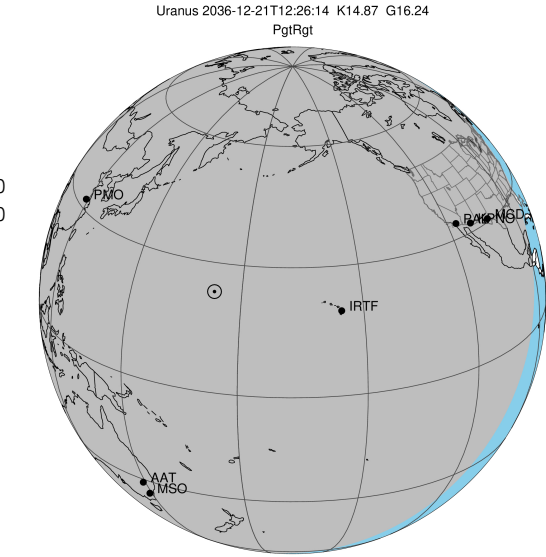


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-12-21T12:26:14.710  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 869291558122119168  
 2Mass ID (if available) : 07171852+2241401

Uranus 2036-12-21T12:26:14 K14.87 G16.24 PgtRgt

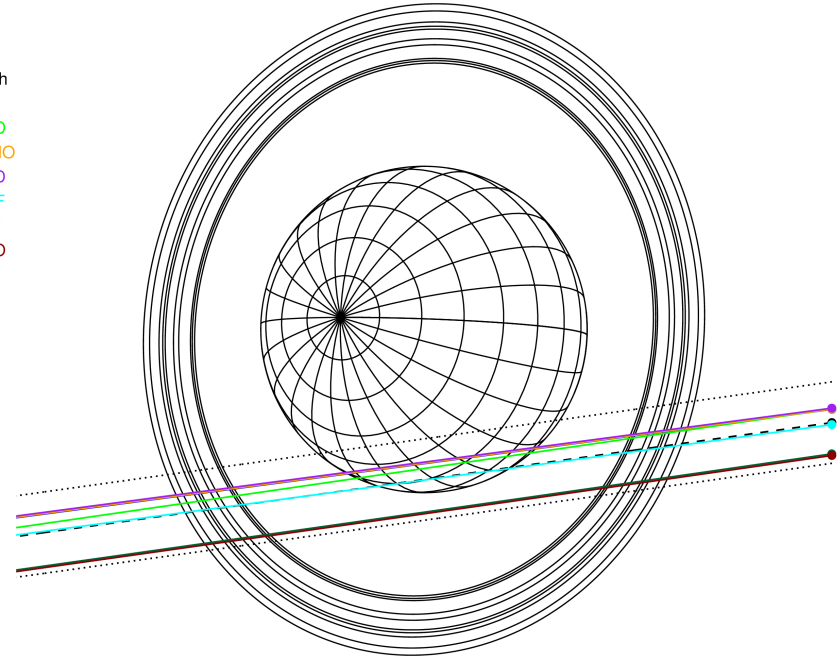
ICRS Star Coord at Epoch: 07h 17m 18.53891s +22:41:40.15004s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 14.869  
 G magnitude : 16.237  
 RP magnitude : 15.733  
 BP magnitude : 16.546  
 DUPflag : 0  
 Distance (au) : 17.829  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.86  
 Sun-Target sep (deg) : 161.93  
 Sun-Moon sep (deg) : 154.71  
 B (ring opening deg) : 58.87  
 PA of pole (deg) : 81.75  
 # 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



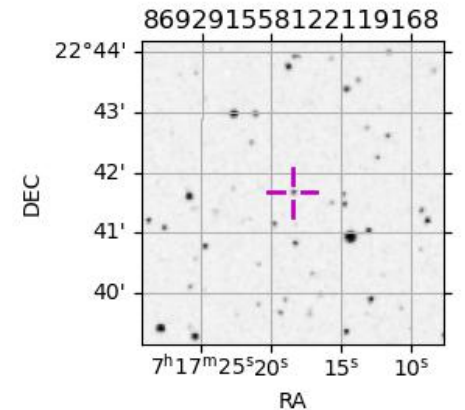
2036-12-21T12:26:14.71000000: 07 17 18.53891 & +22 41 40.15004 C/A 1.7911 PA 7.95 deg v\_sky -21.86 km/s D 17.83 AU  
 Credit: Styled after SORA/Lucky Star

