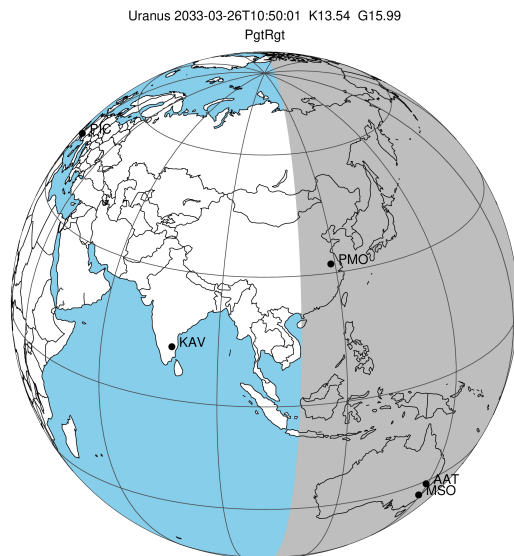


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-03-26T10:50:01.800
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3427682557054363904
 2Mass ID (if available) : 05481845+2337359

Uranus 2033-03-26T10:50:01 K13.54 G15.99 PgtRgt

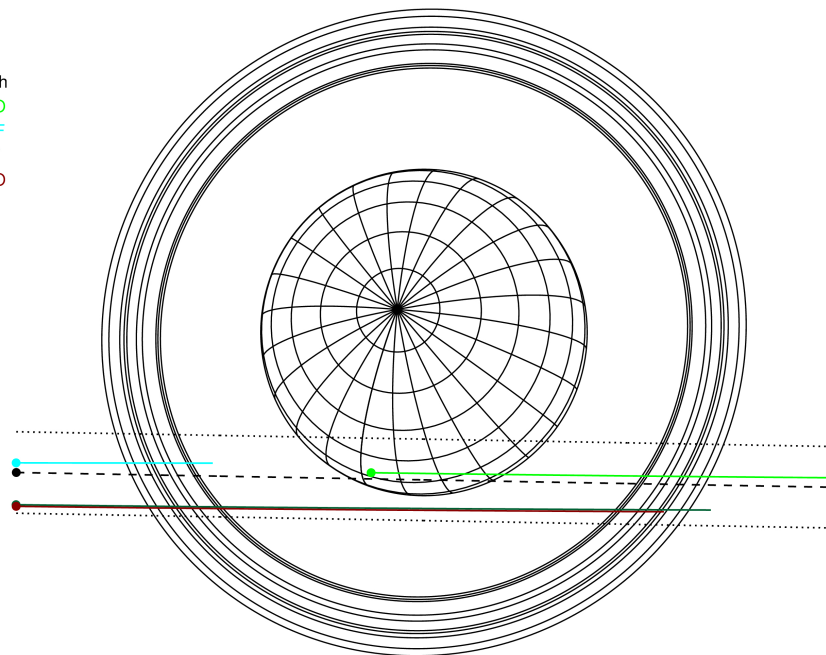
ICRS Star Coord at Epoch: 05h 48m 18.46957s +23:37:35.80189s

RUWE (>1.4 is poor) : 0.00
 K magnitude : 13.542
 G magnitude : 15.987
 RP magnitude : 15.124
 BP magnitude : 16.407
 DUPflag : 0
 Distance (au) : 19.121
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 10.65
 Sun-Target sep (deg) : 81.69
 Sun-Moon sep (deg) : 141.11
 B (ring opening deg) : 77.51
 PA of pole (deg) : 49.19



2033-03-26T10:50:01.8000 cc: 05 48 18.4696 s: +23 37 35.802 C/A 1.657" PA 358.96 deg v_sky +10.65 km/s D 19.12 AU
 Credit: Styled after SORA/Lucky Star

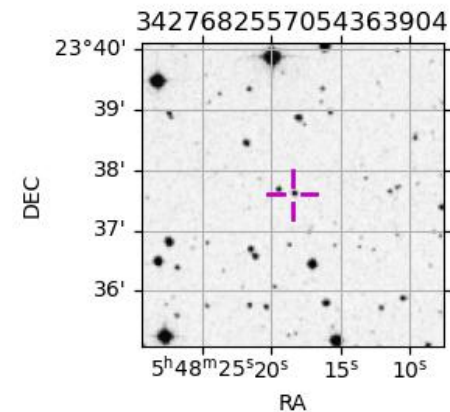
Earth
 PMO
 IRTF
 AAT
 MSO



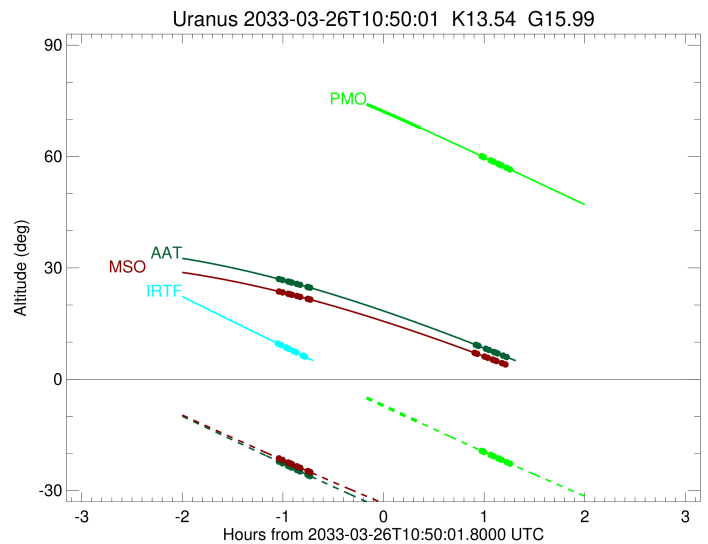
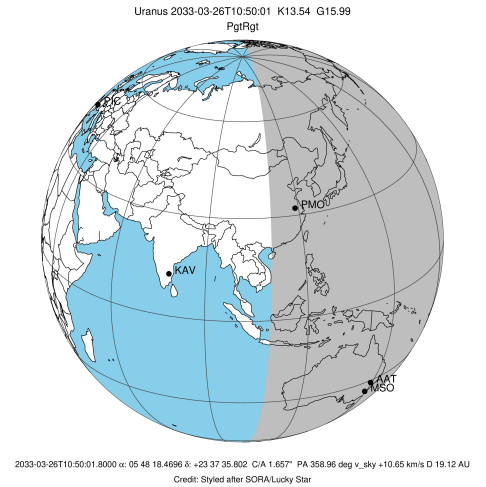
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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		+	+++++++	MAR 26 11:12 - MAR 26 12:05	PneRne
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	+++++++			MAR 26 09:46 - MAR 26 10:03	PnnRin
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	+++++++		+++++++	MAR 26 09:46 - MAR 26 12:03	PnnRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++++		+++++++	MAR 26 09:46 - MAR 26 11:56	PnnRie



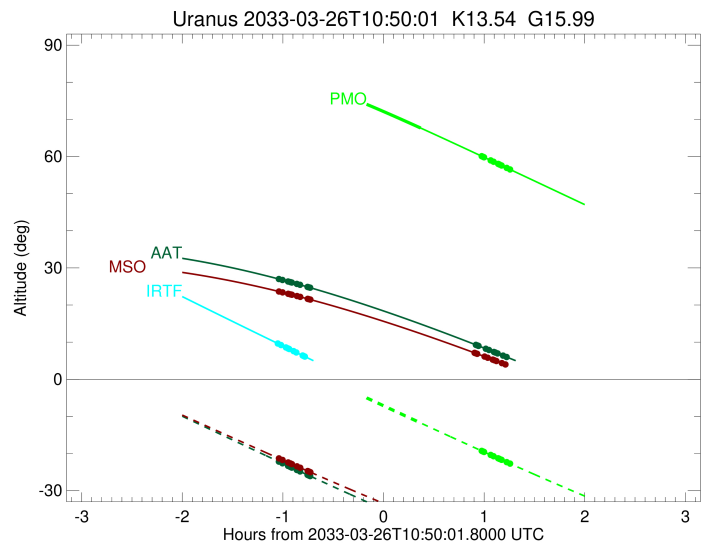
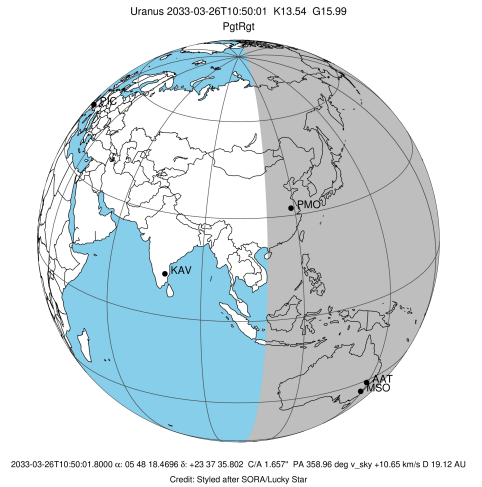
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-03-26T10:52:54.990
