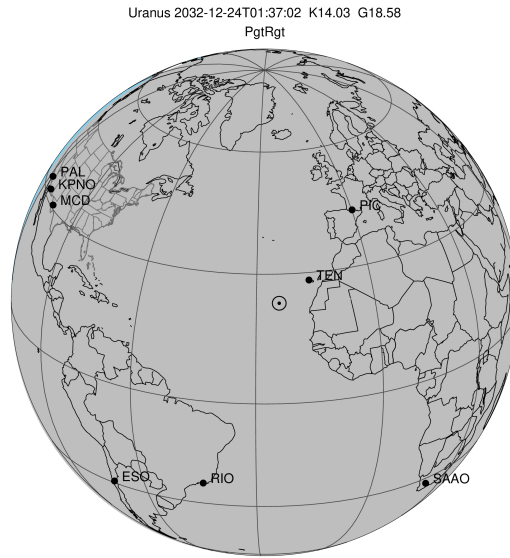


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-12-24T01:37:02.360  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3427813983054352256  
 2Mass ID (if available) : 05554510+2338563

ICRS Star Coord at Epoch: 05h 55m 45.09803s +23:38:56.38272s

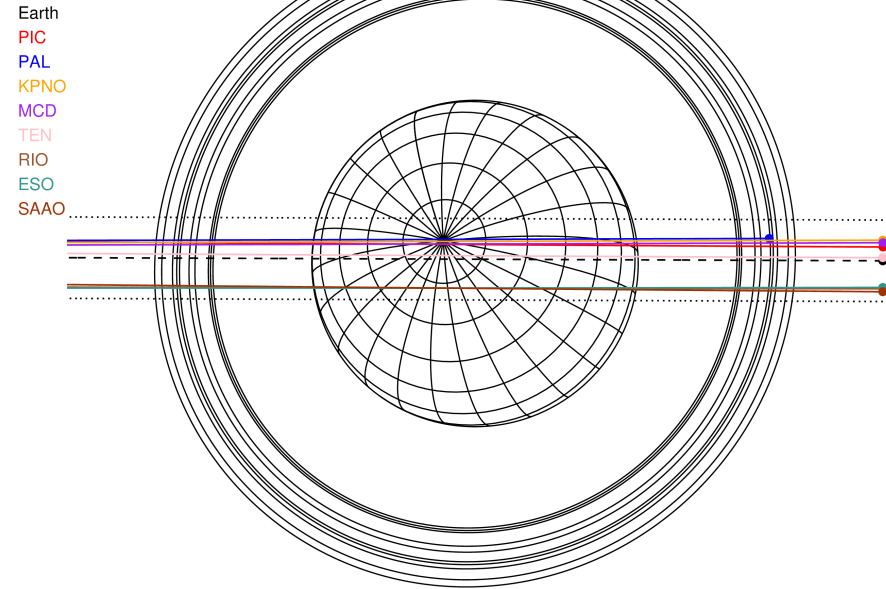
RUWE (>1.4 is poor) : 1.03  
 K magnitude : 14.031  
 G magnitude : 18.584  
 RP magnitude : 17.340  
 BP magnitude : 19.831  
 DUPflag : 0  
 Distance (au) : 18.037  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.37  
 Sun-Target sep (deg) : 176.69  
 Sun-Moon sep (deg) : 84.74  
 B (ring opening deg) : 76.15  
 PA of pole (deg) : 54.37

#	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



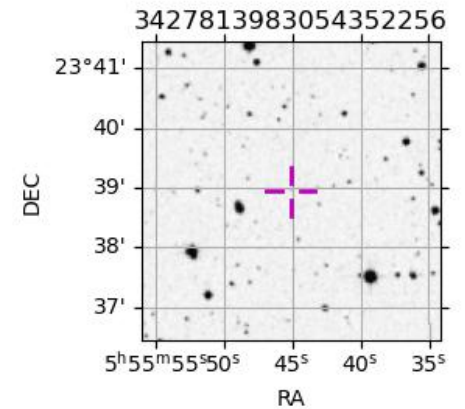
2032-12-24T01:37:02.3600 ra: 05 55 45.09803 ra: +23 38 56.383 C/A 0.058° PA 179.76 deg v\_sky -23.37 km/s D 18.04 AU  
 Credit: Styled after SORA/Lucky Star

Uranus 2032-12-24T01:37:02 K14.03 G18.58 PgtRgt

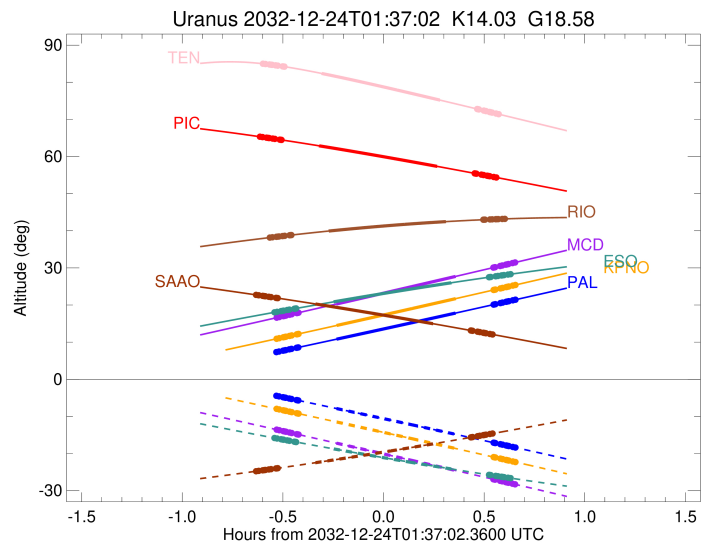
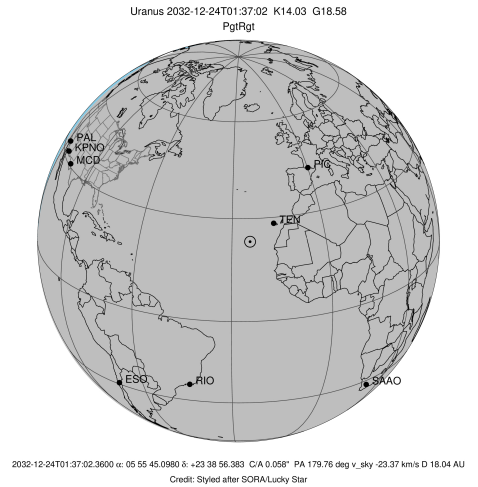


