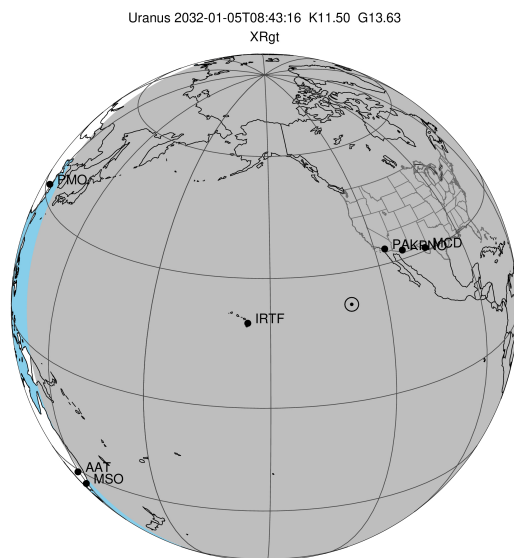


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-01-05T08:43:16.640
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3404539422134619264
 2Mass ID (if available) : 05334497+2327281

ICRS Star Coord at Epoch: 05h 33m 44.98232s +23:27:27.98105s

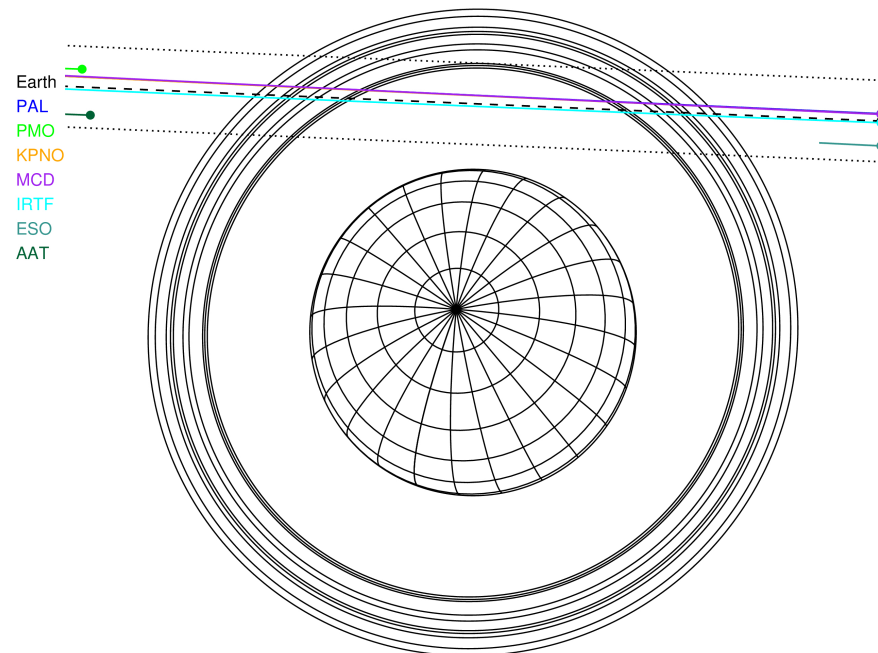
RUWE (>1.4 is poor) : 1.11
 K magnitude : 11.499
 G magnitude : 13.630
 RP magnitude : 12.931
 BP magnitude : 14.164
 DUPflag : 0
 Distance (au) : 18.157
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.63
 Sun-Target sep (deg) : 159.87
 Sun-Moon sep (deg) : 103.74
 B (ring opening deg) : 79.90
 PA of pole (deg) : 35.98

#	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



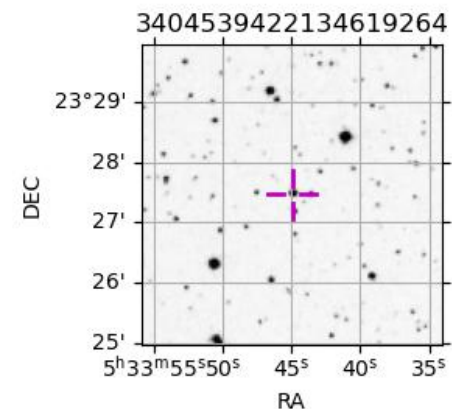
2032-01-05T08:43:16.6400 ra: 05 33 44.9823 s: +23 27 27.981 C/A 2.725° PA 177.56 deg v_sky -21.63 km/s D 18.16 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2032-01-05T08:43:16 K11.50 G13.63 XRgt

