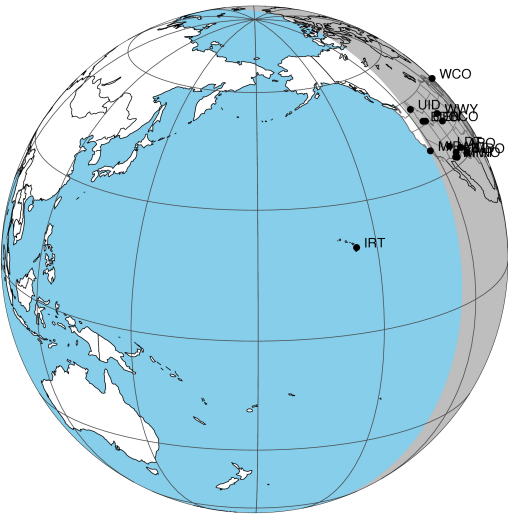


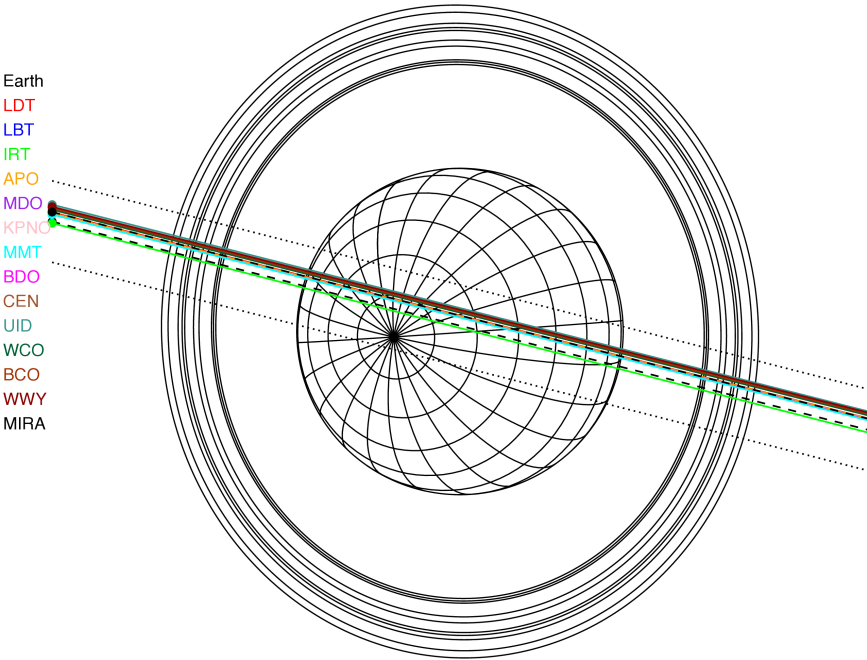
target : Uranus
target radius (km) : 25559.00
half-light altitude (km): 790.0
C/A epoch : 2025-04-08T02:27:55.570
Event type : PgtRgt
: Uranus occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Gaia source ID : 57460310166762752

2Mass ID (if available) : 03294712+1844184
ICRS Star Coord at Epoch: 03h 29m 47.12570s +18:44:17.03963s
RUWE (>1.4 is poor) : 1.08
K magnitude : 7.948
G magnitude : 8.933
RP magnitude : 8.554
BP magnitude : 9.157
DUPflag : 0
Apparent star diam (km) : 1.514
Distance (au) : 20.3316
plate scale (arcsec/km) : 14745.9
f0 (km) : -335.869
g0 (km) : 121.798
GEO skyplane vel. (km/s): 30.267
Sun-Target sep (deg) : 36.58
a(km) ring



2025-04-08T02:27:55.5700 cc: 03 29 47.1257 s: +18 44 17.040 C/A 0.061" PA 165.72 deg v_sky +30.27 km/s D 20.33 AU
Credit: Styled after SORA/Lucky Star

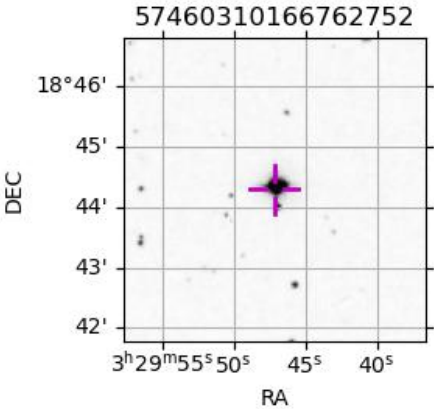
Uranus 2025-04-08T02:27:55 K7.95 G8.93 f0, g0: (-336,122) km PgtRgt



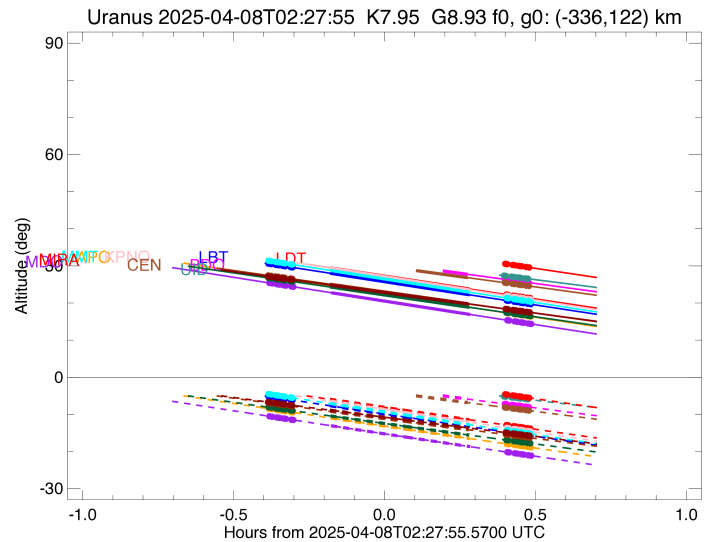
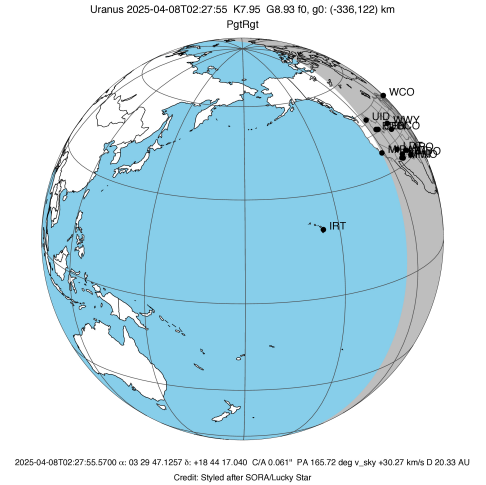
- 1 41837.1 6
- 2 42234.9 5
- 3 42571.1 4
- 4 44718.5 alpha
- 5 45661.1 beta
- 6 47176.0 eta
- 7 47626.2 gamma
- 8 48300.2 delta
- 9 50026.7 lambda
- 10 51149.3 epsilon

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	OEncode
LDT	Lowell Discover Tel.	34.7	-111.4		+ +	+++++	APR 08 02:17 - APR 08 02:57	PieRne
LBT	Large Binocular Tel,	32.7	-109.9	+++++	+ +	+++++	APR 08 02:05 - APR 08 02:57	PieRie
IRT	Infrared Tel. Facil.	19.8	-155.5					PnnRnn
AP0	Apache Point Obs NM,	32.8	-105.8	+++++	+ +	+++++	APR 08 02:05 - APR 08 02:57	PieRie
MDO	McDonald Obs. TX, USA	30.7	-104.0	+++++	+ +	+++++	APR 08 02:05 - APR 08 02:57	PieRie
KPNO	Kitt Peak Natl Obs	32.0	248.4		+ +	+++++	APR 08 02:17 - APR 08 02:57	PieRne
MMT	MMT	31.7	249.1	+++++	+ +	+++++	APR 08 02:07 - APR 08 02:57	PieRie
BDO	Bruneau Dunes Obs.	42.9	-115.7		+	+++++	APR 08 02:44 - APR 08 02:56	PneRne
CEN	Centennial Obs.	42.6	-114.5		+	+++++	APR 08 02:44 - APR 08 02:56	PneRne
UID	U. of Idaho	46.7	243.0			+++++	APR 08 02:51 - APR 08 02:56	PnnRne
WAL	Walsenburg CO	37.6	255.3	+++++	+ +	+++++	APR 08 02:05 - APR 08 02:57	PieRie
BCO	Boulder CO	40.0	254.6	+++++	+ +	+++++	APR 08 02:05 - APR 08 02:56	PieRie
WWY	Wheatland WY	42.1	255.0	+++++	+ +	+++++	APR 08 02:04 - APR 08 02:56	PieRie
MIRA	Monterey IRA	36.3	238.6			+++++	APR 08 02:54 - APR 08 02:56	PnnRne

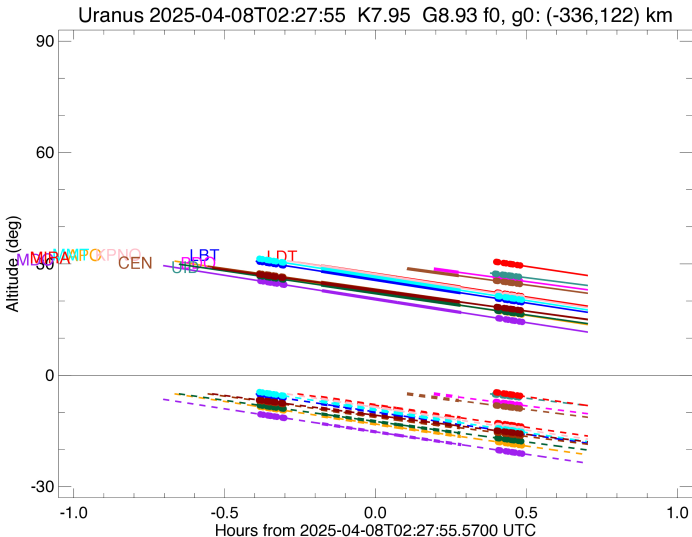
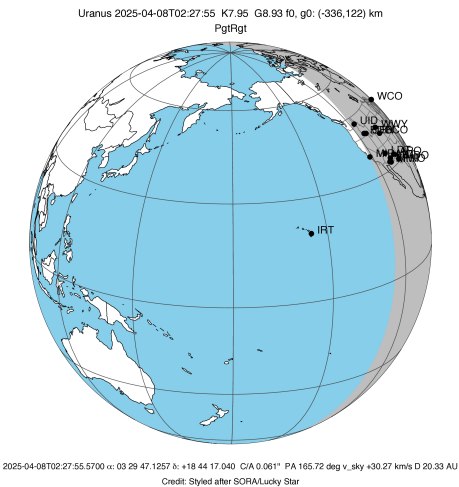


target : Uranus
target radius (km) : 25559.00
half-light altitude (km): 790.0
C/A epoch : 2025-04-08T02:30:56.520
Event type : PgtRgt
: :
: : Uranus occs: geocentric, topocentric
: : Ring occs: geocentric, topocentric
Observer code : LDT
Location : Lowell Discover Tel. AZ, USA
Latitude (deg) : 34.744400
E. Longitude (deg) : 248.578000
Altitude (km) : 2.360
Gaia source ID : 57460310166762752
2Mass ID (if available) : 03294712+1844184
ICRS Star Coord at Epoch: 03h 29m 47.12570s +18:44:17.03963s
RUWE (>1.4 is poor) : 1.08
K magnitude : 7.948
G magnitude : 8.933
RP magnitude : 8.554
BP magnitude : 9.157
DUPflag : 0
Apparent star diam (km) : 1.514
Distance (au) : 20.3316
plate scale (arcsec/km) : 14746.0
f0 (km) : -335.869
g0 (km) : 121.798
GEO skyplane vel. (km/s): 30.267
Sun-Target sep (deg) : 36.58
Sun-Moon sep (deg) : 89.56
B (ring opening deg) : -65.97
PA of pole (deg) : 94.71
Pole direction: RA (deg): 77.311328
: Dec (deg): 15.172797
C/A sky separation (") : 0.165
C/A sky separation (km) : 2426.4
NAIF SPICE kernels : sites.Saunders.spk
peph.ura178.bsp.orig
ura178.bsp
earth_200101_990628_predict.bpc
naif0012.tls
FrenchIcarus2024pole.tpc
uranus_ringframes_rfrench20241015a_v2.tf
earth_flat_IAU.spk



