

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-25T02:04:40.280
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3412552796020904064
 2Mass ID (if available) : 04563410+2240153

Uranus 2029-12-25T02:04:40 K14.86 G17.57 PgtRgt

ICRS Star Coord at Epoch: 04h 56m 34.10715s +22:40:15.14604s

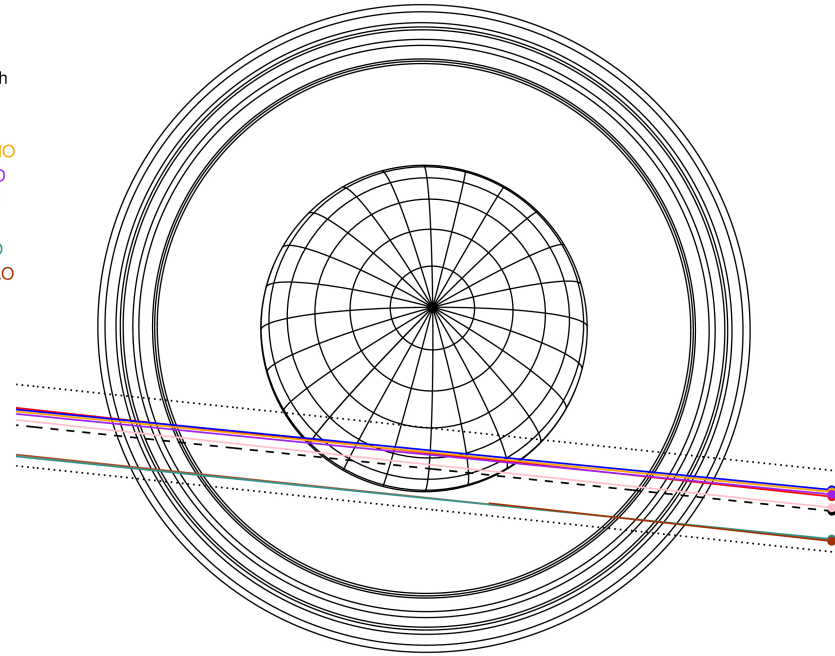
RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.855
 G magnitude : 17.569
 RP magnitude : 16.672
 BP magnitude : 18.423
 DUPflag : 0
 Distance (au) : 18.282
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.04
 Sun-Target sep (deg) : 162.26
 Sun-Moon sep (deg) : 66.15
 B (ring opening deg) : 81.93
 PA of pole (deg) : -22.33

Uranus 2029-12-25T02:04:40 K14.86 G17.57
 PgtRgt



2029-12-25T02:04:40.2800 ra: 04 56 34.1071 s: +22 40 15.146 C/A 1.634 PA 353.98 deg v_sky -22.04 km/s D 18.28 AU
 Credit: Styled after SORA/Lucky Star

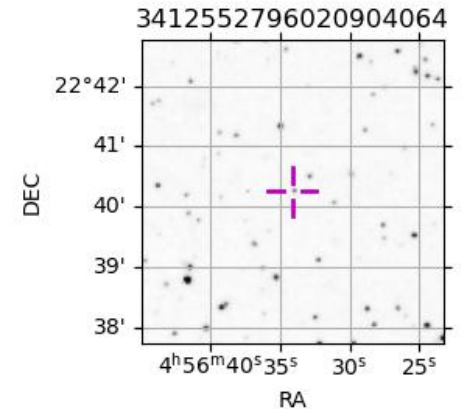
Earth
 PIC
 PAL
 KPNO
 MCD
 TEN
 RIO
 ESO
 SAAO



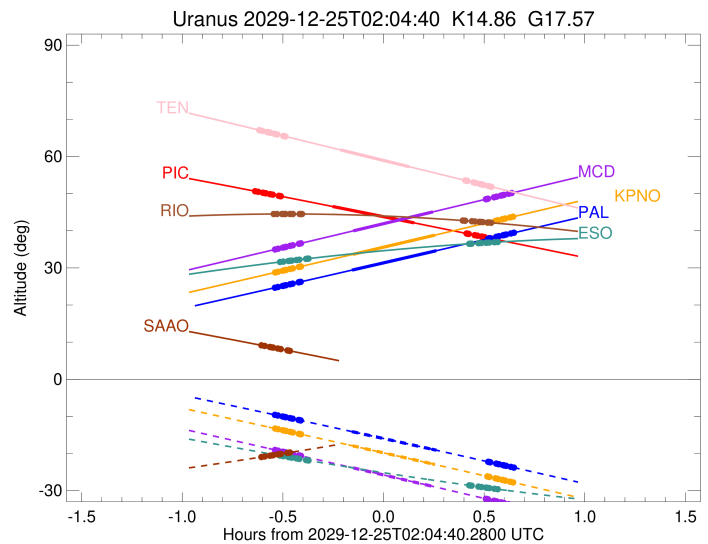
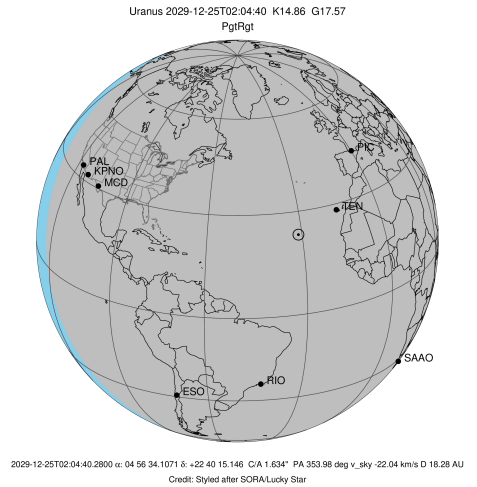
#	a(km)	ring
1	41837.2	6
2	42235.0	5
3	42571.2	4
4	44718.5	alpha
5	45661.1	beta
6	47176.1	eta
7	47626.3	gamma
8	48300.3	delta
9	50026.7	lambda
10	51149.4	epsilon

