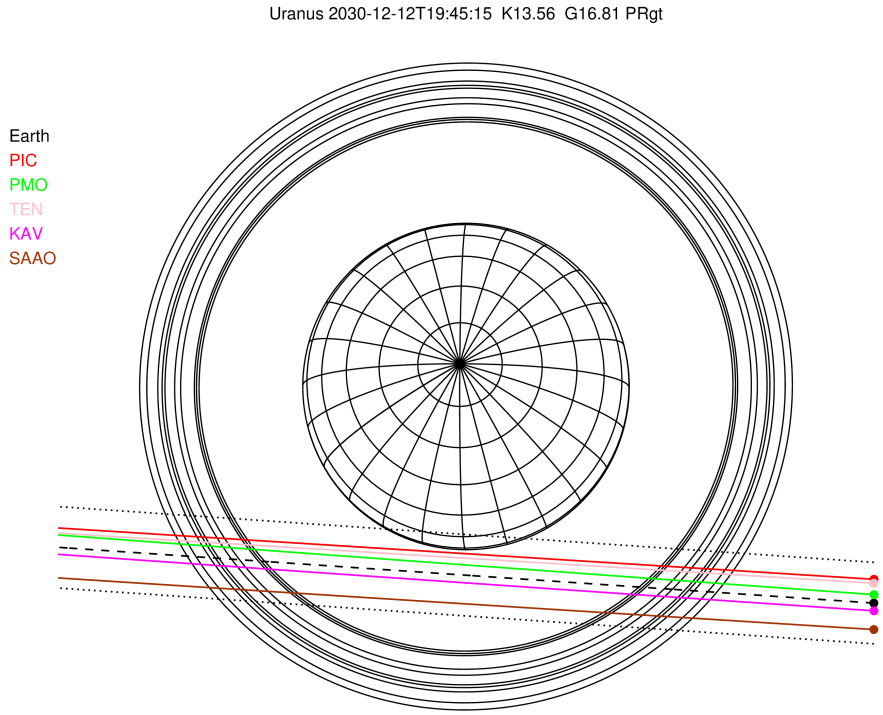
Stellar occultation prediction by rfrench@wellesley.edu Sun Jun 25 00:00:08 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2030-12-12T19:45:15.720
Event type : PRgt
: Uranus occs: not geocentric or topocentric
: Ring occs: geocentric, topocentric
Gaia source ID : 3415588483201904384
2Mass ID (if available) : 05181644+2311001

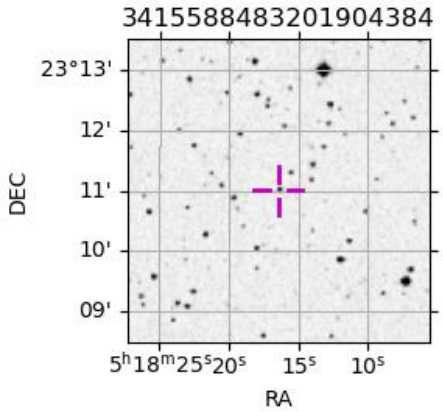
ICRS Star Coord at Epoch: 05h 18m 16.45194s +23:11:00.09025s
RUWE (>1.4 is poor) : 1.01
K magnitude : 13.557
G magnitude : 16.814
RP magnitude : 15.849
BP magnitude : 17.764
DUPflag : 0
Distance (au) : 18.171
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -23.44
Sun-Target sep (deg) : 179.90
Sun-Moon sep (deg) : 31.31
B (ring opening deg) : 81.71
PA of pole (deg) : 15.29

#	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



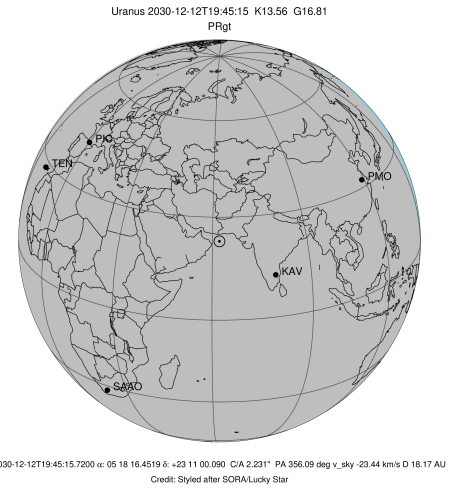
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

