

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2042-02-20T15:13:06.790
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 660270824268555392
 2Mass ID (if available) : 08472162+1836102

Uranus 2042-02-20T15:13:06 K14.44 G15.85 PgtRgt

ICRS Star Coord at Epoch: 08h 47m 21.62420s +18:36:10.00634s

RUWE (>1.4 is poor) : 1.06
 K magnitude : 14.436
 G magnitude : 15.848
 RP magnitude : 15.347
 BP magnitude : 16.184
 DUPflag : 0
 Distance (au) : 17.564
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.97
 Sun-Target sep (deg) : 157.68
 Sun-Moon sep (deg) : 153.05
 B (ring opening deg) : 37.90
 PA of pole (deg) : 95.05

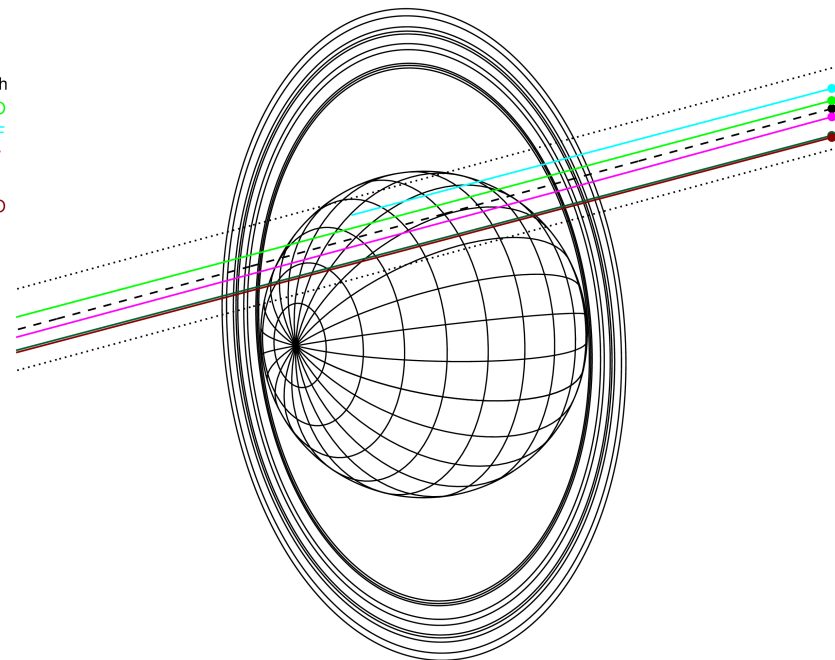
Uranus 2042-02-20T15:13:06 K14.44 G15.85
 PgtRgt



2042-02-20T15:13:06.7900 α: 08 47 21.6242 α: +18 36 10.006 C/A 1.373° PA 195.17 deg v_sky -20.97 km/s D 17.56 AU

