

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2024-10-20T21:42:15.790
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 56783698198142336
 2Mass ID (if available) : 03345002+1859081

ICRS Star Coord at Epoch: 03h 34m 50.00770s +18:59:07.88543s

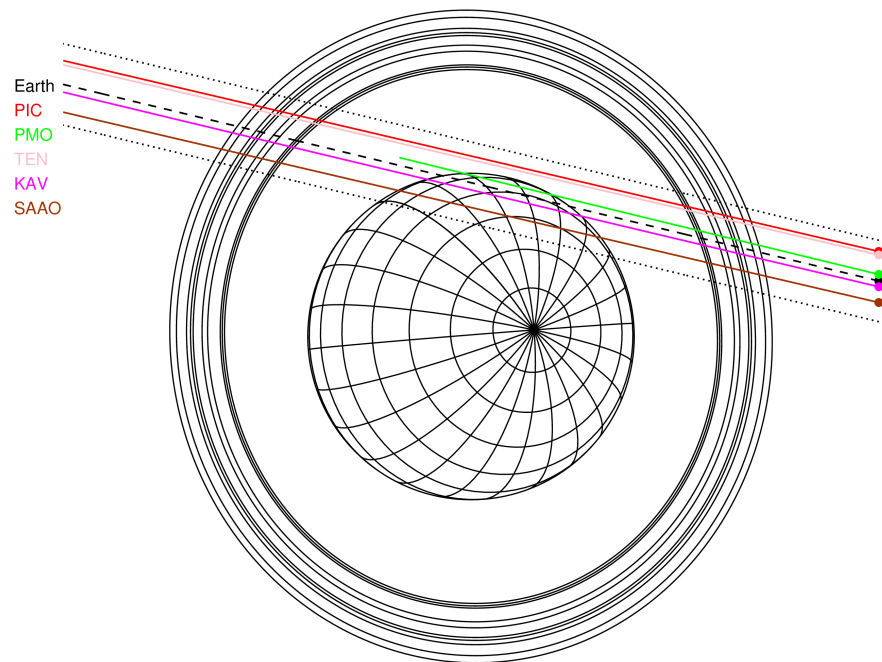
RUWE (>1.4 is poor) : 1.00
 K magnitude : 14.719
 G magnitude : 16.524
 RP magnitude : 15.939
 BP magnitude : 16.917
 DUPflag : 0
 Distance (au) : 18.683
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -19.87
 Sun-Target sep (deg) : 151.68
 Sun-Moon sep (deg) : 19.74
 B (ring opening deg) : 67.14
 PA of pole (deg) : -84.06

#	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



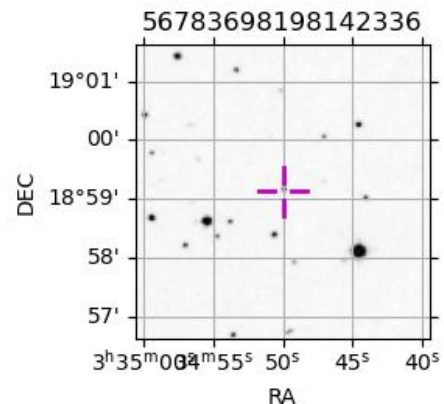
2024-10-20T21:42:15.7900 ra: 03 34 50.0077 s: +18 59 07.885 C/A 1.731" PA 166.45 deg v_sky -19.87 km/s D 18.68 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2024-10-20T21:42:15 K14.72 G16.52 PgtRgt

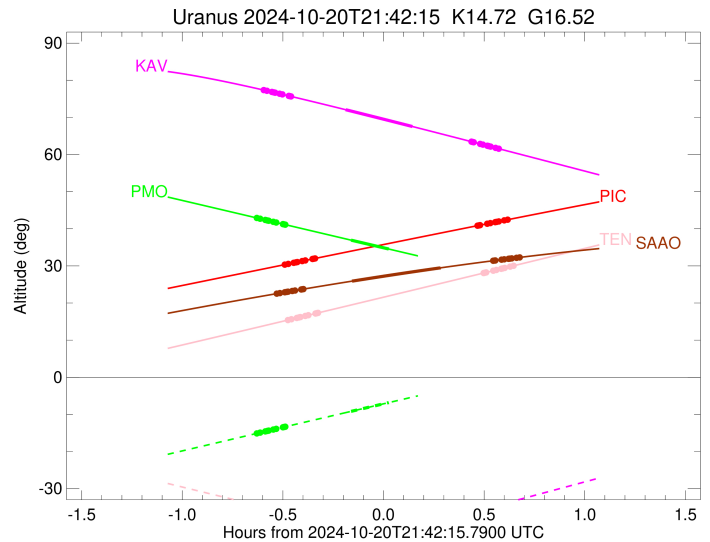
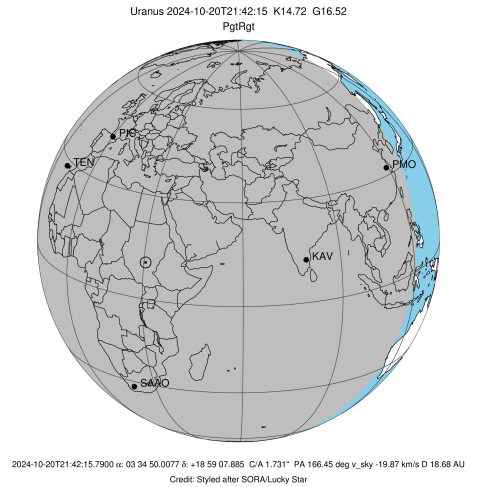


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	OCT 20 21:12 - OCT 20 22:18	PnnRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+ +		OCT 20 21:04 - OCT 20 21:43	PieRin
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	+++++		+++++	OCT 20 21:13 - OCT 20 22:20	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++	+ +	+++++	OCT 20 21:06 - OCT 20 22:16	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					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+++++	+ +	+++++	OCT 20 21:10 - OCT 20 22:22	PieRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2024-10-20T21:45:00.690
 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 : 56783698198142336
 2Mass ID (if available) : 03345002+1859081
 ICRS Star Coord at Epoch: 03h 34m 50.00770s +18:59:07.88543s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 14.719
