

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2038-01-02T19:37:46.680
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 865677841359417216
 2Mass ID (if available) : 07353039+2207416

Uranus 2038-01-02T19:37:46 K7.86 G10.30 PgtRgt

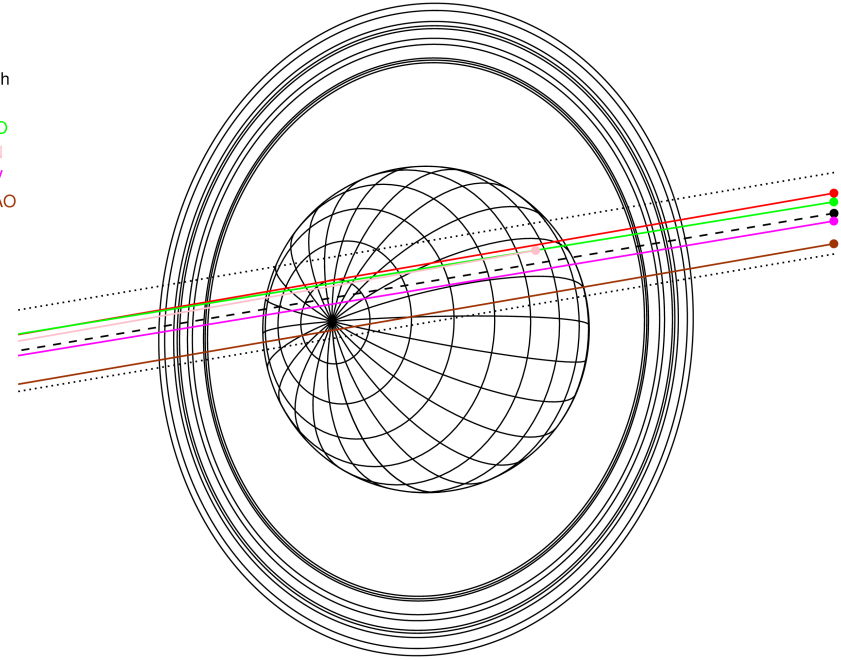
ICRS Star Coord at Epoch: 07h 35m 30.42470s +22:07:41.38366s

RUWE (>1.4 is poor) : 1.28
 K magnitude : 7.855
 G magnitude : 10.298
 RP magnitude : 9.565
 BP magnitude : 10.894
 DUPflag : 0
 Distance (au) : 17.736
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.84
 Sun-Target sep (deg) : 169.95
 Sun-Moon sep (deg) : 135.18
 B (ring opening deg) : 54.75
 PA of pole (deg) : 85.08



2038-01-02T19:37:46.6800 ra: 07 35 30.4247 s: +22 07 41.384 C/A 0.579° PA 189.56 deg v_sky -22.84 km/s D 17.74 AU
 Credit: Styled after SORA/Lucky Star

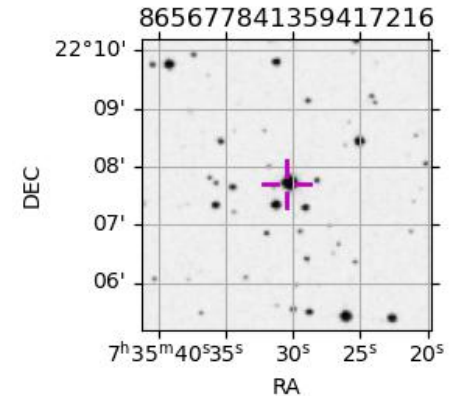
Earth
 PIC
 PMO
 TEN
 KAV
 SAAO



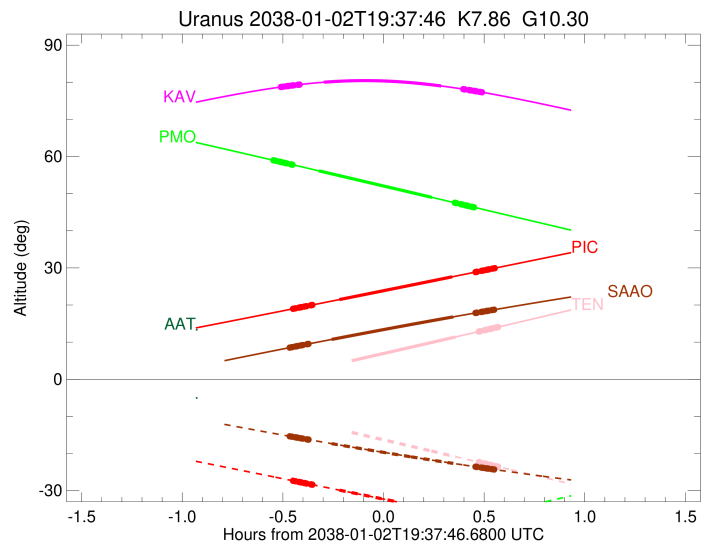
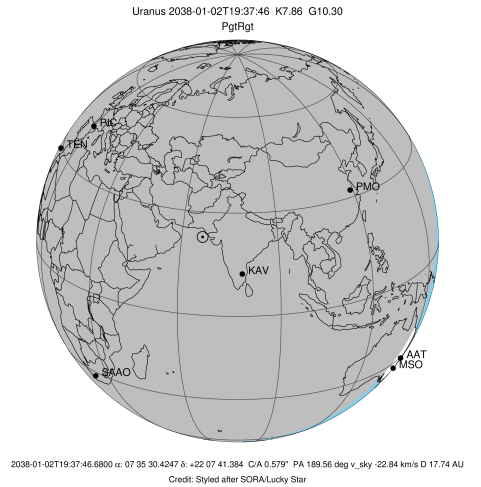
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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	+++++	+ +	+++++	JAN 02 19:10 - JAN 02 20:10	PieRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8	+++++	+ +	+++++	JAN 02 19:04 - JAN 02 20:04	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		+	+++++	JAN 02 19:59 - JAN 02 20:11	PneRne
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++	+ +	+++++	JAN 02 19:07 - JAN 02 20:07	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					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+++++	+ +	+++++	JAN 02 19:09 - JAN 02 20:10	PieRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn

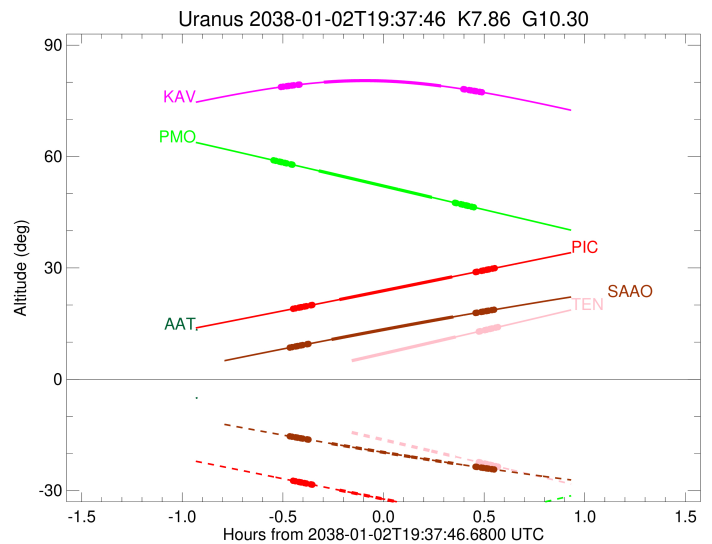
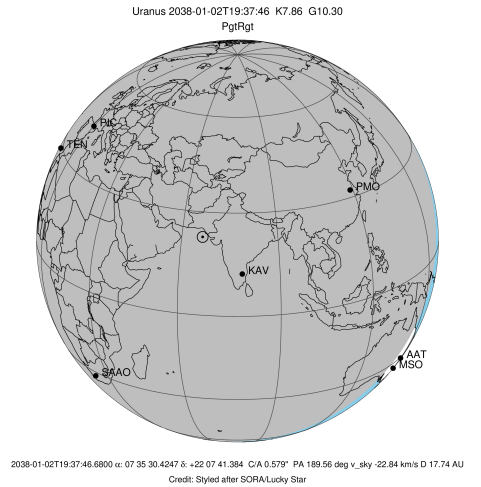


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2038-01-02T19:41:31.660
