

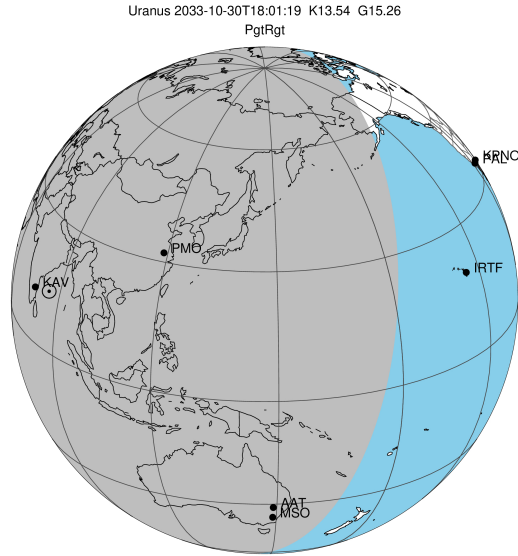
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-10-30T18:01:19.090
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3377382584441538688
 2Mass ID (if available) : 06235180+2334595

Uranus 2033-10-30T18:01:19 K13.54 G15.26 PgtRgt

ICRS Star Coord at Epoch: 06h 23m 51.80946s +23:34:59.38333s

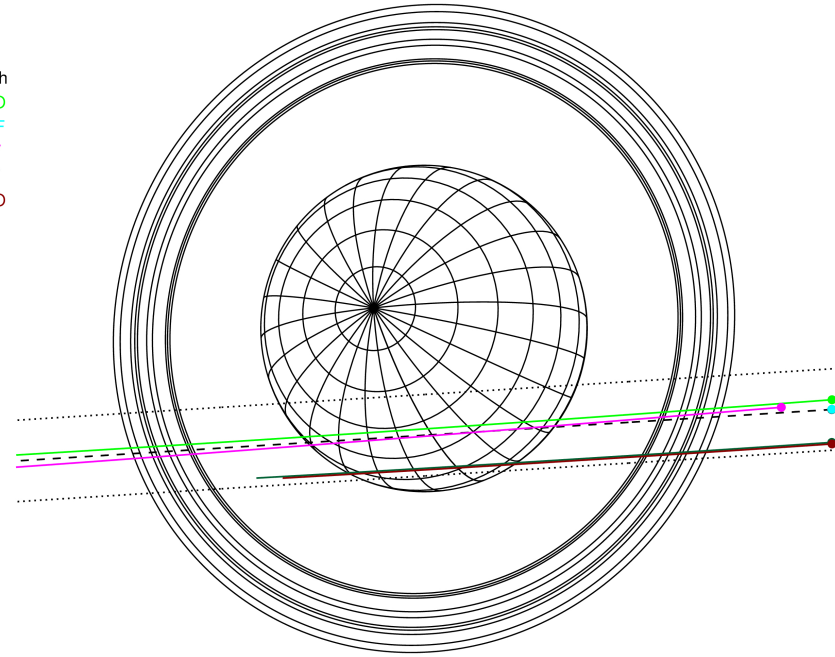
RUWE (>1.4 is poor) : 1.01
 K magnitude : 13.535
 G magnitude : 15.264
 RP magnitude : 14.662
 BP magnitude : 15.686
 DUPflag : 0
 Distance (au) : 18.423
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -9.27
 Sun-Target sep (deg) : 121.70
 Sun-Moon sep (deg) : 153.35
 B (ring opening deg) : 70.52
 PA of pole (deg) : 67.81

#	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



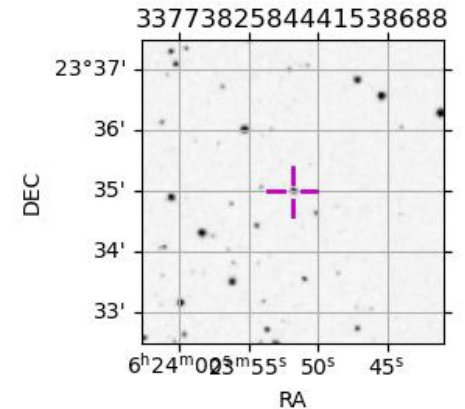
2033-10-30T18:01:19.0900 α: 06 23 51.8095 δ: +23 34 59.383 C/A 1.238° PA 3.61 deg v_sky - 9.27 km/s D 18.42 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PMO
 IRTF
 KAV
 AAT
 MSO



