

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-01-23T02:18:19.770
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Gaia source ID : 673820415296442368
 2Mass ID (if available) : 07520936+2129567

ICRS Star Coord at Epoch: 07h 52m 09.34824s +21:29:56.70260s

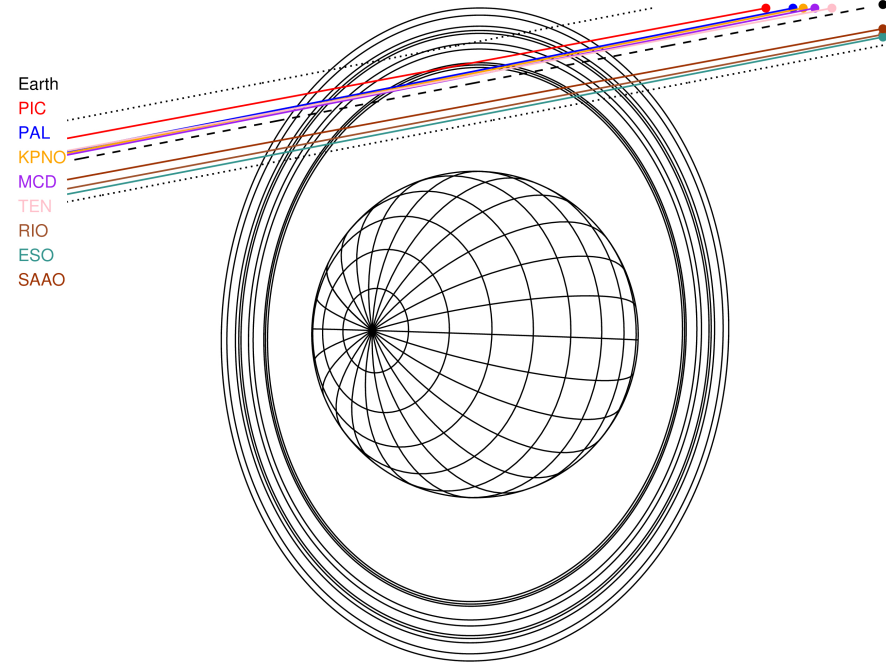
RUWE (>1.4 is poor) : 0.00
 K magnitude : 14.669
 G magnitude : 17.445
 RP magnitude : 16.384
 BP magnitude : 17.909
 DUPflag : 0
 Distance (au) : 17.666
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.09
 Sun-Target sep (deg) : 173.54
 Sun-Moon sep (deg) : 167.09
 B (ring opening deg) : 50.94
 PA of pole (deg) : 87.77

#	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



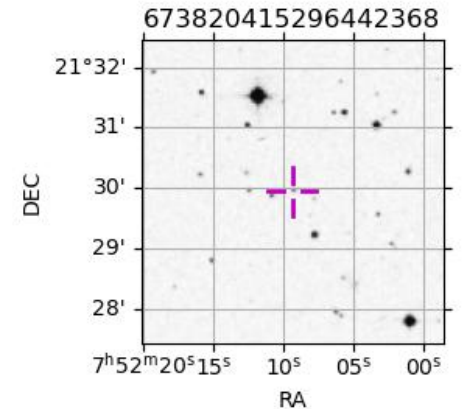
2039-01-23T02:18:19.7700 ra: 07 52 09.3482 s: +21 29 56.703 C/A 3.029° PA 190.87 deg v_sky -23.09 km/s D 17.67 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2039-01-23T02:18:19 K14.67 G17.44 XRgt



