

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-01-22T00:47:10.700  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Gaia source ID : 3416173389027340544  
 2Mass ID (if available) : 05310961+2325503

ICRS Star Coord at Epoch: 05h 31m 09.63083s +23:25:50.42162s

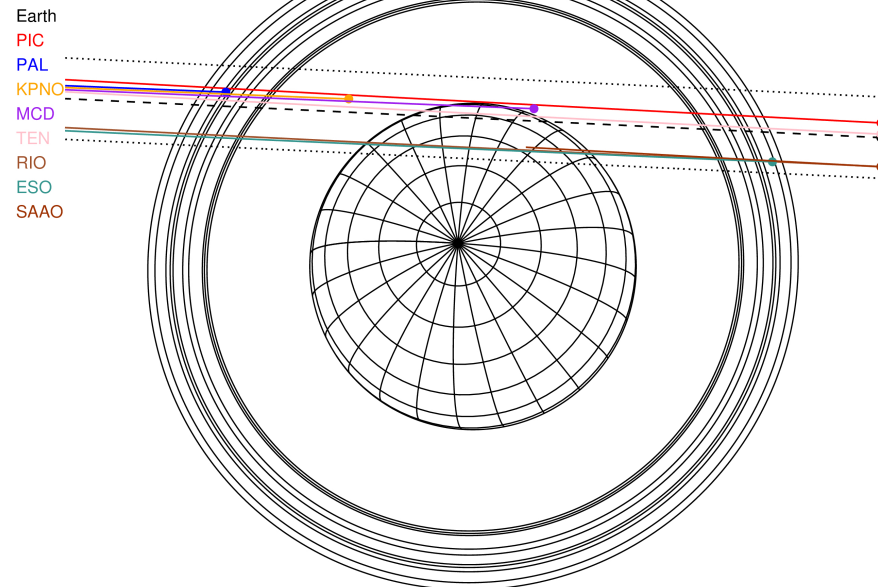
RUWE (>1.4 is poor) : 0.98  
 K magnitude : 14.248  
 G magnitude : 16.718  
 RP magnitude : 15.936  
 BP magnitude : 17.358  
 DUPflag : 0  
 Distance (au) : 18.292  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.22  
 Sun-Target sep (deg) : 142.30  
 Sun-Moon sep (deg) : 22.87  
 B (ring opening deg) : 80.26  
 PA of pole (deg) : 33.01  
 # 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



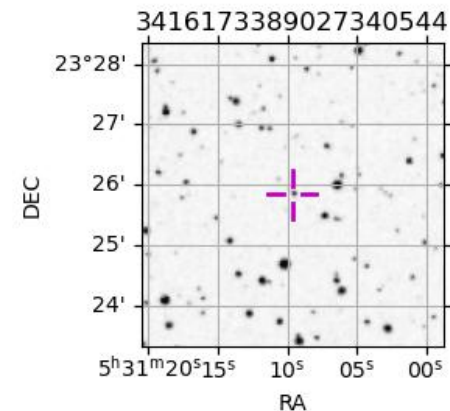
2032-01-22T00:47:10.7000 ex: 05 31 09.6308 s : +23 25 50.422 C/A 1.756" PA 177.26 deg v\_sky -17.22 km/s D 18.29 AU  
 Credit: Styled after SORA/Lucky Star

Uranus 2032-01-22T00:47:10 K14.25 G16.72 PgtRgt



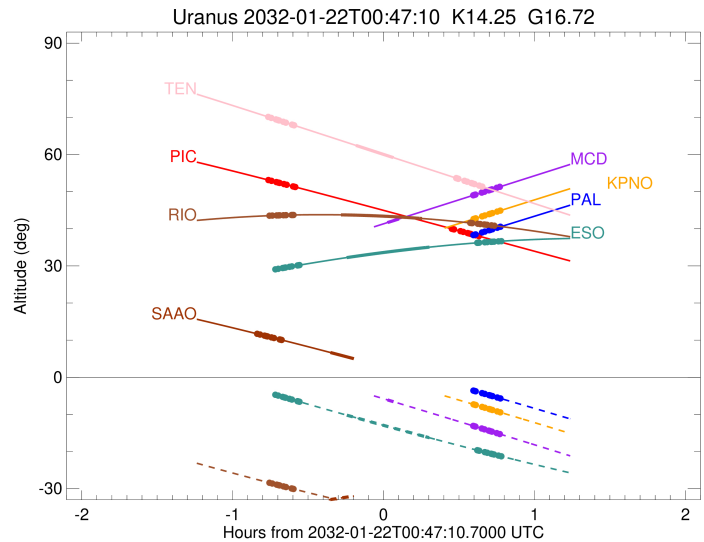
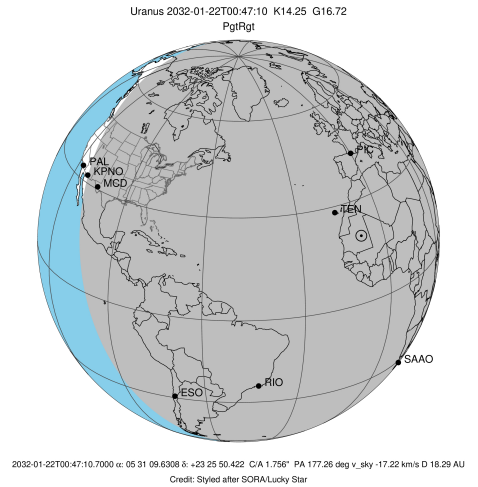
Observable events with sun below -5 deg and altitude above 5 deg unblocked by planet

Obs	Location	lat	Elon	Rings I	Planet	Rings E	Observed Events Interval	OEcode
PIC	Pic du Midi	42.9	0.1	+++++		+++++	JAN 22 00:01 - JAN 22 01:24	PnnRie
PAL	Palomar Mt (200")	33.4	243.1			+++	JAN 22 01:30 - JAN 22 01:33	PnnRne
PMP	Purple Mtn Obs. Nanki	32.1	118.8					PnnRnn
KPNO	Kitt Peak Natl Obs	32.0	248.4			+++++	JAN 22 01:22 - JAN 22 01:33	PnnRne
MCD	McDonald Obs. 2.7m	30.7	256.0		+ +	+++++	JAN 22 00:48 - JAN 22 01:33	PieRne
TEN	Teide Obs./Tenerife	28.3	343.5	+++++	+ +	+++++	JAN 22 00:00 - JAN 22 01:26	PieRie
IRTF	Mauna Kea/IRTF	19.8	204.5					PnnRnn
KAV	Kavalur Observatory	12.6	78.8					PnnRnn
RIO	Rio de Janeiro	-22.9	316.8	+++++	+ +	+++++	JAN 22 00:01 - JAN 22 01:30	PieRie
ESO	European Southern Obs	-29.3	289.3	+++++	+ +	+++++	JAN 22 00:07 - JAN 22 01:33	PieRie
AAT	Siding Spring (AAT)	-31.3	149.1					PnnRnn
SAAO	So. Afr. Astro. Obs.	-32.4	20.8	+++++	+		JAN 21 23:56 - JAN 22 00:26	PinRin
MSO	Mt. Stromlo Observato	-35.3	149.0					PnnRnn



```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2032-01-22T00:43:31.830
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       : 3416173389027340544
2Mass ID (if available) : 05310961+2325503
ICRS Star Coord at Epoch: 05h 31m 09.63083s +23:25:50.42162s
RUWE (>1.4 is poor) : 0.98
K magnitude           : 14.248
G magnitude           : 16.718
RP magnitude          : 15.936
BP magnitude          : 17.358
DUPflag              : 0
Distance (au)        : 18.292
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -17.22
