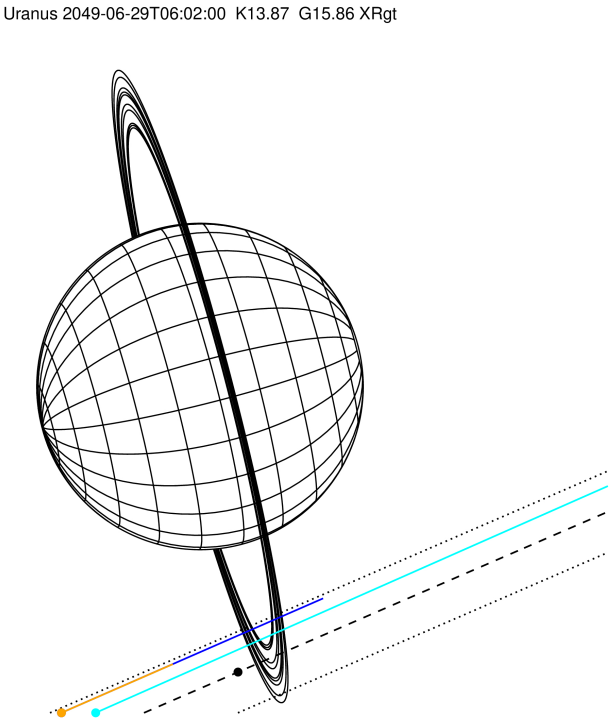
Stellar occultation prediction by rfrench@wellesley.edu Sun Jun 25 02:51:10 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2049-06-29T06:02:00.750
Event type : XRgt
: No Uranus occs
: Ring occs: geocentric, topocentric
Gaia source ID : 3865827667161465216
2Mass ID (if available) : 10541275+0748467

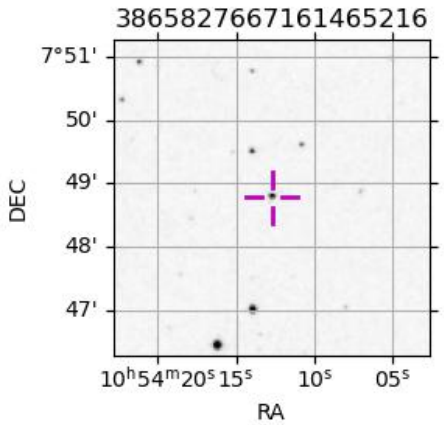
ICRS Star Coord at Epoch: 10h 54m 12.70932s +07:48:46.72831s
RUWE (>1.4 is poor) : 0.98
K magnitude : 13.865
G magnitude : 15.859
RP magnitude : 15.236
BP magnitude : 16.324
DUPflag : 0
Distance (au) : 18.699
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : 19.66
Sun-Target sep (deg) : 64.59
Sun-Moon sep (deg) : 75.02
B (ring opening deg) : 5.64
PA of pole (deg) : 104.59