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 25 01:26 - DEC 25 02:36	PieRie
PAL	Palomar Mt (200")	33.4	243.1	+++++	+ +	+++++	DEC 25 01:32 - DEC 25 02:43	PieRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++	+ +	+++++	DEC 25 01:32 - DEC 25 02:43	PieRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++	+ +	+++++	DEC 25 01:32 - DEC 25 02:42	PieRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++	+ +	+++++	DEC 25 01:27 - DEC 25 02:36	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 25 01:31 - DEC 25 02:36	PnnRie
ESO	European Southern Obs	-29.3	289.3	+++++		+++++	DEC 25 01:33 - DEC 25 02:38	PnnRie
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+++++			DEC 25 01:28 - DEC 25 01:36	PnnRin
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



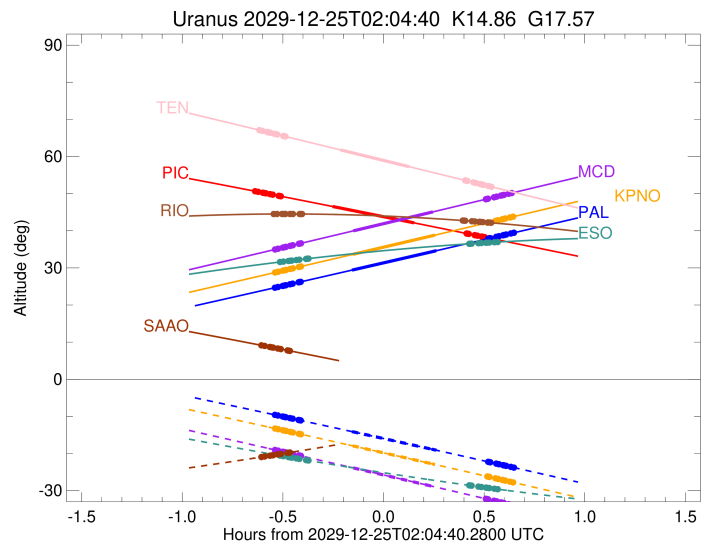
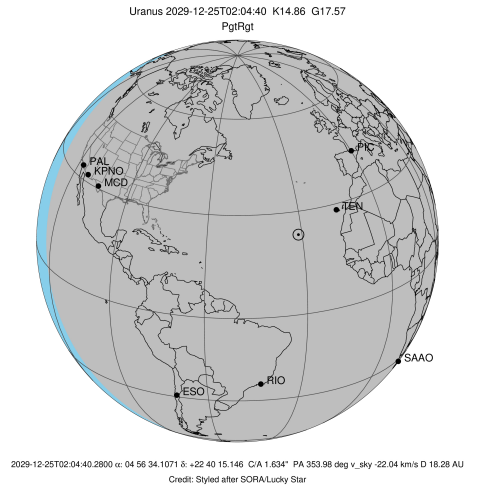
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-25T02:01:48.780
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3412552796020904064
 2Mass ID (if available) : 04563410+2240153
 ICRS Star Coord at Epoch: 04h 56m 34.10715s +22:40:15.14604s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.855
 G magnitude : 17.569
 RP magnitude : 16.672
 BP magnitude : 18.423
 DUPflag : 0
 Distance (au) : 18.282
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.04
 Sun-Target sep (deg) : 162.26
 Sun-Moon sep (deg) : 66.54
 B (ring opening deg) : 81.93
 PA of pole (deg) : -22.33
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.455
 C/A sky separation (km) : 19298.5
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-12-25T01:26:17.791		50.67	-63.59	51277.63	-20.58		
lambda	I	2029-12-25T01:27:18.524		50.50	-63.44	50026.71	-20.55		
delta	I	2029-12-25T01:28:42.800		50.25	-63.25	48300.35	-20.42		
gamma	I	2029-12-25T01:29:15.820		50.15	-63.17	47627.16	-20.36		
eta	I	2029-12-25T01:29:37.997		50.09	-63.11	47176.12	-20.32		
beta	I	2029-12-25T01:30:51.825		49.87	-62.94	45681.10	-20.18		
alpha	I	2029-12-25T01:31:41.221		49.72	-62.82	44686.85	-20.08		
4	I	2029-12-25T01:33:25.374		49.42	-62.57	42608.07	-19.83		
5	I	2029-12-25T01:33:41.929		49.37	-62.53	42279.77	-19.78		
6	I	2029-12-25T01:34:03.668		49.30	-62.47	41850.38	-19.73		
Uranus	I	2029-12-25T01:49:28.560		46.55	-60.14	25381.03		-4.43	-4.64
Uranus	E	2029-12-25T02:13:48.069		42.13	-56.19	25073.94		-7.39	-7.74
6	E	2029-12-25T02:29:24.148		39.28	-53.54	41796.50	19.67		
5	E	2029-12-25T02:29:42.644		39.22	-53.48	42154.84	19.72		
4	E	2029-12-25T02:30:01.349		39.16	-53.43	42528.32	19.77		
alpha	E	2029-12-25T02:31:52.964		38.82	-53.11	44747.70	20.01		
beta	E	2029-12-25T02:32:37.989		38.68	-52.98	45650.22	20.11		
eta	E	2029-12-25T02:33:53.625		38.45	-52.76	47176.12	20.25		
gamma	E	2029-12-25T02:34:15.998		38.38	-52.69	47629.57	20.29		
delta	E	2029-12-25T02:34:49.016		38.28	-52.60	48300.35	20.34		
lambda	E	2029-12-25T02:36:13.599		38.02	-52.35	50026.71	20.48		
epsilon	E	2029-12-25T02:36:50.591		37.91	-52.24	50785.14	20.50		