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++	+ +	+++++	DEC 24 01:00 - DEC 24 02:10	PieRie
PAL	Palomar Mt (200")	33.4	243.1	++++	+ +	+++++	DEC 24 01:08 - DEC 24 02:16	PieRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++	+ +	+++++	DEC 24 01:05 - DEC 24 02:16	PieRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++	+ +	+++++	DEC 24 01:05 - DEC 24 02:16	PieRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++	+ +	+++++	DEC 24 01:01 - DEC 24 02:11	PieRie
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 24 01:03 - DEC 24 02:13	PieRie
ESO	European Southern Obs	-29.3	289.3	+++++	+ +	+++++	DEC 24 01:04 - DEC 24 02:14	PieRie
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+++++	+ +	+++++	DEC 24 00:59 - DEC 24 02:09	PieRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn

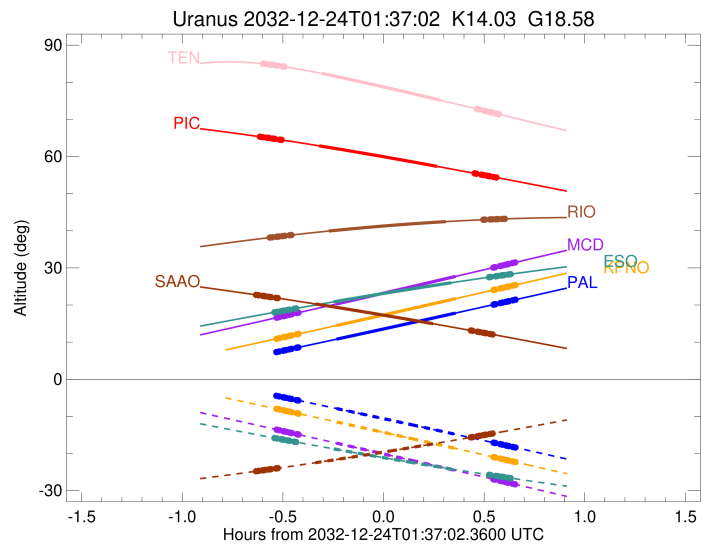
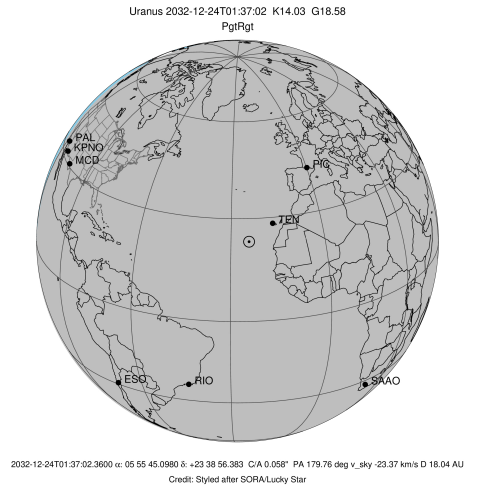


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-12-24T01:35:28.870  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PIC  
 Location : Pic du Midi  
 Latitude (deg) : 42.93656  
 E. Longitude (deg) : 0.14231  
 Altitude (km) : 2.890  
 Gaia source ID : 3427813983054352256  
 2Mass ID (if available) : 05554510+2338563  
 ICRS Star Coord at Epoch: 05h 55m 45.09803s +23:38:56.38272s  
 RUWE (>1.4 is poor) : 1.03  
 K magnitude : 14.031  
 G magnitude : 18.584  
 RP magnitude : 17.340  
 BP magnitude : 19.831  
 DUPflag : 0  
 Distance (au) : 18.037  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.37  
 Sun-Target sep (deg) : 176.69  
 Sun-Moon sep (deg) : 85.49  
 B (ring opening deg) : 76.15  
 PA of pole (deg) : 54.37  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.227  
 C/A sky separation (km) : 2964.5  
 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\_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	2032-12-24T01:00:15.308		65.33	-66.87	51086.89	-24.13		
lambda	I	2032-12-24T01:00:59.257		65.24	-66.79	50026.71	-24.12		
delta	I	2032-12-24T01:02:10.833		65.08	-66.65	48300.35	-24.12		
gamma	I	2032-12-24T01:02:38.567		65.02	-66.60	47631.50	-24.12		
eta	I	2032-12-24T01:02:57.451		64.98	-66.56	47176.12	-24.11		
beta	I	2032-12-24T01:03:59.526		64.84	-66.44	45678.88	-24.11		
alpha	I	2032-12-24T01:04:38.465		64.75	-66.36	44742.86	-24.11		
4	I	2032-12-24T01:06:06.816		64.55	-66.19	42610.19	-24.10		
5	I	2032-12-24T01:06:21.514		64.52	-66.16	42262.51	-24.10		
6	I	2032-12-24T01:06:40.670		64.47	-66.12	41794.87	-24.10		
Uranus	I	2032-12-24T01:17:50.045		62.89	-64.70	25249.77		-10.24	-10.72
Uranus	E	2032-12-24T01:53:03.138		57.35	-59.52	25129.26		12.14	12.70
6	E	2032-12-24T02:04:15.184		55.46	-57.72	41878.69	24.06		
5	E	2032-12-24T02:04:29.011		55.42	-57.68	42218.41	24.06		
4	E	2032-12-24T02:04:42.170		55.39	-57.64	42529.38	24.06		
alpha	E	2032-12-24T02:06:12.169		55.13	-57.40	44697.60	24.07		
beta	E	2032-12-24T02:06:51.662		55.02	-57.29	45644.82	24.07		
eta	E	2032-12-24T02:07:55.264		54.84	-57.11	47176.12	24.07		
gamma	E	2032-12-24T02:08:13.756		54.78	-57.06	47621.19	24.07		
delta	E	2032-12-24T02:08:41.973		54.70	-56.98	48300.35	24.07		
lambda	E	2032-12-24T02:09:53.691		54.50	-56.78	50026.71	24.07		
epsilon	E	2032-12-24T02:10:44.632		54.35	-56.64	51253.03	24.08		

