

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-09T04:23:46.600
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3404401291689361792
 2Mass ID (if available) : 05384333+2330007

ICRS Star Coord at Epoch: 05h 38m 43.33502s +23:30:00.61190s

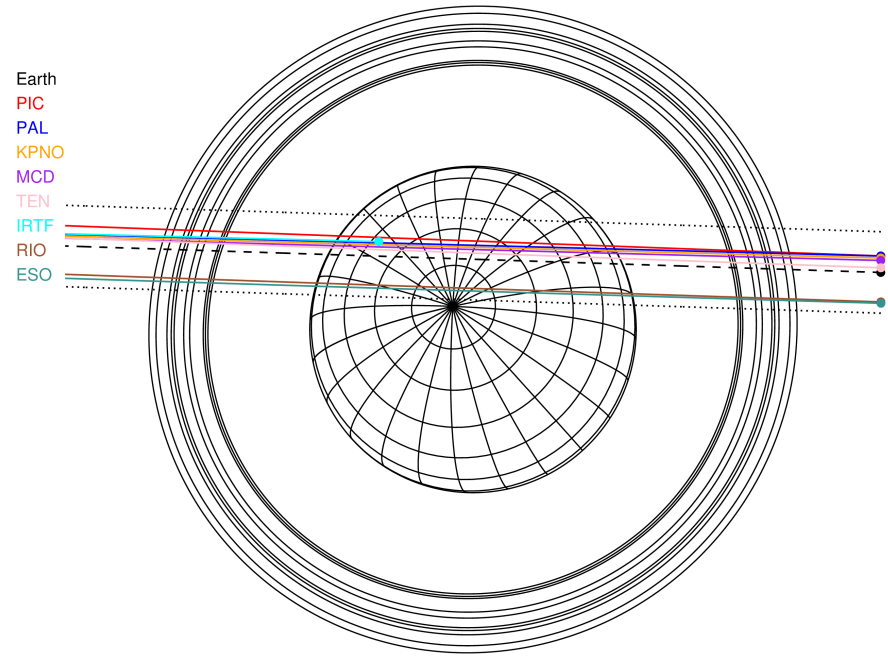
RUWE (>1.4 is poor) : 1.04
 K magnitude : 14.752
 G magnitude : 17.575
 RP magnitude : 16.700
 BP magnitude : 18.347
 DUPflag : 0
 Distance (au) : 18.114
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.10
 Sun-Target sep (deg) : 171.31
 Sun-Moon sep (deg) : 104.64
 B (ring opening deg) : 79.16
 PA of pole (deg) : 41.16

#	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



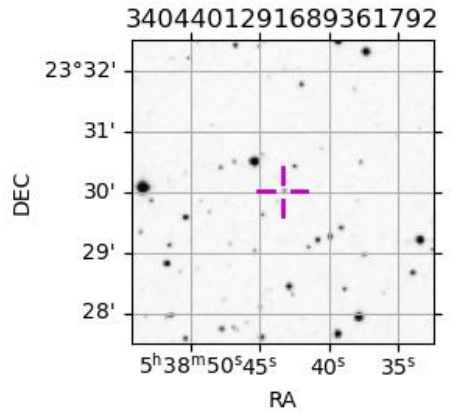
2031-12-09T04:23:46.6000 ra: 05 38 43.3350 s: +23 30 00.612 C/A 0.844 PA 178.14 deg v_sky -23.10 km/s D 18.11 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2031-12-09T04:23:46 K14.75 G17.57 PgtRgt

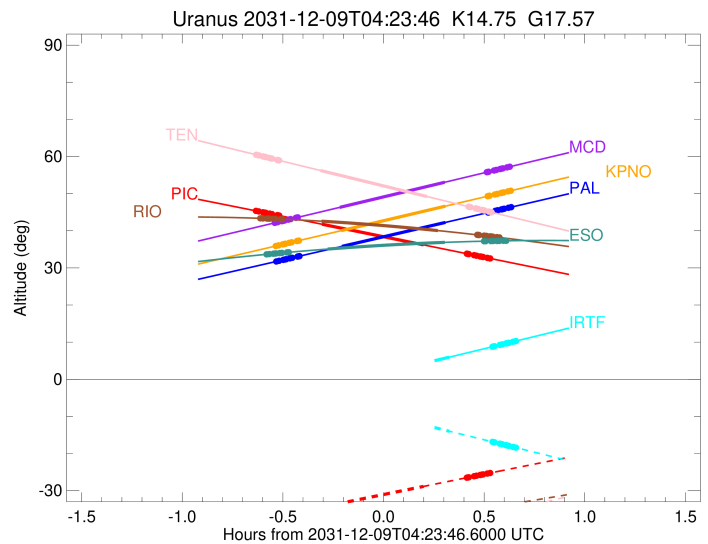
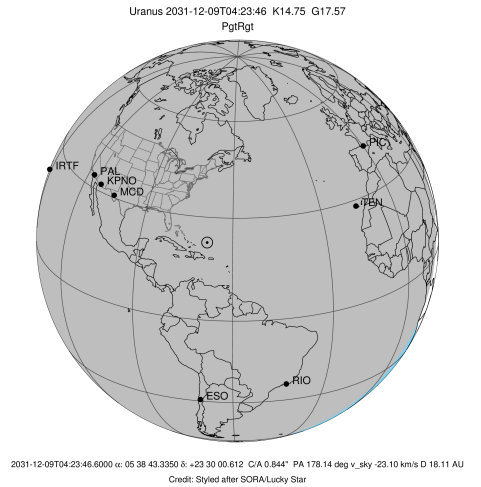


