

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-01-12T08:14:17.630
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3404536467197163136
 2Mass ID (if available) : 05323560+2326408

ICRS Star Coord at Epoch: 05h 32m 35.60152s +23:26:40.71160s

RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.167
 G magnitude : 16.658
 RP magnitude : 15.855
 BP magnitude : 17.321
 DUPflag : 0
 Distance (au) : 18.204
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.09
 Sun-Target sep (deg) : 152.49
 Sun-Moon sep (deg) : 159.09
 B (ring opening deg) : 80.07
 PA of pole (deg) : 34.69

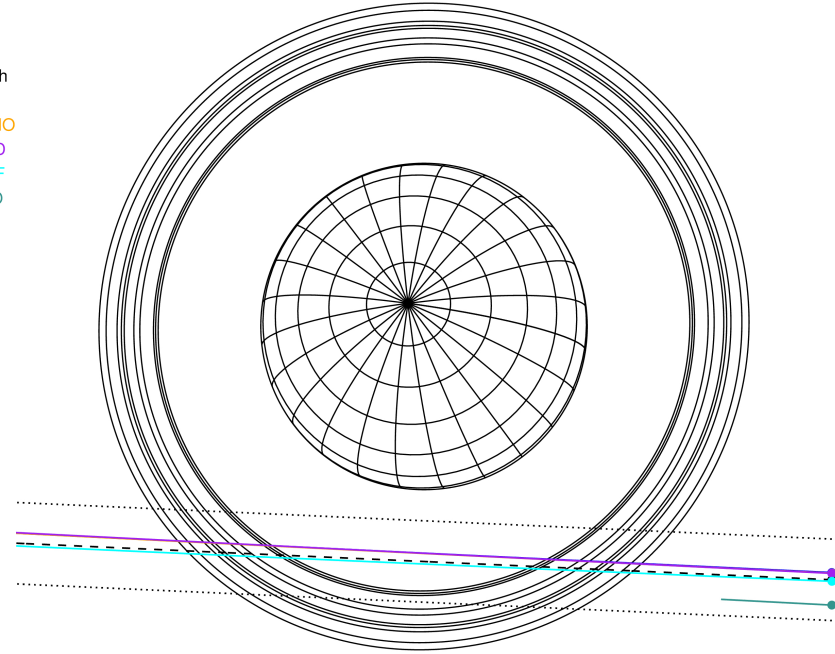
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2032-01-12T08:14:17.6300 ex: 05 32 35.6015 s: +23 26 40.712 C/A 2.778° PA 357.43 deg v_sky -20.09 km/s D 18.20 AU
 Credit: Styled after SORA/Lucky Star

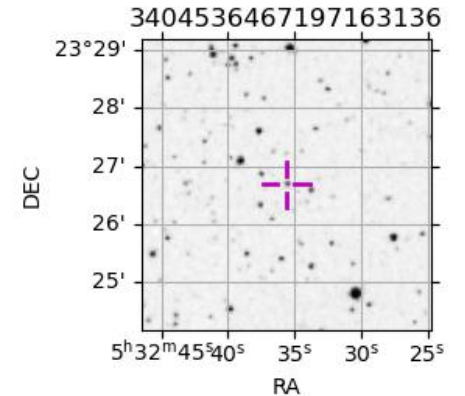
Uranus 2032-01-12T08:14:17 K14.17 G16.66 XRgt

Earth
 PAL
 KPNO
 MCD
 IRTF
 ESO

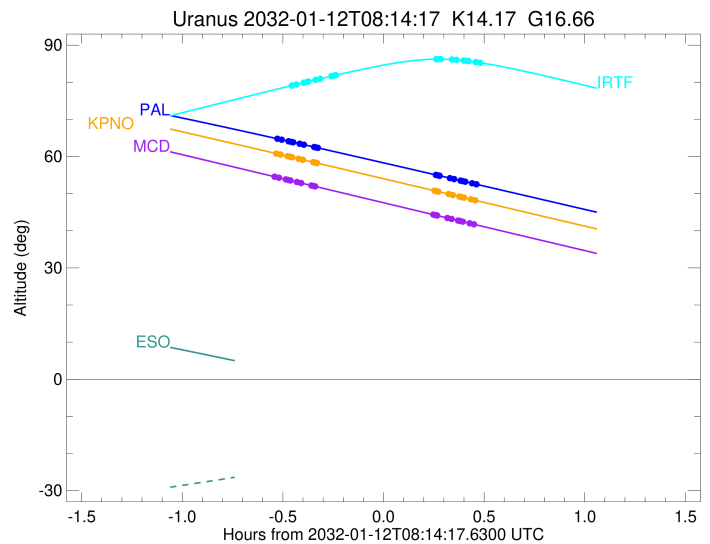
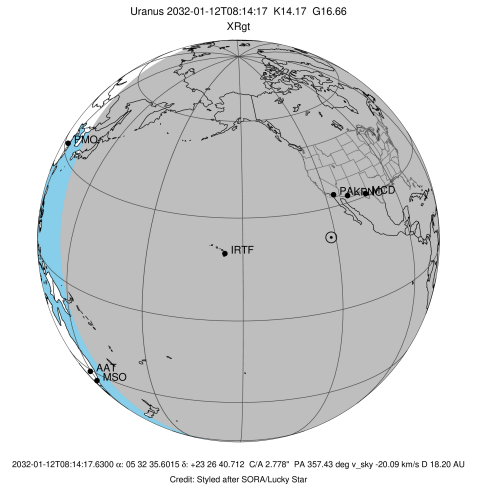


