

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-04T05:39:16.840
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Gaia source ID : 3427823500701876096
 2Mass ID (if available) : 05534172+2338472

Uranus 2033-01-04T05:39:16 K13.86 G17.33 PgtRgt

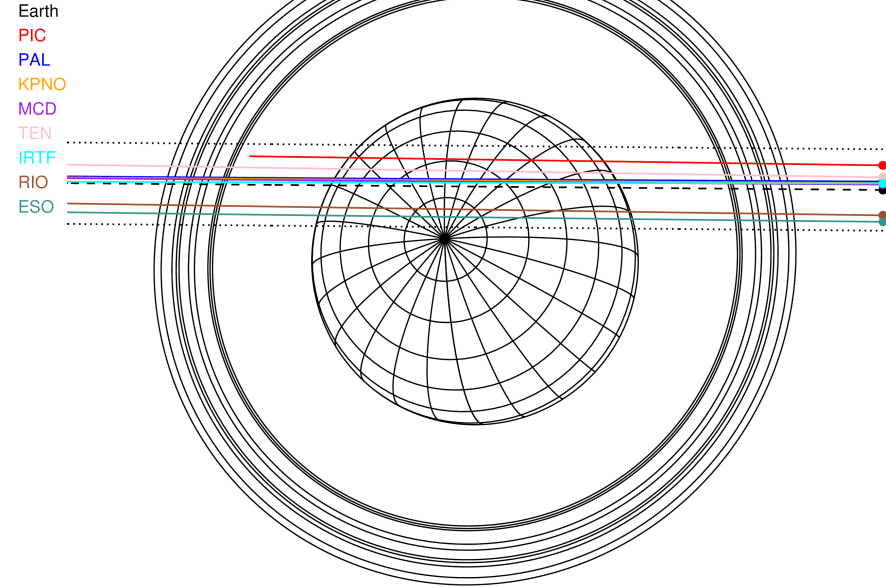
ICRS Star Coord at Epoch: 05h 53m 41.73168s +23:38:46.94014s

RUWE (>1.4 is poor) : 1.99
 K magnitude : 13.856
 G magnitude : 17.331
 RP magnitude : 16.235
 BP magnitude : 18.293
 DUPflag : 0
 Distance (au) : 18.066
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.40
 Sun-Target sep (deg) : 164.84
 Sun-Moon sep (deg) : 126.76
 B (ring opening deg) : 76.54
 PA of pole (deg) : 53.02

#	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

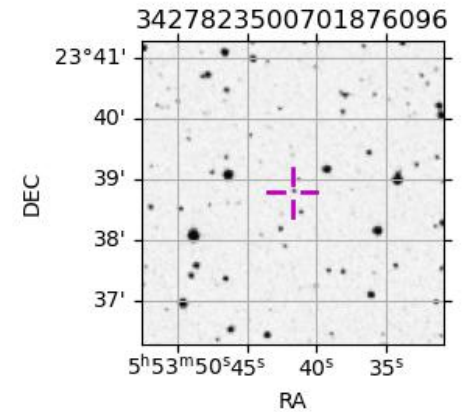


2033-01-04T05:39:16.8400 ra: 05 53 41.7317 s: +23 38 46.940 C/A 0.902° PA 179.52 deg v_sky -22.40 km/s D 18.07 AU
 Credit: Styled after SORA/Lucky Star

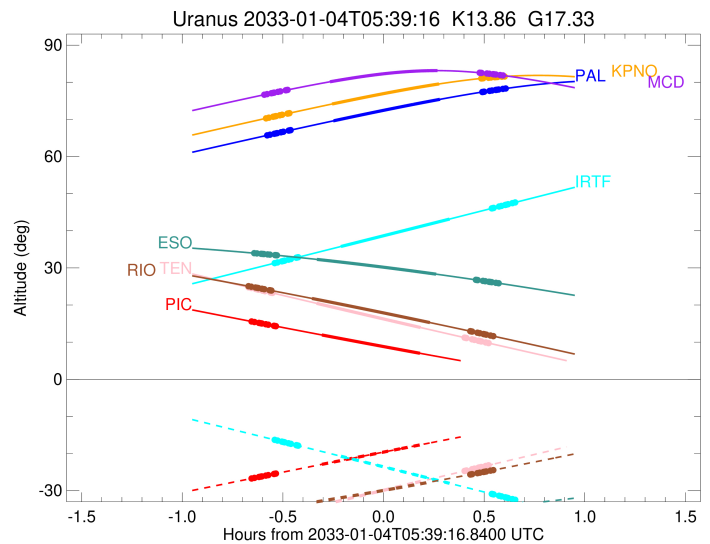
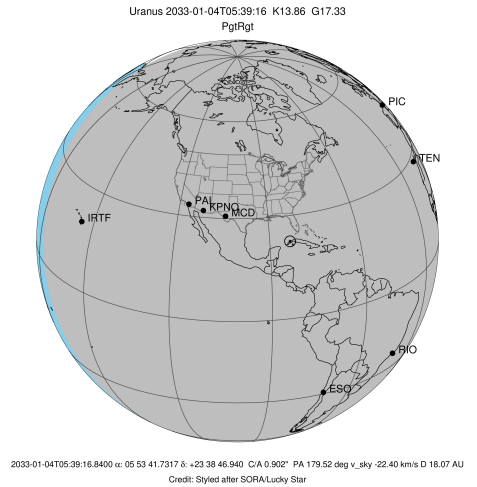


Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++	+ +		JAN 04 05:00 - JAN 04 05:50	PieRin
PAL	Palomar Mt (200")	33.4	243.1	+++++	+ +	+++++	JAN 04 05:04 - JAN 04 06:15	PieRie
PNO	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4	+++++	+ +	+++++	JAN 04 05:04 - JAN 04 06:15	PieRie
MCD	McDonald Obs. 2.7m	30.7	256.0	+++++	+ +	+++++	JAN 04 05:03 - JAN 04 06:15	PieRie
TEN	Teide Obs./Tenerife	28.3	343.5	+++++	+ +	+++++	JAN 04 04:59 - JAN 04 06:10	PieRie
IRTF	Mauna Kea/IRTF	19.8	204.5	+++++	+ +	+++++	JAN 04 05:06 - JAN 04 06:18	PieRie
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++	+ +	+++++	JAN 04 04:59 - JAN 04 06:12	PieRie
ESO	European Southern Obs	-29.3	289.3	+++++	+ +	+++++	JAN 04 05:00 - JAN 04 06:13	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

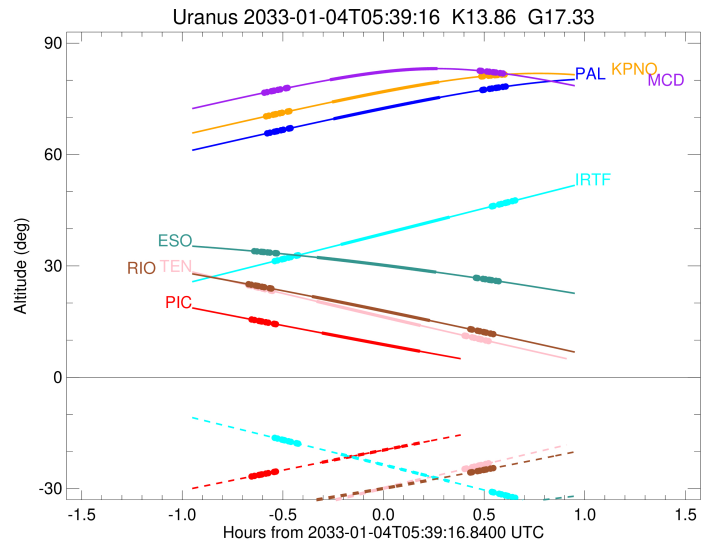
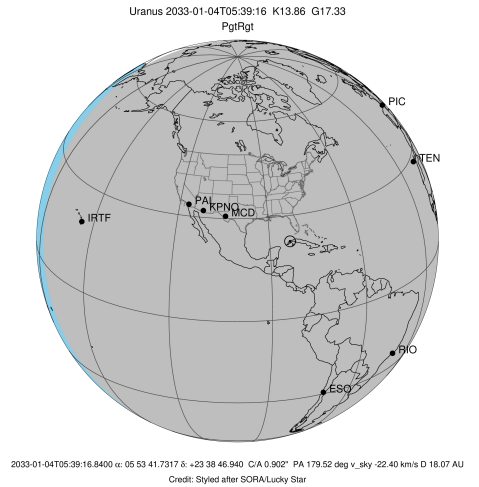


target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-04T05:35:45.460
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : PIC
 Location : Pic du Midi
 Latitude (deg) : 42.93656
 E. Longitude (deg) : 0.14231
 Altitude (km) : 2.890
 Gaia source ID : 3427823500701876096
 2Mass ID (if available) : 05534172+2338472
 ICRS Star Coord at Epoch: 05h 53m 41.73168s +23:38:46.94014s
 RUWE (>1.4 is poor) : 1.99
 K magnitude : 13.856
 G magnitude : 17.331
 RP magnitude : 16.235
 BP magnitude : 18.293
 DUPflag : 0
 Distance (au) : 18.066
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.40
 Sun-Target sep (deg) : 164.84
 Sun-Moon sep (deg) : 126.49
 B (ring opening deg) : 76.54
 PA of pole (deg) : 53.02
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.219
 C/A sky separation (km) : 15975.2
 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