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++	+ +	+++++	DEC 09 03:45 - DEC 09 04:55	PieRie
PAL	Palomar Mt (200")	33.4	243.1	+++++	+ +	+++++	DEC 09 03:51 - DEC 09 05:01	PieRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++	+ +	+++++	DEC 09 03:51 - DEC 09 05:01	PieRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++	+ +	+++++	DEC 09 03:51 - DEC 09 05:01	PieRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++	+ +	+++++	DEC 09 03:45 - DEC 09 04:55	PieRie
IRTF	Mauna Kea/IRTF	19.8	204.5		+	+++++	DEC 09 04:43 - DEC 09 05:03	PneRne
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++	+ +	+++++	DEC 09 03:46 - DEC 09 04:58	PieRie
ESO	European Southern Obs	-29.3	289.3	+++++	+ +	+++++	DEC 09 03:48 - DEC 09 05:00	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

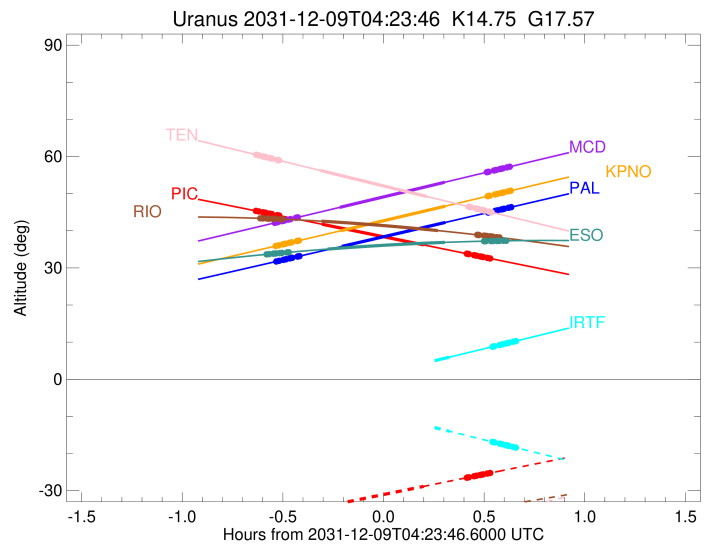
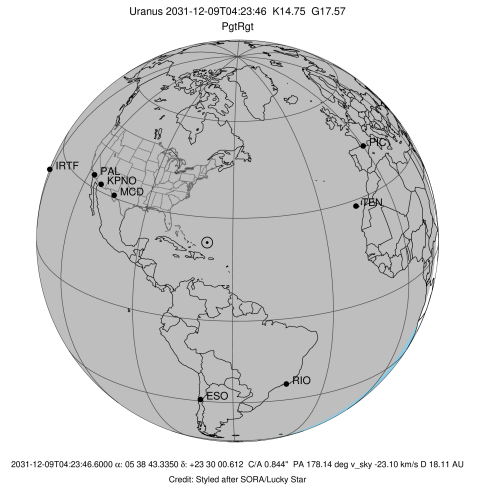


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-09T04:20:48.530
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3404401291689361792
 2Mass ID (if available) : 05384333+2330007
 ICRS Star Coord at Epoch: 05h 38m 43.33502s +23:30:00.61190s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 14.752
 G magnitude : 17.575
 RP magnitude : 16.700
 BP magnitude : 18.347
 DUPflag : 0
 Distance (au) : 18.114
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.10
 Sun-Target sep (deg) : 171.31
 Sun-Moon sep (deg) : 105.35
 B (ring opening deg) : 79.16
 PA of pole (deg) : 41.16
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.055
 C/A sky separation (km) : 13856.0
 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	2031-12-09T03:45:40.582		45.37	-38.04	51262.87	-22.58		
lambda	I	2031-12-09T03:46:35.266		45.21	-37.87	50026.71	-22.58		
delta	I	2031-12-09T03:47:51.834		44.98	-37.63	48300.35	-22.51		
gamma	I	2031-12-09T03:48:21.644		44.89	-37.54	47629.74	-22.48		
eta	I	2031-12-09T03:48:41.832		44.83	-37.48	47176.12	-22.46		
beta	I	2031-12-09T03:49:48.691		44.62	-37.28	45676.63	-22.38		
alpha	I	2031-12-09T03:50:31.367		44.49	-37.15	44722.87	-22.33		
4	I	2031-12-09T03:52:06.442		44.20	-36.86	42603.50	-22.21		
5	I	2031-12-09T03:52:24.886		44.15	-36.80	42198.44	-22.20		
6	I	2031-12-09T03:52:43.003		44.09	-36.75	41796.61	-22.15		
Uranus	I	2031-12-09T04:05:27.624		41.76	-34.41	25539.89		-1.95	-2.04
Uranus	E	2031-12-09T04:35:43.550		36.20	-28.86	25022.00		10.56	11.05
6	E	2031-12-09T04:48:38.009		33.82	-26.51	41860.83	22.09		
5	E	2031-12-09T04:48:57.952		33.76	-26.45	42308.21	22.13		
4	E	2031-12-09T04:49:10.083		33.73	-26.41	42565.75	22.15		
alpha	E	2031-12-09T04:50:45.842		33.43	-26.12	44694.95	22.26		
beta	E	2031-12-09T04:51:28.278		33.30	-25.99	45641.10	22.31		
eta	E	2031-12-09T04:52:36.932		33.09	-25.78	47176.12	22.39		
gamma	E	2031-12-09T04:52:57.005		33.03	-25.72	47625.66	22.41		
delta	E	2031-12-09T04:53:27.098		32.94	-25.63	48300.35	22.43		
lambda	E	2031-12-09T04:54:43.929		32.70	-25.40	50026.71	22.50		
epsilon	E	2031-12-09T04:55:20.207		32.59	-25.29	50843.64	22.50		

