

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-04-22T23:28:30.300  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3427500076781265152  
 2Mass ID (if available) : 05515017+2338283

ICRS Star Coord at Epoch: 05h 51m 50.16677s +23:38:28.04406s

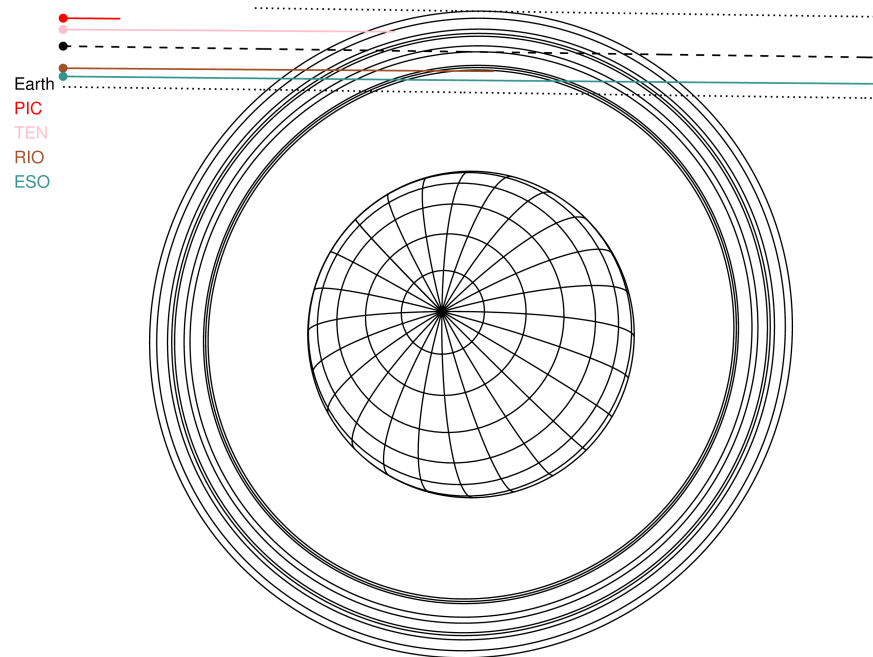
RUWE (>1.4 is poor) : 0.97  
 K magnitude : 12.649  
 G magnitude : 14.438  
 RP magnitude : 13.830  
 BP magnitude : 14.872  
 DUPflag : 0  
 Distance (au) : 19.549  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 23.24  
 Sun-Target sep (deg) : 55.45  
 Sun-Moon sep (deg) : 138.88  
 B (ring opening deg) : 76.88  
 PA of pole (deg) : 51.76

#	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



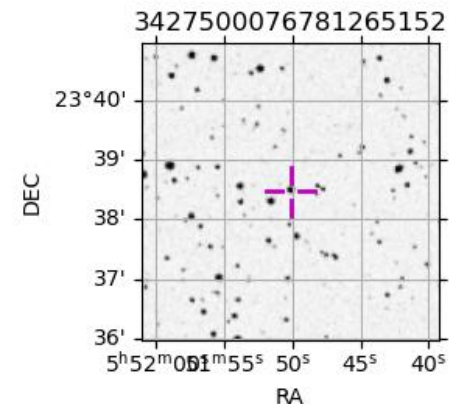
2033-04-22T23:28:30.3000 ex: 05 51 50.1668 s: +23 38 28.044 C/A 3.128° PA 179.20 deg v\_sky +23.24 km/s D 19.55 AU  
 Credit: Styled after SORA/Lucky Star