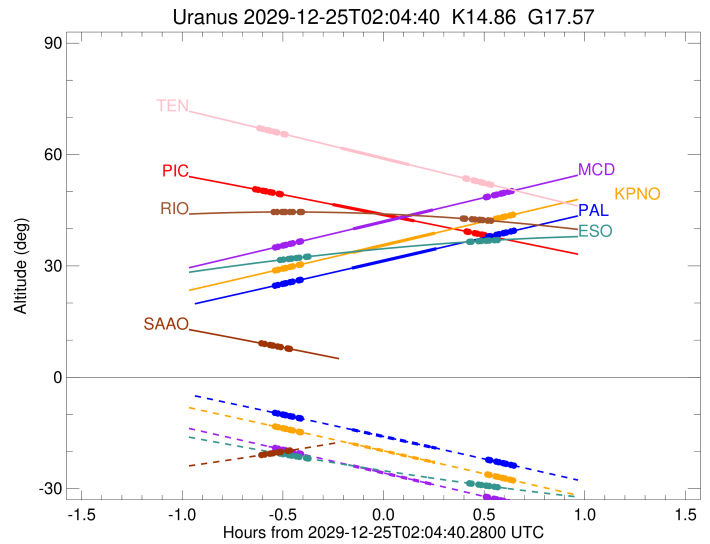
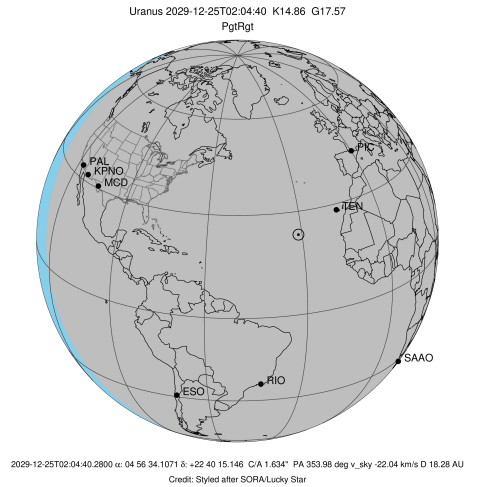
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2029-12-25T02:08:02.690
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       : 3412552796020904064
2Mass ID (if available) : 04563410+2240153
ICRS Star Coord at Epoch: 04h 56m 34.10715s +22:40:15.14604s
RUWE (>1.4 is poor) : 1.03
K magnitude           : 14.855
G magnitude           : 17.569
RP magnitude          : 16.672
BP magnitude          : 18.423
DUPflag              : 0
Distance (au)         : 18.282
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -22.04
Sun-Target sep (deg) : 162.26
Sun-Moon sep (deg)   : 66.89
B (ring opening deg) : 81.93
PA of pole (deg)     : -22.33
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.425
C/A sky separation (km) : 18897.3
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_itr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```



