

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-12-08T03:01:43.890  
 Event type : XRgt  
 : No Uranus occs  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3415600195576838400  
 2Mass ID (if available) : 05190858+2311483

ICRS Star Coord at Epoch: 05h 19m 08.59455s +23:11:48.16447s

RUWE (>1.4 is poor) : 1.00  
 K magnitude : 14.538  
 G magnitude : 17.653  
 RP magnitude : 16.725  
 BP magnitude : 18.547  
 DUPflag : 0  
 Distance (au) : 18.175  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.33  
 Sun-Target sep (deg) : 175.00  
 Sun-Moon sep (deg) : 24.69  
 B (ring opening deg) : 81.65  
 PA of pole (deg) : 16.67

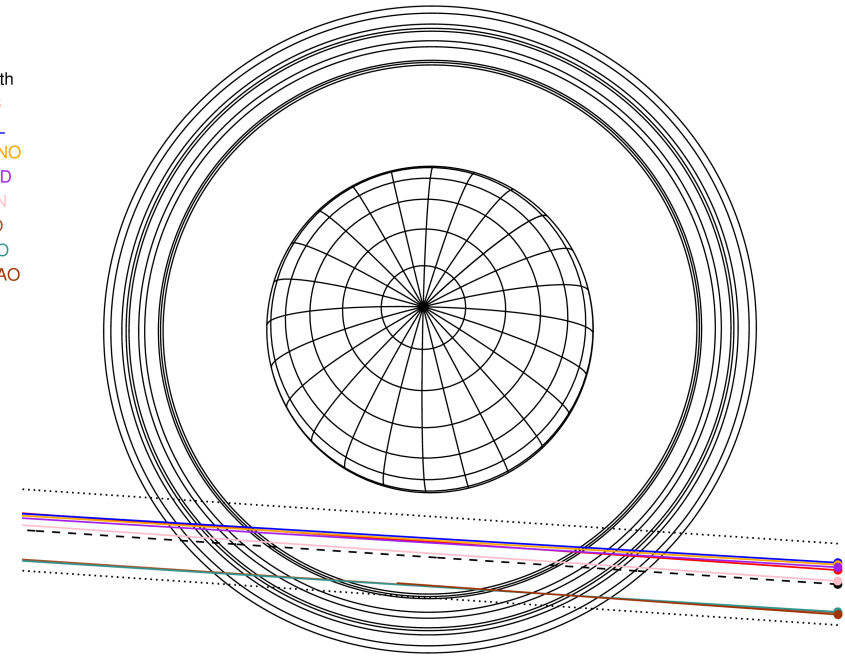
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon



2030-12-08T03:01:43.8900 ra: 05 19 08.5945 s: +23 11 48.164 C/A 2.693° PA 356.19 deg v\_sky -23.33 km/s D 18.17 AU  
 Credit: Styled after SORA/Lucky Star

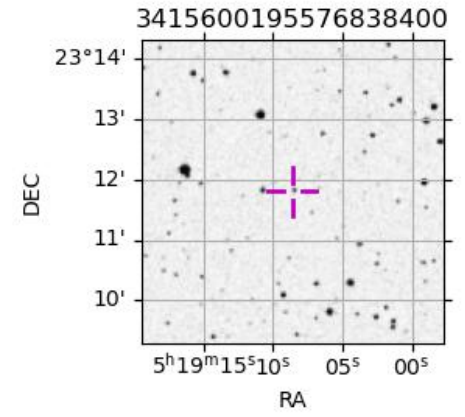
Uranus 2030-12-08T03:01:43 K14.54 G17.65 XRgt

Earth  
 PIC  
 PAL  
 KPNO  
 MCD  
 TEN  
 RIO  
 ESO  
 SAAO

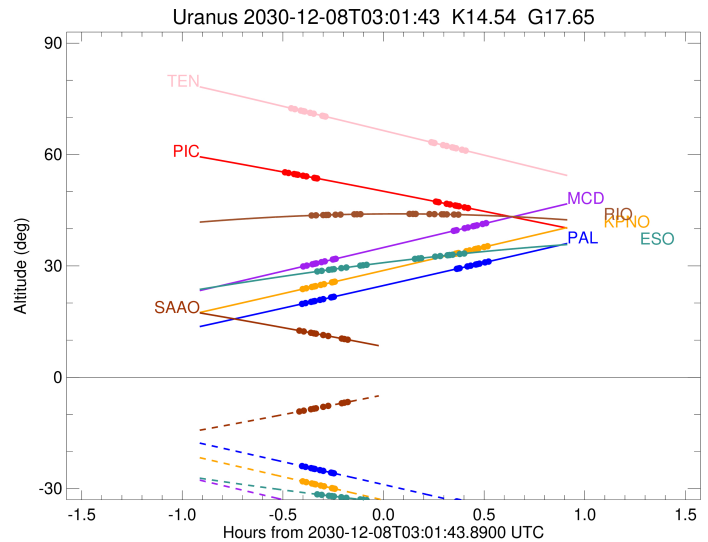
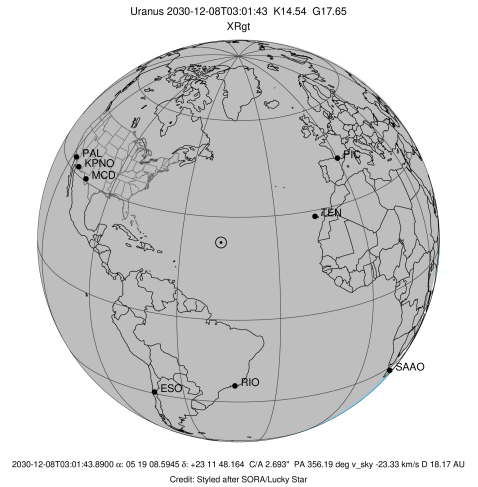