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 865677841359417216
 2Mass ID (if available) : 07353039+2207416
 ICRS Star Coord at Epoch: 07h 35m 30.42470s +22:07:41.38366s
 RUWE (>1.4 is poor) : 1.28
 K magnitude : 7.855
 G magnitude : 10.298
 RP magnitude : 9.565
 BP magnitude : 10.894
 DUPflag : 0
 Distance (au) : 17.736
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.84
 Sun-Target sep (deg) : 169.95
 Sun-Moon sep (deg) : 134.93
 B (ring opening deg) : 54.75
 PA of pole (deg) : 85.08
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.785
 C/A sky separation (km) : 10100.9
 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



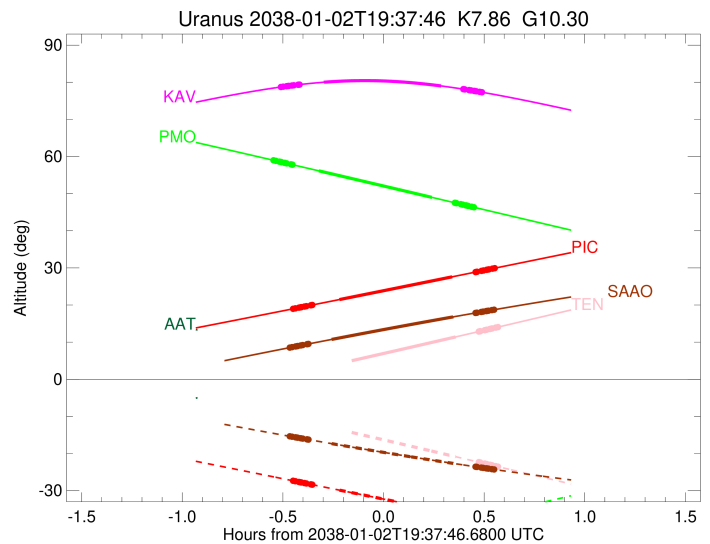
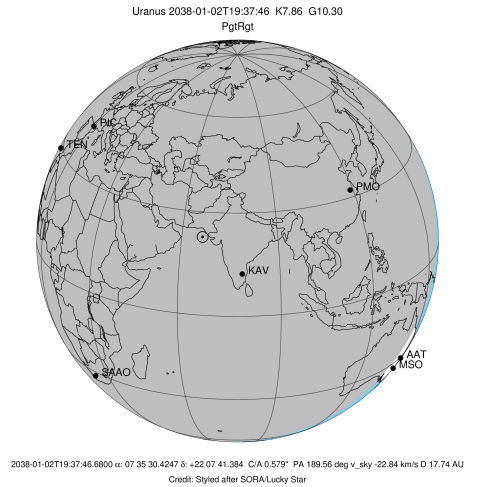
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2038-01-02T19:10:45.986		18.97	-27.33	51265.01	-27.21		
lambda	I	2038-01-02T19:11:31.593		19.11	-27.47	50026.71	-27.14		
delta	I	2038-01-02T19:12:35.255		19.30	-27.67	48300.35	-27.10		
gamma	I	2038-01-02T19:12:59.962		19.37	-27.74	47631.11	-27.08		
eta	I	2038-01-02T19:13:16.769		19.42	-27.79	47176.12	-27.07		
beta	I	2038-01-02T19:14:13.502		19.59	-27.97	45644.35	-27.02		
alpha	I	2038-01-02T19:14:47.703		19.69	-28.07	44720.73	-27.00		
4	I	2038-01-02T19:16:05.694		19.93	-28.31	42601.13	-26.91		
5	I	2038-01-02T19:16:18.156		19.97	-28.34	42254.46	-26.87		
6	I	2038-01-02T19:16:36.569		20.02	-28.40	41798.59	-26.89		
Uranus	I	2038-01-02T19:24:39.270		21.47	-29.87	25316.97		-26.94	-28.02
Uranus	E	2038-01-02T19:58:16.389		27.60	-36.03	25178.80		34.76	36.01
6	E	2038-01-02T20:05:13.949		28.88	-37.31	41862.81	26.97		
5	E	2038-01-02T20:05:26.698		28.92	-37.35	42181.01	26.96		
4	E	2038-01-02T20:05:40.399		28.96	-37.39	42560.70	27.00		
alpha	E	2038-01-02T20:06:59.859		29.20	-37.63	44731.61	27.09		
beta	E	2038-01-02T20:07:35.027		29.31	-37.74	45681.07	27.12		
