

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-11-22T20:21:31.670
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3377582111442263040
 2Mass ID (if available) : 06211868+2336517

Uranus 2033-11-22T20:21:31 K11.28 G12.77 PgtRgt

ICRS Star Coord at Epoch: 06h 21m 18.69940s +23:36:51.42723s

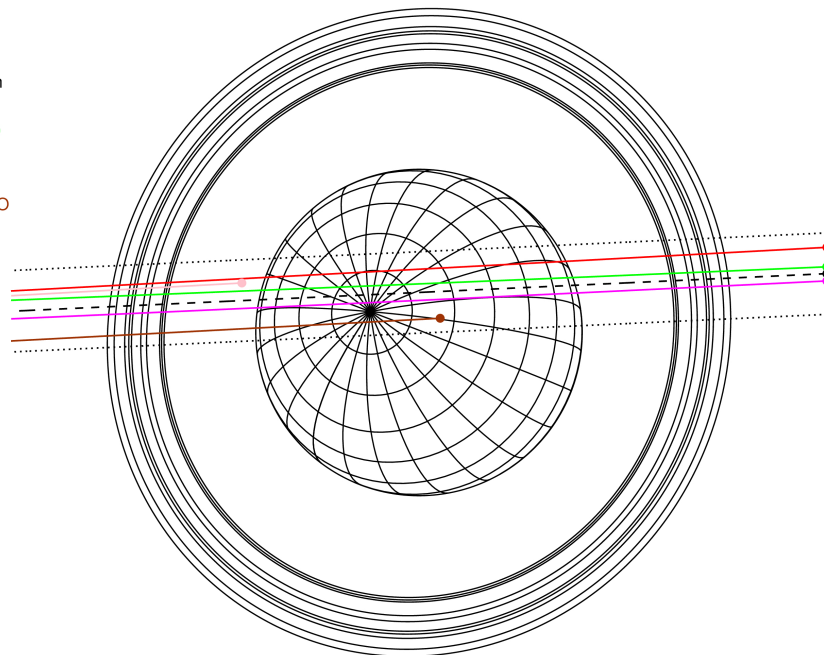
RUWE (>1.4 is poor) : 1.08
 K magnitude : 11.281
 G magnitude : 12.774
 RP magnitude : 12.249
 BP magnitude : 13.068
 DUPflag : 0
 Distance (au) : 18.137
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.17
 Sun-Target sep (deg) : 145.50
 Sun-Moon sep (deg) : 153.86
 B (ring opening deg) : 71.05
 PA of pole (deg) : 66.82

Uranus 2033-11-22T20:21:31 K11.28 G12.77
 PgtRgt



2033-11-22T20:21:31.6700 α: 06 21 18.6994 δ: +23 36 51.427 C/A 0.485° PA 182.64 deg v_sky -18.17 km/s D 18.14 AU
 Credit: Styled after SORA/Lucky Star