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	DEC 08 02:32 - DEC 08 03:27	PnnRie
PAL	Palomar Mt (200")	33.4	243.1	+++++		+++++	DEC 08 02:37 - DEC 08 03:33	PnnRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++		+++++	DEC 08 02:38 - DEC 08 03:32	PnnRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++		+++++	DEC 08 02:38 - DEC 08 03:32	PnnRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++		+++++	DEC 08 02:34 - DEC 08 03:26	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	+++++		+++++	DEC 08 02:40 - DEC 08 03:24	PnnRie
ESO	European Southern Obs	-29.3	289.3	+++++		+++++	DEC 08 02:42 - DEC 08 03:25	PnnRie
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+++++			DEC 08 02:37 - DEC 08 02:51	PnnRin
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-12-08T02:59:28.160  
 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 : 3415600195576838400  
 2Mass ID (if available) : 05190858+2311483  
 ICRS Star Coord at Epoch: 05h 19m 08.59455s +23:11:48.16447s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 14.538  
 G magnitude : 17.653  
 RP magnitude : 16.725  
 BP magnitude : 18.547  
 DUPflag : 0  
 Distance (au) : 18.175  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.33  
 Sun-Target sep (deg) : 175.00  
 Sun-Moon sep (deg) : 25.40  
 B (ring opening deg) : 81.65  
 PA of pole (deg) : 16.67  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.517  
 C/A sky separation (km) : 33180.3  
 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



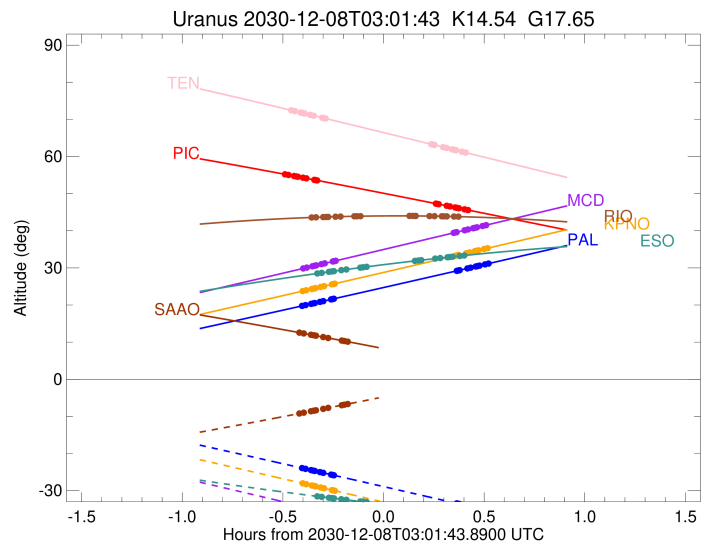
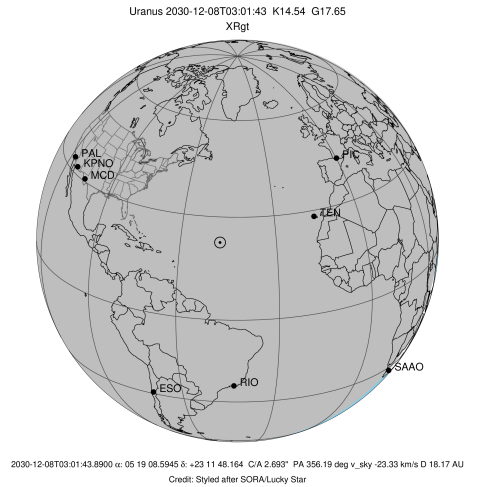
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-08T02:32:43.214		55.15	-51.07	50779.86	-17.81		
lambda	I	2030-12-08T02:33:25.878		55.03	-50.95	50026.71	-17.55		
delta	I	2030-12-08T02:35:05.738		54.75	-50.66	48300.35	-17.02		
gamma	I	2030-12-08T02:35:45.922		54.63	-50.54	47621.03	-16.79		
eta	I	2030-12-08T02:36:12.545		54.56	-50.46	47176.12	-16.63		
beta	I	2030-12-08T02:37:43.965		54.30	-50.19	45681.22	-16.06		
alpha	I	2030-12-08T02:38:44.843		54.12	-50.02	44715.05	-15.66		
4	I	2030-12-08T02:41:08.025		53.71	-49.60	42551.77	-14.58		
5	I	2030-12-08T02:41:28.098		53.65	-49.54	42263.45	-14.43		
6	I	2030-12-08T02:41:55.314		53.58	-49.46	41876.82	-14.18		

