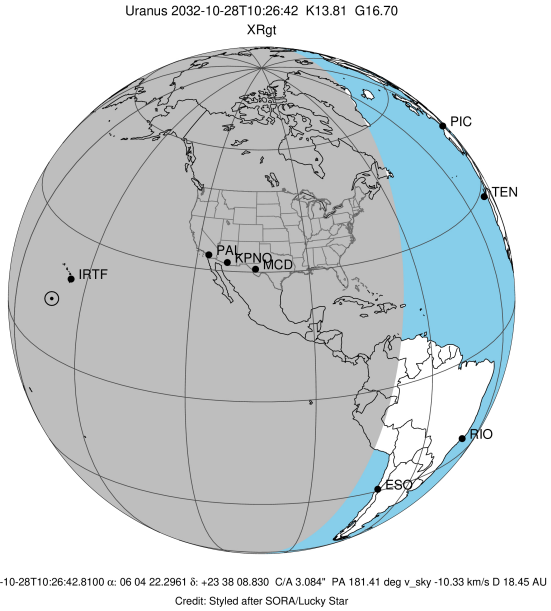
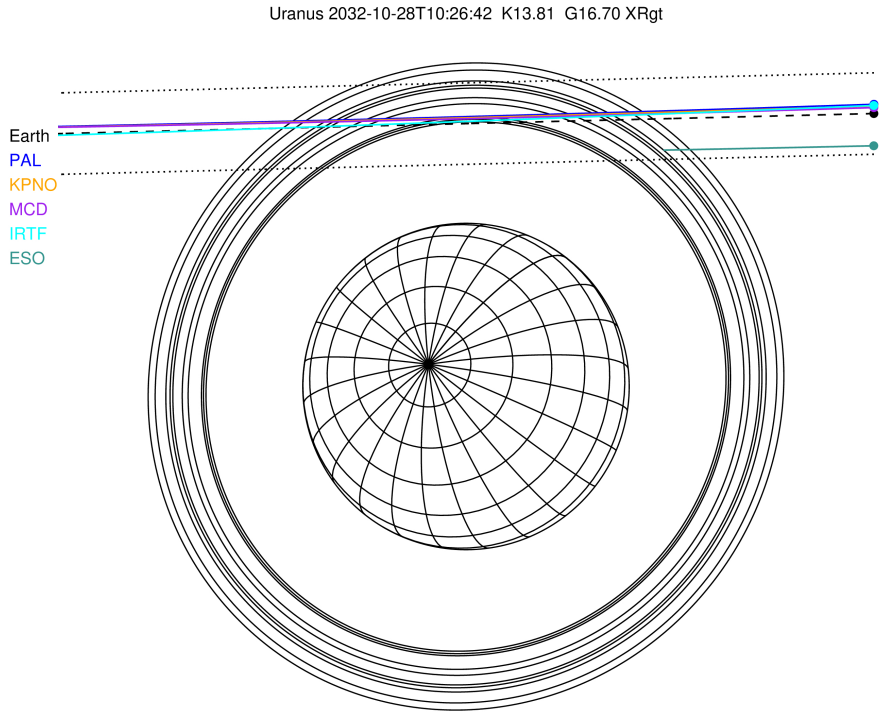
Stellar occultation prediction by rfrench@wellesley.edu Sun Jun 25 00:36:10 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2032-10-28T10:26:42.810
Event type : XRgt
: No Uranus occs
: Ring occs: geocentric, topocentric
Gaia source ID : 3426136613644877952
2Mass ID (if available) : 06042229+2338091

ICRS Star Coord at Epoch: 06h 04m 22.29609s +23:38:08.82998s
RUWE (>1.4 is poor) : 0.93
K magnitude : 13.808
G magnitude : 16.697
RP magnitude : 15.793
BP magnitude : 17.520
DUPflag : 0
Distance (au) : 18.454
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -10.33
Sun-Target sep (deg) : 124.10
Sun-Moon sep (deg) : 59.72
B (ring opening deg) : 74.51
PA of pole (deg) : 59.40

