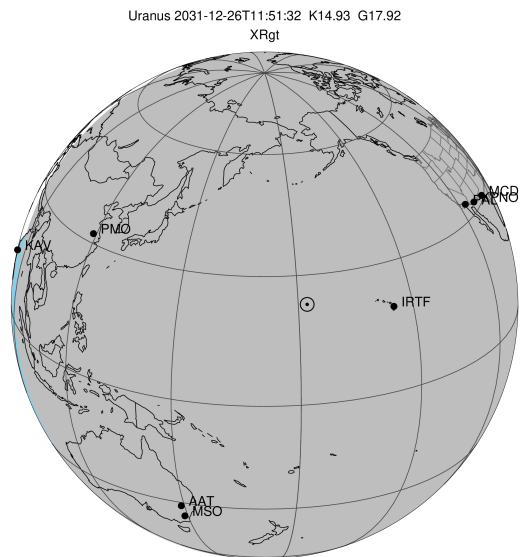


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-12-26T11:51:32.240  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3404507222762799872  
 2Mass ID (if available) : 05353041+2328277

ICRS Star Coord at Epoch: 05h 35m 30.42143s +23:28:27.61653s

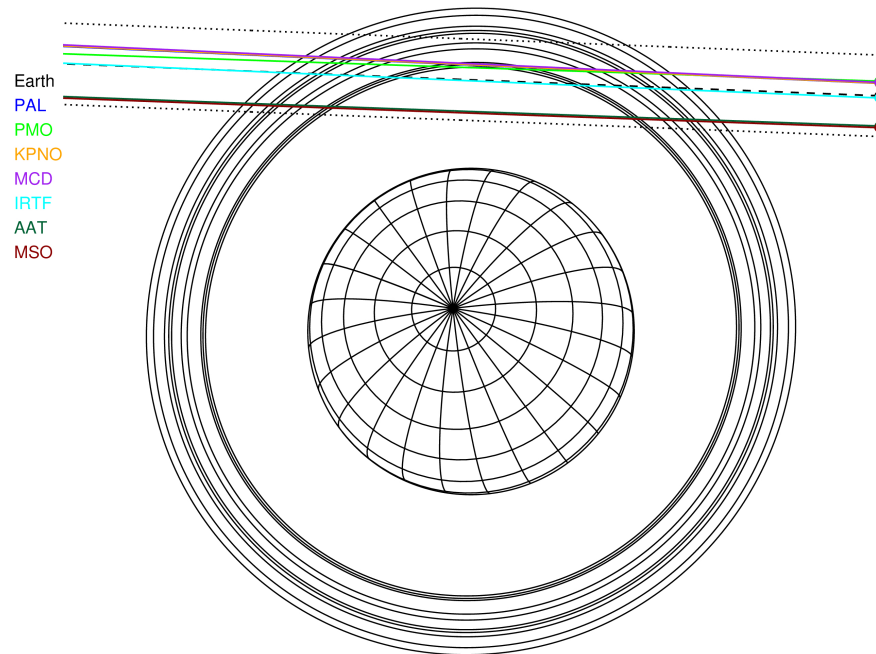
RUWE (>1.4 is poor) : 0.94  
 K magnitude : 14.930  
 G magnitude : 17.920  
 RP magnitude : 17.041  
 BP magnitude : 18.735  
 DUPflag : 0  
 Distance (au) : 18.115  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.01  
 Sun-Target sep (deg) : 170.33  
 Sun-Moon sep (deg) : 15.37  
 B (ring opening deg) : 79.65  
 PA of pole (deg) : 37.89

#	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



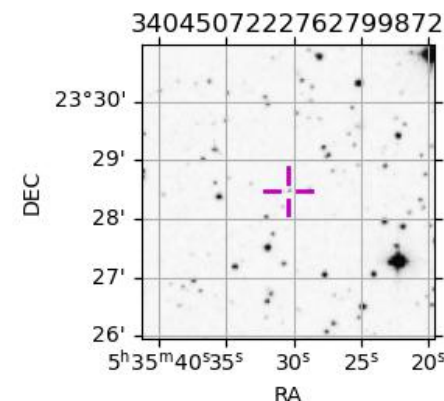
2031-12-26T11:51:32.2400 ra: 05 35 30.4214 s: +23 28 27.617 C/A 3.005° PA 177.76 deg v\_sky -23.01 km/s D 18.11 AU  
 Credit: Styled after SORA/Lucky Star

