

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-03-03T19:54:00.450
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 674544168824093824
 2Mass ID (if available) : 07460527+2145207

Uranus 2039-03-03T19:54:00 K14.99 G16.23 PgtRgt

ICRS Star Coord at Epoch: 07h 46m 05.26284s +21:45:20.65852s

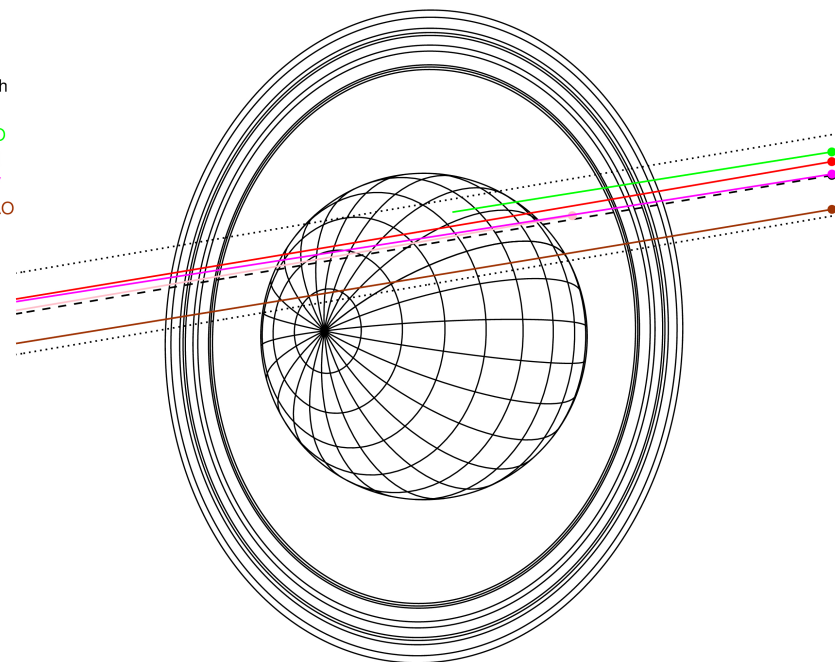
RUWE (>1.4 is poor) : 1.11
 K magnitude : 14.986
 G magnitude : 16.232
 RP magnitude : 15.791
 BP magnitude : 16.501
 DUPflag : 0
 Distance (au) : 17.960
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.40
 Sun-Target sep (deg) : 131.95
 Sun-Moon sep (deg) : 33.99
 B (ring opening deg) : 52.33
 PA of pole (deg) : 86.81

#	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



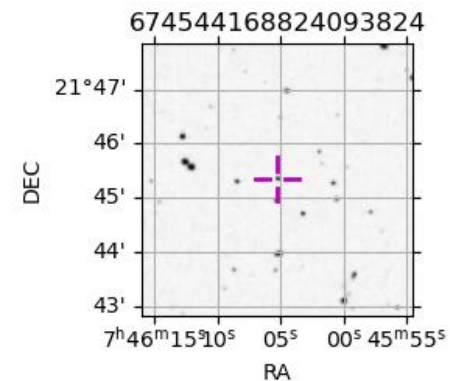
2039-03-03T19:54:00.4500 ra: 07 46 05.2628 s: +21 45 20.659 C/A 1.094 PA 189.64 deg v_sky -13.40 km/s D 17.96 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PIC
 PMO
 TEN
 KAV
 SAAO