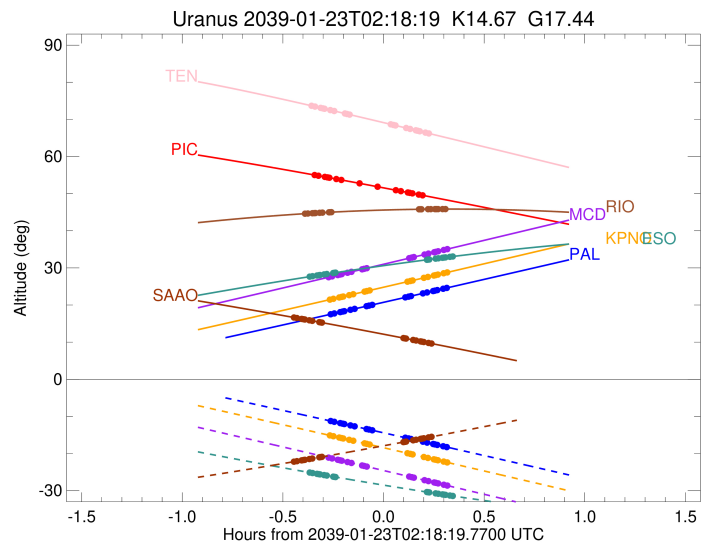
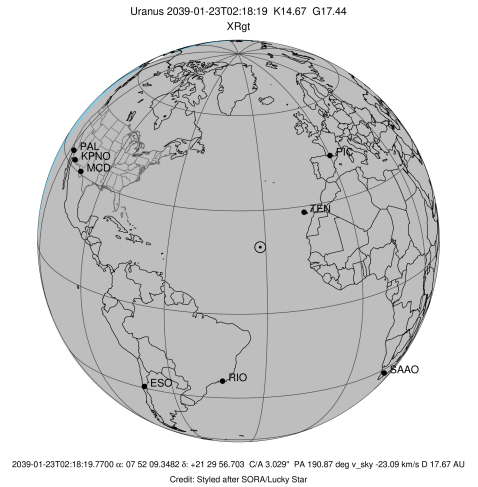
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	JAN 23 01:58 - JAN 23 02:29	PnnRie
PAL	Palomar Mt (200")	33.4	243.1	+++++		+++++	JAN 23 02:02 - JAN 23 02:36	PnnRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	JAN 23 02:02 - JAN 23 02:37	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	JAN 23 02:02 - JAN 23 02:37	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++		+++++	JAN 23 01:57 - JAN 23 02:31	PnnRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++		+++++	JAN 23 01:55 - JAN 23 02:36	PnnRie
ESO	European Southern Obs	-29.3	289.3	+++++		+++++	JAN 23 01:56 - JAN 23 02:38	PnnRie
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+++++		+++++	JAN 23 01:51 - JAN 23 02:32	PnnRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2039-01-23T02:16:29.890
Event type           : XRgt
: No Uranus occs
: 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       : 673820415296442368
2Mass ID (if available) : 07520936+2129567
ICRS Star Coord at Epoch: 07h 52m 09.34824s +21:29:56.70260s
RUWE (>1.4 is poor) : 0.00
K magnitude           : 14.669
G magnitude           : 17.445
RP magnitude          : 16.384
BP magnitude          : 17.909
DUPflag              : 0
Distance (au)         : 17.666
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -23.09
Sun-Target sep (deg) : 173.54
Sun-Moon sep (deg)   : 167.58
B (ring opening deg) : 50.94
PA of pole (deg)     : 87.77
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.269
C/A sky separation (km) : 41886.2
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall11.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
  
```

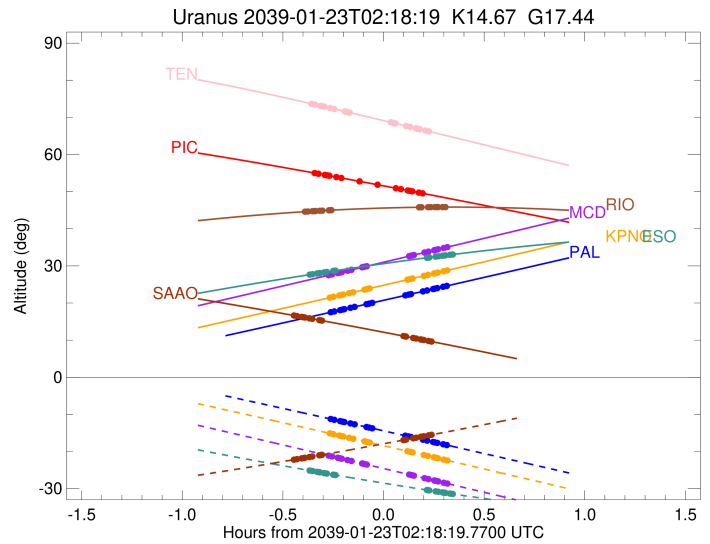
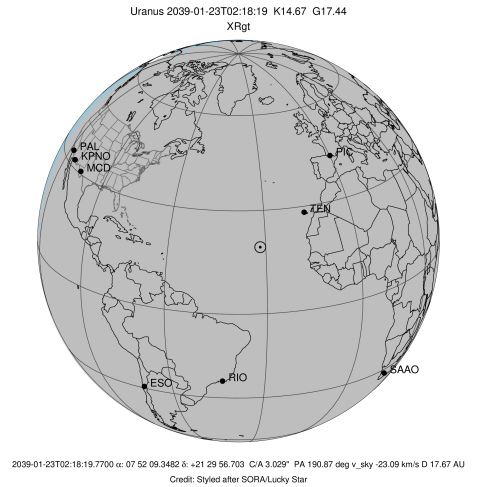


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-01-23T01:58:12.086		54.95	-57.62	50755.49	-16.40		
lambda	I	2039-01-23T01:58:57.144		54.82	-57.51	50026.71	-15.89		
delta	I	2039-01-23T02:00:51.161		54.51	-57.23	48300.35	-14.36		
gamma	I	2039-01-23T02:01:39.430		54.38	-57.12	47623.69	-13.66		
eta	I	2039-01-23T02:02:12.781		54.28	-57.03	47176.12	-13.17		
beta	I	2039-01-23T02:04:18.589		53.94	-56.72	45642.96	-11.17		
alpha	I	2039-01-23T02:05:50.477		53.68	-56.49	44688.90	-9.58		
4	I	2039-01-23T02:11:19.386		52.76	-55.66	42563.70	-3.16		

No planet occultations

4	E	2039-01-23T02:16:22.456		51.90	-54.87	42554.46	3.16		
alpha	E	2039-01-23T02:21:57.436		50.94	-53.99	44705.08	9.58		
beta	E	2039-01-23T02:23:28.448		50.68	-53.75	45654.01	11.16		
eta	E	2039-01-23T02:25:33.557		50.32	-53.41	47176.12	13.16		
gamma	E	2039-01-23T02:26:06.746		50.22	-53.32	47620.99	13.65		
delta	E	2039-01-23T02:26:55.267		50.08	-53.19	48300.35	14.35		
lambda	E	2039-01-23T02:28:49.424		49.75	-52.89	50026.71	15.87		
epsilon	E	2039-01-23T02:29:43.564		49.59	-52.74	50904.19	16.38		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-01-23T02:22:33.720
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 673820415296442368
 2Mass ID (if available) : 07520936+2129567
 ICRS Star Coord at Epoch: 07h 52m 09.34824s +21:29:56.70260s
 RUWE (>1.4 is poor) : 0.00
 K magnitude : 14.669
 G magnitude : 17.445
 RP magnitude : 16.384
 BP magnitude : 17.909
