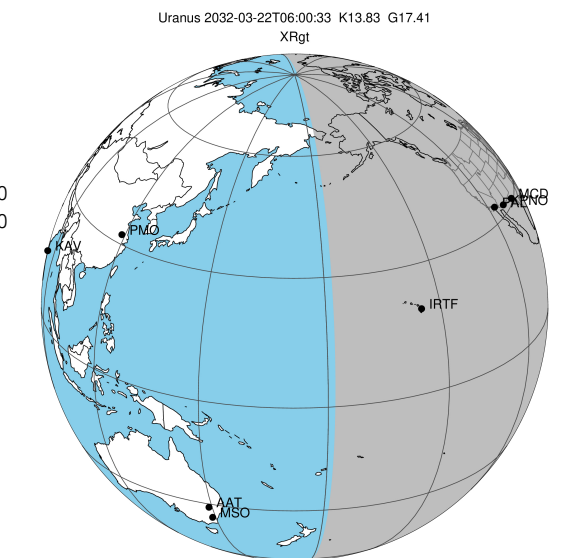


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-03-22T06:00:33.130
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3416227574334830848
 2Mass ID (if available) : 05291482+2324306

ICRS Star Coord at Epoch: 05h 29m 14.82368s +23:24:30.28247s

RUWE (>1.4 is poor) : 0.98
 K magnitude : 13.833
 G magnitude : 17.412
 RP magnitude : 16.355
 BP magnitude : 18.563
 DUPflag : 0
 Distance (au) : 19.196
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 10.89
 Sun-Target sep (deg) : 81.22
 Sun-Moon sep (deg) : 46.03
 B (ring opening deg) : 80.51
 PA of pole (deg) : 30.69

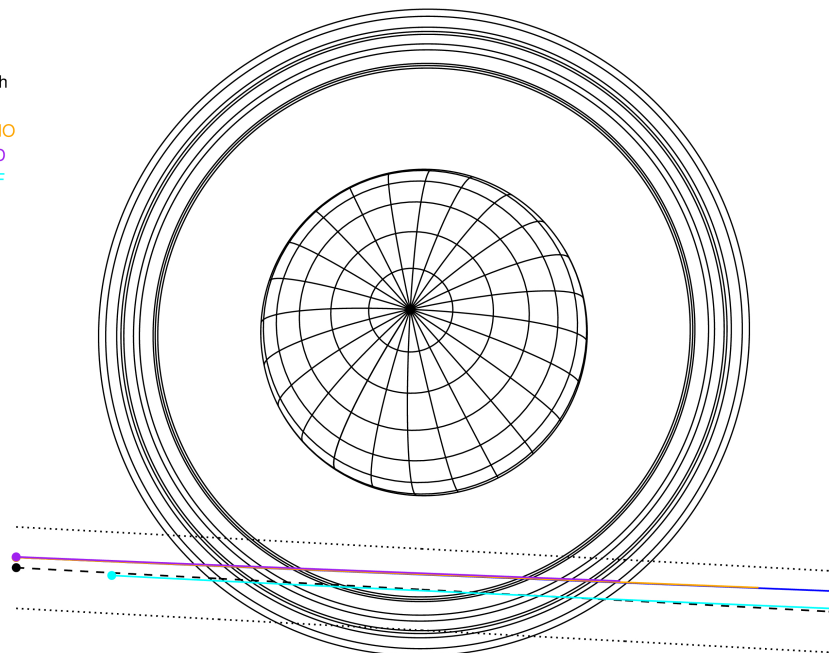
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2032-03-22T06:00:33.1300 ex: 05 29 14.8237 8: +23 24 30.282 C/A 2.883° PA 356.91 deg v_sky +10.89 km/s D 19.20 AU
 Credit: Styled after SORA/Lucky Star

