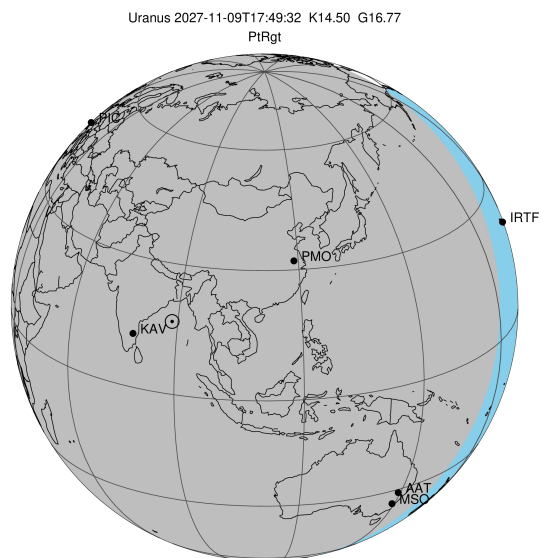


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2027-11-09T17:49:32.940
 Event type : PtRgt
 : Uranus occs: topocentric, not geocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 145400246588802816
 2Mass ID (if available) : 04263574+2136332

ICRS Star Coord at Epoch: 04h 26m 35.74583s +21:36:33.14427s

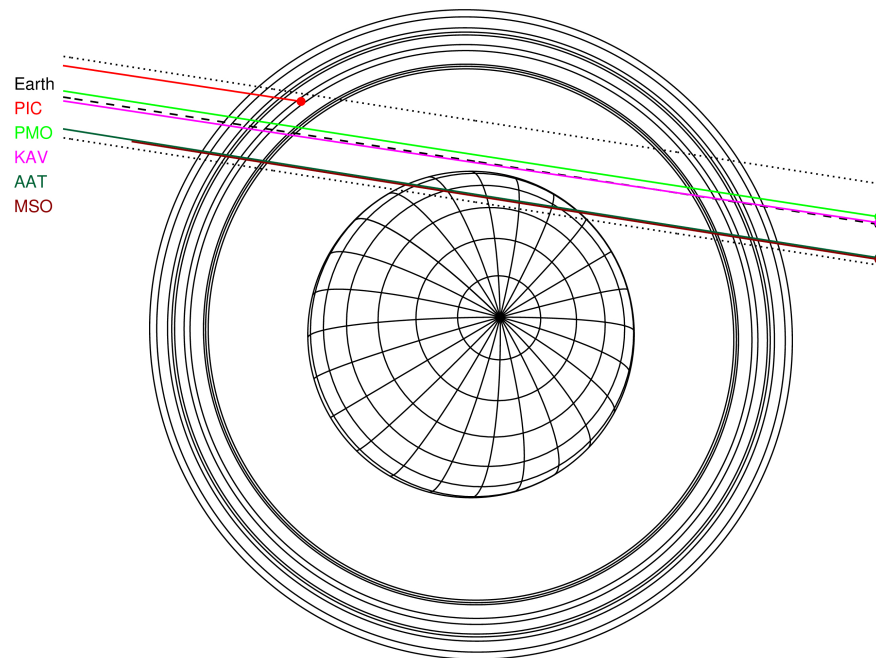
RUWE (>1.4 is poor) : 1.14
 K magnitude : 14.501
 G magnitude : 16.771
 RP magnitude : 15.986
 BP magnitude : 17.336
 DUPflag : 0
 Distance (au) : 18.443
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.35
 Sun-Target sep (deg) : 158.34
 Sun-Moon sep (deg) : 74.38
 B (ring opening deg) : 78.02
 PA of pole (deg) : -59.32

#	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



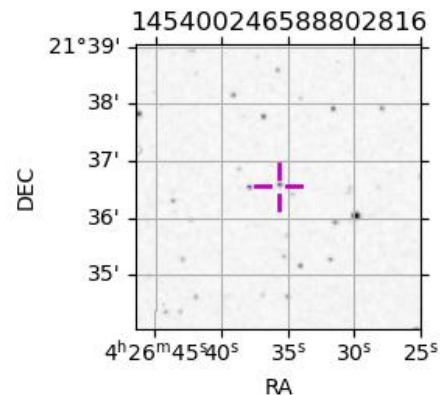
2027-11-09T17:49:32.9400 ex: 04 26 35.7458 s: +21 36 33.144 C/A 2.015° PA 171.13 deg v_sky -21.35 km/s D 18.44 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2027-11-09T17:49:32 K14.50 G16.77 PtRgt