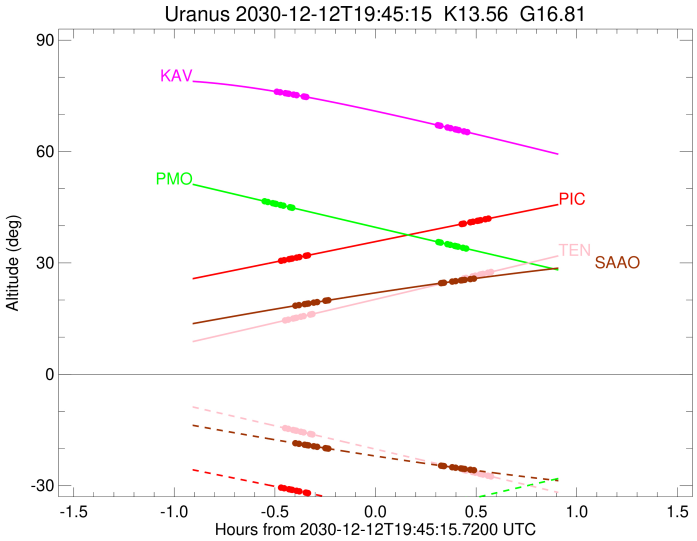
Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	++++++++++		++++++++++	DEC 12 19:17 - DEC 12 20:19	PnnRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	++++++++++		++++++++++	DEC 12 19:12 - DEC 12 20:12	PnnRie
KPNO	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	++++++++++		++++++++++	DEC 12 19:18 - DEC 12 20:19	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	++++++++++		++++++++++	DEC 12 19:16 - DEC 12 20:12	PnnRie
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	++++++++++		++++++++++	DEC 12 19:21 - DEC 12 20:14	PnnRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



Uranus_2030-12-12T19_45_15.7200_PIC.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:15:41 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2030-12-12T19:47:55.900
Event type : PRgt
: Uranus occs: not geocentric or topocentric
: Ring occs: geocentric, topocentric
Observer code : PIC
Location : Pic du Midi
Latitude (deg) : 42.93656
E. Longitude (deg) : 0.14231
Altitude (km) : 2.890
Gaia source ID : 3415588483201904384
2Mass ID (if available) : 05181644+2311001
ICRS Star Coord at Epoch: 05h 18m 16.45194s +23:11:00.09025s
RUWE (>1.4 is poor) : 1.01
K magnitude : 13.557
G magnitude : 16.814
RP magnitude : 15.849
BP magnitude : 17.764
DUPflag : 0
Distance (au) : 18.171
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -23.44
Sun-Target sep (deg) : 179.90
Sun-Moon sep (deg) : 32.11
B (ring opening deg) : 81.71
PA of pole (deg) : 15.29
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.983
C/A sky separation (km) : 26135.7
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

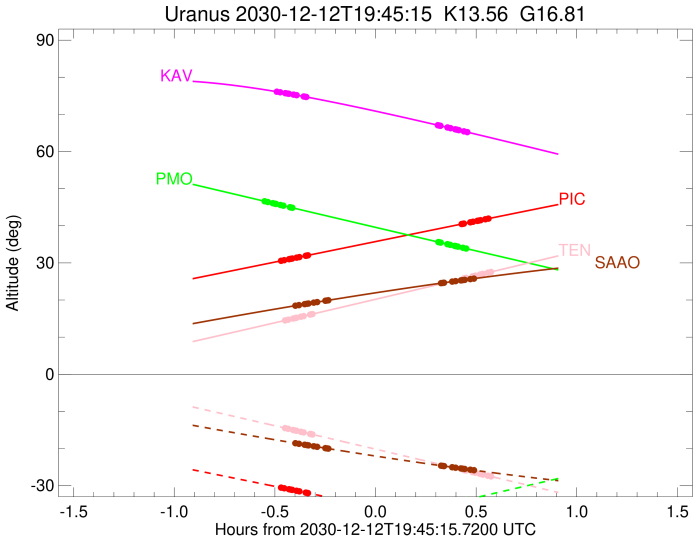
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-12T19:17:25.865		30.62	-30.60	50769.05	-20.17		
lambda	I	2030-12-12T19:18:02.828		30.74	-30.71	50026.71	-20.03		
delta	I	2030-12-12T19:19:29.629		31.00	-30.97	48300.35	-19.75		
gamma	I	2030-12-12T19:20:04.140		31.11	-31.08	47620.99	-19.62		
eta	I	2030-12-12T19:20:26.857		31.18	-31.15	47176.12	-19.54		
beta	I	2030-12-12T19:21:43.914		31.41	-31.38	45681.23	-19.24		
alpha	I	2030-12-12T19:22:34.416		31.57	-31.54	44713.54	-19.04		
4	I	2030-12-12T19:24:29.784		31.92	-31.89	42550.44	-18.51		
5	I	2030-12-12T19:24:45.372		31.97	-31.94	42261.17	-18.44		
6	I	2030-12-12T19:25:06.633		32.03	-32.00	41876.38	-18.31		