Credit: Styled after SORA/Lucky Star

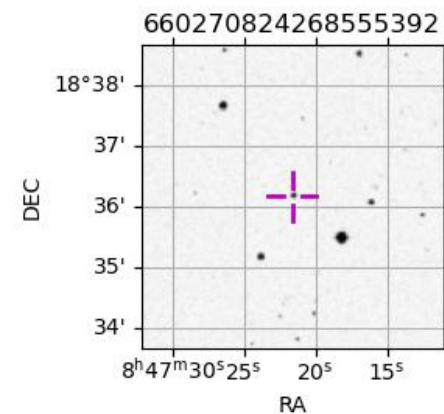
Earth
 PMO
 IRTF
 KAV
 AAT
 MSO



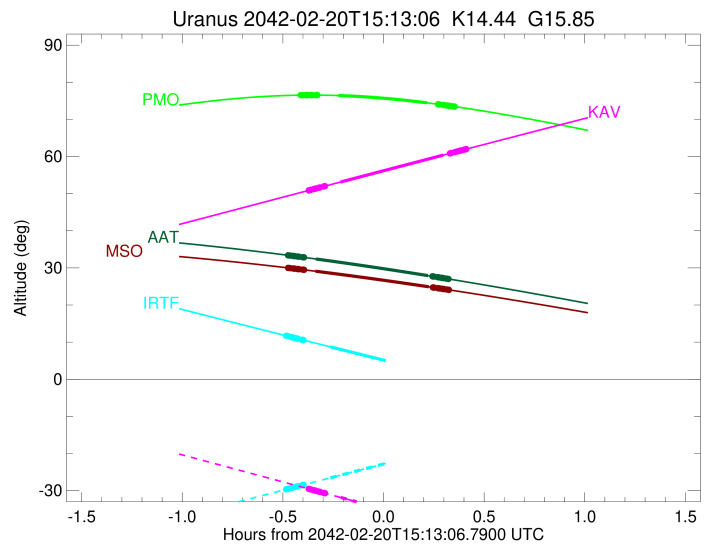
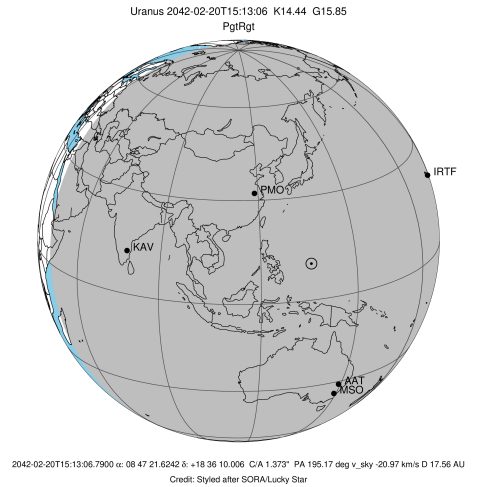
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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	+++++	+ +	+++++	FEB 20 14:48 - FEB 20 15:34	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 20 14:43 - FEB 20 14:57	PinRin
KAV	Kavalur Observatory	12.6	78.8	+++++	+ +	+++++	FEB 20 14:50 - FEB 20 15:37	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 20 14:44 - FEB 20 15:32	PieRie
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0	+++++	+ +	+++++	FEB 20 14:44 - FEB 20 15:32	PieRie