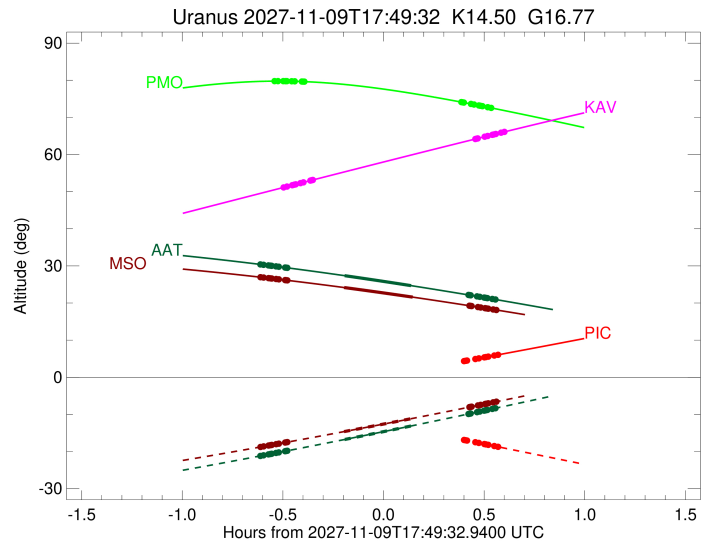
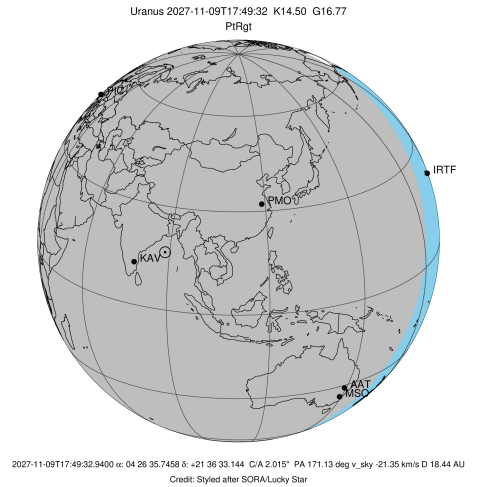


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1			+++++	NOV 09 18:17 - NOV 09 18:23	PnnRne
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++		+++++	NOV 09 17:16 - NOV 09 18:21	PnnRie
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	+++++		+++++	NOV 09 17:19 - NOV 09 18:25	PnnRie
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	+++++	+ +	+++++	NOV 09 17:12 - NOV 09 18:22	PieRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++	+ +	+++++	NOV 09 17:12 - NOV 09 18:23	PieRie



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2027-11-09T17:52:30.650
 Event type : PtRgt
 : Uranus occs: topocentric, not geocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 145400246588802816
 2Mass ID (if available) : 04263574+2136332
 ICRS Star Coord at Epoch: 04h 26m 35.74583s +21:36:33.14427s
 RUWE (>1.4 is poor) : 1.14
 K magnitude : 14.501
 G magnitude : 16.771
 RP magnitude : 15.986
 BP magnitude : 17.336
 DUPflag : 0
 Distance (au) : 18.443
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.35
 Sun-Target sep (deg) : 158.34
 Sun-Moon sep (deg) : 74.23
 B (ring opening deg) : 78.02
 PA of pole (deg) : -59.32
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.401
 C/A sky separation (km) : 32114.4
 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