Earth  
 PAL  
 PMO  
 KPNO  
 MCD  
 IRTF  
 AAT  
 MSO



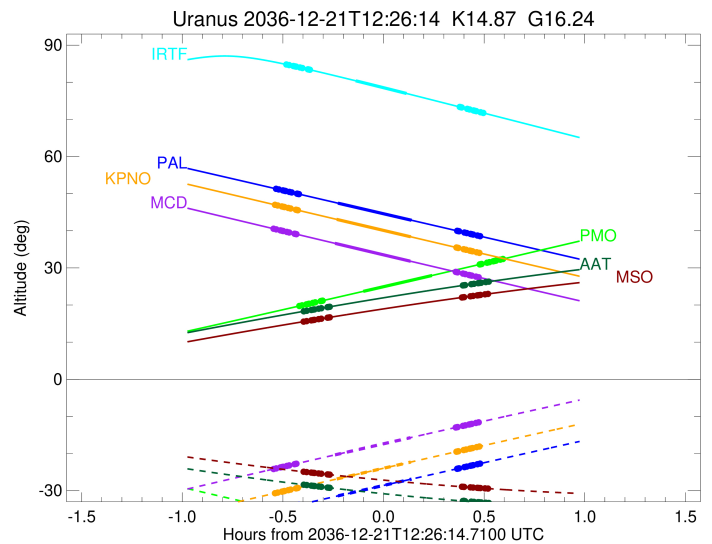
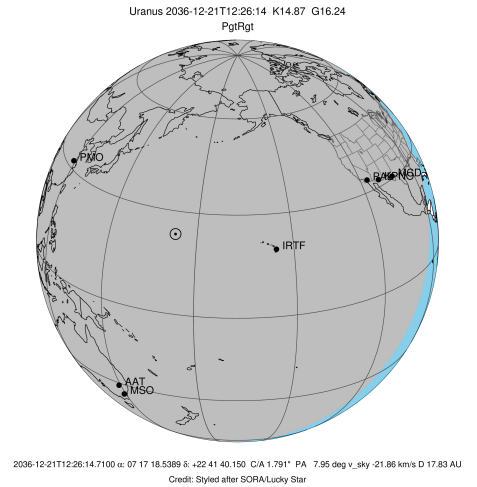
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEncode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (200")	33.4	243.1	+++++	+ +	+++++	DEC 21 11:54 - DEC 21 12:55	PieRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+ +	+++++	DEC 21 12:00 - DEC 21 13:01	PieRie
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++	+ +	+++++	DEC 21 11:53 - DEC 21 12:54	PieRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++	+ +	+++++	DEC 21 11:53 - DEC 21 12:54	PieRie
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++	+ +	+++++	DEC 21 11:57 - DEC 21 12:56	PieRie
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 21 12:02 - DEC 21 12:57	PnnRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++		+++++	DEC 21 12:02 - DEC 21 12:57	PnnRie



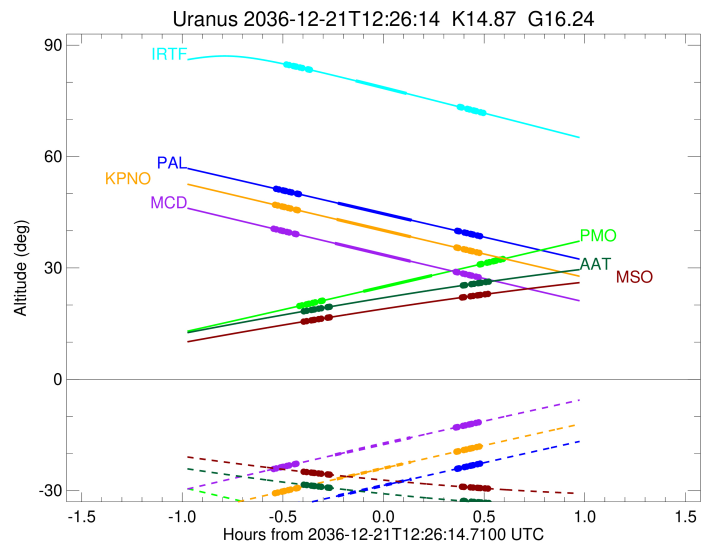
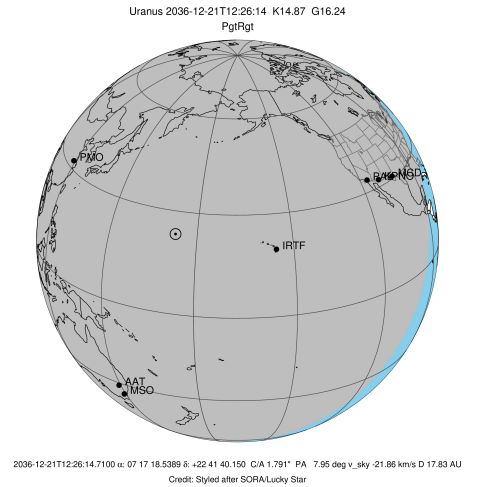
```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch              : 2036-12-21T12:23:28.940
Event type             : PgtRgt
: Uranus occs: geocentric, topocentric
: 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        : 869291558122119168
2Mass ID (if available) : 07171852+2241401
ICRS Star Coord at Epoch: 07h 17m 18.53891s +22:41:40.15004s
RUWE (>1.4 is poor)  : 1.04
K magnitude            : 14.869
G magnitude            : 16.237
RP magnitude           : 15.733
BP magnitude           : 16.546
DUPflag                : 0
Distance (au)         : 17.829
f0 (km)                : 0.000
g0 (km)                : 0.000
skyplane vel. (km/s)  : -21.86
Sun-Target sep (deg)  : 161.93
Sun-Moon sep (deg)    : 154.49
B (ring opening deg)  : 58.87
PA of pole (deg)      : 81.75
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.610
C/A sky separation (km) : 20822.1
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
    
```



