

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-10-28T14:40:05.640
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3377381897246759168
 2Mass ID (if available) : 06240063+2334529

ICRS Star Coord at Epoch: 06h 24m 00.63841s +23:34:52.93921s

RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.076
 G magnitude : 14.903
 RP magnitude : 14.296
 BP magnitude : 15.346
 DUPflag : 0
 Distance (au) : 18.454
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -8.30
 Sun-Target sep (deg) : 119.53
 Sun-Moon sep (deg) : 174.34
 B (ring opening deg) : 70.49
 PA of pole (deg) : 67.86

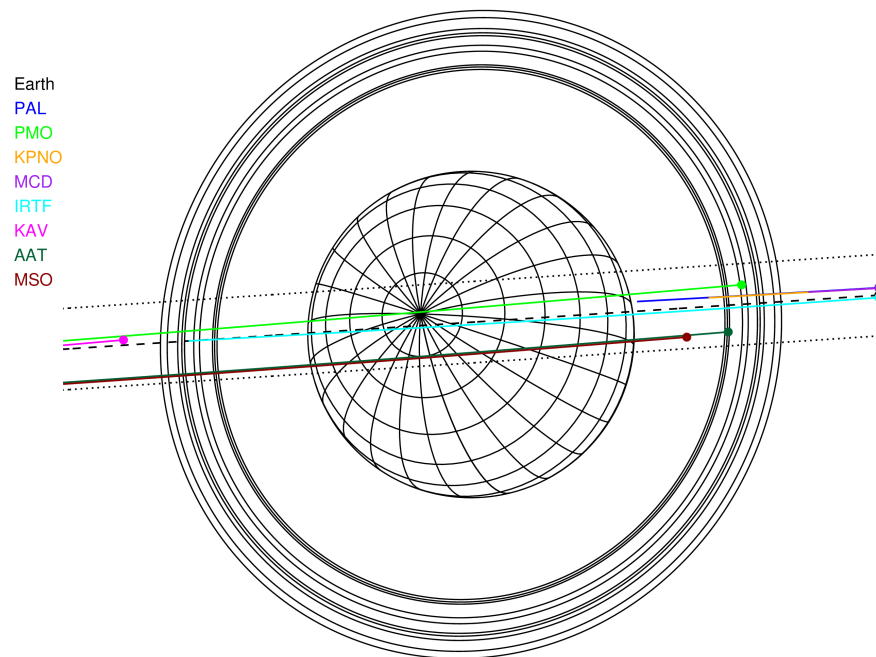
a(km) ring

 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



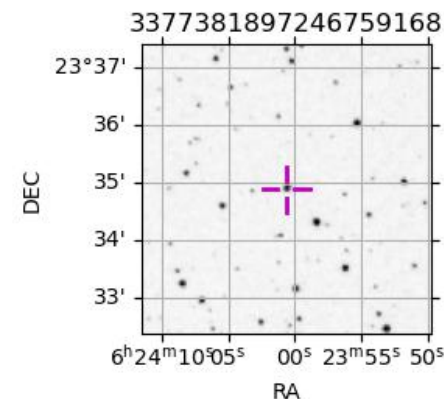
2033-10-28T14:40:05.6400 α: 06 24 00.6384 δ: +23 34 52.939 C/A 0.154° PA 183.78 deg v_sky - 8.30 km/s D 18.45 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2033-10-28T14:40:05 K13.08 G14.90 PgtRgt

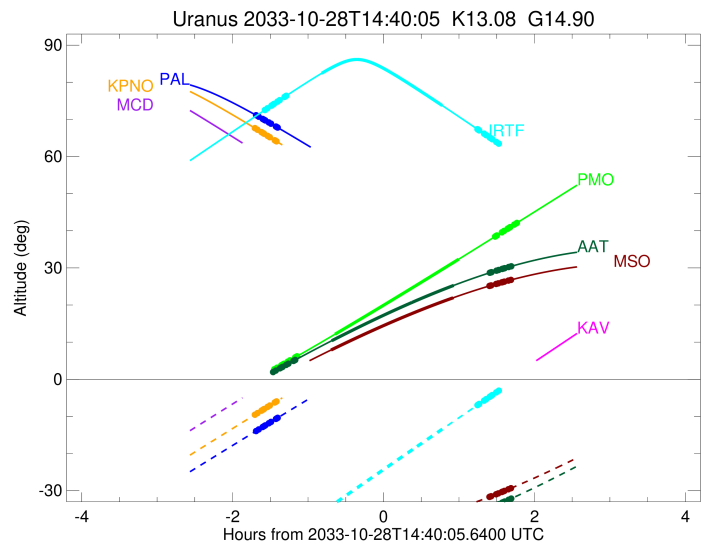
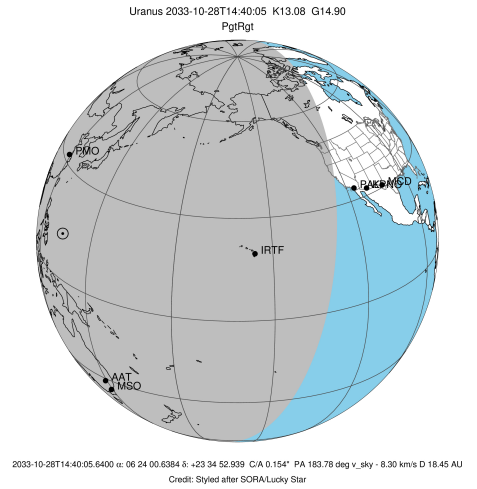


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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 28 12:59 - OCT 28 13:15	PnnRin
PMO	Purple Mtn Obs. Nanki	32.1	118.8	++++	+ +	+++++	OCT 28 13:25 - OCT 28 16:26	PieRie
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++			OCT 28 12:58 - OCT 28 13:15	PnnRin
MCD	McDonald Obs. 2.7m	30.7	256.0					PnnRnn
TEN	Teide Obs./Tenerife	28.3	343.5					PnnRnn
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++	+ +	++++	OCT 28 13:06 - OCT 28 16:01	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		++	+ +	OCT 28 13:29 - OCT 28 16:22	PieRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0		+ +	+++++	OCT 28 13:58 - OCT 28 16:22	PieRne

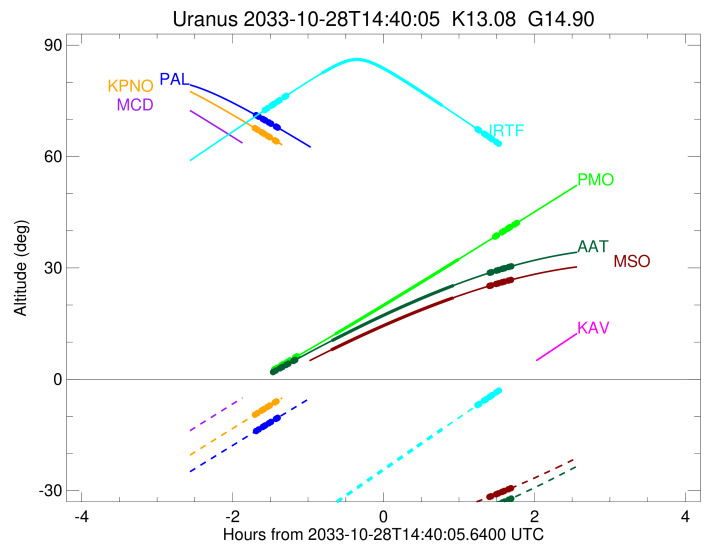
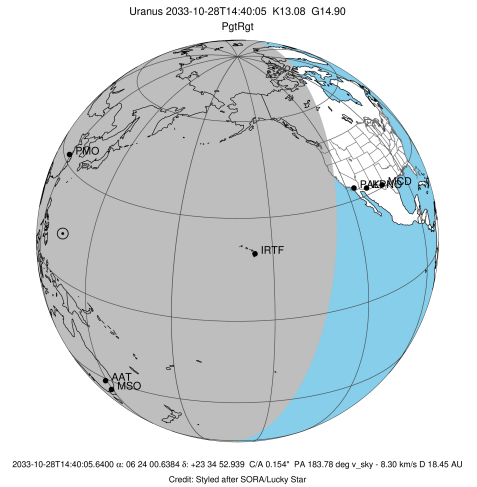


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-10-28T14:33:02.670