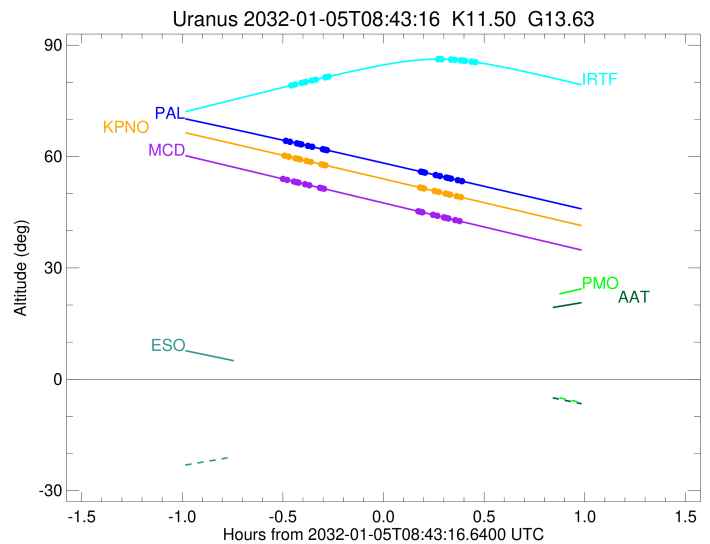
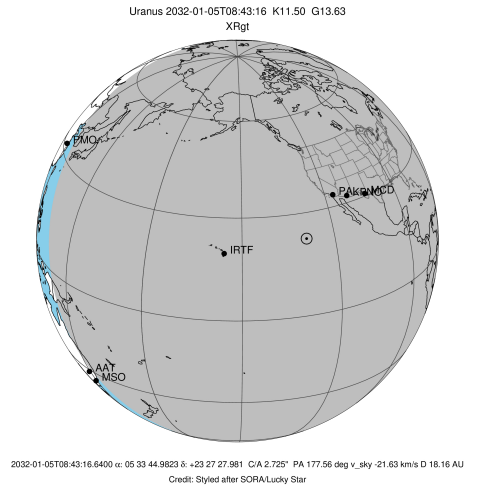


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1				JAN 05 08:14 - JAN 05 09:06	PnnRnn
PAL	Palomar Mt (200")	33.4	243.1	+++++		+++++	JAN 05 08:14 - JAN 05 09:06	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8				JAN 05 08:13 - JAN 05 09:05	PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	JAN 05 08:13 - JAN 05 09:05	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	JAN 05 08:13 - JAN 05 09:05	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5				JAN 05 08:15 - JAN 05 09:10	PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++		+++++	JAN 05 08:15 - JAN 05 09:10	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 : 2032-01-05T08:40:50.670
 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 : 3404539422134619264
 2Mass ID (if available) : 05334497+2327281
 ICRS Star Coord at Epoch: 05h 33m 44.98232s +23:27:27.98105s
 RUWE (>1.4 is poor) : 1.11
 K magnitude : 11.499
 G magnitude : 13.630
 RP magnitude : 12.931
 BP magnitude : 14.164
 DUPflag : 0
 Distance (au) : 18.157
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.63
 Sun-Target sep (deg) : 159.87
 Sun-Moon sep (deg) : 104.61
 B (ring opening deg) : 79.90
 PA of pole (deg) : 35.98
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.819
 C/A sky separation (km) : 37122.5
 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