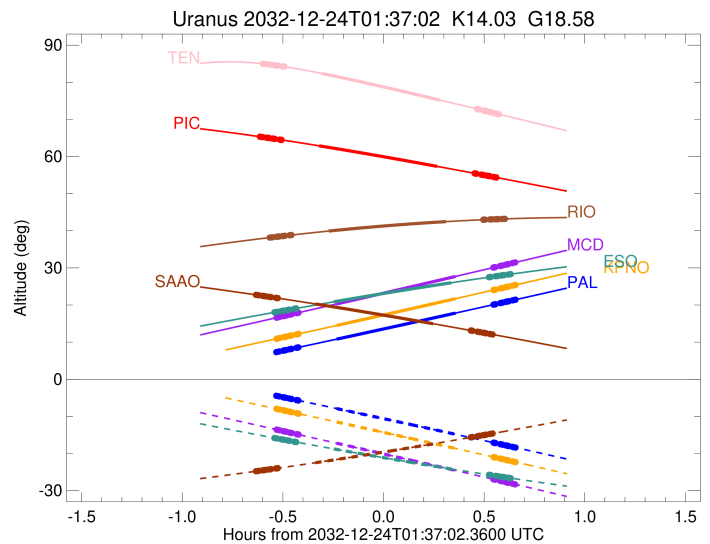
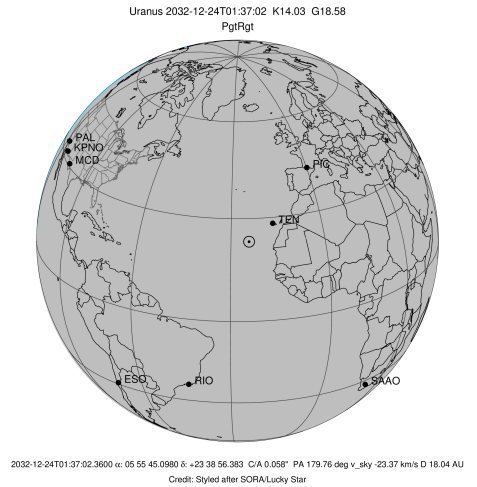
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-12-24T01:40:51.470  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PAL  
 Location : Palomar Mt (200")  
 Latitude (deg) : 33.35622  
 E. Longitude (deg) : 243.13601  
 Altitude (km) : 1.706  
 Gaia source ID : 3427813983054352256  
 2Mass ID (if available) : 05554510+2338563  
 ICRS Star Coord at Epoch: 05h 55m 45.09803s +23:38:56.38272s  
 RUWE (>1.4 is poor) : 1.03  
 K magnitude : 14.031  
 G magnitude : 18.584  
 RP magnitude : 17.340  
 BP magnitude : 19.831  
 DUPflag : 0  
 Distance (au) : 18.037  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.37  
 Sun-Target sep (deg) : 176.69  
 Sun-Moon sep (deg) : 85.02  
 B (ring opening deg) : 76.15  
 PA of pole (deg) : 54.37  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.289  
 C/A sky separation (km) : 3785.2  
 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\_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	2032-12-24T01:05:08.449		7.33	-4.47x	51096.94	-23.73		
lambda	I	2032-12-24T01:05:53.577		7.47	-4.61x	50026.71	-23.71		
delta	I	2032-12-24T01:07:06.381		7.70	-4.84x	48300.35	-23.71		
gamma	I	2032-12-24T01:07:34.590		7.80	-4.93x	47631.52	-23.71		
eta	I	2032-12-24T01:07:53.798		7.86	-4.99x	47176.12	-23.71		
beta	I	2032-12-24T01:08:56.926		8.06	-5.19	45679.13	-23.70		
alpha	I	2032-12-24T01:09:36.512		8.19	-5.31	44743.49	-23.70		
4	I	2032-12-24T01:11:06.429		8.48	-5.60	42609.51	-23.69		
5	I	2032-12-24T01:11:21.266		8.53	-5.65	42264.65	-23.70		
6	I	2032-12-24T01:11:40.852		8.59	-5.71	41794.80	-23.69		
Uranus	I	2032-12-24T01:23:02.371		10.80	-7.89	25272.75		-9.84	-10.30
Uranus	E	2032-12-24T01:58:32.548		17.83	-14.83	25118.75		12.30	12.86
6	E	2032-12-24T02:09:53.056		20.12	-17.09	41878.59	23.79		
5	E	2032-12-24T02:10:07.073		20.16	-17.14	42219.23	23.80		
4	E	2032-12-24T02:10:20.332		20.21	-17.18	42529.21	23.79		
alpha	E	2032-12-24T02:11:51.332		20.52	-17.48	44697.84	23.81		
beta	E	2032-12-24T02:12:31.243		20.65	-17.62	45644.92	23.81		
eta	E	2032-12-24T02:13:35.509		20.87	-17.83	47176.12	23.82		
gamma	E	2032-12-24T02:13:54.193		20.93	-17.89	47621.20	23.82		
delta	E	2032-12-24T02:14:22.700		21.03	-17.99	48300.35	23.83		
lambda	E	2032-12-24T02:15:35.147		21.27	-18.23	50026.71	23.83		
epsilon	E	2032-12-24T02:16:26.708		21.44	-18.40	51255.67	23.85		