Sun-Target sep (deg) : 142.30
Sun-Moon sep (deg)  : 23.64
B (ring opening deg) : 80.26
PA of pole (deg)    : 33.01
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.944
C/A sky separation (km) : 25789.2
NAIF SPICE kernels   : RAJobs_U111+rgf15.spk
URKALLvl1.spk
urall1.bsp
IAU_URANUS_for_RINGFIT.tpc
vgr2.urall1.bsp
ural61.bsp
vgr2.ural61.bsp
peph.ural60.bsp
earthstns_itrfr93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```

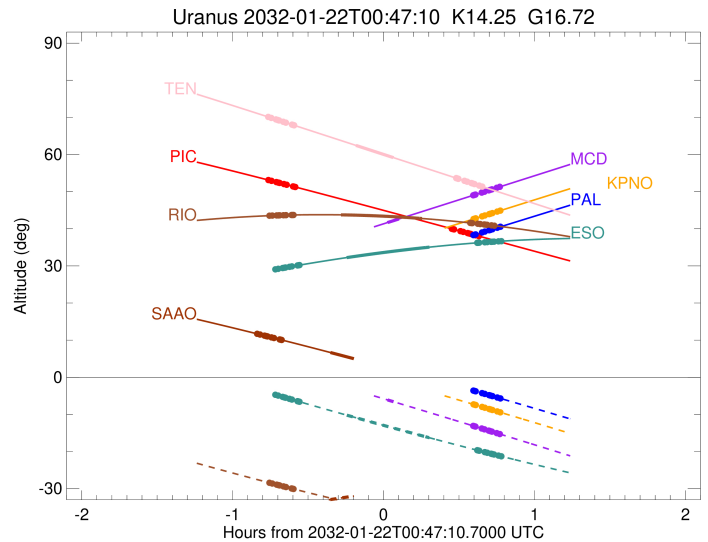
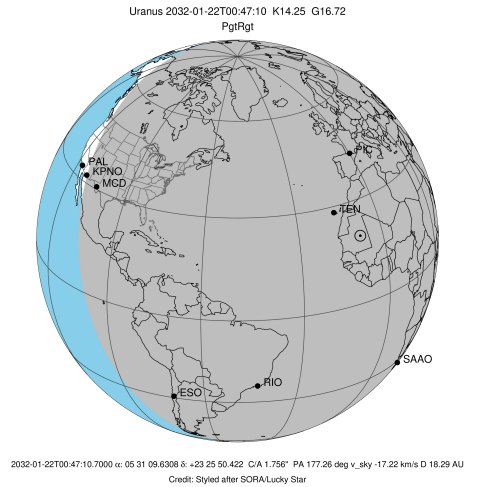


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-01-22T00:01:02.633		53.20	-66.98	51507.26	-15.14		
lambda	I	2032-01-22T00:02:40.696		52.91	-67.01	50026.71	-15.02		
delta	I	2032-01-22T00:04:36.437		52.58	-67.04	48300.35	-14.81		
gamma	I	2032-01-22T00:05:22.209		52.44	-67.05	47624.45	-14.72		
eta	I	2032-01-22T00:05:52.724		52.35	-67.05	47176.12	-14.66		
beta	I	2032-01-22T00:07:35.652		52.05	-67.06	45678.04	-14.45		
alpha	I	2032-01-22T00:08:40.067		51.86	-67.07	44752.35	-14.30		
4	I	2032-01-22T00:11:17.197		51.40	-67.07	42536.47	-13.90		
5	I	2032-01-22T00:11:43.682		51.33	-67.07	42169.72	-13.81		
6	I	2032-01-22T00:12:06.266		51.26	-67.07	41858.05	-13.75		

No planet occultations

6	E	2032-01-22T01:14:15.780	40.01	-63.45	41796.50	13.68
5	E	2032-01-22T01:14:46.109	39.92	-63.40	42204.91	13.74
4	E	2032-01-22T01:15:15.296	39.83	-63.35	42608.05	13.84
alpha	E	2032-01-22T01:17:44.631	39.37	-63.08	44705.47	14.22
beta	E	2032-01-22T01:18:51.950	39.16	-62.95	45665.45	14.37
eta	E	2032-01-22T01:20:36.300	38.85	-62.76	47176.12	14.58
gamma	E	2032-01-22T01:21:07.476	38.75	-62.70	47631.57	14.64
delta	E	2032-01-22T01:21:53.029	38.61	-62.61	48300.35	14.72
lambda	E	2032-01-22T01:23:49.472	38.25	-62.39	50026.71	14.92
epsilon	E	2032-01-22T01:24:41.779	38.09	-62.29	50809.57	15.05

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-01-22T00:52:00.640  
 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 : 3416173389027340544  
 2Mass ID (if available) : 05310961+2325503  
 ICRS Star Coord at Epoch: 05h 31m 09.63083s +23:25:50.42162s  
 RUWE (>1.4 is poor) : 0.98  
 K magnitude : 14.248  
 G magnitude : 16.718  
 RP magnitude : 15.936  
 BP magnitude : 17.358  
 DUPflag : 0  
 Distance (au) : 18.292  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.22  
 Sun-Target sep (deg) : 142.30  
 Sun-Moon sep (deg) : 22.44  
 B (ring opening deg) : 80.26  
 PA of pole (deg) : 33.01  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.942  
 C/A sky separation (km) : 25766.8  
 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