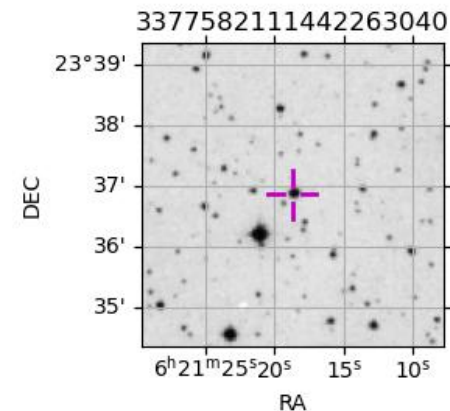
Earth
 PIC
 PMO
 TEN
 KAV
 SAAO



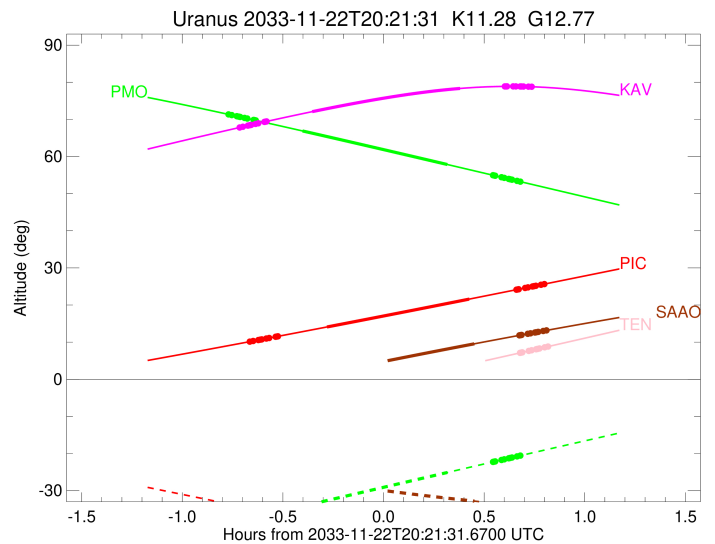
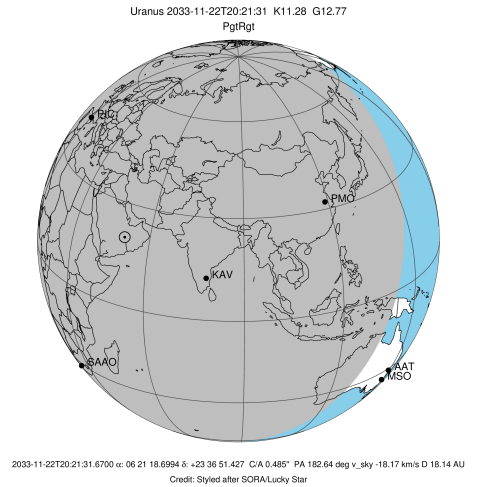
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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	+++++	+ +	+++++	NOV 22 19:42 - NOV 22 21:09	PieRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+ +	+++++	NOV 22 19:35 - NOV 22 21:02	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			+++++	NOV 22 21:02 - NOV 22 21:10	PnnRne
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++	+ +	+++++	NOV 22 19:39 - NOV 22 21:06	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		+	+++++	NOV 22 20:48 - NOV 22 21:10	PneRne
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn

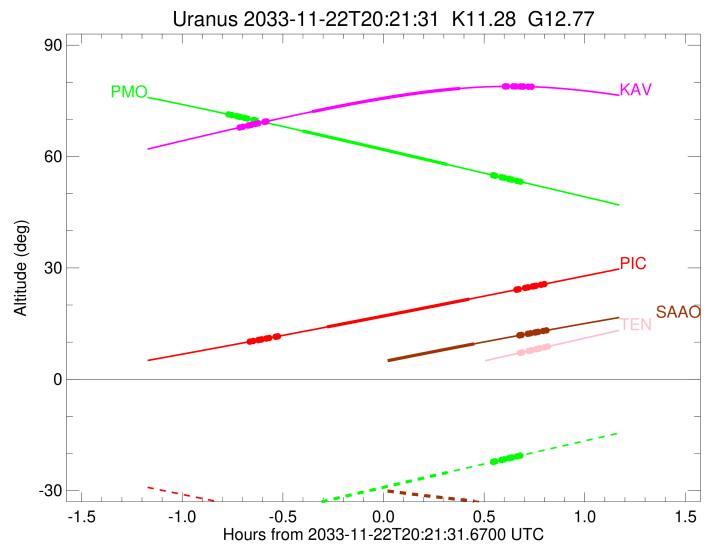
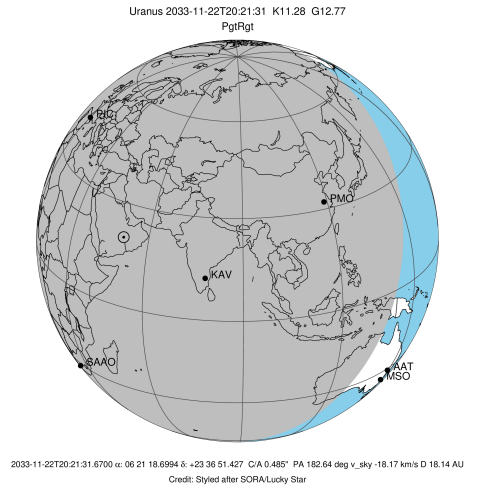