Uranus 2031-12-26T11:51:32 K14.93 G17.92 XRgt

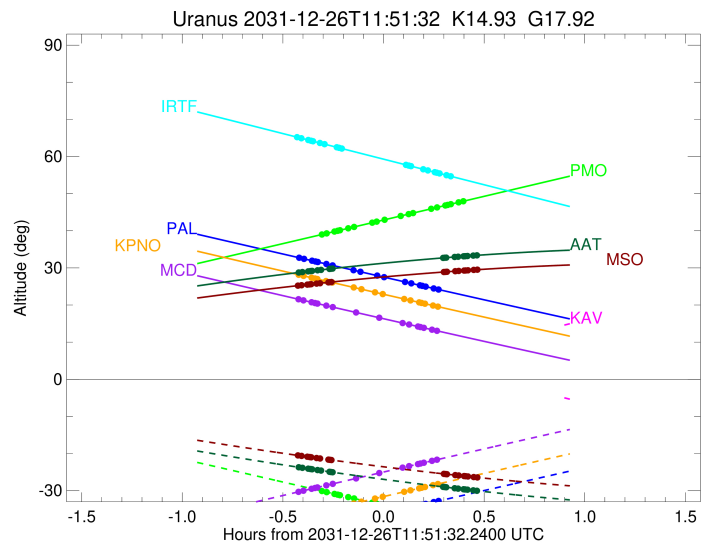
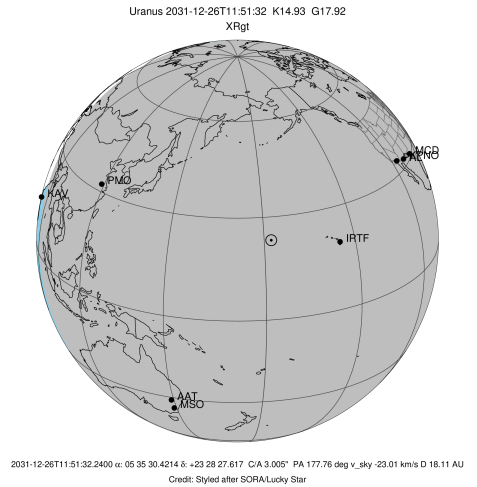


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+++++		+++++	DEC 26 11:26 - DEC 26 12:07	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++		+++++	DEC 26 11:33 - DEC 26 12:14	PnnRie
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	DEC 26 11:26 - DEC 26 12:07	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	DEC 26 11:26 - DEC 26 12:06	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++		+++++	DEC 26 11:25 - DEC 26 12:11	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	+++++		+++++	DEC 26 11:26 - DEC 26 12:19	PnnRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++		+++++	DEC 26 11:25 - DEC 26 12:19	PnnRie



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-12-26T11:47:38.940  
 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 : 3404507222762799872  
 2Mass ID (if available) : 05353041+2328277  
 ICRS Star Coord at Epoch: 05h 35m 30.42143s +23:28:27.61653s  
 RUWE (>1.4 is poor) : 0.94  
 K magnitude : 14.930  
 G magnitude : 17.920  
 RP magnitude : 17.041  
 BP magnitude : 18.735  
 DUPflag : 0  
 Distance (au) : 18.115  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.01  
 Sun-Target sep (deg) : 170.33  
 Sun-Moon sep (deg) : 16.24  
 B (ring opening deg) : 79.65  
 PA of pole (deg) : 37.89  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.174  
 C/A sky separation (km) : 41695.2  
 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

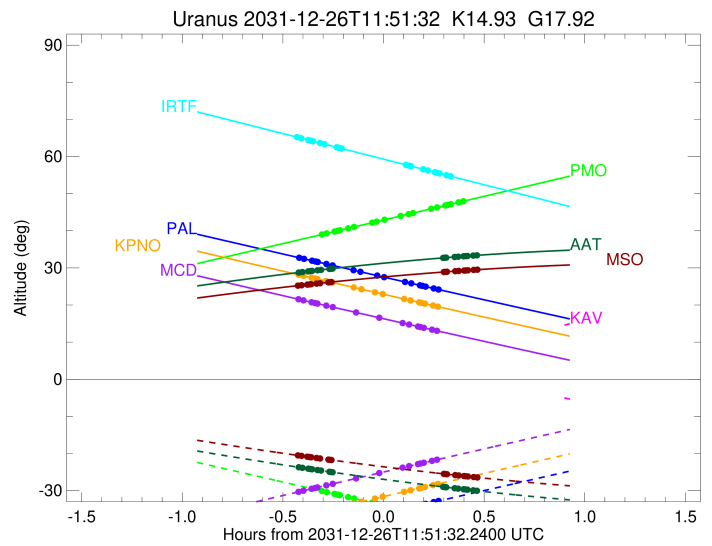
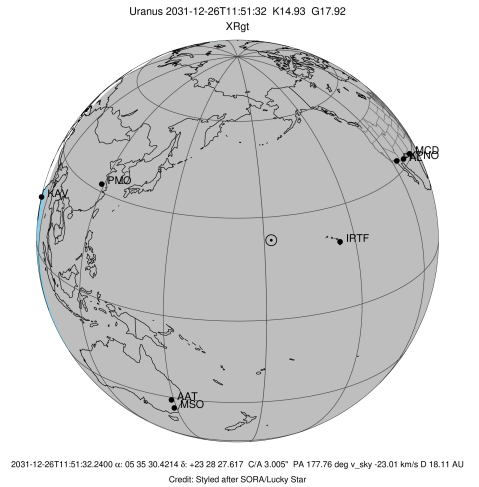