 G magnitude : 16.524
 RP magnitude : 15.939
 BP magnitude : 16.917
 DUPflag : 0
 Distance (au) : 18.683
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -19.87
 Sun-Target sep (deg) : 151.68
 Sun-Moon sep (deg) : 20.23
 B (ring opening deg) : 67.14
 PA of pole (deg) : -84.06
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.031
 C/A sky separation (km) : 27522.8
 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

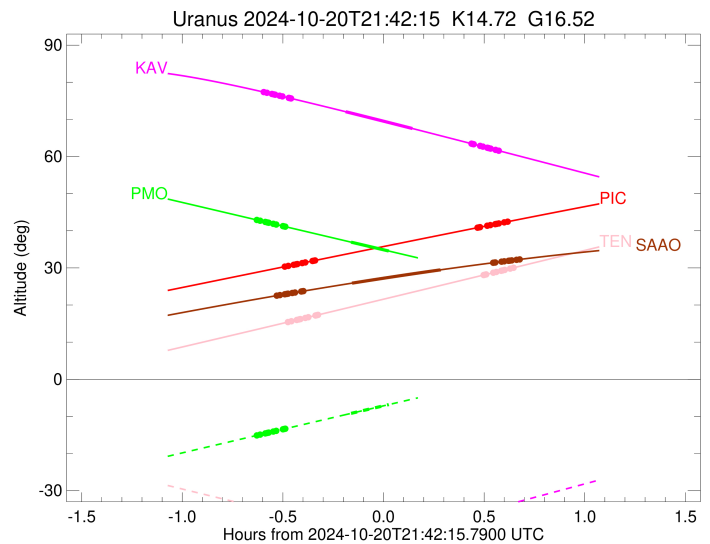
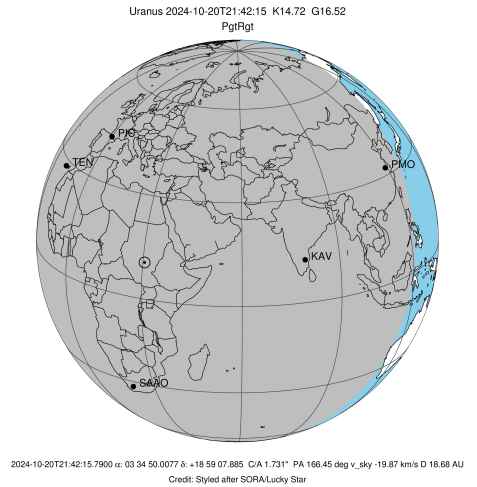


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2024-10-20T21:12:34.197		30.30	-44.12	51446.78	-18.03		
lambda	I	2024-10-20T21:13:53.136		30.54	-44.32	50026.71	-17.88		
delta	I	2024-10-20T21:15:30.459		30.84	-44.57	48300.35	-17.59		
gamma	I	2024-10-20T21:16:09.168		30.96	-44.67	47621.79	-17.47		
eta	I	2024-10-20T21:16:34.746		31.03	-44.73	47176.12	-17.38		
beta	I	2024-10-20T21:18:01.841		31.30	-44.96	45674.12	-17.08		
alpha	I	2024-10-20T21:18:56.355		31.47	-45.09	44745.84	-16.85		
4	I	2024-10-20T21:21:07.518		31.87	-45.42	42568.05	-16.32		
5	I	2024-10-20T21:21:23.277		31.92	-45.46	42307.63	-16.22		
6	I	2024-10-20T21:21:54.609		32.01	-45.54	41794.76	-16.07		

No planet occultations

6	E	2024-10-20T22:10:16.695		40.83	-52.06	41843.01	16.13		
5	E	2024-10-20T22:10:37.825		40.90	-52.10	42191.35	16.28		
4	E	2024-10-20T22:11:04.049		40.98	-52.16	42616.42	16.38		
alpha	E	2024-10-20T22:13:09.000		41.35	-52.40	44692.73	16.92		
beta	E	2024-10-20T22:14:06.430		41.52	-52.50	45672.57	17.15		
eta	E	2024-10-20T22:15:33.337		41.78	-52.67	47176.12	17.46		
gamma	E	2024-10-20T22:15:59.292		41.86	-52.72	47630.40	17.55		
delta	E	2024-10-20T22:16:37.337		41.97	-52.79	48300.35	17.67		
lambda	E	2024-10-20T22:18:14.206		42.26	-52.97	50026.71	17.97		
epsilon	E	2024-10-20T22:18:55.774		42.39	-53.04	50776.02	18.12		

