

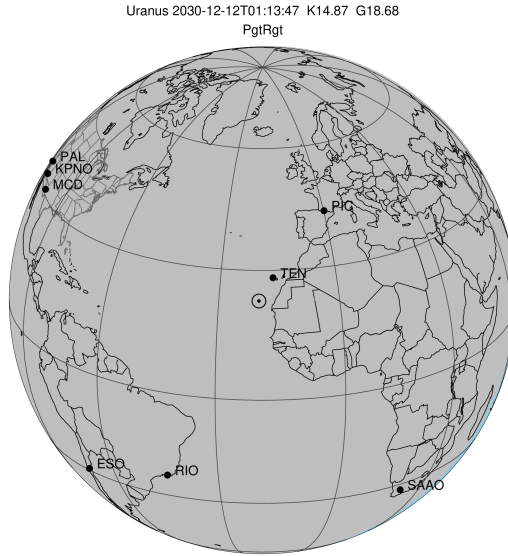
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-12-12T01:13:47.970  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3415611156331956992  
 2Mass ID (if available) : 05182501+2311122

Uranus 2030-12-12T01:13:47 K14.87 G18.68 PgtRgt

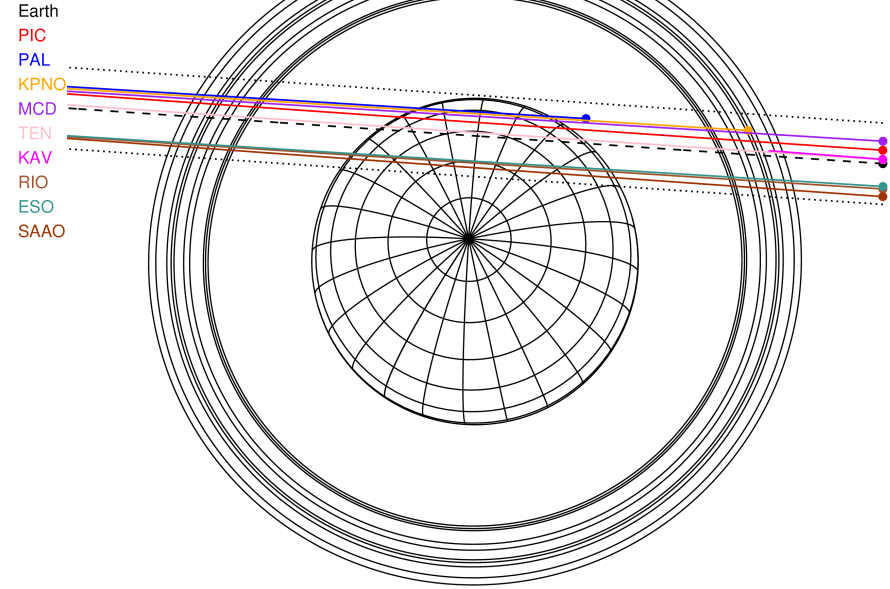
ICRS Star Coord at Epoch: 05h 18m 25.01556s +23:11:11.87987s

RUWE (>1.4 is poor) : 1.02  
 K magnitude : 14.874  
 G magnitude : 18.683  
 RP magnitude : 17.640  
 BP magnitude : 19.851  
 DUPflag : 0  
 Distance (au) : 18.171  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.44  
 Sun-Target sep (deg) : 179.15  
 Sun-Moon sep (deg) : 22.11  
 B (ring opening deg) : 81.70  
 PA of pole (deg) : 15.52

#	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

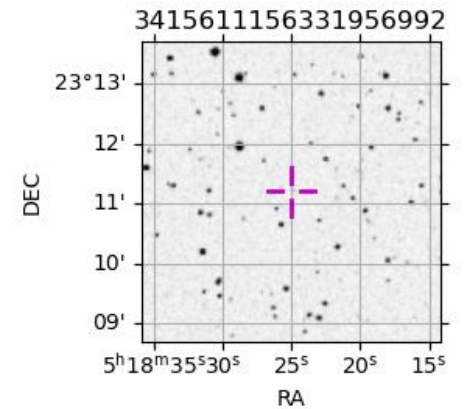


2030-12-12T01:13:47.9700 ra: 05 18 25.0156 s: +23 11 11.880 C/A 1.495° PA 176.11 deg v\_sky -23.44 km/s D 18.17 AU  
 Credit: Styled after SORA/Lucky Star

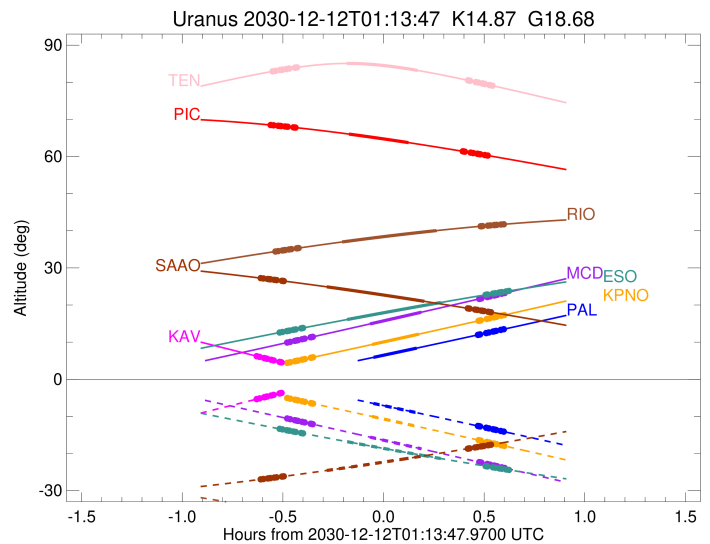
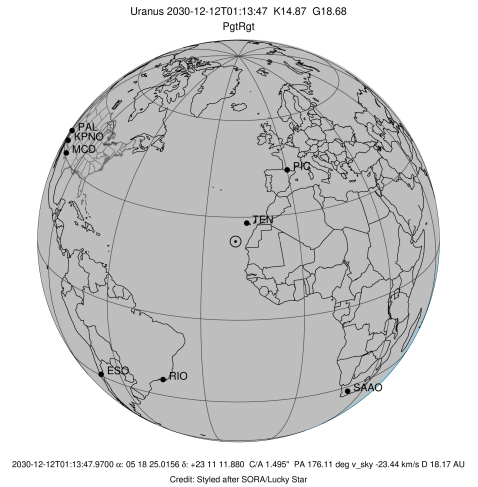