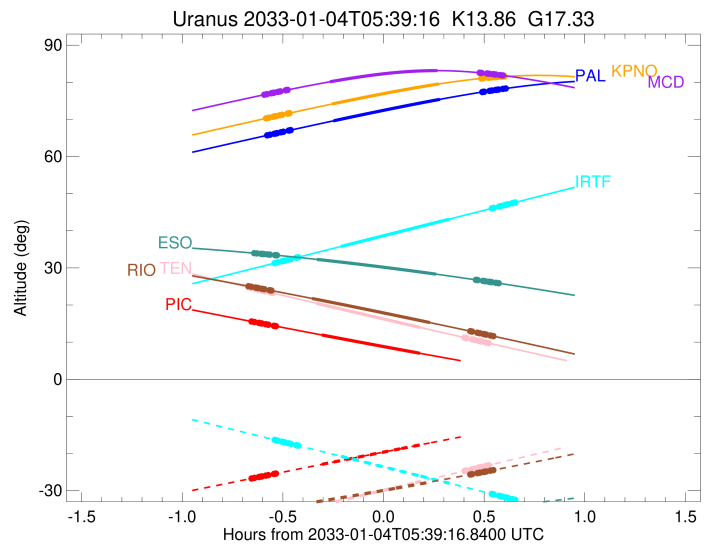
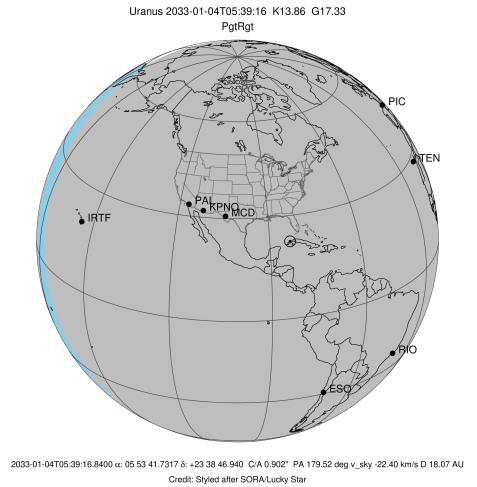
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-01-04T05:00:00.085		15.56	-26.71	51083.79	-21.70		
lambda	I	2033-01-04T05:00:48.989		15.41	-26.57	50026.71	-21.59		
delta	I	2033-01-04T05:02:09.125		15.18	-26.32	48300.35	-21.50		
gamma	I	2033-01-04T05:02:40.272		15.09	-26.23	47631.44	-21.46		
eta	I	2033-01-04T05:03:01.507		15.03	-26.16	47176.12	-21.43		
beta	I	2033-01-04T05:04:11.586		14.82	-25.95	45677.79	-21.33		
alpha	I	2033-01-04T05:04:55.675		14.70	-25.82	44739.63	-21.27		
4	I	2033-01-04T05:06:35.860		14.41	-25.51	42613.92	-21.09		
5	I	2033-01-04T05:06:53.649		14.35	-25.46	42246.63	-21.09		
6	I	2033-01-04T05:07:14.980		14.29	-25.39	41796.59	-21.03		
Uranus	I	2033-01-04T05:20:55.206		11.93	-22.92	25520.27		-3.48	-3.64
Uranus	E	2033-01-04T05:50:06.977		7.00	-17.69	25007.18		13.44	14.05
6	E	2033-01-04T06:03:44.712		4.77x	-15.28	41856.88	20.94		
5	E	2033-01-04T06:04:04.691		4.72x	-15.22	42282.73	21.00		
4	E	2033-01-04T06:04:16.881		4.68x	-15.19	42530.16	21.01		
alpha	E	2033-01-04T06:06:00.561		4.40x	-14.88	44720.78	21.18		
beta	E	2033-01-04T06:06:44.829		4.28x	-14.76	45656.10	21.24		
eta	E	2033-01-04T06:07:56.219		4.09x	-14.55	47176.12	21.33		
gamma	E	2033-01-04T06:08:17.161		4.03x	-14.49	47623.07	21.36		
delta	E	2033-01-04T06:08:48.847		3.95x	-14.39	48300.35	21.39		
lambda	E	2033-01-04T06:10:09.370		3.73x	-14.16	50026.71	21.48		
epsilon	E	2033-01-04T06:11:14.953		3.56x	-13.97	51437.83	21.59		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-04T05:40:25.520
 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 : 3427823500701876096
 2Mass ID (if available) : 05534172+2338472
 ICRS Star Coord at Epoch: 05h 53m 41.73168s +23:38:46.94014s
 RUWE (>1.4 is poor) : 1.99
 K magnitude : 13.856
 G magnitude : 17.331
 RP magnitude : 16.235
 BP magnitude : 18.293
 DUPflag : 0
 Distance (au) : 18.066
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.40
 Sun-Target sep (deg) : 164.84
 Sun-Moon sep (deg) : 127.67
 B (ring opening deg) : 76.54
 PA of pole (deg) : 53.02
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.983
 C/A sky separation (km) : 12883.5
 NAIF SPICE kernels : RAJobs_U111+rgf15.spk
 URKALLvl.spk
 ural11.bsp
 IAU_URANUS_for_RINGFIT.tpc
 vgr2.ural11.bsp
 ural61.bsp
 vgr2.ural61.bsp
 peph.ural60.bsp
 earthstns_itr93_040916.bsp
 earth_720101_070426.bpc
 earth_200101_990628_predict.bpc
 pg3f0000r.bsp
 pg490000r.bsp
 naif0012.tls
 earth_flat_IAU.spk



Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-01-04T05:04:41.112		65.72	-51.78	51061.85	-22.44		
lambda	I	2033-01-04T05:05:27.357		65.88	-51.94	50026.71	-22.37		
delta	I	2033-01-04T05:06:44.640		66.14	-52.21	48300.35	-22.31		
gamma	I	2033-01-04T05:07:14.645		66.24	-52.31	47631.35	-22.28		
eta	I	2033-01-04T05:07:35.082		66.31	-52.38	47176.12	-22.27		
beta	I	2033-01-04T05:08:42.496		66.53	-52.61	45677.04	-22.21		
alpha	I	2033-01-04T05:09:24.880		66.67	-52.76	44737.84	-22.17		
4	I	2033-01-04T05:11:00.718		66.99	-53.09	42614.87	-22.06		
5	I	2033-01-04T05:11:18.059		67.05	-53.15	42241.03	-22.06		
6	I	2033-01-04T05:11:38.122		67.12	-53.22	41797.58	-22.01		
Uranus	I	2033-01-04T05:24:20.476		69.61	-55.86	25472.14		-5.22	-5.46
Uranus	E	2033-01-04T05:56:06.708		75.41	-62.37	25010.22		13.40	14.01
6	E	2033-01-04T06:08:45.040		77.38	-64.91	41860.08	22.04		
5	E	2033-01-04T06:09:03.656		77.43	-64.97	42277.00	22.08		
4	E	2033-01-04T06:09:15.477		77.45	-65.01	42528.68	22.08		
alpha	E	2033-01-04T06:10:54.203		77.69	-65.33	44718.02	22.19		
beta	E	2033-01-04T06:11:36.515		77.78	-65.47	45654.57	22.23		
eta	E	2033-01-04T06:12:44.841		77.94	-65.70	47176.12	22.29		
gamma	E	2033-01-04T06:13:04.869		77.98	-65.76	47622.76	22.31		
delta	E	2033-01-04T06:13:35.224		78.05	-65.86	48300.35	22.33		
lambda	E	2033-01-04T06:14:52.414		78.22	-66.12	50026.71	22.39		
epsilon	E	2033-01-04T06:15:54.428		78.35	-66.32	51416.88	22.47		

