:29:48.272		48.71	-8.44	48300.35	9.94		
lambda	E	2028-10-25T12:32:36.999		48.10	-7.84	50026.71	10.51		
epsilon	E	2028-10-25T12:34:42.135		47.65	-7.40	51366.77	10.82		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2028-10-25T12:05:17.910
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      : 3413038818815208192
2Mass ID (if available) : 04473095+2221262
ICRS Star Coord at Epoch: 04h 47m 30.95021s +22:21:25.93897s
RUWE (>1.4 is poor) : 0.93
K magnitude          : 14.289
G magnitude          : 16.440
RP magnitude         : 15.716
BP magnitude         : 17.008
DUPflag             : 0
Distance (au)       : 18.541
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -16.14
Sun-Target sep (deg) : 138.92
Sun-Moon sep (deg)  : 128.53
B (ring opening deg) : 81.17
PA of pole (deg)    : -36.52
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.761
C/A sky separation (km) : 37132.8
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
    
```



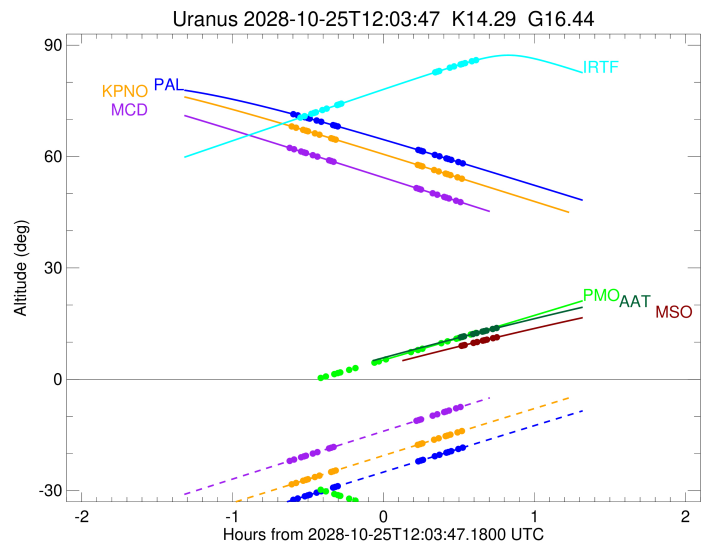
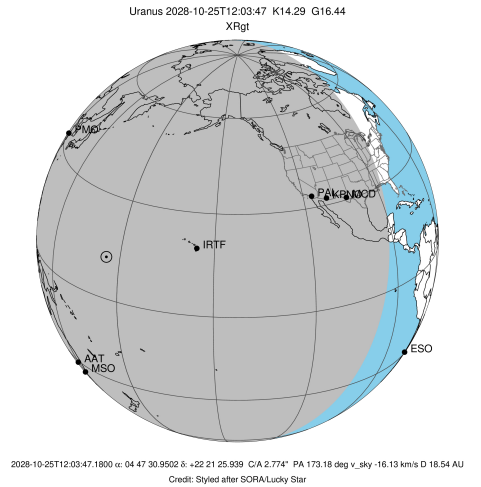
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-10-25T11:31:13.371		70.61	-68.26	50834.88	-11.27		
lambda	I	2028-10-25T11:32:26.194		70.89	-67.98	50026.71	-10.99		
delta	I	2028-10-25T11:35:07.075		71.51	-67.38	48300.35	-10.46		
gamma	I	2028-10-25T11:36:12.711		71.76	-67.13	47620.96	-10.24		
eta	I	2028-10-25T11:36:56.512		71.93	-66.96	47176.12	-10.08		
beta	I	2028-10-25T11:39:32.679		72.53	-66.37	45648.76	-9.48		
alpha	I	2028-10-25T11:41:13.058		72.91	-65.99	44717.05	-9.04		
4	I	2028-10-25T11:45:25.868		73.88	-65.03	42579.45	-7.86		
5	I	2028-10-25T11:46:09.910		74.05	-64.86	42232.78	-7.62		
6	I	2028-10-25T11:47:05.306		74.27	-64.65	41818.93	-7.34		

No planet occultations

6	E	2028-10-25T12:24:12.649		82.66	-56.05	41795.68	7.36		
5	E	2028-10-25T12:25:03.277		82.84	-55.85	42168.40	7.64		
4	E	2028-10-25T12:25:50.554		83.02	-55.66	42538.66	7.87		
alpha	E	2028-10-25T12:30:04.261		83.92	-54.68	44687.00	9.06		
beta	E	2028-10-25T12:31:50.263		84.28	-54.26	45671.63	9.50		
eta	E	2028-10-25T12:34:23.684		84.80	-53.66	47176.12	10.10		
gamma	E	2028-10-25T12:35:07.786		84.95	-53.49	47625.20	10.26		
delta	E	2028-10-25T12:36:12.838		85.16	-53.24	48300.35	10.49		
lambda	E	2028-10-25T12:38:53.271		85.66	-52.61	50026.71	11.02		