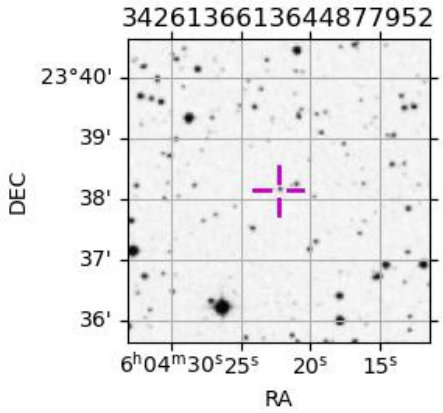
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon





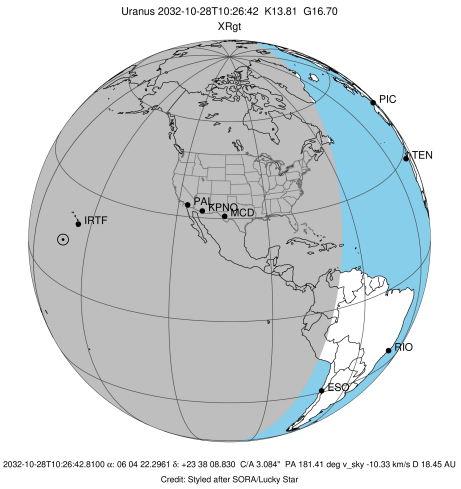
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

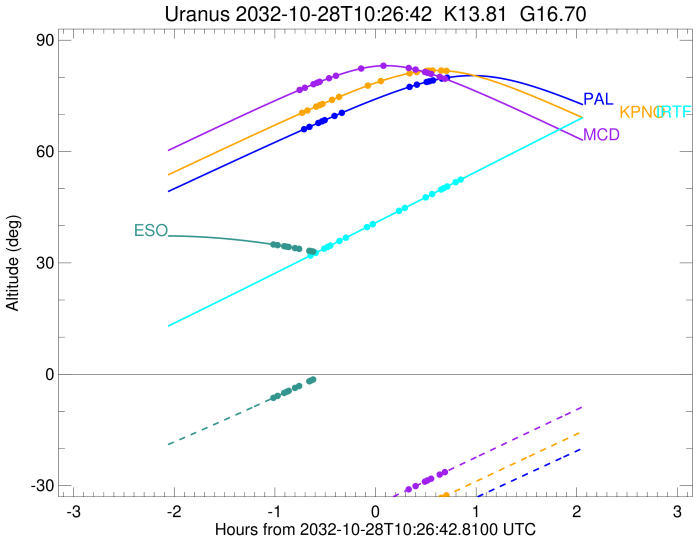
Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	|	|	|	|	PnnRnn
PAL	Palomar Mt (200")	33.4	243.1	|+++++++	|	+++++++ |	OCT 28 09:43 - OCT 28 11:09 |	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8	|	|	|	|	PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	|++++++++	|	++++++++ |	OCT 28 09:42 - OCT 28 11:08 |	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	|++++++++	|	++++++++ |	OCT 28 09:40 - OCT 28 11:07 |	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5	|	|	|	|	PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	|+++++++++	|	+++++++++ |	OCT 28 09:47 - OCT 28 11:17 |	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	|+++	|	|	OCT 28 09:25 - OCT 28 09:32 |	PnnRin
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_2032-10-28T10_26_42.8100_PAL.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:18:07 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2032-10-28T10:28:59.870
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 : 3426136613644877952
2Mass ID (if available) : 06042229+2338091
ICRS Star Coord at Epoch: 06h 04m 22.29609s +23:38:08.82998s
RUWE (>1.4 is poor) : 0.93
K magnitude : 13.808
G magnitude : 16.697
RP magnitude : 15.793
BP magnitude : 17.520
DUPflag : 0
Distance (au) : 18.454
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -10.33
Sun-Target sep (deg) : 124.10
Sun-Moon sep (deg) : 60.57
B (ring opening deg) : 74.51
PA of pole (deg) : 59.40
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.156
C/A sky separation (km) : 42241.4
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
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