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2036-12-21T11:54:01.398		51.34	-35.27	51433.04	-23.40		
lambda	I	2036-12-21T11:55:01.823		51.13	-35.06	50026.71	-23.21		
delta	I	2036-12-21T11:56:16.510		50.87	-34.80	48300.35	-23.02		
gamma	I	2036-12-21T11:56:45.777		50.77	-34.70	47627.73	-22.94		
eta	I	2036-12-21T11:57:05.484		50.70	-34.63	47176.12	-22.89		
beta	I	2036-12-21T11:58:12.650		50.47	-34.40	45645.47	-22.69		
alpha	I	2036-12-21T11:58:52.308		50.33	-34.26	44749.64	-22.57		
4	I	2036-12-21T12:00:31.239		49.98	-33.92	42526.98	-22.22		
5	I	2036-12-21T12:00:40.942		49.95	-33.89	42296.08	-22.16		
6	I	2036-12-21T12:01:02.488		49.88	-33.81	41849.79	-22.12		
Uranus	I	2036-12-21T12:12:38.365		47.45	-31.41	25301.96		-23.49	-24.48
Uranus	E	2036-12-21T12:34:36.379		42.84	-26.89	25510.35		9.92	10.39
6	E	2036-12-21T12:48:12.564		39.98	-24.11	41866.22	22.07		
5	E	2036-12-21T12:48:26.714		39.93	-24.06	42159.31	22.10		
4	E	2036-12-21T12:48:46.445		39.87	-24.00	42602.27	22.17		
alpha	E	2036-12-21T12:50:19.952		39.54	-23.68	44689.97	22.51		
beta	E	2036-12-21T12:51:03.096		39.39	-23.53	45659.90	22.63		
eta	E	2036-12-21T12:52:09.876		39.16	-23.31	47176.12	22.82		
gamma	E	2036-12-21T12:52:29.361		39.09	-23.24	47621.33	22.87		
delta	E	2036-12-21T12:52:58.995		38.98	-23.14	48300.35	22.95		
lambda	E	2036-12-21T12:54:13.912		38.72	-22.89	50026.71	23.13		
epsilon	E	2036-12-21T12:55:03.321		38.55	-22.72	51172.34	23.32		