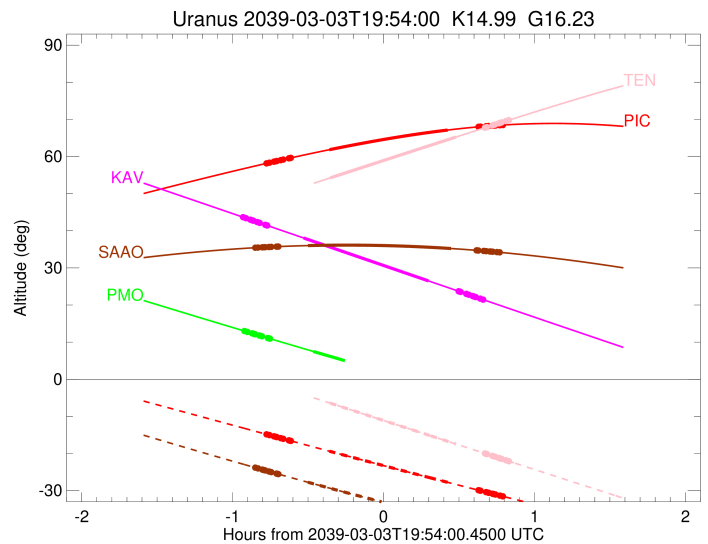
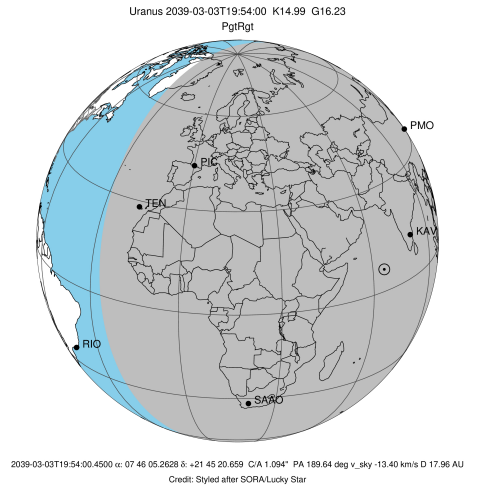


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++	+ +	+++++	MAR 03 19:07 - MAR 03 20:41	PieRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+		MAR 03 18:58 - MAR 03 19:26	PinRin
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		+ +	+++++	MAR 03 19:32 - MAR 03 20:43	PieRne
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++	+ +	+++++	MAR 03 18:58 - MAR 03 20:33	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	+++++	+ +	+++++	MAR 03 19:02 - MAR 03 20:39	PieRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn

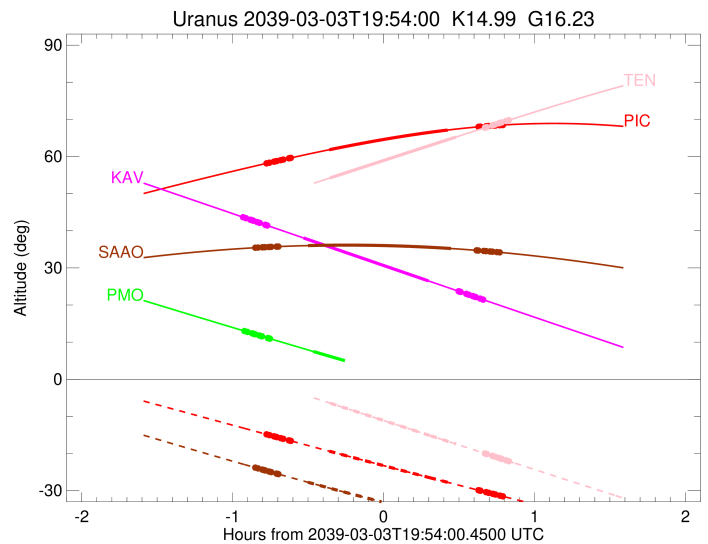
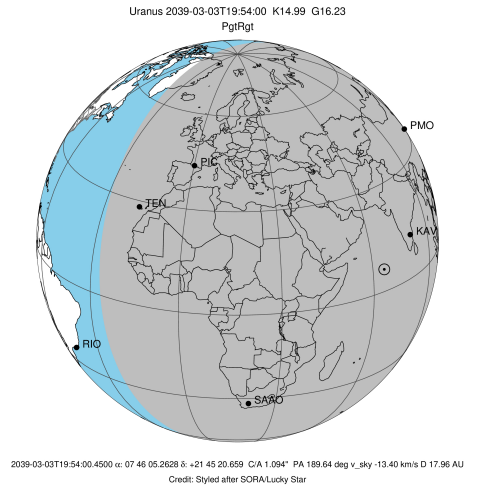