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-12-26T11:26:24.646		32.73	-41.43	51152.45	-13.10		
lambda	I	2031-12-26T11:27:51.685		32.43	-41.13	50026.71	-12.60		
delta	I	2031-12-26T11:30:15.195		31.93	-40.63	48300.35	-11.43		
gamma	I	2031-12-26T11:31:15.134		31.73	-40.42	47630.64	-10.91		
eta	I	2031-12-26T11:31:57.545		31.58	-40.27	47176.12	-10.52		
beta	I	2031-12-26T11:34:31.024		31.05	-39.74	45673.07	-9.03		
alpha	I	2031-12-26T11:36:24.318		30.66	-39.35	44714.56	-7.84		
4	I	2031-12-26T11:42:28.775		29.40	-38.08	42611.33	-3.60		
5	I	2031-12-26T11:44:56.981		28.90	-37.57	42225.04	-1.75		

No planet occultations

5	E	2031-12-26T11:49:28.597		27.96	-36.62	42237.04	1.75		
4	E	2031-12-26T11:51:52.226		27.47	-36.13	42615.87	3.60		
alpha	E	2031-12-26T11:57:52.906		26.23	-34.88	44694.16	7.82		
beta	E	2031-12-26T11:59:47.345		25.84	-34.48	45657.97	9.01		
eta	E	2031-12-26T12:02:22.755		25.31	-33.94	47176.12	10.50		
gamma	E	2031-12-26T12:03:05.316		25.17	-33.80	47631.22	10.89		
delta	E	2031-12-26T12:04:05.344		24.96	-33.59	48300.35	11.41		
lambda	E	2031-12-26T12:06:29.234		24.47	-33.09	50026.71	12.57		
epsilon	E	2031-12-26T12:07:27.628		24.27	-32.89	50773.54	13.06		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-12-26T11:54:45.090  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Observer code : PMO  
 Location : Purple Mtn Obs. Nanking  
 Latitude (deg) : 32.06667  
 E. Longitude (deg) : 118.82089  
 Altitude (km) : 0.364  
 Gaia source ID : 3404507222762799872  
 2Mass ID (if available) : 05353041+2328277  
 ICRS Star Coord at Epoch: 05h 35m 30.42143s +23:28:27.61653s  
 RUWE (>1.4 is poor) : 0.94  
 K magnitude : 14.930  
 G magnitude : 17.920  
 RP magnitude : 17.041  
 BP magnitude : 18.735  
 DUPflag : 0  
 Distance (au) : 18.115  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.01  
 Sun-Target sep (deg) : 170.33  
 Sun-Moon sep (deg) : 14.99  
 B (ring opening deg) : 79.65  
 PA of pole (deg) : 37.89  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.144  
 C/A sky separation (km) : 41301.5  
 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\_itrff93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

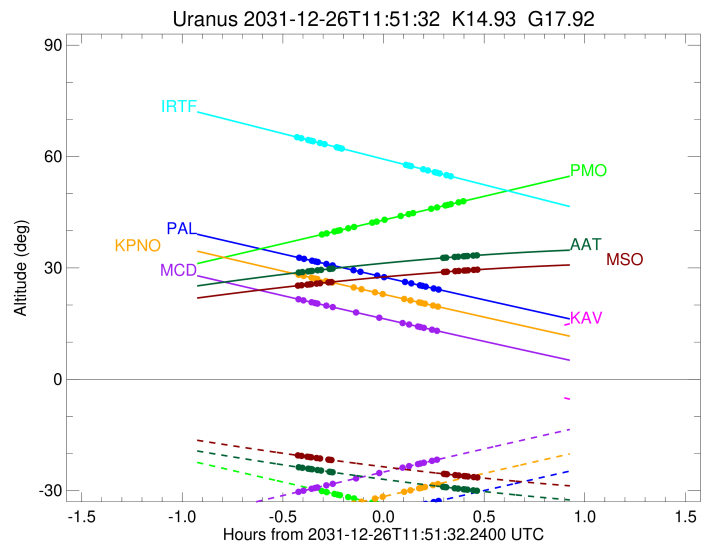
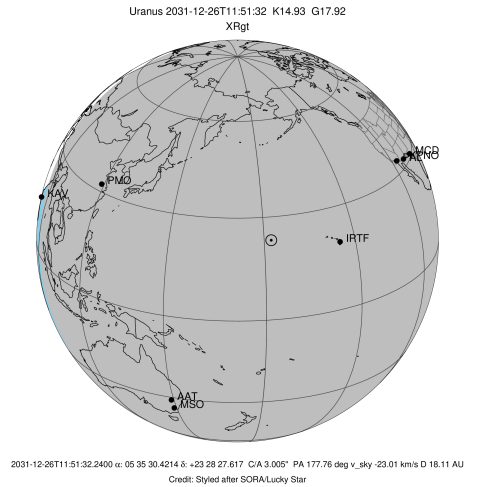