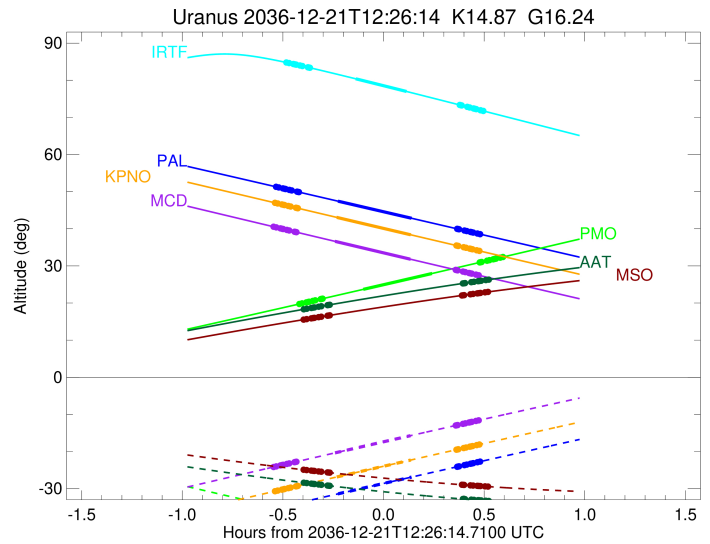
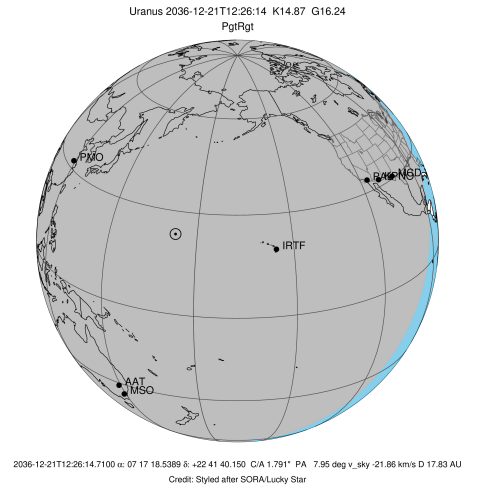
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-12-21T12:30:19.280  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PMO  
 Location : Purple Mtn Obs. Nanking  
 Latitude (deg) : 32.06667  
 E. Longitude (deg) : 118.82089  
 Altitude (km) : 0.364  
 Gaia source ID : 869291558122119168  
 2Mass ID (if available) : 07171852+2241401  
 ICRS Star Coord at Epoch: 07h 17m 18.53891s +22:41:40.15004s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 14.869  
 G magnitude : 16.237  
 RP magnitude : 15.733  
 BP magnitude : 16.546  
 DUPflag : 0  
 Distance (au) : 17.829  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.86  
 Sun-Target sep (deg) : 161.93  
 Sun-Moon sep (deg) : 155.57  
 B (ring opening deg) : 58.87  
 PA of pole (deg) : 81.75  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.666  
 C/A sky separation (km) : 21542.7  
 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\_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	2036-12-21T12:00:57.539		19.70	-36.41	51434.52	-23.02		
lambda	I	2036-12-21T12:01:59.045		19.91	-36.63	50026.71	-22.82		
delta	I	2036-12-21T12:03:15.024		20.17	-36.89	48300.35	-22.62		
gamma	I	2036-12-21T12:03:44.811		20.27	-37.00	47627.70	-22.54		
eta	I	2036-12-21T12:04:04.869		20.34	-37.07	47176.12	-22.48		
beta	I	2036-12-21T12:05:13.270		20.58	-37.31	45645.37	-22.27		
alpha	I	2036-12-21T12:05:53.675		20.72	-37.45	44749.53	-22.14		
4	I	2036-12-21T12:07:34.546		21.06	-37.80	42527.08	-21.78		
5	I	2036-12-21T12:07:44.478		21.10	-37.84	42295.57	-21.71		
6	I	2036-12-21T12:08:06.419		21.17	-37.92	41850.20	-21.67		
Uranus	I	2036-12-21T12:20:14.206		23.68	-40.48	25318.20		-22.68	-23.64
Uranus	E	2036-12-21T12:40:41.676		27.95	-44.81	25526.09		8.15	8.53
6	E	2036-12-21T12:54:56.147		30.94	-47.83	41867.18	21.76		
5	E	2036-12-21T12:55:10.445		30.99	-47.88	42160.17	21.79		
4	E	2036-12-21T12:55:30.388		31.06	-47.95	42601.24	21.86		
alpha	E	2036-12-21T12:57:05.188		31.39	-48.29	44690.52	22.24		
beta	E	2036-12-21T12:57:48.789		31.54	-48.44	45659.32	22.37		
eta	E	2036-12-21T12:58:56.331		31.78	-48.68	47176.12	22.58		
gamma	E	2036-12-21T12:59:16.017		31.85	-48.75	47621.28	22.64		
delta	E	2036-12-21T12:59:45.954		31.95	-48.86	48300.35	22.73		
lambda	E	2036-12-21T13:01:01.582		32.22	-49.12	50026.71	22.92		
epsilon	E	2036-12-21T13:01:51.892		32.40	-49.30	51183.13	23.13		

```

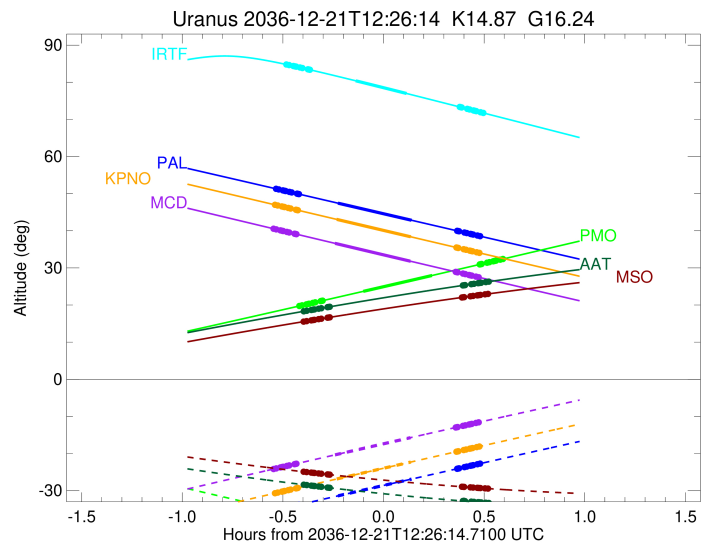
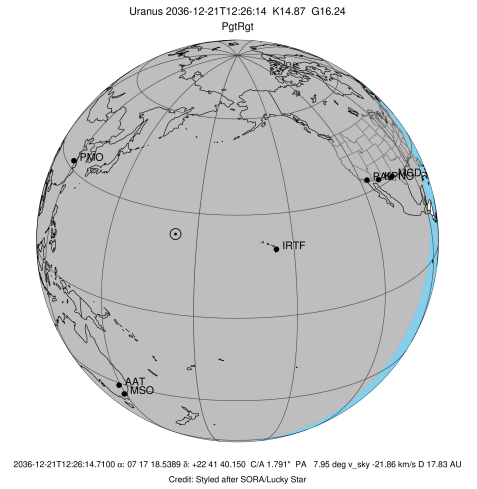
target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2036-12-21T12:23:12.800
Event type            : PgtRgt
: Uranus occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code         : KPNO
Location              : Kitt Peak Natl Obs
Latitude (deg)        : 31.96333
E. Longitude (deg)    : 248.40000
Altitude (km)         : 2.120
Gaia source ID        : 869291558122119168
2Mass ID (if available) : 07171852+2241401
ICRS Star Coord at Epoch: 07h 17m 18.53891s +22:41:40.15004s
RUWE (>1.4 is poor) : 1.04
K magnitude           : 14.869
G magnitude           : 16.237
RP magnitude          : 15.733
BP magnitude          : 16.546
DUPflag              : 0
Distance (au)         : 17.829
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -21.86
Sun-Target sep (deg)  : 161.93
Sun-Moon sep (deg)    : 154.42
B (ring opening deg) : 58.87
PA of pole (deg)     : 81.75
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.606
C/A sky separation (km) : 20761.6
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_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	2036-12-21T11:53:42.083		47.03	-30.74	51432.74	-23.39		
lambda	I	2036-12-21T11:54:42.517		46.82	-30.53	50026.71	-23.20		
delta	I	2036-12-21T11:55:57.227		46.55	-30.27	48300.35	-23.01		
gamma	I	2036-12-21T11:56:26.502		46.45	-30.17	47627.74	-22.94		
eta	I	2036-12-21T11:56:46.214		46.38	-30.10	47176.12	-22.88		
beta	I	2036-12-21T11:57:53.395		46.14	-29.86	45645.48	-22.69		
alpha	I	2036-12-21T11:58:33.060		46.00	-29.72	44749.66	-22.56		
4	I	2036-12-21T12:00:12.003		45.65	-29.38	42526.97	-22.22		
5	I	2036-12-21T12:00:21.703		45.61	-29.35	42296.16	-22.16		
6	I	2036-12-21T12:00:43.256		45.54	-29.27	41849.73	-22.12		
Uranus	I	2036-12-21T12:12:17.673		43.07	-26.86	25300.38		-23.57	-24.56
Uranus	E	2036-12-21T12:34:24.790		38.37	-22.29	25509.16		10.05	10.51
6	E	2036-12-21T12:47:59.319		35.49	-19.51	41866.16	22.06		
5	E	2036-12-21T12:48:13.477		35.44	-19.46	42159.26	22.10		
4	E	2036-12-21T12:48:33.217		35.37	-19.40	42602.33	22.16		
alpha	E	2036-12-21T12:50:06.753		35.04	-19.08	44689.94	22.50		
beta	E	2036-12-21T12:50:49.920		34.89	-18.93	45659.94	22.62		
eta	E	2036-12-21T12:51:56.732		34.65	-18.70	47176.12	22.81		
gamma	E	2036-12-21T12:52:16.228		34.58	-18.64	47621.33	22.86		
delta	E	2036-12-21T12:52:45.879		34.48	-18.54	48300.35	22.94		
lambda	E	2036-12-21T12:54:00.843		34.22	-18.28	50026.71	23.12		
epsilon	E	2036-12-21T12:54:50.257		34.04	-18.12	51171.71	23.31		