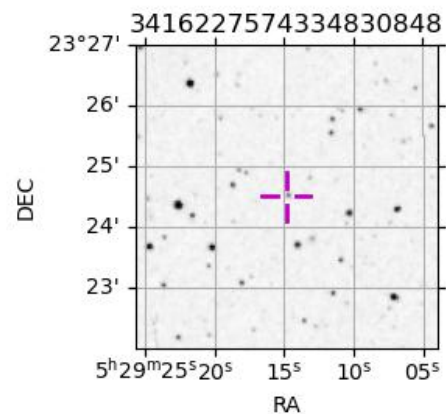
Uranus 2032-03-22T06:00:33 K13.83 G17.41 XRgt

Earth
 PAL
 KPNO
 MCD
 IRTF

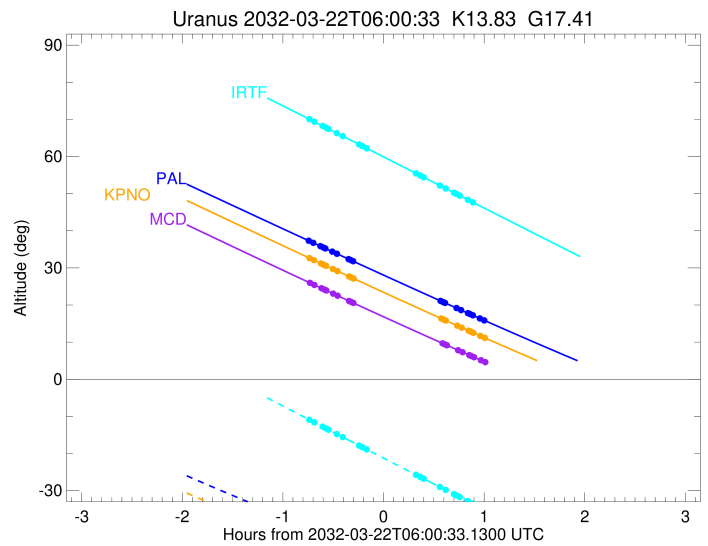
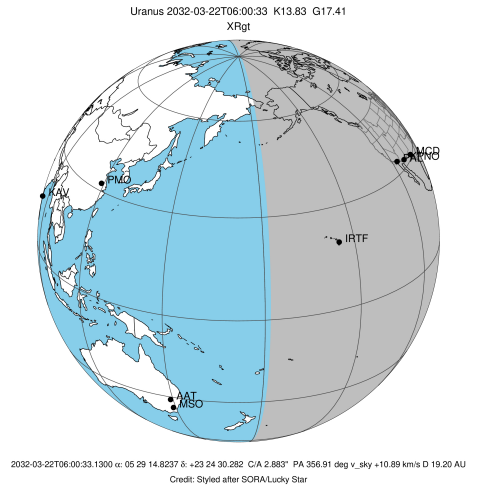


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+++++		+++++	MAR 22 05:16 - MAR 22 06:59	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	MAR 22 05:17 - MAR 22 07:00	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	MAR 22 05:17 - MAR 22 06:58	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++		+++++	MAR 22 05:17 - MAR 22 06:53	PnnRie
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8					PnnRnn
ESO	European Southern Obs	-29.3	289.3					PnnRnn
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 : 2032-03-22T06:09:18.630
 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 : 3416227574334830848
 2Mass ID (if available) : 05291482+2324306
 ICRS Star Coord at Epoch: 05h 29m 14.82368s +23:24:30.28247s
 RUWE (>1.4 is poor) : 0.98
 K magnitude : 13.833
 G magnitude : 17.412
 RP magnitude : 16.355
 BP magnitude : 18.563
 DUPflag : 0
 Distance (au) : 19.196
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 10.89
 Sun-Target sep (deg) : 81.22
 Sun-Moon sep (deg) : 45.86
 B (ring opening deg) : 80.51
 PA of pole (deg) : 30.69
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.722
 C/A sky separation (km) : 37903.2
 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



