

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-30T06:15:24.100
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3404548767983659392
 2Mass ID (if available) : 05344940+2328030

ICRS Star Coord at Epoch: 05h 34m 49.40887s +23:28:03.01873s

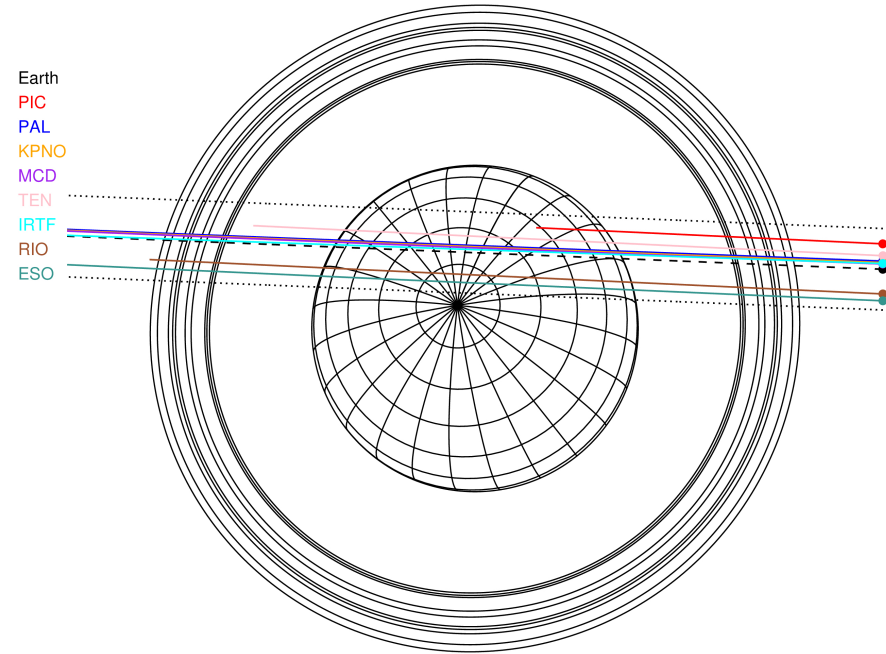
RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.948
 G magnitude : 17.576
 RP magnitude : 16.759
 BP magnitude : 18.268
 DUPflag : 0
 Distance (au) : 18.127
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.59
 Sun-Target sep (deg) : 166.34
 Sun-Moon sep (deg) : 30.74
 B (ring opening deg) : 79.75
 PA of pole (deg) : 37.16

#	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



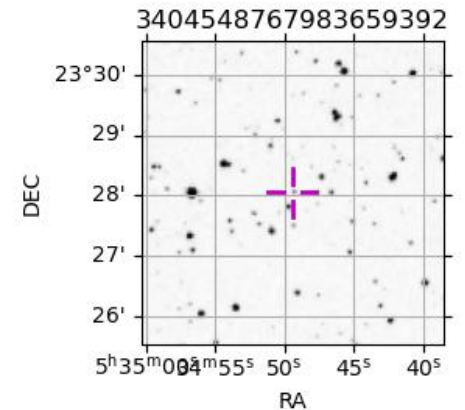
2031-12-30T06:15:24.1000 α: 05 34 49.40889 α: +23 28 03.019 C/A 0.908° PA 177.68 deg v_sky -22.59 km/s D 18.13 AU
 Credit: Styled after SORA/Lucky Star

Uranus 2031-12-30T06:15:24 K14.95 G17.58 PgtRgt

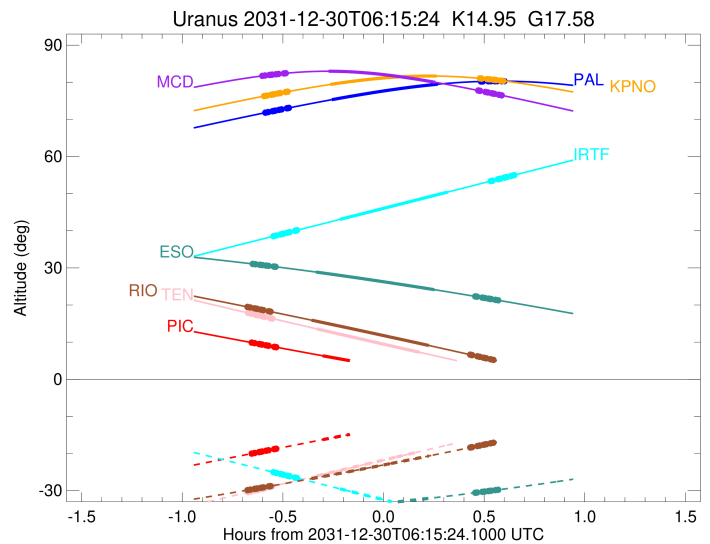
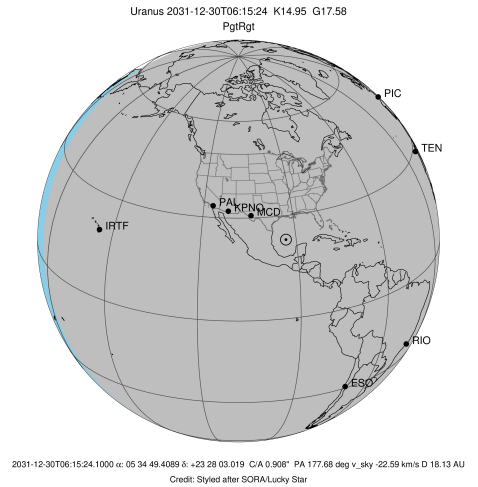


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OCode
PIC	Pic du Midi	42.9	0.1	+++++	+		DEC 30 05:35 - DEC 30 05:57	PinRin
PAL	Palomar Mt (200")	33.4	243.1	+++++	+ +	+++++	DEC 30 05:39 - DEC 30 06:51	PieRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++	+ +	+++++	DEC 30 05:39 - DEC 30 06:50	PieRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++	+ +	+++++	DEC 30 05:39 - DEC 30 06:50	PieRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++	+ +		DEC 30 05:34 - DEC 30 06:26	PieRin
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++	+ +	+++++	DEC 30 05:42 - DEC 30 06:54	PieRie
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++	+ +	+++++	DEC 30 05:34 - DEC 30 06:47	PieRie
ESO	European Southern Obs	-29.3	289.3	+++++	+ +	+++++	DEC 30 05:36 - DEC 30 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

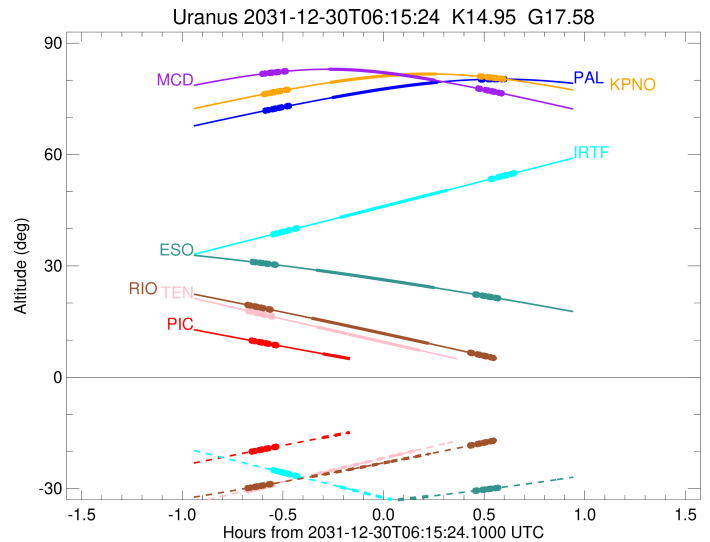
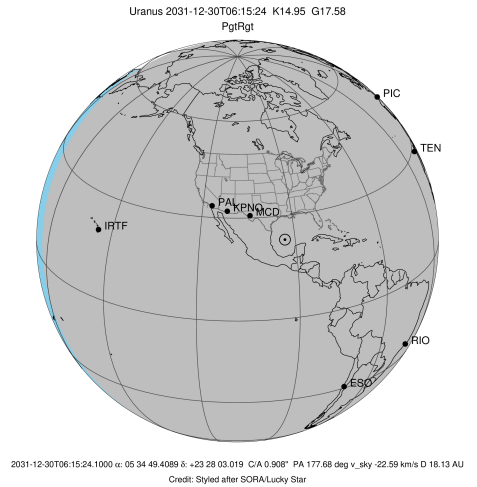


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-30T06:11:54.940
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3404548767983659392
 2Mass ID (if available) : 05344940+2328030
 ICRS Star Coord at Epoch: 05h 34m 49.40887s +23:28:03.01873s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.948
 G magnitude : 17.576
 RP magnitude : 16.759
 BP magnitude : 18.268
 DUPflag : 0
 Distance (au) : 18.127
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.59
 Sun-Target sep (deg) : 166.34
 Sun-Moon sep (deg) : 30.31
 B (ring opening deg) : 79.75
 PA of pole (deg) : 37.16
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.233
