

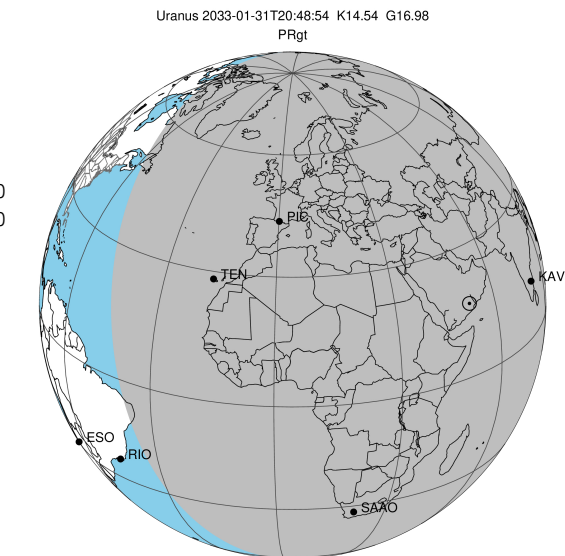
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-31T20:48:54.940
 Event type : PRgt
 : Uranus occs: not geocentric or topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3427672489651028992
 2Mass ID (if available) : 05492805+2337592

ICRS Star Coord at Epoch: 05h 49m 28.06187s +23:37:58.95306s

RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.543
 G magnitude : 16.977
 RP magnitude : 16.186
 BP magnitude : 17.650
 DUPflag : 0
 Distance (au) : 18.294
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -14.99
 Sun-Target sep (deg) : 135.75
 Sun-Moon sep (deg) : 122.32
 B (ring opening deg) : 77.30
 PA of pole (deg) : 50.05

a(km) ring

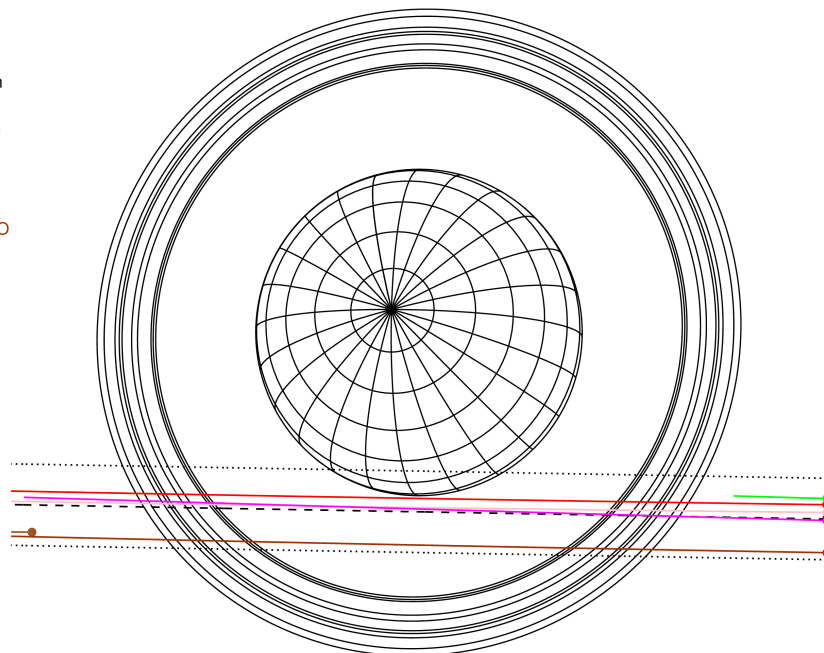
- 1 41837.2 6
- 2 42235.0 5
- 3 42571.2 4
- 4 44718.5 alpha
- 5 45661.1 beta
- 6 47176.1 eta
- 7 47626.3 gamma
- 8 48300.3 delta
- 9 50026.7 lambda
- 10 51149.4 epsilon



2033-01-31T20:48:54.9400 ra: 05 49 28.06187 s: +23 37 58.953 C/A 2.110° PA 358.99 deg v_sky -14.99 km/s D 18.29 AU
 Credit: Styled after SORA/Lucky Star