No planet occultations

6	E	2030-12-12T20:10:56.451		40.46	-40.41	41845.33	18.36		
5	E	2030-12-12T20:11:21.139		40.54	-40.48	42303.06	18.49		
4	E	2030-12-12T20:11:38.165		40.59	-40.54	42615.26	18.56		
alpha	E	2030-12-12T20:13:31.528		40.94	-40.88	44751.97	19.10		
beta	E	2030-12-12T20:14:18.562		41.08	-41.02	45654.70	19.30		
eta	E	2030-12-12T20:15:36.786		41.32	-41.26	47176.12	19.60		
gamma	E	2030-12-12T20:15:59.833		41.39	-41.33	47628.86	19.69		
delta	E	2030-12-12T20:16:33.835		41.50	-41.44	48300.35	19.81		
lambda	E	2030-12-12T20:18:00.355		41.76	-41.70	50026.71	20.09		
epsilon	E	2030-12-12T20:19:10.905		41.97	-41.91	51451.93	20.24		

Uranus_2030-12-12T19_45_15.7200_PMO.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:19:53 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2030-12-12T19:42:05.560
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 : 3415588483201904384
2Mass ID (if available) : 05181644+2311001
ICRS Star Coord at Epoch: 05h 18m 16.45194s +23:11:00.09025s
RUWE (>1.4 is poor) : 1.01
K magnitude : 13.557
G magnitude : 16.814
RP magnitude : 15.849
BP magnitude : 17.764
DUPflag : 0
Distance (au) : 18.171
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -23.44
Sun-Target sep (deg) : 179.90
Sun-Moon sep (deg) : 31.08
B (ring opening deg) : 81.71
PA of pole (deg) : 15.29
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.116
C/A sky separation (km) : 27883.2
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

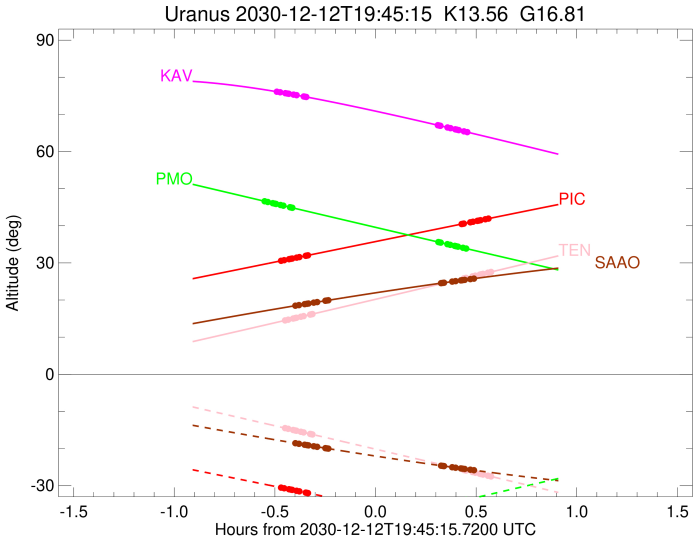
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-12T19:12:31.856		46.54	-46.46	50776.73	-19.79		
lambda	I	2030-12-12T19:13:09.968		46.40	-46.33	50026.71	-19.61		
delta	I	2030-12-12T19:14:38.742		46.09	-46.01	48300.35	-19.28		
gamma	I	2030-12-12T19:15:14.115		45.96	-45.89	47621.03	-19.13		
eta	I	2030-12-12T19:15:37.429		45.88	-45.81	47176.12	-19.03		
beta	I	2030-12-12T19:16:56.682		45.60	-45.53	45681.21	-18.68		
alpha	I	2030-12-12T19:17:48.670		45.41	-45.34	44715.56	-18.44		
4	I	2030-12-12T19:19:48.203		44.99	-44.92	42553.06	-17.80		
5	I	2030-12-12T19:20:04.326		44.93	-44.86	42266.01	-17.71		
6	I	2030-12-12T19:20:26.686		44.85	-44.78	41877.38	-17.56		