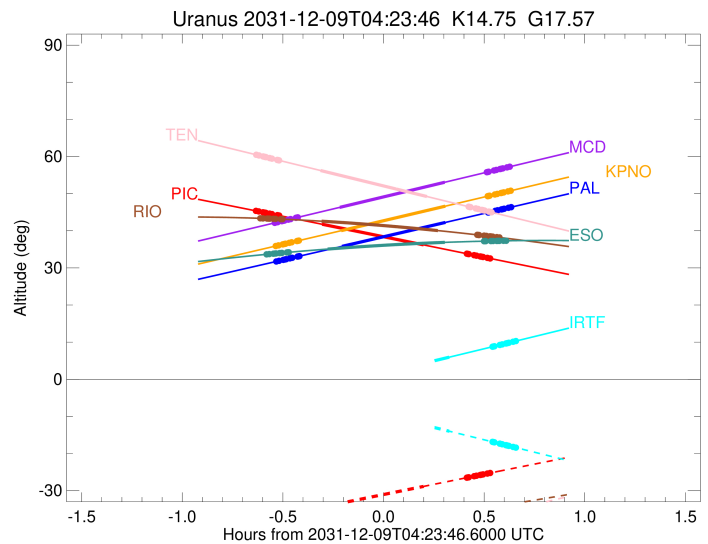
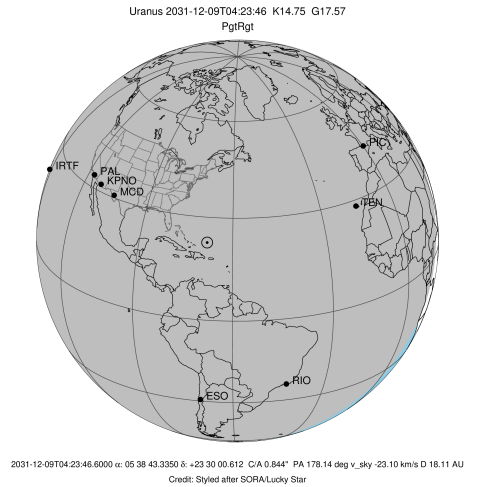
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-09T04:27:02.120
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 3404401291689361792
 2Mass ID (if available) : 05384333+2330007
 ICRS Star Coord at Epoch: 05h 38m 43.33502s +23:30:00.61190s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 14.752
 G magnitude : 17.575
 RP magnitude : 16.700
 BP magnitude : 18.347
 DUPflag : 0
 Distance (au) : 18.114
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.10
 Sun-Target sep (deg) : 171.31
 Sun-Moon sep (deg) : 105.03
 B (ring opening deg) : 79.16
 PA of pole (deg) : 41.16
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.004
 C/A sky separation (km) : 13184.7
 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	2031-12-09T03:51:43.847		31.72	-39.26	51264.13	-22.59		
lambda	I	2031-12-09T03:52:38.557		31.91	-39.45	50026.71	-22.60		
delta	I	2031-12-09T03:53:55.055		32.17	-39.72	48300.35	-22.54		
gamma	I	2031-12-09T03:54:24.830		32.27	-39.82	47629.72	-22.51		
eta	I	2031-12-09T03:54:44.989		32.34	-39.89	47176.12	-22.49		
beta	I	2031-12-09T03:55:51.731		32.57	-40.12	45676.70	-22.43		
alpha	I	2031-12-09T03:56:34.313		32.72	-40.27	44723.06	-22.38		
4	I	2031-12-09T03:58:09.156		33.05	-40.60	42603.29	-22.28		
5	I	2031-12-09T03:58:27.558		33.11	-40.67	42197.97	-22.27		
6	I	2031-12-09T03:58:45.590		33.17	-40.73	41796.69	-22.23		
Uranus	I	2031-12-09T04:11:23.440		35.80	-43.37	25535.45		-2.17	-2.27
Uranus	E	2031-12-09T04:42:14.622		42.25	-49.82	25033.23		10.44	10.92
6	E	2031-12-09T04:54:58.215		44.92	-52.48	41861.79	22.31		
5	E	2031-12-09T04:55:17.893		44.99	-52.55	42307.29	22.35		
4	E	2031-12-09T04:55:29.888		45.03	-52.59	42564.53	22.36		
alpha	E	2031-12-09T04:57:04.829		45.36	-52.92	44695.60	22.47		
beta	E	2031-12-09T04:57:46.852		45.51	-53.06	45641.14	22.52		
eta	E	2031-12-09T04:58:54.889		45.75	-53.30	47176.12	22.59		
gamma	E	2031-12-09T04:59:14.779		45.82	-53.37	47625.53	22.61		
delta	E	2031-12-09T04:59:44.613		45.92	-53.47	48300.35	22.63		
lambda	E	2031-12-09T05:01:00.780		46.19	-53.74	50026.71	22.70		
epsilon	E	2031-12-09T05:01:37.037		46.32	-53.86	50850.18	22.69		