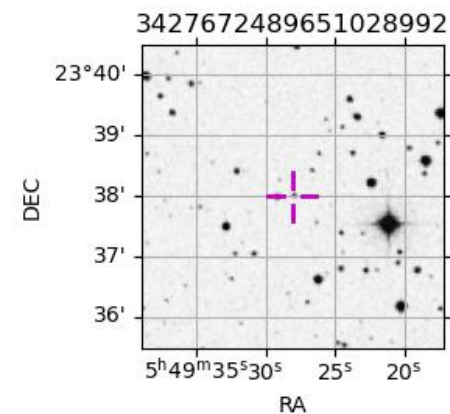
Uranus 2033-01-31T20:48:54 K14.54 G16.98 PRgt

Earth
 PIC
 PMO
 TEN
 KAV
 RIO
 SAAO

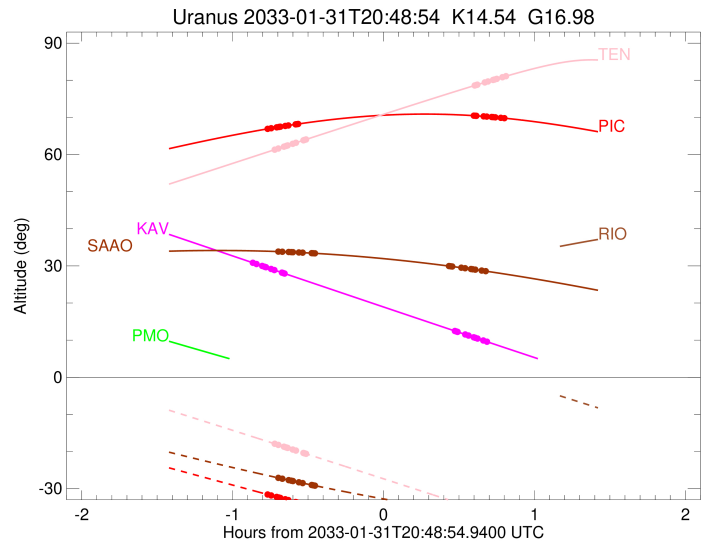
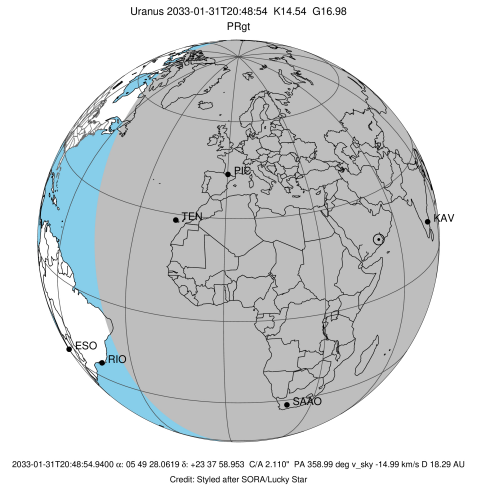


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	JAN 31 20:03 - JAN 31 21:37	PnnRie
PAL	Palomar Mt (200")	33.4	243.1					PnnRnn
PMO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
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 31 20:06 - JAN 31 21:37	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	+++++		+++++	JAN 31 19:57 - JAN 31 21:30	PnnRie
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 31 20:07 - JAN 31 21:29	PnnRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-31T20:49:13.290
 Event type : PRgt
 : Uranus occs: not geocentric or 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 : 3427672489651028992
 2Mass ID (if available) : 05492805+2337592
 ICRS Star Coord at Epoch: 05h 49m 28.06187s +23:37:58.95306s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.543
 G magnitude : 16.977
 RP magnitude : 16.186
 BP magnitude : 17.650
 DUPflag : 0
 Distance (au) : 18.294
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -14.99
 Sun-Target sep (deg) : 135.75
 Sun-Moon sep (deg) : 123.16
 B (ring opening deg) : 77.30
 PA of pole (deg) : 50.05
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.958
 C/A sky separation (km) : 25984.1
 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_itrfr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