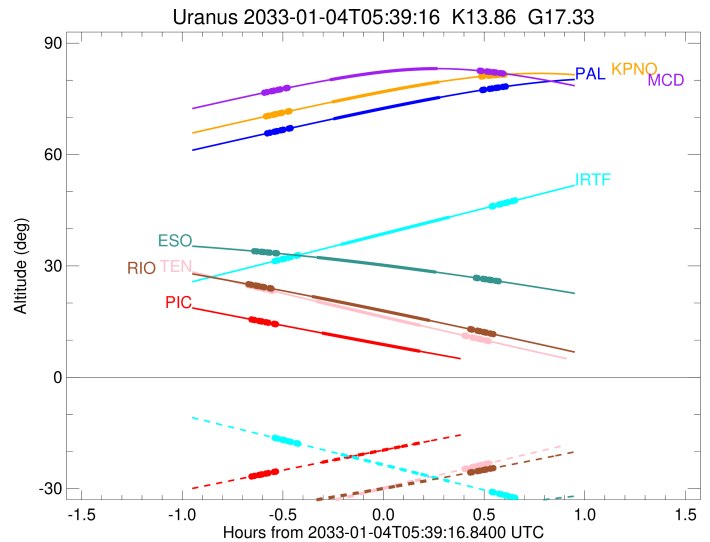
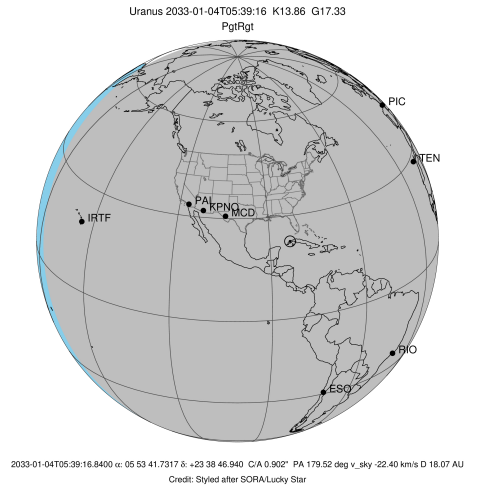
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-04T05:40:05.060
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : KPNO
 Location : Kitt Peak Natl Obs
 Latitude (deg) : 31.96333
 E. Longitude (deg) : 248.40000
 Altitude (km) : 2.120
 Gaia source ID : 3427823500701876096
 2Mass ID (if available) : 05534172+2338472
 ICRS Star Coord at Epoch: 05h 53m 41.73168s +23:38:46.94014s
 RUWE (>1.4 is poor) : 1.99
 K magnitude : 13.856
 G magnitude : 17.331
 RP magnitude : 16.235
 BP magnitude : 18.293
 DUPflag : 0
 Distance (au) : 18.066
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.40
 Sun-Target sep (deg) : 164.84
 Sun-Moon sep (deg) : 127.64
 B (ring opening deg) : 76.54
 PA of pole (deg) : 53.02
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.968
 C/A sky separation (km) : 12682.8
 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	2033-01-04T05:04:20.338		70.31	-56.26	51060.02	-22.49		
lambda	I	2033-01-04T05:05:06.411		70.46	-56.42	50026.71	-22.41		
delta	I	2033-01-04T05:06:23.537		70.72	-56.69	48300.35	-22.35		
gamma	I	2033-01-04T05:06:53.479		70.82	-56.80	47631.34	-22.33		
eta	I	2033-01-04T05:07:13.873		70.89	-56.87	47176.12	-22.31		
beta	I	2033-01-04T05:08:21.143		71.11	-57.11	45676.98	-22.26		
alpha	I	2033-01-04T05:09:03.437		71.25	-57.25	44737.70	-22.22		
4	I	2033-01-04T05:10:39.040		71.57	-57.59	42614.94	-22.11		
5	I	2033-01-04T05:10:56.364		71.62	-57.65	42240.58	-22.11		
6	I	2033-01-04T05:11:16.352		71.69	-57.72	41797.66	-22.07		
Uranus	I	2033-01-04T05:23:55.781		74.15	-60.38	25468.20		-5.34	-5.59
Uranus	E	2033-01-04T05:55:50.984		79.56	-66.97	25011.18		13.39	14.00
6	E	2033-01-04T06:08:26.705		81.04	-69.49	41860.24	22.08		
5	E	2033-01-04T06:08:45.263		81.07	-69.55	42276.70	22.12		
4	E	2033-01-04T06:08:57.072		81.08	-69.59	42528.61	22.12		
alpha	E	2033-01-04T06:10:35.599		81.23	-69.92	44717.88	22.23		
beta	E	2033-01-04T06:11:17.835		81.28	-70.06	45654.49	22.27		
eta	E	2033-01-04T06:12:26.044		81.37	-70.28	47176.12	22.33		
gamma	E	2033-01-04T06:12:46.037		81.39	-70.34	47622.74	22.35		
delta	E	2033-01-04T06:13:16.343		81.43	-70.44	48300.35	22.37		
lambda	E	2033-01-04T06:14:33.409		81.51	-70.69	50026.71	22.43		
epsilon	E	2033-01-04T06:15:35.281		81.57	-70.89	51415.81	22.51		

