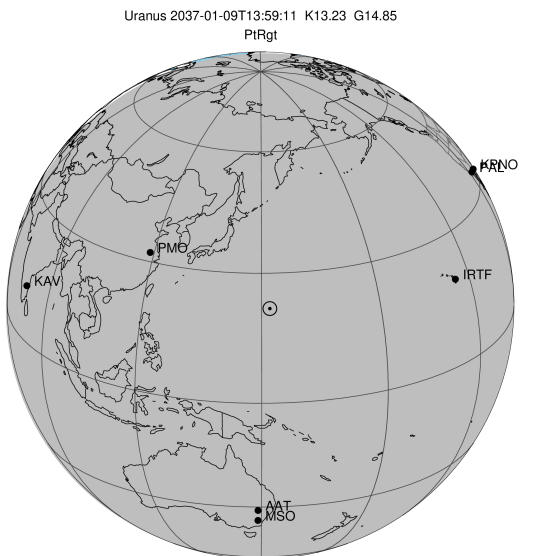


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2037-01-09T13:59:11.090  
 Event type : PtRgt  
 : Uranus occs: topocentric, not geocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3367487323387490176  
 2Mass ID (if available) : 07134942+2248141

ICRS Star Coord at Epoch: 07h 13m 49.43631s +22:48:14.04056s

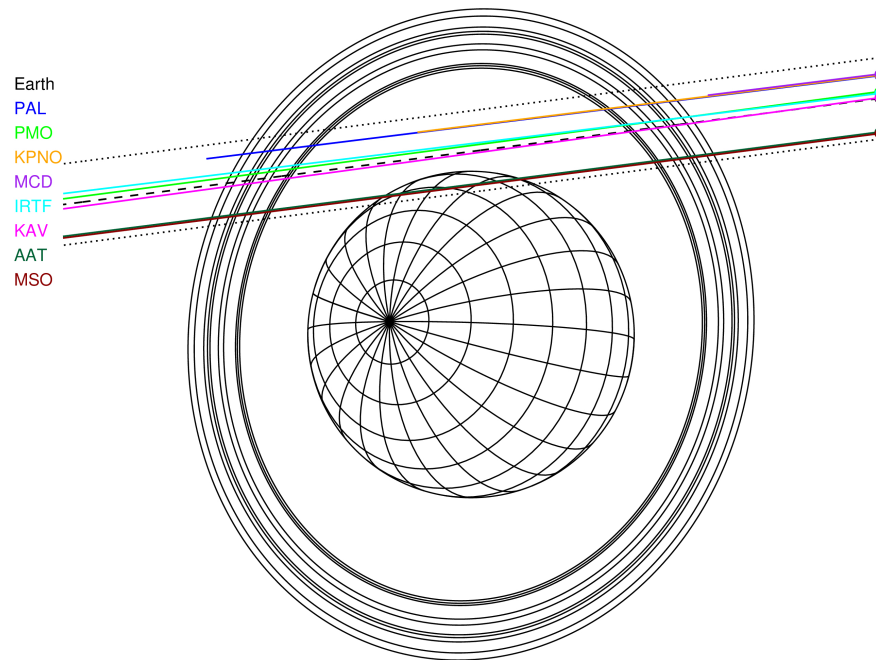
RUWE (>1.4 is poor) : 1.16  
 K magnitude : 13.231  
 G magnitude : 14.852  
 RP magnitude : 14.292  
 BP magnitude : 15.234  
 DUPflag : 0  
 Distance (au) : 17.781  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.30  
 Sun-Target sep (deg) : 177.78  
 Sun-Moon sep (deg) : 102.35  
 B (ring opening deg) : 59.64  
 PA of pole (deg) : 81.02

#	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



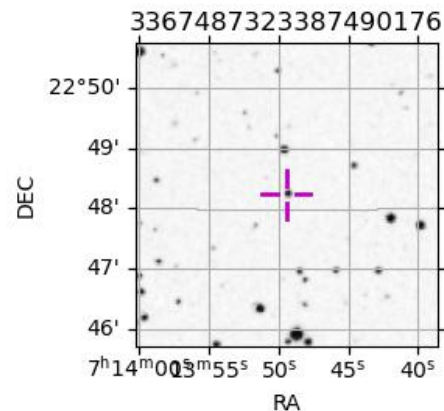
2037-01-09T13:59:11.0900 ra: 07 13 49.4363 s: +22 48 14.041 C/A 2.212° PA 187.41 deg v\_sky -23.30 km/s D 17.78 AU  
 Credit: Styled after SORA/Lucky Star