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++	+ +	+++++	DEC 12 00:40 - DEC 12 01:45	PieRie
PAL	Palomar Mt (200")	33.4	243.1		+ +	+++++	DEC 12 01:10 - DEC 12 01:49	PieRne
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++	+ +	+++++	DEC 12 00:48 - DEC 12 01:50	PieRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++	+ +	+++++	DEC 12 00:45 - DEC 12 01:50	PieRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++	+ +	+++++	DEC 12 00:41 - DEC 12 01:46	PieRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8	++			DEC 12 00:36 - DEC 12 00:36	PnnRin
RIO	Rio de Janeiro	-22.9	316.8	+++++	+ +	+++++	DEC 12 00:41 - DEC 12 01:49	PieRie
ESO	European Southern Obs	-29.3	289.3	+++++	+ +	+++++	DEC 12 00:43 - DEC 12 01:51	PieRie
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+++++	+ +	+++++	DEC 12 00:37 - DEC 12 01:46	PieRie
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn

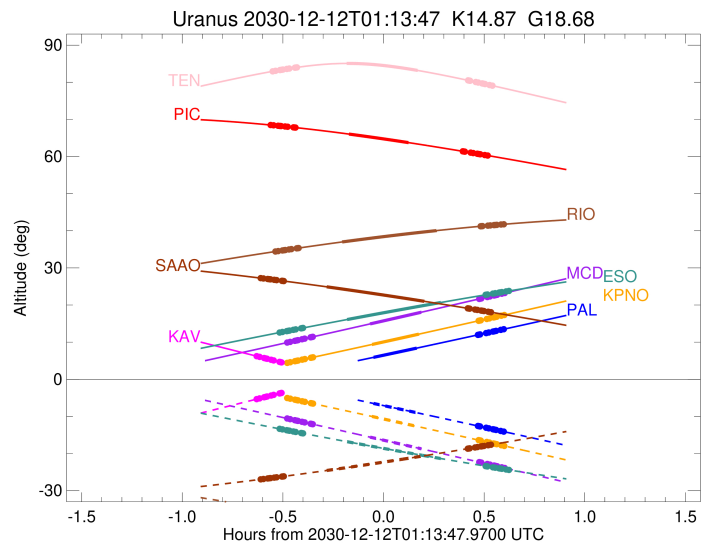
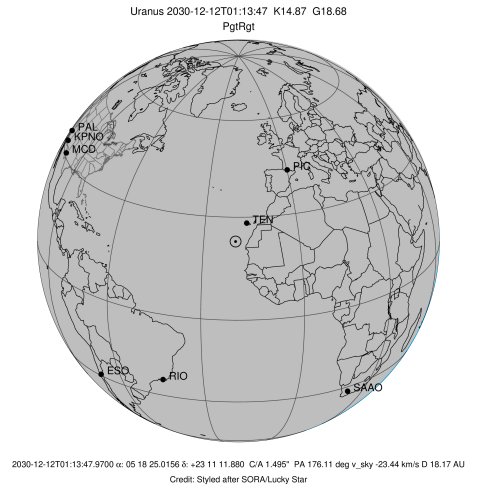


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-12-12T01:12:36.020  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PIC  
 Location : Pic du Midi  
 Latitude (deg) : 42.93656  
 E. Longitude (deg) : 0.14231  
 Altitude (km) : 2.890  
 Gaia source ID : 3415611156331956992  
 2Mass ID (if available) : 05182501+2311122  
 ICRS Star Coord at Epoch: 05h 18m 25.01556s +23:11:11.87987s  
 RUWE (>1.4 is poor) : 1.02  
 K magnitude : 14.874  
 G magnitude : 18.683  
 RP magnitude : 17.640  
 BP magnitude : 19.851  
 DUPflag : 0  
 Distance (au) : 18.171  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.44  
 Sun-Target sep (deg) : 179.15  
 Sun-Moon sep (deg) : 22.24  
 B (ring opening deg) : 81.70  
 PA of pole (deg) : 15.52  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.650  
 C/A sky separation (km) : 21748.9  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 ural11.bsp  
 IAU\_URANUS\_for\_RINGFIT.tpc  
 vgr2.ural11.bsp  
 ural61.bsp  
 vgr2.ural61.bsp  
 peph.ural60.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	2030-12-12T00:40:24.597		68.47	-67.99	50824.22	-21.51		
lambda	I	2030-12-12T00:41:01.823		68.41	-67.93	50026.71	-21.38		
delta	I	2030-12-12T00:42:22.907		68.29	-67.80	48300.35	-21.20		
gamma	I	2030-12-12T00:42:54.911		68.24	-67.75	47623.27	-21.12		
eta	I	2030-12-12T00:43:16.114		68.21	-67.72	47176.12	-21.06		
beta	I	2030-12-12T00:44:27.994		68.10	-67.60	45669.29	-20.86		
alpha	I	2030-12-12T00:45:15.299		68.02	-67.52	44685.72	-20.72		
4	I	2030-12-12T00:47:00.310		67.85	-67.34	42526.41	-20.38		
5	I	2030-12-12T00:47:17.860		67.83	-67.31	42171.22	-20.30		
6	I	2030-12-12T00:47:34.426		67.80	-67.28	41833.15	-20.24		
Uranus	I	2030-12-12T01:03:30.561		66.05	-65.47	25319.84		5.29	5.54
Uranus	E	2030-12-12T01:21:15.002		63.75	-63.13	25002.35		8.17	8.55
6	E	2030-12-12T01:37:24.224		61.41	-60.76	41801.18	20.22		
5	E	2030-12-12T01:37:45.206		61.36	-60.71	42220.66	20.28		
4	E	2030-12-12T01:38:03.656		61.31	-60.66	42597.93	20.36		
alpha	E	2030-12-12T01:39:47.472		61.05	-60.39	44728.06	20.70		
beta	E	2030-12-12T01:40:31.383		60.94	-60.28	45641.27	20.84		
eta	E	2030-12-12T01:41:44.665		60.75	-60.09	47176.12	21.04		
gamma	E	2030-12-12T01:42:06.286		60.70	-60.04	47631.58	21.09		
delta	E	2030-12-12T01:42:37.931		60.61	-59.96	48300.35	21.17		
lambda	E	2030-12-12T01:43:59.108		60.41	-59.75	50026.71	21.36		
epsilon	E	2030-12-12T01:45:09.866		60.22	-59.56	51543.24	21.49		