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-11-22T20:26:03.130
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3377582111442263040
 2Mass ID (if available) : 06211868+2336517
 ICRS Star Coord at Epoch: 06h 21m 18.69940s +23:36:51.42723s
 RUWE (>1.4 is poor) : 1.08
 K magnitude : 11.281
 G magnitude : 12.774
 RP magnitude : 12.249
 BP magnitude : 13.068
 DUPflag : 0
 Distance (au) : 18.137
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.17
 Sun-Target sep (deg) : 145.50
 Sun-Moon sep (deg) : 153.45
 B (ring opening deg) : 71.05
 PA of pole (deg) : 66.82
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.752
 C/A sky separation (km) : 9895.2
 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



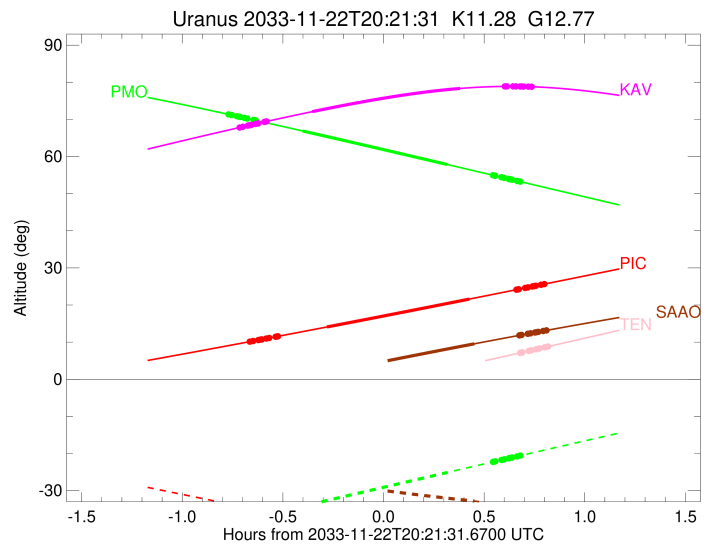
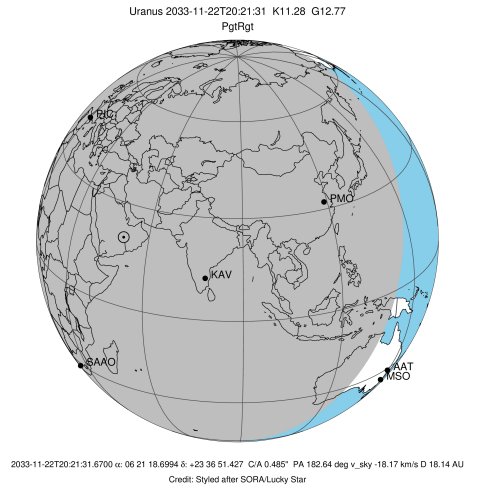
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-11-22T19:42:02.647		10.20	-34.79	50744.83	-18.58		
lambda	I	2033-11-22T19:42:41.303		10.31	-34.90	50026.71	-18.57		
delta	I	2033-11-22T19:44:14.319		10.57	-35.19	48300.35	-18.55		
gamma	I	2033-11-22T19:44:50.878		10.68	-35.30	47622.50	-18.54		
eta	I	2033-11-22T19:45:14.966		10.75	-35.37	47176.12	-18.53		
beta	I	2033-11-22T19:46:35.744		10.97	-35.62	45679.51	-18.50		
alpha	I	2033-11-22T19:47:26.589		11.12	-35.78	44743.06	-18.49		
4	I	2033-11-22T19:49:24.704		11.46	-36.14	42558.67	-18.44		
5	I	2033-11-22T19:49:44.653		11.51	-36.20	42184.57	-18.41		
6	I	2033-11-22T19:50:01.410		11.56	-36.25	41878.14	-18.42		
Uranus	I	2033-11-22T20:04:40.256		14.09	-38.92	25331.83		-12.24	-12.80
Uranus	E	2033-11-22T20:47:05.846		21.59	-46.53	25036.79		18.92	19.75
6	E	2033-11-22T21:01:07.846		24.12	-48.97	41806.47	18.54		
5	E	2033-11-22T21:01:32.033		24.20	-49.04	42250.64	18.54		
4	E	2033-11-22T21:01:51.022		24.25	-49.10	42602.36	18.56		
alpha	E	2033-11-22T21:03:43.746		24.59	-49.42	44706.68	18.62		
beta	E	2033-11-22T21:04:34.204		24.75	-49.57	45641.06	18.63		
eta	E	2033-11-22T21:05:56.436		25.00	-49.80	47176.12	18.67		
gamma	E	2033-11-22T21:06:20.645		25.07	-49.87	47628.15	18.68		
delta	E	2033-11-22T21:06:56.624		25.18	-49.97	48300.35	18.69		
lambda	E	2033-11-22T21:08:28.914		25.46	-50.24	50026.71	18.72		
epsilon	E	2033-11-22T21:09:48.051		25.70	-50.46	51509.25	18.73		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-11-22T20:19:04.620
 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 : 3377582111442263040
 2Mass ID (if available) : 06211868+2336517
 ICRS Star Coord at Epoch: 06h 21m 18.69940s +23:36:51.42723s
 RUWE (>1.4 is poor) : 1.08
 K magnitude : 11.281
 G magnitude : 12.774
 RP magnitude : 12.249
 BP magnitude : 13.068
 DUPflag : 0
 Distance (au) : 18.137
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.17
 Sun-Target sep (deg) : 145.50
 Sun-Moon sep (deg) : 154.58
 B (ring opening deg) : 71.05
 PA of pole (deg) : 66.82
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.578
 C/A sky separation (km) : 7605.6
 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