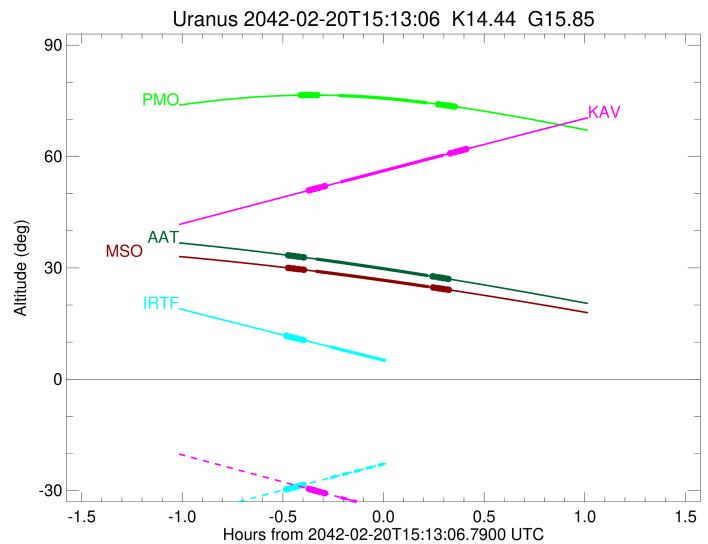
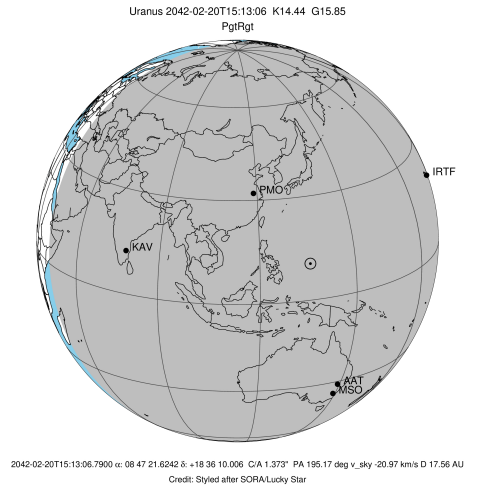
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2042-02-20T15:12:57.580
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 660270824268555392
 2Mass ID (if available) : 08472162+1836102
 ICRS Star Coord at Epoch: 08h 47m 21.62420s +18:36:10.00634s
 RUWE (>1.4 is poor) : 1.06
 K magnitude : 14.436
 G magnitude : 15.848
 RP magnitude : 15.347
 BP magnitude : 16.184
 DUPflag : 0
 Distance (au) : 17.564
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.97
 Sun-Target sep (deg) : 157.68
 Sun-Moon sep (deg) : 153.45
 B (ring opening deg) : 37.90
 PA of pole (deg) : 95.05
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.490
 C/A sky separation (km) : 18982.4
 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	2042-02-20T14:48:16.521		76.53	-60.35	51469.07	-31.89		
lambda	I	2042-02-20T14:49:01.762		76.54	-60.47	50026.71	-31.81		
delta	I	2042-02-20T14:49:56.209		76.55	-60.61	48300.35	-31.60		
gamma	I	2042-02-20T14:50:17.565		76.55	-60.67	47626.29	-31.52		
eta	I	2042-02-20T14:50:31.860		76.55	-60.71	47176.12	-31.46		
beta	I	2042-02-20T14:51:19.529		76.55	-60.83	45676.97	-31.25		
alpha	I	2042-02-20T14:51:50.866		76.55	-60.92	44694.75	-31.11		
4	I	2042-02-20T14:52:57.590		76.55	-61.09	42616.57	-30.74		
5	I	2042-02-20T14:53:07.960		76.55	-61.12	42312.81	-30.66		
6	I	2042-02-20T14:53:21.349		76.55	-61.15	41868.49	-30.60		
Uranus	I	2042-02-20T14:59:40.305		76.43	-62.12	25496.57		-24.76	-25.78
Uranus	E	2042-02-20T15:26:09.971		74.46	-65.65	25423.84		38.14	39.43
6	E	2042-02-20T15:29:22.488		74.08	-66.00	41842.57	30.57		
5	E	2042-02-20T15:29:34.513		74.06	-66.02	42173.44	30.64		
4	E	2042-02-20T15:29:45.372		74.04	-66.04	42544.05	30.71		
alpha	E	2042-02-20T15:30:56.549		73.89	-66.17	44752.29	31.08		
beta	E	2042-02-20T15:31:25.262		73.83	-66.22	45641.47	31.22		
eta	E	2042-02-20T15:32:14.121		73.73	-66.30	47176.12	31.43		
gamma	E	2042-02-20T15:32:28.552		73.70	-66.33	47630.17	31.49		
delta	E	2042-02-20T15:32:49.803		73.65	-66.37	48300.35	31.58		
lambda	E	2042-02-20T15:33:44.300		73.53	-66.46	50026.71	31.78		
epsilon	E	2042-02-20T15:34:06.908		73.48	-66.50	50745.97	31.86		