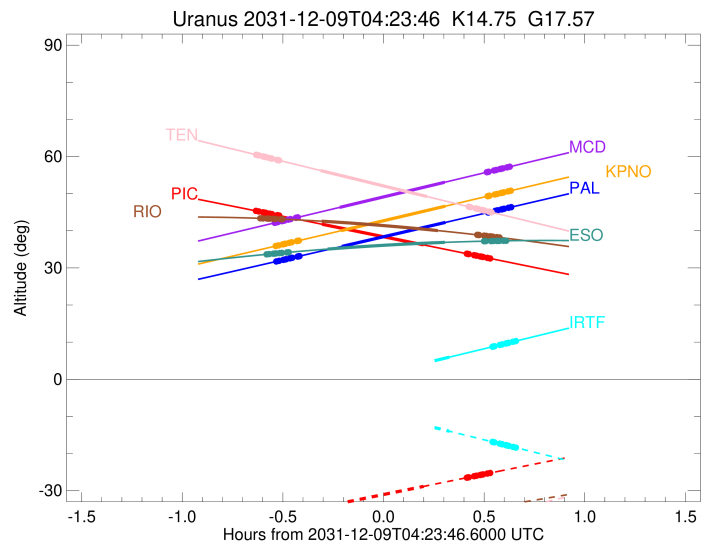
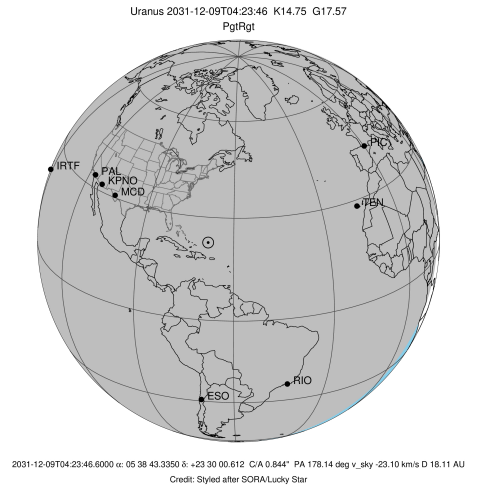
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2031-12-09T04:26:53.060
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       : 3404401291689361792
2Mass ID (if available) : 05384333+2330007
ICRS Star Coord at Epoch: 05h 38m 43.33502s +23:30:00.61190s
RUWE (>1.4 is poor) : 1.04
K magnitude          : 14.752
G magnitude          : 17.575
RP magnitude         : 16.700
BP magnitude         : 18.347
DUPflag             : 0
Distance (au)        : 18.114
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -23.10
Sun-Target sep (deg) : 171.31
Sun-Moon sep (deg)   : 105.09
B (ring opening deg) : 79.16
PA of pole (deg)     : 41.16
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.980
C/A sky separation (km) : 12880.3
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_itrff93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
    