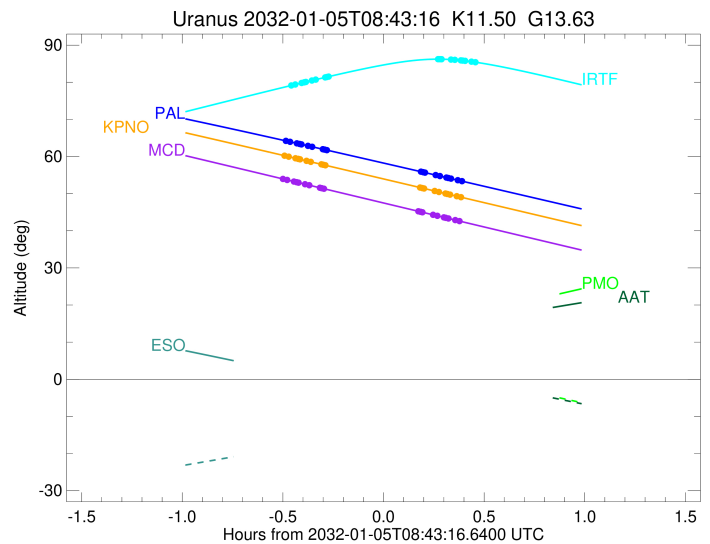
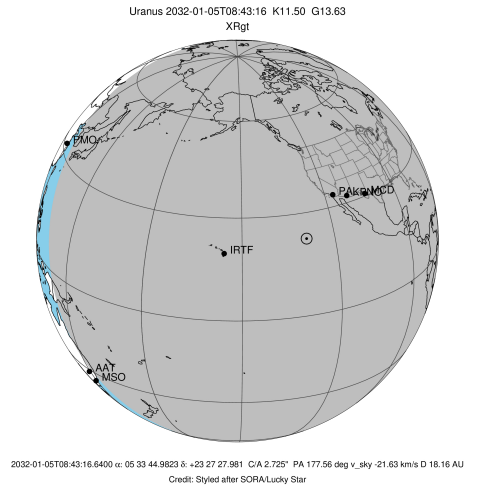


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-01-05T08:14:01.275		64.25	-78.45	51302.87	-14.98		
lambda	I	2032-01-05T08:15:27.060		63.96	-78.32	50026.71	-14.65		
delta	I	2032-01-05T08:17:27.771		63.55	-78.12	48300.35	-13.94		
gamma	I	2032-01-05T08:18:16.457		63.39	-78.04	47628.76	-13.64		
eta	I	2032-01-05T08:18:49.903		63.27	-77.98	47176.12	-13.42		
beta	I	2032-01-05T08:20:44.684		62.88	-77.77	45679.82	-12.63		
alpha	I	2032-01-05T08:22:01.170		62.62	-77.62	44734.50	-12.05		
4	I	2032-01-05T08:25:11.470		61.97	-77.24	42584.65	-10.51		
5	I	2032-01-05T08:25:52.261		61.83	-77.16	42168.27	-10.13		
6	I	2032-01-05T08:26:28.027		61.71	-77.08	41808.77	-9.77		

No planet occultations

6	E	2032-01-05T08:54:20.235		55.94	-72.79	41794.87	9.76		
5	E	2032-01-05T08:55:03.990		55.79	-72.67	42232.45	10.12		
4	E	2032-01-05T08:55:42.010		55.66	-72.56	42614.78	10.49		
alpha	E	2032-01-05T08:58:46.402		55.02	-72.01	44697.71	12.03		
beta	E	2032-01-05T09:00:04.655		54.75	-71.78	45660.71	12.61		
eta	E	2032-01-05T09:02:01.128		54.34	-71.43	47176.12	13.40		
gamma	E	2032-01-05T09:02:34.840		54.22	-71.33	47631.42	13.61		
delta	E	2032-01-05T09:03:23.438		54.05	-71.18	48300.35	13.91		
lambda	E	2032-01-05T09:05:24.427		53.63	-70.81	50026.71	14.61		
epsilon	E	2032-01-05T09:06:16.032		53.45	-70.65	50787.85	14.95		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-01-05T08:40:29.370
 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 : 3404539422134619264
 2Mass ID (if available) : 05334497+2327281
 ICRS Star Coord at Epoch: 05h 33m 44.98232s +23:27:27.98105s
 RUWE (>1.4 is poor) : 1.11
 K magnitude : 11.499
 G magnitude : 13.630
 RP magnitude : 12.931
 BP magnitude : 14.164
 DUPflag : 0
 Distance (au) : 18.157
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.63
 Sun-Target sep (deg) : 159.87
 Sun-Moon sep (deg) : 104.59
 B (ring opening deg) : 79.90
 PA of pole (deg) : 35.98
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.815
 C/A sky separation (km) : 37074.6
 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