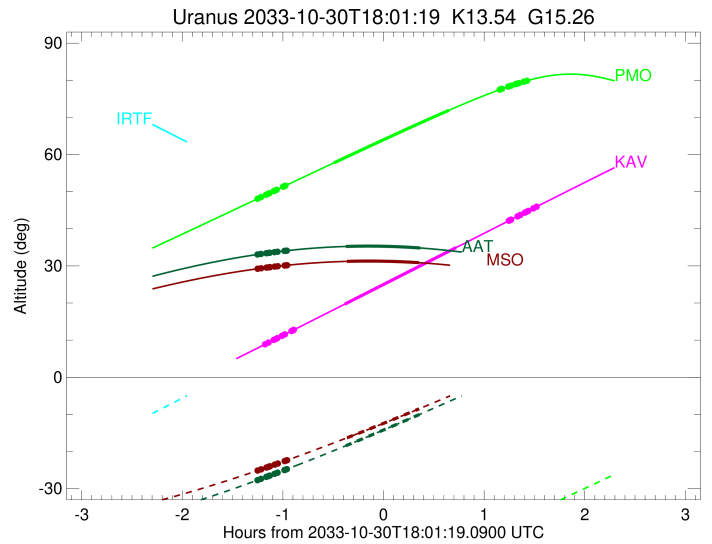
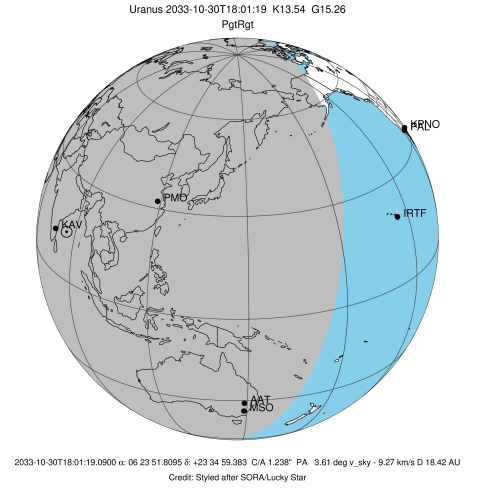
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1					PnnRnn
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+ +	+++++	OCT 30 16:47 - OCT 30 19:27	PieRie
KPNO	Kitt Peak Natl Obs	32.0	248.4					PnnRnn
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					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++	+ +	+++++	OCT 30 16:51 - OCT 30 19:33	PieRie
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 30 16:46 - OCT 30 18:23	PieRin
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++	+ +		OCT 30 16:47 - OCT 30 18:22	PieRin