```



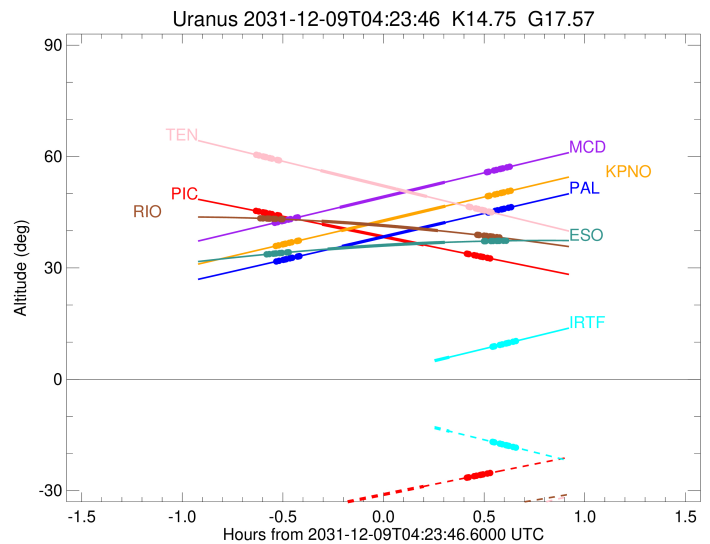
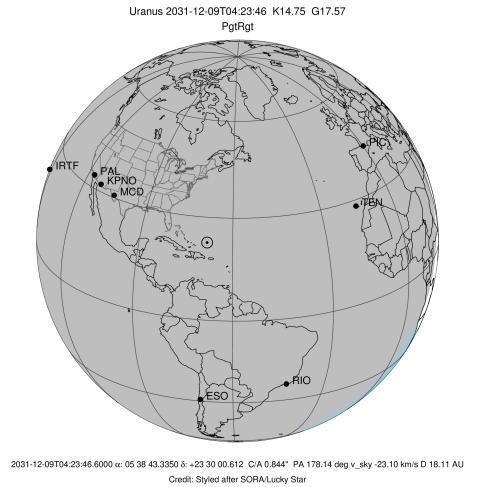
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-12-09T03:51:34.551		35.88	-43.59	51266.63	-22.66		
lambda	I	2031-12-09T03:52:29.196		36.07	-43.79	50026.71	-22.67		
delta	I	2031-12-09T03:53:45.442		36.34	-44.06	48300.35	-22.61		
gamma	I	2031-12-09T03:54:15.116		36.44	-44.16	47629.70	-22.59		
eta	I	2031-12-09T03:54:35.204		36.52	-44.23	47176.12	-22.57		
beta	I	2031-12-09T03:55:41.705		36.75	-44.47	45676.79	-22.51		
alpha	I	2031-12-09T03:56:24.125		36.90	-44.62	44723.30	-22.46		
4	I	2031-12-09T03:57:58.625		37.23	-44.95	42603.04	-22.37		
5	I	2031-12-09T03:58:16.972		37.30	-45.02	42197.42	-22.36		
6	I	2031-12-09T03:58:34.900		37.36	-45.08	41796.79	-22.32		
Uranus	I	2031-12-09T04:11:08.152		40.02	-47.75	25532.14		-2.31	-2.42
Uranus	E	2031-12-09T04:42:12.440		46.63	-54.34	25037.32		10.40	10.88
6	E	2031-12-09T04:54:51.410		49.32	-57.01	41862.05	22.40		
5	E	2031-12-09T04:55:10.992		49.39	-57.08	42307.03	22.43		
4	E	2031-12-09T04:55:22.937		49.44	-57.13	42564.20	22.45		
alpha	E	2031-12-09T04:56:57.552		49.77	-57.46	44695.77	22.55		
beta	E	2031-12-09T04:57:39.422		49.92	-57.61	45641.15	22.59		
eta	E	2031-12-09T04:58:47.230		50.16	-57.84	47176.12	22.66		
gamma	E	2031-12-09T04:59:07.053		50.23	-57.91	47625.49	22.68		
delta	E	2031-12-09T04:59:36.793		50.34	-58.02	48300.35	22.70		
lambda	E	2031-12-09T05:00:52.723		50.61	-58.28	50026.71	22.77		
epsilon	E	2031-12-09T05:01:28.942		50.74	-58.41	50851.82	22.76		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-09T04:26:35.120
 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 : 3404401291689361792
 2Mass ID (if available) : 05384333+2330007
 ICRS Star Coord at Epoch: 05h 38m 43.33502s +23:30:00.61190s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 14.752
 G magnitude : 17.575
 RP magnitude : 16.700
 BP magnitude : 18.347
 DUPflag : 0
 Distance (au) : 18.114
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.10
 Sun-Target sep (deg) : 171.31
 Sun-Moon sep (deg) : 105.17
 B (ring opening deg) : 79.16
 PA of pole (deg) : 41.16
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.953
 C/A sky separation (km) : 12522.9
 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	2031-12-09T03:51:16.915		42.12	-49.99	51269.62	-22.75		
lambda	I	2031-12-09T03:52:11.475		42.31	-50.19	50026.71	-22.76		
delta	I	2031-12-09T03:53:27.410		42.59	-50.46	48300.35	-22.71		
gamma	I	2031-12-09T03:53:56.962		42.69	-50.57	47629.66	-22.68		
eta	I	2031-12-09T03:54:16.963		42.76	-50.64	47176.12	-22.67		
beta	I	2031-12-09T03:55:23.171		43.00	-50.88	45676.90	-22.61		
alpha	I	2031-12-09T03:56:05.392		43.15	-51.03	44723.60	-22.56		
4	I	2031-12-09T03:57:39.478		43.49	-51.36	42602.74	-22.47		
5	I	2031-12-09T03:57:57.757		43.56	-51.43	42196.76	-22.46		
6	I	2031-12-09T03:58:15.560		43.62	-51.49	41796.92	-22.43		
Uranus	I	2031-12-09T04:10:43.425		46.31	-54.18	25527.96		-2.49	-2.60
