

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2028-10-23T06:25:36.320
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3413037371411063552
 2Mass ID (if available) : 04474712+2221530

ICRS Star Coord at Epoch: 04h 47m 47.11635s +22:21:52.82912s

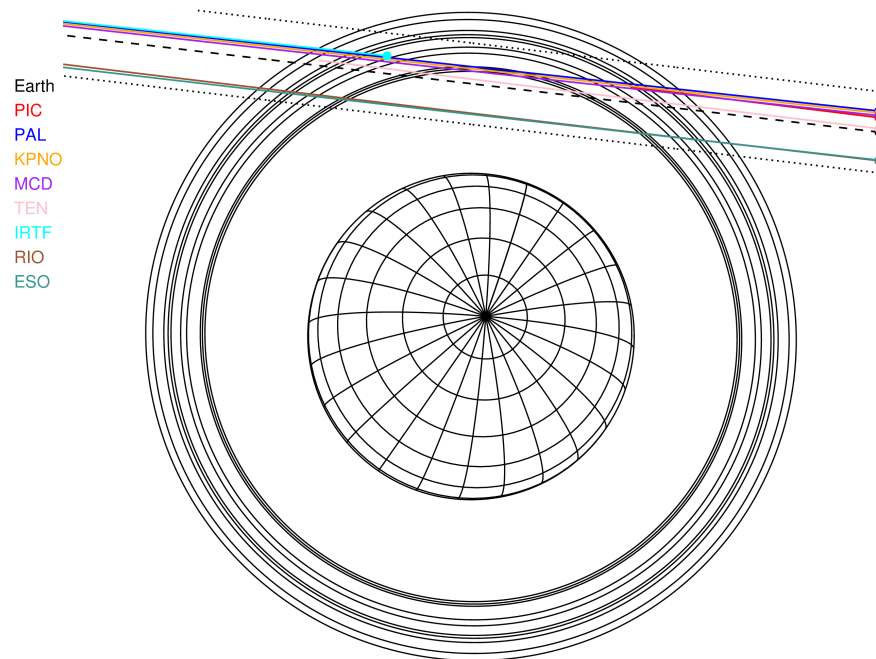
RUWE (>1.4 is poor) : 1.01
 K magnitude : 13.630
 G magnitude : 16.738
 RP magnitude : 15.815
 BP magnitude : 17.596
 DUPflag : 0
 Distance (au) : 18.566
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.34
 Sun-Target sep (deg) : 136.64
 Sun-Moon sep (deg) : 155.79
 B (ring opening deg) : 81.20
 PA of pole (deg) : -36.15

#	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



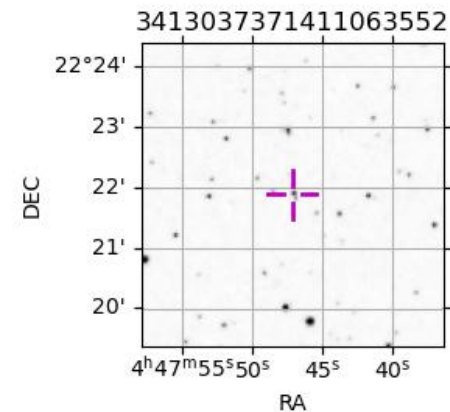
2028-10-23T06:25:36.3200 ra: 04 47 47.1164 d: +22 21 52.829 C/A 2.925° PA 173.22 deg v_sky -15.34 km/s D 18.57 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2028-10-23T06:25:36 K13.63 G16.74 XRgt

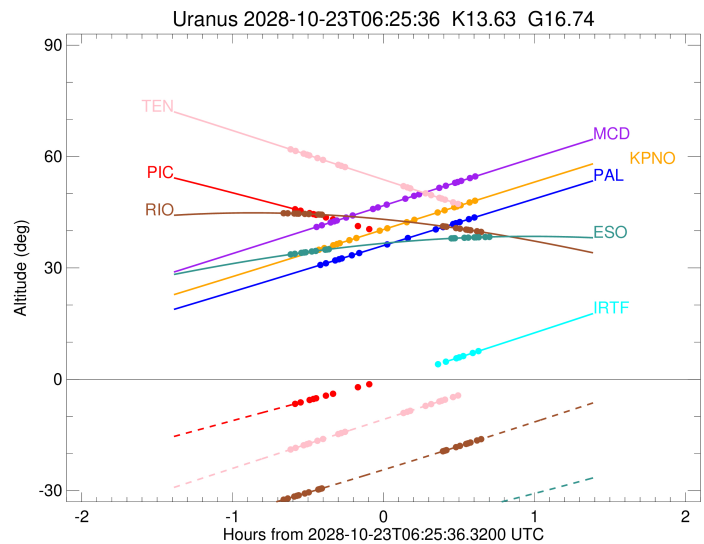
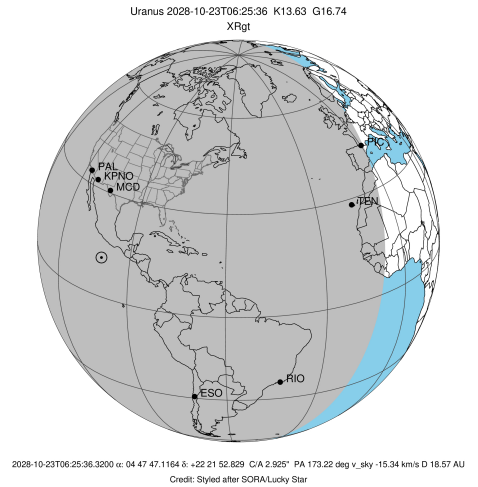