 DUPflag : 0
 Distance (au) : 17.666
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.09
 Sun-Target sep (deg) : 173.54
 Sun-Moon sep (deg) : 166.30
 B (ring opening deg) : 50.94
 PA of pole (deg) : 87.77
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.159
 C/A sky separation (km) : 40477.0
 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

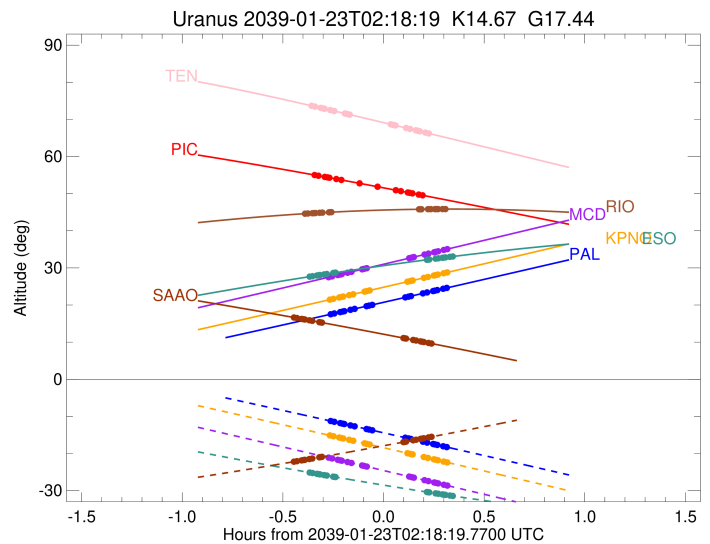
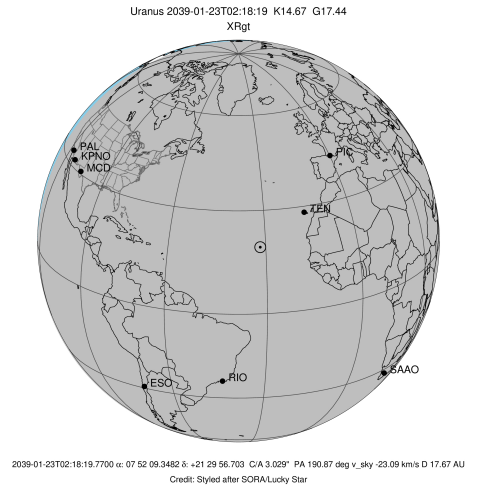


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-01-23T02:02:58.150		17.59	-11.32	50759.62	-17.41		
lambda	I	2039-01-23T02:03:40.710		17.73	-11.46	50026.71	-16.98		
delta	I	2039-01-23T02:05:26.372		18.09	-11.82	48300.35	-15.68		
gamma	I	2039-01-23T02:06:10.326		18.24	-11.97	47623.93	-15.09		
eta	I	2039-01-23T02:06:40.398		18.34	-12.07	47176.12	-14.68		
beta	I	2039-01-23T02:08:30.786		18.72	-12.44	45642.44	-13.07		
alpha	I	2039-01-23T02:09:47.302		18.98	-12.69	44687.71	-11.86		
4	I	2039-01-23T02:13:18.141		19.70	-13.40	42571.03	-8.08		
5	I	2039-01-23T02:14:12.765		19.88	-13.59	42155.70	-7.06		
6	I	2039-01-23T02:15:05.487		20.06	-13.77	41812.86	-6.08		

No planet occultations

6	E	2039-01-23T02:24:47.731		22.05	-15.74	41828.93	6.08		
5	E	2039-01-23T02:25:35.650		22.21	-15.90	42170.23	7.07		
4	E	2039-01-23T02:26:25.837		22.39	-16.07	42547.23	8.09		
alpha	E	2039-01-23T02:30:02.358		23.13	-16.80	44708.05	11.88		
beta	E	2039-01-23T02:31:17.800		23.39	-17.06	45655.58	13.09		
eta	E	2039-01-23T02:33:07.169		23.76	-17.43	47176.12	14.71		
gamma	E	2039-01-23T02:33:36.989		23.87	-17.54	47620.96	15.12		
delta	E	2039-01-23T02:34:21.054		24.02	-17.69	48300.35	15.71		
lambda	E	2039-01-23T02:36:06.494		24.38	-18.04	50026.71	17.01		
epsilon	E	2039-01-23T02:36:58.241		24.56	-18.22	50922.59	17.45		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-01-23T02:22:28.500
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Observer code : KPNO
 Location : Kitt Peak Natl Obs
 Latitude (deg) : 31.96333
 E. Longitude (deg) : 248.40000
 Altitude (km) : 2.120
 Gaia source ID : 673820415296442368
 2Mass ID (if available) : 07520936+2129567
 ICRS Star Coord at Epoch: 07h 52m 09.34824s +21:29:56.70260s
 RUWE (>1.4 is poor) : 0.00
 K magnitude : 14.669
 G magnitude : 17.445
 RP magnitude : 16.384
 BP magnitude : 17.909
 DUPflag : 0
 Distance (au) : 17.666
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.09
 Sun-Target sep (deg) : 173.54
 Sun-Moon sep (deg) : 166.33
 B (ring opening deg) : 50.94
 PA of pole (deg) : 87.77
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.137
 C/A sky separation (km) : 40189.6
 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_itrfr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk

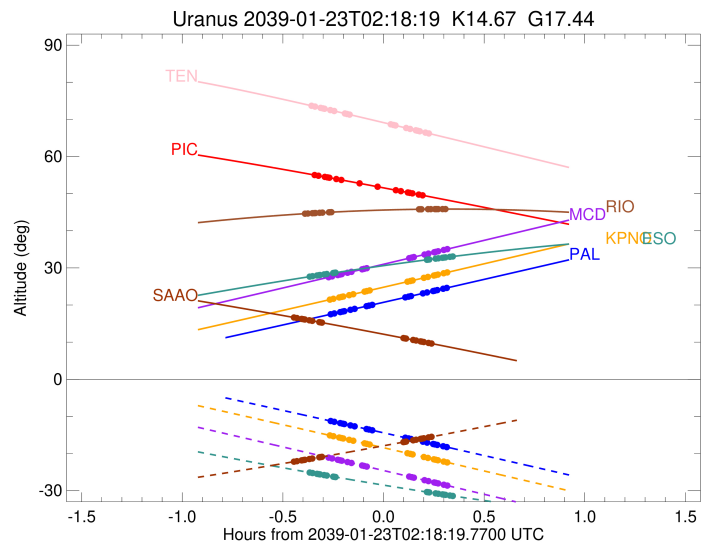
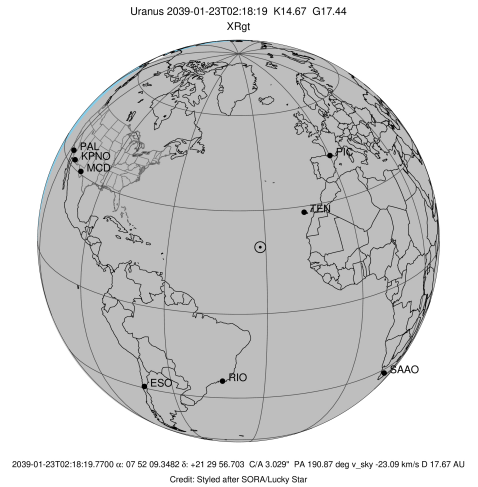


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-01-23T02:02:42.779		21.53	-15.20	50760.76	-17.66		
lambda	I	2039-01-23T02:03:24.762		21.68	-15.35	50026.71	-17.25		
delta	I	2039-01-23T02:05:08.596		22.04	-15.70	48300.35	-15.98		
gamma	I	2039-01-23T02:05:51.664		22.19	-15.85	47623.99	-15.42		
eta	I	2039-01-23T02:06:21.086		22.29	-15.95	47176.12	-15.02		
beta	I	2039-01-23T02:08:08.641		22.66	-16.32	45642.34	-13.47		