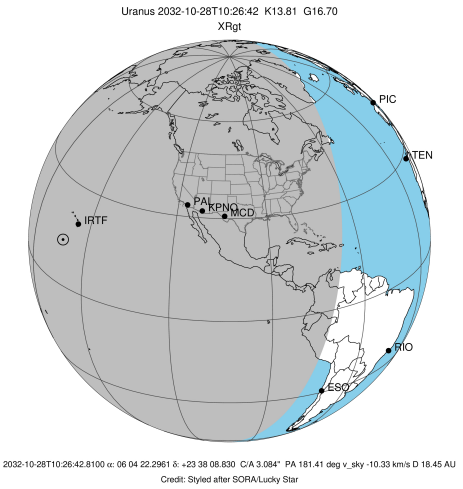
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-10-28T09:43:14.307		65.83	-54.03	51490.56	-6.10		
lambda	I	2032-10-28T09:47:20.928		66.65	-53.25	50026.71	-5.73		
delta	I	2032-10-28T09:52:38.361		67.70	-52.23	48300.35	-5.14		
gamma	I	2032-10-28T09:54:53.930		68.15	-51.80	47621.64	-4.87		
eta	I	2032-10-28T09:56:27.235		68.45	-51.50	47176.12	-4.68		
beta	I	2032-10-28T10:02:24.513		69.62	-50.34	45643.15	-3.89		
alpha	I	2032-10-28T10:06:51.054		70.47	-49.47	44689.25	-3.25		

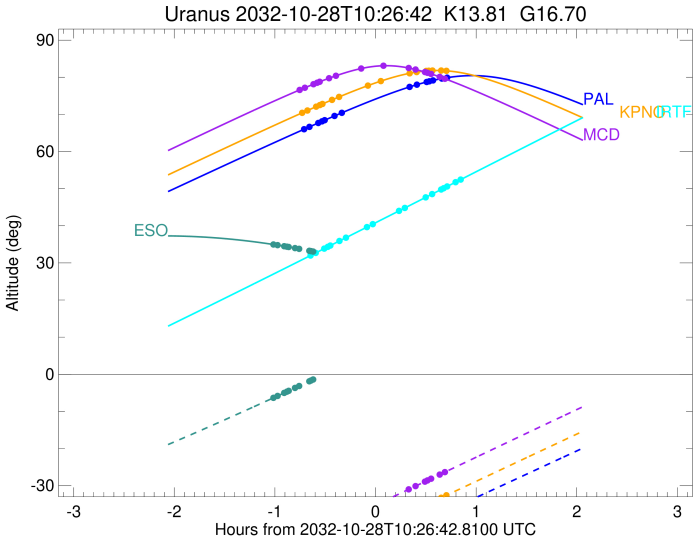
No planet occultations

alpha	E	2032-10-28T10:46:48.163		77.37	-41.44	44684.69	3.26		
beta	E	2032-10-28T10:51:14.257		77.99	-40.53	45641.73	3.90		
eta	E	2032-10-28T10:57:10.682		78.73	-39.31	47176.12	4.70		
gamma	E	2032-10-28T10:58:43.541		78.91	-38.99	47621.38	4.89		
delta	E	2032-10-28T11:00:58.555		79.15	-38.53	48300.35	5.16		
lambda	E	2032-10-28T11:06:14.404		79.65	-37.44	50026.71	5.76		
epsilon	E	2032-10-28T11:09:12.277		79.88	-36.83	51078.32	6.14		