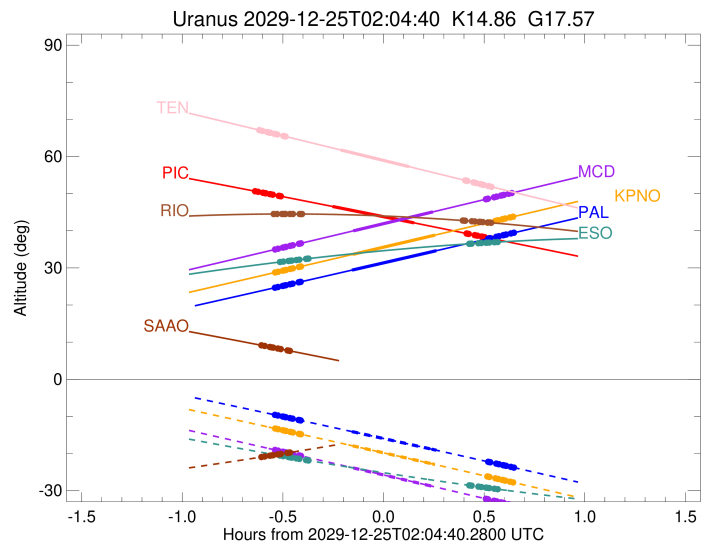
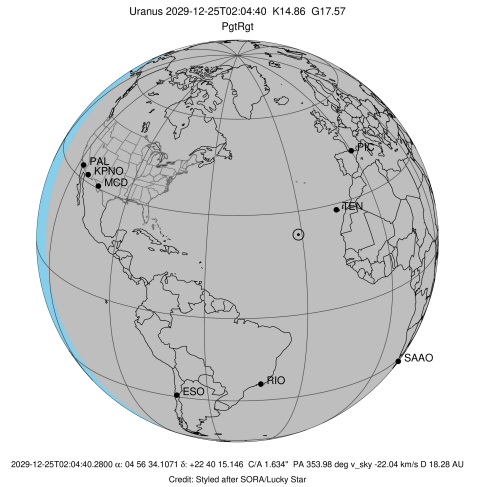
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-12-25T01:32:11.757		24.64	-9.57	51284.80	-20.49		
lambda	I	2029-12-25T01:33:13.090		24.85	-9.77	50026.71	-20.47		
delta	I	2029-12-25T01:34:37.680		25.14	-10.04	48300.35	-20.34		
gamma	I	2029-12-25T01:35:10.818		25.26	-10.15	47627.06	-20.29		
eta	I	2029-12-25T01:35:33.061		25.33	-10.22	47176.12	-20.25		
beta	I	2029-12-25T01:36:47.107		25.59	-10.46	45681.04	-20.12		
alpha	I	2029-12-25T01:37:36.635		25.76	-10.62	44686.61	-20.03		
4	I	2029-12-25T01:39:20.949		26.12	-10.96	42608.61	-19.80		
5	I	2029-12-25T01:39:37.488		26.17	-11.02	42281.15	-19.75		
6	I	2029-12-25T01:39:59.277		26.25	-11.09	41851.23	-19.71		
Uranus	I	2029-12-25T01:55:17.312		29.41	-14.10	25399.51		-4.19	-4.39
Uranus	E	2029-12-25T02:20:25.726		34.63	-19.11	25079.99		-7.35	-7.69
6	E	2029-12-25T02:35:50.663		37.85	-22.23	41796.51	19.78		
5	E	2029-12-25T02:36:09.058		37.92	-22.29	42154.84	19.82		
4	E	2029-12-25T02:36:27.664		37.98	-22.35	42528.32	19.87		
alpha	E	2029-12-25T02:38:18.716		38.37	-22.73	44747.69	20.11		
beta	E	2029-12-25T02:39:03.527		38.53	-22.88	45650.23	20.21		
eta	E	2029-12-25T02:40:18.815		38.79	-23.13	47176.12	20.34		
gamma	E	2029-12-25T02:40:41.088		38.87	-23.21	47629.58	20.38		
delta	E	2029-12-25T02:41:13.960		38.98	-23.32	48300.35	20.43		
lambda	E	2029-12-25T02:42:38.179		39.28	-23.61	50026.71	20.56		
epsilon	E	2029-12-25T02:43:14.998		39.40	-23.73	50784.80	20.59		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-25T02:07:57.300
 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 : 3412552796020904064
 2Mass ID (if available) : 04563410+2240153
 ICRS Star Coord at Epoch: 04h 56m 34.10715s +22:40:15.14604s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.855
 G magnitude : 17.569
 RP magnitude : 16.672
 BP magnitude : 18.423
 DUPflag : 0
 Distance (au) : 18.282
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.04
 Sun-Target sep (deg) : 162.26
 Sun-Moon sep (deg) : 66.94
 B (ring opening deg) : 81.93
 PA of pole (deg) : -22.33
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.449
 C/A sky separation (km) : 19214.5
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