alpha	I	2039-01-23T02:09:22.649		22.92	-16.58	44687.49	-12.31		
4	I	2039-01-23T02:12:42.019		23.61	-17.27	42572.13	-8.78		
5	I	2039-01-23T02:13:31.876		23.79	-17.44	42155.40	-7.85		
6	I	2039-01-23T02:14:18.870		23.95	-17.60	41811.77	-7.00		

No planet occultations

6	E	2039-01-23T02:25:27.095		26.28	-19.92	41830.24	7.00		
5	E	2039-01-23T02:26:09.323		26.43	-20.06	42171.53	7.86		
4	E	2039-01-23T02:26:54.748		26.59	-20.22	42546.33	8.79		
alpha	E	2039-01-23T02:30:19.786		27.31	-20.93	44708.56	12.33		
beta	E	2039-01-23T02:31:32.724		27.57	-21.19	45655.85	13.49		
eta	E	2039-01-23T02:33:19.264		27.94	-21.56	47176.12	15.05		
gamma	E	2039-01-23T02:33:48.435		28.04	-21.66	47620.96	15.45		
delta	E	2039-01-23T02:34:31.616		28.19	-21.81	48300.35	16.02		
lambda	E	2039-01-23T02:36:15.232		28.56	-22.17	50026.71	17.28		
epsilon	E	2039-01-23T02:37:06.383		28.74	-22.35	50925.73	17.71		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-01-23T02:22:16.060
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Observer code : MCD
 Location : McDonald Obs. 2.7m
 Latitude (deg) : 30.67158
 E. Longitude (deg) : 255.97844
 Altitude (km) : 2.075
 Gaia source ID : 673820415296442368
 2Mass ID (if available) : 07520936+2129567
 ICRS Star Coord at Epoch: 07h 52m 09.34824s +21:29:56.70260s
 RUWE (>1.4 is poor) : 0.00
 K magnitude : 14.669
 G magnitude : 17.445
 RP magnitude : 16.384
 BP magnitude : 17.909
 DUPflag : 0
 Distance (au) : 17.666
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.09
 Sun-Target sep (deg) : 173.54
 Sun-Moon sep (deg) : 166.39
 B (ring opening deg) : 50.94
 PA of pole (deg) : 87.77
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 3.112
 C/A sky separation (km) : 39866.4
 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



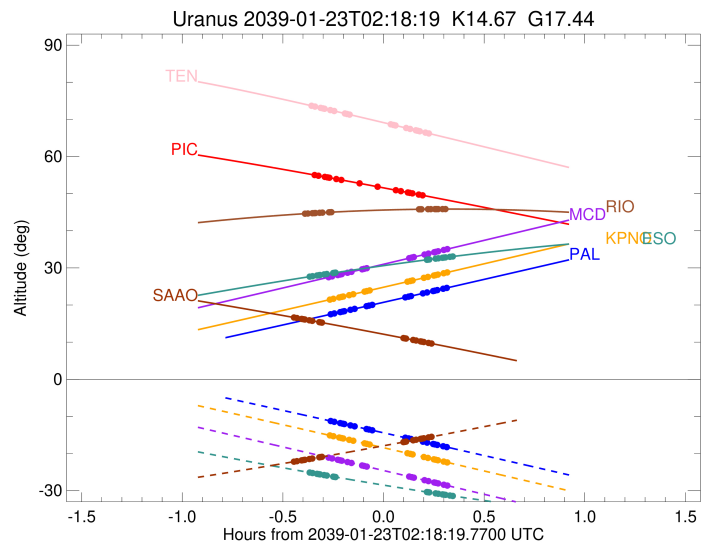
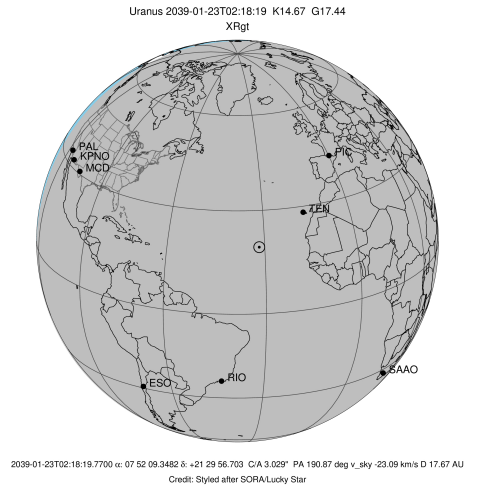
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-01-23T02:02:19.892		27.57	-21.19	50762.09	-17.96		
lambda	I	2039-01-23T02:03:01.242		27.71	-21.33	50026.71	-17.55		
delta	I	2039-01-23T02:04:43.082		28.07	-21.69	48300.35	-16.33		
gamma	I	2039-01-23T02:05:25.195		28.22	-21.84	47624.06	-15.78		
eta	I	2039-01-23T02:05:53.921		28.33	-21.94	47176.12	-15.40		
beta	I	2039-01-23T02:07:38.488		28.70	-22.31	45642.23	-13.91		
alpha	I	2039-01-23T02:08:49.914		28.95	-22.56	44687.25	-12.80		
4	I	2039-01-23T02:11:58.345		29.62	-23.23	42573.28	-9.50		
5	I	2039-01-23T02:12:44.094		29.78	-23.39	42155.16	-8.67		
6	I	2039-01-23T02:13:26.529		29.94	-23.54	41810.70	-7.91		

No planet occultations

6	E	2039-01-23T02:25:58.546		32.62	-26.21	41831.53	7.92		
5	E	2039-01-23T02:26:36.257		32.75	-26.34	42172.90	8.67		
4	E	2039-01-23T02:27:17.584		32.90	-26.49	42545.41	9.51		
alpha	E	2039-01-23T02:30:31.671		33.59	-27.18	44709.10	12.82		
beta	E	2039-01-23T02:31:42.039		33.85	-27.43	45656.14	13.93		
eta	E	2039-01-23T02:33:25.601		34.22	-27.80	47176.12	15.43		
gamma	E	2039-01-23T02:33:54.079		34.32	-27.90	47620.96	15.81		
delta	E	2039-01-23T02:34:36.309		34.47	-28.05	48300.35	16.36		
lambda	E	2039-01-23T02:36:17.941		34.83	-28.41	50026.71	17.59		
epsilon	E	2039-01-23T02:37:08.431		35.01	-28.59	50929.19	18.00		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2039-01-23T02:16:50.580