eta	E	2038-01-02T20:08:30.210		29.48	-37.91	47176.12	27.16		
gamma	E	2038-01-02T20:08:46.583		29.53	-37.96	47620.96	27.18		
delta	E	2038-01-02T20:09:11.574		29.60	-38.04	48300.35	27.20		
lambda	E	2038-01-02T20:10:15.000		29.80	-38.23	50026.71	27.24		
epsilon	E	2038-01-02T20:10:57.662		29.93	-38.36	51189.48	27.31		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2038-01-02T19:35:23.330
 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 : 865677841359417216
 2Mass ID (if available) : 07353039+2207416
 ICRS Star Coord at Epoch: 07h 35m 30.42470s +22:07:41.38366s
 RUWE (>1.4 is poor) : 1.28
 K magnitude : 7.855
 G magnitude : 10.298
 RP magnitude : 9.565
 BP magnitude : 10.894
 DUPflag : 0
 Distance (au) : 17.736
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.84
 Sun-Target sep (deg) : 169.95
 Sun-Moon sep (deg) : 136.09
 B (ring opening deg) : 54.75
 PA of pole (deg) : 85.08
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.738
 C/A sky separation (km) : 9490.7
 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



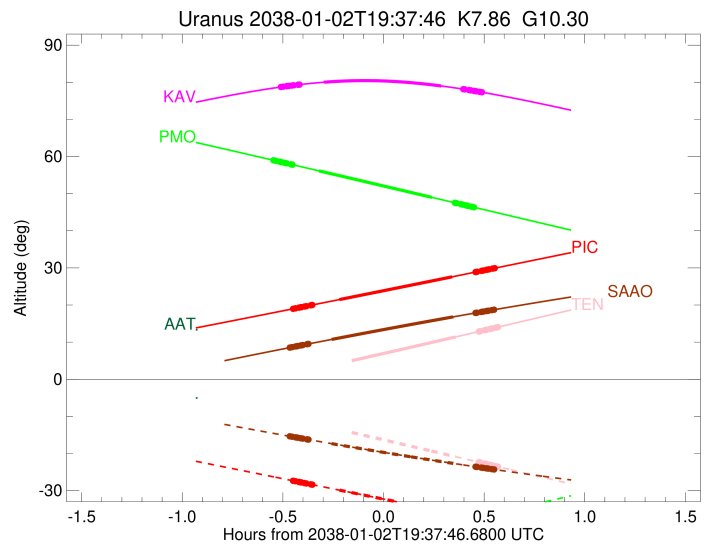
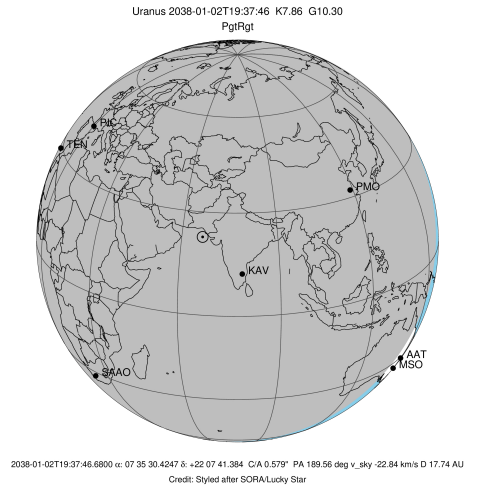
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2038-01-02T19:04:56.096		59.00	-50.15	51256.58	-27.60		
lambda	I	2038-01-02T19:05:40.742		58.84	-50.00	50026.71	-27.53		
delta	I	2038-01-02T19:06:43.487		58.62	-49.78	48300.35	-27.49		
gamma	I	2038-01-02T19:07:07.834		58.54	-49.69	47631.16	-27.48		
eta	I	2038-01-02T19:07:24.398		58.48	-49.63	47176.12	-27.47		
beta	I	2038-01-02T19:08:20.315		58.29	-49.43	45644.10	-27.43		
alpha	I	2038-01-02T19:08:54.041		58.17	-49.31	44719.94	-27.40		
4	I	2038-01-02T19:10:10.863		57.90	-49.04	42600.30	-27.32		
5	I	2038-01-02T19:10:23.036		57.86	-49.00	42256.35	-27.28		
6	I	2038-01-02T19:10:41.220		57.79	-48.93	41799.03	-27.30		
Uranus	I	2038-01-02T19:18:29.219		56.15	-47.28	25303.18		-27.77	-28.88