 C/A sky separation (km) : 16213.8
 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	2031-12-30T05:35:53.838		9.91	-20.06	51423.69	-21.47		
lambda	I	2031-12-30T05:36:58.882		9.72	-19.86	50026.71	-21.44		
delta	I	2031-12-30T05:38:19.574		9.50	-19.62	48300.35	-21.35		
gamma	I	2031-12-30T05:38:51.154		9.41	-19.53	47626.90	-21.31		
eta	I	2031-12-30T05:39:12.326		9.35	-19.47	47176.12	-21.28		
beta	I	2031-12-30T05:40:22.741		9.15	-19.26	45681.23	-21.18		
alpha	I	2031-12-30T05:41:07.071		9.03	-19.12	44744.64	-21.11		
4	I	2031-12-30T05:42:50.643		8.73	-18.82	42566.41	-20.94		
5	I	2031-12-30T05:43:10.258		8.68	-18.76	42156.03	-20.90		
6	I	2031-12-30T05:43:26.278		8.63	-18.71	41824.02	-20.86		
Uranus	I	2031-12-30T05:57:16.956		6.33	-16.27	25558.96		-0.08	-0.08
Uranus	E	2031-12-30T06:26:01.807		1.69x	-11.28	25007.56		10.10	10.57
6	E	2031-12-30T06:40:03.437	-0.50x	-8.90	41817.18	20.78			
5	E	2031-12-30T06:40:26.736	-0.56x	-8.83	42300.08	20.82			
4	E	2031-12-30T06:40:41.787	-0.60x	-8.79	42606.64	20.86			
alpha	E	2031-12-30T06:42:20.869	-0.85x	-8.51	44684.68	21.02			
beta	E	2031-12-30T06:43:06.602	-0.97x	-8.38	45646.30	21.09			
eta	E	2031-12-30T06:44:18.957	-1.15x	-8.18	47176.12	21.18			
gamma	E	2031-12-30T06:44:40.333	-1.21x	-8.12	47629.20	21.21			
delta	E	2031-12-30T06:45:11.947	-1.29x	-8.03	48300.35	21.25			
lambda	E	2031-12-30T06:46:33.014	-1.49x	-7.81	50026.71	21.34			
epsilon	E	2031-12-30T06:47:06.842	-1.58x	-7.71	50749.24	21.37			

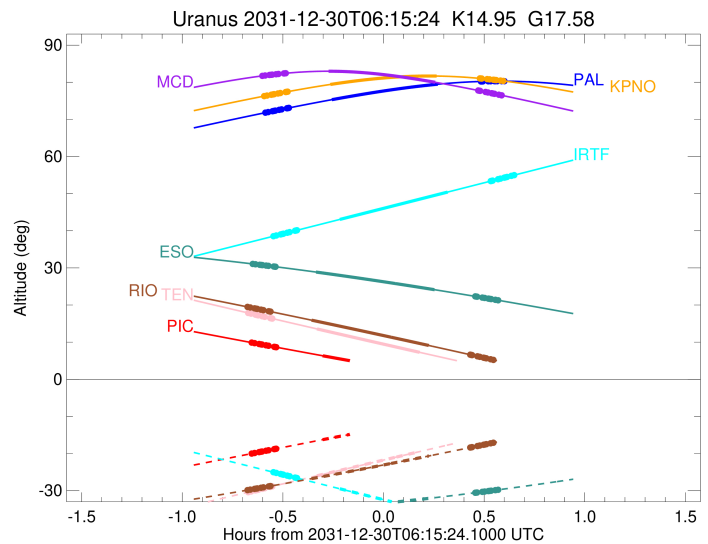
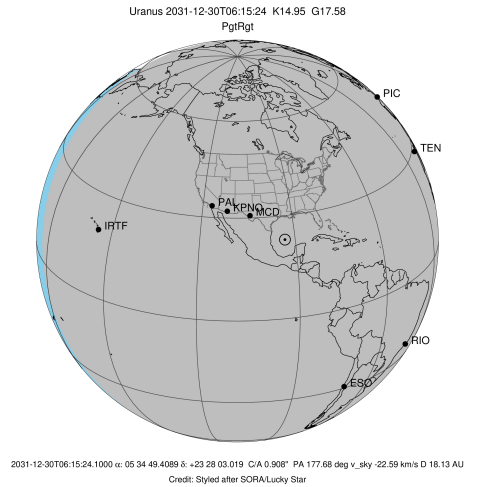
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-30T06:15:58.350
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PAL
 Location : Palomar Mt (200")
 Latitude (deg) : 33.35622
 E. Longitude (deg) : 243.13601
 Altitude (km) : 1.706
 Gaia source ID : 3404548767983659392
 2Mass ID (if available) : 05344940+2328030
 ICRS Star Coord at Epoch: 05h 34m 49.40887s +23:28:03.01873s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.948
 G magnitude : 17.576
 RP magnitude : 16.759
 BP magnitude : 18.268
 DUPflag : 0
 Distance (au) : 18.127
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.59
 Sun-Target sep (deg) : 166.34
 Sun-Moon sep (deg) : 31.31
 B (ring opening deg) : 79.75
 PA of pole (deg) : 37.16
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.988
 C/A sky separation (km) : 12983.4
 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	2031-12-30T05:39:58.709		71.78	-59.86	51440.71	-22.31		
lambda	I	2031-12-30T05:41:02.049		71.97	-60.07	50026.71	-22.30		
delta	I	2031-12-30T05:42:19.562		72.21	-60.34	48300.35	-22.24		