Event type           : XRgt
: No Uranus occs
: 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       : 673820415296442368
2Mass ID (if available) : 07520936+2129567
ICRS Star Coord at Epoch: 07h 52m 09.34824s +21:29:56.70260s
RUWE (>1.4 is poor) : 0.00
K magnitude          : 14.669
G magnitude          : 17.445
RP magnitude         : 16.384
BP magnitude         : 17.909
DUPflag             : 0
Distance (au)        : 17.666
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -23.09
Sun-Target sep (deg) : 173.54
Sun-Moon sep (deg)   : 167.56
B (ring opening deg) : 50.94
PA of pole (deg)     : 87.77
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.120
C/A sky separation (km) : 39969.7
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_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```



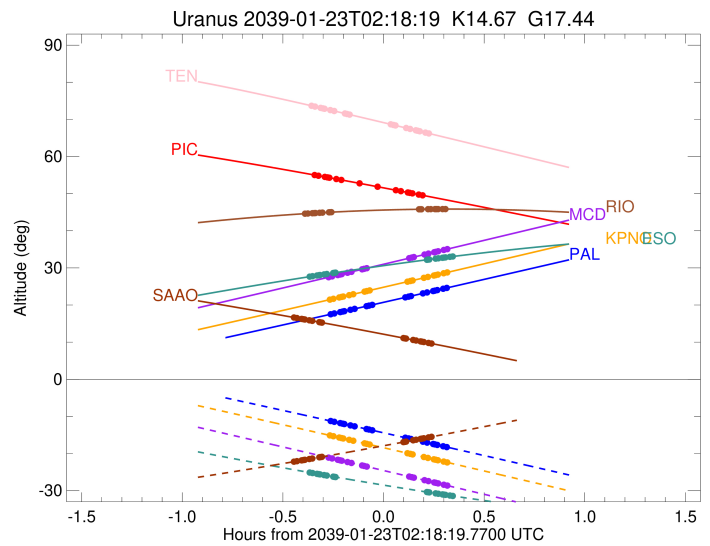
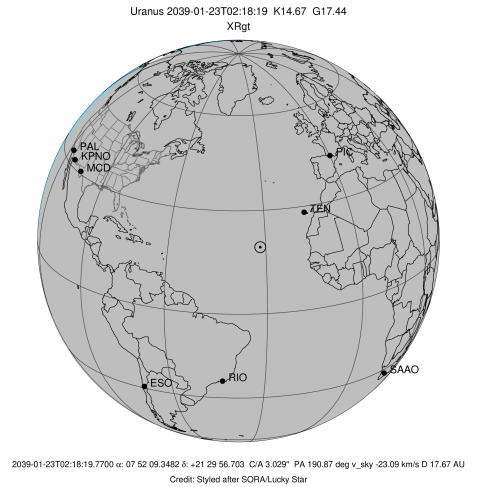
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-01-23T01:57:14.033		73.60	-77.49	50762.73	-18.08		
lambda	I	2039-01-23T01:57:55.132		73.46	-77.38	50026.71	-17.67		
delta	I	2039-01-23T01:59:36.332		73.11	-77.10	48300.35	-16.42		
gamma	I	2039-01-23T02:00:18.209		72.96	-76.98	47624.08	-15.87		
eta	I	2039-01-23T02:00:46.788		72.86	-76.90	47176.12	-15.48		
beta	I	2039-01-23T02:02:30.918		72.50	-76.60	45642.20	-13.96		
alpha	I	2039-01-23T02:03:42.160		72.25	-76.39	44687.20	-12.82		
4	I	2039-01-23T02:06:50.869		71.59	-75.82	42573.39	-9.44		
5	I	2039-01-23T02:07:36.995		71.43	-75.68	42155.15	-8.58		
6	I	2039-01-23T02:08:19.963		71.27	-75.55	41810.67	-7.80		

No planet occultations

6	E	2039-01-23T02:20:28.356		68.68	-73.25	41830.94	7.79		
5	E	2039-01-23T02:21:06.633		68.55	-73.13	42172.24	8.58		
4	E	2039-01-23T02:21:48.479		68.40	-72.99	42545.88	9.44		
alpha	E	2039-01-23T02:25:03.133		67.70	-72.35	44708.74	12.82		
beta	E	2039-01-23T02:26:13.497		67.44	-72.11	45655.93	13.95		
eta	E	2039-01-23T02:27:56.895		67.07	-71.77	47176.12	15.46		
gamma	E	2039-01-23T02:28:25.304		66.97	-71.67	47620.96	15.85		
delta	E	2039-01-23T02:29:07.418		66.82	-71.53	48300.35	16.41		
lambda	E	2039-01-23T02:30:48.722		66.45	-71.19	50026.71	17.65		
epsilon	E	2039-01-23T02:31:38.846		66.27	-71.02	50925.87	18.06		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2039-01-23T02:18:00.470
Event type           : XRgt
: No Uranus occs
: Ring occs: geocentric, topocentric
Observer code        : RIO
Location             : Rio de Janeiro
Latitude (deg)       : -22.89506
E. Longitude (deg)   : 316.77708
Altitude (km)        : 0.033
Gaia source ID       : 673820415296442368
2Mass ID (if available) : 07520936+2129567
ICRS Star Coord at Epoch: 07h 52m 09.34824s +21:29:56.70260s
RUWE (>1.4 is poor) : 0.00
K magnitude          : 14.669
G magnitude          : 17.445
RP magnitude         : 16.384
BP magnitude         : 17.909
DUPflag             : 0
Distance (au)        : 17.666
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -23.09
Sun-Target sep (deg) : 173.54
Sun-Moon sep (deg)   : 167.31
B (ring opening deg) : 50.94
PA of pole (deg)     : 87.77
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.673
C/A sky separation (km) : 34253.5
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
  