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-12-26T11:33:11.014		39.00	-30.11	51153.08	-13.38		
lambda	I	2031-12-26T11:34:36.211		39.30	-30.40	50026.71	-12.90		
delta	I	2031-12-26T11:36:55.939		39.80	-30.89	48300.35	-11.79		
gamma	I	2031-12-26T11:37:53.987		40.00	-31.09	47630.62	-11.29		
eta	I	2031-12-26T11:38:34.919		40.15	-31.24	47176.12	-10.92		
beta	I	2031-12-26T11:41:01.789		40.67	-31.75	45673.23	-9.51		
alpha	I	2031-12-26T11:42:48.407		41.04	-32.12	44715.01	-8.41		
4	I	2031-12-26T11:48:05.245		42.16	-33.23	42610.47	-4.78		
5	I	2031-12-26T11:49:40.153		42.50	-33.56	42219.59	-3.62		
6	I	2031-12-26T11:52:26.487		43.09	-34.14	41794.89	-1.44		

No planet occultations

6	E	2031-12-26T11:56:06.132		43.87	-34.91	41795.45	1.44		
5	E	2031-12-26T11:58:58.644		44.48	-35.51	42244.39	3.63		
4	E	2031-12-26T12:00:28.801		44.80	-35.83	42616.28	4.79		
alpha	E	2031-12-26T12:05:41.212		45.90	-36.93	44693.31	8.42		
beta	E	2031-12-26T12:07:28.610		46.29	-37.30	45657.31	9.53		
eta	E	2031-12-26T12:09:56.852		46.81	-37.83	47176.12	10.94		
gamma	E	2031-12-26T12:10:37.757		46.96	-37.97	47631.16	11.31		
delta	E	2031-12-26T12:11:35.645		47.16	-38.17	48300.35	11.81		
lambda	E	2031-12-26T12:13:55.077		47.66	-38.66	50026.71	12.93		
epsilon	E	2031-12-26T12:14:51.602		47.86	-38.86	50769.83	13.41		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-12-26T11:47:28.550  
 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 : 3404507222762799872  
 2Mass ID (if available) : 05353041+2328277  
 ICRS Star Coord at Epoch: 05h 35m 30.42143s +23:28:27.61653s  
 RUWE (>1.4 is poor) : 0.94  
 K magnitude : 14.930  
 G magnitude : 17.920  
 RP magnitude : 17.041  
 BP magnitude : 18.735  
 DUPflag : 0  
 Distance (au) : 18.115  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.01  
 Sun-Target sep (deg) : 170.33  
 Sun-Moon sep (deg) : 16.25  
 B (ring opening deg) : 79.65  
 PA of pole (deg) : 37.89  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.177  
 C/A sky separation (km) : 41745.2  
 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\_itrf93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk

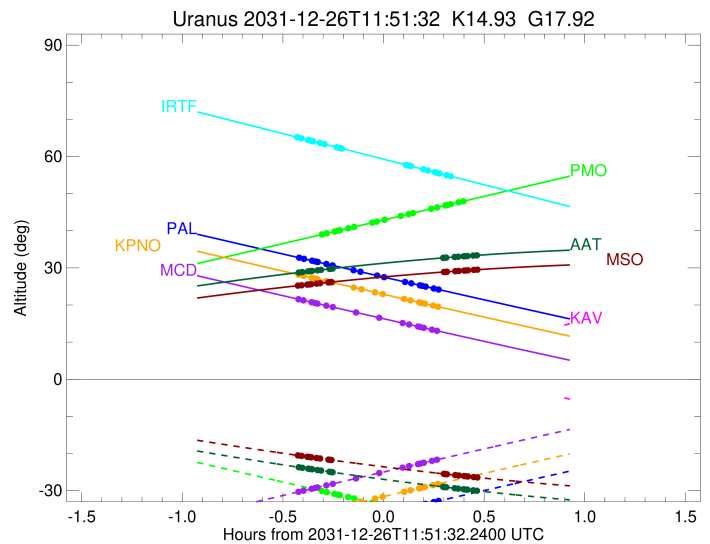
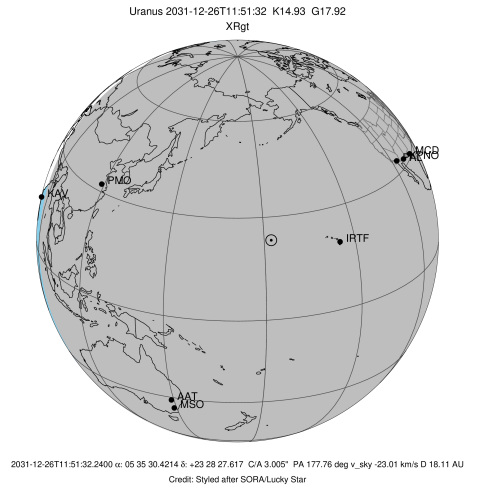