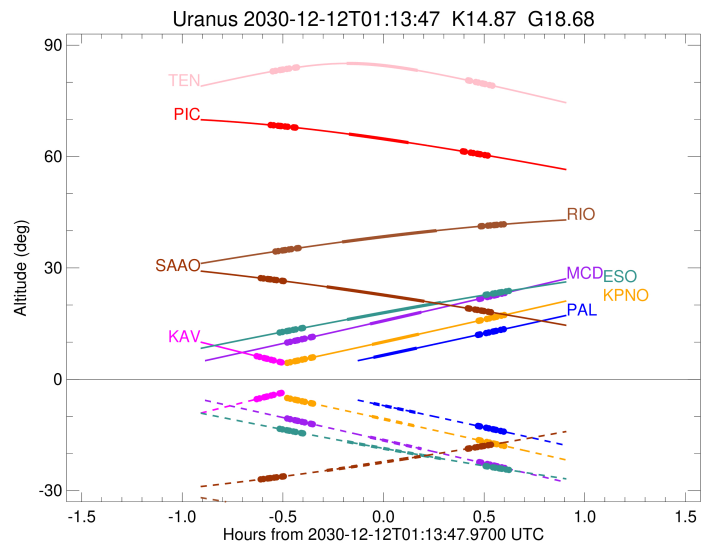
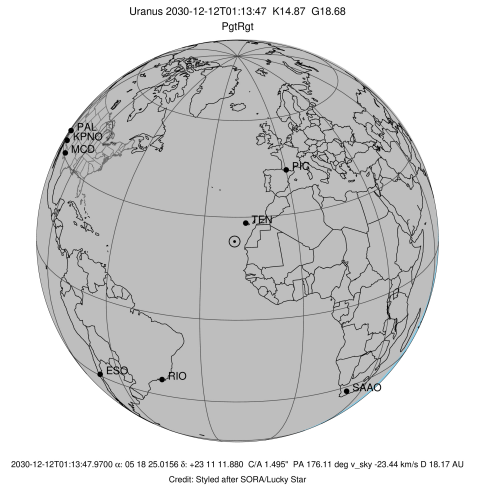
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-12-12T01:17:30.350  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : PAL  
 Location : Palomar Mt (200")  
 Latitude (deg) : 33.35622  
 E. Longitude (deg) : 243.13601  
 Altitude (km) : 1.706  
 Gaia source ID : 3415611156331956992  
 2Mass ID (if available) : 05182501+2311122  
 ICRS Star Coord at Epoch: 05h 18m 25.01556s +23:11:11.87987s  
 RUWE (>1.4 is poor) : 1.02  
 K magnitude : 14.874  
 G magnitude : 18.683  
 RP magnitude : 17.640  
 BP magnitude : 19.851  
 DUPflag : 0  
 Distance (au) : 18.171  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.44  
 Sun-Target sep (deg) : 179.15  
 Sun-Moon sep (deg) : 22.88  
 B (ring opening deg) : 81.70  
 PA of pole (deg) : 15.52  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.776  
 C/A sky separation (km) : 23410.8  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 ural11.bsp  
 IAU\_URANUS\_for\_RINGFIT.tpc  
 vgr2.ural11.bsp  
 ural61.bsp  
 vgr2.ural61.bsp  
 peph.ural60.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	2030-12-12T00:45:19.336		1.08x	-1.68x	50835.05	-20.72		
lambda	I	2030-12-12T00:45:58.532		1.20x	-1.81x	50026.71	-20.58		
delta	I	2030-12-12T00:47:22.865		1.46x	-2.07x	48300.35	-20.36		
gamma	I	2030-12-12T00:47:56.182		1.57x	-2.17x	47623.48	-20.27		
eta	I	2030-12-12T00:48:18.286		1.64x	-2.24x	47176.12	-20.21		
beta	I	2030-12-12T00:49:33.321		1.87x	-2.48x	45668.38	-19.97		
alpha	I	2030-12-12T00:50:22.731		2.02x	-2.63x	44685.32	-19.81		
4	I	2030-12-12T00:52:12.686		2.37x	-2.98x	42526.83	-19.42		
5	I	2030-12-12T00:52:31.290		2.43x	-3.03x	42168.69	-19.32		
6	I	2030-12-12T00:52:48.658		2.48x	-3.09x	41830.84	-19.26		
Uranus	I	2030-12-12T01:10:48.288		5.90	-6.51	25226.74		6.26	6.56
Uranus	E	2030-12-12T01:23:43.673		8.39	-9.01	24985.68		8.30	8.68
6	E	2030-12-12T01:41:54.382		11.95	-12.57	41800.31	19.32		
5	E	2030-12-12T01:42:16.208		12.02	-12.64	42217.54	19.39		
4	E	2030-12-12T01:42:35.585		12.09	-12.71	42596.48	19.49		
alpha	E	2030-12-12T01:44:23.827		12.44	-13.06	44726.89	19.89		
beta	E	2030-12-12T01:45:09.537		12.59	-13.21	45641.18	20.06		
eta	E	2030-12-12T01:46:25.599		12.84	-13.46	47176.12	20.29		
gamma	E	2030-12-12T01:46:48.007		12.92	-13.54	47631.58	20.36		
delta	E	2030-12-12T01:47:20.783		13.02	-13.64	48300.35	20.45		
lambda	E	2030-12-12T01:48:44.741		13.30	-13.92	50026.71	20.67		
epsilon	E	2030-12-12T01:49:57.654		13.54	-14.16	51540.25	20.82		

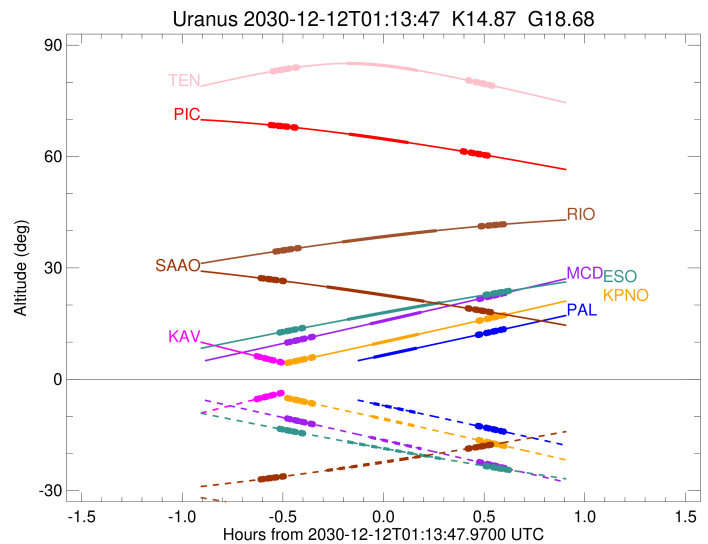
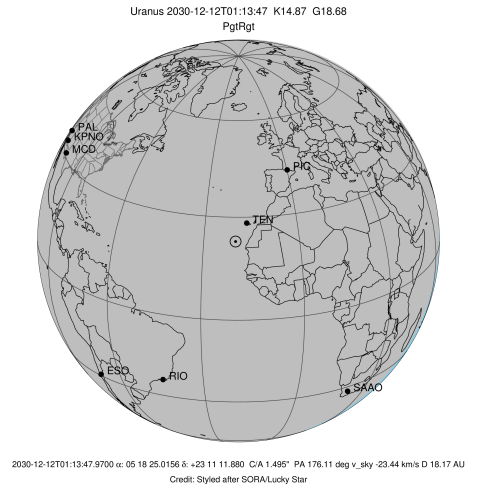
```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2030-12-12T01:17:36.430
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        : 3415611156331956992
2Mass ID (if available) : 05182501+2311122
ICRS Star Coord at Epoch: 05h 18m 25.01556s +23:11:11.87987s
RUWE (>1.4 is poor) : 1.02
K magnitude           : 14.874
G magnitude           : 18.683
RP magnitude          : 17.640
BP magnitude          : 19.851
DUPflag              : 0
Distance (au)         : 18.171
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -23.44
Sun-Target sep (deg) : 179.15
Sun-Moon sep (deg)   : 22.91
B (ring opening deg) : 81.70
PA of pole (deg)     : 15.52
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.753
C/A sky separation (km) : 23107.1
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLvl1.spk
ural11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ural11.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
    
```