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 3377381897246759168
 2Mass ID (if available) : 06240063+2334529
 ICRS Star Coord at Epoch: 06h 24m 00.63841s +23:34:52.93921s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.076
 G magnitude : 14.903
 RP magnitude : 14.296
 BP magnitude : 15.346
 DUPflag : 0
 Distance (au) : 18.454
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -8.30
 Sun-Target sep (deg) : 119.53
 Sun-Moon sep (deg) : 174.78
 B (ring opening deg) : 70.49
 PA of pole (deg) : 67.86
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.282
 C/A sky separation (km) : 3774.2
 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	2033-10-28T12:59:29.851		70.99	-13.80	50774.01	-9.04		
lambda	I	2033-10-28T13:00:52.498		70.73	-13.51	50026.71	-9.04		
delta	I	2033-10-28T13:04:03.467		70.12	-12.85	48300.35	-9.04		
gamma	I	2033-10-28T13:05:18.633		69.88	-12.59	47621.01	-9.04		
eta	I	2033-10-28T13:06:07.865		69.72	-12.42	47176.12	-9.04		
beta	I	2033-10-28T13:08:54.582		69.19	-11.85	45668.95	-9.03		
alpha	I	2033-10-28T13:10:36.524		68.86	-11.50	44752.37	-9.03		
4	I	2033-10-28T13:14:33.650		68.08	-10.68	42600.89	-9.03		
5	I	2033-10-28T13:15:24.493		67.91	-10.50	42155.53	-9.03		
6	I	2033-10-28T13:15:56.931		67.81	-10.39	41867.19	-9.03		
Uranus	I	2033-10-28T13:44:47.314		61.99	-4.48x	25196.46		-16.11	-16.83
Uranus	E	2033-10-28T15:21:18.141		41.84	14.47x	25079.21		18.68	19.50
6	E	2033-10-28T15:49:56.766		35.86	19.69x	41802.08	8.89		
5	E	2033-10-28T15:50:54.941		35.65	19.86x	42315.12	8.89		
4	E	2033-10-28T15:51:23.057		35.56	19.94x	42548.47	8.89		
alpha	E	2033-10-28T15:55:22.106		34.73	20.64x	44684.86	8.89		
beta	E	2033-10-28T15:57:11.139		34.35	20.96x	45650.21	8.89		
eta	E	2033-10-28T16:00:02.709		33.75	21.46x	47176.12	8.89		
gamma	E	2033-10-28T16:00:53.924		33.58	21.61x	47631.32	8.89		
delta	E	2033-10-28T16:02:09.202		33.32	21.83x	48300.35	8.89		
lambda	E	2033-10-28T16:05:23.480		32.64	22.39x	50026.71	8.88		