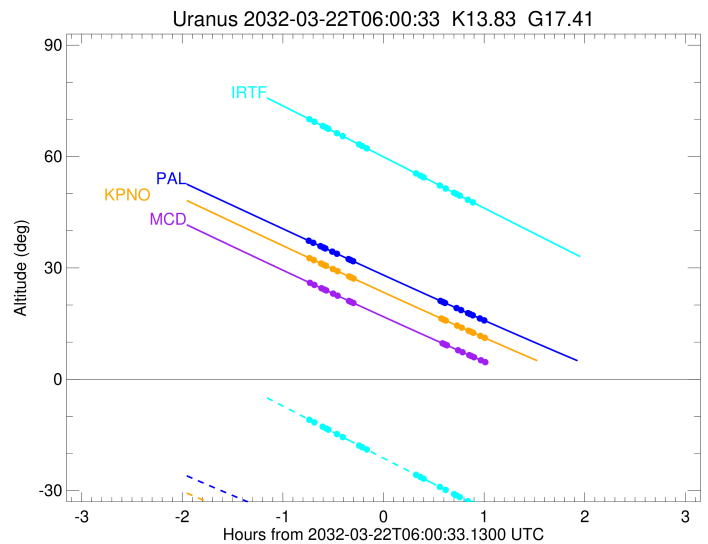
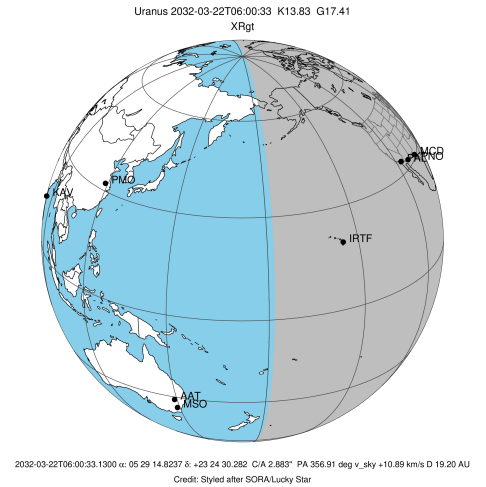
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-03-22T05:16:48.350		37.14	-39.71	50815.15	-7.00		
lambda	I	2032-03-22T05:18:41.523		36.75	-40.03	50026.71	-6.89		
delta	I	2032-03-22T05:22:58.555		35.85	-40.76	48300.35	-6.53		
gamma	I	2032-03-22T05:24:42.169		35.49	-41.05	47631.41	-6.38		
eta	I	2032-03-22T05:25:54.195		35.24	-41.26	47176.12	-6.26		
beta	I	2032-03-22T05:30:01.919		34.38	-41.94	45674.58	-5.85		
alpha	I	2032-03-22T05:32:48.375		33.81	-42.40	44726.41	-5.54		
4	I	2032-03-22T05:39:48.245		32.35	-43.53	42571.70	-4.71		
5	I	2032-03-22T05:41:17.327		32.05	-43.77	42156.43	-4.51		
6	I	2032-03-22T05:42:32.310		31.79	-43.96	41827.70	-4.32		

No planet occultations

6	E	2032-03-22T06:34:23.044		21.15	-51.10	41800.32	4.36		
5	E	2032-03-22T06:35:51.193		20.85	-51.26	42196.12	4.55		
4	E	2032-03-22T06:37:17.662		20.56	-51.42	42607.19	4.76		
alpha	E	2032-03-22T06:43:59.407		19.20	-52.14	44693.06	5.62		
beta	E	2032-03-22T06:46:45.734		18.65	-52.42	45652.96	5.93		
eta	E	2032-03-22T06:50:53.489		17.81	-52.82	47176.12	6.36		
gamma	E	2032-03-22T06:52:03.997		17.58	-52.93	47629.03	6.48		
delta	E	2032-03-22T06:53:46.271		17.24	-53.08	48300.35	6.65		
lambda	E	2032-03-22T06:57:58.786		16.39	-53.45	50026.71	7.02		
epsilon	E	2032-03-22T06:59:57.936		16.00	-53.62	50873.26	7.14		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2032-03-22T06:09:40.040
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       : 3416227574334830848
2Mass ID (if available) : 05291482+2324306
ICRS Star Coord at Epoch: 05h 29m 14.82368s +23:24:30.28247s
RUWE (>1.4 is poor) : 0.98
K magnitude           : 13.833
G magnitude           : 17.412
RP magnitude          : 16.355
BP magnitude          : 18.563
DUPflag              : 0
Distance (au)        : 19.196
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : 10.89
Sun-Target sep (deg) : 81.22
Sun-Moon sep (deg)   : 45.80
B (ring opening deg) : 80.51
PA of pole (deg)     : 30.69
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation ("): 2.719
C/A sky separation (km): 37848.0
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall11.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
    