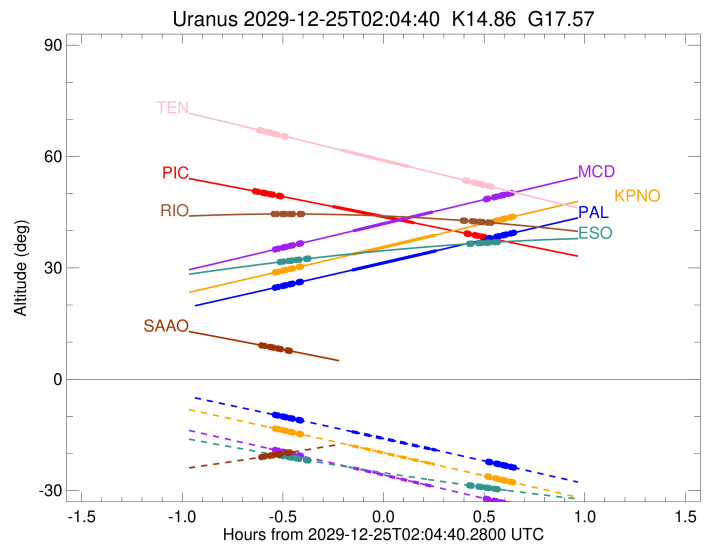
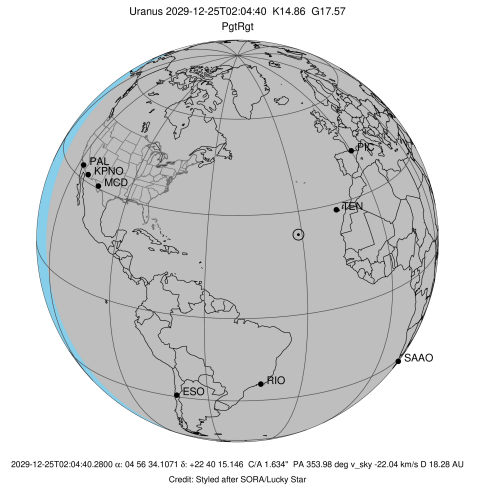
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-12-25T01:32:15.653		28.75	-13.25	51282.21	-20.47		
lambda	I	2029-12-25T01:33:16.933		28.96	-13.45	50026.71	-20.44		
delta	I	2029-12-25T01:34:41.641		29.26	-13.74	48300.35	-20.31		
gamma	I	2029-12-25T01:35:14.829		29.37	-13.85	47627.09	-20.26		
eta	I	2029-12-25T01:35:37.111		29.45	-13.92	47176.12	-20.22		
beta	I	2029-12-25T01:36:51.292		29.71	-14.17	45681.07	-20.08		
alpha	I	2029-12-25T01:37:40.920		29.89	-14.34	44686.70	-19.99		
4	I	2029-12-25T01:39:25.501		30.25	-14.69	42608.39	-19.75		
5	I	2029-12-25T01:39:42.101		30.31	-14.74	42280.59	-19.70		
6	I	2029-12-25T01:40:03.942		30.39	-14.82	41850.88	-19.65		
Uranus	I	2029-12-25T01:55:30.026		33.64	-17.94	25389.37		-4.32	-4.53
Uranus	E	2029-12-25T02:20:01.941		38.84	-22.96	25071.78		-7.41	-7.76
6	E	2029-12-25T02:35:35.197		42.14	-26.17	41796.40	19.72		
5	E	2029-12-25T02:35:53.656		42.21	-26.24	42154.83	19.77		
4	E	2029-12-25T02:36:12.318		42.27	-26.30	42528.44	19.82		
alpha	E	2029-12-25T02:38:03.642		42.67	-26.69	44747.56	20.06		
beta	E	2029-12-25T02:38:48.565		42.83	-26.84	45650.36	20.16		
eta	E	2029-12-25T02:40:03.997		43.10	-27.10	47176.12	20.30		
gamma	E	2029-12-25T02:40:26.312		43.18	-27.18	47629.61	20.34		
delta	E	2029-12-25T02:40:59.239		43.29	-27.30	48300.35	20.40		
lambda	E	2029-12-25T02:42:23.588		43.59	-27.59	50026.71	20.53		
epsilon	E	2029-12-25T02:43:00.401		43.72	-27.72	50783.61	20.56		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-25T02:07:44.030
 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 : 3412552796020904064
 2Mass ID (if available) : 04563410+2240153
 ICRS Star Coord at Epoch: 04h 56m 34.10715s +22:40:15.14604s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.855
 G magnitude : 17.569
 RP magnitude : 16.672
 BP magnitude : 18.423
 DUPflag : 0
 Distance (au) : 18.282
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.04
 Sun-Target sep (deg) : 162.26
 Sun-Moon sep (deg) : 66.99
 B (ring opening deg) : 81.93
 PA of pole (deg) : -22.33
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.479
 C/A sky separation (km) : 19605.8
 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	2029-12-25T01:32:14.426		34.95	-19.02	51278.93	-20.44		
lambda	I	2029-12-25T01:33:15.627		35.17	-19.23	50026.71	-20.42		
delta	I	2029-12-25T01:34:40.468		35.47	-19.52	48300.35	-20.28		
gamma	I	2029-12-25T01:35:13.713		35.59	-19.63	47627.14	-20.22		
eta	I	2029-12-25T01:35:36.041		35.67	-19.71	47176.12	-20.18		
beta	I	2029-12-25T01:36:50.380		35.93	-19.97	45681.09	-20.04		
alpha	I	2029-12-25T01:37:40.124		36.11	-20.14	44686.82	-19.94		
4	I	2029-12-25T01:39:25.026		36.49	-20.50	42608.11	-19.68		
5	I	2029-12-25T01:39:41.700		36.55	-20.56	42279.88	-19.63		
6	I	2029-12-25T01:40:03.603		36.62	-20.63	41850.44	-19.58		
Uranus	I	2029-12-25T01:55:40.135		39.98	-23.88	25376.18		-4.49	-4.70
Uranus	E	2029-12-25T02:19:24.974		45.09	-28.87	25061.89		-7.49	-7.84
6	E	2029-12-25T02:35:09.075		48.49	-32.20	41796.29	19.64		
5	E	2029-12-25T02:35:27.614		48.56	-32.26	42154.82	19.70		
4	E	2029-12-25T02:35:46.347		48.63	-32.33	42528.60	19.75		
alpha	E	2029-12-25T02:37:38.008		49.03	-32.72	44747.39	20.01		
beta	E	2029-12-25T02:38:23.072		49.19	-32.88	45650.52	20.11		
eta	E	2029-12-25T02:39:38.681		49.46	-33.15	47176.12	20.26		
gamma	E	2029-12-25T02:40:01.048		49.54	-33.23	47629.64	20.30		
delta	E	2029-12-25T02:40:34.044		49.66	-33.34	48300.35	20.36		
lambda	E	2029-12-25T02:41:58.553		49.97	-33.64	50026.71	20.50		
epsilon	E	2029-12-25T02:42:35.360		50.10	-33.77	50782.20	20.52		