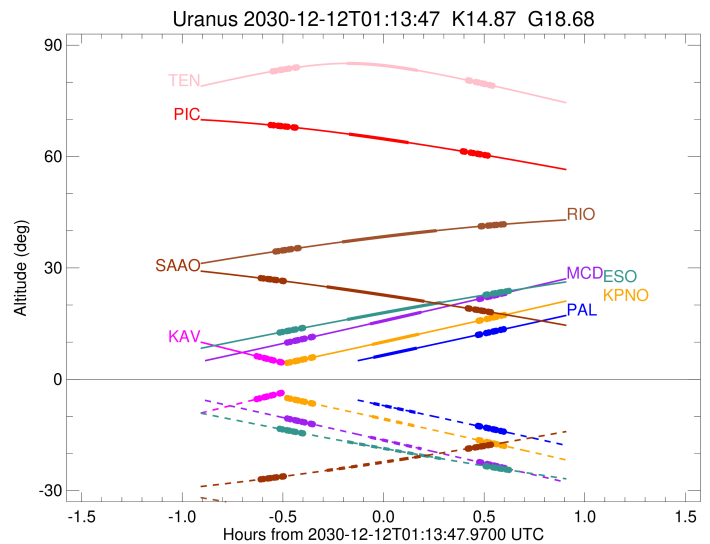
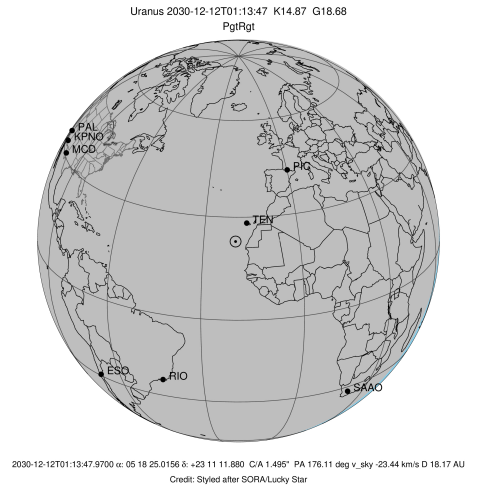
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-12T00:45:21.657		4.47x	-5.11	50833.39	-20.83		
lambda	I	2030-12-12T00:46:00.575		4.60x	-5.23	50026.71	-20.68		
delta	I	2030-12-12T00:47:24.460		4.87x	-5.51	48300.35	-20.47		
gamma	I	2030-12-12T00:47:57.593		4.97x	-5.61	47623.45	-20.39		
eta	I	2030-12-12T00:48:19.570		5.05	-5.69	47176.12	-20.32		
beta	I	2030-12-12T00:49:34.152		5.29	-5.93	45668.52	-20.10		
alpha	I	2030-12-12T00:50:23.255		5.45	-6.09	44685.38	-19.94		
4	I	2030-12-12T00:52:12.471		5.80	-6.44	42526.76	-19.56		
5	I	2030-12-12T00:52:30.913		5.86	-6.50	42169.07	-19.47		
6	I	2030-12-12T00:52:48.158		5.92	-6.56	41831.20	-19.40		
Uranus	I	2030-12-12T01:10:22.098		9.37	-10.02	25245.21		6.08	6.37
Uranus	E	2030-12-12T01:24:22.417		12.16	-12.81	24987.23		8.28	8.67
6	E	2030-12-12T01:42:07.162		15.74	-16.39	41800.50	19.47		
5	E	2030-12-12T01:42:28.851		15.81	-16.46	42218.24	19.54		
4	E	2030-12-12T01:42:48.065		15.88	-16.53	42596.81	19.63		
alpha	E	2030-12-12T01:44:35.559		16.24	-16.89	44727.16	20.02		
beta	E	2030-12-12T01:45:20.965		16.40	-17.04	45641.20	20.18		
eta	E	2030-12-12T01:46:36.566		16.65	-17.30	47176.12	20.41		
gamma	E	2030-12-12T01:46:58.844		16.73	-17.37	47631.58	20.48		
delta	E	2030-12-12T01:47:31.434		16.84	-17.49	48300.35	20.57		
lambda	E	2030-12-12T01:48:54.936		17.12	-17.77	50026.71	20.78		
epsilon	E	2030-12-12T01:50:07.512		17.37	-18.01	51541.00	20.93		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-12-12T01:17:39.510  
 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 : 3415611156331956992  
 2Mass ID (if available) : 05182501+2311122  
 ICRS Star Coord at Epoch: 05h 18m 25.01556s +23:11:11.87987s  
 RUWE (>1.4 is poor) : 1.02  
 K magnitude : 14.874  
 G magnitude : 18.683  
 RP magnitude : 17.640  
 BP magnitude : 19.851  
 DUPflag : 0  
 Distance (au) : 18.171  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.44  
 Sun-Target sep (deg) : 179.15  
 Sun-Moon sep (deg) : 22.95  
 B (ring opening deg) : 81.70  
 PA of pole (deg) : 15.52  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.723  
 C/A sky separation (km) : 22712.7  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 ural11.bsp  
 IAU\_URANUS\_for\_RINGFIT.tpc  
 vgr2.ural11.bsp  
 ural61.bsp  
 vgr2.ural61.bsp  
 peph.ural60.bsp  
 earthstns\_itrf93\_040916.bsp  
 earth\_720101\_070426.bpc  
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 pg3f0000r.bsp  
 pg490000r.bsp  
 naif0012.tls  
 earth\_flat\_IAU.spk