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-12-26T11:26:15.644		28.15	-36.92	51151.89	-13.05		
lambda	I	2031-12-26T11:27:42.994		27.85	-36.61	50026.71	-12.55		
delta	I	2031-12-26T11:30:07.177		27.34	-36.11	48300.35	-11.37		
gamma	I	2031-12-26T11:31:07.439		27.14	-35.89	47630.64	-10.85		
eta	I	2031-12-26T11:31:50.100		26.99	-35.74	47176.12	-10.46		
beta	I	2031-12-26T11:34:24.666		26.45	-35.20	45673.03	-8.96		
alpha	I	2031-12-26T11:36:19.037		26.05	-34.80	44714.46	-7.75		
4	I	2031-12-26T11:42:32.112		24.76	-33.49	42611.49	-3.41		
5	I	2031-12-26T11:45:19.015		24.19	-32.91	42226.46	-1.33		

No planet occultations

5	E	2031-12-26T11:48:45.638		23.47	-32.19	42235.57	1.33		
4	E	2031-12-26T11:51:27.963		22.92	-31.62	42615.80	3.41		
alpha	E	2031-12-26T11:57:37.273		21.65	-30.33	44694.25	7.74		
beta	E	2031-12-26T11:59:32.801		21.25	-29.93	45658.03	8.94		
eta	E	2031-12-26T12:02:09.316		20.71	-29.39	47176.12	10.44		
gamma	E	2031-12-26T12:02:52.131		20.57	-29.24	47631.23	10.82		
delta	E	2031-12-26T12:03:52.490		20.36	-29.03	48300.35	11.35		
lambda	E	2031-12-26T12:06:17.071		19.87	-28.52	50026.71	12.51		
epsilon	E	2031-12-26T12:07:15.738		19.67	-28.32	50773.86	13.01		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-12-26T11:47:18.750  
 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 : 3404507222762799872  
 2Mass ID (if available) : 05353041+2328277  
 ICRS Star Coord at Epoch: 05h 35m 30.42143s +23:28:27.61653s  
 RUWE (>1.4 is poor) : 0.94  
 K magnitude : 14.930  
 G magnitude : 17.920  
 RP magnitude : 17.041  
 BP magnitude : 18.735  
 DUPflag : 0  
 Distance (au) : 18.115  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.01  
 Sun-Target sep (deg) : 170.33  
 Sun-Moon sep (deg) : 16.25  
 B (ring opening deg) : 79.65  
 PA of pole (deg) : 37.89  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.189  
 C/A sky separation (km) : 41901.3  
 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\_itrf93\_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	2031-12-26T11:26:13.001		21.55	-30.32	51149.81	-12.92		
lambda	I	2031-12-26T11:27:41.135		21.25	-30.01	50026.71	-12.41		
delta	I	2031-12-26T11:30:07.166		20.74	-29.50	48300.35	-11.21		
gamma	I	2031-12-26T11:31:08.340		20.53	-29.28	47630.66	-10.68		
eta	I	2031-12-26T11:31:51.713		20.38	-29.13	47176.12	-10.28		
beta	I	2031-12-26T11:34:29.475		19.83	-28.58	45672.89	-8.74		
alpha	I	2031-12-26T11:36:27.148		19.43	-28.16	44714.11	-7.50		
4	I	2031-12-26T11:43:12.076		18.03	-26.74	42612.04	-2.76		

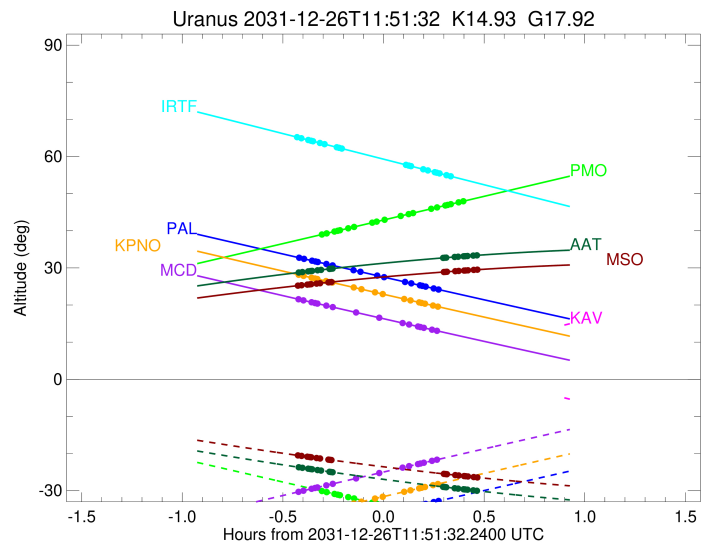
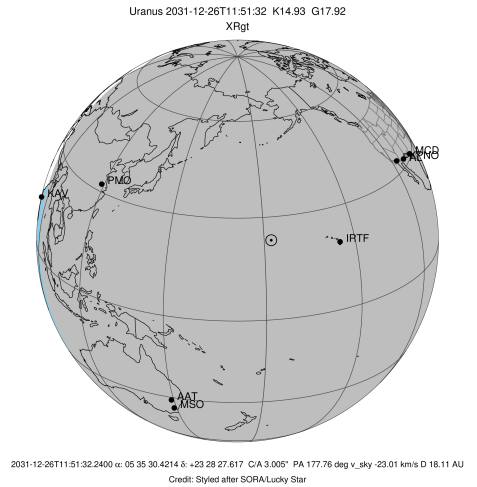
No planet occultations