No planet occultations

6	E	2030-12-08T03:17:21.199		47.31	-43.10	41863.14	14.16		
5	E	2030-12-08T03:17:52.492		47.22	-43.01	42314.79	14.41		
4	E	2030-12-08T03:18:12.956		47.16	-42.94	42606.40	14.56		
alpha	E	2030-12-08T03:20:34.724		46.73	-42.52	44751.59	15.63		
beta	E	2030-12-08T03:21:32.244		46.56	-42.34	45661.93	16.03		
eta	E	2030-12-08T03:23:05.052		46.28	-42.06	47176.12	16.60		
gamma	E	2030-12-08T03:23:32.093		46.20	-41.98	47627.23	16.76		
delta	E	2030-12-08T03:24:11.982		46.08	-41.86	48300.35	16.99		
lambda	E	2030-12-08T03:25:52.038		45.78	-41.55	50026.71	17.51		
epsilon	E	2030-12-08T03:27:07.753		45.55	-41.32	51366.51	17.77		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2030-12-08T03:05:06.870
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      : 3415600195576838400
2Mass ID (if available) : 05190858+2311483
ICRS Star Coord at Epoch: 05h 19m 08.59455s +23:11:48.16447s
RUWE (>1.4 is poor) : 1.00
K magnitude         : 14.538
G magnitude         : 17.653
RP magnitude        : 16.725
BP magnitude        : 18.547
DUPflag            : 0
Distance (au)       : 18.175
f0 (km)            : 0.000
g0 (km)            : 0.000
skyplane vel. (km/s) : -23.33
Sun-Target sep (deg) : 175.00
Sun-Moon sep (deg)  : 24.19
B (ring opening deg) : 81.65
PA of pole (deg)    : 16.67
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 2.476
C/A sky separation (km) : 32633.2
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_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```

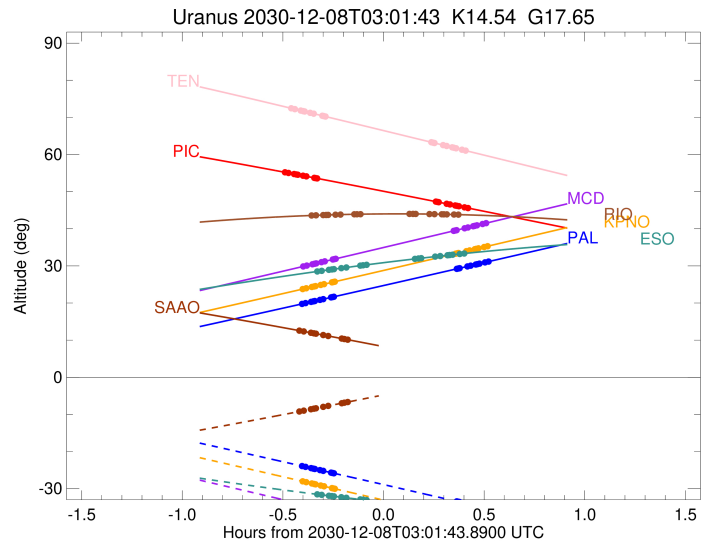
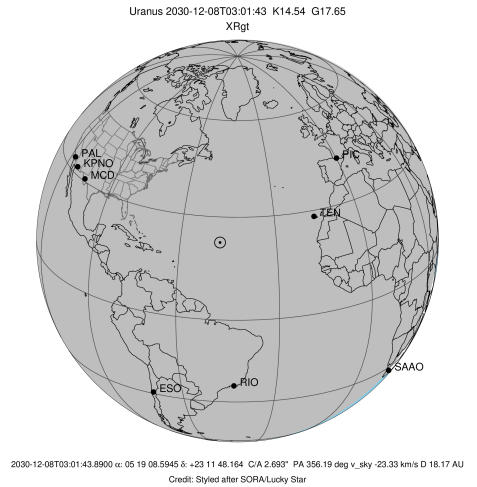


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-08T02:37:48.262		19.84	-23.99	50776.01	-17.85		
lambda	I	2030-12-08T02:38:30.576		19.98	-24.14	50026.71	-17.61		
delta	I	2030-12-08T02:40:09.990		20.31	-24.48	48300.35	-17.11		
gamma	I	2030-12-08T02:40:49.937		20.45	-24.61	47621.01	-16.90		
eta	I	2030-12-08T02:41:16.381		20.54	-24.70	47176.12	-16.75		
beta	I	2030-12-08T02:42:47.050		20.85	-25.01	45681.23	-16.21		
alpha	I	2030-12-08T02:43:47.355		21.05	-25.22	44714.11	-15.84		
4	I	2030-12-08T02:46:08.561		21.53	-25.70	42550.55	-14.83		
5	I	2030-12-08T02:46:28.338		21.59	-25.77	42261.15	-14.69		
6	I	2030-12-08T02:46:54.945		21.68	-25.86	41876.32	-14.45		