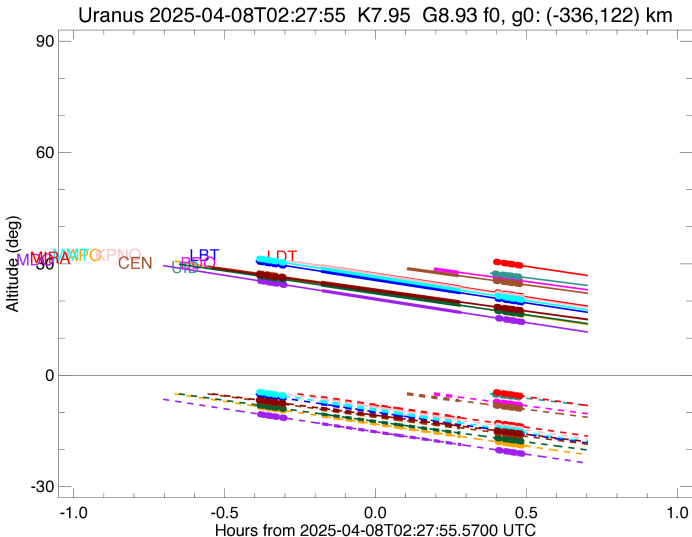
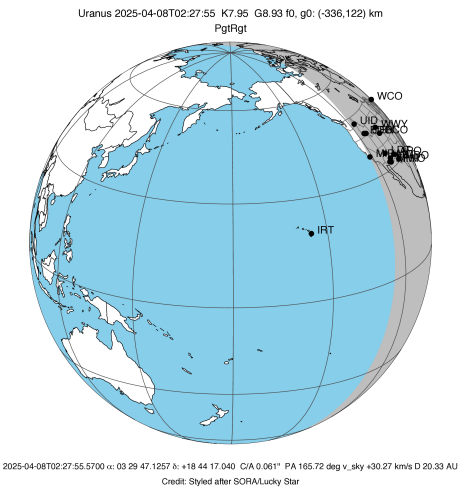
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg										
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	anomaly	W(km)	W(s)
epsilon	I	2025-04-08T02:04:59.703		31.97	-3.51x	50782.65	-32.58	334.40	23.66	0.73
lambda	I	2025-04-08T02:05:22.901		31.89	-3.59x	50026.70	-32.59	141.76	2.00	0.06
delta	I	2025-04-08T02:06:15.885		31.71	-3.76x	48300.23	-32.58	119.42	4.98	0.15
gamma	I	2025-04-08T02:06:36.621		31.64	-3.83x	47624.57	-32.58	72.46	3.12	0.10
eta	I	2025-04-08T02:06:50.388		31.59	-3.88x	47176.01	-32.58	3.55	2.00	0.06
beta	I	2025-04-08T02:07:36.539		31.43	-4.03x	45671.70	-32.58	122.00	10.20	0.31
alpha	I	2025-04-08T02:08:04.624		31.33	-4.13x	44752.38	-32.57	178.40	10.10	0.31
4	I	2025-04-08T02:09:12.748		31.10	-4.36x	42528.53	-32.56	339.91	2.47	0.08
5	I	2025-04-08T02:09:21.747		31.07	-4.39x	42228.52	-32.56	85.56	2.65	0.08
6	I	2025-04-08T02:09:33.193		31.03	-4.43x	41866.51	-32.56	226.15	2.91	0.09
.						r_sky	v_perp	lat-geo	lat-geodetic	
Uranus	I	2025-04-08T02:16:38.930		29.57	-5.85	25928.90	-29.96	21.79	22.72	half-light
Uranus	I	2025-04-08T02:17:04.848		29.48	-5.94	25152.54	-29.95	21.76	22.69	reference level
Uranus	E	2025-04-08T02:44:45.663		23.79	-11.44	25096.32	30.00	-23.34	-24.32	reference level
Uranus	E	2025-04-08T02:45:11.540		23.70	-11.52	25872.67	30.01	-23.33	-24.30	half-light
6	E	2025-04-08T02:52:07.897		22.28	-12.88	41804.21	32.64	39.34	1.65	0.05
5	E	2025-04-08T02:52:21.851		22.24	-12.92	42250.32	32.64	258.81	2.76	0.08
4	E	2025-04-08T02:52:32.688		22.20	-12.96	42611.60	32.65	153.21	3.95	0.12
alpha	E	2025-04-08T02:53:36.020		21.98	-13.17	44684.88	32.66	352.03	4.48	0.14
beta	E	2025-04-08T02:54:05.496		21.88	-13.26	45652.31	32.67	295.76	7.14	0.22
eta	E	2025-04-08T02:54:52.121		21.72	-13.41	47176.01	32.67	177.51	2.45	0.08
gamma	E	2025-04-08T02:55:05.964		21.68	-13.46	47628.29	32.67	246.48	3.44	0.11
delta	E	2025-04-08T02:55:26.529		21.61	-13.52	48300.23	32.67	293.53	4.98	0.15
lambda	E	2025-04-08T02:56:19.362		21.43	-13.70	50026.70	32.68	316.08	2.00	0.06
epsilon	E	2025-04-08T02:57:04.310		21.27	-13.84	51495.72	32.68	148.83	91.70	2.81

target : Uranus
target radius (km) : 25559.00
half-light altitude (km): 790.0
C/A epoch : 2025-04-08T02:31:00.680
Event type : PgtRgt
: : Uranus occs: geocentric, topocentric
: : Ring occs: geocentric, topocentric
Observer code : LBT
Location : Large Binocular Tel, USA
Latitude (deg) : 32.701600
E. Longitude (deg) : 250.128100
Altitude (km) : 3.221
Gaia source ID : 57460310166762752
2Mass ID (if available) : 03294712+1844184
ICRS Star Coord at Epoch: 03h 29m 47.12570s +18:44:17.03963s
RUWE (>1.4 is poor) : 1.08
K magnitude : 7.948
G magnitude : 8.933
RP magnitude : 8.554
BP magnitude : 9.157
DUPflag : 0
Apparent star diam (km) : 1.514
Distance (au) : 20.3316
plate scale (arcsec/km) : 14746.0
f0 (km) : -335.869
g0 (km) : 121.798
GEO skyplane vel. (km/s): 30.267
Sun-Target sep (deg) : 36.58
Sun-Moon sep (deg) : 89.54
B (ring opening deg) : -65.97
PA of pole (deg) : 94.71
Pole direction: RA (deg): 77.311328
: Dec (deg): 15.172797
C/A sky separation (") : 0.152
C/A sky separation (km) : 2242.9
NAIF SPICE kernels : sites.Saunders.spk
peph.ura178.bsp.orig
ura178.bsp
earth_200101_990628_predict.bpc
naif0012.tls
FrenchIcarus2024pole.tpc
uranus_ringframes_rfrench20241015a_v2.tf
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	anomaly	W(km) W(s)
epsilon	I	2025-04-08T02:05:04.179		30.56	-5.20	50783.31	-32.59	334.18	23.73 0.73
lambda	I	2025-04-08T02:05:27.390		30.48	-5.28	50026.69	-32.60	141.54	2.00 0.06
delta	I	2025-04-08T02:06:20.356		30.29	-5.46	48300.23	-32.59	119.19	4.98 0.15
gamma	I	2025-04-08T02:06:41.086		30.22	-5.53	47624.55	-32.59	72.22	3.12 0.10
eta	I	2025-04-08T02:06:54.847		30.17	-5.58	47176.01	-32.59	3.31	2.00 0.06
beta	I	2025-04-08T02:07:40.984		30.01	-5.74	45671.63	-32.59	121.76	10.19 0.31
alpha	I	2025-04-08T02:08:09.056		29.91	-5.83	44752.37	-32.59	178.15	10.10 0.31
4	I	2025-04-08T02:09:17.150		29.67	-6.07	42528.60	-32.58	339.65	2.47 0.08
5	I	2025-04-08T02:09:26.158		29.64	-6.10	42228.16	-32.58	85.30	2.65 0.08
6	I	2025-04-08T02:09:37.582		29.60	-6.14	41866.65	-32.58	225.89	2.92 0.09
.						r_sky	v_perp	lat-geo	lat-geodetic
Uranus	I	2025-04-08T02:16:42.786		28.11	-7.59	25926.23	-29.98	21.87	22.80 half-light
Uranus	I	2025-04-08T02:17:08.683		28.02	-7.68	25149.86	-29.98	21.84	22.77 reference level
Uranus	E	2025-04-08T02:44:50.277		22.21	-13.29	25097.88	30.02	-23.30	-24.28 reference level
Uranus	E	2025-04-08T02:45:16.132		22.12	-13.38	25874.23	30.03	-23.28	-24.26 half-light
6	E	2025-04-08T02:52:12.416		20.68	-14.77	41804.32	32.66	39.58	1.65 0.05
5	E	2025-04-08T02:52:26.352		20.63	-14.82	42249.98	32.66	259.05	2.76 0.08
4	E	2025-04-08T02:52:37.196		20.59	-14.85	42611.68	32.66	153.45	3.96 0.12
alpha	E	2025-04-08T02:53:40.496		20.37	-15.06	44684.87	32.67	352.26	4.48 0.14
beta	E	2025-04-08T02:54:09.956		20.27	-15.16	45652.24	32.68	295.98	7.13 0.22
eta	E	2025-04-08T02:54:56.563		20.11	-15.31	47176.01	32.69	177.73	2.45 0.07
gamma	E	2025-04-08T02:55:10.399		20.06	-15.36	47628.27	32.69	246.69	3.44 0.11
delta	E	2025-04-08T02:55:30.956		19.99	-15.43	48300.23	32.69	293.74	4.98 0.15
lambda	E	2025-04-08T02:56:23.767		19.80	-15.60	50026.70	32.69	316.28	2.00 0.06
epsilon	E	2025-04-08T02:57:08.718		19.65	-15.75	51496.44	32.69	149.03	91.77 2.81

