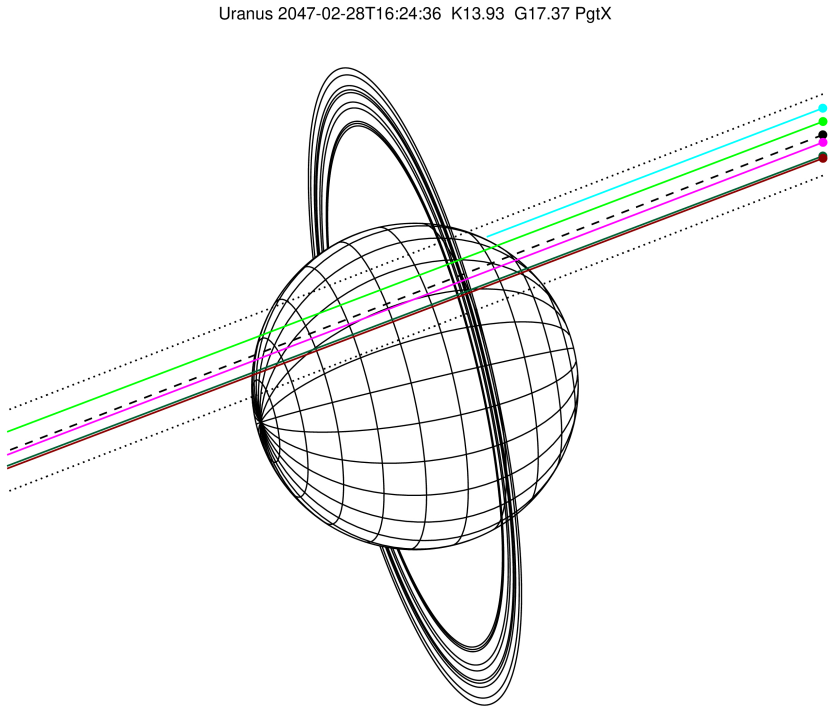
Stellar occultation prediction by rfrench@wellesley.edu Sun Jun 25 02:46:10 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2047-02-28T16:24:36.550
Event type : PgtX
: Uranus occs: geocentric, topocentric
: No ring occs
Gaia source ID : 3877244794040854016
2Mass ID (if available) : 10223790+1059363

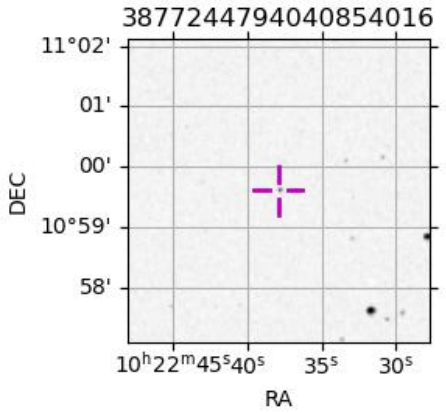
ICRS Star Coord at Epoch: 10h 22m 37.88890s +10:59:36.51571s
RUWE (>1.4 is poor) : 0.94
K magnitude : 13.925
G magnitude : 17.372
RP magnitude : 16.298
BP magnitude : 18.541
DUPflag : 0
Distance (au) : 17.329
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -22.85
Sun-Target sep (deg) : 174.05
Sun-Moon sep (deg) : 130.56
B (ring opening deg) : 13.96
PA of pole (deg) : 103.09

#	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

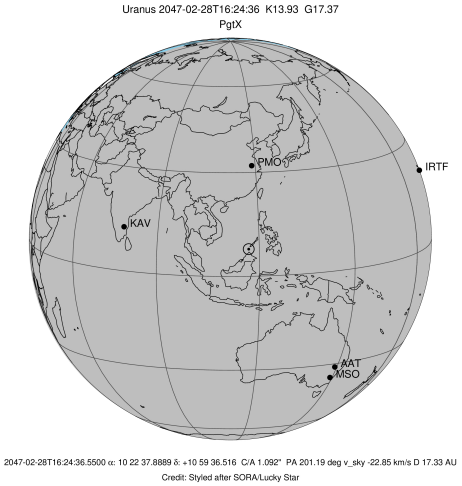


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8		+ +		FEB 28 16:10 - FEB 28 16:38	PieRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4					PnnRnn
MCD	McDonald Obs. 2.7m	30.7	256.0					PnnRnn
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8		+ +		FEB 28 16:11 - FEB 28 16:42	PieRnn
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		+ +		FEB 28 16:04 - FEB 28 16:37	PieRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0		+ +		FEB 28 16:04 - FEB 28 16:38	PieRnn



