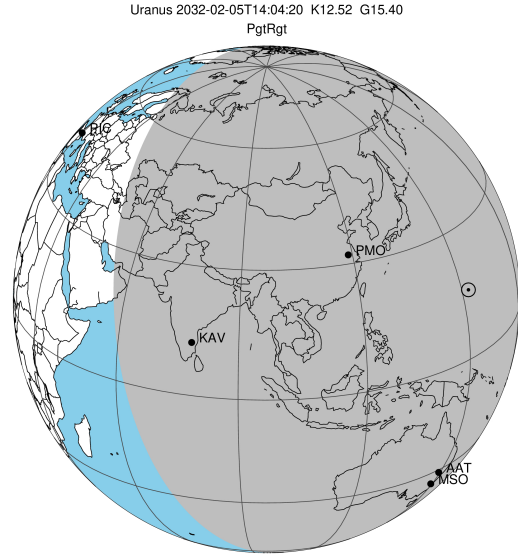


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-02-05T14:04:20.370
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3416181910242758400
 2Mass ID (if available) : 05292999+2324400

ICRS Star Coord at Epoch: 05h 29m 30.00221s +23:24:39.77337s

RUWE (>1.4 is poor) : 0.97
 K magnitude : 12.517
 G magnitude : 15.401
 RP magnitude : 14.508
 BP magnitude : 16.206
 DUPflag : 0
 Distance (au) : 18.466
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -11.66
 Sun-Target sep (deg) : 127.13
 Sun-Moon sep (deg) : 155.22
 B (ring opening deg) : 80.48
 PA of pole (deg) : 31.01

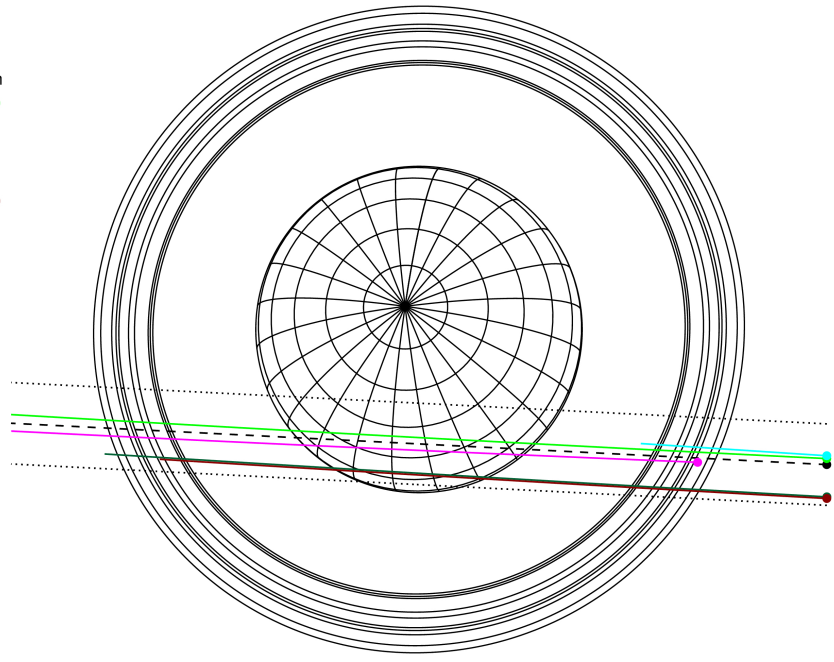
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2032-02-05T14:04:20.3700 ex: 05 29 30.0022 s : +23 24 39.773 C/A 1.330° PA 357.10 deg v_sky -11.66 km/s D 18.47 AU
 Credit: Styled after SORA/Lucky Star

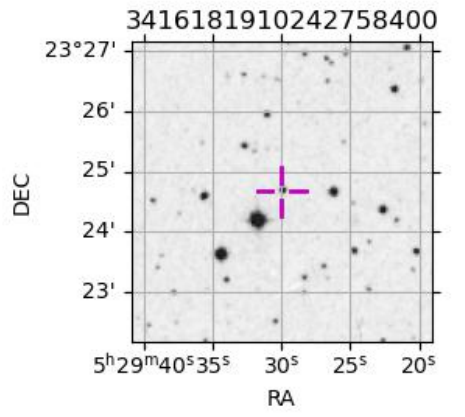
Uranus 2032-02-05T14:04:20 K12.52 G15.40 PgtRgt