No planet occultations

6	E	2030-12-08T03:23:36.229		29.21	-33.44	41862.74	14.49		
5	E	2030-12-08T03:24:06.844		29.31	-33.54	42314.69	14.73		
4	E	2030-12-08T03:24:26.894		29.38	-33.61	42606.71	14.87		
alpha	E	2030-12-08T03:26:46.062		29.86	-34.09	44751.66	15.88		
beta	E	2030-12-08T03:27:42.701		30.06	-34.29	45661.77	16.26		
eta	E	2030-12-08T03:29:14.295		30.37	-34.61	47176.12	16.81		
gamma	E	2030-12-08T03:29:41.016		30.47	-34.70	47627.26	16.96		
delta	E	2030-12-08T03:30:20.455		30.60	-34.84	48300.35	17.17		
lambda	E	2030-12-08T03:31:59.507		30.94	-35.18	50026.71	17.68		
epsilon	E	2030-12-08T03:33:14.639		31.20	-35.44	51367.96	17.92		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-12-08T03:05:04.270  
 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 : 3415600195576838400  
 2Mass ID (if available) : 05190858+2311483  
 ICRS Star Coord at Epoch: 05h 19m 08.59455s +23:11:48.16447s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 14.538  
 G magnitude : 17.653  
 RP magnitude : 16.725  
 BP magnitude : 18.547  
 DUPflag : 0  
 Distance (au) : 18.175  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.33  
 Sun-Target sep (deg) : 175.00  
 Sun-Moon sep (deg) : 24.22  
 B (ring opening deg) : 81.65  
 PA of pole (deg) : 16.67  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.500  
 C/A sky separation (km) : 32951.6  
 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

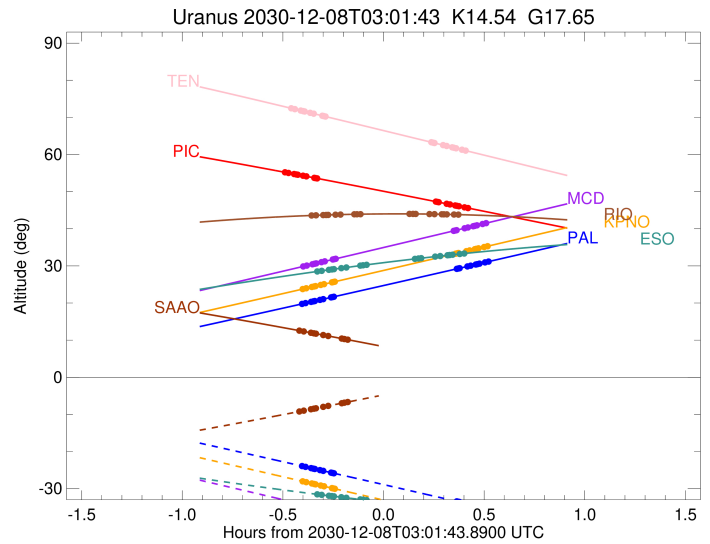
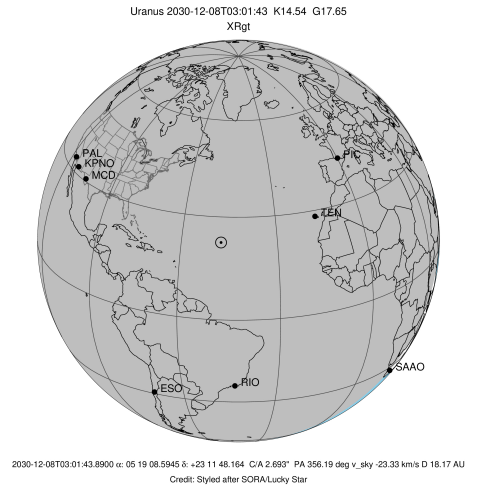


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-08T02:37:59.957		23.83	-28.11	50777.34	-17.75		
lambda	I	2030-12-08T02:38:42.593		23.98	-28.26	50026.71	-17.50		
delta	I	2030-12-08T02:40:22.659		24.32	-28.61	48300.35	-16.99		
gamma	I	2030-12-08T02:41:02.898		24.46	-28.75	47621.02	-16.77		
eta	I	2030-12-08T02:41:29.547		24.56	-28.84	47176.12	-16.62		
beta	I	2030-12-08T02:43:00.993		24.87	-29.16	45681.23	-16.06		
alpha	I	2030-12-08T02:44:01.864		25.08	-29.37	44714.47	-15.67		
4	I	2030-12-08T02:46:24.721		25.58	-29.87	42551.03	-14.63		
5	I	2030-12-08T02:46:44.746		25.65	-29.94	42262.08	-14.49		
6	I	2030-12-08T02:47:11.777		25.74	-30.03	41876.52	-14.24		

No planet occultations

6	E	2030-12-08T03:23:14.434		33.29	-37.62	41863.16	14.28		
5	E	2030-12-08T03:23:45.463		33.40	-37.73	42314.80	14.52		
4	E	2030-12-08T03:24:05.763		33.47	-37.81	42606.37	14.67		
alpha	E	2030-12-08T03:26:26.590		33.97	-38.30	44751.58	15.72		
beta	E	2030-12-08T03:27:23.804		34.17	-38.50	45661.98	16.11		
eta	E	2030-12-08T03:28:56.178		34.49	-38.83	47176.12	16.67		
gamma	E	2030-12-08T03:29:23.106		34.59	-38.92	47627.21	16.83		
delta	E	2030-12-08T03:30:02.840		34.73	-39.06	48300.35	17.05		
lambda	E	2030-12-08T03:31:42.549		35.08	-39.42	50026.71	17.57		
epsilon	E	2030-12-08T03:32:57.959		35.34	-39.68	51365.14	17.82		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-12-08T03:04:55.290  
 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 : 3415600195576838400  
 2Mass ID (if available) : 05190858+2311483  
 ICRS Star Coord at Epoch: 05h 19m 08.59455s +23:11:48.16447s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 14.538  
 G magnitude : 17.653  
 RP magnitude : 16.725  
 BP magnitude : 18.547  
 DUPflag : 0  
 Distance (au) : 18.175  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.33  
 Sun-Target sep (deg) : 175.00  
 Sun-Moon sep (deg) : 24.28  
 B (ring opening deg) : 81.65  
 PA of pole (deg) : 16.67  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.530  
 C/A sky separation (km) : 33346.9  
 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