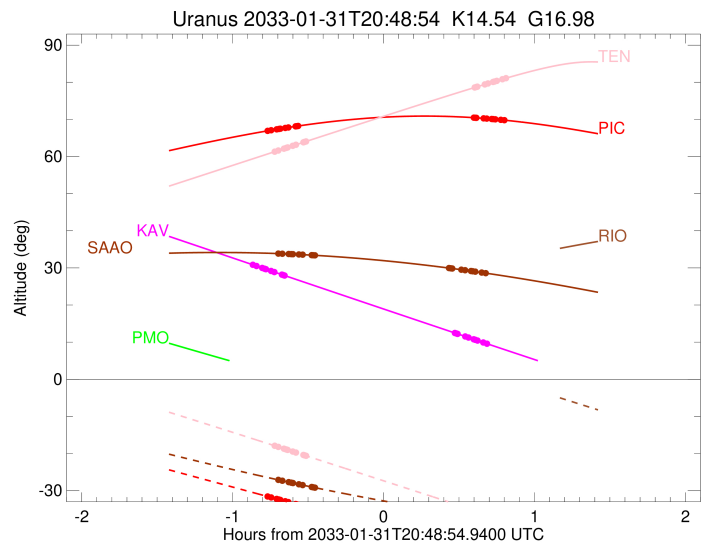
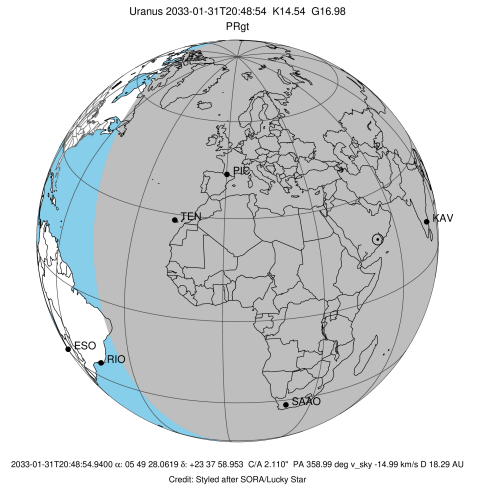


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-01-31T20:03:22.692		66.98	-31.68	50745.51	-13.31		
lambda	I	2033-01-31T20:04:16.848		67.08	-31.84	50026.71	-13.24		
delta	I	2033-01-31T20:06:28.163		67.33	-32.24	48300.35	-13.05		
gamma	I	2033-01-31T20:07:20.130		67.43	-32.40	47624.06	-12.97		
eta	I	2033-01-31T20:07:54.726		67.49	-32.50	47176.12	-12.92		
beta	I	2033-01-31T20:09:54.171		67.71	-32.87	45644.57	-12.72		
alpha	I	2033-01-31T20:11:10.091		67.84	-33.10	44685.28	-12.58		
4	I	2033-01-31T20:14:01.236		68.13	-33.62	42554.15	-12.23		
5	I	2033-01-31T20:14:33.835		68.19	-33.71	42170.10	-12.18		
6	I	2033-01-31T20:14:58.101		68.23	-33.79	41875.58	-12.12		

No planet occultations

6	E	2033-01-31T21:24:49.201		70.47	-46.14	41846.76	12.11		
5	E	2033-01-31T21:25:26.316		70.44	-46.24	42295.84	12.17		
4	E	2033-01-31T21:25:45.924		70.43	-46.30	42534.63	12.22		
alpha	E	2033-01-31T21:28:42.233		70.29	-46.79	44722.59	12.57		
beta	E	2033-01-31T21:29:55.984		70.22	-47.00	45656.14	12.71		
eta	E	2033-01-31T21:31:54.622		70.11	-47.33	47176.12	12.91		
gamma	E	2033-01-31T21:32:29.140		70.08	-47.43	47622.71	12.96		
delta	E	2033-01-31T21:33:21.249		70.03	-47.57	48300.35	13.04		
lambda	E	2033-01-31T21:35:32.667		69.89	-47.94	50026.71	13.23		
epsilon	E	2033-01-31T21:37:14.068		69.78	-48.22	51374.54	13.30		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-31T20:50:56.690
 Event type : PRgt
 : Uranus occs: not geocentric or 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 : 3427672489651028992
 2Mass ID (if available) : 05492805+2337592
 ICRS Star Coord at Epoch: 05h 49m 28.06187s +23:37:58.95306s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.543
 G magnitude : 16.977
 RP magnitude : 16.186
 BP magnitude : 17.650
 DUPflag : 0
 Distance (au) : 18.294
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -14.99
 Sun-Target sep (deg) : 135.75
 Sun-Moon sep (deg) : 123.30
 B (ring opening deg) : 77.30
 PA of pole (deg) : 50.05
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.066
 C/A sky separation (km) : 27412.7
 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_itrfr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