epsilon	E	2028-10-25T12:40:54.088		86.02	-52.14	51380.14	11.30		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2028-10-25T12:09:43.090  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Observer code : AAT  
 Location : Siding Spring (AAT)  
 Latitude (deg) : -31.27703  
 E. Longitude (deg) : 149.06608  
 Altitude (km) : 1.164  
 Gaia source ID : 3413038818815208192  
 2Mass ID (if available) : 04473095+2221262  
 ICRS Star Coord at Epoch: 04h 47m 30.95021s +22:21:25.93897s  
 RUWE (>1.4 is poor) : 0.93  
 K magnitude : 14.289  
 G magnitude : 16.440  
 RP magnitude : 15.716  
 BP magnitude : 17.008  
 DUPflag : 0  
 Distance (au) : 18.541  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -16.14  
 Sun-Target sep (deg) : 138.92  
 Sun-Moon sep (deg) : 128.26  
 B (ring opening deg) : 81.17  
 PA of pole (deg) : -36.52  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.526  
 C/A sky separation (km) : 33966.0  
 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

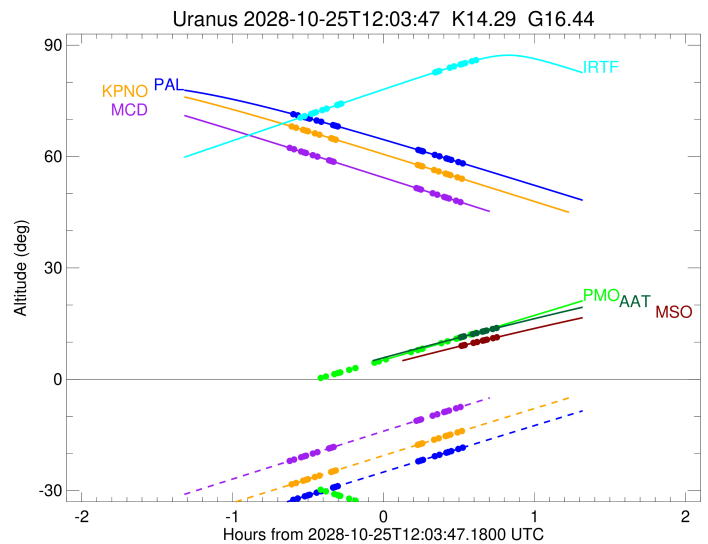
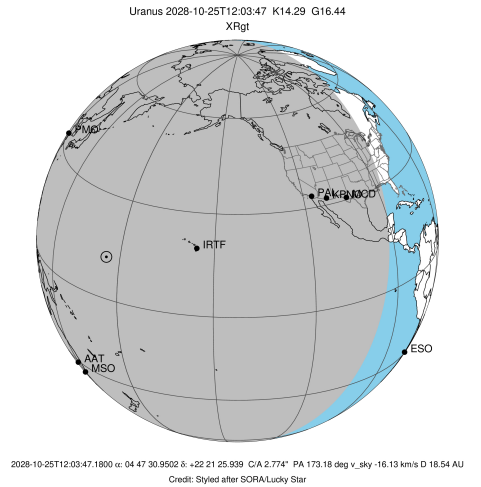


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-10-25T11:31:43.466	-0.26x	-35.63	50814.45	-12.05			
lambda	I	2028-10-25T11:32:49.556	-0.05x	-35.79	50026.71	-11.84			
delta	I	2028-10-25T11:35:17.738	0.43x	-36.14	48300.35	-11.45			
gamma	I	2028-10-25T11:36:17.482	0.62x	-36.28	47620.97	-11.29			
eta	I	2028-10-25T11:36:57.093	0.74x	-36.38	47176.12	-11.17			
beta	I	2028-10-25T11:39:16.580	1.19x	-36.70	45647.11	-10.74			
alpha	I	2028-10-25T11:40:43.828	1.47x	-36.90	44720.99	-10.44			
4	I	2028-10-25T11:44:16.624	2.14x	-37.38	42585.44	-9.64			
5	I	2028-10-25T11:44:51.848	2.25x	-37.46	42244.06	-9.49			
6	I	2028-10-25T11:45:36.380	2.39x	-37.56	41824.71	-9.31			

No planet occultations

6	E	2028-10-25T12:34:25.731	11.32	-43.08	41794.81	9.36			
5	E	2028-10-25T12:35:05.196	11.44	-43.14	42162.49	9.54			
4	E	2028-10-25T12:35:43.567	11.55	-43.20	42534.45	9.70			
alpha	E	2028-10-25T12:39:16.469	12.17	-43.50	44685.69	10.51			
beta	E	2028-10-25T12:40:49.032	12.44	-43.63	45673.58	10.82			
eta	E	2028-10-25T12:43:05.080	12.83	-43.82	47176.12	11.26			
gamma	E	2028-10-25T12:43:44.809	12.94	-43.87	47625.76	11.38			
delta	E	2028-10-25T12:44:43.661	13.11	-43.95	48300.35	11.55			
lambda	E	2028-10-25T12:47:10.619	13.53	-44.14	50026.71	11.94			