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+++++		+++++	JAN 12 07:42 - JAN 12 08:41	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	JAN 12 07:41 - JAN 12 08:41	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	JAN 12 07:41 - JAN 12 08:40	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++		+++++	JAN 12 07:46 - JAN 12 08:42	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 : 2032-01-12T08:11:53.130
 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 : 3404536467197163136
 2Mass ID (if available) : 05323560+2326408
 ICRS Star Coord at Epoch: 05h 32m 35.60152s +23:26:40.71160s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.167
 G magnitude : 16.658
 RP magnitude : 15.855
 BP magnitude : 17.321
 DUPflag : 0
 Distance (au) : 18.204
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.09
 Sun-Target sep (deg) : 152.49
 Sun-Moon sep (deg) : 158.99
 B (ring opening deg) : 80.07
 PA of pole (deg) : 34.69
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.685
 C/A sky separation (km) : 35456.6
 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

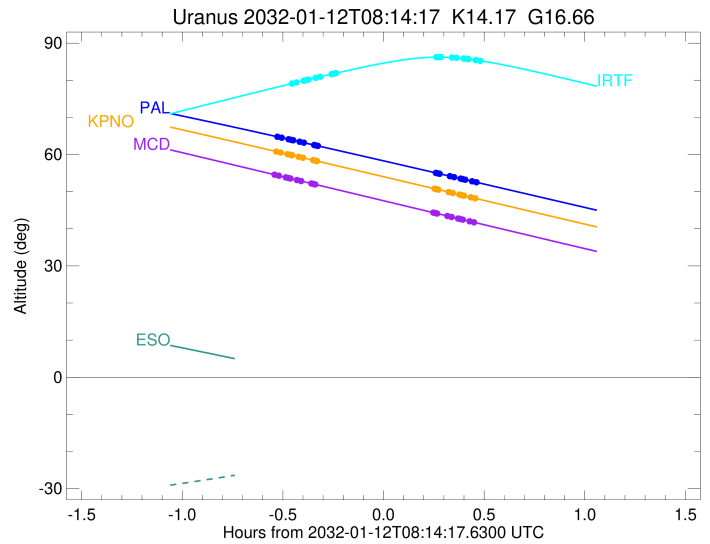
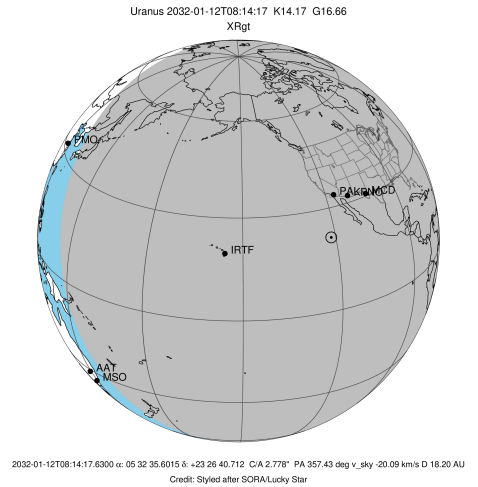


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-01-12T07:42:17.519		64.86	-78.15	51488.18	-14.70		
lambda	I	2032-01-12T07:43:57.888		64.52	-78.23	50026.71	-14.35		
delta	I	2032-01-12T07:46:00.554		64.11	-78.32	48300.35	-13.79		
gamma	I	2032-01-12T07:46:50.263		63.94	-78.35	47620.98	-13.54		
eta	I	2032-01-12T07:47:23.313		63.83	-78.37	47176.12	-13.38		
beta	I	2032-01-12T07:49:19.468		63.44	-78.43	45657.87	-12.74		
alpha	I	2032-01-12T07:50:33.322		63.19	-78.46	44733.62	-12.30		
4	I	2032-01-12T07:53:40.998		62.55	-78.50	42531.95	-11.09		
5	I	2032-01-12T07:54:06.760		62.46	-78.51	42256.55	-10.93		
6	I	2032-01-12T07:54:41.989		62.34	-78.51	41879.13	-10.64		