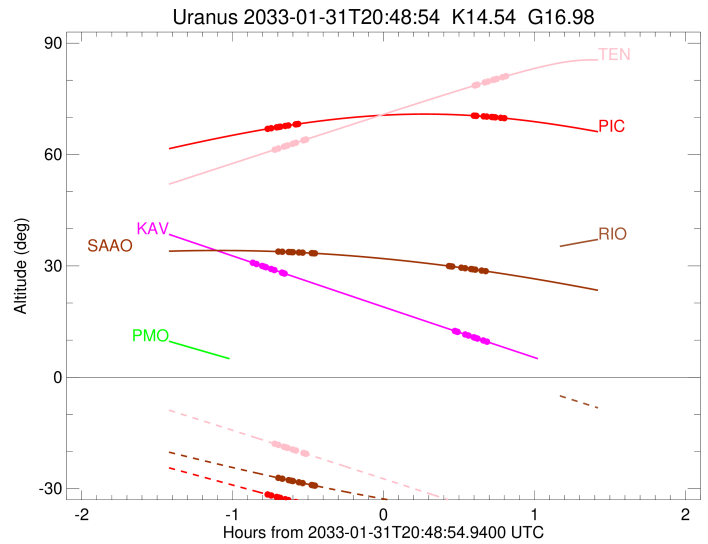
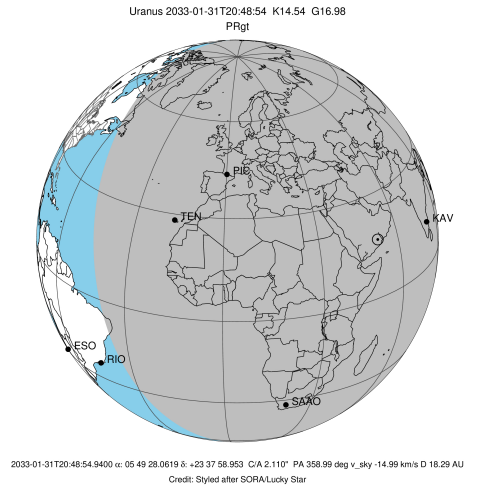


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-01-31T20:06:11.680		61.43	-18.03	50746.91	-13.05		
lambda	I	2033-01-31T20:07:07.056		61.63	-18.23	50026.71	-12.97		
delta	I	2033-01-31T20:09:21.274		62.12	-18.71	48300.35	-12.76		
gamma	I	2033-01-31T20:10:14.489		62.32	-18.90	47623.90	-12.67		
eta	I	2033-01-31T20:10:49.926		62.45	-19.03	47176.12	-12.60		
beta	I	2033-01-31T20:12:52.546		62.90	-19.48	45644.17	-12.38		
alpha	I	2033-01-31T20:14:10.642		63.19	-19.76	44685.05	-12.22		
4	I	2033-01-31T20:17:07.436		63.84	-20.40	42552.45	-11.81		
5	I	2033-01-31T20:17:40.882		63.96	-20.52	42172.11	-11.76		
6	I	2033-01-31T20:18:06.119		64.06	-20.61	41876.32	-11.69		