gamma	I	2031-12-30T05:42:49.873		72.31	-60.44	47626.56	-22.22		
eta	I	2031-12-30T05:43:10.156		72.37	-60.51	47176.12	-22.20		
beta	I	2031-12-30T05:44:17.584		72.57	-60.74	45681.18	-22.14		
alpha	I	2031-12-30T05:44:59.904		72.70	-60.89	44746.08	-22.09		
4	I	2031-12-30T05:46:38.902		73.00	-61.22	42563.11	-21.99		
5	I	2031-12-30T05:46:57.473		73.06	-61.29	42155.22	-21.96		
6	I	2031-12-30T05:47:12.555		73.10	-61.34	41827.10	-21.94		
Uranus	I	2031-12-30T06:00:00.785		75.32	-63.94	25545.20		-1.57	-1.64
Uranus	E	2031-12-30T06:31:30.805		79.48	-70.12	25052.41		9.66	10.11
6	E	2031-12-30T06:44:25.364		80.22	-72.51	41820.64	21.95		
5	E	2031-12-30T06:44:47.484		80.23	-72.57	42304.01	21.98		
4	E	2031-12-30T06:45:01.404		80.24	-72.61	42604.00	22.00		
alpha	E	2031-12-30T06:46:35.611		80.27	-72.89	44684.62	22.10		
beta	E	2031-12-30T06:47:19.081		80.28	-73.02	45645.23	22.15		
eta	E	2031-12-30T06:48:28.077		80.30	-73.23	47176.12	22.21		
gamma	E	2031-12-30T06:48:48.451		80.30	-73.29	47628.84	22.23		
delta	E	2031-12-30T06:49:18.642		80.30	-73.37	48300.35	22.25		
lambda	E	2031-12-30T06:50:36.109		80.30	-73.60	50026.71	22.32		
epsilon	E	2031-12-30T06:51:08.742		80.30	-73.69	50755.31	22.33		

```

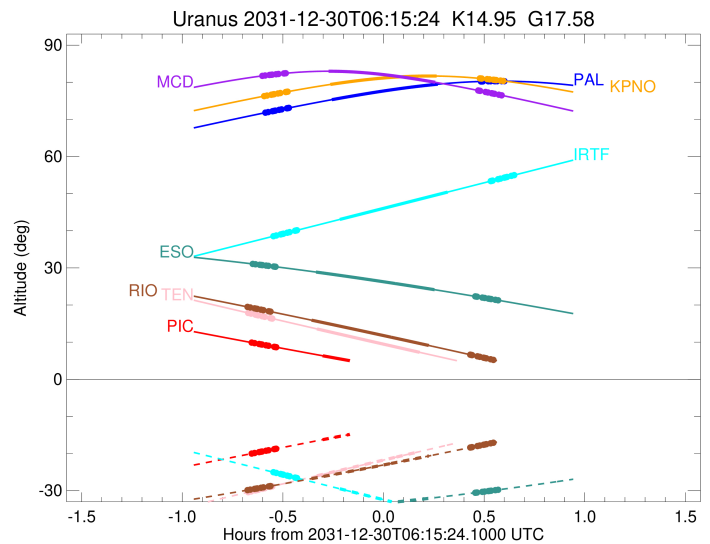
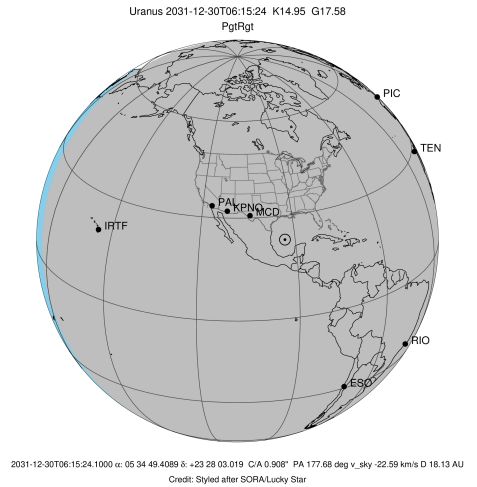
target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2031-12-30T06:15:37.310
Event type          : PgtRgt
: Uranus occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code       : KPNO
Location            : Kitt Peak Natl Obs
Latitude (deg)      : 31.96333
E. Longitude (deg)  : 248.40000
Altitude (km)       : 2.120
Gaia source ID      : 3404548767983659392
2Mass ID (if available) : 05344940+2328030
ICRS Star Coord at Epoch: 05h 34m 49.40887s +23:28:03.01873s
RUWE (>1.4 is poor) : 0.99
K magnitude          : 14.948
G magnitude          : 17.576
RP magnitude         : 16.759
BP magnitude         : 18.268
DUPflag             : 0
Distance (au)       : 18.127
f0 (km)             : 0.000
g0 (km)             : 0.000
skyplane vel. (km/s) : -22.59
Sun-Target sep (deg) : 166.34
Sun-Moon sep (deg)  : 31.26
B (ring opening deg) : 79.75
PA of pole (deg)    : 37.16
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.973
C/A sky separation (km) : 12793.5
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_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	2031-12-30T05:39:36.815		76.24	-64.41	51441.97	-22.35		
lambda	I	2031-12-30T05:40:40.103		76.42	-64.63	50026.71	-22.34		
delta	I	2031-12-30T05:41:57.477		76.65	-64.90	48300.35	-22.28		
gamma	I	2031-12-30T05:42:27.733		76.74	-65.00	47626.53	-22.26		