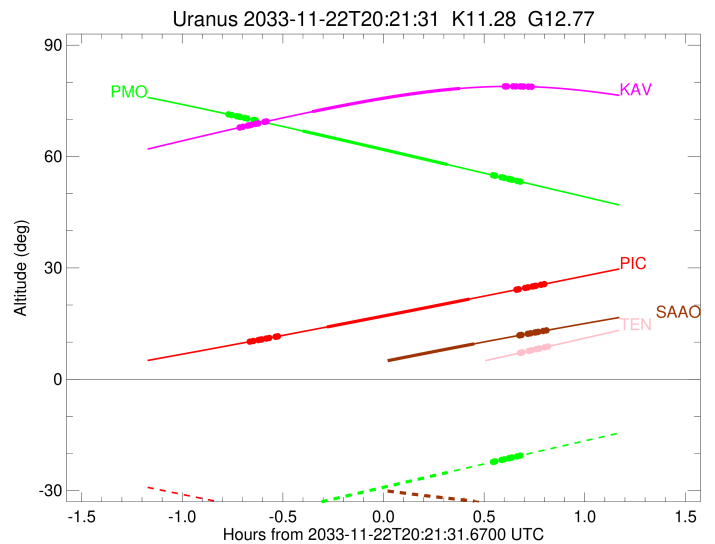
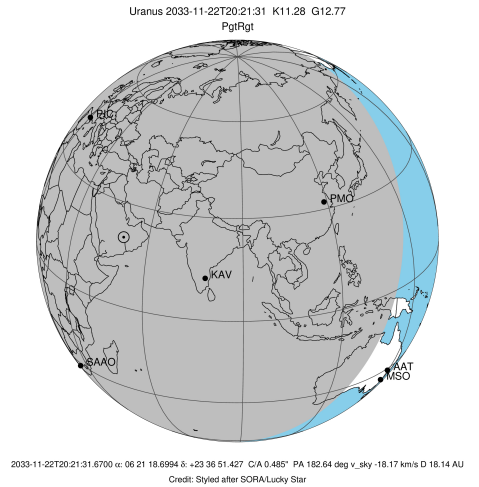
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-11-22T19:35:41.545	71.28	-38.80	50747.38	-19.17			
lambda	I	2033-11-22T19:36:19.145	71.16	-38.67	50026.71	-19.16			
delta	I	2033-11-22T19:37:49.274	70.86	-38.35	48300.35	-19.15			
gamma	I	2033-11-22T19:38:24.674	70.74	-38.22	47622.74	-19.14			
eta	I	2033-11-22T19:38:48.014	70.66	-38.14	47176.12	-19.13			
beta	I	2033-11-22T19:40:06.191	70.40	-37.87	45679.99	-19.11			
alpha	I	2033-11-22T19:40:55.518	70.24	-37.69	44741.51	-19.11			
4	I	2033-11-22T19:42:49.779	69.85	-37.29	42555.77	-19.07			
5	I	2033-11-22T19:43:08.716	69.79	-37.22	42188.90	-19.06			
6	I	2033-11-22T19:43:25.201	69.74	-37.16	41877.25	-19.06			
Uranus	I	2033-11-22T19:57:22.795	66.89	-34.21	25275.40	-13.73		-14.35	
Uranus	E	2033-11-22T20:40:34.401	57.85	-25.11	25044.85	18.77		19.59	
6	E	2033-11-22T20:54:09.014	54.97	-22.27	41805.19	19.01			
5	E	2033-11-22T20:54:32.844	54.89	-22.19	42254.07	19.01			
4	E	2033-11-22T20:54:51.069	54.82	-22.13	42600.91	19.02			
alpha	E	2033-11-22T20:56:41.161	54.43	-21.74	44705.41	19.05			
beta	E	2033-11-22T20:57:30.539	54.26	-21.57	45641.06	19.06			
eta	E	2033-11-22T20:58:50.966	53.97	-21.29	47176.12	19.08			
gamma	E	2033-11-22T20:59:14.666	53.89	-21.21	47628.33	19.08			
delta	E	2033-11-22T20:59:49.876	53.76	-21.09	48300.35	19.09			
lambda	E	2033-11-22T21:01:20.271	53.44	-20.78	50026.71	19.11			
epsilon	E	2033-11-22T21:02:38.162	53.17	-20.51	51515.34	19.11			

