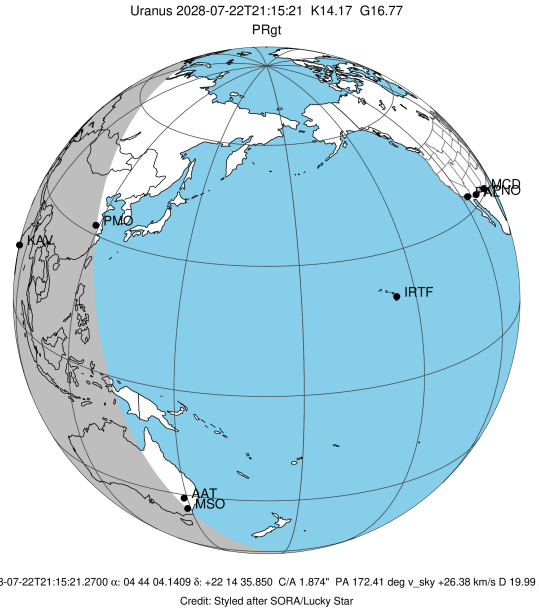
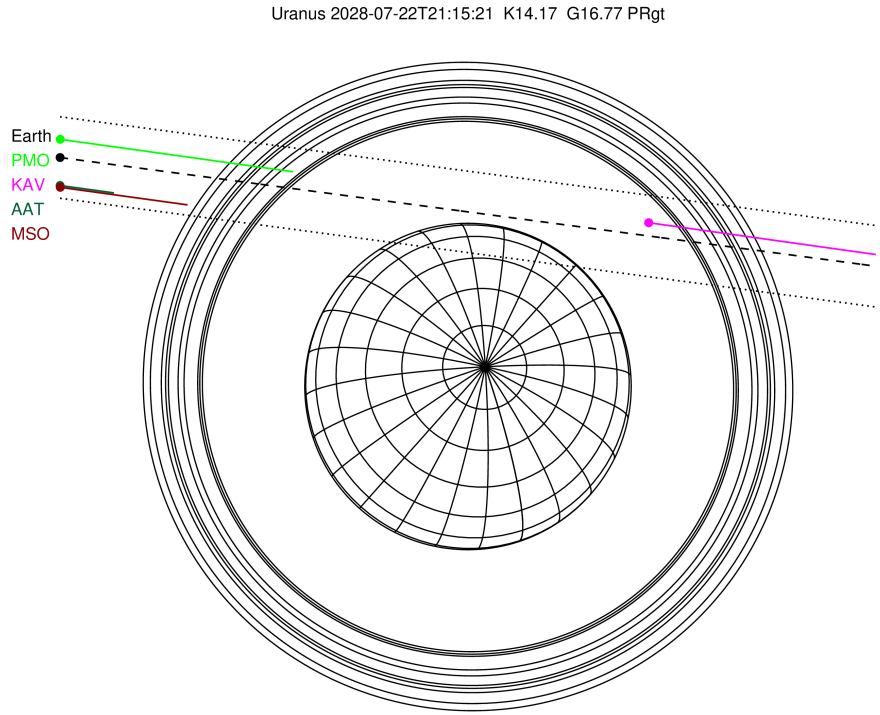
Stellar occultation prediction by rfrench@wellesley.edu Sat Jun 24 23:32:11 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2028-07-22T21:15:21.270
Event type : PRgt
: Uranus occs: not geocentric or topocentric
: Ring occs: geocentric, topocentric
Gaia source ID : 3412996659416097664
2Mass ID (if available) : 04440411+2214358

ICRS Star Coord at Epoch: 04h 44m 04.14086s +22:14:35.84996s
RUWE (>1.4 is poor) : 0.98
K magnitude : 14.169
G magnitude : 16.774
RP magnitude : 15.939
BP magnitude : 17.504
DUPflag : 0
Distance (au) : 19.988
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : 26.38
Sun-Target sep (deg) : 47.70
Sun-Moon sep (deg) : 58.16
B (ring opening deg) : 80.76
PA of pole (deg) : -41.20

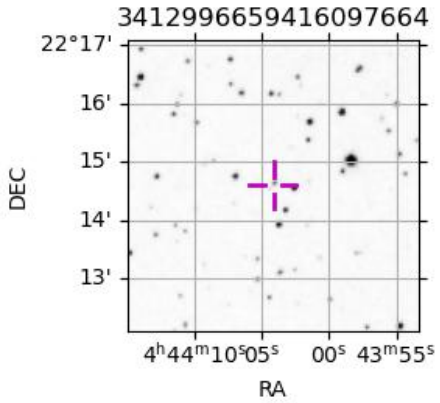
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