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEncode
PIC	Pic du Midi	42.9	0.1	+++++			OCT 23 05:50 - OCT 23 05:58	PnnRin
PAL	Palomar Mt (200")	33.4	243.1	+++++++		+++++++	OCT 23 06:01 - OCT 23 07:02	PnnRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++++		+++++++	OCT 23 06:00 - OCT 23 07:02	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++++		+++++++	OCT 23 05:59 - OCT 23 07:02	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++++		+++++++	OCT 23 05:49 - OCT 23 06:50	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5			+++++	OCT 23 06:54 - OCT 23 07:03	PnnRne
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++++		+++++++	OCT 23 05:46 - OCT 23 07:04	PnnRie
ESO	European Southern Obs	-29.3	289.3	+++++++		+++++++	OCT 23 05:49 - OCT 23 07:08	PnnRie
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



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2028-10-23T06:20:50.560
 Event type : XRgt
 : No Uranus occs
 : 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 : 3413037371411063552
 2Mass ID (if available) : 04474712+2221530
 ICRS Star Coord at Epoch: 04h 47m 47.11635s +22:21:52.82912s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 13.630
 G magnitude : 16.738
 RP magnitude : 15.815
 BP magnitude : 17.596
 DUPflag : 0
 Distance (au) : 18.567
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.34
 Sun-Target sep (deg) : 136.64
 Sun-Moon sep (deg) : 155.45
 B (ring opening deg) : 81.20
 PA of pole (deg) : -36.15
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.107
 C/A sky separation (km) : 41836.5
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

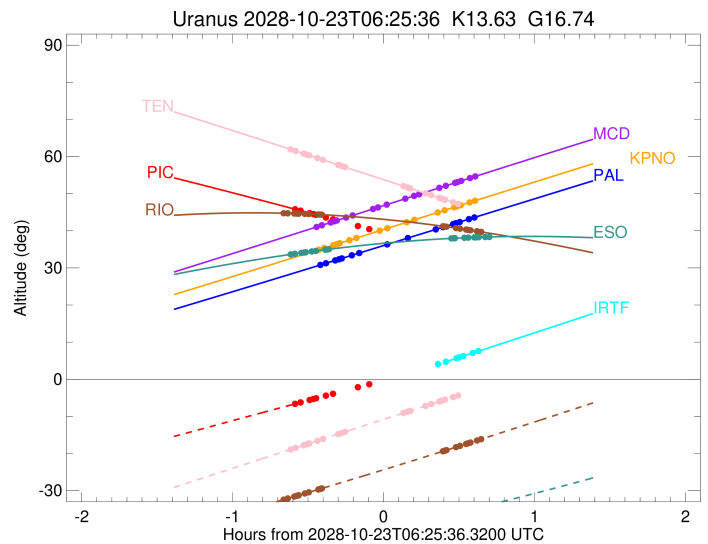
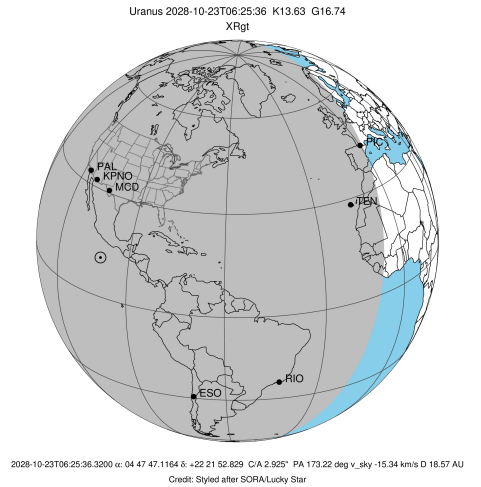


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-10-23T05:50:59.195		45.71	-6.53	50889.44	-8.80		
lambda	I	2028-10-23T05:52:40.126		45.41	-6.23	50026.71	-8.37		
delta	I	2028-10-23T05:56:16.346		44.76	-5.58	48300.35	-7.58		
gamma	I	2028-10-23T05:57:48.130		44.48	-5.30	47621.17	-7.22		
eta	I	2028-10-23T05:58:50.908		44.29	-5.11	47176.12	-6.96		
beta	I	2028-10-23T06:02:46.794		43.58	-4.41x	45653.74	-5.94		
alpha	I	2028-10-23T06:05:37.714		43.06	-3.89x	44706.56	-5.11		
4	I	2028-10-23T06:15:42.616		41.22	-2.09x	42558.75	-1.90		
5	I	2028-10-23T06:21:23.261		40.18	-1.08x	42267.22	-0.63		