```

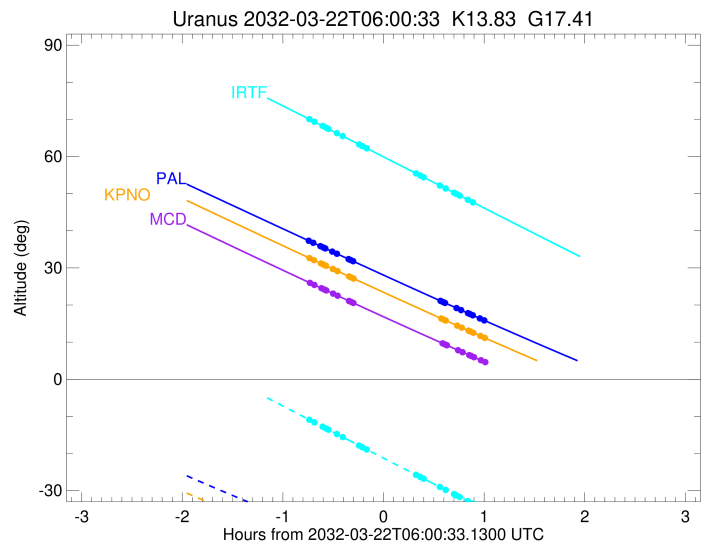
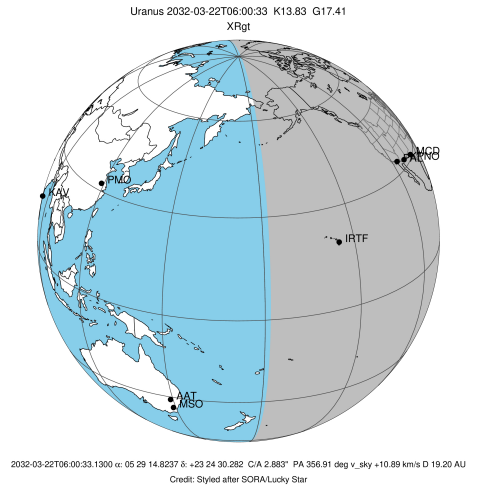


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-03-22T05:17:13.740		32.47	-44.17	50815.35	-7.04		
lambda	I	2032-03-22T05:19:06.389		32.07	-44.48	50026.71	-6.93		
delta	I	2032-03-22T05:23:22.095		31.18	-45.18	48300.35	-6.57		
gamma	I	2032-03-22T05:25:05.141		30.82	-45.45	47631.41	-6.41		
eta	I	2032-03-22T05:26:16.759		30.57	-45.64	47176.12	-6.30		
beta	I	2032-03-22T05:30:22.979		29.71	-46.29	45674.60	-5.89		
alpha	I	2032-03-22T05:33:08.319		29.13	-46.72	44726.46	-5.58		
4	I	2032-03-22T05:40:04.889		27.68	-47.78	42571.60	-4.75		
5	I	2032-03-22T05:41:33.122		27.37	-48.00	42156.39	-4.55		
6	I	2032-03-22T05:42:47.314		27.12	-48.18	41827.80	-4.37		

No planet occultations

6	E	2032-03-22T06:34:51.046		16.40	-54.53	41800.24	4.41		
5	E	2032-03-22T06:36:18.340		16.11	-54.67	42196.38	4.60		
4	E	2032-03-22T06:37:43.934		15.82	-54.79	42607.29	4.80		
alpha	E	2032-03-22T06:44:22.303		14.48	-55.35	44693.00	5.66		
beta	E	2032-03-22T06:47:07.447		13.92	-55.56	45652.91	5.97		
eta	E	2032-03-22T06:51:13.590		13.10	-55.85	47176.12	6.40		
gamma	E	2032-03-22T06:52:23.662		12.86	-55.93	47629.02	6.52		
delta	E	2032-03-22T06:54:05.324		12.52	-56.04	48300.35	6.68		
lambda	E	2032-03-22T06:58:16.398		11.69	-56.30	50026.71	7.06		
epsilon	E	2032-03-22T07:00:14.991		11.29	-56.41	50873.91	7.18		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-03-22T06:09:58.690
 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 : 3416227574334830848
 2Mass ID (if available) : 05291482+2324306
 ICRS Star Coord at Epoch: 05h 29m 14.82368s +23:24:30.28247s
 RUWE (>1.4 is poor) : 0.98
 K magnitude : 13.833
 G magnitude : 17.412
 RP magnitude : 16.355
 BP magnitude : 18.563
 DUPflag : 0
 Distance (au) : 19.196
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 10.89
 Sun-Target sep (deg) : 81.22