#	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

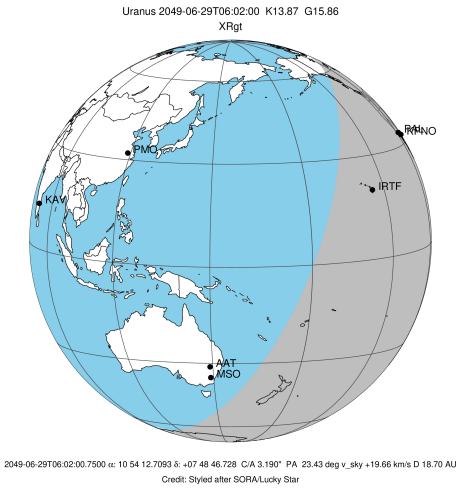


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

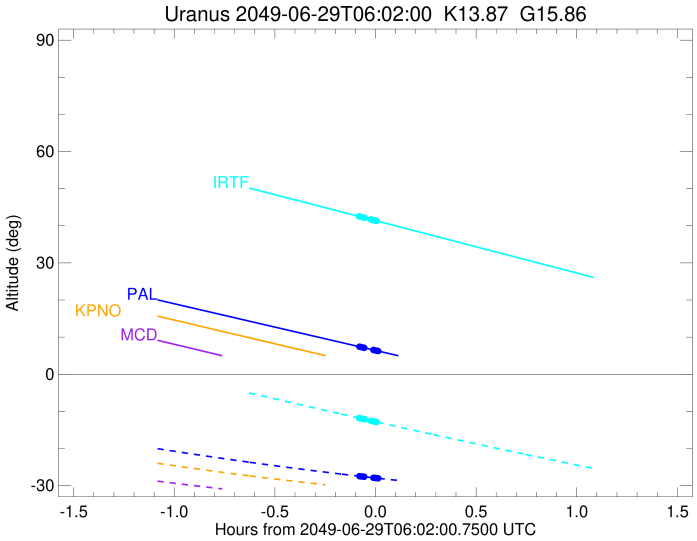
Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (200")	33.4	243.1	++++++++++		++++++++++	JUN 29 05:57 - JUN 29 06:02	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4					PnnRnn
MCD	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	++++++++++		++++++++++	JUN 29 05:57 - JUN 29 06:02	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					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