Uranus_2047-02-28T16_24_36.5500_PMO.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:21:30 2023




```
target                  : Uranus
target radius (km)      :  25559.00
C/A epoch               : 2047-02-28T16:24:41.170
Event type              : PgtX
: Uranus occs: geocentric, topocentric
: No ring occs
Observer code           : PMO
Location                : Purple Mtn Obs. Nanking
Latitude (deg)          :  32.06667
E. Longitude (deg)      : 118.82089
Altitude (km)           :   0.364
Gaia source ID          : 3877244794040854016
2Mass ID (if available) : 10223790+1059363
ICRS Star Coord at Epoch: 10h 22m 37.88890s +10:59:36.51571s
RUWE (>1.4 is poor)     :   0.94
K magnitude             : 13.925
G magnitude             : 17.372
RP magnitude            : 16.298
BP magnitude            : 18.541
DUPflag                 : 0
Distance (au)           : 17.329
f0 (km)                 :       0.000
g0 (km)                 :       0.000
skyplane vel. (km/s)    : -22.85
Sun-Target sep (deg)    :  174.05
Sun-Moon sep (deg)      :  131.23
B (ring opening deg)    :   13.96
PA of pole (deg)        :  103.09
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (")  :   1.277
C/A sky separation (km) :  16053.8
NAIF SPICE kernels      : RAJobs_U111+rgf15.spk
URKALLv1.spk
ura111.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ura111.bsp
ura161.bsp
vgr2.ura161.bsp
peph.ura160.bsp
earthstns_itrf93_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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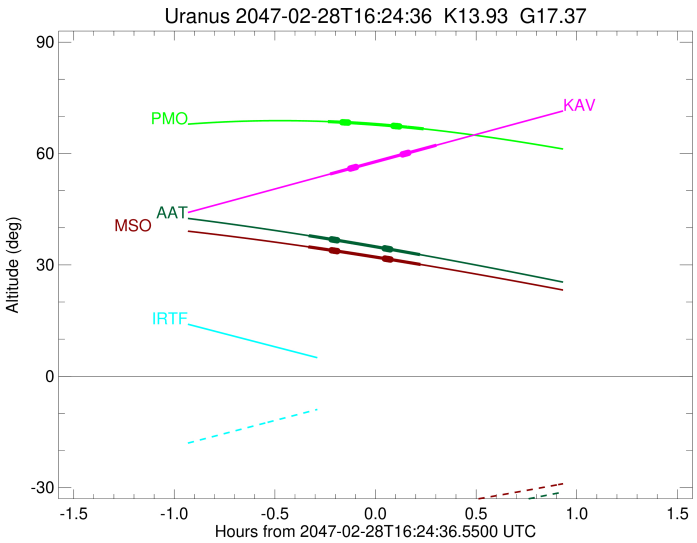

b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2047-02-28T16:14:42.352	b	68.43	-65.92	51387.90	-90.34		
lambda	I	2047-02-28T16:14:57.410	b	68.41	-65.92	50026.71	-90.26		
delta	I	2047-02-28T16:15:16.576	b	68.40	-65.92	48300.35	-89.88		
gamma	I	2047-02-28T16:15:24.059	b	68.39	-65.92	47628.45	-89.72		
eta	I	2047-02-28T16:15:29.104	b	68.39	-65.92	47176.12	-89.60		
beta	I	2047-02-28T16:15:46.153	b	68.38	-65.92	45660.90	-89.22		
alpha	I	2047-02-28T16:15:56.512	b	68.37	-65.92	44684.84	-88.83		
4	I	2047-02-28T16:16:20.228	b	68.35	-65.93	42572.01	-88.10		
5	I	2047-02-28T16:16:25.041	b	68.34	-65.93	42165.55	-88.10		
6	I	2047-02-28T16:16:27.278	b	68.34	-65.93	41849.79	-87.72		
Uranus	I	2047-02-28T16:10:25.254		68.60	-65.88	25543.09		-41.75	-43.06
Uranus	E	2047-02-28T16:38:56.802		66.65	-65.39	25534.31		56.08	57.28
6	E	2047-02-28T16:29:57.428	b	67.45	-65.74	41857.44	87.74		
5	E	2047-02-28T16:30:00.168	b	67.45	-65.73	42255.29	88.12		
4	E	2047-02-28T16:30:05.993	b	67.44	-65.73	42602.59	88.12		
alpha	E	2047-02-28T16:30:29.451	b	67.41	-65.72	44740.69	88.84		
beta	E	2047-02-28T16:30:39.618	b	67.40	-65.71	45674.66	89.23		
eta	E	2047-02-28T16:30:56.400	b	67.37	-65.71	47176.11	89.61		
gamma	E	2047-02-28T16:31:01.436	b	67.37	-65.70	47627.69	89.72		
delta	E	2047-02-28T16:31:08.927	b	67.36	-65.70	48300.34	89.88		
lambda	E	2047-02-28T16:31:28.093	b	67.33	-65.69	50026.71	90.26		
epsilon	E	2047-02-28T16:31:36.213	b	67.32	-65.69	50760.16	90.34		

Uranus_2047-02-28T16_24_36.5500_KAV.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:32:12 2023