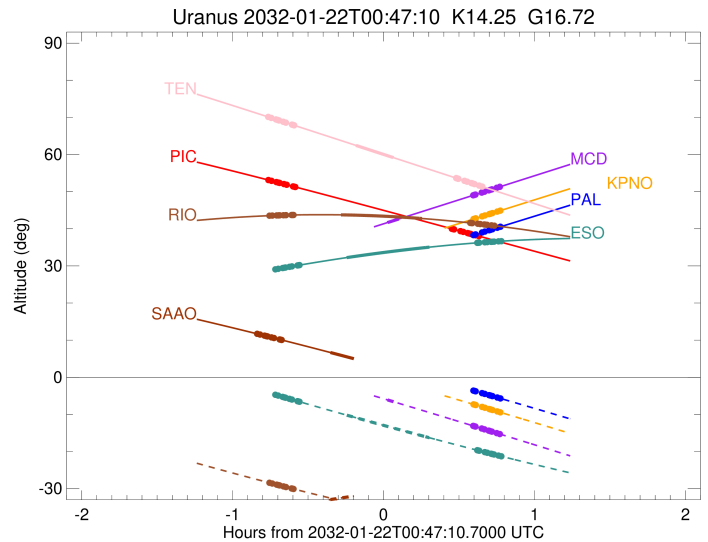
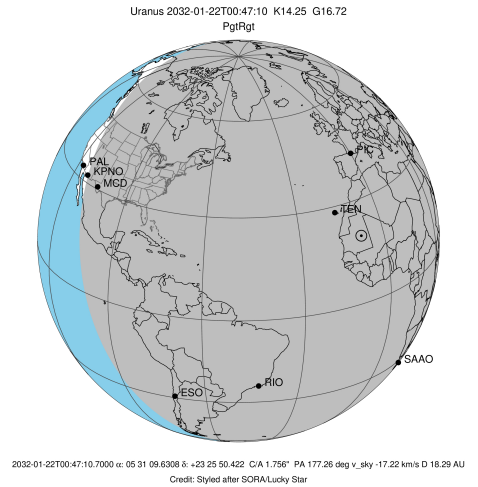
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-01-22T00:09:10.112		23.05	10.18x	51504.72	-14.97		
lambda	I	2032-01-22T00:10:49.101		23.38	9.89x	50026.71	-14.85		
delta	I	2032-01-22T00:12:46.103		23.78	9.54x	48300.35	-14.65		
gamma	I	2032-01-22T00:13:32.357		23.94	9.40x	47624.51	-14.57		
eta	I	2032-01-22T00:14:03.198		24.04	9.31x	47176.12	-14.51		
beta	I	2032-01-22T00:15:47.184		24.40	9.00x	45678.18	-14.30		
alpha	I	2032-01-22T00:16:52.262		24.62	8.81x	44752.31	-14.15		
4	I	2032-01-22T00:19:30.900		25.16	8.33x	42536.85	-13.77		
5	I	2032-01-22T00:19:57.718		25.25	8.25x	42169.13	-13.68		
6	I	2032-01-22T00:20:20.502		25.33	8.18x	41857.57	-13.62		

No planet occultations

6	E	2032-01-22T01:22:50.351		38.28	-3.58x	41796.34	13.69		
5	E	2032-01-22T01:23:20.763		38.38	-3.68x	42205.98	13.75		
4	E	2032-01-22T01:23:49.879		38.49	-3.78x	42608.42	13.84		
alpha	E	2032-01-22T01:26:19.076		39.01	-4.26x	44705.02	14.23		
beta	E	2032-01-22T01:27:26.354		39.24	-4.48x	45665.17	14.38		
eta	E	2032-01-22T01:29:10.620		39.60	-4.82x	47176.12	14.59		
gamma	E	2032-01-22T01:29:41.760		39.71	-4.92x	47631.56	14.66		
delta	E	2032-01-22T01:30:27.257		39.87	-5.07	48300.35	14.74		
lambda	E	2032-01-22T01:32:23.533		40.28	-5.45	50026.71	14.95		
epsilon	E	2032-01-22T01:33:15.546		40.46	-5.62	50806.45	15.07		

```

target                : Uranus
target radius (km)   : 25559.00
C/A epoch            : 2032-01-22T00:51:52.710
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       : 3416173389027340544
2Mass ID (if available) : 05310961+2325503
ICRS Star Coord at Epoch: 05h 31m 09.63083s +23:25:50.42162s
RUWE (>1.4 is poor) : 0.98
K magnitude           : 14.248
G magnitude           : 16.718
RP magnitude          : 15.936
BP magnitude          : 17.358
DUPflag              : 0
Distance (au)        : 18.292
f0 (km)              : 0.000
g0 (km)              : 0.000
skyplane vel. (km/s) : -17.22
Sun-Target sep (deg) : 142.30
Sun-Moon sep (deg)   : 22.47
B (ring opening deg) : 80.26
PA of pole (deg)     : 33.01
Pole direction: RA (deg): 257.31100
Dec (deg): -15.17500
C/A sky separation (") : 1.918
C/A sky separation (km) : 25451.9
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_itrf93_040916.bsp
earth_720101_070426.bpc
earth_200101_990628_predict.bpc
pg3f0000r.bsp
pg490000r.bsp
naif0012.tls
earth_flat_IAU.spk
  
```

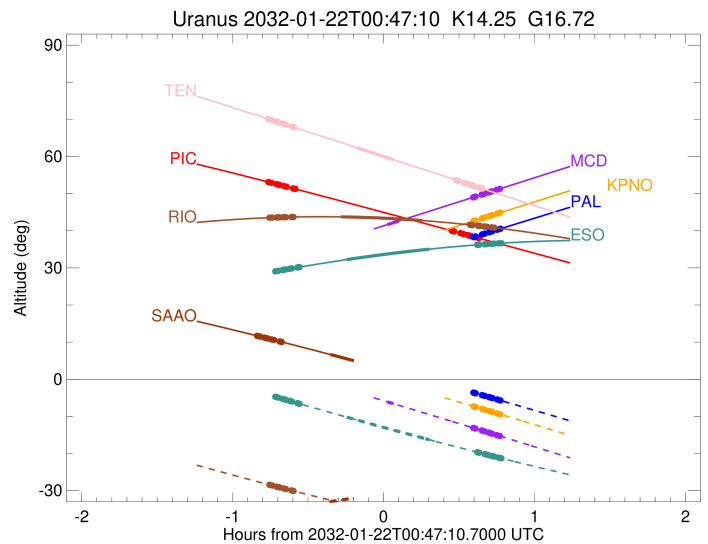
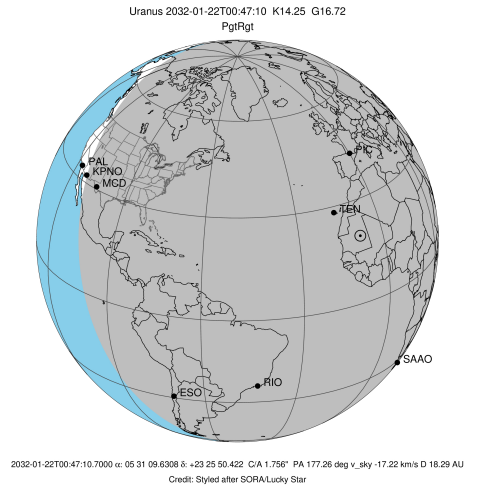


Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-01-22T00:08:57.130		27.02	7.09x	51506.14	-15.07		