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 3427682557054363904
 2Mass ID (if available) : 05481845+2337359
 ICRS Star Coord at Epoch: 05h 48m 18.46957s +23:37:35.80189s
 RUWE (>1.4 is poor) : 0.00
 K magnitude : 13.542
 G magnitude : 15.987
 RP magnitude : 15.124
 BP magnitude : 16.407
 DUPflag : 0
 Distance (au) : 19.121
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 10.65
 Sun-Target sep (deg) : 81.69
 Sun-Moon sep (deg) : 141.51
 B (ring opening deg) : 77.51
 PA of pole (deg) : 49.19
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.592
 C/A sky separation (km) : 22072.5
 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	2033-03-26T09:37:31.936		81.74	8.22x	51525.61	-9.35		
lambda	I	2033-03-26T09:40:12.956		81.73	7.65x	50026.71	-9.28		
delta	I	2033-03-26T09:43:19.896		81.67	6.99x	48300.35	-9.19		
gamma	I	2033-03-26T09:44:32.879		81.63	6.73x	47630.72	-9.16		
eta	I	2033-03-26T09:45:22.588		81.60	6.56x	47176.12	-9.13		
beta	I	2033-03-26T09:48:07.081		81.46	5.97x	45680.93	-9.05		
alpha	I	2033-03-26T09:49:50.879		81.36	5.61x	44744.60	-8.99		
4	I	2033-03-26T09:53:49.908		81.06	4.76x	42616.55	-8.83		
5	I	2033-03-26T09:54:35.683		81.00	4.60x	42209.35	-8.81		
6	I	2033-03-26T09:55:20.932		80.93	4.44x	41810.59	-8.76		
Uranus	I	2033-03-26T10:32:01.578		75.54	-3.33x	25542.37		-2.10	-2.20
Uranus	E	2033-03-26T11:12:13.005		67.67	-11.78	25074.32		-11.60	-12.14
6	E	2033-03-26T11:48:32.416		60.10	-19.28	41818.80	8.85		
5	E	2033-03-26T11:49:28.586		59.91	-19.48	42314.52	8.90		
4	E	2033-03-26T11:49:53.909		59.82	-19.56	42551.81	8.92		
alpha	E	2033-03-26T11:53:55.870		58.97	-20.38	44724.06	9.08		
beta	E	2033-03-26T11:55:37.515		58.61	-20.73	45653.71	9.15		