 Sun-Moon sep (deg) : 45.71
 B (ring opening deg) : 80.51
 PA of pole (deg) : 30.69
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.707
 C/A sky separation (km) : 37686.7
 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



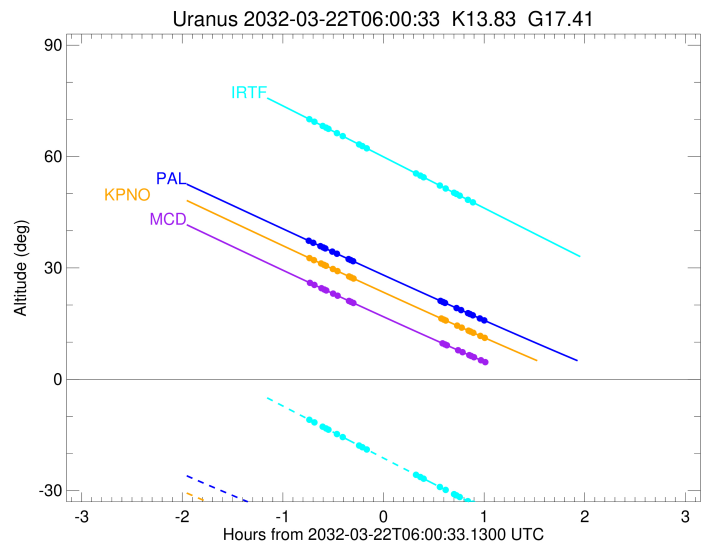
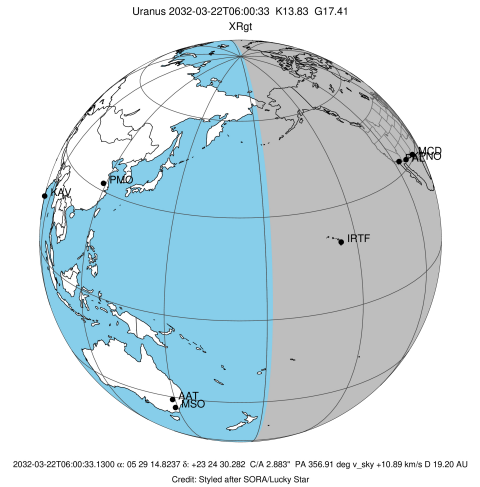
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-03-22T05:17:30.682		25.80	-49.86	50816.27	-7.11		
lambda	I	2032-03-22T05:19:22.300		25.41	-50.13	50026.71	-7.00		
delta	I	2032-03-22T05:23:35.174		24.52	-50.74	48300.35	-6.65		
gamma	I	2032-03-22T05:25:16.989		24.17	-50.98	47631.40	-6.49		
eta	I	2032-03-22T05:26:27.714		23.92	-51.15	47176.12	-6.38		
beta	I	2032-03-22T05:30:30.590		23.07	-51.71	45674.69	-5.97		
alpha	I	2032-03-22T05:33:13.395		22.51	-52.08	44726.67	-5.67		
4	I	2032-03-22T05:40:02.301		21.09	-52.96	42571.25	-4.86		
5	I	2032-03-22T05:41:28.491		20.79	-53.14	42156.26	-4.66		
6	I	2032-03-22T05:42:40.748		20.54	-53.29	41828.17	-4.48		

No planet occultations

6	E	2032-03-22T06:35:35.372		9.71	-57.96	41800.03	4.53		
5	E	2032-03-22T06:37:00.655		9.43	-58.02	42197.05	4.71		
4	E	2032-03-22T06:38:24.197		9.15	-58.08	42607.54	4.91		
alpha	E	2032-03-22T06:44:54.899		7.85	-58.33	44692.83	5.75		
beta	E	2032-03-22T06:47:37.461		7.31	-58.41	45652.78	6.06		
eta	E	2032-03-22T06:51:40.186		6.50	-58.50	47176.12	6.49		
gamma	E	2032-03-22T06:52:49.349		6.28	-58.52	47628.99	6.61		
delta	E	2032-03-22T06:54:29.752		5.94	-58.55	48300.35	6.77		
lambda	E	2032-03-22T06:58:37.928		5.13	-58.60	50026.71	7.14		
epsilon	E	2032-03-22T07:00:35.457		4.74x	-58.61	50875.48	7.25		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2032-03-22T06:06:04.870
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      : 3416227574334830848
2Mass ID (if available) : 05291482+2324306
ICRS Star Coord at Epoch: 05h 29m 14.82368s +23:24:30.28247s
RUWE (>1.4 is poor) : 0.98
