

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-08T06:16:32.500
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3404402532934661120
 2Mass ID (if available) : 05385349+2330036

ICRS Star Coord at Epoch: 05h 38m 53.49482s +23:30:03.40195s

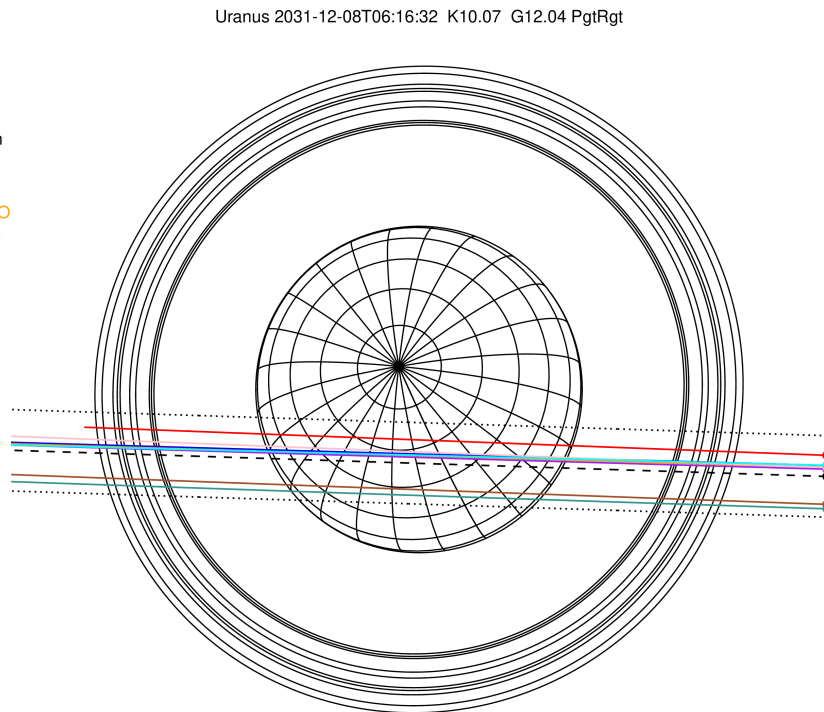
RUWE (>1.4 is poor) : 0.00
 K magnitude : 10.067
 G magnitude : 12.044
 RP magnitude : 10.777
 BP magnitude : 11.433
 DUPflag : 0
 Distance (au) : 18.117
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.02
 Sun-Target sep (deg) : 170.33
 Sun-Moon sep (deg) : 93.00
 B (ring opening deg) : 79.13
 PA of pole (deg) : 41.33

#	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



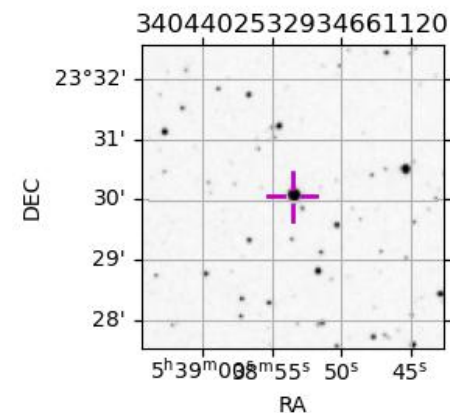
2031-12-08T06:16:32.5000 ra: 05 38 53.4948 s: +23 30 03.402 C/A 0.873° PA 358.17 deg v_sky -23.02 km/s D 18.12 AU
 Credit: Styled after SORA/Lucky Star

Earth
 PIC
 PAL
 KPNO
 MCD
 TEN
 IRTF
 RIO
 ESO

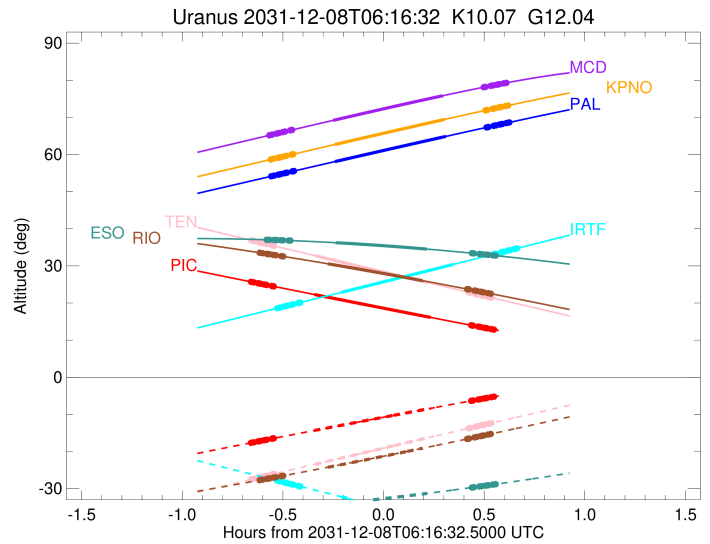
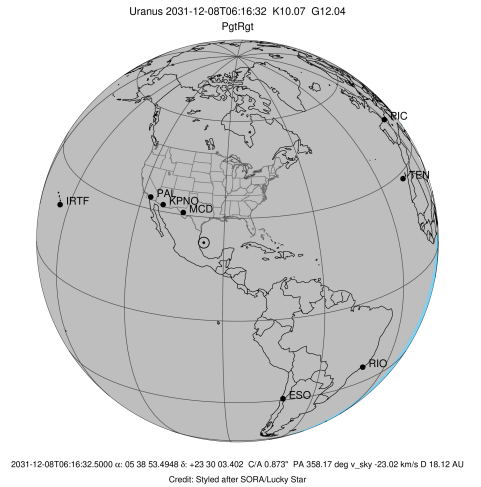


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++	+ +	+++++	DEC 08 05:36 - DEC 08 06:49	PieRie
PAL	Palomar Mt (200")	33.4	243.1	+++++	+ +	+++++	DEC 08 05:42 - DEC 08 06:53	PieRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++	+ +	+++++	DEC 08 05:42 - DEC 08 06:53	PieRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++	+ +	+++++	DEC 08 05:42 - DEC 08 06:53	PieRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++	+ +	+++++	DEC 08 05:36 - DEC 08 06:48	PieRie
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++	+ +	+++++	DEC 08 05:44 - DEC 08 06:56	PieRie
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++	+ +	+++++	DEC 08 05:39 - DEC 08 06:48	PieRie
ESO	European Southern Obs	-29.3	289.3	+++++	+ +	+++++	DEC 08 05:41 - DEC 08 06:49	PieRie
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8					PnnRnn
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



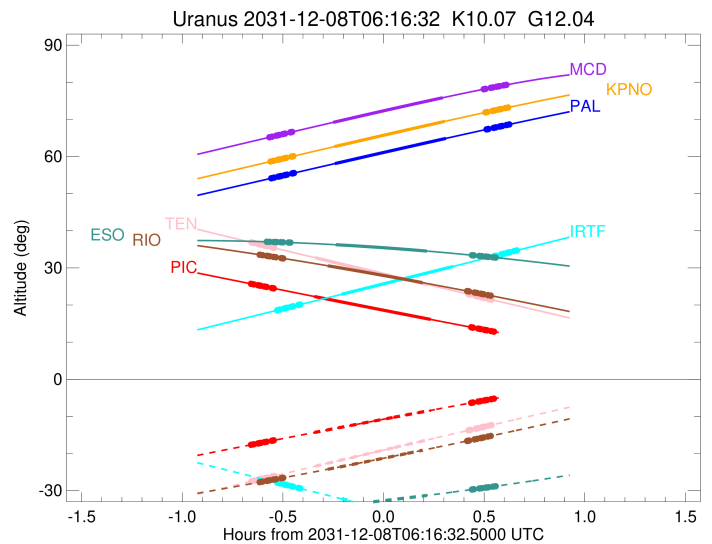
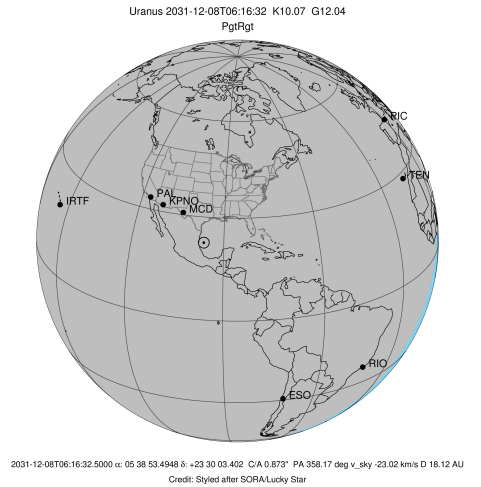
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-08T06:13:07.350
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3404402532934661120
 2Mass ID (if available) : 05385349+2330036
 ICRS Star Coord at Epoch: 05h 38m 53.49482s +23:30:03.40195s
 RUWE (>1.4 is poor) : 0.00
 K magnitude : 10.067
 G magnitude : 12.044
 RP magnitude : 10.777
 BP magnitude : 11.433
 DUPflag : 0
 Distance (au) : 18.117
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.02
 Sun-Target sep (deg) : 170.33
 Sun-Moon sep (deg) : 93.33
 B (ring opening deg) : 79.13