epsilon	E	2033-10-28T16:08:14.253		32.05	22.87x	51543.85	8.88		

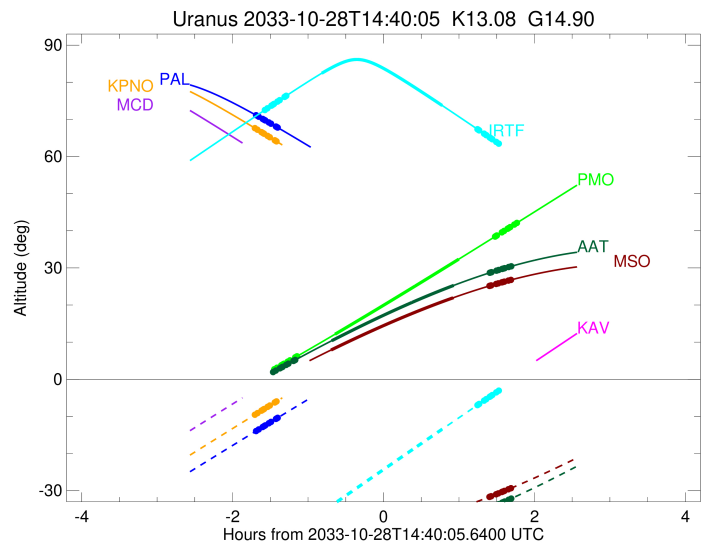
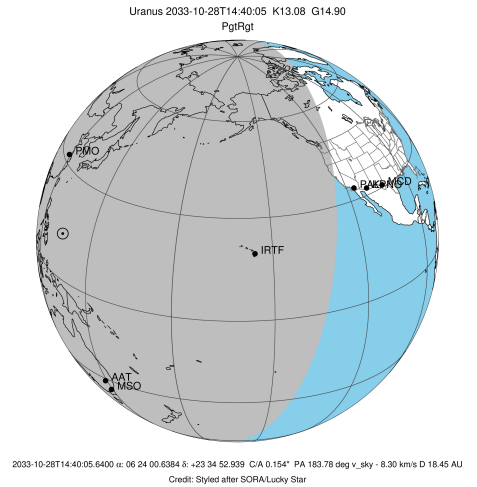
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-10-28T14:51:11.110
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 3377381897246759168
 2Mass ID (if available) : 06240063+2334529
 ICRS Star Coord at Epoch: 06h 24m 00.63841s +23:34:52.93921s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.076
 G magnitude : 14.903
 RP magnitude : 14.296
 BP magnitude : 15.346
 DUPflag : 0
 Distance (au) : 18.454
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -8.30
 Sun-Target sep (deg) : 119.53
 Sun-Moon sep (deg) : 174.45
 B (ring opening deg) : 70.49
 PA of pole (deg) : 67.86
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.311
 C/A sky separation (km) : 4161.1
 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_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	2033-10-28T13:14:00.883		2.84x	-50.12	50779.93	-8.58		
lambda	I	2033-10-28T13:15:28.704		3.12x	-50.41	50026.71	-8.58		
delta	I	2033-10-28T13:18:49.910		3.76x	-51.09	48300.35	-8.58		
gamma	I	2033-10-28T13:20:09.059		4.02x	-51.35	47620.99	-8.58		
eta	I	2033-10-28T13:21:00.880		4.18x	-51.52	47176.12	-8.59		
beta	I	2033-10-28T13:23:56.370		4.75x	-52.10	45668.24	-8.59		
alpha	I	2033-10-28T13:25:43.490		5.09	-52.46	44752.27	-8.59		
4	I	2033-10-28T13:29:52.486		5.90	-53.28	42602.20	-8.59		
5	I	2033-10-28T13:30:45.878		6.07	-53.45	42156.00	-8.60		
6	I	2033-10-28T13:31:20.121		6.18	-53.56	41866.00	-8.60		
Uranus	I	2033-10-28T14:01:34.411		12.14	-59.30	25219.14		-15.58	-16.28
Uranus	E	2033-10-28T15:39:57.274		32.35	-71.37	25083.87		18.59	19.40
6	E	2033-10-28T16:08:41.106		38.41	-70.91	41802.58	8.92		
5	E	2033-10-28T16:09:39.045		38.62	-70.85	42315.20	8.92		
4	E	2033-10-28T16:10:06.923		38.71	-70.83	42547.66	8.92		
alpha	E	2033-10-28T16:14:05.007		39.55	-70.57	44684.78	8.94		