eta	E	2033-03-26T11:58:23.241		58.02	-21.29	47176.12	9.24		
gamma	E	2033-03-26T11:59:11.375		57.85	-21.45	47621.37	9.26		
delta	E	2033-03-26T12:00:24.524		57.60	-21.70	48300.35	9.30		
lambda	E	2033-03-26T12:03:29.236		56.94	-22.32	50026.71	9.39		
epsilon	E	2033-03-26T12:05:15.789		56.57	-22.68	51029.81	9.47		

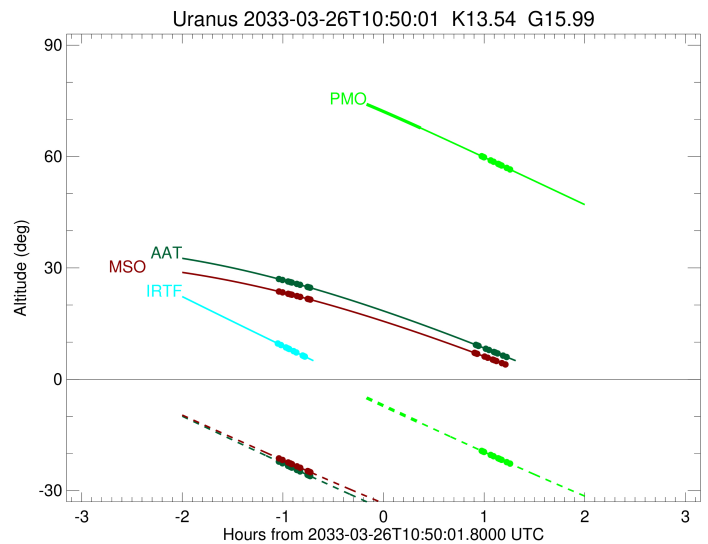
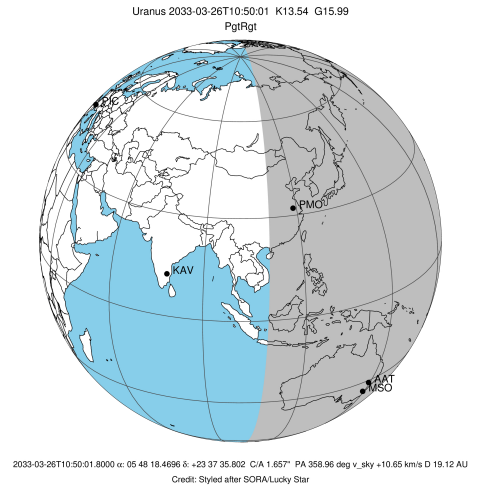
```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch              : 2033-03-26T10:59:37.750
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        : 3427682557054363904
2Mass ID (if available) : 05481845+2337359
ICRS Star Coord at Epoch: 05h 48m 18.46957s +23:37:35.80189s
RUWE (>1.4 is poor)  : 0.00
K magnitude           : 13.542
G magnitude           : 15.987
RP magnitude          : 15.124
BP magnitude          : 16.407
DUPflag               : 0
Distance (au)         : 19.121
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : 10.65
Sun-Target sep (deg)  : 81.69
Sun-Moon sep (deg)    : 140.41
B (ring opening deg)  : 77.51
PA of pole (deg)      : 49.19
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.480
C/A sky separation (km) : 20526.6
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_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	2033-03-26T09:46:23.834		9.77	-65.70	51522.62	-9.86		
lambda	I	2033-03-26T09:48:56.187		9.21	-65.95	50026.71	-9.79		
delta	I	2033-03-26T09:51:53.097		8.57	-66.23	48300.35	-9.72		
gamma	I	2033-03-26T09:53:02.058		8.31	-66.33	47630.78	-9.69		
eta	I	2033-03-26T09:53:49.005		8.14	-66.40	47176.12	-9.67		
beta	I	2033-03-26T09:56:24.140		7.58	-66.61	45680.84	-9.60		
alpha	I	2033-03-26T09:58:01.898		7.22	-66.74	44744.03	-9.55		