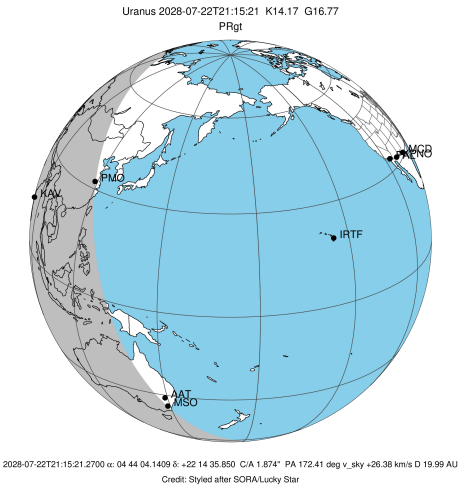


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+++++++			JUL 22 20:46 - JUL 22 20:51	PnnRin
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			++++++++++	JUL 22 21:30 - JUL 22 21:37	PnnRne
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					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



Uranus_2028-07-22T21_15_21.2700_PMO.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:19:37 2023




```
target                  : Uranus
target radius (km)      :  25559.00
C/A epoch               : 2028-07-22T21:12:53.960
Event type              : PRgt
: Uranus occs: not geocentric or topocentric
: 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          : 3412996659416097664
2Mass ID (if available) : 04440411+2214358
ICRS Star Coord at Epoch: 04h 44m 04.14086s +22:14:35.84996s
RUWE (>1.4 is poor)     :   0.98
K magnitude             : 14.169
G magnitude             : 16.774
RP magnitude            : 15.939
BP magnitude            : 17.504
DUPflag                 : 0
Distance (au)           : 19.988
f0 (km)                 :       0.000
g0 (km)                 :       0.000
skyplane vel. (km/s)    :  26.38
Sun-Target sep (deg)    :   47.70
Sun-Moon sep (deg)      :   59.08
B (ring opening deg)    :   80.76
PA of pole (deg)        :  -41.20
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (")  :   2.037
C/A sky separation (km) :  29536.9
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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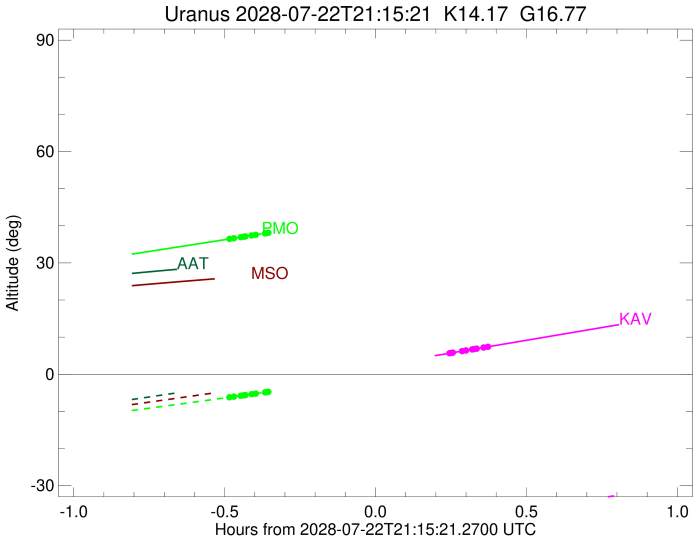

b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-07-22T20:46:18.522		36.45	-6.20	51186.75	-21.51		
lambda	I	2028-07-22T20:47:13.095		36.65	-6.03	50026.71	-21.12		
delta	I	2028-07-22T20:48:35.643		36.94	-5.77	48300.35	-20.69		
gamma	I	2028-07-22T20:49:08.298		37.05	-5.67	47627.53	-20.51		
eta	I	2028-07-22T20:49:30.375		37.13	-5.60	47176.12	-20.38		
beta	I	2028-07-22T20:50:46.386		37.40	-5.36	45644.28	-19.92		
alpha	I	2028-07-22T20:51:31.626		37.56	-5.22	44750.50	-19.61		
4	I	2028-07-22T20:53:23.195		37.95	-4.87x	42606.85	-18.79		
5	I	2028-07-22T20:53:40.712		38.02	-4.81x	42280.02	-18.67		
6	I	2028-07-22T20:54:04.454		38.10	-4.74x	41839.71	-18.46		

No planet occultations

6	E	2028-07-22T21:31:19.361		46.02	2.44x	41879.70	18.42		
5	E	2028-07-22T21:31:42.856		46.10	2.52x	42301.02	18.62		
4	E	2028-07-22T21:31:58.452		46.16	2.57x	42598.46	18.75		
alpha	E	2028-07-22T21:33:49.486		46.55	2.93x	44726.09	19.56		
beta	E	2028-07-22T21:34:37.647		46.72	3.09x	45674.44	19.86		
eta	E	2028-07-22T21:35:52.382		46.99	3.34x	47176.12	20.32		
gamma	E	2028-07-22T21:36:14.695		47.06	3.41x	47631.03	20.45		
delta	E	2028-07-22T21:36:47.279		47.18	3.52x	48300.35	20.63		
lambda	E	2028-07-22T21:38:10.087		47.47	3.79x	50026.71	21.06		
epsilon	E	2028-07-22T21:39:20.325		47.72	4.02x	51517.34	21.44		

Uranus_2028-07-22T21_15_21.2700_KAV.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:30:25 2023