```

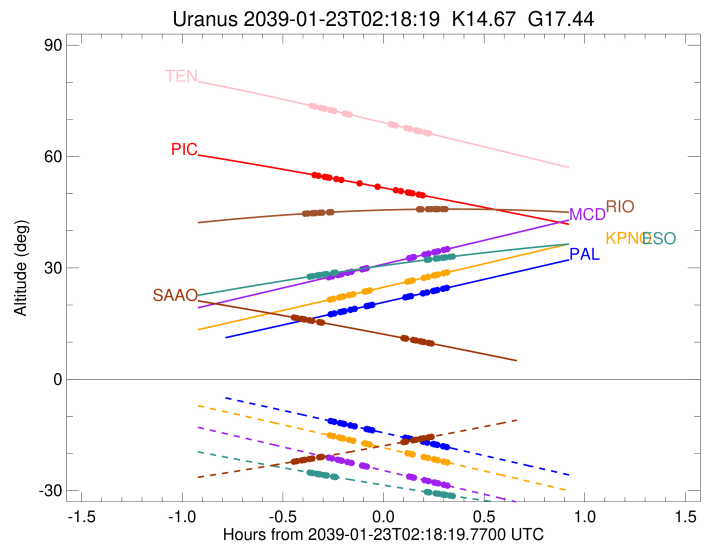
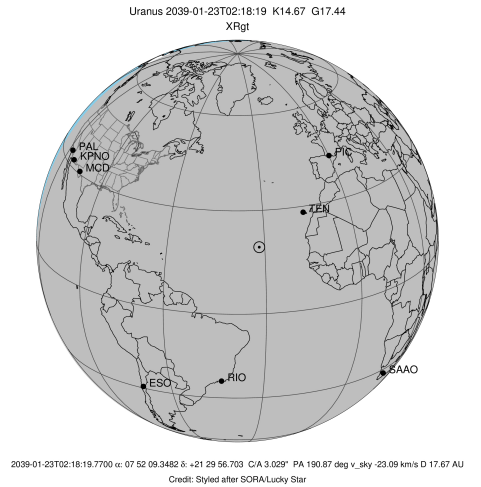