 PA of pole (deg) : 41.33
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.601
 C/A sky separation (km) : 7893.1
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_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	2031-12-08T05:36:52.504		25.74	-17.69	51409.70	-23.04		
lambda	I	2031-12-08T05:37:52.617		25.56	-17.51	50026.71	-23.00		
delta	I	2031-12-08T05:39:07.723		25.33	-17.29	48300.35	-22.97		
gamma	I	2031-12-08T05:39:37.009		25.24	-17.20	47627.70	-22.96		
eta	I	2031-12-08T05:39:56.677		25.19	-17.14	47176.12	-22.96		
beta	I	2031-12-08T05:41:01.827		24.99	-16.95	45680.68	-22.93		
alpha	I	2031-12-08T05:41:42.970		24.86	-16.83	44737.45	-22.92		
4	I	2031-12-08T05:43:16.851		24.58	-16.55	42585.04	-22.87		
5	I	2031-12-08T05:43:35.470		24.52	-16.50	42169.35	-22.86		
6	I	2031-12-08T05:43:51.083		24.48	-16.45	41807.22	-22.86		
Uranus	I	2031-12-08T05:55:53.492		22.30	-14.34	25116.88		-9.57	-10.01
Uranus	E	2031-12-08T06:30:37.616		16.12	-8.37	25451.93		4.64	4.86
6	E	2031-12-08T06:42:42.672		14.00	-6.35	41876.28	22.78		
5	E	2031-12-08T06:43:00.285		13.95	-6.30	42278.94	22.78		
4	E	2031-12-08T06:43:12.129		13.92	-6.27	42542.55	22.78		
alpha	E	2031-12-08T06:44:47.078		13.64	-6.01	44710.56	22.83		
beta	E	2031-12-08T06:45:27.992		13.53	-5.89	45644.38	22.84		
eta	E	2031-12-08T06:46:34.999		13.33	-5.71	47176.12	22.86		
gamma	E	2031-12-08T06:46:54.553		13.28	-5.65	47623.23	22.87		
delta	E	2031-12-08T06:47:24.155		13.19	-5.57	48300.35	22.88		
lambda	E	2031-12-08T06:48:39.580		12.97	-5.37	50026.71	22.90		
epsilon	E	2031-12-08T06:49:21.722		12.85	-5.25	50991.91	22.94		

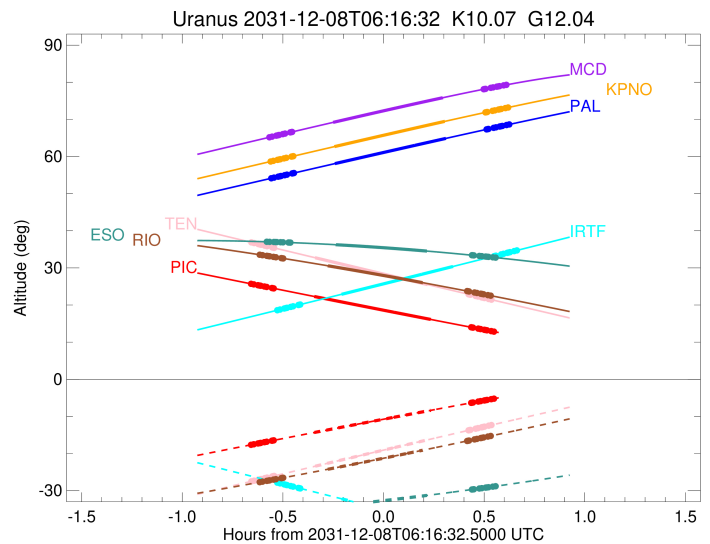
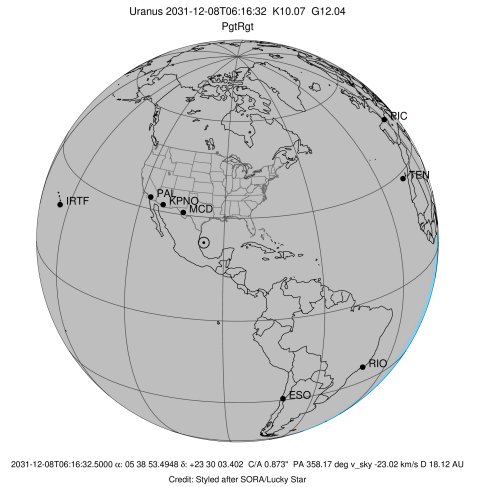
```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2031-12-08T06:18:27.180
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        : 3404402532934661120
2Mass ID (if available) : 05385349+2330036
ICRS Star Coord at Epoch: 05h 38m 53.49482s +23:30:03.40195s
RUWE (>1.4 is poor)  : 0.00
K magnitude           : 10.067
G magnitude           : 12.044
RP magnitude          : 10.777
BP magnitude          : 11.433
DUPflag              : 0
Distance (au)         : 18.117
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -23.02
Sun-Target sep (deg)  : 170.33
Sun-Moon sep (deg)    : 93.78
B (ring opening deg)  : 79.13
PA of pole (deg)      : 41.33
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.770
C/A sky separation (km) : 10117.0
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_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	2031-12-08T05:42:54.021		54.11	-62.39	51420.35	-23.06		