target : Uranus
target radius (km) : 25559.00
half-light altitude (km): 790.0
C/A epoch : 2025-04-08T02:31:04.930
Event type : PgtRgt
: : Uranus occs: geocentric, topocentric
: : Ring occs: geocentric, topocentric
Observer code : AP0
Location : Apache Point Obs NM, USA
Latitude (deg) : 32.780278
E. Longitude (deg) : 254.179722
Altitude (km) : 2.788
Gaia source ID : 57460310166762752
2Mass ID (if available) : 03294712+1844184
ICRS Star Coord at Epoch: 03h 29m 47.12570s +18:44:17.03963s
RUWE (>1.4 is poor) : 1.08
K magnitude : 7.948
G magnitude : 8.933
RP magnitude : 8.554
BP magnitude : 9.157
DUPflag : 0
Apparent star diam (km) : 1.514
Distance (au) : 20.3316
plate scale (arcsec/km) : 14746.0
f0 (km) : -335.869
g0 (km) : 121.798
GEO skyplane vel. (km/s): 30.267
Sun-Target sep (deg) : 36.58
Sun-Moon sep (deg) : 89.49
B (ring opening deg) : -65.97
PA of pole (deg) : 94.71
Pole direction: RA (deg): 77.311328
: Dec (deg): 15.172797
C/A sky separation (") : 0.159
C/A sky separation (km) : 2339.3
NAIF SPICE kernels : sites.Saunders.spk
peph.ura178.bsp.orig
ura178.bsp
earth_200101_990628_predict.bpc
naif0012.tls
FrenchIcarus2024pole.tpc
uranus_ringframes_rfrench20241015a_v2.tf
earth_flat_IAU.spk

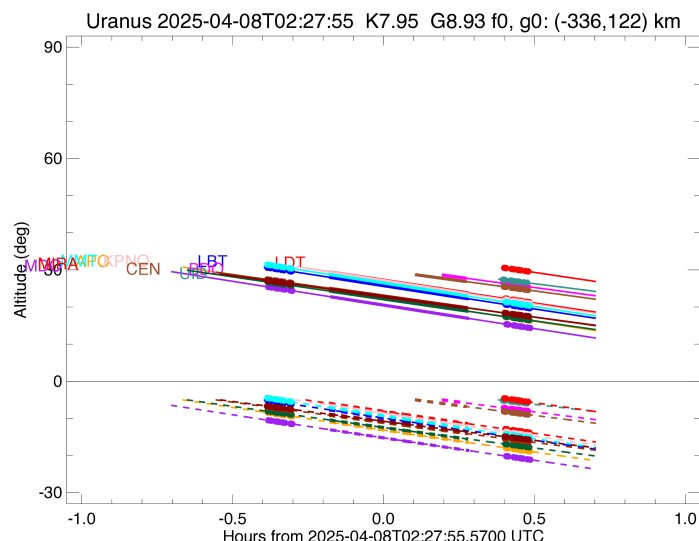


b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg										
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	anomaly	W(km)	W(s)
epsilon	I	2025-04-08T02:05:09.725		27.15	-8.53	50783.03	-32.62	334.27	23.70	0.73
lambda	I	2025-04-08T02:05:32.910		27.07	-8.60	50026.70	-32.62	141.64	2.00	0.06
delta	I	2025-04-08T02:06:25.837		26.88	-8.78	48300.23	-32.62	119.29	4.98	0.15
gamma	I	2025-04-08T02:06:46.551		26.81	-8.85	47624.56	-32.62	72.32	3.12	0.10
eta	I	2025-04-08T02:07:00.303		26.76	-8.90	47176.01	-32.62	3.41	2.00	0.06
beta	I	2025-04-08T02:07:46.406		26.60	-9.06	45671.66	-32.62	121.86	10.19	0.31
alpha	I	2025-04-08T02:08:14.458		26.50	-9.15	44752.37	-32.61	178.26	10.10	0.31
4	I	2025-04-08T02:09:22.505		26.26	-9.38	42528.57	-32.60	339.76	2.47	0.08
5	I	2025-04-08T02:09:31.502		26.23	-9.41	42228.32	-32.60	85.41	2.65	0.08
6	I	2025-04-08T02:09:42.925		26.19	-9.45	41866.59	-32.60	226.01	2.91	0.09
.						r_sky	v_perp	lat-geo	lat-geodetic	
Uranus	I	2025-04-08T02:16:47.998		24.71	-10.89	25927.49	-30.00	21.83	22.76	half-light
Uranus	I	2025-04-08T02:17:13.882		24.62	-10.98	25151.12	-29.99	21.80	22.73	reference level
Uranus	E	2025-04-08T02:44:53.501		18.85	-16.51	25096.97	30.04	-23.33	-24.30	reference level
Uranus	E	2025-04-08T02:45:19.342		18.76	-16.59	25873.32	30.05	-23.31	-24.29	half-light
6	E	2025-04-08T02:52:15.236		17.32	-17.96	41804.25	32.68	39.44	1.65	0.05
5	E	2025-04-08T02:52:29.168		17.28	-18.00	42250.19	32.68	258.90	2.76	0.08
4	E	2025-04-08T02:52:39.997		17.24	-18.04	42611.63	32.69	153.31	3.95	0.12
alpha	E	2025-04-08T02:53:43.250		17.02	-18.24	44684.87	32.70	352.12	4.48	0.14
beta	E	2025-04-08T02:54:12.689		16.92	-18.34	45652.28	32.71	295.85	7.13	0.22
eta	E	2025-04-08T02:54:59.258		16.76	-18.49	47176.01	32.71	177.59	2.45	0.07
gamma	E	2025-04-08T02:55:13.084		16.71	-18.54	47628.28	32.71	246.56	3.44	0.11
delta	E	2025-04-08T02:55:33.624		16.64	-18.60	48300.23	32.71	293.61	4.98	0.15
lambda	E	2025-04-08T02:56:26.393		16.46	-18.78	50026.70	32.72	316.15	2.00	0.06
epsilon	E	2025-04-08T02:57:11.294		16.31	-18.92	51495.99	32.72	148.91	91.72	2.80

Uranus 2025-04-08T02:27:55 K7.95 G8.93 I0, g0: (-336,122) km PglRgt

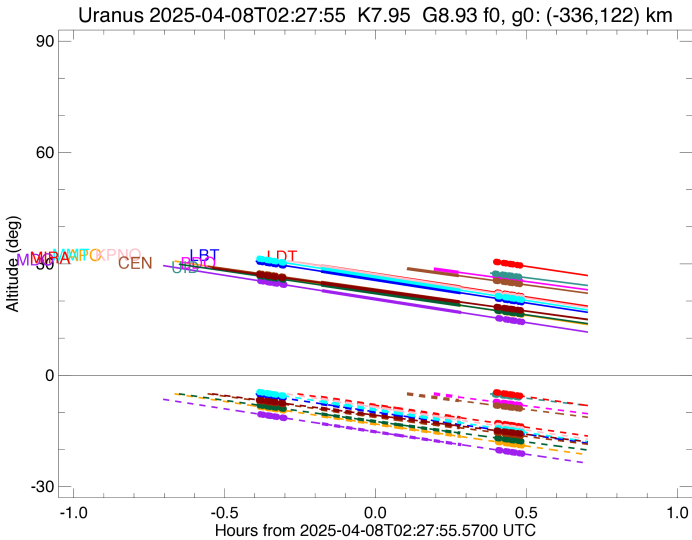
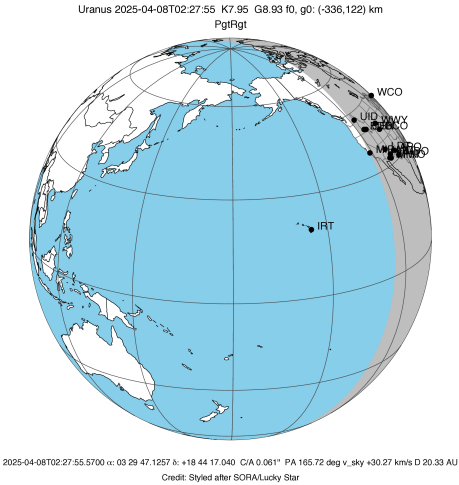
WCO
UID
WXX
GSC
M101
IRT

2025-04-08T02:27:55.5700 u: 03 29 47.1257 h: +18 44 17.040 CIA 0.0611 PA 165.72 deg v_sky +30.27 km/s D 20.33 AU
Credit: Shaded after SORAAI and Star