lambda	I	2032-01-22T00:10:35.579		27.36	6.78x	50026.71	-14.95		
delta	I	2032-01-22T00:12:31.783		27.76	6.42x	48300.35	-14.76		
gamma	I	2032-01-22T00:13:17.711		27.92	6.27x	47624.47	-14.68		
eta	I	2032-01-22T00:13:48.324		28.03	6.18x	47176.12	-14.62		
beta	I	2032-01-22T00:15:31.523		28.39	5.85x	45678.09	-14.41		
alpha	I	2032-01-22T00:16:36.069		28.62	5.65x	44752.34	-14.27		
4	I	2032-01-22T00:19:13.344		29.16	5.16x	42536.57	-13.90		
5	I	2032-01-22T00:19:39.851		29.26	5.07x	42169.57	-13.81		
6	I	2032-01-22T00:20:02.426		29.33	5.00x	41857.94	-13.75		

No planet occultations

6	E	2032-01-22T01:22:53.255		42.61	-7.29	41796.23	13.82		
5	E	2032-01-22T01:23:23.440		42.71	-7.39	42206.68	13.88		
4	E	2032-01-22T01:23:52.247		42.82	-7.48	42608.66	13.97		
alpha	E	2032-01-22T01:26:20.130		43.34	-7.98	44704.76	14.35		
beta	E	2032-01-22T01:27:26.883		43.58	-8.20	45665.01	14.49		
eta	E	2032-01-22T01:29:10.383		43.94	-8.55	47176.12	14.70		
gamma	E	2032-01-22T01:29:41.301		44.05	-8.66	47631.56	14.76		
delta	E	2032-01-22T01:30:26.482		44.21	-8.81	48300.35	14.84		
lambda	E	2032-01-22T01:32:21.989		44.62	-9.20	50026.71	15.04		
epsilon	E	2032-01-22T01:33:13.576		44.81	-9.37	50804.95	15.16		

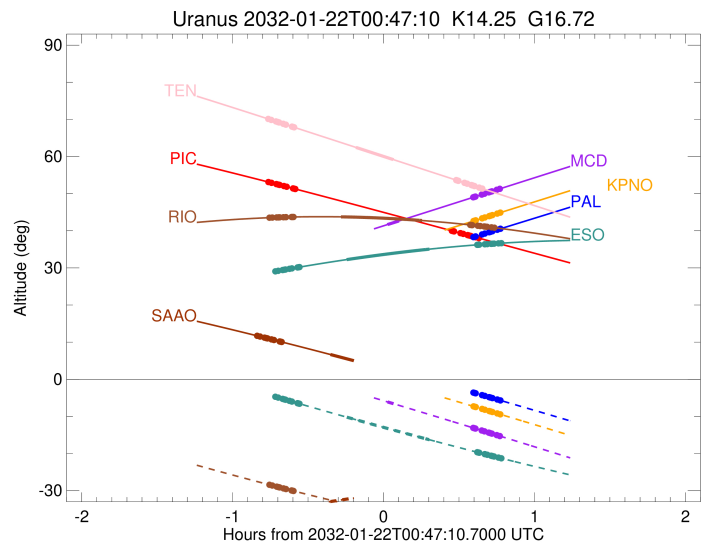
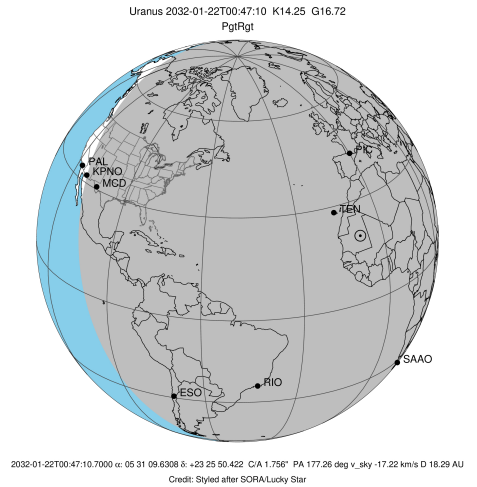
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-01-22T00:51:34.020  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : MCD  
 Location : McDonald Obs. 2.7m  
 Latitude (deg) : 30.67158  
 E. Longitude (deg) : 255.97844  
 Altitude (km) : 2.075  
 Gaia source ID : 3416173389027340544  
 2Mass ID (if available) : 05310961+2325503  
 ICRS Star Coord at Epoch: 05h 31m 09.63083s +23:25:50.42162s  
 RUWE (>1.4 is poor) : 0.98  
 K magnitude : 14.248  
 G magnitude : 16.718  
 RP magnitude : 15.936  
 BP magnitude : 17.358  
 DUPflag : 0  
 Distance (au) : 18.292  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.22  
 Sun-Target sep (deg) : 142.30  
 Sun-Moon sep (deg) : 22.54  
 B (ring opening deg) : 80.26  
 PA of pole (deg) : 33.01  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.890  
 C/A sky separation (km) : 25070.7  
 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	2032-01-22T00:08:33.468		33.06	1.93x	51507.87	-15.19		
lambda	I	2032-01-22T00:10:11.239		33.41	1.61x	50026.71	-15.08		
delta	I	2032-01-22T00:12:06.458		33.82	1.23x	48300.35	-14.89		
gamma	I	2032-01-22T00:12:51.982		33.98	1.08x	47624.42	-14.81		
eta	I	2032-01-22T00:13:22.315		34.09	0.98x	47176.12	-14.75		
beta	I	2032-01-22T00:15:04.549		34.45	0.65x	45677.97	-14.56		
alpha	I	2032-01-22T00:16:08.445		34.68	0.44x	44752.36	-14.42		
4	I	2032-01-22T00:18:44.062		35.23	-0.07x	42536.23	-14.06		