lambda	I	2031-12-08T05:43:54.556		54.32	-62.60	50026.71	-23.01		
delta	I	2031-12-08T05:45:09.643		54.58	-62.85	48300.35	-22.97		
gamma	I	2031-12-08T05:45:38.941		54.68	-62.95	47627.51	-22.96		
eta	I	2031-12-08T05:45:58.606		54.75	-63.01	47176.12	-22.95		
beta	I	2031-12-08T05:47:03.791		54.98	-63.23	45680.85	-22.91		
alpha	I	2031-12-08T05:47:44.932		55.12	-63.37	44738.60	-22.89		
4	I	2031-12-08T05:49:19.115		55.45	-63.69	42583.12	-22.81		
5	I	2031-12-08T05:49:37.795		55.51	-63.75	42167.35	-22.80		
6	I	2031-12-08T05:49:53.278		55.57	-63.80	41808.62	-22.80		
Uranus	I	2031-12-08T06:02:03.974		58.10	-66.22	25079.82		-9.97	-10.44
Uranus	E	2031-12-08T06:35:09.070		64.89	-72.44	25493.67		3.62	3.79
6	E	2031-12-08T06:47:18.195		67.32	-74.50	41877.28	22.85		
5	E	2031-12-08T06:47:35.534		67.38	-74.55	42274.58	22.86		
4	E	2031-12-08T06:47:47.398		67.42	-74.58	42540.39	22.87		
alpha	E	2031-12-08T06:49:22.121		67.73	-74.84	44712.56	22.95		
beta	E	2031-12-08T06:50:02.761		67.86	-74.94	45645.07	22.97		
eta	E	2031-12-08T06:51:09.343		68.08	-75.12	47176.12	23.01		
gamma	E	2031-12-08T06:51:28.760		68.14	-75.17	47622.99	23.02		
delta	E	2031-12-08T06:51:58.175		68.24	-75.24	48300.35	23.04		
lambda	E	2031-12-08T06:53:13.054		68.49	-75.44	50026.71	23.07		
epsilon	E	2031-12-08T06:53:55.747		68.62	-75.54	51012.24	23.13		

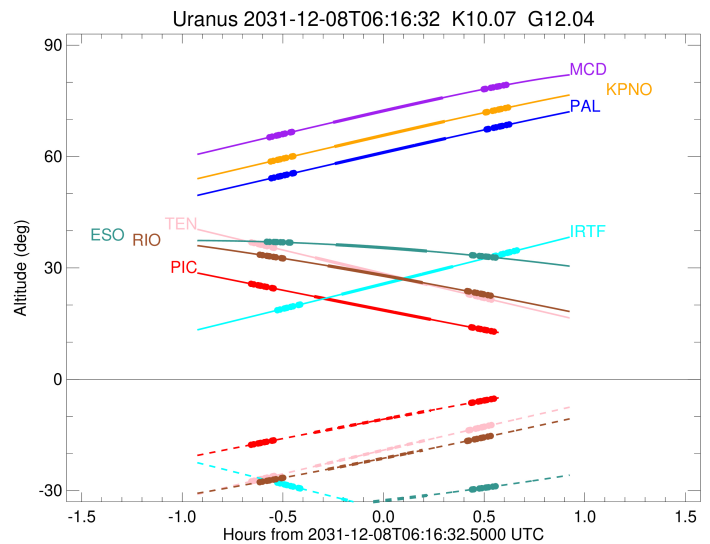
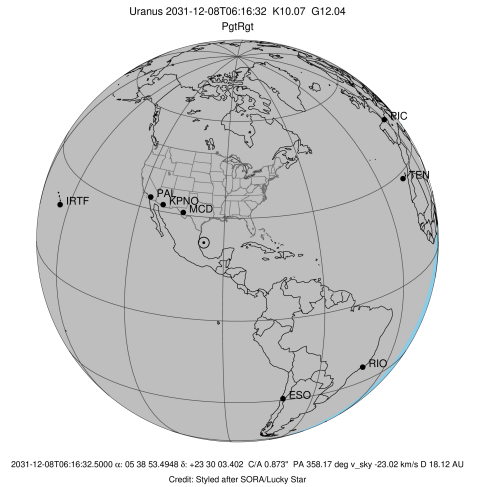
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-08T06:18:10.680
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KPNO
 Location : Kitt Peak Natl Obs
 Latitude (deg) : 31.96333
 E. Longitude (deg) : 248.40000
 Altitude (km) : 2.120
 Gaia source ID : 3404402532934661120
 2Mass ID (if available) : 05385349+2330036
 ICRS Star Coord at Epoch: 05h 38m 53.49482s +23:30:03.40195s
 RUWE (>1.4 is poor) : 0.00
 K magnitude : 10.067
 G magnitude : 12.044
 RP magnitude : 10.777
 BP magnitude : 11.433
 DUPflag : 0
 Distance (au) : 18.117
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.02
 Sun-Target sep (deg) : 170.33
 Sun-Moon sep (deg) : 93.82
 B (ring opening deg) : 79.13
 PA of pole (deg) : 41.33
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.789
 C/A sky separation (km) : 10368.0
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-12-08T05:42:42.082		58.62	-67.00	51422.00	-23.07		
lambda	I	2031-12-08T05:43:42.685		58.84	-67.21	50026.71	-23.01		
delta	I	2031-12-08T05:44:57.773		59.10	-67.46	48300.35	-22.97		
gamma	I	2031-12-08T05:45:27.074		59.21	-67.56	47627.48	-22.96		
