

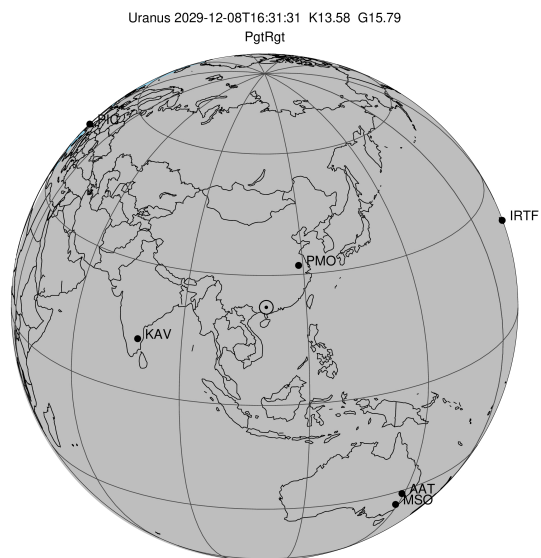
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-08T16:31:31.690
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3412523968199788672
 2Mass ID (if available) : 04593081+2244275

ICRS Star Coord at Epoch: 04h 59m 30.80853s +22:44:27.32873s

RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.580
 G magnitude : 15.793
 RP magnitude : 15.062
 BP magnitude : 16.384
 DUPflag : 0
 Distance (au) : 18.239
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.47
 Sun-Target sep (deg) : 179.62
 Sun-Moon sep (deg) : 138.24
 B (ring opening deg) : 82.09
 PA of pole (deg) : -17.33

a(km) ring

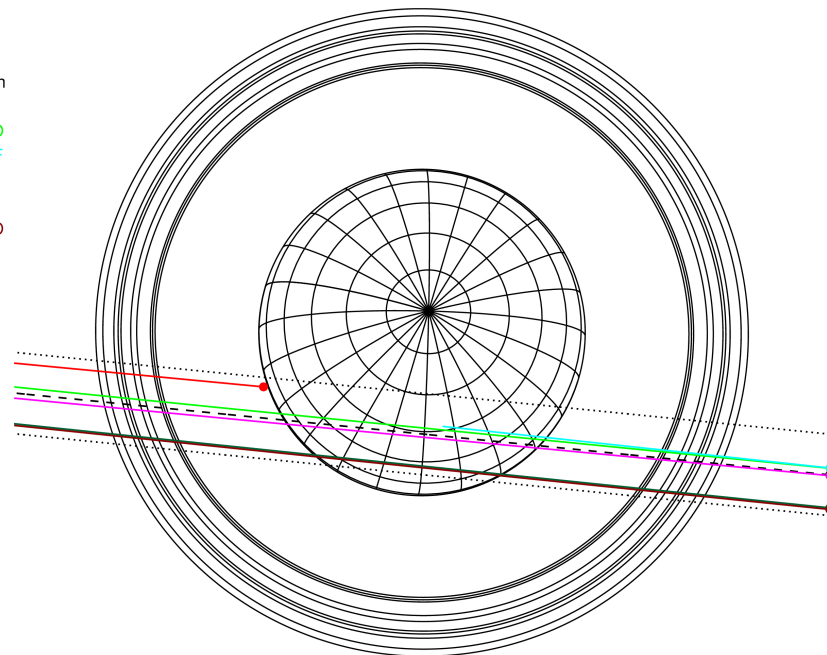
- 1 41837.2 6
- 2 42235.0 5
- 3 42571.2 4
- 4 44718.5 alpha
- 5 45661.1 beta
- 6 47176.1 eta
- 7 47626.3 gamma
- 8 48300.3 delta
- 9 50026.7 lambda
- 10 51149.4 epsilon



2029-12-08T16:31:31.6900 ex: 04 59 30.8085 s : +22 44 27.329 C/A 1.190° PA 354.27 deg v_sky -23.47 km/s D 18.24 AU
 Credit: Styled after SORA/Lucky Star

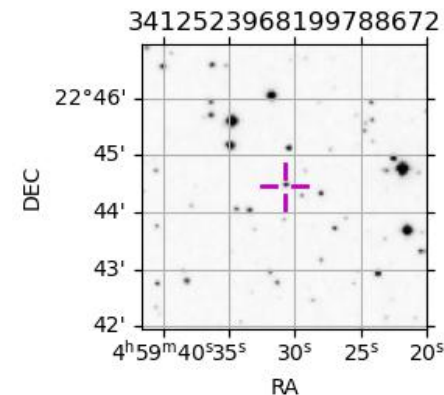
Uranus 2029-12-08T16:31:31 K13.58 G15.79 PgtRgt

Earth
 PIC
 PMO
 IRTF
 KAV
 AAT
 MSO

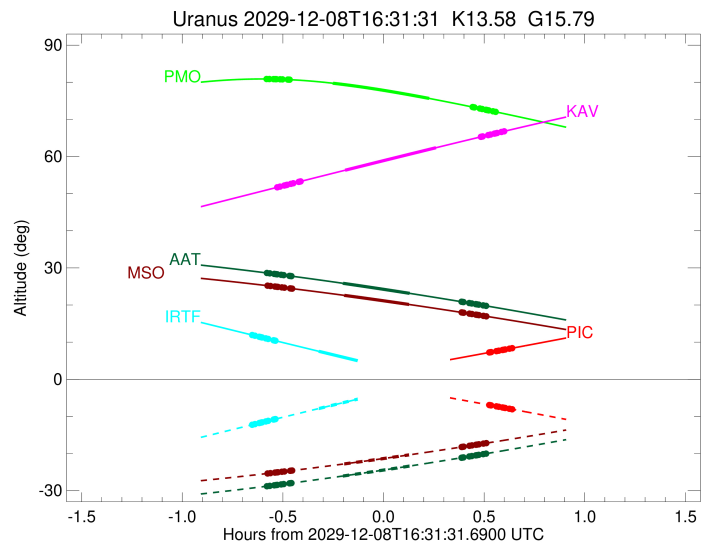
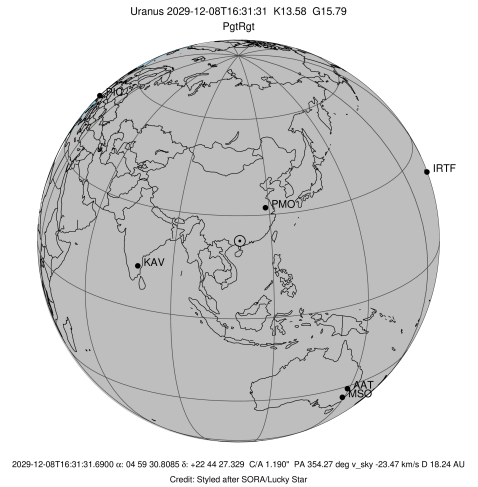


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1			+++++	DEC 08 17:03 - DEC 08 17:09	PnnRne
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+ +	+++++	DEC 08 15:56 - DEC 08 17:04	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	+++++	+		DEC 08 15:52 - DEC 08 16:12	PinRin
KAV	Kavalur Observatory	12.6	78.8	+++++	+ +	+++++	DEC 08 15:59 - DEC 08 17:07	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	+++++	+ +	+++++	DEC 08 15:56 - DEC 08 17:01	PieRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++	+ +	+++++	DEC 08 15:56 - DEC 08 17:01	PieRie

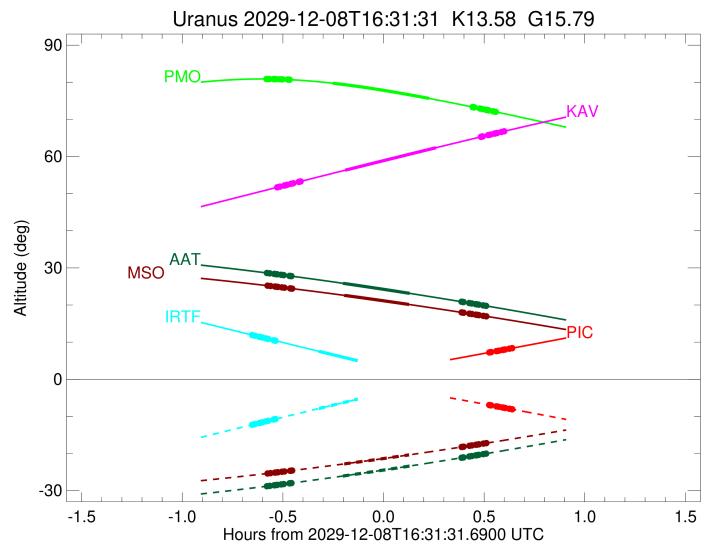
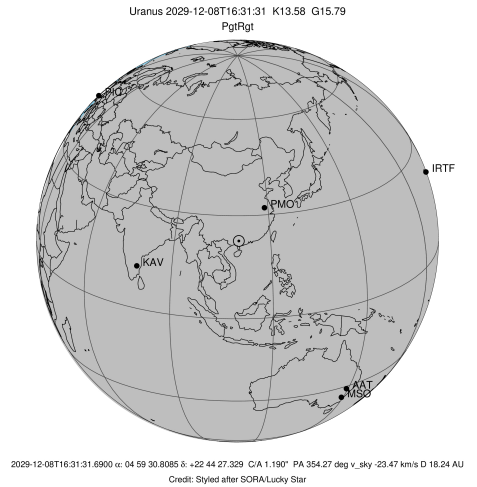


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-08T16:34:18.340