eta	I	2031-12-30T05:42:47.977		76.79	-65.07	47176.12	-22.24		
beta	I	2031-12-30T05:43:55.276		76.99	-65.30	45681.17	-22.18		
alpha	I	2031-12-30T05:44:37.508		77.11	-65.45	44746.18	-22.14		
4	I	2031-12-30T05:46:16.313		77.38	-65.79	42562.87	-22.04		
5	I	2031-12-30T05:46:34.836		77.43	-65.85	42155.18	-22.01		
6	I	2031-12-30T05:46:49.874		77.48	-65.90	41827.32	-21.99		
Uranus	I	2031-12-30T05:59:35.484		79.42	-68.50	25543.52		-1.66	-1.74
Uranus	E	2031-12-30T06:31:14.499		81.68	-74.64	25055.32		9.64	10.08
6	E	2031-12-30T06:44:06.558		81.05	-76.90	41820.80	21.99		
5	E	2031-12-30T06:44:28.639		81.02	-76.96	42304.18	22.02		
4	E	2031-12-30T06:44:42.518		81.00	-77.00	42603.86	22.04		
alpha	E	2031-12-30T06:46:16.571		80.86	-77.26	44684.63	22.14		
beta	E	2031-12-30T06:46:59.970		80.79	-77.37	45645.19	22.18		
eta	E	2031-12-30T06:48:08.864		80.68	-77.56	47176.12	22.24		
gamma	E	2031-12-30T06:48:29.208		80.65	-77.61	47628.82	22.26		
delta	E	2031-12-30T06:48:59.358		80.60	-77.69	48300.35	22.29		
lambda	E	2031-12-30T06:50:16.720		80.46	-77.89	50026.71	22.34		
epsilon	E	2031-12-30T06:50:49.326		80.40	-77.98	50755.63	22.36		

```

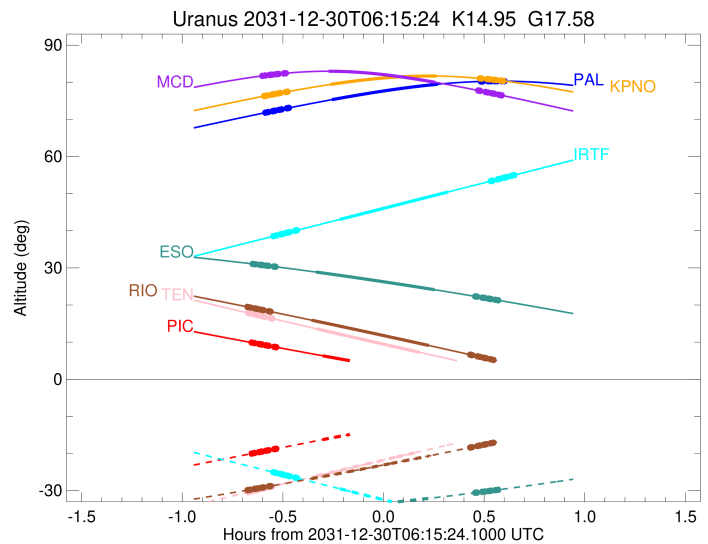
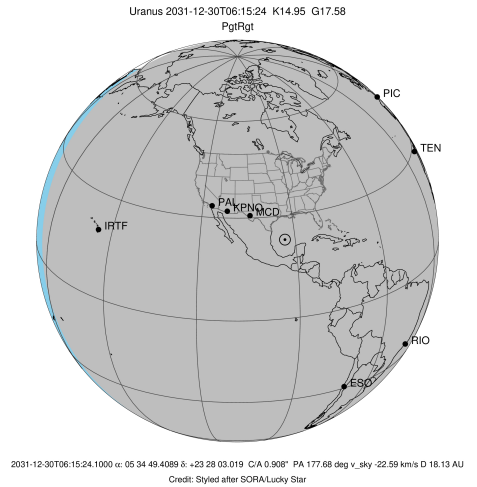
target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2031-12-30T06:15:05.680
Event type            : PgtRgt
: Uranus occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code         : MCD
Location              : McDonald Obs. 2.7m
Latitude (deg)        : 30.67158
E. Longitude (deg)    : 255.97844
Altitude (km)         : 2.075
Gaia source ID        : 3404548767983659392
2Mass ID (if available) : 05344940+2328030
ICRS Star Coord at Epoch: 05h 34m 49.40887s +23:28:03.01873s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 14.948
G magnitude           : 17.576
RP magnitude          : 16.759
BP magnitude          : 18.268
DUPflag              : 0
Distance (au)         : 18.127
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -22.59
Sun-Target sep (deg)  : 166.34
Sun-Moon sep (deg)    : 31.17
B (ring opening deg)  : 79.75
PA of pole (deg)      : 37.16
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.960
C/A sky separation (km) : 12627.1
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	2031-12-30T05:39:04.336		81.71	-70.90	51443.17	-22.39		
lambda	I	2031-12-30T05:40:07.581		81.83	-71.11	50026.71	-22.37		
delta	I	2031-12-30T05:41:24.834		81.97	-71.37	48300.35	-22.32		
gamma	I	2031-12-30T05:41:55.043		82.03	-71.48	47626.51	-22.29		
eta	I	2031-12-30T05:42:15.253		82.06	-71.55	47176.12	-22.28		