No planet occultations

5	E	2028-10-23T06:21:49.856		40.10	-1.01x	42299.93	0.92		
4	E	2028-10-23T06:26:48.047		39.19	-0.13x	42548.59	1.90		
alpha	E	2028-10-23T06:36:55.226		37.33	1.65x	44689.51	5.10		
beta	E	2028-10-23T06:39:52.544		36.79	2.17x	45668.99	5.92		
eta	E	2028-10-23T06:43:46.498		36.07	2.85x	47176.12	6.94		
gamma	E	2028-10-23T06:44:49.924		35.87	3.03x	47624.55	7.20		
delta	E	2028-10-23T06:46:21.512		35.59	3.30x	48300.35	7.56		
lambda	E	2028-10-23T06:49:58.446		34.93	3.92x	50026.71	8.35		
epsilon	E	2028-10-23T06:52:31.549		34.46	4.36x	51343.74	8.76		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2028-10-23T06:30:43.490
 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 : 3413037371411063552
 2Mass ID (if available) : 04474712+2221530
 ICRS Star Coord at Epoch: 04h 47m 47.11635s +22:21:52.82912s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 13.630
 G magnitude : 16.738
 RP magnitude : 15.815
 BP magnitude : 17.596
 DUPflag : 0
 Distance (au) : 18.566
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.34
 Sun-Target sep (deg) : 136.64
 Sun-Moon sep (deg) : 156.58
 B (ring opening deg) : 81.20
 PA of pole (deg) : -36.15
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.121
 C/A sky separation (km) : 42022.8
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.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

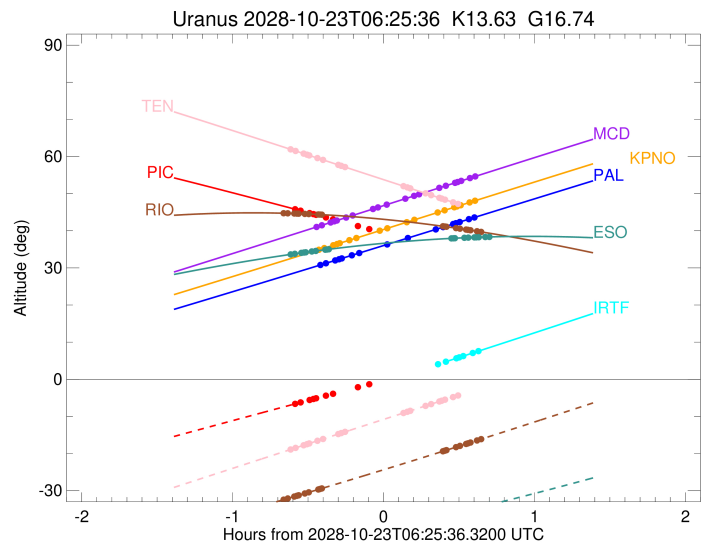
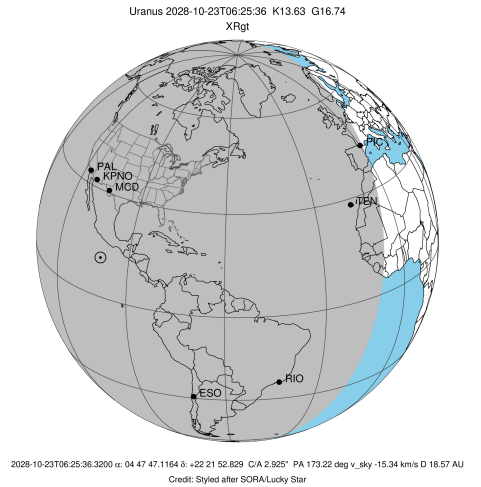


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-10-23T06:01:01.903		30.90	-60.06	50895.97	-8.66		
lambda	I	2028-10-23T06:02:45.310		31.25	-60.33	50026.71	-8.23		
delta	I	2028-10-23T06:06:25.584		32.02	-60.90	48300.35	-7.43		
gamma	I	2028-10-23T06:07:59.297		32.34	-61.14	47621.20	-7.06		
eta	I	2028-10-23T06:09:03.503		32.56	-61.30	47176.12	-6.80		
beta	I	2028-10-23T06:13:05.668		33.41	-61.90	45654.21	-5.76		
alpha	I	2028-10-23T06:16:03.042		34.02	-62.33	44705.70	-4.90		
4	I	2028-10-23T06:27:30.885		36.42	-63.89	42556.29	-1.24		

No planet occultations

4	E	2028-10-23T06:34:46.812		37.94	-64.79	42549.69	1.24		
alpha	E	2028-10-23T06:46:14.660		40.34	-66.05	44689.47	4.92		
beta	E	2028-10-23T06:49:17.358		40.98	-66.34	45669.07	5.78		
eta	E	2028-10-23T06:53:15.887		41.81	-66.70	47176.12	6.84		
gamma	E	2028-10-23T06:54:20.237		42.04	-66.79	47624.58	7.10		
delta	E	2028-10-23T06:55:52.962		42.36	-66.92	48300.35	7.47		
lambda	E	2028-10-23T06:59:31.901		43.13	-67.21	50026.71	8.28		
epsilon	E	2028-10-23T07:02:06.321		43.67	-67.39	51346.97	8.72		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2028-10-23T06:30:32.310
 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 : 3413037371411063552
 2Mass ID (if available) : 04474712+2221530
 ICRS Star Coord at Epoch: 04h 47m 47.11635s +22:21:52.82912s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 13.630
 G magnitude : 16.738
 RP magnitude : 15.815
 BP magnitude : 17.596
 DUPflag : 0
 Distance (au) : 18.566
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.34
 Sun-Target sep (deg) : 136.64
 Sun-Moon sep (deg) : 156.59
 B (ring opening deg) : 81.20
 PA of pole (deg) : -36.15
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.097
 C/A sky separation (km) : 41708.2
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.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