```

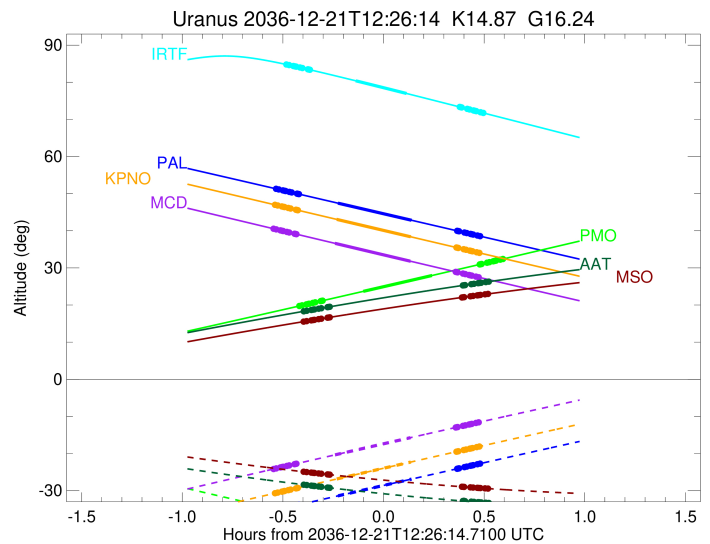
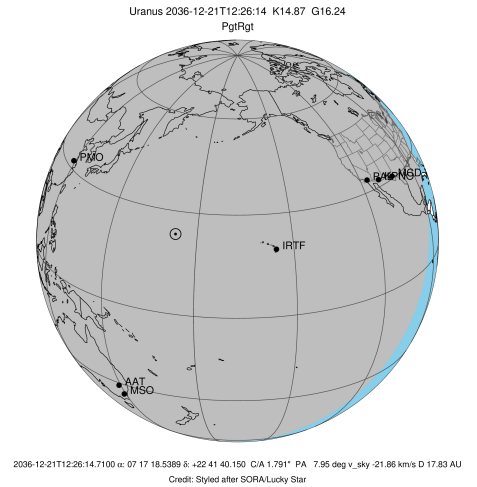
target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2036-12-21T12:22:54.070
Event type          : PgtRgt
: Uranus occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code       : MCD
Location            : McDonald Obs. 2.7m
Latitude (deg)      : 30.67158
E. Longitude (deg)  : 255.97844
Altitude (km)       : 2.075
Gaia source ID      : 869291558122119168
2Mass ID (if available) : 07171852+2241401
ICRS Star Coord at Epoch: 07h 17m 18.53891s +22:41:40.15004s
RUWE (>1.4 is poor) : 1.04
K magnitude          : 14.869
G magnitude          : 16.237
RP magnitude         : 15.733
BP magnitude         : 16.546
DUPflag             : 0
Distance (au)       : 17.829
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -21.86
Sun-Target sep (deg) : 161.93
Sun-Moon sep (deg)  : 154.33
B (ring opening deg) : 58.87
PA of pole (deg)    : 81.75
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.593
C/A sky separation (km) : 20594.3
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
    