4	I	2033-03-26T10:01:46.325		6.41	-67.01	42616.50	-9.43		
5	I	2033-03-26T10:02:29.403		6.25	-67.05	42207.13	-9.41		
6	I	2033-03-26T10:03:11.417		6.10	-67.10	41811.59	-9.36		
Uranus	I	2033-03-26T10:36:01.520		-0.96x	-67.78	25556.00		-0.89	-0.94
Uranus	E	2033-03-26T11:21:44.621		-10.51x	-64.16	25034.24		-12.09	-12.65
6	E	2033-03-26T11:53:57.356		-16.98x	-59.32	41820.83	9.58		
5	E	2033-03-26T11:54:48.945		-17.14x	-59.17	42313.86	9.63		
4	E	2033-03-26T11:55:12.191		-17.22x	-59.11	42549.75	9.65		
alpha	E	2033-03-26T11:58:56.342		-17.95x	-58.46	44722.44	9.79		
beta	E	2033-03-26T12:00:30.742		-18.26x	-58.18	45652.84	9.85		
eta	E	2033-03-26T12:03:04.808		-18.76x	-57.73	47176.12	9.93		
gamma	E	2033-03-26T12:03:49.565		-18.90x	-57.59	47621.28	9.96		
delta	E	2033-03-26T12:04:57.638		-19.12x	-57.39	48300.35	9.99		
lambda	E	2033-03-26T12:07:49.682		-19.67x	-56.87	50026.71	10.07		
epsilon	E	2033-03-26T12:09:27.447		-19.98x	-56.57	51013.79	10.15		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-03-26T10:56:57.320
 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 : 3427682557054363904
 2Mass ID (if available) : 05481845+2337359
 ICRS Star Coord at Epoch: 05h 48m 18.46957s +23:37:35.80189s
 RUWE (>1.4 is poor) : 0.00
 K magnitude : 13.542
 G magnitude : 15.987
 RP magnitude : 15.124
 BP magnitude : 16.407
 DUPflag : 0
 Distance (au) : 19.121
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 10.65
 Sun-Target sep (deg) : 81.69
 Sun-Moon sep (deg) : 140.75
 B (ring opening deg) : 77.51
 PA of pole (deg) : 49.19
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.988
 C/A sky separation (km) : 27563.6
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