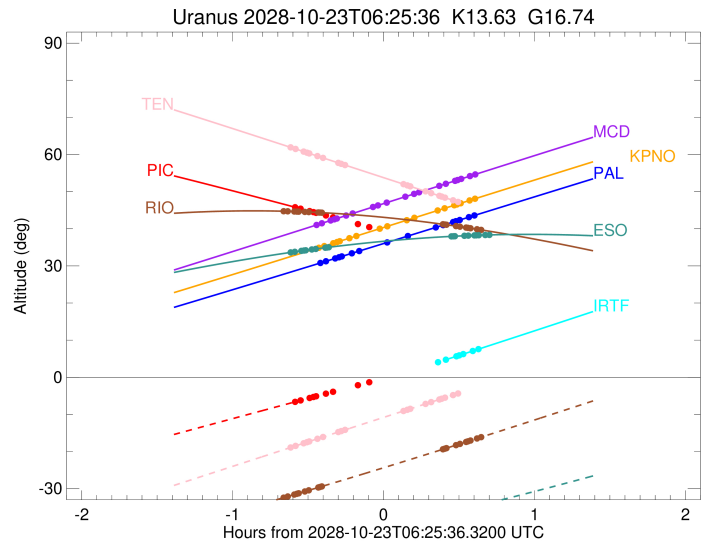
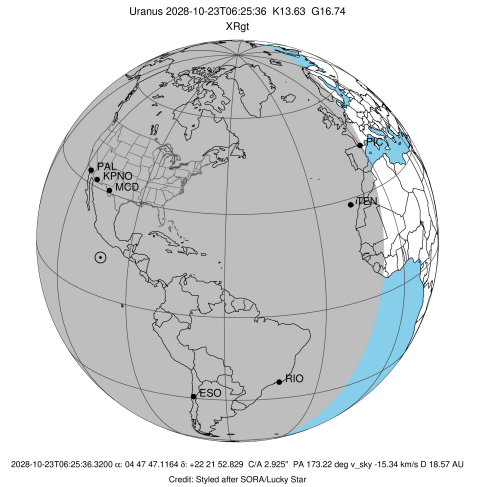


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-10-23T06:00:24.626		34.99	-64.12	50892.47	-8.82		
lambda	I	2028-10-23T06:02:05.593		35.35	-64.36	50026.71	-8.41		
delta	I	2028-10-23T06:05:40.714		36.11	-64.86	48300.35	-7.63		
gamma	I	2028-10-23T06:07:11.811		36.43	-65.07	47621.18	-7.28		
eta	I	2028-10-23T06:08:14.031		36.65	-65.21	47176.12	-7.03		
beta	I	2028-10-23T06:12:06.939		37.48	-65.72	45653.86	-6.03		
alpha	I	2028-10-23T06:14:54.572		38.07	-66.07	44706.39	-5.24		
4	I	2028-10-23T06:24:20.599		40.07	-67.16	42559.14	-2.27		
5	I	2028-10-23T06:27:54.937		40.83	-67.54	42193.43	-1.04		

No planet occultations

5	E	2028-10-23T06:33:56.812		42.12	-68.11	42184.71	1.05		
4	E	2028-10-23T06:37:33.982		42.89	-68.42	42547.10	2.27		
alpha	E	2028-10-23T06:47:00.072		44.90	-69.10	44689.10	5.25		
beta	E	2028-10-23T06:49:53.042		45.51	-69.26	45669.40	6.06		
eta	E	2028-10-23T06:53:42.363		46.33	-69.45	47176.12	7.06		
gamma	E	2028-10-23T06:54:44.740		46.55	-69.49	47624.66	7.32		
delta	E	2028-10-23T06:56:14.870		46.87	-69.55	48300.35	7.67		
lambda	E	2028-10-23T06:59:48.710		47.63	-69.67	50026.71	8.46		
epsilon	E	2028-10-23T07:02:20.604		48.17	-69.73	51350.80	8.88		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2028-10-23T06:30:07.870
 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 : 3413037371411063552
 2Mass ID (if available) : 04474712+2221530
 ICRS Star Coord at Epoch: 04h 47m 47.11635s +22:21:52.82912s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 13.630
 G magnitude : 16.738
 RP magnitude : 15.815
 BP magnitude : 17.596
 DUPflag : 0
 Distance (au) : 18.566
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.34
 Sun-Target sep (deg) : 136.64
 Sun-Moon sep (deg) : 156.57
 B (ring opening deg) : 81.20
 PA of pole (deg) : -36.15
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.069
 C/A sky separation (km) : 41324.5
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_itrff93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