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

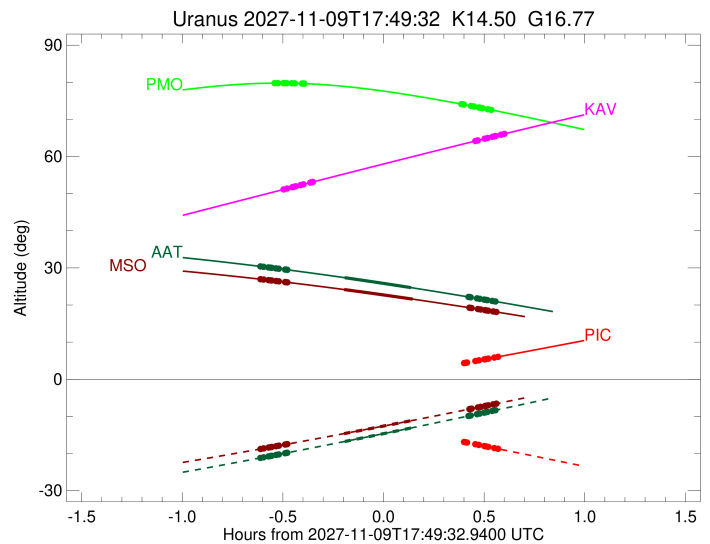
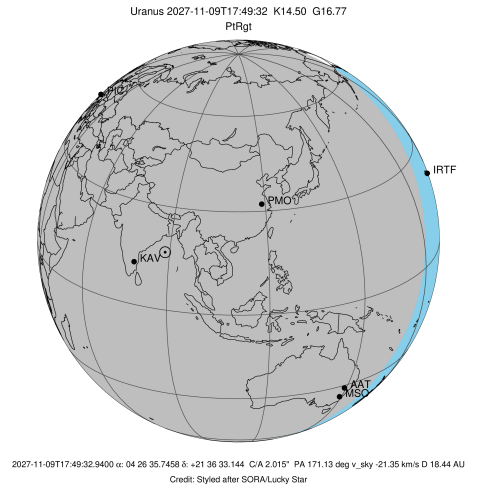
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2027-11-09T17:21:59.806	-3.86x	-7.62	51496.60	-16.72			
lambda	I	2027-11-09T17:23:28.866	-3.63x	-7.89	50026.71	-16.34			
delta	I	2027-11-09T17:25:15.928	-3.36x	-8.20	48300.35	-15.90			
gamma	I	2027-11-09T17:25:58.430	-3.25x	-8.33	47628.31	-15.72			
eta	I	2027-11-09T17:26:27.318	-3.18x	-8.41	47176.12	-15.59			
beta	I	2027-11-09T17:28:07.079	-2.92x	-8.71	45644.52	-15.11			
alpha	I	2027-11-09T17:29:10.394	-2.76x	-8.89	44697.49	-14.77			
4	I	2027-11-09T17:31:38.937	-2.38x	-9.33	42562.22	-13.93			
5	I	2027-11-09T17:31:59.992	-2.32x	-9.40	42269.97	-13.80			
6	I	2027-11-09T17:32:29.582	-2.25x	-9.48	41879.24	-13.59			

No planet occultations

6	E	2027-11-09T18:13:33.706	4.35x	-16.89	41851.99	13.63			
5	E	2027-11-09T18:14:07.243	4.45x	-16.99	42312.21	13.84			
4	E	2027-11-09T18:14:28.906	4.51x	-17.05	42613.67	13.97			
alpha	E	2027-11-09T18:16:53.063	4.91x	-17.49	44690.84	14.82			
beta	E	2027-11-09T18:17:58.520	5.09	-17.69	45672.28	15.16			
eta	E	2027-11-09T18:19:36.087	5.36	-17.99	47176.12	15.65			
gamma	E	2027-11-09T18:20:04.415	5.44	-18.07	47621.23	15.78			
delta	E	2027-11-09T18:20:47.199	5.56	-18.20	48300.35	15.97			
lambda	E	2027-11-09T18:22:33.821	5.86	-18.53	50026.71	16.41			
epsilon	E	2027-11-09T18:23:49.528	6.07	-18.76	51279.84	16.80			