Uranus 2037-01-09T13:59:11 K13.23 G14.85 PtRgt

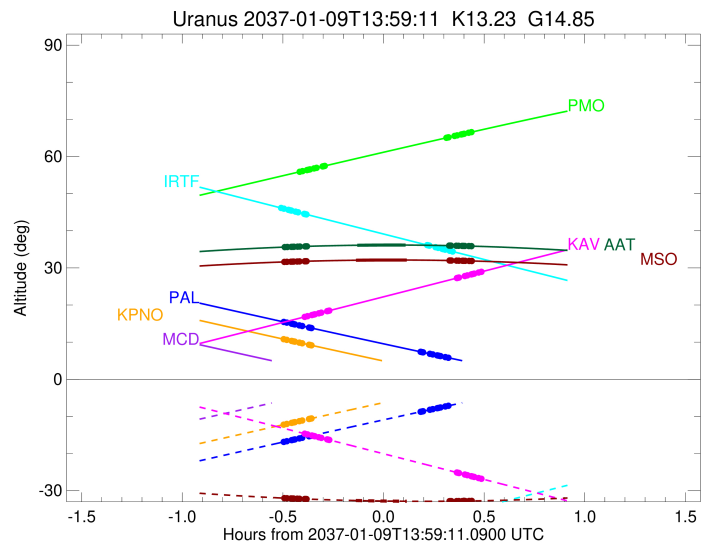
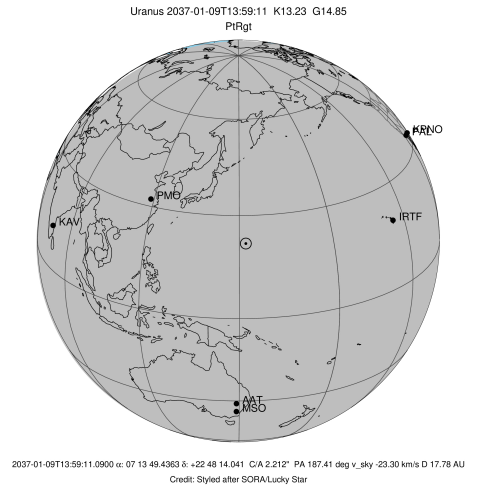


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1				JAN 09 13:29 - JAN 09 14:18	PnnRnn
PAL	Palomar Mt (200")	33.4	243.1	+++++		+++++	JAN 09 13:29 - JAN 09 14:18	PnnRie
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++		+++++	JAN 09 13:34 - JAN 09 14:25	PnnRie
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	JAN 09 13:29 - JAN 09 13:37	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	+++++		+++++	JAN 09 13:28 - JAN 09 14:19	PnnRie
KAV	Kavalur Observatory	12.6	78.8	+++++		+++++	JAN 09 13:35 - JAN 09 14:28	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	+++++	+ +	+++++	JAN 09 13:29 - JAN 09 14:25	PieRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++	+ +	+++++	JAN 09 13:29 - JAN 09 14:25	PieRie



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2037-01-09T13:55:34.430  
 Event type : PtRgt  
 : Uranus occs: topocentric, not geocentric  
 : 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 : 3367487323387490176  
 2Mass ID (if available) : 07134942+2248141  
 ICRS Star Coord at Epoch: 07h 13m 49.43631s +22:48:14.04056s  
 RUWE (>1.4 is poor) : 1.16  
 K magnitude : 13.231  
 G magnitude : 14.852  
 RP magnitude : 14.292  
 BP magnitude : 15.234  
 DUPflag : 0  
 Distance (au) : 17.781  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.30  
 Sun-Target sep (deg) : 177.78  
 Sun-Moon sep (deg) : 102.68  
 B (ring opening deg) : 59.64  
 PA of pole (deg) : 81.02  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.512  
 C/A sky separation (km) : 32399.3  
 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



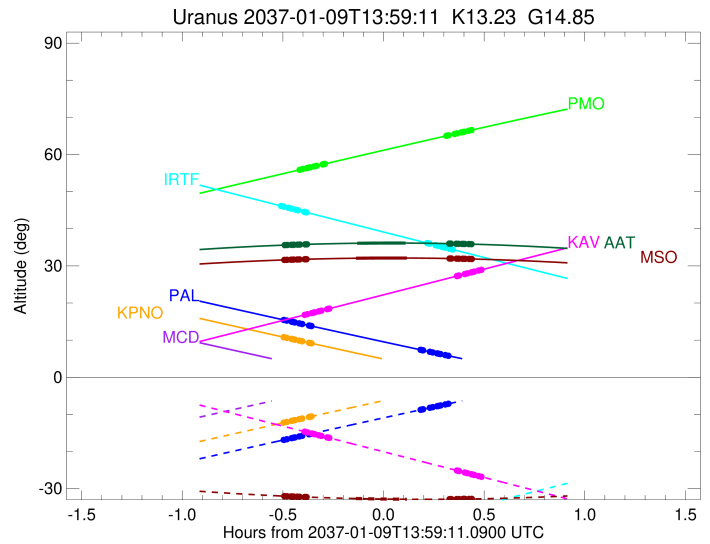
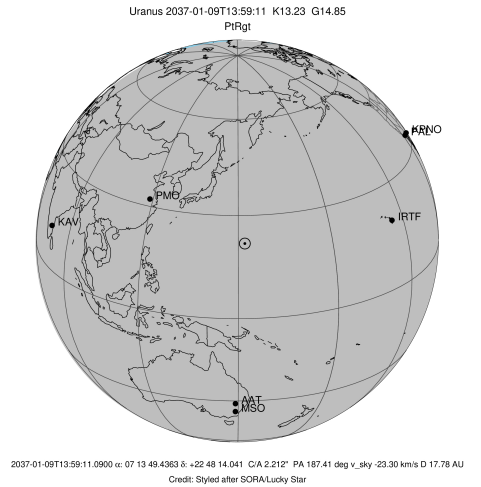
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-01-09T13:29:25.375		15.45	-16.88	51195.32	-20.43		
lambda	I	2037-01-09T13:30:22.677		15.26	-16.68	50026.71	-20.22		
delta	I	2037-01-09T13:31:49.227		14.97	-16.39	48300.35	-19.66		
gamma	I	2037-01-09T13:32:23.506		14.85	-16.28	47630.45	-19.42		
eta	I	2037-01-09T13:32:47.000		14.78	-16.20	47176.12	-19.25		
beta	I	2037-01-09T13:34:07.316		14.51	-15.93	45655.29	-18.64		
alpha	I	2037-01-09T13:34:56.407		14.35	-15.77	44751.93	-18.23		
4	I	2037-01-09T13:37:02.530		13.93	-15.35	42528.11	-17.07		
5	I	2037-01-09T13:37:15.385		13.88	-15.30	42313.77	-16.95		
6	I	2037-01-09T13:37:43.956		13.79	-15.21	41828.65	-16.62		