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-03-03T19:56:06.250
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 674544168824093824
 2Mass ID (if available) : 07460527+2145207
 ICRS Star Coord at Epoch: 07h 46m 05.26284s +21:45:20.65852s
 RUWE (>1.4 is poor) : 1.11
 K magnitude : 14.986
 G magnitude : 16.232
 RP magnitude : 15.791
 BP magnitude : 16.501
 DUPflag : 0
 Distance (au) : 17.960
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.40
 Sun-Target sep (deg) : 131.95
 Sun-Moon sep (deg) : 34.25
 B (ring opening deg) : 52.33
 PA of pole (deg) : 86.81
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.250
 C/A sky separation (km) : 16288.1
 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_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



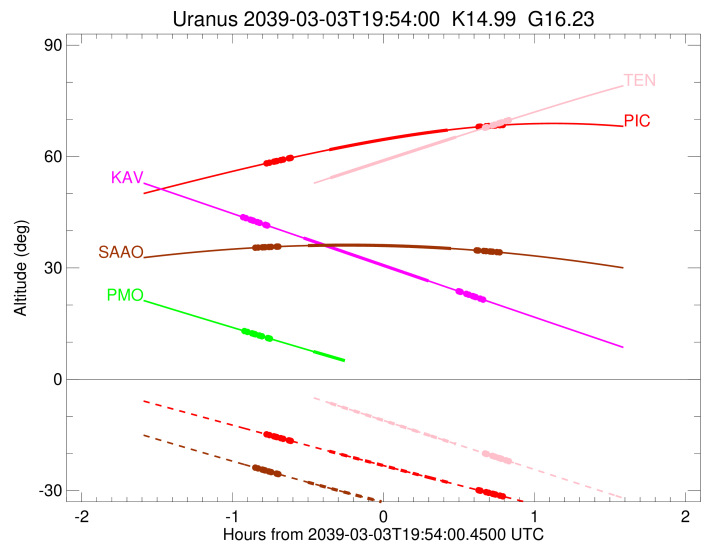
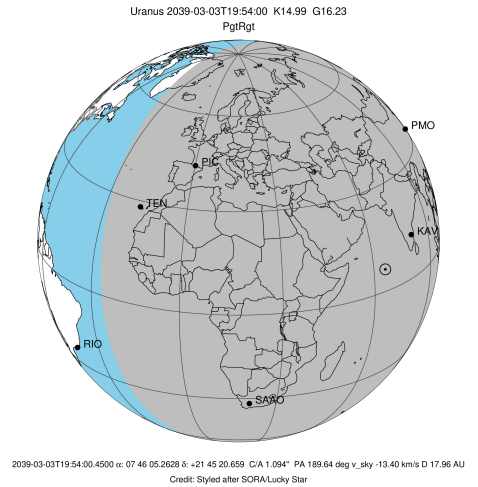
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-03-03T19:07:24.420		58.14	-14.82	51260.28	-16.22		
lambda	I	2039-03-03T19:08:40.395		58.34	-15.05	50026.71	-16.21		
delta	I	2039-03-03T19:10:27.104		58.61	-15.37	48300.35	-16.14		
gamma	I	2039-03-03T19:11:08.574		58.72	-15.50	47631.54	-16.11		
eta	I	2039-03-03T19:11:36.859		58.79	-15.58	47176.12	-16.09		
beta	I	2039-03-03T19:13:10.807		59.03	-15.87	45665.53	-16.01		
alpha	I	2039-03-03T19:14:09.655		59.18	-16.05	44728.78	-15.96		
4	I	2039-03-03T19:16:23.269		59.52	-16.46	42590.29	-15.84		
5	I	2039-03-03T19:16:41.196		59.56	-16.51	42305.63	-15.80		
6	I	2039-03-03T19:17:12.127		59.64	-16.60	41852.08	-15.79		
Uranus	I	2039-03-03T19:32:24.735		61.83	-19.37	25422.41		-21.78	-22.71
Uranus	E	2039-03-03T20:19:33.115		67.14	-27.77	25269.63		32.85	34.06
6	E	2039-03-03T20:31:41.277		67.99	-29.87	41798.11	15.80		
5	E	2039-03-03T20:32:08.059		68.02	-29.95	42158.63	15.81		
4	E	2039-03-03T20:32:34.382		68.05	-30.02	42587.26	15.85		
alpha	E	2039-03-03T20:34:45.631		68.17	-30.40	44688.86	15.97		
beta	E	2039-03-03T20:35:45.160		68.22	-30.57	45644.67	16.02		
eta	E	2039-03-03T20:37:20.439		68.30	-30.84	47176.12	16.10		
gamma	E	2039-03-03T20:37:48.106		68.32	-30.92	47621.86	16.12		
delta	E	2039-03-03T20:38:30.151		68.36	-31.04	48300.35	16.15		
lambda	E	2039-03-03T20:40:16.791		68.44	-31.34	50026.71	16.22		
epsilon	E	2039-03-03T20:41:05.620		68.47	-31.48	50819.66	16.23		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-03-03T19:47:59.900
 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 : 674544168824093824
 2Mass ID (if available) : 07460527+2145207
 ICRS Star Coord at Epoch: 07h 46m 05.26284s +21:45:20.65852s
 RUWE (>1.4 is poor) : 1.11
 K magnitude : 14.986
 G magnitude : 16.232
 RP magnitude : 15.791
 BP magnitude : 16.501
 DUPflag : 0
 Distance (au) : 17.960
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.40
 Sun-Target sep (deg) : 131.95
 Sun-Moon sep (deg) : 34.56
 B (ring opening deg) : 52.33
 PA of pole (deg) : 86.81
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.422
 C/A sky separation (km) : 18529.2
 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_itrff93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