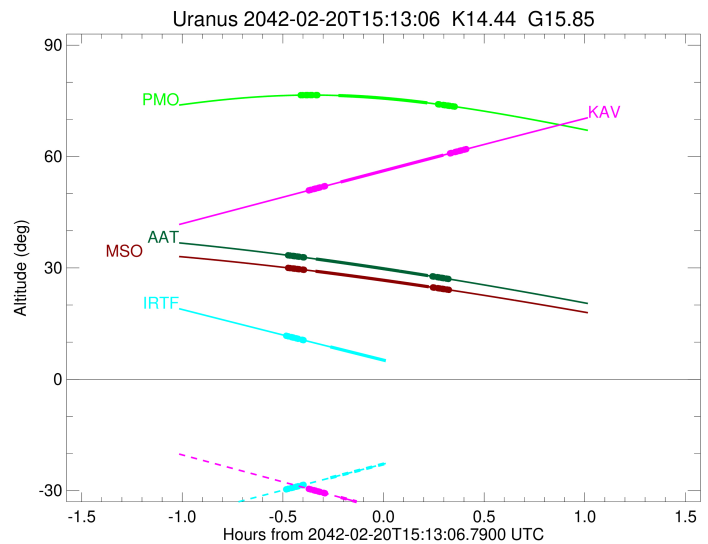
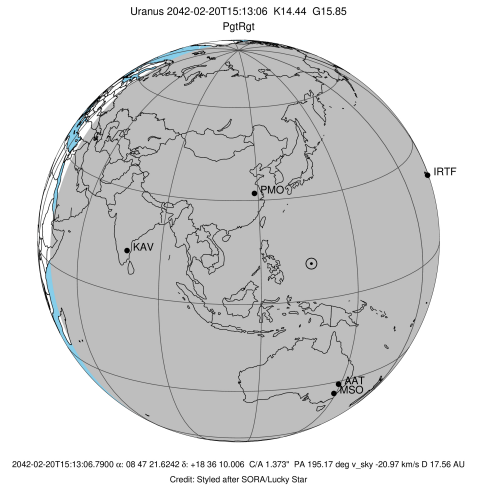
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2042-02-20T15:08:49.960
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      : 660270824268555392
2Mass ID (if available) : 08472162+1836102
ICRS Star Coord at Epoch: 08h 47m 21.62420s +18:36:10.00634s
RUWE (>1.4 is poor) : 1.06
K magnitude          : 14.436
G magnitude          : 15.848
RP magnitude         : 15.347
BP magnitude         : 16.184
DUPflag             : 0
Distance (au)       : 17.564
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -20.97
Sun-Target sep (deg) : 157.68
Sun-Moon sep (deg)  : 152.29
B (ring opening deg) : 37.90
PA of pole (deg)    : 95.05
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.646
C/A sky separation (km) : 20971.9
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall1.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall1.bsp
ural161.bsp
vgr2.ural161.bsp
peph.ural160.bsp
earthstns_itr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```



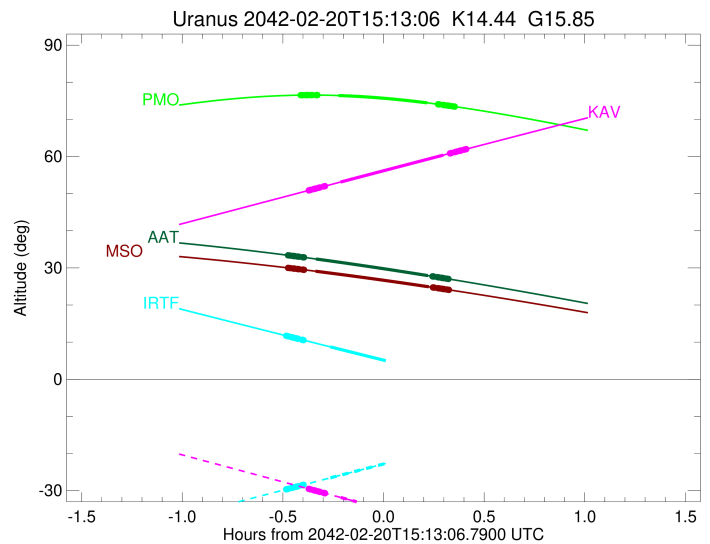
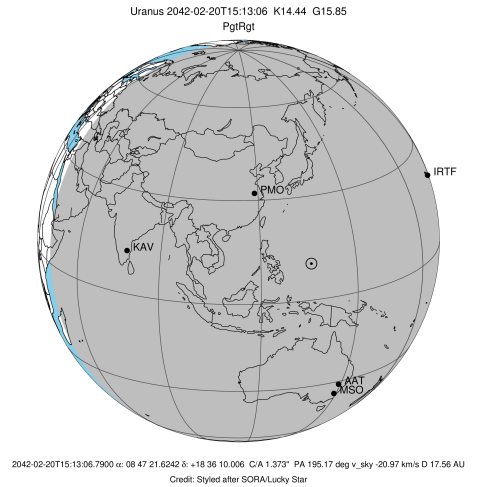
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2042-02-20T14:43:57.314		11.75	-29.69	51458.35	-30.77		
lambda	I	2042-02-20T14:44:43.869		11.57	-29.51	50026.71	-30.66		
delta	I	2042-02-20T14:45:40.405		11.36	-29.28	48300.35	-30.41		
gamma	I	2042-02-20T14:46:02.601		11.27	-29.20	47626.53	-30.31		
eta	I	2042-02-20T14:46:17.481		11.22	-29.14	47176.12	-30.23		
beta	I	2042-02-20T14:47:07.161		11.03	-28.94	45676.36	-29.97		
alpha	I	2042-02-20T14:47:39.785		10.90	-28.82	44695.97	-29.80		