Earth
 PMO
 IRTF
 KAV
 AAT
 MSO

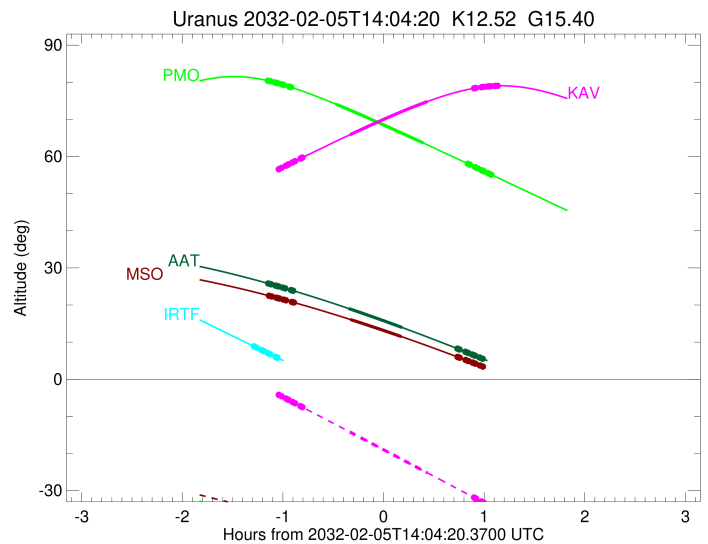
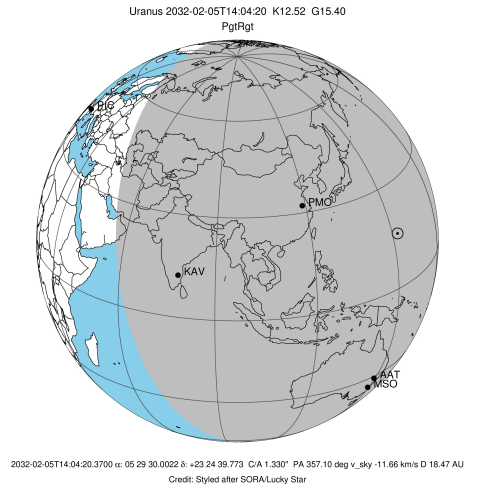


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

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	+++++	+ +	+++++	FEB 05 12:54 - FEB 05 15:07	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	+++++			FEB 05 12:46 - FEB 05 13:01	PnnRin
KAV	Kavalur Observatory	12.6	78.8	+++++	+ +	+++++	FEB 05 13:06 - FEB 05 15:11	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	+++++	+ +	+++++	FEB 05 12:55 - FEB 05 15:02	PieRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++	+ +	++++	FEB 05 12:55 - FEB 05 14:53	PieRie



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-02-05T14:01:29.960
 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 : 3416181910242758400
 2Mass ID (if available) : 05292999+2324400
 ICRS Star Coord at Epoch: 05h 29m 30.00221s +23:24:39.77337s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 12.517
 G magnitude : 15.401
 RP magnitude : 14.508
 BP magnitude : 16.206
 DUPflag : 0
 Distance (au) : 18.466
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -11.66
 Sun-Target sep (deg) : 127.13
 Sun-Moon sep (deg) : 155.89
 B (ring opening deg) : 80.48
 PA of pole (deg) : 31.01
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.262
 C/A sky separation (km) : 16904.0
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