eta	I	2031-12-08T05:45:46.740		59.28	-67.63	47176.12	-22.95		
beta	I	2031-12-08T05:46:51.934		59.51	-67.85	45680.88	-22.91		
alpha	I	2031-12-08T05:47:33.078		59.65	-67.98	44738.77	-22.88		
4	I	2031-12-08T05:49:07.314		59.98	-68.30	42582.83	-22.80		
5	I	2031-12-08T05:49:26.004		60.05	-68.36	42167.07	-22.79		
6	I	2031-12-08T05:49:41.469		60.10	-68.41	41808.83	-22.79		
Uranus	I	2031-12-08T06:01:53.466		62.67	-70.82	25075.26		-10.02	-10.49
Uranus	E	2031-12-08T06:34:47.125		69.46	-76.78	25497.36		3.52	3.68
6	E	2031-12-08T06:46:57.634		71.89	-78.58	41877.36	22.84		
5	E	2031-12-08T06:47:14.967		71.95	-78.62	42274.18	22.84		
4	E	2031-12-08T06:47:26.846		71.99	-78.65	42540.20	22.85		
alpha	E	2031-12-08T06:49:01.649		72.30	-78.85	44712.75	22.93		
beta	E	2031-12-08T06:49:42.308		72.43	-78.94	45645.13	22.96		
eta	E	2031-12-08T06:50:48.921		72.65	-79.08	47176.12	23.00		
gamma	E	2031-12-08T06:51:08.346		72.71	-79.12	47622.97	23.01		
delta	E	2031-12-08T06:51:37.774		72.81	-79.18	48300.35	23.03		
lambda	E	2031-12-08T06:52:52.681		73.05	-79.33	50026.71	23.07		
epsilon	E	2031-12-08T06:53:35.463		73.19	-79.41	51013.98	23.12		

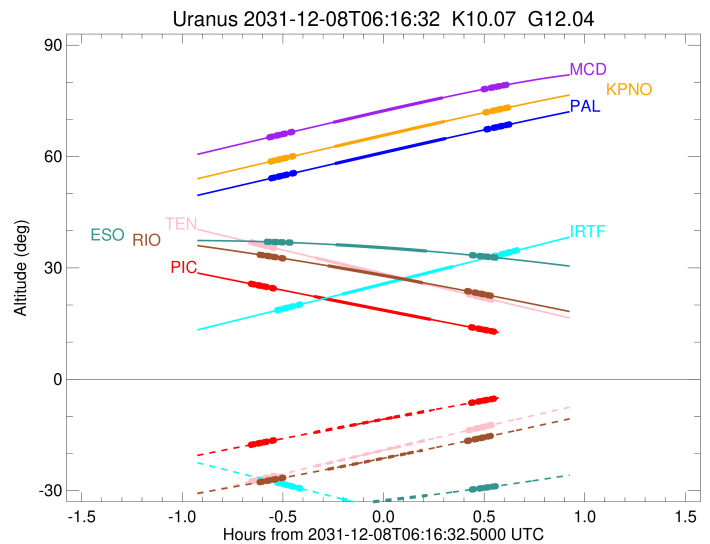
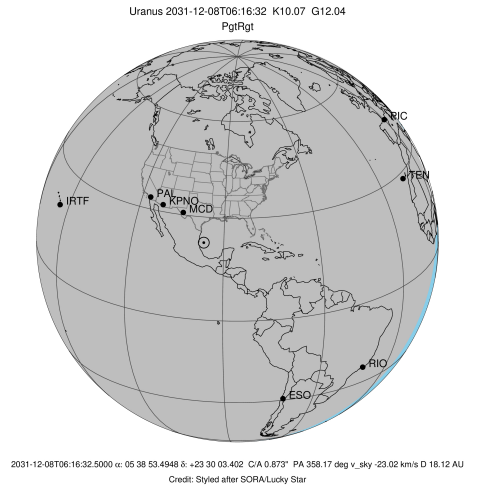
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2031-12-08T06:17:43.830
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      : 3404402532934661120
2Mass ID (if available) : 05385349+2330036
ICRS Star Coord at Epoch: 05h 38m 53.49482s +23:30:03.40195s
RUWE (>1.4 is poor) : 0.00
K magnitude          : 10.067
G magnitude          : 12.044
RP magnitude         : 10.777
BP magnitude         : 11.433
DUPflag             : 0
Distance (au)       : 18.117
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -23.02
Sun-Target sep (deg) : 170.33
Sun-Moon sep (deg)  : 93.87
B (ring opening deg) : 79.13
PA of pole (deg)    : 41.33
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.809
C/A sky separation (km) : 10630.7
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_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	2031-12-08T05:42:20.290		65.15	-73.45	51423.81	-23.07		
lambda	I	2031-12-08T05:43:20.958		65.36	-73.65	50026.71	-23.01		
delta	I	2031-12-08T05:44:36.037		65.63	-73.89	48300.35	-22.97		
gamma	I	2031-12-08T05:45:05.338		65.73	-73.99	47627.44	-22.96		
eta	I	2031-12-08T05:45:25.003		65.80	-74.05	47176.12	-22.95		
beta	I	2031-12-08T05:46:30.199		66.03	-74.26	45680.90	-22.90		
alpha	I	2031-12-08T05:47:11.342		66.18	-74.40	44738.96	-22.88		