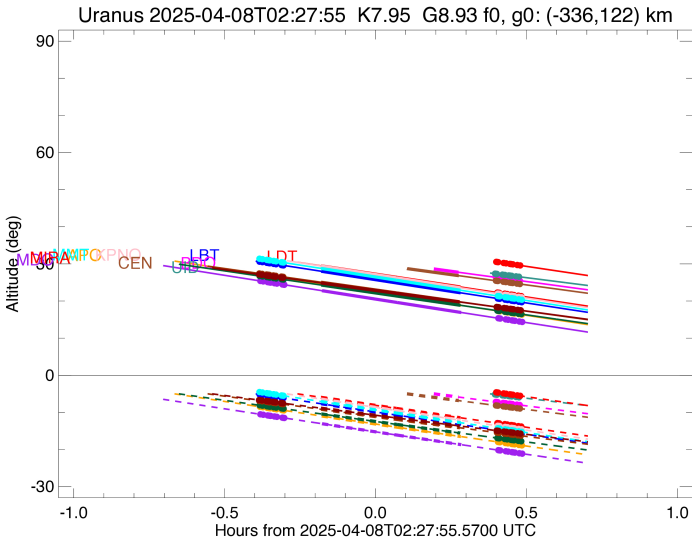
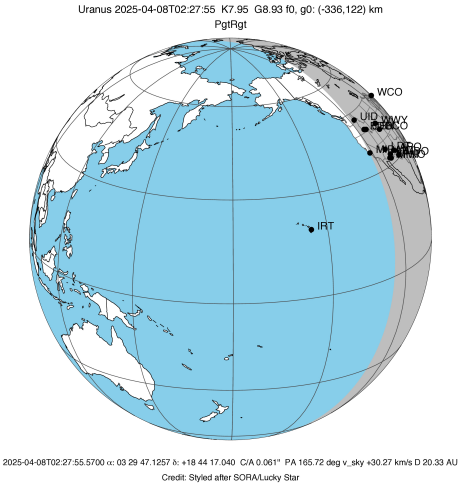
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	anomaly	W(km)	W(s)
epsilon	I	2025-04-08T02:05:14.131		25.36	-10.56	50783.68	-32.63	334.06	23.76	0.73
lambda	I	2025-04-08T02:05:37.326		25.28	-10.64	50026.70	-32.63	141.42	2.00	0.06
delta	I	2025-04-08T02:06:30.231		25.09	-10.82	48300.23	-32.63	119.07	4.98	0.15
gamma	I	2025-04-08T02:06:50.937		25.01	-10.89	47624.54	-32.63	72.10	3.12	0.10
eta	I	2025-04-08T02:07:04.682		24.97	-10.94	47176.01	-32.63	3.18	2.00	0.06
beta	I	2025-04-08T02:07:50.765		24.80	-11.10	45671.59	-32.63	121.62	10.18	0.31
alpha	I	2025-04-08T02:08:18.803		24.70	-11.19	44752.37	-32.63	178.02	10.10	0.31
4	I	2025-04-08T02:09:26.814		24.46	-11.43	42528.64	-32.62	339.51	2.47	0.08
5	I	2025-04-08T02:09:35.819		24.43	-11.46	42227.97	-32.62	85.16	2.65	0.08
6	I	2025-04-08T02:09:47.220		24.39	-11.50	41866.72	-32.62	225.75	2.92	0.09
.						r_sky	v_perp	lat-geo	lat-geodetic	
Uranus	I	2025-04-08T02:16:51.735		22.88	-12.96	25924.90	-30.02	21.90	22.84	half-light
Uranus	I	2025-04-08T02:17:17.597		22.78	-13.05	25148.52	-30.02	21.88	22.81	reference level
Uranus	E	2025-04-08T02:44:57.752		16.91	-18.69	25098.49	30.07	-23.28	-24.26	reference level
Uranus	E	2025-04-08T02:45:23.569		16.82	-18.78	25874.85	30.08	-23.27	-24.24	half-light
6	E	2025-04-08T02:52:19.355		15.36	-20.17	41804.36	32.70	39.67	1.65	0.05
5	E	2025-04-08T02:52:33.267		15.31	-20.22	42249.87	32.70	259.14	2.76	0.08
4	E	2025-04-08T02:52:44.102		15.28	-20.25	42611.71	32.70	153.54	3.96	0.12
alpha	E	2025-04-08T02:53:47.317		15.05	-20.46	44684.86	32.72	352.34	4.48	0.14
beta	E	2025-04-08T02:54:16.739		14.95	-20.56	45652.21	32.72	296.06	7.12	0.22
eta	E	2025-04-08T02:55:03.285		14.79	-20.72	47176.01	32.73	177.80	2.45	0.07
gamma	E	2025-04-08T02:55:17.103		14.74	-20.76	47628.26	32.73	246.76	3.44	0.11
delta	E	2025-04-08T02:55:37.633		14.67	-20.83	48300.23	32.73	293.81	4.98	0.15
lambda	E	2025-04-08T02:56:30.374		14.48	-21.00	50026.70	32.74	316.35	2.00	0.06
epsilon	E	2025-04-08T02:57:15.275		14.33	-21.15	51496.69	32.74	149.10	91.79	2.80

target : Uranus
target radius (km) : 25559.00
half-light altitude (km): 790.0
C/A epoch : 2025-04-08T02:30:59.300
Event type : PgtRgt
 :
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
Observer code : KPNO
Location : Kitt Peak Natl Obs
Latitude (deg) : 31.963333
E. Longitude (deg) : 248.400000
Altitude (km) : 2.120
Gaia source ID : 57460310166762752
2Mass ID (if available) : 03294712+1844184
ICRS Star Coord at Epoch: 03h 29m 47.12570s +18:44:17.03963s
RUWE (>1.4 is poor) : 1.08
K magnitude : 7.948
G magnitude : 8.933
RP magnitude : 8.554
BP magnitude : 9.157
DUPflag : 0
Apparent star diam (km) : 1.514
Distance (au) : 20.3316
plate scale (arcsec/km) : 14746.0
f0 (km) : -335.869
g0 (km) : 121.798
GEO skyplane vel. (km/s): 30.267
Sun-Target sep (deg) : 36.58
Sun-Moon sep (deg) : 89.56
B (ring opening deg) : -65.97
PA of pole (deg) : 94.71
Pole direction: RA (deg): 77.311328
 : Dec (deg): 15.172797
C/A sky separation (") : 0.144
C/A sky separation (km) : 2129.4
NAIF SPICE kernels : sites.Saunders.spk
peph.ura178.bsp.orig
ura178.bsp
earth_200101_990628_predict.bpc
naif0012.tls
FrenchIcarus2024pole.tpc
uranus_ringframes_rfrench20241015a_v2.tf
earth_flat_IAU.spk



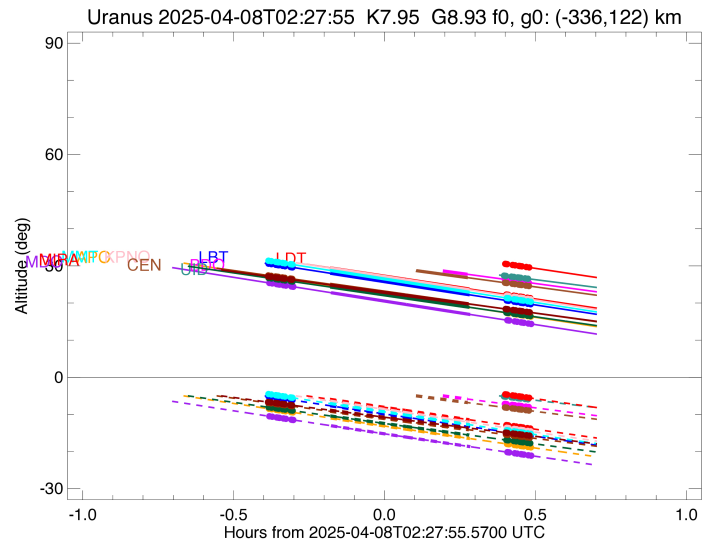
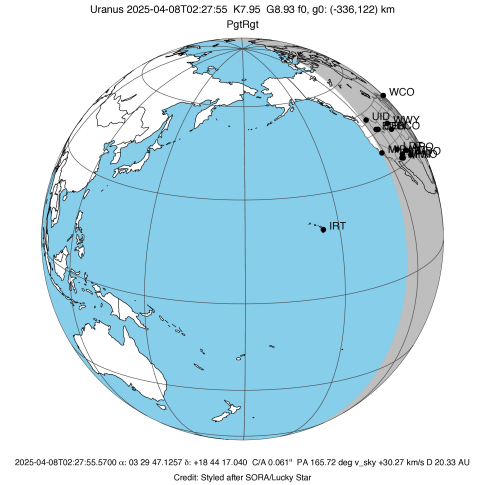
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg										
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	anomaly	W(km)	W(s)
epsilon	I	2025-04-08T02:05:02.214		31.98	-3.91x	50783.68	-32.58	334.05	23.76	0.73
lambda	I	2025-04-08T02:05:25.443		31.90	-3.99x	50026.70	-32.59	141.42	2.00	0.06
delta	I	2025-04-08T02:06:18.424		31.71	-4.17x	48300.23	-32.59	119.06	4.98	0.15
gamma	I	2025-04-08T02:06:39.160		31.64	-4.24x	47624.54	-32.59	72.09	3.12	0.10
eta	I	2025-04-08T02:06:52.925		31.59	-4.29x	47176.01	-32.58	3.18	2.00	0.06
beta	I	2025-04-08T02:07:39.076		31.43	-4.45x	45671.59	-32.58	121.62	10.18	0.31
alpha	I	2025-04-08T02:08:07.154		31.33	-4.55x	44752.37	-32.58	178.01	10.10	0.31
4	I	2025-04-08T02:09:15.264		31.09	-4.79x	42528.64	-32.57	339.50	2.47	0.08
5	I	2025-04-08T02:09:24.282		31.05	-4.82x	42227.95	-32.57	85.15	2.65	0.08
6	I	2025-04-08T02:09:35.699		31.01	-4.86x	41866.73	-32.57	225.74	2.92	0.09
.						r_sky	v_perp	lat-geo	lat-geodetic	
Uranus	I	2025-04-08T02:16:40.803		29.51	-6.33	25924.68	-29.98	21.91	22.84	half-light
Uranus	I	2025-04-08T02:17:06.701		29.42	-6.42	25148.29	-29.98	21.88	22.82	reference level
Uranus	E	2025-04-08T02:44:49.588		23.55	-12.11	25098.90	30.02	-23.27	-24.25	reference level
Uranus	E	2025-04-08T02:45:15.444		23.46	-12.20	25875.27	30.03	-23.26	-24.23	half-light
6	E	2025-04-08T02:52:11.925		22.00	-13.61	41804.40	32.65	39.75	1.65	0.05
5	E	2025-04-08T02:52:25.856		21.95	-13.66	42249.77	32.65	259.21	2.76	0.08
4	E	2025-04-08T02:52:36.713		21.91	-13.69	42611.74	32.65	153.61	3.96	0.12
alpha	E	2025-04-08T02:53:40.027		21.69	-13.91	44684.86	32.66	352.41	4.48	0.14
beta	E	2025-04-08T02:54:09.495		21.59	-14.00	45652.19	32.67	296.13	7.12	0.22
eta	E	2025-04-08T02:54:56.116		21.42	-14.16	47176.01	32.68	177.87	2.45	0.08
gamma	E	2025-04-08T02:55:09.956		21.38	-14.21	47628.26	32.68	246.83	3.44	0.11
delta	E	2025-04-08T02:55:30.519		21.30	-14.28	48300.23	32.68	293.88	4.98	0.15
lambda	E	2025-04-08T02:56:23.345		21.12	-14.45	50026.70	32.68	316.42	2.00	0.06
epsilon	E	2025-04-08T02:57:08.325		20.96	-14.61	51496.93	32.68	149.16	91.81	2.81

target : Uranus
target radius (km) : 25559.00
half-light altitude (km): 790.0
C/A epoch : 2025-04-08T02:31:00.490
Event type : PgtRgt
 :
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
Observer code : MMT
Location : MMT
Latitude (deg) : 31.688333
E. Longitude (deg) : 249.115000
Altitude (km) : 2.626
Gaia source ID : 57460310166762752
2Mass ID (if available) : 03294712+1844184
ICRS Star Coord at Epoch: 03h 29m 47.12570s +18:44:17.03963s
RUWE (>1.4 is poor) : 1.08
K magnitude : 7.948
G magnitude : 8.933
RP magnitude : 8.554
BP magnitude : 9.157
DUPflag : 0
Apparent star diam (km) : 1.514
Distance (au) : 20.3316
plate scale (arcsec/km) : 14746.0
f0 (km) : -335.869
g0 (km) : 121.798
GEO skyplane vel. (km/s): 30.267
Sun-Target sep (deg) : 36.58
Sun-Moon sep (deg) : 89.55
B (ring opening deg) : -65.97
PA of pole (deg) : 94.71
Pole direction: RA (deg): 77.311328
 : Dec (deg): 15.172797
C/A sky separation (") : 0.143
C/A sky separation (km) : 2114.8
NAIF SPICE kernels : sites.Saunders.spk
peph.ura178.bsp.orig
ura178.bsp
earth_200101_990628_predict.bpc
naif0012.tls
FrenchIcarus2024pole.tpc
uranus_ringframes_rfrench20241015a_v2.tf
earth_flat_IAU.spk