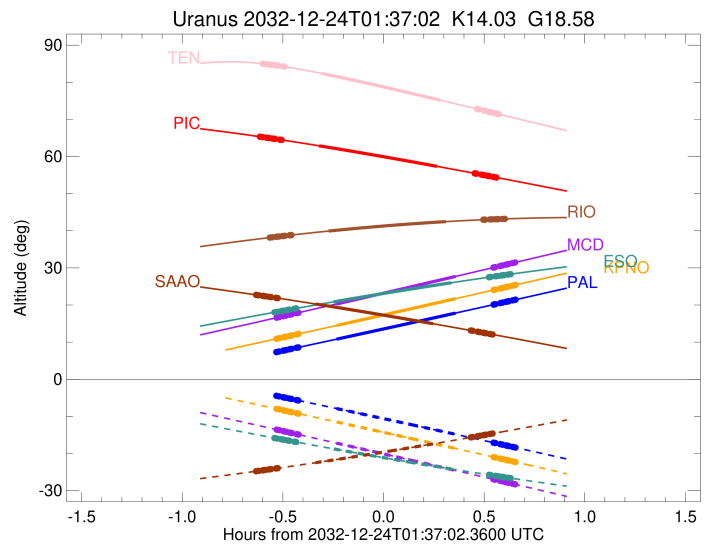
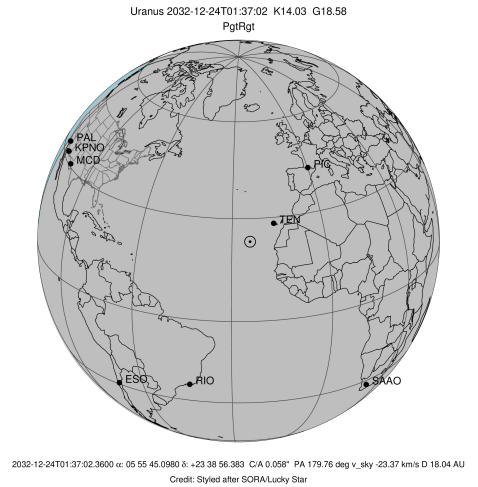
```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch              : 2032-12-24T01:40:53.220
Event type             : PgtRgt
: Uranus occs: geocentric, topocentric
: 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        : 3427813983054352256
2Mass ID (if available) : 05554510+2338563
ICRS Star Coord at Epoch: 05h 55m 45.09803s +23:38:56.38272s
RUWE (>1.4 is poor)  : 1.03
K magnitude           : 14.031
G magnitude           : 18.584
RP magnitude          : 17.340
BP magnitude          : 19.831
DUPflag              : 0
Distance (au)         : 18.037
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -23.37
Sun-Target sep (deg)  : 176.69
Sun-Moon sep (deg)    : 85.07
B (ring opening deg)  : 76.15
PA of pole (deg)      : 54.37
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.265
C/A sky separation (km) : 3465.9
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
    
```