5	I	2032-01-22T00:19:10.193		35.33	-0.16x	42170.12	-13.97		
6	I	2032-01-22T00:19:32.518		35.41	-0.23x	41858.38	-13.92		
Uranus	I	2032-01-22T00:48:47.223		41.68	-6.10	25239.17		7.23	7.57
Uranus	E	2032-01-22T00:53:19.345		42.65	-7.02	25138.07		8.33	8.72
6	E	2032-01-22T01:22:46.805		49.00	-13.08	41796.11	13.98		
5	E	2032-01-22T01:23:16.716		49.11	-13.19	42207.50	14.03		
4	E	2032-01-22T01:23:45.158		49.21	-13.28	42608.93	14.12		
alpha	E	2032-01-22T01:26:11.474		49.74	-13.79	44704.45	14.49		
beta	E	2032-01-22T01:27:17.597		49.98	-14.02	45664.82	14.63		
eta	E	2032-01-22T01:29:00.177		50.35	-14.38	47176.12	14.83		
gamma	E	2032-01-22T01:29:30.829		50.46	-14.48	47631.55	14.89		
delta	E	2032-01-22T01:30:15.629		50.62	-14.64	48300.35	14.97		
lambda	E	2032-01-22T01:32:10.209		51.03	-15.04	50026.71	15.16		
epsilon	E	2032-01-22T01:33:01.286		51.22	-15.21	50803.21	15.28		

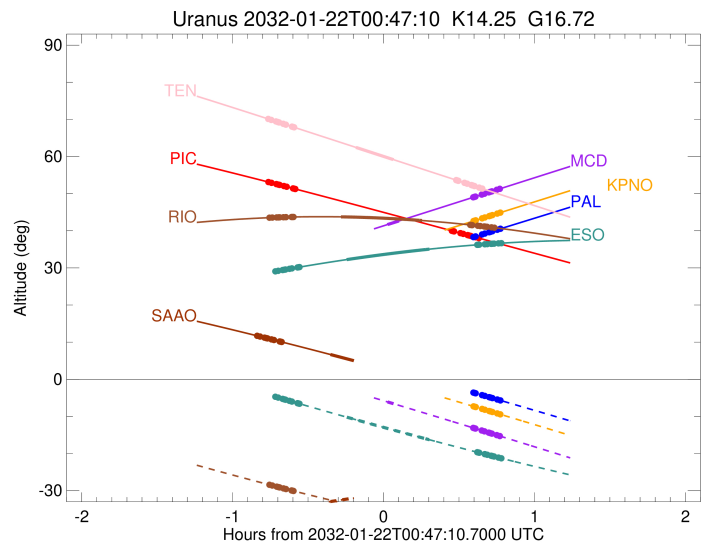
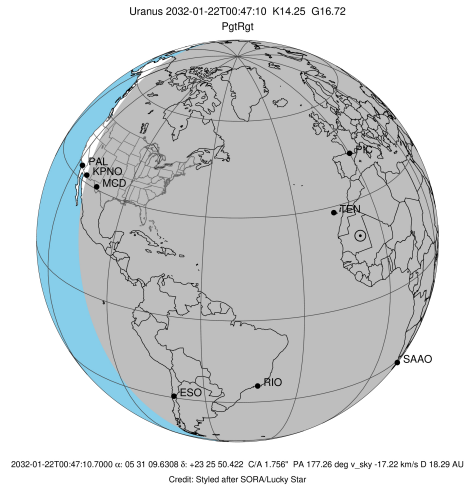


target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-01-22T00:44:08.920  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : TEN  
 Location : Teide Obs./Tenerife  
 Latitude (deg) : 28.30050  
 E. Longitude (deg) : 343.48909  
 Altitude (km) : 2.395  
 Gaia source ID : 3416173389027340544  
 2Mass ID (if available) : 05310961+2325503  
 ICRS Star Coord at Epoch: 05h 31m 09.63083s +23:25:50.42162s  
 RUWE (>1.4 is poor) : 0.98  
 K magnitude : 14.248  
 G magnitude : 16.718  
 RP magnitude : 15.936  
 BP magnitude : 17.358  
 DUPflag : 0  
 Distance (au) : 18.292  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.22  
 Sun-Target sep (deg) : 142.30  
 Sun-Moon sep (deg) : 23.61  
 B (ring opening deg) : 80.26  
 PA of pole (deg) : 33.01  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.805  
 C/A sky separation (km) : 23940.4  
 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



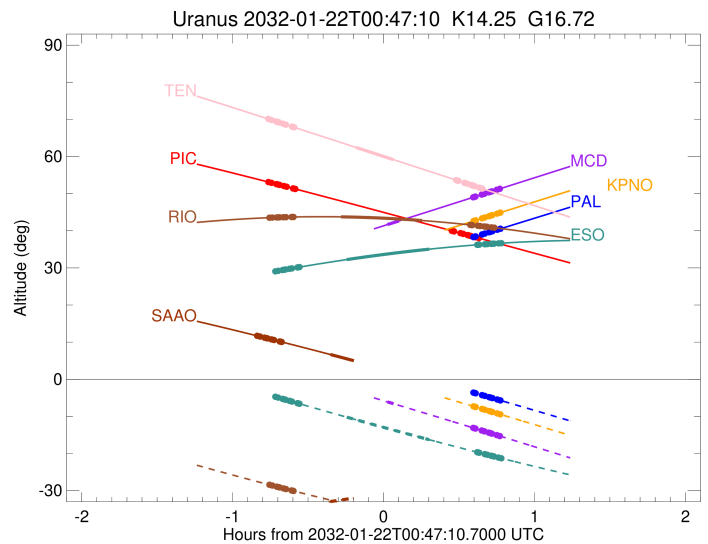
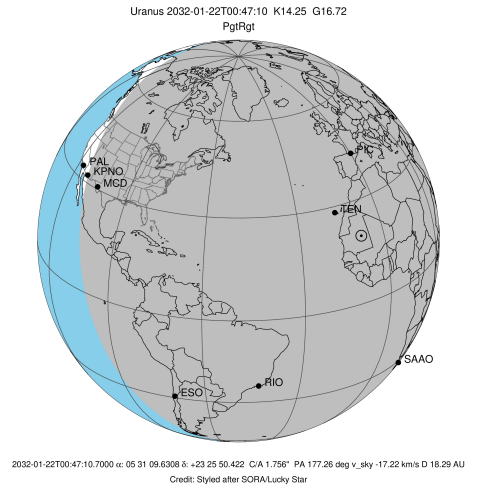
Ring	I/E	UTC	b?	alt	alt-sun	radius	r-dot	lat-geo	lat-geodetic
epsilon	I	2032-01-22T00:00:59.017		70.21	-70.72	51514.70	-15.60		
lambda	I	2032-01-22T00:02:34.606		69.86	-71.05	50026.71	-15.50		
delta	I	2032-01-22T00:04:26.620		69.45	-71.43	48300.35	-15.32		
gamma	I	2032-01-22T00:05:10.850		69.29	-71.58	47624.23	-15.25		
eta	I	2032-01-22T00:05:40.285		69.18	-71.68	47176.12	-15.20		
beta	I	2032-01-22T00:07:19.480		68.82	-72.01	45677.51	-15.02		
alpha	I	2032-01-22T00:08:21.350		68.60	-72.22	44752.42	-14.89		
4	I	2032-01-22T00:10:51.909		68.05	-72.72	42534.99	-14.56		
5	I	2032-01-22T00:11:16.859		67.95	-72.81	42172.31	-14.48		