No planet occultations

6	E	2037-01-09T14:10:10.654		7.41	-8.77	41794.76	16.58		
5	E	2037-01-09T14:10:40.392		7.31	-8.68	42265.57	16.91		
4	E	2037-01-09T14:10:58.113		7.25	-8.62	42576.92	17.03		
alpha	E	2037-01-09T14:12:59.380		6.86	-8.22	44715.12	18.18		
beta	E	2037-01-09T14:13:52.053		6.69	-8.05	45680.19	18.59		
eta	E	2037-01-09T14:15:11.270		6.44	-7.79	47176.12	19.19		
gamma	E	2037-01-09T14:15:34.782		6.36	-7.72	47629.30	19.36		
delta	E	2037-01-09T14:16:09.235		6.25	-7.61	48300.35	19.60		
lambda	E	2037-01-09T14:17:36.085		5.97	-7.32	50026.71	20.15		
epsilon	E	2037-01-09T14:18:11.503		5.86	-7.21	50744.10	20.35		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2037-01-09T14:01:16.660
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       : 3367487323387490176
2Mass ID (if available) : 07134942+2248141
ICRS Star Coord at Epoch: 07h 13m 49.43631s +22:48:14.04056s
RUWE (>1.4 is poor) : 1.16
K magnitude           : 13.231
G magnitude           : 14.852
RP magnitude          : 14.292
BP magnitude          : 15.234
DUPflag              : 0
Distance (au)         : 17.781
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -23.30
Sun-Target sep (deg)  : 177.78
Sun-Moon sep (deg)   : 103.07
B (ring opening deg) : 59.64
PA of pole (deg)     : 81.02
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.275
C/A sky separation (km) : 29342.8
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
  
```



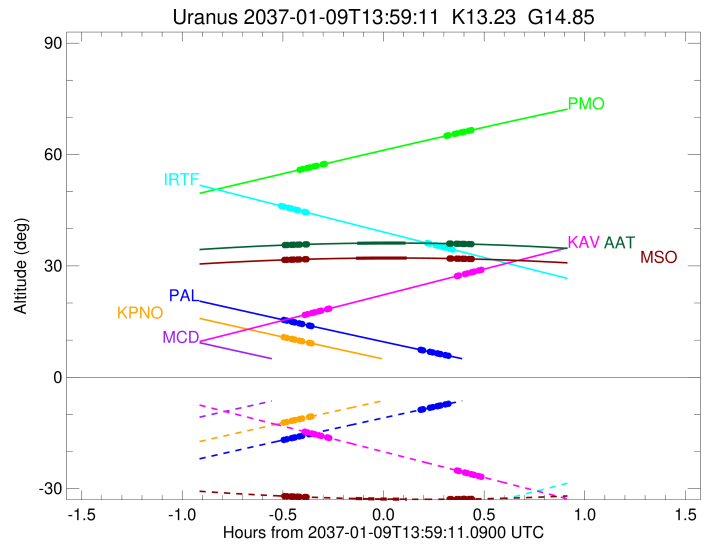
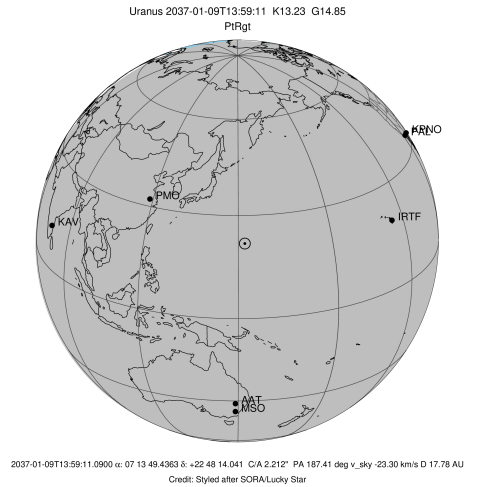
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-01-09T13:34:08.926		55.88	-53.69	51223.04	-21.97		
lambda	I	2037-01-09T13:35:03.411		56.07	-53.88	50026.71	-21.82		
delta	I	2037-01-09T13:36:23.310		56.35	-54.16	48300.35	-21.39		
gamma	I	2037-01-09T13:36:54.780		56.47	-54.27	47630.18	-21.20		
eta	I	2037-01-09T13:37:16.262		56.54	-54.35	47176.12	-21.07		
beta	I	2037-01-09T13:38:29.376		56.80	-54.61	45653.67	-20.61		
alpha	I	2037-01-09T13:39:13.553		56.95	-54.76	44752.31	-20.29		
4	I	2037-01-09T13:41:05.767		57.35	-55.16	42526.95	-19.43		
5	I	2037-01-09T13:41:17.099		57.39	-55.20	42311.83	-19.34		
6	I	2037-01-09T13:41:41.755		57.48	-55.28	41833.00	-19.10		

No planet occultations

6	E	2037-01-09T14:17:52.309		65.03	-62.82	41794.92	19.12		
5	E	2037-01-09T14:18:17.793		65.12	-62.91	42256.93	19.37		
4	E	2037-01-09T14:18:33.984		65.17	-62.97	42581.93	19.46		
alpha	E	2037-01-09T14:20:20.955		65.54	-63.33	44711.70	20.32		
beta	E	2037-01-09T14:21:08.446		65.70	-63.49	45680.72	20.64		
eta	E	2037-01-09T14:22:20.135		65.95	-63.74	47176.12	21.10		
gamma	E	2037-01-09T14:22:41.522		66.02	-63.81	47628.89	21.24		
delta	E	2037-01-09T14:23:13.005		66.13	-63.92	48300.35	21.42		
lambda	E	2037-01-09T14:24:32.773		66.40	-64.19	50026.71	21.86		
epsilon	E	2037-01-09T14:25:05.615		66.51	-64.30	50747.28	22.01		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2037-01-09T13:55:33.350
Event type          : PtRgt
: Uranus occs: topocentric, not geocentric