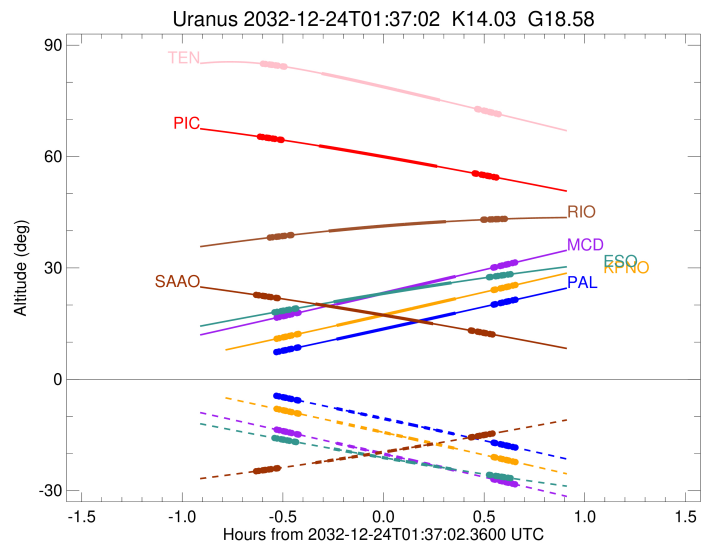
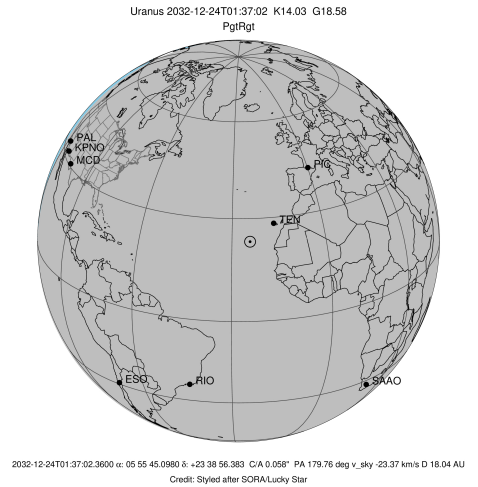
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-12-24T01:05:13.023		10.92	-7.98	51094.43	-23.78		
lambda	I	2032-12-24T01:05:57.957		11.07	-8.13	50026.71	-23.76		
delta	I	2032-12-24T01:07:10.614		11.31	-8.36	48300.35	-23.76		
gamma	I	2032-12-24T01:07:38.765		11.40	-8.46	47631.52	-23.76		
eta	I	2032-12-24T01:07:57.934		11.47	-8.52	47176.12	-23.76		
beta	I	2032-12-24T01:09:00.933		11.68	-8.72	45679.07	-23.75		
alpha	I	2032-12-24T01:09:40.440		11.81	-8.85	44743.33	-23.75		
4	I	2032-12-24T01:11:10.150		12.11	-9.15	42609.70	-23.74		
5	I	2032-12-24T01:11:24.984		12.16	-9.20	42264.08	-23.75		
6	I	2032-12-24T01:11:44.500		12.22	-9.26	41794.81	-23.74		
Uranus	I	2032-12-24T01:23:04.109		14.49	-11.50	25265.78		-9.97	-10.43
Uranus	E	2032-12-24T01:58:34.879		21.72	-18.66	25124.48		12.21	12.77
6	E	2032-12-24T02:09:53.654		24.06	-20.97	41878.66	23.84		
5	E	2032-12-24T02:10:07.613		24.11	-21.02	42218.62	23.85		
4	E	2032-12-24T02:10:20.877		24.15	-21.06	42529.33	23.85		
alpha	E	2032-12-24T02:11:51.664		24.47	-21.37	44697.65	23.86		
beta	E	2032-12-24T02:12:31.493		24.60	-21.51	45644.84	23.86		
eta	E	2032-12-24T02:13:35.627		24.82	-21.73	47176.12	23.87		
gamma	E	2032-12-24T02:13:54.272		24.89	-21.79	47621.19	23.87		
delta	E	2032-12-24T02:14:22.720		24.99	-21.89	48300.35	23.87		
lambda	E	2032-12-24T02:15:35.020		25.24	-22.14	50026.71	23.88		
epsilon	E	2032-12-24T02:16:26.372		25.41	-22.31	51253.20	23.90		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-12-24T01:40:50.280  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : 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 : 3427813983054352256  
 2Mass ID (if available) : 05554510+2338563  
 ICRS Star Coord at Epoch: 05h 55m 45.09803s +23:38:56.38272s  
 RUWE (>1.4 is poor) : 1.03  
 K magnitude : 14.031  
 G magnitude : 18.584  
 RP magnitude : 17.340  
 BP magnitude : 19.831  
 DUPflag : 0  
 Distance (au) : 18.037  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.37  
 Sun-Target sep (deg) : 176.69  
 Sun-Moon sep (deg) : 85.16  
 B (ring opening deg) : 76.15  
 PA of pole (deg) : 54.37  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.234  
 C/A sky separation (km) : 3064.6  
 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\_itr93\_040916.bsp  
 earth\_720101\_070426.bpc  
 earth\_200101\_990628\_predict.bpc  
 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



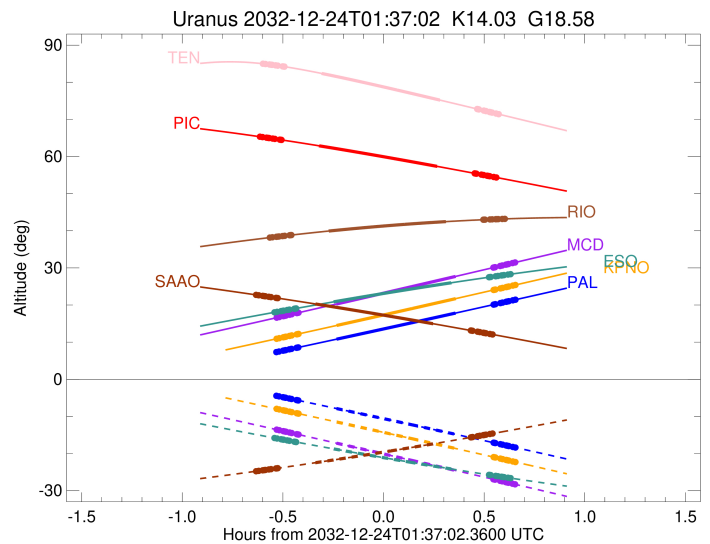
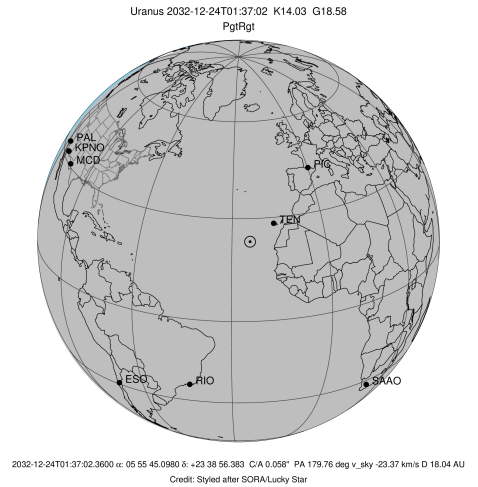
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-12-24T01:05:14.421		16.60	-13.58	51091.23	-23.84		
lambda	I	2032-12-24T01:05:59.095		16.76	-13.73	50026.71	-23.83		
delta	I	2032-12-24T01:07:11.547		17.01	-13.97	48300.35	-23.83		
gamma	I	2032-12-24T01:07:39.619		17.10	-14.07	47631.51	-23.83		
eta	I	2032-12-24T01:07:58.733		17.17	-14.13	47176.12	-23.83		
beta	I	2032-12-24T01:09:01.554		17.38	-14.35	45678.98	-23.82		
alpha	I	2032-12-24T01:09:40.953		17.52	-14.48	44743.12	-23.82		
4	I	2032-12-24T01:11:10.379		17.82	-14.79	42609.93	-23.82		
5	I	2032-12-24T01:11:25.206		17.88	-14.84	42263.36	-23.82		
6	I	2032-12-24T01:11:44.629		17.94	-14.90	41794.84	-23.81		
Uranus	I	2032-12-24T01:23:01.721		20.28	-17.21	25256.96		-10.12	-10.59
Uranus	E	2032-12-24T01:58:32.119		27.71	-24.57	25131.73		12.11	12.66
6	E	2032-12-24T02:09:48.653		30.09	-26.94	41878.75	23.91		
5	E	2032-12-24T02:10:02.539		30.14	-26.99	42217.88	23.92		
4	E	2032-12-24T02:10:15.805		30.19	-27.03	42529.50	23.92		
alpha	E	2032-12-24T02:11:46.310		30.50	-27.35	44697.41	23.93		
beta	E	2032-12-24T02:12:26.031		30.65	-27.49	45644.73	23.93		
eta	E	2032-12-24T02:13:29.989		30.87	-27.71	47176.12	23.94		
gamma	E	2032-12-24T02:13:48.582		30.94	-27.78	47621.18	23.94		
delta	E	2032-12-24T02:14:16.952		31.04	-27.88	48300.35	23.94		
lambda	E	2032-12-24T02:15:29.053		31.29	-28.13	50026.71	23.95		
epsilon	E	2032-12-24T02:16:20.139		31.47	-28.31	51250.14	23.96		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-12-24T01:36:15.250  
 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 : 3427813983054352256  
 2Mass ID (if available) : 05554510+2338563  
 ICRS Star Coord at Epoch: 05h 55m 45.09803s +23:38:56.38272s  
 RUWE (>1.4 is poor) : 1.03  
 K magnitude : 14.031  
 G magnitude : 18.584  
 RP magnitude : 17.340  
 BP magnitude : 19.831  
 DUPflag : 0  
 Distance (au) : 18.037  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.37  
 Sun-Target sep (deg) : 176.69  
 Sun-Moon sep (deg) : 85.61  
 B (ring opening deg) : 76.15  
 PA of pole (deg) : 54.37  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.092  
 C/A sky separation (km) : 1206.9  
 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