4	I	2042-02-20T14:48:49.625		10.64	-28.54	42616.48	-29.34		
5	I	2042-02-20T14:49:00.602		10.60	-28.50	42311.65	-29.25		
6	I	2042-02-20T14:49:14.481		10.55	-28.44	41870.00	-29.16		
Uranus	I	2042-02-20T14:57:15.556		8.73	-26.56	25519.43		-19.47	-20.31
Uranus	E	2042-02-20T15:20:19.393		3.54x	-21.14	25451.28		33.43	34.65
6	E	2042-02-20T15:24:52.663		2.52x	-20.07	41844.87	29.06		
5	E	2042-02-20T15:25:05.435		2.47x	-20.02	42176.32	29.14		
4	E	2042-02-20T15:25:16.762		2.43x	-19.97	42546.03	29.23		
alpha	E	2042-02-20T15:26:31.381		2.15x	-19.68	44752.08	29.68		
beta	E	2042-02-20T15:27:01.463		2.04x	-19.56	45641.70	29.85		
eta	E	2042-02-20T15:27:52.522		1.85x	-19.36	47176.12	30.11		
gamma	E	2042-02-20T15:28:07.591		1.79x	-19.30	47630.33	30.18		
delta	E	2042-02-20T15:28:29.756		1.71x	-19.22	48300.35	30.28		
lambda	E	2042-02-20T15:29:26.542		1.50x	-19.00	50026.71	30.52		
epsilon	E	2042-02-20T15:29:50.148		1.41x	-18.90	50748.26	30.63		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2042-02-20T15:15:41.880
 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 : 660270824268555392
 2Mass ID (if available) : 08472162+1836102
 ICRS Star Coord at Epoch: 08h 47m 21.62420s +18:36:10.00634s
 RUWE (>1.4 is poor) : 1.06
 K magnitude : 14.436
 G magnitude : 15.848
 RP magnitude : 15.347
 BP magnitude : 16.184
 DUPflag : 0
 Distance (au) : 17.564
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.97
 Sun-Target sep (deg) : 157.68
 Sun-Moon sep (deg) : 153.92
 B (ring opening deg) : 37.90
 PA of pole (deg) : 95.05
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.270
 C/A sky separation (km) : 16177.8
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