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3412523968199788672
 2Mass ID (if available) : 04593081+2244275
 ICRS Star Coord at Epoch: 04h 59m 30.80853s +22:44:27.32873s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.580
 G magnitude : 15.793
 RP magnitude : 15.062
 BP magnitude : 16.384
 DUPflag : 0
 Distance (au) : 18.239
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.47
 Sun-Target sep (deg) : 179.62
 Sun-Moon sep (deg) : 138.75
 B (ring opening deg) : 82.09
 PA of pole (deg) : -17.33
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.819
 C/A sky separation (km) : 10830.9
 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	2029-12-08T15:58:21.566	-3.10x	3.32x	51466.74	-22.75			
lambda	I	2029-12-08T15:59:24.851	-2.94x	3.17x	50026.71	-22.74			
delta	I	2029-12-08T16:00:40.837	-2.75x	2.98x	48300.35	-22.70			
gamma	I	2029-12-08T16:01:10.664	-2.67x	2.90x	47623.58	-22.68			
eta	I	2029-12-08T16:01:30.397	-2.62x	2.85x	47176.12	-22.67			
beta	I	2029-12-08T16:02:36.737	-2.45x	2.69x	45673.55	-22.63			
alpha	I	2029-12-08T16:03:20.307	-2.34x	2.58x	44688.32	-22.60			
4	I	2029-12-08T16:04:52.248	-2.11x	2.34x	42613.89	-22.53			
5	I	2029-12-08T16:05:05.496	-2.08x	2.31x	42315.25	-22.52			
6	I	2029-12-08T16:05:24.916	-2.03x	2.26x	41878.55	-22.50			
Uranus	I	2029-12-08T16:17:47.707	-0.12x	0.36x	25527.86			-1.81	-1.89
Uranus	E	2029-12-08T16:50:39.335	5.16	-4.89x	25344.55			-4.77	-4.99
6	E	2029-12-08T17:03:01.574	7.22	-6.93	41796.52	22.57			
5	E	2029-12-08T17:03:17.899	7.26	-6.98	42165.97	22.59			
4	E	2029-12-08T17:03:34.558	7.31	-7.03	42541.76	22.61			
alpha	E	2029-12-08T17:05:11.550	7.58	-7.30	44737.82	22.68			
beta	E	2029-12-08T17:05:52.078	7.70	-7.41	45657.47	22.71			
eta	E	2029-12-08T17:06:58.884	7.88	-7.59	47176.12	22.76			
gamma	E	2029-12-08T17:07:18.854	7.94	-7.65	47630.71	22.77			
delta	E	2029-12-08T17:07:48.251	8.02	-7.73	48300.35	22.79			