beta	I	2031-12-30T05:43:22.439		82.17	-71.77	45681.17	-22.22		
alpha	I	2031-12-30T05:44:04.594		82.24	-71.92	44746.27	-22.18		
4	I	2031-12-30T05:45:43.235		82.39	-72.25	42562.65	-22.08		
5	I	2031-12-30T05:46:01.715		82.42	-72.31	42155.14	-22.05		
6	I	2031-12-30T05:46:16.715		82.44	-72.36	41827.54	-22.03		
Uranus	I	2031-12-30T05:59:00.104		82.98	-74.89	25541.92		-1.74	-1.82
Uranus	E	2031-12-30T06:30:47.080		80.00	-80.43	25057.76		9.61	10.06
6	E	2031-12-30T06:43:37.162		77.80	-81.97	41820.93	22.02		
5	E	2031-12-30T06:43:59.214		77.73	-82.00	42304.32	22.04		
4	E	2031-12-30T06:44:13.063		77.69	-82.02	42603.76	22.07		
alpha	E	2031-12-30T06:45:47.007		77.40	-82.15	44684.63	22.17		
beta	E	2031-12-30T06:46:30.356		77.27	-82.21	45645.15	22.21		
eta	E	2031-12-30T06:47:39.180		77.05	-82.29	47176.12	22.27		
gamma	E	2031-12-30T06:47:59.503		76.99	-82.31	47628.81	22.28		
delta	E	2031-12-30T06:48:29.625		76.90	-82.34	48300.35	22.31		
lambda	E	2031-12-30T06:49:46.918		76.65	-82.42	50026.71	22.36		
epsilon	E	2031-12-30T06:50:19.508		76.55	-82.45	50755.88	22.37		

```

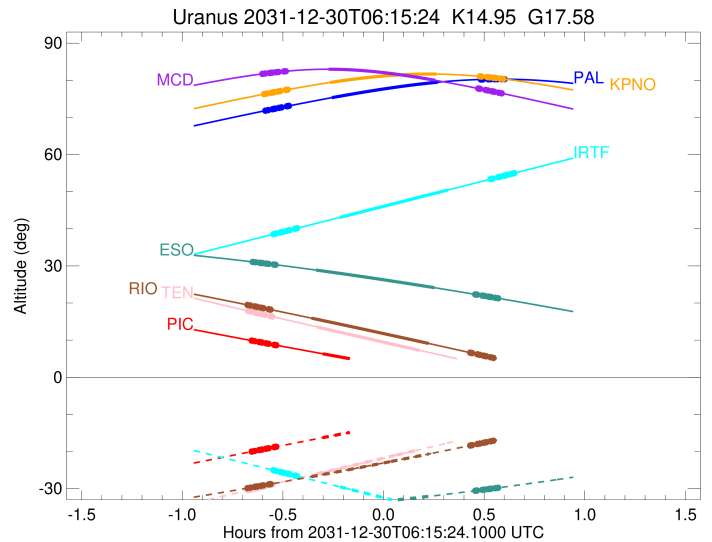
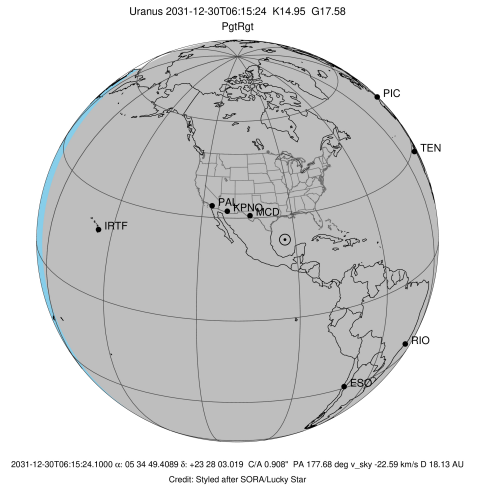
target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2031-12-30T06:11:06.200
Event type           : PgtRgt
: Uranus occs: geocentric, topocentric
: Ring occs: geocentric, topocentric
Observer code        : TEN
Location              : Teide Obs./Tenerife
Latitude (deg)       : 28.30050
E. Longitude (deg)   : 343.48909
Altitude (km)        : 2.395
Gaia source ID       : 3404548767983659392
2Mass ID (if available) : 05344940+2328030
ICRS Star Coord at Epoch: 05h 34m 49.40887s +23:28:03.01873s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 14.948
G magnitude           : 17.576
RP magnitude          : 16.759
BP magnitude          : 18.268
DUPflag              : 0
Distance (au)        : 18.127
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -22.59
Sun-Target sep (deg) : 166.34
Sun-Moon sep (deg)  : 30.18
B (ring opening deg) : 79.75
PA of pole (deg)    : 37.16
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.097
C/A sky separation (km) : 14427.6
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_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	2031-12-30T05:34:51.139		17.90	-30.45	51434.91	-21.84		
lambda	I	2031-12-30T05:35:55.601		17.68	-30.22	50026.71	-21.82		
delta	I	2031-12-30T05:37:14.869		17.40	-29.94	48300.35	-21.74		
gamma	I	2031-12-30T05:37:45.880		17.29	-29.83	47626.68	-21.71		
eta	I	2031-12-30T05:38:06.646		17.22	-29.75	47176.12	-21.69		
beta	I	2031-12-30T05:39:15.698		16.98	-29.50	45681.21	-21.61		