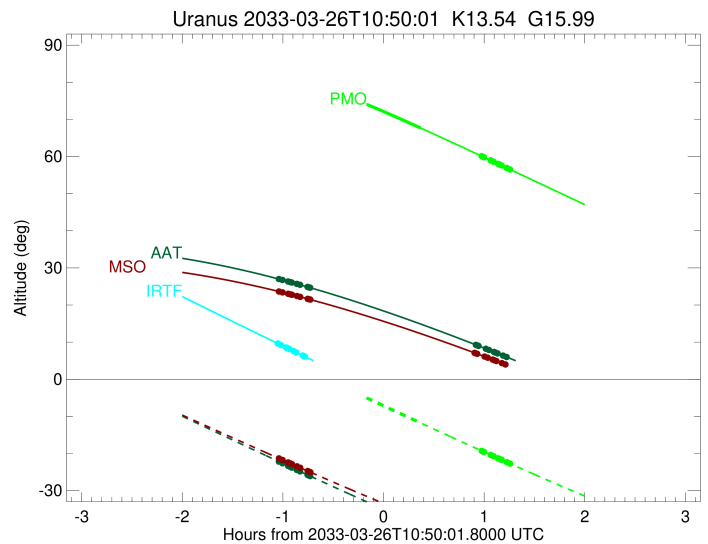
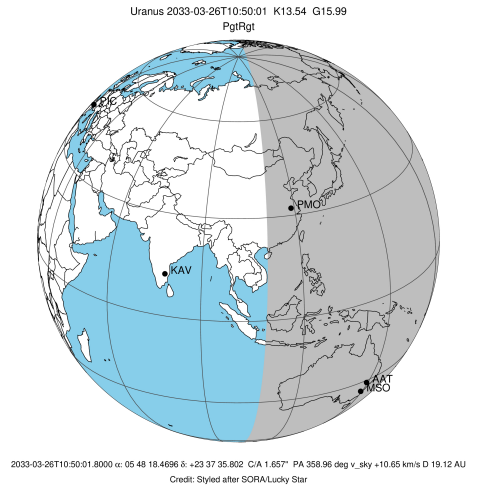


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-03-26T09:46:54.935		27.09	-22.03	51542.37	-8.78		
lambda	I	2033-03-26T09:49:48.841		26.74	-22.64	50026.71	-8.66		
delta	I	2033-03-26T09:53:09.772		26.33	-23.34	48300.35	-8.52		
gamma	I	2033-03-26T09:54:28.685		26.17	-23.62	47630.25	-8.46		
eta	I	2033-03-26T09:55:22.484		26.06	-23.81	47176.12	-8.42		
beta	I	2033-03-26T09:58:21.568		25.69	-24.43	45681.23	-8.27		
alpha	I	2033-03-26T10:00:15.097		25.45	-24.83	44747.68	-8.17		
4	I	2033-03-26T10:04:40.310		24.88	-25.75	42616.11	-7.90		
5	I	2033-03-26T10:05:30.060		24.77	-25.92	42222.65	-7.86		
6	I	2033-03-26T10:06:23.344		24.66	-26.11	41805.27	-7.78		

No planet occultations

6	E	2033-03-26T11:45:03.465		9.28	-45.52	41812.93	7.91		
5	E	2033-03-26T11:46:07.078		9.09	-45.71	42315.23	7.99		
4	E	2033-03-26T11:46:36.091		9.01	-45.80	42558.39	8.04		
alpha	E	2033-03-26T11:51:02.157		8.22	-46.59	44728.81	8.32		
beta	E	2033-03-26T11:52:52.544		7.89	-46.91	45656.38	8.43		
eta	E	2033-03-26T11:55:51.294		7.36	-47.44	47176.12	8.59		
gamma	E	2033-03-26T11:56:43.052		7.21	-47.59	47621.68	8.63		
delta	E	2033-03-26T11:58:01.392		6.97	-47.81	48300.35	8.70		
lambda	E	2033-03-26T12:01:18.194		6.38	-48.38	50026.71	8.85		
epsilon	E	2033-03-26T12:03:16.282		6.02	-48.71	51076.38	8.98		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-03-26T10:56:37.300
 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 : 3427682557054363904
 2Mass ID (if available) : 05481845+2337359
 ICRS Star Coord at Epoch: 05h 48m 18.46957s +23:37:35.80189s
 RUWE (>1.4 is poor) : 0.00
 K magnitude : 13.542