4	E	2031-12-26T11:50:28.014		16.53	-25.22	42615.55	2.76		
alpha	E	2031-12-26T11:57:09.186		15.16	-23.82	44694.51	7.49		
beta	E	2031-12-26T11:59:08.028		14.76	-23.41	45658.22	8.73		
eta	E	2031-12-26T12:01:47.758		14.21	-22.85	47176.12	10.26		
gamma	E	2031-12-26T12:02:31.291		14.07	-22.70	47631.24	10.65		
delta	E	2031-12-26T12:03:32.569		13.86	-22.49	48300.35	11.18		
lambda	E	2031-12-26T12:05:59.016		13.36	-21.98	50026.71	12.37		
epsilon	E	2031-12-26T12:06:58.406		13.16	-21.77	50774.76	12.88		



```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2031-12-26T11:49:07.350
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      : 3404507222762799872
2Mass ID (if available) : 05353041+2328277
ICRS Star Coord at Epoch: 05h 35m 30.42143s +23:28:27.61653s
RUWE (>1.4 is poor) : 0.94
K magnitude          : 14.930
G magnitude          : 17.920
RP magnitude         : 17.041
BP magnitude         : 18.735
DUPflag             : 0
Distance (au)       : 18.115
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -23.01
Sun-Target sep (deg) : 170.33
Sun-Moon sep (deg)  : 16.03
B (ring opening deg) : 79.65
PA of pole (deg)    : 37.89
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.985
C/A sky separation (km) : 39220.9
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_itrff93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```

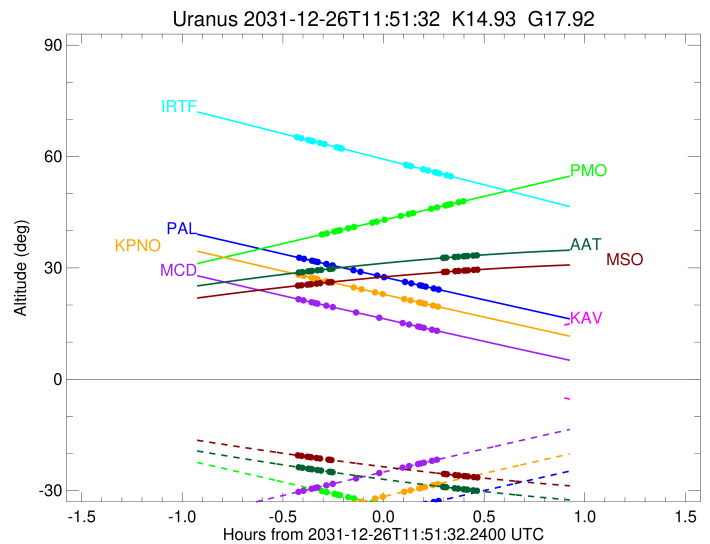
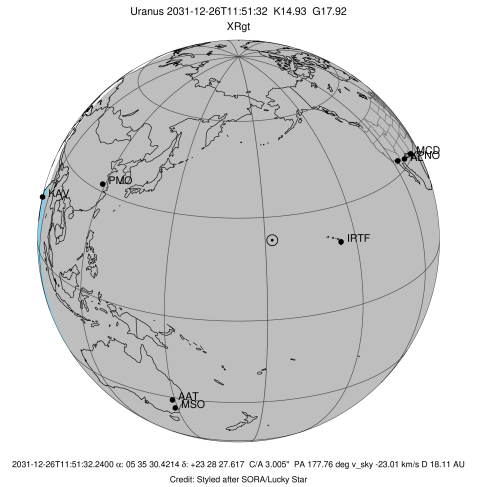


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-12-26T11:25:44.639		65.22	-74.81	51184.53	-14.79		
lambda	I	2031-12-26T11:27:03.572		64.92	-74.52	50026.71	-14.40		
delta	I	2031-12-26T11:29:07.306		64.45	-74.05	48300.35	-13.49		
gamma	I	2031-12-26T11:29:57.718		64.25	-73.86	47630.32	-13.09		
eta	I	2031-12-26T11:30:32.800		64.12	-73.73	47176.12	-12.80		
beta	I	2031-12-26T11:32:35.072		63.65	-73.27	45674.93	-11.73		
alpha	I	2031-12-26T11:33:59.273		63.33	-72.95	44719.18	-10.92		
4	I	2031-12-26T11:37:34.112		62.51	-72.14	42605.74	-8.70		
5	I	2031-12-26T11:38:22.361		62.32	-71.95	42203.74	-8.16		
6	I	2031-12-26T11:39:13.851		62.12	-71.76	41795.84	-7.52		

No planet occultations

6	E	2031-12-26T11:58:06.622		57.78	-67.45	41798.45	7.51		
5	E	2031-12-26T11:59:04.389		57.56	-67.23	42259.20	8.16		
4	E	2031-12-26T11:59:48.012		57.40	-67.07	42616.51	8.69		
alpha	E	2031-12-26T12:03:18.992		56.59	-66.26	44691.07	10.91		
beta	E	2031-12-26T12:04:44.248		56.26	-65.94	45655.50	11.71		