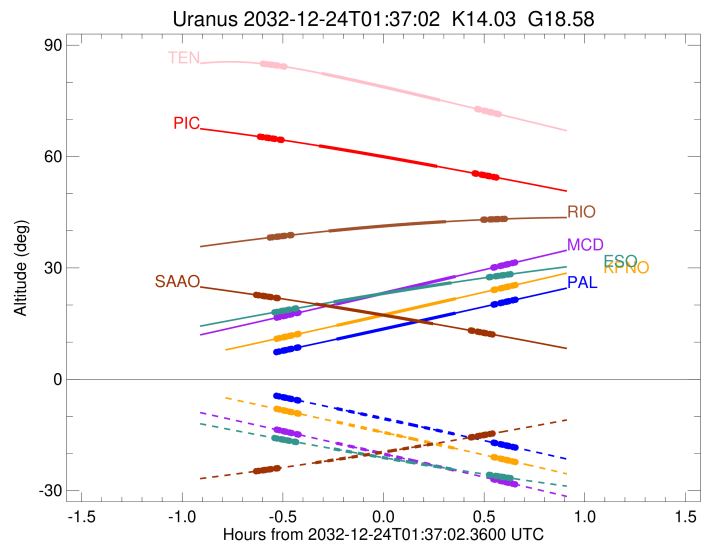
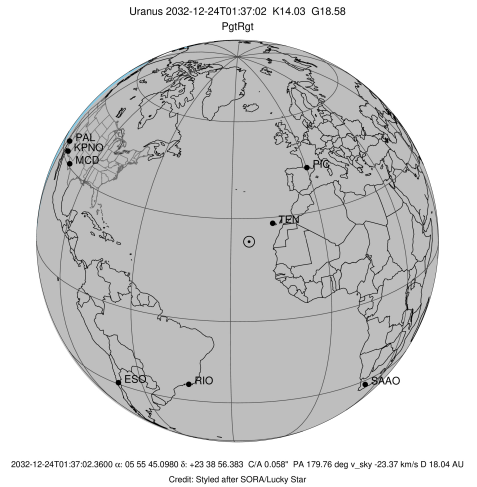
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-12-24T01:01:09.512		85.00	-85.17	51073.58	-24.25		
lambda	I	2032-12-24T01:01:52.690		84.92	-85.20	50026.71	-24.24		
delta	I	2032-12-24T01:03:03.897		84.79	-85.24	48300.35	-24.24		
gamma	I	2032-12-24T01:03:31.487		84.74	-85.25	47631.47	-24.24		
eta	I	2032-12-24T01:03:50.270		84.70	-85.26	47176.12	-24.24		
beta	I	2032-12-24T01:04:52.024		84.57	-85.27	45678.51	-24.24		
alpha	I	2032-12-24T01:05:30.778		84.49	-85.27	44741.93	-24.24		
4	I	2032-12-24T01:06:58.559		84.29	-85.26	42611.09	-24.24		
5	I	2032-12-24T01:07:13.328		84.26	-85.26	42259.42	-24.24		
6	I	2032-12-24T01:07:32.225		84.21	-85.25	41795.05	-24.24		
Uranus	I	2032-12-24T01:18:36.148		82.38	-84.43	25212.82		-10.86	-11.36
Uranus	E	2032-12-24T01:53:52.556		75.20	-78.15	25163.24		11.63	12.17
6	E	2032-12-24T02:04:59.815		72.80	-75.82	41879.06	24.22		
5	E	2032-12-24T02:05:13.408		72.75	-75.77	42215.03	24.22		
4	E	2032-12-24T02:05:26.666		72.70	-75.73	42530.16	24.22		
alpha	E	2032-12-24T02:06:55.996		72.38	-75.41	44696.52	24.22		
beta	E	2032-12-24T02:07:35.257		72.24	-75.27	45644.36	24.22		
eta	E	2032-12-24T02:08:38.477		72.01	-75.05	47176.12	24.22		
gamma	E	2032-12-24T02:08:56.851		71.94	-74.98	47621.13	24.22		
delta	E	2032-12-24T02:09:24.894		71.84	-74.88	48300.35	24.22		
lambda	E	2032-12-24T02:10:36.172		71.58	-74.63	50026.71	24.22		
epsilon	E	2032-12-24T02:11:26.218		71.40	-74.45	51238.88	24.22		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-12-24T01:38:07.140  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : 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 : 3427813983054352256  
 2Mass ID (if available) : 05554510+2338563  
 ICRS Star Coord at Epoch: 05h 55m 45.09803s +23:38:56.38272s  
 RUWE (>1.4 is poor) : 1.03  
 K magnitude : 14.031  
 G magnitude : 18.584  
 RP magnitude : 17.340  
 BP magnitude : 19.831  
 DUPflag : 0  
 Distance (au) : 18.037  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.37  
 Sun-Target sep (deg) : 176.69  
 Sun-Moon sep (deg) : 85.35  
 B (ring opening deg) : 76.15  
 PA of pole (deg) : 54.37  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.296  
 C/A sky separation (km) : 3871.0  
 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\_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	2032-12-24T01:03:13.874		38.18	-36.75	51035.22	-24.15		
lambda	I	2032-12-24T01:03:55.618		38.25	-36.84	50026.71	-24.16		
delta	I	2032-12-24T01:05:07.088		38.38	-36.98	48300.35	-24.15		
gamma	I	2032-12-24T01:05:34.789		38.43	-37.04	47631.33	-24.15		
eta	I	2032-12-24T01:05:53.638		38.46	-37.07	47176.12	-24.15		
beta	I	2032-12-24T01:06:55.684		38.57	-37.20	45677.31	-24.14		
alpha	I	2032-12-24T01:07:34.681		38.64	-37.27	44739.05	-24.14		
4	I	2032-12-24T01:09:02.642		38.79	-37.44	42613.35	-24.13		
5	I	2032-12-24T01:09:17.916		38.82	-37.47	42250.22	-24.13		
6	I	2032-12-24T01:09:36.446		38.85	-37.51	41795.95	-24.13		
Uranus	I	2032-12-24T01:20:43.689		39.93	-38.74	25115.27		-12.35	-12.91
Uranus	E	2032-12-24T01:55:36.889		42.46	-41.82	25271.85		9.86	10.32
6	E	2032-12-24T02:06:49.220		42.98	-42.53	41879.68	24.15		
5	E	2032-12-24T02:07:02.468		42.99	-42.54	42205.53	24.16		
4	E	2032-12-24T02:07:16.293		43.00	-42.55	42532.84	24.16		
alpha	E	2032-12-24T02:08:45.583		43.05	-42.63	44693.64	24.17		
beta	E	2032-12-24T02:09:24.977		43.08	-42.67	45643.20	24.17		
eta	E	2032-12-24T02:10:28.360		43.12	-42.73	47176.12	24.18		
gamma	E	2032-12-24T02:10:46.758		43.13	-42.74	47621.01	24.18		
delta	E	2032-12-24T02:11:14.848		43.14	-42.77	48300.35	24.19		
lambda	E	2032-12-24T02:12:26.220		43.18	-42.83	50026.71	24.19		
epsilon	E	2032-12-24T02:13:14.612		43.21	-42.87	51197.48	24.18		