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-01-23T01:55:12.533		44.62	-44.48	50788.54	-21.86		
lambda	I	2039-01-23T01:55:47.490		44.66	-44.53	50026.71	-21.64		
delta	I	2039-01-23T01:57:08.602		44.73	-44.65	48300.35	-20.91		
gamma	I	2039-01-23T01:57:41.143		44.76	-44.70	47625.06	-20.59		
eta	I	2039-01-23T01:58:03.063		44.78	-44.73	47176.12	-20.37		
beta	I	2039-01-23T01:59:19.941		44.84	-44.85	45641.19	-19.54		
alpha	I	2039-01-23T02:00:09.447		44.89	-44.92	44685.01	-18.96		
4	I	2039-01-23T02:02:04.319		44.98	-45.08	42586.56	-17.44		
5	I	2039-01-23T02:02:28.789		45.00	-45.11	42156.82	-17.09		
6	I	2039-01-23T02:02:51.227		45.02	-45.14	41801.36	-16.82		

No planet occultations

6	E	2039-01-23T02:28:56.747		45.79	-46.86	41845.07	16.83		
5	E	2039-01-23T02:29:15.084		45.79	-46.88	42190.96	17.09		
4	E	2039-01-23T02:29:35.165		45.80	-46.89	42535.87	17.44		
alpha	E	2039-01-23T02:31:35.676		45.82	-46.99	44716.86	18.96		
beta	E	2039-01-23T02:32:24.281		45.83	-47.02	45660.42	19.54		
eta	E	2039-01-23T02:33:40.315		45.83	-47.08	47176.12	20.37		
gamma	E	2039-01-23T02:34:02.038		45.84	-47.10	47621.03	20.59		
delta	E	2039-01-23T02:34:34.773		45.84	-47.12	48300.35	20.91		
lambda	E	2039-01-23T02:35:55.882		45.84	-47.17	50026.71	21.65		
epsilon	E	2039-01-23T02:36:39.849		45.85	-47.20	50986.59	21.87		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-01-23T02:19:47.900
 Event type : XRgt
 : No Uranus occs
 : Ring occs: geocentric, topocentric
 Observer code : ESO
 Location : European Southern Obs. (3.6m)
 Latitude (deg) : -29.26097
 E. Longitude (deg) : 289.26831
 Altitude (km) : 2.400
 Gaia source ID : 673820415296442368
 2Mass ID (if available) : 07520936+2129567
 ICRS Star Coord at Epoch: 07h 52m 09.34824s +21:29:56.70260s
 RUWE (>1.4 is poor) : 0.00
 K magnitude : 14.669
 G magnitude : 17.445
 RP magnitude : 16.384
 BP magnitude : 17.909
 DUPflag : 0
 Distance (au) : 17.666
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.09
 Sun-Target sep (deg) : 173.54
 Sun-Moon sep (deg) : 166.90
 B (ring opening deg) : 50.94
 PA of pole (deg) : 87.77
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.623
 C/A sky separation (km) : 33611.1
 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

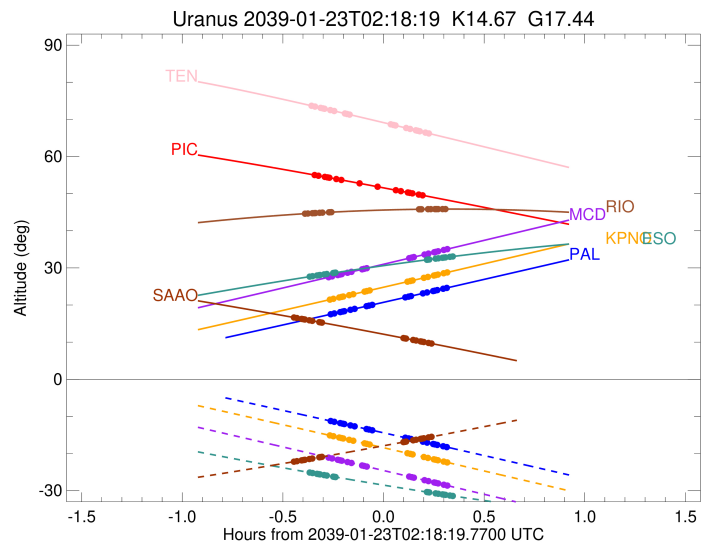
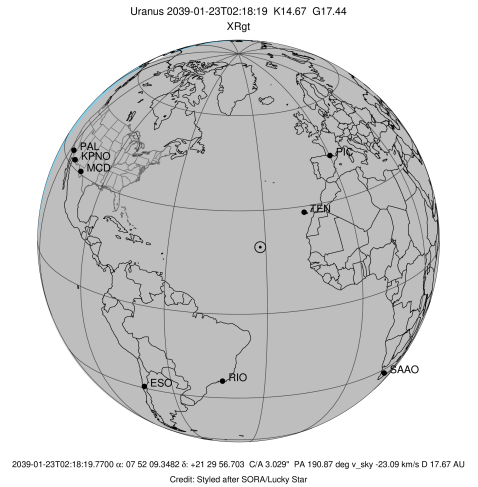