eta	E	2031-12-26T12:06:48.318		55.79	-65.46	47176.12	12.78		
gamma	E	2031-12-26T12:07:23.510		55.65	-65.33	47630.99	13.07		
delta	E	2031-12-26T12:08:13.959		55.46	-65.14	48300.35	13.47		
lambda	E	2031-12-26T12:10:17.926		54.98	-64.66	50026.71	14.37		
epsilon	E	2031-12-26T12:11:08.480		54.79	-64.47	50761.95	14.76		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-12-26T11:53:14.280  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Observer code : AAT  
 Location : Siding Spring (AAT)  
 Latitude (deg) : -31.27703  
 E. Longitude (deg) : 149.06608  
 Altitude (km) : 1.164  
 Gaia source ID : 3404507222762799872  
 2Mass ID (if available) : 05353041+2328277  
 ICRS Star Coord at Epoch: 05h 35m 30.42143s +23:28:27.61653s  
 RUWE (>1.4 is poor) : 0.94  
 K magnitude : 14.930  
 G magnitude : 17.920  
 RP magnitude : 17.041  
 BP magnitude : 18.735  
 DUPflag : 0  
 Distance (au) : 18.115  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.01  
 Sun-Target sep (deg) : 170.33  
 Sun-Moon sep (deg) : 15.10  
 B (ring opening deg) : 79.65  
 PA of pole (deg) : 37.89  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.621  
 C/A sky separation (km) : 34430.6  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl1.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

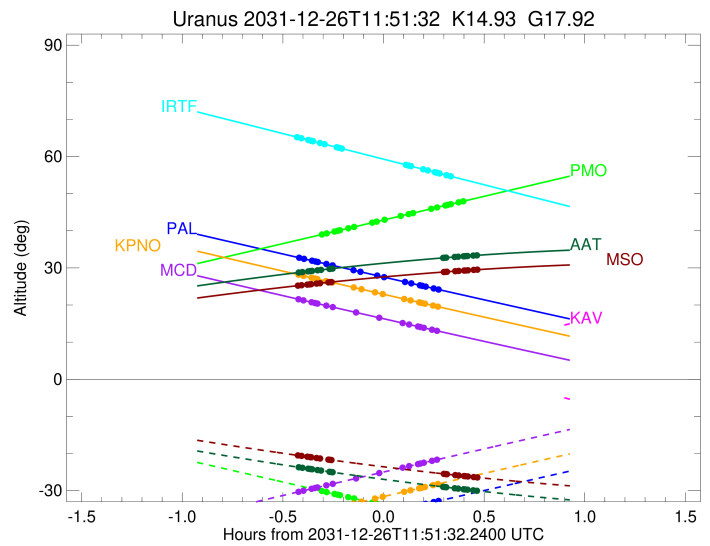
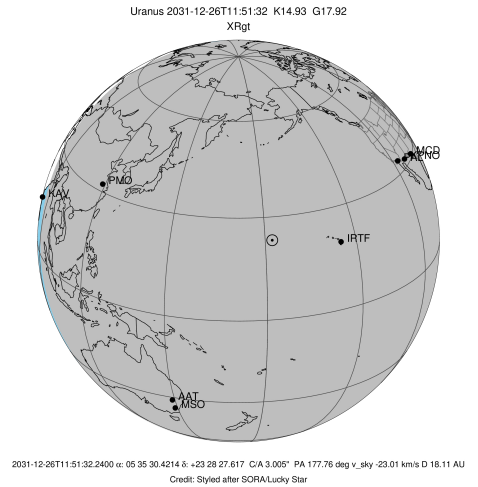


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-12-26T11:26:11.643		28.75	-23.69	51237.63	-17.15		
lambda	I	2031-12-26T11:27:22.491		28.88	-23.85	50026.71	-16.91		
delta	I	2031-12-26T11:29:06.364		29.07	-24.09	48300.35	-16.32		
gamma	I	2031-12-26T11:29:47.766		29.14	-24.18	47629.73	-16.07		
eta	I	2031-12-26T11:30:16.147		29.19	-24.24	47176.12	-15.89		
beta	I	2031-12-26T11:31:52.370		29.36	-24.46	45677.29	-15.24		
alpha	I	2031-12-26T11:32:55.692		29.47	-24.60	44725.60	-14.78		
4	I	2031-12-26T11:35:25.497		29.73	-24.93	42598.07	-13.60		
5	I	2031-12-26T11:35:56.161		29.78	-24.99	42186.92	-13.34		
6	I	2031-12-26T11:36:25.335		29.83	-25.06	41799.63	-13.04		

No planet occultations

6	E	2031-12-26T12:09:15.102		32.69	-28.98	41804.47	13.06		
5	E	2031-12-26T12:09:50.495		32.74	-29.04	42277.74	13.35		
4	E	2031-12-26T12:10:16.320		32.77	-29.09	42614.62	13.61		
alpha	E	2031-12-26T12:12:41.932		32.94	-29.35	44687.61	14.79		
beta	E	2031-12-26T12:13:46.109		33.01	-29.46	45651.95	15.26		
eta	E	2031-12-26T12:15:23.834		33.12	-29.63	47176.12	15.91		