6	I	2032-01-22T00:11:38.451		67.88	-72.88	41860.03	-14.43		
Uranus	I	2032-01-22T00:36:11.277		62.47	-77.47	25370.37		5.53	5.79
Uranus	E	2032-01-22T00:51:08.086		59.16	-79.76	25047.82		9.21	9.64
6	E	2032-01-22T01:16:00.900		53.66	-81.67	41795.89	14.37		
5	E	2032-01-22T01:16:30.134		53.56	-81.67	42209.12	14.42		
4	E	2032-01-22T01:16:57.737		53.46	-81.67	42609.45	14.50		
alpha	E	2032-01-22T01:19:20.446		52.93	-81.66	44703.88	14.82		
beta	E	2032-01-22T01:20:25.139		52.69	-81.64	45664.47	14.95		
eta	E	2032-01-22T01:22:05.665		52.32	-81.60	47176.12	15.12		
gamma	E	2032-01-22T01:22:35.731		52.21	-81.59	47631.55	15.17		
delta	E	2032-01-22T01:23:19.705		52.05	-81.56	48300.35	15.24		
lambda	E	2032-01-22T01:25:12.311		51.63	-81.48	50026.71	15.41		
epsilon	E	2032-01-22T01:26:02.388		51.45	-81.44	50800.39	15.52		

target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-01-22T00:46:46.060  
 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 : 3416173389027340544  
 2Mass ID (if available) : 05310961+2325503  
 ICRS Star Coord at Epoch: 05h 31m 09.63083s +23:25:50.42162s  
 RUWE (>1.4 is poor) : 0.98  
 K magnitude : 14.248  
 G magnitude : 16.718  
 RP magnitude : 15.936  
 BP magnitude : 17.358  
 DUPflag : 0  
 Distance (au) : 18.292  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.22  
 Sun-Target sep (deg) : 142.30  
 Sun-Moon sep (deg) : 23.15  
 B (ring opening deg) : 80.26  
 PA of pole (deg) : 33.01  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.402  
 C/A sky separation (km) : 18597.4  
 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	2032-01-22T00:01:27.885		43.51	-28.36	51532.19	-16.51		
lambda	I	2032-01-22T00:02:59.211		43.55	-28.63	50026.71	-16.45		
delta	I	2032-01-22T00:04:44.498		43.60	-28.93	48300.35	-16.35		
gamma	I	2032-01-22T00:05:25.949		43.61	-29.05	47623.64	-16.31		
eta	I	2032-01-22T00:05:53.421		43.62	-29.13	47176.12	-16.28		
beta	I	2032-01-22T00:07:25.890		43.65	-29.40	45675.86	-16.17		
alpha	I	2032-01-22T00:08:23.144		43.67	-29.57	44752.21	-16.10		
4	I	2032-01-22T00:10:41.845		43.71	-29.97	42531.49	-15.92		
5	I	2032-01-22T00:11:03.834		43.71	-30.03	42180.16	-15.87		
6	I	2032-01-22T00:11:23.772		43.72	-30.09	41865.02	-15.85		
Uranus	I	2032-01-22T00:30:14.665		43.75	-33.23	25537.55		1.85	1.94
Uranus	E	2032-01-22T01:02:32.497		42.76	-38.11	24996.30		9.68	10.13
6	E	2032-01-22T01:21:35.992		41.58	-40.62	41794.87	15.82		
5	E	2032-01-22T01:22:03.383		41.55	-40.68	42220.97	15.85		
4	E	2032-01-22T01:22:27.906		41.52	-40.73	42612.68	15.90		
alpha	E	2032-01-22T01:24:38.368		41.36	-40.99	44699.71	16.08		
beta	E	2032-01-22T01:25:38.206		41.28	-41.11	45661.72	16.15		