beta	E	2033-10-28T16:15:53.502		39.94	-70.44	45650.58	8.94		
eta	E	2033-10-28T16:18:43.949		40.54	-70.22	47176.12	8.95		
gamma	E	2033-10-28T16:19:34.812		40.72	-70.15	47631.35	8.95		
delta	E	2033-10-28T16:20:49.534		40.98	-70.05	48300.35	8.95		
lambda	E	2033-10-28T16:24:02.232		41.67	-69.77	50026.71	8.96		
epsilon	E	2033-10-28T16:26:51.178		42.26	-69.50	51541.57	8.97		

```

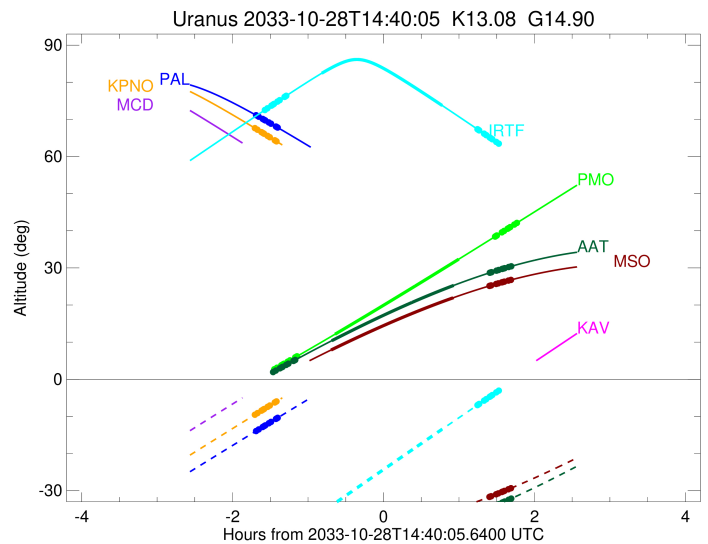
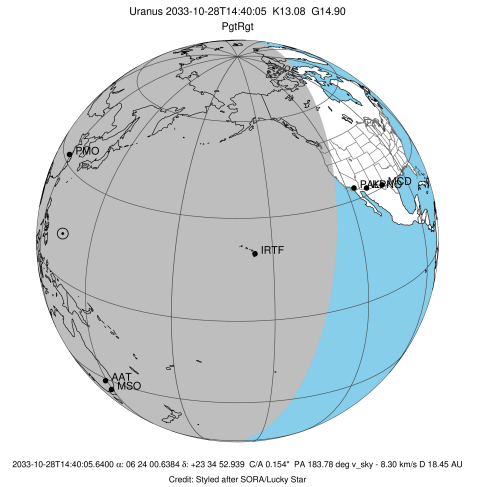
target                : Uranus
target radius (km)    : 25559.00
C/A epoch              : 2033-10-28T14:32:14.370
Event type             : PgtRgt
: Uranus occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code         : KPNO
Location              : Kitt Peak Natl Obs
Latitude (deg)        : 31.96333
E. Longitude (deg)    : 248.40000
Altitude (km)         : 2.120
Gaia source ID        : 3377381897246759168
2Mass ID (if available) : 06240063+2334529
ICRS Star Coord at Epoch: 06h 24m 00.63841s +23:34:52.93921s
RUWE (>1.4 is poor)  : 1.02
K magnitude            : 13.076
G magnitude            : 14.903
RP magnitude           : 14.296
BP magnitude           : 15.346
DUPflag               : 0
Distance (au)         : 18.454
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -8.30
Sun-Target sep (deg)  : 119.53
Sun-Moon sep (deg)    : 174.79
B (ring opening deg)  : 70.49
PA of pole (deg)      : 67.86
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.283
C/A sky separation (km) : 3792.6
NAIF SPICE kernels    : RAJobs_U111+rgf15.spk
URKALLvl1.spk
ural11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ural11.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	2033-10-28T12:58:32.452	67.50	-9.40	50773.86	-9.04		
lambda	I	2033-10-28T12:59:55.156	67.22	-9.11	50026.71	-9.03		
delta	I	2033-10-28T13:03:06.304	66.56	-8.45	48300.35	-9.03		
gamma	I	2033-10-28T13:04:21.542	66.31	-8.19	47621.01	-9.03		
eta	I	2033-10-28T13:05:10.823	66.14	-8.01	47176.12	-9.03		