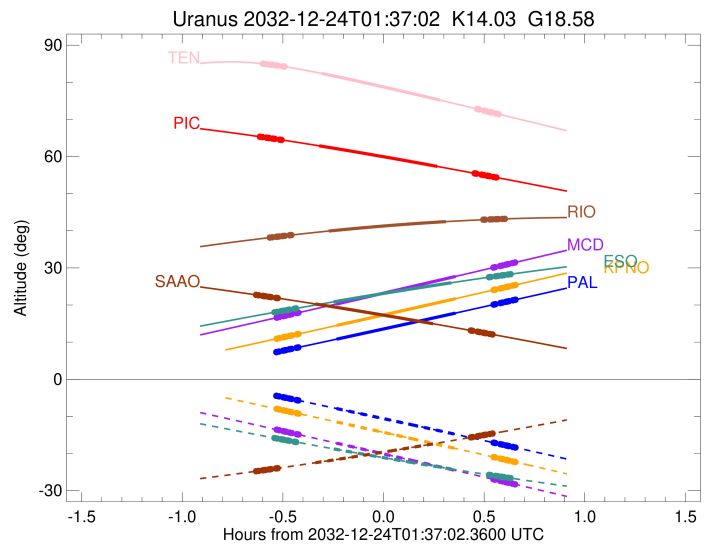
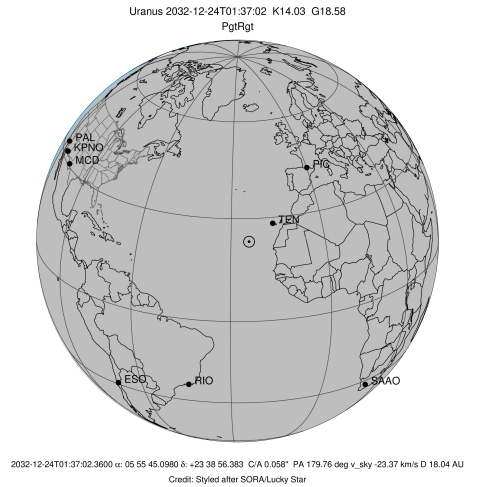
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-12-24T01:39:41.450  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : ESO  
 Location : European Southern Obs. (3.6m)  
 Latitude (deg) : -29.26097  
 E. Longitude (deg) : 289.26831  
 Altitude (km) : 2.400  
 Gaia source ID : 3427813983054352256  
 2Mass ID (if available) : 05554510+2338563  
 ICRS Star Coord at Epoch: 05h 55m 45.09803s +23:38:56.38272s  
 RUWE (>1.4 is poor) : 1.03  
 K magnitude : 14.031  
 G magnitude : 18.584  
 RP magnitude : 17.340  
 BP magnitude : 19.831  
 DUPflag : 0  
 Distance (au) : 18.037  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.37  
 Sun-Target sep (deg) : 176.69  
 Sun-Moon sep (deg) : 85.14  
 B (ring opening deg) : 76.15  
 PA of pole (deg) : 54.37  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.293  
 C/A sky separation (km) : 3831.6  
 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	2032-12-24T01:04:36.824		18.05	-15.84	51036.52	-24.01		
lambda	I	2032-12-24T01:05:18.862		18.16	-15.96	50026.71	-24.02		
delta	I	2032-12-24T01:06:30.740		18.36	-16.16	48300.35	-24.02		
gamma	I	2032-12-24T01:06:58.598		18.43	-16.24	47631.33	-24.01		
eta	I	2032-12-24T01:07:17.555		18.48	-16.29	47176.12	-24.01		
beta	I	2032-12-24T01:08:19.949		18.65	-16.47	45677.35	-24.01		
alpha	I	2032-12-24T01:08:59.163		18.76	-16.58	44739.15	-24.01		
4	I	2032-12-24T01:10:27.622		19.00	-16.82	42613.29	-24.00		
5	I	2032-12-24T01:10:42.968		19.04	-16.87	42250.50	-23.99		
6	I	2032-12-24T01:11:01.615		19.09	-16.92	41795.91	-23.99		
Uranus	I	2032-12-24T01:22:12.444		20.86	-18.76	25117.13		-12.32	-12.89
Uranus	E	2032-12-24T01:57:16.182		26.00	-24.16	25272.53		9.85	10.31
6	E	2032-12-24T02:08:31.183		27.49	-25.75	41879.69	24.06		
5	E	2032-12-24T02:08:44.477		27.52	-25.78	42205.39	24.06		
4	E	2032-12-24T02:08:58.362		27.55	-25.82	42532.88	24.07		
alpha	E	2032-12-24T02:10:27.988		27.74	-26.02	44693.59	24.08		
beta	E	2032-12-24T02:11:07.531		27.83	-26.11	45643.18	24.08		
eta	E	2032-12-24T02:12:11.153		27.96	-26.26	47176.12	24.09		
gamma	E	2032-12-24T02:12:29.619		28.00	-26.30	47621.01	24.09		
delta	E	2032-12-24T02:12:57.814		28.06	-26.36	48300.35	24.10		
lambda	E	2032-12-24T02:14:09.450		28.21	-26.52	50026.71	24.10		
epsilon	E	2032-12-24T02:14:57.986		28.31	-26.63	51196.66	24.09		