gamma	E	2031-12-26T12:15:52.229		33.16	-29.68	47630.52	16.09		
delta	E	2031-12-26T12:16:33.530		33.20	-29.75	48300.35	16.34		
lambda	E	2031-12-26T12:18:17.265		33.31	-29.92	50026.71	16.93		
epsilon	E	2031-12-26T12:18:59.618		33.36	-30.00	50748.51	17.17		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2031-12-26T11:53:10.660  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Observer code : MSO  
 Location : Mt. Stromlo Observatory  
 Latitude (deg) : -35.32000  
 E. Longitude (deg) : 149.00833  
 Altitude (km) : 0.770  
 Gaia source ID : 3404507222762799872  
 2Mass ID (if available) : 05353041+2328277  
 ICRS Star Coord at Epoch: 05h 35m 30.42143s +23:28:27.61653s  
 RUWE (>1.4 is poor) : 0.94  
 K magnitude : 14.930  
 G magnitude : 17.920  
 RP magnitude : 17.041  
 BP magnitude : 18.735  
 DUPflag : 0  
 Distance (au) : 18.115  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.01  
 Sun-Target sep (deg) : 170.33  
 Sun-Moon sep (deg) : 15.09  
 B (ring opening deg) : 79.65  
 PA of pole (deg) : 37.89  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.601  
 C/A sky separation (km) : 34176.1  
 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	2031-12-26T11:25:56.850		25.21	-20.50	51240.41	-17.25		
lambda	I	2031-12-26T11:27:07.445		25.33	-20.65	50026.71	-17.01		
delta	I	2031-12-26T11:28:50.632		25.50	-20.87	48300.35	-16.44		
gamma	I	2031-12-26T11:29:31.731		25.57	-20.96	47629.70	-16.20		
eta	I	2031-12-26T11:29:59.889		25.61	-21.01	47176.12	-16.02		
beta	I	2031-12-26T11:31:35.278		25.77	-21.21	45677.40	-15.39		
alpha	I	2031-12-26T11:32:37.965		25.87	-21.34	44725.90	-14.93		
4	I	2031-12-26T11:35:06.034		26.11	-21.65	42597.68	-13.79		
5	I	2031-12-26T11:35:36.281		26.15	-21.71	42186.23	-13.54		
6	I	2031-12-26T11:36:04.958		26.20	-21.77	41799.85	-13.25		

No planet occultations

6	E	2031-12-26T12:09:28.567		28.89	-25.48	41804.76	13.26		
5	E	2031-12-26T12:10:03.471		28.93	-25.54	42278.45	13.55		
4	E	2031-12-26T12:10:28.872		28.96	-25.58	42614.48	13.80		
alpha	E	2031-12-26T12:12:52.751		29.11	-25.81	44687.49	14.95		
beta	E	2031-12-26T12:13:56.298		29.18	-25.92	45651.80	15.41		
eta	E	2031-12-26T12:15:33.195		29.28	-26.07	47176.12	16.04		
gamma	E	2031-12-26T12:16:01.369		29.31	-26.12	47630.49	16.22		
delta	E	2031-12-26T12:16:42.369		29.35	-26.18	48300.35	16.46		
lambda	E	2031-12-26T12:18:25.424		29.46	-26.34	50026.71	17.03		
epsilon	E	2031-12-26T12:19:07.504		29.50	-26.41	50748.09	17.27		