lambda	E	2029-12-08T17:09:03.932	8.23	-7.94	50026.71	22.83			
epsilon	E	2029-12-08T17:09:35.806	8.32	-8.03	50754.76	22.84			

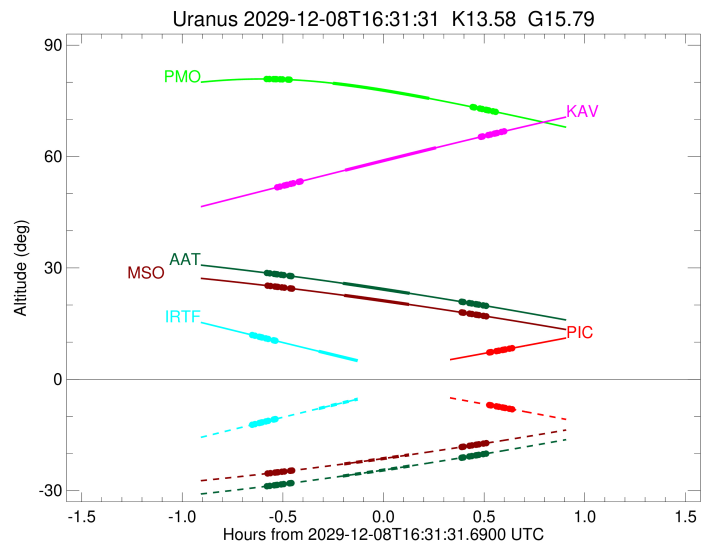
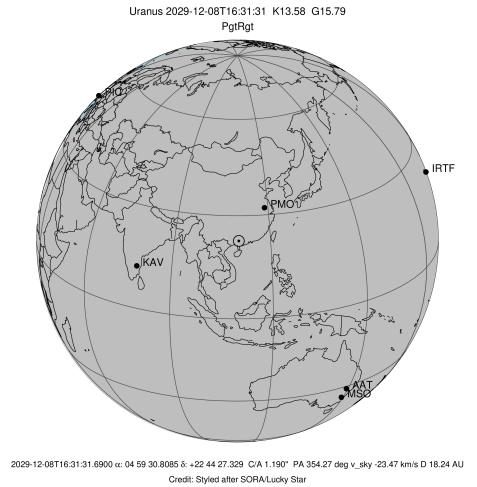
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-08T16:30:51.460
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 3412523968199788672
 2Mass ID (if available) : 04593081+2244275
 ICRS Star Coord at Epoch: 04h 59m 30.80853s +22:44:27.32873s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.580
 G magnitude : 15.793
 RP magnitude : 15.062
 BP magnitude : 16.384
 DUPflag : 0
 Distance (au) : 18.239
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.47
 Sun-Target sep (deg) : 179.62
 Sun-Moon sep (deg) : 138.77
 B (ring opening deg) : 82.09
 PA of pole (deg) : -17.33
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.124
 C/A sky separation (km) : 14863.1
 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_itrff93_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	2029-12-08T15:56:27.731		80.89	-80.89	51443.85	-22.78		
lambda	I	2029-12-08T15:57:29.909		80.88	-80.89	50026.71	-22.76		
delta	I	2029-12-08T15:58:45.893		80.86	-80.88	48300.35	-22.68		
gamma	I	2029-12-08T15:59:15.739		80.85	-80.88	47624.02	-22.64		
eta	I	2029-12-08T15:59:35.530		80.84	-80.87	47176.12	-22.62		
beta	I	2029-12-08T16:00:42.017		80.81	-80.85	45675.02	-22.54		
alpha	I	2029-12-08T16:01:25.927		80.79	-80.84	44686.94	-22.47		
4	I	2029-12-08T16:02:58.410		80.73	-80.79	42615.25	-22.33		
5	I	2029-12-08T16:03:11.828		80.72	-80.78	42314.91	-22.31		
6	I	2029-12-08T16:03:31.521		80.71	-80.77	41877.26	-22.27		
Uranus	I	2029-12-08T16:16:24.884		79.75	-79.91	25460.58		-3.22	-3.37
Uranus	E	2029-12-08T16:45:06.722		75.66	-75.95	25239.80		-5.84	-6.11
6	E	2029-12-08T16:58:03.482		73.34	-73.66	41797.90	22.26		
5	E	2029-12-08T16:58:20.183		73.29	-73.61	42170.23	22.29		
4	E	2029-12-08T16:58:37.012		73.24	-73.56	42545.18	22.32		