Uranus_2032-10-28T10_26_42.8100_KPNO.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:22:26 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2032-10-28T10:28:10.770
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 : 3426136613644877952
2Mass ID (if available) : 06042229+2338091
ICRS Star Coord at Epoch: 06h 04m 22.29609s +23:38:08.82998s
RUWE (>1.4 is poor) : 0.93
K magnitude : 13.808
G magnitude : 16.697
RP magnitude : 15.793
BP magnitude : 17.520
DUPflag : 0
Distance (au) : 18.454
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -10.33
Sun-Target sep (deg) : 124.10
Sun-Moon sep (deg) : 60.55
B (ring opening deg) : 74.51
PA of pole (deg) : 59.40
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.143
C/A sky separation (km) : 42064.8
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





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

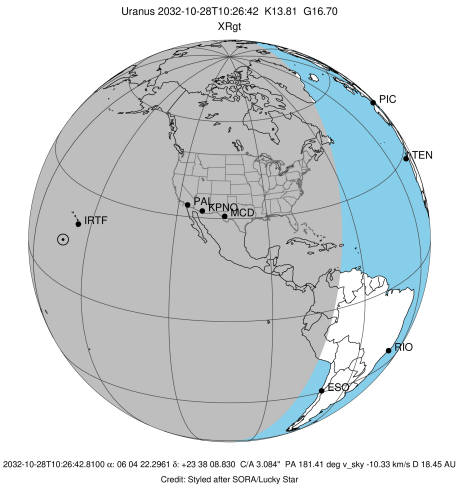
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-10-28T09:42:05.691		70.25	-50.67	51492.19	-6.17		
lambda	I	2032-10-28T09:46:09.662		71.06	-49.85	50026.71	-5.80		
delta	I	2032-10-28T09:51:22.507		72.10	-48.79	48300.35	-5.23		
gamma	I	2032-10-28T09:53:35.720		72.53	-48.34	47621.66	-4.96		
eta	I	2032-10-28T09:55:07.235		72.83	-48.03	47176.12	-4.77		
beta	I	2032-10-28T10:00:55.769		73.95	-46.84	45643.26	-4.01		
alpha	I	2032-10-28T10:05:12.802		74.75	-45.96	44689.50	-3.39		
4	I	2032-10-28T10:22:46.011		77.86	-42.33	42564.78	-0.57		

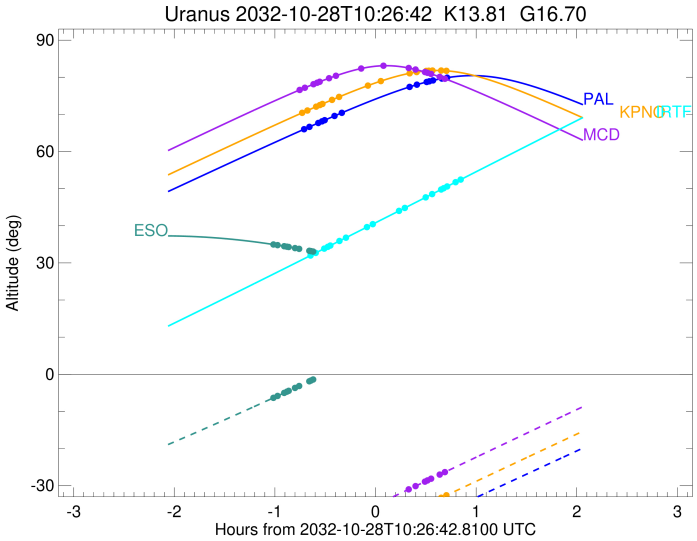
No planet occultations

4	E	2032-10-28T10:29:27.638		78.91	-40.93	42569.45	0.57		
alpha	E	2032-10-28T10:46:50.127		81.05	-37.29	44684.72	3.40		
beta	E	2032-10-28T10:51:06.881		81.40	-36.39	45641.78	4.02		
eta	E	2032-10-28T10:56:54.837		81.71	-35.16	47176.12	4.79		
gamma	E	2032-10-28T10:58:25.986		81.77	-34.84	47621.40	4.98		
delta	E	2032-10-28T11:00:38.768		81.82	-34.37	48300.35	5.25		
lambda	E	2032-10-28T11:05:50.352		81.82	-33.28	50026.71	5.83		
epsilon	E	2032-10-28T11:08:45.938		81.75	-32.66	51076.30	6.20		