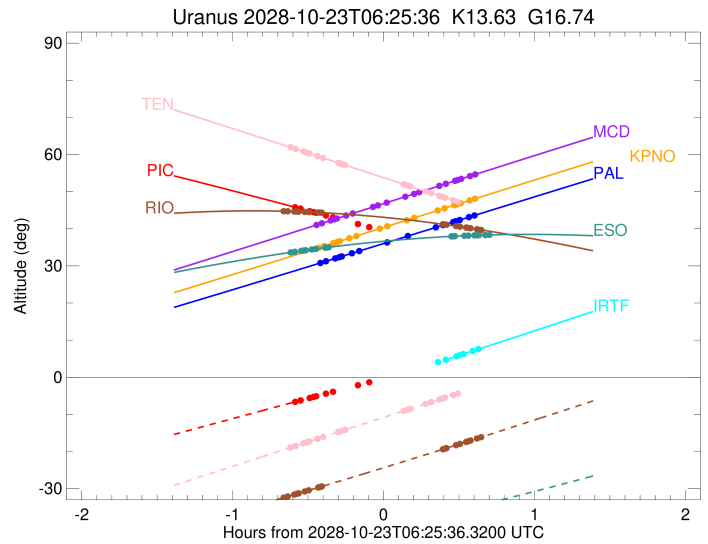
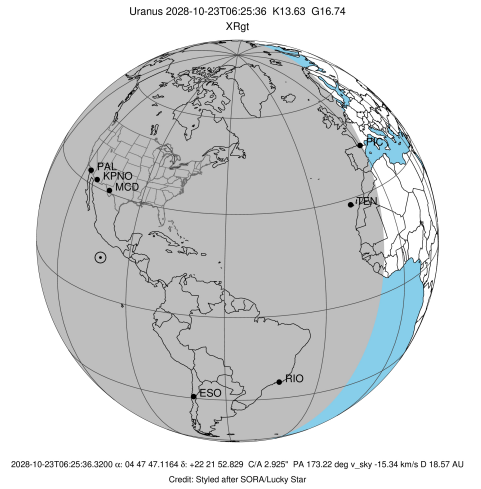


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-10-23T05:59:29.963		41.14	-68.86	50888.24	-9.02		
lambda	I	2028-10-23T06:01:08.097		41.49	-69.02	50026.71	-8.62		
delta	I	2028-10-23T06:04:37.324		42.24	-69.36	48300.35	-7.87		
gamma	I	2028-10-23T06:06:05.477		42.56	-69.50	47621.15	-7.53		
eta	I	2028-10-23T06:07:05.486		42.77	-69.59	47176.12	-7.30		
beta	I	2028-10-23T06:10:48.358		43.57	-69.90	45653.46	-6.36		
alpha	I	2028-10-23T06:13:25.954		44.14	-70.10	44707.19	-5.62		
4	I	2028-10-23T06:21:35.015		45.90	-70.61	42561.49	-3.09		
5	I	2028-10-23T06:23:44.863		46.37	-70.71	42199.30	-2.36		
6	I	2028-10-23T06:27:40.117		47.21	-70.88	41802.74	-1.01		

No planet occultations

6	E	2028-10-23T06:33:26.741		48.46	-71.04	41799.86	1.02		
5	E	2028-10-23T06:37:17.110		49.29	-71.09	42179.57	2.36		
4	E	2028-10-23T06:39:29.798		49.77	-71.11	42545.12	3.10		
alpha	E	2028-10-23T06:47:39.037		51.53	-71.03	44688.70	5.64		
beta	E	2028-10-23T06:50:22.002		52.12	-70.97	45669.78	6.38		
eta	E	2028-10-23T06:54:01.379		52.91	-70.85	47176.12	7.33		
gamma	E	2028-10-23T06:55:01.568		53.12	-70.81	47624.74	7.57		
delta	E	2028-10-23T06:56:28.794		53.44	-70.75	48300.35	7.91		
lambda	E	2028-10-23T06:59:56.841		54.18	-70.58	50026.71	8.67		
epsilon	E	2028-10-23T07:02:25.810		54.72	-70.43	51355.26	9.07		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2028-10-23T06:21:30.340
 Event type : XRgt
 : No Uranus occs
 : 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 : 3413037371411063552
 2Mass ID (if available) : 04474712+2221530
 ICRS Star Coord at Epoch: 04h 47m 47.11635s +22:21:52.82912s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 13.630
 G magnitude : 16.738
 RP magnitude : 15.815
 BP magnitude : 17.596
 DUPflag : 0
 Distance (au) : 18.567
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.34
 Sun-Target sep (deg) : 136.64
 Sun-Moon sep (deg) : 155.60
 B (ring opening deg) : 81.20
 PA of pole (deg) : -36.15
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.971
 C/A sky separation (km) : 40013.2
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