Uranus	E	2038-01-02T19:52:12.399		49.00	-40.13	25177.11		34.85	36.10
6	E	2038-01-02T19:59:04.401		47.54	-38.68	41863.03	27.23		
5	E	2038-01-02T19:59:17.044		47.50	-38.63	42181.39	27.22		
4	E	2038-01-02T19:59:30.589		47.45	-38.59	42560.43	27.25		
alpha	E	2038-01-02T20:00:49.328		47.17	-38.31	44731.44	27.33		
beta	E	2038-01-02T20:01:24.192		47.05	-38.19	45681.05	27.35		
eta	E	2038-01-02T20:02:18.905		46.85	-37.99	47176.12	27.39		
gamma	E	2038-01-02T20:02:35.142		46.79	-37.94	47620.96	27.40		
delta	E	2038-01-02T20:02:59.928		46.71	-37.85	48300.35	27.42		
lambda	E	2038-01-02T20:04:02.848		46.48	-37.63	50026.71	27.46		
epsilon	E	2038-01-02T20:04:45.130		46.33	-37.48	51188.11	27.52		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2038-01-02T19:42:13.190
 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 : 865677841359417216
 2Mass ID (if available) : 07353039+2207416
 ICRS Star Coord at Epoch: 07h 35m 30.42470s +22:07:41.38366s
 RUWE (>1.4 is poor) : 1.28
 K magnitude : 7.855
 G magnitude : 10.298
 RP magnitude : 9.565
 BP magnitude : 10.894
 DUPflag : 0
 Distance (au) : 17.736
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.84
 Sun-Target sep (deg) : 169.95
 Sun-Moon sep (deg) : 134.64
 B (ring opening deg) : 54.75
 PA of pole (deg) : 85.08
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.717
 C/A sky separation (km) : 9226.0
 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	2038-01-02T19:11:16.114		1.54x	-10.79	51258.81	-27.17		
lambda	I	2038-01-02T19:12:01.550		1.69x	-10.95	50026.71	-27.11		
delta	I	2038-01-02T19:13:05.278		1.91x	-11.16	48300.35	-27.07		
gamma	I	2038-01-02T19:13:30.004		1.99x	-11.25	47631.15	-27.06		
eta	I	2038-01-02T19:13:46.824		2.05x	-11.31	47176.12	-27.05		
beta	I	2038-01-02T19:14:43.595		2.24x	-11.50	45644.15	-27.01		