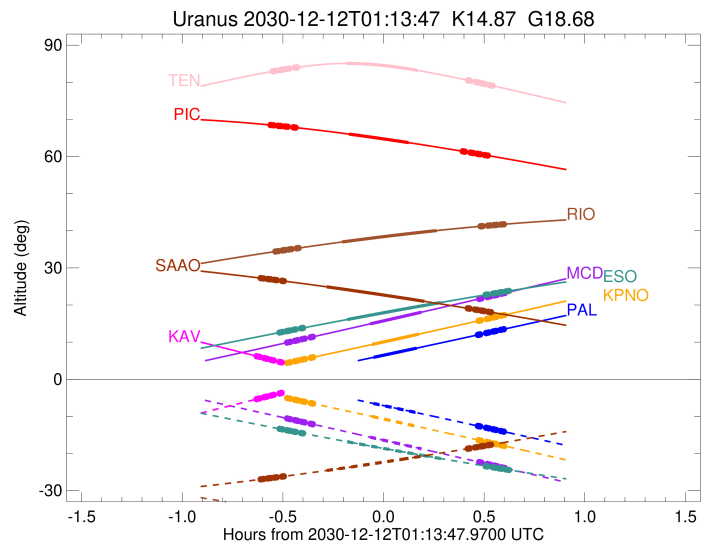
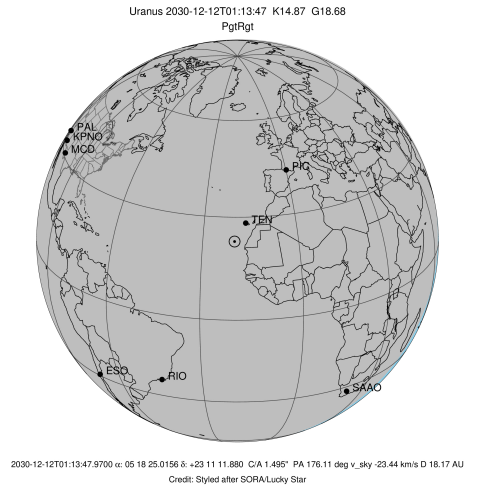
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-12T00:45:20.648		9.94	-10.62	50831.25	-20.96		
lambda	I	2030-12-12T00:45:59.199		10.07	-10.75	50026.71	-20.83		
delta	I	2030-12-12T00:47:22.488		10.35	-11.03	48300.35	-20.62		
gamma	I	2030-12-12T00:47:55.377		10.46	-11.14	47623.41	-20.54		
eta	I	2030-12-12T00:48:17.185		10.54	-11.21	47176.12	-20.48		
beta	I	2030-12-12T00:49:31.169		10.79	-11.46	45668.70	-20.26		
alpha	I	2030-12-12T00:50:19.869		10.95	-11.63	44685.46	-20.11		
4	I	2030-12-12T00:52:08.118		11.31	-11.99	42526.67	-19.74		
5	I	2030-12-12T00:52:26.349		11.38	-12.05	42169.58	-19.66		
6	I	2030-12-12T00:52:43.433		11.43	-12.11	41831.67	-19.59		
Uranus	I	2030-12-12T01:09:47.640		14.91	-15.59	25267.43		5.86	6.13
Uranus	E	2030-12-12T01:25:03.551		18.05	-18.73	24990.69		8.26	8.64
6	E	2030-12-12T01:42:18.262		21.64	-22.31	41800.75	19.67		
5	E	2030-12-12T01:42:39.774		21.71	-22.39	42219.14	19.73		
4	E	2030-12-12T01:42:58.777		21.78	-22.45	42597.23	19.82		
alpha	E	2030-12-12T01:44:45.302		22.15	-22.82	44727.50	20.20		
beta	E	2030-12-12T01:45:30.312		22.31	-22.98	45641.23	20.35		
eta	E	2030-12-12T01:46:45.311		22.57	-23.24	47176.12	20.57		
gamma	E	2030-12-12T01:47:07.419		22.64	-23.32	47631.58	20.63		
delta	E	2030-12-12T01:47:39.765		22.76	-23.43	48300.35	20.72		
lambda	E	2030-12-12T01:49:02.670		23.05	-23.72	50026.71	20.92		
epsilon	E	2030-12-12T01:50:14.798		23.30	-23.97	51541.93	21.07		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-12-12T01:13:36.180  
 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 : 3415611156331956992  
 2Mass ID (if available) : 05182501+2311122  
 ICRS Star Coord at Epoch: 05h 18m 25.01556s +23:11:11.87987s  
 RUWE (>1.4 is poor) : 1.02  
 K magnitude : 14.874  
 G magnitude : 18.683  
 RP magnitude : 17.640  
 BP magnitude : 19.851  
 DUPflag : 0  
 Distance (au) : 18.171  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.44  
 Sun-Target sep (deg) : 179.15  
 Sun-Moon sep (deg) : 22.43  
 B (ring opening deg) : 81.70  
 PA of pole (deg) : 15.52  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.529  
 C/A sky separation (km) : 20152.6  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 ural11.bsp  
 IAU\_URANUS\_for\_RINGFIT.tpc  
 vgr2.ural11.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