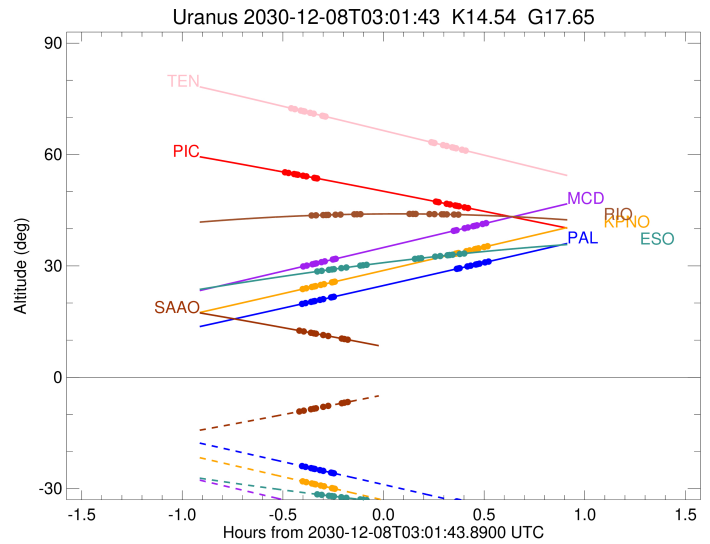
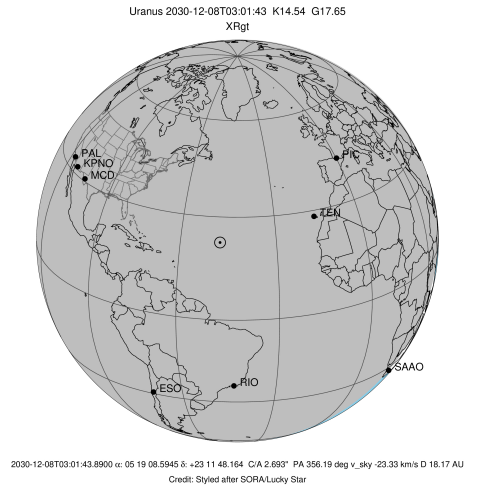


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-08T02:38:09.327		29.93	-34.34	50779.06	-17.63		
lambda	I	2030-12-08T02:38:52.371		30.08	-34.49	50026.71	-17.37		
delta	I	2030-12-08T02:40:33.256		30.44	-34.85	48300.35	-16.84		
gamma	I	2030-12-08T02:41:13.865		30.58	-34.99	47621.03	-16.61		
eta	I	2030-12-08T02:41:40.773		30.68	-35.09	47176.12	-16.45		
beta	I	2030-12-08T02:43:13.210		31.01	-35.42	45681.22	-15.88		
alpha	I	2030-12-08T02:44:14.806		31.23	-35.64	44714.93	-15.47		
4	I	2030-12-08T02:46:39.804		31.74	-36.15	42551.66	-14.38		
5	I	2030-12-08T02:47:00.155		31.81	-36.22	42263.25	-14.23		
6	I	2030-12-08T02:47:27.743		31.91	-36.32	41876.78	-13.98		

No planet occultations

6	E	2030-12-08T03:22:40.827		39.44	-43.88	41863.69	14.01		
5	E	2030-12-08T03:23:12.402		39.55	-43.99	42314.92	14.27		
4	E	2030-12-08T03:23:33.033		39.63	-44.06	42605.94	14.42		
alpha	E	2030-12-08T03:25:56.020		40.14	-44.58	44751.48	15.52		
beta	E	2030-12-08T03:26:53.977		40.35	-44.78	45662.23	15.92		
eta	E	2030-12-08T03:28:27.353		40.68	-45.12	47176.12	16.51		
gamma	E	2030-12-08T03:28:54.545		40.78	-45.22	47627.15	16.67		
delta	E	2030-12-08T03:29:34.656		40.92	-45.36	48300.35	16.90		
lambda	E	2030-12-08T03:31:15.202		41.28	-45.72	50026.71	17.43		
epsilon	E	2030-12-08T03:32:30.964		41.55	-45.99	51361.64	17.70		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-12-08T03:00:02.340  
 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 : 3415600195576838400  
 2Mass ID (if available) : 05190858+2311483  
 ICRS Star Coord at Epoch: 05h 19m 08.59455s +23:11:48.16447s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 14.538  
 G magnitude : 17.653  
 RP magnitude : 16.725  
 BP magnitude : 18.547  
 DUPflag : 0  
 Distance (au) : 18.175  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.33  
 Sun-Target sep (deg) : 175.00  
 Sun-Moon sep (deg) : 25.36  
 B (ring opening deg) : 81.65  
 PA of pole (deg) : 16.67  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 2.653  
 C/A sky separation (km) : 34970.9  
 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



