

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-10-19T11:17:01.110
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3427632808450590592
 2Mass ID (if available) : 05453557+2332152

ICRS Star Coord at Epoch: 05h 45m 35.57712s +23:32:15.10550s

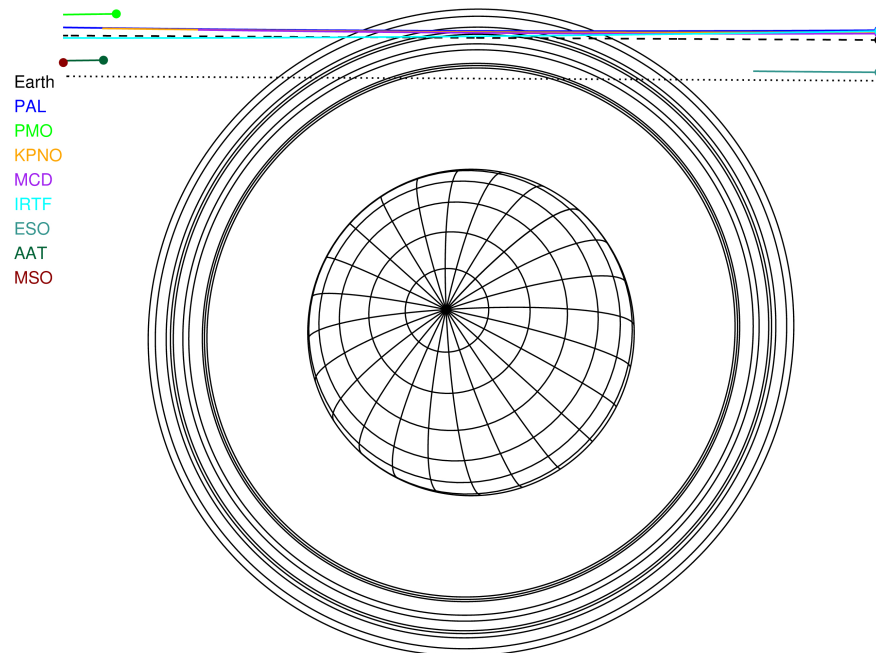
RUWE (>1.4 is poor) : 1.05
 K magnitude : 11.800
 G magnitude : 15.493
 RP magnitude : 14.471
 BP magnitude : 16.559
 DUPflag : 0
 Distance (au) : 18.599
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -7.99
 Sun-Target sep (deg) : 118.74
 Sun-Moon sep (deg) : 158.22
 B (ring opening deg) : 78.03
 PA of pole (deg) : 47.31

#	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



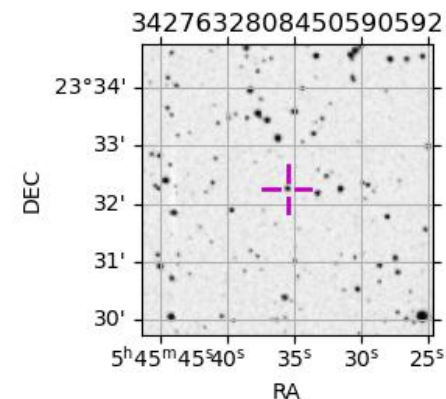
2031-10-19T11:17:01.1100 α: 05 45 35.5771 s: +23 32 15.106 C/A 3.430° PA 179.69 deg v_sky - 7.99 km/s D 18.60 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2031-10-19T11:17:01 K11.80 G15.49 XRgt

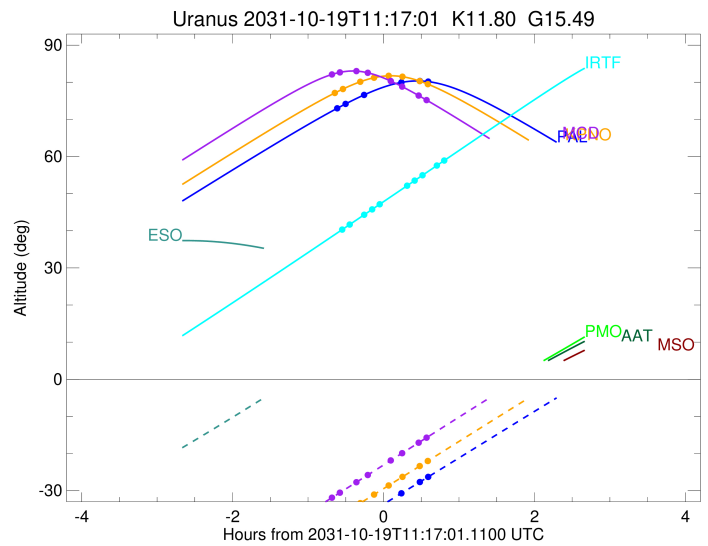
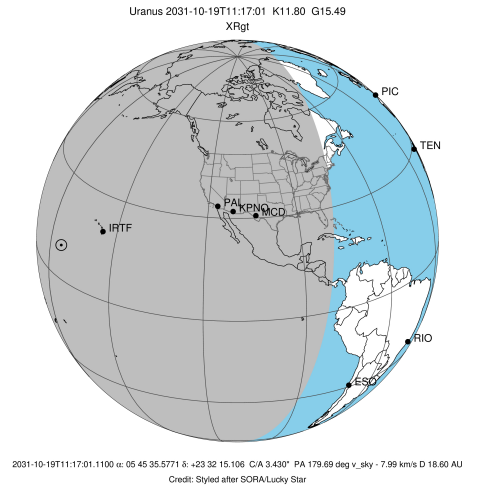