```
target                  : Uranus
target radius (km)      :  25559.00
C/A epoch               : 2028-07-22T21:11:41.680
Event type              : PRgt
: Uranus occs: not geocentric or topocentric
: Ring occs: geocentric, topocentric
Observer code           : KAV
Location                : Kavalur Observatory
Latitude (deg)          :  12.57556
E. Longitude (deg)      :  78.83167
Altitude (km)           :   0.722
Gaia source ID          : 3412996659416097664
2Mass ID (if available) : 04440411+2214358
ICRS Star Coord at Epoch: 04h 44m 04.14086s +22:14:35.84996s
RUWE (>1.4 is poor)     :   0.98
K magnitude             : 14.169
G magnitude             : 16.774
RP magnitude            : 15.939
BP magnitude            : 17.504
DUPflag                 : 0
Distance (au)           : 19.988
f0 (km)                 :       0.000
g0 (km)                 :       0.000
skyplane vel. (km/s)    :  26.38
Sun-Target sep (deg)    :   47.70
Sun-Moon sep (deg)      :   58.70
B (ring opening deg)    :   80.76
PA of pole (deg)        :  -41.20
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (")  :   2.022
C/A sky separation (km) :  29319.4
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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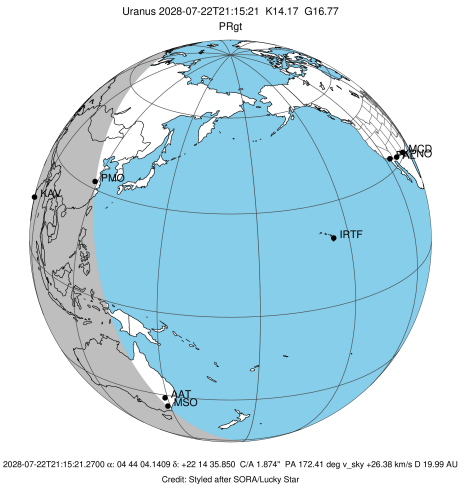

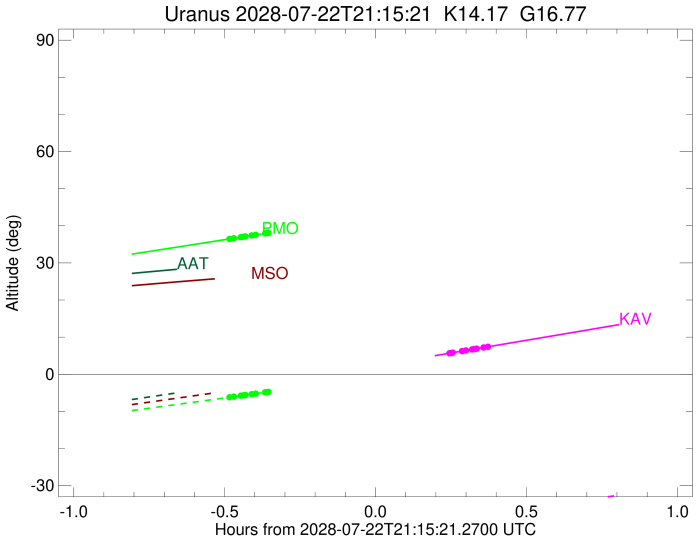

b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-07-22T20:45:16.852		-4.44x	-47.04	51184.77	-21.81		
lambda	I	2028-07-22T20:46:10.556		-4.24x	-46.90	50026.71	-21.43		
delta	I	2028-07-22T20:47:31.898		-3.94x	-46.68	48300.35	-21.01		
gamma	I	2028-07-22T20:48:04.068		-3.82x	-46.59	47627.50	-20.83		
eta	I	2028-07-22T20:48:25.810		-3.73x	-46.53	47176.12	-20.70		
beta	I	2028-07-22T20:49:40.651		-3.45x	-46.33	45644.22	-20.23		
alpha	I	2028-07-22T20:50:25.170		-3.29x	-46.21	44750.43	-19.93		
4	I	2028-07-22T20:52:14.892		-2.88x	-45.91	42606.66	-19.12		
5	I	2028-07-22T20:52:32.119		-2.81x	-45.86	42279.56	-19.00		
6	I	2028-07-22T20:52:55.435		-2.73x	-45.79	41839.41	-18.79		

No planet occultations

6	E	2028-07-22T21:30:04.673		5.67	-39.16	41879.69	18.74		
5	E	2028-07-22T21:30:27.753		5.76	-39.09	42300.65	18.94		
4	E	2028-07-22T21:30:43.093		5.82	-39.04	42598.17	19.06		
alpha	E	2028-07-22T21:32:32.371		6.23	-38.70	44725.85	19.86		
beta	E	2028-07-22T21:33:19.822		6.41	-38.55	45674.54	20.16		
eta	E	2028-07-22T21:34:33.463		6.69	-38.31	47176.12	20.62		
gamma	E	2028-07-22T21:34:55.458		6.77	-38.24	47631.01	20.75		
delta	E	2028-07-22T21:35:27.586		6.90	-38.14	48300.35	20.92		
lambda	E	2028-07-22T21:36:49.263		7.21	-37.88	50026.71	21.34		
epsilon	E	2028-07-22T21:37:58.523		7.47	-37.66	51516.30	21.72		