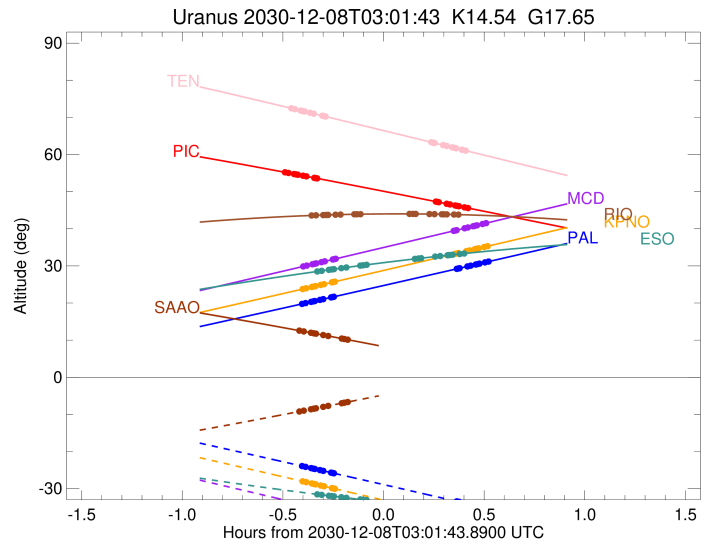
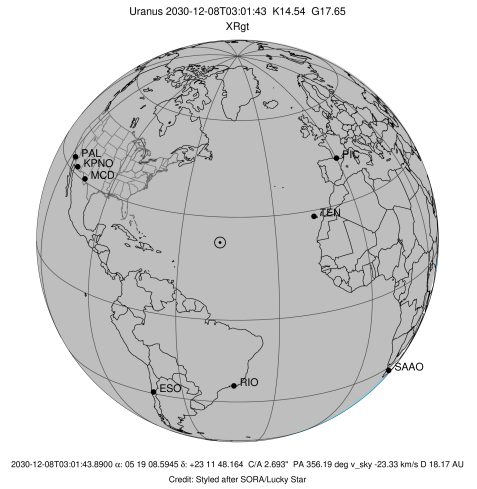
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-08T02:34:34.970		72.38	-67.50	50788.09	-17.12		
lambda	I	2030-12-08T02:35:19.924		72.22	-67.34	50026.71	-16.81		
delta	I	2030-12-08T02:37:04.503		71.84	-66.96	48300.35	-16.19		
gamma	I	2030-12-08T02:37:46.801		71.69	-66.81	47621.09	-15.92		
eta	I	2030-12-08T02:38:14.910		71.59	-66.70	47176.12	-15.74		
beta	I	2030-12-08T02:39:51.972		71.24	-66.35	45681.14	-15.05		
alpha	I	2030-12-08T02:40:57.000		71.00	-66.11	44717.15	-14.57		
4	I	2030-12-08T02:43:32.447		70.44	-65.55	42554.72	-13.26		
5	I	2030-12-08T02:43:54.433		70.36	-65.47	42268.81	-13.07		
6	I	2030-12-08T02:44:24.853		70.25	-65.36	41877.86	-12.76		