4	I	2031-12-08T05:48:45.624		66.51	-74.70	42582.51	-22.80		
5	I	2031-12-08T05:49:04.322		66.58	-74.76	42166.77	-22.78		
6	I	2031-12-08T05:49:19.767		66.63	-74.81	41809.06	-22.78		
Uranus	I	2031-12-08T06:01:33.107		69.21	-77.07	25070.48		-10.07	-10.54
Uranus	E	2031-12-08T06:34:14.410		75.85	-81.63	25501.04		3.41	3.57
6	E	2031-12-08T06:46:26.446		78.14	-82.19	41877.44	22.82		
5	E	2031-12-08T06:46:43.775		78.19	-82.19	42273.78	22.82		
4	E	2031-12-08T06:46:55.670		78.22	-82.19	42540.02	22.83		
alpha	E	2031-12-08T06:48:30.564		78.51	-82.19	44712.92	22.92		
beta	E	2031-12-08T06:49:11.246		78.62	-82.19	45645.19	22.94		
eta	E	2031-12-08T06:50:17.896		78.82	-82.17	47176.12	22.99		
gamma	E	2031-12-08T06:50:37.331		78.88	-82.17	47622.95	23.00		
delta	E	2031-12-08T06:51:06.775		78.96	-82.16	48300.35	23.01		
lambda	E	2031-12-08T06:52:21.717		79.17	-82.12	50026.71	23.06		
epsilon	E	2031-12-08T06:53:04.592		79.30	-82.10	51015.71	23.12		

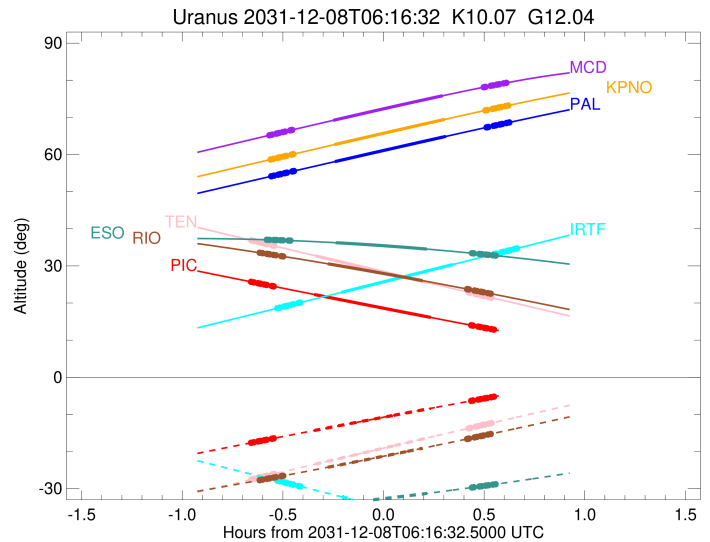
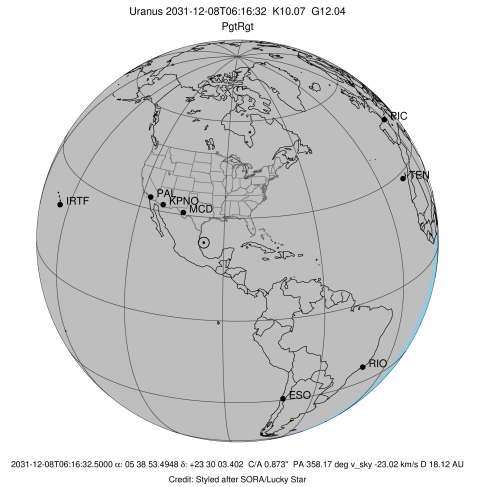
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-08T06:12:45.940
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 3404402532934661120
 2Mass ID (if available) : 05385349+2330036
 ICRS Star Coord at Epoch: 05h 38m 53.49482s +23:30:03.40195s
 RUWE (>1.4 is poor) : 0.00
 K magnitude : 10.067
 G magnitude : 12.044
 RP magnitude : 10.777
 BP magnitude : 11.433
 DUPflag : 0
 Distance (au) : 18.117
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.02
 Sun-Target sep (deg) : 170.33
 Sun-Moon sep (deg) : 93.49
 B (ring opening deg) : 79.13
 PA of pole (deg) : 41.33
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.745
 C/A sky separation (km) : 9784.9
 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	2031-12-08T05:36:58.115		36.91	-27.54	51421.42	-23.01		
lambda	I	2031-12-08T05:37:58.823		36.69	-27.32	50026.71	-22.96		
delta	I	2031-12-08T05:39:14.069		36.42	-27.05	48300.35	-22.92		
gamma	I	2031-12-08T05:39:43.430		36.31	-26.95	47627.49	-22.91		
eta	I	2031-12-08T05:40:03.138		36.24	-26.88	47176.12	-22.90		
beta	I	2031-12-08T05:41:08.462		36.00	-26.64	45680.86	-22.86		
alpha	I	2031-12-08T05:41:49.690		35.85	-26.50	44738.67	-22.84		
4	I	2031-12-08T05:43:24.083		35.51	-26.16	42583.03	-22.77		
5	I	2031-12-08T05:43:42.803		35.44	-26.09	42167.27	-22.76		
6	I	2031-12-08T05:43:58.312		35.39	-26.04	41808.67	-22.75		
Uranus	I	2031-12-08T05:56:09.907		32.74	-23.42	25081.51		-9.96	-10.42
Uranus	E	2031-12-08T06:29:41.993		25.51	-16.31	25484.60		3.87	4.05
6	E	2031-12-08T06:41:55.813		22.89	-13.75	41877.02	22.66		