Uranus 2033-04-22T23:28:30 K12.65 G14.44 XRgt



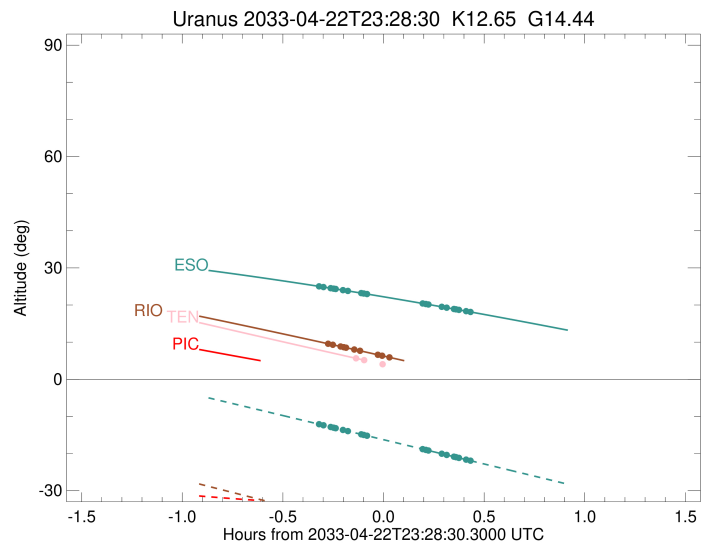
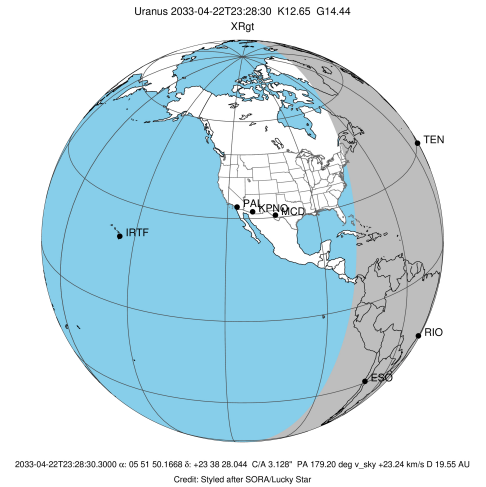
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4					PnnRnn
MCD	McDonald Obs. 2.7m	30.7	256.0					PnnRnn
TEN	Teide Obs./Tenerife	28.3	343.5	++			APR 22 23:21 - APR 22 23:22	PnnRin
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++			APR 22 23:12 - APR 22 23:30	PnnRin
ESO	European Southern Obs	-29.3	289.3	+++++		+++++	APR 22 23:09 - APR 22 23:54	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