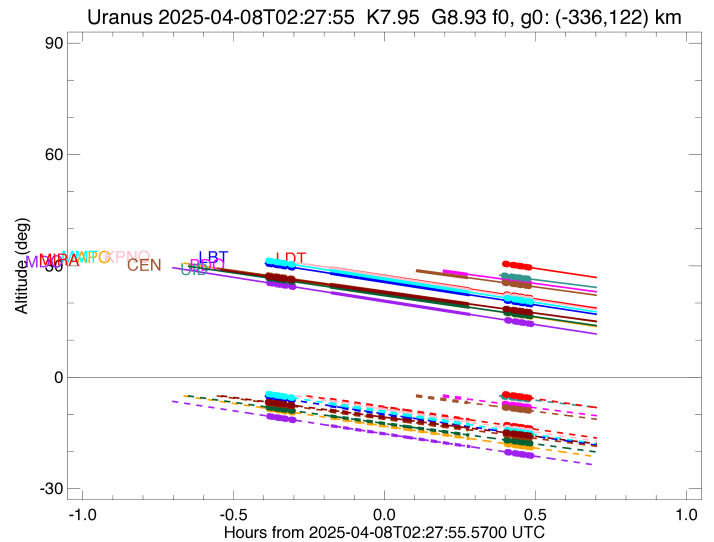
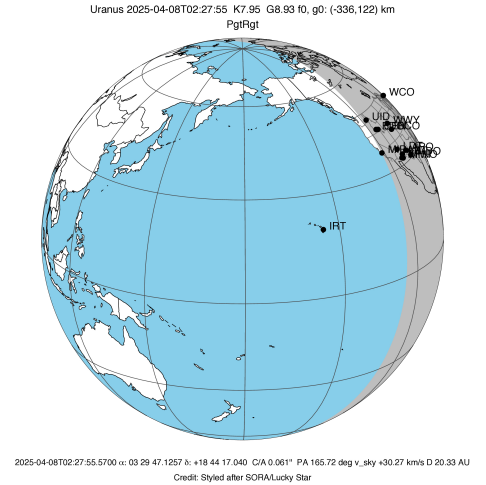
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg										
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	anomaly	W(km)	W(s)
epsilon	I	2025-04-08T02:05:03.605		31.35	-4.56x	50783.74	-32.59	334.03	23.77	0.73
lambda	I	2025-04-08T02:05:26.833		31.27	-4.64x	50026.69	-32.59	141.40	2.00	0.06
delta	I	2025-04-08T02:06:19.807		31.08	-4.83x	48300.23	-32.59	119.04	4.98	0.15
gamma	I	2025-04-08T02:06:40.540		31.01	-4.90x	47624.53	-32.59	72.07	3.12	0.10
eta	I	2025-04-08T02:06:54.303		30.96	-4.95x	47176.01	-32.59	3.16	2.00	0.06
beta	I	2025-04-08T02:07:40.448		30.79	-5.11	45671.58	-32.59	121.60	10.18	0.31
alpha	I	2025-04-08T02:08:08.521		30.69	-5.21	44752.37	-32.58	177.99	10.10	0.31
4	I	2025-04-08T02:09:16.622		30.45	-5.44	42528.65	-32.57	339.48	2.47	0.08
5	I	2025-04-08T02:09:25.640		30.42	-5.47	42227.92	-32.57	85.12	2.65	0.08
6	I	2025-04-08T02:09:37.054		30.38	-5.51	41866.74	-32.57	225.72	2.92	0.09
.						r_sky	v_perp	lat-geo	lat-geodetic	
Uranus	I	2025-04-08T02:16:42.067		28.87	-6.99	25924.45	-29.99	21.92	22.85	half-light
Uranus	I	2025-04-08T02:17:07.960		28.78	-7.08	25148.06	-29.98	21.89	22.82	reference level
Uranus	E	2025-04-08T02:44:50.710		22.91	-12.78	25099.02	30.03	-23.27	-24.25	reference level
Uranus	E	2025-04-08T02:45:16.560		22.81	-12.87	25875.39	30.04	-23.25	-24.23	half-light
6	E	2025-04-08T02:52:12.986		21.35	-14.28	41804.41	32.66	39.76	1.65	0.05
5	E	2025-04-08T02:52:26.913		21.30	-14.32	42249.74	32.65	259.23	2.76	0.08
4	E	2025-04-08T02:52:37.769		21.26	-14.36	42611.74	32.66	153.63	3.96	0.12
alpha	E	2025-04-08T02:53:41.073		21.04	-14.57	44684.85	32.67	352.42	4.48	0.14
beta	E	2025-04-08T02:54:10.536		20.94	-14.67	45652.19	32.68	296.15	7.12	0.22
eta	E	2025-04-08T02:54:57.150		20.77	-14.83	47176.01	32.68	177.89	2.45	0.07
gamma	E	2025-04-08T02:55:10.988		20.73	-14.88	47628.26	32.68	246.85	3.44	0.11
delta	E	2025-04-08T02:55:31.548		20.65	-14.94	48300.23	32.68	293.89	4.98	0.15
lambda	E	2025-04-08T02:56:24.366		20.47	-15.12	50026.70	32.69	316.43	2.00	0.06
epsilon	E	2025-04-08T02:57:09.340		20.31	-15.27	51496.98	32.69	149.17	91.82	2.81

target : Uranus
target radius (km) : 25559.00
half-light altitude (km): 790.0
C/A epoch : 2025-04-08T02:30:40.170
Event type : PgtRgt
 :
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
Observer code : BD0
Location : Bruneau Dunes Obs.
Latitude (deg) : 42.902978
E. Longitude (deg) : 244.308818
Altitude (km) : 0.763
Gaia source ID : 57460310166762752
2Mass ID (if available) : 03294712+1844184
ICRS Star Coord at Epoch: 03h 29m 47.12570s +18:44:17.03963s
RUWE (>1.4 is poor) : 1.08
K magnitude : 7.948
G magnitude : 8.933
RP magnitude : 8.554
BP magnitude : 9.157
DUPflag : 0
Apparent star diam (km) : 1.514
Distance (au) : 20.3316
plate scale (arcsec/km) : 14746.0
f0 (km) : -335.869
g0 (km) : 121.798
GEO skyplane vel. (km/s): 30.267
Sun-Target sep (deg) : 36.58
Sun-Moon sep (deg) : 89.61
B (ring opening deg) : -65.97
PA of pole (deg) : 94.71
Pole direction: RA (deg): 77.311328
 : Dec (deg): 15.172797
C/A sky separation (") : 0.217
C/A sky separation (km) : 3194.3
NAIF SPICE kernels : sites.Saunders.spk
peph.ura178.bsp.orig
ura178.bsp
earth_200101_990628_predict.bpc
naif0012.tls
FrenchIcarus2024pole.tpc
uranus_ringframes_rfrench20241015a_v2.tf
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	anomaly	W(km)	W(s)
epsilon	I	2025-04-08T02:04:43.242		35.04	1.25x	50779.96	-32.55	335.30	23.40	0.72
lambda	I	2025-04-08T02:05:06.378		34.97	1.18x	50026.70	-32.56	142.68	2.00	0.06
delta	I	2025-04-08T02:05:59.413		34.81	1.02x	48300.23	-32.55	120.37	4.98	0.15
gamma	I	2025-04-08T02:06:20.167		34.75	0.96x	47624.66	-32.55	73.42	3.13	0.10
eta	I	2025-04-08T02:06:33.951		34.71	0.92x	47176.01	-32.55	4.52	2.00	0.06
beta	I	2025-04-08T02:07:20.142		34.57	0.78x	45672.00	-32.54	123.00	10.24	0.31
alpha	I	2025-04-08T02:07:48.269		34.48	0.69x	44752.39	-32.54	179.42	10.10	0.31
4	I	2025-04-08T02:08:56.486		34.27	0.49x	42528.25	-32.52	340.98	2.47	0.08
5	I	2025-04-08T02:09:05.446		34.24	0.46x	42230.04	-32.52	86.64	2.66	0.08
6	I	2025-04-08T02:09:16.977		34.21	0.43x	41865.92	-32.52	227.25	2.90	0.09
.						r_sky	v_perp	lat-geo	lat-geodetic	
Uranus	I	2025-04-08T02:16:24.865		32.90	-0.86x	25940.41	-29.86	21.47	22.39	half-light
Uranus	I	2025-04-08T02:16:50.870		32.82	-0.94x	25164.11	-29.84	21.43	22.34	reference level
Uranus	E	2025-04-08T02:44:26.441		27.74	-5.87	25090.27	29.88	-23.51	-24.49	reference level
Uranus	E	2025-04-08T02:44:52.410		27.66	-5.95	25866.53	29.90	-23.49	-24.47	half-light
6	E	2025-04-08T02:51:48.987		26.38	-7.17	41803.73	32.59	38.31	1.64	0.05
5	E	2025-04-08T02:52:03.014		26.34	-7.21	42251.72	32.59	257.79	2.77	0.09
4	E	2025-04-08T02:52:13.812		26.31	-7.24	42611.23	32.59	152.20	3.95	0.12
alpha	E	2025-04-08T02:53:17.254		26.11	-7.43	44684.97	32.61	351.06	4.49	0.14
beta	E	2025-04-08T02:53:46.778		26.02	-7.52	45652.61	32.62	294.82	7.18	0.22
eta	E	2025-04-08T02:54:33.461		25.88	-7.65	47176.01	32.63	176.60	2.45	0.08
gamma	E	2025-04-08T02:54:47.326		25.84	-7.69	47628.36	32.63	245.58	3.45	0.11
delta	E	2025-04-08T02:55:07.916		25.77	-7.75	48300.23	32.63	292.64	4.98	0.15
lambda	E	2025-04-08T02:56:00.819		25.61	-7.91	50026.70	32.64	315.22	2.00	0.06
epsilon	E	2025-04-08T02:56:45.727		25.47	-8.04	51492.59	32.64	148.00	91.40	2.80

target : Uranus
target radius (km) : 25559.00
half-light altitude (km): 790.0
C/A epoch : 2025-04-08T02:30:42.180
Event type : PgtRgt
: :
: : Uranus occs: geocentric, topocentric
: : Ring occs: geocentric, topocentric
Observer code : CEN
Location : Centennial Obs.
Latitude (deg) : 42.584279
E. Longitude (deg) : 245.529136
Altitude (km) : 1.114
Gaia source ID : 57460310166762752
2Mass ID (if available) : 03294712+1844184
ICRS Star Coord at Epoch: 03h 29m 47.12570s +18:44:17.03963s
RUWE (>1.4 is poor) : 1.08
K magnitude : 7.948
G magnitude : 8.933
RP magnitude : 8.554
BP magnitude : 9.157
DUPflag : 0
Apparent star diam (km) : 1.514
Distance (au) : 20.3316
plate scale (arcsec/km) : 14746.0
f0 (km) : -335.869
g0 (km) : 121.798
GEO skyplane vel. (km/s): 30.267
Sun-Target sep (deg) : 36.58
Sun-Moon sep (deg) : 89.60
B (ring opening deg) : -65.97
PA of pole (deg) : 94.71
Pole direction: RA (deg): 77.311328
: Dec (deg): 15.172797
C/A sky separation (") : 0.216
C/A sky separation (km) : 3181.0
NAIF SPICE kernels : sites.Saunders.spk
peph.ura178.bsp.orig
ura178.bsp
earth_200101_990628_predict.bpc
naif0012.tls
FrenchIcarus2024pole.tpc
uranus_ringframes_rfrench20241015a_v2.tf
earth_flat_IAU.spk