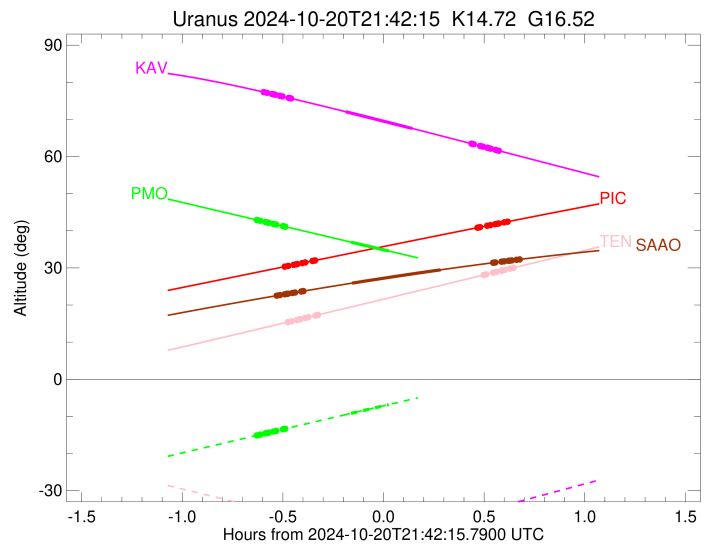
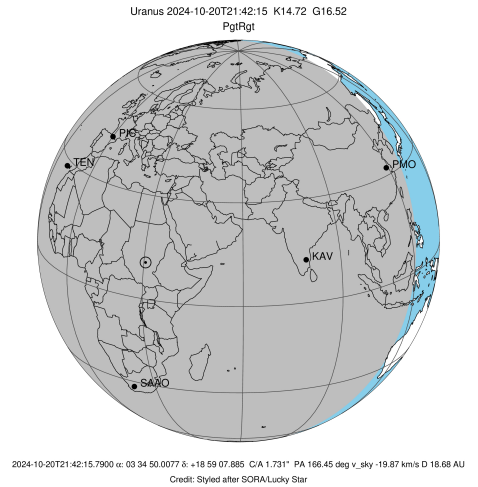
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2024-10-20T21:37:58.200
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PMO
 Location : Purple Mtn Obs. Nanking
 Latitude (deg) : 32.06667
 E. Longitude (deg) : 118.82089
 Altitude (km) : 0.364
 Gaia source ID : 56783698198142336
 2Mass ID (if available) : 03345002+1859081
 ICRS Star Coord at Epoch: 03h 34m 50.00770s +18:59:07.88543s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 14.719
 G magnitude : 16.524
 RP magnitude : 15.939
 BP magnitude : 16.917
 DUPflag : 0
 Distance (au) : 18.683
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -19.87
 Sun-Target sep (deg) : 151.68
 Sun-Moon sep (deg) : 19.16
 B (ring opening deg) : 67.14
 PA of pole (deg) : -84.06
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.812
 C/A sky separation (km) : 24551.8
 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	2024-10-20T21:04:13.551		42.97	-15.18	51467.05	-18.93		
lambda	I	2024-10-20T21:05:29.771		42.70	-14.91	50026.71	-18.81		
delta	I	2024-10-20T21:07:02.088		42.38	-14.58	48300.35	-18.59		
gamma	I	2024-10-20T21:07:38.704		42.25	-14.45	47621.57	-18.49		
eta	I	2024-10-20T21:08:02.840		42.16	-14.37	47176.12	-18.42		
beta	I	2024-10-20T21:09:24.892		41.87	-14.08	45672.72	-18.19		
alpha	I	2024-10-20T21:10:15.794		41.69	-13.90	44747.55	-18.02		
4	I	2024-10-20T21:12:18.304		41.26	-13.47	42563.67	-17.61		
5	I	2024-10-20T21:12:32.496		41.21	-13.42	42310.64	-17.54		
6	I	2024-10-20T21:13:01.529		41.10	-13.32	41794.88	-17.42		
Uranus	I	2024-10-20T21:32:34.958		36.94	-9.19	25396.66		12.70	13.29
Uranus	E	2024-10-20T21:43:51.474		34.54	-6.82	25557.06		1.38	1.44
6	E	2024-10-20T22:04:58.363		30.06	-2.40x	41846.46	17.37		
5	E	2024-10-20T22:05:17.448		29.99	-2.34x	42186.05	17.48		