alpha	I	2038-01-02T19:15:17.827		2.35x	-11.62	44720.10	-26.99		
4	I	2038-01-02T19:16:35.802		2.62x	-11.89	42600.46	-26.92		
5	I	2038-01-02T19:16:48.174		2.66x	-11.93	42256.00	-26.89		
6	I	2038-01-02T19:17:06.618		2.72x	-12.00	41798.95	-26.90		
Uranus	I	2038-01-02T19:25:01.259		4.33x	-13.64	25303.85		-27.73	-28.83
Uranus	E	2038-01-02T19:59:17.630		11.41	-20.86	25174.76		34.98	36.22
6	E	2038-01-02T20:06:11.893		12.85	-22.33	41863.60	27.01		
5	E	2038-01-02T20:06:24.687		12.90	-22.37	42182.40	26.99		
4	E	2038-01-02T20:06:38.275		12.95	-22.42	42559.69	27.03		
alpha	E	2038-01-02T20:07:57.675		13.22	-22.70	44730.92	27.11		
beta	E	2038-01-02T20:08:32.840		13.35	-22.83	45681.01	27.13		
eta	E	2038-01-02T20:09:28.005		13.54	-23.02	47176.12	27.17		
gamma	E	2038-01-02T20:09:44.375		13.60	-23.08	47620.96	27.18		
delta	E	2038-01-02T20:10:09.363		13.68	-23.17	48300.35	27.20		
lambda	E	2038-01-02T20:11:12.794		13.91	-23.40	50026.71	27.24		
epsilon	E	2038-01-02T20:11:55.183		14.06	-23.55	51181.69	27.30		

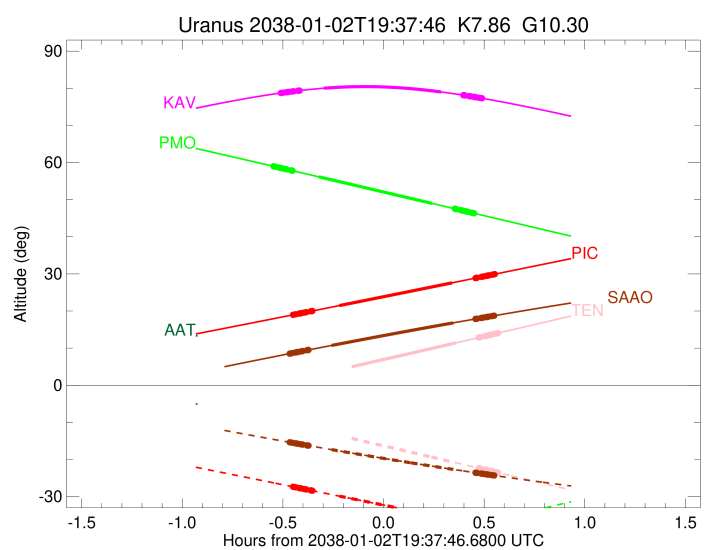
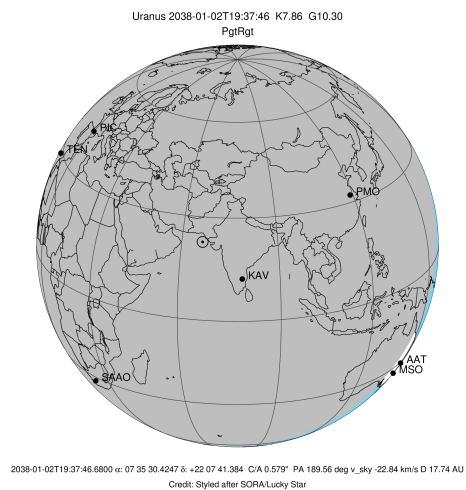
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2038-01-02T19:37:31.630
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KAV
 Location : Kavalur Observatory
 Latitude (deg) : 12.57556
 E. Longitude (deg) : 78.83167
 Altitude (km) : 0.722
 Gaia source ID : 865677841359417216
 2Mass ID (if available) : 07353039+2207416
 ICRS Star Coord at Epoch: 07h 35m 30.42470s +22:07:41.38366s
 RUWE (>1.4 is poor) : 1.28
 K magnitude : 7.855
 G magnitude : 10.298
 RP magnitude : 9.565
 BP magnitude : 10.894
 DUPflag : 0
 Distance (au) : 17.736
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.84
 Sun-Target sep (deg) : 169.95
 Sun-Moon sep (deg) : 135.87
 B (ring opening deg) : 54.75
 PA of pole (deg) : 85.08
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.491