alpha	E	2029-12-08T17:00:14.837		72.93	-73.26	44735.22	22.46		
beta	E	2029-12-08T17:00:55.930		72.80	-73.13	45659.22	22.52		
eta	E	2029-12-08T17:02:03.166		72.59	-72.92	47176.12	22.61		
gamma	E	2029-12-08T17:02:23.275		72.53	-72.86	47630.94	22.63		
delta	E	2029-12-08T17:02:52.831		72.43	-72.77	48300.35	22.67		
lambda	E	2029-12-08T17:04:08.859		72.19	-72.53	50026.71	22.75		
epsilon	E	2029-12-08T17:04:40.573		72.09	-72.43	50748.60	22.77		

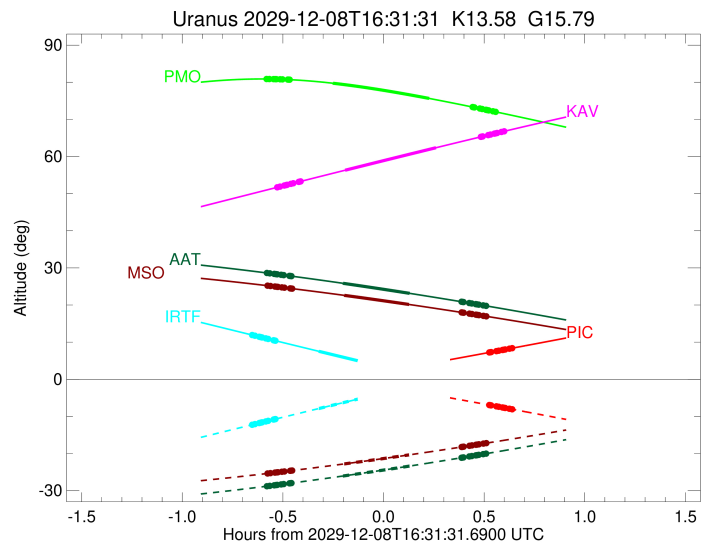
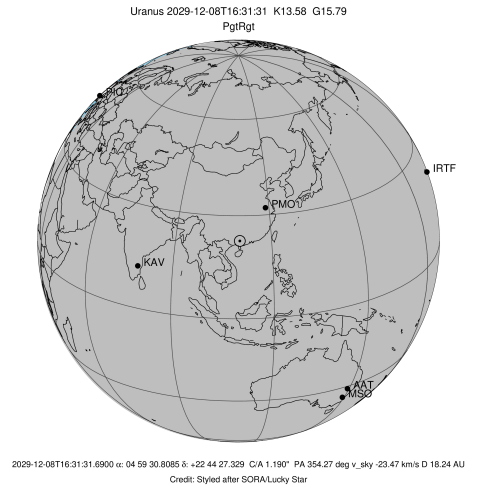
```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch              : 2029-12-08T16:27:13.120
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        : 3412523968199788672
2Mass ID (if available) : 04593081+2244275
ICRS Star Coord at Epoch: 04h 59m 30.80853s +22:44:27.32873s
RUWE (>1.4 is poor)  : 1.02
K magnitude           : 13.580
G magnitude           : 15.793
RP magnitude          : 15.062
BP magnitude          : 16.384
DUPflag              : 0
Distance (au)         : 18.239
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -23.47
Sun-Target sep (deg)  : 179.62
Sun-Moon sep (deg)    : 137.59
B (ring opening deg)  : 82.09
PA of pole (deg)     : -17.33
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.079
C/A sky separation (km) : 14267.8
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	2029-12-08T15:52:09.546		11.96	-12.30	51444.96	-22.55		
lambda	I	2029-12-08T15:53:12.428		11.73	-12.07	50026.71	-22.53		
delta	I	2029-12-08T15:54:29.198		11.45	-11.79	48300.35	-22.45		
gamma	I	2029-12-08T15:54:59.350		11.34	-11.68	47623.99	-22.42		
eta	I	2029-12-08T15:55:19.340		11.26	-11.61	47176.12	-22.39		
beta	I	2029-12-08T15:56:26.493		11.02	-11.36	45674.93	-22.32		
alpha	I	2029-12-08T15:57:10.824		10.85	-11.20	44687.02	-22.25		
4	I	2029-12-08T15:58:44.188		10.51	-10.85	42615.18	-22.13		
5	I	2029-12-08T15:58:57.725		10.46	-10.80	42314.96	-22.10		
6	I	2029-12-08T15:59:17.592		10.39	-10.73	41877.36	-22.07		