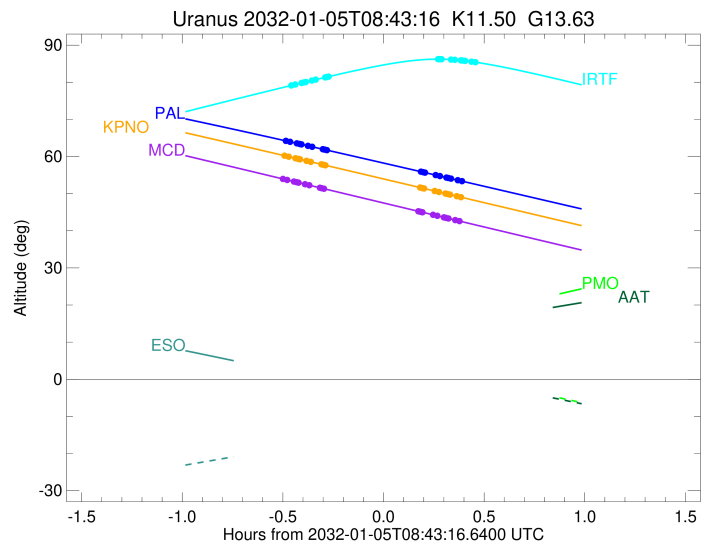
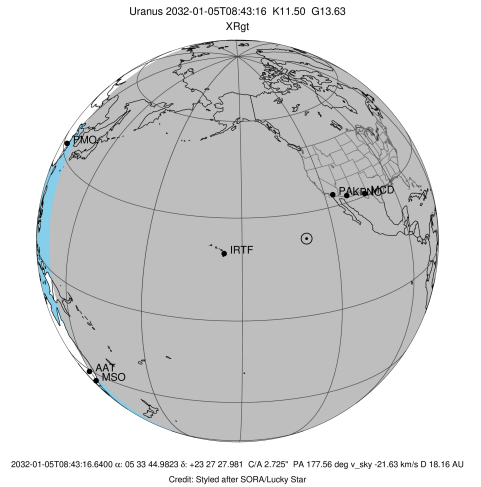


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-01-05T08:13:36.585		60.26	-76.93	51303.63	-15.00		
lambda	I	2032-01-05T08:15:02.331		59.96	-76.70	50026.71	-14.66		
delta	I	2032-01-05T08:17:02.889		59.53	-76.37	48300.35	-13.96		
gamma	I	2032-01-05T08:17:51.504		59.36	-76.24	47628.75	-13.66		
eta	I	2032-01-05T08:18:24.896		59.24	-76.14	47176.12	-13.45		
beta	I	2032-01-05T08:20:19.462		58.84	-75.82	45679.84	-12.66		
alpha	I	2032-01-05T08:21:35.769		58.57	-75.61	44734.57	-12.08		
4	I	2032-01-05T08:24:45.500		57.90	-75.06	42584.52	-10.55		
5	I	2032-01-05T08:25:26.124		57.76	-74.94	42168.13	-10.18		
6	I	2032-01-05T08:26:01.708		57.63	-74.84	41808.87	-9.81		