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2027-11-09T17:48:53.810
Event type            : PtRgt
: Uranus occs: topocentric, not geocentric
: 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        : 145400246588802816
2Mass ID (if available) : 04263574+2136332
ICRS Star Coord at Epoch: 04h 26m 35.74583s +21:36:33.14427s
RUWE (>1.4 is poor)  : 1.14
K magnitude           : 14.501
G magnitude           : 16.771
RP magnitude          : 15.986
BP magnitude          : 17.336
DUPflag              : 0
Distance (au)         : 18.443
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -21.35
Sun-Target sep (deg)  : 158.34
Sun-Moon sep (deg)    : 75.27
B (ring opening deg) : 78.02
PA of pole (deg)     : -59.32
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.087
C/A sky separation (km) : 27914.9
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
  
```

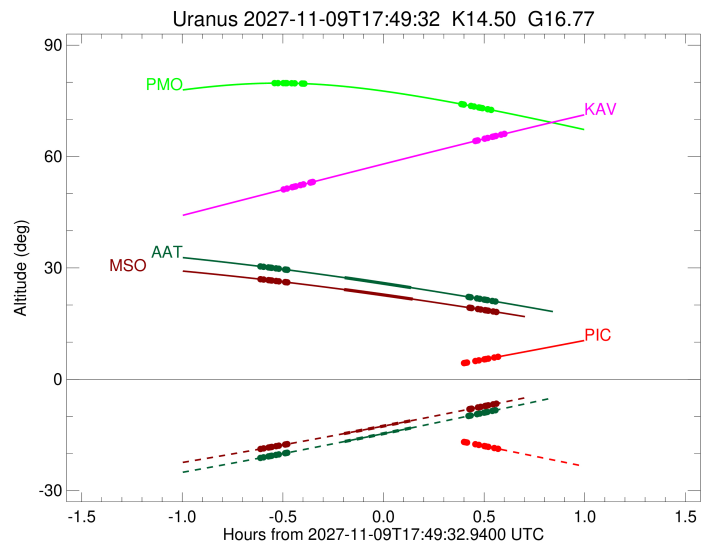
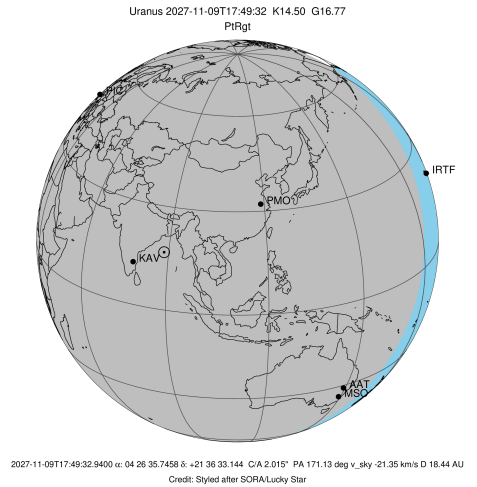


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2027-11-09T17:16:46.811		79.77	-65.05	51472.86	-18.49		
lambda	I	2027-11-09T17:18:05.749		79.78	-64.81	50026.71	-18.20		
delta	I	2027-11-09T17:19:41.395		79.77	-64.52	48300.35	-17.89		
gamma	I	2027-11-09T17:20:19.062		79.77	-64.41	47628.87	-17.76		
eta	I	2027-11-09T17:20:44.621		79.76	-64.33	47176.12	-17.67		
beta	I	2027-11-09T17:22:12.192		79.74	-64.06	45643.23	-17.33		
alpha	I	2027-11-09T17:23:06.878		79.72	-63.89	44701.15	-17.09		
4	I	2027-11-09T17:25:14.284		79.66	-63.50	42555.93	-16.52		
5	I	2027-11-09T17:25:32.188		79.65	-63.44	42259.09	-16.44		
6	I	2027-11-09T17:25:56.455		79.64	-63.37	41877.80	-16.30		

No planet occultations

6	E	2027-11-09T18:12:45.078		74.13	-54.16	41846.13	16.30		
5	E	2027-11-09T18:13:13.422		74.05	-54.06	42308.37	16.44		
4	E	2027-11-09T18:13:31.967		73.99	-54.00	42615.46	16.52		
alpha	E	2027-11-09T18:15:35.518		73.64	-53.58	44693.52	17.09		
beta	E	2027-11-09T18:16:32.510		73.47	-53.38	45674.21	17.33		
eta	E	2027-11-09T18:17:58.298		73.22	-53.09	47176.12	17.67		
gamma	E	2027-11-09T18:18:23.418		73.15	-53.01	47621.07	17.76		
delta	E	2027-11-09T18:19:01.525		73.03	-52.88	48300.35	17.89		
lambda	E	2027-11-09T18:20:37.172		72.75	-52.55	50026.71	18.20		
epsilon	E	2027-11-09T18:21:43.541		72.55	-52.32	51241.35	18.49		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2027-11-09T17:52:16.690