Uranus	I	2029-12-08T16:12:14.145		7.54	-7.89	25469.47		-3.07	-3.21
Uranus	E	2029-12-08T16:42:02.423		1.05x	-1.41x	25261.09		-5.64	-5.90
6	E	2029-12-08T16:55:04.331		-1.75x	1.38x	41797.54	21.97		
5	E	2029-12-08T16:55:21.215		-1.81x	1.44x	42169.17	22.00		
4	E	2029-12-08T16:55:38.282		-1.88x	1.50x	42544.35	22.02		
alpha	E	2029-12-08T16:57:17.514		-2.23x	1.85x	44735.86	22.15		
beta	E	2029-12-08T16:57:59.142		-2.38x	2.00x	45658.80	22.21		
eta	E	2029-12-08T16:59:07.375		-2.62x	2.24x	47176.12	22.28		
gamma	E	2029-12-08T16:59:27.778		-2.69x	2.32x	47630.89	22.30		
delta	E	2029-12-08T16:59:57.779		-2.80x	2.42x	48300.35	22.33		
lambda	E	2029-12-08T17:01:14.965		-3.07x	2.70x	50026.71	22.40		
epsilon	E	2029-12-08T17:01:47.229		-3.19x	2.81x	50749.94	22.42		

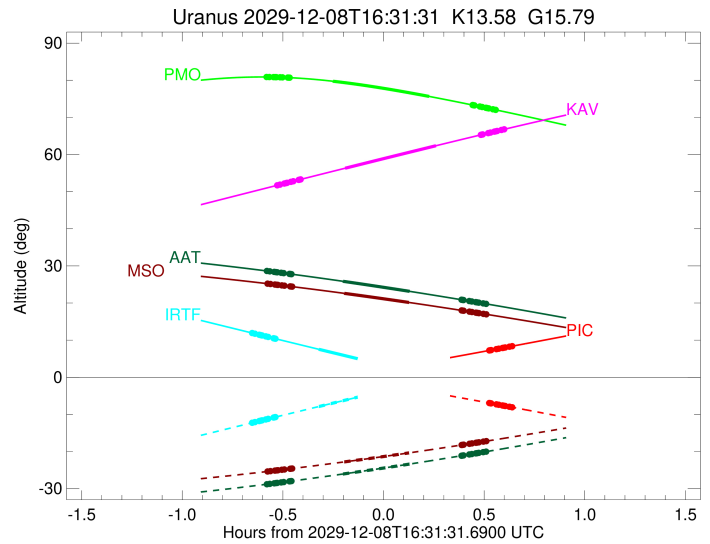
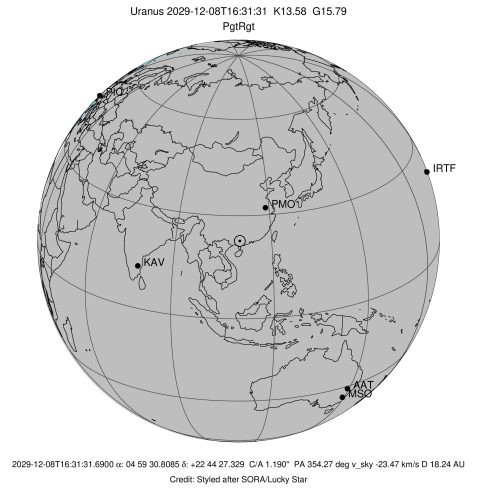
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-08T16:33:44.760
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KAV
 Location : Kavalur Observatory
 Latitude (deg) : 12.57556
 E. Longitude (deg) : 78.83167
 Altitude (km) : 0.722
 Gaia source ID : 3412523968199788672
 2Mass ID (if available) : 04593081+2244275
 ICRS Star Coord at Epoch: 04h 59m 30.80853s +22:44:27.32873s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.580
 G magnitude : 15.793
 RP magnitude : 15.062
 BP magnitude : 16.384
 DUPflag : 0
 Distance (au) : 18.239
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.47
 Sun-Target sep (deg) : 179.62
 Sun-Moon sep (deg) : 139.16
 B (ring opening deg) : 82.09
 PA of pole (deg) : -17.33
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.233
 C/A sky separation (km) : 16312.3
 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



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	2029-12-08T15:59:38.255		51.66	-51.31	51436.64	-22.51		
lambda	I	2029-12-08T16:00:40.863		51.90	-51.55	50026.71	-22.48		