No planet occultations

6	E	2030-12-12T20:04:00.452		35.61	-35.57	41847.21	17.51		
5	E	2030-12-12T20:04:26.291		35.52	-35.48	42304.87	17.67		
4	E	2030-12-12T20:04:43.991		35.46	-35.42	42614.75	17.75		
alpha	E	2030-12-12T20:06:42.144		35.04	-35.01	44752.17	18.38		
beta	E	2030-12-12T20:07:30.975		34.87	-34.83	45655.43	18.62		
eta	E	2030-12-12T20:08:51.876		34.59	-34.55	47176.12	18.98		
gamma	E	2030-12-12T20:09:15.665		34.51	-34.47	47628.70	19.07		
delta	E	2030-12-12T20:09:50.748		34.38	-34.34	48300.35	19.21		
lambda	E	2030-12-12T20:11:19.814		34.07	-34.03	50026.71	19.55		
epsilon	E	2030-12-12T20:12:31.851		33.82	-33.78	51443.59	19.72		

Uranus_2030-12-12T19_45_15.7200_TEN.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:26:25 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2030-12-12T19:48:55.330
Event type : PRgt
: Uranus occs: not geocentric or topocentric
: Ring occs: geocentric, topocentric
Observer code : TEN
Location : Teide Obs./Tenerife
Latitude (deg) : 28.30050
E. Longitude (deg) : 343.48909
Altitude (km) : 2.395
Gaia source ID : 3415588483201904384
2Mass ID (if available) : 05181644+2311001
ICRS Star Coord at Epoch: 05h 18m 16.45194s +23:11:00.09025s
RUWE (>1.4 is poor) : 1.01
K magnitude : 13.557
G magnitude : 16.814
RP magnitude : 15.849
BP magnitude : 17.764
DUPflag : 0
Distance (au) : 18.171
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -23.44
Sun-Target sep (deg) : 179.90
Sun-Moon sep (deg) : 32.16
B (ring opening deg) : 81.71
PA of pole (deg) : 15.29
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.037
C/A sky separation (km) : 26841.9
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



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

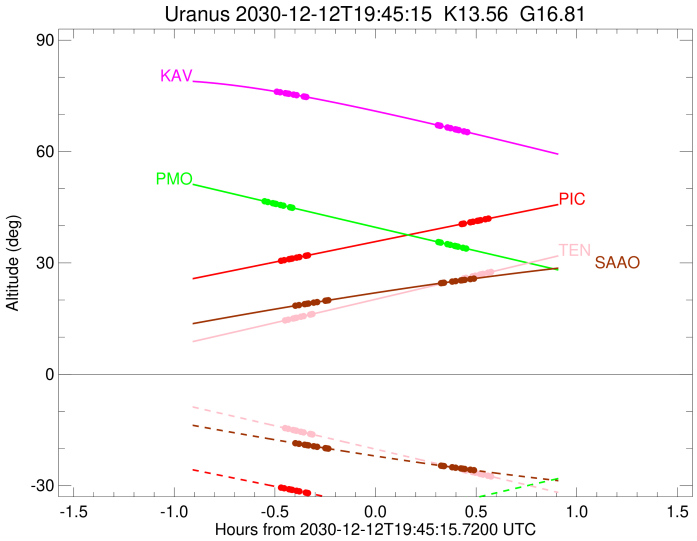
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-12T19:18:37.573		14.58	-14.57	50771.21	-19.89		
lambda	I	2030-12-12T19:19:15.176		14.71	-14.70	50026.71	-19.74		
delta	I	2030-12-12T19:20:43.287		15.02	-15.01	48300.35	-19.44		
gamma	I	2030-12-12T19:21:18.347		15.14	-15.13	47621.00	-19.31		
eta	I	2030-12-12T19:21:41.435		15.22	-15.21	47176.12	-19.22		
beta	I	2030-12-12T19:22:59.812		15.49	-15.49	45681.23	-18.91		
alpha	I	2030-12-12T19:23:51.202		15.67	-15.67	44714.17	-18.69		
4	I	2030-12-12T19:25:48.860		16.08	-16.08	42551.25	-18.13		
5	I	2030-12-12T19:26:04.750		16.14	-16.13	42262.70	-18.05		
6	I	2030-12-12T19:26:26.541		16.22	-16.21	41876.71	-17.91		