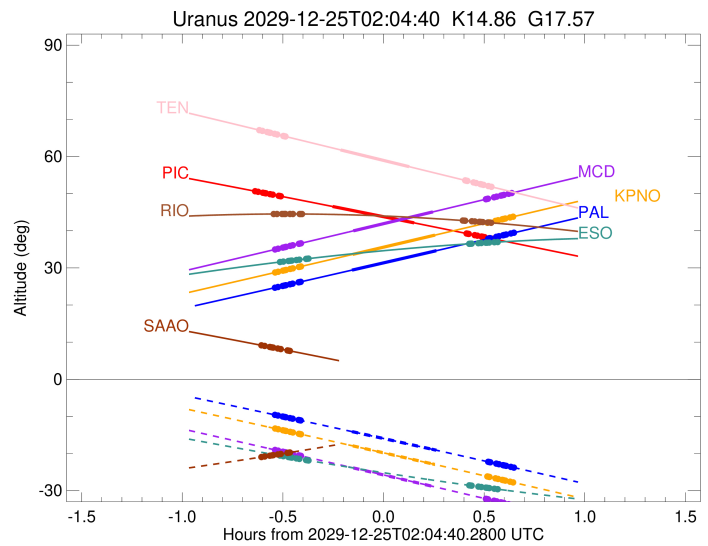
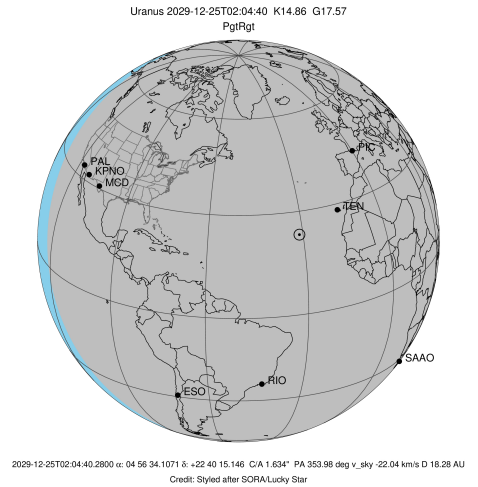
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-25T02:02:18.470
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 3412552796020904064
 2Mass ID (if available) : 04563410+2240153
 ICRS Star Coord at Epoch: 04h 56m 34.10715s +22:40:15.14604s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.855
 G magnitude : 17.569
 RP magnitude : 16.672
 BP magnitude : 18.423
 DUPflag : 0
 Distance (au) : 18.282
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.04
 Sun-Target sep (deg) : 162.26
 Sun-Moon sep (deg) : 66.71
 B (ring opening deg) : 81.93
 PA of pole (deg) : -22.33
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.592
 C/A sky separation (km) : 21104.3
 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	2029-12-25T01:27:33.964		67.13	-83.21	51263.05	-20.33		
lambda	I	2029-12-25T01:28:34.736		66.91	-83.04	50026.71	-20.29		
delta	I	2029-12-25T01:30:00.168		66.59	-82.80	48300.35	-20.12		
gamma	I	2029-12-25T01:30:33.668		66.47	-82.71	47627.37	-20.05		
eta	I	2029-12-25T01:30:56.198		66.39	-82.65	47176.12	-20.00		
beta	I	2029-12-25T01:32:11.242		66.12	-82.43	45681.18	-19.83		
alpha	I	2029-12-25T01:33:01.504		65.93	-82.28	44687.42	-19.71		
4	I	2029-12-25T01:34:47.856		65.54	-81.96	42606.77	-19.40		
5	I	2029-12-25T01:35:04.869		65.48	-81.91	42276.52	-19.34		
6	I	2029-12-25T01:35:27.047		65.40	-81.84	41848.40	-19.28		
Uranus	I	2029-12-25T01:51:54.062		61.78	-78.63	25314.05		-5.21	-5.46
Uranus	E	2029-12-25T02:12:19.785		57.27	-74.34	25028.79		-7.74	-8.11
6	E	2029-12-25T02:28:58.899		53.58	-70.75	41795.94	19.23		
5	E	2029-12-25T02:29:17.869		53.51	-70.68	42154.86	19.30		
4	E	2029-12-25T02:29:36.997		53.44	-70.61	42529.10	19.36		
alpha	E	2029-12-25T02:31:30.728		53.03	-70.20	44746.86	19.66		
beta	E	2029-12-25T02:32:16.623		52.86	-70.03	45651.00	19.78		
eta	E	2029-12-25T02:33:33.428		52.57	-69.75	47176.12	19.95		
gamma	E	2029-12-25T02:33:56.142		52.49	-69.67	47629.75	20.00		
delta	E	2029-12-25T02:34:29.622		52.37	-69.55	48300.35	20.06		
lambda	E	2029-12-25T02:35:55.312		52.05	-69.24	50026.71	20.23		
epsilon	E	2029-12-25T02:36:32.409		51.91	-69.10	50778.27	20.26		

```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2029-12-25T02:04:26.830
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       : 3412552796020904064
2Mass ID (if available) : 04563410+2240153
ICRS Star Coord at Epoch: 04h 56m 34.10715s +22:40:15.14604s
RUWE (>1.4 is poor) : 1.03
K magnitude           : 14.855
G magnitude           : 17.569
RP magnitude          : 16.672
BP magnitude          : 18.423
DUPflag              : 0
Distance (au)        : 18.282
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -22.04
Sun-Target sep (deg) : 162.26
Sun-Moon sep (deg)   : 66.72
B (ring opening deg) : 81.93
PA of pole (deg)     : -22.33
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.985
C/A sky separation (km) : 26322.5
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_itrfr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```

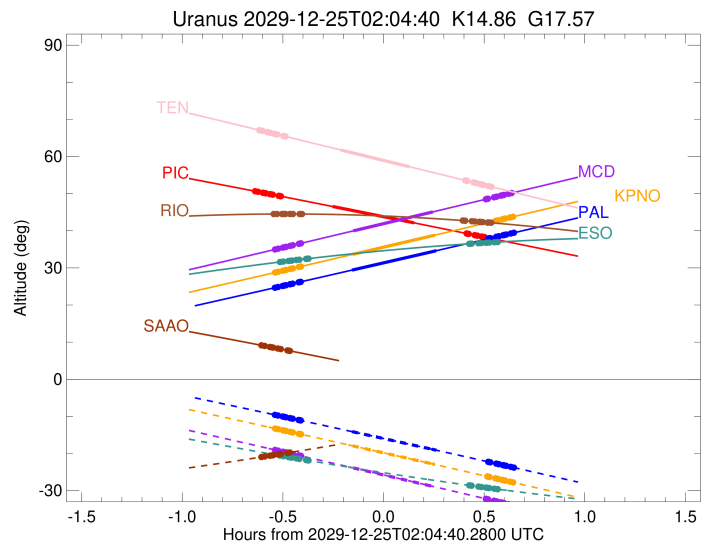
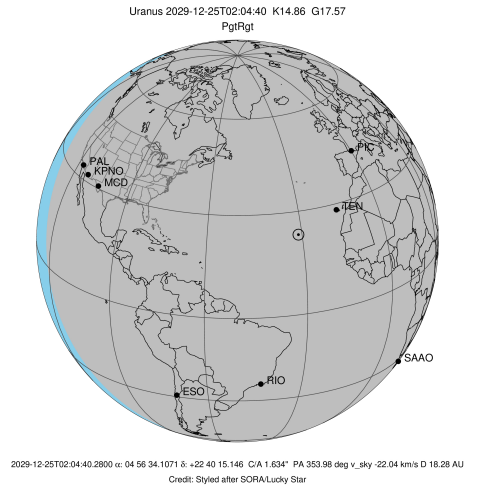


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-12-25T01:31:52.905		44.52	-39.83	51218.06	-19.12		
lambda	I	2029-12-25T01:32:55.193		44.52	-39.93	50026.71	-19.04		