```
target                  : Uranus
target radius (km)      :  25559.00
C/A epoch               : 2047-02-28T16:26:55.720
Event type              : PgtX
: Uranus occs: geocentric, topocentric
: No ring occs
Observer code           : KAV
Location                : Kavalur Observatory
Latitude (deg)          :  12.57556
E. Longitude (deg)      :  78.83167
Altitude (km)           :   0.722
Gaia source ID          : 3877244794040854016
2Mass ID (if available) : 10223790+1059363
ICRS Star Coord at Epoch: 10h 22m 37.88890s +10:59:36.51571s
RUWE (>1.4 is poor)     :   0.94
K magnitude             : 13.925
G magnitude             : 17.372
RP magnitude            : 16.298
BP magnitude            : 18.541
DUPflag                 : 0
Distance (au)           : 17.329
f0 (km)                 :       0.000
g0 (km)                 :       0.000
skyplane vel. (km/s)    : -22.85
Sun-Target sep (deg)    :  174.05
Sun-Moon sep (deg)      :  131.42
B (ring opening deg)    :   13.96
PA of pole (deg)        :  103.09
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (")  :   1.018
C/A sky separation (km) :  12800.0
NAIF SPICE kernels      : RAJobs_U111+rgf15.spk
URKALLv1.spk
ura111.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ura111.bsp
ura161.bsp
vgr2.ura161.bsp
peph.ura160.bsp
earthstns_itrf93_040916.bsp
earth_720101_070426.bpc
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pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
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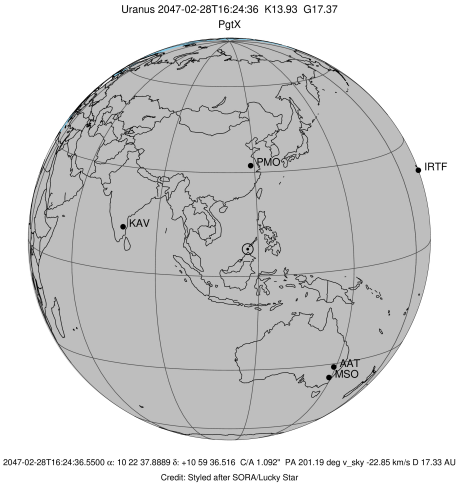