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+++		+++	OCT 19 10:42 - OCT 19 11:51	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	++++		++++	OCT 19 10:40 - OCT 19 11:51	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	++++		++++	OCT 19 10:38 - OCT 19 11:50	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++		+++++	OCT 19 10:46 - OCT 19 12:04	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 : 2031-10-19T11:18:27.870
 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 : 3427632808450590592
 2Mass ID (if available) : 05453557+2332152
 ICRS Star Coord at Epoch: 05h 45m 35.57712s +23:32:15.10550s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 11.800
 G magnitude : 15.493
 RP magnitude : 14.471
 BP magnitude : 16.559
 DUPflag : 0
 Distance (au) : 18.599
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -7.99
 Sun-Target sep (deg) : 118.74
 Sun-Moon sep (deg) : 158.49
 B (ring opening deg) : 78.03
 PA of pole (deg) : 47.31
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.502
 C/A sky separation (km) : 47232.4
 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_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

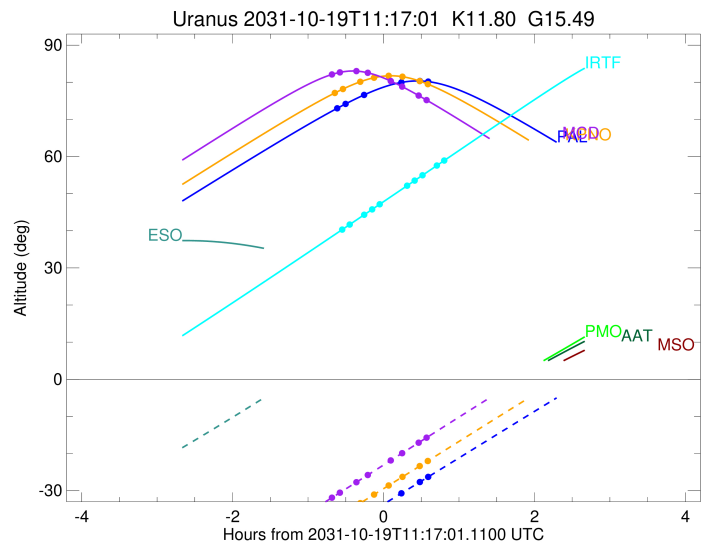
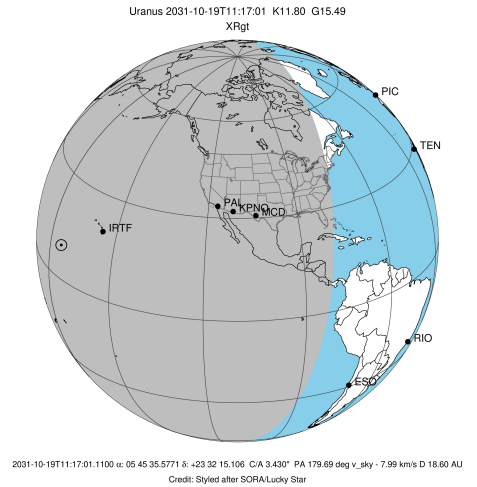
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-10-19T10:42:27.310		73.40	-40.68	50763.10	-2.91		
lambda	I	2031-10-19T10:46:57.781		74.19	-39.77	50026.71	-2.55		
delta	I	2031-10-19T11:01:46.201		76.63	-36.78	48300.35	-1.32		