beta	I	2033-10-28T13:07:57.709	65.56	-7.43	45668.96	-9.02		
alpha	I	2033-10-28T13:09:39.761	65.21	-7.08	44752.37	-9.02		
4	I	2033-10-28T13:13:37.155	64.38	-6.26	42600.86	-9.01		
5	I	2033-10-28T13:14:28.056	64.21	-6.08	42155.52	-9.02		
6	I	2033-10-28T13:15:00.528	64.09	-5.97	41867.22	-9.02		
Uranus	I	2033-10-28T13:43:53.356	58.01	-0.01x	25196.19		-16.12	-16.84
Uranus	E	2033-10-28T15:20:37.555	37.44	18.91x	25078.70		18.70	19.52
6	E	2033-10-28T15:49:21.799	31.38	24.05x	41802.04	8.86		
5	E	2033-10-28T15:50:20.180	31.18	24.22x	42315.12	8.86		
4	E	2033-10-28T15:50:48.403	31.08	24.30x	42548.53	8.86		
alpha	E	2033-10-28T15:54:48.290	30.24	24.99x	44684.87	8.86		
beta	E	2033-10-28T15:56:37.707	29.86	25.30x	45650.19	8.86		
eta	E	2033-10-28T15:59:29.894	29.26	25.79x	47176.12	8.86		
gamma	E	2033-10-28T16:00:21.293	29.08	25.94x	47631.32	8.86		
delta	E	2033-10-28T16:01:36.843	28.82	26.15x	48300.35	8.86		
lambda	E	2033-10-28T16:04:51.827	28.14	26.70x	50026.71	8.85		
epsilon	E	2033-10-28T16:07:43.240	27.54	27.17x	51543.98	8.85		

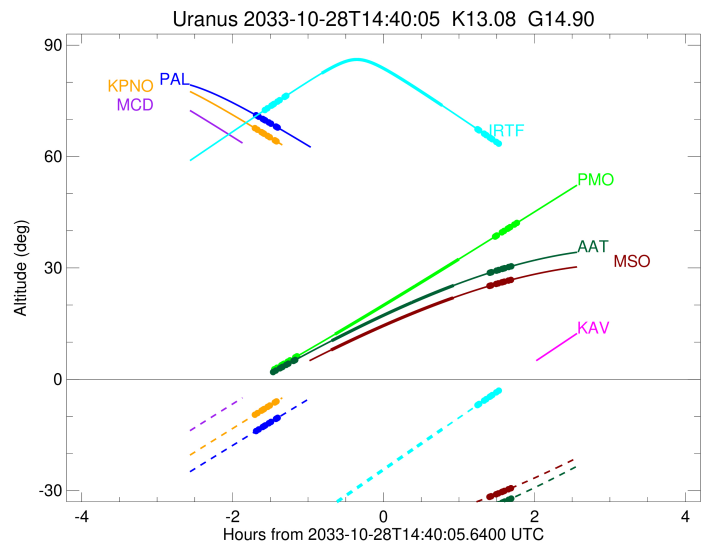
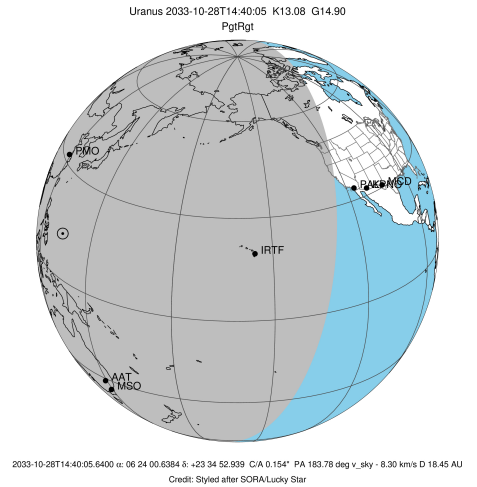
```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2033-10-28T14:38:58.070
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        : 3377381897246759168
2Mass ID (if available) : 06240063+2334529
ICRS Star Coord at Epoch: 06h 24m 00.63841s +23:34:52.93921s
RUWE (>1.4 is poor)  : 1.02
K magnitude           : 13.076
G magnitude           : 14.903
RP magnitude          : 14.296
BP magnitude          : 15.346
DUPflag              : 0
Distance (au)         : 18.454
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -8.30
Sun-Target sep (deg)  : 119.53
Sun-Moon sep (deg)    : 174.40
B (ring opening deg)  : 70.49
PA of pole (deg)      : 67.86
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.114
C/A sky separation (km) : 1530.0
NAIF SPICE kernels    : RAJobs_U111+rgf15.spk
URKALLvl1.spk