No planet occultations

6	E	2032-01-12T08:29:54.099		55.05	-76.22	41850.15	10.62		
5	E	2032-01-12T08:30:36.957		54.91	-76.13	42314.03	10.91		
4	E	2032-01-12T08:31:01.048		54.82	-76.08	42575.49	11.07		
alpha	E	2032-01-12T08:34:02.177		54.19	-75.69	44693.63	12.27		
beta	E	2032-01-12T08:35:18.018		53.93	-75.53	45641.10	12.71		
eta	E	2032-01-12T08:37:15.831		53.52	-75.26	47176.12	13.34		
gamma	E	2032-01-12T08:37:49.274		53.40	-75.18	47625.11	13.51		
delta	E	2032-01-12T08:38:38.812		53.23	-75.07	48300.35	13.75		
lambda	E	2032-01-12T08:40:41.828		52.80	-74.77	50026.71	14.31		
epsilon	E	2032-01-12T08:41:43.502		52.58	-74.62	50917.09	14.66		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-01-12T08:11:32.470
 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 : 3404536467197163136
 2Mass ID (if available) : 05323560+2326408
 ICRS Star Coord at Epoch: 05h 32m 35.60152s +23:26:40.71160s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.167
 G magnitude : 16.658
 RP magnitude : 15.855
 BP magnitude : 17.321
 DUPflag : 0
 Distance (au) : 18.204
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.09
 Sun-Target sep (deg) : 152.49
 Sun-Moon sep (deg) : 158.91
 B (ring opening deg) : 80.07
 PA of pole (deg) : 34.69
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.689
 C/A sky separation (km) : 35505.9
 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

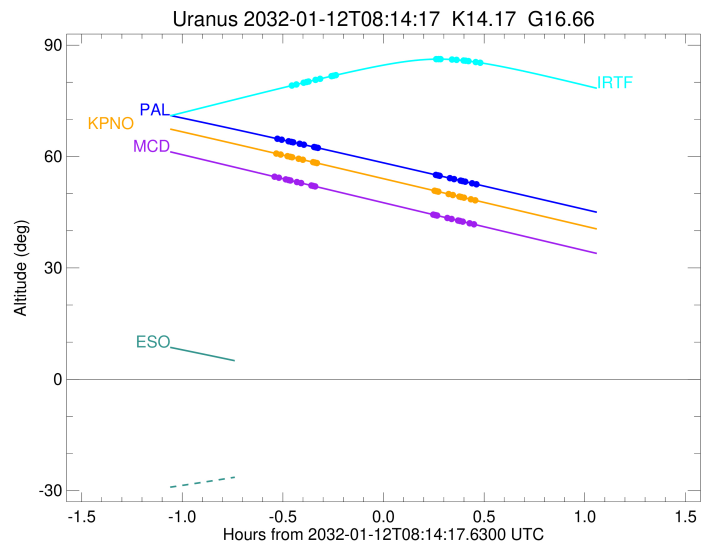
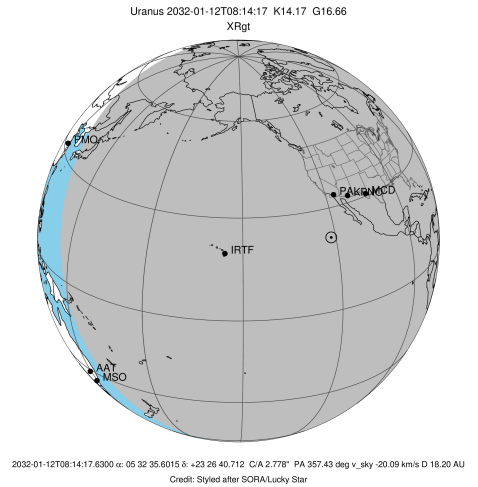