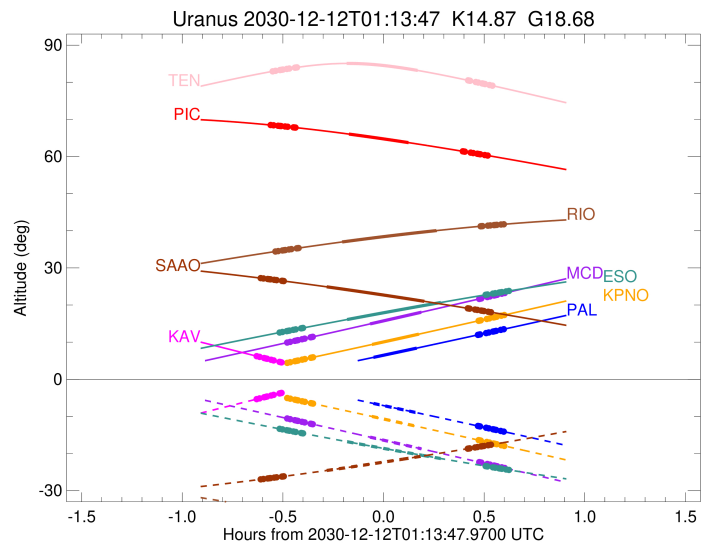
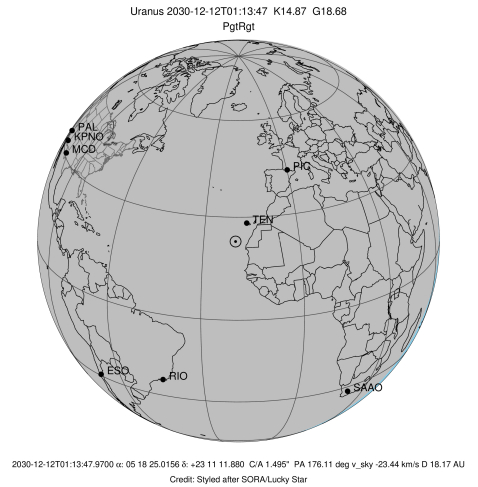
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2030-12-12T00:41:01.062		82.99	-83.44	50816.44	-21.92		
lambda	I	2030-12-12T00:41:37.223		83.09	-83.53	50026.71	-21.81		
delta	I	2030-12-12T00:42:56.678		83.30	-83.71	48300.35	-21.65		
gamma	I	2030-12-12T00:43:28.012		83.38	-83.78	47623.11	-21.58		
eta	I	2030-12-12T00:43:48.747		83.43	-83.82	47176.12	-21.53		
beta	I	2030-12-12T00:44:58.959		83.60	-83.97	45669.98	-21.36		
alpha	I	2030-12-12T00:45:45.137		83.71	-84.06	44686.07	-21.25		
4	I	2030-12-12T00:47:27.434		83.94	-84.25	42526.18	-20.96		
5	I	2030-12-12T00:47:44.361		83.98	-84.28	42173.33	-20.89		
6	I	2030-12-12T00:48:00.487		84.01	-84.31	41834.96	-20.84		
Uranus	I	2030-12-12T01:02:49.143		85.08	-84.87	25382.90		4.53	4.75
Uranus	E	2030-12-12T01:23:58.802		83.19	-82.50	25032.93		7.93	8.30
6	E	2030-12-12T01:38:58.966		80.53	-79.76	41802.26	20.84		
5	E	2030-12-12T01:39:19.454		80.46	-79.69	42224.28	20.89		
4	E	2030-12-12T01:39:37.267		80.41	-79.63	42599.56	20.96		
alpha	E	2030-12-12T01:41:18.266		80.08	-79.30	44729.44	21.25		
beta	E	2030-12-12T01:42:01.019		79.94	-79.16	45641.41	21.36		
eta	E	2030-12-12T01:43:12.556		79.70	-78.92	47176.12	21.53		
gamma	E	2030-12-12T01:43:33.684		79.63	-78.85	47631.57	21.58		
delta	E	2030-12-12T01:44:04.628		79.53	-78.75	48300.35	21.65		
lambda	E	2030-12-12T01:45:24.088		79.26	-78.48	50026.71	21.80		
epsilon	E	2030-12-12T01:46:33.590		79.03	-78.25	51546.54	21.91		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-12-12T01:09:13.570  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : KAV  
 Location : Kavalur Observatory  
 Latitude (deg) : 12.57556  
 E. Longitude (deg) : 78.83167  
 Altitude (km) : 0.722  
 Gaia source ID : 3415611156331956992  
 2Mass ID (if available) : 05182501+2311122  
 ICRS Star Coord at Epoch: 05h 18m 25.01556s +23:11:11.87987s  
 RUWE (>1.4 is poor) : 1.02  
 K magnitude : 14.874  
 G magnitude : 18.683  
 RP magnitude : 17.640  
 BP magnitude : 19.851  
 DUPflag : 0  
 Distance (au) : 18.171  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.44  
 Sun-Target sep (deg) : 179.15  
 Sun-Moon sep (deg) : 21.31  
 B (ring opening deg) : 81.70  
 PA of pole (deg) : 15.52  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.577  
 C/A sky separation (km) : 20780.4  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 ural11.bsp  
 IAU\_URANUS\_for\_RINGFIT.tpc  
 vgr2.ural11.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	2030-12-12T00:36:14.920		6.16	-5.29	50817.52	-21.43		
lambda	I	2030-12-12T00:36:51.955		6.02	-5.15	50026.71	-21.32		
delta	I	2030-12-12T00:38:13.257		5.72	-4.85x	48300.35	-21.15		
gamma	I	2030-12-12T00:38:45.333		5.60	-4.73x	47623.14	-21.08		
eta	I	2030-12-12T00:39:06.568		5.52	-4.65x	47176.12	-21.03		
beta	I	2030-12-12T00:40:18.503		5.25	-4.38x	45669.86	-20.85		
alpha	I	2030-12-12T00:41:05.839		5.07	-4.20x	44686.00	-20.72		
4	I	2030-12-12T00:42:50.791		4.67x	-3.81x	42526.22	-20.41		
5	I	2030-12-12T00:43:08.199		4.61x	-3.74x	42172.91	-20.34		
6	I	2030-12-12T00:43:24.754		4.55x	-3.68x	41834.60	-20.29		
Uranus	I	2030-12-12T00:58:52.177		1.07x	-0.21x	25364.47		4.77	4.99
Uranus	E	2030-12-12T01:19:09.274		-3.46x	4.30x	25017.77		8.05	8.43
6	E	2030-12-12T01:34:51.795		-6.94x	7.77x	41801.66	20.20		
5	E	2030-12-12T01:35:12.859		-7.02x	7.85x	42222.28	20.25		
4	E	2030-12-12T01:35:31.290		-7.09x	7.91x	42598.66	20.32		
alpha	E	2030-12-12T01:37:15.394		-7.47x	8.29x	44728.66	20.62		
beta	E	2030-12-12T01:37:59.462		-7.63x	8.46x	45641.33	20.74		
eta	E	2030-12-12T01:39:13.116		-7.90x	8.72x	47176.12	20.92		
gamma	E	2030-12-12T01:39:34.862		-7.98x	8.80x	47631.58	20.97		
delta	E	2030-12-12T01:40:06.703		-8.10x	8.92x	48300.35	21.04		
lambda	E	2030-12-12T01:41:28.441		-8.40x	9.22x	50026.71	21.20		
epsilon	E	2030-12-12T01:42:39.818		-8.66x	9.48x	51544.63	21.31		