ural11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ural11.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
    
```



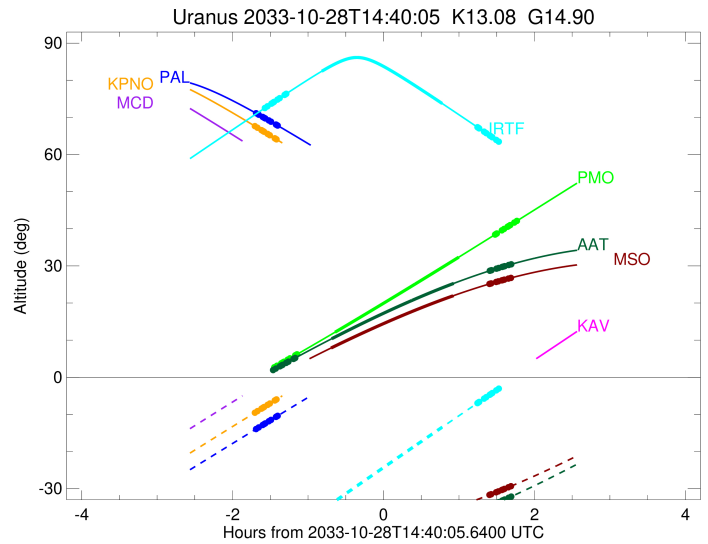
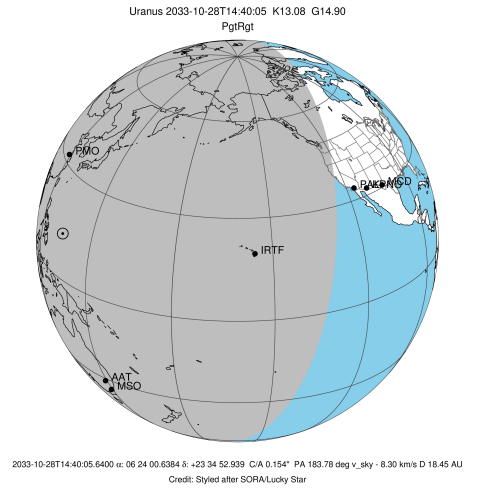
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-10-28T13:06:29.706		72.69	-46.31	50768.92	-9.12		
lambda	I	2033-10-28T13:07:51.102		73.00	-45.99	50026.71	-9.12		
delta	I	2033-10-28T13:11:00.393		73.72	-45.25	48300.35	-9.12		
gamma	I	2033-10-28T13:12:14.863		74.00	-44.96	47621.05	-9.12		
eta	I	2033-10-28T13:13:03.635		74.18	-44.77	47176.12	-9.12		
beta	I	2033-10-28T13:15:48.649		74.80	-44.12	45669.68	-9.12		
alpha	I	2033-10-28T13:17:29.625		75.18	-43.72	44752.43	-9.13		
4	I	2033-10-28T13:21:24.353		76.05	-42.80	42599.37	-9.13		
5	I	2033-10-28T13:22:14.589		76.24	-42.60	42155.14	-9.13		
6	I	2033-10-28T13:22:46.471		76.36	-42.48	41868.50	-9.13		
Uranus	I	2033-10-28T13:51:02.821		82.44	-35.83	25160.17		-16.94	-17.69
Uranus	E	2033-10-28T15:26:46.055		73.74	-13.45	25110.19		18.03	18.83
6	E	2033-10-28T15:54:41.622		67.39	-6.99	41803.61	9.15		
5	E	2033-10-28T15:55:38.011		67.17	-6.77	42315.25	9.15		
4	E	2033-10-28T15:56:04.959		67.07	-6.67	42546.14	9.15		
alpha	E	2033-10-28T15:59:57.505		66.18	-5.78	44684.68	9.15		
beta	E	2033-10-28T16:01:43.598		65.78	-5.37	45651.19	9.15		
eta	E	2033-10-28T16:04:30.205		65.14	-4.73x	47176.12	9.15		
gamma	E	2033-10-28T16:05:19.979		64.95	-4.54x	47631.40	9.15		
delta	E	2033-10-28T16:06:33.116		64.67	-4.26x	48300.35	9.15		
lambda	E	2033-10-28T16:09:41.879		63.95	-3.54x	50026.71	9.14		
epsilon	E	2033-10-28T16:12:27.195		63.31	-2.91x	51538.41	9.14		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-10-28T14:47:33.470
 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 : 3377381897246759168
 2Mass ID (if available) : 06240063+2334529
 ICRS Star Coord at Epoch: 06h 24m 00.63841s +23:34:52.93921s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.076
 G magnitude : 14.903