: 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      : 3367487323387490176
2Mass ID (if available) : 07134942+2248141
ICRS Star Coord at Epoch: 07h 13m 49.43631s +22:48:14.04056s
RUWE (>1.4 is poor) : 1.16
K magnitude          : 13.231
G magnitude          : 14.852
RP magnitude         : 14.292
BP magnitude         : 15.234
DUPflag             : 0
Distance (au)       : 17.781
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -23.30
Sun-Target sep (deg) : 177.78
Sun-Moon sep (deg)  : 102.60
B (ring opening deg) : 59.64
PA of pole (deg)    : 81.02
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.518
C/A sky separation (km) : 32476.9
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_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```



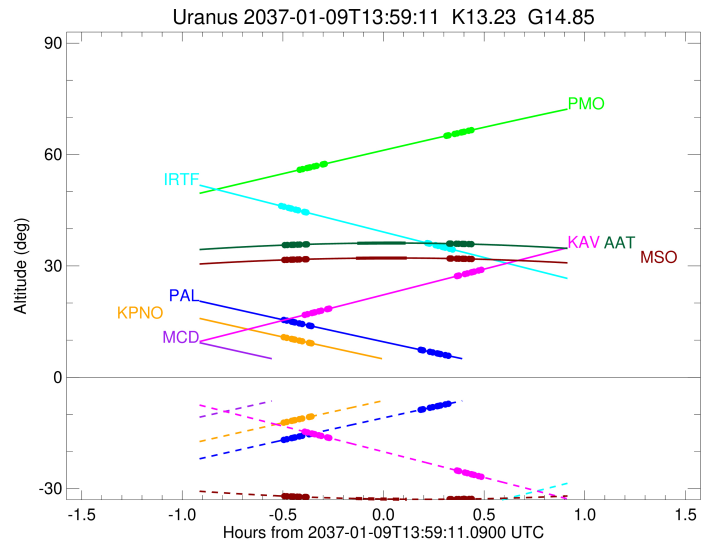
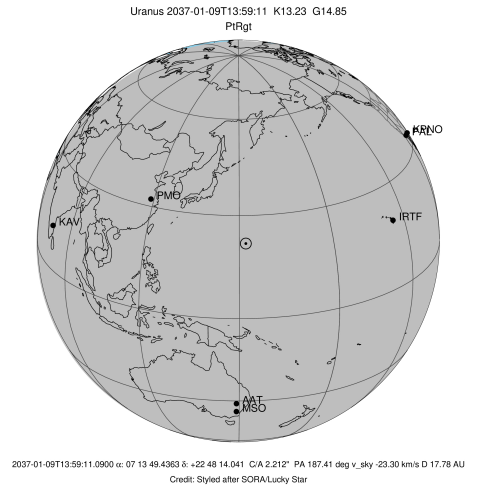
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-01-09T13:29:24.035		10.80	-12.23	51194.47	-20.36		
lambda	I	2037-01-09T13:30:21.484		10.61	-12.04	50026.71	-20.15		
delta	I	2037-01-09T13:31:48.337		10.32	-11.75	48300.35	-19.59		
gamma	I	2037-01-09T13:32:22.742		10.21	-11.63	47630.46	-19.35		
eta	I	2037-01-09T13:32:46.326		10.13	-11.55	47176.12	-19.18		
beta	I	2037-01-09T13:34:06.958		9.86	-11.28	45655.34	-18.57		
alpha	I	2037-01-09T13:34:56.261		9.70	-11.12	44751.92	-18.15		
4	I	2037-01-09T13:37:02.973		9.28	-10.69	42528.15	-16.99		
5	I	2037-01-09T13:37:15.894		9.23	-10.65	42313.82	-16.86		
6	I	2037-01-09T13:37:44.626		9.14	-10.55	41828.52	-16.53		

No planet occultations

6	E	2037-01-09T14:10:06.970		2.80x	-4.15x	41794.77	16.49		
5	E	2037-01-09T14:10:36.876		2.70x	-4.05x	42265.77	16.82		
4	E	2037-01-09T14:10:54.669		2.64x	-3.99x	42576.79	16.94		
alpha	E	2037-01-09T14:12:56.519		2.25x	-3.60x	44715.20	18.10		
beta	E	2037-01-09T14:13:49.411		2.08x	-3.43x	45680.17	18.51		
eta	E	2037-01-09T14:15:08.946		1.83x	-3.17x	47176.12	19.12		
gamma	E	2037-01-09T14:15:32.547		1.75x	-3.09x	47629.31	19.29		
delta	E	2037-01-09T14:16:07.127		1.64x	-2.98x	48300.35	19.52		
lambda	E	2037-01-09T14:17:34.284		1.36x	-2.70x	50026.71	20.08		
epsilon	E	2037-01-09T14:18:09.818		1.25x	-2.59x	50744.06	20.29		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2037-01-09T13:55:38.990
Event type           : PtRgt
: Uranus occs: topocentric, not geocentric
: 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       : 3367487323387490176
2Mass ID (if available) : 07134942+2248141
ICRS Star Coord at Epoch: 07h 13m 49.43631s +22:48:14.04056s
RUWE (>1.4 is poor) : 1.16
K magnitude          : 13.231
G magnitude          : 14.852
RP magnitude         : 14.292
BP magnitude         : 15.234
DUPflag              : 0
Distance (au)        : 17.781
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -23.30
Sun-Target sep (deg) : 177.78
Sun-Moon sep (deg)   : 103.11
B (ring opening deg) : 59.64
PA of pole (deg)     : 81.02
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.301
C/A sky separation (km) : 29669.6
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
  