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-12-24T01:34:11.590  
 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 : 3427813983054352256  
 2Mass ID (if available) : 05554510+2338563  
 ICRS Star Coord at Epoch: 05h 55m 45.09803s +23:38:56.38272s  
 RUWE (>1.4 is poor) : 1.03  
 K magnitude : 14.031  
 G magnitude : 18.584  
 RP magnitude : 17.340  
 BP magnitude : 19.831  
 DUPflag : 0  
 Distance (au) : 18.037  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.37  
 Sun-Target sep (deg) : 176.69  
 Sun-Moon sep (deg) : 84.95  
 B (ring opening deg) : 76.15  
 PA of pole (deg) : 54.37  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 0.298  
 C/A sky separation (km) : 3893.3  
 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\_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	2032-12-24T00:59:08.374		22.72	-24.76	51032.39	-24.06		
lambda	I	2032-12-24T00:59:50.150		22.62	-24.68	50026.71	-24.07		
delta	I	2032-12-24T01:01:01.880		22.46	-24.53	48300.35	-24.06		
gamma	I	2032-12-24T01:01:29.684		22.40	-24.47	47631.31	-24.06		
eta	I	2032-12-24T01:01:48.603		22.36	-24.43	47176.12	-24.06		
beta	I	2032-12-24T01:02:50.887		22.22	-24.30	45677.22	-24.05		
alpha	I	2032-12-24T01:03:30.039		22.13	-24.21	44738.85	-24.05		
4	I	2032-12-24T01:04:58.335		21.93	-24.03	42613.47	-24.04		
5	I	2032-12-24T01:05:13.697		21.90	-23.99	42249.65	-24.03		
6	I	2032-12-24T01:05:32.272		21.85	-23.95	41796.02	-24.03		
Uranus	I	2032-12-24T01:16:42.479		20.29	-22.48	25111.88		-12.40	-12.97
Uranus	E	2032-12-24T01:51:48.433		14.97	-17.41	25268.64		9.92	10.38
6	E	2032-12-24T02:03:06.078		13.14	-15.65	41879.67	23.95		
5	E	2032-12-24T02:03:19.454		13.10	-15.61	42205.97	23.96		
4	E	2032-12-24T02:03:33.368		13.06	-15.58	42532.70	23.96		
alpha	E	2032-12-24T02:05:03.424		12.82	-15.34	44693.78	23.97		
beta	E	2032-12-24T02:05:43.149		12.71	-15.23	45643.25	23.97		
eta	E	2032-12-24T02:06:47.072		12.53	-15.06	47176.12	23.97		
gamma	E	2032-12-24T02:07:05.629		12.48	-15.01	47621.02	23.98		
delta	E	2032-12-24T02:07:33.962		12.40	-14.94	48300.35	23.98		
lambda	E	2032-12-24T02:08:45.954		12.20	-14.74	50026.71	23.98		
epsilon	E	2032-12-24T02:09:34.873		12.07	-14.61	51199.93	23.97		