Uranus	E	2031-12-09T04:42:02.072		53.07	-60.89	25042.23		10.35	10.83
6	E	2031-12-09T04:54:35.701		55.78	-63.56	41862.34	22.50		
5	E	2031-12-09T04:54:55.172		55.85	-63.63	42306.73	22.54		
4	E	2031-12-09T04:55:07.058		55.89	-63.67	42563.82	22.55		
alpha	E	2031-12-09T04:56:41.288		56.23	-64.01	44695.97	22.64		
beta	E	2031-12-09T04:57:22.978		56.38	-64.15	45641.17	22.69		
eta	E	2031-12-09T04:58:30.515		56.62	-64.39	47176.12	22.75		
gamma	E	2031-12-09T04:58:50.259		56.70	-64.46	47625.45	22.77		
delta	E	2031-12-09T04:59:19.888		56.80	-64.57	48300.35	22.79		
lambda	E	2031-12-09T05:00:35.537		57.07	-64.83	50026.71	22.85		
epsilon	E	2031-12-09T05:01:11.709		57.20	-64.96	50853.70	22.84		

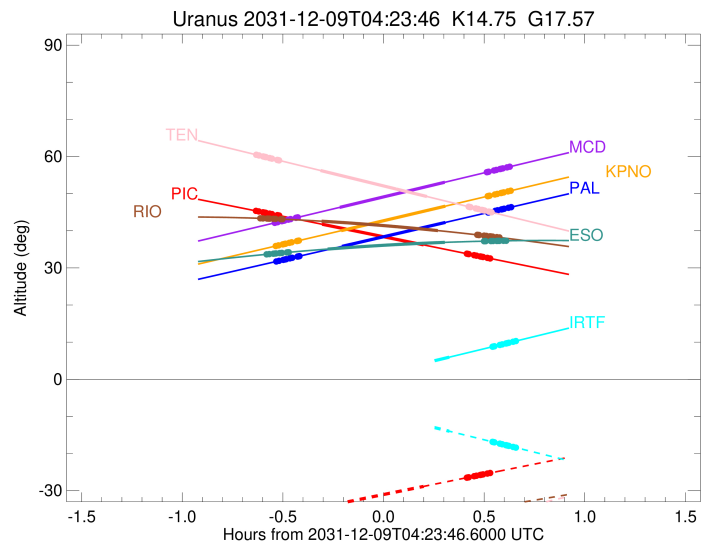
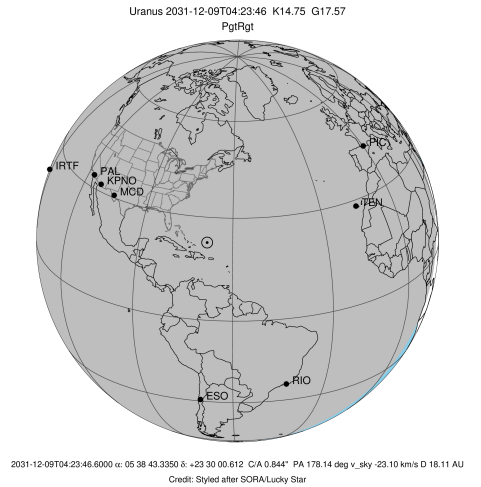
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-09T04:21:02.420
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 3404401291689361792
 2Mass ID (if available) : 05384333+2330007
 ICRS Star Coord at Epoch: 05h 38m 43.33502s +23:30:00.61190s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 14.752
 G magnitude : 17.575
 RP magnitude : 16.700
 BP magnitude : 18.347
 DUPflag : 0
 Distance (au) : 18.114
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.10
 Sun-Target sep (deg) : 171.31
 Sun-Moon sep (deg) : 105.50
 B (ring opening deg) : 79.16
 PA of pole (deg) : 41.16
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.911
 C/A sky separation (km) : 11962.5
 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	2031-12-09T03:45:45.312		60.49	-51.95	51277.62	-22.94		
lambda	I	2031-12-09T03:46:39.788		60.29	-51.75	50026.71	-22.94		
delta	I	2031-12-09T03:47:55.116		60.01	-51.48	48300.35	-22.89		
gamma	I	2031-12-09T03:48:24.433		59.90	-51.37	47629.57	-22.87		
eta	I	2031-12-09T03:48:44.268		59.83	-51.29	47176.12	-22.85		
beta	I	2031-12-09T03:49:49.921		59.59	-51.05	45677.17	-22.80		
alpha	I	2031-12-09T03:50:31.771		59.44	-50.90	44724.35	-22.76		
4	I	2031-12-09T03:52:05.121		59.09	-50.56	42601.98	-22.67		
5	I	2031-12-09T03:52:23.293		59.02	-50.49	42195.13	-22.66		
6	I	2031-12-09T03:52:40.849		58.96	-50.43	41797.24	-22.63		
Uranus	I	2031-12-09T04:05:00.121		56.24	-47.72	25518.44		-2.84	-2.98
Uranus	E	2031-12-09T04:36:42.608		49.23	-40.76	25047.44		10.29	10.77
6	E	2031-12-09T04:49:10.920		46.48	-38.03	41862.51	22.57		
5	E	2031-12-09T04:49:30.322		46.41	-37.96	42306.55	22.60		
4	E	2031-12-09T04:49:42.172		46.37	-37.92	42563.62	22.61		
alpha	E	2031-12-09T04:51:16.187		46.03	-37.58	44696.07	22.69		
beta	E	2031-12-09T04:51:57.790		45.87	-37.43	45641.17	22.73		
eta	E	2031-12-09T04:53:05.212		45.63	-37.18	47176.12	22.78		
gamma	E	2031-12-09T04:53:24.926		45.55	-37.11	47625.44	22.80		
delta	E	2031-12-09T04:53:54.515		45.44	-37.00	48300.35	22.82		
lambda	E	2031-12-09T04:55:10.081		45.17	-36.73	50026.71	22.87		
epsilon	E	2031-12-09T04:55:46.249		45.04	-36.60	50854.29	22.86		