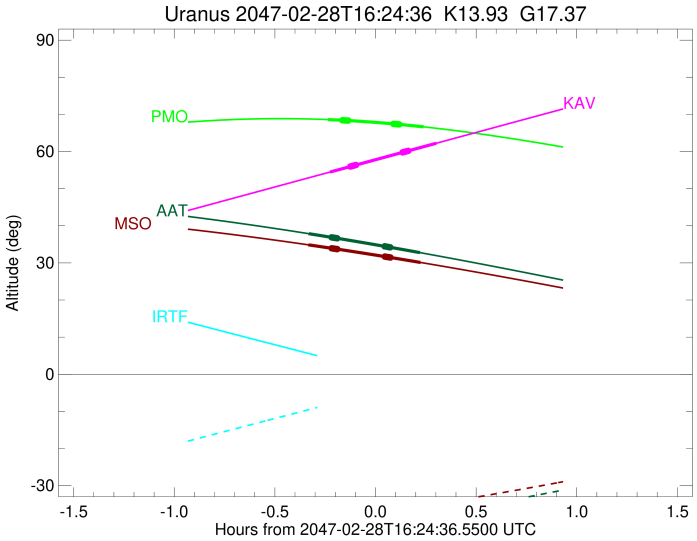

b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2047-02-28T16:17:03.416	b	55.95	-50.40	51409.16	-92.13		
lambda	I	2047-02-28T16:17:18.410	b	56.01	-50.46	50026.71	-92.11		
delta	I	2047-02-28T16:17:37.176	b	56.08	-50.54	48300.34	-91.88		
gamma	I	2047-02-28T16:17:44.496	b	56.11	-50.57	47628.10	-91.78		
eta	I	2047-02-28T16:17:49.423	b	56.13	-50.59	47176.12	-91.71		
beta	I	2047-02-28T16:18:06.075	b	56.20	-50.66	45659.39	-91.48		
alpha	I	2047-02-28T16:18:16.151	b	56.24	-50.70	44685.23	-91.20		
4	I	2047-02-28T16:18:39.191	b	56.34	-50.79	42568.32	-90.73		
5	I	2047-02-28T16:18:43.984	b	56.36	-50.81	42169.08	-90.80		
6	I	2047-02-28T16:18:46.099	b	56.37	-50.82	41846.38	-90.44		
Uranus	I	2047-02-28T16:11:03.882		54.48	-48.94	25538.00		-49.92	-51.21
Uranus	E	2047-02-28T16:42:46.614		62.24	-56.66	25530.08		63.93	64.94
6	E	2047-02-28T16:32:41.071	b	59.77	-54.21	41854.24	90.52		
5	E	2047-02-28T16:32:43.774	b	59.78	-54.22	42261.67	90.88		
4	E	2047-02-28T16:32:49.235	b	59.81	-54.24	42599.79	90.80		
alpha	E	2047-02-28T16:33:12.111	b	59.90	-54.33	44742.62	91.27		
beta	E	2047-02-28T16:33:21.931	b	59.94	-54.37	45673.49	91.55		
eta	E	2047-02-28T16:33:38.327	b	60.01	-54.44	47176.12	91.78		
gamma	E	2047-02-28T16:33:43.241	b	60.03	-54.46	47627.31	91.85		
delta	E	2047-02-28T16:33:50.565	b	60.06	-54.49	48300.35	91.94		
lambda	E	2047-02-28T16:34:09.318	b	60.13	-54.57	50026.71	92.18		
epsilon	E	2047-02-28T16:34:17.364	b	60.16	-54.60	50768.81	92.20		

Uranus_2047-02-28T16_24_36.5500_AAT.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:38:41 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2047-02-28T16:21:16.290
Event type : PgtX
: Uranus occs: geocentric, topocentric
: No ring occs
Observer code : AAT
Location : Siding Spring (AAT)
Latitude (deg) : -31.27703
E. Longitude (deg) : 149.06608
Altitude (km) : 1.164
Gaia source ID : 3877244794040854016
2Mass ID (if available) : 10223790+1059363
ICRS Star Coord at Epoch: 10h 22m 37.88890s +10:59:36.51571s
RUWE (>1.4 is poor) : 0.94
K magnitude : 13.925
G magnitude : 17.372
RP magnitude : 16.298
BP magnitude : 18.541
DUPflag : 0
Distance (au) : 17.329
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -22.85
Sun-Target sep (deg) : 174.05
Sun-Moon sep (deg) : 130.50
B (ring opening deg) : 13.96
PA of pole (deg) : 103.09
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.880
C/A sky separation (km) : 11064.8
NAIF SPICE kernels : RAJobs_U111+rgf15.spk
URKALLv1.spk
ura111.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ura111.bsp
ura161.bsp
vgr2.ura161.bsp
peph.ura160.bsp
earthstns_itrf93_040916.bsp
earth_720101_070426.bpc
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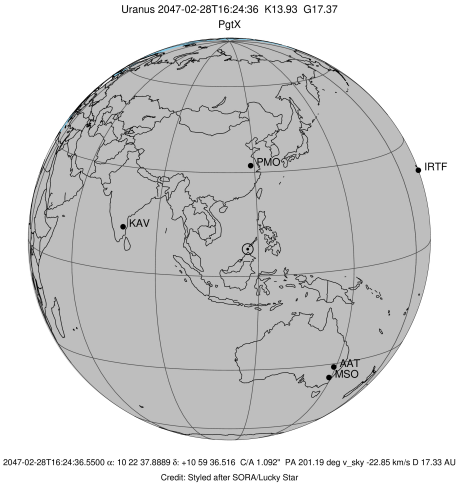
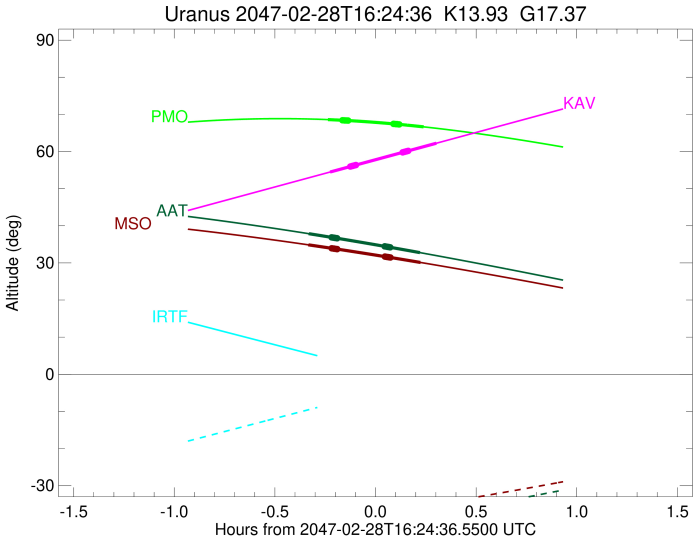
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk