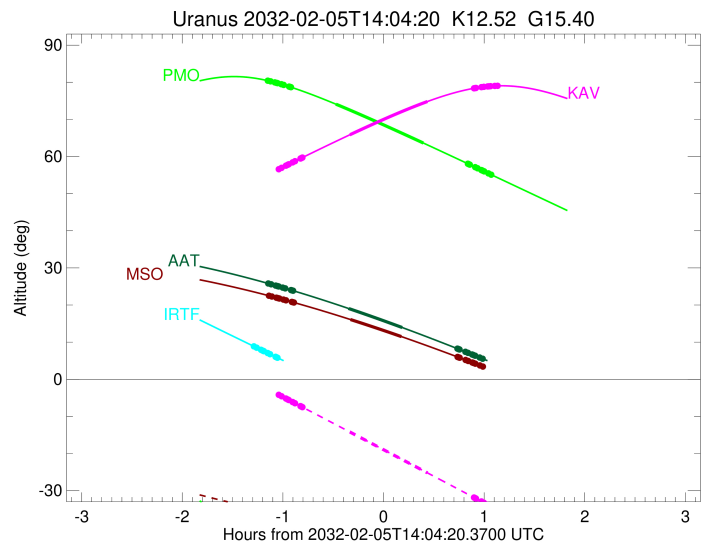
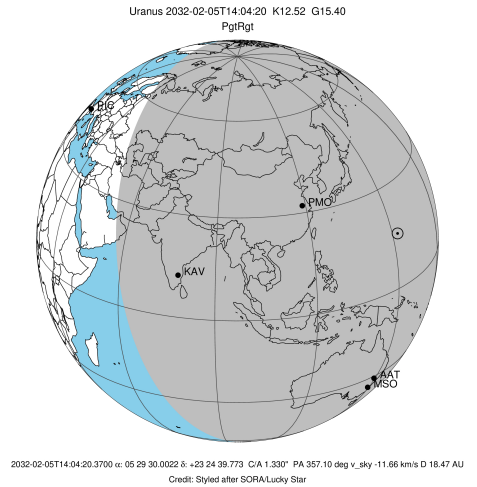


b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-02-05T12:54:56.046		80.48	-41.28	51452.27	-11.40		
lambda	I	2032-02-05T12:57:01.056		80.26	-41.72	50026.71	-11.38		
delta	I	2032-02-05T12:59:33.094		79.97	-42.26	48300.35	-11.33		
gamma	I	2032-02-05T13:00:33.133		79.85	-42.47	47621.03	-11.30		
eta	I	2032-02-05T13:01:12.525		79.77	-42.60	47176.12	-11.29		
beta	I	2032-02-05T13:03:27.962		79.48	-43.08	45651.46	-11.23		
alpha	I	2032-02-05T13:04:51.125		79.29	-43.37	44721.07	-11.18		
4	I	2032-02-05T13:08:06.301		78.83	-44.05	42547.94	-11.09		
5	I	2032-02-05T13:08:28.660		78.78	-44.13	42292.82	-11.08		
6	I	2032-02-05T13:09:07.628		78.69	-44.27	41868.86	-11.05		
Uranus	I	2032-02-05T13:35:56.506		74.11	-49.85	25019.02		-9.26	-9.69
Uranus	E	2032-02-05T14:28:05.803		63.64	-60.26	25549.54		-1.20	-1.26
6	E	2032-02-05T14:54:34.506		58.08	-65.11	41794.97	10.96		
5	E	2032-02-05T14:55:14.790		57.94	-65.23	42236.45	10.99		
4	E	2032-02-05T14:55:49.096		57.81	-65.33	42615.54	11.00		
alpha	E	2032-02-05T14:58:57.153		57.15	-65.86	44692.96	11.09		
beta	E	2032-02-05T15:00:23.825		56.84	-66.11	45656.02	11.13		
eta	E	2032-02-05T15:02:40.044		56.36	-66.49	47176.12	11.19		
gamma	E	2032-02-05T15:03:20.656		56.22	-66.60	47630.76	11.20		
delta	E	2032-02-05T15:04:20.371		56.01	-66.76	48300.35	11.22		
lambda	E	2032-02-05T15:06:53.826		55.47	-67.18	50026.71	11.28		
epsilon	E	2032-02-05T15:07:57.384		55.24	-67.35	50743.97	11.29		