epsilon	E	2028-10-25T12:49:05.113	13.86	-44.28	51410.16	12.16			

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2028-10-25T12:09:30.530  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Observer code : MSO  
 Location : Mt. Stromlo Observatory  
 Latitude (deg) : -35.32000  
 E. Longitude (deg) : 149.00833  
 Altitude (km) : 0.770  
 Gaia source ID : 3413038818815208192  
 2Mass ID (if available) : 04473095+2221262  
 ICRS Star Coord at Epoch: 04h 47m 30.95021s +22:21:25.93897s  
 RUWE (>1.4 is poor) : 0.93  
 K magnitude : 14.289  
 G magnitude : 16.440  
 RP magnitude : 15.716  
 BP magnitude : 17.008  
 DUPflag : 0  
 Distance (au) : 18.541  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -16.14  
 Sun-Target sep (deg) : 138.92  
 Sun-Moon sep (deg) : 128.21  
 B (ring opening deg) : 81.17  
 PA of pole (deg) : -36.52  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.501  
 C/A sky separation (km) : 33637.0  
 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



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	2028-10-25T11:31:11.530	-2.18x	-32.50	50812.37	-12.14			
lambda	I	2028-10-25T11:32:16.928	-1.98x	-32.65	50026.71	-11.94			
delta	I	2028-10-25T11:34:43.824	-1.53x	-32.97	48300.35	-11.56			
gamma	I	2028-10-25T11:35:42.995	-1.35x	-33.10	47620.97	-11.40			
eta	I	2028-10-25T11:36:22.208	-1.23x	-33.18	47176.12	-11.29			
beta	I	2028-10-25T11:38:40.170	-0.81x	-33.48	45646.94	-10.87			
alpha	I	2028-10-25T11:40:06.279	-0.55x	-33.66	44721.40	-10.58			
4	I	2028-10-25T11:43:35.886	0.08x	-34.10	42586.01	-9.81			
5	I	2028-10-25T11:44:10.458	0.19x	-34.17	42245.15	-9.66			
6	I	2028-10-25T11:44:54.212	0.32x	-34.26	41825.28	-9.49			

No planet occultations

6	E	2028-10-25T12:34:42.360	8.99	-39.41	41794.78	9.54			
5	E	2028-10-25T12:35:21.050	9.10	-39.46	42162.05	9.71			
4	E	2028-10-25T12:35:58.778	9.21	-39.51	42534.11	9.86			
alpha	E	2028-10-25T12:39:28.547	9.78	-39.78	44685.60	10.65			
beta	E	2028-10-25T12:40:59.998	10.03	-39.90	45673.75	10.95			
eta	E	2028-10-25T12:43:14.558	10.40	-40.06	47176.12	11.37			
gamma	E	2028-10-25T12:43:53.899	10.51	-40.11	47625.81	11.49			
delta	E	2028-10-25T12:44:52.197	10.67	-40.18	48300.35	11.65			
lambda	E	2028-10-25T12:47:17.914	11.06	-40.35	50026.71	12.04			
epsilon	E	2028-10-25T12:49:11.767	11.37	-40.47	51412.73	12.24			