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-01-12T07:41:58.148		60.88	-79.76	51487.72	-14.68		
lambda	I	2032-01-12T07:43:38.678		60.53	-79.70	50026.71	-14.32		
delta	I	2032-01-12T07:45:41.603		60.10	-79.60	48300.35	-13.76		
gamma	I	2032-01-12T07:46:31.426		59.92	-79.55	47620.98	-13.51		
eta	I	2032-01-12T07:47:04.556		59.80	-79.52	47176.12	-13.34		
beta	I	2032-01-12T07:49:01.018		59.39	-79.39	45657.82	-12.70		
alpha	I	2032-01-12T07:50:15.091		59.13	-79.31	44733.55	-12.26		
4	I	2032-01-12T07:53:23.410		58.47	-79.06	42532.02	-11.05		
5	I	2032-01-12T07:53:49.265		58.38	-79.02	42256.77	-10.89		
6	I	2032-01-12T07:54:24.663		58.25	-78.97	41879.11	-10.60		

No planet occultations

6	E	2032-01-12T08:29:30.356		50.79	-74.12	41850.22	10.58		
5	E	2032-01-12T08:30:13.399		50.64	-73.99	42314.01	10.86		
4	E	2032-01-12T08:30:37.590		50.55	-73.92	42575.42	11.02		
alpha	E	2032-01-12T08:33:39.409		49.91	-73.39	44693.65	12.23		
beta	E	2032-01-12T08:34:55.493		49.64	-73.17	45641.10	12.67		
eta	E	2032-01-12T08:36:53.652		49.22	-72.82	47176.12	13.30		
gamma	E	2032-01-12T08:37:27.187		49.10	-72.72	47625.11	13.47		
delta	E	2032-01-12T08:38:16.857		48.92	-72.57	48300.35	13.72		
lambda	E	2032-01-12T08:40:20.179		48.48	-72.19	50026.71	14.27		
epsilon	E	2032-01-12T08:41:22.014		48.26	-72.00	50917.33	14.63		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-01-12T08:11:05.470
 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 : 3404536467197163136
 2Mass ID (if available) : 05323560+2326408
 ICRS Star Coord at Epoch: 05h 32m 35.60152s +23:26:40.71160s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.167
 G magnitude : 16.658
 RP magnitude : 15.855
 BP magnitude : 17.321
 DUPflag : 0
 Distance (au) : 18.204
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.09
 Sun-Target sep (deg) : 152.49
 Sun-Moon sep (deg) : 158.80
 B (ring opening deg) : 80.07
 PA of pole (deg) : 34.69
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.687
 C/A sky separation (km) : 35471.7
 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



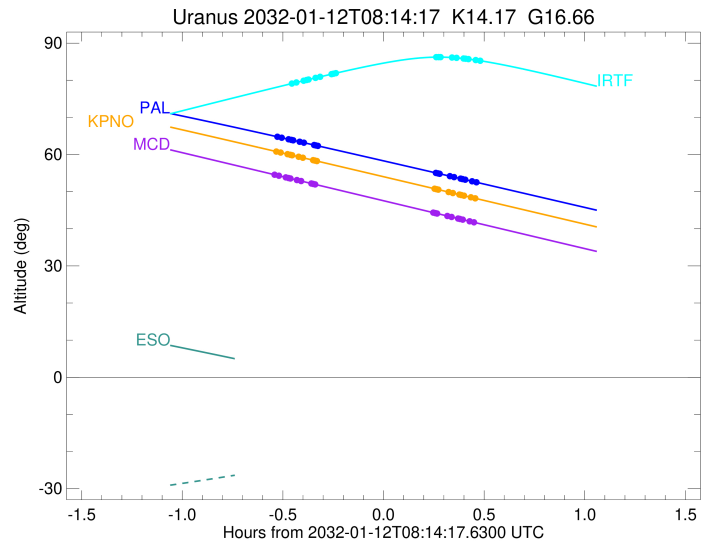
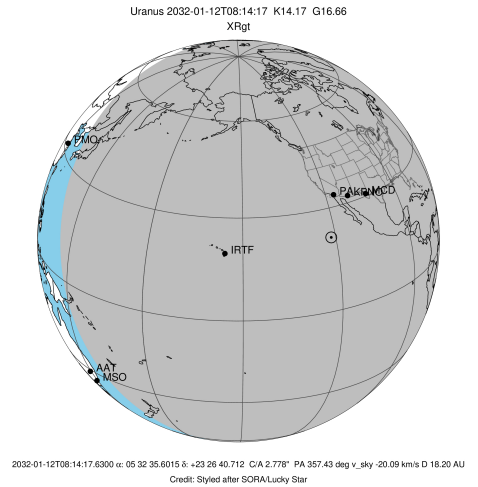
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-01-12T07:41:27.162		54.65	-77.85	51487.73	-14.67		
lambda	I	2032-01-12T07:43:07.712		54.29	-77.59	50026.71	-14.32		
delta	I	2032-01-12T07:45:10.646		53.84	-77.26	48300.35	-13.76		
gamma	I	2032-01-12T07:46:00.468		53.66	-77.13	47620.98	-13.51		
eta	I	2032-01-12T07:46:33.595		53.54	-77.04	47176.12	-13.34		
beta	I	2032-01-12T07:48:30.030		53.13	-76.72	45657.82	-12.71		
alpha	I	2032-01-12T07:49:44.072		52.86	-76.51	44733.56	-12.27		
4	I	2032-01-12T07:52:52.244		52.18	-75.97	42532.00	-11.06		
5	I	2032-01-12T07:53:18.072		52.09	-75.89	42256.72	-10.90		
6	I	2032-01-12T07:53:53.419		51.96	-75.79	41879.11	-10.61		