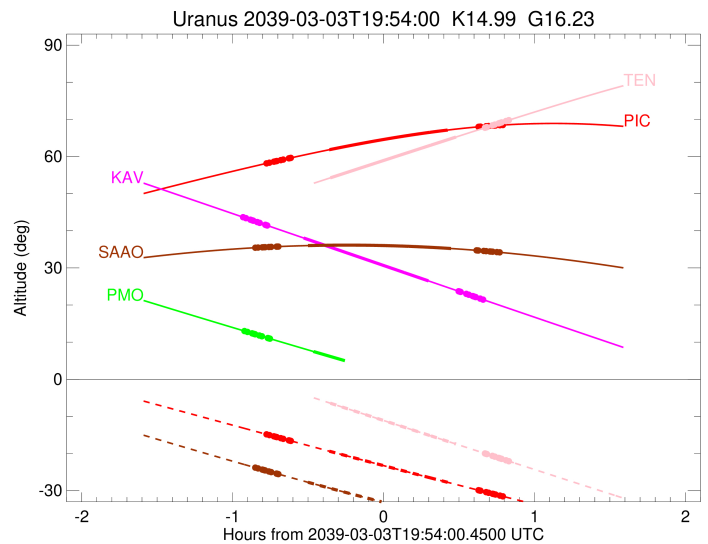
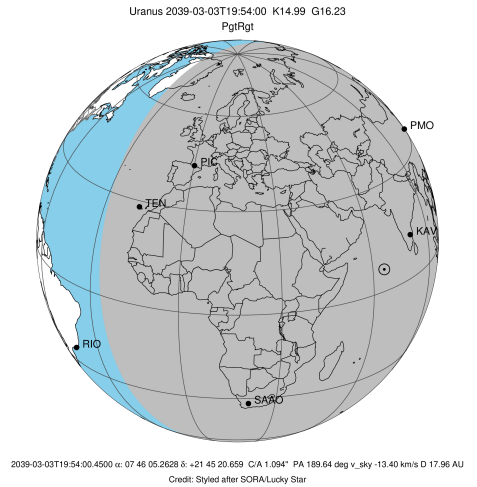
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-03-03T18:58:39.013		13.01	-44.60	51244.95	-15.58		
lambda	I	2039-03-03T18:59:57.121		12.74	-44.35	50026.71	-15.57		
delta	I	2039-03-03T19:01:48.374		12.37	-43.99	48300.35	-15.47		
gamma	I	2039-03-03T19:02:31.669		12.22	-43.85	47631.51	-15.43		
eta	I	2039-03-03T19:03:01.213		12.12	-43.76	47176.12	-15.40		
beta	I	2039-03-03T19:04:39.534		11.79	-43.44	45664.63	-15.29		
alpha	I	2039-03-03T19:05:41.243		11.58	-43.24	44727.24	-15.23		
4	I	2039-03-03T19:08:01.337		11.11	-42.78	42592.34	-15.06		
5	I	2039-03-03T19:08:20.513		11.05	-42.72	42303.60	-15.02		
6	I	2039-03-03T19:08:52.859		10.94	-42.62	41849.99	-15.00		
Uranus	I	2039-03-03T19:26:09.450		7.48	-39.19	25460.24		-18.37	-19.18
Uranus	E	2039-03-03T20:09:38.036		-1.00x	-30.30	25310.57		30.13	31.29
6	E	2039-03-03T20:23:34.986		-3.63x	-27.39	41797.13	14.83		
5	E	2039-03-03T20:24:03.633		-3.72x	-27.29	42160.35	14.85		
4	E	2039-03-03T20:24:31.694		-3.81x	-27.19	42589.91	14.89		
alpha	E	2039-03-03T20:26:51.022		-4.24x	-26.70	44687.92	15.04		
beta	E	2039-03-03T20:27:54.170		-4.44x	-26.48	45644.02	15.11		
eta	E	2039-03-03T20:29:35.206		-4.75x	-26.13	47176.12	15.20		
gamma	E	2039-03-03T20:30:04.513		-4.84x	-26.02	47622.03	15.23		
delta	E	2039-03-03T20:30:49.002		-4.98x	-25.87	48300.35	15.27		
lambda	E	2039-03-03T20:32:41.765		-5.33x	-25.47	50026.71	15.35		
epsilon	E	2039-03-03T20:33:32.581		-5.48x	-25.30	50807.78	15.36		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-03-03T19:57:58.450
 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 : 674544168824093824
 2Mass ID (if available) : 07460527+2145207
 ICRS Star Coord at Epoch: 07h 46m 05.26284s +21:45:20.65852s
 RUWE (>1.4 is poor) : 1.11
 K magnitude : 14.986
 G magnitude : 16.232