4	E	2024-10-20T22:05:42.170		29.90	-2.25x	42615.99	17.55		
alpha	E	2024-10-20T22:07:39.314		29.49	-1.85x	44691.19	17.96		
beta	E	2024-10-20T22:08:33.547		29.30	-1.66x	45671.37	18.12		
eta	E	2024-10-20T22:09:56.059		29.00	-1.37x	47176.12	18.35		
gamma	E	2024-10-20T22:10:20.777		28.92	-1.29x	47630.61	18.42		
delta	E	2024-10-20T22:10:57.043		28.79	-1.16x	48300.35	18.51		
lambda	E	2024-10-20T22:12:29.728		28.46	-0.84x	50026.71	18.73		
epsilon	E	2024-10-20T22:13:09.167		28.32	-0.71x	50767.33	18.85		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2024-10-20T21:46:23.520
Event type          : PgtRgt
: Uranus occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code       : TEN
Location            : Teide Obs./Tenerife
Latitude (deg)      : 28.30050
E. Longitude (deg)  : 343.48909
Altitude (km)       : 2.395
Gaia source ID      : 56783698198142336
2Mass ID (if available) : 03345002+1859081
ICRS Star Coord at Epoch: 03h 34m 50.00770s +18:59:07.88543s
RUWE (>1.4 is poor) : 1.00
K magnitude          : 14.719
G magnitude          : 16.524
RP magnitude         : 15.939
BP magnitude         : 16.917
DUPflag             : 0
Distance (au)       : 18.683
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -19.87
Sun-Target sep (deg) : 151.68
Sun-Moon sep (deg)  : 20.40
B (ring opening deg) : 67.14
PA of pole (deg)    : -84.06
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.989
C/A sky separation (km) : 26950.4
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
  
```

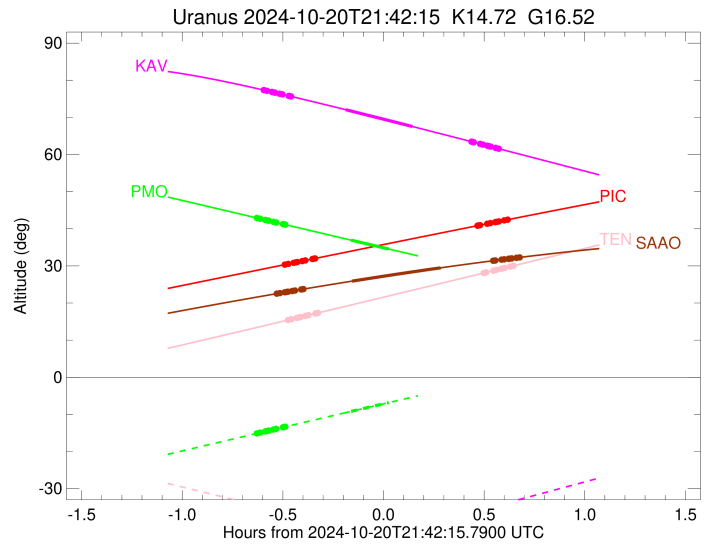
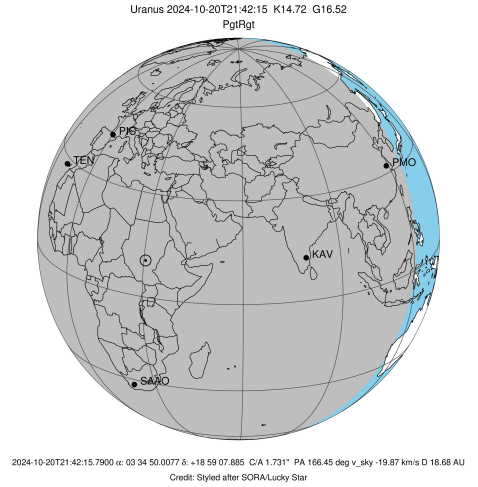


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2024-10-20T21:13:30.124		15.35	-36.43	51450.27	-18.10		
lambda	I	2024-10-20T21:14:48.926		15.63	-36.71	50026.71	-17.96		
delta	I	2024-10-20T21:16:25.760		15.98	-37.07	48300.35	-17.69		
gamma	I	2024-10-20T21:17:04.250		16.12	-37.21	47621.75	-17.57		