No planet occultations

6	E	2032-01-12T08:29:07.813		44.36	-69.03	41850.12	10.59		
5	E	2032-01-12T08:29:50.828		44.20	-68.89	42314.04	10.87		
4	E	2032-01-12T08:30:15.003		44.11	-68.80	42575.53	11.03		
alpha	E	2032-01-12T08:33:16.734		43.46	-68.19	44693.60	12.23		
beta	E	2032-01-12T08:34:32.821		43.19	-67.93	45641.10	12.67		
eta	E	2032-01-12T08:36:31.005		42.76	-67.52	47176.12	13.30		
gamma	E	2032-01-12T08:37:04.553		42.64	-67.41	47625.12	13.47		
delta	E	2032-01-12T08:37:54.244		42.47	-67.24	48300.35	13.71		
lambda	E	2032-01-12T08:39:57.637		42.02	-66.82	50026.71	14.26		
epsilon	E	2032-01-12T08:40:59.475		41.80	-66.60	50916.73	14.61		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2032-01-12T08:14:36.860
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      : 3404536467197163136
2Mass ID (if available) : 05323560+2326408
ICRS Star Coord at Epoch: 05h 32m 35.60152s +23:26:40.71160s
RUWE (>1.4 is poor) : 0.97
K magnitude          : 14.167
G magnitude          : 16.658
RP magnitude         : 15.855
BP magnitude         : 17.321
DUPflag             : 0
Distance (au)       : 18.204
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -20.09
Sun-Target sep (deg) : 152.49
Sun-Moon sep (deg)  : 159.50
B (ring opening deg) : 80.07
PA of pole (deg)    : 34.69
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.815
C/A sky separation (km) : 37162.5
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
    
```



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

Ring	I/E	UTC	b? alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-01-12T07:46:35.676	79.04	-51.86	51478.21	-14.04		
lambda	I	2032-01-12T07:48:20.263	79.42	-52.26	50026.71	-13.63		
delta	I	2032-01-12T07:50:29.933	79.89	-52.76	48300.35	-12.98		
gamma	I	2032-01-12T07:51:22.854	80.08	-52.97	47620.96	-12.69		
eta	I	2032-01-12T07:51:58.176	80.20	-53.10	47176.12	-12.49		
beta	I	2032-01-12T07:54:03.437	80.65	-53.59	45656.71	-11.73		
alpha	I	2032-01-12T07:55:24.080	80.94	-53.90	44731.69	-11.21		
4	I	2032-01-12T07:58:53.464	81.67	-54.71	42533.76	-9.71		
5	I	2032-01-12T07:59:22.621	81.77	-54.82	42262.46	-9.51		
6	I	2032-01-12T08:00:04.019	81.91	-54.98	41878.41	-9.14		

No planet occultations

6	E	2032-01-12T08:30:00.657	86.24	-61.92	41853.77	9.14		
5	E	2032-01-12T08:30:49.560	86.24	-62.11	42312.51	9.51		
4	E	2032-01-12T08:31:16.958	86.24	-62.22	42571.64	9.71		
alpha	E	2032-01-12T08:34:39.457	86.13	-63.00	44695.36	11.21		
beta	E	2032-01-12T08:36:01.890	86.05	-63.32	45641.24	11.74		
eta	E	2032-01-12T08:38:08.518	85.87	-63.81	47176.12	12.49		
gamma	E	2032-01-12T08:38:44.141	85.81	-63.95	47624.80	12.69		
delta	E	2032-01-12T08:39:36.760	85.71	-64.15	48300.35	12.98		
lambda	E	2032-01-12T08:41:46.429	85.45	-64.66	50026.71	13.64		
epsilon	E	2032-01-12T08:42:52.303	85.30	-64.91	50935.12	14.04		