 Event type : PtRgt
 : Uranus occs: topocentric, not geocentric
 : 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 : 145400246588802816
 2Mass ID (if available) : 04263574+2136332
 ICRS Star Coord at Epoch: 04h 26m 35.74583s +21:36:33.14427s
 RUWE (>1.4 is poor) : 1.14
 K magnitude : 14.501
 G magnitude : 16.771
 RP magnitude : 15.986
 BP magnitude : 17.336
 DUPflag : 0
 Distance (au) : 18.443
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.35
 Sun-Target sep (deg) : 158.34
 Sun-Moon sep (deg) : 75.00
 B (ring opening deg) : 78.02
 PA of pole (deg) : -59.32
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.997
 C/A sky separation (km) : 26711.1
 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



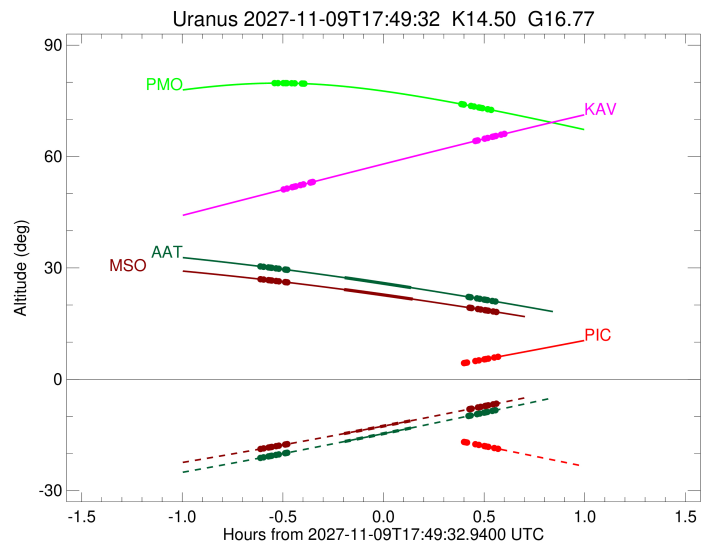
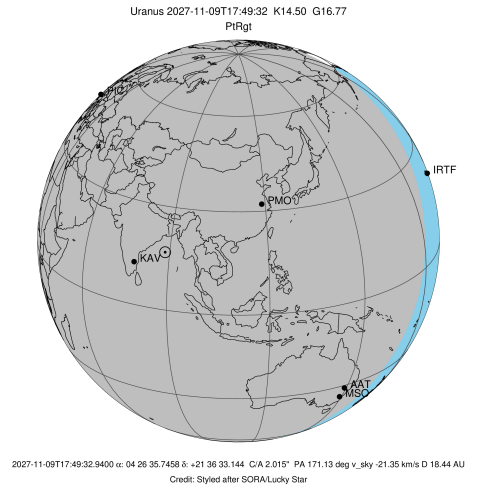
b: ring blocked by planet x: target alt < 5.0 deg or sun > -5.0 deg

Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2027-11-09T17:19:30.134		51.08	-72.74	51467.02	-18.77		
lambda	I	2027-11-09T17:20:47.526		51.37	-73.04	50026.71	-18.51		
delta	I	2027-11-09T17:22:21.502		51.74	-73.41	48300.35	-18.23		
gamma	I	2027-11-09T17:22:58.448		51.88	-73.55	47628.99	-18.11		
eta	I	2027-11-09T17:23:23.507		51.98	-73.65	47176.12	-18.03		
beta	I	2027-11-09T17:24:49.221		52.31	-73.98	45642.98	-17.73		
alpha	I	2027-11-09T17:25:42.563		52.51	-74.19	44702.03	-17.52		
4	I	2027-11-09T17:27:46.701		52.99	-74.67	42554.54	-17.02		
5	I	2027-11-09T17:28:04.127		53.06	-74.73	42256.52	-16.95		
6	I	2027-11-09T17:28:27.544		53.15	-74.82	41877.34	-16.82		

No planet occultations

6	E	2027-11-09T18:16:55.200		64.18	-84.74	41844.32	16.87		
5	E	2027-11-09T18:17:22.652		64.28	-84.80	42306.92	16.99		
4	E	2027-11-09T18:17:40.686		64.35	-84.84	42615.84	17.07		
alpha	E	2027-11-09T18:19:40.611		64.79	-85.06	44694.44	17.58		
beta	E	2027-11-09T18:20:36.073		65.00	-85.15	45674.79	17.79		
eta	E	2027-11-09T18:21:59.719		65.31	-85.28	47176.12	18.09		
gamma	E	2027-11-09T18:22:24.254		65.40	-85.31	47621.04	18.17		
delta	E	2027-11-09T18:23:01.509		65.54	-85.35	48300.35	18.29		
lambda	E	2027-11-09T18:24:35.147		65.88	-85.45	50026.71	18.57		
epsilon	E	2027-11-09T18:25:39.527		66.12	-85.49	51228.27	18.84		

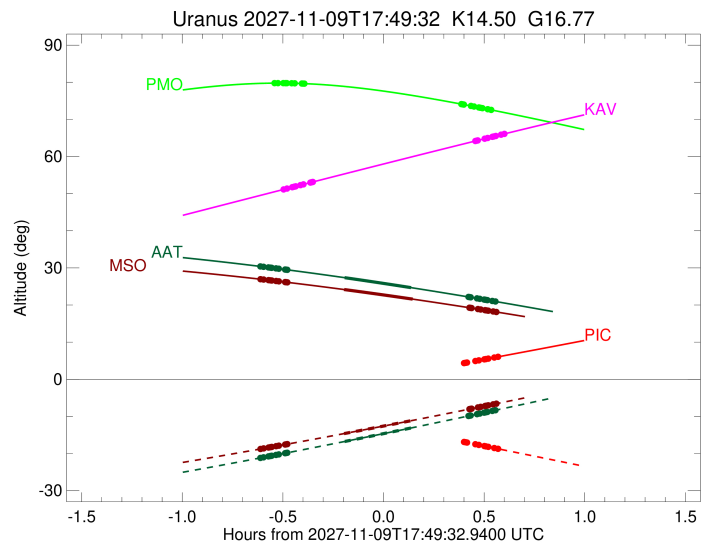