delta	I	2029-12-25T01:34:26.512		44.52	-40.07	48300.35	-18.76		
gamma	I	2029-12-25T01:35:02.453		44.53	-40.13	47628.01	-18.65		
eta	I	2029-12-25T01:35:26.738		44.53	-40.17	47176.12	-18.57		
beta	I	2029-12-25T01:36:47.869		44.53	-40.29	45681.20	-18.28		
alpha	I	2029-12-25T01:37:42.435		44.52	-40.37	44689.54	-18.07		
4	I	2029-12-25T01:39:39.567		44.52	-40.54	42602.27	-17.55		
5	I	2029-12-25T01:39:58.706		44.51	-40.57	42265.89	-17.45		
6	I	2029-12-25T01:40:23.127		44.51	-40.61	41842.11	-17.34		

No planet occultations

6	E	2029-12-25T02:28:15.213		42.76	-43.47	41794.88	17.33		
5	E	2029-12-25T02:28:36.476		42.74	-43.48	42156.19	17.44		
4	E	2029-12-25T02:28:57.644		42.71	-43.49	42532.14	17.54		
alpha	E	2029-12-25T02:31:01.940		42.57	-43.55	44743.91	18.06		
beta	E	2029-12-25T02:31:52.072		42.52	-43.58	45653.51	18.26		
eta	E	2029-12-25T02:33:14.806		42.42	-43.61	47176.12	18.55		
gamma	E	2029-12-25T02:33:39.229		42.39	-43.62	47630.25	18.64		
delta	E	2029-12-25T02:34:15.076		42.34	-43.64	48300.35	18.75		
lambda	E	2029-12-25T02:35:46.464		42.23	-43.67	50026.71	19.02		
epsilon	E	2029-12-25T02:36:24.963		42.18	-43.68	50761.22	19.10		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2029-12-25T02:06:23.300
 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 : 3412552796020904064
 2Mass ID (if available) : 04563410+2240153
 ICRS Star Coord at Epoch: 04h 56m 34.10715s +22:40:15.14604s
 RUWE (>1.4 is poor) : 1.03
 K magnitude : 14.855
 G magnitude : 17.569
 RP magnitude : 16.672
 BP magnitude : 18.423
 DUPflag : 0
 Distance (au) : 18.282
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.04
 Sun-Target sep (deg) : 162.26
 Sun-Moon sep (deg) : 66.77
 B (ring opening deg) : 81.93
 PA of pole (deg) : -22.33
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.992
 C/A sky separation (km) : 26409.8
 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



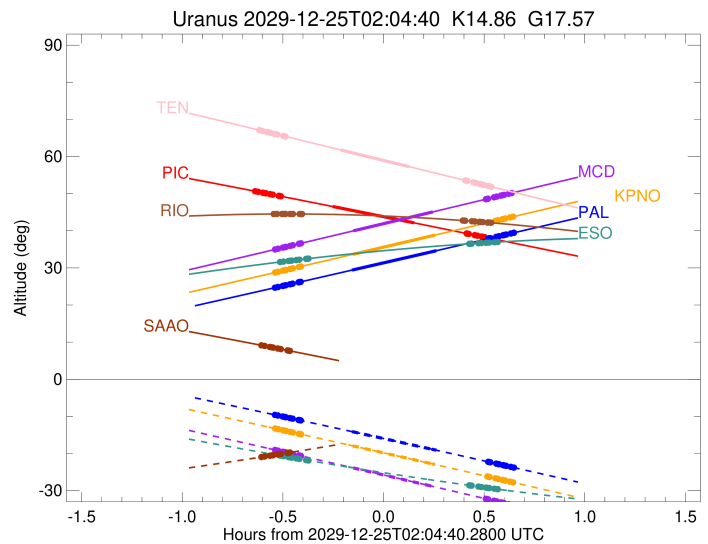
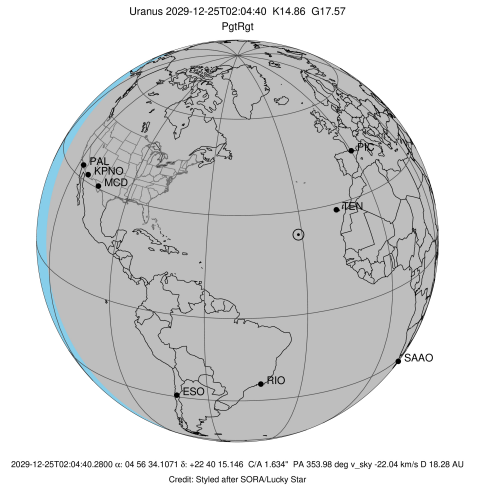
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-12-25T01:33:46.258		31.58	-20.55	51218.45	-19.03		
lambda	I	2029-12-25T01:34:48.851		31.70	-20.72	50026.71	-18.95		
delta	I	2029-12-25T01:36:20.595		31.87	-20.96	48300.35	-18.68		
gamma	I	2029-12-25T01:36:56.705		31.93	-21.05	47628.01	-18.56		
eta	I	2029-12-25T01:37:21.105		31.98	-21.11	47176.12	-18.48		
beta	I	2029-12-25T01:38:42.626		32.12	-21.32	45681.20	-18.19		
alpha	I	2029-12-25T01:39:37.461		32.22	-21.47	44689.53	-17.98		
4	I	2029-12-25T01:41:35.185		32.43	-21.77	42602.28	-17.46		
5	I	2029-12-25T01:41:54.423		32.46	-21.82	42265.92	-17.36		
6	I	2029-12-25T01:42:18.973		32.51	-21.88	41842.12	-17.25		

No planet occultations

6	E	2029-12-25T02:30:10.839		36.49	-28.57	41794.86	17.27		
5	E	2029-12-25T02:30:32.187		36.51	-28.61	42156.28	17.38		
4	E	2029-12-25T02:30:53.426		36.53	-28.66	42532.28	17.48		
alpha	E	2029-12-25T02:32:58.106		36.65	-28.91	44743.79	18.00		
beta	E	2029-12-25T02:33:48.398		36.70	-29.02	45653.61	18.21		
eta	E	2029-12-25T02:35:11.354		36.78	-29.19	47176.12	18.50		
gamma	E	2029-12-25T02:35:35.841		36.80	-29.24	47630.26	18.59		
delta	E	2029-12-25T02:36:11.779		36.83	-29.31	48300.35	18.70		
lambda	E	2029-12-25T02:37:43.388		36.92	-29.49	50026.71	18.98		
epsilon	E	2029-12-25T02:38:21.942		36.95	-29.57	50760.61	19.06		