No planet occultations

6	E	2030-12-12T20:11:35.255		25.81	-25.78	41846.32	17.98		
5	E	2030-12-12T20:12:00.455		25.90	-25.87	42304.03	18.11		
4	E	2030-12-12T20:12:17.774		25.97	-25.93	42615.00	18.19		
alpha	E	2030-12-12T20:14:13.310		26.38	-26.35	44752.09	18.76		
beta	E	2030-12-12T20:15:01.174		26.55	-26.52	45655.10	18.98		
eta	E	2030-12-12T20:16:20.643		26.84	-26.80	47176.12	19.30		
gamma	E	2030-12-12T20:16:44.038		26.92	-26.88	47628.77	19.39		
delta	E	2030-12-12T20:17:18.552		27.04	-27.01	48300.35	19.52		
lambda	E	2030-12-12T20:18:46.287		27.36	-27.32	50026.71	19.83		
epsilon	E	2030-12-12T20:19:57.513		27.61	-27.58	51447.02	19.98		

Uranus_2030-12-12T19_45_15.7200_KAV.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:30:40 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2030-12-12T19:44:05.230
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 : 3415588483201904384
2Mass ID (if available) : 05181644+2311001
ICRS Star Coord at Epoch: 05h 18m 16.45194s +23:11:00.09025s
RUWE (>1.4 is poor) : 1.01
K magnitude : 13.557
G magnitude : 16.814
RP magnitude : 15.849
BP magnitude : 17.764
DUPflag : 0
Distance (au) : 18.171
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -23.44
Sun-Target sep (deg) : 179.90
Sun-Moon sep (deg) : 31.54
B (ring opening deg) : 81.71
PA of pole (deg) : 15.29
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.328
C/A sky separation (km) : 30684.0
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
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

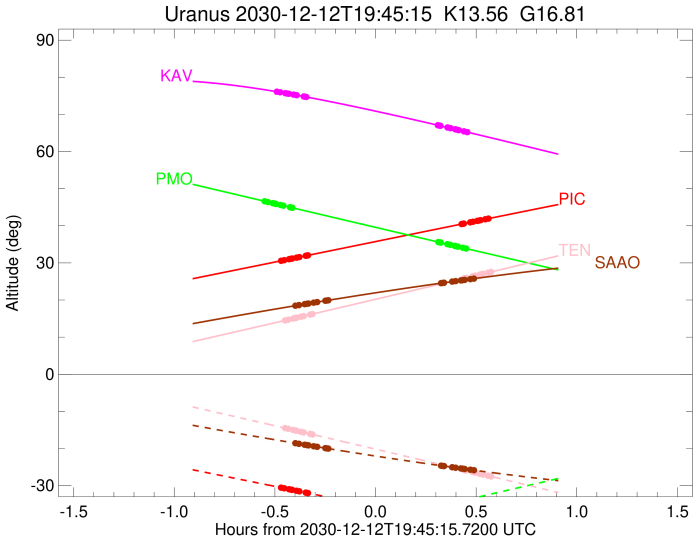
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-12T19:16:10.576		76.06	-76.11	50787.76	-18.99		
lambda	I	2030-12-12T19:16:50.941		75.96	-76.01	50026.71	-18.77		
delta	I	2030-12-12T19:18:23.981		75.72	-75.77	48300.35	-18.34		
gamma	I	2030-12-12T19:19:01.212		75.62	-75.67	47621.11	-18.15		
eta	I	2030-12-12T19:19:25.815		75.56	-75.60	47176.12	-18.02		
beta	I	2030-12-12T19:20:49.808		75.33	-75.38	45681.08	-17.56		
alpha	I	2030-12-12T19:21:45.080		75.18	-75.22	44718.28	-17.24		
4	I	2030-12-12T19:23:53.735		74.82	-74.87	42556.80	-16.40		
5	I	2030-12-12T19:24:11.129		74.78	-74.82	42272.52	-16.28		
6	I	2030-12-12T19:24:35.803		74.71	-74.75	41878.49	-16.08		