Uranus_2032-10-28T10_26_42.8100_MCD.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:24:38 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2032-10-28T10:26:56.660
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 : 3426136613644877952
2Mass ID (if available) : 06042229+2338091
ICRS Star Coord at Epoch: 06h 04m 22.29609s +23:38:08.82998s
RUWE (>1.4 is poor) : 0.93
K magnitude : 13.808
G magnitude : 16.697
RP magnitude : 15.793
BP magnitude : 17.520
DUPflag : 0
Distance (au) : 18.454
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -10.33
Sun-Target sep (deg) : 124.10
Sun-Moon sep (deg) : 60.51
B (ring opening deg) : 74.51
PA of pole (deg) : 59.40
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.132
C/A sky separation (km) : 41917.1
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

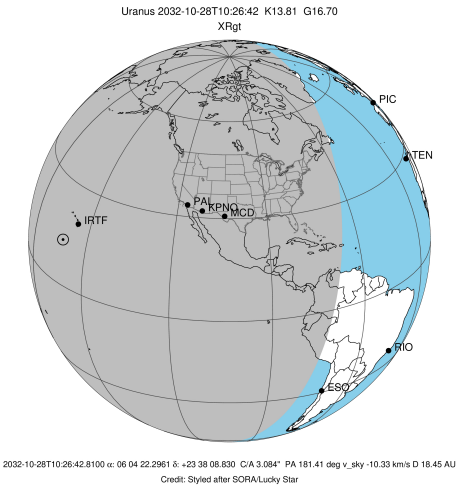
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-10-28T09:40:35.860		76.42	-45.07	51493.72	-6.23		
lambda	I	2032-10-28T09:44:37.615		77.19	-44.22	50026.71	-5.86		
delta	I	2032-10-28T09:49:46.655		78.14	-43.13	48300.35	-5.30		
gamma	I	2032-10-28T09:51:57.940		78.53	-42.67	47621.68	-5.04		
eta	I	2032-10-28T09:53:28.003		78.80	-42.35	47176.12	-4.85		
beta	I	2032-10-28T09:59:09.574		79.77	-41.14	45643.36	-4.11		
alpha	I	2032-10-28T10:03:19.299		80.44	-40.26	44689.73	-3.51		
4	I	2032-10-28T10:18:31.808		82.39	-37.01	42562.59	-1.09		

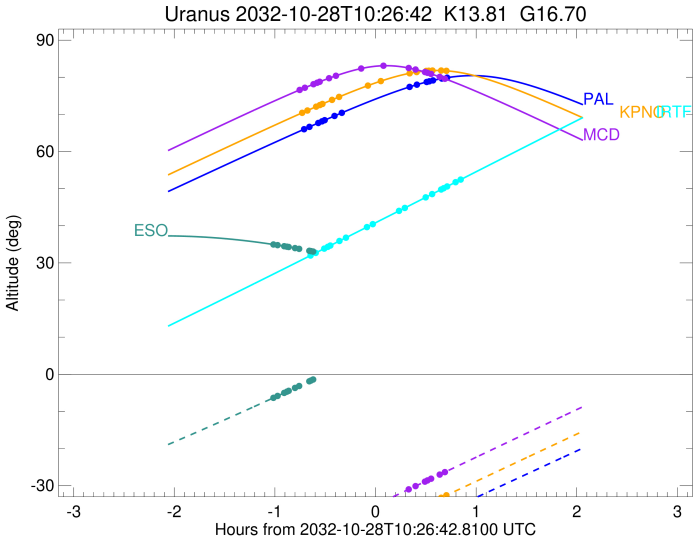
No planet occultations

4	E	2032-10-28T10:31:15.179		83.11	-34.28	42571.50	1.09		
alpha	E	2032-10-28T10:46:17.493		82.52	-31.05	44684.75	3.52		
beta	E	2032-10-28T10:50:27.190		82.11	-30.16	45641.82	4.11		
eta	E	2032-10-28T10:56:08.596		81.42	-28.93	47176.12	4.87		
gamma	E	2032-10-28T10:57:38.412		81.22	-28.61	47621.41	5.05		
delta	E	2032-10-28T10:59:49.454		80.91	-28.14	48300.35	5.31		
lambda	E	2032-10-28T11:04:57.716		80.12	-27.03	50026.71	5.88		
epsilon	E	2032-10-28T11:07:51.569		79.64	-26.41	51074.93	6.25		