```

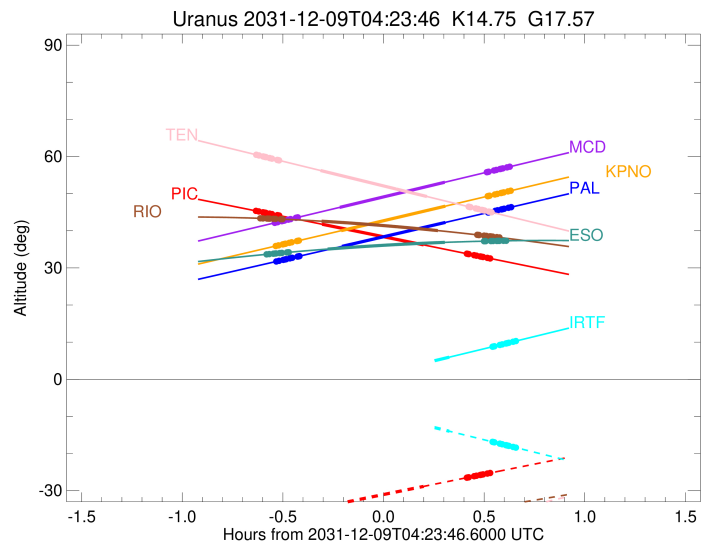
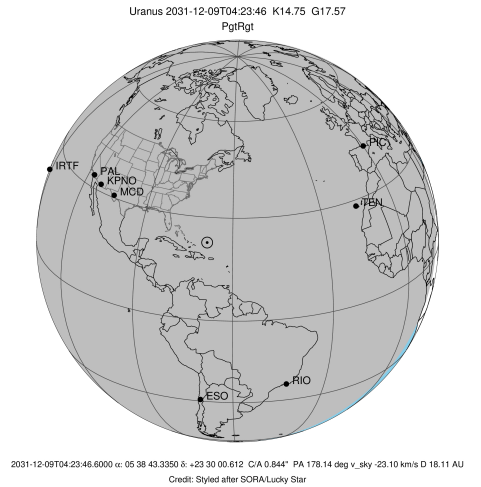
target                : Uranus
target radius (km)    : 25559.00
C/A epoch              : 2031-12-09T04:28:06.670
Event type             : PgtRgt
: Uranus occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code         : IRTF
Location               : Mauna Kea/IRTF
Latitude (deg)        : 19.82622
E. Longitude (deg)    : 204.52800
Altitude (km)         : 4.168
Gaia source ID        : 3404401291689361792
2Mass ID (if available) : 05384333+2330007
ICRS Star Coord at Epoch: 05h 38m 43.33502s +23:30:00.61190s
RUWE (>1.4 is poor)  : 1.04
K magnitude           : 14.752
G magnitude           : 17.575
RP magnitude          : 16.700
BP magnitude          : 18.347
DUPflag              : 0
Distance (au)         : 18.114
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -23.10
Sun-Target sep (deg)  : 171.31
Sun-Moon sep (deg)    : 104.45
B (ring opening deg)  : 79.16
PA of pole (deg)      : 41.16
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.019
C/A sky separation (km) : 13389.3
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_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	2031-12-09T03:52:26.397	-4.95x	-2.83x	51262.00	-22.30			
lambda	I	2031-12-09T03:53:21.721	-4.76x	-3.03x	50026.71	-22.31			
delta	I	2031-12-09T03:54:39.216	-4.49x	-3.31x	48300.35	-22.25			
gamma	I	2031-12-09T03:55:09.379	-4.38x	-3.41x	47629.75	-22.22			
eta	I	2031-12-09T03:55:29.803	-4.31x	-3.49x	47176.12	-22.20			
beta	I	2031-12-09T03:56:37.427	-4.07x	-3.73x	45676.62	-22.13			
alpha	I	2031-12-09T03:57:20.578	-3.92x	-3.89x	44722.85	-22.09			
4	I	2031-12-09T03:58:56.668	-3.58x	-4.24x	42603.50	-21.98			
5	I	2031-12-09T03:59:15.302	-3.52x	-4.30x	42198.44	-21.97			
6	I	2031-12-09T03:59:33.603	-3.45x	-4.37x	41796.61	-21.93			
Uranus	I	2031-12-09T04:12:22.678	-0.73x	-7.16	25537.86	-2.05		-2.15	
Uranus	E	2031-12-09T04:43:23.503	5.95	-13.99	25031.01	10.46		10.95	
6	E	2031-12-09T04:56:17.750	8.77	-16.86	41861.67	22.04			
5	E	2031-12-09T04:56:37.677	8.84	-16.94	42307.40	22.08			
4	E	2031-12-09T04:56:49.821	8.88	-16.98	42564.67	22.09			
alpha	E	2031-12-09T04:58:25.898	9.24	-17.34	44695.52	22.20			
beta	E	2031-12-09T04:59:08.426	9.39	-17.50	45641.13	22.25			
eta	E	2031-12-09T05:00:17.267	9.64	-17.75	47176.12	22.32			
gamma	E	2031-12-09T05:00:37.390	9.72	-17.83	47625.54	22.34			
delta	E	2031-12-09T05:01:07.572	9.83	-17.94	48300.35	22.37			
lambda	E	2031-12-09T05:02:24.622	10.11	-18.23	50026.71	22.44			
epsilon	E	2031-12-09T05:03:01.267	10.24	-18.36	50849.55	22.44			