delta	I	2029-12-08T16:01:57.814		52.19	-51.84	48300.35	-22.38		
gamma	I	2029-12-08T16:02:28.050		52.31	-51.95	47624.15	-22.34		
eta	I	2029-12-08T16:02:48.116		52.38	-52.03	47176.12	-22.31		
beta	I	2029-12-08T16:03:55.520		52.64	-52.29	45675.44	-22.21		
alpha	I	2029-12-08T16:04:40.116		52.81	-52.46	44686.58	-22.13		
4	I	2029-12-08T16:06:14.035		53.17	-52.81	42615.58	-21.97		
5	I	2029-12-08T16:06:27.694		53.22	-52.86	42314.62	-21.94		
6	I	2029-12-08T16:06:47.746		53.30	-52.94	41876.77	-21.89		
Uranus	I	2029-12-08T16:20:06.426		56.32	-55.95	25428.94		-3.70	-3.88
Uranus	E	2029-12-08T16:47:09.801		62.37	-62.00	25195.23		-6.24	-6.54
6	E	2029-12-08T17:00:30.990		65.29	-64.91	41798.62	21.94		
5	E	2029-12-08T17:00:48.001		65.35	-64.97	42172.27	21.99		
4	E	2029-12-08T17:01:05.033		65.41	-65.04	42546.75	22.02		
alpha	E	2029-12-08T17:02:43.991		65.77	-65.39	44734.04	22.19		
beta	E	2029-12-08T17:03:25.654		65.92	-65.54	45660.00	22.27		
eta	E	2029-12-08T17:04:33.587		66.16	-65.78	47176.12	22.37		
gamma	E	2029-12-08T17:04:53.906		66.24	-65.86	47631.03	22.40		
delta	E	2029-12-08T17:05:23.752		66.34	-65.96	48300.35	22.45		
lambda	E	2029-12-08T17:06:40.486		66.62	-66.24	50026.71	22.55		
epsilon	E	2029-12-08T17:07:12.385		66.73	-66.35	50746.61	22.58		

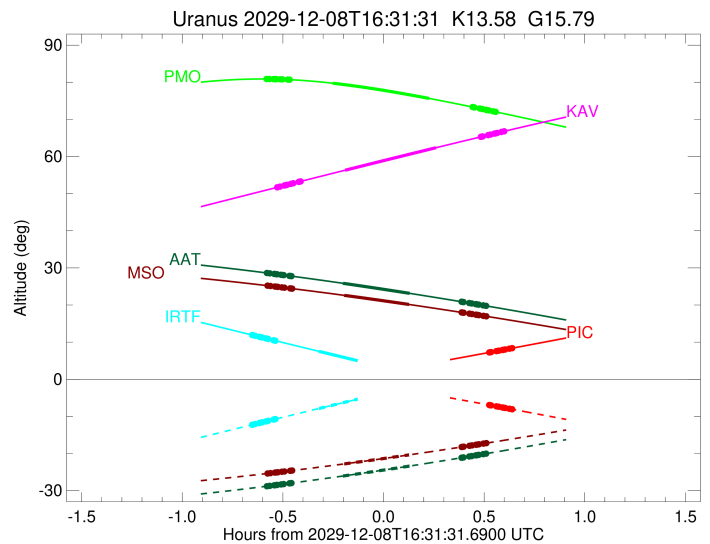
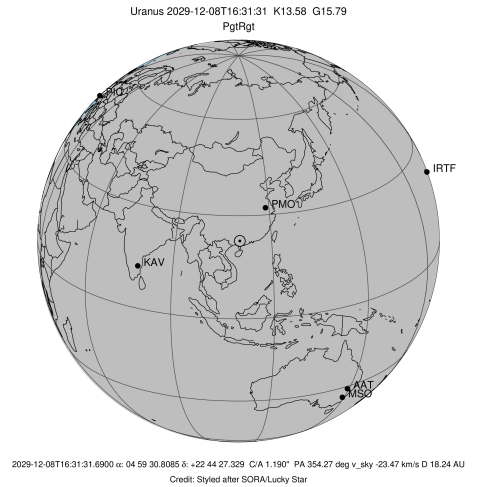
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-08T16:29:28.370
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : AAT
 Location : Siding Spring (AAT)
 Latitude (deg) : -31.27703
 E. Longitude (deg) : 149.06608
 Altitude (km) : 1.164
 Gaia source ID : 3412523968199788672
 2Mass ID (if available) : 04593081+2244275
 ICRS Star Coord at Epoch: 04h 59m 30.80853s +22:44:27.32873s
 RUWE (>1.4 is poor) : 1.02
 K magnitude : 13.580
 G magnitude : 15.793
 RP magnitude : 15.062
 BP magnitude : 16.384
 DUPflag : 0
 Distance (au) : 18.239
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.47
 Sun-Target sep (deg) : 179.62