 RP magnitude : 15.791
 BP magnitude : 16.501
 DUPflag : 0
 Distance (au) : 17.960
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.40
 Sun-Target sep (deg) : 131.95
 Sun-Moon sep (deg) : 34.04
 B (ring opening deg) : 52.33
 PA of pole (deg) : 86.81
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.128
 C/A sky separation (km) : 14699.1
 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_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	2039-03-03T19:08:56.309		48.97	-1.20x	51272.06	-16.39		
lambda	I	2039-03-03T19:10:12.212		49.25	-1.47x	50026.71	-16.39		
delta	I	2039-03-03T19:11:57.730		49.64	-1.86x	48300.35	-16.33		
gamma	I	2039-03-03T19:12:38.708		49.79	-2.01x	47631.56	-16.31		
eta	I	2039-03-03T19:13:06.648		49.89	-2.11x	47176.12	-16.29		
beta	I	2039-03-03T19:14:39.349		50.23	-2.45x	45666.21	-16.23		
alpha	I	2039-03-03T19:15:37.348		50.45	-2.66x	44729.92	-16.19		
4	I	2039-03-03T19:17:49.116		50.93	-3.14x	42588.72	-16.09		
5	I	2039-03-03T19:18:06.537		51.00	-3.20x	42307.04	-16.06		
6	I	2039-03-03T19:18:37.109		51.11	-3.32x	41853.61	-16.06		
Uranus	I	2039-03-03T19:32:52.344		54.26	-6.45	25395.43		-23.97	-24.97
Uranus	E	2039-03-03T20:22:49.710		65.25	-17.45	25246.98		34.31	35.55
6	E	2039-03-03T20:34:14.460		67.74	-19.96	41798.87	16.12		
5	E	2039-03-03T20:34:40.639		67.83	-20.06	42157.65	16.12		
4	E	2039-03-03T20:35:06.433		67.92	-20.15	42585.44	16.15		
alpha	E	2039-03-03T20:37:15.446		68.39	-20.62	44689.54	16.25		
beta	E	2039-03-03T20:38:13.980		68.60	-20.84	45645.14	16.29		
eta	E	2039-03-03T20:39:47.685		68.93	-21.18	47176.12	16.36		
gamma	E	2039-03-03T20:40:14.914		69.03	-21.28	47621.75	16.38		
delta	E	2039-03-03T20:40:56.323		69.18	-21.43	48300.35	16.40		
lambda	E	2039-03-03T20:42:41.397		69.56	-21.82	50026.71	16.46		
epsilon	E	2039-03-03T20:43:30.054		69.73	-22.00	50828.18	16.46		