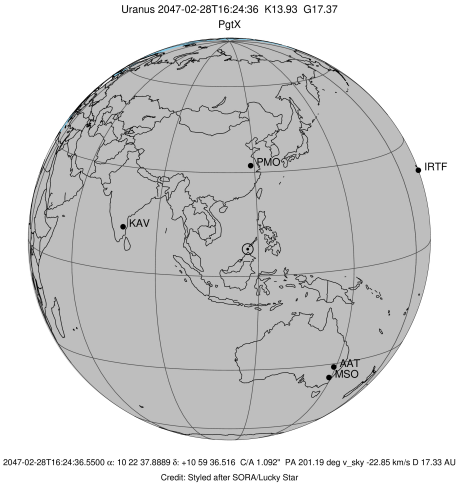


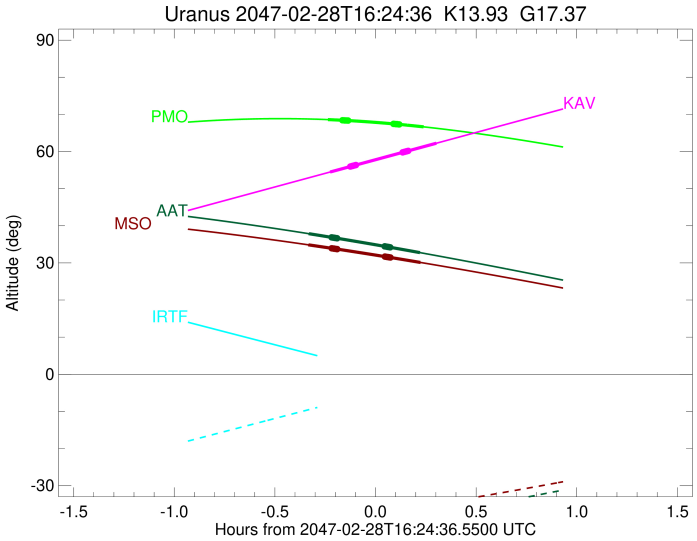
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2047-02-28T16:11:28.591	b	36.89	-42.27	51420.20	-92.66		
lambda	I	2047-02-28T16:11:43.620	b	36.85	-42.24	50026.71	-92.66		
delta	I	2047-02-28T16:12:02.269	b	36.80	-42.20	48300.34	-92.48		
gamma	I	2047-02-28T16:12:09.543	b	36.79	-42.18	47627.90	-92.41		
eta	I	2047-02-28T16:12:14.433	b	36.77	-42.17	47176.11	-92.36		
beta	I	2047-02-28T16:12:30.967	b	36.73	-42.13	45658.59	-92.20		
alpha	I	2047-02-28T16:12:40.953	b	36.71	-42.11	44685.53	-91.96		
4	I	2047-02-28T16:13:03.777	b	36.65	-42.05	42566.36	-91.59		
5	I	2047-02-28T16:13:08.591	b	36.64	-42.04	42171.14	-91.70		
6	I	2047-02-28T16:13:10.663	b	36.63	-42.04	41844.53	-91.35		
Uranus	I	2047-02-28T16:04:41.641		37.87	-43.19	25535.46		-54.12	-55.36
Uranus	E	2047-02-28T16:37:51.402		32.77	-38.38	25528.46		67.39	68.30
6	E	2047-02-28T16:27:19.279	b	34.46	-39.99	41852.53	91.29		
5	E	2047-02-28T16:27:21.993	b	34.46	-39.98	42264.90	91.64		
4	E	2047-02-28T16:27:27.302	b	34.44	-39.97	42598.26	91.53		
alpha	E	2047-02-28T16:27:50.053	b	34.38	-39.91	44743.55	91.89		
beta	E	2047-02-28T16:27:59.767	b	34.36	-39.89	45672.85	92.12		
eta	E	2047-02-28T16:28:16.082	b	34.31	-39.85	47176.12	92.28		
gamma	E	2047-02-28T16:28:20.968	b	34.30	-39.84	47627.12	92.33		
delta	E	2047-02-28T16:28:28.257	b	34.28	-39.82	48300.35	92.40		
lambda	E	2047-02-28T16:28:46.924	b	34.23	-39.77	50026.71	92.56		
epsilon	E	2047-02-28T16:28:54.993	b	34.21	-39.75	50773.95	92.57		