eta	I	2024-10-20T21:17:29.668		16.21	-37.30	47176.12	-17.49		
beta	I	2024-10-20T21:18:56.181		16.52	-37.61	45673.89	-17.20		
alpha	I	2024-10-20T21:19:50.234		16.71	-37.81	44746.15	-17.00		
4	I	2024-10-20T21:22:00.242		17.18	-38.28	42567.28	-16.49		
5	I	2024-10-20T21:22:15.755		17.24	-38.34	42308.21	-16.40		
6	I	2024-10-20T21:22:46.758		17.35	-38.45	41794.75	-16.26		

No planet occultations

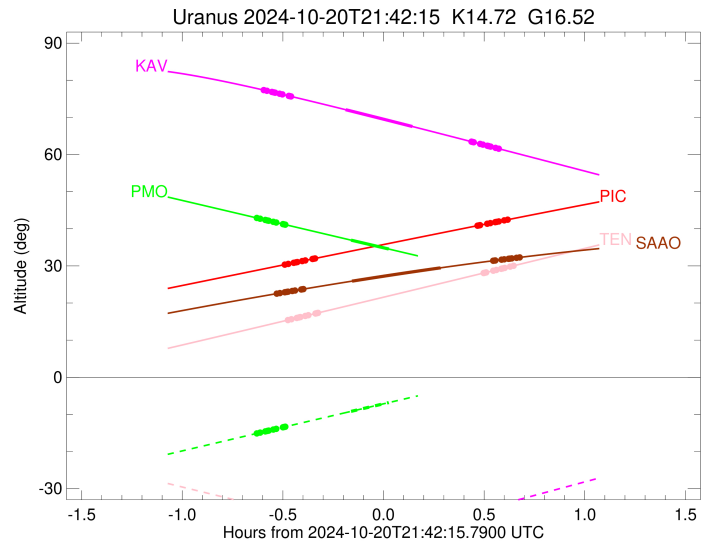
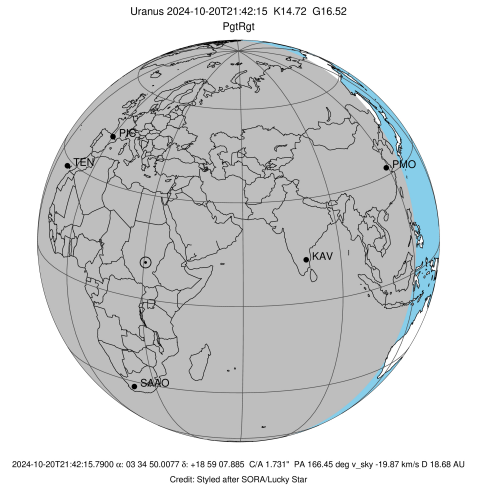
6	E	2024-10-20T22:12:06.768		28.08	-49.06	41843.82	16.34		
5	E	2024-10-20T22:12:27.495		28.15	-49.13	42190.09	16.48		
4	E	2024-10-20T22:12:53.479		28.25	-49.22	42616.35	16.57		
alpha	E	2024-10-20T22:14:57.095		28.70	-49.65	44692.36	17.09		
beta	E	2024-10-20T22:15:54.001		28.91	-49.85	45672.29	17.30		
eta	E	2024-10-20T22:17:20.211		29.22	-50.16	47176.12	17.59		
gamma	E	2024-10-20T22:17:45.974		29.32	-50.25	47630.46	17.68		
delta	E	2024-10-20T22:18:23.743		29.46	-50.38	48300.35	17.80		
lambda	E	2024-10-20T22:19:59.984		29.81	-50.71	50026.71	18.08		
epsilon	E	2024-10-20T22:20:41.185		29.96	-50.86	50773.78	18.22		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2024-10-20T21:40:42.540
 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 : 56783698198142336
 2Mass ID (if available) : 03345002+1859081
 ICRS Star Coord at Epoch: 03h 34m 50.00770s +18:59:07.88543s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 14.719
 G magnitude : 16.524
 RP magnitude : 15.939
 BP magnitude : 16.917
 DUPflag : 0
 Distance (au) : 18.683
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -19.87
 Sun-Target sep (deg) : 151.68
 Sun-Moon sep (deg) : 19.83
 B (ring opening deg) : 67.14
 PA of pole (deg) : -84.06
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.648
 C/A sky separation (km) : 22335.3