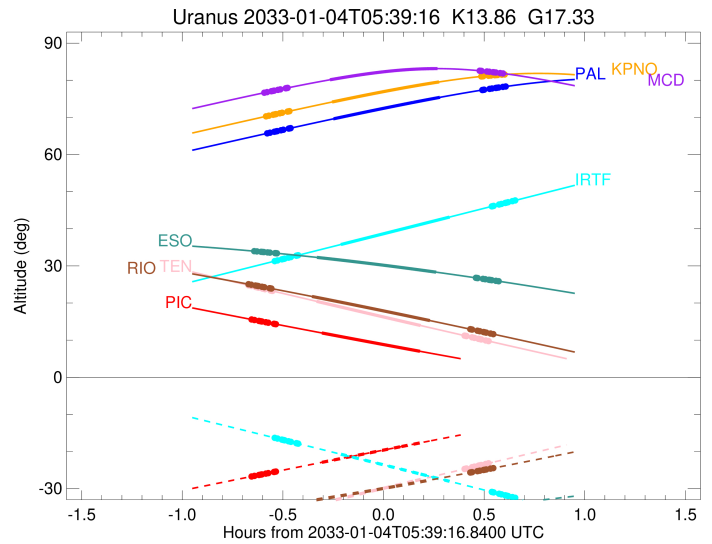
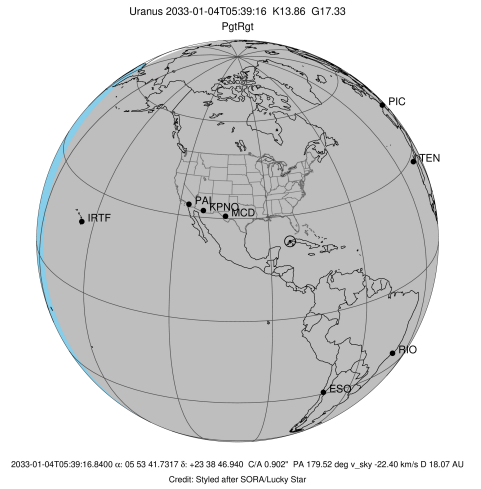
```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2033-01-04T05:39:33.680
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       : 3427823500701876096
2Mass ID (if available) : 05534172+2338472
ICRS Star Coord at Epoch: 05h 53m 41.73168s +23:38:46.94014s
RUWE (>1.4 is poor) : 1.99
K magnitude           : 13.856
G magnitude           : 17.331
RP magnitude          : 16.235
BP magnitude          : 18.293
DUPflag              : 0
Distance (au)        : 18.066
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s) : -22.40
Sun-Target sep (deg) : 164.84
Sun-Moon sep (deg)   : 127.59
B (ring opening deg) : 76.54
PA of pole (deg)     : 53.02
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.954
C/A sky separation (km) : 12500.1
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_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	2033-01-04T05:03:48.790		76.67	-62.75	51058.21	-22.53		
lambda	I	2033-01-04T05:04:34.696		76.81	-62.91	50026.71	-22.45		
delta	I	2033-01-04T05:05:51.672		77.06	-63.18	48300.35	-22.40		
gamma	I	2033-01-04T05:06:21.556		77.15	-63.29	47631.34	-22.38		
eta	I	2033-01-04T05:06:41.908		77.21	-63.36	47176.12	-22.36		
beta	I	2033-01-04T05:07:49.043		77.42	-63.60	45676.92	-22.30		
alpha	I	2033-01-04T05:08:31.252		77.55	-63.75	44737.55	-22.27		
4	I	2033-01-04T05:10:06.635		77.85	-64.08	42615.01	-22.16		
5	I	2033-01-04T05:10:23.944		77.90	-64.14	42240.15	-22.16		
6	I	2033-01-04T05:10:43.861		77.96	-64.21	41797.75	-22.12		
Uranus	I	2033-01-04T05:23:20.632		80.14	-66.87	25464.41		-5.45	-5.70
Uranus	E	2033-01-04T05:55:23.872		83.14	-73.40	25012.06		13.38	13.99
6	E	2033-01-04T06:07:57.355		82.57	-75.80	41860.38	22.12		
5	E	2033-01-04T06:08:15.863		82.54	-75.86	42276.44	22.16		
4	E	2033-01-04T06:08:27.662		82.53	-75.90	42528.55	22.16		
alpha	E	2033-01-04T06:10:06.026		82.37	-76.20	44717.77	22.27		
beta	E	2033-01-04T06:10:48.200		82.30	-76.33	45654.43	22.31		
eta	E	2033-01-04T06:11:56.314		82.19	-76.54	47176.12	22.36		
gamma	E	2033-01-04T06:12:16.279		82.15	-76.60	47622.73	22.38		
delta	E	2033-01-04T06:12:46.544		82.09	-76.69	48300.35	22.40		
lambda	E	2033-01-04T06:14:03.512		81.95	-76.92	50026.71	22.46		
epsilon	E	2033-01-04T06:15:05.272		81.83	-77.10	51414.94	22.53		

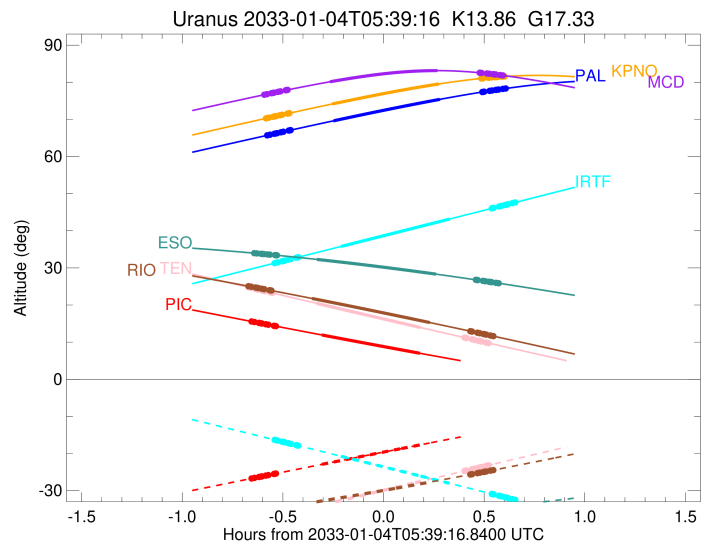
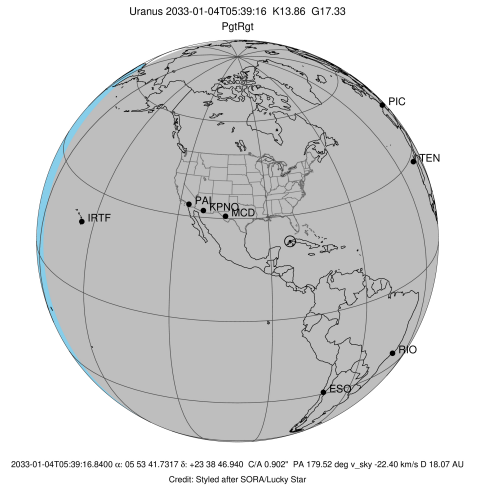