Uranus_2032-10-28T10_26_42.8100_IRTF.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:28:53 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2032-10-28T10:35:04.090
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 : 3426136613644877952
2Mass ID (if available) : 06042229+2338091
ICRS Star Coord at Epoch: 06h 04m 22.29609s +23:38:08.82998s
RUWE (>1.4 is poor) : 0.93
K magnitude : 13.808
G magnitude : 16.697
RP magnitude : 15.793
BP magnitude : 17.520
DUPflag : 0
Distance (au) : 18.454
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -10.33
Sun-Target sep (deg) : 124.10
Sun-Moon sep (deg) : 60.56
B (ring opening deg) : 74.51
PA of pole (deg) : 59.40
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.099
C/A sky separation (km) : 41483.8
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





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

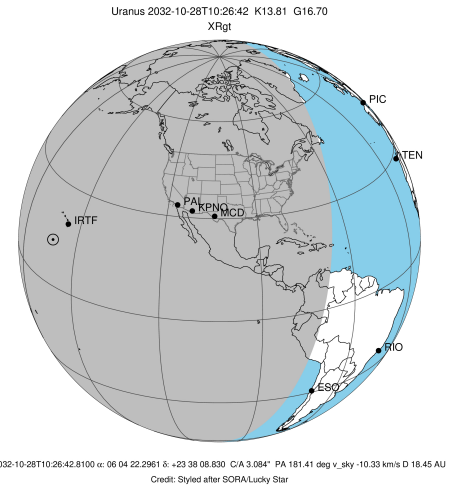
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-10-28T09:47:05.251		31.79	-82.26	51494.19	-6.24		
lambda	I	2032-10-28T09:51:06.108		32.70	-82.77	50026.71	-5.90		
delta	I	2032-10-28T09:56:11.989		33.86	-83.27	48300.35	-5.38		
gamma	I	2032-10-28T09:58:21.088		34.35	-83.43	47621.70	-5.14		
eta	I	2032-10-28T09:59:49.297		34.68	-83.51	47176.12	-4.97		
beta	I	2032-10-28T10:05:20.302		35.94	-83.66	45643.47	-4.28		
alpha	I	2032-10-28T10:09:17.242		36.83	-83.60	44690.02	-3.75		
4	I	2032-10-28T10:21:49.923		39.69	-82.57	42559.91	-1.87		
5	I	2032-10-28T10:26:23.978		40.74	-81.94	42158.33	-1.10		