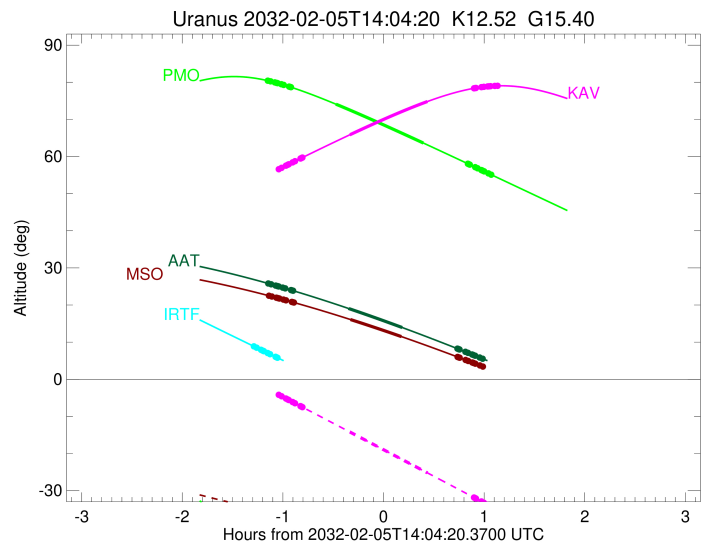
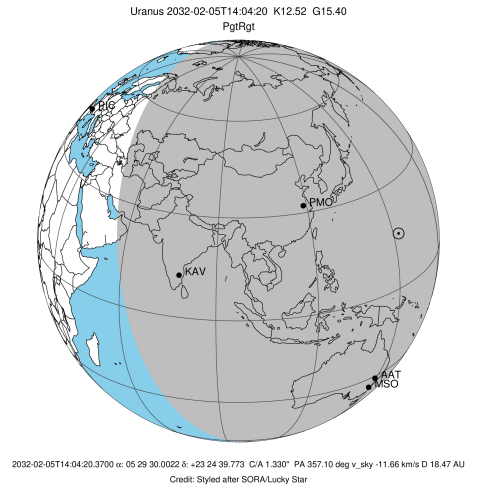
```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch              : 2032-02-05T13:56:14.950
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        : 3416181910242758400
2Mass ID (if available) : 05292999+2324400
ICRS Star Coord at Epoch: 05h 29m 30.00221s +23:24:39.77337s
RUWE (>1.4 is poor)  : 0.97
K magnitude            : 12.517
G magnitude           : 15.401
RP magnitude          : 14.508
BP magnitude          : 16.206
DUPflag               : 0
Distance (au)         : 18.466
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -11.66
Sun-Target sep (deg)  : 127.13
Sun-Moon sep (deg)   : 155.99
B (ring opening deg) : 80.48
PA of pole (deg)     : 31.01
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.160
C/A sky separation (km) : 15542.3
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
    
```