No planet occultations

6	E	2030-12-12T20:03:50.821		67.09	-67.12	41851.26	16.07		
5	E	2030-12-12T20:04:18.866		66.99	-67.03	42308.38	16.27		
4	E	2030-12-12T20:04:37.806		66.93	-66.96	42613.32	16.39		
alpha	E	2030-12-12T20:06:44.864		66.48	-66.51	44752.41	17.23		
beta	E	2030-12-12T20:07:36.914		66.29	-66.33	45657.08	17.54		
eta	E	2030-12-12T20:09:02.386		65.99	-66.03	47176.12	18.01		
gamma	E	2030-12-12T20:09:27.412		65.90	-65.94	47628.32	18.13		
delta	E	2030-12-12T20:10:04.285		65.77	-65.81	48300.35	18.32		
lambda	E	2030-12-12T20:11:37.428		65.44	-65.48	50026.71	18.75		
epsilon	E	2030-12-12T20:12:51.288		65.18	-65.21	51422.81	18.97		

Uranus_2030-12-12T19_45_15.7200_SAAO.txt
Occultation predictions computed by rfrench@wellesley.edu Sun Jun 11 11:39:16 2023

target : Uranus
target radius (km) : 25559.00
C/A epoch : 2030-12-12T19:47:51.220
Event type : PRgt
: Uranus occs: not geocentric or topocentric
: Ring occs: geocentric, topocentric
Observer code : SAAO
Location : So. Afr. Astro. Obs. (Sutherland)
Latitude (deg) : -32.37953
E. Longitude (deg) : 20.81070
Altitude (km) : 1.768
Gaia source ID : 3415588483201904384
2Mass ID (if available) : 05181644+2311001
ICRS Star Coord at Epoch: 05h 18m 16.45194s +23:11:00.09025s
RUWE (>1.4 is poor) : 1.01
K magnitude : 13.557
G magnitude : 16.814
RP magnitude : 15.849
BP magnitude : 17.764
DUPflag : 0
Distance (au) : 18.171
f0 (km) : 0.000
g0 (km) : 0.000
skyplane vel. (km/s) : -23.44
Sun-Target sep (deg) : 179.90
Sun-Moon sep (deg) : 31.89
B (ring opening deg) : 81.71
PA of pole (deg) : 15.29
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.578
C/A sky separation (km) : 33981.1
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	2030-12-12T19:21:42.596		18.52	-18.62	50803.46	-17.56		
lambda	I	2030-12-12T19:22:27.301		18.63	-18.73	50026.71	-17.26		
delta	I	2030-12-12T19:24:08.968		18.89	-18.99	48300.35	-16.69		
gamma	I	2030-12-12T19:24:49.950		18.99	-19.09	47621.24	-16.45		
eta	I	2030-12-12T19:25:17.154		19.06	-19.16	47176.12	-16.28		
beta	I	2030-12-12T19:26:50.759		19.29	-19.39	45680.75	-15.66		
alpha	I	2030-12-12T19:27:52.804		19.45	-19.54	44721.78	-15.23		
4	I	2030-12-12T19:30:20.478		19.81	-19.90	42561.89	-14.06		
5	I	2030-12-12T19:30:40.685		19.86	-19.95	42280.66	-13.89		
6	I	2030-12-12T19:31:10.200		19.93	-20.03	41879.43	-13.60		

No planet occultations

6	E	2030-12-12T20:04:48.813		24.54	-24.63	41856.49	13.62		
5	E	2030-12-12T20:05:21.601		24.61	-24.70	42311.99	13.91		
4	E	2030-12-12T20:05:43.322		24.66	-24.74	42610.82	14.08		
alpha	E	2030-12-12T20:08:08.983		24.97	-25.05	44752.32	15.26		
beta	E	2030-12-12T20:09:07.618		25.09	-25.17	45659.28	15.69		
eta	E	2030-12-12T20:10:42.424		25.28	-25.37	47176.12	16.31		
gamma	E	2030-12-12T20:11:09.966		25.34	-25.42	47627.80	16.48		
delta	E	2030-12-12T20:11:50.458		25.42	-25.51	48300.35	16.73		
lambda	E	2030-12-12T20:13:31.884		25.63	-25.71	50026.71	17.30		
epsilon	E	2030-12-12T20:14:50.021		25.79	-25.87	51394.40	17.60		