5	E	2031-12-08T06:42:13.361		22.83	-13.69	42275.83	22.67		
4	E	2031-12-08T06:42:25.306		22.79	-13.65	42540.99	22.67		
alpha	E	2031-12-08T06:44:00.803		22.45	-13.32	44711.98	22.74		
beta	E	2031-12-08T06:44:41.826		22.30	-13.17	45644.86	22.76		
eta	E	2031-12-08T06:45:49.029		22.06	-12.94	47176.12	22.80		
gamma	E	2031-12-08T06:46:08.630		21.99	-12.87	47623.06	22.81		
delta	E	2031-12-08T06:46:38.319		21.89	-12.77	48300.35	22.82		
lambda	E	2031-12-08T06:47:53.917		21.62	-12.51	50026.71	22.85		
epsilon	E	2031-12-08T06:48:36.752		21.47	-12.36	51005.94	22.90		

```

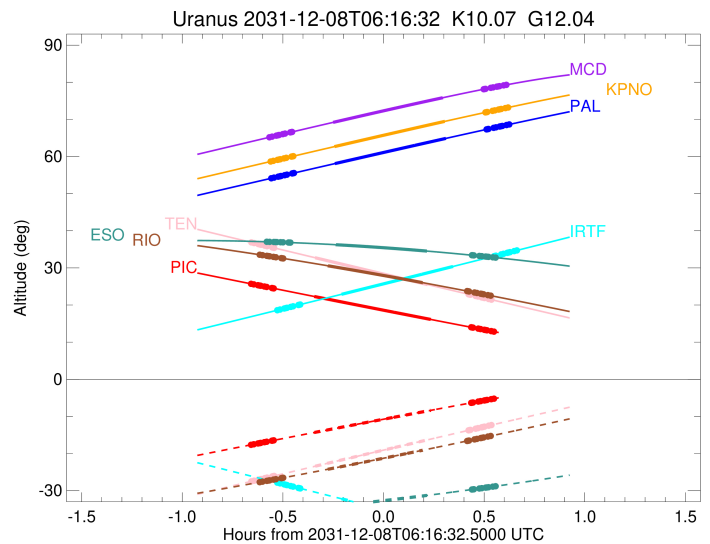
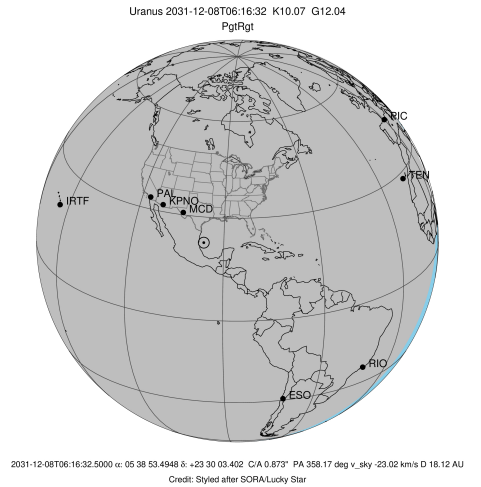
target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2031-12-08T06:20:30.960
Event type          : PgtRgt
: Uranus occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code       : IRTF
Location            : Mauna Kea/IRTF
Latitude (deg)      : 19.82622
E. Longitude (deg)  : 204.52800
Altitude (km)       : 4.168
Gaia source ID      : 3404402532934661120
2Mass ID (if available) : 05385349+2330036
ICRS Star Coord at Epoch: 05h 38m 53.49482s +23:30:03.40195s
RUWE (>1.4 is poor) : 0.00
K magnitude          : 10.067
G magnitude          : 12.044
RP magnitude         : 10.777
BP magnitude         : 11.433
DUPflag             : 0
Distance (au)       : 18.117
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -23.02
Sun-Target sep (deg) : 170.33
Sun-Moon sep (deg)  : 93.35
B (ring opening deg) : 79.13
PA of pole (deg)    : 41.33
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.784
C/A sky separation (km) : 10298.7
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	2031-12-08T05:44:41.719		18.56	-27.81	51420.51	-22.84		
lambda	I	2031-12-08T05:45:42.852		18.79	-28.04	50026.71	-22.79		
delta	I	2031-12-08T05:46:58.673		19.07	-28.33	48300.35	-22.75		
gamma	I	2031-12-08T05:47:28.258		19.18	-28.44	47627.50	-22.74		
eta	I	2031-12-08T05:47:48.116		19.25	-28.51	47176.12	-22.73		
beta	I	2031-12-08T05:48:53.940		19.50	-28.76	45680.86	-22.69		
alpha	I	2031-12-08T05:49:35.485		19.65	-28.92	44738.63	-22.67		
4	I	2031-12-08T05:51:10.602		20.01	-29.28	42583.06	-22.59		
5	I	2031-12-08T05:51:29.467		20.08	-29.35	42167.30	-22.58		
6	I	2031-12-08T05:51:45.098		20.14	-29.41	41808.66	-22.58		
Uranus	I	2031-12-08T06:04:03.534		22.89	-32.20	25077.96		-9.99	-10.46
Uranus	E	2031-12-08T06:37:16.901		30.39	-39.78	25497.72		3.51	3.67
6	E	2031-12-08T06:49:32.374		33.17	-42.58	41877.39	22.68		
5	E	2031-12-08T06:49:49.818		33.23	-42.65	42274.01	22.69		