No planet occultations

6	E	2032-01-05T08:54:04.034		51.67	-69.54	41794.88	9.80		
5	E	2032-01-05T08:54:47.620		51.52	-69.40	42232.60	10.16		
4	E	2032-01-05T08:55:25.482		51.38	-69.27	42614.81	10.53		
alpha	E	2032-01-05T08:58:29.341		50.73	-68.66	44697.67	12.06		
beta	E	2032-01-05T08:59:47.437		50.45	-68.40	45660.69	12.63		
eta	E	2032-01-05T09:01:43.727		50.04	-68.02	47176.12	13.42		
gamma	E	2032-01-05T09:02:17.394		49.92	-67.90	47631.42	13.63		
delta	E	2032-01-05T09:03:05.935		49.75	-67.74	48300.35	13.93		
lambda	E	2032-01-05T09:05:06.811		49.32	-67.33	50026.71	14.62		
epsilon	E	2032-01-05T09:05:58.368		49.13	-67.16	50787.70	14.95		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-01-05T08:40:01.470
 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 : 3404539422134619264
 2Mass ID (if available) : 05334497+2327281
 ICRS Star Coord at Epoch: 05h 33m 44.98232s +23:27:27.98105s
 RUWE (>1.4 is poor) : 1.11
 K magnitude : 11.499
 G magnitude : 13.630
 RP magnitude : 12.931
 BP magnitude : 14.164
 DUPflag : 0
 Distance (au) : 18.157
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.63
 Sun-Target sep (deg) : 159.87
 Sun-Moon sep (deg) : 104.54
 B (ring opening deg) : 79.90
 PA of pole (deg) : 35.98
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.818
 C/A sky separation (km) : 37110.6
 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



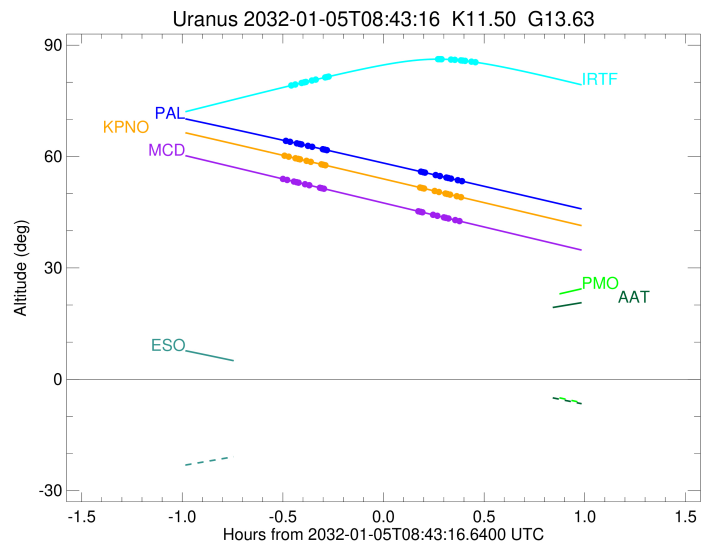
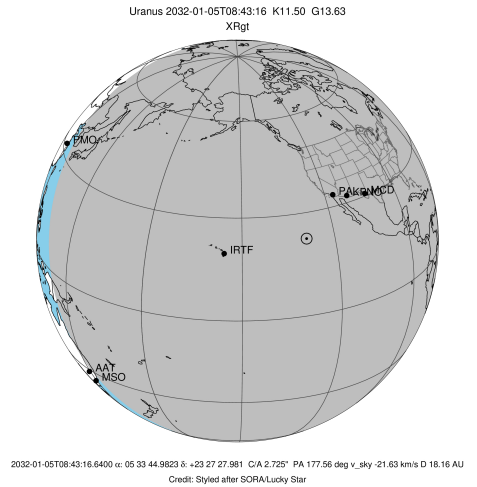
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-01-05T08:13:08.325		54.00	-72.13	51303.56	-14.96		
lambda	I	2032-01-05T08:14:34.267		53.69	-71.84	50026.71	-14.63		
delta	I	2032-01-05T08:16:35.129		53.26	-71.44	48300.35	-13.93		
gamma	I	2032-01-05T08:17:23.875		53.08	-71.27	47628.76	-13.63		
eta	I	2032-01-05T08:17:57.361		52.96	-71.16	47176.12	-13.41		
beta	I	2032-01-05T08:19:52.272		52.55	-70.77	45679.83	-12.62		
alpha	I	2032-01-05T08:21:08.836		52.27	-70.51	44734.56	-12.04		
4	I	2032-01-05T08:24:19.316		51.59	-69.86	42584.56	-10.50		
5	I	2032-01-05T08:25:00.132		51.44	-69.72	42168.17	-10.13		
6	I	2032-01-05T08:25:35.903		51.31	-69.60	41808.84	-9.76		