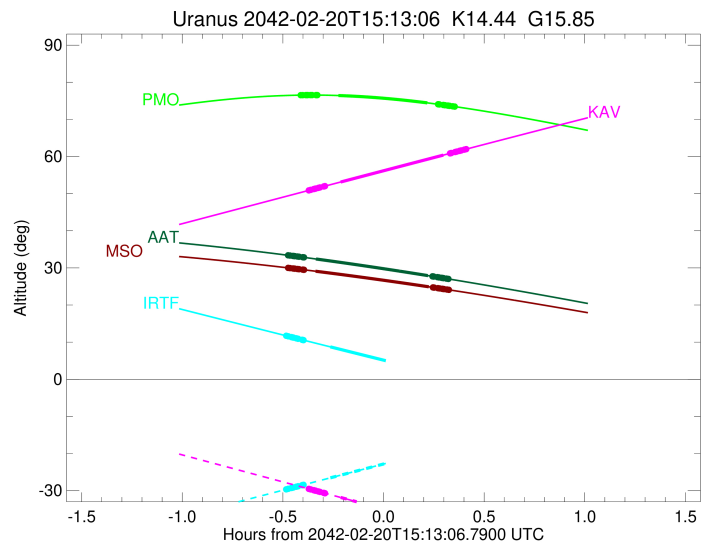
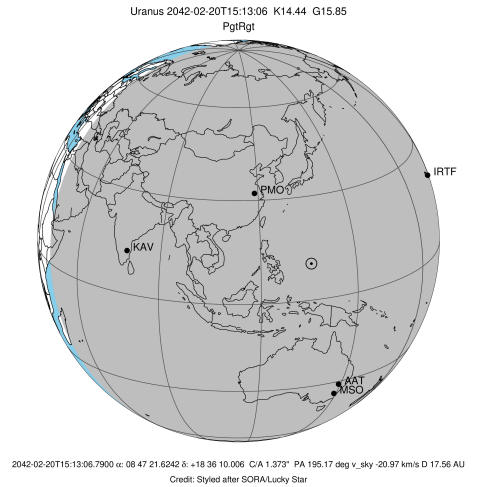
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2042-02-20T14:50:41.090		50.85	-29.49	51482.60	-32.55		
lambda	I	2042-02-20T14:51:25.822		51.02	-29.67	50026.71	-32.49		
delta	I	2042-02-20T14:52:19.066		51.23	-29.89	48300.35	-32.35		
gamma	I	2042-02-20T14:52:39.930		51.32	-29.97	47625.96	-32.29		
eta	I	2042-02-20T14:52:53.869		51.37	-30.03	47176.12	-32.25		
beta	I	2042-02-20T14:53:40.292		51.55	-30.22	45677.74	-32.10		
alpha	I	2042-02-20T14:54:10.864		51.68	-30.34	44693.21	-32.00		
4	I	2042-02-20T14:55:15.540		51.93	-30.60	42616.48	-31.74		
5	I	2042-02-20T14:55:25.436		51.97	-30.64	42314.00	-31.69		
6	I	2042-02-20T14:55:38.604		52.02	-30.70	41866.34	-31.64		
Uranus	I	2042-02-20T15:00:20.728		53.14	-31.84	25465.79		-30.81	-31.99
Uranus	E	2042-02-20T15:30:58.057		60.39	-39.29	25392.27		43.36	44.67
6	E	2042-02-20T15:32:56.753		60.86	-39.77	41839.30	31.68		
5	E	2042-02-20T15:33:08.188		60.90	-39.82	42169.71	31.73		
4	E	2042-02-20T15:33:18.800		60.94	-39.86	42541.39	31.78		
alpha	E	2042-02-20T15:34:27.751		61.21	-40.14	44752.42	32.05		
beta	E	2042-02-20T15:34:55.580		61.32	-40.26	45641.24	32.15		
eta	E	2042-02-20T15:35:43.075		61.51	-40.45	47176.12	32.30		
gamma	E	2042-02-20T15:35:57.114		61.56	-40.50	47629.92	32.35		
delta	E	2042-02-20T15:36:17.821		61.65	-40.59	48300.35	32.41		
lambda	E	2042-02-20T15:37:10.974		61.85	-40.80	50026.71	32.55		
epsilon	E	2042-02-20T15:37:32.992		61.94	-40.89	50743.99	32.61		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2042-02-20T15:09:41.490
 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 : 660270824268555392
 2Mass ID (if available) : 08472162+1836102
 ICRS Star Coord at Epoch: 08h 47m 21.62420s +18:36:10.00634s
 RUWE (>1.4 is poor) : 1.06
 K magnitude : 14.436
 G magnitude : 15.848
 RP magnitude : 15.347
 BP magnitude : 16.184
 DUPflag : 0
 Distance (au) : 17.564
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.97
 Sun-Target sep (deg) : 157.68
 Sun-Moon sep (deg) : 152.74
 B (ring opening deg) : 37.90
 PA of pole (deg) : 95.05
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.088
 C/A sky separation (km) : 13857.2
 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	2042-02-20T14:44:30.272		33.41	-47.66	51494.26	-33.01		
lambda	I	2042-02-20T14:45:14.729		33.33	-47.63	50026.71	-32.97		
delta	I	2042-02-20T14:46:07.172		33.22	-47.60	48300.35	-32.87		
gamma	I	2042-02-20T14:46:27.714		33.18	-47.59	47625.67	-32.82		
eta	I	2042-02-20T14:46:41.417		33.16	-47.58	47176.12	-32.79		
beta	I	2042-02-20T14:47:27.022		33.07	-47.55	45678.37	-32.68		
alpha	I	2042-02-20T14:47:57.115		33.01	-47.53	44691.90	-32.61		
4	I	2042-02-20T14:49:00.479		32.88	-47.48	42616.21	-32.41		
5	I	2042-02-20T14:49:10.033		32.86	-47.48	42314.74	-32.37		
6	I	2042-02-20T14:49:23.121		32.84	-47.47	41864.29	-32.34		
Uranus	I	2042-02-20T14:52:58.728		32.40	-47.30	25439.77		-35.43	-36.69