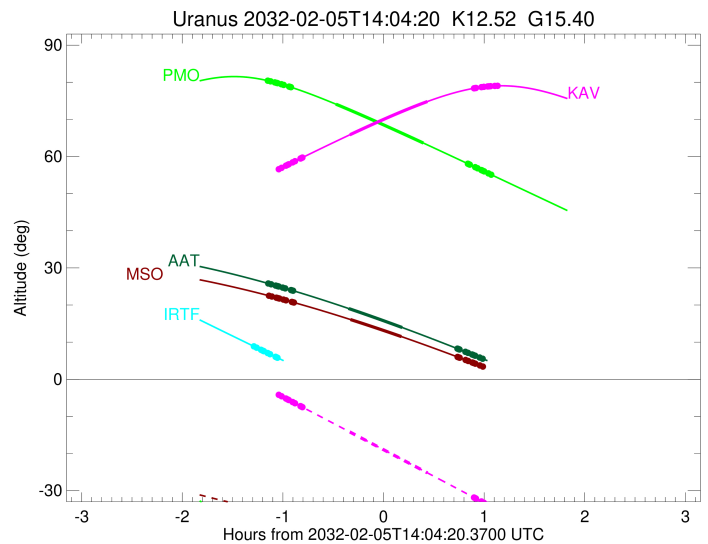
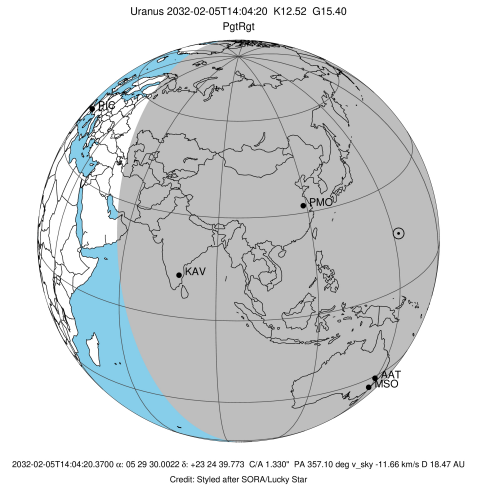
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-02-05T12:46:36.244		8.96	-58.70	51456.26	-11.17		
lambda	I	2032-02-05T12:48:44.228		8.50	-58.19	50026.71	-11.15		
delta	I	2032-02-05T12:51:19.395		7.93	-57.59	48300.35	-11.10		
gamma	I	2032-02-05T12:52:20.651		7.71	-57.35	47621.02	-11.08		
eta	I	2032-02-05T12:53:00.832		7.56	-57.19	47176.12	-11.07		
beta	I	2032-02-05T12:55:18.910		7.06	-56.65	45651.80	-11.01		
alpha	I	2032-02-05T12:56:43.638		6.75	-56.31	44721.74	-10.98		
4	I	2032-02-05T13:00:02.563		6.03	-55.53	42547.08	-10.90		
5	I	2032-02-05T13:00:25.357		5.95	-55.44	42291.57	-10.88		
6	I	2032-02-05T13:01:04.821		5.80	-55.29	41869.50	-10.86		
Uranus	I	2032-02-05T13:27:59.685	-0.00x	-48.96	25035.66			-9.11	-9.53
Uranus	E	2032-02-05T14:25:36.643	-12.04x	-35.43	25557.69			-0.45	-0.47
6	E	2032-02-05T14:52:27.533	-17.41x	-29.15	41794.82		10.64		
5	E	2032-02-05T14:53:08.740	-17.55x	-28.99	42232.83		10.66		
4	E	2032-02-05T14:53:44.354	-17.66x	-28.85	42615.07		10.67		
alpha	E	2032-02-05T14:56:58.566	-18.30x	-28.10	44693.94		10.74		
beta	E	2032-02-05T14:58:28.108	-18.59x	-27.75	45656.83		10.77		
eta	E	2032-02-05T15:00:48.903	-19.04x	-27.21	47176.12		10.81		
gamma	E	2032-02-05T15:01:30.940	-19.18x	-27.04	47630.87		10.82		
delta	E	2032-02-05T15:02:32.746	-19.38x	-26.80	48300.35		10.84		
lambda	E	2032-02-05T15:05:11.716	-19.89x	-26.19	50026.71		10.88		
epsilon	E	2032-02-05T15:06:17.696	-20.10x	-25.93	50744.99		10.89		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-02-05T14:06:51.220
 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 : 3416181910242758400
 2Mass ID (if available) : 05292999+2324400
 ICRS Star Coord at Epoch: 05h 29m 30.00221s +23:24:39.77337s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 12.517
 G magnitude : 15.401
 RP magnitude : 14.508
 BP magnitude : 16.206
 DUPflag : 0
 Distance (au) : 18.466
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -11.66
 Sun-Target sep (deg) : 127.13
 Sun-Moon sep (deg) : 155.33
 B (ring opening deg) : 80.48
 PA of pole (deg) : 31.01
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.412
 C/A sky separation (km) : 18912.4
 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_itrf93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