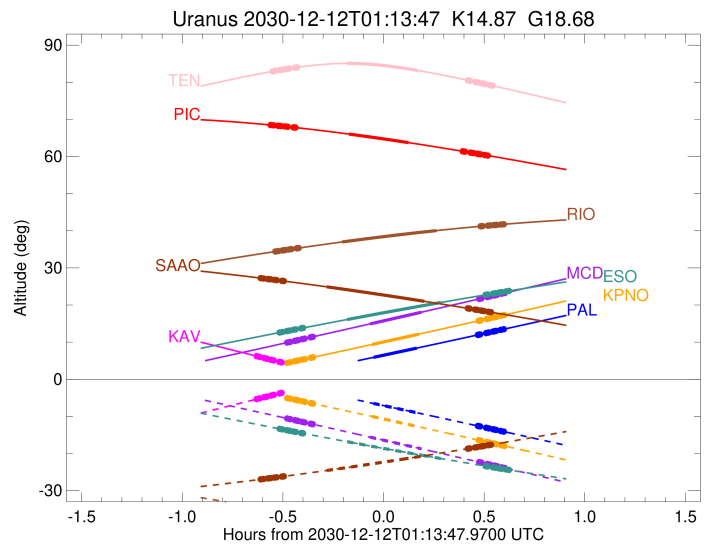
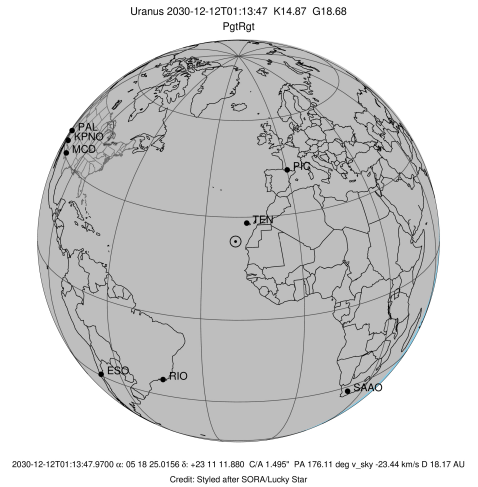
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-12-12T01:15:42.750  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : RIO  
 Location : Rio de Janeiro  
 Latitude (deg) : -22.89506  
 E. Longitude (deg) : 316.77708  
 Altitude (km) : 0.033  
 Gaia source ID : 3415611156331956992  
 2Mass ID (if available) : 05182501+2311122  
 ICRS Star Coord at Epoch: 05h 18m 25.01556s +23:11:11.87987s  
 RUWE (>1.4 is poor) : 1.02  
 K magnitude : 14.874  
 G magnitude : 18.683  
 RP magnitude : 17.640  
 BP magnitude : 19.851  
 DUPflag : 0  
 Distance (au) : 18.171  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.44  
 Sun-Target sep (deg) : 179.15  
 Sun-Moon sep (deg) : 22.60  
 B (ring opening deg) : 81.70  
 PA of pole (deg) : 15.52  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.168  
 C/A sky separation (km) : 15392.8  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 ural11.bsp  
 IAU\_URANUS\_for\_RINGFIT.tpc  
 vgr2.ural11.bsp  
 ural61.bsp  
 vgr2.ural61.bsp  
 peph.ural60.bsp  
 earthstns\_itrff93\_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	2030-12-12T00:41:50.585		34.45	-35.09	50795.46	-22.70		
lambda	I	2030-12-12T00:42:24.514		34.53	-35.16	50026.71	-22.64		
delta	I	2030-12-12T00:43:40.914		34.70	-35.33	48300.35	-22.55		
gamma	I	2030-12-12T00:44:10.988		34.77	-35.40	47622.68	-22.52		
eta	I	2030-12-12T00:44:30.833		34.81	-35.44	47176.12	-22.49		
beta	I	2030-12-12T00:45:37.851		34.97	-35.59	45671.93	-22.40		
alpha	I	2030-12-12T00:46:21.870		35.06	-35.68	44687.41	-22.33		
4	I	2030-12-12T00:47:58.987		35.28	-35.89	42525.94	-22.17		
5	I	2030-12-12T00:48:14.610		35.31	-35.93	42180.09	-22.13		
6	I	2030-12-12T00:48:29.947		35.35	-35.96	41840.25	-22.11		
Uranus	I	2030-12-12T01:01:29.186		36.99	-37.56	25502.84		2.55	2.67
Uranus	E	2030-12-12T01:29:37.365		40.05	-40.53	25152.05		6.95	7.27
6	E	2030-12-12T01:42:43.764		41.21	-41.64	41805.70	22.15		
5	E	2030-12-12T01:43:03.362		41.24	-41.66	42234.60	22.17		
4	E	2030-12-12T01:43:19.867		41.26	-41.68	42603.83	22.21		
alpha	E	2030-12-12T01:44:55.459		41.39	-41.81	44733.22	22.37		
beta	E	2030-12-12T01:45:35.971		41.44	-41.86	45641.99	22.44		
eta	E	2030-12-12T01:46:44.173		41.53	-41.94	47176.12	22.54		
gamma	E	2030-12-12T01:47:04.367		41.56	-41.97	47631.51	22.56		
delta	E	2030-12-12T01:47:33.986		41.59	-42.00	48300.35	22.60		
lambda	E	2030-12-12T01:48:50.218		41.69	-42.09	50026.71	22.69		
epsilon	E	2030-12-12T01:49:57.380		41.77	-42.17	51553.07	22.76		