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target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-04-22T23:32:16.070
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      : 3427500076781265152
2Mass ID (if available) : 05515017+2338283
ICRS Star Coord at Epoch: 05h 51m 50.16677s +23:38:28.04406s
RUWE (>1.4 is poor) : 0.97
K magnitude         : 12.649
G magnitude         : 14.438
RP magnitude        : 13.830
BP magnitude        : 14.872
DUPflag            : 0
Distance (au)       : 19.549
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : 23.24
Sun-Target sep (deg) : 55.45
Sun-Moon sep (deg)  : 138.34
B (ring opening deg) : 76.88
PA of pole (deg)    : 51.76
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.338
C/A sky separation (km) : 47330.2
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
  
```

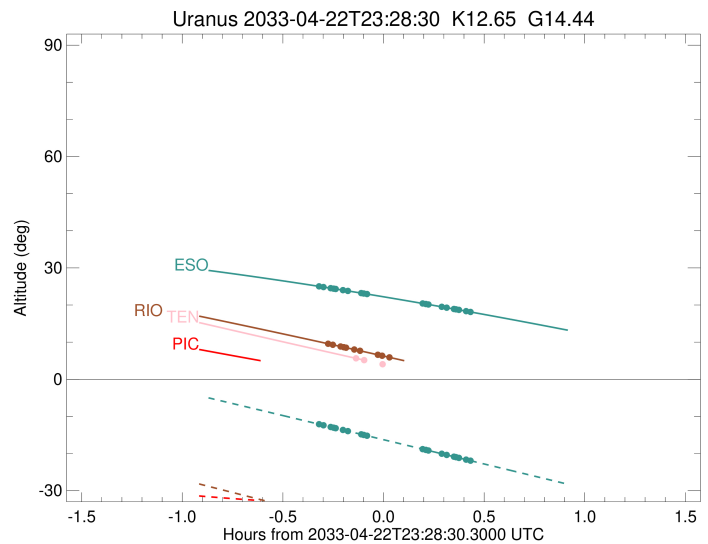
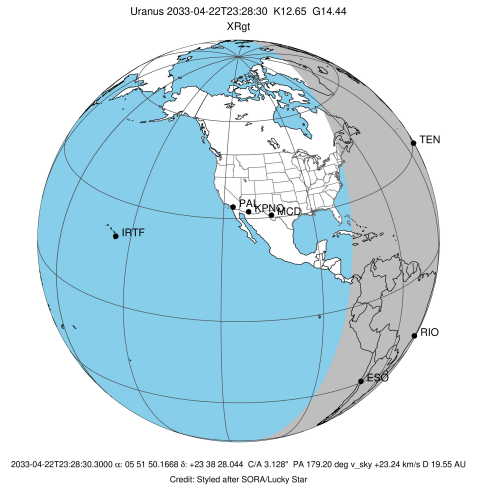


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-04-22T23:21:05.769		5.49	-42.25	50780.27	-7.90		
lambda	I	2033-04-22T23:22:46.577		5.15	-42.46	50026.71	-6.97		
delta	I	2033-04-22T23:28:18.898		4.03x	-43.14	48300.35	-3.36		

No planet occultations

delta	E	2033-04-22T23:37:56.646		2.11x	-44.25	48300.35	3.36		
lambda	E	2033-04-22T23:43:28.524		1.01x	-44.85	50026.71	6.98		
epsilon	E	2033-04-22T23:45:06.141		0.69x	-45.01	50756.38	7.92		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-04-22T23:32:17.970  
 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 : 3427500076781265152  
 2Mass ID (if available) : 05515017+2338283  
 ICRS Star Coord at Epoch: 05h 51m 50.16677s +23:38:28.04406s  
 RUWE (>1.4 is poor) : 0.97  
 K magnitude : 12.649  
 G magnitude : 14.438  
 RP magnitude : 13.830  
 BP magnitude : 14.872  
 DUPflag : 0  
 Distance (au) : 19.549  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 23.24  
 Sun-Target sep (deg) : 55.45  
 Sun-Moon sep (deg) : 138.28  
 B (ring opening deg) : 76.88  
 PA of pole (deg) : 51.76  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.909  
 C/A sky separation (km) : 41246.8  
 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\_itrff93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

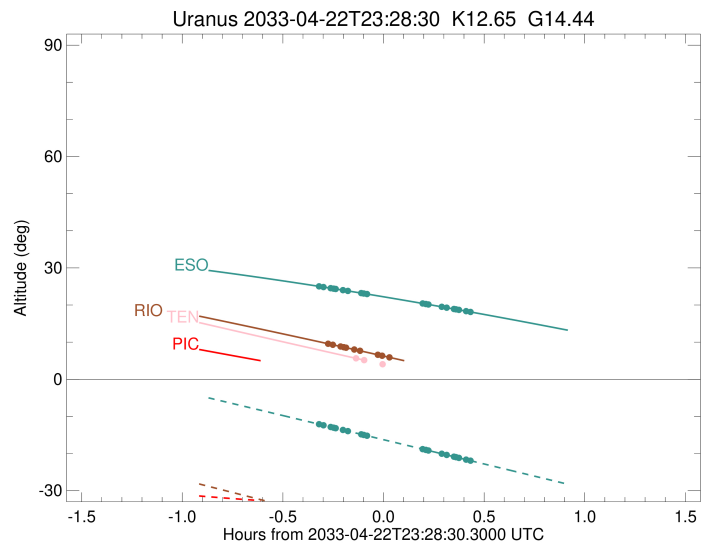
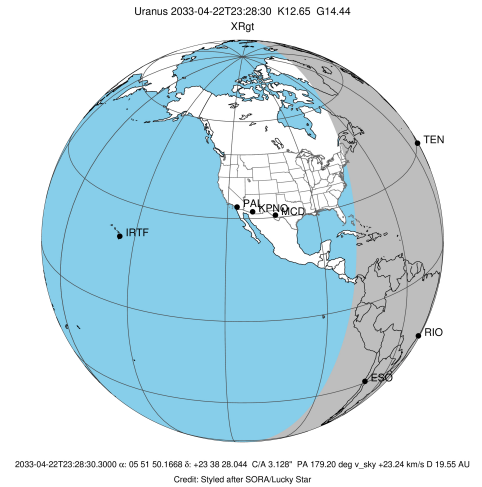


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-04-22T23:12:23.707		9.49	-37.16	50837.28	-13.34		
lambda	I	2033-04-22T23:13:25.044		9.29	-37.40	50026.71	-12.98		
delta	I	2033-04-22T23:15:43.856		8.83	-37.93	48300.35	-11.87		
gamma	I	2033-04-22T23:16:41.984		8.63	-38.15	47624.98	-11.36		
eta	I	2033-04-22T23:17:22.111		8.50	-38.31	47176.12	-11.00		
beta	I	2033-04-22T23:19:51.039		8.00	-38.88	45642.17	-9.58		
alpha	I	2033-04-22T23:21:36.503		7.65	-39.29	44686.36	-8.49		
4	I	2033-04-22T23:27:03.318		6.55	-40.54	42525.99	-4.68		