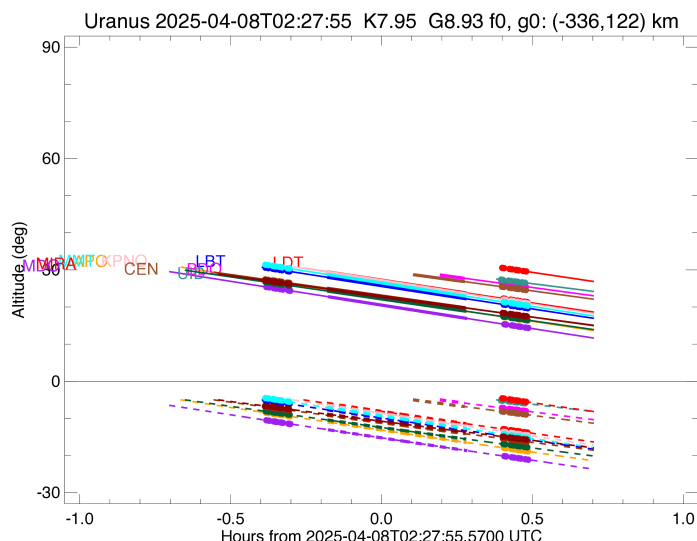


b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg										
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	anomaly	W(km)	W(s)
epsilon	I	2025-04-08T02:04:45.527		34.18	0.31x	50780.01	-32.56	335.28	23.41	0.72
lambda	I	2025-04-08T02:05:08.661		34.10	0.24x	50026.69	-32.56	142.66	2.00	0.06
delta	I	2025-04-08T02:06:01.685		33.94	0.08x	48300.23	-32.56	120.35	4.98	0.15
gamma	I	2025-04-08T02:06:22.436		33.88	0.01x	47624.65	-32.56	73.40	3.13	0.10
eta	I	2025-04-08T02:06:36.217		33.83	-0.03x	47176.01	-32.55	4.50	2.00	0.06
beta	I	2025-04-08T02:07:22.399		33.69	-0.17x	45672.00	-32.55	122.98	10.24	0.31
alpha	I	2025-04-08T02:07:50.521		33.61	-0.25x	44752.39	-32.54	179.40	10.10	0.31
4	I	2025-04-08T02:08:58.725		33.40	-0.46x	42528.25	-32.53	340.96	2.47	0.08
5	I	2025-04-08T02:09:07.684		33.37	-0.49x	42230.01	-32.53	86.62	2.66	0.08
6	I	2025-04-08T02:09:19.211		33.33	-0.52x	41865.93	-32.53	227.22	2.90	0.09
.						r_sky	v_perp	lat-geo	lat-geodetic	
Uranus	I	2025-04-08T02:16:26.982		32.02	-1.81x	25940.17	-29.86	21.48	22.39	half-light
Uranus	I	2025-04-08T02:16:52.981		31.94	-1.89x	25163.87	-29.85	21.43	22.35	reference level
Uranus	E	2025-04-08T02:44:28.358		26.83	-6.83	25090.36	29.89	-23.51	-24.49	reference level
Uranus	E	2025-04-08T02:44:54.321		26.75	-6.91	25866.62	29.91	-23.49	-24.47	half-light
6	E	2025-04-08T02:51:50.809		25.47	-8.13	41803.73	32.60	38.32	1.64	0.05
5	E	2025-04-08T02:52:04.832		25.42	-8.17	42251.70	32.60	257.80	2.77	0.09
4	E	2025-04-08T02:52:15.628		25.39	-8.20	42611.23	32.60	152.21	3.95	0.12
alpha	E	2025-04-08T02:53:19.056		25.20	-8.39	44684.97	32.62	351.08	4.49	0.14
beta	E	2025-04-08T02:53:48.574		25.10	-8.47	45652.61	32.63	294.83	7.18	0.22
eta	E	2025-04-08T02:54:35.246		24.96	-8.61	47176.01	32.63	176.61	2.45	0.08
gamma	E	2025-04-08T02:54:49.108		24.92	-8.65	47628.36	32.64	245.59	3.45	0.11
delta	E	2025-04-08T02:55:09.694		24.85	-8.71	48300.23	32.64	292.65	4.98	0.15
lambda	E	2025-04-08T02:56:02.584		24.69	-8.87	50026.70	32.65	315.23	2.00	0.06
epsilon	E	2025-04-08T02:56:47.484		24.55	-9.00	51492.63	32.64	148.01	91.41	2.80

Uranus 2025-04-08T02:27:55 K7.95 G8.93 I0, g0: (-336,122) km PglRgt

WCO
UID
WXX
GSC
M101
IRT

2025-04-08T02:27:55.5700 u: 03 29 47.1257 h: +18 44 17.040 CIA 0.0611 PA 165.72 deg v_sky +30.27 km/s D 20.33 AU
Credit: Shaded after SORAAI and Star

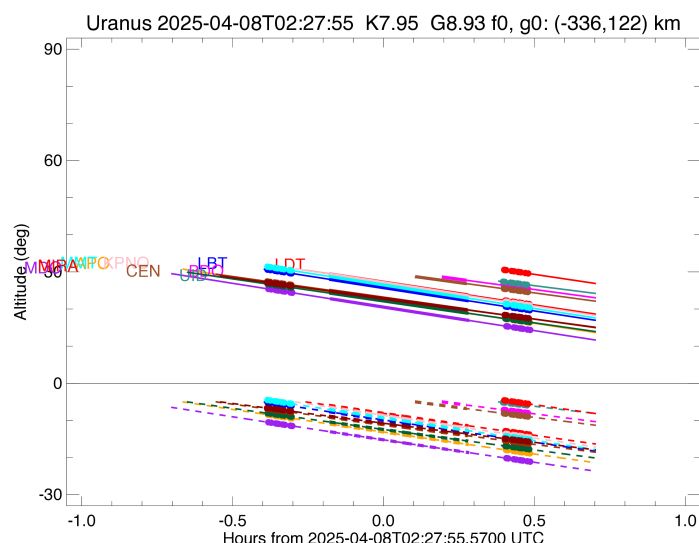


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	anomaly	W(km)	W(s)
epsilon	I	2025-04-08T02:04:35.896		35.44	2.74x	50778.72	-32.54	335.73	23.28	0.72
lambda	I	2025-04-08T02:04:59.002		35.37	2.68x	50026.70	-32.55	143.12	2.00	0.06
delta	I	2025-04-08T02:05:52.053		35.22	2.53x	48300.23	-32.54	120.82	4.98	0.15
gamma	I	2025-04-08T02:06:12.813		35.17	2.47x	47624.70	-32.54	73.87	3.13	0.10
eta	I	2025-04-08T02:06:26.603		35.13	2.43x	47176.01	-32.54	4.98	2.00	0.06
beta	I	2025-04-08T02:07:12.807		35.00	2.30x	45672.14	-32.53	123.48	10.27	0.32
alpha	I	2025-04-08T02:07:40.951		34.92	2.22x	44752.39	-32.52	179.91	10.10	0.31
4	I	2025-04-08T02:08:49.206		34.72	2.02x	42528.12	-32.51	341.49	2.46	0.08
5	I	2025-04-08T02:08:58.145		34.70	2.00x	42230.76	-32.51	87.15	2.66	0.08
6	I	2025-04-08T02:09:09.715		34.66	1.97x	41865.63	-32.50	227.76	2.90	0.09
.						r_sky	v_perp	lat-geo	lat-geodetic	
Uranus	I	2025-04-08T02:16:18.631		33.45	0.75x	25946.04	-29.81	21.31	22.22	half-light
Uranus	I	2025-04-08T02:16:44.680		33.37	0.68x	25169.78	-29.79	21.26	22.17	reference level
Uranus	E	2025-04-08T02:44:16.864		28.64	-3.94x	25087.67	29.83	-23.58	-24.57	reference level
Uranus	E	2025-04-08T02:44:42.879		28.57	-4.01x	25863.88	29.85	-23.56	-24.54	half-light
6	E	2025-04-08T02:51:39.571		27.37	-5.16	41803.50	32.57	37.82	1.64	0.05
5	E	2025-04-08T02:51:53.631		27.33	-5.20	42252.39	32.57	257.30	2.77	0.09
4	E	2025-04-08T02:52:04.409		27.30	-5.23	42611.05	32.57	151.72	3.94	0.12
alpha	E	2025-04-08T02:53:07.897		27.12	-5.40	44685.01	32.59	350.60	4.49	0.14
beta	E	2025-04-08T02:53:37.441		27.03	-5.49	45652.75	32.60	294.37	7.21	0.22
eta	E	2025-04-08T02:54:24.145		26.90	-5.61	47176.01	32.61	176.17	2.45	0.08
gamma	E	2025-04-08T02:54:38.018		26.86	-5.65	47628.40	32.61	245.15	3.45	0.11
delta	E	2025-04-08T02:54:58.618		26.80	-5.71	48300.23	32.61	292.22	4.98	0.15
lambda	E	2025-04-08T02:55:51.546		26.65	-5.85	50026.70	32.62	314.81	2.00	0.06
epsilon	E	2025-04-08T02:56:36.428		26.52	-5.98	51491.07	32.62	147.60	91.26	2.80

Uranus 2025-04-08T02:27:55 K7.95 G8.93 I0, g0: (-336,122) km PglRgt

WCO
UID
WXX
GSC
M101
IRT

2025-04-08T02:27:55.5700 u: 03 29 47.1257 h: +18 44 17.040 CIA 0.0611 PA 165.72 deg v_sky +30.27 km/s D 20.33 AU
Credit: Shaded after SORAAI and Star