```



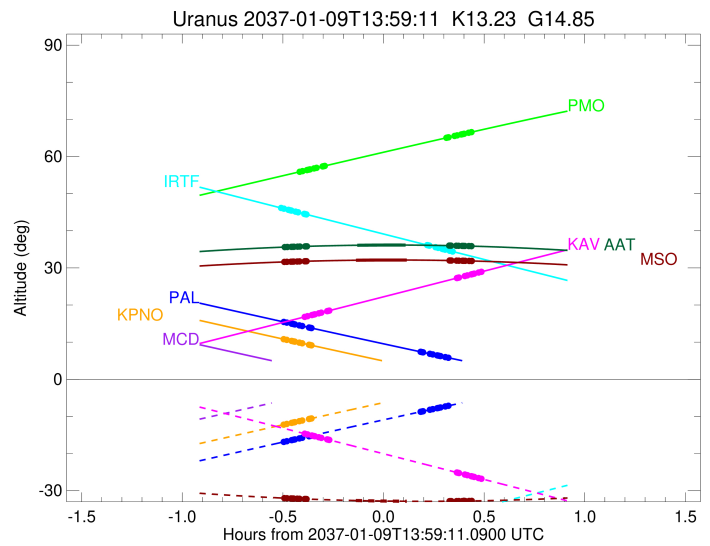
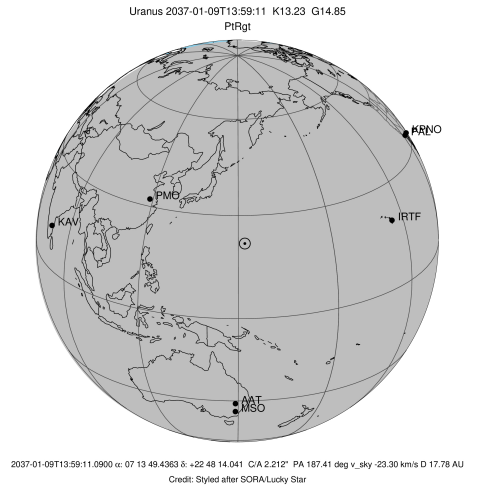
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-01-09T13:28:36.421		46.16	-48.15	51223.10	-21.82		
lambda	I	2037-01-09T13:29:31.290		45.95	-47.94	50026.71	-21.66		
delta	I	2037-01-09T13:30:51.801		45.64	-47.63	48300.35	-21.21		
gamma	I	2037-01-09T13:31:23.531		45.52	-47.50	47630.19	-21.03		
eta	I	2037-01-09T13:31:45.197		45.43	-47.42	47176.12	-20.89		
beta	I	2037-01-09T13:32:58.979		45.15	-47.14	45653.70	-20.41		
alpha	I	2037-01-09T13:33:43.599		44.98	-46.97	44752.31	-20.09		
4	I	2037-01-09T13:35:37.075		44.54	-46.53	42526.97	-19.19		
5	I	2037-01-09T13:35:48.545		44.50	-46.49	42311.90	-19.10		
6	I	2037-01-09T13:36:13.526		44.40	-46.39	41832.87	-18.85		