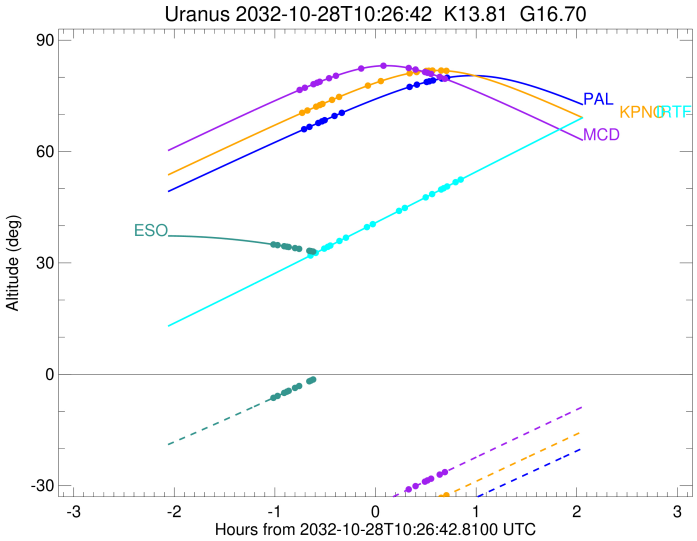
No planet occultations

5	E	2032-10-28T10:39:22.985		43.70	-79.73	42155.24	1.10		
4	E	2032-10-28T10:44:07.083		44.79	-78.81	42575.35	1.87		
alpha	E	2032-10-28T10:56:25.902		47.61	-76.28	44684.90	3.78		
beta	E	2032-10-28T11:00:21.112		48.51	-75.44	45642.03	4.32		
eta	E	2032-10-28T11:05:49.113		49.76	-74.26	47176.12	5.02		
gamma	E	2032-10-28T11:07:16.257		50.09	-73.94	47621.48	5.20		
delta	E	2032-10-28T11:09:23.824		50.58	-73.47	48300.35	5.44		
lambda	E	2032-10-28T11:14:25.599		51.73	-72.35	50026.71	5.99		
epsilon	E	2032-10-28T11:17:14.864		52.38	-71.72	51064.27	6.34		

Uranus_2032-10-28T10_26_42.8100_ESO.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:35:15 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2032-10-28T10:21:26.840
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 : 3426136613644877952
2Mass ID (if available) : 06042229+2338091
ICRS Star Coord at Epoch: 06h 04m 22.29609s +23:38:08.82998s
RUWE (>1.4 is poor) : 0.93
K magnitude : 13.808
G magnitude : 16.697
RP magnitude : 15.793
BP magnitude : 17.520
DUPflag : 0
Distance (au) : 18.454
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -10.33
Sun-Target sep (deg) : 124.10
Sun-Moon sep (deg) : 59.85
B (ring opening deg) : 74.51
PA of pole (deg) : 59.40
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.725
C/A sky separation (km) : 36473.4
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
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	2032-10-28T09:25:03.316		35.01	-6.51	51526.32	-7.67		
lambda	I	2032-10-28T09:28:21.338		34.78	-5.83	50026.71	-7.45		
delta	I	2032-10-28T09:32:18.334		34.49	-5.01	48300.35	-7.12		
gamma	I	2032-10-28T09:33:54.564		34.37	-4.68x	47622.38	-6.97		
eta	I	2032-10-28T09:34:59.023		34.28	-4.45x	47176.12	-6.87		
beta	I	2032-10-28T09:38:47.773		33.98	-3.66x	45646.31	-6.49		
alpha	I	2032-10-28T09:41:17.177		33.78	-3.14x	44695.89	-6.22		
4	I	2032-10-28T09:47:23.466		33.25	-1.86x	42544.79	-5.51		
5	I	2032-10-28T09:48:31.750		33.14	-1.63x	42174.66	-5.34		
6	I	2032-10-28T09:49:28.656		33.06	-1.43x	41874.04	-5.22		

No planet occultations

6	E	2032-10-28T10:49:39.118		26.15	11.40x	41839.88	5.20		
5	E	2032-10-28T10:50:41.402		26.01	11.63x	42158.20	5.32		
4	E	2032-10-28T10:52:01.183		25.83	11.91x	42589.78	5.49		
alpha	E	2032-10-28T10:57:59.441		25.00	13.20x	44686.76	6.20		
beta	E	2032-10-28T11:00:29.993		24.64	13.75x	45643.69	6.46		
eta	E	2032-10-28T11:04:20.364		24.09	14.58x	47176.12	6.84		
gamma	E	2032-10-28T11:05:25.093		23.94	14.81x	47621.94	6.94		
delta	E	2032-10-28T11:07:01.896		23.70	15.16x	48300.35	7.08		
lambda	E	2032-10-28T11:11:00.222		23.12	16.02x	50026.71	7.40		
epsilon	E	2032-10-28T11:13:11.757		22.79	16.50x	51011.40	7.63		