 RP magnitude : 14.296
 BP magnitude : 15.346
 DUPflag : 0
 Distance (au) : 18.454
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -8.30
 Sun-Target sep (deg) : 119.53
 Sun-Moon sep (deg) : 173.57
 B (ring opening deg) : 70.49
 PA of pole (deg) : 67.86
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.211
 C/A sky separation (km) : 2830.7
 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	2033-10-28T13:13:04.337		2.08x	-44.80	50759.80	-8.80		
lambda	I	2033-10-28T13:14:27.594		2.34x	-44.86	50026.71	-8.81		
delta	I	2033-10-28T13:17:43.569		2.95x	-44.99	48300.35	-8.81		
gamma	I	2033-10-28T13:19:00.641		3.19x	-45.04	47621.14	-8.81		
eta	I	2033-10-28T13:19:51.128		3.35x	-45.07	47176.12	-8.82		
beta	I	2033-10-28T13:22:41.714		3.87x	-45.17	45671.13	-8.82		
alpha	I	2033-10-28T13:24:26.333		4.19x	-45.22	44752.36	-8.82		
4	I	2033-10-28T13:28:29.422		4.94x	-45.33	42596.12	-8.83		
5	I	2033-10-28T13:29:21.203		5.10	-45.35	42154.82	-8.83		
6	I	2033-10-28T13:29:53.842		5.20	-45.36	41870.98	-8.83		
Uranus	I	2033-10-28T13:58:52.657		10.37	-45.47	25099.41		-18.26	-19.07
Uranus	E	2033-10-28T15:35:59.074		25.29	-38.46	25189.52		16.27	17.00
6	E	2033-10-28T16:04:30.126		28.68	-34.68	41807.02	9.09		
5	E	2033-10-28T16:05:26.476		28.78	-34.55	42314.62	9.09		
4	E	2033-10-28T16:05:52.966		28.83	-34.49	42541.80	9.08		
alpha	E	2033-10-28T16:09:47.532		29.25	-33.92	44684.66	9.09		
beta	E	2033-10-28T16:11:34.483		29.43	-33.66	45653.22	9.10		
eta	E	2033-10-28T16:14:21.750		29.72	-33.24	47176.12	9.10		
gamma	E	2033-10-28T16:15:11.783		29.80	-33.12	47631.52	9.10		
delta	E	2033-10-28T16:16:25.252		29.92	-32.94	48300.35	9.10		
lambda	E	2033-10-28T16:19:34.817		30.23	-32.46	50026.71	9.11		
epsilon	E	2033-10-28T16:22:19.200		30.50	-32.04	51524.45	9.11		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-10-28T14:47:10.020
 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 : 3377381897246759168