No planet occultations

6	E	2033-01-31T21:25:10.298		78.60	-35.32	41848.74	11.71		
5	E	2033-01-31T21:25:48.268		78.73	-35.46	42293.29	11.78		
4	E	2033-01-31T21:26:08.620		78.80	-35.53	42533.42	11.83		
alpha	E	2033-01-31T21:29:10.173		79.42	-36.20	44721.12	12.24		
beta	E	2033-01-31T21:30:25.907		79.68	-36.48	45655.32	12.40		
eta	E	2033-01-31T21:32:27.411		80.09	-36.92	47176.12	12.63		
gamma	E	2033-01-31T21:33:02.671		80.20	-37.05	47622.55	12.69		
delta	E	2033-01-31T21:33:55.885		80.38	-37.25	48300.35	12.78		
lambda	E	2033-01-31T21:36:09.821		80.82	-37.74	50026.71	12.99		
epsilon	E	2033-01-31T21:37:52.016		81.15	-38.12	51362.13	13.08		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-31T20:42:38.190
 Event type : PRgt
 : Uranus occs: not geocentric or 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 : 3427672489651028992
 2Mass ID (if available) : 05492805+2337592
 ICRS Star Coord at Epoch: 05h 49m 28.06187s +23:37:58.95306s
 RUWE (>1.4 is poor) : 0.97
 K magnitude : 14.543
 G magnitude : 16.977
 RP magnitude : 16.186
 BP magnitude : 17.650
 DUPflag : 0
 Distance (au) : 18.294
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -14.99
 Sun-Target sep (deg) : 135.75
 Sun-Moon sep (deg) : 122.10
 B (ring opening deg) : 77.30
 PA of pole (deg) : 50.05
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.083
 C/A sky separation (km) : 27630.5
 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



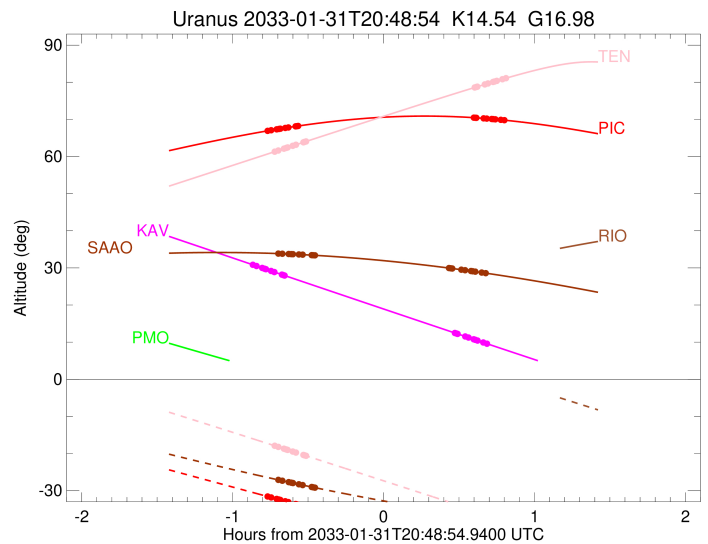
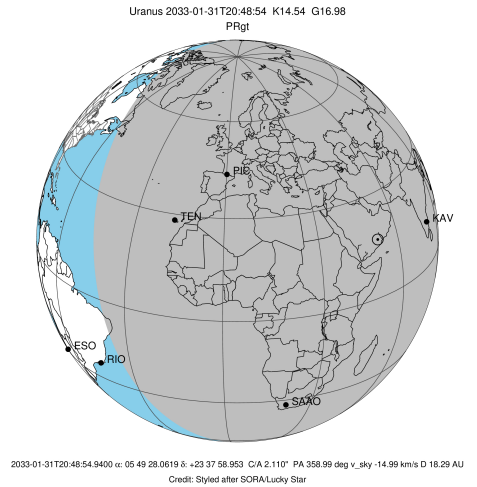
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-01-31T19:57:30.657		30.72	-74.93	50748.07	-12.91		
lambda	I	2033-01-31T19:58:26.745		30.51	-74.72	50026.71	-12.82		
delta	I	2033-01-31T20:00:42.540		29.99	-74.20	48300.35	-12.60		
gamma	I	2033-01-31T20:01:36.417		29.78	-73.99	47623.80	-12.51		
eta	I	2033-01-31T20:02:12.291		29.64	-73.85	47176.12	-12.45		
beta	I	2033-01-31T20:04:16.532		29.17	-73.37	45643.95	-12.21		
alpha	I	2033-01-31T20:05:35.699		28.86	-73.07	44684.94	-12.05		
4	I	2033-01-31T20:08:35.162		28.18	-72.37	42551.55	-11.63		
5	I	2033-01-31T20:09:08.954		28.05	-72.24	42173.22	-11.58		
6	I	2033-01-31T20:09:34.640		27.95	-72.14	41876.68	-11.50		