```



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2036-12-21T11:53:16.635		40.59	-24.22	51431.77	-23.39		
lambda	I	2036-12-21T11:54:17.030		40.38	-24.01	50026.71	-23.20		
delta	I	2036-12-21T11:55:31.735		40.11	-23.75	48300.35	-23.02		
gamma	I	2036-12-21T11:56:01.003		40.00	-23.64	47627.75	-22.94		
eta	I	2036-12-21T11:56:20.712		39.93	-23.58	47176.12	-22.89		
beta	I	2036-12-21T11:57:27.868		39.69	-23.34	45645.53	-22.70		
alpha	I	2036-12-21T11:58:07.515		39.55	-23.20	44749.71	-22.57		
4	I	2036-12-21T11:59:46.396		39.19	-22.86	42526.93	-22.24		
5	I	2036-12-21T11:59:56.075		39.16	-22.83	42296.38	-22.18		
6	I	2036-12-21T12:00:17.631		39.08	-22.75	41849.55	-22.14		
Uranus	I	2036-12-21T12:11:47.295		36.61	-20.36	25295.83		-23.79	-24.79
Uranus	E	2036-12-21T12:34:17.655		31.80	-15.73	25505.99		10.37	10.85
6	E	2036-12-21T12:47:46.752		28.93	-12.99	41866.01	22.08		
5	E	2036-12-21T12:48:00.910		28.88	-12.94	42159.13	22.11		
4	E	2036-12-21T12:48:20.649		28.81	-12.87	42602.49	22.17		
alpha	E	2036-12-21T12:49:54.141		28.48	-12.56	44689.85	22.50		
beta	E	2036-12-21T12:50:37.309		28.33	-12.41	45660.02	22.62		
eta	E	2036-12-21T12:51:44.118		28.09	-12.19	47176.12	22.81		
gamma	E	2036-12-21T12:52:03.617		28.02	-12.12	47621.34	22.86		
delta	E	2036-12-21T12:52:33.272		27.92	-12.02	48300.35	22.93		
lambda	E	2036-12-21T12:53:48.258		27.65	-11.77	50026.71	23.11		
epsilon	E	2036-12-21T12:54:37.627		27.48	-11.60	51170.17	23.30		

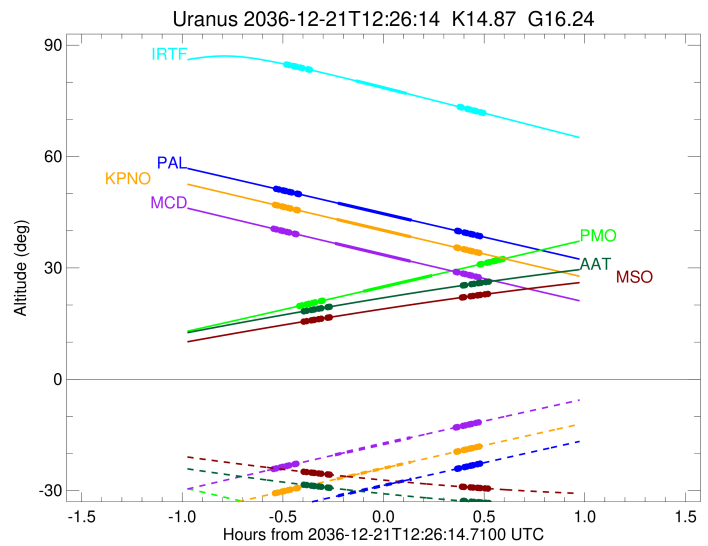
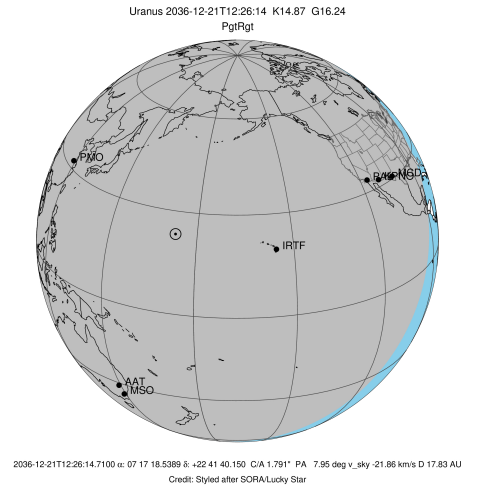
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2036-12-21T12:25:22.470
Event type          : PgtRgt
: Uranus occs: geocentric, topocentric
: 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      : 869291558122119168
2Mass ID (if available) : 07171852+2241401
ICRS Star Coord at Epoch: 07h 17m 18.53891s +22:41:40.15004s
RUWE (>1.4 is poor) : 1.04
K magnitude         : 14.869
G magnitude         : 16.237
RP magnitude        : 15.733
BP magnitude        : 16.546
DUPflag            : 0
Distance (au)       : 17.829
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -21.86
Sun-Target sep (deg) : 161.93
Sun-Moon sep (deg)  : 154.92
B (ring opening deg) : 58.87
PA of pole (deg)    : 81.75
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.808
C/A sky separation (km) : 23378.2
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
    
```