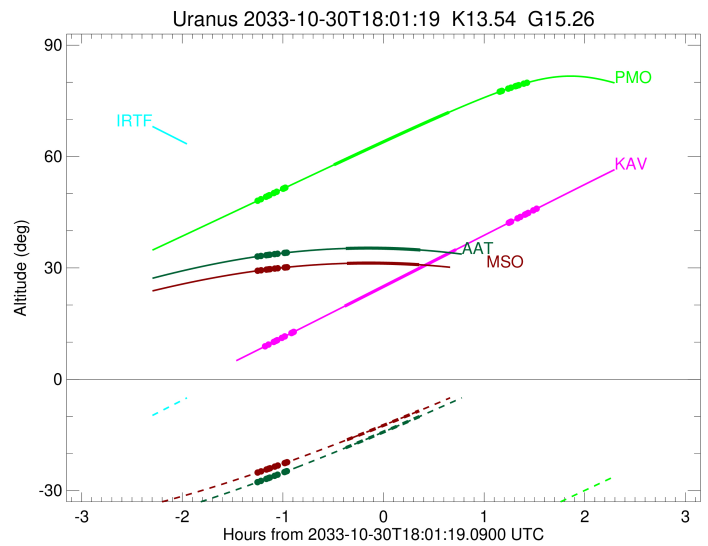
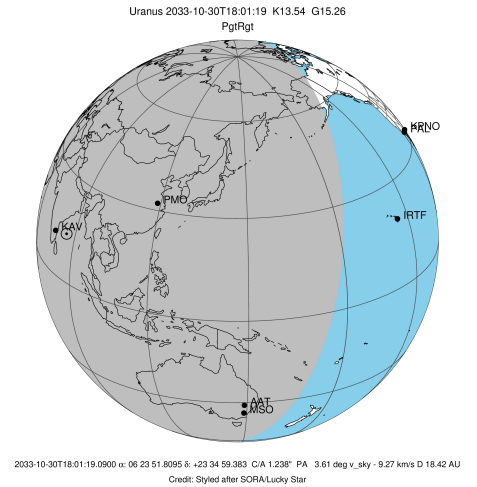
```

target           : Uranus
target radius (km) : 25559.00
C/A epoch       : 2033-10-30T18:05:41.990
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  : 3377382584441538688
2Mass ID (if available) : 06235180+2334595
ICRS Star Coord at Epoch: 06h 23m 51.80946s +23:34:59.38333s
RUWE (>1.4 is poor) : 1.01
K magnitude     : 13.535
G magnitude     : 15.264
RP magnitude    : 14.662
BP magnitude    : 15.686
DUPflag        : 0
Distance (au)   : 18.423
f0 (km)         : 0.000
g0 (km)         : 0.000
skyplane vel. (km/s) : -9.27
Sun-Target sep (deg) : 121.70
Sun-Moon sep (deg) : 154.09
B (ring opening deg) : 70.52
PA of pole (deg) : 67.81
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.175
C/A sky separation (km) : 15697.6
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
  
```



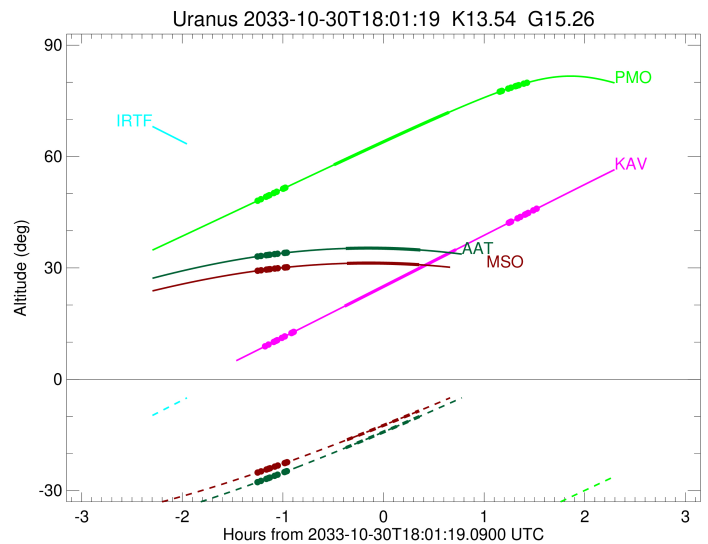
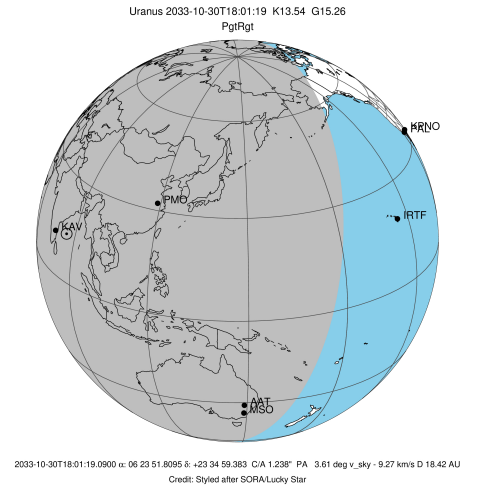
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-10-30T16:46:59.522		48.25	-67.67	50743.77	-9.49		
lambda	I	2033-10-30T16:48:15.176		48.52	-67.49	50026.71	-9.47		
delta	I	2033-10-30T16:51:17.770		49.16	-67.07	48300.35	-9.44		
gamma	I	2033-10-30T16:52:29.713		49.42	-66.89	47621.93	-9.42		
eta	I	2033-10-30T16:53:17.053		49.59	-66.78	47176.12	-9.41		
beta	I	2033-10-30T16:55:56.573		50.15	-66.39	45676.86	-9.38		
alpha	I	2033-10-30T16:57:36.037		50.51	-66.14	44748.96	-9.35		
4	I	2033-10-30T17:01:27.803		51.33	-65.54	42578.42	-9.28		
5	I	2033-10-30T17:02:14.727		51.49	-65.42	42162.04	-9.28		
6	I	2033-10-30T17:02:45.717		51.60	-65.34	41878.72	-9.26		