 Sun-Moon sep (deg) : 138.12
 B (ring opening deg) : 82.09
 PA of pole (deg) : -17.33
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.573
 C/A sky separation (km) : 20802.9
 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_itrff93_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	2029-12-08T15:56:34.603		28.66	-28.83	51405.46	-21.68		
lambda	I	2029-12-08T15:57:38.213		28.54	-28.71	50026.71	-21.61		
delta	I	2029-12-08T15:58:58.402		28.38	-28.56	48300.35	-21.44		
gamma	I	2029-12-08T15:59:29.965		28.32	-28.50	47624.71	-21.37		
eta	I	2029-12-08T15:59:50.981		28.28	-28.46	47176.12	-21.32		
beta	I	2029-12-08T16:01:01.584		28.14	-28.32	45676.99	-21.14		
alpha	I	2029-12-08T16:01:48.630		28.05	-28.23	44685.45	-21.01		
4	I	2029-12-08T16:03:27.801		27.85	-28.04	42616.41	-20.71		
5	I	2029-12-08T16:03:42.380		27.82	-28.01	42312.69	-20.66		
6	I	2029-12-08T16:04:03.769		27.78	-27.97	41874.42	-20.59		
Uranus	I	2029-12-08T16:19:24.678		25.86	-26.07	25277.30		-5.48	-5.74
Uranus	E	2029-12-08T16:39:16.534		23.15	-23.39	25065.86		-7.30	-7.65
6	E	2029-12-08T16:54:44.515		20.89	-21.15	41800.87	20.54		
5	E	2029-12-08T16:55:02.898		20.84	-21.10	42178.25	20.61		
4	E	2029-12-08T16:55:20.953		20.80	-21.06	42551.11	20.67		
alpha	E	2029-12-08T16:57:05.685		20.54	-20.79	44730.83	20.96		
beta	E	2029-12-08T16:57:49.987		20.42	-20.68	45662.03	21.09		
eta	E	2029-12-08T16:59:01.495		20.24	-20.50	47176.12	21.27		
gamma	E	2029-12-08T16:59:22.872		20.19	-20.45	47631.23	21.32		
delta	E	2029-12-08T16:59:54.211		20.11	-20.37	48300.35	21.39		
lambda	E	2029-12-08T17:01:14.617		19.90	-20.17	50026.71	21.55		
epsilon	E	2029-12-08T17:01:47.837		19.82	-20.08	50743.78	21.61		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2029-12-08T16:29:36.040
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        : 3412523968199788672
2Mass ID (if available) : 04593081+2244275
ICRS Star Coord at Epoch: 04h 59m 30.80853s +22:44:27.32873s