No planet occultations

6	E	2037-01-09T14:12:09.314		36.16	-38.13	41794.86	18.81		
5	E	2037-01-09T14:12:35.288		36.06	-38.03	42258.29	19.06		
4	E	2037-01-09T14:12:51.630		36.00	-37.97	42581.16	19.15		
alpha	E	2037-01-09T14:14:40.304		35.59	-37.55	44712.25	20.03		
beta	E	2037-01-09T14:15:28.442		35.40	-37.37	45680.65	20.35		
eta	E	2037-01-09T14:16:41.115		35.12	-37.09	47176.12	20.83		
gamma	E	2037-01-09T14:17:02.791		35.04	-37.01	47628.96	20.96		
delta	E	2037-01-09T14:17:34.682		34.92	-36.89	48300.35	21.15		
lambda	E	2037-01-09T14:18:55.461		34.61	-36.58	50026.71	21.59		
epsilon	E	2037-01-09T14:19:28.671		34.49	-36.45	50746.51	21.74		



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2037-01-09T14:03:29.590  
 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 : 3367487323387490176  
 2Mass ID (if available) : 07134942+2248141  
 ICRS Star Coord at Epoch: 07h 13m 49.43631s +22:48:14.04056s  
 RUWE (>1.4 is poor) : 1.16  
 K magnitude : 13.231  
 G magnitude : 14.852  
 RP magnitude : 14.292  
 BP magnitude : 15.234  
 DUPflag : 0  
 Distance (au) : 17.781  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.30  
 Sun-Target sep (deg) : 177.78  
 Sun-Moon sep (deg) : 102.51  
 B (ring opening deg) : 59.64  
 PA of pole (deg) : 81.02  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.177  
 C/A sky separation (km) : 28080.4  
 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

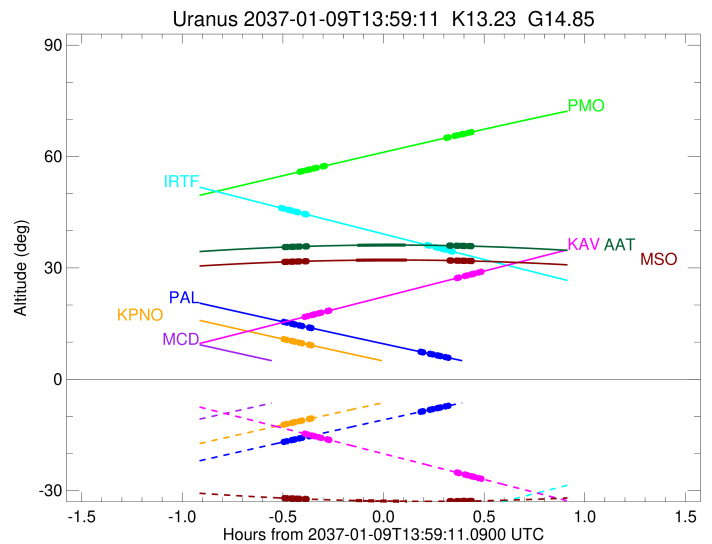
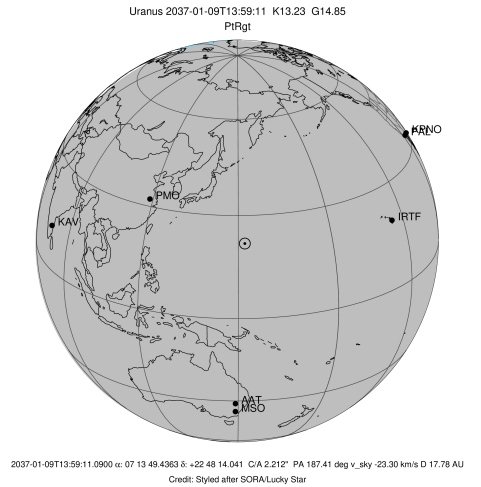