Uranus	I	2033-10-30T17:31:47.534		57.77	-60.39	25062.95		-18.99	-19.82
Uranus	E	2033-10-30T18:40:21.179		71.92	-46.94	25457.14		8.38	8.77
6	E	2033-10-30T19:10:32.238		77.46	-40.67	41813.88	9.40		
5	E	2033-10-30T19:11:25.501		77.61	-40.49	42310.80	9.41		
4	E	2033-10-30T19:11:50.008		77.68	-40.40	42535.28	9.41		
alpha	E	2033-10-30T19:15:36.590		78.28	-39.61	44685.77	9.49		
beta	E	2033-10-30T19:17:19.191		78.54	-39.25	45657.21	9.52		
eta	E	2033-10-30T19:19:58.260		78.94	-38.69	47176.12	9.56		
gamma	E	2033-10-30T19:20:45.851		79.05	-38.53	47631.57	9.58		
delta	E	2033-10-30T19:21:55.625		79.22	-38.28	48300.35	9.59		
lambda	E	2033-10-30T19:24:55.189		79.62	-37.65	50026.71	9.63		
epsilon	E	2033-10-30T19:27:26.426		79.95	-37.12	51486.20	9.65		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-10-30T18:11:01.190
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KAV
 Location : Kavalur Observatory
 Latitude (deg) : 12.57556
 E. Longitude (deg) : 78.83167
 Altitude (km) : 0.722
 Gaia source ID : 3377382584441538688
 2Mass ID (if available) : 06235180+2334595
 ICRS Star Coord at Epoch: 06h 23m 51.80946s +23:34:59.38333s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 13.535
 G magnitude : 15.264
 RP magnitude : 14.662
 BP magnitude : 15.686
 DUPflag : 0
 Distance (au) : 18.423
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -9.27
 Sun-Target sep (deg) : 121.70
 Sun-Moon sep (deg) : 154.29
 B (ring opening deg) : 70.52
 PA of pole (deg) : 67.81
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.260
 C/A sky separation (km) : 16835.6
 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