K magnitude         : 13.833
G magnitude         : 17.412
RP magnitude        : 16.355
BP magnitude        : 18.563
DUPflag            : 0
Distance (au)       : 19.196
f0 (km)            : 0.000
g0 (km)            : 0.000
skyplane vel. (km/s) : 10.89
Sun-Target sep (deg) : 81.22
Sun-Moon sep (deg)  : 46.29
B (ring opening deg) : 80.51
PA of pole (deg)    : 30.69
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.902
C/A sky separation (km) : 40403.7
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall11.bsp
ural61.bsp
vgr2.ural61.bsp
peph.ural60.bsp
earthstns_itrfr93_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	2032-03-22T05:17:18.389		69.84	-11.14	50799.38	-6.21		
lambda	I	2032-03-22T05:19:23.918		69.36	-11.63	50026.71	-6.07		
delta	I	2032-03-22T05:24:19.380		68.23	-12.79	48300.35	-5.61		
gamma	I	2032-03-22T05:26:20.708		67.77	-13.26	47631.51	-5.41		
eta	I	2032-03-22T05:27:46.004		67.44	-13.59	47176.12	-5.27		
beta	I	2032-03-22T05:32:46.939		66.29	-14.77	45672.95	-4.71		
alpha	I	2032-03-22T05:36:17.982		65.49	-15.59	44722.56	-4.29		
4	I	2032-03-22T05:46:03.543		63.25	-17.87	42578.78	-3.01		
5	I	2032-03-22T05:48:29.364		62.69	-18.43	42160.30	-2.65		
6	I	2032-03-22T05:50:47.687		62.16	-18.97	41820.14	-2.29		

No planet occultations

6	E	2032-03-22T06:19:37.080		55.53	-25.66	41805.21	2.30		
5	E	2032-03-22T06:22:09.039		54.95	-26.24	42184.03	2.66		
4	E	2032-03-22T06:24:32.467		54.40	-26.80	42602.05	3.02		
alpha	E	2032-03-22T06:34:00.794		52.22	-28.98	44696.10	4.32		
beta	E	2032-03-22T06:37:32.351		51.41	-29.78	45655.14	4.75		
eta	E	2032-03-22T06:42:34.361		50.25	-30.94	47176.12	5.32		
gamma	E	2032-03-22T06:43:58.423		49.93	-31.26	47629.47	5.47		
delta	E	2032-03-22T06:45:58.846		49.47	-31.72	48300.35	5.67		
lambda	E	2032-03-22T06:50:50.929		48.35	-32.83	50026.71	6.14		
epsilon	E	2032-03-22T06:53:02.798		47.85	-33.33	50849.32	6.29		