No planet occultations

6	E	2032-01-05T08:53:33.996		45.27	-63.76	41794.87	9.75		
5	E	2032-01-05T08:54:17.788		45.12	-63.60	42232.39	10.11		
4	E	2032-01-05T08:54:55.855		44.98	-63.47	42614.78	10.48		
alpha	E	2032-01-05T08:58:00.507		44.32	-62.82	44697.73	12.01		
beta	E	2032-01-05T08:59:18.889		44.03	-62.54	45660.73	12.59		
eta	E	2032-01-05T09:01:15.568		43.61	-62.12	47176.12	13.37		
gamma	E	2032-01-05T09:01:49.343		43.49	-62.01	47631.42	13.59		
delta	E	2032-01-05T09:02:38.033		43.32	-61.83	48300.35	13.89		
lambda	E	2032-01-05T09:04:39.265		42.88	-61.40	50026.71	14.58		
epsilon	E	2032-01-05T09:05:30.989		42.70	-61.22	50788.04	14.91		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2032-01-05T08:43:38.740
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       : 3404539422134619264
2Mass ID (if available) : 05334497+2327281
ICRS Star Coord at Epoch: 05h 33m 44.98232s +23:27:27.98105s
RUWE (>1.4 is poor) : 1.11
K magnitude          : 11.499
G magnitude          : 13.630
RP magnitude         : 12.931
BP magnitude         : 14.164
DUPflag             : 0
Distance (au)        : 18.157
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -21.63
Sun-Target sep (deg) : 159.87
Sun-Moon sep (deg)   : 104.61
B (ring opening deg) : 79.90
PA of pole (deg)     : 35.98
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.689
C/A sky separation (km) : 35406.3
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	2032-01-05T08:15:37.019		79.11	-59.29	51319.20	-15.81		
lambda	I	2032-01-05T08:16:59.201		79.41	-59.61	50026.71	-15.53		
delta	I	2032-01-05T08:18:52.555		79.82	-60.05	48300.35	-14.92		
gamma	I	2032-01-05T08:19:37.966		79.98	-60.22	47628.52	-14.67		
eta	I	2032-01-05T08:20:09.010		80.09	-60.34	47176.12	-14.48		
beta	I	2032-01-05T08:21:54.707		80.47	-60.75	45680.22	-13.81		
alpha	I	2032-01-05T08:23:04.181		80.72	-61.01	44736.34	-13.33		
4	I	2032-01-05T08:25:53.673		81.32	-61.66	42581.37	-12.07		
5	I	2032-01-05T08:26:28.893		81.44	-61.80	42165.00	-11.77		
6	I	2032-01-05T08:26:59.027		81.54	-61.92	41811.43	-11.49		

No planet occultations

6	E	2032-01-05T08:59:27.568		86.23	-69.40	41795.35	11.49		
5	E	2032-01-05T09:00:05.593		86.23	-69.55	42239.45	11.78		
4	E	2032-01-05T09:00:37.931		86.22	-69.67	42615.69	12.07		
alpha	E	2032-01-05T09:03:21.257		86.12	-70.30	44695.84	13.33		
beta	E	2032-01-05T09:04:32.334		86.05	-70.57	45659.35	13.81		
eta	E	2032-01-05T09:06:19.483		85.90	-70.98	47176.12	14.48		
gamma	E	2032-01-05T09:06:50.716		85.85	-71.10	47631.33	14.67		
delta	E	2032-01-05T09:07:35.930		85.78	-71.27	48300.35	14.93		
lambda	E	2032-01-05T09:09:29.272		85.56	-71.71	50026.71	15.53		
epsilon	E	2032-01-05T09:10:17.324		85.46	-71.89	50778.57	15.81		