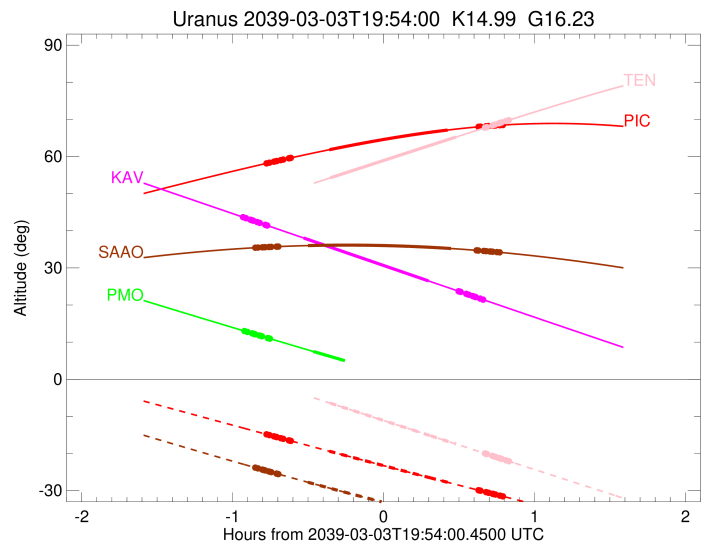
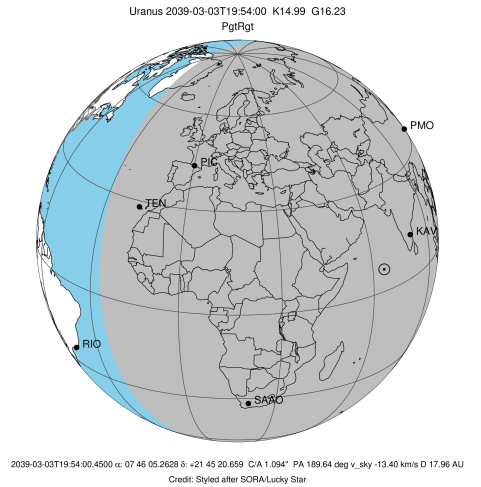
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-03-03T19:47:10.460
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KAV
 Location : Kavalur Observatory
 Latitude (deg) : 12.57556
 E. Longitude (deg) : 78.83167
 Altitude (km) : 0.722
 Gaia source ID : 674544168824093824
 2Mass ID (if available) : 07460527+2145207
 ICRS Star Coord at Epoch: 07h 46m 05.26284s +21:45:20.65852s
 RUWE (>1.4 is poor) : 1.11
 K magnitude : 14.986
 G magnitude : 16.232
 RP magnitude : 15.791
 BP magnitude : 16.501
 DUPflag : 0
 Distance (au) : 17.960
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -13.40
 Sun-Target sep (deg) : 131.95
 Sun-Moon sep (deg) : 34.88
 B (ring opening deg) : 52.33
 PA of pole (deg) : 86.81
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.170
 C/A sky separation (km) : 15241.1
 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_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	2039-03-03T18:58:04.808		43.69	-84.15	51272.79	-16.33		
lambda	I	2039-03-03T18:59:21.050		43.39	-84.12	50026.71	-16.32		
delta	I	2039-03-03T19:01:07.033		42.98	-84.05	48300.35	-16.26		
gamma	I	2039-03-03T19:01:48.210		42.82	-84.02	47631.56	-16.23		
eta	I	2039-03-03T19:02:16.292		42.71	-83.99	47176.12	-16.21		
beta	I	2039-03-03T19:03:49.500		42.35	-83.89	45666.22	-16.14		
alpha	I	2039-03-03T19:04:47.847		42.12	-83.81	44729.92	-16.09		
4	I	2039-03-03T19:07:00.491		41.61	-83.61	42588.76	-15.98		
5	I	2039-03-03T19:07:18.044		41.54	-83.58	42307.00	-15.95		
6	I	2039-03-03T19:07:48.842		41.42	-83.53	41853.56	-15.92		
Uranus	I	2039-03-03T19:22:19.369		38.04	-81.36	25399.37		-23.66	-24.65
Uranus	E	2039-03-03T20:11:54.067		26.50	-70.51	25257.82		33.61	34.84
6	E	2039-03-03T20:23:46.788		23.74	-67.70	41798.44	15.76		
5	E	2039-03-03T20:24:13.611		23.63	-67.60	42158.19	15.76		
4	E	2039-03-03T20:24:40.007		23.53	-67.49	42586.48	15.79		
alpha	E	2039-03-03T20:26:51.852		23.02	-66.97	44689.14	15.89		
beta	E	2039-03-03T20:27:51.694		22.79	-66.73	45644.86	15.94		
eta	E	2039-03-03T20:29:27.523		22.42	-66.35	47176.12	16.00		
gamma	E	2039-03-03T20:29:55.367		22.31	-66.24	47621.82	16.02		
delta	E	2039-03-03T20:30:37.702		22.15	-66.07	48300.35	16.04		
lambda	E	2039-03-03T20:32:25.138		21.73	-65.64	50026.71	16.10		