No planet occultations

6	E	2033-01-31T21:17:17.118		12.47	-56.10	41848.42	11.40		
5	E	2033-01-31T21:17:56.190		12.32	-55.95	42293.74	11.47		
4	E	2033-01-31T21:18:17.076		12.24	-55.87	42533.62	11.52		
alpha	E	2033-01-31T21:21:23.502		11.54	-55.12	44721.41	11.92		
beta	E	2033-01-31T21:22:41.235		11.24	-54.82	45655.49	12.08		
eta	E	2033-01-31T21:24:45.938		10.77	-54.32	47176.12	12.31		
gamma	E	2033-01-31T21:25:22.131		10.64	-54.18	47622.59	12.37		
delta	E	2033-01-31T21:26:16.743		10.43	-53.96	48300.35	12.45		
lambda	E	2033-01-31T21:28:34.204		9.91	-53.41	50026.71	12.66		
epsilon	E	2033-01-31T21:30:19.350		9.51	-52.99	51365.49	12.75		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch              : 2033-01-31T20:47:25.140
Event type             : PRgt
: Uranus occs: not geocentric or 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        : 3427672489651028992
2Mass ID (if available) : 05492805+2337592
ICRS Star Coord at Epoch: 05h 49m 28.06187s +23:37:58.95306s
RUWE (>1.4 is poor)  : 0.97
K magnitude           : 14.543
G magnitude           : 16.977
RP magnitude          : 16.186
BP magnitude          : 17.650
DUPflag              : 0
Distance (au)         : 18.294
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -14.99
Sun-Target sep (deg)  : 135.75
Sun-Moon sep (deg)    : 122.61
B (ring opening deg)  : 77.30
PA of pole (deg)      : 50.05
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.509
C/A sky separation (km) : 33288.2
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_itrfr93_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	2033-01-31T20:07:40.515		33.84	-27.18	50759.51	-11.72		
lambda	I	2033-01-31T20:08:43.542		33.81	-27.34	50026.71	-11.56		
delta	I	2033-01-31T20:11:15.177		33.74	-27.71	48300.35	-11.21		
gamma	I	2033-01-31T20:12:16.024		33.71	-27.86	47623.13	-11.05		
eta	I	2033-01-31T20:12:56.659		33.69	-27.96	47176.12	-10.95		
beta	I	2033-01-31T20:15:19.252		33.62	-28.30	45642.50	-10.55		
alpha	I	2033-01-31T20:16:51.397		33.56	-28.52	44684.63	-10.28		
4	I	2033-01-31T20:20:26.385		33.43	-29.03	42544.29	-9.55		
5	I	2033-01-31T20:21:05.731		33.41	-29.12	42184.02	-9.44		
6	I	2033-01-31T20:21:38.134		33.39	-29.20	41879.00	-9.30		

No planet occultations

6	E	2033-01-31T21:14:56.961		29.96	-35.67	41856.78	9.28		
5	E	2033-01-31T21:15:42.323		29.89	-35.75	42281.20	9.42		
4	E	2033-01-31T21:16:08.488		29.85	-35.79	42529.28	9.52		
alpha	E	2033-01-31T21:19:49.234		29.52	-36.15	44715.12	10.25		
beta	E	2033-01-31T21:21:19.380		29.38	-36.30	45652.15	10.52		
eta	E	2033-01-31T21:23:41.526		29.16	-36.52	47176.12	10.91		
gamma	E	2033-01-31T21:24:22.192		29.09	-36.58	47622.01	11.02		
delta	E	2033-01-31T21:25:23.344		28.99	-36.68	48300.35	11.17		
lambda	E	2033-01-31T21:27:55.511		28.75	-36.90	50026.71	11.52		
epsilon	E	2033-01-31T21:29:45.997		28.57	-37.07	51312.07	11.67		