eta	E	2032-01-22T01:27:11.690		41.16	-41.30	47176.12	16.25		
gamma	E	2032-01-22T01:27:39.689		41.12	-41.35	47631.43	16.28		
delta	E	2032-01-22T01:28:20.736		41.07	-41.43	48300.35	16.32		
lambda	E	2032-01-22T01:30:06.219		40.92	-41.64	50026.71	16.41		
epsilon	E	2032-01-22T01:30:51.939		40.86	-41.73	50778.07	16.47		

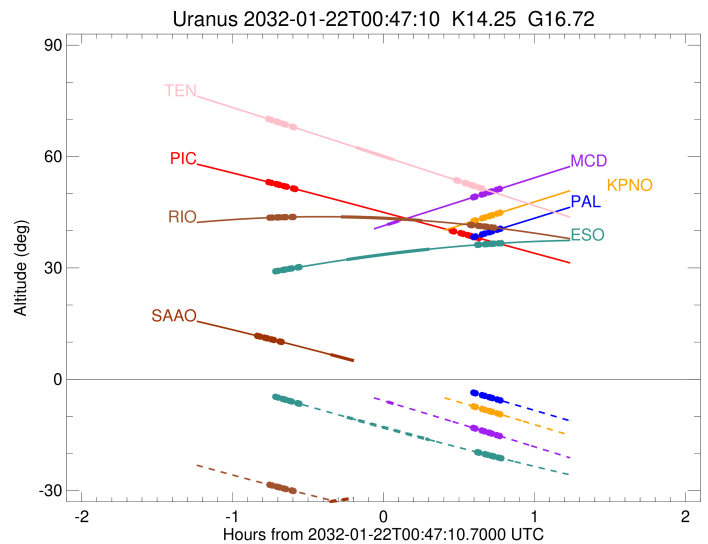
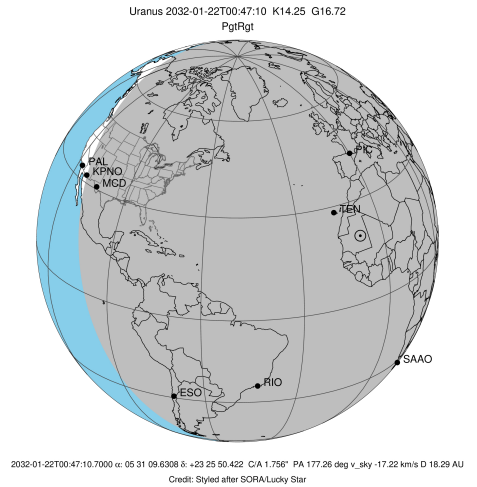
target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-01-22T00:49:22.190  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : ESO  
 Location : European Southern Obs. (3.6m)  
 Latitude (deg) : -29.26097  
 E. Longitude (deg) : 289.26831  
 Altitude (km) : 2.400  
 Gaia source ID : 3416173389027340544  
 2Mass ID (if available) : 05310961+2325503  
 ICRS Star Coord at Epoch: 05h 31m 09.63083s +23:25:50.42162s  
 RUWE (>1.4 is poor) : 0.98  
 K magnitude : 14.248  
 G magnitude : 16.718  
 RP magnitude : 15.936  
 BP magnitude : 17.358  
 DUPflag : 0  
 Distance (au) : 18.292  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.22  
 Sun-Target sep (deg) : 142.30  
 Sun-Moon sep (deg) : 22.74  
 B (ring opening deg) : 80.26  
 PA of pole (deg) : 33.01  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.386  
 C/A sky separation (km) : 18383.6  
 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	2032-01-22T00:03:48.591		29.03	-4.64x	51532.26	-16.45		
lambda	I	2032-01-22T00:05:20.213		29.22	-4.94x	50026.71	-16.39		
delta	I	2032-01-22T00:07:05.815		29.43	-5.29	48300.35	-16.30		
gamma	I	2032-01-22T00:07:47.383		29.51	-5.42	47623.64	-16.26		
eta	I	2032-01-22T00:08:14.930		29.57	-5.51	47176.12	-16.23		
beta	I	2032-01-22T00:09:47.638		29.75	-5.82	45675.84	-16.13		
alpha	I	2032-01-22T00:10:45.028		29.86	-6.00	44752.21	-16.07		
4	I	2032-01-22T00:13:04.020		30.13	-6.45	42531.45	-15.89		
5	I	2032-01-22T00:13:26.040		30.17	-6.53	42180.26	-15.84		
6	I	2032-01-22T00:13:46.017		30.21	-6.59	41865.08	-15.82		
Uranus	I	2032-01-22T00:32:34.628		32.24	-10.21	25539.30		1.77	1.86
Uranus	E	2032-01-22T01:05:24.551		35.05	-16.29	24998.45		9.66	10.11
6	E	2032-01-22T01:24:22.842		36.21	-19.64	41794.84	15.85		
5	E	2032-01-22T01:24:50.240		36.24	-19.72	42221.75	15.87		
4	E	2032-01-22T01:25:14.683		36.26	-19.79	42612.86	15.92		
alpha	E	2032-01-22T01:27:24.938		36.36	-20.16	44699.44	16.10		
beta	E	2032-01-22T01:28:24.706		36.41	-20.34	45661.53	16.17		
eta	E	2032-01-22T01:29:58.093		36.48	-20.60	47176.12	16.27		
gamma	E	2032-01-22T01:30:26.060		36.50	-20.68	47631.41	16.29		
delta	E	2032-01-22T01:31:07.064		36.54	-20.80	48300.35	16.33		