 2Mass ID (if available) : 06240063+2334529
 ICRS Star Coord at Epoch: 06h 24m 00.63841s +23:34:52.93921s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.076
 G magnitude : 14.903
 RP magnitude : 14.296
 BP magnitude : 15.346
 DUPflag : 0
 Distance (au) : 18.454
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -8.30
 Sun-Target sep (deg) : 119.53
 Sun-Moon sep (deg) : 173.53
 B (ring opening deg) : 70.49
 PA of pole (deg) : 67.86
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.231
 C/A sky separation (km) : 3091.4
 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	2033-10-28T13:12:37.260	-0.01x	-40.82	50759.15	-8.79			
lambda	I	2033-10-28T13:14:00.540	0.23x	-40.88	50026.71	-8.80			
delta	I	2033-10-28T13:17:16.751	0.82x	-41.00	48300.35	-8.80			
gamma	I	2033-10-28T13:18:33.916	1.04x	-41.04	47621.15	-8.80			
eta	I	2033-10-28T13:19:24.467	1.19x	-41.07	47176.12	-8.80			
beta	I	2033-10-28T13:22:15.260	1.70x	-41.16	45671.24	-8.81			
alpha	I	2033-10-28T13:24:00.030	2.00x	-41.20	44752.34	-8.81			
4	I	2033-10-28T13:28:03.478	2.72x	-41.31	42595.86	-8.81			
5	I	2033-10-28T13:28:55.315	2.87x	-41.32	42154.83	-8.82			
6	I	2033-10-28T13:29:27.981	2.96x	-41.34	41871.15	-8.82			
Uranus	I	2033-10-28T13:58:29.186	7.90	-41.45	25095.83	-18.34	-19.14		
Uranus	E	2033-10-28T15:35:37.472	21.97	-35.17	25194.24	16.16	16.89		
6	E	2033-10-28T16:04:13.945	25.14	-31.70	41807.20	9.07			
5	E	2033-10-28T16:05:10.401	25.23	-31.58	42314.56	9.07			
4	E	2033-10-28T16:05:36.925	25.28	-31.52	42541.60	9.06			
alpha	E	2033-10-28T16:09:32.061	25.66	-31.00	44684.67	9.07			
beta	E	2033-10-28T16:11:19.268	25.83	-30.75	45653.32	9.08			
eta	E	2033-10-28T16:14:06.907	26.10	-30.37	47176.12	9.08			
gamma	E	2033-10-28T16:14:57.054	26.18	-30.26	47631.52	9.08			
delta	E	2033-10-28T16:16:10.689	26.29	-30.09	48300.35	9.08			
lambda	E	2033-10-28T16:19:20.683	26.58	-29.64	50026.71	9.09			
epsilon	E	2033-10-28T16:22:05.352	26.82	-29.25	51523.69	9.09			