alpha	I	2031-12-30T05:39:59.092		16.82	-29.35	44745.57	-21.55		
4	I	2031-12-30T05:41:40.574		16.47	-28.98	42564.32	-21.42		
5	I	2031-12-30T05:41:59.681		16.40	-28.91	42155.47	-21.39		
6	I	2031-12-30T05:42:15.230		16.35	-28.86	41825.96	-21.36		
Uranus	I	2031-12-30T05:55:33.292		13.57	-26.00	25553.58		-0.98	-1.03
Uranus	E	2031-12-30T06:26:11.972		7.25	-19.48	25028.12		9.90	10.36
6	E	2031-12-30T06:39:40.545	4.52x	-16.64	41818.88	21.26			
5	E	2031-12-30T06:40:03.362	4.44x	-16.56	42302.10	21.29			
4	E	2031-12-30T06:40:17.909	4.39x	-16.51	42605.36	21.32			
alpha	E	2031-12-30T06:41:55.022	4.07x	-16.17	44684.62	21.44			
beta	E	2031-12-30T06:42:39.853	3.92x	-16.02	45645.76	21.49			
eta	E	2031-12-30T06:43:50.908	3.68x	-15.77	47176.12	21.57			
gamma	E	2031-12-30T06:44:11.898	3.61x	-15.70	47629.03	21.59			
delta	E	2031-12-30T06:44:42.973	3.50x	-15.59	48300.35	21.62			
lambda	E	2031-12-30T06:46:02.697	3.24x	-15.31	50026.71	21.69			
epsilon	E	2031-12-30T06:46:36.112	3.13x	-15.19	50751.91	21.71			

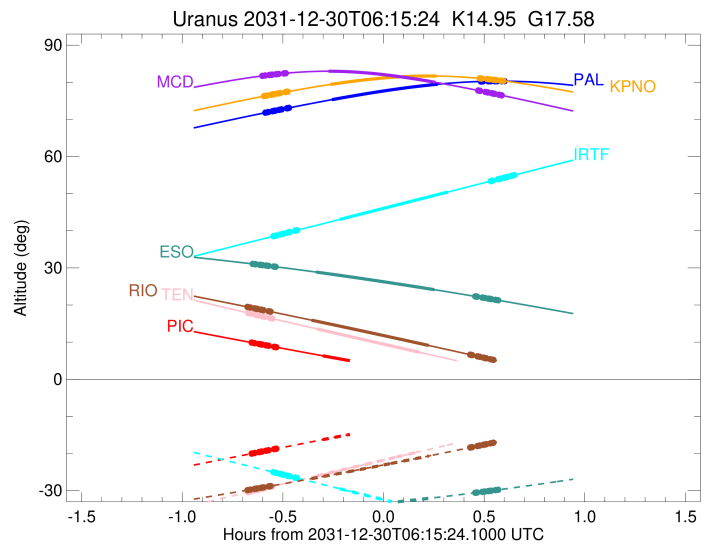
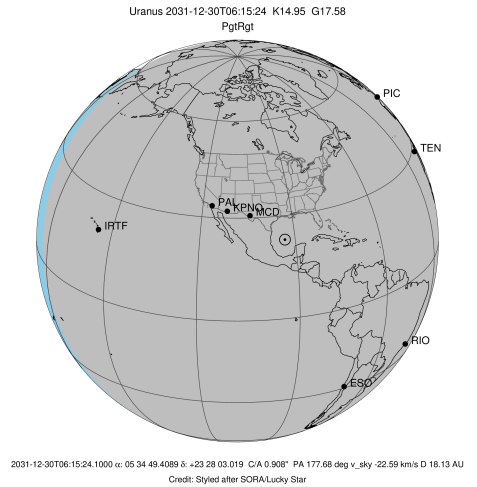
```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch             : 2031-12-30T06:18:39.570
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        : 3404548767983659392
2Mass ID (if available) : 05344940+2328030
ICRS Star Coord at Epoch: 05h 34m 49.40887s +23:28:03.01873s
RUWE (>1.4 is poor) : 0.99
K magnitude           : 14.948
G magnitude           : 17.576
RP magnitude          : 16.759
BP magnitude          : 18.268
DUPflag              : 0
Distance (au)         : 18.127
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -22.59
Sun-Target sep (deg)  : 166.34
Sun-Moon sep (deg)   : 31.61
B (ring opening deg) : 79.75
PA of pole (deg)     : 37.16
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.939
C/A sky separation (km) : 12344.4
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
    
```



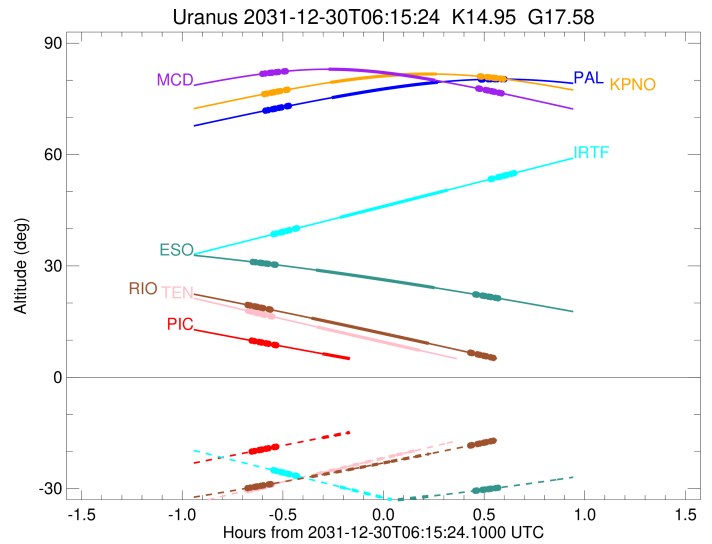
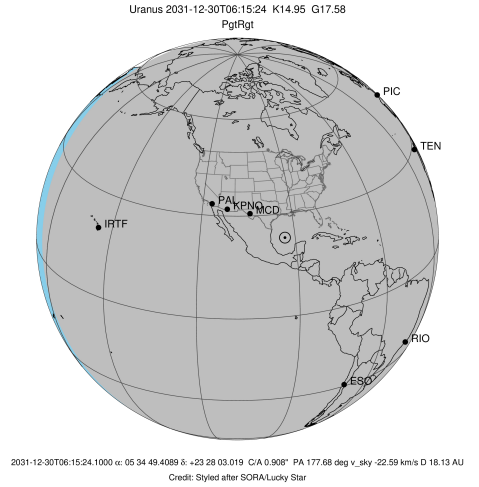
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2031-12-30T05:42:22.744		38.49	-24.99	51443.19	-22.26		
lambda	I	2031-12-30T05:43:26.335		38.73	-25.23	50026.71	-22.26		
delta	I	2031-12-30T05:44:43.995		39.02	-25.52	48300.35	-22.20		
gamma	I	2031-12-30T05:45:14.359		39.14	-25.63	47626.51	-22.18		
eta	I	2031-12-30T05:45:34.671		39.22	-25.71	47176.12	-22.17		
beta	I	2031-12-30T05:46:42.189		39.47	-25.96	45681.17	-22.11		
alpha	I	2031-12-30T05:47:24.544		39.63	-26.12	44746.29	-22.07		
4	I	2031-12-30T05:49:03.636		40.01	-26.49	42562.59	-21.98		