target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-04T05:35:02.850
 Event type : PgtRgt
 : Uranus occs: geocentric, topocentric
 : Ring occs: geocentric, topocentric
 Observer code : TEN
 Location : Teide Obs./Tenerife
 Latitude (deg) : 28.30050
 E. Longitude (deg) : 343.48909
 Altitude (km) : 2.395
 Gaia source ID : 3427823500701876096
 2Mass ID (if available) : 05534172+2338472
 ICRS Star Coord at Epoch: 05h 53m 41.73168s +23:38:46.94014s
 RUWE (>1.4 is poor) : 1.99
 K magnitude : 13.856
 G magnitude : 17.331
 RP magnitude : 16.235
 BP magnitude : 18.293
 DUPflag : 0
 Distance (au) : 18.066
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.40
 Sun-Target sep (deg) : 164.84
 Sun-Moon sep (deg) : 126.48
 B (ring opening deg) : 76.54
 PA of pole (deg) : 53.02
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 1.081
 C/A sky separation (km) : 14164.9
 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	2033-01-04T04:59:06.499		24.76	-38.64	51068.48	-22.06		
lambda	I	2033-01-04T04:59:53.865		24.59	-38.47	50026.71	-21.97		
delta	I	2033-01-04T05:01:12.564		24.31	-38.18	48300.35	-21.90		
gamma	I	2033-01-04T05:01:43.134		24.20	-38.07	47631.38	-21.87		
eta	I	2033-01-04T05:02:03.963		24.13	-37.99	47176.12	-21.85		
beta	I	2033-01-04T05:03:12.689		23.88	-37.74	45677.29	-21.77		
alpha	I	2033-01-04T05:03:55.914		23.73	-37.59	44738.42	-21.72		
4	I	2033-01-04T05:05:33.827		23.38	-37.23	42614.58	-21.58		
5	I	2033-01-04T05:05:51.439		23.32	-37.17	42242.86	-21.58		
6	I	2033-01-04T05:06:12.057		23.24	-37.09	41797.23	-21.53		
Uranus	I	2033-01-04T05:19:19.592		20.45	-34.23	25491.30		-4.60	-4.82
Uranus	E	2033-01-04T05:50:21.187		13.94	-27.52	25005.53		13.46	14.07
6	E	2033-01-04T06:03:27.623		11.22	-24.70	41858.58	21.43		
5	E	2033-01-04T06:03:46.951		11.15	-24.63	42279.77	21.48		
4	E	2033-01-04T06:03:58.991		11.11	-24.59	42529.34	21.48		
alpha	E	2033-01-04T06:05:40.463		10.76	-24.23	44719.35	21.61		
beta	E	2033-01-04T06:06:23.885		10.61	-24.07	45655.30	21.66		
eta	E	2033-01-04T06:07:33.973		10.37	-23.82	47176.12	21.73		
gamma	E	2033-01-04T06:07:54.528		10.30	-23.75	47622.91	21.75		
delta	E	2033-01-04T06:08:25.659		10.19	-23.64	48300.35	21.78		
lambda	E	2033-01-04T06:09:44.810		9.92	-23.36	50026.71	21.84		
epsilon	E	2033-01-04T06:10:48.854		9.70	-23.13	51427.35	21.93		

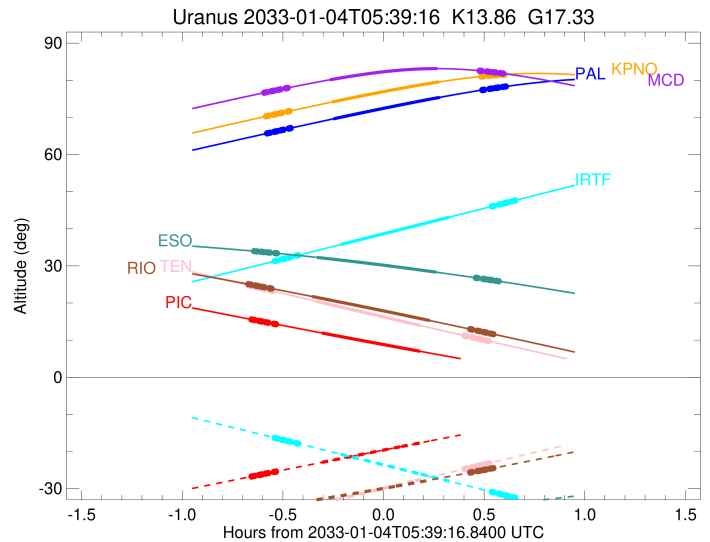
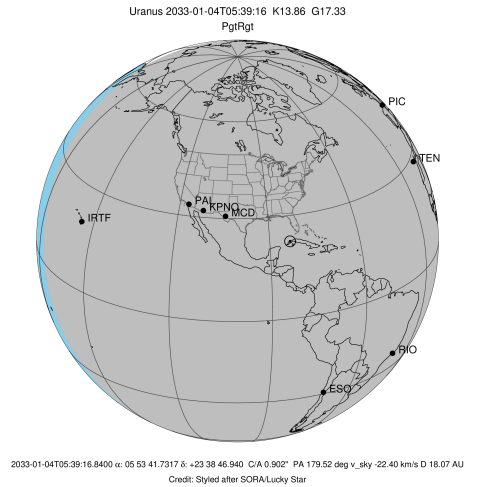
```