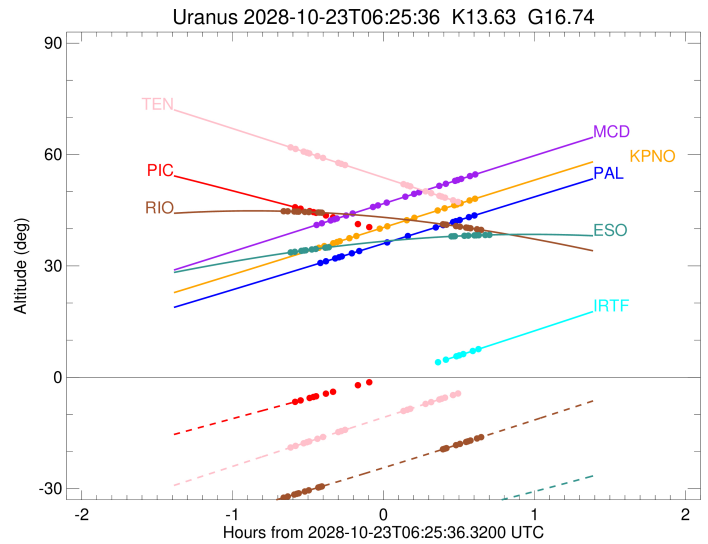
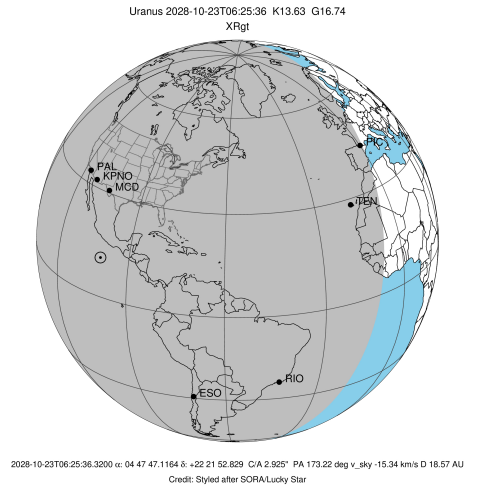
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-10-23T05:49:11.482		61.82	-18.81	50871.40	-9.65		
lambda	I	2028-10-23T05:50:41.025		61.50	-18.48	50026.71	-9.29		
delta	I	2028-10-23T05:53:53.535		60.79	-17.78	48300.35	-8.63		
gamma	I	2028-10-23T05:55:13.571		60.49	-17.48	47621.07	-8.34		
eta	I	2028-10-23T05:56:07.590		60.30	-17.28	47176.12	-8.13		
beta	I	2028-10-23T05:59:24.469		59.57	-16.56	45652.03	-7.34		
alpha	I	2028-10-23T06:01:37.931		59.08	-16.07	44710.02	-6.74		
4	I	2028-10-23T06:07:43.455		57.73	-14.74	42567.45	-4.94		
5	I	2028-10-23T06:08:57.227		57.46	-14.47	42210.75	-4.54		
6	I	2028-10-23T06:10:31.140		57.12	-14.12	41808.50	-4.04		

No planet occultations

6	E	2028-10-23T06:33:18.451		52.08	-9.14	41796.76	4.04		
5	E	2028-10-23T06:34:47.844		51.75	-8.82	42172.59	4.54		
4	E	2028-10-23T06:36:04.780		51.47	-8.54	42541.30	4.94		
alpha	E	2028-10-23T06:42:12.465		50.11	-7.20	44687.76	6.72		
beta	E	2028-10-23T06:44:32.209		49.60	-6.70	45670.73	7.32		
eta	E	2028-10-23T06:47:47.079		48.88	-5.99	47176.12	8.11		
gamma	E	2028-10-23T06:48:41.715		48.68	-5.79	47624.95	8.32		
delta	E	2028-10-23T06:50:01.514		48.39	-5.51	48300.35	8.61		
lambda	E	2028-10-23T06:53:14.624		47.67	-4.81x	50026.71	9.26		
epsilon	E	2028-10-23T06:55:35.851		47.16	-4.30x	51365.59	9.61		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2028-10-23T06:32:13.150
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        : 3413037371411063552
2Mass ID (if available) : 04474712+2221530
ICRS Star Coord at Epoch: 04h 47m 47.11635s +22:21:52.82912s
RUWE (>1.4 is poor)  : 1.01
K magnitude           : 13.630
G magnitude           : 16.738
RP magnitude          : 15.815
BP magnitude          : 17.596
DUPflag              : 0
Distance (au)         : 18.566
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -15.34
Sun-Target sep (deg)  : 136.64
Sun-Moon sep (deg)    : 156.53
B (ring opening deg)  : 81.20
PA of pole (deg)      : -36.15
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.140
C/A sky separation (km) : 42282.8
NAIF SPICE kernels    : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall1.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall1.bsp
ural61.bsp
vgr2.ural61.bsp
peph.ural60.bsp
earthstns_itr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```