 C/A sky separation (km) : 6313.0
 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	2038-01-02T19:07:09.585		78.73	-78.76	51232.55	-28.02		
lambda	I	2038-01-02T19:07:52.670		78.82	-78.70	50026.71	-27.98		
delta	I	2038-01-02T19:08:54.384		78.95	-78.60	48300.35	-27.96		
gamma	I	2038-01-02T19:09:18.313		78.99	-78.56	47631.28	-27.96		
eta	I	2038-01-02T19:09:34.595		79.03	-78.53	47176.12	-27.95		
beta	I	2038-01-02T19:10:29.540		79.13	-78.43	45643.41	-27.94		
alpha	I	2038-01-02T19:11:02.720		79.19	-78.38	44717.55	-27.93		
4	I	2038-01-02T19:12:18.006		79.33	-78.24	42597.64	-27.88		
5	I	2038-01-02T19:12:29.625		79.35	-78.21	42262.08	-27.86		
6	I	2038-01-02T19:12:47.553		79.38	-78.18	41800.55	-27.88		
Uranus	I	2038-01-02T19:20:01.522		80.02	-77.26	25258.30		-30.39	-31.55
Uranus	E	2038-01-02T19:54:57.886		79.01	-71.18	25169.69		35.25	36.50
6	E	2038-01-02T20:01:34.833		78.15	-69.85	41865.65	27.88		
5	E	2038-01-02T20:01:47.392		78.12	-69.80	42186.30	27.86		
4	E	2038-01-02T20:02:00.310		78.09	-69.76	42556.99	27.88		
alpha	E	2038-01-02T20:03:17.371		77.90	-69.50	44729.06	27.92		
beta	E	2038-01-02T20:03:51.562		77.82	-69.38	45680.81	27.93		
eta	E	2038-01-02T20:04:45.177		77.69	-69.20	47176.12	27.95		
gamma	E	2038-01-02T20:05:01.092		77.65	-69.14	47620.97	27.95		
delta	E	2038-01-02T20:05:25.393		77.58	-69.06	48300.35	27.96		
lambda	E	2038-01-02T20:06:27.117		77.42	-68.85	50026.71	27.98		
epsilon	E	2038-01-02T20:07:07.671		77.32	-68.71	51161.56	28.02		


```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2038-01-02T19:40:28.050
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       : 865677841359417216
2Mass ID (if available) : 07353039+2207416
ICRS Star Coord at Epoch: 07h 35m 30.42470s +22:07:41.38366s
RUWE (>1.4 is poor) : 1.28
K magnitude          : 7.855
G magnitude           : 10.298
RP magnitude          : 9.565