No planet occultations

delta	E	2031-10-19T11:31:03.911		79.96	-30.76	48300.35	1.32		
lambda	E	2031-10-19T11:45:49.813		80.36	-27.70	50026.71	2.56		
epsilon	E	2031-10-19T11:51:16.993		80.23	-26.57	50933.23	2.93		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2031-10-19T11:17:20.740
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      : 3427632808450590592
2Mass ID (if available) : 05453557+2332152
ICRS Star Coord at Epoch: 05h 45m 35.57712s +23:32:15.10550s
RUWE (>1.4 is poor) : 1.05
K magnitude         : 11.800
G magnitude         : 15.493
RP magnitude        : 14.471
BP magnitude        : 16.559
DUPflag            : 0
Distance (au)       : 18.599
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -7.99
Sun-Target sep (deg) : 118.74
Sun-Moon sep (deg)  : 158.56
B (ring opening deg) : 78.03
PA of pole (deg)    : 47.31
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.489
C/A sky separation (km) : 47066.3
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl.spk
urall1.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall1.bsp
ural61.bsp
vgr2.ural61.bsp
peph.ural60.bsp
earthstns_itrff93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```



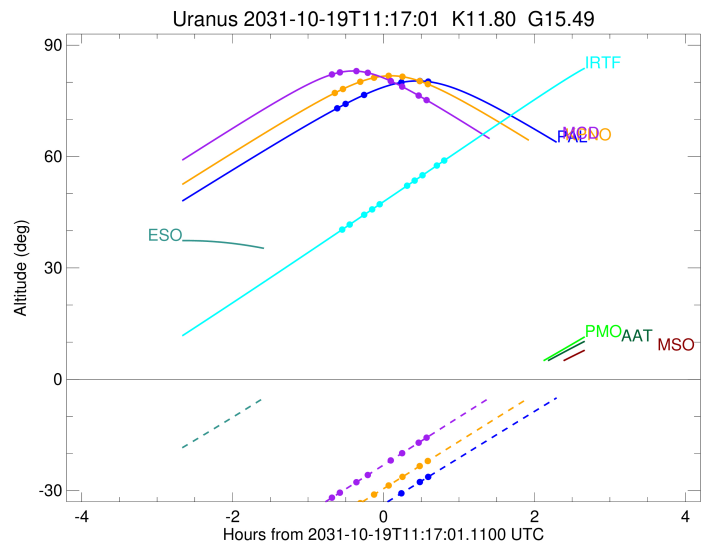
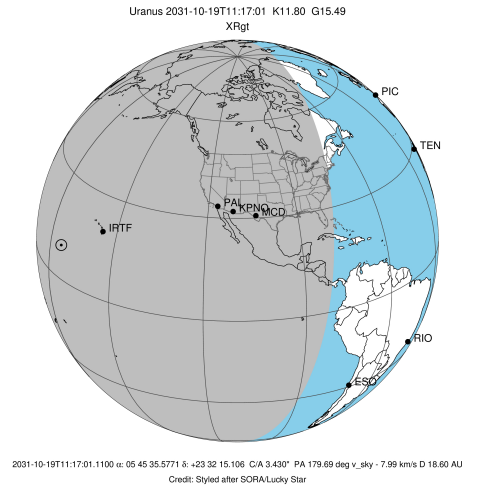
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-10-19T10:40:29.994		77.49	-37.13	50761.75	-2.99		
lambda	I	2031-10-19T10:44:51.581		78.20	-36.22	50026.71	-2.64		
delta	I	2031-10-19T10:58:41.971		80.16	-33.33	48300.35	-1.49		
gamma	I	2031-10-19T11:10:04.084		81.28	-30.94	47624.41	-0.48		

No planet occultations

gamma	E	2031-10-19T11:20:32.633		81.74	-28.73	47623.87	0.48		
delta	E	2031-10-19T11:31:55.192		81.52	-26.33	48300.35	1.50		
lambda	E	2031-10-19T11:45:43.780		80.33	-23.40	50026.71	2.65		
epsilon	E	2031-10-19T11:51:02.242		79.67	-22.27	50935.94	3.00		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-10-19T11:15:41.200
 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 : 3427632808450590592
 2Mass ID (if available) : 05453557+2332152
 ICRS Star Coord at Epoch: 05h 45m 35.57712s +23:32:15.10550s
 RUWE (>1.4 is poor) : 1.05
 K magnitude : 11.800
 G magnitude : 15.493
 RP magnitude : 14.471
 BP magnitude : 16.559
 DUPflag : 0
 Distance (au) : 18.599
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -7.99
 Sun-Target sep (deg) : 118.74
 Sun-Moon sep (deg) : 158.66
 B (ring opening deg) : 78.03
 PA of pole (deg) : 47.31
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.479
 C/A sky separation (km) : 46933.4
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