5	I	2033-04-22T23:28:00.706		6.36	-40.76	42267.89	-3.99		
6	I	2033-04-22T23:30:13.771		5.91	-41.27	41855.86	-2.21		

No planet occultations

6	E	2033-04-22T23:35:48.830		4.78x	-42.56	41848.36	2.21		
5	E	2033-04-22T23:38:11.120		4.29x	-43.10	42290.52	4.00		
4	E	2033-04-22T23:39:04.824		4.11x	-43.31	42530.53	4.69		
alpha	E	2033-04-22T23:44:31.379		2.99x	-44.56	44702.02	8.51		
beta	E	2033-04-22T23:46:15.125		2.64x	-44.96	45643.58	9.60		
eta	E	2033-04-22T23:48:43.482		2.13x	-45.53	47176.12	11.04		
gamma	E	2033-04-22T23:49:23.164		1.99x	-45.68	47621.22	11.40		
delta	E	2033-04-22T23:50:21.448		1.79x	-45.90	48300.35	11.91		
lambda	E	2033-04-22T23:52:39.803		1.31x	-46.43	50026.71	13.03		
epsilon	E	2033-04-22T23:53:37.900		1.11x	-46.65	50796.56	13.39		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2033-04-22T23:31:09.220  
 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 : 3427500076781265152  
 2Mass ID (if available) : 05515017+2338283  
 ICRS Star Coord at Epoch: 05h 51m 50.16677s +23:38:28.04406s  
 RUWE (>1.4 is poor) : 0.97  
 K magnitude : 12.649  
 G magnitude : 14.438  
 RP magnitude : 13.830  
 BP magnitude : 14.872  
 DUPflag : 0  
 Distance (au) : 19.549  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : 23.24  
 Sun-Target sep (deg) : 55.45  
 Sun-Moon sep (deg) : 138.62  
 B (ring opening deg) : 76.88  
 PA of pole (deg) : 51.76  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.807  
 C/A sky separation (km) : 39801.0  
 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	2033-04-22T23:09:39.418		24.98	-12.19	50849.63	-14.17		
lambda	I	2033-04-22T23:10:37.884		24.84	-12.40	50026.71	-13.87		
delta	I	2033-04-22T23:12:46.662		24.53	-12.86	48300.35	-12.92		
gamma	I	2033-04-22T23:13:39.769		24.41	-13.05	47625.28	-12.50		
eta	I	2033-04-22T23:14:16.141		24.32	-13.18	47176.12	-12.20		
beta	I	2033-04-22T23:16:28.069		24.00	-13.66	45642.68	-11.03		
alpha	I	2033-04-22T23:17:57.992		23.78	-13.99	44685.61	-10.18		
4	I	2033-04-22T23:22:00.893		23.19	-14.87	42526.06	-7.59		
5	I	2033-04-22T23:22:35.721		23.10	-14.99	42257.20	-7.23		
6	I	2033-04-22T23:23:33.260		22.96	-15.20	41862.59	-6.48		

No planet occultations

6	E	2033-04-22T23:40:08.899		20.42	-18.81	41840.44	6.49		
5	E	2033-04-22T23:41:15.732		20.25	-19.06	42298.38	7.24		
4	E	2033-04-22T23:41:46.846		20.17	-19.17	42533.53	7.60		
alpha	E	2033-04-22T23:45:49.630		19.53	-20.05	44704.57	10.20		
beta	E	2033-04-22T23:47:17.874		19.29	-20.37	45644.36	11.06		
eta	E	2033-04-22T23:49:29.320		18.94	-20.85	47176.12	12.23		
gamma	E	2033-04-22T23:50:05.274		18.84	-20.98	47621.13	12.53		
delta	E	2033-04-22T23:50:58.581		18.70	-21.17	48300.35	12.95		
lambda	E	2033-04-22T23:53:07.013		18.35	-21.64	50026.71	13.91		
epsilon	E	2033-04-22T23:54:02.342		18.20	-21.84	50807.16	14.22		