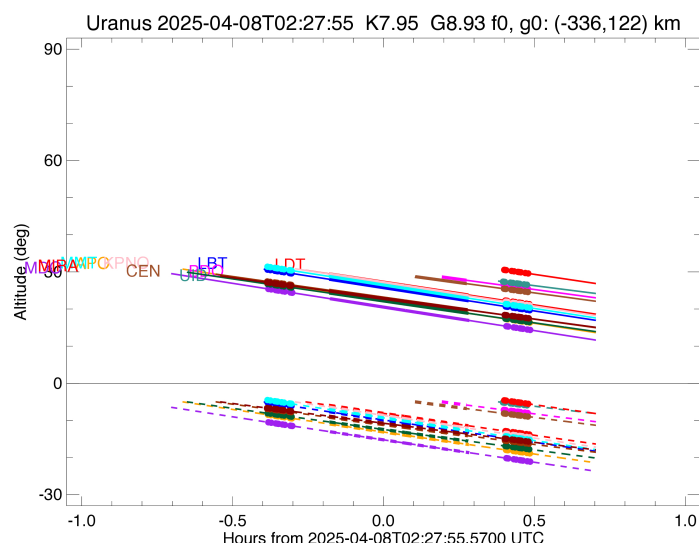


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	anomaly	W(km)	W(s)
epsilon	I	2025-04-08T02:05:05.308		26.69	-8.12	50781.22	-32.61	334.87	23.53	0.72
lambda	I	2025-04-08T02:05:28.439		26.62	-8.20	50026.70	-32.62	142.25	2.00	0.06
delta	I	2025-04-08T02:06:21.370		26.44	-8.36	48300.23	-32.62	119.92	4.98	0.15
gamma	I	2025-04-08T02:06:42.084		26.37	-8.43	47624.62	-32.61	72.96	3.12	0.10
eta	I	2025-04-08T02:06:55.839		26.33	-8.47	47176.01	-32.61	4.06	2.00	0.06
beta	I	2025-04-08T02:07:41.942		26.18	-8.62	45671.86	-32.61	122.53	10.22	0.31
alpha	I	2025-04-08T02:08:10.006		26.08	-8.71	44752.38	-32.60	178.94	10.10	0.31
4	I	2025-04-08T02:09:18.076		25.86	-8.92	42528.38	-32.59	340.48	2.47	0.08
5	I	2025-04-08T02:09:27.040		25.83	-8.95	42229.33	-32.59	86.13	2.66	0.08
6	I	2025-04-08T02:09:38.514		25.79	-8.99	41866.20	-32.59	226.73	2.91	0.09
						r_sky	v_perp	lat-geo	lat-geodetic	
Uranus	I	2025-04-08T02:16:44.740		24.38	-10.34	25935.07	-29.95	21.62	22.54	half-light
Uranus	I	2025-04-08T02:17:10.665		24.30	-10.42	25158.75	-29.94	21.58	22.50	reference level
Uranus	E	2025-04-08T02:44:46.056		18.86	-15.57	25092.67	29.98	-23.44	-24.43	reference level
Uranus	E	2025-04-08T02:45:11.940		18.77	-15.64	25868.96	30.00	-23.42	-24.41	half-light
6	E	2025-04-08T02:52:07.663		17.41	-16.91	41803.92	32.67	38.72	1.64	0.05
5	E	2025-04-08T02:52:21.636		17.37	-16.95	42251.16	32.67	258.19	2.77	0.08
4	E	2025-04-08T02:52:32.429		17.33	-16.99	42611.38	32.67	152.60	3.95	0.12
alpha	E	2025-04-08T02:53:35.714		17.13	-17.18	44684.93	32.69	351.45	4.49	0.14
beta	E	2025-04-08T02:54:05.165		17.03	-17.27	45652.49	32.70	295.19	7.17	0.22
eta	E	2025-04-08T02:54:51.742		16.88	-17.41	47176.01	32.70	176.96	2.45	0.07
gamma	E	2025-04-08T02:55:05.573		16.83	-17.45	47628.33	32.70	245.93	3.44	0.11
delta	E	2025-04-08T02:55:26.116		16.77	-17.51	48300.23	32.71	292.99	4.98	0.15
lambda	E	2025-04-08T02:56:18.896		16.60	-17.67	50026.70	32.71	315.56	2.00	0.06
epsilon	E	2025-04-08T02:57:03.739		16.45	-17.81	51493.82	32.71	148.33	91.52	2.80

```

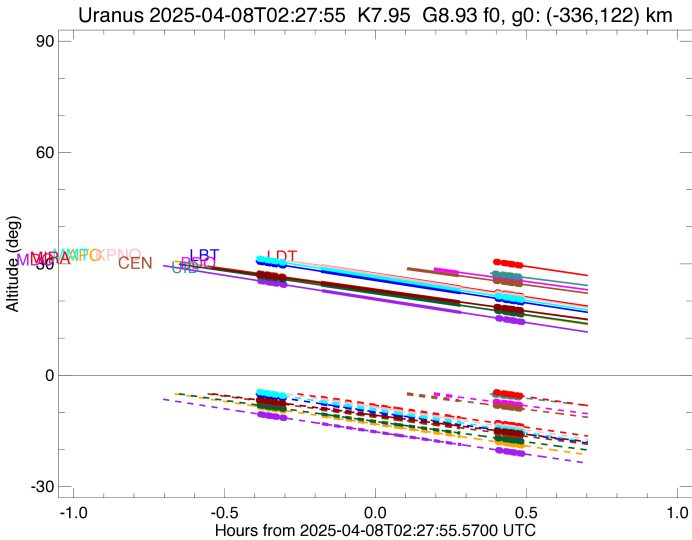
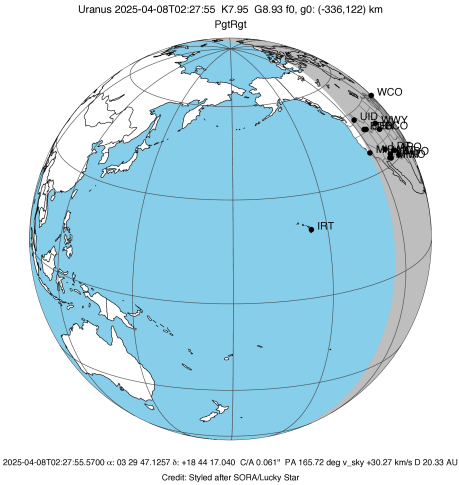
target                                : Uranus
target radius (km)                   : 25559.00
half-light altitude (km)             : 790.0
C/A epoch                            : 2025-04-08T02:30:55.660
Event type                           : PgtRgt
:                                    : Uranus occs: geocentric, topocentric
:                                    : Ring occs: geocentric, topocentric
Observer code                        : BCO
Location                             : Boulder CO
Latitude (deg)                       : 39.998012
E. Longitude (deg)                   : 254.564051
Altitude (km)                        : 1.628
Gaia source ID                      : 57460310166762752
2Mass ID (if available)              : 03294712+1844184
ICRS Star Coord at Epoch: 03h 29m 47.12570s +18:44:17.03963s
RUWE (>1.4 is poor)                : 1.08
K magnitude                          : 7.948
G magnitude                          : 8.933
RP magnitude                         : 8.554
BP magnitude                         : 9.157
DUPflag                             : 0
Apparent star diam (km)              : 1.514
Distance (au)                       : 20.3316
plate scale (arcsec/km)             : 14746.0
f0 (km)                             : -335.869
g0 (km)                             : 121.798
GEO skyplane vel. (km/s)            : 30.267
Sun-Target sep (deg)                : 36.58
Sun-Moon sep (deg)                  : 89.50
B (ring opening deg)                : -65.97
PA of pole (deg)                    : 94.71
Pole direction: RA (deg)             : 77.311328
:                                   Dec (deg) : 15.172797
C/A sky separation (")               : 0.209
C/A sky separation (km)              : 3087.2
NAIF SPICE kernels                   : sites.Saunders.spk
peph.ura178.bsp.orig
ura178.bsp
earth_200101_990628_predict.bpc
naif0012.tls
FrenchIcarus2024pole.tpc
uranus_ringframes_rfrench20241015a_v2.tf
earth_flat_IAU.spk

```



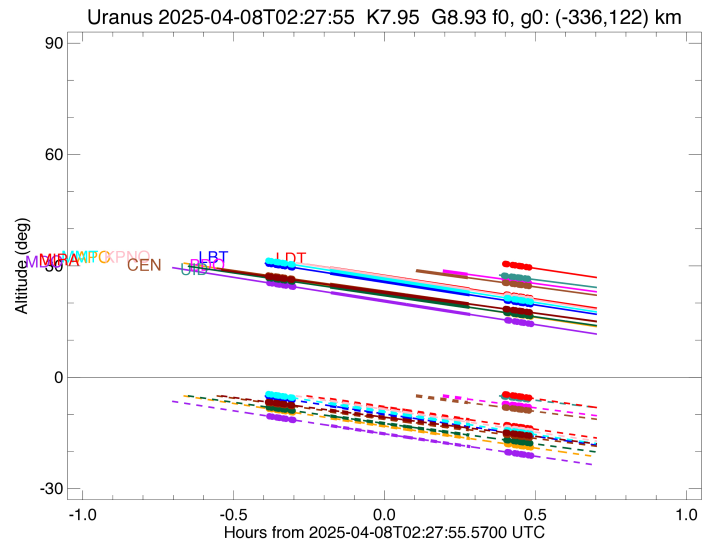
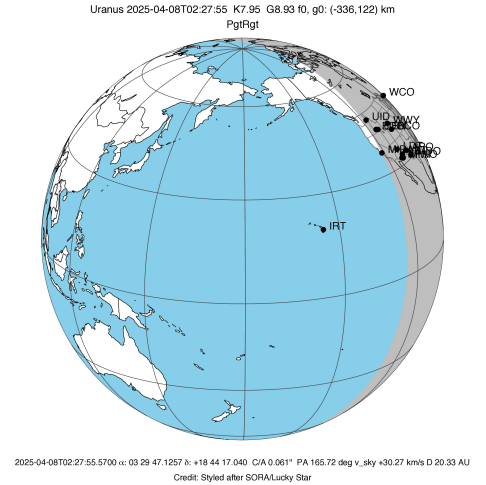
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	anomaly	W(km)	W(s)
epsilon	I	2025-04-08T02:05:01.229		27.39	-6.94	50780.44	-32.61	335.14	23.45	0.72
lambda	I	2025-04-08T02:05:24.341		27.31	-7.01	50026.70	-32.61	142.52	2.00	0.06
delta	I	2025-04-08T02:06:17.286		27.14	-7.18	48300.23	-32.61	120.20	4.98	0.15
gamma	I	2025-04-08T02:06:38.005		27.07	-7.24	47624.64	-32.61	73.25	3.13	0.10
eta	I	2025-04-08T02:06:51.765		27.03	-7.28	47176.01	-32.60	4.34	2.00	0.06
beta	I	2025-04-08T02:07:37.878		26.88	-7.43	45671.95	-32.60	122.82	10.24	0.31
alpha	I	2025-04-08T02:08:05.955		26.79	-7.51	44752.38	-32.59	179.24	10.10	0.31
4	I	2025-04-08T02:09:14.051		26.57	-7.72	42528.29	-32.58	340.79	2.47	0.08
5	I	2025-04-08T02:09:23.003		26.55	-7.75	42229.77	-32.58	86.45	2.66	0.08
6	I	2025-04-08T02:09:34.502		26.51	-7.78	41866.02	-32.58	227.06	2.90	0.09
						r_sky	v_perp	lat-geo	lat-geodetic	
Uranus	I	2025-04-08T02:16:41.363		25.14	-9.09	25938.48	-29.92	21.52	22.44	half-light
Uranus	I	2025-04-08T02:17:07.314		25.06	-9.17	25162.18	-29.91	21.48	22.40	reference level
Uranus	E	2025-04-08T02:44:41.001		19.79	-14.14	25090.94	29.95	-23.49	-24.47	reference level
Uranus	E	2025-04-08T02:45:06.912		19.70	-14.22	25867.20	29.97	-23.47	-24.45	half-light
6	E	2025-04-08T02:52:02.700		18.39	-15.44	41803.78	32.66	38.41	1.64	0.05
5	E	2025-04-08T02:52:16.694		18.34	-15.48	42251.58	32.66	257.89	2.77	0.08
4	E	2025-04-08T02:52:27.476		18.31	-15.51	42611.27	32.66	152.30	3.95	0.12
alpha	E	2025-04-08T02:53:30.791		18.11	-15.70	44684.96	32.67	351.16	4.49	0.14
beta	E	2025-04-08T02:54:00.256		18.01	-15.79	45652.58	32.68	294.91	7.18	0.22
eta	E	2025-04-08T02:54:46.848		17.87	-15.92	47176.01	32.69	176.69	2.45	0.07
gamma	E	2025-04-08T02:55:00.685		17.82	-15.96	47628.36	32.69	245.66	3.45	0.11
delta	E	2025-04-08T02:55:21.235		17.76	-16.02	48300.23	32.70	292.73	4.98	0.15
lambda	E	2025-04-08T02:56:14.034		17.59	-16.18	50026.70	32.70	315.30	2.00	0.06
epsilon	E	2025-04-08T02:56:58.864		17.45	-16.31	51492.89	32.70	148.08	91.43	2.80