epsilon	E	2039-03-03T20:33:14.561		21.54	-65.45	50822.86	16.10		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch              : 2039-03-03T19:52:28.240
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        : 674544168824093824
2Mass ID (if available) : 07460527+2145207
ICRS Star Coord at Epoch: 07h 46m 05.26284s +21:45:20.65852s
RUWE (>1.4 is poor)  : 1.11
K magnitude           : 14.986
G magnitude           : 16.232
RP magnitude          : 15.791
BP magnitude          : 16.501
DUPflag              : 0
Distance (au)         : 17.960
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -13.40
Sun-Target sep (deg)  : 131.95
Sun-Moon sep (deg)    : 34.43
B (ring opening deg)  : 52.33
PA of pole (deg)      : 86.81
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.704
C/A sky separation (km) : 9171.3
NAIF SPICE kernels    : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall11.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	2039-03-03T19:02:53.772		35.43	-23.78	51316.90	-16.97		
lambda	I	2039-03-03T19:04:09.747		35.48	-24.02	50026.71	-16.97		
delta	I	2039-03-03T19:05:51.520		35.54	-24.34	48300.35	-16.95		
gamma	I	2039-03-03T19:06:30.983		35.56	-24.47	47631.57	-16.94		
eta	I	2039-03-03T19:06:57.872		35.58	-24.55	47176.12	-16.94		
beta	I	2039-03-03T19:08:26.809		35.63	-24.84	45668.74	-16.91		
alpha	I	2039-03-03T19:09:22.273		35.66	-25.01	44734.13	-16.89		
4	I	2039-03-03T19:11:28.859		35.72	-25.41	42582.61	-16.85		
5	I	2039-03-03T19:11:44.734		35.73	-25.46	42311.36	-16.84		
6	I	2039-03-03T19:12:14.338		35.75	-25.55	41859.11	-16.85		
Uranus	I	2039-03-03T19:23:58.456		36.01	-27.75	25304.90		-30.52	-31.68
Uranus	E	2039-03-03T20:20:51.683		35.22	-37.62	25201.91		37.14	38.42
6	E	2039-03-03T20:30:54.063		34.73	-39.19	41801.66	16.81		
5	E	2039-03-03T20:31:18.855		34.71	-39.25	42155.54	16.80		
4	E	2039-03-03T20:31:43.481		34.69	-39.31	42579.67	16.81		
alpha	E	2039-03-03T20:33:48.077		34.57	-39.63	44691.95	16.85		
beta	E	2039-03-03T20:34:44.616		34.52	-39.77	45646.73	16.86		
eta	E	2039-03-03T20:36:15.150		34.43	-40.00	47176.12	16.89		
gamma	E	2039-03-03T20:36:41.515		34.41	-40.07	47621.46	16.89		
delta	E	2039-03-03T20:37:21.689		34.37	-40.17	48300.35	16.90		
lambda	E	2039-03-03T20:39:03.757		34.26	-40.42	50026.71	16.92		
epsilon	E	2039-03-03T20:39:52.779		34.21	-40.54	50856.59	16.92		