4	E	2031-12-08T06:50:01.779		33.28	-42.70	42540.13	22.70		
alpha	E	2031-12-08T06:51:37.235		33.64	-43.06	44712.83	22.78		
beta	E	2031-12-08T06:52:18.167		33.80	-43.22	45645.16	22.80		
eta	E	2031-12-08T06:53:25.228		34.05	-43.47	47176.12	22.84		
gamma	E	2031-12-08T06:53:44.783		34.12	-43.55	47622.96	22.86		
delta	E	2031-12-08T06:54:14.410		34.24	-43.66	48300.35	22.87		
lambda	E	2031-12-08T06:55:29.818		34.52	-43.95	50026.71	22.91		
epsilon	E	2031-12-08T06:56:12.930		34.68	-44.11	51015.02	22.97		

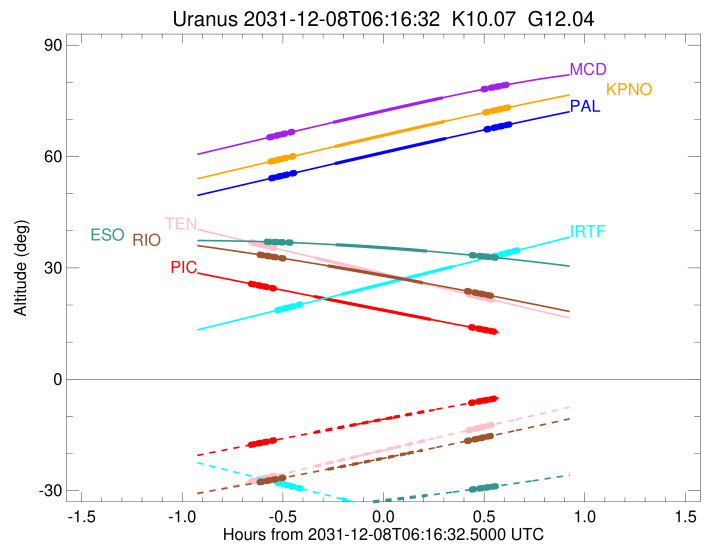
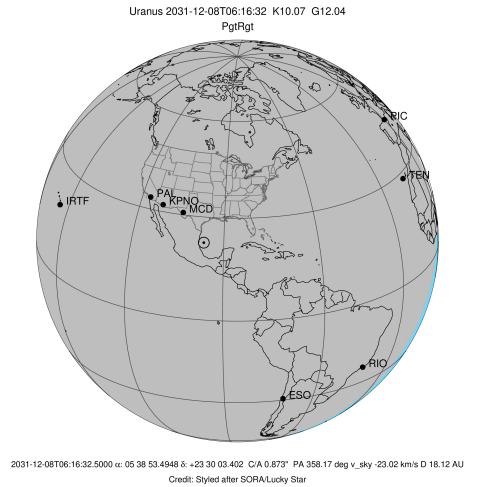
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2031-12-08T06:13:50.240
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      : 3404402532934661120
2Mass ID (if available) : 05385349+2330036
ICRS Star Coord at Epoch: 05h 38m 53.49482s +23:30:03.40195s
RUWE (>1.4 is poor) : 0.00
K magnitude          : 10.067
G magnitude          : 12.044
RP magnitude         : 10.777
BP magnitude         : 11.433
DUPflag             : 0
Distance (au)       : 18.117
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -23.02
Sun-Target sep (deg) : 170.33
Sun-Moon sep (deg)  : 93.47
B (ring opening deg) : 79.13
PA of pole (deg)    : 41.33
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.193
C/A sky separation (km) : 15680.8
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_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	2031-12-08T05:39:24.998		33.58	-27.76	51455.02	-22.46		
lambda	I	2031-12-08T05:40:28.785		33.43	-27.58	50026.71	-22.36		
delta	I	2031-12-08T05:41:46.161		33.25	-27.36	48300.35	-22.26		
gamma	I	2031-12-08T05:42:16.439		33.18	-27.28	47626.82	-22.22		
eta	I	2031-12-08T05:42:36.730		33.13	-27.22	47176.12	-22.20		
beta	I	2031-12-08T05:43:44.188		32.97	-27.03	45681.20	-22.10		
alpha	I	2031-12-08T05:44:26.710		32.87	-26.91	44742.21	-22.04		
4	I	2031-12-08T05:46:05.213		32.63	-26.64	42576.58	-21.86		
5	I	2031-12-08T05:46:24.703		32.59	-26.58	42161.74	-21.83		
6	I	2031-12-08T05:46:40.325		32.55	-26.54	41813.62	-21.81		
Uranus	I	2031-12-08T05:59:55.982		30.58	-24.25	25004.01		-10.77	-11.27
Uranus	E	2031-12-08T06:28:15.125		26.02	-19.11	25553.49		1.05	1.10
6	E	2031-12-08T06:41:30.101		23.75	-16.62	41878.82	21.76		
5	E	2031-12-08T06:41:47.835		23.70	-16.56	42265.05	21.77		
4	E	2031-12-08T06:42:00.459		23.67	-16.52	42536.33	21.80		
alpha	E	2031-12-08T06:43:39.981		23.38	-16.20	44716.71	21.98		
beta	E	2031-12-08T06:44:22.263		23.25	-16.07	45646.63	22.04		
eta	E	2031-12-08T06:45:31.509		23.05	-15.85	47176.12	22.13		