5	I	2031-12-30T05:49:22.195		40.08	-26.56	42155.13	-21.96		
6	I	2031-12-30T05:49:37.256		40.14	-26.62	41827.60	-21.94		
Uranus	I	2031-12-30T06:02:22.232		43.06	-29.50	25540.54		-1.81	-1.90
Uranus	E	2031-12-30T06:34:32.195		50.43	-36.79	25064.78		9.54	9.98
6	E	2031-12-30T06:47:21.483		53.38	-39.71	41821.45	22.01		
5	E	2031-12-30T06:47:43.550		53.46	-39.80	42304.83	22.03		
4	E	2031-12-30T06:47:57.357		53.51	-39.85	42603.35	22.06		
alpha	E	2031-12-30T06:49:31.374		53.87	-40.21	44684.64	22.15		
beta	E	2031-12-30T06:50:14.744		54.04	-40.37	45645.00	22.19		
eta	E	2031-12-30T06:51:23.621		54.30	-40.63	47176.12	22.25		
gamma	E	2031-12-30T06:51:43.956		54.38	-40.71	47628.75	22.27		
delta	E	2031-12-30T06:52:14.102		54.50	-40.83	48300.35	22.29		
lambda	E	2031-12-30T06:53:31.453		54.79	-41.12	50026.71	22.35		
epsilon	E	2031-12-30T06:54:04.121		54.92	-41.24	50757.06	22.36		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-30T06:11:33.440
 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 : 3404548767983659392
 2Mass ID (if available) : 05344940+2328030
 ICRS Star Coord at Epoch: 05h 34m 49.40887s +23:28:03.01873s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.948
 G magnitude : 17.576
 RP magnitude : 16.759
 BP magnitude : 18.268
 DUPflag : 0
 Distance (au) : 18.127
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.59
 Sun-Target sep (deg) : 166.34
 Sun-Moon sep (deg) : 30.14
 B (ring opening deg) : 79.75
 PA of pole (deg) : 37.16
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.637
 C/A sky separation (km) : 8374.5
 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_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	2031-12-30T05:34:37.964		19.53	-29.90	51467.84	-22.66		
lambda	I	2031-12-30T05:35:41.529		19.34	-29.73	50026.71	-22.66		
delta	I	2031-12-30T05:36:57.754		19.10	-29.53	48300.35	-22.63		
gamma	I	2031-12-30T05:37:27.555		19.01	-29.45	47625.98	-22.62		
eta	I	2031-12-30T05:37:47.443		18.95	-29.40	47176.12	-22.62		
beta	I	2031-12-30T05:38:53.586		18.75	-29.22	45680.89	-22.59		
alpha	I	2031-12-30T05:39:34.941		18.62	-29.11	44748.17	-22.57		
4	I	2031-12-30T05:41:12.030		18.32	-28.86	42557.78	-22.53		
5	I	2031-12-30T05:41:29.964		18.26	-28.81	42154.85	-22.51		
6	I	2031-12-30T05:41:44.452		18.22	-28.77	41832.26	-22.50		
Uranus	I	2031-12-30T05:53:57.722		15.92	-26.77	25486.30		-3.60	-3.77
Uranus	E	2031-12-30T06:28:54.266		9.10	-20.66	25135.81		8.80	9.21
6	E	2031-12-30T06:41:14.403		6.62	-18.39	41824.93	22.40		
5	E	2031-12-30T06:41:36.102		6.55	-18.33	42307.97	22.41		
4	E	2031-12-30T06:41:49.372		6.51	-18.28	42600.52	22.42		