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2036-12-21T11:57:04.747		84.83	-67.20	51448.21	-22.94		
lambda	I	2036-12-21T11:58:07.115		84.63	-66.96	50026.71	-22.70		
delta	I	2036-12-21T11:59:23.556		84.38	-66.67	48300.35	-22.46		
gamma	I	2036-12-21T11:59:53.580		84.28	-66.55	47627.43	-22.36		
eta	I	2036-12-21T12:00:13.794		84.21	-66.48	47176.12	-22.29		
beta	I	2036-12-21T12:01:22.890		83.98	-66.21	45644.71	-22.03		
alpha	I	2036-12-21T12:02:03.765		83.84	-66.06	44748.71	-21.87		
4	I	2036-12-21T12:03:46.036		83.48	-65.67	42527.76	-21.42		
5	I	2036-12-21T12:03:56.342		83.45	-65.63	42292.29	-21.33		
6	I	2036-12-21T12:04:18.343		83.37	-65.54	41852.64	-21.28		
Uranus	I	2036-12-21T12:17:58.056		80.40	-62.42	25387.48		-18.95	-19.78
Uranus	E	2036-12-21T12:33:05.433		76.99	-58.95	25550.84		4.04	4.24
6	E	2036-12-21T12:48:58.945		73.36	-55.30	41868.47	21.27		
5	E	2036-12-21T12:49:13.498		73.30	-55.25	42161.48	21.32		
4	E	2036-12-21T12:49:33.776		73.22	-55.17	42599.77	21.41		
alpha	E	2036-12-21T12:51:10.521		72.85	-54.80	44691.29	21.85		
beta	E	2036-12-21T12:51:54.774		72.68	-54.63	45658.57	22.02		
eta	E	2036-12-21T12:53:03.352		72.42	-54.37	47176.12	22.28		
gamma	E	2036-12-21T12:53:23.302		72.34	-54.29	47621.22	22.34		
delta	E	2036-12-21T12:53:53.626		72.23	-54.18	48300.35	22.45		
lambda	E	2036-12-21T12:55:10.122		71.93	-53.89	50026.71	22.68		
epsilon	E	2036-12-21T12:56:01.488		71.74	-53.69	51195.75	22.93		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-12-21T12:28:29.970  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : 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 : 869291558122119168  
 2Mass ID (if available) : 07171852+2241401  
 ICRS Star Coord at Epoch: 07h 17m 18.53891s +22:41:40.15004s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 14.869  
 G magnitude : 16.237  
 RP magnitude : 15.733  
 BP magnitude : 16.546  
 DUPflag : 0  
 Distance (au) : 17.829  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.86  
 Sun-Target sep (deg) : 161.93  
 Sun-Moon sep (deg) : 155.24  
 B (ring opening deg) : 58.87  
 PA of pole (deg) : 81.75  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.191  
 C/A sky separation (km) : 28332.5  
 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

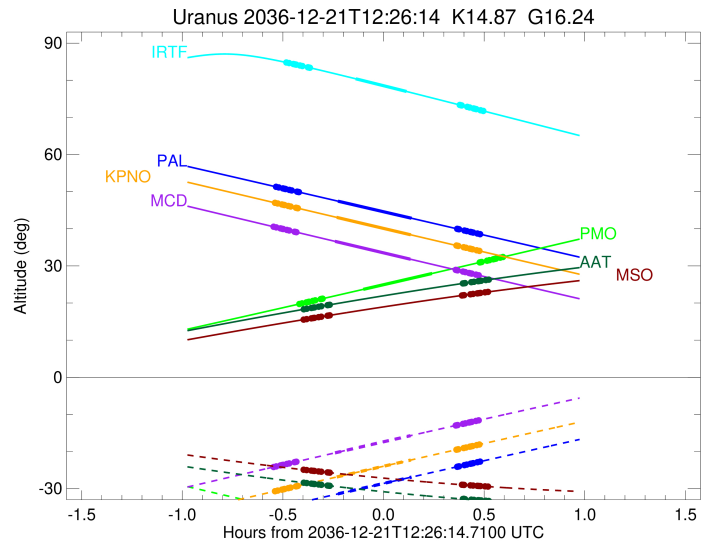
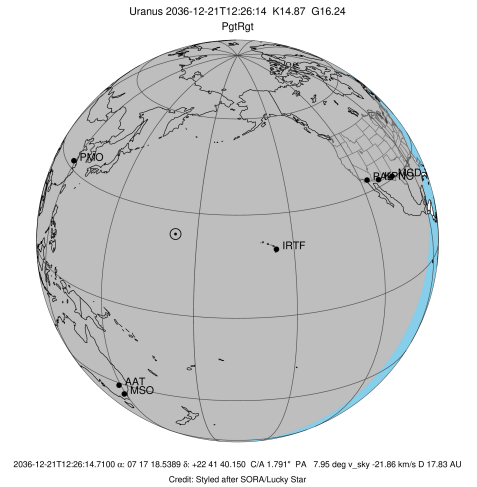