No planet occultations

6	E	2030-12-08T03:16:00.804		63.31	-58.41	41865.66	12.75		
5	E	2030-12-08T03:16:35.246		63.18	-58.29	42315.21	13.06		
4	E	2030-12-08T03:16:57.619		63.10	-58.20	42604.21	13.25		
alpha	E	2030-12-08T03:19:31.588		62.53	-57.64	44751.04	14.56		
beta	E	2030-12-08T03:20:33.250		62.31	-57.41	45663.16	15.04		
eta	E	2030-12-08T03:22:11.651		61.94	-57.05	47176.12	15.72		
gamma	E	2030-12-08T03:22:40.162		61.84	-56.95	47626.94	15.90		
delta	E	2030-12-08T03:23:22.149		61.68	-56.79	48300.35	16.17		
lambda	E	2030-12-08T03:25:06.870		61.30	-56.41	50026.71	16.79		
epsilon	E	2030-12-08T03:26:24.675		61.01	-56.12	51349.44	17.09		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2030-12-08T03:01:58.770
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        : 3415600195576838400
2Mass ID (if available) : 05190858+2311483
ICRS Star Coord at Epoch: 05h 19m 08.59455s +23:11:48.16447s
RUWE (>1.4 is poor)  : 1.00
K magnitude           : 14.538
G magnitude           : 17.653
RP magnitude          : 16.725
BP magnitude          : 18.547
DUPflag              : 0
Distance (au)         : 18.175
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -23.33
Sun-Target sep (deg)  : 175.00
Sun-Moon sep (deg)    : 24.93
B (ring opening deg)  : 81.65
PA of pole (deg)      : 16.67
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 3.045
C/A sky separation (km) : 40141.9
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
  
```

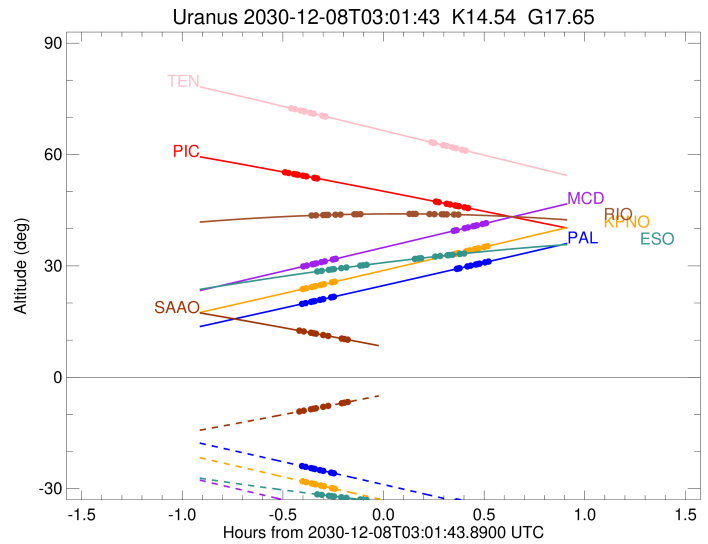
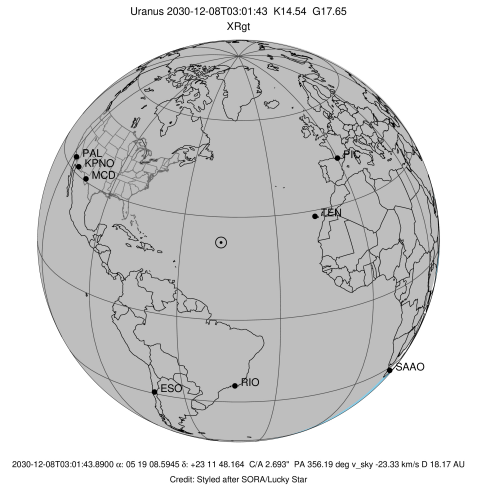


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-08T02:40:41.400		43.60	-44.53	50819.88	-14.42		
lambda	I	2030-12-08T02:41:37.516		43.63	-44.54	50026.71	-13.93		
delta	I	2030-12-08T02:43:46.003		43.69	-44.54	48300.35	-12.92		
gamma	I	2030-12-08T02:44:39.458		43.72	-44.54	47621.38	-12.48		
eta	I	2030-12-08T02:45:15.606		43.73	-44.54	47176.12	-12.16		
beta	I	2030-12-08T02:47:24.899		43.79	-44.54	45680.34	-10.96		
alpha	I	2030-12-08T02:48:55.785		43.82	-44.53	44724.62	-10.06		
4	I	2030-12-08T02:53:04.173		43.90	-44.49	42566.98	-7.28		
5	I	2030-12-08T02:53:44.701		43.92	-44.49	42288.25	-6.79		
6	I	2030-12-08T02:54:48.561		43.93	-44.47	41879.74	-5.97		

No planet occultations

6	E	2030-12-08T03:09:32.353		44.01	-44.14	41874.10	5.97		
5	E	2030-12-08T03:10:40.120		44.00	-44.10	42312.46	6.80		
4	E	2030-12-08T03:11:21.026		44.00	-44.08	42594.13	7.28		
alpha	E	2030-12-08T03:15:27.721		43.96	-43.92	44748.04	10.06		
beta	E	2030-12-08T03:16:55.177		43.94	-43.86	45667.31	10.96		
eta	E	2030-12-08T03:19:05.669		43.91	-43.77	47176.12	12.16		
gamma	E	2030-12-08T03:19:42.176		43.90	-43.74	47625.95	12.48		
delta	E	2030-12-08T03:20:35.257		43.88	-43.70	48300.35	12.93		
lambda	E	2030-12-08T03:22:43.719		43.84	-43.60	50026.71	13.93		
epsilon	E	2030-12-08T03:24:12.478		43.81	-43.53	51291.85	14.43		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-12-08T03:03:42.130  
 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 : 3415600195576838400  
 2Mass ID (if available) : 05190858+2311483  
 ICRS Star Coord at Epoch: 05h 19m 08.59455s +23:11:48.16447s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 14.538  
 G magnitude : 17.653  
 RP magnitude : 16.725  
 BP magnitude : 18.547  
 DUPflag : 0  
 Distance (au) : 18.175  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.33  
 Sun-Target sep (deg) : 175.00  
 Sun-Moon sep (deg) : 24.53  
 B (ring opening deg) : 81.65  
 PA of pole (deg) : 16.67  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.049  