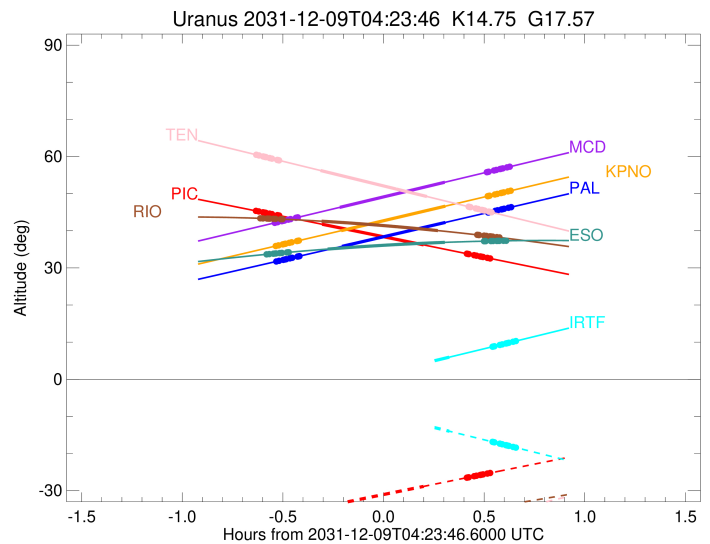
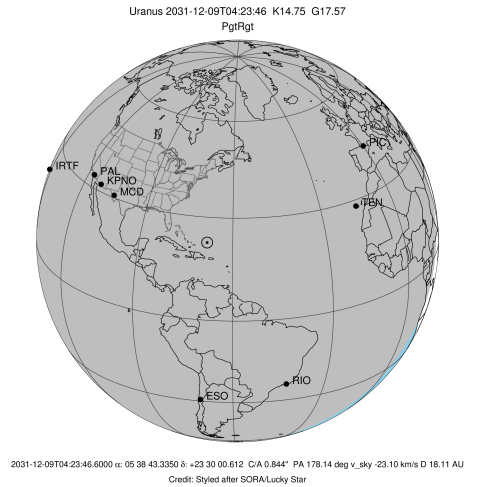
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2031-12-09T04:22:45.940
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       : 3404401291689361792
2Mass ID (if available) : 05384333+2330007
ICRS Star Coord at Epoch: 05h 38m 43.33502s +23:30:00.61190s
RUWE (>1.4 is poor) : 1.04
K magnitude          : 14.752
G magnitude          : 17.575
RP magnitude         : 16.700
BP magnitude         : 18.347
DUPflag             : 0
Distance (au)        : 18.114
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -23.10
Sun-Target sep (deg) : 171.31
Sun-Moon sep (deg)   : 105.30
B (ring opening deg) : 79.16
PA of pole (deg)     : 41.16
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation ("): 0.489
C/A sky separation (km): 6429.9
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_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	2031-12-09T03:46:55.881		43.36	-42.03	51318.50	-23.51		
lambda	I	2031-12-09T03:47:50.790		43.33	-41.96	50026.71	-23.52		
delta	I	2031-12-09T03:49:04.211		43.29	-41.86	48300.35	-23.51		
gamma	I	2031-12-09T03:49:32.774		43.27	-41.82	47629.07	-23.50		
eta	I	2031-12-09T03:49:52.051		43.26	-41.80	47176.12	-23.49		
beta	I	2031-12-09T03:50:55.795		43.22	-41.71	45678.53	-23.48		
alpha	I	2031-12-09T03:51:36.288		43.20	-41.66	44728.47	-23.47		
4	I	2031-12-09T03:53:07.045		43.14	-41.53	42597.34	-23.44		
5	I	2031-12-09T03:53:24.861		43.13	-41.51	42186.27	-23.44		
6	I	2031-12-09T03:53:41.305		43.12	-41.49	41799.52	-23.43		
Uranus	I	2031-12-09T04:05:20.049		42.58	-40.44	25427.55		-5.14	-5.38
Uranus	E	2031-12-09T04:39:59.918		40.05	-36.55	25149.49		9.17	9.60
6	E	2031-12-09T04:51:44.494		38.90	-35.00	41867.03	23.41		
5	E	2031-12-09T04:52:02.837		38.87	-34.96	42300.86	23.42		
4	E	2031-12-09T04:52:14.216		38.85	-34.93	42557.57	23.42		
alpha	E	2031-12-09T04:53:45.507		38.69	-34.72	44699.57	23.44		
beta	E	2031-12-09T04:54:25.684		38.62	-34.63	45641.62	23.45		
eta	E	2031-12-09T04:55:31.066		38.51	-34.48	47176.12	23.47		
gamma	E	2031-12-09T04:55:50.182		38.47	-34.43	47624.80	23.47		
delta	E	2031-12-09T04:56:18.959		38.42	-34.37	48300.35	23.48		
lambda	E	2031-12-09T04:57:32.464		38.29	-34.20	50026.71	23.49		
epsilon	E	2031-12-09T04:58:09.115		38.22	-34.11	50887.89	23.48		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-09T04:24:43.470
 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 : 3404401291689361792
 2Mass ID (if available) : 05384333+2330007
 ICRS Star Coord at Epoch: 05h 38m 43.33502s +23:30:00.61190s
 RUWE (>1.4 is poor) : 1.04
 K magnitude : 14.752
 G magnitude : 17.575
 RP magnitude : 16.700
 BP magnitude : 18.347
 DUPflag : 0
 Distance (au) : 18.114
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -23.10
 Sun-Target sep (deg) : 171.31
 Sun-Moon sep (deg) : 105.13
 B (ring opening deg) : 79.16
 PA of pole (deg) : 41.16
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.458
 C/A sky separation (km) : 6017.3
 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	2031-12-09T03:48:48.224		33.64	-36.94	51320.33	-23.48		
lambda	I	2031-12-09T03:49:43.271		33.72	-36.99	50026.71	-23.50		
delta	I	2031-12-09T03:50:56.766		33.83	-37.05	48300.35	-23.48		
gamma	I	2031-12-09T03:51:25.355		33.87	-37.07	47629.04	-23.48		
eta	I	2031-12-09T03:51:44.648		33.90	-37.09	47176.12	-23.47		
beta	I	2031-12-09T03:52:48.441		33.98	-37.14	45678.59	-23.46		
alpha	I	2031-12-09T03:53:28.955		34.04	-37.17	44728.67	-23.45		
4	I	2031-12-09T03:54:59.781		34.16	-37.23	42597.10	-23.43		
5	I	2031-12-09T03:55:17.616		34.19	-37.25	42185.84	-23.43		
6	I	2031-12-09T03:55:34.041		34.21	-37.26	41799.66	-23.42		
Uranus	I	2031-12-09T04:07:12.251		35.08	-37.69	25421.04		-5.27	-5.51
Uranus	E	2031-12-09T04:42:02.890		36.88	-38.09	25159.79		9.05	9.47
6	E	2031-12-09T04:53:45.609		37.19	-37.92	41867.43	23.45		
5	E	2031-12-09T04:54:03.883		37.20	-37.91	42300.25	23.46		
4	E	2031-12-09T04:54:15.241		37.20	-37.91	42557.01	23.46		
alpha	E	2031-12-09T04:55:46.421		37.23	-37.88	44699.93	23.48		
beta	E	2031-12-09T04:56:26.524		37.25	-37.86	45641.68	23.49		
eta	E	2031-12-09T04:57:31.802		37.26	-37.83	47176.12	23.50		
gamma	E	2031-12-09T04:57:50.887		37.27	-37.82	47624.74	23.51		
delta	E	2031-12-09T04:58:19.622		37.28	-37.81	48300.35	23.51		
lambda	E	2031-12-09T04:59:33.019		37.30	-37.78	50026.71	23.53		
epsilon	E	2031-12-09T05:00:09.769		37.30	-37.76	50891.48	23.52		