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-11-22T20:26:45.780
 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 : 3377582111442263040
 2Mass ID (if available) : 06211868+2336517
 ICRS Star Coord at Epoch: 06h 21m 18.69940s +23:36:51.42723s
 RUWE (>1.4 is poor) : 1.08
 K magnitude : 11.281
 G magnitude : 12.774
 RP magnitude : 12.249
 BP magnitude : 13.068
 DUPflag : 0
 Distance (au) : 18.137
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.17
 Sun-Target sep (deg) : 145.50
 Sun-Moon sep (deg) : 153.22
 B (ring opening deg) : 71.05
 PA of pole (deg) : 66.82
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.705
 C/A sky separation (km) : 9270.7
 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_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	2033-11-22T19:42:22.734	-8.52x	-20.07	50745.23	-18.50			
lambda	I	2033-11-22T19:43:01.580	-8.40x	-20.21	50026.71	-18.49			
delta	I	2033-11-22T19:44:34.988	-8.11x	-20.55	48300.35	-18.47			
gamma	I	2033-11-22T19:45:11.694	-7.99x	-20.68	47622.55	-18.46			
eta	I	2033-11-22T19:45:35.880	-7.92x	-20.77	47176.12	-18.45			
beta	I	2033-11-22T19:46:56.963	-7.66x	-21.06	45679.61	-18.43			
alpha	I	2033-11-22T19:47:48.021	-7.50x	-21.24	44742.76	-18.42			
4	I	2033-11-22T19:49:46.547	-7.13x	-21.67	42558.07	-18.38			
5	I	2033-11-22T19:50:06.485	-7.07x	-21.74	42185.44	-18.36			
6	I	2033-11-22T19:50:23.356	-7.02x	-21.80	41877.97	-18.36			
Uranus	I	2033-11-22T20:05:01.342	-4.23x	-24.96	25318.85	-12.60		-13.17	
Uranus	E	2033-11-22T20:48:10.512	4.26x	-34.37	25038.71	18.89		19.71	
6	E	2033-11-22T21:02:12.367	7.10	-37.44	41805.97	18.50			
5	E	2033-11-22T21:02:36.699	7.18	-37.53	42251.97	18.50			
4	E	2033-11-22T21:02:55.607	7.25	-37.60	42601.80	18.52			
alpha	E	2033-11-22T21:04:48.594	7.63	-38.02	44706.17	18.57			
beta	E	2033-11-22T21:05:39.202	7.80	-38.20	45641.06	18.59			
eta	E	2033-11-22T21:07:01.648	8.08	-38.50	47176.12	18.62			
gamma	E	2033-11-22T21:07:25.926	8.17	-38.59	47628.22	18.63			
delta	E	2033-11-22T21:08:02.001	8.29	-38.72	48300.35	18.64			
lambda	E	2033-11-22T21:09:34.558	8.61	-39.06	50026.71	18.67			
epsilon	E	2033-11-22T21:10:54.077	8.88	-39.35	51511.90	18.68			