gamma	E	2031-12-08T06:45:51.669		22.99	-15.78	47622.53	22.16		
delta	E	2031-12-08T06:46:22.235		22.90	-15.68	48300.35	22.19		
lambda	E	2031-12-08T06:47:39.861		22.67	-15.43	50026.71	22.28		
epsilon	E	2031-12-08T06:48:25.873		22.54	-15.29	51053.13	22.39		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-08T06:15:37.900
 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 : 3404402532934661120
 2Mass ID (if available) : 05385349+2330036
 ICRS Star Coord at Epoch: 05h 38m 53.49482s +23:30:03.40195s
 RUWE (>1.4 is poor) : 0.00
 K magnitude : 10.067
 G magnitude : 12.044
 RP magnitude : 10.777
 BP magnitude : 11.433
 DUPflag : 0
 Distance (au) : 18.117
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.02
 Sun-Target sep (deg) : 170.33
 Sun-Moon sep (deg) : 93.55
 B (ring opening deg) : 79.13
 PA of pole (deg) : 41.33
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.263
 C/A sky separation (km) : 16592.1
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ura111.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ura111.bsp
 ura161.bsp
 vgr2.ura161.bsp
 peph.ura160.bsp
 earthstns_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	2031-12-08T05:41:31.049		37.05	-35.77	51459.18	-22.36		
lambda	I	2031-12-08T05:42:35.325		37.02	-35.69	50026.71	-22.25		
delta	I	2031-12-08T05:43:53.102		36.98	-35.59	48300.35	-22.14		
gamma	I	2031-12-08T05:44:23.552		36.96	-35.56	47626.73	-22.10		
eta	I	2031-12-08T05:44:43.955		36.95	-35.53	47176.12	-22.07		
beta	I	2031-12-08T05:45:51.823		36.92	-35.45	45681.22	-21.96		
alpha	I	2031-12-08T05:46:34.601		36.89	-35.39	44742.66	-21.90		
4	I	2031-12-08T05:48:13.880		36.84	-35.26	42575.67	-21.69		
5	I	2031-12-08T05:48:33.514		36.83	-35.24	42161.09	-21.66		
6	I	2031-12-08T05:48:49.187		36.82	-35.22	41814.36	-21.64		
Uranus	I	2031-12-08T06:02:19.161		36.25	-34.07	24998.54		-10.82	-11.32
Uranus	E	2031-12-08T06:29:28.474		34.53	-31.29	25557.64		0.52	0.55
6	E	2031-12-08T06:42:56.318		33.42	-29.70	41879.04	21.62		
5	E	2031-12-08T06:43:14.062		33.39	-29.66	42263.05	21.64		
4	E	2031-12-08T06:43:26.804		33.37	-29.63	42535.58	21.67		
alpha	E	2031-12-08T06:45:06.928		33.22	-29.43	44717.57	21.88		
beta	E	2031-12-08T06:45:49.377		33.16	-29.34	45646.98	21.94		
eta	E	2031-12-08T06:46:58.882		33.05	-29.19	47176.12	22.05		
gamma	E	2031-12-08T06:47:19.110		33.02	-29.15	47622.44	22.08		
delta	E	2031-12-08T06:47:49.783		32.97	-29.09	48300.35	22.12		
lambda	E	2031-12-08T06:49:07.635		32.85	-28.92	50026.71	22.22		
epsilon	E	2031-12-08T06:49:54.152		32.78	-28.82	51061.85	22.34		