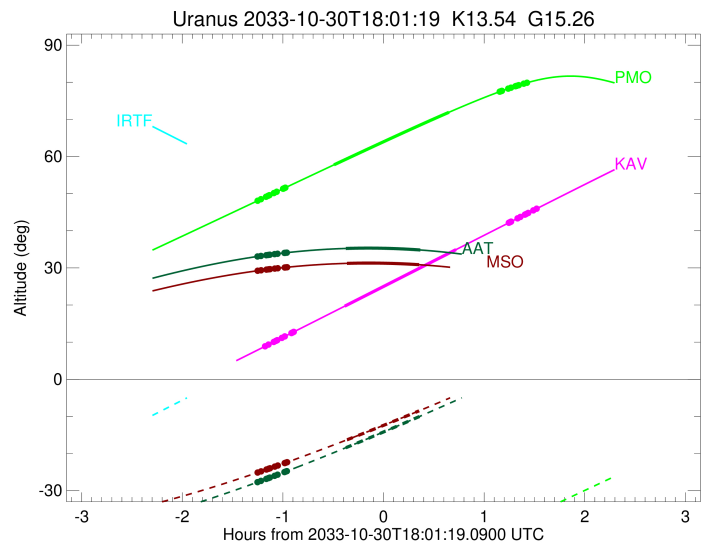
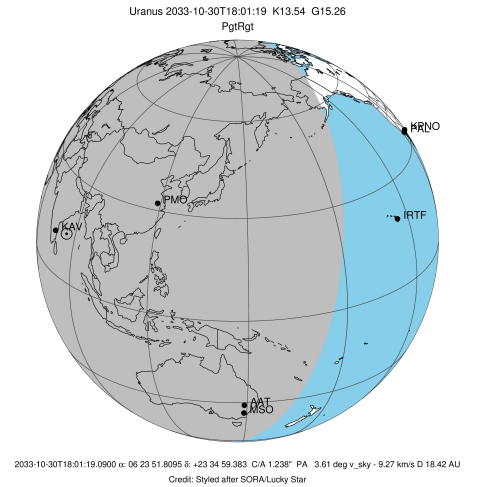
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-10-30T16:51:27.896		9.05	-66.40	50744.02	-9.18		
lambda	I	2033-10-30T16:52:46.086		9.35	-66.72	50026.71	-9.17		
delta	I	2033-10-30T16:55:54.787		10.06	-67.48	48300.35	-9.13		
gamma	I	2033-10-30T16:57:09.154		10.34	-67.78	47621.98	-9.11		
eta	I	2033-10-30T16:57:58.106		10.53	-67.98	47176.12	-9.10		
beta	I	2033-10-30T17:00:43.072		11.15	-68.64	45677.08	-9.06		
alpha	I	2033-10-30T17:02:26.034		11.54	-69.06	44748.69	-9.04		
4	I	2033-10-30T17:06:26.081		12.45	-70.03	42577.54	-8.96		
5	I	2033-10-30T17:07:14.537		12.63	-70.22	42162.72	-8.95		
6	I	2033-10-30T17:07:46.698		12.76	-70.35	41878.90	-8.94		
Uranus	I	2033-10-30T17:38:11.833		19.70	-77.71	25074.51		-18.75	-19.57
Uranus	E	2033-10-30T18:44:34.238		34.93	-85.74	25484.16		7.17	7.51
6	E	2033-10-30T19:15:58.810		42.14	-78.29	41815.36	9.19		
5	E	2033-10-30T19:16:52.933		42.34	-78.07	42309.66	9.21		
4	E	2033-10-30T19:17:17.890		42.44	-77.97	42534.20	9.22		
alpha	E	2033-10-30T19:21:09.308		43.32	-77.04	44686.13	9.31		
beta	E	2033-10-30T19:22:53.900		43.72	-76.62	45657.96	9.35		
eta	E	2033-10-30T19:25:35.786		44.34	-75.97	47176.12	9.40		
gamma	E	2033-10-30T19:26:24.208		44.52	-75.78	47631.55	9.41		
delta	E	2033-10-30T19:27:35.177		44.79	-75.49	48300.35	9.43		
lambda	E	2033-10-30T19:30:37.672		45.49	-74.75	50026.71	9.48		
epsilon	E	2033-10-30T19:33:10.372		46.07	-74.14	51478.03	9.51		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-10-30T18:00:28.390
 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 : 3377382584441538688
 2Mass ID (if available) : 06235180+2334595
 ICRS Star Coord at Epoch: 06h 23m 51.80946s +23:34:59.38333s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 13.535
 G magnitude : 15.264
 RP magnitude : 14.662
 BP magnitude : 15.686
 DUPflag : 0
 Distance (au) : 18.423
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -9.27
 Sun-Target sep (deg) : 121.70
 Sun-Moon sep (deg) : 153.39
 B (ring opening deg) : 70.52
 PA of pole (deg) : 67.81
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.636
 C/A sky separation (km) : 21862.7
 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	2033-10-30T16:46:56.545		33.13	-27.59	50749.70	-9.09		
lambda	I	2033-10-30T16:48:16.234		33.22	-27.37	50026.71	-9.06		
delta	I	2033-10-30T16:51:27.647		33.42	-26.84	48300.35	-8.98		
gamma	I	2033-10-30T16:52:43.284		33.50	-26.63	47622.44	-8.95		
eta	I	2033-10-30T16:53:33.240		33.55	-26.48	47176.12	-8.92		
beta	I	2033-10-30T16:56:21.779		33.71	-26.01	45678.64	-8.84		
alpha	I	2033-10-30T16:58:07.893		33.81	-25.71	44746.15	-8.78		
4	I	2033-10-30T17:02:16.498		34.03	-25.00	42570.66	-8.63		
5	I	2033-10-30T17:03:05.391		34.08	-24.86	42168.87	-8.61		
6	I	2033-10-30T17:03:39.395		34.10	-24.76	41879.70	-8.59		