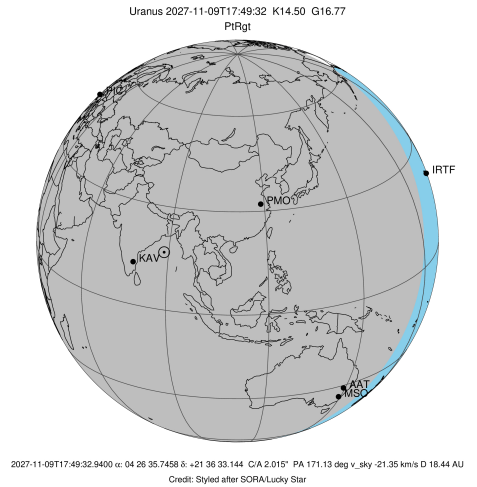
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2027-11-09T17:47:30.080
 Event type : PtRgt
 : Uranus occs: topocentric, not geocentric
 : Ring occs: geocentric, topocentric
 Observer code : AAT
 Location : Siding Spring (AAT)
 Latitude (deg) : -31.27703
 E. Longitude (deg) : 149.06608
 Altitude (km) : 1.164
 Gaia source ID : 145400246588802816
 2Mass ID (if available) : 04263574+2136332
 ICRS Star Coord at Epoch: 04h 26m 35.74583s +21:36:33.14427s
 RUWE (>1.4 is poor) : 1.14
 K magnitude : 14.501
 G magnitude : 16.771
 RP magnitude : 15.986
 BP magnitude : 17.336
 DUPflag : 0
 Distance (au) : 18.443
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.35
 Sun-Target sep (deg) : 158.34
 Sun-Moon sep (deg) : 74.87
 B (ring opening deg) : 78.02
 PA of pole (deg) : -59.32
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.628
 C/A sky separation (km) : 21780.8
 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



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	2027-11-09T17:12:36.785		30.43	-21.23	51434.92	-19.93		
lambda	I	2027-11-09T17:13:47.851		30.29	-21.03	50026.71	-19.75		
delta	I	2027-11-09T17:15:15.641		30.13	-20.77	48300.35	-19.58		
gamma	I	2027-11-09T17:15:49.971		30.06	-20.68	47629.56	-19.50		
eta	I	2027-11-09T17:16:13.251		30.02	-20.61	47176.12	-19.45		
beta	I	2027-11-09T17:17:32.475		29.87	-20.38	45641.97	-19.27		
alpha	I	2027-11-09T17:18:21.195		29.77	-20.24	44706.37	-19.13		
4	I	2027-11-09T17:20:14.707		29.55	-19.91	42548.39	-18.83		
5	I	2027-11-09T17:20:30.680		29.52	-19.86	42244.52	-18.79		
6	I	2027-11-09T17:20:51.303		29.48	-19.80	41874.69	-18.71		
Uranus	I	2027-11-09T17:37:57.919		27.37	-16.76	25066.50		11.20	11.72
Uranus	E	2027-11-09T17:57:46.058		24.68	-13.12	25547.36		1.69	1.77
6	E	2027-11-09T18:14:52.426		22.18	-9.89	41838.48	18.67		
5	E	2027-11-09T18:15:17.387		22.12	-9.81	42301.43	18.75		
4	E	2027-11-09T18:15:34.018		22.08	-9.76	42616.52	18.79		
alpha	E	2027-11-09T18:17:23.850		21.80	-9.41	44697.59	19.09		
beta	E	2027-11-09T18:18:14.992		21.67	-9.24	45676.46	19.22		
eta	E	2027-11-09T18:19:32.618		21.47	-9.00	47176.12	19.40		
gamma	E	2027-11-09T18:19:55.515		21.41	-8.92	47620.97	19.45		
delta	E	2027-11-09T18:20:30.373		21.32	-8.81	48300.35	19.53		