target                : Uranus
target radius (km)    : 25559.00
C/A epoch              : 2033-01-04T05:42:58.530
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        : 3427823500701876096
2Mass ID (if available) : 05534172+2338472
ICRS Star Coord at Epoch: 05h 53m 41.73168s +23:38:46.94014s
RUWE (>1.4 is poor)  : 1.99
K magnitude           : 13.856
G magnitude           : 17.331
RP magnitude          : 16.235
BP magnitude          : 18.293
DUPflag              : 0
Distance (au)         : 18.066
f0 (km)               : 0.000
g0 (km)               : 0.000
skyplane vel. (km/s)  : -22.40
Sun-Target sep (deg)  : 164.84
Sun-Moon sep (deg)    : 127.73
B (ring opening deg)  : 76.54
PA of pole (deg)      : 53.02
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 0.941
C/A sky separation (km) : 12327.3
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
    
```



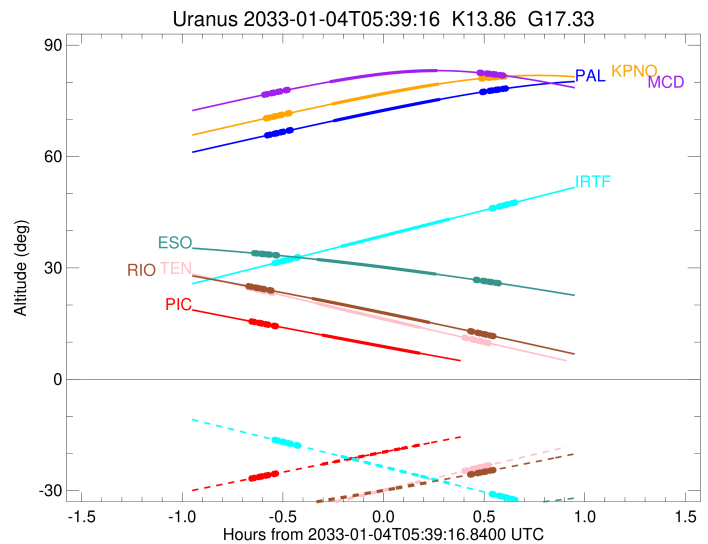
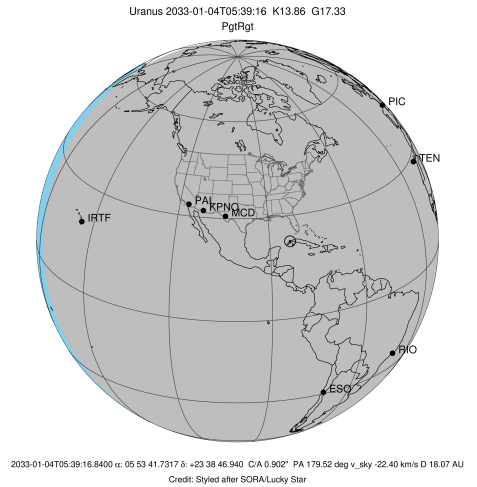
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2033-01-04T05:06:55.206		31.30	-16.34	51058.99	-22.35		
lambda	I	2033-01-04T05:07:41.511		31.48	-16.51	50026.71	-22.28		
delta	I	2033-01-04T05:08:59.089		31.77	-16.80	48300.35	-22.23		
gamma	I	2033-01-04T05:09:29.203		31.88	-16.91	47631.34	-22.21		
eta	I	2033-01-04T05:09:49.711		31.96	-16.98	47176.12	-22.19		
beta	I	2033-01-04T05:10:57.353		32.22	-17.24	45676.94	-22.14		
alpha	I	2033-01-04T05:11:39.875		32.38	-17.39	44737.59	-22.10		
4	I	2033-01-04T05:13:15.955		32.74	-17.75	42614.99	-22.00		
5	I	2033-01-04T05:13:33.382		32.81	-17.82	42240.24	-22.00		
6	I	2033-01-04T05:13:53.446		32.88	-17.89	41797.73	-21.96		
Uranus	I	2033-01-04T05:26:34.450		35.76	-20.73	25463.55		-5.47	-5.73
Uranus	E	2033-01-04T05:58:58.846		43.16	-28.03	25013.85		13.35	13.96
6	E	2033-01-04T06:11:34.447		46.04	-30.89	41860.74	22.05		
5	E	2033-01-04T06:11:52.974		46.11	-30.96	42275.75	22.09		
4	E	2033-01-04T06:12:04.841		46.15	-31.00	42528.40	22.09		
alpha	E	2033-01-04T06:13:43.533		46.53	-31.37	44717.43	22.19		
beta	E	2033-01-04T06:14:25.858		46.69	-31.53	45654.25	22.23		
eta	E	2033-01-04T06:15:34.216		46.95	-31.79	47176.12	22.28		
gamma	E	2033-01-04T06:15:54.249		47.03	-31.87	47622.69	22.30		
delta	E	2033-01-04T06:16:24.620		47.15	-31.98	48300.35	22.32		
lambda	E	2033-01-04T06:17:41.853		47.44	-32.28	50026.71	22.38		
epsilon	E	2033-01-04T06:18:43.695		47.68	-32.51	51412.05	22.46		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-04T05:35:37.980
 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 : 3427823500701876096
 2Mass ID (if available) : 05534172+2338472
 ICRS Star Coord at Epoch: 05h 53m 41.73168s +23:38:46.94014s
 RUWE (>1.4 is poor) : 1.99
 K magnitude : 13.856
 G magnitude : 17.331
 RP magnitude : 16.235
 BP magnitude : 18.293
 DUPflag : 0
 Distance (au) : 18.066
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.40
 Sun-Target sep (deg) : 164.84
 Sun-Moon sep (deg) : 126.51
 B (ring opening deg) : 76.54
 PA of pole (deg) : 53.02
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.620
 C/A sky separation (km) : 8128.6
 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	2033-01-04T04:59:08.200		25.05	-35.82	51021.13	-22.84		
lambda	I	2033-01-04T04:59:51.808		24.93	-35.72	50026.71	-22.80		
delta	I	2033-01-04T05:01:07.578		24.71	-35.56	48300.35	-22.77		