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2037-01-09T13:35:38.114		16.79	-14.65	51233.44	-22.24		
lambda	I	2037-01-09T13:36:32.383		17.00	-14.85	50026.71	-22.11		
delta	I	2037-01-09T13:37:51.122		17.30	-15.15	48300.35	-21.73		
gamma	I	2037-01-09T13:38:22.083		17.42	-15.27	47630.08	-21.57		
eta	I	2037-01-09T13:38:43.188		17.50	-15.35	47176.12	-21.45		
beta	I	2037-01-09T13:39:54.929		17.77	-15.63	45653.08	-21.04		
alpha	I	2037-01-09T13:40:38.121		17.94	-15.79	44752.39	-20.77		
4	I	2037-01-09T13:42:27.468		18.36	-16.21	42526.63	-20.01		
5	I	2037-01-09T13:42:38.496		18.40	-16.26	42310.92	-19.94		
6	I	2037-01-09T13:43:02.288		18.49	-16.35	41834.61	-19.72		

No planet occultations

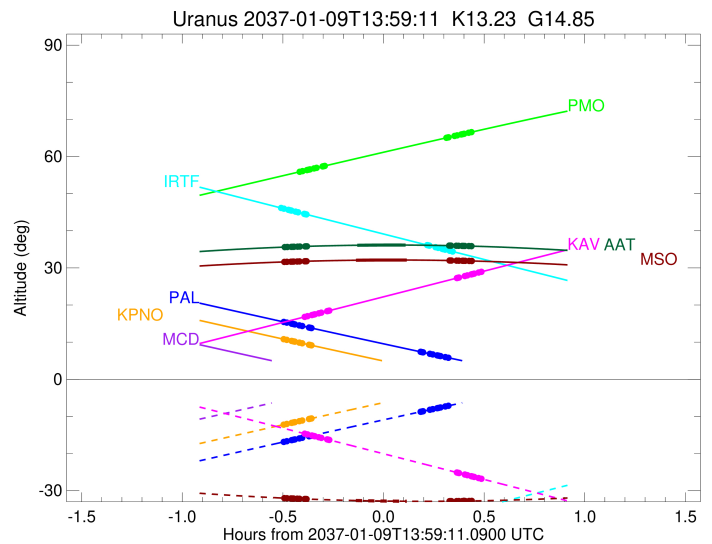
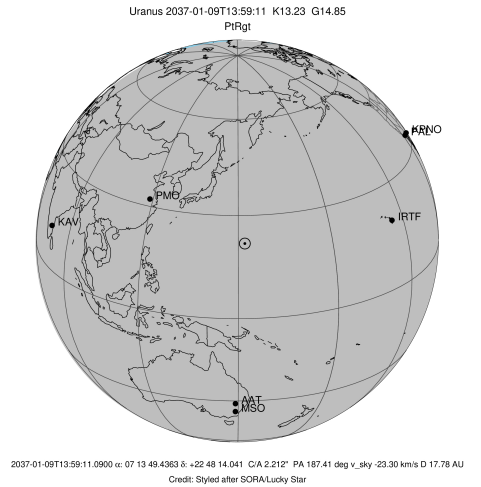
6	E	2037-01-09T14:21:00.358		27.24	-25.10	41795.14	19.78		
5	E	2037-01-09T14:21:24.842		27.34	-25.20	42253.41	20.00		
4	E	2037-01-09T14:21:40.808		27.40	-25.26	42583.89	20.07		
alpha	E	2037-01-09T14:23:24.681		27.80	-25.66	44710.33	20.84		
beta	E	2037-01-09T14:24:11.130		27.98	-25.84	45680.89	21.12		
eta	E	2037-01-09T14:25:21.298		28.25	-26.11	47176.12	21.53		
gamma	E	2037-01-09T14:25:42.263		28.33	-26.19	47628.71	21.65		
delta	E	2037-01-09T14:26:13.173		28.45	-26.31	48300.35	21.81		
lambda	E	2037-01-09T14:27:31.610		28.75	-26.61	50026.71	22.20		
epsilon	E	2037-01-09T14:28:04.053		28.87	-26.74	50749.41	22.33		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2037-01-09T13:58:42.940  
 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 : 3367487323387490176  
 2Mass ID (if available) : 07134942+2248141  
 ICRS Star Coord at Epoch: 07h 13m 49.43631s +22:48:14.04056s  
 RUWE (>1.4 is poor) : 1.16  
 K magnitude : 13.231  
 G magnitude : 14.852  
 RP magnitude : 14.292  
 BP magnitude : 15.234  
 DUPflag : 0  
 Distance (au) : 17.781  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.30  
 Sun-Target sep (deg) : 177.78  
 Sun-Moon sep (deg) : 102.91  
 B (ring opening deg) : 59.64  
 PA of pole (deg) : 81.02  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.807  
 C/A sky separation (km) : 23304.9  
 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	2037-01-09T13:29:39.077		35.60	-35.98	51279.40	-24.05		
lambda	I	2037-01-09T13:30:31.138		35.63	-36.02	50026.71	-23.98		
delta	I	2037-01-09T13:31:43.504		35.67	-36.07	48300.35	-23.73		
gamma	I	2037-01-09T13:32:11.835		35.69	-36.09	47629.57	-23.62		
eta	I	2037-01-09T13:32:31.060		35.70	-36.11	47176.12	-23.55		
beta	I	2037-01-09T13:33:36.270		35.73	-36.15	45650.66	-23.29		
alpha	I	2037-01-09T13:34:15.119		35.75	-36.17	44752.29	-23.11		
4	I	2037-01-09T13:35:52.662		35.79	-36.24	42525.94	-22.64		
5	I	2037-01-09T13:36:02.567		35.80	-36.24	42306.09	-22.60		
6	I	2037-01-09T13:36:23.117		35.81	-36.26	41841.20	-22.46		
Uranus	I	2037-01-09T13:51:20.994		36.10	-36.69	25550.49		-4.00	-4.19