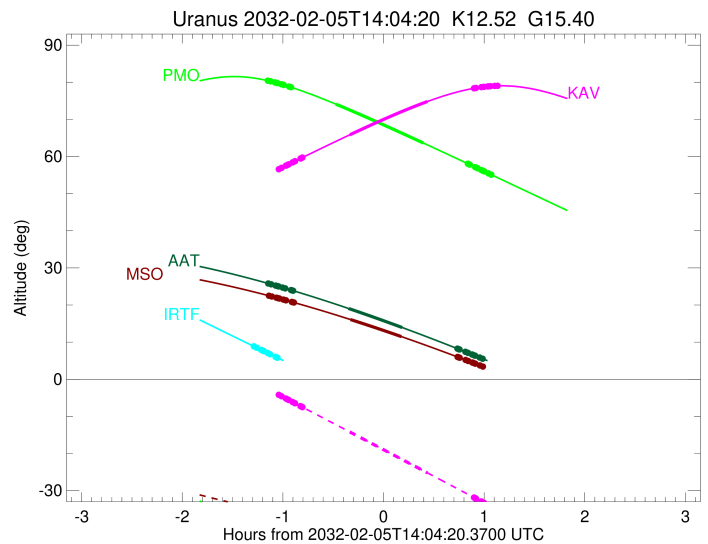
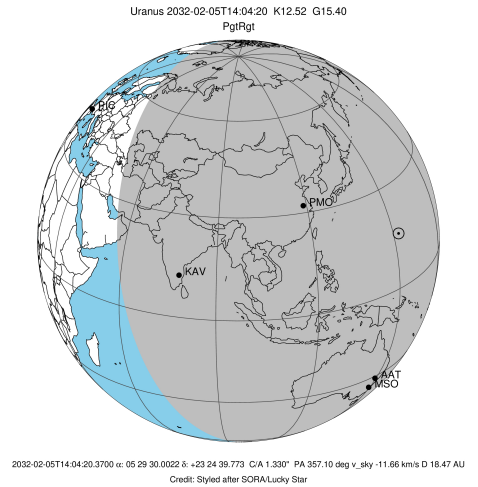
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-02-05T13:01:28.841		56.49	-4.09x	51443.17	-11.20		
lambda	I	2032-02-05T13:03:35.327		56.96	-4.58x	50026.71	-11.17		
delta	I	2032-02-05T13:06:10.301		57.54	-5.19	48300.35	-11.11		
gamma	I	2032-02-05T13:07:11.550		57.77	-5.43	47621.07	-11.08		
eta	I	2032-02-05T13:07:51.757		57.92	-5.59	47176.12	-11.06		
beta	I	2032-02-05T13:10:10.163		58.43	-6.13	45650.78	-10.98		
alpha	I	2032-02-05T13:11:35.277		58.75	-6.47	44719.70	-10.93		
4	I	2032-02-05T13:14:54.910		59.48	-7.25	42549.64	-10.81		
5	I	2032-02-05T13:15:17.789		59.57	-7.34	42295.21	-10.80		
6	I	2032-02-05T13:15:58.152		59.72	-7.50	41867.57	-10.76		
Uranus	I	2032-02-05T13:44:17.128		65.86	-14.20	24998.15		-9.44	-9.88
Uranus	E	2032-02-05T14:30:30.124		74.82	-25.21	25523.54		-2.33	-2.44
6	E	2032-02-05T14:58:14.066		78.38	-31.84	41795.33	10.79		
5	E	2032-02-05T14:58:55.390		78.43	-32.00	42241.44	10.83		
4	E	2032-02-05T14:59:29.859		78.47	-32.14	42616.05	10.84		
alpha	E	2032-02-05T15:02:40.224		78.69	-32.90	44691.70	10.96		
beta	E	2032-02-05T15:04:07.869		78.77	-33.25	45654.91	11.01		
eta	E	2032-02-05T15:06:25.494		78.88	-33.80	47176.12	11.09		
gamma	E	2032-02-05T15:07:06.436		78.91	-33.96	47630.60	11.11		
delta	E	2032-02-05T15:08:06.635		78.95	-34.20	48300.35	11.14		
lambda	E	2032-02-05T15:10:41.114		79.02	-34.82	50026.71	11.21		
epsilon	E	2032-02-05T15:11:44.983		79.04	-35.07	50743.52	11.24		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-02-05T13:58:51.650
 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 : 3416181910242758400
 2Mass ID (if available) : 05292999+2324400
 ICRS Star Coord at Epoch: 05h 29m 30.00221s +23:24:39.77337s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 12.517
 G magnitude : 15.401
 RP magnitude : 14.508
 BP magnitude : 16.206
 DUPflag : 0
 Distance (au) : 18.466
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -11.66
 Sun-Target sep (deg) : 127.13
 Sun-Moon sep (deg) : 155.85
 B (ring opening deg) : 80.48
 PA of pole (deg) : 31.01
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.678
 C/A sky separation (km) : 22475.4
 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_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	2032-02-05T12:55:14.119		25.85	-38.95	51415.87	-10.78		
lambda	I	2032-02-05T12:57:23.093		25.58	-39.14	50026.71	-10.73		
delta	I	2032-02-05T13:00:04.729		25.23	-39.39	48300.35	-10.63		
gamma	I	2032-02-05T13:01:08.769		25.09	-39.48	47621.20	-10.58		
eta	I	2032-02-05T13:01:50.887		25.00	-39.54	47176.12	-10.55		
beta	I	2032-02-05T13:04:16.354		24.68	-39.75	45649.04	-10.44		
alpha	I	2032-02-05T13:05:46.215		24.48	-39.87	44716.08	-10.36		
4	I	2032-02-05T13:09:16.721		24.01	-40.16	42554.26	-10.18		
5	I	2032-02-05T13:09:40.974		23.96	-40.19	42300.84	-10.15		
6	I	2032-02-05T13:10:24.922		23.86	-40.25	41863.95	-10.10		