 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	2024-10-20T21:06:17.676		77.42	-51.56	51477.92	-19.60		
lambda	I	2024-10-20T21:07:31.810		77.17	-51.26	50026.71	-19.51		
delta	I	2024-10-20T21:09:00.724		76.86	-50.89	48300.35	-19.32		
gamma	I	2024-10-20T21:09:35.927		76.73	-50.75	47621.45	-19.25		
eta	I	2024-10-20T21:09:59.098		76.65	-50.66	47176.12	-19.19		
beta	I	2024-10-20T21:11:17.793		76.38	-50.34	45671.84	-19.01		
alpha	I	2024-10-20T21:12:06.359		76.21	-50.14	44748.45	-18.87		
4	I	2024-10-20T21:14:03.255		75.79	-49.66	42561.08	-18.54		
5	I	2024-10-20T21:14:16.527		75.74	-49.61	42312.09	-18.48		
6	I	2024-10-20T21:14:44.080		75.65	-49.50	41795.17	-18.39		
Uranus	I	2024-10-20T21:30:58.499		72.08	-45.54	25287.16		16.59	17.33
Uranus	E	2024-10-20T21:50:53.260		67.55	-40.68	25544.58		-3.74	-3.92
6	E	2024-10-20T22:08:29.553		63.47	-36.40	41849.34	18.37		
5	E	2024-10-20T22:08:47.172		63.40	-36.33	42181.79	18.47		
4	E	2024-10-20T22:09:10.784		63.31	-36.23	42615.39	18.53		
alpha	E	2024-10-20T22:11:02.074		62.88	-35.78	44689.96	18.85		
beta	E	2024-10-20T22:11:53.787		62.67	-35.57	45670.28	18.98		
eta	E	2024-10-20T22:13:12.727		62.37	-35.25	47176.12	19.17		
gamma	E	2024-10-20T22:13:36.410		62.27	-35.15	47630.79	19.22		
delta	E	2024-10-20T22:14:11.168		62.14	-35.01	48300.35	19.30		
lambda	E	2024-10-20T22:15:40.188		61.79	-34.65	50026.71	19.48		
epsilon	E	2024-10-20T22:16:17.782		61.65	-34.50	50760.45	19.57		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2024-10-20T21:45:55.750
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : SAAO
 Location : So. Afr. Astro. Obs. (Sutherland)
 Latitude (deg) : -32.37953
 E. Longitude (deg) : 20.81070
 Altitude (km) : 1.768
 Gaia source ID : 56783698198142336
 2Mass ID (if available) : 03345002+1859081
 ICRS Star Coord at Epoch: 03h 34m 50.00770s +18:59:07.88543s
 RUWE (>1.4 is poor) : 1.00
 K magnitude : 14.719