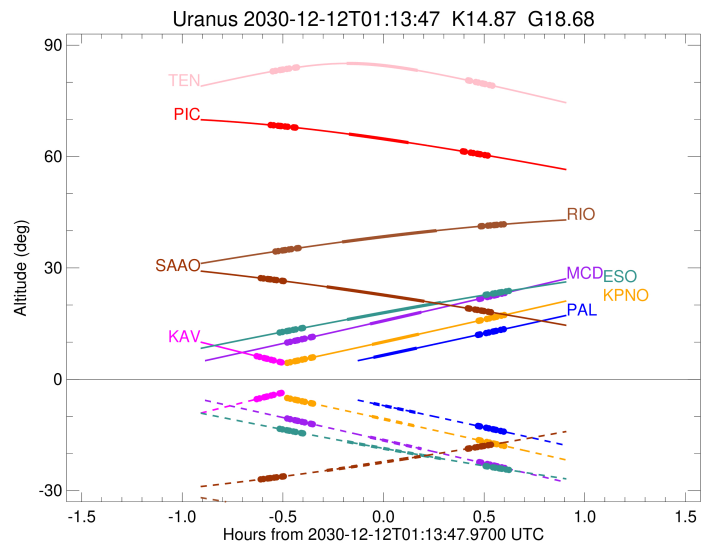
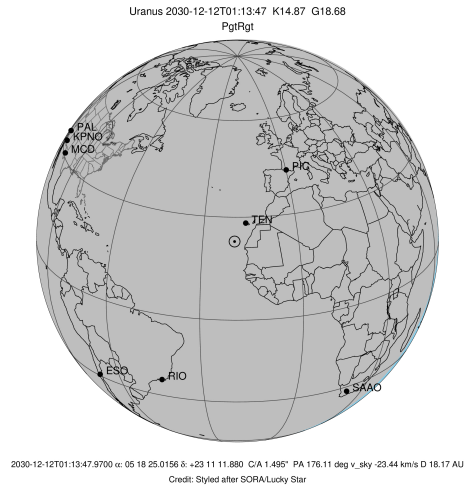
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2030-12-12T01:17:07.260  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : ESO  
 Location : European Southern Obs. (3.6m)  
 Latitude (deg) : -29.26097  
 E. Longitude (deg) : 289.26831  
 Altitude (km) : 2.400  
 Gaia source ID : 3415611156331956992  
 2Mass ID (if available) : 05182501+2311122  
 ICRS Star Coord at Epoch: 05h 18m 25.01556s +23:11:11.87987s  
 RUWE (>1.4 is poor) : 1.02  
 K magnitude : 14.874  
 G magnitude : 18.683  
 RP magnitude : 17.640  
 BP magnitude : 19.851  
 DUPflag : 0  
 Distance (au) : 18.171  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -23.44  
 Sun-Target sep (deg) : 179.15  
 Sun-Moon sep (deg) : 22.75  
 B (ring opening deg) : 81.70  
 PA of pole (deg) : 15.52  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.189  
 C/A sky separation (km) : 15670.4  
 NAIF SPICE kernels : RAJobs\_U111+rgf15.spk  
 URKALLvl.spk  
 ural11.bsp  
 IAU\_URANUS\_for\_RINGFIT.tpc  
 vgr2.ural11.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	2030-12-12T00:43:05.888		12.64	-13.40	50796.98	-22.51		
lambda	I	2030-12-12T00:43:40.179		12.74	-13.50	50026.71	-22.44		
delta	I	2030-12-12T00:44:57.250		12.97	-13.72	48300.35	-22.35		
gamma	I	2030-12-12T00:45:27.589		13.06	-13.81	47622.71	-22.32		
eta	I	2030-12-12T00:45:47.613		13.12	-13.87	47176.12	-22.29		
beta	I	2030-12-12T00:46:55.242		13.31	-14.07	45671.79	-22.19		
alpha	I	2030-12-12T00:47:39.663		13.44	-14.20	44687.30	-22.13		
4	I	2030-12-12T00:49:17.679		13.73	-14.48	42525.93	-21.97		
5	I	2030-12-12T00:49:33.478		13.78	-14.53	42179.56	-21.92		
6	I	2030-12-12T00:49:48.950		13.82	-14.57	41839.86	-21.90		
Uranus	I	2030-12-12T01:02:57.795		16.09	-16.82	25497.24		2.67	2.80
Uranus	E	2030-12-12T01:30:57.131		20.69	-21.37	25145.81		7.00	7.33
6	E	2030-12-12T01:44:12.456		22.74	-23.39	41805.56	21.97		
5	E	2030-12-12T01:44:32.202		22.79	-23.44	42234.20	21.99		
4	E	2030-12-12T01:44:48.851		22.83	-23.48	42603.68	22.04		
alpha	E	2030-12-12T01:46:25.191		23.08	-23.72	44733.08	22.20		
beta	E	2030-12-12T01:47:06.015		23.18	-23.82	45641.96	22.27		
eta	E	2030-12-12T01:48:14.723		23.35	-23.99	47176.12	22.37		
gamma	E	2030-12-12T01:48:35.065		23.40	-24.04	47631.51	22.40		
delta	E	2030-12-12T01:49:04.897		23.47	-24.11	48300.35	22.44		
lambda	E	2030-12-12T01:50:21.668		23.66	-24.30	50026.71	22.53		
epsilon	E	2030-12-12T01:51:29.286		23.83	-24.46	51552.92	22.60		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2030-12-12T01:11:33.240
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      : 3415611156331956992
2Mass ID (if available) : 05182501+2311122
ICRS Star Coord at Epoch: 05h 18m 25.01556s +23:11:11.87987s
RUWE (>1.4 is poor) : 1.02
K magnitude         : 14.874
G magnitude         : 18.683
RP magnitude        : 17.640
BP magnitude        : 19.851
DUPflag            : 0
Distance (au)       : 18.171
f0 (km)            : 0.000
g0 (km)            : 0.000
skyplane vel. (km/s) : -23.44
Sun-Target sep (deg) : 179.15
Sun-Moon sep (deg)  : 21.75
B (ring opening deg) : 81.70
PA of pole (deg)    : 15.52
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.111
C/A sky separation (km) : 14646.0
NAIF SPICE kernels  : RAJobs_U111+rgf15.spk
URKALLvl1.spk
ural11.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.ural11.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	2030-12-12T00:37:27.579		27.22	-26.93	50791.07	-22.80		
lambda	I	2030-12-12T00:38:01.168		27.15	-26.87	50026.71	-22.74		
delta	I	2030-12-12T00:39:17.220		27.01	-26.72	48300.35	-22.66		
gamma	I	2030-12-12T00:39:47.155		26.95	-26.66	47622.59	-22.62		
eta	I	2030-12-12T00:40:06.899		26.92	-26.62	47176.12	-22.60		
beta	I	2030-12-12T00:41:13.556		26.79	-26.49	45672.35	-22.51		
alpha	I	2030-12-12T00:41:57.340		26.70	-26.41	44687.76	-22.45		
4	I	2030-12-12T00:43:33.909		26.52	-26.22	42525.97	-22.31		
5	I	2030-12-12T00:43:49.356		26.49	-26.18	42181.64	-22.27		
6	I	2030-12-12T00:44:04.628		26.46	-26.15	41841.37	-22.25		
Uranus	I	2030-12-12T00:56:53.697		24.90	-24.57	25517.07		2.20	2.31
Uranus	E	2030-12-12T01:25:55.322		21.00	-20.61	25167.92		6.81	7.13
6	E	2030-12-12T01:38:53.771		19.11	-18.70	41806.05	22.20		
5	E	2030-12-12T01:39:13.354		19.06	-18.65	42235.57	22.22		
4	E	2030-12-12T01:39:29.799		19.02	-18.61	42604.20	22.26		
alpha	E	2030-12-12T01:41:05.257		18.78	-18.37	44733.55	22.40		
beta	E	2030-12-12T01:41:45.727		18.68	-18.27	45642.05	22.45		
eta	E	2030-12-12T01:42:53.902		18.51	-18.09	47176.12	22.54		
gamma	E	2030-12-12T01:43:14.097		18.46	-18.04	47631.50	22.56		
delta	E	2030-12-12T01:43:43.720		18.39	-17.97	48300.35	22.59		
lambda	E	2030-12-12T01:44:59.993		18.19	-17.77	50026.71	22.67		
epsilon	E	2030-12-12T01:46:07.237		18.02	-17.60	51553.41	22.73		