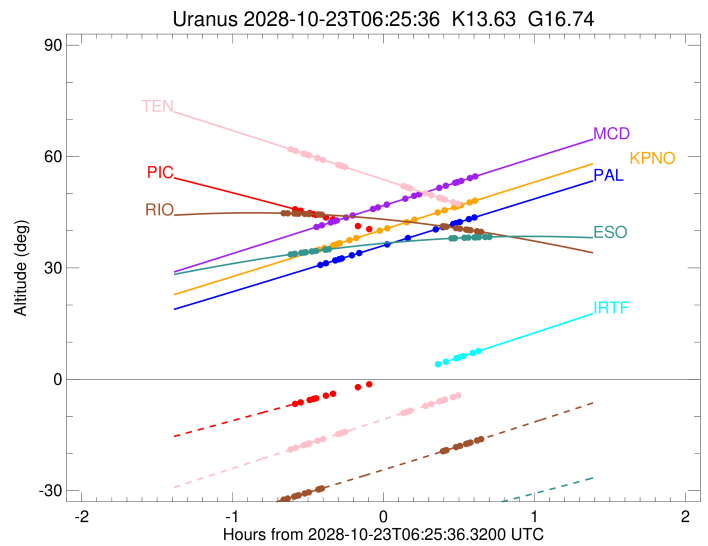
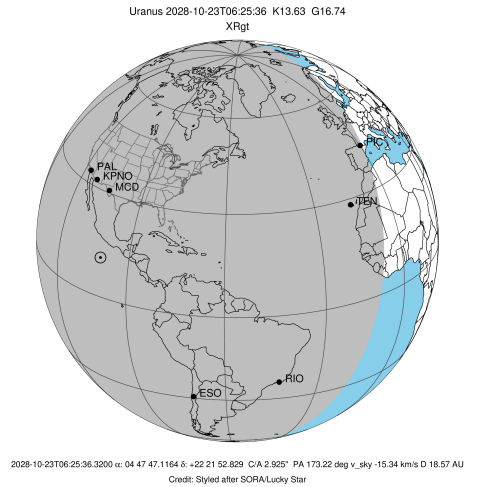


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-10-23T06:02:25.437	-5.60x	-31.05	50898.98	-8.38			
lambda	I	2028-10-23T06:04:12.711	-5.22x	-31.47	50026.71	-7.95			
delta	I	2028-10-23T06:08:01.201	-4.41x	-32.36	48300.35	-7.14			
gamma	I	2028-10-23T06:09:38.816	-4.07x	-32.75	47621.22	-6.77			
eta	I	2028-10-23T06:10:45.883	-3.83x	-33.01	47176.12	-6.50			
beta	I	2028-10-23T06:15:00.653	-2.92x	-34.01	45654.52	-5.43			
alpha	I	2028-10-23T06:18:10.482	-2.24x	-34.75	44705.09	-4.54			

No planet occultations

alpha	E	2028-10-23T06:47:07.657	4.02x	-41.57	44689.79	4.56			
beta	E	2028-10-23T06:50:22.720	4.73x	-42.34	45668.79	5.46			
eta	E	2028-10-23T06:54:33.486	5.64	-43.32	47176.12	6.54			
gamma	E	2028-10-23T06:55:40.610	5.89	-43.58	47624.53	6.81			
delta	E	2028-10-23T06:57:17.078	6.24	-43.96	48300.35	7.19			
lambda	E	2028-10-23T07:01:03.846	7.07	-44.85	50026.71	8.02			
epsilon	E	2028-10-23T07:03:42.826	7.66	-45.47	51344.10	8.46			

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2028-10-23T06:24:47.280
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Observer code : RIO
 Location : Rio de Janeiro
 Latitude (deg) : -22.89506
 E. Longitude (deg) : 316.77708
 Altitude (km) : 0.033
 Gaia source ID : 3413037371411063552
 2Mass ID (if available) : 04474712+2221530
 ICRS Star Coord at Epoch: 04h 47m 47.11635s +22:21:52.82912s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 13.630
 G magnitude : 16.738
 RP magnitude : 15.815
 BP magnitude : 17.596
 DUPflag : 0
 Distance (au) : 18.567
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.34
 Sun-Target sep (deg) : 136.64
 Sun-Moon sep (deg) : 155.96
 B (ring opening deg) : 81.20
 PA of pole (deg) : -36.15
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.579
 C/A sky separation (km) : 34733.4
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.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

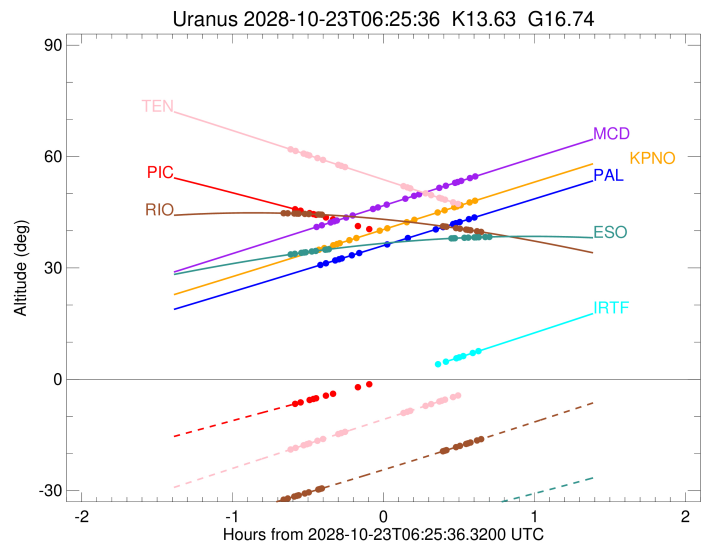
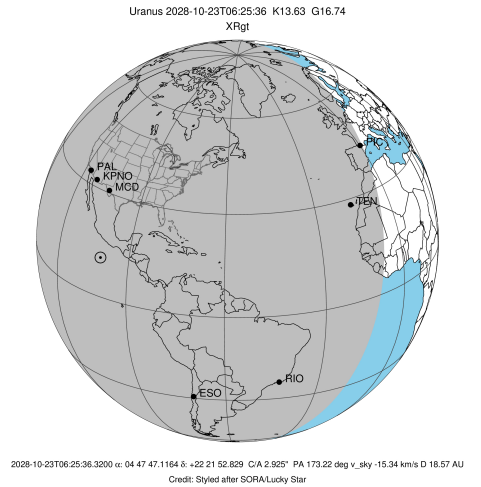