lambda	E	2027-11-09T18:21:58.393		21.10	-8.53	50026.71	19.70		
epsilon	E	2027-11-09T18:22:57.164		20.95	-8.34	51187.47	19.88		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2027-11-09T17:47:39.170
 Event type : PtRgt
 : Uranus occs: topocentric, not geocentric
 : 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 : 145400246588802816
 2Mass ID (if available) : 04263574+2136332
 ICRS Star Coord at Epoch: 04h 26m 35.74583s +21:36:33.14427s
 RUWE (>1.4 is poor) : 1.14
 K magnitude : 14.501
 G magnitude : 16.771
 RP magnitude : 15.986
 BP magnitude : 17.336
 DUPflag : 0
 Distance (au) : 18.443
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -21.35
 Sun-Target sep (deg) : 158.34
 Sun-Moon sep (deg) : 74.82
 B (ring opening deg) : 78.02
 PA of pole (deg) : -59.32
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.610
 C/A sky separation (km) : 21530.7
 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	2027-11-09T17:12:38.809		26.98	-18.81	51433.36	-19.97		
lambda	I	2027-11-09T17:13:49.664		26.86	-18.62	50026.71	-19.79		
delta	I	2027-11-09T17:15:17.269		26.70	-18.38	48300.35	-19.62		
gamma	I	2027-11-09T17:15:51.519		26.65	-18.29	47629.58	-19.55		
eta	I	2027-11-09T17:16:14.745		26.60	-18.23	47176.12	-19.50		
beta	I	2027-11-09T17:17:33.768		26.46	-18.01	45641.94	-19.32		
alpha	I	2027-11-09T17:18:22.341		26.38	-17.88	44706.57	-19.19		
4	I	2027-11-09T17:20:15.522		26.18	-17.57	42548.12	-18.89		
5	I	2027-11-09T17:20:31.453		26.15	-17.53	42243.97	-18.85		
6	I	2027-11-09T17:20:51.982		26.11	-17.47	41874.55	-18.78		
Uranus	I	2027-11-09T17:37:47.421		24.17	-14.64	25059.69		11.28	11.80
Uranus	E	2027-11-09T17:58:14.270		21.59	-11.08	25550.21		1.47	1.54
6	E	2027-11-09T18:15:09.382		19.28	-8.05	41838.17	18.74		
5	E	2027-11-09T18:15:34.257		19.22	-7.97	42301.11	18.81		
4	E	2027-11-09T18:15:50.844		19.18	-7.92	42616.53	18.85		
alpha	E	2027-11-09T18:17:40.328		18.92	-7.59	44697.77	19.15		
beta	E	2027-11-09T18:18:31.319		18.80	-7.43	45676.54	19.27		
eta	E	2027-11-09T18:19:48.733		18.61	-7.20	47176.12	19.45		
gamma	E	2027-11-09T18:20:11.572		18.56	-7.13	47620.96	19.50		
delta	E	2027-11-09T18:20:46.346		18.48	-7.02	48300.35	19.57		
lambda	E	2027-11-09T18:22:14.170		18.26	-6.75	50026.71	19.74		
epsilon	E	2027-11-09T18:23:12.708		18.12	-6.57	51185.23	19.91		