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2036-12-21T12:02:13.691		18.27	-28.38	51476.00	-21.30		
lambda	I	2036-12-21T12:03:22.385		18.45	-28.50	50026.71	-20.96		
delta	I	2036-12-21T12:04:45.496		18.67	-28.66	48300.35	-20.58		
gamma	I	2036-12-21T12:05:18.348		18.75	-28.72	47626.79	-20.42		
eta	I	2036-12-21T12:05:40.476		18.81	-28.76	47176.12	-20.31		
beta	I	2036-12-21T12:06:56.684		19.01	-28.89	45643.37	-19.90		
alpha	I	2036-12-21T12:07:42.083		19.13	-28.97	44746.40	-19.63		
4	I	2036-12-21T12:09:36.663		19.43	-29.18	42530.04	-18.91		
5	I	2036-12-21T12:09:49.009		19.46	-29.20	42283.52	-18.78		
6	I	2036-12-21T12:10:13.055		19.52	-29.24	41858.31	-18.67		

No planet occultations

6	E	2036-12-21T12:49:54.841		25.28	-32.79	41872.67	18.71		
5	E	2036-12-21T12:50:11.167		25.32	-32.81	42167.43	18.82		
4	E	2036-12-21T12:50:33.600		25.37	-32.84	42593.95	18.95		
alpha	E	2036-12-21T12:52:22.378		25.61	-32.97	44694.49	19.69		
beta	E	2036-12-21T12:53:11.031		25.71	-33.02	45655.80	19.95		
eta	E	2036-12-21T12:54:26.484		25.88	-33.11	47176.12	20.37		
gamma	E	2036-12-21T12:54:48.269		25.93	-33.13	47621.04	20.48		
delta	E	2036-12-21T12:55:21.307		26.00	-33.17	48300.35	20.64		
lambda	E	2036-12-21T12:56:44.168		26.18	-33.26	50026.71	21.02		
epsilon	E	2036-12-21T12:57:41.727		26.30	-33.33	51243.63	21.37		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2036-12-21T12:28:20.980  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : 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 : 869291558122119168  
 2Mass ID (if available) : 07171852+2241401  
 ICRS Star Coord at Epoch: 07h 17m 18.53891s +22:41:40.15004s  
 RUWE (>1.4 is poor) : 1.04  
 K magnitude : 14.869  
 G magnitude : 16.237  
 RP magnitude : 15.733  
 BP magnitude : 16.546  
 DUPflag : 0  
 Distance (au) : 17.829  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -21.86  
 Sun-Target sep (deg) : 161.93  
 Sun-Moon sep (deg) : 155.20  
 B (ring opening deg) : 58.87  
 PA of pole (deg) : 81.75  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.210  
 C/A sky separation (km) : 28580.8  
 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	2036-12-21T12:02:11.111		15.49	-24.89	51477.45	-21.21		
lambda	I	2036-12-21T12:03:20.195		15.66	-25.00	50026.71	-20.85		
delta	I	2036-12-21T12:04:43.731		15.87	-25.15	48300.35	-20.47		
gamma	I	2036-12-21T12:05:16.766		15.95	-25.20	47626.76	-20.31		
eta	I	2036-12-21T12:05:39.017		16.01	-25.24	47176.12	-20.19		
beta	I	2036-12-21T12:06:55.687		16.20	-25.37	45643.30	-19.77		
alpha	I	2036-12-21T12:07:41.384		16.31	-25.44	44746.25	-19.50		
4	I	2036-12-21T12:09:36.787		16.59	-25.63	42530.20	-18.76		
5	I	2036-12-21T12:09:49.273		16.62	-25.66	42282.99	-18.62		
6	I	2036-12-21T12:10:13.459		16.68	-25.69	41858.62	-18.51		

No planet occultations

6	E	2036-12-21T12:49:38.223		22.04	-28.95	41872.86	18.55		
5	E	2036-12-21T12:49:54.681		22.07	-28.97	42167.77	18.67		
4	E	2036-12-21T12:50:17.267		22.12	-29.00	42593.64	18.80		
alpha	E	2036-12-21T12:52:06.879		22.35	-29.12	44694.66	19.55		
beta	E	2036-12-21T12:52:55.837		22.45	-29.17	45655.66	19.83		
eta	E	2036-12-21T12:54:11.761		22.60	-29.25	47176.12	20.25		
gamma	E	2036-12-21T12:54:33.670		22.65	-29.27	47621.04	20.36		
delta	E	2036-12-21T12:55:06.894		22.71	-29.31	48300.35	20.53		
lambda	E	2036-12-21T12:56:30.189		22.88	-29.39	50026.71	20.92		
epsilon	E	2036-12-21T12:57:28.136		23.00	-29.45	51245.92	21.27		