 G magnitude : 15.987
 RP magnitude : 15.124
 BP magnitude : 16.407
 DUPflag : 0
 Distance (au) : 19.121
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : 10.65
 Sun-Target sep (deg) : 81.69
 Sun-Moon sep (deg) : 140.74
 B (ring opening deg) : 77.51
 PA of pole (deg) : 49.19
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.008
 C/A sky separation (km) : 27844.0
 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	2033-03-26T09:46:57.160		23.72	-21.17	51542.99	-8.76		
lambda	I	2033-03-26T09:49:51.642		23.40	-21.75	50026.71	-8.63		
delta	I	2033-03-26T09:53:13.249		23.02	-22.42	48300.35	-8.49		
gamma	I	2033-03-26T09:54:32.460		22.87	-22.68	47630.23	-8.43		
eta	I	2033-03-26T09:55:26.469		22.77	-22.86	47176.12	-8.39		
beta	I	2033-03-26T09:58:26.325		22.42	-23.45	45681.23	-8.23		
alpha	I	2033-03-26T10:00:20.387		22.20	-23.83	44747.81	-8.13		
4	I	2033-03-26T10:04:47.110		21.66	-24.71	42616.05	-7.86		
5	I	2033-03-26T10:05:37.096		21.56	-24.87	42223.32	-7.81		
6	I	2033-03-26T10:06:30.857		21.45	-25.05	41805.03	-7.73		

No planet occultations

6	E	2033-03-26T11:44:16.159		7.12	-43.07	41812.60	7.85		
5	E	2033-03-26T11:45:20.290		6.95	-43.24	42315.21	7.93		
4	E	2033-03-26T11:45:49.574		6.86	-43.32	42558.80	7.98		
alpha	E	2033-03-26T11:50:17.333		6.11	-44.06	44729.09	8.27		
beta	E	2033-03-26T11:52:08.332		5.80	-44.35	45656.55	8.38		
eta	E	2033-03-26T11:55:07.989		5.29	-44.84	47176.12	8.54		
gamma	E	2033-03-26T11:55:59.998		5.15	-44.97	47621.70	8.59		
delta	E	2033-03-26T11:57:18.699		4.92x	-45.18	48300.35	8.66		
lambda	E	2033-03-26T12:00:36.343		4.36x	-45.70	50026.71	8.81		
epsilon	E	2033-03-26T12:02:35.215		4.02x	-46.01	51079.25	8.94		