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-10-23T05:46:23.367		44.72	-32.34	50830.22	-11.50		
lambda	I	2028-10-23T05:47:34.068		44.70	-32.10	50026.71	-11.28		
delta	I	2028-10-23T05:50:09.856		44.65	-31.59	48300.35	-10.88		
gamma	I	2028-10-23T05:51:12.825		44.63	-31.38	47620.96	-10.70		
eta	I	2028-10-23T05:51:54.631		44.61	-31.25	47176.12	-10.58		
beta	I	2028-10-23T05:54:22.100		44.55	-30.76	45648.57	-10.13		
alpha	I	2028-10-23T05:55:55.316		44.51	-30.45	44717.43	-9.81		
4	I	2028-10-23T05:59:43.181		44.39	-29.69	42579.95	-8.96		
5	I	2028-10-23T06:00:21.744		44.36	-29.56	42233.74	-8.79		
6	I	2028-10-23T06:01:09.154		44.34	-29.40	41819.42	-8.60		

No planet occultations

6	E	2028-10-23T06:49:07.216		41.23	-19.42	41794.75	8.60		
5	E	2028-10-23T06:49:49.907		41.16	-19.27	42160.49	8.79		
4	E	2028-10-23T06:50:31.521		41.10	-19.12	42532.91	8.96		
alpha	E	2028-10-23T06:54:21.010		40.73	-18.30	44685.31	9.80		
beta	E	2028-10-23T06:56:00.173		40.57	-17.95	45674.26	10.13		
eta	E	2028-10-23T06:58:25.199		40.33	-17.43	47176.12	10.58		
gamma	E	2028-10-23T06:59:07.486		40.25	-17.28	47625.94	10.70		
delta	E	2028-10-23T07:00:10.015		40.15	-17.05	48300.35	10.87		
lambda	E	2028-10-23T07:02:45.868		39.88	-16.49	50026.71	11.27		
epsilon	E	2028-10-23T07:04:47.648		39.66	-16.05	51417.43	11.50		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2028-10-23T06:27:52.050
 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 : 3413037371411063552
 2Mass ID (if available) : 04474712+2221530
 ICRS Star Coord at Epoch: 04h 47m 47.11635s +22:21:52.82912s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 13.630
 G magnitude : 16.738
 RP magnitude : 15.815
 BP magnitude : 17.596
 DUPflag : 0
 Distance (au) : 18.566
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -15.34
 Sun-Target sep (deg) : 136.64
 Sun-Moon sep (deg) : 156.30
 B (ring opening deg) : 81.20
 PA of pole (deg) : -36.15
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.568
 C/A sky separation (km) : 34579.3
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2028-10-23T05:49:11.513		33.68	-44.75	50830.22	-11.50		
lambda	I	2028-10-23T05:50:22.210		33.80	-44.63	50026.71	-11.28		
delta	I	2028-10-23T05:52:57.903		34.04	-44.35	48300.35	-10.89		
gamma	I	2028-10-23T05:54:00.798		34.14	-44.23	47620.96	-10.72		
eta	I	2028-10-23T05:54:42.540		34.21	-44.16	47176.12	-10.60		
beta	I	2028-10-23T05:57:09.697		34.43	-43.88	45648.56	-10.16		
alpha	I	2028-10-23T05:58:42.623		34.57	-43.70	44717.48	-9.84		
4	I	2028-10-23T06:02:29.438		34.90	-43.26	42580.05	-9.01		
5	I	2028-10-23T06:03:07.756		34.96	-43.18	42233.92	-8.85		
6	I	2028-10-23T06:03:54.853		35.02	-43.09	41819.52	-8.67		

No planet occultations

6	E	2028-10-23T06:52:29.310		37.95	-36.28	41794.76	8.69		
5	E	2028-10-23T06:53:11.551		37.97	-36.17	42160.16	8.87		
4	E	2028-10-23T06:53:52.811		38.00	-36.07	42532.65	9.03		
alpha	E	2028-10-23T06:57:40.580		38.11	-35.46	44685.25	9.87		
beta	E	2028-10-23T06:59:19.144		38.16	-35.20	45674.41	10.19		
eta	E	2028-10-23T07:01:43.346		38.22	-34.81	47176.12	10.63		
gamma	E	2028-10-23T07:02:25.421		38.24	-34.69	47625.99	10.75		
delta	E	2028-10-23T07:03:27.638		38.26	-34.52	48300.35	10.92		
lambda	E	2028-10-23T07:06:02.787		38.32	-34.10	50026.71	11.32		
epsilon	E	2028-10-23T07:08:04.299		38.35	-33.76	51420.12	11.54		