Uranus	E	2037-01-09T14:05:47.012		36.15	-36.89	25379.67		18.78	19.61
6	E	2037-01-09T14:18:42.386		36.01	-36.87	41796.38	22.46		
5	E	2037-01-09T14:19:03.465		36.00	-36.87	42242.47	22.59		
4	E	2037-01-09T14:19:18.380		36.00	-36.87	42589.71	22.63		
alpha	E	2037-01-09T14:20:50.910		35.97	-36.85	44706.26	23.11		
beta	E	2037-01-09T14:21:33.119		35.95	-36.84	45681.19	23.29		
eta	E	2037-01-09T14:22:37.020		35.93	-36.83	47176.12	23.55		
gamma	E	2037-01-09T14:22:56.188		35.92	-36.83	47628.16	23.62		
delta	E	2037-01-09T14:23:24.582		35.91	-36.82	48300.35	23.73		
lambda	E	2037-01-09T14:24:36.958		35.88	-36.80	50026.71	23.98		
epsilon	E	2037-01-09T14:25:07.423		35.87	-36.80	50758.64	24.05		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2037-01-09T13:58:41.740  
 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 : 3367487323387490176  
 2Mass ID (if available) : 07134942+2248141  
 ICRS Star Coord at Epoch: 07h 13m 49.43631s +22:48:14.04056s  
 RUWE (>1.4 is poor) : 1.16  
 K magnitude : 13.231  
 G magnitude : 14.852  
 RP magnitude : 14.292  
 BP magnitude : 15.234  
 DUPflag : 0  
 Distance (au) : 17.781  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.30  
 Sun-Target sep (deg) : 177.78  
 Sun-Moon sep (deg) : 102.85  
 B (ring opening deg) : 59.64  
 PA of pole (deg) : 81.02  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.788  
 C/A sky separation (km) : 23056.6  
 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	2037-01-09T13:29:32.421		31.61	-32.02	51281.50	-24.10		
lambda	I	2037-01-09T13:30:24.457		31.64	-32.05	50026.71	-24.03		
delta	I	2037-01-09T13:31:36.651		31.67	-32.10	48300.35	-23.79		
gamma	I	2037-01-09T13:32:04.910		31.69	-32.12	47629.55	-23.69		
eta	I	2037-01-09T13:32:24.083		31.69	-32.13	47176.12	-23.61		
beta	I	2037-01-09T13:33:29.109		31.73	-32.17	45650.55	-23.36		
alpha	I	2037-01-09T13:34:07.834		31.74	-32.20	44752.27	-23.19		
4	I	2037-01-09T13:35:45.029		31.79	-32.25	42525.94	-22.72		
5	I	2037-01-09T13:35:54.905		31.79	-32.26	42305.82	-22.68		
6	I	2037-01-09T13:36:15.354		31.80	-32.27	41841.50	-22.55		
Uranus	I	2037-01-09T13:50:57.125		32.06	-32.67	25547.50		-4.66	-4.88
Uranus	E	2037-01-09T14:06:08.645		32.12	-32.86	25369.65		19.33	20.17
6	E	2037-01-09T14:18:49.060		31.99	-32.84	41796.47	22.55		
5	E	2037-01-09T14:19:10.024		31.98	-32.84	42241.90	22.68		
4	E	2037-01-09T14:19:24.921		31.98	-32.84	42590.00	22.72		
alpha	E	2037-01-09T14:20:57.101		31.95	-32.82	44706.05	23.19		
beta	E	2037-01-09T14:21:39.187		31.94	-32.82	45681.20	23.36		
eta	E	2037-01-09T14:22:42.904		31.92	-32.81	47176.12	23.61		
gamma	E	2037-01-09T14:23:02.019		31.91	-32.80	47628.13	23.68		
delta	E	2037-01-09T14:23:30.341		31.90	-32.80	48300.35	23.79		
lambda	E	2037-01-09T14:24:42.544		31.88	-32.78	50026.71	24.03		
epsilon	E	2037-01-09T14:25:12.969		31.87	-32.78	50759.27	24.10		