Uranus_2047-02-28T16_24_36.5500_MSO.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:42:55 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2047-02-28T16:21:17.410
Event type : PgtX
: Uranus occs: geocentric, topocentric
: No ring occs
Observer code : MSO
Location : Mt. Stromlo Observatory
Latitude (deg) : -35.32000
E. Longitude (deg) : 149.00833
Altitude (km) : 0.770
Gaia source ID : 3877244794040854016
2Mass ID (if available) : 10223790+1059363
ICRS Star Coord at Epoch: 10h 22m 37.88890s +10:59:36.51571s
RUWE (>1.4 is poor) : 0.94
K magnitude : 13.925
G magnitude : 17.372
RP magnitude : 16.298
BP magnitude : 18.541
DUPflag : 0
Distance (au) : 17.329
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -22.85
Sun-Target sep (deg) : 174.05
Sun-Moon sep (deg) : 130.47
B (ring opening deg) : 13.96
PA of pole (deg) : 103.09
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.851
C/A sky separation (km) : 10701.1
NAIF SPICE kernels : RAJobs_U111+rgf15.spk
URKALLv1.spk
ura111.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ura111.bsp
ura161.bsp
vgr2.ura161.bsp
peph.ura160.bsp
earthstns_itrf93_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	2047-02-28T16:11:30.403	b	33.94	-39.17	51422.39	-92.75		
lambda	I	2047-02-28T16:11:45.441	b	33.91	-39.14	50026.71	-92.75		
delta	I	2047-02-28T16:12:04.070	b	33.87	-39.10	48300.35	-92.59		
gamma	I	2047-02-28T16:12:11.336	b	33.85	-39.09	47627.85	-92.52		
eta	I	2047-02-28T16:12:16.220	b	33.84	-39.08	47176.12	-92.47		
beta	I	2047-02-28T16:12:32.732	b	33.80	-39.04	45658.43	-92.32		
alpha	I	2047-02-28T16:12:42.703	b	33.78	-39.02	44685.60	-92.09		
4	I	2047-02-28T16:13:05.488	b	33.73	-38.97	42565.96	-91.74		
5	I	2047-02-28T16:13:10.307	b	33.71	-38.96	42171.59	-91.86		
6	I	2047-02-28T16:13:12.372	b	33.71	-38.96	41844.15	-91.51		
Uranus	I	2047-02-28T16:04:34.822		34.87	-40.02	25534.99		-54.93	-56.15
Uranus	E	2047-02-28T16:38:00.450		30.12	-35.59	25528.15		68.09	68.98
6	E	2047-02-28T16:27:23.488	b	31.70	-37.08	41852.17	91.45		
5	E	2047-02-28T16:27:26.205	b	31.70	-37.08	42265.57	91.80		
4	E	2047-02-28T16:27:31.481	b	31.68	-37.06	42597.94	91.68		
alpha	E	2047-02-28T16:27:54.206	b	31.63	-37.01	44743.76	92.02		
beta	E	2047-02-28T16:28:03.898	b	31.60	-36.99	45672.72	92.25		
eta	E	2047-02-28T16:28:20.194	b	31.56	-36.95	47176.12	92.39		
gamma	E	2047-02-28T16:28:25.074	b	31.55	-36.94	47627.08	92.44		
delta	E	2047-02-28T16:28:32.355	b	31.53	-36.92	48300.34	92.50		
lambda	E	2047-02-28T16:28:51.002	b	31.49	-36.88	50026.71	92.66		
epsilon	E	2047-02-28T16:28:59.077	b	31.47	-36.86	50775.10	92.66		