alpha	E	2031-12-30T06:43:22.136		6.19	-18.00	44684.87	22.46		
beta	E	2031-12-30T06:44:04.888		6.05	-17.86	45644.12	22.48		
eta	E	2031-12-30T06:45:12.993		5.82	-17.65	47176.12	22.50		
gamma	E	2031-12-30T06:45:33.093		5.75	-17.59	47628.40	22.51		
delta	E	2031-12-30T06:46:02.944		5.65	-17.49	48300.35	22.51		
lambda	E	2031-12-30T06:47:19.582		5.39	-17.25	50026.71	22.54		
epsilon	E	2031-12-30T06:47:52.336		5.28	-17.15	50765.04	22.54		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2031-12-30T06:13:02.760
 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 : 3404548767983659392
 2Mass ID (if available) : 05344940+2328030
 ICRS Star Coord at Epoch: 05h 34m 49.40887s +23:28:03.01873s
 RUWE (>1.4 is poor) : 0.99
 K magnitude : 14.948
 G magnitude : 17.576
 RP magnitude : 16.759
 BP magnitude : 18.268
 DUPflag : 0
 Distance (au) : 18.127
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.59
 Sun-Target sep (deg) : 166.34
 Sun-Moon sep (deg) : 30.47
 B (ring opening deg) : 79.75
 PA of pole (deg) : 37.16
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.541
 C/A sky separation (km) : 7116.7
 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_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	2031-12-30T05:36:11.206		31.09	-36.31	51473.36	-22.86		
lambda	I	2031-12-30T05:37:14.461		30.98	-36.25	50026.71	-22.86		
delta	I	2031-12-30T05:38:30.002		30.84	-36.18	48300.35	-22.84		
gamma	I	2031-12-30T05:38:59.534		30.79	-36.15	47625.85	-22.84		
eta	I	2031-12-30T05:39:19.231		30.75	-36.13	47176.12	-22.83		
beta	I	2031-12-30T05:40:24.745		30.63	-36.07	45680.79	-22.81		
alpha	I	2031-12-30T05:41:05.671		30.55	-36.03	44748.59	-22.80		
4	I	2031-12-30T05:42:41.829		30.37	-35.93	42556.59	-22.77		
5	I	2031-12-30T05:42:59.526		30.34	-35.91	42154.93	-22.76		
6	I	2031-12-30T05:43:13.813		30.31	-35.90	41833.44	-22.75		
Uranus	I	2031-12-30T05:55:16.388		28.88	-35.08	25466.58		-4.06	-4.25
Uranus	E	2031-12-30T06:30:36.301		24.13	-31.91	25163.84		8.50	8.89
6	E	2031-12-30T06:42:44.055		22.33	-30.58	41826.30	22.68		
5	E	2031-12-30T06:43:05.478		22.28	-30.53	42309.04	22.69		
4	E	2031-12-30T06:43:18.470		22.24	-30.51	42599.37	22.70		
alpha	E	2031-12-30T06:44:50.184		22.01	-30.33	44685.02	22.73		
beta	E	2031-12-30T06:45:32.417		21.90	-30.25	45643.80	22.74		
eta	E	2031-12-30T06:46:39.761		21.73	-30.12	47176.12	22.76		
gamma	E	2031-12-30T06:46:59.628		21.68	-30.08	47628.25	22.76		
delta	E	2031-12-30T06:47:29.153		21.60	-30.02	48300.35	22.77		
lambda	E	2031-12-30T06:48:44.954		21.41	-29.87	50026.71	22.78		
epsilon	E	2031-12-30T06:49:17.521		21.32	-29.81	50768.79	22.78		