lambda	E	2032-01-22T01:32:52.439		36.61	-21.10	50026.71	16.43		
epsilon	E	2032-01-22T01:33:38.028		36.64	-21.23	50776.65	16.49		



target : Uranus  
 target radius (km) : 25559.00  
 C/A epoch : 2032-01-22T00:42:19.500  
 Event type : PgtRgt  
 : Uranus occs: geocentric, topocentric  
 : Ring occs: geocentric, topocentric  
 Observer code : SAAO  
 Location : So. Afr. Astro. Obs. (Sutherland)  
 Latitude (deg) : -32.37953  
 E. Longitude (deg) : 20.81070  
 Altitude (km) : 1.768  
 Gaia source ID : 3416173389027340544  
 2Mass ID (if available) : 05310961+2325503  
 ICRS Star Coord at Epoch: 05h 31m 09.63083s +23:25:50.42162s  
 RUWE (>1.4 is poor) : 0.98  
 K magnitude : 14.248  
 G magnitude : 16.718  
 RP magnitude : 15.936  
 BP magnitude : 17.358  
 DUPflag : 0  
 Distance (au) : 18.292  
 f0 (km) : 0.000  
 g0 (km) : 0.000  
 skyplane vel. (km/s) : -17.22  
 Sun-Target sep (deg) : 142.30  
 Sun-Moon sep (deg) : 23.51  
 B (ring opening deg) : 80.26  
 PA of pole (deg) : 33.01  
 Pole direction: RA (deg): 257.31100  
 Dec (deg): -15.17500  
 C/A sky separation (") : 1.440  
 C/A sky separation (km) : 19107.0  
 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\_itrf93\_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	2032-01-21T23:56:34.258		11.77	-35.45	51531.89	-16.24		
lambda	I	2032-01-21T23:58:07.071		11.51	-35.34	50026.71	-16.17		
delta	I	2032-01-21T23:59:54.149		11.21	-35.21	48300.35	-16.07		
gamma	I	2032-01-22T00:00:36.320		11.09	-35.16	47623.66	-16.02		
eta	I	2032-01-22T00:01:04.277		11.01	-35.12	47176.12	-15.99		
beta	I	2032-01-22T00:02:38.405		10.74	-35.00	45675.91	-15.88		
alpha	I	2032-01-22T00:03:36.719		10.58	-34.93	44752.23	-15.81		
4	I	2032-01-22T00:05:58.071		10.18	-34.74	42531.60	-15.61		
5	I	2032-01-22T00:06:20.525		10.11	-34.71	42179.86	-15.56		
6	I	2032-01-22T00:06:40.850		10.05	-34.68	41864.85	-15.54		
Uranus	I	2032-01-22T00:26:05.237		6.67	-32.94	25532.56		2.06	2.15
Uranus	E	2032-01-22T00:57:47.823		0.90x	-29.43	24992.53		9.71	10.17
6	E	2032-01-22T01:17:30.564		-2.82x	-26.89	41794.95	15.42		
5	E	2032-01-22T01:17:58.557		-2.91x	-26.82	42219.30	15.45		
4	E	2032-01-22T01:18:23.810		-2.99x	-26.77	42612.29	15.50		
alpha	E	2032-01-22T01:20:37.661		-3.41x	-26.46	44700.28	15.68		
beta	E	2032-01-22T01:21:38.993		-3.61x	-26.32	45662.11	15.75		
eta	E	2032-01-22T01:23:14.775		-3.91x	-26.10	47176.12	15.86		
gamma	E	2032-01-22T01:23:43.465		-4.01x	-26.03	47631.45	15.89		
delta	E	2032-01-22T01:24:25.519		-4.14x	-25.94	48300.35	15.93		
lambda	E	2032-01-22T01:26:13.570		-4.49x	-25.68	50026.71	16.03		
epsilon	E	2032-01-22T01:27:00.585		-4.64x	-25.57	50781.12	16.09		