Uranus	I	2033-10-30T17:38:49.813		35.24	-18.44	25202.33		-15.95	-16.66
Uranus	E	2033-10-30T18:23:18.047		34.82	-9.93	25553.87		1.87	1.96
6	E	2033-10-30T19:00:27.903		32.93	-2.48x	41819.84	8.61		
5	E	2033-10-30T19:01:24.602		32.86	-2.28x	42305.71	8.64		
4	E	2033-10-30T19:01:51.096		32.83	-2.19x	42531.43	8.65		
alpha	E	2033-10-30T19:05:57.186		32.53	-1.36x	44687.40	8.81		
beta	E	2033-10-30T19:07:47.622		32.40	-0.98x	45660.04	8.87		
eta	E	2033-10-30T19:10:37.677		32.18	-0.40x	47176.12	8.95		
gamma	E	2033-10-30T19:11:28.476		32.11	-0.23x	47631.48	8.98		
delta	E	2033-10-30T19:12:42.854		32.01	0.03x	48300.35	9.01		
lambda	E	2033-10-30T19:15:53.611		31.75	0.68x	50026.71	9.09		
epsilon	E	2033-10-30T19:18:30.306		31.53	1.22x	51455.69	9.13		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-10-30T18:00:27.880
 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 : 3377382584441538688
 2Mass ID (if available) : 06235180+2334595
 ICRS Star Coord at Epoch: 06h 23m 51.80946s +23:34:59.38333s
 RUWE (>1.4 is poor) : 1.01
 K magnitude : 13.535
 G magnitude : 15.264
 RP magnitude : 14.662
 BP magnitude : 15.686
 DUPflag : 0
 Distance (au) : 18.423
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -9.27
 Sun-Target sep (deg) : 121.70
 Sun-Moon sep (deg) : 153.36
 B (ring opening deg) : 70.52
 PA of pole (deg) : 67.81
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.655
 C/A sky separation (km) : 22108.1
 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_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	2033-10-30T16:47:01.128		29.28	-25.01	50750.08	-9.05		
lambda	I	2033-10-30T16:48:21.216		29.36	-24.80	50026.71	-9.02		
delta	I	2033-10-30T16:51:33.519		29.55	-24.30	48300.35	-8.94		
gamma	I	2033-10-30T16:52:49.519		29.62	-24.11	47622.47	-8.90		
eta	I	2033-10-30T16:53:39.724		29.66	-23.97	47176.12	-8.88		
beta	I	2033-10-30T16:56:29.118		29.81	-23.53	45678.70	-8.80		
alpha	I	2033-10-30T16:58:15.817		29.91	-23.24	44746.03	-8.74		
4	I	2033-10-30T17:02:25.870		30.11	-22.57	42570.36	-8.58		
5	I	2033-10-30T17:03:14.987		30.15	-22.44	42169.19	-8.56		
6	I	2033-10-30T17:03:49.230		30.18	-22.35	41879.71	-8.53		
Uranus	I	2033-10-30T17:39:30.399		31.22	-16.32	25211.59		-15.73	-16.43
Uranus	E	2033-10-30T18:22:37.422		30.86	-8.49	25555.66		1.51	1.58
6	E	2033-10-30T19:00:19.640		29.12	-1.29x	41820.12	8.56		
5	E	2033-10-30T19:01:16.614		29.06	-1.11x	42305.44	8.59		
4	E	2033-10-30T19:01:43.268		29.03	-1.02x	42531.28	8.60		
alpha	E	2033-10-30T19:05:50.786		28.76	-0.22x	44687.49	8.76		
beta	E	2033-10-30T19:07:41.808		28.63	0.14x	45660.18	8.82		
eta	E	2033-10-30T19:10:32.705		28.43	0.70x	47176.12	8.91		
gamma	E	2033-10-30T19:11:23.750		28.37	0.87x	47631.47	8.93		
delta	E	2033-10-30T19:12:38.483		28.28	1.11x	48300.35	8.97		
lambda	E	2033-10-30T19:15:50.111		28.04	1.74x	50026.71	9.05		
epsilon	E	2033-10-30T19:18:27.320		27.84	2.26x	51454.18	9.09		