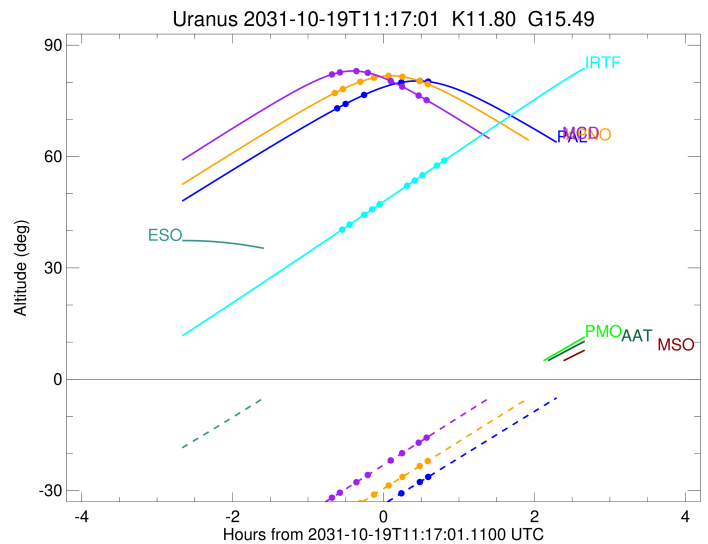
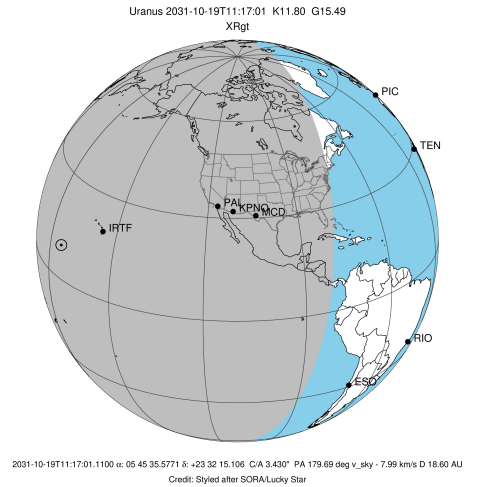
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-10-19T10:38:10.840		82.33	-31.44	50760.59	-3.06		
lambda	I	2031-10-19T10:42:25.777		82.67	-30.53	50026.71	-2.72		
delta	I	2031-10-19T10:55:37.580		83.01	-27.70	48300.35	-1.63		
gamma	I	2031-10-19T11:04:52.602		82.53	-25.72	47624.61	-0.80		

No planet occultations

gamma	E	2031-10-19T11:22:25.934		80.39	-21.94	47623.70	0.80		
delta	E	2031-10-19T11:31:41.805		78.86	-19.95	48300.35	1.63		
lambda	E	2031-10-19T11:44:52.856		76.44	-17.11	50026.71	2.72		
epsilon	E	2031-10-19T11:50:04.980		75.44	-15.99	50937.70	3.06		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2031-10-19T11:26:56.130
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      : 3427632808450590592
2Mass ID (if available) : 05453557+2332152
ICRS Star Coord at Epoch: 05h 45m 35.57712s +23:32:15.10550s
RUWE (>1.4 is poor) : 1.05
K magnitude          : 11.800
G magnitude          : 15.493
RP magnitude         : 14.471
BP magnitude         : 16.559
DUPflag             : 0
Distance (au)       : 18.599
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -7.99
Sun-Target sep (deg) : 118.74
Sun-Moon sep (deg)  : 157.89
B (ring opening deg) : 78.03
PA of pole (deg)    : 47.31
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.438
C/A sky separation (km) : 46377.9
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
    
```



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	2031-10-19T10:46:14.255	40.79	-76.42	50759.12	-3.23		
lambda	I	2031-10-19T10:50:12.782	41.69	-75.73	50026.71	-2.93		
delta	I	2031-10-19T11:01:47.034	44.34	-73.58	48300.35	-2.03		
gamma	I	2031-10-19T11:08:10.189	45.80	-72.31	47624.96	-1.49		
eta	I	2031-10-19T11:14:15.757	47.20	-71.07	47176.12	-0.96		

No planet occultations

eta	E	2031-10-19T11:35:32.084	52.08	-66.52	47176.12	0.96		
gamma	E	2031-10-19T11:41:34.486	53.47	-65.19	47623.25	1.50		
delta	E	2031-10-19T11:47:55.687	54.93	-63.77	48300.35	2.05		
lambda	E	2031-10-19T11:59:21.847	57.56	-61.20	50026.71	2.97		
epsilon	E	2031-10-19T12:04:15.770	58.68	-60.08	50953.41	3.28		