BP magnitude          : 10.894
DUPflag              : 0
Distance (au)        : 17.736
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -22.84
Sun-Target sep (deg) : 169.95
Sun-Moon sep (deg)   : 134.88
B (ring opening deg) : 54.75
PA of pole (deg)     : 85.08
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.183
C/A sky separation (km) : 2352.4
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLvl.bsp
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	2038-01-02T19:09:49.096		8.53	-15.36	51203.47	-27.87		
lambda	I	2038-01-02T19:10:31.336		8.65	-15.47	50026.71	-27.86		
delta	I	2038-01-02T19:11:33.307		8.84	-15.64	48300.35	-27.86		
gamma	I	2038-01-02T19:11:57.320		8.91	-15.70	47631.40	-27.86		
eta	I	2038-01-02T19:12:13.664		8.96	-15.75	47176.12	-27.86		
beta	I	2038-01-02T19:13:08.810		9.12	-15.89	45642.69	-27.86		
alpha	I	2038-01-02T19:13:42.177		9.22	-15.98	44714.70	-27.86		
4	I	2038-01-02T19:14:57.586		9.44	-16.18	42594.27	-27.84		
5	I	2038-01-02T19:15:08.863		9.47	-16.21	42268.72	-27.83		
6	I	2038-01-02T19:15:26.912		9.53	-16.26	41802.64	-27.85		
Uranus	I	2038-01-02T19:22:19.682		10.73	-17.34	25214.55		-32.83	-34.04
Uranus	E	2038-01-02T19:58:33.694		16.81	-22.66	25179.65		34.71	35.96
6	E	2038-01-02T20:05:12.829		17.86	-23.56	41868.73	27.94		
5	E	2038-01-02T20:05:25.627		17.90	-23.59	42192.98	27.92		
4	E	2038-01-02T20:05:38.107		17.93	-23.62	42552.75	27.93		
alpha	E	2038-01-02T20:06:55.118		18.13	-23.79	44725.93	27.95		
beta	E	2038-01-02T20:07:29.348		18.22	-23.87	45680.33	27.95		
eta	E	2038-01-02T20:08:22.957		18.36	-23.99	47176.12	27.95		
gamma	E	2038-01-02T20:08:38.872		18.40	-24.02	47621.02	27.96		
delta	E	2038-01-02T20:09:03.171		18.47	-24.07	48300.35	27.96		
lambda	E	2038-01-02T20:10:04.914		18.63	-24.21	50026.71	27.96		
epsilon	E	2038-01-02T20:10:44.272		18.73	-24.29	51127.32	27.98		