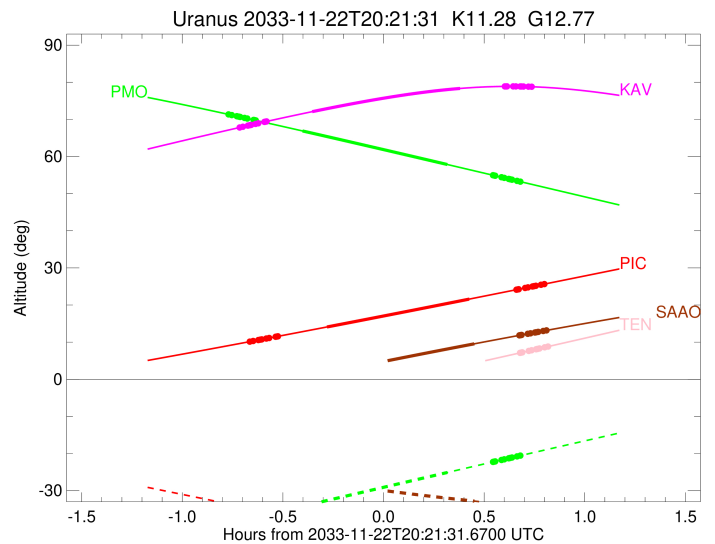
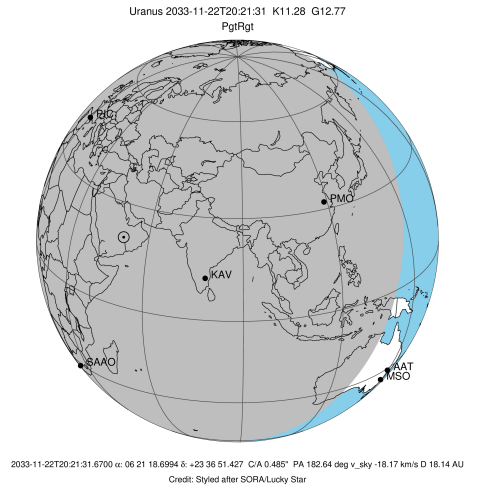
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-11-22T20:22:23.660
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KAV
 Location : Kavalur Observatory
 Latitude (deg) : 12.57556
 E. Longitude (deg) : 78.83167
 Altitude (km) : 0.722
 Gaia source ID : 3377582111442263040
 2Mass ID (if available) : 06211868+2336517
 ICRS Star Coord at Epoch: 06h 21m 18.69940s +23:36:51.42723s
 RUWE (>1.4 is poor) : 1.08
 K magnitude : 11.281
 G magnitude : 12.774
 RP magnitude : 12.249
 BP magnitude : 13.068
 DUPflag : 0
 Distance (au) : 18.137
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -18.17
 Sun-Target sep (deg) : 145.50
 Sun-Moon sep (deg) : 154.09
 B (ring opening deg) : 71.05
 PA of pole (deg) : 66.82
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.382
 C/A sky separation (km) : 5021.7
 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	2033-11-22T19:39:00.497		67.90	-71.92	50750.37	-19.35		
lambda	I	2033-11-22T19:39:37.891		68.03	-71.78	50026.71	-19.35		
delta	I	2033-11-22T19:41:07.119		68.33	-71.46	48300.35	-19.34		
gamma	I	2033-11-22T19:41:42.139		68.45	-71.33	47622.94	-19.34		
eta	I	2033-11-22T19:42:05.242		68.53	-71.25	47176.12	-19.34		
beta	I	2033-11-22T19:43:22.538		68.79	-70.97	45680.33	-19.33		
alpha	I	2033-11-22T19:44:11.398		68.96	-70.79	44740.14	-19.33		
4	I	2033-11-22T19:46:04.283		69.34	-70.38	42553.39	-19.32		
5	I	2033-11-22T19:46:22.688		69.40	-70.31	42192.72	-19.31		
6	I	2033-11-22T19:46:39.218		69.45	-70.25	41876.36	-19.31		
Uranus	I	2033-11-22T20:00:15.672		72.09	-67.22	25224.37		-14.96	-15.63
Uranus	E	2033-11-22T20:44:22.223		78.34	-57.13	25066.27		18.34	19.15
6	E	2033-11-22T20:57:40.007		78.89	-54.04	41803.37	19.35		
5	E	2033-11-22T20:58:03.772		78.90	-53.94	42259.29	19.35		
4	E	2033-11-22T20:58:21.226		78.90	-53.88	42598.54	19.36		
alpha	E	2033-11-22T21:00:09.516		78.90	-53.46	44703.44	19.37		
beta	E	2033-11-22T21:00:58.185		78.89	-53.27	45641.11	19.37		
eta	E	2033-11-22T21:02:17.328		78.88	-52.96	47176.12	19.38		
gamma	E	2033-11-22T21:02:40.671		78.87	-52.87	47628.62	19.39		
delta	E	2033-11-22T21:03:15.319		78.86	-52.73	48300.35	19.39		
lambda	E	2033-11-22T21:04:44.339		78.83	-52.39	50026.71	19.40		