```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2029-12-25T02:01:15.490
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       : 3412552796020904064
2Mass ID (if available) : 04563410+2240153
ICRS Star Coord at Epoch: 04h 56m 34.10715s +22:40:15.14604s
RUWE (>1.4 is poor) : 1.03
K magnitude           : 14.855
G magnitude           : 17.569
RP magnitude          : 16.672
BP magnitude          : 18.423
DUPflag              : 0
Distance (au)         : 18.282
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -22.04
Sun-Target sep (deg) : 162.26
Sun-Moon sep (deg)   : 65.89
B (ring opening deg) : 81.93
PA of pole (deg)     : -22.33
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.966
C/A sky separation (km) : 26073.6
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall1.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall1.bsp
ural61.bsp
vgr2.ural61.bsp
peph.ural60.bsp
earthstns_itrfr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2029-12-25T01:28:12.826		9.15	-20.96	51217.53	-18.99		
lambda	I	2029-12-25T01:29:15.501		8.97	-20.81	50026.71	-18.92		
delta	I	2029-12-25T01:30:47.409		8.70	-20.59	48300.35	-18.65		
gamma	I	2029-12-25T01:31:23.574		8.60	-20.50	47628.01	-18.54		
eta	I	2029-12-25T01:31:48.008		8.52	-20.45	47176.12	-18.45		
beta	I	2029-12-25T01:33:09.620		8.28	-20.25	45681.20	-18.17		
alpha	I	2029-12-25T01:34:04.492		8.12	-20.12	44689.54	-17.97		
4	I	2029-12-25T01:36:02.225		7.77	-19.83	42602.29	-17.47		
5	I	2029-12-25T01:36:21.454		7.72	-19.79	42265.94	-17.37		
6	I	2029-12-25T01:36:45.986		7.64	-19.73	41842.14	-17.26		

No planet occultations

6	E	2029-12-25T02:25:32.176	-1.35x	-12.08	41794.94	17.20
5	E	2029-12-25T02:25:53.578	-1.42x	-12.02	42155.99	17.30
4	E	2029-12-25T02:26:14.912	-1.49x	-11.96	42531.82	17.40
alpha	E	2029-12-25T02:28:20.298	-1.88x	-11.61	44744.22	17.90
beta	E	2029-12-25T02:29:10.858	-2.05x	-11.47	45653.26	18.10
eta	E	2029-12-25T02:30:34.400	-2.31x	-11.23	47176.12	18.37
gamma	E	2029-12-25T02:30:59.062	-2.39x	-11.16	47630.20	18.45
delta	E	2029-12-25T02:31:35.273	-2.51x	-11.06	48300.35	18.56
lambda	E	2029-12-25T02:33:07.617	-2.80x	-10.80	50026.71	18.82
epsilon	E	2029-12-25T02:33:46.608	-2.93x	-10.69	50762.70	18.90