target : Uranus
target radius (km) : 25559.00
half-light altitude (km): 790.0
C/A epoch : 2025-04-08T02:30:52.760
Event type : PgtRgt
 :
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
Observer code : WWY
Location : Wheatland WY
Latitude (deg) : 42.055630
E. Longitude (deg) : 255.018249
Altitude (km) : 1.477
Gaia source ID : 57460310166762752
2Mass ID (if available) : 03294712+1844184
ICRS Star Coord at Epoch: 03h 29m 47.12570s +18:44:17.03963s
RUWE (>1.4 is poor) : 1.08
K magnitude : 7.948
G magnitude : 8.933
RP magnitude : 8.554
BP magnitude : 9.157
DUPflag : 0
Apparent star diam (km) : 1.514
Distance (au) : 20.3316
plate scale (arcsec/km) : 14746.0
f0 (km) : -335.869
g0 (km) : 121.798
GEO skyplane vel. (km/s): 30.267
Sun-Target sep (deg) : 36.58
Sun-Moon sep (deg) : 89.49
B (ring opening deg) : -65.97
PA of pole (deg) : 94.71
Pole direction: RA (deg): 77.311328
 : Dec (deg): 15.172797
C/A sky separation (") : 0.224
C/A sky separation (km) : 3301.3
NAIF SPICE kernels : sites.Saunders.spk
peph.ura178.bsp.orig
ura178.bsp
earth_200101_990628_predict.bpc
naif0012.tls
FrenchIcarus2024pole.tpc
uranus_ringframes_rfrench20241015a_v2.tf
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	anomaly	W(km)	W(s)
epsilon	I	2025-04-08T02:04:58.732		27.12	-6.71	50779.72	-32.60	335.38	23.38	0.72
lambda	I	2025-04-08T02:05:21.823		27.05	-6.78	50026.70	-32.61	142.77	2.00	0.06
delta	I	2025-04-08T02:06:14.771		26.88	-6.93	48300.22	-32.60	120.46	4.98	0.15
gamma	I	2025-04-08T02:06:35.492		26.82	-7.00	47624.66	-32.60	73.51	3.13	0.10
eta	I	2025-04-08T02:06:49.253		26.78	-7.04	47176.01	-32.60	4.61	2.00	0.06
beta	I	2025-04-08T02:07:35.368		26.63	-7.17	45672.03	-32.60	123.10	10.25	0.31
alpha	I	2025-04-08T02:08:03.451		26.55	-7.26	44752.39	-32.59	179.52	10.10	0.31
4	I	2025-04-08T02:09:11.560		26.33	-7.46	42528.22	-32.57	341.09	2.46	0.08
5	I	2025-04-08T02:09:20.500		26.31	-7.49	42230.19	-32.57	86.75	2.66	0.08
6	I	2025-04-08T02:09:32.020		26.27	-7.52	41865.86	-32.57	227.35	2.90	0.09
.						r_sky	v_perp	lat-geo	lat-geodetic	
Uranus	I	2025-04-08T02:16:39.415		24.94	-8.79	25941.73	-29.90	21.43	22.35	half-light
Uranus	I	2025-04-08T02:17:05.387		24.86	-8.86	25165.45	-29.88	21.39	22.30	reference level
Uranus	E	2025-04-08T02:44:36.989		19.75	-13.65	25089.34	29.92	-23.53	-24.52	reference level
Uranus	E	2025-04-08T02:45:02.923		19.67	-13.73	25865.58	29.94	-23.51	-24.50	half-light
6	E	2025-04-08T02:51:58.704		18.39	-14.91	41803.64	32.65	38.12	1.64	0.05
5	E	2025-04-08T02:52:12.715		18.35	-14.95	42251.97	32.65	257.60	2.77	0.08
4	E	2025-04-08T02:52:23.483		18.32	-14.98	42611.16	32.65	152.02	3.95	0.12
alpha	E	2025-04-08T02:53:26.815		18.12	-15.15	44684.98	32.67	350.89	4.49	0.14
beta	E	2025-04-08T02:53:56.288		18.03	-15.24	45652.67	32.68	294.65	7.19	0.22
eta	E	2025-04-08T02:54:42.885		17.89	-15.37	47176.01	32.69	176.43	2.45	0.07
gamma	E	2025-04-08T02:54:56.725		17.85	-15.41	47628.38	32.69	245.41	3.45	0.11
delta	E	2025-04-08T02:55:17.278		17.78	-15.47	48300.23	32.69	292.47	4.98	0.15
lambda	E	2025-04-08T02:56:10.083		17.62	-15.61	50026.70	32.70	315.06	2.00	0.06
epsilon	E	2025-04-08T02:56:54.891		17.48	-15.74	51491.99	32.70	147.84	91.35	2.79

target : Uranus
target radius (km) : 25559.00
half-light altitude (km): 790.0
C/A epoch : 2025-04-08T02:30:40.430
Event type : PgtRgt
 :
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
Observer code : MIRA
Location : Monterey IRA
Latitude (deg) : 36.306167
E. Longitude (deg) : 238.618110
Altitude (km) : 1.519
Gaia source ID : 57460310166762752
2Mass ID (if available) : 03294712+1844184
ICRS Star Coord at Epoch: 03h 29m 47.12570s +18:44:17.03963s
RUWE (>1.4 is poor) : 1.08
K magnitude : 7.948
G magnitude : 8.933
RP magnitude : 8.554
BP magnitude : 9.157
DUPflag : 0
Apparent star diam (km) : 1.514
Distance (au) : 20.3316
plate scale (arcsec/km) : 14746.0
f0 (km) : -335.869
g0 (km) : 121.798
GEO skyplane vel. (km/s): 30.267
Sun-Target sep (deg) : 36.58
Sun-Moon sep (deg) : 89.67
B (ring opening deg) : -65.97
PA of pole (deg) : 94.71
Pole direction: RA (deg): 77.311328
 : Dec (deg): 15.172797
C/A sky separation (") : 0.165
C/A sky separation (km) : 2427.2
NAIF SPICE kernels : sites.Saunders.spk
peph.ura178.bsp.orig
ura178.bsp
earth_200101_990628_predict.bpc
naif0012.tls
FrenchIcarus2024pole.tpc
uranus_ringframes_rfrench20241015a_v2.tf
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	anomaly	w(km)	w(s)
epsilon	I	2025-04-08T02:04:40.936		40.11	4.82x	50782.51	-32.53	334.44	23.65	0.73
lambda	I	2025-04-08T02:05:04.168		40.03	4.74x	50026.70	-32.53	141.81	2.00	0.06
delta	I	2025-04-08T02:05:57.240		39.85	4.56x	48300.23	-32.53	119.47	4.98	0.15
gamma	I	2025-04-08T02:06:18.010		39.78	4.49x	47624.57	-32.53	72.50	3.12	0.10
eta	I	2025-04-08T02:06:31.800		39.73	4.45x	47176.01	-32.53	3.59	2.00	0.06
beta	I	2025-04-08T02:07:18.027		39.58	4.29x	45671.72	-32.53	122.04	10.20	0.31
alpha	I	2025-04-08T02:07:46.159		39.48	4.20x	44752.38	-32.52	178.44	10.10	0.31
4	I	2025-04-08T02:08:54.396		39.25	3.97x	42528.52	-32.51	339.95	2.47	0.08
5	I	2025-04-08T02:09:03.409		39.22	3.94x	42228.59	-32.51	85.60	2.65	0.08
6	I	2025-04-08T02:09:14.877		39.18	3.90x	41866.49	-32.51	226.20	2.91	0.09
.						r_sky	v_perp	lat-geo	lat-geodetic	
Uranus	I	2025-04-08T02:16:21.371		37.75	2.47x	25929.22	-29.91	21.78	22.71	half-light
Uranus	I	2025-04-08T02:16:47.333		37.66	2.39x	25152.85	-29.90	21.75	22.68	reference level
Uranus	E	2025-04-08T02:44:31.062		32.05	-3.13x	25096.49	29.94	-23.34	-24.32	reference level
Uranus	E	2025-04-08T02:44:56.986		31.96	-3.22x	25872.84	29.95	-23.32	-24.30	half-light
6	E	2025-04-08T02:51:54.147		30.56	-4.59x	41804.23	32.58	39.38	1.65	0.05
5	E	2025-04-08T02:52:08.125		30.51	-4.64x	42250.26	32.58	258.85	2.76	0.08
4	E	2025-04-08T02:52:18.985		30.47	-4.67x	42611.61	32.58	153.25	3.95	0.12
alpha	E	2025-04-08T02:53:22.437		30.26	-4.88x	44684.88	32.60	352.07	4.48	0.14
beta	E	2025-04-08T02:53:51.968		30.16	-4.98x	45652.30	32.60	295.80	7.14	0.22
eta	E	2025-04-08T02:54:38.683		30.00	-5.13	47176.01	32.61	177.55	2.45	0.08
gamma	E	2025-04-08T02:54:52.553		29.95	-5.18	47628.28	32.61	246.52	3.44	0.11
delta	E	2025-04-08T02:55:13.157		29.88	-5.25	48300.23	32.61	293.57	4.98	0.15
lambda	E	2025-04-08T02:56:06.091		29.71	-5.42	50026.70	32.62	316.12	2.00	0.06
epsilon	E	2025-04-08T02:56:51.130		29.55	-5.57	51495.87	32.62	148.87	91.71	2.81