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2039-01-23T01:56:35.927		27.68	-25.17	50791.24	-22.12		
lambda	I	2039-01-23T01:57:10.588		27.76	-25.26	50026.71	-21.92		
delta	I	2039-01-23T01:58:30.595		27.95	-25.48	48300.35	-21.22		
gamma	I	2039-01-23T01:59:02.631		28.03	-25.56	47625.15	-20.92		
eta	I	2039-01-23T01:59:24.195		28.08	-25.62	47176.12	-20.72		
beta	I	2039-01-23T02:00:39.664		28.25	-25.82	45641.15	-19.94		
alpha	I	2039-01-23T02:01:28.108		28.36	-25.94	44684.92	-19.40		
4	I	2039-01-23T02:03:19.919		28.62	-26.23	42587.53	-17.98		
5	I	2039-01-23T02:03:43.635		28.67	-26.30	42157.25	-17.66		
6	I	2039-01-23T02:04:05.445		28.72	-26.35	41800.82	-17.41		

No planet occultations

6	E	2039-01-23T02:31:17.381		32.19	-30.38	41846.29	17.43		
5	E	2039-01-23T02:31:35.138		32.23	-30.42	42192.90	17.68		
4	E	2039-01-23T02:31:54.406		32.26	-30.46	42535.10	18.00		
alpha	E	2039-01-23T02:33:51.741		32.49	-30.73	44717.70	19.42		
beta	E	2039-01-23T02:34:39.227		32.58	-30.84	45660.90	19.97		
eta	E	2039-01-23T02:35:53.754		32.73	-31.01	47176.12	20.75		
gamma	E	2039-01-23T02:36:15.095		32.77	-31.06	47621.05	20.95		
delta	E	2039-01-23T02:36:47.283		32.83	-31.14	48300.35	21.25		
lambda	E	2039-01-23T02:38:07.181		32.98	-31.32	50026.71	21.95		
epsilon	E	2039-01-23T02:38:50.894		33.06	-31.41	50993.92	22.15		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2039-01-23T02:14:19.720
 Event type : XRgt
 : No Uranus occs
 : 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 : 673820415296442368
 2Mass ID (if available) : 07520936+2129567
 ICRS Star Coord at Epoch: 07h 52m 09.34824s +21:29:56.70260s
 RUWE (>1.4 is poor) : 0.00
 K magnitude : 14.669
 G magnitude : 17.445
 RP magnitude : 16.384
 BP magnitude : 17.909
 DUPflag : 0
 Distance (au) : 17.666
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.09
 Sun-Target sep (deg) : 173.54
 Sun-Moon sep (deg) : 167.96
 B (ring opening deg) : 50.94
 PA of pole (deg) : 87.77
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 2.767
 C/A sky separation (km) : 35457.6
 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_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	2039-01-23T01:51:55.803		16.59	-22.16	50783.22	-21.00		
lambda	I	2039-01-23T01:52:31.977		16.49	-22.06	50026.71	-20.75		
delta	I	2039-01-23T01:53:56.802		16.26	-21.84	48300.35	-19.94		
gamma	I	2039-01-23T01:54:30.978		16.16	-21.75	47624.89	-19.58		
eta	I	2039-01-23T01:54:54.034		16.10	-21.69	47176.12	-19.34		
beta	I	2039-01-23T01:56:15.282		15.88	-21.48	45641.29	-18.42		
alpha	I	2039-01-23T01:57:07.972		15.73	-21.35	44685.25	-17.77		
4	I	2039-01-23T01:59:11.750		15.39	-21.02	42584.53	-16.04		
5	I	2039-01-23T01:59:38.382		15.32	-20.95	42156.04	-15.65		
6	I	2039-01-23T02:00:02.674		15.25	-20.89	41802.54	-15.34		

No planet occultations

6	E	2039-01-23T02:24:17.206		11.10	-16.92	41842.70	15.31		
5	E	2039-01-23T02:24:37.250		11.04	-16.87	42187.36	15.62		
4	E	2039-01-23T02:24:59.526		10.98	-16.80	42537.43	16.01		
alpha	E	2039-01-23T02:27:09.278		10.60	-16.44	44715.28	17.73		
beta	E	2039-01-23T02:28:01.168		10.44	-16.29	45659.54	18.38		
eta	E	2039-01-23T02:29:21.753		10.21	-16.06	47176.12	19.30		
gamma	E	2039-01-23T02:29:44.664		10.14	-16.00	47621.00	19.54		
delta	E	2039-01-23T02:30:19.122		10.04	-15.90	48300.35	19.89		
lambda	E	2039-01-23T02:31:44.164		9.78	-15.66	50026.71	20.70		
epsilon	E	2039-01-23T02:32:29.471		9.65	-15.53	50973.44	20.94		