 G magnitude : 16.524
 RP magnitude : 15.939
 BP magnitude : 16.917
 DUPflag : 0
 Distance (au) : 18.683
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -19.87
 Sun-Target sep (deg) : 151.68
 Sun-Moon sep (deg) : 20.65
 B (ring opening deg) : 67.14
 PA of pole (deg) : -84.06
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.452
 C/A sky separation (km) : 19679.3
 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_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	2024-10-20T21:10:10.328		22.49	-43.79	51490.22	-19.93		
lambda	I	2024-10-20T21:11:23.817		22.68	-43.90	50026.71	-19.86		
delta	I	2024-10-20T21:12:51.020		22.90	-44.02	48300.35	-19.73		
gamma	I	2024-10-20T21:13:25.487		22.99	-44.07	47621.33	-19.67		
eta	I	2024-10-20T21:13:48.141		23.05	-44.10	47176.12	-19.63		
beta	I	2024-10-20T21:15:05.023		23.25	-44.21	45670.76	-19.50		
alpha	I	2024-10-20T21:15:52.208		23.37	-44.28	44749.41	-19.39		
4	I	2024-10-20T21:17:45.885		23.66	-44.43	42558.08	-19.16		
5	I	2024-10-20T21:17:58.518		23.69	-44.44	42313.45	-19.11		
6	I	2024-10-20T21:18:25.150		23.75	-44.48	41795.69	-19.04		
Uranus	I	2024-10-20T21:32:54.392		25.90	-45.50	25201.02		19.18	20.01
Uranus	E	2024-10-20T21:59:19.738		29.49	-46.71	25497.02		-7.79	-8.15
6	E	2024-10-20T22:14:58.114		31.39	-47.00	41852.52	19.11		
5	E	2024-10-20T22:15:14.610		31.42	-47.00	42177.27	19.18		
4	E	2024-10-20T22:15:37.529		31.47	-47.01	42614.47	19.23		
alpha	E	2024-10-20T22:17:24.998		31.67	-47.02	44688.71	19.47		
beta	E	2024-10-20T22:18:15.087		31.77	-47.02	45668.98	19.57		
eta	E	2024-10-20T22:19:31.809		31.91	-47.02	47176.12	19.72		
gamma	E	2024-10-20T22:19:54.855		31.96	-47.02	47630.97	19.76		
delta	E	2024-10-20T22:20:28.687		32.02	-47.03	48300.35	19.81		
lambda	E	2024-10-20T22:21:55.506		32.18	-47.03	50026.71	19.95		
epsilon	E	2024-10-20T22:22:31.905		32.25	-47.02	50753.96	20.02		