gamma	I	2033-01-04T05:01:36.973		24.63	-35.49	47631.15	-22.76		
eta	I	2033-01-04T05:01:56.968		24.57	-35.45	47176.12	-22.75		
beta	I	2033-01-04T05:03:02.950		24.38	-35.30	45675.51	-22.73		
alpha	I	2033-01-04T05:03:44.440		24.27	-35.20	44734.41	-22.71		
4	I	2033-01-04T05:05:17.620		24.00	-34.99	42616.06	-22.66		
5	I	2033-01-04T05:05:35.033		23.95	-34.95	42230.95	-22.67		
6	I	2033-01-04T05:05:53.957		23.89	-34.91	41799.82	-22.65		
Uranus	I	2033-01-04T05:17:57.112		21.77	-33.20	25371.24		-7.71	-8.07
Uranus	E	2033-01-04T05:53:05.302		15.28	-27.70	25052.11		12.85	13.44
6	E	2033-01-04T06:05:09.819		12.95	-25.66	41863.91	22.55		
5	E	2033-01-04T06:05:27.541		12.90	-25.61	42269.27	22.57		
4	E	2033-01-04T06:05:39.413		12.86	-25.57	42527.24	22.57		
alpha	E	2033-01-04T06:07:16.058		12.54	-25.30	44714.55	22.61		
beta	E	2033-01-04T06:07:57.669		12.41	-25.18	45652.70	22.62		
eta	E	2033-01-04T06:09:04.962		12.19	-24.98	47176.12	22.64		
gamma	E	2033-01-04T06:09:24.668		12.13	-24.92	47622.39	22.65		
delta	E	2033-01-04T06:09:54.594		12.03	-24.84	48300.35	22.66		
lambda	E	2033-01-04T06:11:10.749		11.78	-24.62	50026.71	22.68		
epsilon	E	2033-01-04T06:12:10.798		11.58	-24.44	51389.03	22.72		

target : Uranus
 target radius (km) : 25559.00
 C/A epoch : 2033-01-04T05:37:16.940
 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 : 3427823500701876096
 2Mass ID (if available) : 05534172+2338472
 ICRS Star Coord at Epoch: 05h 53m 41.73168s +23:38:46.94014s
 RUWE (>1.4 is poor) : 1.99
 K magnitude : 13.856
 G magnitude : 17.331
 RP magnitude : 16.235
 BP magnitude : 18.293
 DUPflag : 0
 Distance (au) : 18.066
 f0 (km) : 0.000
 g0 (km) : 0.000
 skyplane vel. (km/s) : -22.40
 Sun-Target sep (deg) : 164.84
 Sun-Moon sep (deg) : 126.86
 B (ring opening deg) : 76.54
 PA of pole (deg) : 53.02
 Pole direction: RA (deg): 257.31100
 Dec (deg): -15.17500
 C/A sky separation (") : 0.528
 C/A sky separation (km) : 6921.7
 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	2033-01-04T05:00:50.614		33.96	-38.13	51013.03	-23.00		
lambda	I	2033-01-04T05:01:33.543		33.90	-38.12	50026.71	-22.97		
delta	I	2033-01-04T05:02:48.726		33.80	-38.10	48300.35	-22.95		
gamma	I	2033-01-04T05:03:17.889		33.76	-38.09	47631.10	-22.95		
eta	I	2033-01-04T05:03:37.720		33.73	-38.08	47176.12	-22.94		
beta	I	2033-01-04T05:04:43.169		33.64	-38.07	45675.17	-22.92		
alpha	I	2033-01-04T05:05:24.325		33.58	-38.05	44733.66	-22.91		
4	I	2033-01-04T05:06:56.628		33.44	-38.02	42616.22	-22.88		
5	I	2033-01-04T05:07:13.986		33.42	-38.01	42228.84	-22.88		
6	I	2033-01-04T05:07:32.607		33.39	-38.01	41800.37	-22.86		
Uranus	I	2033-01-04T05:19:25.817		32.29	-37.67	25346.34		-8.21	-8.59
Uranus	E	2033-01-04T05:54:56.210		28.32	-35.77	25069.67		12.62	13.20
6	E	2033-01-04T06:06:50.285		26.78	-34.85	41864.96	22.81		
5	E	2033-01-04T06:07:07.671		26.74	-34.83	42266.94	22.83		
4	E	2033-01-04T06:07:19.505		26.72	-34.81	42526.92	22.82		
alpha	E	2033-01-04T06:08:55.065		26.51	-34.67	44713.53	22.85		
beta	E	2033-01-04T06:09:36.254		26.41	-34.62	45652.16	22.86		
eta	E	2033-01-04T06:10:42.874		26.26	-34.52	47176.12	22.88		
gamma	E	2033-01-04T06:11:02.376		26.22	-34.49	47622.29	22.88		
delta	E	2033-01-04T06:11:32.005		26.15	-34.45	48300.35	22.89		
lambda	E	2033-01-04T06:12:47.405		25.98	-34.34	50026.71	22.90		
epsilon	E	2033-01-04T06:13:46.485		25.85	-34.25	51380.19	22.94		