Uranus	I	2032-02-05T13:43:32.723		19.06	-42.24	25001.11		-9.42	-9.85
Uranus	E	2032-02-05T14:15:32.760		13.93	-42.96	25433.17		-4.40	-4.61
6	E	2032-02-05T14:48:20.378		8.26	-42.39	41796.08	9.97		
5	E	2032-02-05T14:49:05.643		8.13	-42.36	42248.08	10.02		
4	E	2032-02-05T14:49:42.341		8.02	-42.34	42616.46	10.04		
alpha	E	2032-02-05T14:53:07.017		7.41	-42.20	44690.19	10.21		
beta	E	2032-02-05T14:54:40.973		7.12	-42.13	45653.51	10.29		
eta	E	2032-02-05T14:57:08.217		6.68	-42.02	47176.12	10.39		
gamma	E	2032-02-05T14:57:51.871		6.55	-41.99	47630.37	10.42		
delta	E	2032-02-05T14:58:56.041		6.35	-41.93	48300.35	10.46		
lambda	E	2032-02-05T15:01:40.308		5.86	-41.79	50026.71	10.56		
epsilon	E	2032-02-05T15:02:48.177		5.65	-41.73	50744.42	10.60		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2032-02-05T13:59:08.610
 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 : 3416181910242758400
 2Mass ID (if available) : 05292999+2324400
 ICRS Star Coord at Epoch: 05h 29m 30.00221s +23:24:39.77337s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 12.517
 G magnitude : 15.401
 RP magnitude : 14.508
 BP magnitude : 16.206
 DUPflag : 0
 Distance (au) : 18.466
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -11.66
 Sun-Target sep (deg) : 127.13
 Sun-Moon sep (deg) : 155.80
 B (ring opening deg) : 80.48
 PA of pole (deg) : 31.01
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.698
 C/A sky separation (km) : 22747.8
 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_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	2032-02-05T12:55:38.650		22.55	-35.31	51414.13	-10.73		
lambda	I	2032-02-05T12:57:48.018		22.29	-35.49	50026.71	-10.68		
delta	I	2032-02-05T13:00:30.391		21.97	-35.71	48300.35	-10.58		
gamma	I	2032-02-05T13:01:34.736		21.84	-35.80	47621.21	-10.53		
eta	I	2032-02-05T13:02:17.060		21.75	-35.85	47176.12	-10.50		
beta	I	2032-02-05T13:04:43.276		21.45	-36.04	45648.94	-10.38		
alpha	I	2032-02-05T13:06:13.632		21.27	-36.16	44715.85	-10.31		
4	I	2032-02-05T13:09:45.299		20.83	-36.42	42554.57	-10.12		
5	I	2032-02-05T13:10:09.701		20.77	-36.44	42301.17	-10.09		
6	I	2032-02-05T13:10:53.985		20.68	-36.50	41863.70	-10.03		
Uranus	I	2032-02-05T13:44:36.389		16.10	-38.31	25005.41		-9.38	-9.81
Uranus	E	2032-02-05T14:15:03.770		11.49	-38.92	25421.15		-4.61	-4.82
6	E	2032-02-05T14:48:25.008		6.03	-38.42	41796.17	9.91		
5	E	2032-02-05T14:49:10.587		5.90	-38.40	42248.73	9.96		
4	E	2032-02-05T14:49:47.437		5.79	-38.38	42616.48	9.99		
alpha	E	2032-02-05T14:53:13.163		5.21	-38.25	44690.05	10.16		
beta	E	2032-02-05T14:54:47.570		4.94x	-38.19	45653.37	10.24		
eta	E	2032-02-05T14:57:15.489		4.52x	-38.09	47176.12	10.35		
gamma	E	2032-02-05T14:57:59.327		4.39x	-38.06	47630.35	10.38		
delta	E	2032-02-05T14:59:03.767		4.21x	-38.01	48300.35	10.42		
lambda	E	2032-02-05T15:01:48.681		3.73x	-37.88	50026.71	10.52		
epsilon	E	2032-02-05T15:02:56.820		3.53x	-37.83	50744.60	10.56		