Uranus	E	2042-02-20T15:26:21.503		27.92	-45.02	25373.71		46.40	47.71
6	E	2042-02-20T15:27:41.923		27.73	-44.90	41836.89	32.26		
5	E	2042-02-20T15:27:53.027		27.70	-44.88	42167.20	32.30		
4	E	2042-02-20T15:28:03.552		27.67	-44.87	42539.54	32.34		
alpha	E	2042-02-20T15:29:11.440		27.51	-44.76	44752.41	32.53		
beta	E	2042-02-20T15:29:38.852		27.44	-44.72	45641.13	32.60		
eta	E	2042-02-20T15:30:25.727		27.33	-44.65	47176.12	32.71		
gamma	E	2042-02-20T15:30:39.591		27.29	-44.63	47629.73	32.74		
delta	E	2042-02-20T15:31:00.063		27.24	-44.60	48300.35	32.78		
lambda	E	2042-02-20T15:31:52.649		27.11	-44.51	50026.71	32.88		
epsilon	E	2042-02-20T15:32:14.438		27.06	-44.48	50743.52	32.92		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2042-02-20T15:09:44.740
 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 : 660270824268555392
 2Mass ID (if available) : 08472162+1836102
 ICRS Star Coord at Epoch: 08h 47m 21.62420s +18:36:10.00634s
 RUWE (>1.4 is poor) : 1.06
 K magnitude : 14.436
 G magnitude : 15.848
 RP magnitude : 15.347
 BP magnitude : 16.184
 DUPflag : 0
 Distance (au) : 17.564
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -20.97
 Sun-Target sep (deg) : 157.68
 Sun-Moon sep (deg) : 152.73
 B (ring opening deg) : 37.90
 PA of pole (deg) : 95.05
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.063
 C/A sky separation (km) : 13537.6
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ural11.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ural11.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	2042-02-20T14:44:31.289		30.02	-43.69	51495.61	-33.05		
lambda	I	2042-02-20T14:45:15.736		29.94	-43.67	50026.71	-33.01		
delta	I	2042-02-20T14:46:08.112		29.85	-43.64	48300.35	-32.91		
gamma	I	2042-02-20T14:46:28.626		29.81	-43.63	47625.63	-32.87		
eta	I	2042-02-20T14:46:42.308		29.78	-43.62	47176.12	-32.84		
beta	I	2042-02-20T14:47:27.840		29.70	-43.59	45678.45	-32.73		
alpha	I	2042-02-20T14:47:57.891		29.65	-43.57	44691.74	-32.67		
4	I	2042-02-20T14:49:01.131		29.53	-43.53	42616.16	-32.48		
5	I	2042-02-20T14:49:10.648		29.51	-43.53	42314.81	-32.44		
6	I	2042-02-20T14:49:23.735		29.49	-43.52	41864.03	-32.41		
Uranus	I	2042-02-20T14:52:51.905		29.10	-43.38	25436.61		-35.98	-37.24
Uranus	E	2042-02-20T15:26:34.883		24.91	-41.32	25371.33		46.79	48.10
6	E	2042-02-20T15:27:50.612		24.74	-41.22	41836.54	32.33		
5	E	2042-02-20T15:28:01.673		24.72	-41.21	42166.84	32.37		
4	E	2042-02-20T15:28:12.190		24.70	-41.19	42539.28	32.40		
alpha	E	2042-02-20T15:29:19.948		24.54	-41.10	44752.41	32.59		
beta	E	2042-02-20T15:29:47.309		24.48	-41.06	45641.12	32.65		
eta	E	2042-02-20T15:30:34.107		24.37	-41.00	47176.12	32.76		
gamma	E	2042-02-20T15:30:47.947		24.34	-40.98	47629.70	32.79		
delta	E	2042-02-20T15:31:08.390		24.29	-40.95	48300.35	32.83		
lambda	E	2042-02-20T15:32:00.904		24.17	-40.88	50026.71	32.92		
epsilon	E	2042-02-20T15:32:22.665		24.12	-40.85	50743.51	32.96		