Uranus_2049-06-29T06_02_00.7500_PAL.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:19:22 2023




```
target                  : Uranus
target radius (km)      :  25559.00
C/A epoch               : 2049-06-29T06:05:04.880
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          : 3865827667161465216
2Mass ID (if available) : 10541275+0748467
ICRS Star Coord at Epoch: 10h 54m 12.70932s +07:48:46.72831s
RUWE (>1.4 is poor)     :   0.98
K magnitude             : 13.865
G magnitude             : 15.859
RP magnitude            : 15.236
BP magnitude            : 16.324
DUPflag                 : 0
Distance (au)           : 18.699
f0 (km)                 :       0.000
g0 (km)                 :       0.000
skyplane vel. (km/s)    :  19.66
Sun-Target sep (deg)    :   64.59
Sun-Moon sep (deg)      :   75.26
B (ring opening deg)    :    5.64
PA of pole (deg)        :  104.59
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (")  :   2.811
C/A sky separation (km) :  38128.2
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

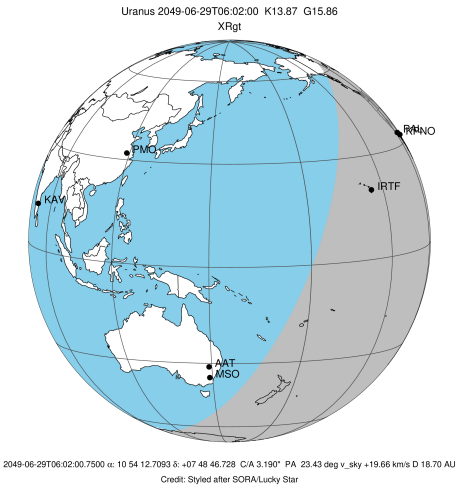
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2049-06-29T05:57:14.580		7.42	-27.46	50744.49	-128.33		
lambda	I	2049-06-29T05:57:20.232		7.40	-27.47	50026.71	-125.67		
delta	I	2049-06-29T05:57:34.350		7.35	-27.49	48300.35	-118.73		
gamma	I	2049-06-29T05:57:40.105		7.33	-27.50	47625.59	-115.67		
eta	I	2049-06-29T05:57:44.025		7.32	-27.51	47176.11	-113.55		
beta	I	2049-06-29T05:57:58.035		7.27	-27.53	45641.95	-105.31		
alpha	I	2049-06-29T05:58:06.716		7.24	-27.55	44748.21	-99.70		
4	I	2049-06-29T05:58:31.276		7.15	-27.59	42577.90	-82.98		
5	I	2049-06-29T05:58:34.388		7.14	-27.59	42219.23	-79.47		
6	I	2049-06-29T05:58:41.041		7.12	-27.61	41869.73	-77.24		

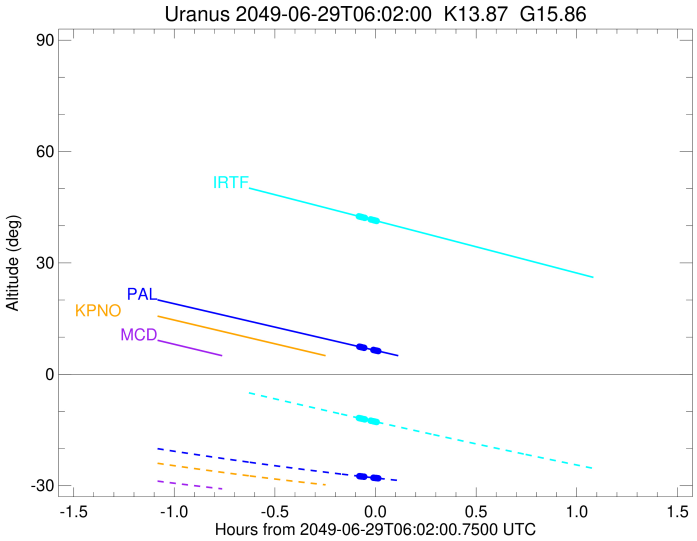
No planet occultations

6	E	2049-06-29T06:01:23.357		6.55	-27.88	41879.56	77.35		
5	E	2049-06-29T06:01:29.422		6.53	-27.89	42282.78	79.58		
4	E	2049-06-29T06:01:32.499		6.52	-27.89	42541.35	83.08		
alpha	E	2049-06-29T06:01:55.888		6.44	-27.93	44747.33	99.80		
beta	E	2049-06-29T06:02:04.397		6.41	-27.95	45658.23	105.42		
eta	E	2049-06-29T06:02:18.049		6.36	-27.97	47176.13	113.66		
gamma	E	2049-06-29T06:02:21.928		6.35	-27.98	47621.06	115.79		
delta	E	2049-06-29T06:02:27.719		6.33	-27.99	48300.34	118.85		
lambda	E	2049-06-29T06:02:41.828		6.28	-28.01	50026.71	125.79		
epsilon	E	2049-06-29T06:02:50.339		6.25	-28.02	51113.54	128.45		

Uranus_2049-06-29T06_02_00.7500_IRTF.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:30:09 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2049-06-29T06:05:16.890
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 : 3865827667161465216
2Mass ID (if available) : 10541275+0748467
ICRS Star Coord at Epoch: 10h 54m 12.70932s +07:48:46.72831s
RUWE (>1.4 is poor) : 0.98
K magnitude : 13.865
G magnitude : 15.859
RP magnitude : 15.236
BP magnitude : 16.324
DUPflag : 0
Distance (au) : 18.699
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : 19.66
Sun-Target sep (deg) : 64.59
Sun-Moon sep (deg) : 75.73
B (ring opening deg) : 5.64
PA of pole (deg) : 104.59
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.957
C/A sky separation (km) : 40098.7
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	2049-06-29T05:57:06.424		42.53	-11.80	50747.12	-116.92		
lambda	I	2049-06-29T05:57:12.675		42.51	-11.82	50026.71	-113.68		
delta	I	2049-06-29T05:57:28.425		42.45	-11.87	48300.35	-105.34		
gamma	I	2049-06-29T05:57:34.947		42.42	-11.90	47625.18	-101.61		
eta	I	2049-06-29T05:57:39.422		42.40	-11.91	47176.12	-98.98		
beta	I	2049-06-29T05:57:55.767		42.34	-11.97	45642.58	-88.67		
alpha	I	2049-06-29T05:58:06.264		42.30	-12.00	44749.68	-81.43		
4	I	2049-06-29T05:58:38.271		42.17	-12.11	42571.88	-57.75		
5	I	2049-06-29T05:58:43.341		42.15	-12.13	42230.49	-52.78		
6	I	2049-06-29T05:58:52.143		42.12	-12.16	41873.56	-47.47		

No planet occultations

6	E	2049-06-29T06:00:34.700		41.72	-12.50	41879.67	47.56		
5	E	2049-06-29T06:00:42.847		41.69	-12.53	42273.29	52.87		
4	E	2049-06-29T06:00:47.943		41.67	-12.55	42546.09	57.85		
alpha	E	2049-06-29T06:01:18.678		41.55	-12.65	44748.93	81.53		
beta	E	2049-06-29T06:01:28.984		41.51	-12.69	45656.46	88.77		
eta	E	2049-06-29T06:01:44.955		41.45	-12.74	47176.12	99.08		
gamma	E	2049-06-29T06:01:49.389		41.43	-12.76	47621.14	101.71		
delta	E	2049-06-29T06:01:55.948		41.40	-12.78	48300.34	105.44		
lambda	E	2049-06-29T06:02:11.691		41.34	-12.83	50026.71	113.79		
epsilon	E	2049-06-29T06:02:20.840		41.31	-12.86	51088.18	117.02		