 C/A sky separation (km) : 40184.9  
 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



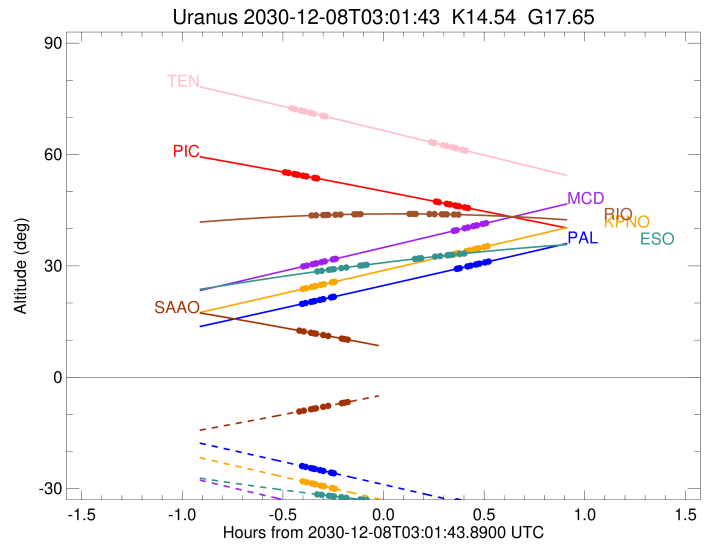
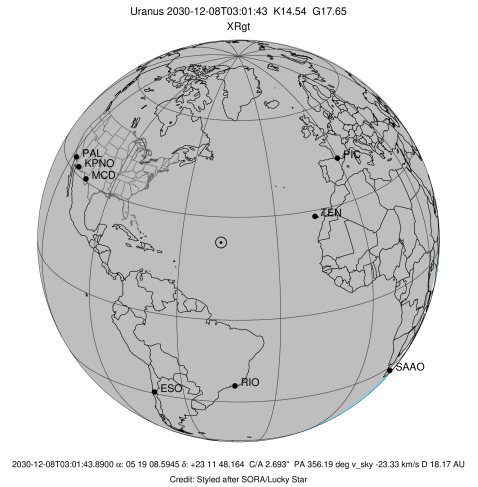
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-08T02:42:22.806		28.55	-31.58	50819.57	-14.34		
lambda	I	2030-12-08T02:43:19.223		28.67	-31.68	50026.71	-13.85		
delta	I	2030-12-08T02:45:28.485		28.94	-31.92	48300.35	-12.84		
gamma	I	2030-12-08T02:46:22.283		29.05	-32.01	47621.38	-12.39		
eta	I	2030-12-08T02:46:58.669		29.13	-32.08	47176.12	-12.08		
beta	I	2030-12-08T02:49:08.885		29.39	-32.31	45680.34	-10.87		
alpha	I	2030-12-08T02:50:40.506		29.58	-32.47	44724.60	-9.97		
4	I	2030-12-08T02:54:51.577		30.08	-32.90	42567.00	-7.18		
5	I	2030-12-08T02:55:32.711		30.16	-32.97	42288.30	-6.69		
6	I	2030-12-08T02:56:37.717		30.28	-33.08	41879.74	-5.85		

No planet occultations

6	E	2030-12-08T03:11:09.743		31.89	-34.44	41874.25	5.86		
5	E	2030-12-08T03:12:18.635		32.01	-34.54	42312.32	6.69		
4	E	2030-12-08T03:13:00.115		32.08	-34.60	42593.88	7.19		
alpha	E	2030-12-08T03:17:09.305		32.51	-34.94	44747.95	9.98		
beta	E	2030-12-08T03:18:37.401		32.65	-35.06	45667.40	10.89		
eta	E	2030-12-08T03:20:48.679		32.87	-35.23	47176.12	12.09		
gamma	E	2030-12-08T03:21:25.384		32.92	-35.28	47625.92	12.41		
delta	E	2030-12-08T03:22:18.743		33.01	-35.35	48300.35	12.86		
lambda	E	2030-12-08T03:24:27.816		33.21	-35.51	50026.71	13.87		
epsilon	E	2030-12-08T03:25:56.841		33.35	-35.62	51290.18	14.37		



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-12-08T02:58:40.170  
 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 : 3415600195576838400  
 2Mass ID (if available) : 05190858+2311483  
 ICRS Star Coord at Epoch: 05h 19m 08.59455s +23:11:48.16447s  
 RUWE (>1.4 is poor) : 1.00  
 K magnitude : 14.538  
 G magnitude : 17.653  
 RP magnitude : 16.725  
 BP magnitude : 18.547  
 DUPflag : 0  
 Distance (au) : 18.175  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.33  
 Sun-Target sep (deg) : 175.00  
 Sun-Moon sep (deg) : 25.35  
 B (ring opening deg) : 81.65  
 PA of pole (deg) : 16.67  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 3.033  
 C/A sky separation (km) : 39983.2  
 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\_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	2030-12-08T02:37:02.315		12.50	-9.15	50820.22	-14.40		
lambda	I	2030-12-08T02:37:58.513		12.34	-8.99	50026.71	-13.92		
delta	I	2030-12-08T02:40:06.994		11.98	-8.62	48300.35	-12.94		
gamma	I	2030-12-08T02:41:00.376		11.83	-8.46	47621.39	-12.50		
eta	I	2030-12-08T02:41:36.444		11.73	-8.35	47176.12	-12.19		
beta	I	2030-12-08T02:43:45.210		11.37	-7.97	45680.34	-11.02		
alpha	I	2030-12-08T02:45:15.430		11.12	-7.71	44724.56	-10.15		
4	I	2030-12-08T02:49:19.661		10.42	-6.98	42566.72	-7.49		
5	I	2030-12-08T02:49:58.963		10.31	-6.87	42287.85	-7.03		
6	I	2030-12-08T02:51:00.267		10.13	-6.68	41879.74	-6.26		

No planet occultations

6	E	2030-12-08T03:06:44.146		7.39	-3.83x	41873.64	6.25		
5	E	2030-12-08T03:07:49.460		7.20	-3.63x	42312.85	7.02		
4	E	2030-12-08T03:08:29.214		7.08	-3.51x	42594.86	7.48		
alpha	E	2030-12-08T03:12:32.108		6.36	-2.77x	44748.28	10.14		
beta	E	2030-12-08T03:13:59.034		6.10	-2.50x	45667.04	11.00		
eta	E	2030-12-08T03:16:09.294		5.71	-2.10x	47176.12	12.17		
gamma	E	2030-12-08T03:16:45.811		5.60	-1.98x	47626.02	12.47		
delta	E	2030-12-08T03:17:38.940		5.44	-1.82x	48300.35	12.91		
lambda	E	2030-12-08T03:19:47.733		5.05	-1.42x	50026.71	13.88		
epsilon	E	2030-12-08T03:21:17.159		4.78x	-1.14x	51296.30	14.37		