RUWE (>1.4 is poor)  : 1.02
K magnitude           : 13.580
G magnitude           : 15.793
RP magnitude          : 15.062
BP magnitude          : 16.384
DUPflag              : 0
Distance (au)         : 18.239
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -23.47
Sun-Target sep (deg)  : 179.62
Sun-Moon sep (deg)    : 138.11
B (ring opening deg)  : 82.09
PA of pole (deg)      : -17.33
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.592
C/A sky separation (km) : 21058.0
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	2029-12-08T15:56:45.954		25.23	-25.40	51403.74	-21.61		
lambda	I	2029-12-08T15:57:49.690		25.12	-25.28	50026.71	-21.54		
delta	I	2029-12-08T15:59:10.153		24.98	-25.14	48300.35	-21.37		
gamma	I	2029-12-08T15:59:41.827		24.92	-25.09	47624.74	-21.29		
eta	I	2029-12-08T16:00:02.922		24.88	-25.05	47176.12	-21.24		
beta	I	2029-12-08T16:01:13.793		24.75	-24.92	45677.07	-21.06		
alpha	I	2029-12-08T16:02:01.036		24.67	-24.84	44685.40	-20.92		
4	I	2029-12-08T16:03:40.639		24.48	-24.66	42616.44	-20.62		
5	I	2029-12-08T16:03:55.292		24.46	-24.63	42312.55	-20.56		
6	I	2029-12-08T16:04:16.786		24.42	-24.59	41874.27	-20.49		
Uranus	I	2029-12-08T16:19:48.639		22.61	-22.80	25266.66		-5.58	-5.85
Uranus	E	2029-12-08T16:39:07.671		20.15	-20.37	25058.45		-7.36	-7.71
6	E	2029-12-08T16:54:46.655		18.01	-18.25	41801.03	20.44		
5	E	2029-12-08T16:55:05.139		17.97	-18.21	42178.65	20.52		
4	E	2029-12-08T16:55:23.268		17.93	-18.17	42551.40	20.57		
alpha	E	2029-12-08T16:57:08.425		17.68	-17.92	44730.62	20.88		
beta	E	2029-12-08T16:57:52.919		17.57	-17.82	45662.16	21.01		
eta	E	2029-12-08T16:59:04.687		17.40	-17.65	47176.12	21.19		
gamma	E	2029-12-08T16:59:26.140		17.35	-17.60	47631.24	21.24		
delta	E	2029-12-08T16:59:57.588		17.28	-17.52	48300.35	21.31		
lambda	E	2029-12-08T17:01:18.258		17.08	-17.33	50026.71	21.48		
epsilon	E	2029-12-08T17:01:51.579		17.00	-17.25	50743.70	21.55		