epsilon	E	2033-11-22T21:06:01.552		78.79	-52.09	51524.66	19.40		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-11-22T20:25:53.340
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       : 3377582111442263040
2Mass ID (if available) : 06211868+2336517
ICRS Star Coord at Epoch: 06h 21m 18.69940s +23:36:51.42723s
RUWE (>1.4 is poor) : 1.08
K magnitude           : 11.281
G magnitude           : 12.774
RP magnitude          : 12.249
BP magnitude          : 13.068
DUPflag              : 0
Distance (au)        : 18.137
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -18.17
Sun-Target sep (deg) : 145.50
Sun-Moon sep (deg)   : 153.18
B (ring opening deg) : 71.05
PA of pole (deg)     : 66.82
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.156
C/A sky separation (km) : 2048.4
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_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	2033-11-22T19:41:40.578	-2.61x	-24.83	50754.84	-19.08			
lambda	I	2033-11-22T19:42:18.743	-2.49x	-24.92	50026.71	-19.08			
delta	I	2033-11-22T19:43:49.225	-2.20x	-25.13	48300.35	-19.08			
gamma	I	2033-11-22T19:44:24.715	-2.09x	-25.21	47623.18	-19.08			
eta	I	2033-11-22T19:44:48.145	-2.02x	-25.26	47176.12	-19.08			
beta	I	2033-11-22T19:46:06.455	-1.77x	-25.45	45680.65	-19.08			
alpha	I	2033-11-22T19:46:56.068	-1.61x	-25.56	44738.50	-19.08			
4	I	2033-11-22T19:48:50.384	-1.25x	-25.82	42550.74	-19.08			
5	I	2033-11-22T19:49:08.683	-1.20x	-25.87	42197.24	-19.08			
6	I	2033-11-22T19:49:25.726	-1.14x	-25.90	41875.18	-19.08			
Uranus	I	2033-11-22T20:03:03.572	1.40x	-27.71	25170.57	-16.17		-16.90	
Uranus	E	2033-11-22T20:48:36.474	9.55	-32.82	25104.20	17.58		18.36	
6	E	2033-11-22T21:02:00.570	11.82	-34.00	41801.45	19.22			
5	E	2033-11-22T21:02:24.890	11.89	-34.04	42265.21	19.21			
4	E	2033-11-22T21:02:41.936	11.94	-34.06	42595.65	19.22			
alpha	E	2033-11-22T21:04:31.087	12.24	-34.21	44701.22	19.23			
beta	E	2033-11-22T21:05:20.233	12.38	-34.27	45641.27	19.23			
eta	E	2033-11-22T21:06:39.980	12.60	-34.38	47176.12	19.23			
gamma	E	2033-11-22T21:07:03.524	12.66	-34.41	47628.95	19.23			
delta	E	2033-11-22T21:07:38.429	12.76	-34.46	48300.35	19.24			
lambda	E	2033-11-22T21:09:08.168	13.01	-34.57	50026.71	19.24			
epsilon	E	2033-11-22T21:10:26.506	13.22	-34.67	51534.06	19.24			